



Ministry
of Defence

de&s

DE&S Secretariat (Land Equipment and ISTAR)

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Defence Equipment & Support
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MOD Abbey Wood
Bristol BS34 8JH



12th December 2016 Our Ref: FOI2016/10596

Thank you for your email of 5th November 2016 requesting the following information:

I would like to make a freedom of Information request for the following documents;

- | | |
|------------------------|---|
| 1. AESP 2330-E- 202 | Trailer Lightweight GS Cargo |
| 2. AESP 2300-A-050-013 | B Vehicle Test, Inspection and Certification |
| 3. AESP 2300-A-110 | Vehicle and Trailer Electrical Circuits Installation Checks |
| 4. AESP 0200-A-221-013 | Painting of Service Equipment |
| 5. AESP 2320-A-300-532 | B Vehicle Cab Corrosion Inspection Standards |
| 6. AESP 2300-A-310-201 | B Vehicle Corrosion Prevention |
| 7. AESP 2300-A-500 | Material Quality Assessment |
| 8. AESP 2300-A-600 | Waterproofing Regulations-Vehicles and Equipment |

I am treating your correspondence as a request for information under the Freedom of Information Act 2000 (FOIA).

A search for the information has now been completed within the Ministry of Defence, and I can confirm that some information in scope of your request is held.

The information you have requested cannot be sent by email due to the size of the files and the information will be sent by post, but some of the information falls entirely within the scope of the absolute exemption provided for at section 40 (Personal Data) and qualified exemption provided for at section 26 (Defence) of the FOIA and has been redacted.

Section 40(2) has been applied to some of the information in order to protect personal information as governed by the Data Protection Act 1998. Section 40 is an absolute exemption and there is therefore no requirement to consider the public interest in making a decision to withhold the information.

Section 26 is a qualified exemption and subject to public interest testing which means that the information requested can only be withheld if the public interest in doing so outweighs the public interest in disclosure.

Section 26(1)(b) has been applied to some of the information in each AESP, and AESP 2300-A-600 in its entirety, because it contains details which are operationally sensitive and would prejudice the capability and effectiveness of our armed forces. The balance of public interest was found to be in favour of withholding the information given that, overall, the public interest is best served in not releasing any

details on the individuals or the units that took part in the trials and for these reasons I have set the level of prejudice against release of the exempted information at the higher level of "would" rather than "would be likely to".

Under Section 16 of the Act (Advice and Assistance) you may find it helpful to note that, following a search of the technical document area and archives, AESP 2320-A-300 could not be located. AESP 2330-E-202-522 has already been provided under a previous FOI request and can be found at the following link:

[https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/557324/Letter and AESP-2330-E-202-522.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/557324/Letter_and_AESP-2330-E-202-522.pdf)

If you are not satisfied with this response or you wish to complain about any aspect of the handling of your request, then you should contact me in the first instance. If informal resolution is not possible and you are still dissatisfied then you may apply for an independent internal review by contacting the Information Rights Compliance team, Ground Floor, MOD Main Building, Whitehall, SW1A 2HB (e-mail CIO-FOI-IR@mod.uk). Please note that any request for an internal review must be made within 40 working days of the date on which the attempt to reach informal resolution has come to an end.

If you remain dissatisfied following an internal review, you may take your complaint to the Information Commissioner under the provisions of Section 50 of the Freedom of Information Act. Please note that the Information Commissioner will not investigate your case until the MOD internal review process has been completed. Further details of the role and powers of the Information Commissioner can be found on the Commissioner's website, <http://www.ico.org.uk>.

Yours sincerely,

[REDACTED]

[REDACTED]

DES SEC Pol Sec Land Equipment & ISTAR



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TRAILER LIGHTWEIGHT GS CARGO

PURPOSE AND PLANNING INFORMATION

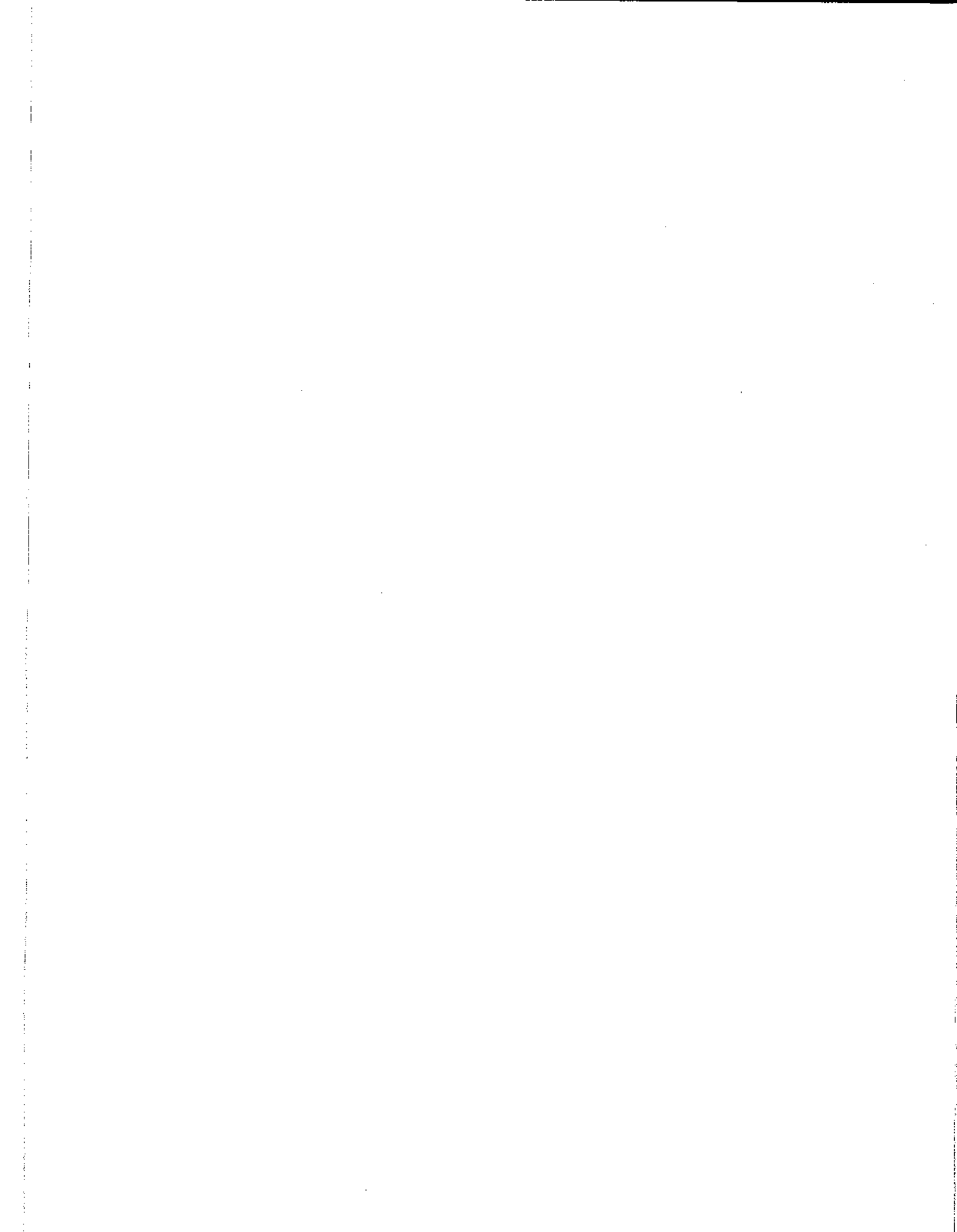
This publication contains information covering the requirements of levels 1, 2 and 3.

BY COMMAND OF THE DEFENCE COUNCIL

Kevin Trewin

Ministry of Defence
Issued by
DEFENCE LOGISTICS ORGANISATION

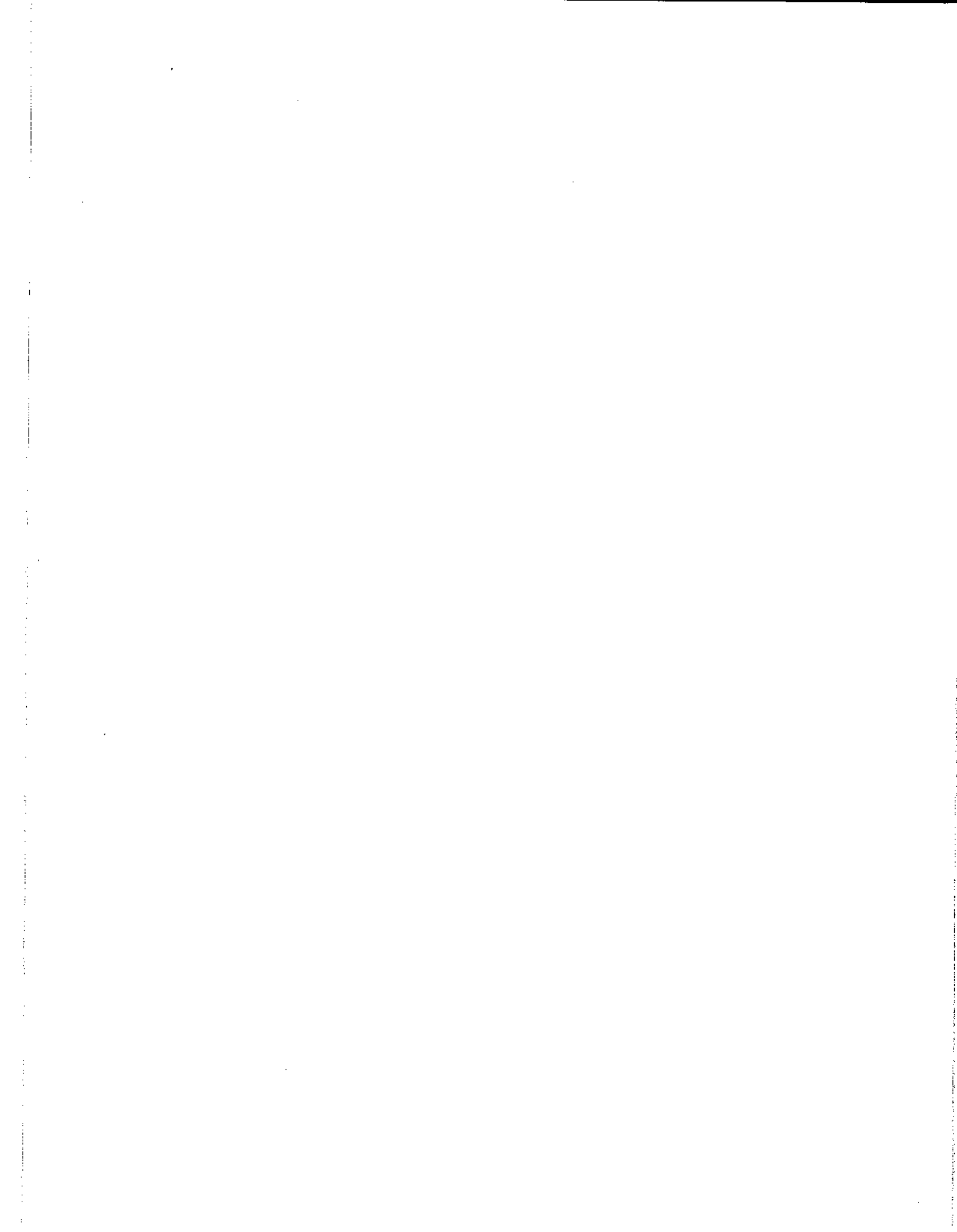
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PURPOSE AND PLANNING INFORMATION

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PREFACE**Sponsor: DEC ELS****INTRODUCTION**

1 Service users should forward any comments concerning this Publication through the channels prescribed in Army Equipment Support Publication (AESP) 0100-P-011-013. An AESP Form 10 is provided at the end of this publication; it should be photocopied and used for forwarding comments on this AESP.

2 AESPs are issued under Defence Council authority and, where AESPs specify action to be taken, the AESP will of itself be sufficient authority for such action and also for the demanding of the necessary stores, subject to the provisions of Para 3 below.

3 The subject matter of this publication may be affected by Defence Council Instructions (DCIs), Standard Operating Procedures (SOPs) or by local regulations. When any such Instruction, Order or Regulation contradicts any portion of this publication they are to be taken as the overriding authority.

RELATED AND ASSOCIATED PUBLICATIONS**Related publications**

4 The Octad for the subject equipment consists of the categories as detailed overleaf. All references are prefixed with the first eight digits of this publication. The availability of the publications can be checked by reference to the relevant Group Index (refer to AESP 0100-A-001-013).

Category/Sub-category			Information Level			
			1 User/ Operator	2 Unit Maintenance	3 Field Maintenance	4 Base Maintenance
1	0	Purpose and Planning Information	101	101	101	*
	1	Equipment Support Policy Directive	111	111	111	*
	2	Equipment Support Policy Directive	*	*	*	*
2	0	Operating Information	201	*	*	*
	1	Aide Memoire	*	*	*	*
	2	Training Aids	*	*	*	*
3		Technical Description	201	302	302	*
4	1	Installation Instructions	411	411	411	*
	2	Preparation for Special Environments	421	421	421	*
5	1	Failure Diagnosis	201	512	512	*
	2	Maintenance Instructions	201	522	522	*
	3	Inspection Standards	*	532	532	*
	4	Calibration Procedures	*	*	*	*
6		Maintenance Schedules	601	601	*	*
7	1	Illustrated Parts Catalogues	711	711	711	*
	2	Commercial Parts Lists	*	*	*	*
	3	Complete Equipment Schedule, Production	*	*	*	*
	4	Complete Equipment Schedule, Service Edition (Simple Equipment)	741	741	741	*
	5	Complete Equipment Schedule, Service Edition (Complex Equipment)	*	*	*	*
8	1	Modification Instructions	*	*	*	*
	2	General Instructions, Special Technical Instructions and Servicing Instructions	*	821	821	*
	3	Service Engineered Modification Instructions (RAF only)	*	*	*	*

* Category/sub-category not published

Associated publications

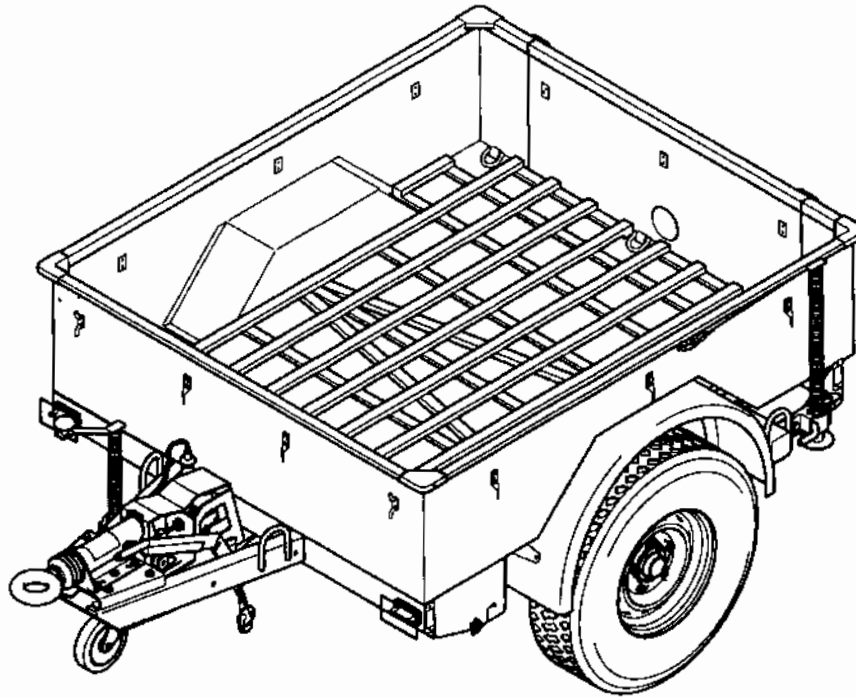
5 A full list of associated publications is as follows:

<u>Reference</u>	<u>Title</u>
AESP 0200-A-221-013	Painting of Service Equipment
AESP 0200-A-308-013	REME Recovery Manual
AESP 2300-A-050-013	B Vehicle Test, Inspection and Certification
AESP 2300-A-110	Vehicle and Trailer Electrical Circuits Installation Checks
AESP 2320-A-300-532	B Vehicle Cab Corrosion Inspection Standards
AESP 2300-A-310-201	B Vehicle Corrosion Prevention
AESP 2300-A-500	Material Quality Assessment - Principles and Practices in REME
AESP 2300-A-600	Waterproofing Regulations-Vehicles and Equipment
EME T & M A028 Chap 155	Inspection of Waterproofing Materials and Kits
JSP 371	Transportation Diagrams for Wheeled and Tracked Vehicles

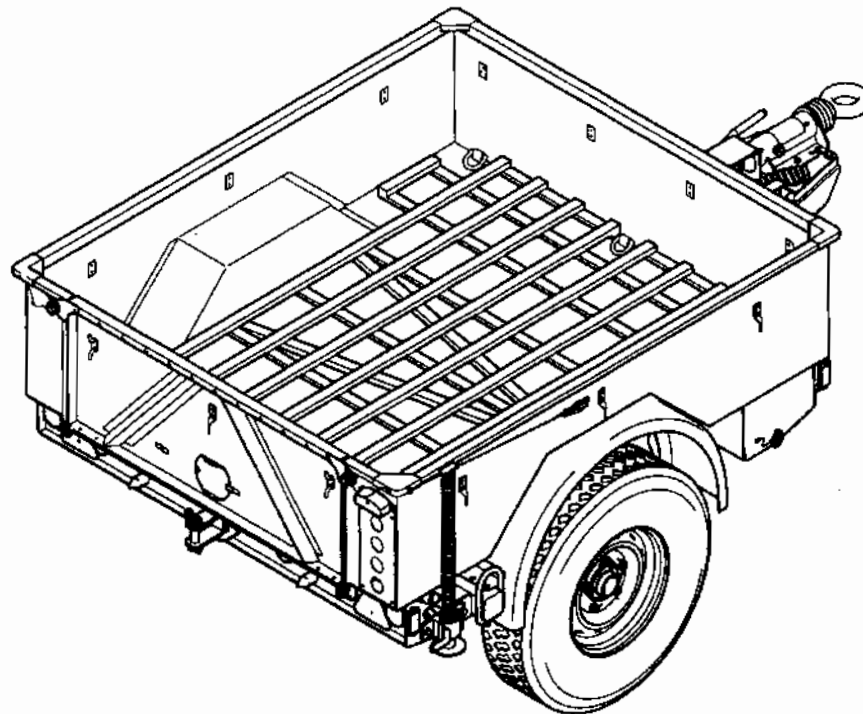
LIST OF ABBREVIATIONS

6 The following abbreviations are used in this publication:

AESP	Army Equipment Support Publication
Ah	Ampere Hour
CES	Complete Equipment Schedule
dB	Decibel
dc	Direct Current
DCIs	Defence Council Instructions
EMER	Electrical Mechanical Engineering Regulation
GIE	Government Issued Equipment
LCT	Landing Craft Tank
LST	Landing Ship Tank
NATO	North Atlantic Treaty Organisation
NSN	Nato Stock Number
SOPs	Standard Operating Procedures
UK	United Kingdom



3/4 View Front



3/4 View Rear

TRL/024

Trailer Lightweight GS Cargo - Three quarter front and rear view

FRONTISPIECE

WARNINGS

7 The following WARNINGS are applicable to this equipment.

(1) **PERSONAL SAFETY.** WHEN PARKING THE TRAILER ENSURE THAT THE PARKING AREA IS AS FLAT AS POSSIBLE, THAT THE HANDBRAKE IS APPLIED FIRMLY, THAT THE REAR SUPPORT LEGS ARE LOWERED AND THE CLAMPING BOLTS ARE TIGHT, AND THAT THE JOCKEY WHEEL IS CLAMPED FIRMLY BEFORE BEING WOUND DOWN.

(2) **PERSONAL SAFETY.** OBSERVE ALL SAFETY INSTRUCTIONS CONCERNING JACKING AND SCOTCHING WHEN CHANGING WHEELS OR EXAMINING BRAKE PADS.

(3) **PERSONNEL HAZARD.** ENSURE THE JOCKEY WHEEL IS LOWERED BEFORE COUPLING TO OR UNCOUPLING FROM THE PRIME MOVER.

(4) **PERSONAL HAZARD.** BEFORE DRIVING THE PRIME MOVER WITH THE TRAILER ATTACHED, ENSURE THAT THE JOCKEY WHEEL AND REAR STANDS ARE SECURED IN THE STOWED POSITION.

(5) **TRAILER LOADING.** ENSURE THAT THE TRAILER PAY LOAD IS CORRECTLY DISTRIBUTED AND THAT THE DRAWBAR PREPONDERANCE IS STRICTLY OBSERVED.

(6) **PERSONNEL HAZARD.** WHEN PARKING THE TRAILER, ENSURE THAT THE PARKING AREA IS AS FLAT AS POSSIBLE, THAT THE HANDBRAKE IS FULLY APPLIED, THAT THE REAR STANDS ARE DOWN AND LOCKED AND THAT THE JOCKEY WHEEL IS DOWN AND LOCKED.

(7) **PERSONAL HAZARD.** OBSERVE ALL APPROPRIATE SAFETY INSTRUCTIONS CONCERNING JACKING AND SCOTCHING WHEN REMOVING AND REFITTING ROAD WHEELS.

(8) **PERSONAL HAZARD.** DUE CONSIDERATION SHOULD BE GIVEN TO THE HIGHLY FLAMMABLE NATURE OF GASOLINE AND ITS VAPOUR. CARELESSNESS IN ITS USE MAY RESULT IN PAINFUL BURNS. GASOLINE SHOULD ALWAYS BE HANDLED IN ACCORDANCE WITH THE REQUIREMENTS OF JSP 317.

(9) **PERSONAL HAZARD.** FIRING ARTILLERY AT RANGES OF 500 YARDS OR LESS SHOULD BE FROM COVER. FIRING RIFLE GRENADES OR ANTI-TANK ROCKETS SHOULD BE FROM COVER.

(10) **PERSONAL INJURY.** THE TRAILER BODY WEIGHS 120KG. CARE MUST BE TAKEN WHEN LIFTING OR REPLACING THE BODY.

(11) **PERSONAL INJURY.** ENSURE THE TRAILER IS CHOCKED WHILST WORK IS BEING CARRIED OUT ON THE HUBS.

(12) **HEALTH RISK.** NEVER USE AN AIR LINE TO REMOVE BRAKE DUST, IF INHALED, BRAKE DUST CAN DAMAGE YOUR HEALTH

(13) **DRAUGHT EYE.** THIS TRAILER HAS A DRAUGHT EYE OF THE NON ROTATING TYPE, IT IS NOT TO BE COUPLED TO A VEHICLE WITH A FIXED TOWING PINTLE.

(14) HEALTH AND SAFETY. MATERIALS USED IN WATERPROOFING ARE REQUIRED TO MEET OBLIGATIONS INTRODUCED UNDER THE CONTROL OF SUBSTANCES HAZARDOUS TO HEALTH REGULATIONS 1994 (COSHH). SAFETY INFORMATION RELATING TO MATERIALS USED IS CONTAINED IN JSP (F) 395 CATALOGUE OF HAZARDOUS STORES.

(15) PERSONNEL HAZARD. ENSURE THE REAR STANDS ARE LOWERED BEFORE COMMENCING ANY WATERPROOFING PREPARATION.

(16) PERSONAL SAFETY. THE TOWING VEHICLE IS TO BE OF THE SAME OR A GREATER WEIGHT CATEGORY THAN THE DISABLED VEHICLE AND TOWING SPEEDS REDUCED TO AN APPROPRIATE LEVEL.

(17) SAFETY HAZARD. AFTER CROSS-COUNTRY USE, ENSURE THAT THE TRAILER IS THOROUGHLY CLEANED WITH PARTICULAR REGARD TO THE HANDBRAKE LEVER MECHANISM AND BRAKING SYSTEM.

CAUTIONS

8 The following CAUTIONS are applicable to this equipment.

(1) EQUIPMENT DAMAGE. If the towing vehicle has a 12V electrical system, the 24V lamps on the trailer must be changed to 12V lamps of an equivalent type and wattage. Additionally, an indelible and legible label must be fitted to the trailer, adjacent to the lighting cable, stating '12 VOLT SYSTEM'.

(2) COUPLING/UNCOUPLING. Always use the front jockey wheel when coupling/uncoupling the trailer.

(3) EQUIPMENT DAMAGE. Ensure the rear support legs and front jockey wheel are stowed prior to moving off.

(4) EQUIPMENT DAMAGE. Only variants with the Equipment Asset Code (EAC) listed on page 1 are suitable for waterproofing kits. The equipment must not be deep forded until Stage B Special Environment Waterproofing Kit is fitted as instructed in this AESP.

(5) VEHICLE RECORD BOOK. This instruction AESP 2330-E-202-421 must be retained with the equipment record book.

(6) EQUIPMENT PREPARATION. Waterproofing demands maximum efficiency of equipment performance. Ensure that the equipment is 100% fit for the task.

(7) TIME LIMITATION. The following Tasks must be carried out within 15 minutes of leaving the water.

(8) EQUIPMENT DAMAGE. The caliper locating pin and locking R clip can be subject to damage during vehicle use. The caliper locating pin, R clip and spring clip are to be replaced whenever the brake pads are removed.

(9) MILEAGE LIMITATION AFTER DISEMBARKATION. Tasks 16, 17 and 18 must be carried out within 25 miles (40 km) from point of disembarkation if operationally possible. The remaining Tasks should be carried out as soon as conditions permit but within 250 miles (400 km) of landing.

(10) EQUIPMENT DAMAGE. The front lifting loops are not to be used for a direct lift. Attach recovery equipment around the chassis rails and then through the lifting loops.

(11) EQUIPMENT DAMAGE. Do not winch the trailer with the prime mover still connected. Always disconnect and recover each vehicle separately.

(12) EQUIPMENT DAMAGE. Extreme care is to be exercised to avoid damage to the trailer body when lifting onto a flatbed vehicle.

PURPOSE AND PLANNING INFORMATION

EQUIPMENT IDENTITY

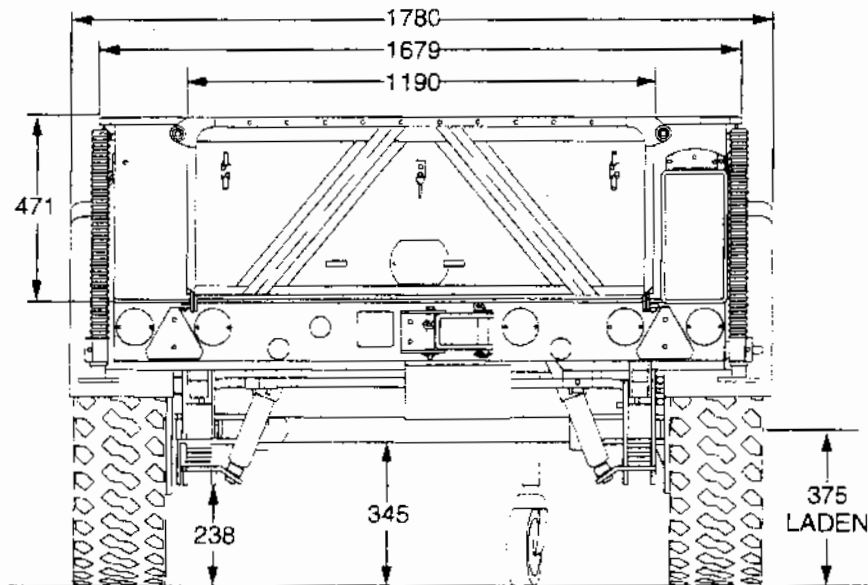
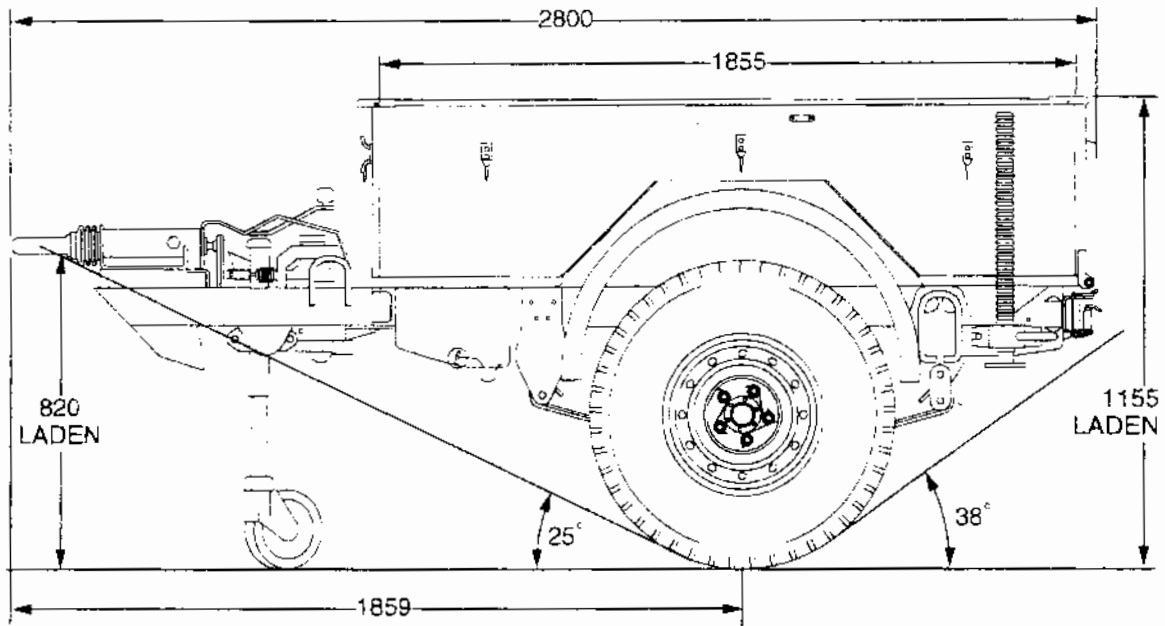
- 1 Trailer Lightweight, GS, Cargo
 - 1.1 NSN 2330-99-908-6472
 - 1.2 Asset Code NB 2853-3107

ROLE

- 2 The trailer is used for carrying cargo loads of up to 1.13 tonne (1.11 ton). The trailer is designed to be towed by CLV, TUL, TUM, TUM HD (4x4), TUH and TUH 6x6.

BRIEF DESCRIPTION

- 3 The trailer has a steel chassis and a stainless steel cargo body with a wooden duckboard. There is a hinged tailgate at the rear of the body. Six load securing shackles are provided in the cargo body. The cargo body is secured to the chassis by ten bolts, washers and locknuts. The trailer has a two wheeled beam axle suspended by two semi-elliptical leaf springs with Aeon springs, two shock absorbers and a transverse anti-roll bar. Hydraulically operated disc brakes are applied through the coupling damper when the towing vehicle applies its brakes. An auto-reversing valve disengages the braking system when the trailer is being reversed. A mechanical handbrake is also fitted, and a breakaway cable for automatic handbrake application in the event of vehicle breakaway. A jockey wheel and two rear mounted support legs provide stability when the trailer is parked. A pintle is fitted on the rear cross member for manoeuvring empty trailers only, it is not for recovery purposes.



TRL/020

Fig 1 Trailer dimensions

PHYSICAL DATA

Weights

4	Unladen	0.62 tonne (0.61 ton)
	Laden (maximum)	1.75 tonnes (1.72 tons)
	Capacity	1.13 tonne (1.11 tons)
	Drawbar preponderance (laden), based upon the lightest towing vehicle	75 kg (165 lbs)

Bridge classification

5	Unladen	1
	Laden	4

NOTE

The bridge classification does not include the prime mover.

Fording depth

6	Without preparation - fresh or sea water	0.75 m (29.5 in.)
	With preparation - fresh or sea water	1.5 m (59.10 in.)

Shipping tonnage

7	Shipping tonnage	0.62 tonne (0.61 ton)
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Performance

8	Towing speeds - fully laden Metalled roads	80 kph (50 mph)
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Retardation

9	[REDACTED]	
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Parking

10	Held in both directions	Gradient up to 33%
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Tyres

11	Size	7.50 x R16C Michelin
	Pressure	3.2 bar (46 psi)

Wheels

12	Type	7XD 2530-99-244-7869
----	------	----------------------

Brakes

13	Type	Disc brakes hydraulically operated Mechanical parking handbrake
----	------	--

Suspension

14 One pair of longitudinal semi-elliptical springs, Aeon rubber springs, telescopic shock absorbers and transverse anti-roll bar.

Electrical equipment

15 As supplied all lamps are 24 Volts dc working.

CAUTION

EQUIPMENT DAMAGE. If the towing vehicle has a 12V electrical system, the 24V lamps on the trailer must be changed to 12V lamps of an equivalent type and wattage. Additionally, an indelible and legible label must be fitted to the trailer, adjacent to the lighting cable, stating '12 VOLT SYSTEM'.

ENVIRONMENTAL DATA

16 The trailer may be operated in ambient air temperature in the range -40°C to $+49^{\circ}\text{C}$ without modification. Storage temperature range is -40°C and $+71^{\circ}\text{C}$. It is capable of shallow fording to a depth of 0.75 m (29.5 in.) in fresh or salt water without preparation.

TRANSPORTATION DATA

17 The shipping tonnage of the trailer is 0.62 tonne. The bridge classification of the trailer is 1 (unladen), 4 (laden). The bridge classification figures are for the trailer only and do not include the towing vehicle. The trailer, when coupled to its prime mover, is capable of being embarked and disembarked from LCT 8 and 9 and LST 3 VESSELS. The trailer may be transported by air in all types of transport aircraft currently in service use. For full details of transportability, see JSP 71 (Transportation Diagrams for Wheeled and Tracked Vehicles).

MANNING REQUIREMENTS

18 The trailer may be coupled and uncoupled to and from a prime mover by one person.

COMMENT(S) ON AESP*

To: DCCS
BFPO 794

From:
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.....

Sender's Reference	BIN Number	Date
AESP* Title:		
Chapter(s)/Instruction	Page(s)/Paragraph(s)	
If you require more space, please use the reverse of this form or a separate piece of paper. Comment(s):		

Signed: Telephone No.:
Name (Capitals): Rank/Grade: Date:
X.....

FOR AESP* SPONSOR USE ONLY

To: From:
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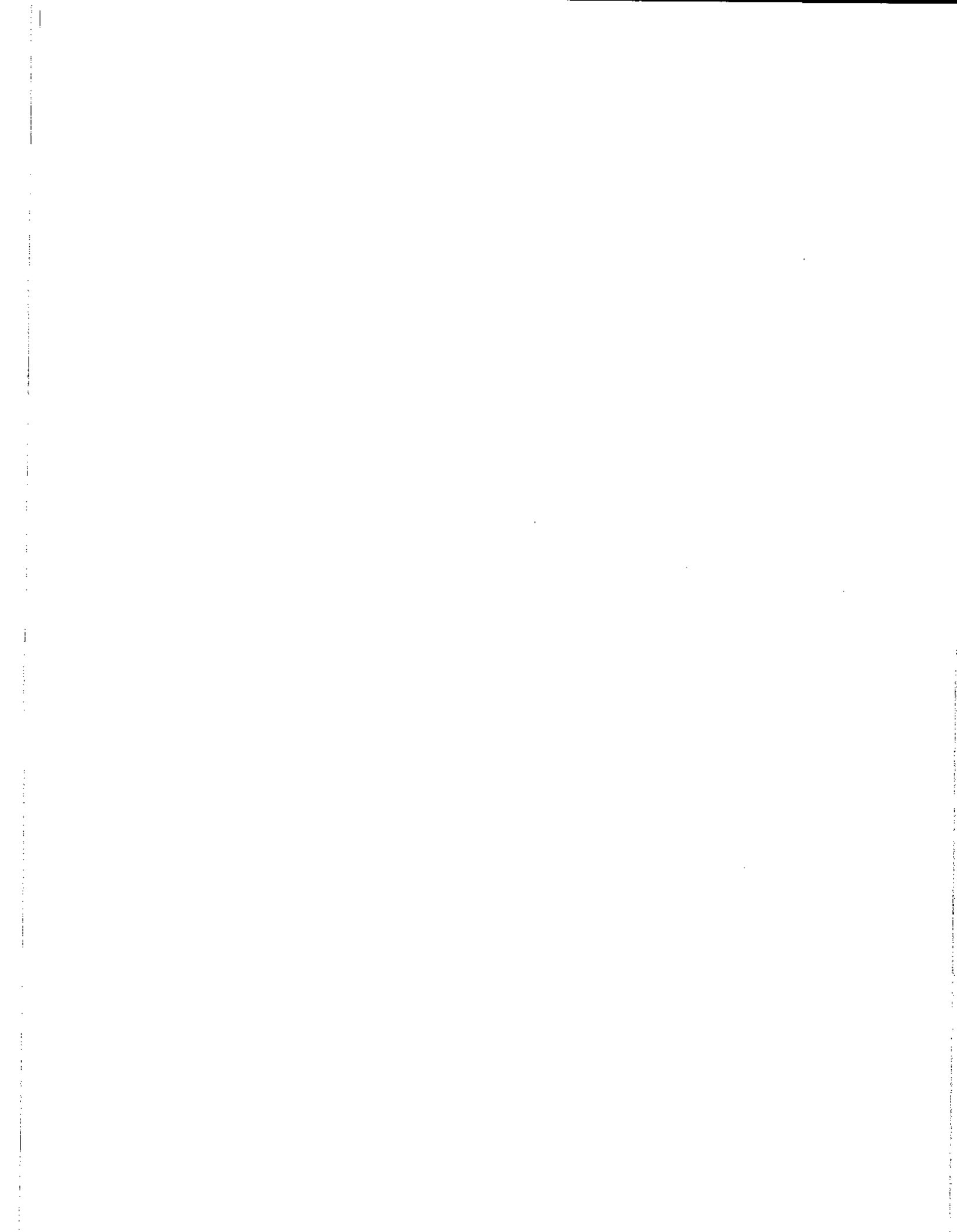
Thank you for commenting on AESP*:

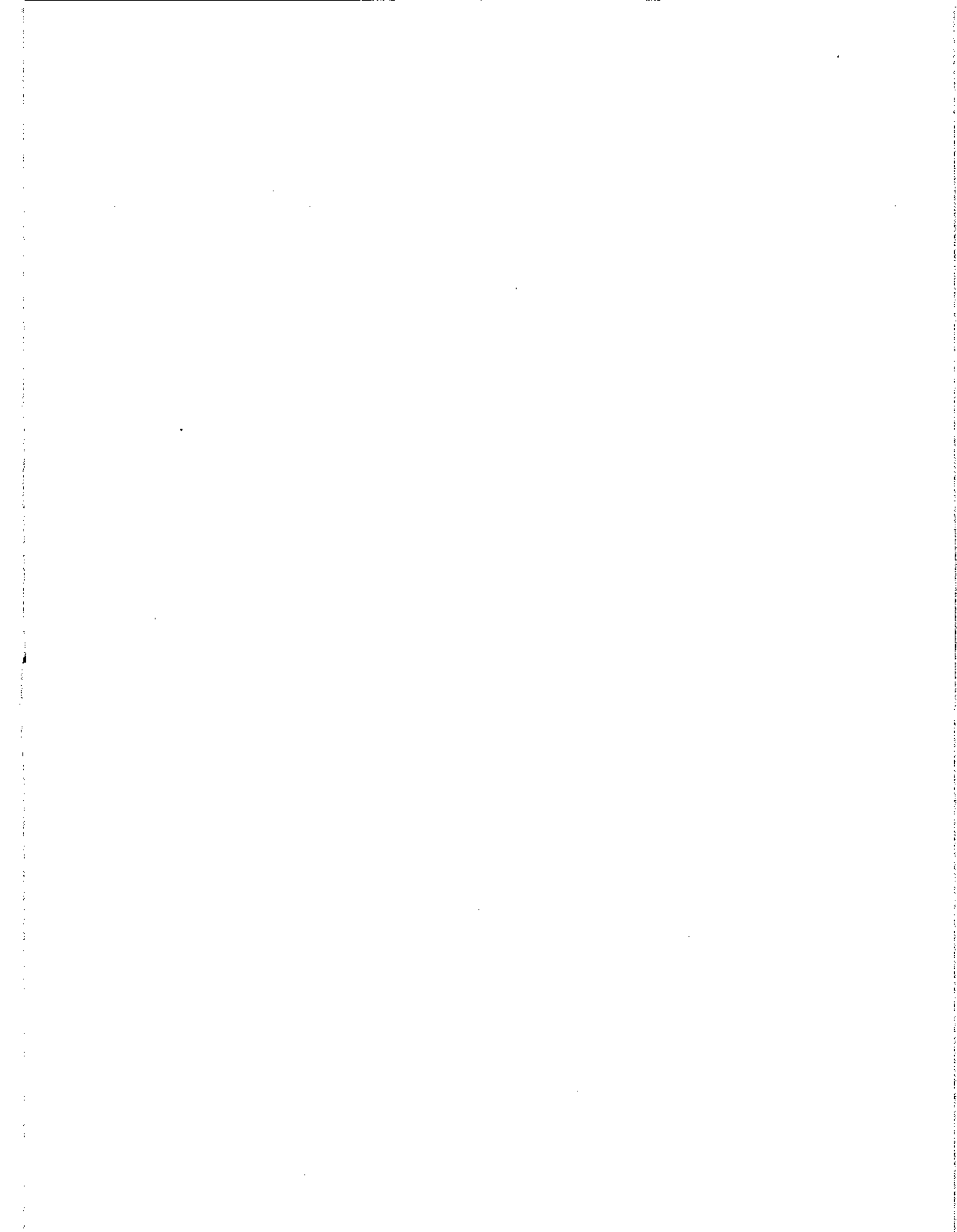
Your reference: Dated:

Action is being taken to:	Tick	Tick
Issue a revised/amended AESP*		Under investigation
Incorporate comment(s) in future amendments		No action required
Remarks		

Signed: Telephone No.:
Name (Capitals): Rank/Grade: Date:

* AESP or EMER







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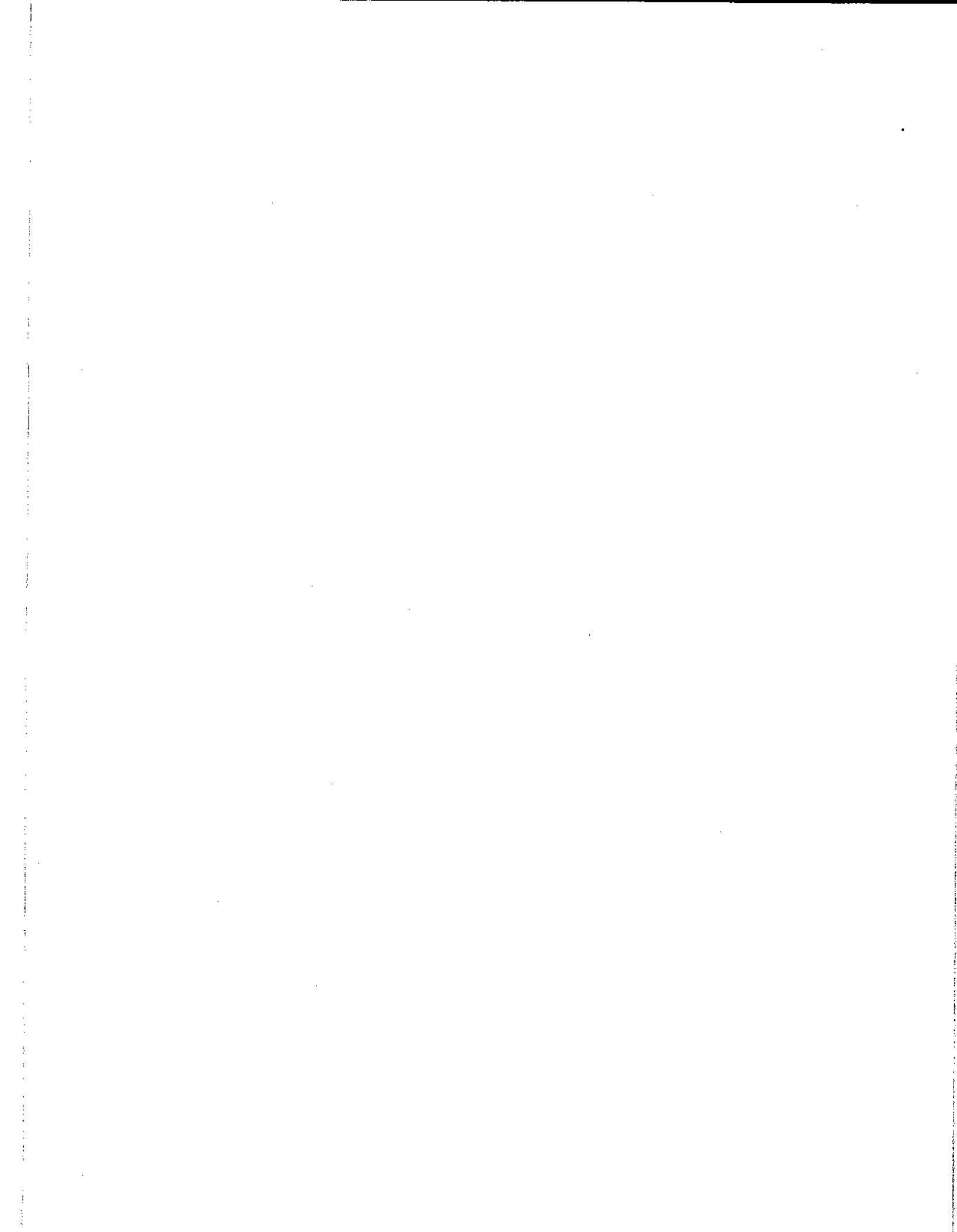
TRAILER LIGHTWEIGHT GS CARGO EQUIPMENT SUPPORT POLICY DIRECTIVE

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BY COMMAND OF THE DEFENCE COUNCIL

Kevin Trewin

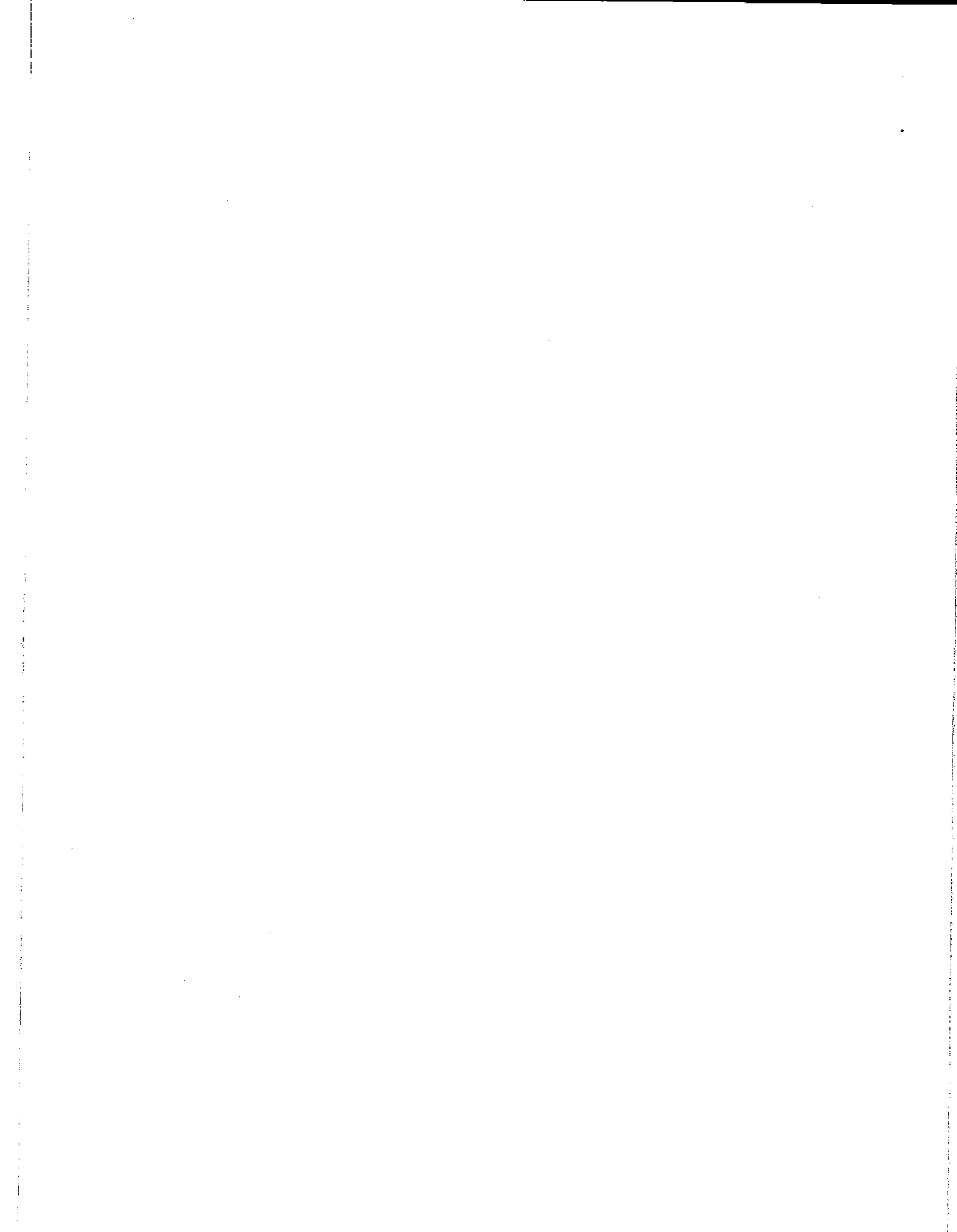
Ministry of Defence
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AMENDMENT RECORD

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- 3 Technical description
- 4 Physical data
- 5 Maintenance policy
- 6 Repair procedures
- 7 Recovery procedures
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PREFACE

Sponsor: SUV IPT
Project No.: 1624
File ref: SUV8/29/2

Publication Authority: TES TI Andover

INTRODUCTION

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Category/Sub-category			Information Level			
			1 User/ Operator	2 Unit Maintenance	3 Field Maintenance	4 Base Maintenance
1	0	Purpose and Planning Information	101	101	101	*
	1	Equipment Support Policy Directives	111	111	111	*
	2	Purpose and Planning Information, Medical and Dental	*	*	*	*
2	0	Operating Information	201	*	*	*
	1	Aide-Memoire	*	*	*	*
	2	Training Aids	*	*	*	*
3		Technical Description	201	302	302	*
4	1	Installation Instructions	411	411	411	*
	2	Preparation for Special Environments	421	421	421	*
5	1	Failure Diagnosis	201	512	512	*
	2	Maintenance Instructions	201	522	522	*
	3	Inspection Standards	*	532	532	*
	4	Calibration Procedures	*	*	*	*
6		Maintenance Schedules	601	601	601	*
7	1	Illustrated Parts Catalogues	711	711	711	*
	2	Commercial Parts Lists	*	*	*	*
	3	Complete Equipment Schedule, Production	*	*	*	*
	4	Complete Equipment Schedule, Service Edition (Simple Equipment)	741	741	741	*
	5	Complete Equipment Schedule, Service Edition (Complex Equipment)	*	*	*	*
8	1	Modification Instructions	*	*	*	*
	2	General Instructions, Special Technical Instructions and Servicing Instructions	*	821	821	*
	3	Service Engineered Modification Instructions (RAF only)	*	*	*	*

*Category/Sub-category not published

Associated publications

5	<u>Reference</u>	<u>Title</u>
	AESP 0200-A-221-013	Painting of Service Equipment
	AESP 0200-A-308-013	REME Recovery Manual
	AESP 2320-a-310-201	B Vehicle Corrosion Prevention
	AESP 2300-A-110	Vehicle and Trailer Electrical Circuits Installation Checks
	AESP 2300-A-310-201	B Vehicle Corrosion Prevention
	AESP 2300-A-050-013	B Vehicle Test, Inspection and Certification
	AESP 2300-A-500	Material Quality Assessment - Principles and Practices in REME
	AESP 2300-A-600	Waterproofing Regulations - Vehicles and Equipment
	EMER T & M A208 Chap 155	Inspection of Waterproofing Materials and Kits
	JSP 336	Defence Supply Chain Manual

JSP 341	Road Transport Regulations
JSP 371	Transport Diagrams of Wheeled and Tracked Vehicles
JSP 445	Transit of Dangerous Goods by Road, Rail and Sea (The Transport of Ammunition, Explosives and Other Dangerous Goods)
JSP 481	General Service Vehicle Familiarisation Package

ABBREVIATIONS

AESP	Army Equipment Support Publication
Ah	Ampere Hour
CES	Complete Equipment Schedule
dB	Decibel
dc	Direct Current
DCI	Defence Council Instruction
EMER	Electrical Mechanical Engineering Regulation
GIE	Government Issued Equipment
LCT	Landing Craft Tank
LST	Landing Ship Tank
NATO	North Atlantic Treaty Organisation
NSN	NATO Stock Number
SOPs	Standard Operating Procedures
UK	United Kingdom

EQUIPMENT SUPPORT POLICY DIRECTIVE (ESPD)

INTRODUCTION

General

- 1 This Equipment Support Policy Directive (ESPD) is concerned with:
 - 1.1 Vehicle designation: Trailer Lightweight GS Cargo.
 - 1.2 Asset code: NB 2853 3107.
 - 1.3 Complete Equipment Schedule (CES) No.: The CES list is incorporated within 2330-E-202-741.

MANAGEMENT INFORMATION

- 2 The management information relating to this equipment is as follows:
 - 2.1 Equipment sponsor: DEC ELS.
 - 2.2 Equipment manager: SUV IPT.
 - 2.3 Main contractor: Penman Engineering Ltd
Heathhall
Dumfries
Scotland DG1 3NY
 - 2.4 Requisition quantity: 6194.
 - 2.5 Contract no.: LLV/DBG/424.
 - 2.6 Engineering support: SUV/IPT.
 - 2.7 Supply manager: SUV IPT.
 - 2.8 Planned role: The Trailer Lightweight GS Cargo is a general service trailer designed to be towed behind the following GS vehicles:
 - TUL/TUM - Land Rover 4x4 Defender
 - TUL/TUM - Land Rover 4x4 High Specification
 - TUM (HD) - Pinzgauer 4x4
 - TUH - Reynolds Boughton RB44 4x4
 - Benford Dump Truck
 - 2.9 Deployment: These trailers can be deployed worldwide in climatic conditions A1 to C1 inclusive in accordance with Def Stan 00-35. The trailers have been introduced to Army, Navy and RAF Units.
 - 2.10 Planned life: 20 years.
 - 2.11 In-service date: Feb 04.
 - 2.12 Planned utilisation:
 - 2.12.1 Average: 7,500 km per year
 - 2.12.2 Maximum: 12,000 km per year

TECHNICAL DESCRIPTION

3 The trailers have the following specification:

3.1 Tow hitch. The tow hitch is of a standard NATO type with the addition of a safety breakaway landyard. The trailers must only be drawn by vehicles equipped with a suitable attachment for the breakaway landyard.

3.2 Wheels and hubs. The hubs are machined to accept the TUL/TUM - Land Rover (high specification) wheel and tyre assemblies, such that prime mover spare wheel assemblies can be utilised. A spare wheel carrier will be available as an installation for use with trailers drawn behind other prime movers.

3.3 Axle. The beam axle is of hollow tube construction.

3.4 Suspension. The trailer is equipped with leaf spring suspension, telescopic hydraulic dampers and transverse anti-roll bar.

3.5 Wheels and tyres. All trailers are fitted with 6.50J x R16 drop centre rims and 7.50R16 XZL Michelin tyres.

3.6 Braking system. The trailer prime braking system is a hydraulically operated overrun type acting on disc brakes incorporating an auto-reverse system. A ratchet action handbrake operates the parking brake via the brake callipers. The safety breakaway system operated by the breakaway landyard applies the handbrake should the trailer become detached from the prime mover.

3.7 Bodywork. The trailer has stainless steel sides, floor (with wooden duck-board) and drop down tailgate. The trailer has stabilising legs, external rope cleats for the weather resistant cover and the trailer floor is equipped with load securing points.

3.8 Electrical equipment. The trailer lighting equipment is 24 V negative earth return type and conforms to Def Stan 25 - 5/3 'Road Lighting of Military Vehicles' and UK Lighting Regulations. The trailer utilises the NATO 12 pin electrical socket and cable. The bulbs will need to be changed to 12 V when towed by RB44 or any vehicle with 12 V systems.

PHYSICAL DATA

4 The following is the physical data for the base trailer.

4.1 Dimensions.

4.1.1	Overall length	2800 mm.
4.1.2	Overall width	1780 mm.
4.1.3	Overall height (unladen)	1520 mm.
4.1.4	Overall height (laden)	1155 mm.
4.1.5	Wheel track	1520 mm.
4.1.6	Ground clearance (axle centre)	345 mm.
4.1.7	Load bed height	661 mm.
4.1.8	Body side panel height	465 mm.

4.2 Weights.

4.2.1 Unladen [REDACTED]

4.2.2 Gross trailer weight [REDACTED]

MAINTENANCE POLICY

Organisation and manpower

5 Deployment of this vehicle will not require any changes to support organisation or manpower.

5.1 Periodic maintenance and routine repair of the equipment is to be carried out in accordance with JSP 336 Vol 12, Part 2, Pam 4, Equipment Support Repair Procedures. AESP 2330-E-202-601 contains the Maintenance Schedule for this equipment.

5.2 The maintenance policy follows normal B Vehicle Maintenance Policy; current in-service oils and lubricants are to be used.

REPAIR PROCEDURES

6 The following tables show the repair procedures:

TABLE 1 LEVELS OF REPAIR

Repair level (1)	Detail (2)
1	Day to day maintenance preparation. It may include such operations as functional testing, replenishment, servicing, role changing, minor modification, fault diagnosis and corrective maintenance by replacement, adjustment or minor repair.
2	Maintenance by replacement, adjustment or minor repair including fault diagnosis and minor authorised modifications, within times detailed or by operational constraints, using generally provisioned resources.
3	Maintenance in greater depth than level 2. It includes such operations as repair, partial reconditioning modification requiring special skills or special equipment; but which is short of complete strip, reconditioning and re-assembly.
4	Maintenance that is full reconditioning, major conversions, or major repairs.

6.1 Levels of repair are subject to operational constraints and should be used in conjunction with ADC/P (01) 04 dated 05 Jun 01, Battlefield Maintenance Doctrine for the Army and AP3260 Book 1, Mechanical Transport Maintenance Regulations for the Royal Air Force.

TABLE 2 SCHEDULED MAINTENANCE

Repair level	1	2	3	4
Daily before use.	*			
Daily after use.	*			
Weekly.	*			
1 st - 200 km/10 hrs or 1 month.		*		
A - 3000 km/300 hrs or 6 months.		*		
B - 6000 km/600 hrs or 12 months.		*		
C - 12000 km/1200 hrs or 24 months.		*		
Maintenance B and C, VM Tasks are carried out at Level 2 repair.				

TABLE 3 MAJOR ASSEMBLY REPLACEMENT

Repair level	1	2	3	4
Axle assembly.		*		

TABLE 4 MAJOR ASSEMBLY REPAIR

Repair level	1	2	3	4
Axle assembly.				*

6.2 Periodic specialist inspection and certification: inspection and certification requirements for this trailer are detailed in AESP 2300-A-050-013 'B' Vehicle Test, Inspection and Certification.

RECOVERY PROCEDURES

7 Recovery procedures. User recovery details are given in the All Arms Recovery Manual, AESP 0200-A-308-013.

TABLE 5 TOWING PRECAUTIONS

Ser (1)	Towing precautions (2)
1	The preferred method of recovery is by loading the trailer on to a suitable flat bed vehicle or trailer. NOTE JSP 341, Part 4, Chap 9, Para 9.262(a) states that the towing vehicle is to be of the same or a greater weight category than the disabled vehicle.

SUPPLY POLICY

8 Spare parts should be demanded through the Army Supply System in accordance with JSP 336 Vol 12, Part 1, Pam 1 Part 2, Unit Guide for Demanding Materiel from Army Stores. The complete spare parts listing is available under cover of AESP 2330-E-202-721. Further information and support is available from Equipment Manager and Supply and Repair Branch SUV IPT. The back-loading of major components and repairables should be completed in accordance with JSP 336 Vol 12, Part 1 Pam 7 and the Stores System User Guide, Part 37. An AF G8621 is to be raised against such items.

PUBLICATIONS

9 This equipment will be supported by Army Equipment Support Publications (AESP) and distributed by:

DSDC (L) Mwrwg Road
Llangennech
Llanelli
Carmarthenshire
SA14 8YP

10 The AESP Octad for this equipment is 2330-E-202, information is divided into the following categories:

- 10.1 Category 1 - Planning and Support Information.
- 10.2 Category 2 - Operating and Training Information.

- 10.3 Category 3 - Technical Instructions.
- 10.4 Category 4 - Preparation for Special Environments.
- 10.5 Category 5 - Failure Diagnosis, Repair and Inspection Standards.
- 10.6 Category 6 - Maintenance Schedule.
- 10.7 Category 7 - Illustrated Parts Catalogue and Complete Equipment Schedule.
- 10.8 Category 8 - Modification Instruction.

SPECIAL TOOLS AND TEST EQUIPMENT

- 11 The West Scale number for the Tlr (LW) is 06346.

TRAINING

- 12 Training requirement for this vehicle for Artificer Vehicles and Vehicle Mechanics will be by field experience. Driver training is by normal unit driver training and additional familiarisation training. Driver training requirements are to be requested through HQ Land/HQ Strike Command as applicable.

WARRANTY

- 13 The trailer has been procured with a 60 month reliability warranty only. For the first 60 months of life of each trailer 100% Equipment Failure Reporting must be observed as per current procedures. Routine maintenance by trained service personnel using the approved parts list does not invalidate the warranty. The warranty does not cover tyres or damage through accident, incorrect maintenance, misuse, fair wear and tear or neglect.

- 14 In the event of a warranty repair being required, the repair must be reported to SUV IPT using Form F/INS/777. Procedures for reporting using this form are detailed within JSP 336 Vol 12 Part 2 Pam 3 Sect 2. A copy of the job card for the repair detailing the work done and spares consumed must accompany the F/INS/777. In the event of a suspected warranty issue, contact should be made with SUV IPT before repairs are made. The contact details of SUV IPT are:

Asset Manager: [REDACTED] [REDACTED]
Project Manager: [REDACTED] [REDACTED]
Fax: [REDACTED] [REDACTED]

CONFIGURATION MANAGEMENT

- 15 Configuration Management (CM) for this equipment is to be in accordance with Land Systems Procedure No. 123, Procedure for the Configuration Management of Land Service Equipment Projects. Management of a complete equipment system involves ensuring that its parts, spares, test equipment, tools, software, ancillaries and support documentation remain compatible and fit for purpose during development, subsequent manufacture, Service use and after repair.

- 15.1 Modifications. Modifications must only be carried out when approved and authorised by SUV IPT and instructions are issued in the AESP Cat 8.

- 15.2 Post Design Services (PDS). PDS will be contracted for as and when required and authorised by SUV IPT.

- 15.3 Reporting. Recording of modifications embodied should be carried out as appropriate. Embodiment of modifications should be recorded on the Field Equipment Management Information System (FEMIS) or AF G1084A. Embodiment details should also be entered on AB 562 or

FMT 1004 as applicable. RAF units carrying out embodiment should record the relevant information on the Station Transport ADP Management Aid (STAMA) or AF G1084A and AB 562 or FMT 1004 as appropriate.

STORAGE

16 The equipment should be stored wherever possible under cover and protected from the elements.

DISPOSAL

17 Equipment disposal is to be in accordance with AESP 0200-A-062-013, Management and Control of Equipment Support Units, Casting and Damage Reporting Procedures for all equipment. Vehicles that fall within the Special Casting Range under Chap 7 of this publication may only be cast with the Equipment Support Manager's authority.

COMMENT(S) ON AESP*

To: FRACAS
BFPO 794

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Sender's Reference	BIN Number	Date
AESP* Title:		
Chapter(s)/Instruction	Page(s)/Paragraph(s)	
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Comment(s):		

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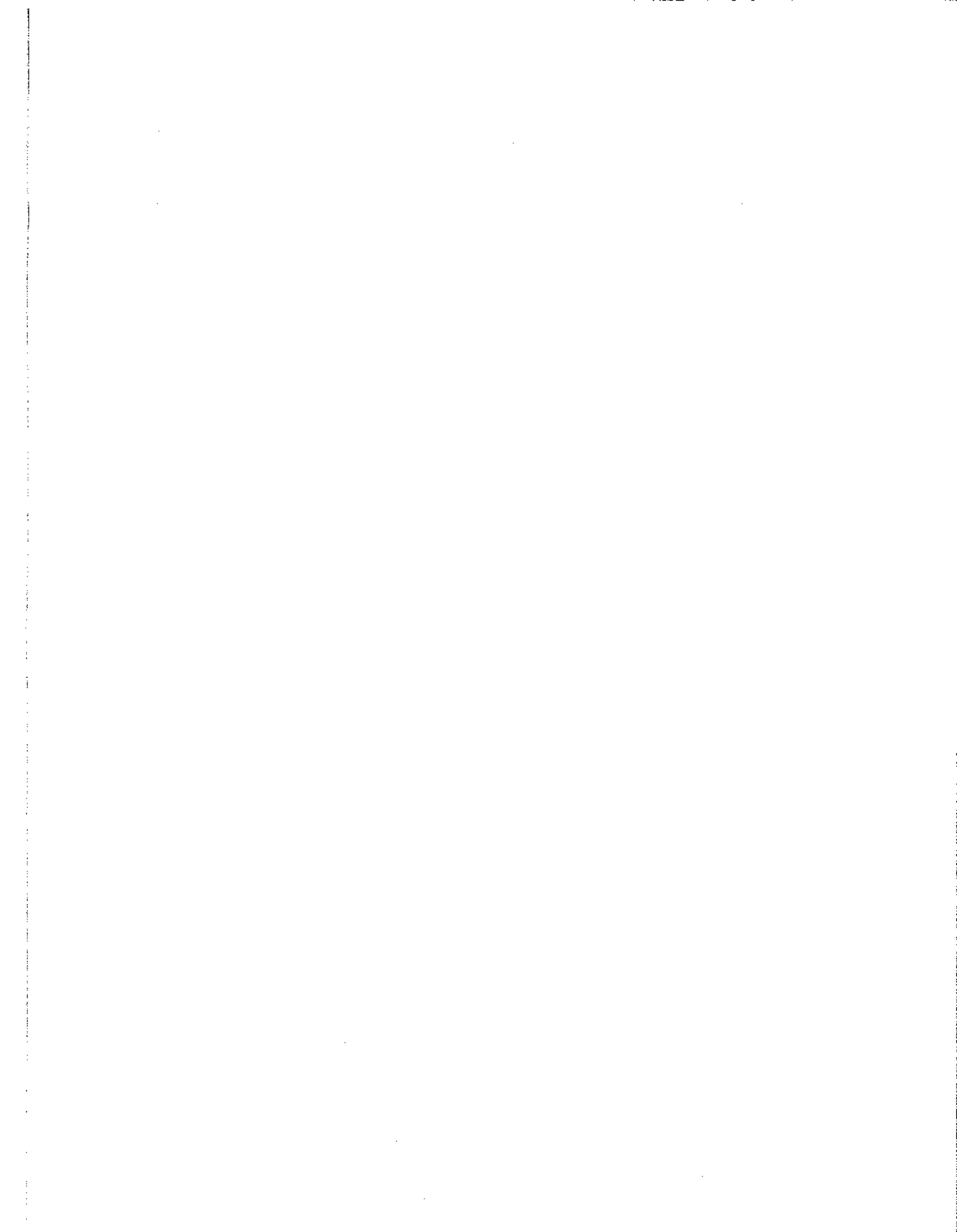
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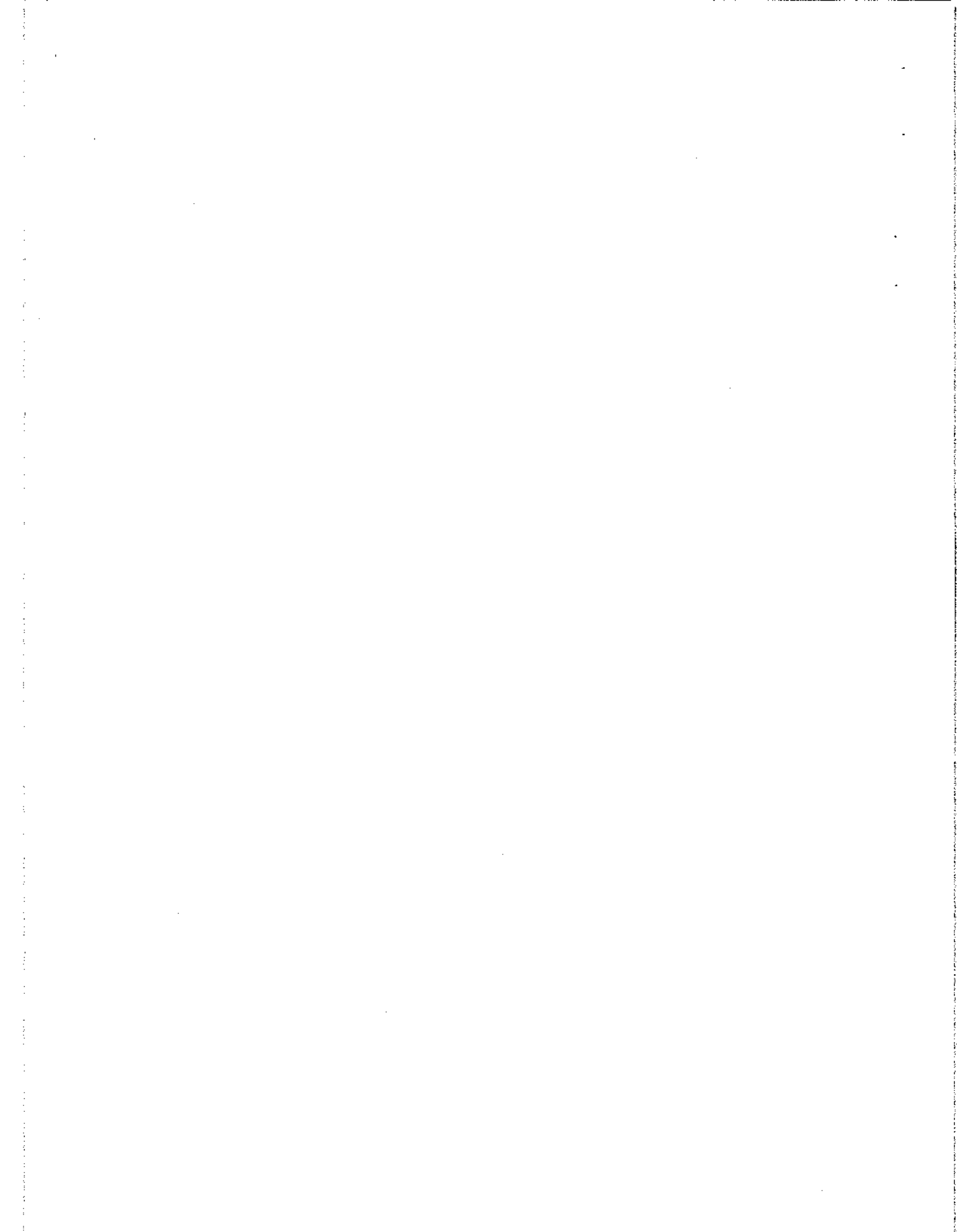
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TRAILER LIGHTWEIGHT GS CARGO OPERATING INFORMATION

BY COMMAND OF THE DEFENCE COUNCIL

Kevin Trewin

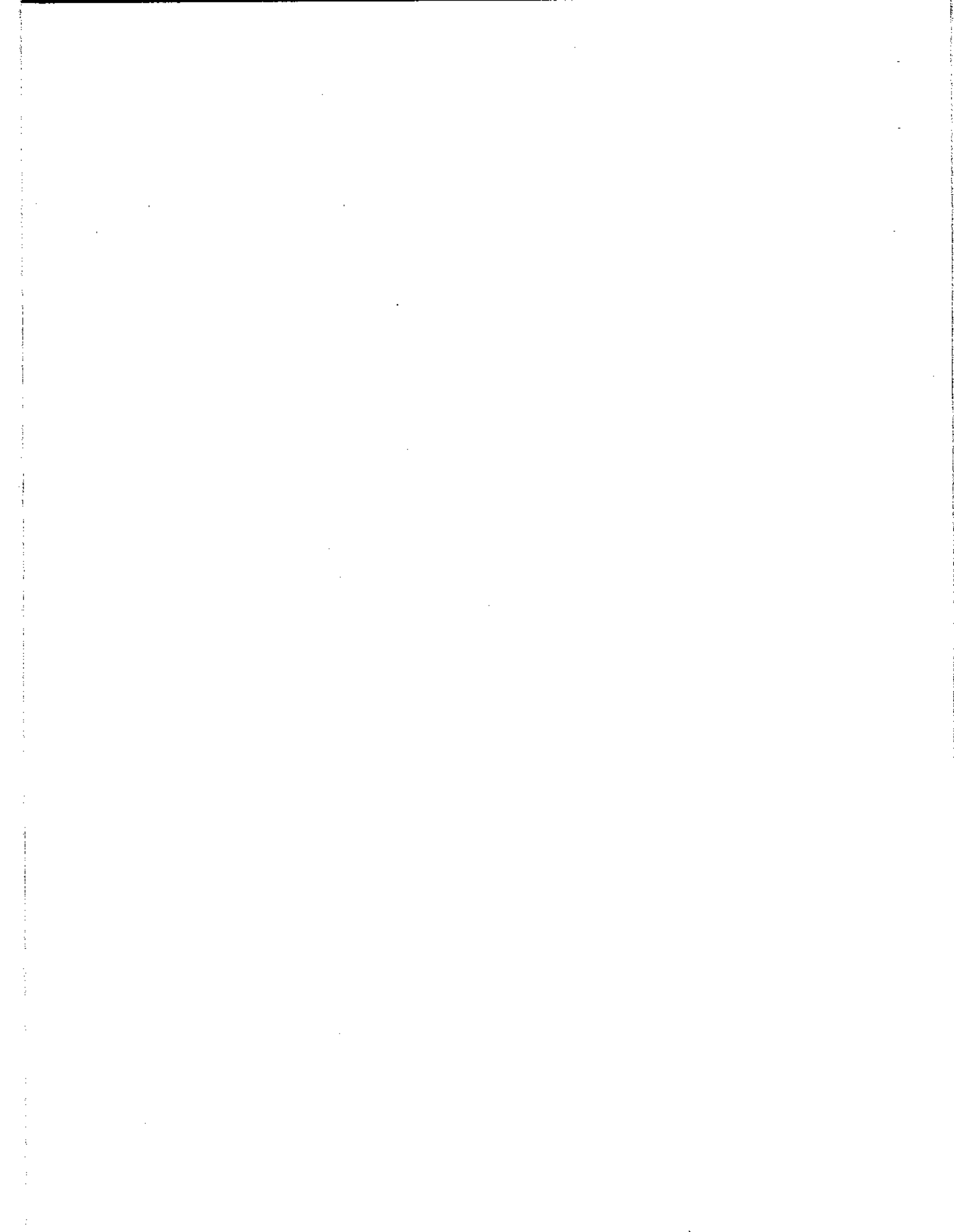
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AMENDMENT RECORD

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OPERATING INFORMATION

Chapter

- 1 General description and data
- 2 Operating information
- 3 User maintenance
- 4 Denial of equipment

PREFACE

Sponsor: DEC ELS

INTRODUCTION

1 Service users should forward any comments concerning this Publication through the channels prescribed in Army Equipment Support Publication (AESP) 0100-P-011-013. An AESP Form 10 is provided at the end of this publication; it should be photocopied and used for forwarding comments on this AESP.

2 AESPs are issued under Defence Council authority and, where AESPs specify action to be taken, the AESP will of itself be sufficient authority for such action and also for the demanding of the necessary stores, subject to the provisions of Para 3 below.

3 The subject matter of this publication may be affected by Defence Council Instructions (DCIs), Standard Operating Procedures (SOPs) or by local regulations. When any such Instruction, Order or Regulation contradicts any portion of this publication they are to be taken as the overriding authority.

RELATED AND ASSOCIATED PUBLICATIONS

Related publications

4 The Octad for the subject equipment consists of the categories as detailed overleaf. All references are prefixed with the first eight digits of this publication. The availability of the publications can be checked by reference to the relevant Group Index (refer to AESP 0100-A-001-013).

Category/Sub-category			Information Level			
			1 User/ Operator	2 Unit Maintenance	3 Field Maintenance	4 Base Maintenance
1	0	Purpose and Planning Information	101	101	101	*
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	1	Aide Memoire	*	*	*	*
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5	1	Failure Diagnosis	201	512	512	*
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* Category/sub-category not published

Associated publications

5 A full list of associated publications is as follows:

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AESP 2300-A-310-201	B Vehicle Corrosion Prevention
AESP 2300-A-500	Material Quality Assessment - Principles and Practices in REME
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JSP 371	Transportation Diagrams for Wheeled and Tracked Vehicles

LIST OF ABBREVIATIONS

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GIE	Government Issued Equipment
LCT	Landing Craft Tank
LST	Landing Ship Tank
NATO	North Atlantic Treaty Organisation
NSN	Nato Stock Number
SOPs	Standard Operating Procedures
UK	United Kingdom

WARNINGS

7 The following WARNINGS are applicable to this equipment.

(1) **PERSONNEL HAZARD. ENSURE THE JOCKEY WHEEL IS LOWERED BEFORE COUPLING TO OR UNCOUPLING FROM THE PRIME MOVER.**

(2) **PERSONAL HAZARD. BEFORE DRIVING THE PRIME MOVER WITH THE TRAILER ATTACHED, ENSURE THAT THE JOCKEY WHEEL AND REAR STANDS ARE SECURED IN THE STOWED POSITION.**

(3) **TRAILER LOADING. ENSURE THAT THE TRAILER PAY LOAD IS CORRECTLY DISTRIBUTED AND THAT THE DRAWBAR PREPONDERANCE IS STRICTLY OBSERVED.**

(4) **PERSONNEL HAZARD. WHEN PARKING THE TRAILER, ENSURE THAT THE PARKING AREA IS AS FLAT AS POSSIBLE, THAT THE HANDBRAKE IS FULLY APPLIED, THAT THE REAR STANDS ARE DOWN AND LOCKED AND THAT THE JOCKEY WHEEL IS DOWN AND LOCKED.**

(5) **PERSONAL HAZARD. OBSERVE ALL APPROPRIATE SAFETY INSTRUCTIONS CONCERNING JACKING AND SCOTCHING WHEN REMOVING AND REFITTING ROAD WHEELS.**

(6) **PERSONAL HAZARD. DUE CONSIDERATION SHOULD BE GIVEN TO THE HIGHLY FLAMMABLE NATURE OF GASOLINE AND ITS VAPOUR. CARELESSNESS IN ITS USE MAY RESULT IN PAINFUL BURNS. GASOLINE SHOULD ALWAYS BE HANDLED IN ACCORDANCE WITH THE REQUIREMENTS OF JSP 317.**

(7) **PERSONAL HAZARD. FIRING ARTILLERY AT RANGES OF 500 YARDS OR LESS SHOULD BE FROM COVER. FIRING RIFLE GRENADES OR ANTI-TANK ROCKETS SHOULD BE FROM COVER.**

(8) **DRAUGHT EYE. THIS TRAILER HAS A DRAUGHT EYE OF THE NON ROTATING TYPE, IT IS NOT TO BE COUPLED TO A VEHICLE WITH A FIXED TOWING PINTLE.**

(9) **PERSONNEL INJURY. UNDER NO CIRCUMSTANCE ARE PERSONNEL TO STAND BETWEEN A PRIME MOVER AND TRAILER WHEN COUPLING OR UNCOUPLING.**

(10) **PERSONAL SAFETY. THE TOWING VEHICLE IS TO BE OF THE SAME OR A GREATER WEIGHT CATEGORY THAN THE DISABLED VEHICLE AND TOWING SPEEDS REDUCED TO AN APPROPRIATE LEVEL.**

(11) **ROAD HAZARD. ENSURE THAT THE BREAKAWAY CABLE IS CORRECTLY CONNECTED TO THE PRIME MOVER. THE TRAILER MUST NOT BE USED IF THE CABLE IS DAMAGED OR A SECURE CONNECTION IS NOT POSSIBLE.**

(12) **PERSONAL INJURY. THE TAILGATE MUST NOT BE LOADED IN EXCESS OF 150 KG (330 LB) MAXIMUM, THE LOAD MUST ALSO BE EVENLY DISTRIBUTED. ANY LOAD IN EXCESS OF THE MAXIMUM MAY CAUSE FAILURE OF THE SECURING CABLES AND RESULT IN INJURIES TO PERSONNEL.**

(13) **PERSONAL HAZARD. WHEN REPLACING A ROAD WHEEL ENSURE THAT ONLY 'WOLF' LANDROVER WHEEL RIMS ARE USED WITH THE REPLACEMENT WHEEL ASSEMBLY. FAILURE TO DO SO WILL AFFECT THE STABILITY OF THE VEHICLE.**

(14) **PERSONAL HAZARD.** UNDER NO CIRCUMSTANCES ARE THE FRONT JOCKEY WHEEL OR REAR STANDS TO BE USED AS A METHOD OF JACKING UP THE TRAILER DURING ANY ROAD WHEEL REMOVAL/REFITTING PROCEDURE. THE JOCKEY WHEEL AND STANDS ARE USED FOR STABILITY AND MANOEUVRABILITY PURPOSES ONLY, THEY WILL NOT SUPPORT THE TRAILER WHEN A ROAD WHEEL IS REMOVED

(15) **SAFETY HAZARD.** AFTER CROSS-COUNTRY USE, ENSURE THAT THE TRAILER IS THOROUGHLY CLEANED WITH PARTICULAR REGARD TO THE HANDBRAKE LEVER MECHANISM AND BRAKING SYSTEM.

CAUTIONS

8 The following CAUTIONS are applicable to this equipment.

- (1) **EQUIPMENT DAMAGE.** If the towing vehicle has a 12V electrical system, the 24V lamps on the trailer must be changed to 12V lamps of an equivalent type and wattage. Additionally, an indelible and legible label must be fitted to the trailer, adjacent to the lighting cable, stating '12 VOLT SYSTEM'.
- (2) **EQUIPMENT DAMAGE.** The rear tow hitch is to be used for unladen trailer movement in depot only. Under no circumstances is the tow hitch to be used for recovery purposes.
- (3) **EQUIPMENT DAMAGE.** The front lifting loops are not to be used for a direct lift. Attach recovery equipment around the chassis rails and then through the lifting loops.
- (4) **EQUIPMENT DAMAGE.** Do not winch the trailer with the prime mover still connected. Always disconnect and recover each vehicle separately.
- (5) **EQUIPMENT DAMAGE.** Extreme care is to be exercised to avoid damage to the trailer body when lifting onto a flatbed vehicle.
- (6) **EQUIPMENT DAMAGE.** Sand is an abrasive material and will cause accelerated wear to components if not effectively removed.

CHAPTER 1
GENERAL DESCRIPTION AND DATA
CONTENTS

Para

- 1 General description
- 10 Data

Fig

Page

- 1 Trailer lightweight, GS, cargo 2

GENERAL DESCRIPTION

1 The trailer lightweight, General Service (GS), cargo (Fig 1) a single axle, two wheeled unit is capable of carrying loads up to 1130 kg.

2 The trailer chassis (12) is constructed from steel members welded to form a platform which carries a formed stainless steel body (1). The body is flat floored with wheel arches protruding into the floor space. A hinged tailgate (3) is provided at the rear of the body, the tailgate is fitted with a closure plate (11).

3 Equally spaced around the outside, the body is fitted with cleats (14) for the retaining rope of a top cover.

4 Mudwings (8) are attached to the chassis and sit under the body wheel arch and over the wheel locations.

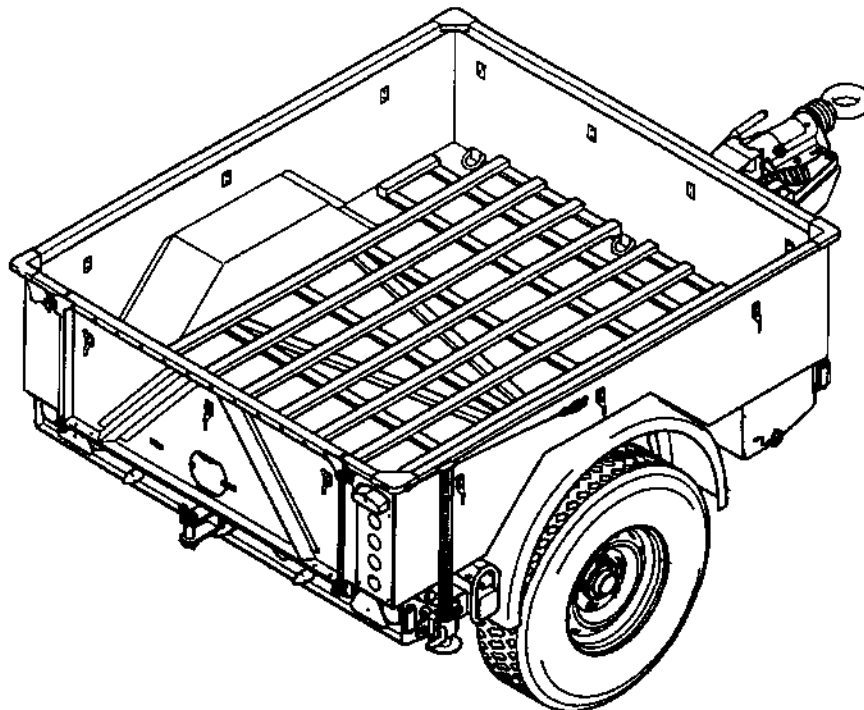
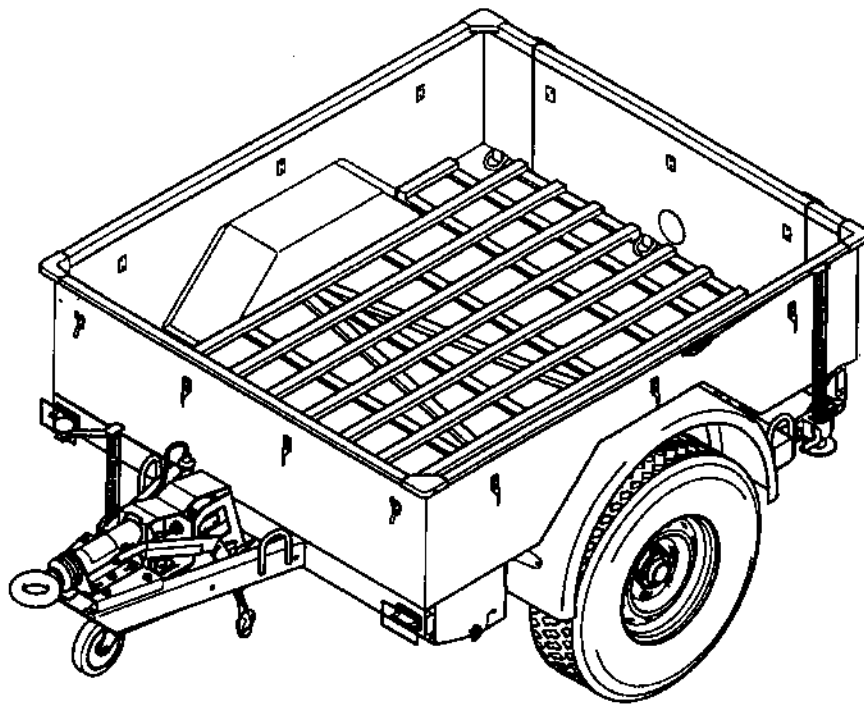
5 A standard size fixed towing eye and damper (14) are attached to the drawbar extension of the chassis. A fully adjustable wind down jockey wheel (13) is attached to the drawbar.

6 The chassis members support rear stands (5 and 9) and CES stowage boxes (6 and 7). The rear cross member is fitted with a tow hitch (10).

7 A single beam axle on two longitudinal, semi-elliptical leaf springs is attached to hangar brackets on the chassis, together with two telescopic shock absorbers, check straps and rubber springs. A transverse anti-roll bar is connected across the axle.

8 The trailer has a hydraulic disc brake system, operated by the towing eye damper moving backwards when the prime mover brakes are applied and the trailer overruns. An automatic reversing device incorporated within the hydraulic system, allows reversing to take place without a mechanical operation being applied. A mechanical handbrake is provided on the drawbar. A breakaway cable is connected to the handbrake linkage, which is also connected to the prime mover when the trailer is being towed. Should the trailer become detached from the prime mover, the trailer brakes are automatically applied.

9 The trailer electric circuit operates and is controlled from the towing vehicles 24V dc supply via a NATO standard socket. The lighting consists of normal tail, brake, turn, rear fog and convoy plate light and front runner white lights. Reflectors are fitted to the front, sides and rear.



TRL/027

- | | | | |
|---|----------------------|----|-----------------------|
| 1 | Body | 9 | Rear stand (RH) |
| 2 | Duckboard | 10 | Tow hitch |
| 3 | Tie down | 11 | Closure plate |
| 4 | Tailgate | 12 | Chassis |
| 5 | Rear stand (LH) | 13 | Jockey wheel |
| 6 | CES stowage box (LH) | 14 | Towing eye and damper |
| 7 | CES stowage box (RH) | 15 | Cleat |
| 8 | Mudwing | | |

Fig 1 Trailer lightweight, GS, cargo

DATA

10 The following data is applicable to the trailer lightweight GS cargo.

Dimensions

Refer to Cat 101

Weights

Unladen
Laden (Gross vehicle weight)
Payload
Drawbar preponderance (laden), based upon
the lightest towing vehicle

[REDACTED]
[REDACTED]
[REDACTED]

Bridge classification

Unladen
Laden

1
4

NOTE

Bridge classification does not include prime mover.

Fording depth

Without preparation - fresh or seawater
With preparation - fresh or seawater

0.75 m (29.5 in.)
1.5 m (59.1 in.)

Shipping tonnage

[REDACTED]

Performance

Metalled roads

80 kph (50 mph)

Tyres

Size
Pressure

7.50 x R 16 C
3.2 bar

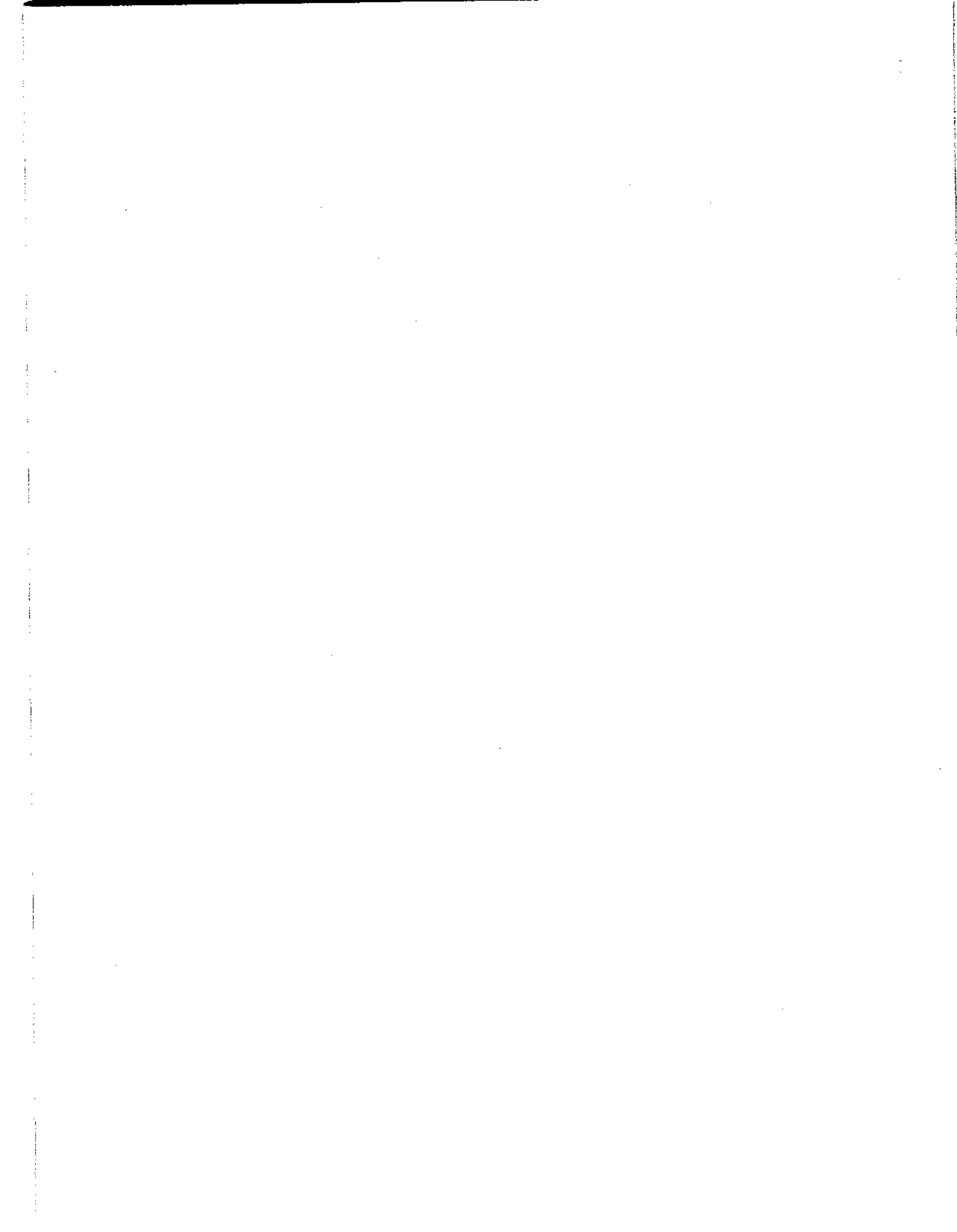
Brakes

Type

Disc brakes, hydraulically operated
Mechanical parking brake

Suspension

Two longitudinal semi-elliptical springs,
rubber springs, two telescopic shock
absorbers and a transverse anti-roll bar.



CHAPTER 2
OPERATING INFORMATION
CONTENTS

Para	
	Before use checks
1	General
3	Tyres
4	Electrical equipment (CAUTION)
5	Braking system (WARNING)
	Operation (CAUTION)
7	Jockey wheel
8	Deploy
12	Stow
14	Rear stands
15	Handbrake
17	Trailer coupling (WARNINGS)
18	Checks during a journey
20	Trailer uncoupling (WARNINGS)
21	Tailgate (WARNING)
	Recovery (WARNING) (CAUTIONS)
24	Recovery by the user
26	Recovery by REME
29	Winch recovery
32	Trailer recovery

Fig		Page
1	Jockey wheel	4
2	Rear stand	5
3	Handbrake	6
4	Tailgate	10

BEFORE USE CHECKS**General**

- 1 Examine the trailer for damage or failure of welds, security of component items, tighten any part that is likely to come loose during use.
- 2 Check that all warning decals and plates are clearly visible and secured.

Tyres

- 3 The tyres must be checked for the following:
 - 3.1 Replace any missing valve caps.
 - 3.2 Check the tyre pressure (3.2 bar). Tyre pressure checks and adjustment should always be done when the tyres are cold.
 - 3.3 Remove any flints or stones from the tyre treads, check for cuts and damage on the tyre side walls.
 - 3.4 Remove any oil or grease from the tyres, using an approved cleaning agent.

Electrical equipment**CAUTION**

EQUIPMENT DAMAGE. If the towing vehicle has a 12V electrical system, the 24V lamps on the trailer must be changed to 12V lamps of an equivalent type and wattage. Additionally, an indelible and legible label must be fitted to the trailer, adjacent to the lighting cable, stating '12 VOLT SYSTEM'.

- 4 Check the electrical equipment as follows:
 - 4.1 Check all leads, cables and connectors for security or any deterioration.
 - 4.2 Check the lighting cable plug for damage and security.
 - 4.3 Check all lamps, lights, lenses and reflectors for cleanliness, operation and security.

Braking system**WARNING**

ROAD HAZARD. ENSURE THAT THE BREAKAWAY CABLE IS CORRECTLY CONNECTED TO THE PRIME MOVER. THE TRAILER MUST NOT BE USED IF THE CABLE IS DAMAGED OR A SECURE CONNECTION IS NOT POSSIBLE.

- 5 Carry out the following checks on the braking system:
 - 5.1 Master cylinder reservoir fluid level, top up as necessary.
 - 5.2 Check the serviceability of the master cylinder outer cover, waterproofing requirement.
 - 5.3 Operation of handbrake.
 - 5.4 Check that the breakaway cable is fitted and serviceable ensuring that the connecting ring at the base of the handbrake is not distorted or deformed.

- 6 Report all faults to REME.

OPERATION

CAUTION

EQUIPMENT DAMAGE. The rear tow hitch is to be used for unladen trailer movement in depot only. Under no circumstances is the tow hitch to be used for recovery purposes.

Jockey wheel

7 The jockey wheel (Fig 1) mounted on the drawbar provides stability for the trailer while it is being loaded or when parked. The jockey wheel assists when connecting the trailer to the prime mover or manually moving the trailer (rear stands in the stowed position). Deploy/stow the jockey wheel, as follows.

Deploy

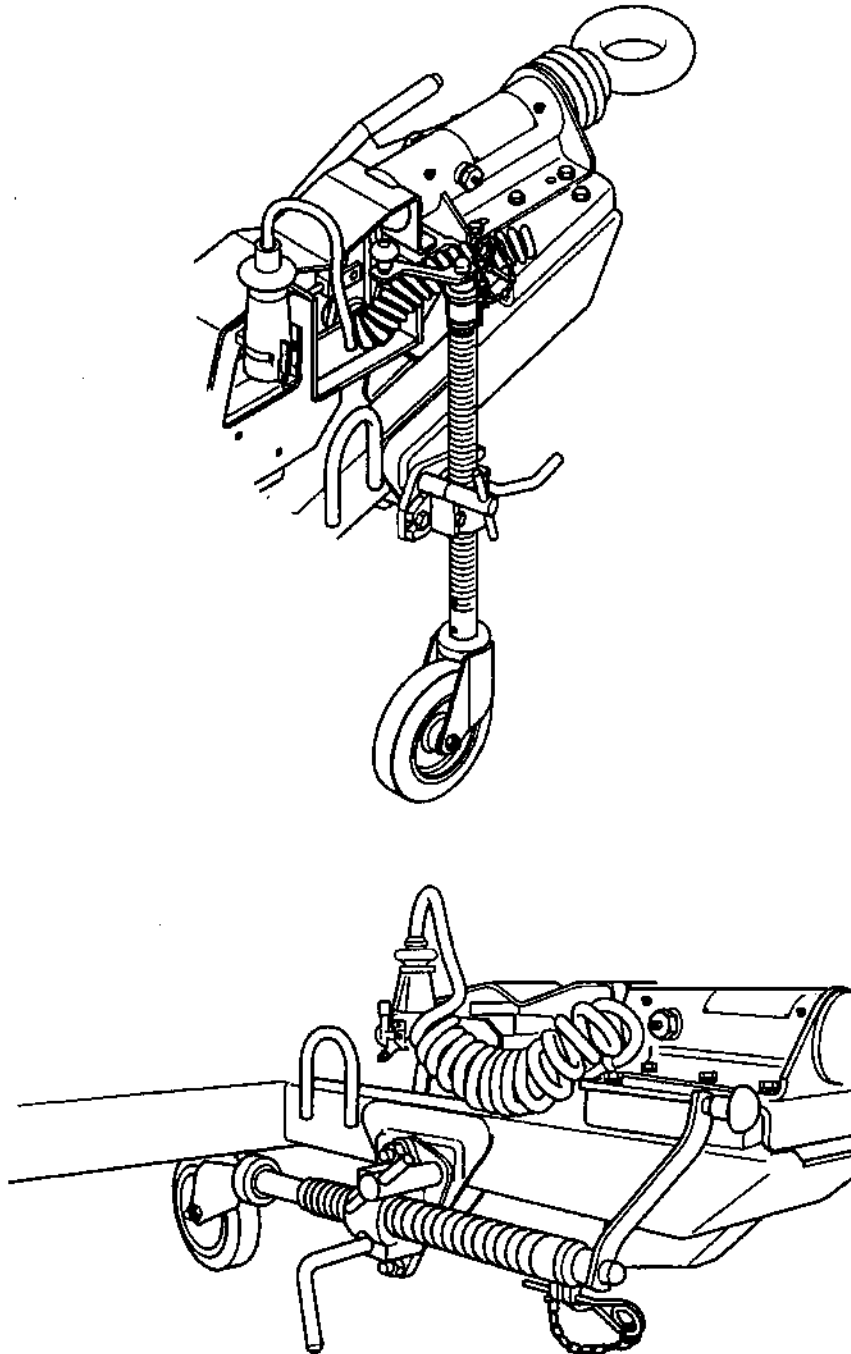
- 8 Pull out the spring loaded plunger (4), holding the jockey wheel in the stowed position.
- 9 Carefully swing the jockey wheel down until the locking plunger locks the jockey wheel in the vertical position.
- 10 If required slacken off the handle (3) and adjust the height of the jockey wheel until it is in contact with the ground. Tighten the handle, clamping the outer leg (5) tightly.
- 11 Remove the winding handle locking clip (2), rotate the winding handle (1) counter-clockwise to raise the height of the drawbar, clockwise to lower the height of drawbar. Refit the locking clip.

Stow

NOTE

Stowing the jockey wheel is normally done when the trailer is connected to the prime mover.

- 12 Remove the winding handle locking clip (2), rotate the winding handle (1) clockwise to raise the wheel (7) clear of the ground, refit the locking clip.
- 13 Pull out the spring loaded plunger (4), rotate the jockey wheel until the spring loaded plunger locks it in the horizontal position. When stowed the wheel (7) should be positioned beneath the chassis and the winding handle locked in an upright position.



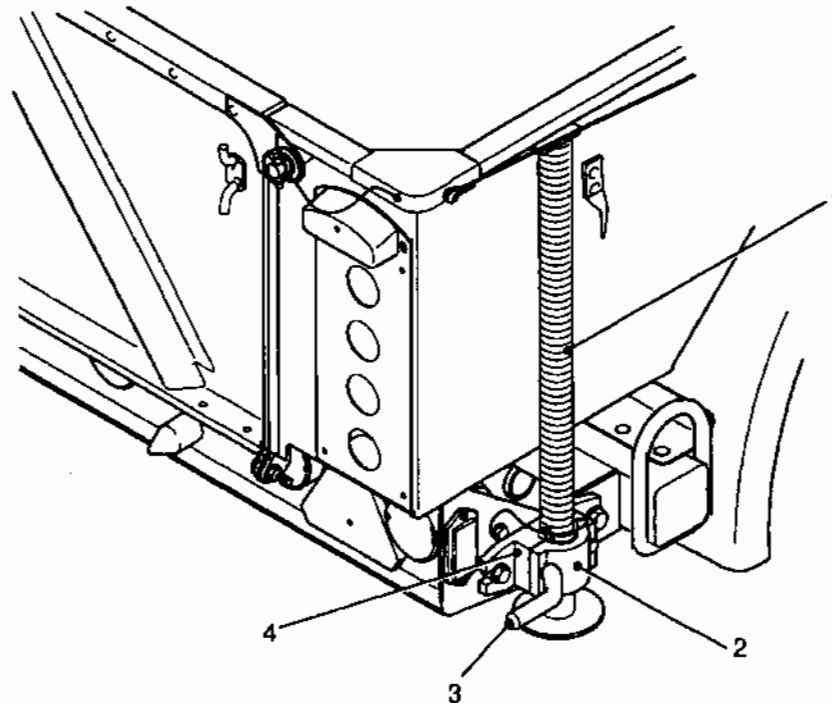
TRL/028

- | | | | |
|---|-----------------------|---|-----------|
| 1 | Winding handle | 5 | Outer leg |
| 2 | Locking clip | 6 | Inner leg |
| 3 | Handle | 7 | Wheel |
| 4 | Spring loaded plunger | | |

Fig 1 Jack y whe l

Rear stands

14 . The rear stands (Fig 2) can be height adjusted by slackening off the handle (3), loosening the clamp (2) and raise or lower the stand leg (1) to the required height. The locking pin (4) must be fitted at all times, it is only removed to allow the stand leg to pass through the clamp.



TRL/029

1 Stand leg
2 Clamp

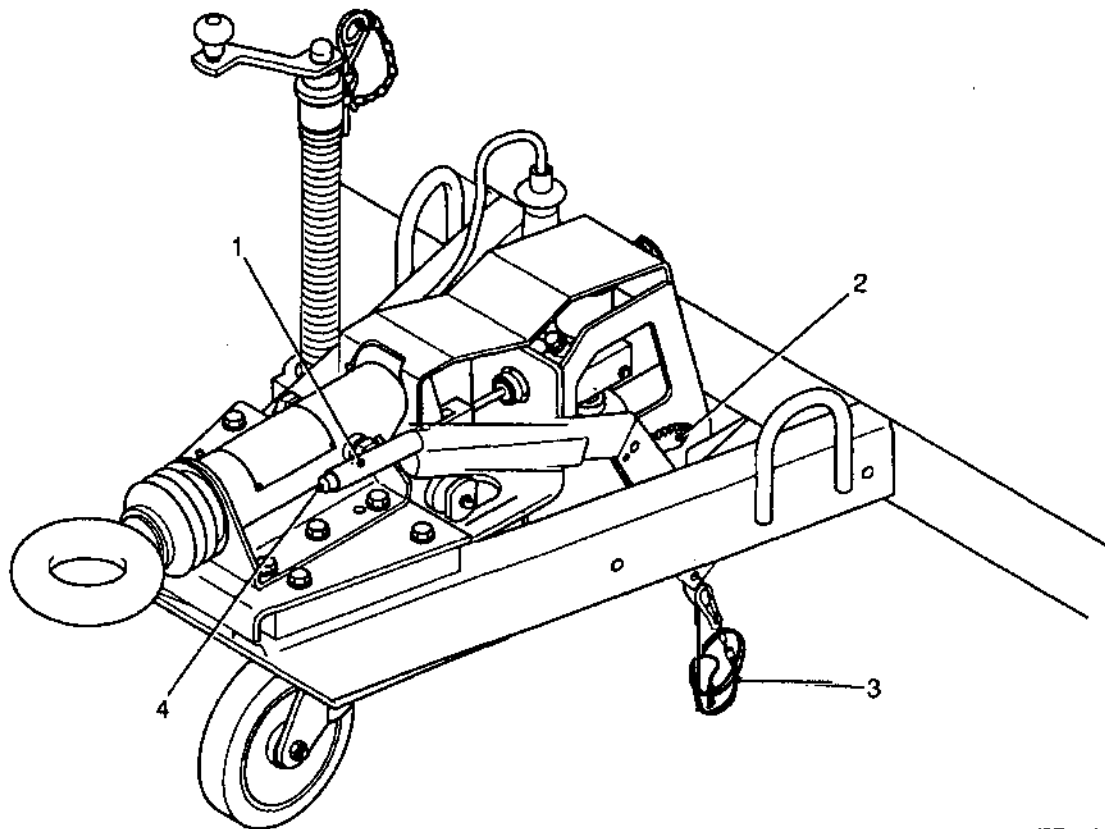
3 Handle
4 Locking pin

Fig 2 Rear stand

Handbrake

15 To apply the handbrake (Fig 3), depress the pawl release button (4), lift the handbrake lever (1) until it reaches the end of its travel, release pawl release button, allowing the pawl to engage with the ratchet (2) teeth. Attempt to lift the handle to fully apply the handbrake.

16 To release the handbrake, grip the handbrake lever handle apply an upward pressure, at the same time depress the pawl release button to disengage the pawl from the ratchet. Keeping the pawl release button depressed lower the handbrake lever.



TRL/030

- | | | | |
|---|-----------------|---|---------------------|
| 1 | Handbrake lever | 3 | Breakaway cable |
| 2 | Ratchet | 4 | Pawl release button |

Fig 3 Handbrake

Trailer coupling

WARNINGS

- (1) **PERSONNEL HAZARD. ENSURE THE JOCKEY WHEEL IS LOWERED BEFORE COUPLING TO OR UNCOUPLING FROM THE PRIME MOVER.**
- (2) **PERSONAL HAZARD. BEFORE DRIVING THE PRIME MOVER WITH THE TRAILER ATTACHED, ENSURE THAT THE JOCKEY WHEEL AND REAR STANDS ARE SECURED IN THE STOWED POSITION.**
- (3) **TRAILER LOADING. ENSURE THAT THE TRAILER PAY LOAD IS CORRECTLY DISTRIBUTED AND THAT THE DRAWBAR PREPONDERANCE IS STRICTLY OBSERVED.**
- (4) **DRAUGHT EYE. THIS TRAILER HAS A DRAUGHT EYE OF THE NON ROTATING TYPE, IT IS NOT TO BE COUPLED TO A VEHICLE WITH A FIXED TOWING PINTLE.**

17 Couple the trailer to a suitable prime mover, as follows:

17.1 Ensure that the trailer handbrake is on.

WARNING

PERSONNEL INJURY. UNDER NO CIRCUMSTANCE ARE PERSONNEL TO STAND BETWEEN A PRIME MOVER AND TRAILER WHEN COUPLING OR UNCOUPLING.

17.2 Reverse the prime mover to the front of the trailer.

17.3 Adjust the position of the trailer to engage the towing eye with the towing hook, as follows:

17.3.1 Release the handbrake to obtain side to side movement. Re-apply the handbrake.

17.3.2 Raise or lower the height of the towing eye by operating the jockey wheel winding handle (Fig 1 (1))

NOTE

The position of the rear stands may require adjusting to allow movement of the trailer for alignment.

17.4 Connect the towing eye and ensure that the following conditions apply.

17.4.1 The prime mover towing hook is closed and locking devices applied.

17.4.2 The towing hooks anti-rotation device is unlocked.

17.5 Connect the trailer electrical plug into the vehicle's NATO socket, check operation of all trailer lights.

WARNING

ROAD HAZARD. ENSURE THAT THE BREAKAWAY CABLE IS CORRECTLY CONNECTED TO THE PRIME MOVER. THE TRAILER MUST NOT BE USED IF THE CABLE IS DAMAGED OR A SECURE CONNECTION IS NOT POSSIBLE.

17.6 Connect the breakaway cable (Fig 3 (3)).

17.7 Raise and lock the jockey wheel, as detailed in Para 12.

- 17.8 Raise and lock the rear stands, as detailed in Para 14.

Checks during a journey

18 After travelling approximately 1 mile, stop the vehicle and carry out the following checks on the trailer:

- 18.1 Security of the load.
 - 18.2 Security of the towing eye.
 - 18.3 Tyre's, for punctures and embedded stones.
 - 18.4 Breakaway cable is connected.
 - 18.5 Brake fluid level.
 - 18.6 Report all faults to REME.
- 19 Carry out the checks detailed in Para 18 after every subsequent four hours of travelling time.

Trailer uncoupling

WARNING

PERSONNEL HAZARD. WHEN PARKING THE TRAILER, ENSURE THAT THE PARKING AREA IS AS FLAT AS POSSIBLE, THAT THE HANDBRAKE IS FULLY APPLIED, THAT THE REAR STANDS ARE DOWN AND LOCKED AND THAT THE JOCKEY WHEEL IS DOWN AND LOCKED.

20 Uncouple the trailer from the prime mover, as follows:

NOTE

It may be necessary to unload the trailer before uncoupling the trailer.

- 20.1 Lower and lock the rear stands, as detailed in Para 14.
- 20.2 Lower and lock the jockey wheel, as detailed in Para 8.
- 20.3 Adjust the height of the jockey wheel, using the winding handle (Fig 1 (1)).
- 20.4 Disconnect the trailer electrical plug.
- 20.5 Disconnect the breakaway cable.
- 20.6 Unlock and open the prime mover's towing hook.
- 20.7 Apply the handbrake.
- 20.8 Raise the height of the towing hook by using the jockey wheel winding handle.

WARNING

PERSONNEL INJURY. UNDER NO CIRCUMSTANCE ARE PERSONNEL TO STAND BETWEEN A PRIME MOVER AND TRAILER WHEN COUPLING OR UNCOUPLING.

20.9 Uncouple the trailer.

Tailgate

21 The tailgate (Fig 4(1)) can be fully lowered (180 deg) or lowered to a position parallel (90 deg) with the body load area using tailgate securing cables (3) located either side of the body. When not in use each securing cable connects to a staple (4) secured to the body.

22 To fully lower the tailgate proceed as follows:

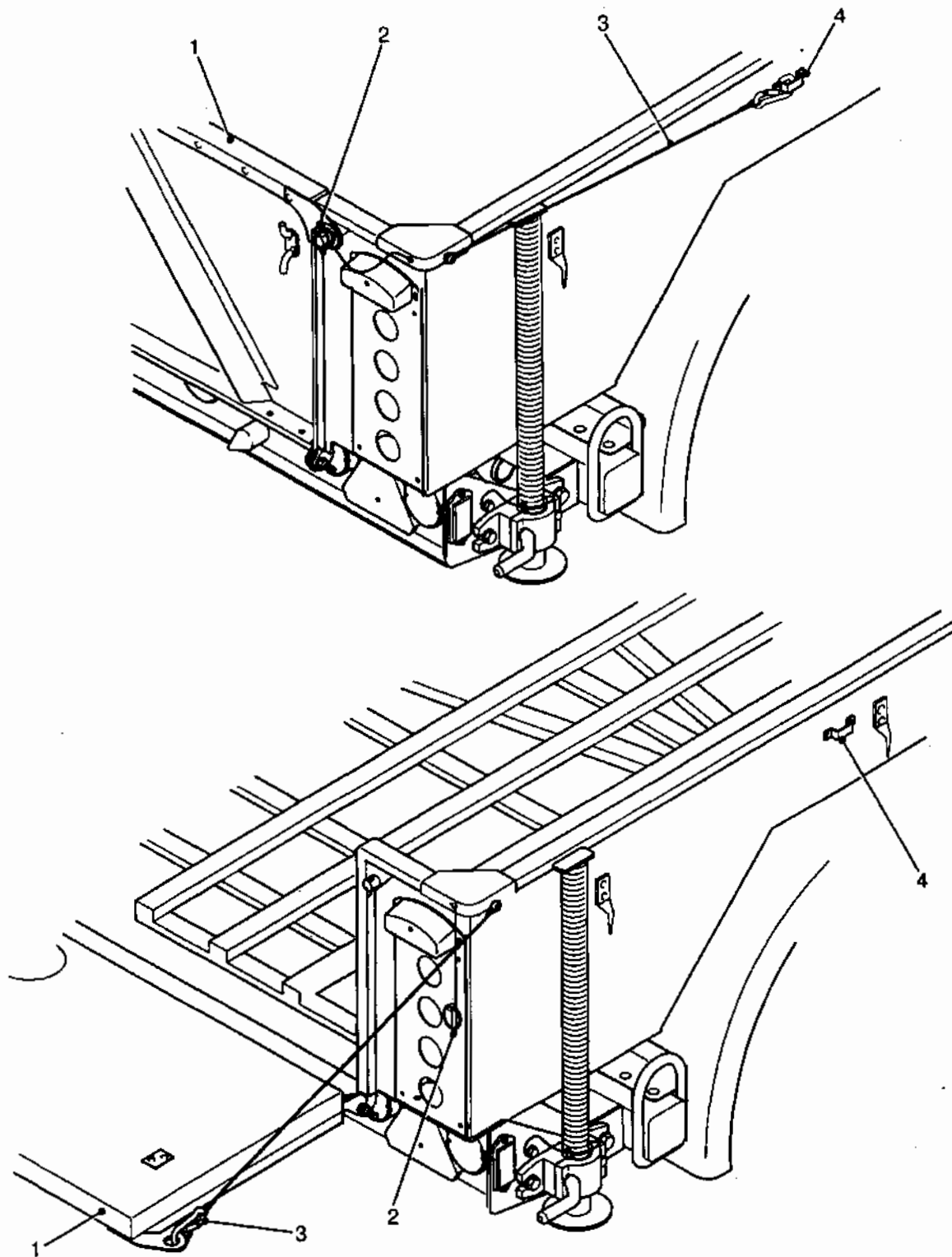
- 22.1 Ensure that the rear tow hatch is secured in the stowed position.
- 22.2 Remove the two locking pins (2) securing the tailgate in the closed position.
- 22.3 Allow the tailgate to lower, under control, until it reaches its maximum position.

WARNING

PERSONAL INJURY. THE TAILGATE MUST NOT BE LOADED IN EXCESS OF 150 KG (330 LB) MAXIMUM, THE LOAD MUST ALSO BE EVENLY DISTRIBUTED. ANY LOAD IN EXCESS OF THE MAXIMUM MAY CAUSE FAILURE OF THE SECURING CABLES AND RESULT IN INJURIES TO PERSONNEL.

23 To lower the tailgate parallel with the load area proceed as follows:

- 23.1 Release the two tailgate securing cables from their stowed position.
- 23.2 With the tailgate supported remove the two locking pins.
- 23.3 Connect each securing cable, in turn, to the tailgate as shown in Fig 4.
- 23.4 Lower the tailgate under control until the cables are fully extended.



- | | | | |
|---|-------------|---|----------------|
| 1 | Tailgate | 3 | Staple |
| 2 | Locking pin | 4 | Securing cable |

Fig 4 Tailgate

TRL/065

RECOVERY

WARNING

PERSONAL SAFETY. THE TOWING VEHICLE IS TO BE OF THE SAME OR A GREATER WEIGHT CATEGORY THAN THE DISABLED VEHICLE AND TOWING SPEEDS REDUCED TO AN APPROPRIATE LEVEL.

CAUTIONS

- (1) **EQUIPMENT DAMAGE.** The front lifting loops are not to be used for a direct lift. Attach recovery equipment around the chassis rails and then through the lifting loops.
- (2) **EQUIPMENT DAMAGE.** Do not winch the trailer with the prime mover still connected. Always disconnect and recover each vehicle separately.
- (3) **EQUIPMENT DAMAGE.** Extreme care is to be exercised to avoid damage to the trailer body when lifting onto a flatbed vehicle.

Recovery by the user

- 24 **Front.** User recovery is restricted to normal towing from the drawbar eye.
- 25 **Rear.** The trailer can be recovered from the rear using suitable shackles and towropes. This method is for emergency obstacle clearance only. The rear tow hitch is not to be used for self-recovery.

Recovery by REME

- 26 **Front.** Recovery is restricted to normal towing from the drawbar eye.
- 27 **Rear.** The trailer can be recovered from the rear using suitable shackles and towropes. This method is for emergency obstacle clearance only.
- 28 Where damage has occurred to the towing pintle or any other sub-system the trailer is to be lifted onto a suitable flatbed vehicle or recovery trailer. When carrying out a trailer lift extreme care is to be exercised to avoid damage to the body of the trailer. The front lifting loops are not to be used as the main point of lifting. The drawbar chassis rails are to be used with the lifting loops as a guide.

Winch recovery

- 29 **Front.** The trailer can be winched from the drawbar chassis. The spring hangars are not to be used as a winching point.
- 30 **Rear.** The trailer can be winched from the rear using the chassis outriggers. The spring hangars are not to be used as a winching point.
- 31 Always disconnect the prime mover and recover each vehicle separately.

Trailer recovery

- 32 The vehicle can be loaded and recovered using the following trailers:
 - 32.1 Trailer Recovery CL 20 tonne.
 - 32.2 44 Tonne Light 'A' mover.



CHAPTER 3
USER MAINTENANCE
CONTENTS

Para

- 1 General
- User maintenance
 - Road wheels (WARNINGS)
- 3 To remove a road wheel (WARNING)
- 4 To refit a road wheel
- 5 To check and top-up the brake fluid reservoir
- 7 Lamp, lens and reflector replacement (CAUTION)
- 10 Lubrication
- 12 Wash down (WARNING) (CAUTION)

Table

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1 Lamp type and wattage	5
2 Access method to lamps.....	7
3 Reflector replacement methods.....	7
4 Lubricating points.....	7

Fig

1 Wheel nut tightening sequence and spring restrainer position	3
2 Drawbar assembly	4
3 Lamp replacement	6
4 Lubricating points.....	9/10

GENERAL

- 1 User maintenance should be carried out at intervals specified in the Cat 601.
- 2 Refer to the Cat 601 for details of the oils and lubricants to be used when carrying out user maintenance.

USER MAINTENANCE**Road wheels****WARNINGS**

(1) PERSONAL HAZARD. OBSERVE ALL APPROPRIATE SAFETY INSTRUCTIONS CONCERNING JACKING AND SCOTCHING WHEN REMOVING AND REFITTING ROAD WHEELS.

(2) PERSONAL HAZARD. WHEN REPLACING A ROAD WHEEL ENSURE THAT ONLY 'WOLF' LANDROVER WHEEL RIMS ARE USED WITH THE REPLACEMENT WHEEL ASSEMBLY. FAILURE TO DO SO WILL AFFECT THE STABILITY OF THE VEHICLE.

(3) PERSONAL HAZARD. UNDER NO CIRCUMSTANCES ARE THE FRONT JOCKEY WHEEL OR REAR STANDS TO BE USED AS A METHOD OF JACKING UP THE TRAILER DURING ANY ROAD WHEEL REMOVAL/REFITTING PROCEDURE. THE JOCKEY WHEEL AND STANDS ARE USED FOR STABILITY AND MANOEUVRABILITY PURPOSES ONLY, THEY WILL NOT SUPPORT THE TRAILER WHEN A ROAD WHEEL IS REMOVED.

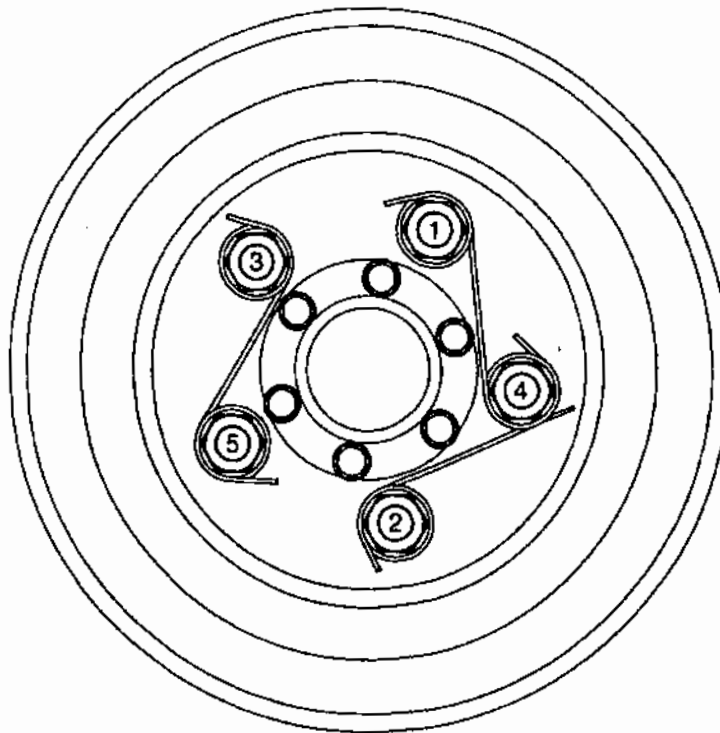
To remove a road wheel

- 3 Remove a road wheel, as follows:
 - 3.1 Ensure the handbrake is fully applied.
 - 3.2 Chock the road wheel on the opposite side of the trailer.
 - 3.3 Place a jack up under the road spring clamping plate.
 - 3.4 Remove the road wheel spring restrainers (Fig 1).
 - 3.5 Loosen the wheel nuts slightly.
 - 3.6 Using the jack raise the trailer to allow removal of the road wheel.
 - 3.7 Remove the 6 plastic caps from the axle hub cap.
 - 3.8 Remove the wheel nuts and remove the road wheel from the hub, taking care not to damage the wheel stud threads.

To refit a road wheel

- 4 Refit a road wheel, as follows:
 - 4.1 Position the road wheel near to the hub.
 - 4.2 Fit the road wheel onto the hub and wheel studs, taking care not to damage the threads.
 - 4.3 Fit the wheel nuts and tighten, do not fully tighten at this stage.
 - 4.4 Lower the trailer to the ground. Refit the 6 plastic caps to the axle hub cap.

- 4.5 Tighten the wheel nuts to 102 to 105 Nm with a torque wrench if available. Use a wheel brace if no torque wrench is available.
 - 4.5.1 Use the sequence as shown (Fig 1).
 - 4.5.2 Re-tighten the wheel nuts after approximately 3 miles.
 - 4.5.3 Re-torque the wheel nuts at the earliest opportunity. Refit the wheel nut restraints the correct way.
- 4.6 Refit the wheel nut spring restrainer (Fig 1) as follows:
 - 4.6.1 Ensure the tipped end is facing towards the wheel.
 - 4.6.2 Position the restrainer and offer up to the wheel nut(s).
 - 4.6.3 Pull back the end ring and slide the restrainer onto the nut.
 - 4.6.4 Release and ensure the fit is secure.
- 4.7 Lower and remove the jack.
- 4.8 Remove the scotching from the opposite trailer wheel.



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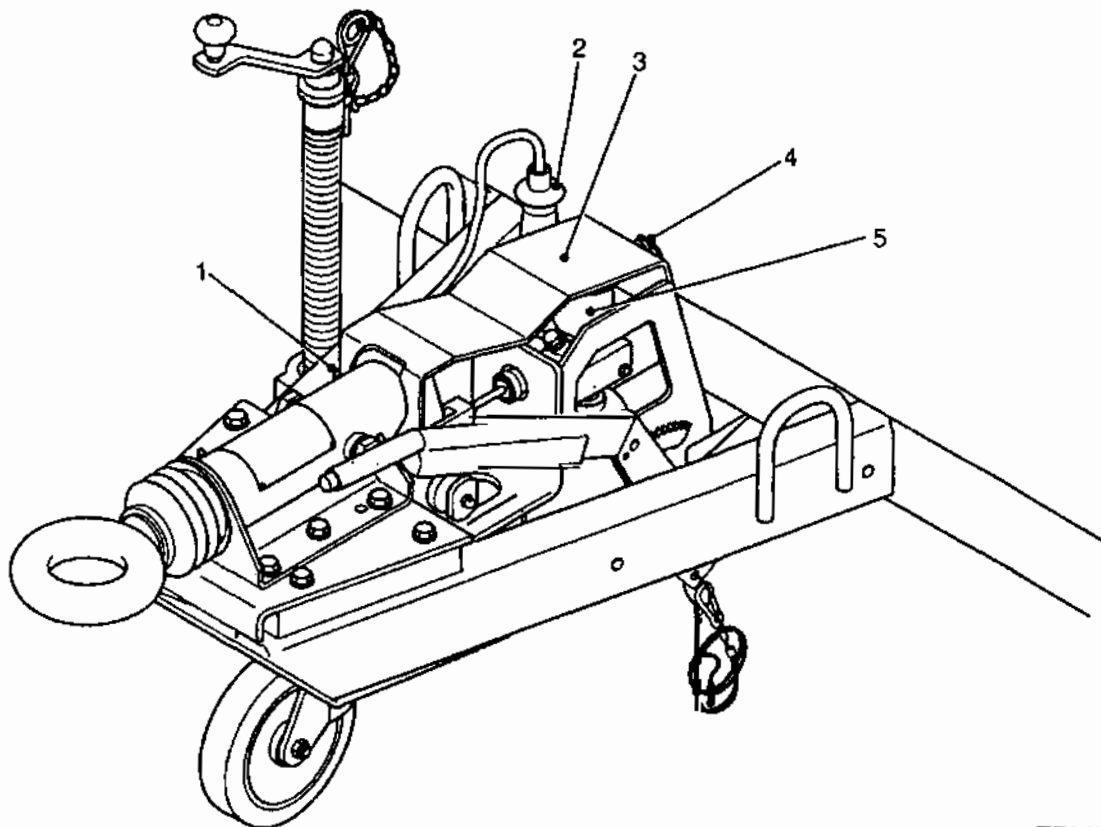
Fig 1 Wheel nut tightening sequence and spring restrainer position

To check and top-up the brake fluid reservoir

5 The hydraulic brake fluid reservoir (Fig 2(5)) level, can be checked by observing the translucent reservoir, ensure the fluid level is above the inscribed mark.

6 Top-up the reservoir, as follows:

- 6.1 Release the pin (4) securing the cover (3).
- 6.2 Remove the electrical plug (2) from its stowage clip.
- 6.3 Remove the cover by swinging out sideways approximately 60 degrees in the direction of the stowage clip before lifting at the rear, then disengaging the tang at the front end of the cover.
- 6.4 Remove the reservoir outer rubber cover.
- 6.5 Remove the reservoir cap.



TRL/032

- | | | | |
|---|-----------------|---|-----------|
| 1 | Grease nipple | 4 | Pin |
| 2 | Electrical plug | 5 | Reservoir |
| 3 | Cover | | |

Fig 2 Drawbar assembly

6.6 Top up the reservoir with fluid, as detailed in the Cat 601. Ensure that the fluid level is above the inscribed line.

NOTE

Ensure that the internal diaphragm is seated correctly. This should be done prior to refitting the outer dust cap as the diaphragm is visible through the translucent reservoir.

- 6.7 Refit the reservoir cap and wipe up any spilt fluid.
- 6.8 Refit the outer rubber cover.
- 6.9 Refit the cover by engaging and refitting the pin.
- 6.10 Stow the electrical plug.

Lamp, lens and reflector replacement

CAUTION

EQUIPMENT DAMAGE. If the towing vehicle has a 12V electrical system, the 24V lamps on the trailer must be changed to 12V lamps of an equivalent type and wattage. Additionally, an indelible and legible label must be fitted to the trailer, adjacent to the lighting cable, stating '12 VOLT SYSTEM'.

7 Refer to Table 1 for lamp type and wattage.

TABLE 1 LAMP TYPE AND WATTAGE

Serial (1)	Location (2)	Type (3)	Wattage (4)
1	Stop/tail	Bayonet	21/5 W
2	Turn	Bayonet	21 W
3	Fog	Bayonet	21 W
4	Number plate	Bayonet	5 W
5	Convoy	Bayonet	5 W
6	Front marker	Spade	5 W

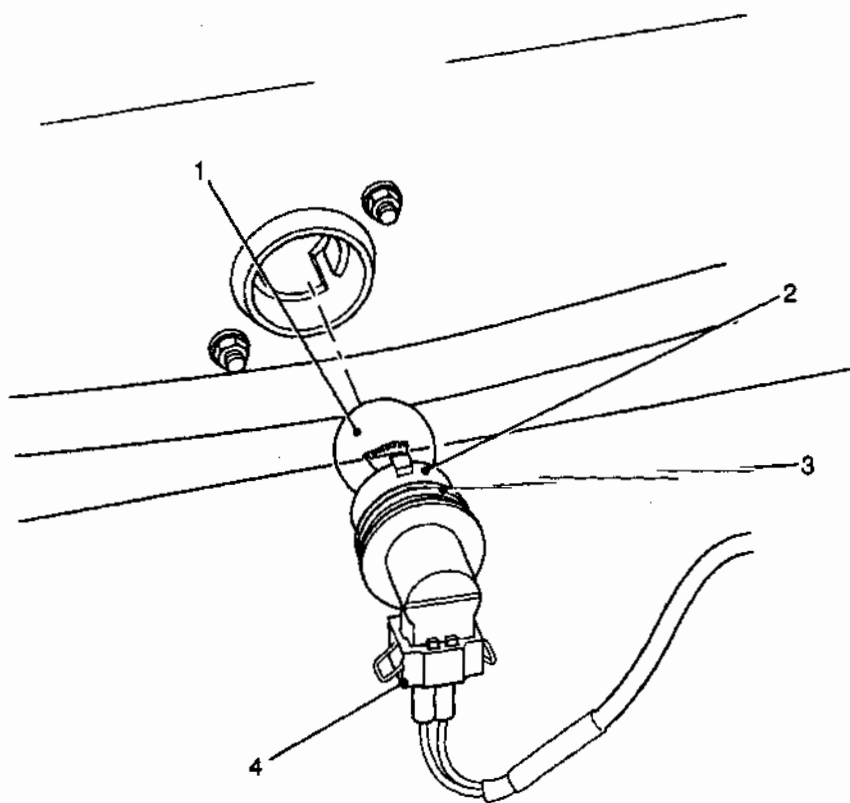
8 Refer to Table 2 and Fig 3 for method of access to lamps. To replace a lamp proceed as follows:

NOTE

This procedure is suitable for the stop/tail, turn, fog, convoy and front marker lamps.

- 8.1 Disconnect the branch connector (Fig 3(4)) by squeezing the metal clips together and pulling it clear of the lamp holder (2).
- 8.2 Rotate the lamp holder through 90 deg clockwise and release it from the chassis/plinth.
- 8.3 Replace the lamp (1) with one of an equivalent type and wattage, refer to Table 1.
- 8.4 Examine the lamp holder O-ring (3) for serviceability. If damaged REPORT to REME.

- 8.5 Refit the lamp holder and rotate through 90 deg counter-clockwise to lock in position.
- 8.6 Reconnect the branch connector by squeezing the metal clips together and refitting on the lamp holder. Ensure the branch connector is secure.
- 8.7 Check the operation of all lights.



TRL/053

- | | | | |
|---|-------------|---|------------------|
| 1 | Lamp | 3 | O-ring |
| 2 | Lamp holder | 4 | Branch connector |

Fig 3 Lamp replacement

TABLE 2 ACCESS METHOD TO LAMPS

Serial (1)	Location (2)	Access method and remarks (3)
1	Stop and tail	Rotate lamp holder through 90 deg
2	Turn	Rotate lamp holder through 90 deg
3	Fog	Rotate lamp holder through 90 deg
4	Number plate	Remove lens securing screw
5	Convoy	Rotate lamp holder through 90 deg
6	Front marker	Rotate lamp holder through 90 deg

9 Refer to Table 3 for reflector replacement methods.

TABLE 3 REFLECTOR REPLACEMENT METHODS

Serial (1)	Location (2)	Access method and remarks (3)
1	Rear	Screw (2 off) complete with sealing washer, plain washer and nyloc nut.
2	Side	Screw (2 off) complete with plain washer and nyloc nut.
3	Front	Screw (2 off)

Lubrication

10 At intervals detailed in the Cat 601, grease and lubricate the points detailed in Fig 4 and Table 4.

11 Lubricate the front jockey wheel pivot (3) with grease, as detailed in Cat 601, until the grease is clearly seen to extrude from both ends of the bush. Wipe off any excess.

TABLE 4 LUBRICATING POINTS

Serial (1)	Item (2)	Type (3)
1	Damper (2)	Grease nipple (Qty 4)
2	Jockey wheel pivot (3)	Grease nipple
3	Handbrake pivot (1)	Grease nipple
4	Brake operating pivot (4)	Grease nipple

Wash down

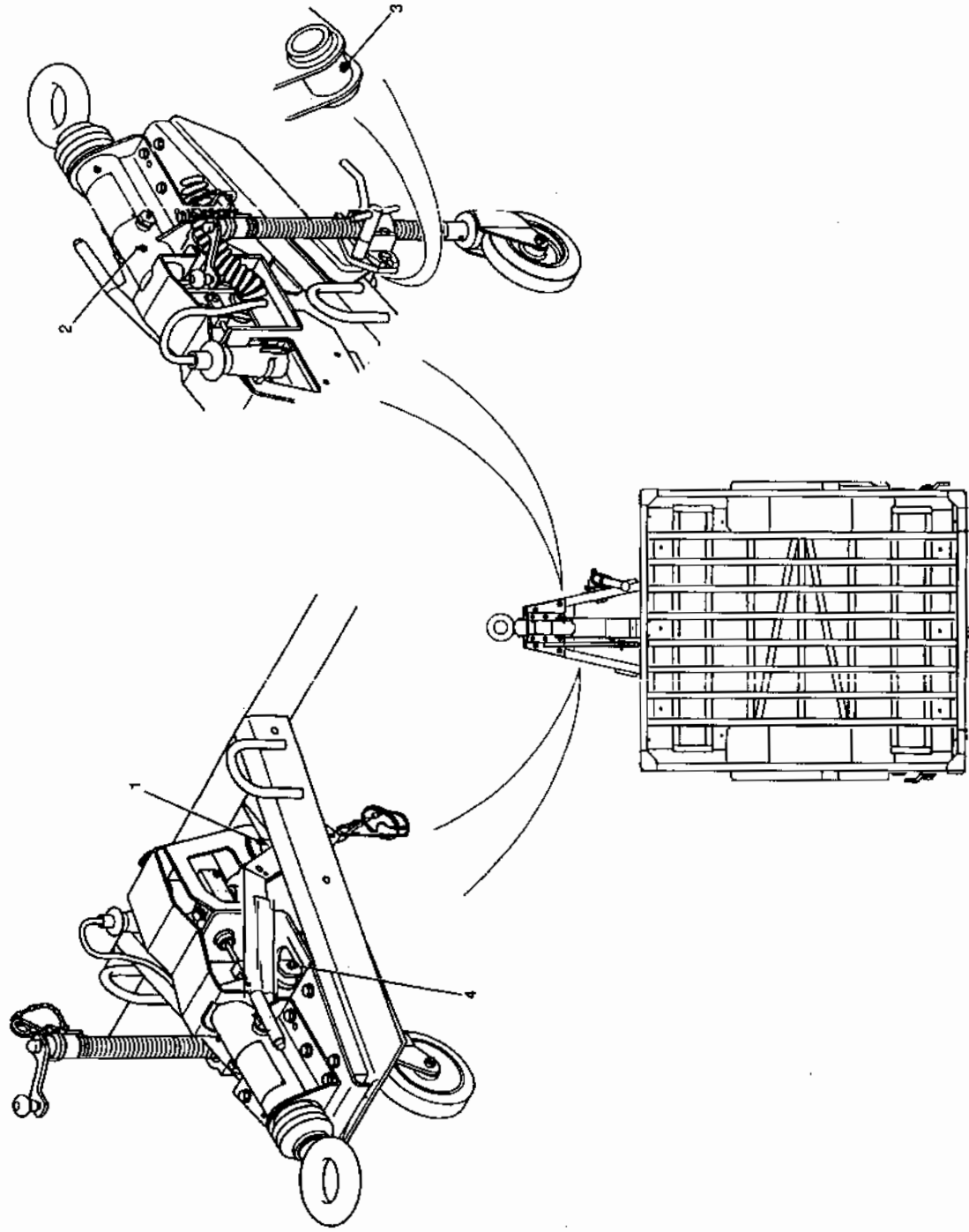
WARNING

SAFETY HAZARD. AFTER CROSS-COUNTRY USE, ENSURE THAT THE TRAILER IS THOROUGHLY CLEANED WITH PARTICULAR REGARD TO THE HANDBRAKE LEVER MECHANISM AND BRAKING SYSTEM.

CAUTION

EQUIPMENT DAMAGE. Sand is an abrasive material and will cause accelerated wear to components if not effectively removed.

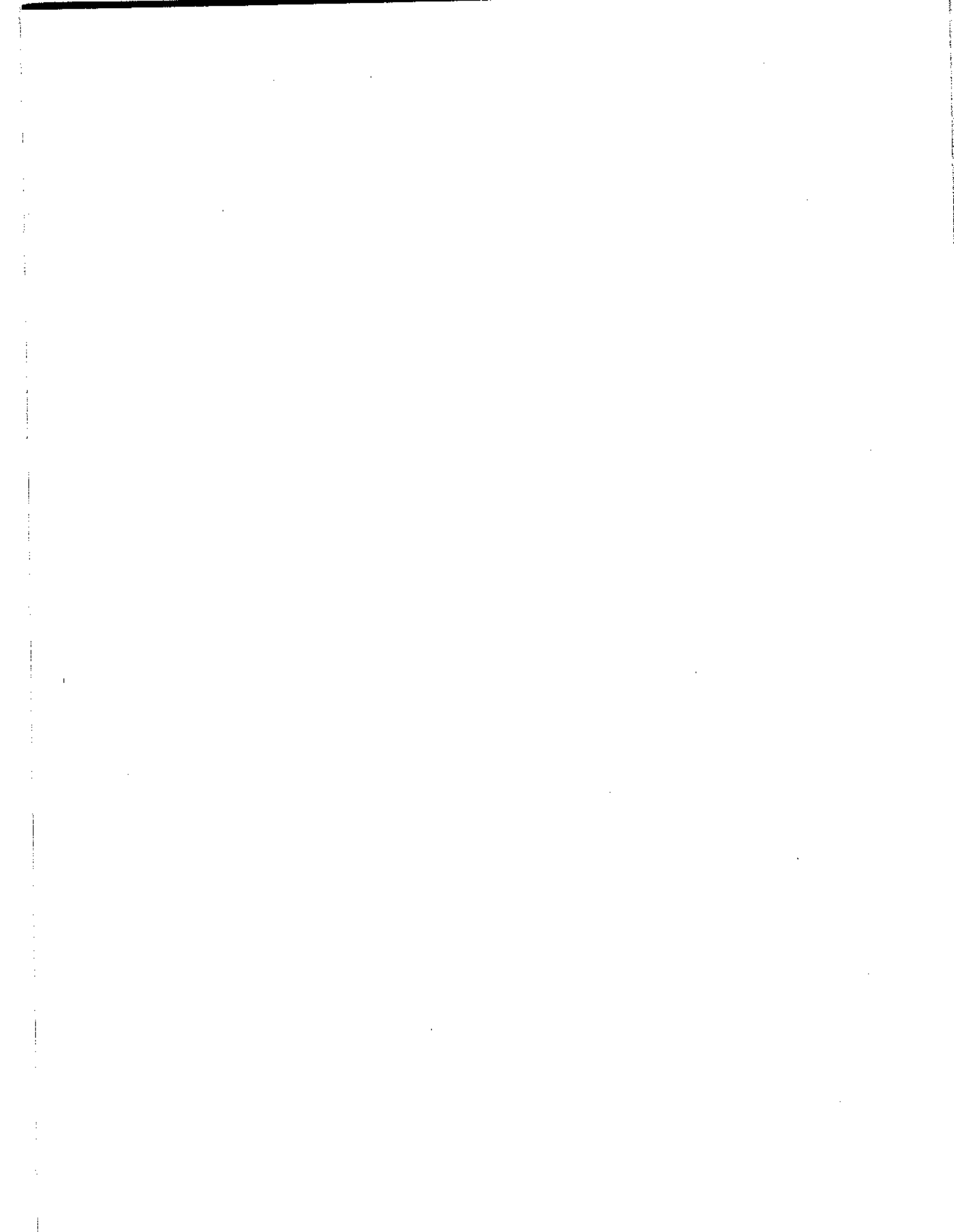
12 Do not rely on dry brushing to remove sand deposits, the preferred method is to wash down the equipment thoroughly with clean fresh water.



- 1 Handbrake pivot
- 2 Damper

- 3 Jockey wheel pivot
- 4 Brake operating pivot

Fig 4 Lubricating points



CHAPTER 4
DENIAL OF EQUIPMENT
CONTENTS

Para

General

- 1 Destruction
- 4 Degree of damage
- 5 Priorities for destruction
- 6 Spare parts
- 7 Equipment being carried on the trailer
- 8 Methods of destruction
- 9 Mechanical
- 10 Burning (WARNING)
- 11 Gunfire (WARNING)

Table

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1	Priorities for destruction.....	2
---	---------------------------------	---

GENERAL**Destruction**

1 Destruction of the equipment, when subject to capture by the enemy will be undertaken by the user arm **ONLY WHEN** ordered to do so by divisional or higher commanders, who may delegate the authority to subordinate commanders should the situation require it.

2 Destruction of the equipment is to be reported through command channels.

3 In general, destruction of essential parts, followed by burning, will usually be sufficient to render the equipment useless. However, selection of the particular method of destruction requires imagination and resourcefulness in the utilisation of the facilities at hand under the existing conditions. Time is usually critical. If destruction is ordered, due consideration should be given to:

3.1 Selection of a point of destruction that will cause greatest obstruction to enemy movement but not prove a hazard to friendly troops from fragments or ricocheting projectiles which may occur incidental to the destruction by gunfire.

3.2 Observance of appropriate safety precautions.

Degree of damage

4 The degree of damage inflicted to prevent the equipment being used by an enemy shall be as follows:

4.1 Methods of destruction should achieve such damage to equipment and essential spare parts that it will not be possible to restore the equipment to a usable condition in the combat zone by repair or be cannibalisation.

4.2 Classified equipment must be destroyed in such degree to prevent whenever possible, duplication by the enemy or the revelation of function or operation.

4.3 Any classified documents, notes, instructions or other written material pertaining to function, operation, maintenance or employment including drawings or parts lists must be destroyed in a manner to render them useless to the enemy.

Priorities for destruction

5 Priorities for destruction are:

5.1 Priority must be given to the destruction to classified equipment and associated documents.

5.2 When lack of time and/or stores prevents complete destruction of equipment, priority is to be given to the destruction of essential parts, and the same parts are to be destroyed on all like equipment.

5.3 A guide to priorities for the destruction of this equipment is shown below.

TABLE 1 PRIORITIES FOR DESTRUCTION

Serial (1)	Parts (2)	Priority (3)
1	Tyres and suspension	1
2	Braking system	2
3	Frame	3

Spare parts

6 The same priority, for destruction of component parts of a major item necessary to render the item inoperable, must be given to the destruction of similar components in spare parts storage areas.

Equipment being carried on the trailer

7 Equipment being carried on the trailer should be destroyed in accordance with the priorities for the equipment itself, taking into account the relative importance of the equipment being carried and the trailer itself.

Methods of destruction

8 The following information is for guidance only. Of the several means of destruction, those most generally applicable are as under.

Mechanical

9 This requires an axe, pick, crowbar or similar implement. The equipment should be destroyed in accordance with the priorities given in Para 5.

Burning

WARNING

PERSONAL HAZARD. DUE CONSIDERATION SHOULD BE GIVEN TO THE HIGHLY FLAMMABLE NATURE OF GASOLINE AND ITS VAPOUR. CARELESSNESS IN ITS USE MAY RESULT IN PAINFUL BURNS. GASOLINE SHOULD ALWAYS BE HANDLED IN ACCORDANCE WITH THE REQUIREMENTS OF JSP 317.

10 This requires gasoline, oil or other flammables.

10.1 Smash all vital parts, in accordance with the priorities given in Para 5.

10.2 Pour gasoline and oil in, on and over the entire equipment.

10.3 Ignite by means of an incendiary grenade fired from a safe distance, by a burst from a flame thrower, by a combustible train of suitable length, or other appropriate means.

10.4 Take cover immediately.

Gunfire

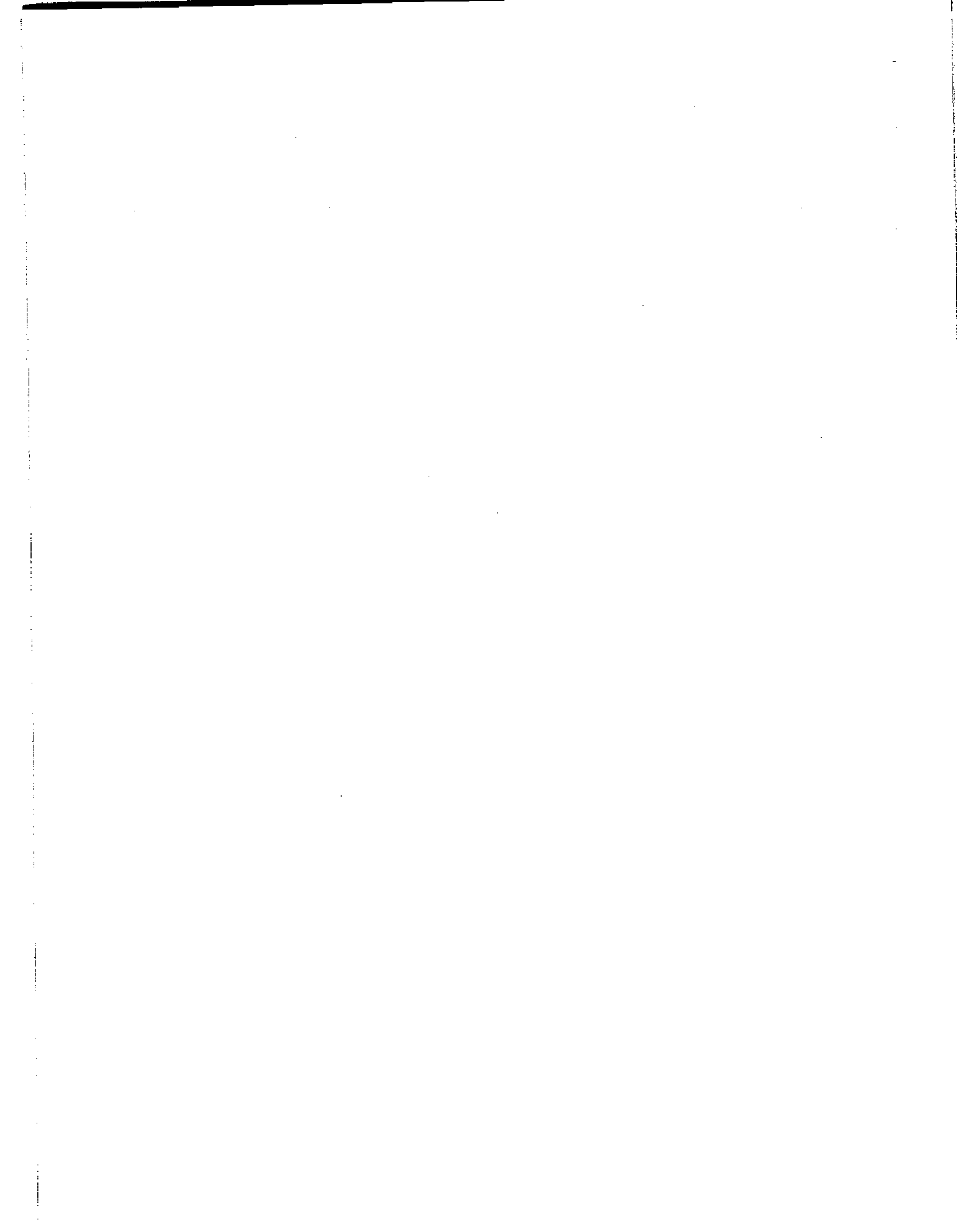
WARNING

PERSONAL HAZARD. FIRING ARTILLERY AT RANGES OF 500 YARDS OR LESS SHOULD BE FROM COVER. FIRING RIFLE GRENADES OR ANTI-TANK ROCKETS SHOULD BE FROM COVER.

11 When destroying the equipment by gunfire proceed as follows.

11.1 Smash all vital parts, in accordance with the priorities given in Para 5.

11.2 Destroy the equipment by gunfire, using adjacent gun tanks, self-propelled guns artillery, rifles using rifle grenades or launchers using anti-tank rockets. Fire on the equipment aiming at the road wheels. Although one well placed direct hit may render the equipment temporarily useless, several hits are usually required for complete destruction unless an intense fire is started, in which case the equipment may be considered destroyed.



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TRAILER LIGHTWEIGHT GS CARGO

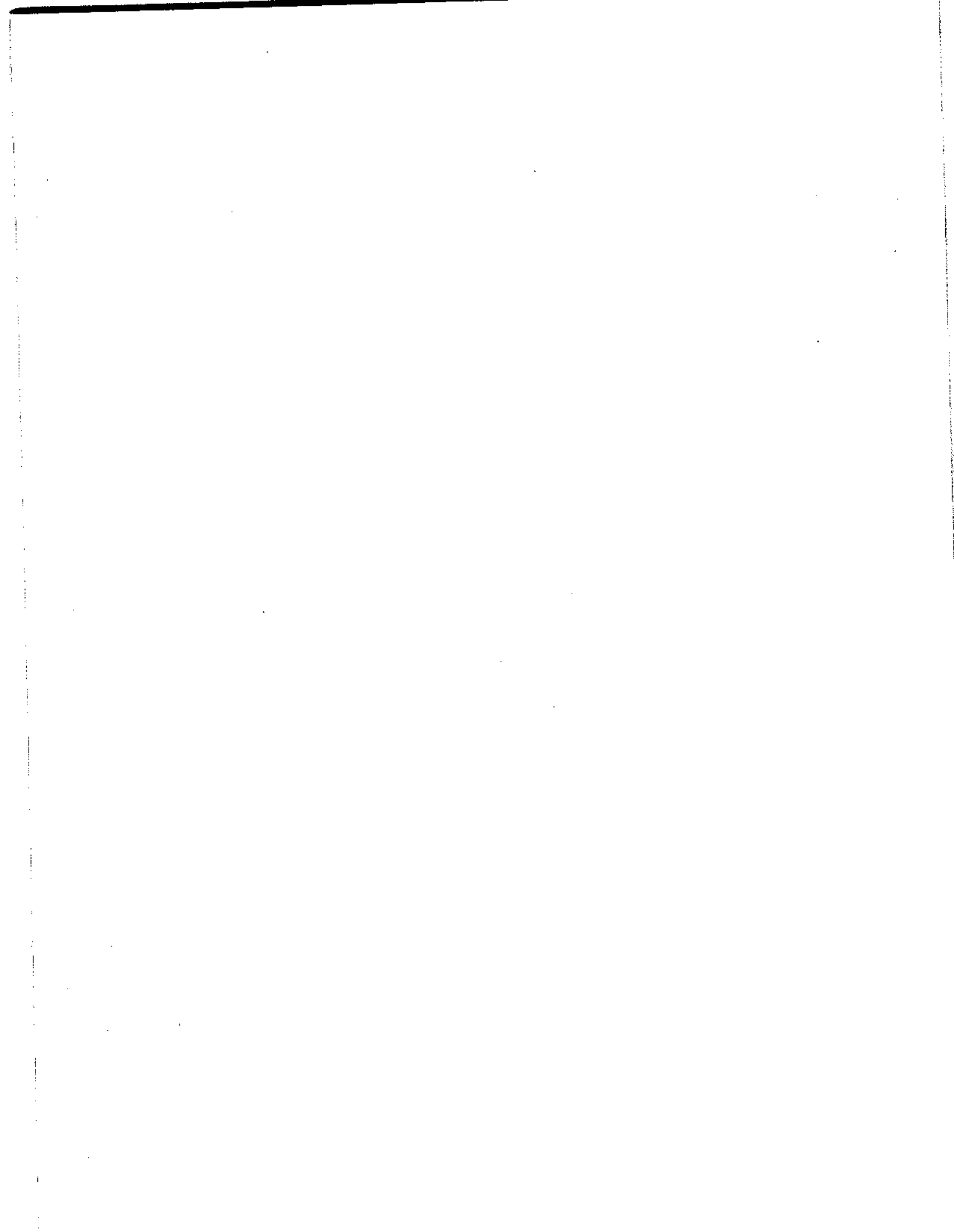
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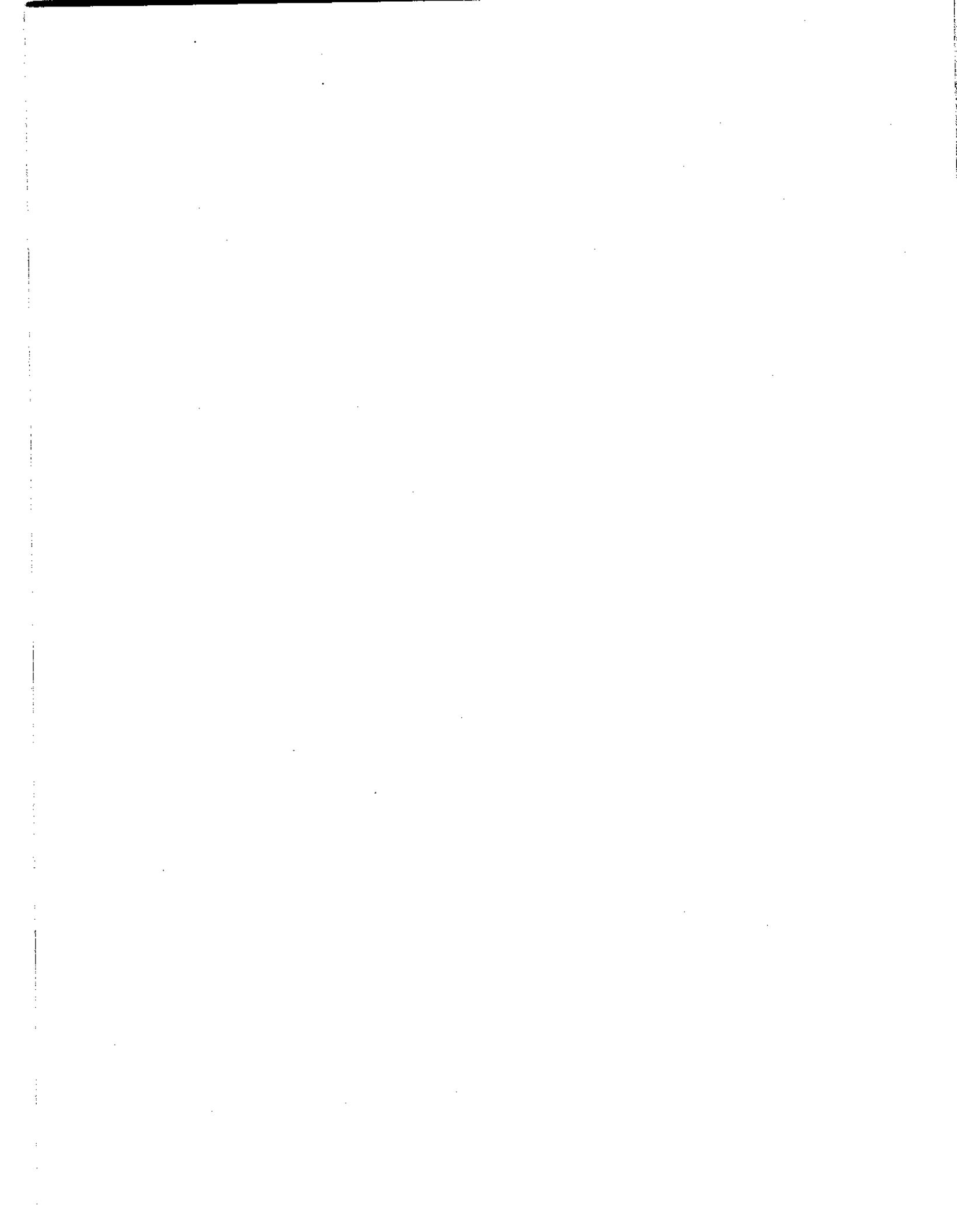
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TECHNICAL DESCRIPTION

Chapter

- 1 Chassis and body
- 2 Braking system
- 3 Electrical system

PREFACE

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INTRODUCTION

1 Service users should forward any comments concerning this Publication through the channels prescribed in Army Equipment Support Publication (AESP) 0100-P-011-013. An AESP Form 10 is provided at the end of this publication; it should be photocopied and used for forwarding comments on this AESP.

2 AESPs are issued under Defence Council authority and, where AESPs specify action to be taken, the AESP will of itself be sufficient authority for such action and also for the demanding of the necessary stores, subject to the provisions of Para 3 below.

3 The subject matter of this publication may be affected by Defence Council Instructions (DCIs), Standard Operating Procedures (SOPs) or by local regulations. When any such Instruction, Order or Regulation contradicts any portion of this publication they are to be taken as the overriding authority.

RELATED AND ASSOCIATED PUBLICATIONS

Related publications

4 The Octad for the subject equipment consists of the categories as detailed overleaf. All references are prefixed with the first eight digits of this publication. The availability of the publications can be checked by reference to the relevant Group Index (refer to AESP 0100-A-001-013).

Category/Sub-category			Information Level			
			1 User/ Operator	2 Unit Maintenance	3 Field Maintenance	4 Base Maintenance
1	0	Purpose and Planning Information	101	101	101	*
	1	Equipment Support Policy Directive	111	111	111	*
	2	Equipment Support Policy Directive	*	*	*	*
2	0	Operating Information	201	*	*	*
	1	Aide Memoire	*	*	*	*
	2	Training Aids	*	*	*	*
3		Technical Description	201	302	302	*
4	1	Installation Instructions	411	411	411	*
	2	Preparation for Special Environments	421	421	421	*
5	1	Failure Diagnosis	201	512	512	*
	2	Maintenance Instructions	201	522	522	*
	3	Inspection Standards	*	532	532	*
	4	Calibration Procedures	*	*	*	*
6		Maintenance Schedules	601	601	*	*
7	1	Illustrated Parts Catalogues	711	711	711	*
	2	Commercial Parts Lists	*	*	*	*
	3	Complete Equipment Schedule, Production	*	*	*	*
	4	Complete Equipment Schedule, Service Edition (Simple Equipment)	741	741	741	*
	5	Complete Equipment Schedule, Service Edition (Complex Equipment)	*	*	*	*
8	1	Modification Instructions	*	*	*	*
	2	General Instructions, Special Technical Instructions and Servicing Instructions	*	821	821	*
	3	Service Engineered Modification Instructions (RAF only)	*	*	*	*

* Category/sub-category not published

Associated publications

5 A full list of associated publications is as follows:

<u>Reference</u>	<u>Title</u>
AESP 2330-E-202	Trailer Lightweight GS Cargo

LIST OF ABBREVIATIONS

6 The following abbreviations are used in this publication:

AESP	Army Equipment Support Publication
Ah	Ampere Hour
CES	Complete Equipment Schedule
dB	Decibel
dc	Direct Current
DCIs	Defence Council Instructions
EMER	Electrical Mechanical Engineering Regulation
GIE	Government Issued Equipment
LCT	Landing Craft Tank
LST	Landing Ship Tank
NATO	North Atlantic Treaty Organisation
NSN	Nato Stock Number
SOPs	Standard Operating Procedures
UK	United Kingdom

CHAPTER 1
CHASSIS AND BODY
CONTENTS

Para	Description	Page
1	Chassis	
6	Towing eye and damper assembly	
7	Cargo body	
10	Jockey wheel, rear stands and tow hitch	
15	Axle, hubs and suspension	

Fig		Page
1	Trailer lightweight GS cargo	3
2	Axle and suspension (body removed for clarity)	5/6

DESCRIPTION

Chassis

1 The trailer chassis and integral drawbar (Fig 1 (10)) is formed from rectangular C-section steel, cut and welded to form the frame and crossmembers. Strengthening plates and mounting brackets are attached to the frame assembly. Outrigger assemblies are fitted to the frame to provide cargo body support and to carry lighting assemblies. The rear crossmember is stiffened by bracing sections to provide a strong point for a rear facing tow hitch, used for empty trailer movement only.

2 The chassis frame is drilled to accept the screws holding the cargo body (1) to the chassis. A balata belting interfacia is fitted between the cargo body and chassis, providing a measure of sound proofing to reduce cargo body drumming.

3 The drawbar is drilled to provide fixing points for the towing eye and damper assembly (5) and the brake actuating mechanism, the handbrake assembly, the hydraulic master cylinder and the wind down jockey wheel (11). A spring clip which holds the trailer electrics plug when not in use, is attached to the drawbar right hand side.

4 Hanging brackets and fixing points are attached to the main part of the chassis frame to provide anchor points for the mudwings (6), springs, rubber springs and shock absorbers.

5 The rear stands (2 and 7) are attached to the main chassis assembly, one to each side member. The rear crossmember carries the lighting assembly mounting brackets as well as the rear tow hitch (8). The side reflector plates are fitted to the chassis side members, two each side.

Towing eye and damper assembly

6 The fixed towing eye and overrun brake damper assembly is fitted to the draw bar by bolts, nuts and washers. Operation of the towing vehicle brakes causes the trailer to push on the towing eye and on through the damper assembly operating arm, causing a pivoted lever fixed to the draw bar to move back, pushing the piston in the hydraulic master cylinder. The overrun brake damper assembly has internal hydraulics to dampen out the backwards push so that under normal driving conditions the trailer brakes do not jerk on and off.

Cargo body

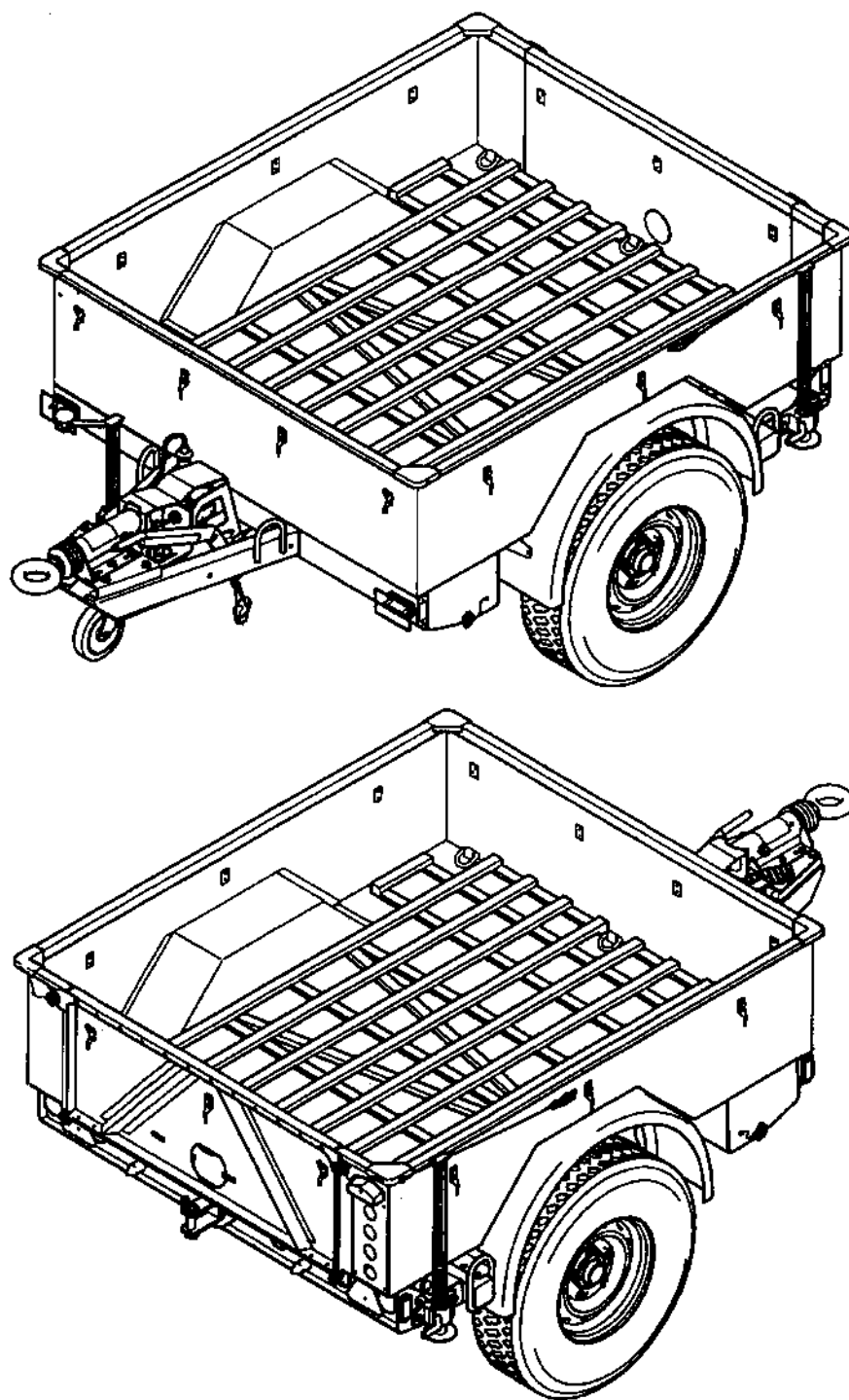
7 The all metal cargo body is formed from stainless steel panel assemblies welded together. Hooks are riveted to the front, sides and rear of the trailer, three to each side and four to the front panel and rear panel and tailgate to engage the tilt cover securing rope. The cargo body assembly is fixed through the floor to the chassis by ten screws complete with nuts and washers and six load securing shackles (3) complete with washers, plastic isolator and plain, and thin nuts. The two wheel arches are integrally formed as part of the floor and side panel assemblies.

8 The tailgate assembly (9) is hinged at the bottom edge and swings down through 180 degrees to allow access to the cargo space. When the tailgate is located in the up position, pins and safety locks hold it in position.

9 The shaped wooden duckboard (4) fits inside the trailer body, the duckboard is not attached to the trailer except when a cargo is lashed to the six load securing shackles in the floor of the trailer. The canvas cover is attached to the trailer cleats by a rope.

KEY TO FIG 1

1	Body	7	Rear stand
2	Rear stand	8	Tow hitch
3	Load securing shackle	9	Tailgate assembly
4	Duckboard	10	Chassis and integral drawbar
5	Damper assembly	11	Jockey wheel
6	Mudwing		



TRL/027

Fig 1 Trailer light weight GS cargo

Jockey wheel, rear stands and tow hitch

10 The jockey wheel mounting bracket is bolted to the drawbar right hand side member near the towing eye. By removing a locking pin, the jockey wheel can be swung through 90 degrees on its mounting bracket to lie alongside the drawbar side member giving good ground clearance while being towed. The locking pin must be replaced for safety.

11 When swung down, the locking pin is utilised to locate the jockey wheel vertically. The jockey wheel tube position can be adjusted relative to the mounting bracket with a clamp bolt and the wheel wound up and down to the desired height using the handle at the top of the assembly. A spring clip is used to lock the handle fore and aft relative to the chassis when the jockey wheel is at the desired height or in the towing position.

12 The two rear mounted stands (2 and 7) are used in conjunction with the jockey wheel to provide stability when the trailer is parked. By removing a locking pin, a rear stand can be lowered from the stowed position and the locking pin then used to lock the stand vertically. The height of the rear stands can be adjusted using the clamp bolts provided.

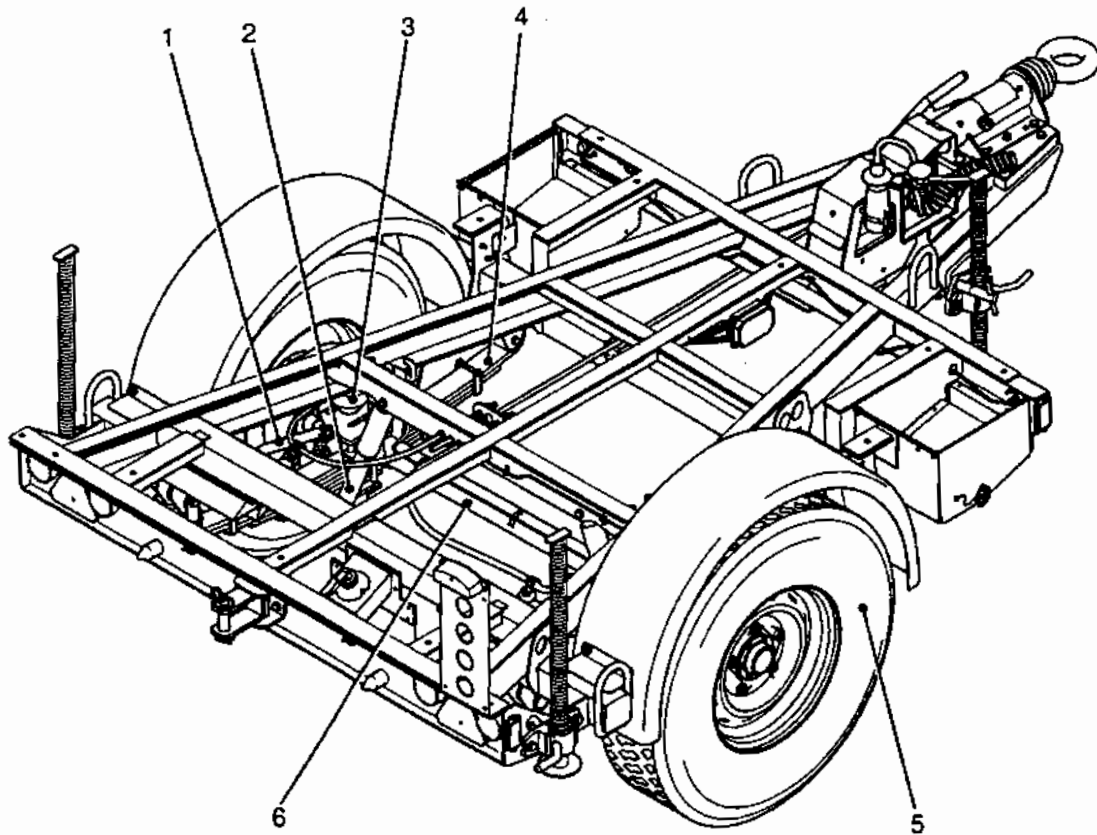
13 When parked, the trailer should be at level by adjusting the jockey wheel and rear stands.

14 A tow hitch (8) is bolted to the rear crossmember of the trailer and incorporates a towing pin secured by a snap ring cotter assembly.

Axle, hubs and suspension

15 The beam axle (Fig 2 (6)) is fabricated from steel tube and runs transversely across the trailer chassis on the line of the centre cross member. The hubs use tapered roller bearings (inner and outer) adjusted for fit by the hub nut. The disc brake is bolted to the hub and the disc caliper to the hub carrier. A fabricated metal stone guard is fitted to exclude road dirt. Each road wheel (5) is attached to a hub by five tapered nuts.

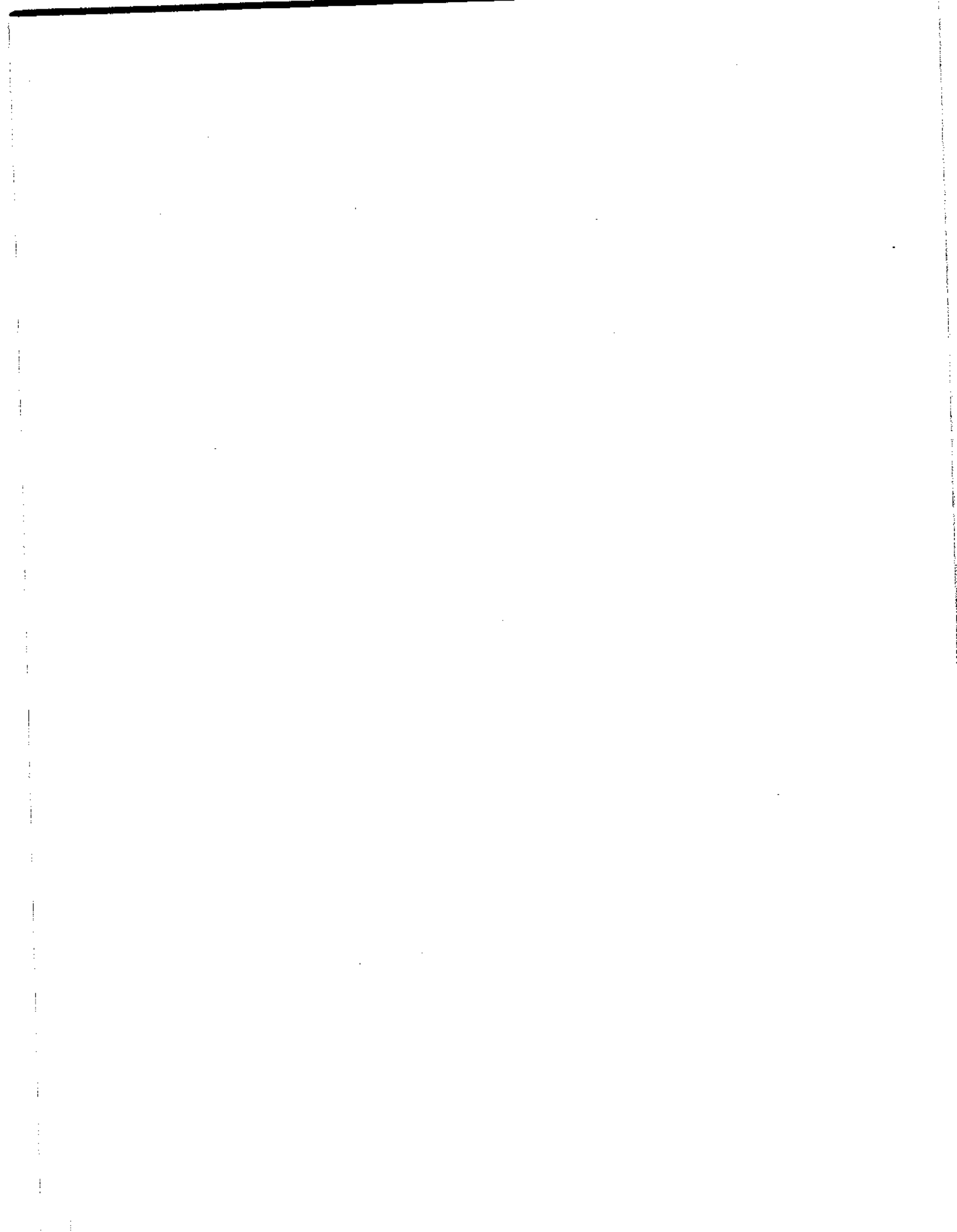
16 The semi-elliptical suspension springs (4) are attached at each end to hanging brackets on the chassis through rubber bushes. The rear spring mountings have a drop link arrangement. The springs are attached to the axle using a U bolt and stud configuration. The shock absorbers (2) are attached to a plate associated with the U bolt fixings and to bolts positioned through the chassis crossmember. The Aeon rubber springs (3) are fixed to the chassis directly above the centre line of the axle and the leaf springs. The transverse anti-roll bar (1) is connected between the two spring assemblies and is located through rubber bushed mounting arms to the chassis.



TRL/048

- | | | | |
|---|--------------------|---|------------|
| 1 | Anti-roll bar | 4 | Spring |
| 2 | Shock absorber | 5 | Road wheel |
| 3 | Aeon rubber spring | 6 | Axle |

Fig 2 Axle and suspension (body removed for clarity)



CHAPTER 2
BRAKING SYSTEM
CONTENTS

Para

	Introduction
1	General
	Detailed description
3	Master cylinder
6	Overload protection accumulator
9	Auto-reverse valve
10	Calipers
11	Handbrake
	System operation
16	Forward
19	Reverse

Fig

Page

1	Brake components (drawbar)	2
2	Handbrake assembly	4

INTRODUCTION

General

1 The braking system fitted to the trailer is a disc brake hydraulically activated, applied during trailer overrun, incorporating an auto-reversing overrun system and a mechanical handbrake.

2 The braking systems comprises:

2.1 Master cylinder (Fig 1(3)).

2.2 Overload protection accumulator (6).

2.3 Auto-reverse valve block.

2.4 Calipers.

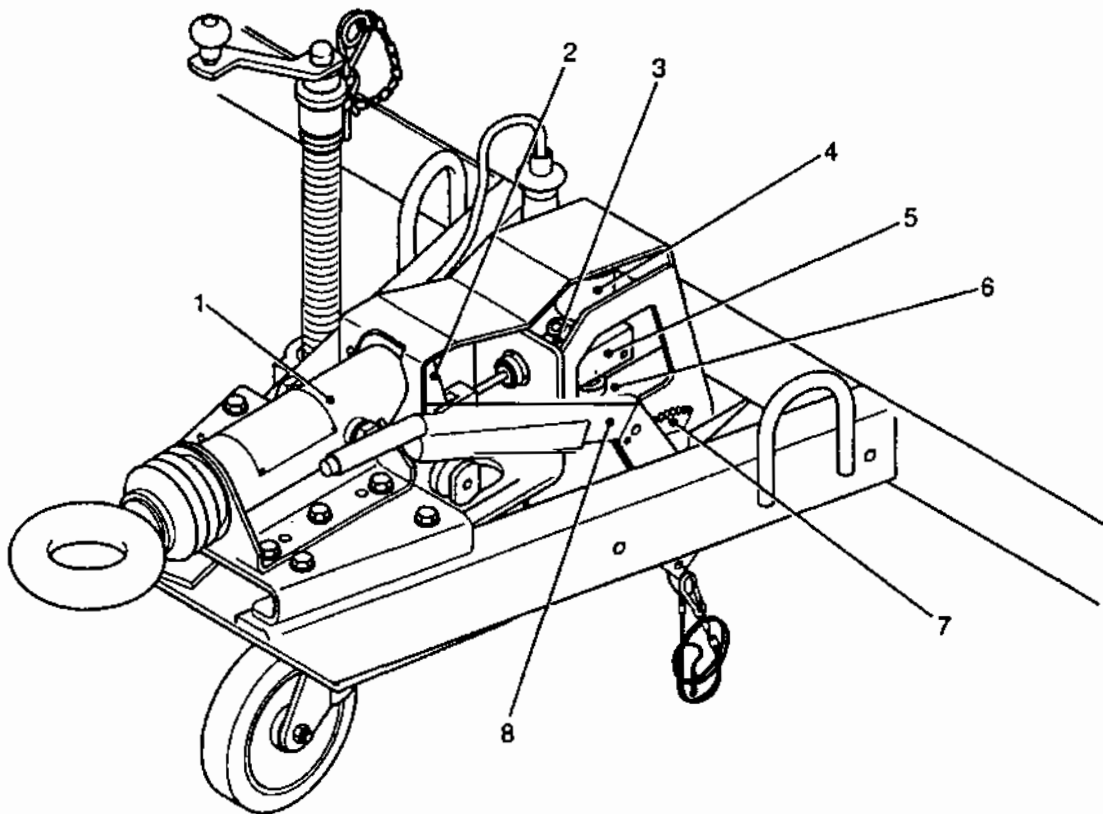
2.5 Handbrake (8) and breakaway cable.

2.6 Mechanical linkages, cables and hydraulic pipes.

DETAILED DESCRIPTION**Master cylinder**

3 The master cylinder (Fig 1(3)) is bolted to the front end assembly mounted directly behind the towing eye damper (1). The pivotal brake operating lever (2) is attached to the master cylinder operating rod by a forked yoke end.

4 The master cylinder is a standard commercial unit with a translucent see-through reservoir, allowing quick observation of the fluid level during before use checks and servicing.



TRL/036

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| 1 | Damper | 5 | Manifold block |
| 2 | Brake operating lever | 6 | Overload protection accumulator |
| 3 | Master cylinder | 7 | Ratchet |
| 4 | Reservoir | 8 | Handbrake lever |

Fig 1 Brake components (drawbar)

5 Mounted directly under the master cylinder is a manifold block (5), hydraulically connected to the master cylinder by a flexible pipe. Two threaded outlets are used to connect the manifold block to the brake system and to the overload protection accumulator.

Overload protection accumulator

6 The overload protection accumulator (6) is screwed directly into the manifold block, and retained by a bracket and grub screw, which prevents the accumulator from unscrewing.

7 The accumulator is a pressure chamber split by a diaphragm. One side of the diaphragm is pressurised with nitrogen, pre-set to a pressure of 91 bar, the other side is connected into the hydraulic circuit.

8 The accumulator is a non-maintenance unit.

Auto-reverse valve

9 The auto-reverse valve (Fig 2 (10)) is mounted on the Right-Hand (RH) brake caliper hub pivot unit. The valve is a non-maintenance sealed unit, which activates the trailer auto-reverse system.

Callipers

10 The brake calipers (Fig 2 (1 and 9)) are standard type, with an integral mechanical handbrake mechanism. The calipers are mounted in such a way that forward or reverse motion allows the caliper to partially rotate.

Handbrake

11 The handbrake is a mechanical system comprising:

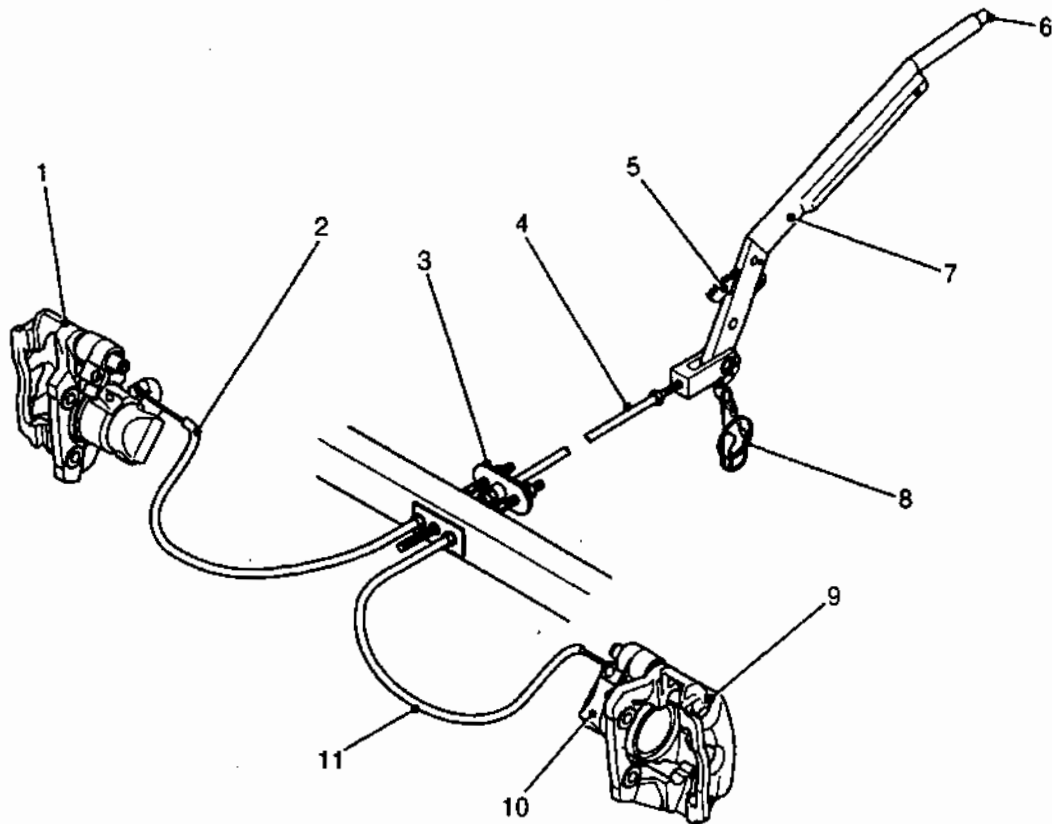
- 11.1 Handbrake lever (Fig 2 (7)).
- 11.2 Brake rod (4) and balance bar (3).
- 11.3 Cables (2 and 11).
- 11.4 Handbrake arm (on calipers).

12 The handbrake is a ratchet and pawl type, operated by a pawl release button (6), fitted in the end of the handbrake lever (7), connected to the pawl by a rod. The pawl engages with a ratchet (5) mounted on the left side of the front end bracket.

13 The handbrake lever is pivoted below the ratchet. The end of the lever is connected to the brake rod by a forked yoke end. Also connected to the yoke end bolt is a breakaway cable (8).

14 The brake rod (4) is connected to the balance bar (3) which in turn is connected to the LH and RH handbrake cables (2 and 11). The balance bar compensates for uneven brake pad and cable wear.

15 The handbrake cables are connected to the arms fitted to each caliper (1 and 9).



TRL/037

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| 1 | LH caliper | 7 | Handbrake lever |
| 2 | LH brake cable | 8 | Breakaway cable |
| 3 | Balance bar | 9 | RH caliper |
| 4 | Brake rod | 10 | Auto-reverse valve |
| 5 | Ratchet | 11 | RH brake cable |
| 6 | Pawl release button | | |

Fig 2 Handbrake assembly

SYSTEM OPERATION**Forward**

16 The trailer braking system operates during trailer overrun. When the towing brakes are applied, forward inertia of the trailer causes the towing eye damper to move rearwards. The damper absorbs violent forces, smoothing out brake applications and release. The damper pushes against the brake operating lever (Fig 1(2)) which in turn moves the push rod, operating the master cylinder.

17 Due to the forward motion of the trailer, a torque is generated at the wheel by the friction drag of the pads on the brake disc, holding the calipers in a forward biased condition. This position acts on a compression spring mounted between a stop on the brake back plate and the rotating caliper carrier. The compression spring pushes the piston in the auto-reverse valve to hold the check valve off its seat, allowing pressurised brake fluid to the calipers, applying the brakes. The higher the inertia the more aggressive the braking.

18 The overload protection accumulator diaphragm will expand if and when the brake line pressure exceeds 91 bar. This expansion of the diaphragm will instantly relieve the pressure protecting the hydraulic system components from any overload.

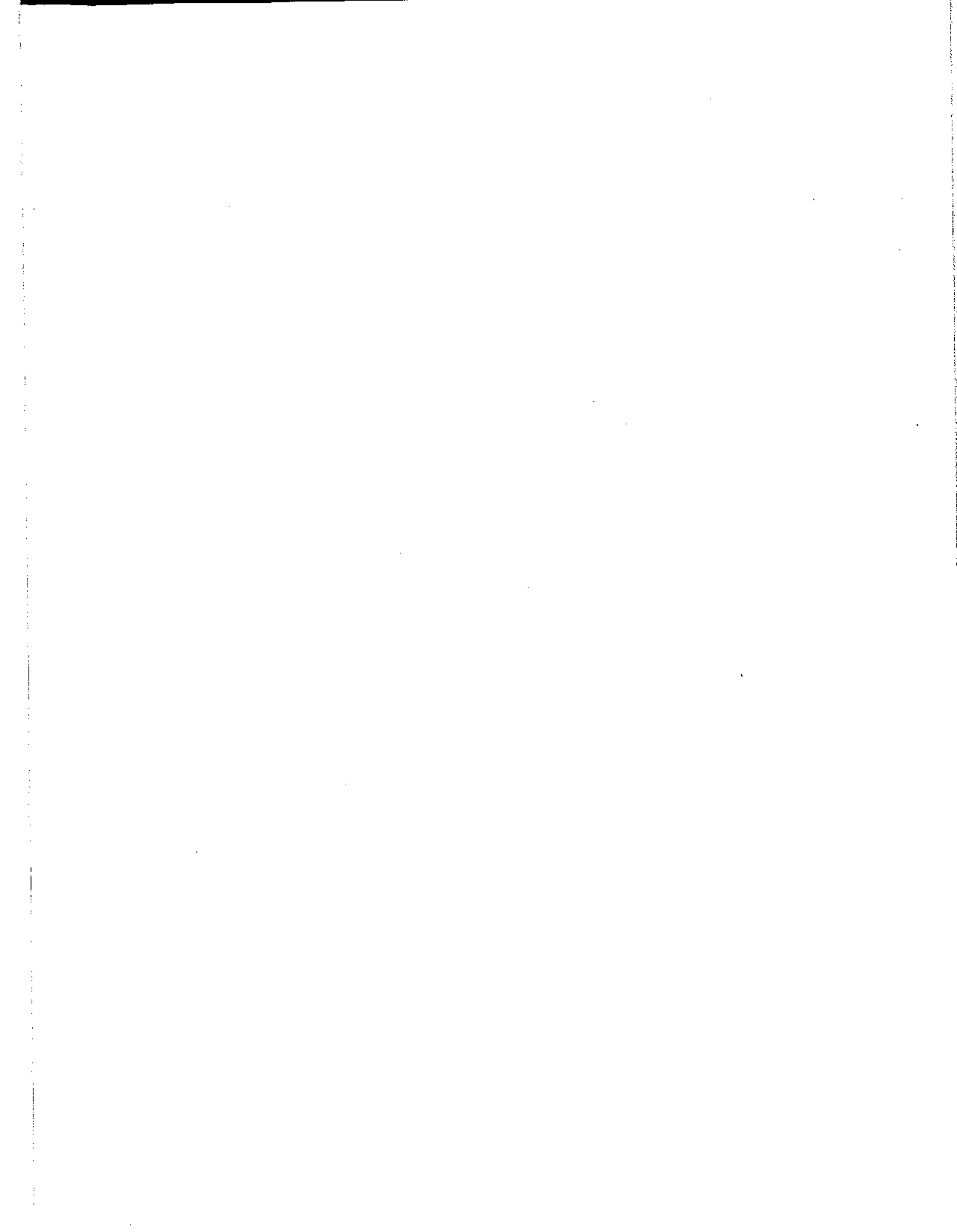
Reverse

19 Normal reversing of the trailer will move the towing eye damper rearwards, applying the brakes. The torque applied to the caliper by the friction drag of the brake pads in contact with the brake disc rotates the RH caliper in a reverse direction against the compression spring forces, that bias it forward. Simultaneous with this, the piston inside the auto-reverse valve is allowed to move as the fixed stop holding it in the forward bias is relaxed.

20 Brake fluid upstream pressure will start to move the piston to the new physical stop position relaxing the holding position it maintains on the auto-reverse valve check valve, closing the check valve, retaining master cylinder pressure in the upstream line and maintaining fluid in the master cylinder.

21 Downstream pressure will decrease due to the piston in the valve moving against a second compression spring being overcome by the pressure trapped downstream.

22 The compression spring maintains sufficient pressure on the piston to ensure that the decreased pressure is such that enough friction at the brake pad and disc is present to maintain the rotating caliper in its reverse position. The level of friction generated at the brake pad and disc is insufficient to cause sufficient braking to arrest the trailer in its rearward movement.



CHAPTER 3
ELECTRICAL SYSTEM
CONTENTS

Para

- 1 Introduction
- 3 Wiring harness
- Light units
- 7 Rear lights
- 9 Front marker light
- 10 Convoy light

Fig

Page

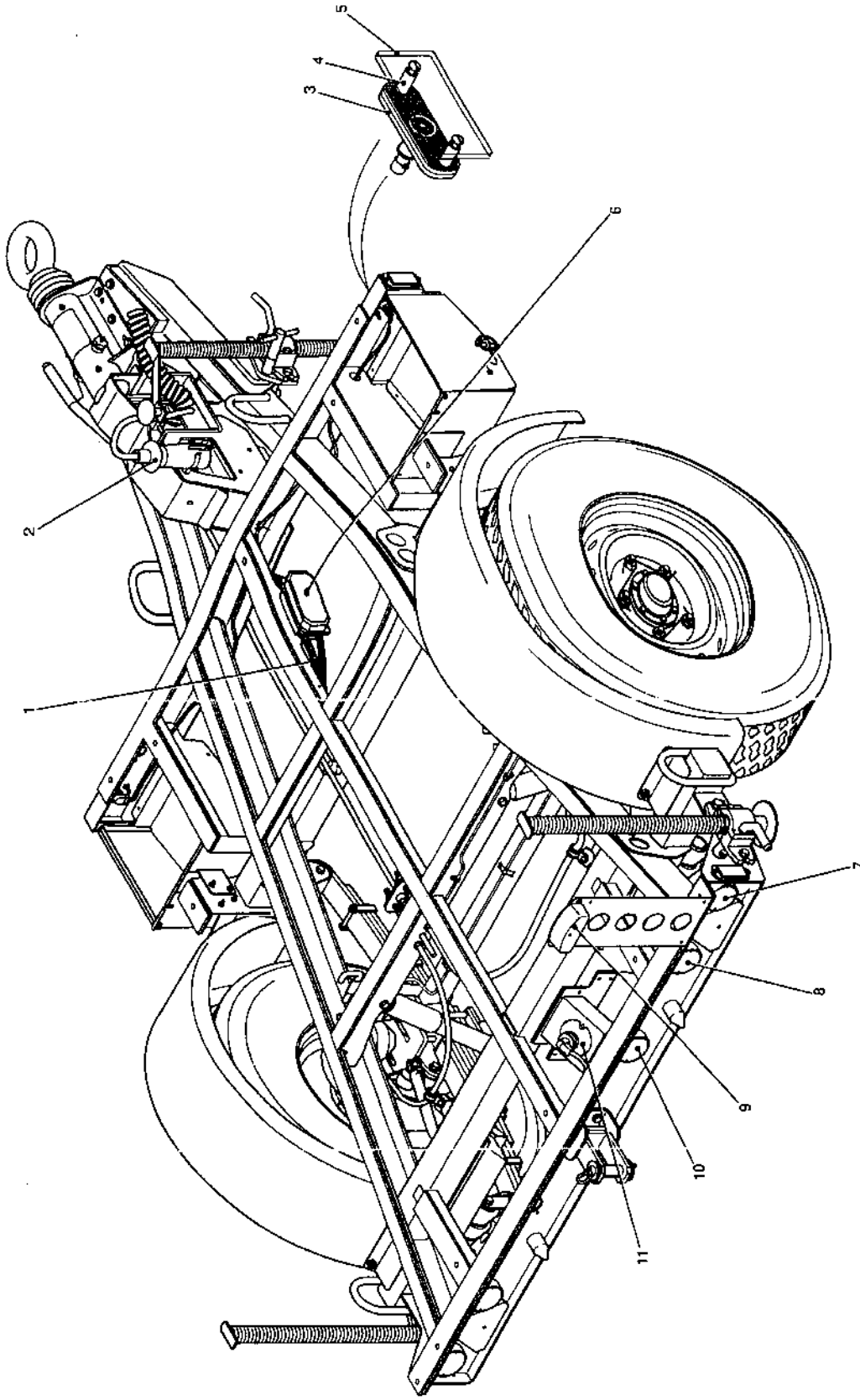
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| 1 | Electrical equipment..... | 2 |
| 2 | Light unit and branch connector | 3 |

INTRODUCTION

- 1 The electrical equipment (Fig 1) on the trailer is powered from and controlled by the towing vehicle supply and switches.
- 2 The trailer is equipped with the following:
 - 2.1 Combined stop and tail light (8).
 - 2.2 Turn lights (at the rear only) (7).
 - 2.3 Rear fog light (10).
 - 2.4 Number plate light (9).
 - 2.5 Convoy light (11).
 - 2.6 Front marker lights (3).
 - 2.7 Interconnecting wiring harness (1) terminating with a standard 25 pin NATO plug (2).

Wiring harness

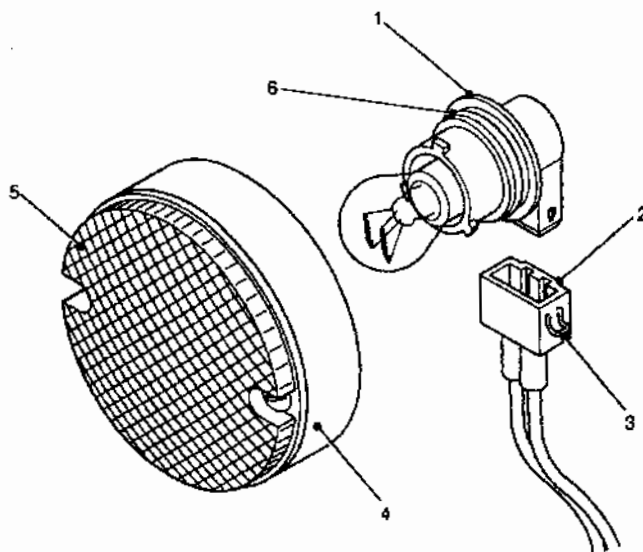
- 3 The wiring harness fitted to the trailer is a multi-branched assembly which interconnects the trailer lights with the towing vehicle lights, via the NATO plug and socket.
- 4 The harness is a single exchange item which must be replaced as an assembly. The terminal box (6) is a factory sealed unit with no maintainer access.



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| 1 | Wiring harness | 7 | Turn light |
| 2 | NATO plug (stowed position) | 8 | Stop and tail light |
| 3 | Front marker light | 9 | Number plate light |
| 4 | Spacer | 10 | Rear fog light |
| 5 | Stone guard | 11 | Convoy light |
| 6 | Terminal box | | |

Fig 1 Electrical equipment



TRL/039

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|---|-------------------|---|--------|
| 1 | Lamp holder | 4 | Plinth |
| 2 | Push-in connector | 5 | Lens |
| 3 | Retaining clip | 6 | O-ring |

Fig 2 Light unit and branch connector

5 Each branched end of the wiring harness is fitted with a push-in connector (Fig 2 (2)), fitted with a retaining clip (3). Each terminal end is identified with a destination tag.

6 The push-in connector engages with the lamp holder (1). A locating device prevents incorrect engagement. A rubber O-ring (6) fitted to the lamp holder ensures waterproof integrity when the lamp holder is in position.

Light units

Rear lights

7 Each rear light unit, with the exception of the convoy light (Fig 1 (11)) and number plate light (9), is mounted on to the chassis in an identical manner.

8 A plastic plinth (Fig 2 (4)), secured to the chassis crossmember, is used to house both the lens (5) and the lamp holder (1). The lamp holder can be removed independently for lamp replacement.

Front marker light

9 The front marker light (Fig 1 (3)) is mounted onto the chassis front crossmember in conjunction with a cylindrical spacer (4) and a plastic stone guard (5). The lamp holder can be removed independently for lamp replacement.

Convoy light

10 The convoy light (Fig 1 (11)) is mounted on a convoy light assembly secured to the chassis crossmember. The convoy light lamp holder engages directly with the light body. The lamp holder can be removed independently for lamp replacement.

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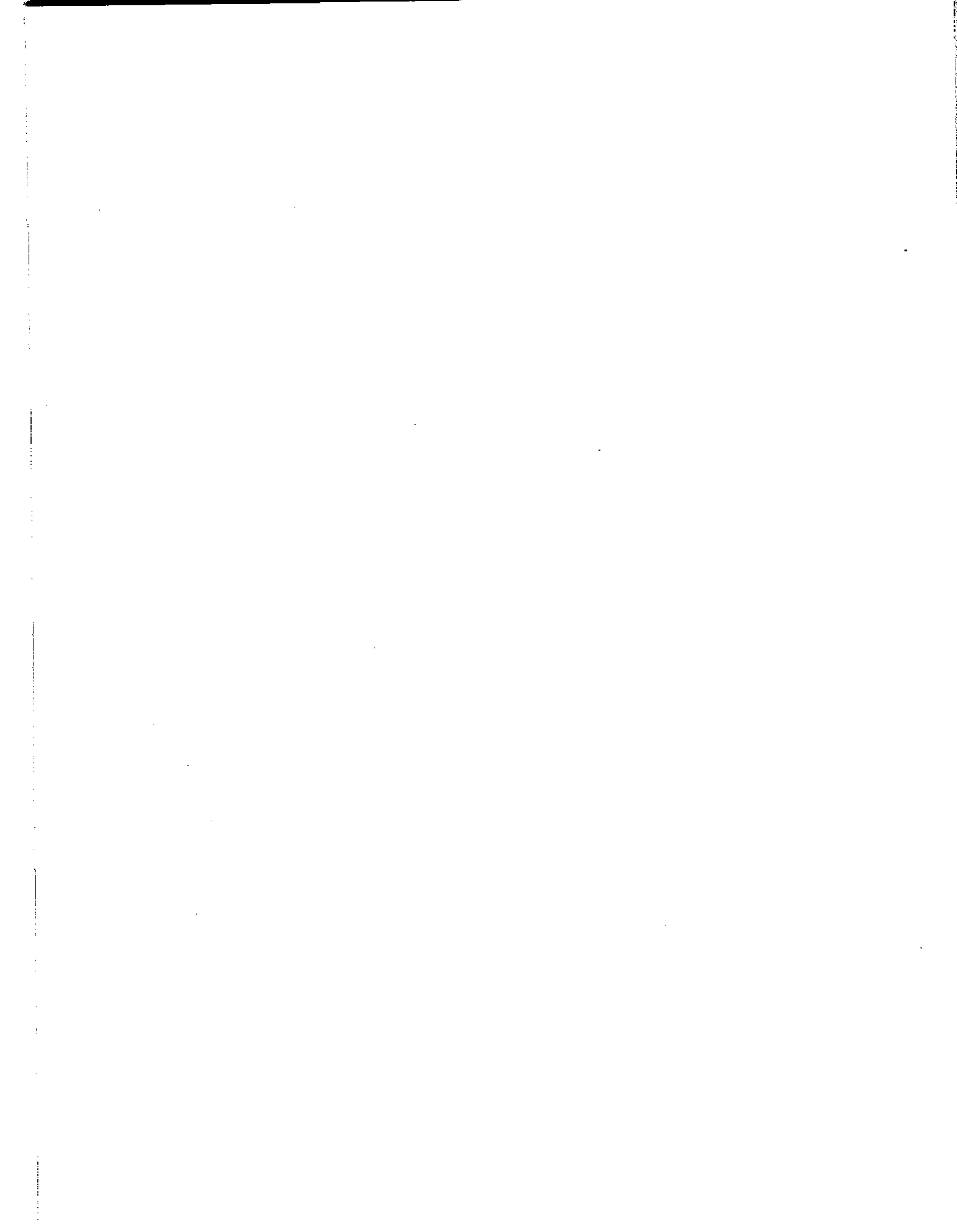
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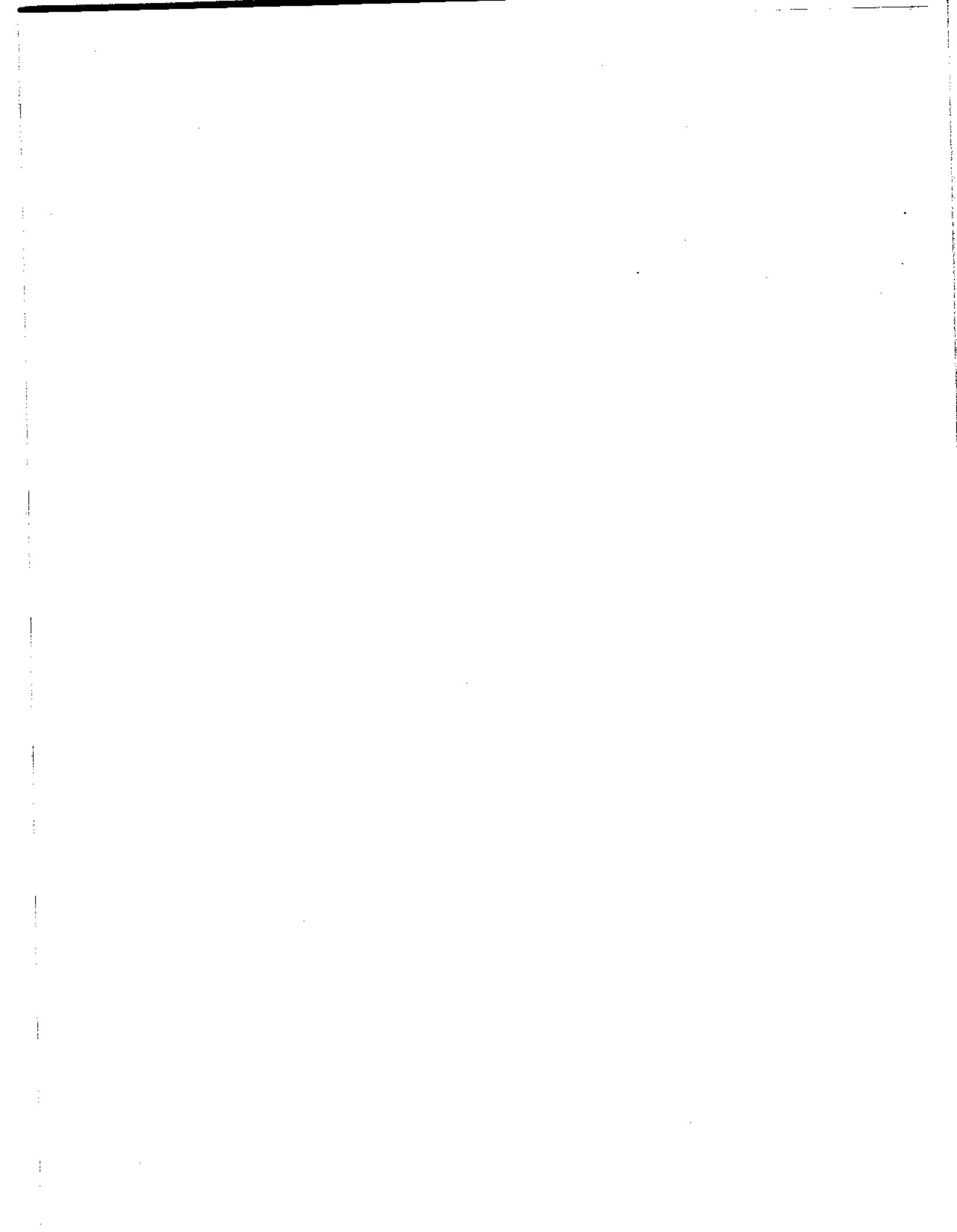
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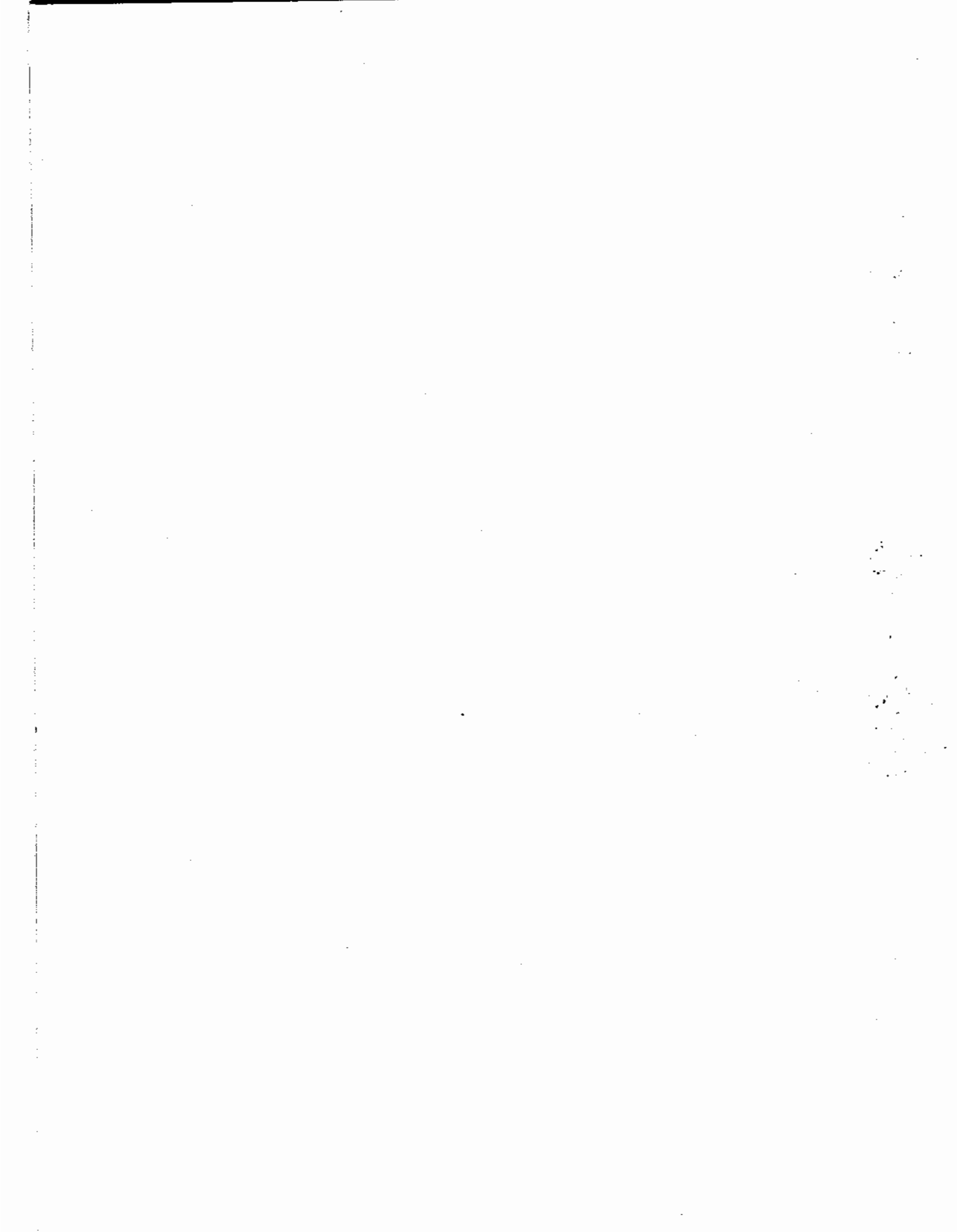
INSTALLATION INSTRUCTION AND INDEX

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BY COMMAND OF THE DEFENCE COUNCIL

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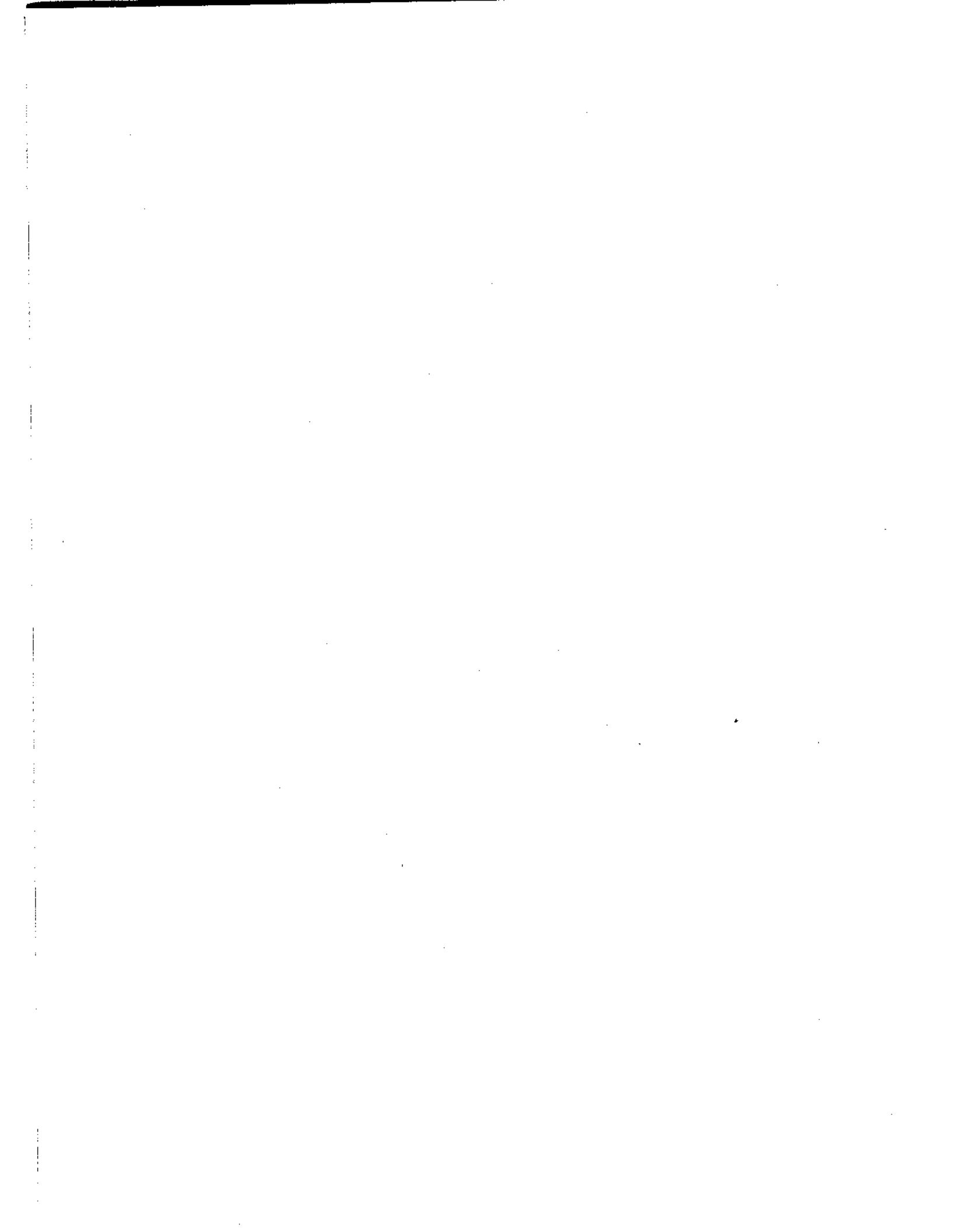
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PREFACE

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Publication Authority: TES TIG Andover

INTRODUCTION

1 Service users should forward any comments concerning this Publication through the channels prescribed in Army Equipment Support Publication (AESP) 0100-P-011-013. An AESP Form 10 is provided at the end of this publication; it should be photocopied and used for forwarding comments on this AESP.

2 AESPs are issued under Defence Council authority and, where AESPs specify action to be taken, the AESP will of itself be sufficient authority for such action and also for the demanding of the necessary stores, subject to the provisions of Para 3 below.

3 All preparation for Special Environment instructions, as issued, are to be recorded in manuscript by the recipient on the Numerical Preparation for Special Environment Instructions Index provided. Amendments to individual instructions are to be recorded on the instruction amendment record. All extant instructions and amendments can be found listed in the main AESP index.

NOTE

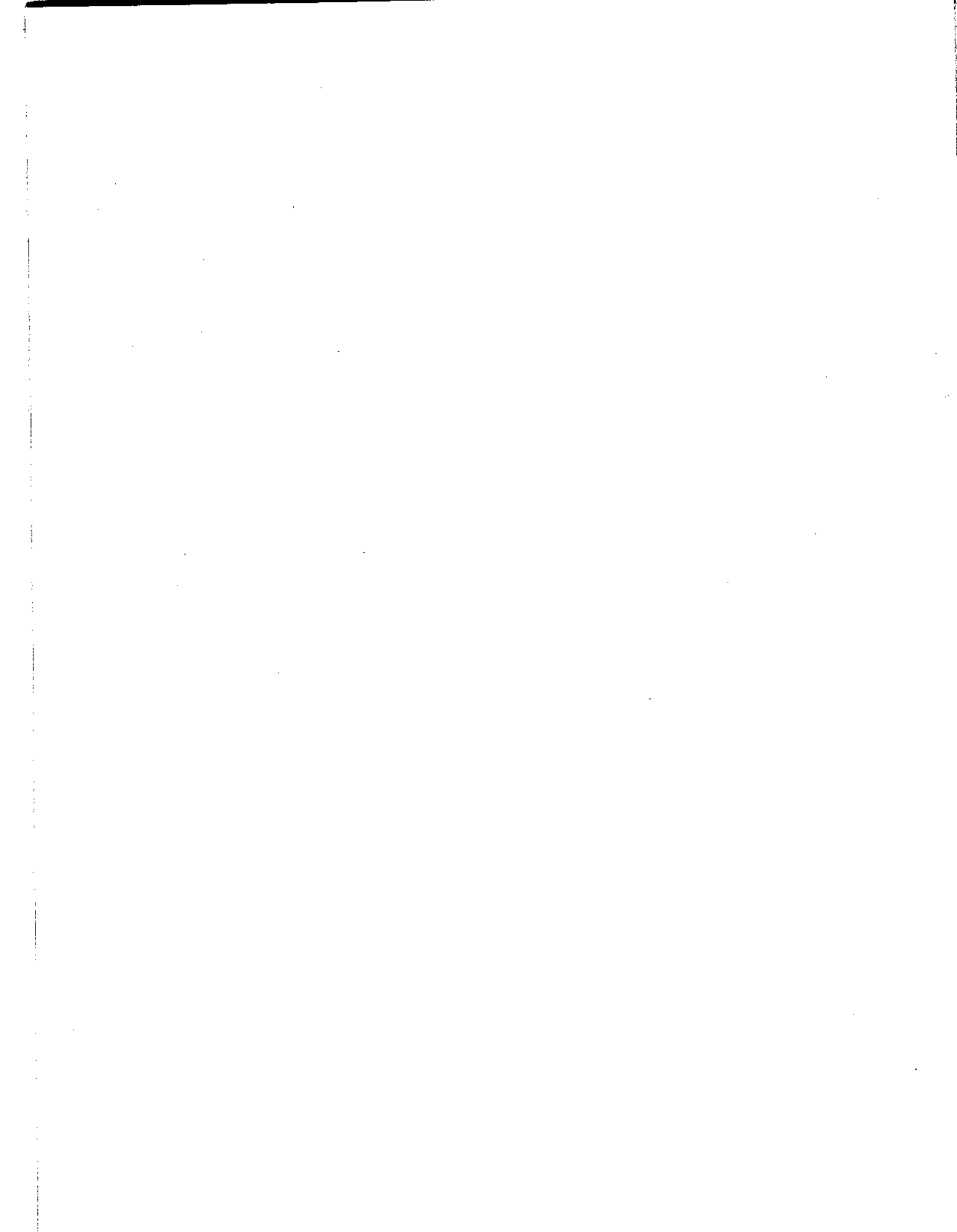
The publication agency is responsible for the preparation and maintenance of the Preparation for Special Environment Instruction Index and will advise the Distribution Authority on the issue of completed and subsequent index pages as necessary.

4 The subject matter of this publication may be affected by Defence Instructions and Notices (DINs), Standard Operating Procedures (SOPs) or by local regulations. When any such Instruction, Order or Regulation contradicts any portion of this publication they are to be taken as the overriding authority.

INSTALLATION INSTRUCTION INDEX

This index is to be kept up to date by the User entering installation instructions as and when they are published.

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1	Fitting of Forward Aircraft Repair Body	
2	Fitting of Airlog 4.5 kw Genset	
3	Fitting Onan Generator Sets	
4	[REDACTED]	
5	[REDACTED]	
6		
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TRAILER LIGHTWEIGHT GS CARGO

CODE NB 2853 3107

INSTALLATION INSTRUCTION NO. 1
FITTING OF FORWARD AIRCRAFT REPAIR BODY

Sponsor: SUV IPT

Publication Authority: TES TIG Andover

AMENDMENT RECORD

Amdt No.	Incorporated by (Signature)	Date
1		
2		
3		

Amdt No.	Incorporated by (Signature)	Date
4		
5		
6		

SUBJECT: The fitting of a forward aircraft repair body

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- 2 Reason for installation
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- 4 Action required by
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WARNINGS

1 The following WARNINGS are used in this instruction:

(1) **PERSONAL INJURY. THE GS BODY WEIGHS 120 KG. CARE MUST BE TAKEN WHEN HANDLING TO AVOID INJURY.**

(2) **PERSONAL INJURY. THE FORWARD AIRCRAFT REPAIR BODY WEIGHS 300 KG. CARE MUST BE TAKEN WHEN HANDLING TO AVOID INJURY.**

REASON FOR INSTALLATION

2 This instruction details the removal of the General Service (GS) cargo body, from the subject trailer, and the fitting of a special to role body to convert the trailer into a Forward Aircraft Repair (FAR) trailer, for use by the Royal Navy.

RELATED AND ASSOCIATED PUBLICATIONS

3 The following publication is referred to in this instruction.

<u>Reference</u>	<u>Title</u>
AESP 2330-E-202-522	Maintenance Instructions

INSTALLATION IMPLEMENTATION PLAN**Action required by:**

4 Units and establishments holding the subject trailers:

4.1 Demand the installation kit (refer to Table 2) when authorised.

4.2 Request the unit repair to carry out the installation, when the installation kit arrives.

5 Units and establishments embodying this installation:

5.1 Carry out this installation, when requested by the holding unit. No special tools or test equipment is required.

Man-hour content

6 The estimated man-hour content is listed in Table 1.

TABLE 1 ESTIMATED TIME REQUIRED PER EQUIPMENT

Serial (1)	Task (2)	Man-hours (3)	Tradesman employed (4)
1	Dismantling, preparation	1.5	REME tech + assistant
2	Assembly	1.5	REME tech + assistant
3	Testing	0.25	REME tech

TRAILER PARTS/ITEMS

Installation kit

7 Installation kit items are listed in Table 2.

TABLE 2 INSTALLATION KIT

Serial (1)	DMC (2)	NSN/Part No. (3)	Designation (4)	Qty (5)	Remarks (6)
1		AA-2462-011	Body, trailer, forward, aircraft repair	1	
2		F164	Screw, countersunk, M8 x 25	2	
3		F394	Washer, plain, M8	2	
4		F353	Nut, nyloc, M8	12	
5		AA-2462-147	Extension harness	1	
6		01200306B	Tie-wrap, 200 x 4 mm	2	

Items to be removed

8 Items to be removed and stored are listed in Table 3. Items to be removed and retained for reinstallation are listed in Table 4.

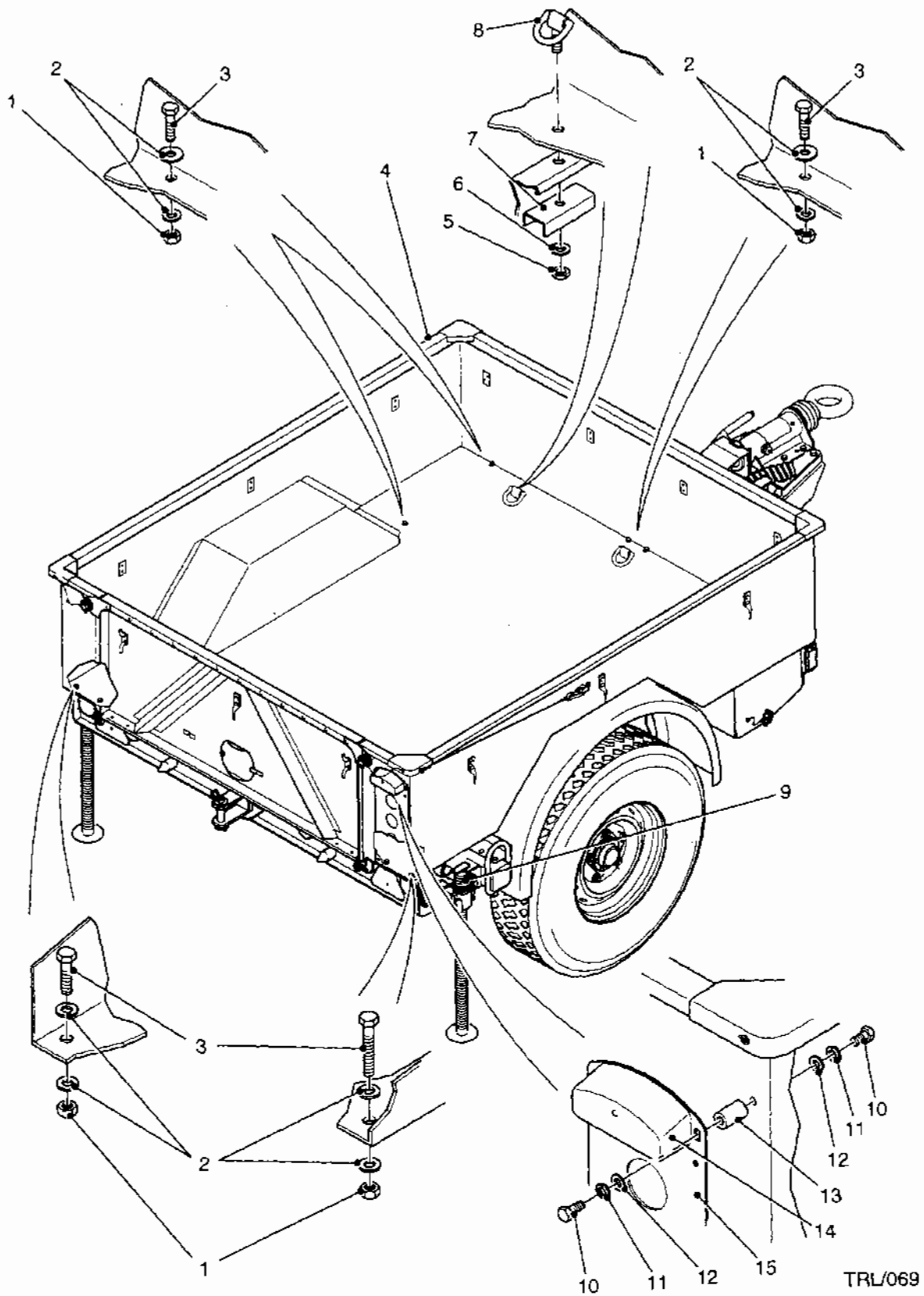
TABLE 3 ITEMS TO BE REMOVED AND STORED

Serial (1)	DMC (2)	NSN/Part No. (3)	Designation (4)	Qty (5)	Remarks (6)
1		AA-2322-232	Duckboard	1	
2		F1046	Nut	6	
3		F1047	Washer	6	
4		AA-2323-168	Reinforcing section	2	
5		AA-2323-285	Shackle	6	
6		AA-2323-136	Body, trailer GS	1	

TABLE 4 ITEMS TO BE REMOVED AND REINSTALLED

Serial (1)	DMC (2)	NSN/Part No. (3)	Designation (4)	Qty (5)	Remarks (6)
1		F1126	Bolt	10	
2		F1017	Washer	20	
3		F1101	Screw	4	
4		F1058	Washer, spring	4	

(continued)



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Fig 1 Trailer with GS body

TABLE 4 ITEMS TO BE REMOVED AND REINSTALLED (continued)

Serial (1)	DMC (2)	NSN/Part No. (3)	Designation (4)	Qty (5)	Remarks (6)
5		F1060	Washer, flat	4	complete with number plate and registration light
6		AA-2323-210	Number plate bracket	1	
7		C-F-20-15-M6-57	Spacer	2	

DISMANTLING/PREPARATION

9 To dismantle/prepare the trailer for its new body, proceed as follows:

- 9.1 Position the trailer on firm, flat, level ground under a suitable overhead crane if available.
- 9.2 Deploy the jockey wheel and rear support stands (Fig 1 (9)) to level the trailer.
- 9.3 Ensure the jockey wheel and support stands are locked and the handbrake fully on.
- 9.4 Remove the duckboard and store (Table 3, Serial 1).

NOTE

The reinforcing sections (7) are fitted to the two outer front shackles only.

- 9.5 With the aid of an assistant, remove the nuts (5), washers (6), reinforcing sections (where fitted) and shackles (8) (Table 3, Serials 2, 3, 4 and 5) at six positions.
- 9.6 With the aid of an assistant, remove the locking nuts (1), bolts (3) and washers (2) at ten positions, securing the trailer body (4) to its chassis. Discard the nuts and retain the bolts and washers for reinstalling (Table 4, Serials 1 and 2).
- 9.7 Disconnect the electrical harness from the registration light (14) and move the harness clear of the number plate bracket (15) and trailer body.
- 9.8 Remove the two screws (10), spring washers (11) and flat washers (12) securing the number plate bracket to the spacers (13). Retain the screws and washers for reinstalling (Table 4, Serials 3, 4 and 5).

Key to Fig 1

- | | | | |
|---|---------------------|----|----------------------|
| 1 | Locking nuts | 9 | Rear support stand |
| 2 | Washer | 10 | Screw |
| 3 | Bolts | 11 | Spring washer |
| 4 | Trailer GS body | 12 | Flat washer |
| 5 | Nut | 13 | Spacer |
| 6 | Washer | 14 | Registration light |
| 7 | Reinforcing section | 15 | Number plate bracket |
| 8 | Shackle | | |

9.9 Supporting the spacers, remove the two screws (10), spring washer (11) and flat washer (12) securing the spacer to the trailer GS body. Remove and retain all items for reinstalling (Table 4, Serials 3, 4, 5 and 7).

WARNING

PERSONAL INJURY. THE GS BODY WEIGHS 120 KG. CARE MUST BE TAKEN WHEN HANDLING TO AVOID INJURY.

9.10 Raise the right-hand corner of the trailer GS body and remove the number plate bracket complete with number plate and registration light. Retain the number plate bracket for reinstalling (Table 4, Serial 5).

9.11 Using suitable lifting tackle, lift the trailer GS body, clear of its chassis, and store (Table 3, Serial 6).

9.12 Inspect the balata belting for serviceability. If unserviceable replace as detailed in the Cat 522, Chap 2.

FITTING OF FORWARD AIRCRAFT REPAIR BODY

10 To fit the FAR body, proceed as follows:

WARNING

PERSONAL INJURY. THE FORWARD AIRCRAFT REPAIR BODY WEIGHS 300 KG. CARE MUST BE TAKEN WHEN HANDLING TO AVOID INJURY.

10.1 With the aid of an assistant, position the FAR body (Fig 2 (1)) (Table 2, Serial 1) onto the trailer chassis, correctly orientated with the rear door (10) to the rear of the trailer.

10.2 Open both side doors (3) and side flaps (2). Deploy the work benches (Fig 4 (2)) and remove the plywood lid centres (13) and plywood lid sides (12) from both sides.

10.3 Align the mounting bolt holes and secure the FAR body to the trailer chassis with the bolts, washers and reinforcing section (Table 4, Serials 1, 2 and 7) and new nuts (Table 2, Serial 4).

10.4 Tighten the nuts to 23 Nm.

10.5 Refit the plywood lid centres and sides, raise the work benches and close the side doors and flaps.

10.6 Secure the two spacers, with the screws, spring washers and flat washers (Table 4, Serials 3, 4, 5 and 7), to the right-hand jerry can holder (9) cross member (4).

10.7 Locate the number plate bracket (5), complete with number plate and registration light (Table 4, Serial 6) onto its mounting points, on the jerry can holder, and secure, at the top, with two screws, spring washers and flat washers (Table 4, Serials 3, 4 and 5).

10.8 Secure the number plate, at the bottom, with two screws (6), plain washers (7) and nyloc nuts (8) (Table 2, Serials 2, 3 and 4).

10.9 Attach the harness extension (Table 2, Serial 5) to the registration light harness and connect to the registration light.

10.10 Secure the registration light harness to the jerry can holder/FAR body as required with the tie-wraps (Table 2, Serial 6).

TESTING

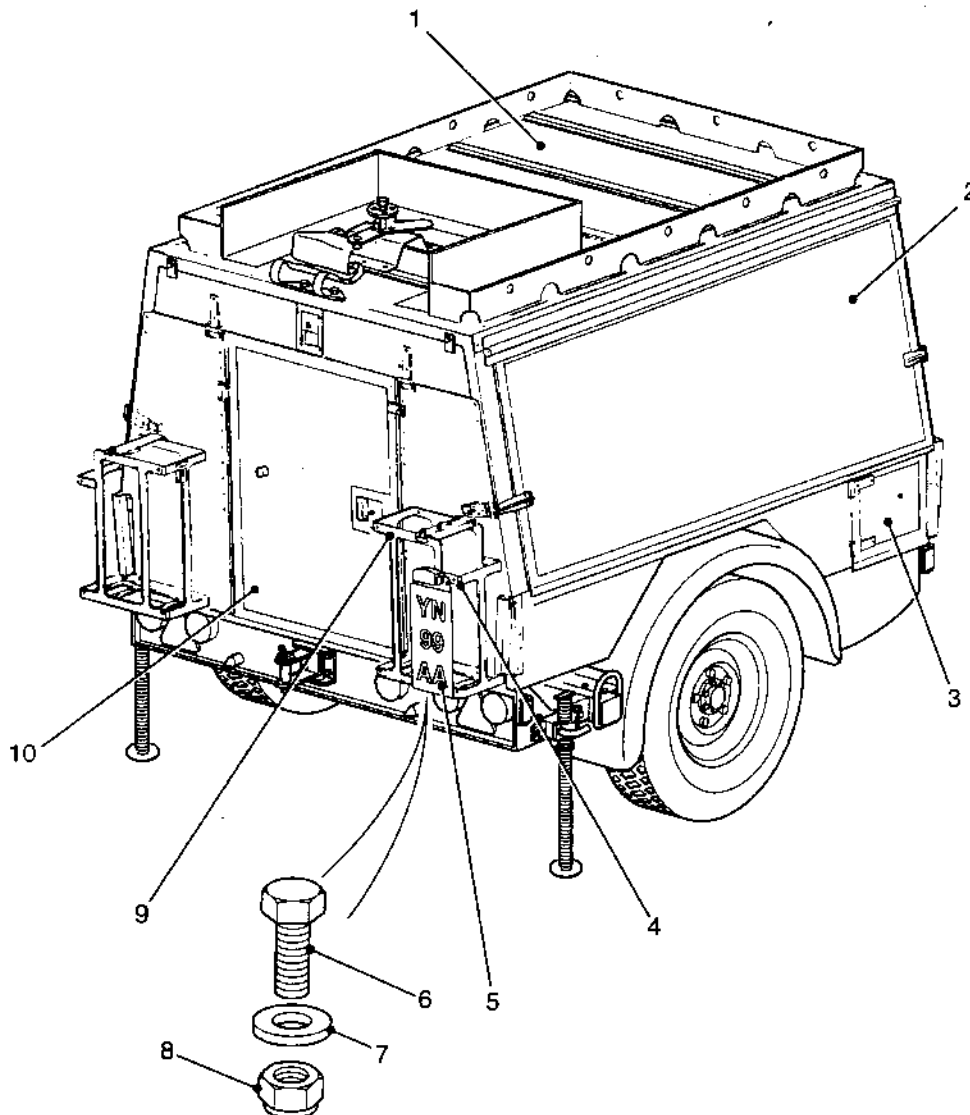
- 11 Connect the trailer electrics to a suitable prime mover and check operation of registration light.

DOCUMENTATION

- 12 Enter details of the winch assembly into the unit lifting tackle register (F88).

PARTS LIST

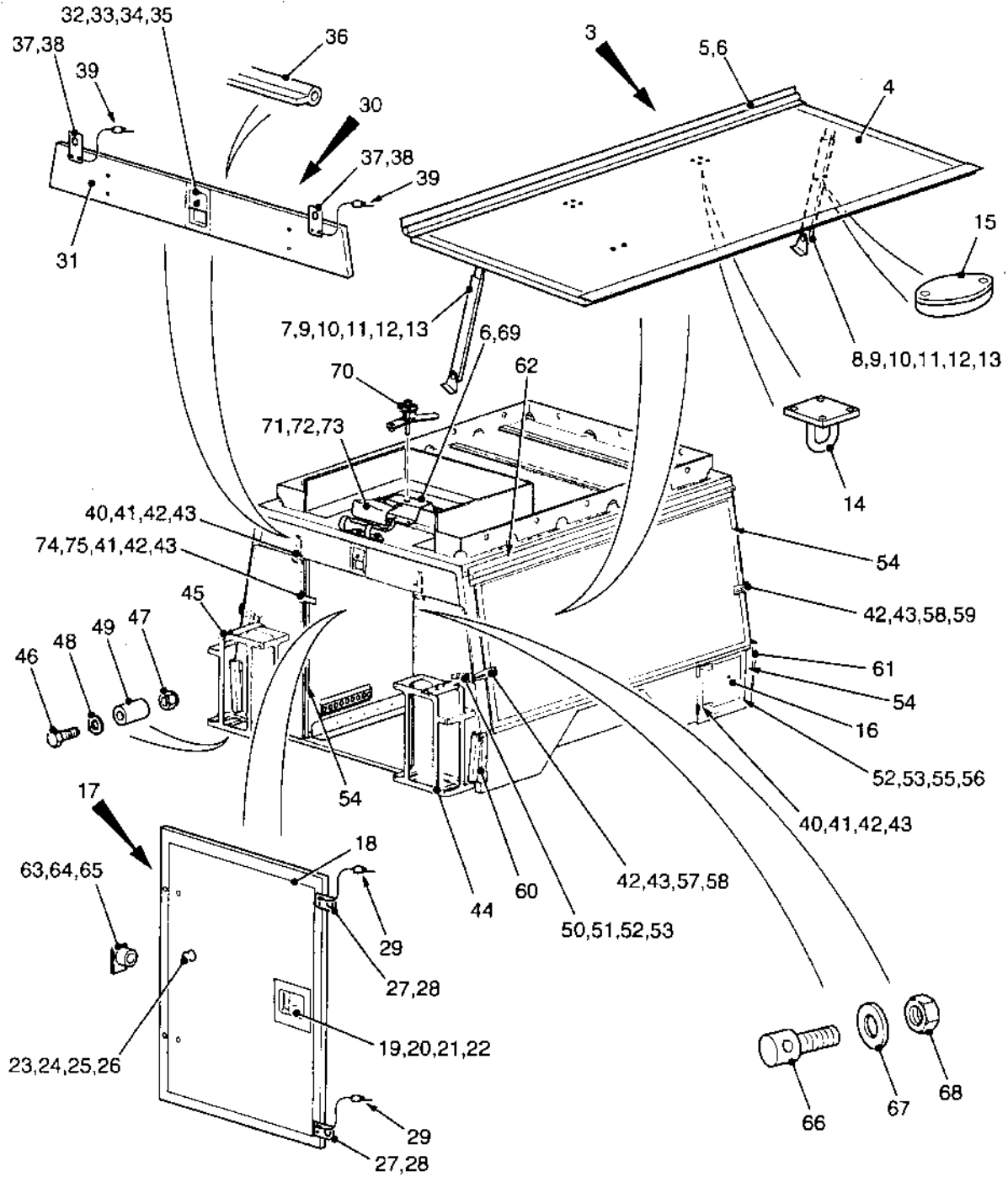
- 13 See Pages 8 to 15/16 for parts list details.



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- | | | | |
|---|----------------------|----|-----------------------------|
| 1 | FAR body | 6 | Screw |
| 2 | Side flap | 7 | Plain washer |
| 3 | Side door | 8 | Nyloc nut |
| 4 | Cross member | 9 | Right-hand jerry can holder |
| 5 | Number plate bracket | 10 | Rear door |

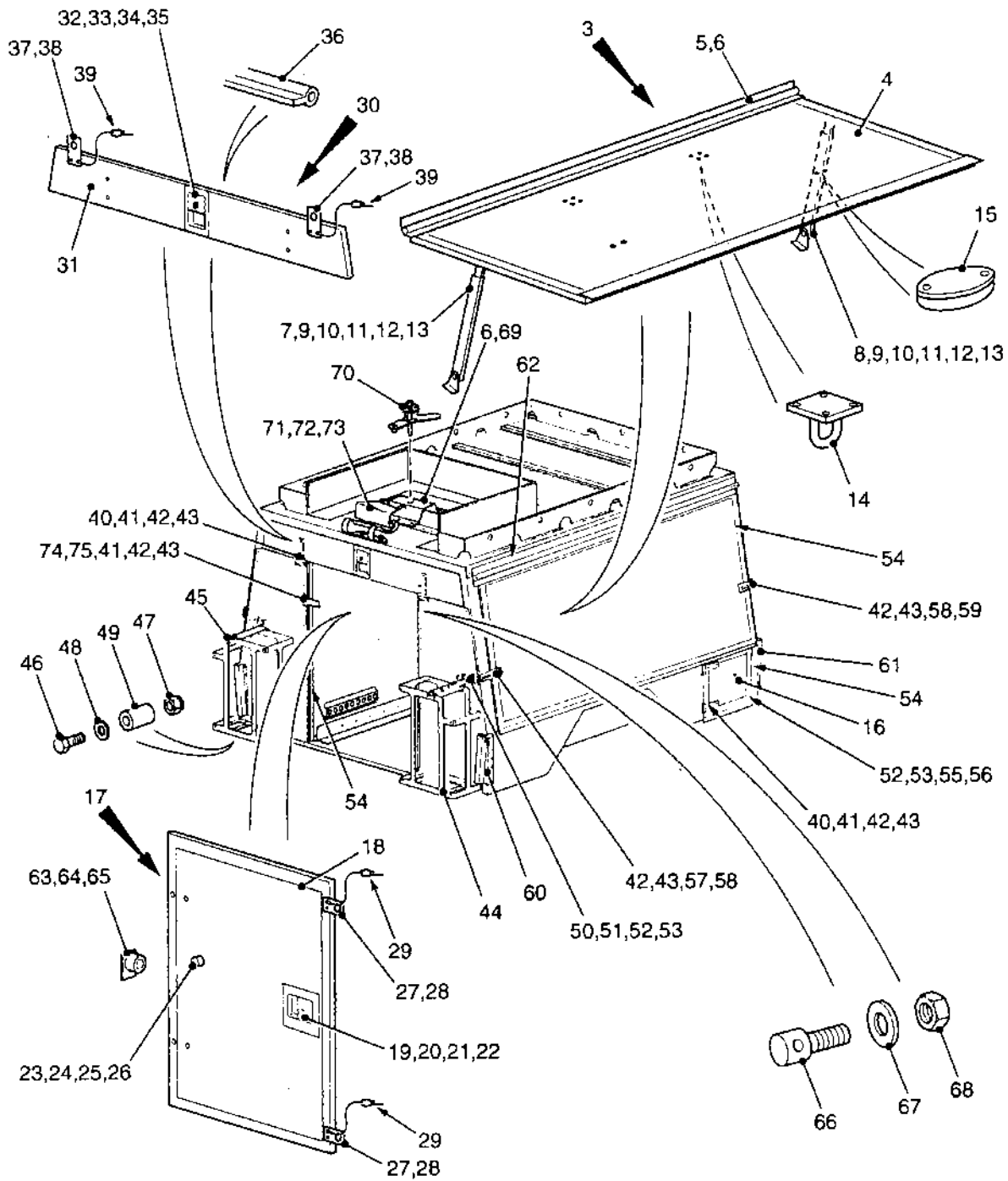
Fig 2 Trailer with FAR body



TRL/071

Fig 3 FAR body, external items

Fig 3 Item	DMC Army	NATO stock number	Item name	Part No./ Dwg No.	No. off	Annotation (NSCM)
NI 1			BODY, FORWARD AIRCRAFT REPAIR		1	
NI 2			.. FITTINGS, EXTERIOR	AA-2462-006	1	
3			.. FLAP, SIDE, ASSY	MS-2462-046	2	
4			.. FLAP, SIDE PANEL	AA-2462-045	1	
5			.. HINGE x 1825.00 LONG	SVF525-1825	1	
6			.. RIVET, ALUM, DIA 4.8, 5.0-6.5	SR01-4811	44	
7			.. STAY, SUPPORT WITH THUMB SCREW AND BOTTOM BRKT	9-0006	2	
8			.. SUPPORT STAY (NO BRKT)	9-00557	2	
9			.. PLATE FORMED - STAY BRKT	AA-2462-066	3	
10			.. SCREW, SOCKET HD, BUTTON, M6 x 30	F109	4	
11			.. SCREW, SOCKET HD, BUTTON, M6 x 20	F107	4	
12			.. NUT, NYLOC, M6	F349	8	
13			.. WASHER, PLAIN, M6 x 1/2	F382	8	
14			.. PLATE, STAPLE	750-711	2	
15			.. BUFFER, RUBBER	2023-002	2	
16			.. DOOR, SIDE, ASSY	MS-2462-048	2	
17			.. DOOR, REAR, ASSY	MS-2462-050	1	
18			.. PANEL, REAR DOOR	AA-2462-049	1	
19			.. HANDLE, PADDLE, HOOK LATCH BLACK, STAINLESS	9-00447B/PL	1	
20			.. SCREW, SOCKET HD, BUTTON, M5 x 25	F050	4	
21			.. NUT, NYLOC, M5	F345	4	
22			.. WASHER, PLAIN, M5 x 3/8	F375	4	
23			.. HOLDER, DOOR, RUBBER (MALE)	0666/002	1	
24			.. SCREW, HEX HD, M6 x 30	F060	1	
25			.. WASHER, PLAIN, M6	F382	1	
26			.. NUT, NYLOC, M6	F349	1	
27			.. PLATE	AA-2462-127	2	
28			.. RIVET, ALUM, DIA 4.8, 5.0-6.5	SR01-4811	4	
29			.. LANYARD ASSY WITH COTTER PIN	AA-2323-299	2	
30			.. FLAP, REAR, ASSY	MS-2462-053	1	
31			.. PLATE, FORMED (REAR FLAP)	AA-2462-052	1	
32			.. HANDLE, PADDLE, HOOK LATCH, STAINLESS	9-00449-PL	1	
33			.. SCREW, SOCKET HD, BUTTON, M5 x 20	F048	4	
34			.. NUT, NYLOC, M5	F345	4	
35			.. WASHER, PLAIN, M5 x 3/8	F375	4	
36			.. SEAL, TOP TUBE	4833-0032	A/R	
37			.. PLATE	AA-2452-127	2	
38			.. RIVET, ALUM, DIA 4.8, 5.0-6.5	SR01-4811	4	
39			.. LANYARD ASSY WITH COTTER PIN	AA-2323-299	2	
40			.. HINGE, STAINLESS STEEL, 304	9810-6330	6	
41			.. SCREW, SOCKET HD, BUTTON, M6 x 25	F108	32	
42			.. NUT, NYLOC, M6	F349	48	
43			.. WASHER, PLAIN, M6 x 3/4	F384	48	
44			.. FRAME, JERRY CAN, ASSY (RH)	MS-2397-080	1	



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Fig 3 FAR body, external items

Fig 3 Item	DMC Army	NATO stock number	Item name	Part No./ Dwg No.	No. off	Annotation (NSCM)
			BODY, FORWARD AIRCRAFT REPAIR - contd.			
			FITTINGS, EXTERIOR - contd			
45			FRAME, JERRY CAN, ASSY (LH)	MS-2462-054	1	
46			SCREW, SOCKET HD, BUTTON, M8 x 40	F180	8	
47			NUT, NYLOC, M8	F353	10	
48			WASHER, PLAIN, M8 x 1	F394	10	
49			BOSS, DRILLED, 9.00	AA-2462-055	8	
50			FASTENER, OVERCENTRE, 703 SERIES ST/ST	S100-703RLSS	4	
51			SCREW, CSK, M5 x 20	F038	12	
52			NUT, NYLOC, M5	F345	16	
53			WASHER, PLAIN, M5 x 3/8	F375	16	
54			SEAL, DOOR, SPONGE RUBBER SECTION (ALL APERTURES LESS REAR FLAP)	SR 5052	A/R	
55			BOLT, SLAM, RING TAIL	2487-001	2	
56			SCREW, HEX HD, M5 x 25	F014	4	
57			KEEPER ASSY, LONG	MS-2462-094	2	
58			SCREW, SOCKET HD, BUTTON, M6 x 35	F110	16	
59			KEEPER ASSY, SHORT	MS-2462-095	2	
60			BRKT, CAM POLE ASSY, LH	MS-2421-175	2	
61			BRKT, CAM POLE ASSY, RH	MS-2421-177	2	
62			RIVET, ALUM, DIA 4.8, 3.5-5.0	SR01-4895	4	
63			HOLDER, DOOR (FEMALE)	G774001	1	
64			SCREW, HEX HD, M6 x 25	F059	1	
65			NUT, NYLOC, M6	F349	1	
66			PEG, RETAINING	AA-2323-212	4	
67			WASHER, FLAT, M10	F1026	4	
68			NUT, PLAIN, M10	F1027	4	
69			ASSEMBLY PLATE, SPARE WHEEL TIE DOWN	AA-2462-137	1	
70			ASSEMBLY PIN AND PLATE, SPARE WHEEL	AA-2462-144	1	
71			SCREW, HEX HD, M12 x 25	F238	2	
72			NUT, NYLOC, M12	F361	2	
73			HARNES, SPARE WHEEL SUPPORT	HS-F8921	1	
74			HINGE, FEMALE	AA-2462-149	2	
75			HINGE, MALE	AA-2462-150	2	

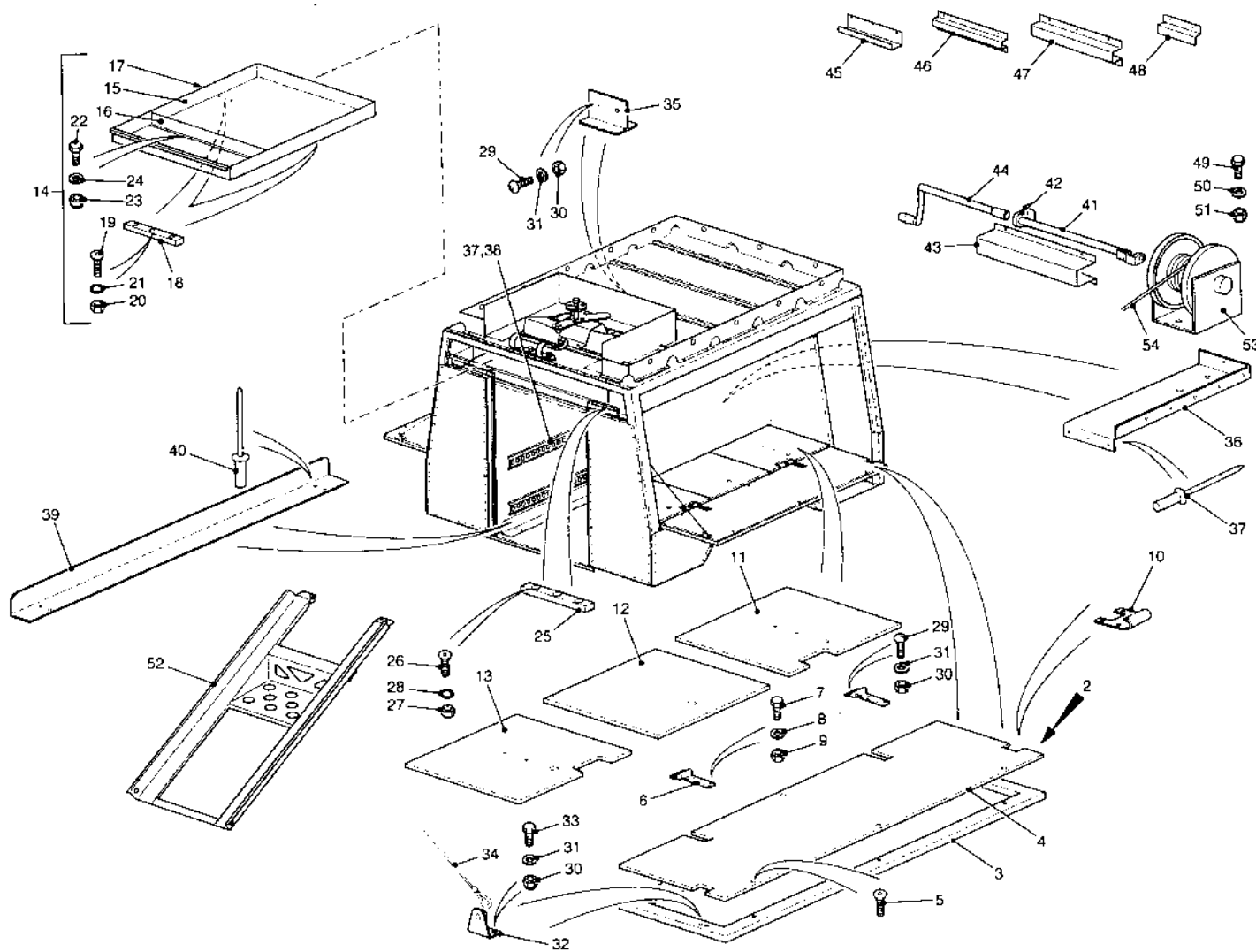
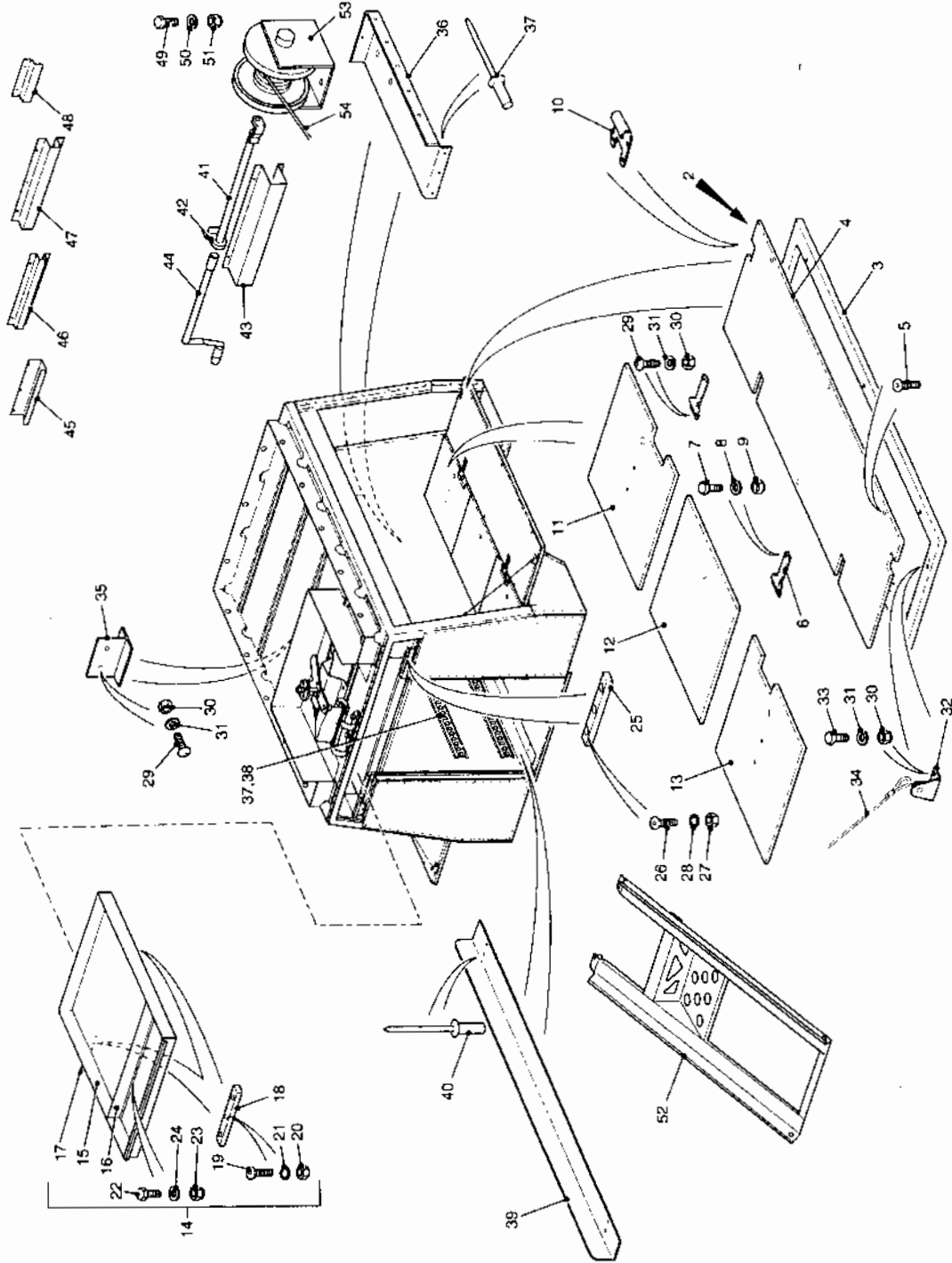


Fig 4 FAR body, internal items

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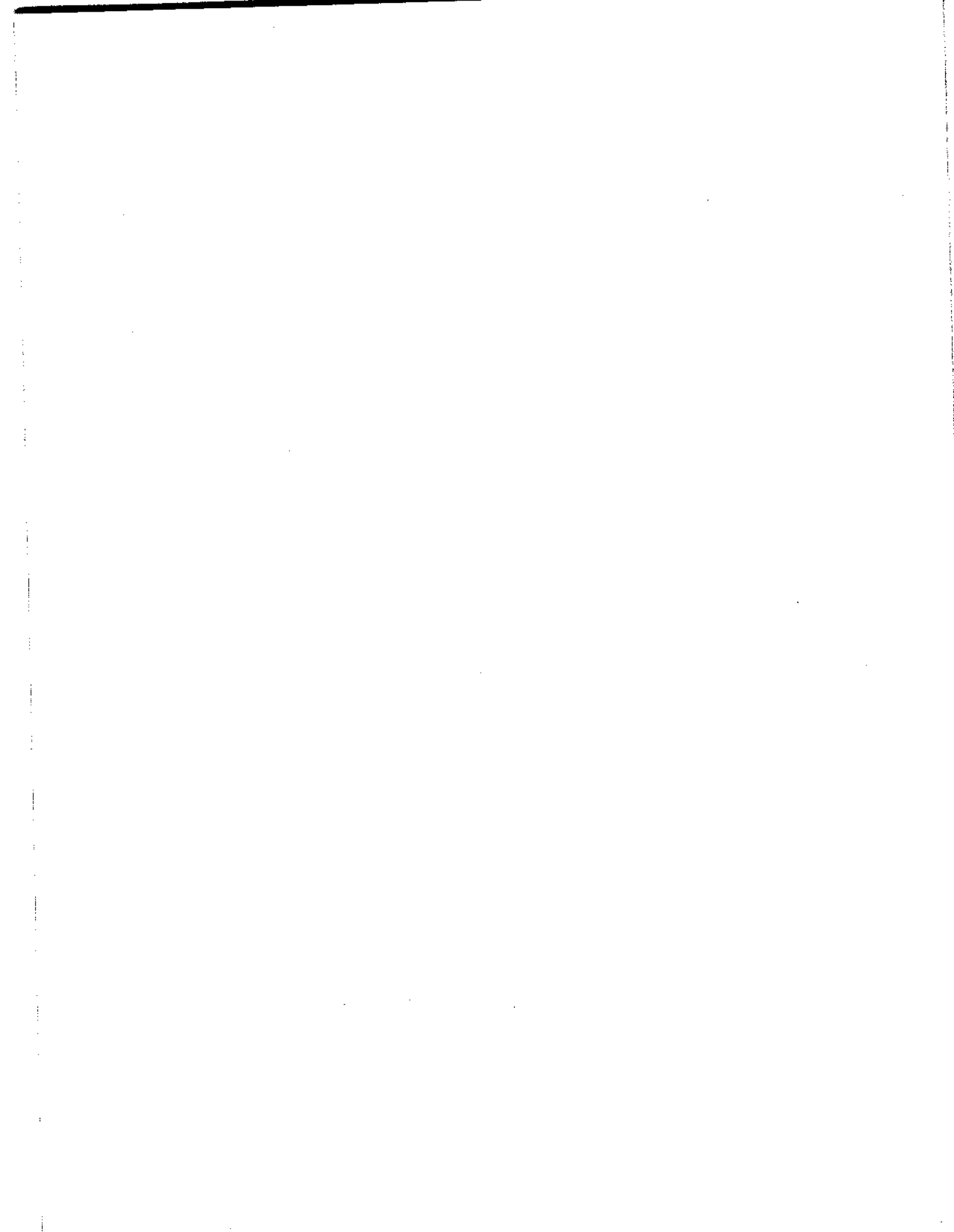
Fig # Item	DMC Army	NATO stock number	Item name	Part No./ Dwg No.	No. off	Annotation (NSC/M)
1			BODY, FORWARD AIRCRAFT REPAIR	AA-2462-005	1	
2			FITTINGS, INTERNAL	MS-2462-061	2	
3			BENCH, WORK, ASSY	CS4-3700	1	
4			FRAME	AA-2462-060	1	
5			WORK TOP	F111	10	
6			SCREW, SKT CSK HD, M6 x 20	9610-6330	2	
7			HINGE	F107	4	
8			BOLT	F388	4	
9			WASHER	DVN01-02634	4	
10			NUT	437-000	4	
11			LATCH	AA-2462-111	1	
12			LID ASSY, SIDE, PLYWOOD	AA-2462-112	2	
13			LID ASSY, CENTRE, PLYWOOD	AA-2462-109	2	
14			LID ASSY, SIDE, PLYWOOD	MS-2462-069	1	
15			DRAWER ASSY	AA-2462-067	1	
16			PLATE, FORMED, DRAWER	AA-2462-070	1	
17			PLATE, FORMED, PARTITION	4948-002	1	
18			TRIM, EDGE	AA-2462-068	AFR	
19			GUIDE, DRAWER	F088	2	
20			SCREW, CSK, M6 x 12	F351	6	
21			NUT, PLAIN, M6	F389	6	
22			WASHER, SHAKEPROOF, M6	F119	6	
23			SCREW, HEX HD, M8 x 16	F353	2	
24			NUT, NYLOC, M8	F382	2	
25			WASHER, PLAIN, M8 x 20	AA-2462-069	2	
26			GUIDE, DRAWER	F088	6	
27			SCREW, CSK, M6 x 12	F351	6	
28			NUT, PLAIN, M6	F388	6	
29			WASHER, SHAKEPROOF	F107	12	
30			SCREW, SOCKET HD,	F349	24	
31			BUTTON, M6 x 20	F382	24	
32			NUT, NYLOC, M6	AA-2462-066	4	
33			WASHER, PLAIN, M6 x 1/2	F059	12	
34			PLATE, FORMED STAY BRKT	AA-2462-071	2	
35			SCREW, HEX SET, M6 x 25	AA-2462-067	2	
36			CABLE, STAY	AA-2462-086	1	
37			GUIDE, BAR, TEE	SP01-4811	100	
38			PLATE, FORMED, WINCH MOUNT	AA-2462-082	10	
39			RIVET, ALUM, DIA 4.8, 5.0-6.5	AA-2462-081	2	
40			LOADLOK, 1800GG x 398mm	SP21-4895	8	
41			PLATE, FORMED, GUIDES	MS-2462-089	1	
42			RIVET, ALUM, DIA 4.8, 0-4.5	AA-2462-100	1	
43			WINCH EXTENSION	AA-2462-115	1	
44			PLATE, FORMED	AA-2462-134	1	
45			COVER, SHAFT	AA-2462-130	1	
46			HANDLE, ASSY	AA-2462-126	1	
47			PLATE, FORMED, WORKMATE	AA-2462-132	1	
48			PLATE, FORMED, SPARE	AA-2462-138	1	
49			WHEEL BRACE			
50			PLATE, FORMED, WINCH HANDLE			
51			PLATE, FORMED, WINCH HANDLE			



TRU/072

Fig 4 FAR body, internal items

Fig 4 Item	DMC Army	NATO stock number	Item name	Part No./ Dwg No.	No. off	Annotation (NSCM)
			BODY, FORWARD AIRCRAFT REPAIR - contd			
			. FITTINGS, INTERNAL - contd			
49			.. SCREW, HEX HD, M8 x 20	F120	2	
50			.. NUT, NYLOC, M8	F353	2	
51			.. WASHER, PLAIN, M8 x 20	F392	2	
52			.. RAMP ASSY	AA-2462-078	1	
53			WINCH ASSY	AA-2462-088	1	
54			. ROPE, WINCH	AA-2462-148	1	



TRAILER LIGHTWEIGHT GS CARGO

CODE NB 2861 3101

**INSTALLATION INSTRUCTION NO. 2
FITTING OF AIRLOG 4.5 KW GENSET**

Sponsor: SUV IPT

Publication Authority: TES TIG Andover

AMENDMENT RECORD

Amdt No.	Incorporated by (Signature)	Date
1		
2		
3		

Amdt No.	Incorporated by (Signature)	Date
4		
5		
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SUBJECT: The fitting of an AIRLOG 4.5 kW generator set

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WARNING

- 1 The following WARNING is used in this instruction:

PERSONAL INJURY. THE AIRLOG 4.5 KW GENSET WEIGHS 324 KG. CARE MUST BE TAKEN WHEN HANDLING TO AVOID INJURY.

REASON FOR INSTALLATION

- 2 This instruction details the removal of the tie down shackles from the body of the General Service (GS) cargo trailer, and the installation of an AIRLOG 4.5 kW GENSET.

RELATED AND ASSOCIATED PUBLICATIONS

- 3 The following publication is referred to in this instruction.

<u>Reference</u>	<u>Title</u>
AESP 2330-E-202-522	Maintenance Instructions

INSTALLATION IMPLEMENTATION PLAN**Action required by**

- 4 Units and establishments holding the subject trailers:
- 4.1 Demand the installation kit (refer to Table 2) when authorised.
- 4.2 Request the unit repair to carry out the installation, when the installation kit arrives.
- 5 Units and establishments embodying this installation:
- 5.1 Carry out this installation, when requested by the holding unit. No special tools or test equipment is required.

Man-hour content

- 6 The estimated man-hour content is listed in Table 1.

TABLE 1 ESTIMATED TIME REQUIRED PER EQUIPMENT

Serial (1)	Task (2)	Man-hours (3)	Tradesman employed (4)
1	Dismantling, preparation	0.5	REME tech + assistant
2	Assembly	0.5	REME tech + assistant
3	Testing	0.25	REME tech

TRAILER PARTS/ITEMS

Installation kit

7 Installation kit items are listed in Table 2.

TABLE 2 INSTALLATION KIT

Serial (1)	DMC (2)	NSN/Part No. (3)	Designation (4)	Qty (5)	Remarks (6)
1			Kit AIRLOG 4.5 kW (genset)	1	
2		F1209	Screw, hexagon, M12 x 30	6	
3		F1042	Washer, flat, M12	6	
4		F1041	Nut, nyloc, M12	6	

Items to be removed

8 Items to be removed and stored are listed in Table 3. Items to be removed and retained for reinstallation are listed in Table 4.

TABLE 3 ITEMS TO BE REMOVED AND STORED

Serial (1)	DMC (2)	NSN/Part No. (3)	Designation (4)	Qty (5)	Remarks (6)
1		AA-2322-232	Duckboard	1	
2		F1046	Nut	6	
3		F1047	Washer	6	
4		AA-2323-285	Shackle	6	

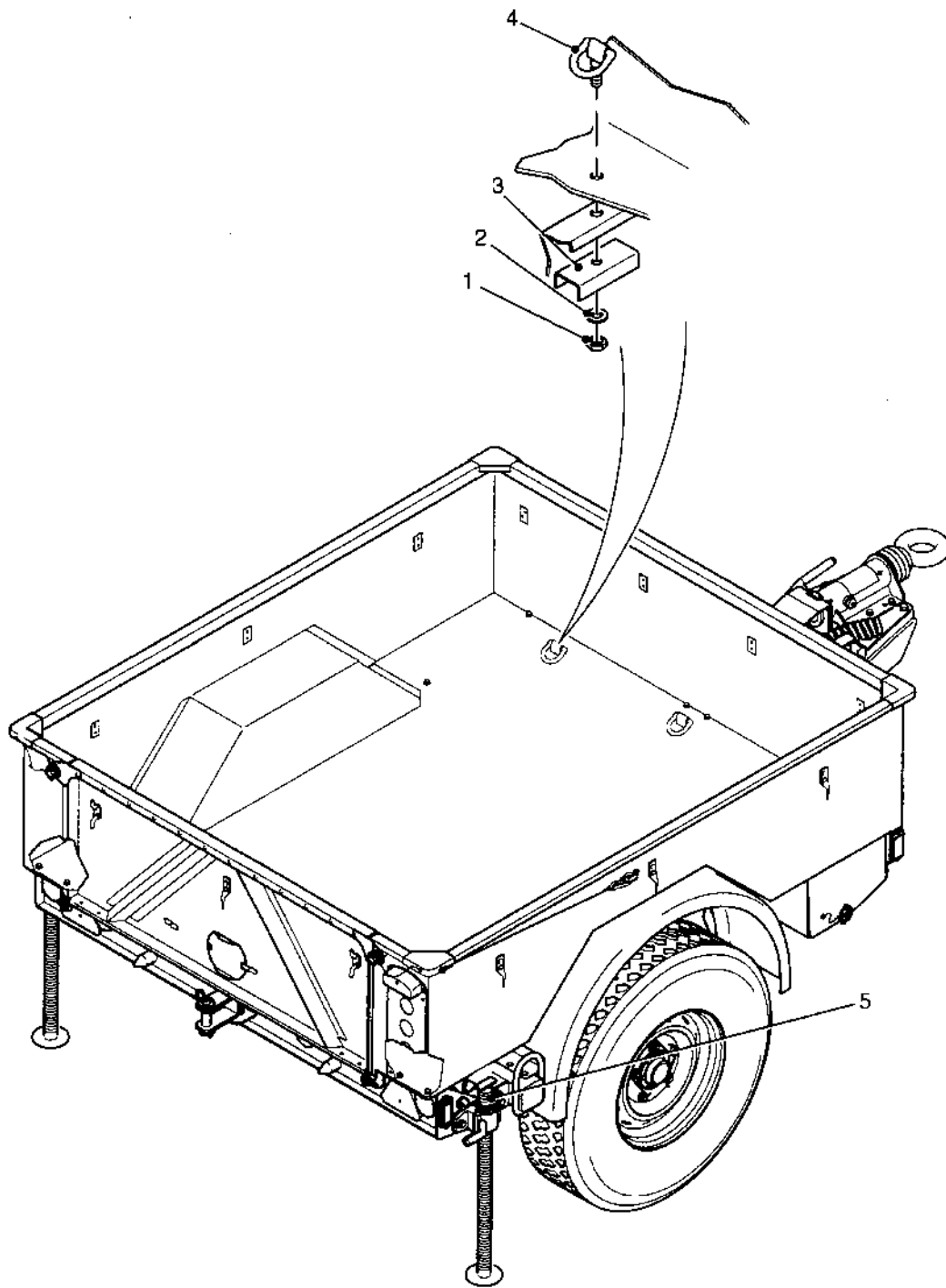
TABLE 4 ITEMS TO BE REMOVED AND REINSTALLED

Serial (1)	DMC (2)	NSN/Part No. (3)	Designation (4)	Qty (5)	Remarks (6)
1		AA-2363-168	Plate, support	2	

DISMANTLING/PREPARATION

9 To dismantle/prepare the trailer for its installation, proceed as follows:

- 9.1 Position the trailer on firm, flat, level ground under a suitable overhead crane if available.
- 9.2 Deploy the jockey wheel and rear support stands (Fig 1 (5)) to level the trailer.
- 9.3 Ensure the jockey wheel and support stands are locked and the handbrake fully on.
- 9.4 Remove the duckboard and store (Table 3, Serial 1).



TRL/073

- | | | | |
|---|---------------|---|---------------|
| 1 | Nut | 4 | Shackle |
| 2 | Washer | 5 | Support stand |
| 3 | Support plate | | |

Fig 1 Trailer with GS body

NOTE

The support plate (3) is fitted to the two outer front shackles only.

9.5 With the aid of an assistant, remove the nuts (1), washers (2), support plates (where fitted) and shackles (4) and store (Table 3, Serials 2, 3 and 4) at six positions. Retain the support plates (Table 4, Serial 1) for refitting.

FITTING OF GENERATOR SET TO TRAILER BODY

10 To fit the Generator set (Table 1, Serial 1) proceed as follows:

WARNING

PERSONAL INJURY. THE GENERATOR SET WEIGHS 324 KG. CARE MUST BE TAKEN WHEN HANDLING TO AVOID INJURY.

10.1 With the aid of an assistant, install the generator frame assembly (Fig 2 (5)) into the trailer body (6) with the equipment tray facing towards the rear of the trailer.

10.2 Ensure that the mounting holes in the frame are aligned with the corresponding holes in the trailer body and secure with the six screws (9) washers (8) and nuts (7) (Table 2, Serials 2, 3 and 4). Refit the support plates removed at Para 9.5.

10.3 Fit the four tie down brackets (4) over the lugs on the generator (1).

10.4 Using a suitable lifting device and with the help of an assistant lower the generator (1) onto the frame assembly with the control panel facing toward the rear of the trailer. Ensure that the mounting holes in the tie down brackets are aligned with the corresponding holes in the frame and secure using the eight screws (2) and spring washers (3).

10.5 Attach the three earth leads (Fig 3 (4, 5 and 7)) to the generator and secure with the bolt (9) and wing nut (2).

10.6 Connect the long earth lead (4) to the earth spike (16) using screw (10) and nut (19).

10.7 Connect the short earth lead (5) to stud (11) on the frame (6) and secure with nut (12).

10.8 Connect the short earth lead (7) to the trailer body (1) and secure with screw (14) and nut (15).

10.9 Tidy up all loose leads with cable ties (3).

10.10 Thread the four equipment straps (8) through the apertures in the equipment tray (13).

10.11 Insert the mallet (17) and five exhaust extensions (18) into the equipment tray (13) and secure with the equipment straps (8).

10.12 Install and secure the fire extinguisher (20) into the bracket (21) on top of the generator.

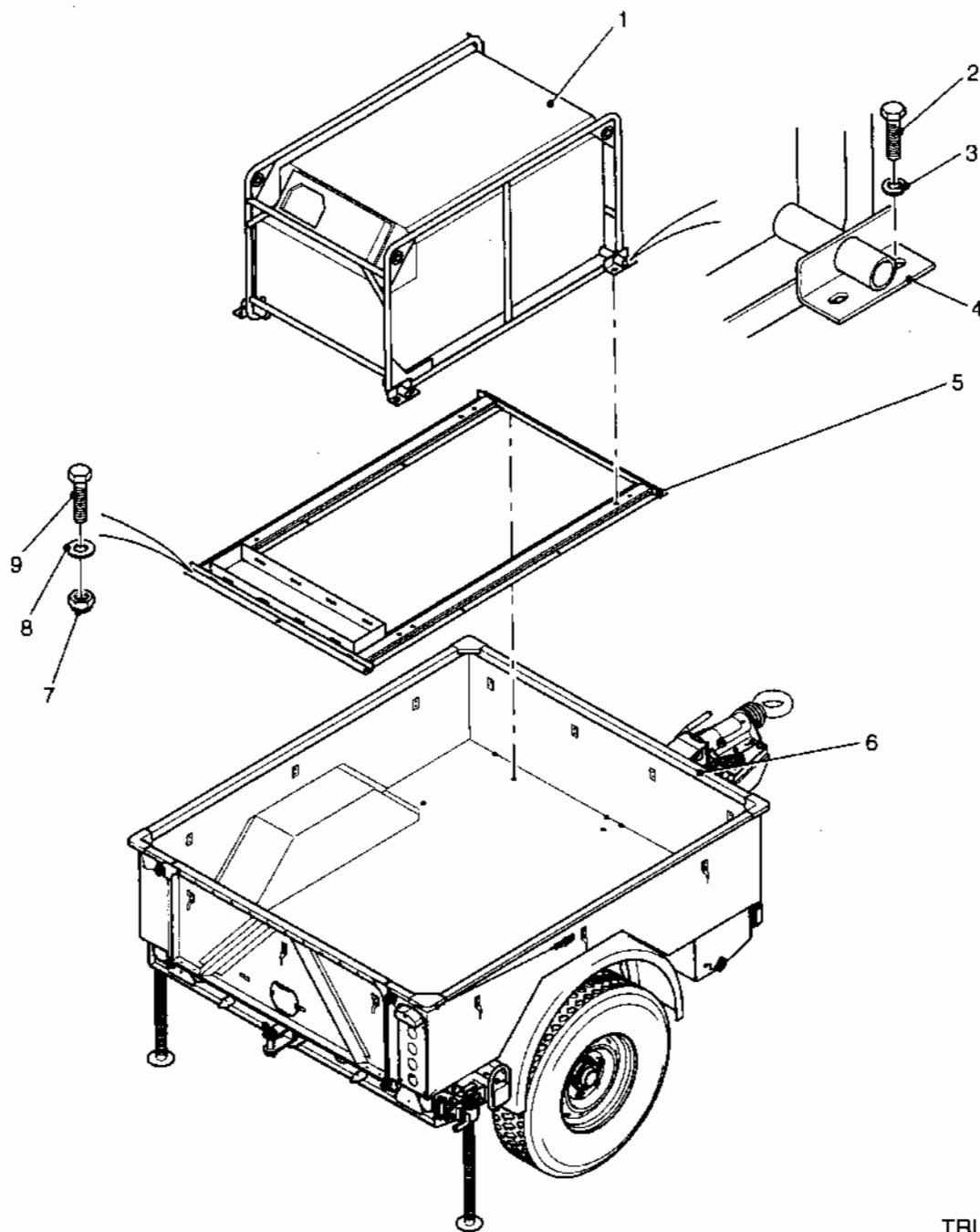
10.13 Install the canopy to the trailer body.

TESTING

11 Connect the trailer electrics to a suitable prime mover and check operation of registration light.

PARTS LIST

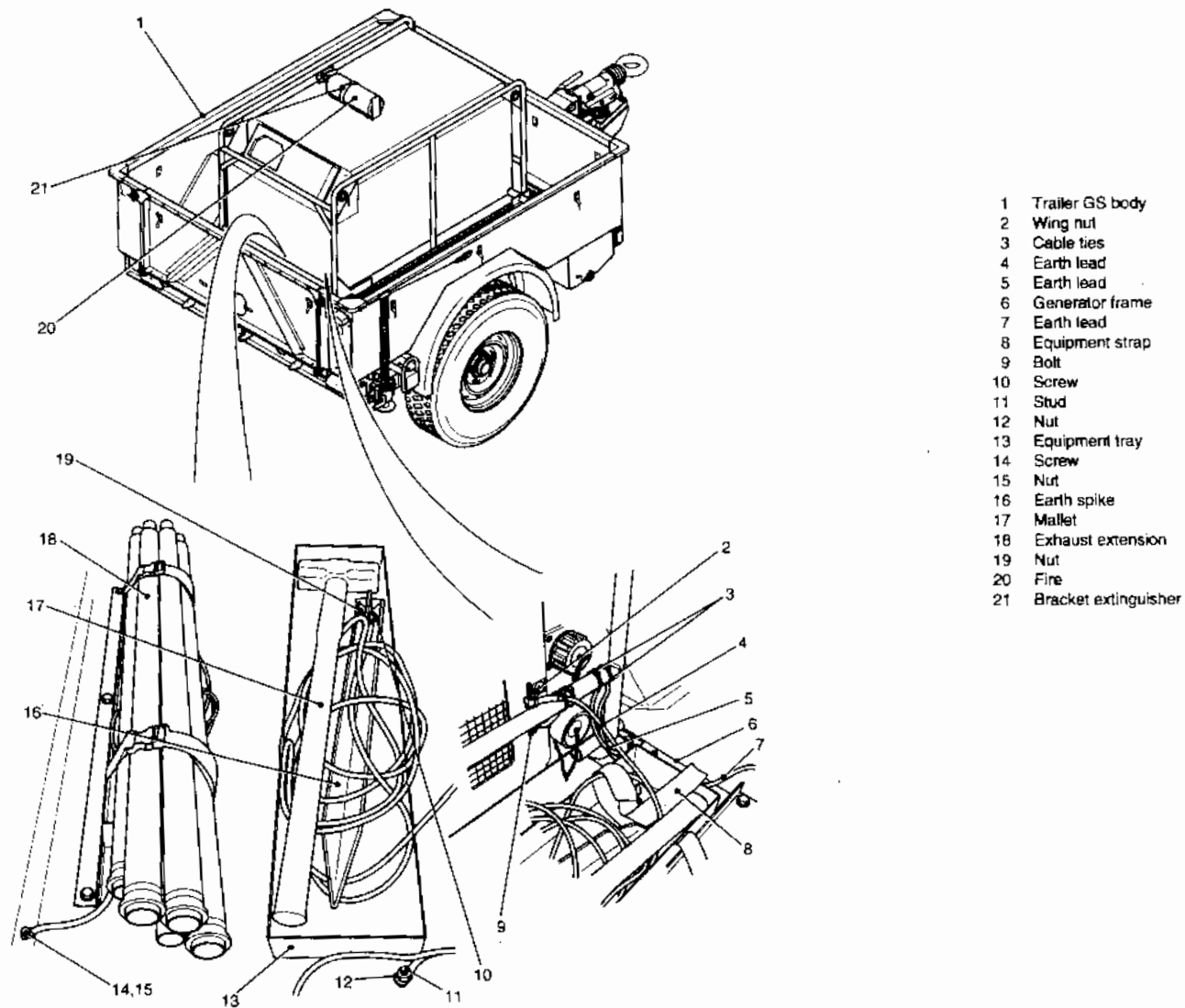
12 See Pages 8 and 9/10 for parts list details.



TRL/074

- | | | | |
|---|------------------|---|-----------------|
| 1 | Generator | 6 | Trailer GS body |
| 2 | Screw | 7 | Nyloc nut |
| 3 | Spring washer | 8 | Washer |
| 4 | Tie down bracket | 9 | Screw |
| 5 | Generator frame | | |

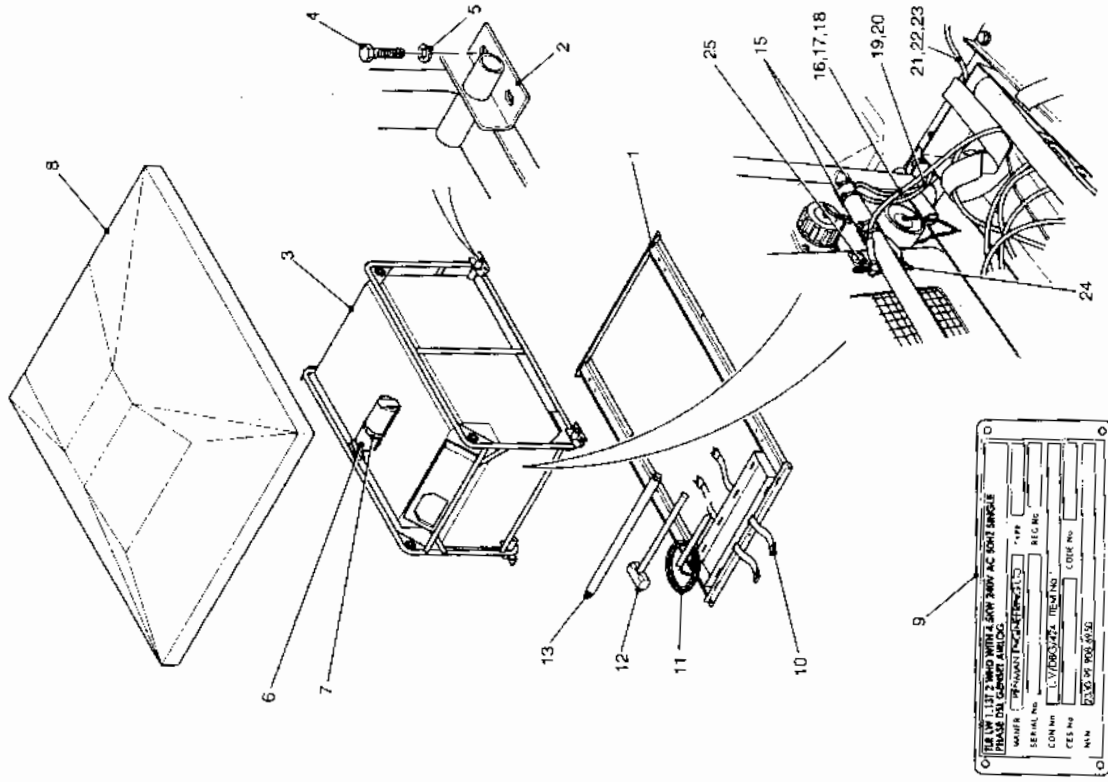
Fig 2 Generator installation



- 1 Trailer GS body
- 2 Wing nut
- 3 Cable ties
- 4 Earth lead
- 5 Earth lead
- 6 Generator frame
- 7 Earth lead
- 8 Equipment strap
- 9 Bolt
- 10 Screw
- 11 Stud
- 12 Nut
- 13 Equipment tray
- 14 Screw
- 15 Nut
- 16 Earth spike
- 17 Mallet
- 18 Exhaust extension
- 19 Nut
- 20 Fire
- 21 Bracket extinguisher

TAL/075

Fig 3 Generator installation



TRL076

Fig 4 Generator installation kit

Fig 4 Item	DMC Army	NATO stock number	Item name	Part No./ Dwg No.	No. off	Annotation (NSCM)
1			INSTALLATION KIT 4.5 KW AIRLOG GENERATOR SET	MS-2558-001	1	
2			WELDED ASSY, GENERATOR FRAME	AA-2558-027	1	
3			TIE DOWN ASSY, GENERATOR	MS-2558-023	4	
4			GENERATOR, AIRLOG		REF	
5			SCREW, M10 X 25, HEX HEAD	F193	8	
6			WASHER, SPRING, M10	F406	8	
7			EXTINGUISHER		1	
8			BRACKET, EXTINGUISHER		1	
9			CANOPY, AIRLOG TRAILER	AA-2558-031	1	
10			CONTRACT PLATE	AA-2558-030	1	
11			EQUIPMENT STRAP		4	
12			SPIKE, EARTH		1	
13			MALLET		1	
14	NI		EXTENSION, EXHAUST		5	
15			EARTHING SCHEME			
16			TIE-WRAP, 200 X 4 MM	01200306B	A/R	
17			EARTH LEAD		1	
18			SCREW		1	
19			NUT		1	
20			EARTH LEAD		1	
21			NUT		1	
22			EARTH LEAD		1	
23			SCREW		1	
24			NUT		1	
25			BOLT		1	
			WING NUT		1	



TRAILER LIGHTWEIGHT GS CARGO

CODE NB 2861 4100

**INSTALLATION INSTRUCTION NO. 3
FITTING ONAN GENERATOR SETS**

Sponsor: SUV IPT

Publication Authority: TES TIG Andover

AMENDMENT RECORD

Amdt No.	Incorporated by (Signature)	Date
1		
2		
3		

Amdt No.	Incorporated by (Signature)	Date
4		
5		
6		

SUBJECT: The fitting of ONAN generator sets

CONTENTS

Para

- 1 Warnings
- 2 Reason for installation
- 3 Related and associated publications
Installation implementation plan
- 4 Action required by
- 6 Man-hour content
- Trailer parts/items
- 7 Installation kit
- 8 Items to be removed
- 9 Dismantling/preparation
- 10 Fitting of generator support frame to trailer body (WARNINGS)
- 11 Earth lead connection points
- 12 Parts list

Table

Page

1	Estimated time required per equipment.....	2
2	Installation kit.....	3
3	Items to be removed and stored.....	3

Fig

1	Trailer with GS body.....	4
2	Generator support frame installation.....	6
3	Earth lead connection points.....	8
4	Generator installation kit.....	10

WARNINGS

- 1 The following WARNINGS are used in this instruction:
- (1) **PERSONAL INJURY. THE GENERATOR SUPPORT FRAME ASSEMBLY WEIGHS 132 KG. CARE MUST BE TAKEN WHEN HANDLING TO AVOID INJURY.**
 - (2) **PERSONAL INJURY. THE ONAN GENERATOR SET WEIGHS 183 KG. CARE MUST BE TAKEN WHEN HANDLING TO AVOID INJURY.**
 - (3) **SAFETY HAZARD. WHEN A SINGLE GENERATOR IS FITTED IT MUST BE LOCATED IN THE REAR GENERATOR POSITION TO AVOID EXCEEDING THE TRAILER DRAWBAR PREPONDERANCE.**

REASON FOR INSTALLATION

- 2 This instruction details the removal of the tie down shackles from the body of the General Service (GS) cargo trailer, and the installation of ONAN generators and associated equipment.

RELATED AND ASSOCIATED PUBLICATIONS

- 3 The following publication is referred to in this instruction.

<u>Reference</u>	<u>Title</u>
AESP 2330-E-202-522	Maintenance Instructions

INSTALLATION IMPLEMENTATION PLAN**Action required by**

- 4 Units and establishments holding the subject trailers:
- 4.1 Demand the installation kit (refer to Table 2) when authorised.
 - 4.2 Request the unit repair to carry out the installation, when the installation kit arrives.
- 5 Units and establishments embodying this installation:
- 5.1 Carry out this installation, when requested by the holding unit. No special tools or test equipment is required.

Man-hour content

- 6 The estimated man-hour content is listed in Table 1.

TABLE 1 ESTIMATED TIME REQUIRED PER EQUIPMENT

Serial (1)	Task (2)	Man-hours (3)	Tradesman employed (4)
1	Dismantling, preparation	0.5	REME tech + assistant
2	Assembly	1.5	REME tech + assistant
3	Testing	0.25	REME tech

TRAILER PARTS/ITEMS

Installation kit

7 Installation kit items are listed in Table 2.

TABLE 2 INSTALLATION KIT

Serial (1)	DMC (2)	NSN/Part No. (3)	Designation (4)	Qty (5)	Remarks (6)
1			ONAN generator installation kit	1	
2		F1209	Screw, hexagon, M12 x 30	6	
3		F1042	Washer, flat, M12	6	
4		F1041	Nut, aero, M12	6	

Items to be removed

8 Items to be removed and stored are listed in Table 3.

TABLE 3 ITEMS TO BE REMOVED AND STORED

Serial (1)	DMC (2)	NSN/Part No. (3)	Designation (4)	Qty (5)	Remarks (6)
1		AA-2322-232	Duckboard	1	
2		F1046	Nut	6	
3		F1047	Washer	6	
4		AA-2363-168	Plate, support	2	
5		AA-2323-285	Shackle	6	

DISMANTLING/PREPARATION

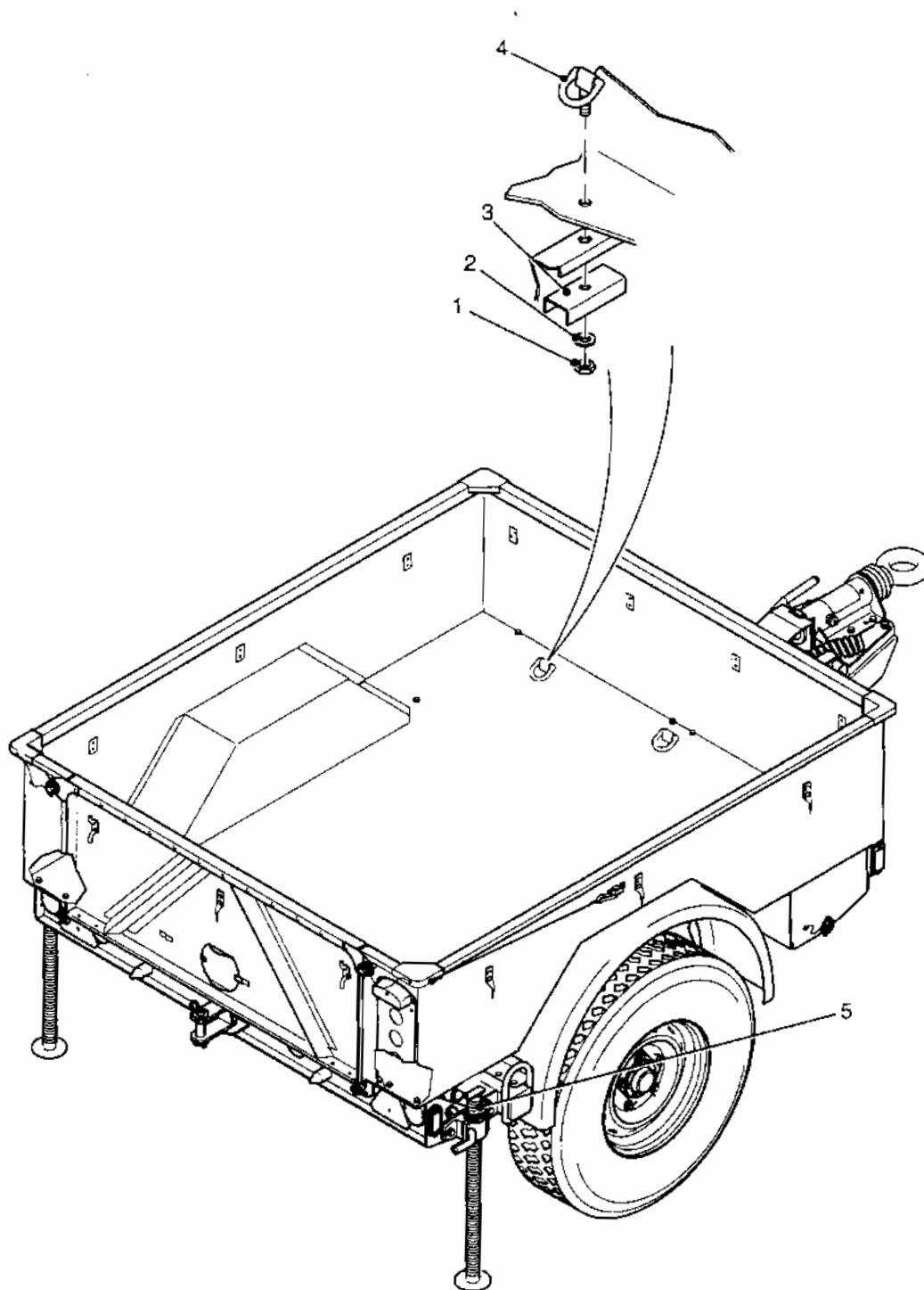
9 To dismantle/prepare the trailer for its installation , proceed as follows:

- 9.1 Position the trailer on firm, flat, level ground under a suitable overhead crane if available.
- 9.2 Deploy the jockey wheel and rear support stands (Fig 1 (5)) to level the trailer.
- 9.3 Ensure the jockey wheel and support stands are locked and the handbrake fully on.
- 9.4 Remove the duckboard and store (Table 3, Serial 1).

NOTE

The support plate (3) is fitted to the two outer front shackles only.

- 9.5 With the aid of an assistant, remove the nuts (1), washers (2), support plates (where fitted) and shackles (4) and store (Table 3, Serials 2, 3, 4 and 5) at six positions.



TRL/078

- | | | | |
|---|---------------|---|--------------------|
| 1 | Nut | 4 | Shackle |
| 2 | Washer | 5 | Rear support stand |
| 3 | Support plate | | |

Fig 1 Trailer with GS body

FITTING OF GENERATOR SUPPORT FRAME TO TRAILER BODY

10 To fit the Generator support frame, proceed as follows:

10.1 With the aid of an assistant, place the generator support frame (Fig 2 (18)) onto suitable supports to allow work on the underside of the frame.

10.2 Install rear generator frame (19) onto the support frame (18) ensuring that the mounting holes are aligned and with the aid of an assistant, secure with four screws (22), plain washers (21) and nuts (20).

10.3 Repeat the procedure for the forward generator frame.

10.4 Install jerry can frame (10) as shown in Fig 2. Align the mounting holes and with the aid of an assistant, secure with four countersunk screws (11), plain washers (12) and nyloc nuts (13).

10.5 Repeat the procedure for the remaining three jerry can frames.

WARNING

PERSONAL INJURY. THE GENERATOR SUPPORT FRAME ASSEMBLY WEIGHS 132 KG. CARE MUST BE TAKEN WHEN HANDLING TO AVOID INJURY.

10.6 Using a suitable lifting device and with the help of an assistant lower the support frame assembly (18) into the trailer body (14). Ensure that the mounting holes in the support frame are aligned with the corresponding holes in the trailer body and secure with six screws (17), plain washers (16) and nyloc nuts (15).

10.7 Loosen the bolts on the four generator clamps (8) on the two generator support plates (9) and rotate inboard.

WARNING

PERSONAL INJURY. THE ONAN GENERATOR SET WEIGHS 183 KG. CARE MUST BE TAKEN WHEN HANDLING TO AVOID INJURY.

10.8 Using a suitable lifting device and with the help of an assistant lower the rear generator set (2) onto the generator frame (19) and ensure the generator is correctly seated and the control panel facing forward.

10.9 Rotate the four generator clamps (8) until they are in contact with the tubular frame of the generator (2) and tighten.

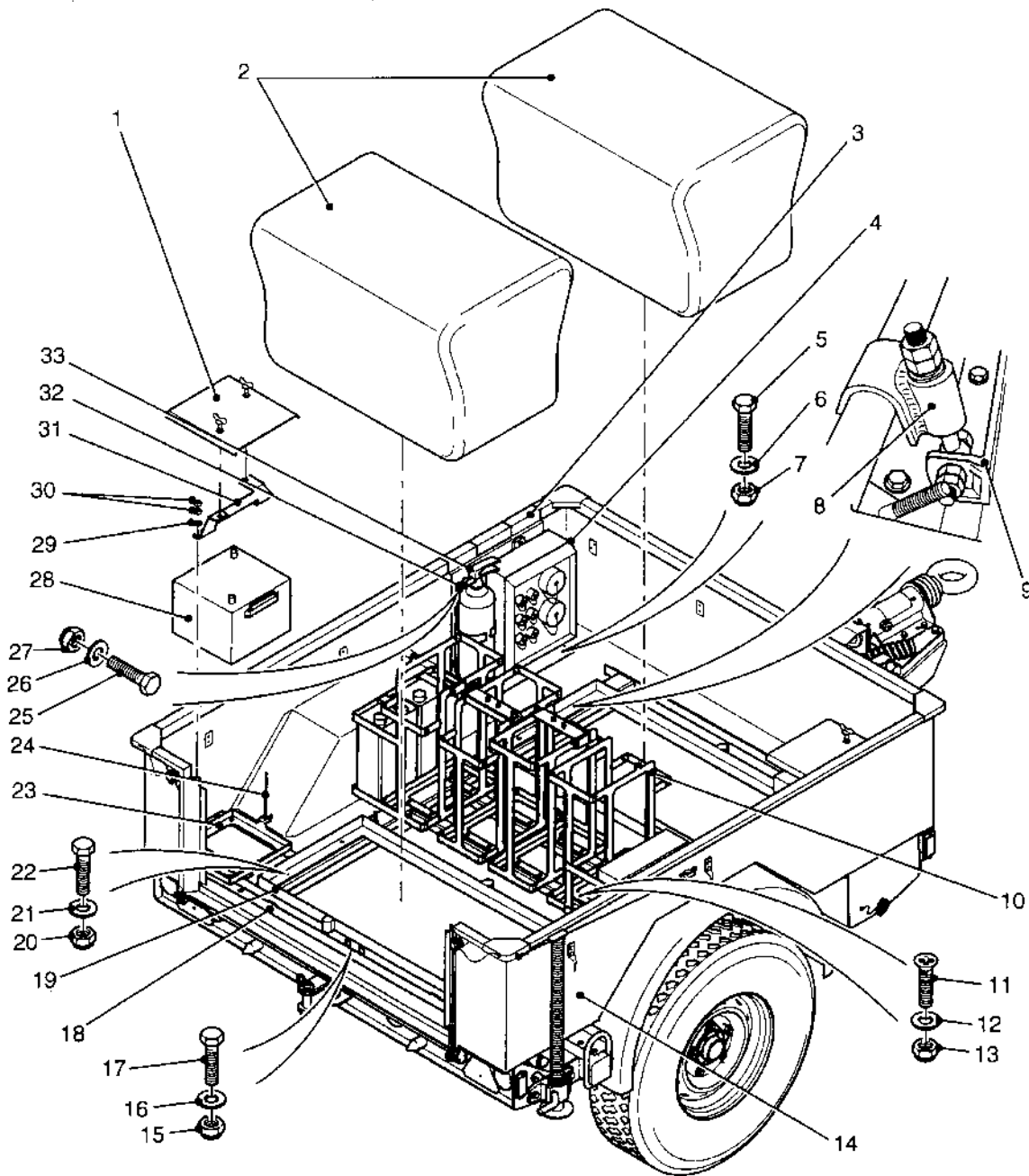
10.10 Repeat the procedure for the forward generator set ensuring that the control panel is facing rearwards.

10.11 Install the rear battery (28) onto the battery base (23). Fit two battery hooks (24) into the holes provided in the battery base (23).

10.12 Fit the clamp plate (31) over the top of the battery (28). Push the two hooks through the clamp plate and secure with two nuts (30) and a plain washer (29). Install battery cover (1).

10.13 Repeat the procedure for the forward battery.

10.14 Hook the control panel bracket (3) over the forward end of the Left-Hand (LH) side of the body panel (14). Align the holes in the panel with corresponding holes in the body floor and secure with two screws (5) washers (6) and nuts (7).



(TAILGATE REMOVED FOR CLARITY)

TRL/080

Fig 2 Generator support frame Installation

Key to Fig 2

1	Battery cover	18	Generator support frame
2	Generator set	19	Generator frame
3	Control panel bracket	20	Nut
4	Control panel	21	Washer
5	Screw	22	Screw
6	Washer	23	Battery base
7	Nut	24	Battery hook
8	Generator clamp	25	Screw
9	Support plate	26	Washer
10	Jerry can frame	27	Nut
11	Screw	28	Battery
12	Washer	29	Washer
13	Nut	30	Nut
14	Trailer body	31	Clamp plate
15	Nut	32	Fire extinguisher bracket
16	Washer	33	Fire extinguisher
17	Screw		

10.15 Fit the control panel (4) and secure with four screws, plain washers and nuts.

10.16 Fit the fire extinguisher bracket (32) to the control panel bracket (3) and secure with four screws (25), washers (26) and nuts (27). Fit the fire extinguisher (33).

EARTH LEAD CONNECTION POINTS

11 There are three common earth points within the trailer body. Earth points A and B as shown in Fig 3 are identical and are secured as shown in Detail A. Earth point C is secured as shown in Detail B. The earth leads are connected as follows:

11.1 Connect earth leads from the forward generator, forward generator frame, jerry can frames 3 and 4, rear battery frame and trailer body to common earth stud A as shown in Fig 3. Secure common earth stud A with two plain nuts (Fig 3 (1)) as shown in Detail A.

11.2 Connect earth leads from the rear generator, rear generator frame, jerry can frames 1 and 2 and forward battery frame to common earth stud A as shown in Fig 3. Secure common earth stud A with two plain nuts (1) as shown in Detail A.

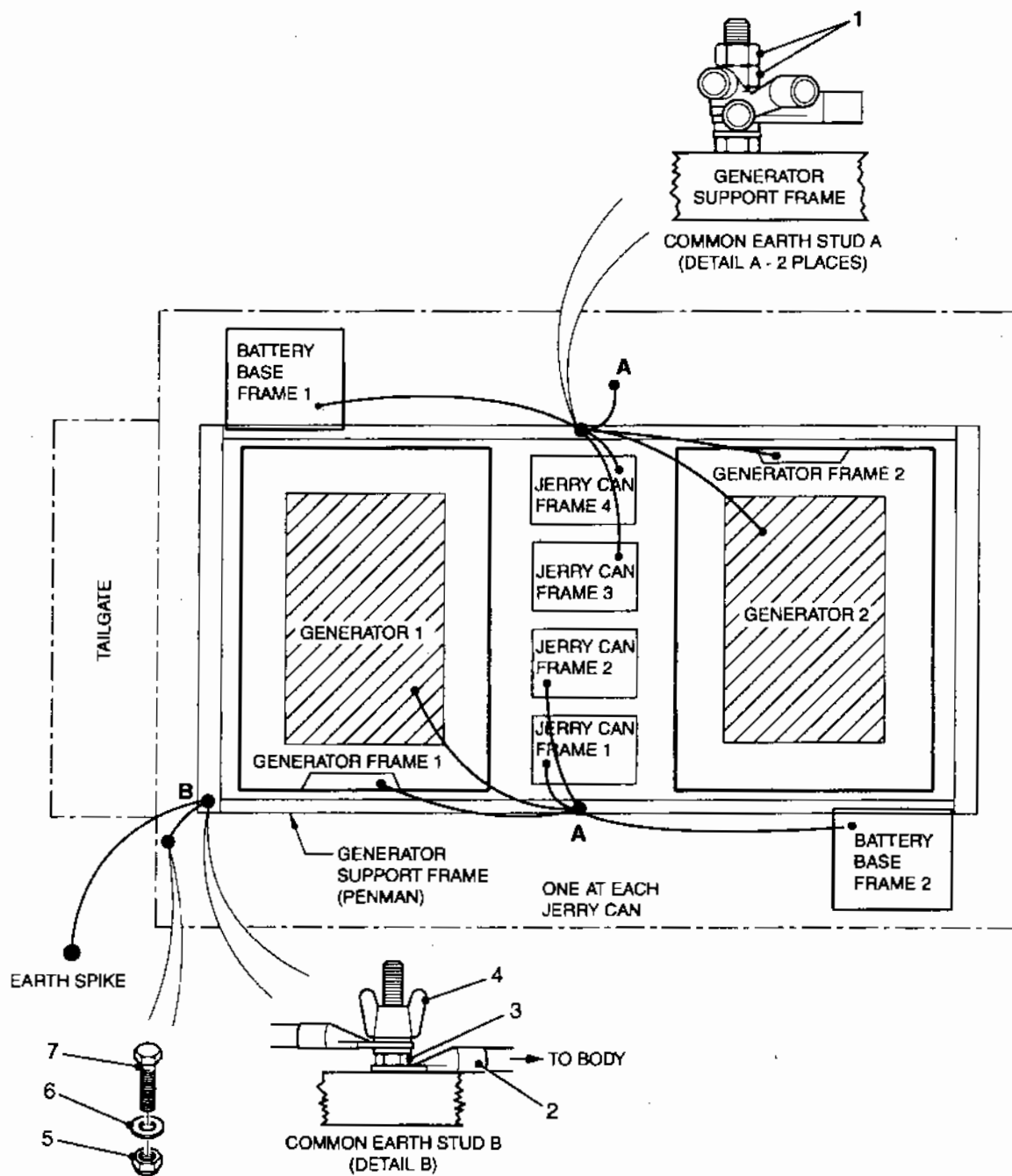
11.3 Attach rear body earth lead (2) to common earth stud B and secure with nut (3). The rear body earth lead is secured to the body using screw (7), plain washer (6) and nyloc nut (5).

11.4 Attach earth spike lead to common earth stud B and secure with wing nut (4).

11.5 Remove front and rear battery covers (Fig 2 (1)). Connect front and rear generator earth and positive connections and refit battery cover.

PARTS LIST

12 See Pages 10 and 11/12 for parts list details.

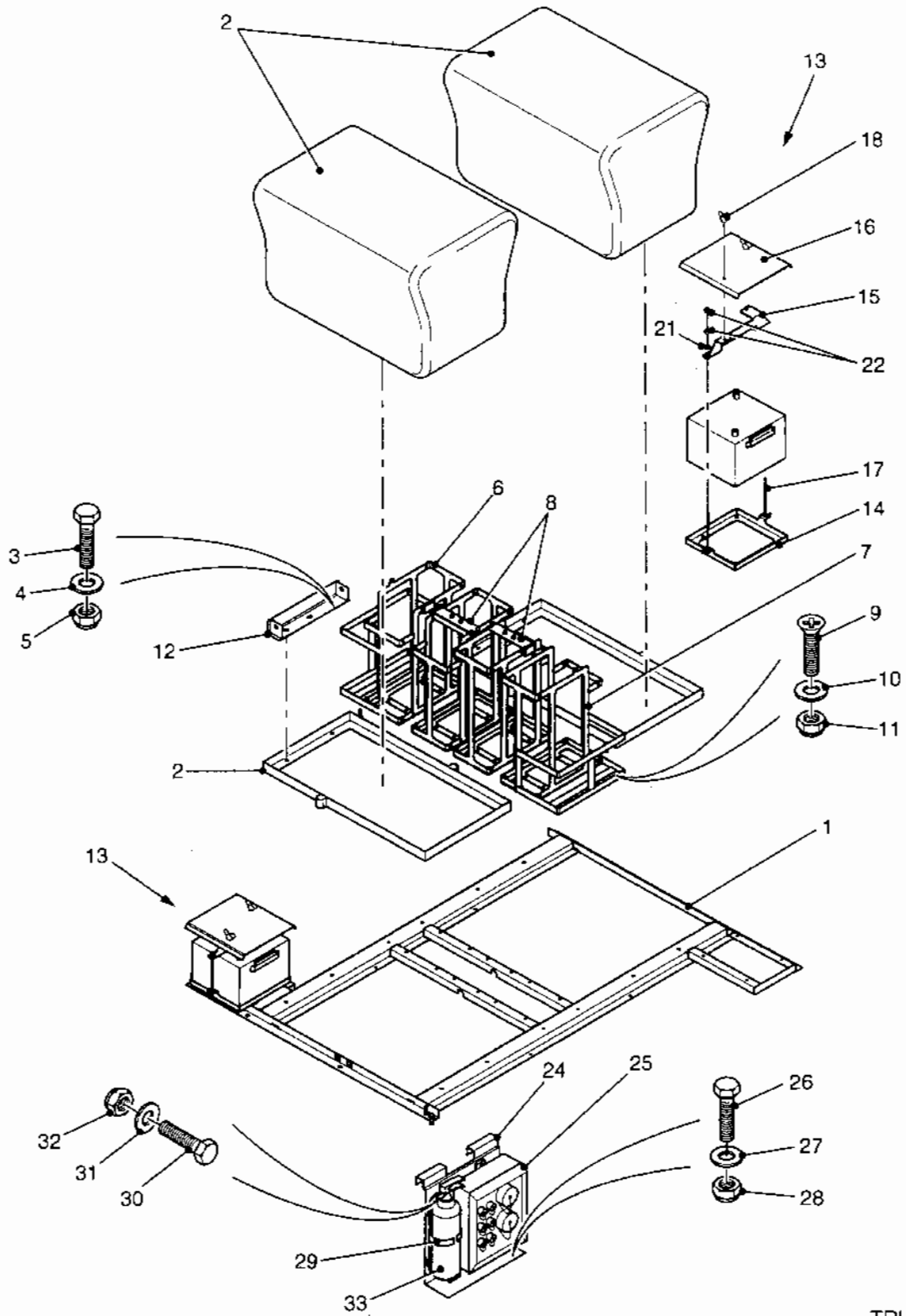


TRL/081

- | | | | |
|---|------------|---|--------------|
| 1 | Nut | 5 | Nut |
| 2 | Earth lead | 6 | Plain washer |
| 3 | Nut | 7 | Screw |
| 4 | Wing nut | | |

Fig 3 Earth lead connection points

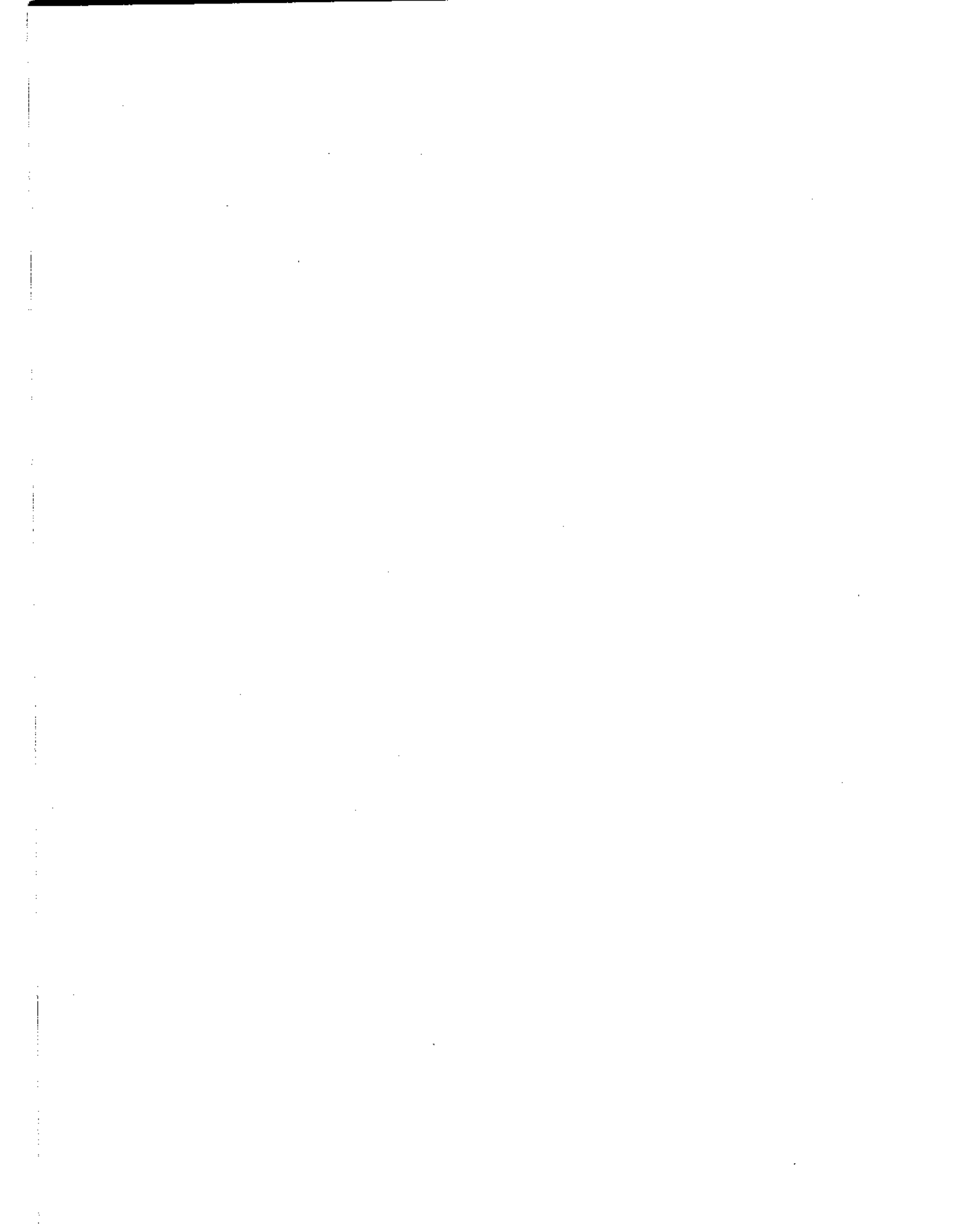
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TRL/082

Fig 4 Generator installation kit

Fig 4 Item	DMC Army	NATO stock number	Item name	Part No./ Dwg No.	No. off	Annotation (NSCM)
			ONAN GENERATOR INSTALLATION KIT	MS-2257-001	1	
1			. ASSEMBLY WELDED, GENERATOR FRAME	MS-2557-018	1	
2			. ONAN GENERATOR AND BASE TRAY		2	
3			. SCREW, HEX HEAD, M8 X 25	F121	8	
4			. WASHER, PLAIN, M8	F394	8	
5			. NUT, NYLOC, M8	F353	8	
6			. JERRY CAN FRAME ASSEMBLY	MS-2557-036	1	
7			. JERRY CAN FRAME ASSEMBLY	MS-2557-042	1	
8			. JERRY CAN FRAME ASSEMBLY	MS-2462-054	2	
9			. SCREW, CSK, SKT HEAD, M6	F111	16	
10			. WASHER, PLAIN, M6	F382	16	
11			. NUT, NYLOC, M6	F349	16	
12			. GENERATOR SUPPORT PLATE	MS-2557-032	4	
13			. FRAME BATTERY ASSEMBLY	MS-2397-099	2	
14			. . BASE PLATE	AA-2397-100	1	
15			. . CLAMP PLATE	AA-2397-101	1	
16			. . BATTERY COVER	AA-2397-102	1	
17			. . BATTERY HOOK	AA-2397-103	2	
18			. . WING HEAD STUD	85-12-400-16	2	
NI 19			. . RETAINER	85-34-201-20	2	
NI 20			. . CLIP ON RECEPTACLE	85-47-101-15	2	
21			. . WASHER, 1/2 PLAIN ST. ST, M6	F1062	2	
22			. . NUT, PLAIN, ST. ST. M6	F1061	4	
NI 23			. . EJECTOR SPRING	14-18-150-24	2	
24			. PLATE, FORMED	AA-2557-046	1	
25			. CONTROL PANEL		1	MoD supplied item
26			. SCREW		4	
27			. WASHER, PLAIN		4	
28			. NUT		4	
29			. BRACKET, FIRE EXTINGUISHER		4	
30			. SCREW		4	
31			. WASHER		4	
32			. NUT		4	
33			. FIRE EXTINGUISHER		1	
NI 34			. EARTHING STRAP		10	
NI 35			. PLATE	AA-2268-677	2	
NI 36			. EQUIPMENT STRAP	AA-2152-154	2	



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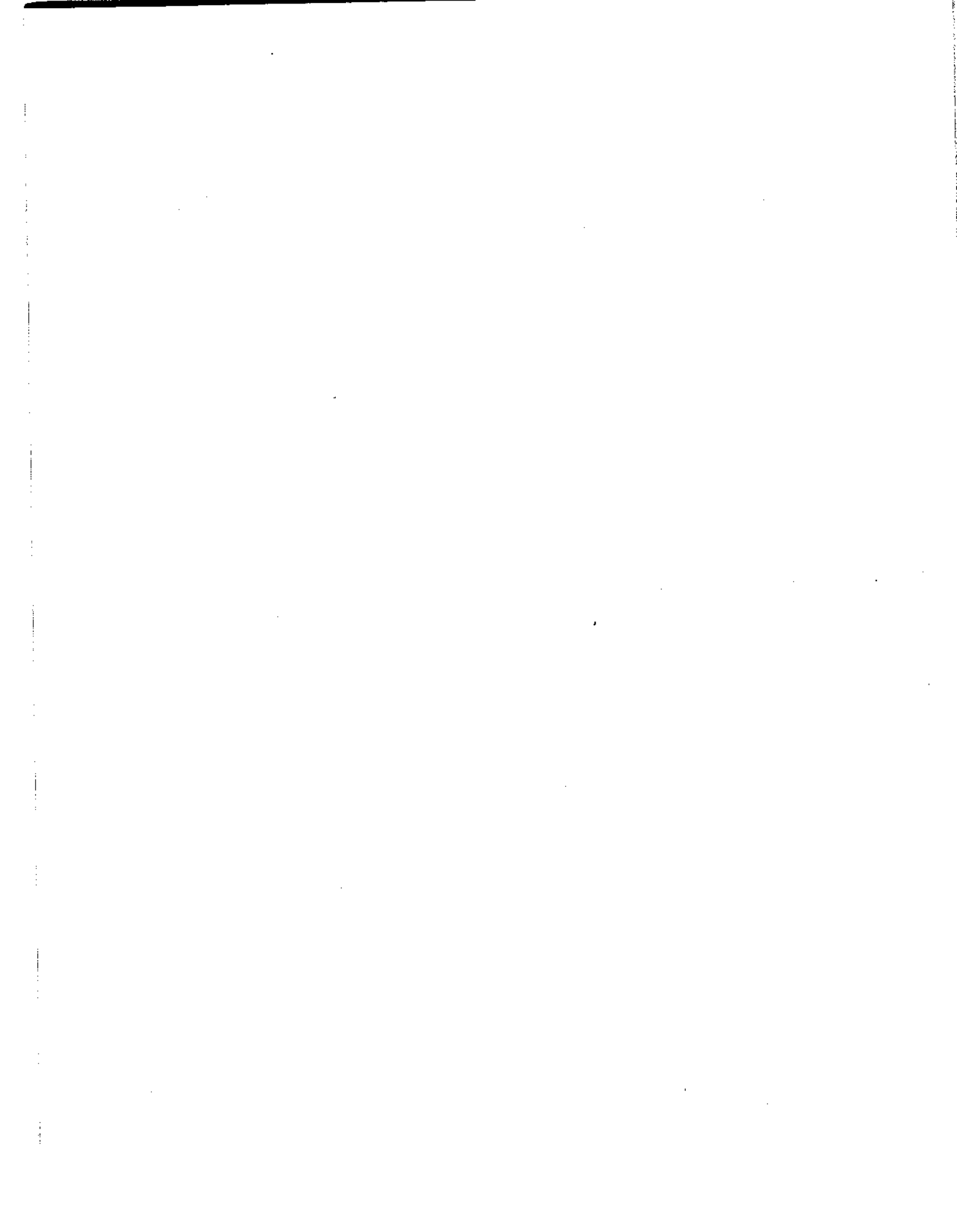
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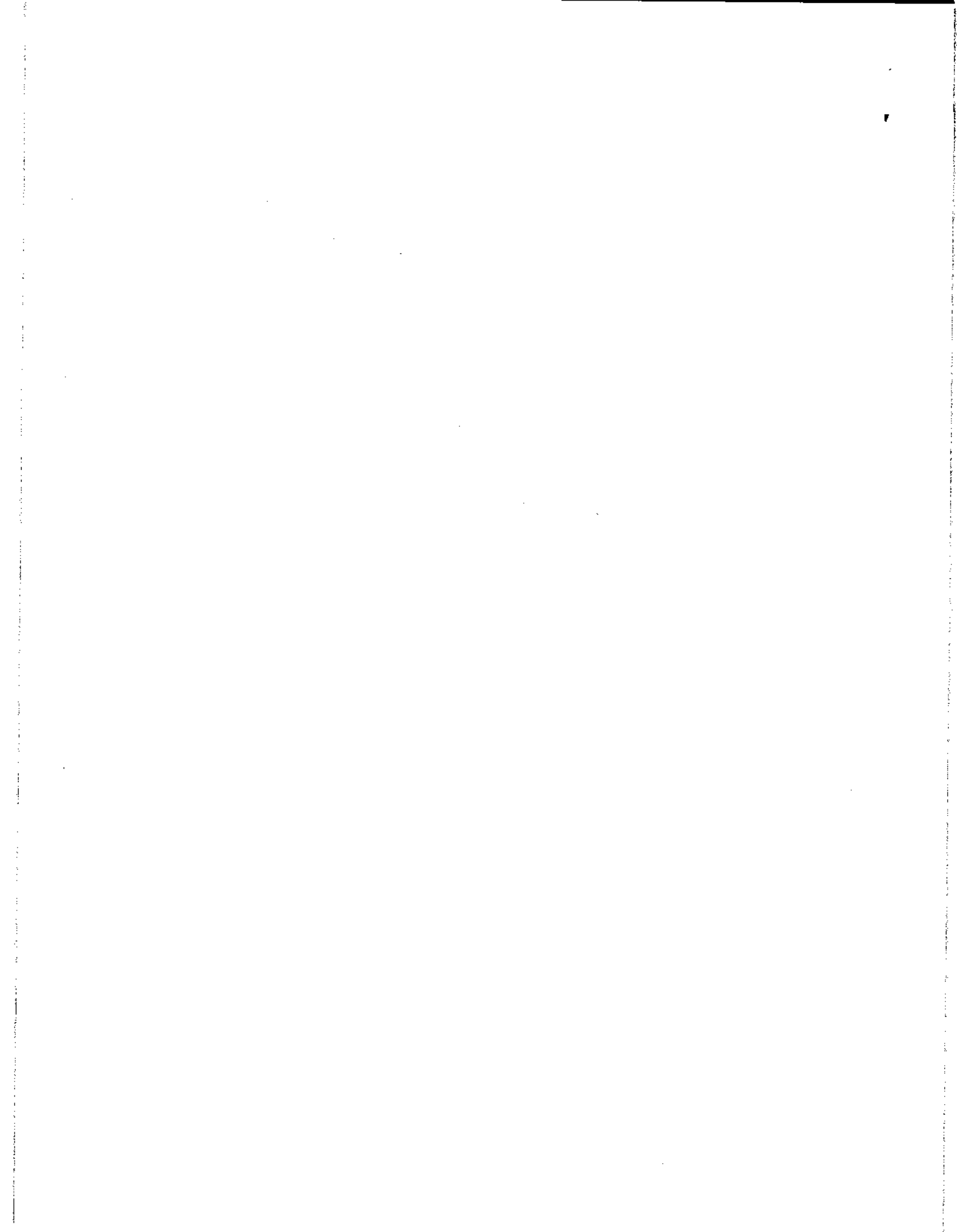
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PREPARATION FOR SPECIAL ENVIRONMENT INSTRUCTIONS AND INDEX

BY COMMAND OF THE DEFENCE COUNCIL

Ministry of Defence
Issued by

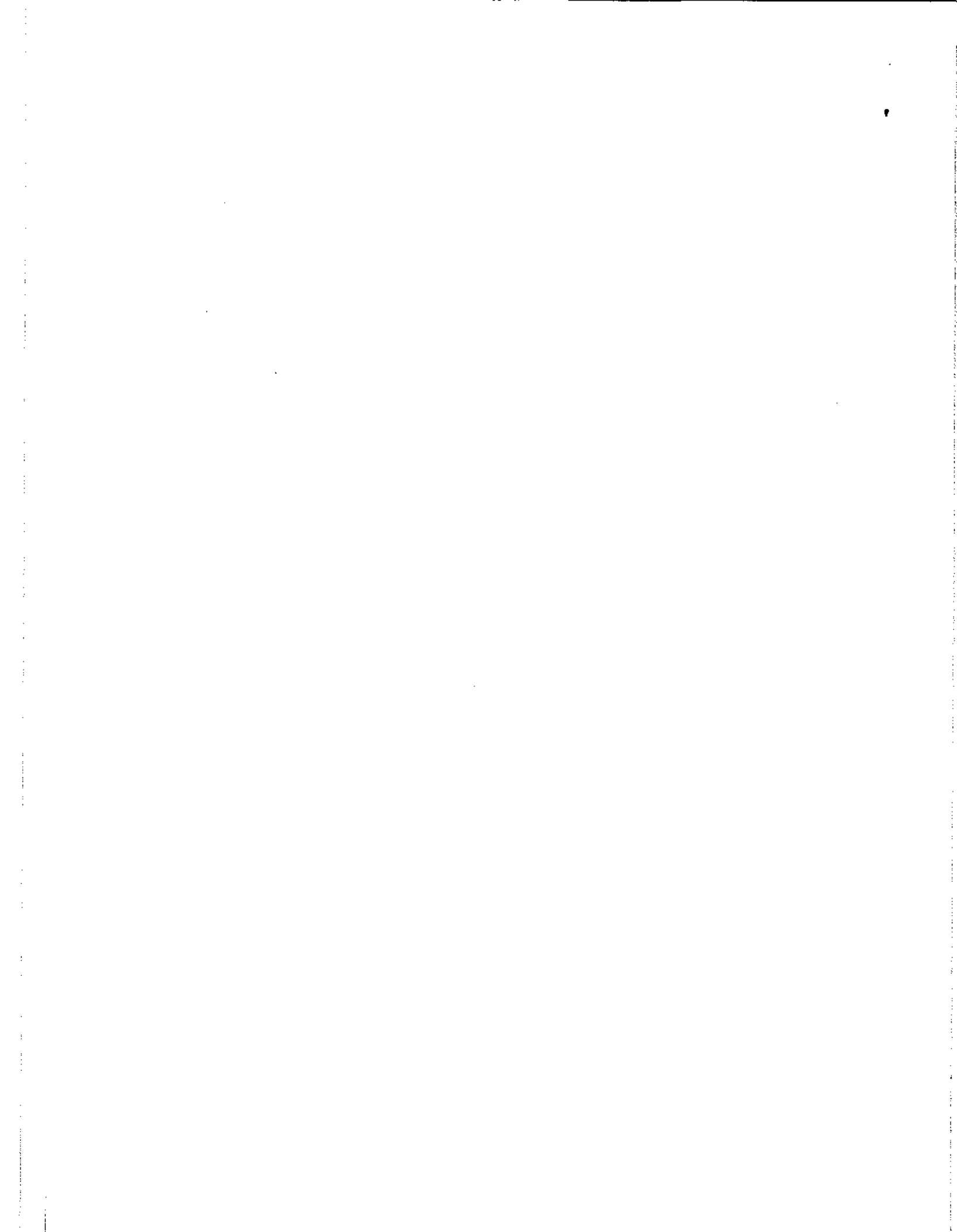
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PREFACE

Sponsor :
ES(Land) SUV IPT

Publications Agency:
DLO Andover

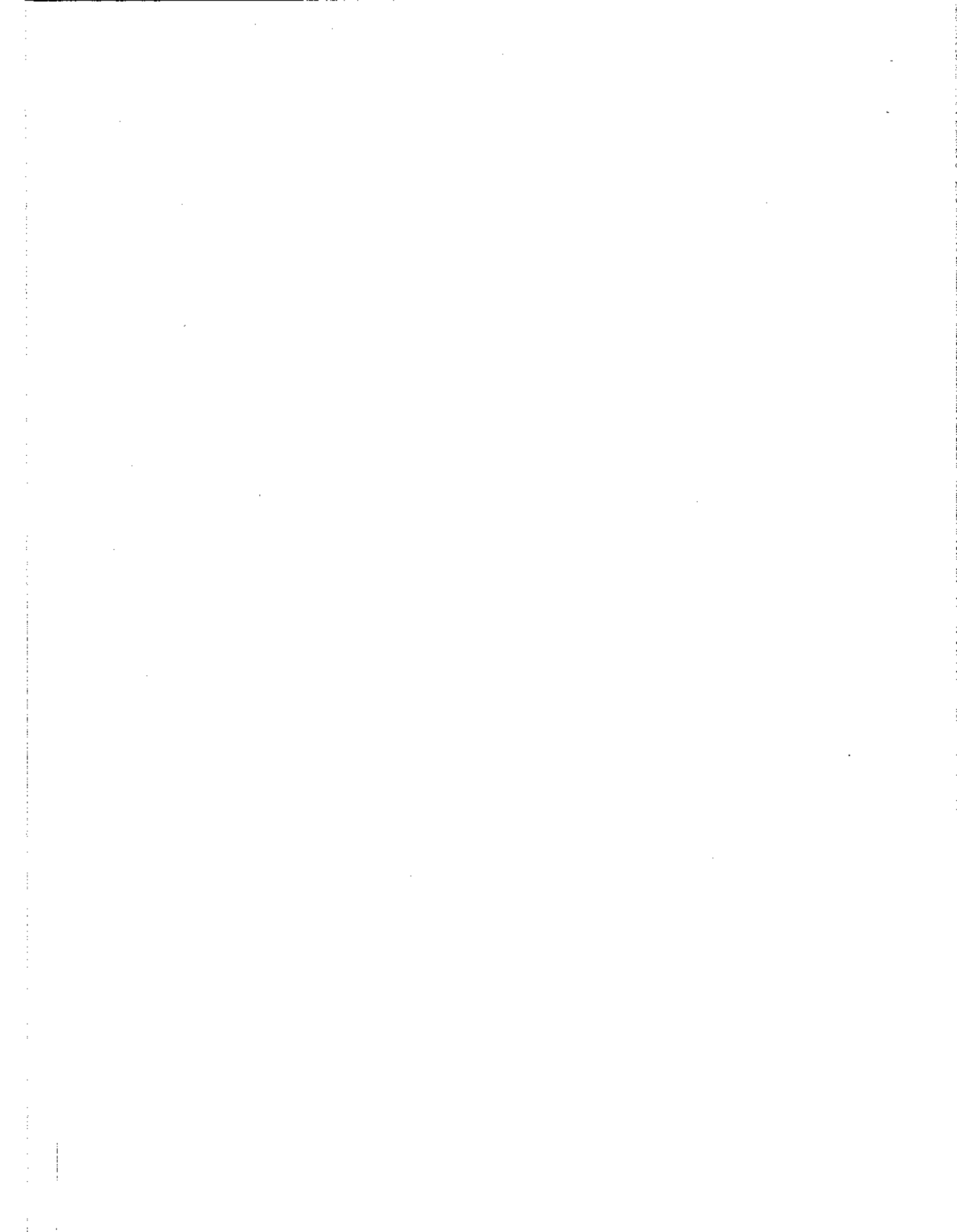
INTRODUCTION

- 1 The Publications Agency is responsible for allocation of instruction numbers.
- 2 All Preparation for Special Environment instructions as issued are to be recorded in manuscript by the recipient on the Preparation for Special Environment instructions index provided. Amendments to individual instructions are to be recorded on the Instruction amendment record. All extant instructions and amendments can be found listed in the main AESP index.
- 3 Service users should forward any comments on this publication through the channels prescribed in AESP 0100-P-011-013. An AESP Form 10 is provided at the end of this publication; it should be photocopied and used for forwarding comments on this AESP.
- 4 AESPs are issued under Defence Council authority and where AESPs specify action to be taken, the AESP will of itself be sufficient authority for such action and also for the demanding of the necessary stores.

PREPARATION FOR SPECIAL ENVIRONMENT INSTRUCTION INDEX

This index is to be kept up to date by the User entering Preparation for Special Environment instructions as and when they are published.

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1	Waterproofing Instructions Stage 'B', Stage 'C' and Stage 'D'
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10	



TRAILER, LIGHTWEIGHT, GS, CARGO

CODE NB 2853 3107

PREPARATION FOR SPECIAL ENVIRONMENT INSTRUCTION No. 1
WATERPROOFING INSTRUCTIONS

Sponsor:
ES(Land) SUV IPT

Publications Agency :
DLO Andover

AMENDMENT RECORD

Amdt No.	Incorporated By (Signature)	Date	Amdt No.	Incorporated By (Signature)	Date
1			4		
2			5		
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SUBJECT : WATERPROOFING INSTRUCTIONS STAGE 'B', STAGE 'C' AND STAGE 'D'

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- 4 De-waterproofing stage 'C'
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- 43 Task 8 Protecting the AESP and remaining items of waterproofing kit
- DE-WATERPROOFING STAGE 'C' (CAUTIONS)
- 44 Task 9 Tailgate
- 45 Task 10 Waterproofed equipment marker stage 'C'
- 46 Task 11 Temporary halt procedure

(Continued)

CONTENTS (continued)

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47	Summary
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48	Task 12 Brakes
49	Task 13 Lights
50	Task 14 Wash down
51	Task 15 Cargobag
52	Task 16 Overrun brake damper (WARNING)
53	Task 17 Road wheel hubs and brakes (WARNING)
54	Task 18 Number plate light
55	Task 19 Towing electrical cable
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57	Task 21 Waterproofed equipment marker
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INTRODUCTION

WARNING

FORDING AREA. BEFORE COMMENCING FORDING OPERATIONS, A RECONNAISSANCE MUST BE CARRIED OUT TO ENSURE THE AREA IS SAFE AND FREE OF OBSTACLES. FORDING IN UNSAFE CONDITIONS COULD RESULT IN INJURY OR DEATH.

CAUTION

EQUIPMENT DAMAGE. Only waterproofed variants with the Equipment Asset Code (EAC) listed on page 1 are to be implemented with this instruction. The equipment must not be subject to prepared fording until the stage 'B' kit is fitted as instructed in this AESP.

NOTE

This instruction AESP 2330-E-202-421 must be retained with the equipment record book.

1 This instruction details the method of waterproofing to enable the equipment to ford through an effective depth of 1.5 metres including ramp angle, wheel sinkage and wave height. The waterproofing when applied will enable the equipment to ford with the minimum of preparation for six minutes. To enable the equipment to achieve this objective, a Special Environment Waterproofing kit is fitted.

2 Where variations from standard occur on the vehicle or equipment due to modifications or contract changes, advice and direction of the unit Motor Transport Officer (MTO) should be sought regarding additional or amended tasks.

Waterproofing stage 'B'

3 The modification kit NSN 6WPG 2540-99-291-1332 is fitted prior to prepared fording. The maximum time allowed to complete this stage is two hours. This will permit the equipment to disembark or embark wet-shod dependant upon operational requirements. On completion of this stage pre-ford running time should be restricted to 15 minutes. Post ford use must conform to de-waterproofing stages 'C' and 'D'.

De-waterproofing stage 'C'

4 The tasks in this stage can be completed in a few minutes and must be conducted within 1 hour of leaving the water.

De-waterproofing stage 'D'

5 Tasks in this stage are dependent on operational conditions. Certain tasks may need to be carried out within 25 miles (40 Km) or 2 hrs from the point of disembarkation. The remaining tasks should be carried out as soon as conditions permit but within 46 miles (75 Km) or 3 days of landing.

NOTE

Vehicle mechanic assistance will be required for Tasks 3, 16, 17 and 20.

Associated publications

6	Refer to AESP:	2300-A-600-013	Waterproofing Regulations - Vehicles and Equipment
		2330-E-202-201	Operating Information
		2330-E-202-302	Technical Description
		2330-E-202-522	Repair Instructions
		2330-E-202-601	Maintenance Schedules

TABLE 1 MAN HOUR CONTENT

Serial	Detail	Approximate time in man-hours		Maximum No of men who can be usefully employed	Maximum time required hours
		Crew Drv (3)	Veh mech (4)		
(1)	(2)	(3)	(4)	(5)	(6)
1	Perusal of this AESP and checking of Wpg kit against kit list.	1	-	2	1
2	Servicing of equipment	2		2	2
3	Waterproofing stage 'B'	1	0.25	2	1
4	De-waterproofing stage 'C'	0.1		2	0.1
5	Wet shod re-embarkation	0.5		2	0.5
6	De-waterproofing stage 'D'	2	1	2	2

STORES REQUIRED

7 Items for waterproofing kits are MOD controlled stores. Operationally they are issued without demand. Should issue be authorized for training purposes:-

7.1 In the UK they are to be demanded from the MOD Defence Storage and Distribution Agency (DSDA), Bicester, through district headquarters.

7.2 Overseas, they are to be demanded through formation or district headquarters.

8 When a complete stage 'B' kit is required, the full Army designation of the vehicle or equipment, including code number and contract number is to be stated on the demand. Authority for issue must be quoted.

9 Normally, individual items are not issued separately but may be demanded to make good kit deficiencies. Such demands are to quote full part numbers and designations as shown in this waterproofing instruction para 11.1. A brief explanation of circumstances necessitating the demand is to be attached.

10 Inflammable items which have a shelf storage life are listed at para 11.2 of the kit list. These items are to be demanded separately by units prior to undertaking the fitting of waterproofing kits.

Stores, tools and equipment

WARNING

HEALTH AND SAFETY. MATERIALS USED IN WATERPROOFING ARE REQUIRED TO MEET OBLIGATIONS INTRODUCED UNDER THE CONTROL OF SUBSTANCES HAZARDOUS TO HEALTH REGULATIONS 2002 (COSHH). SAFETY INFORMATION RELATING TO MATERIALS USED IS CONTAINED IN JSP (F) 395-CATALOGUE OF HAZARDOUS STORES.

11

11.1 Stores to be demanded.

11.1.1 The following modification items are to be demanded quoting this instruction as authority for demand.

Item No.	NSN	Designation	Qty per veh
	6WPG 2540-99-291-1332	Special environment waterproofing kit (WPG 9734) Trailer, Lightweight, GS, Cargo consisting:	1
1	AESP 2330-E-202-421	Waterproofing Instruction No.1	(1)
2	6WPG 2510-99-842-2595	Stay, tailgate (WPG 9728)	(2)
3	6WPG 2540 99 816 2670	Bag, PVC 36 in. x 24 in. (WPG 8220)	(4)
4	6WPG 2540 99 815 9470	Bag, PVC, cargo 72 in. x 36 in. x 18 in. (WPG 9031)	(1)
5	6WPG 5970 99 664 8764	Tape, adhesive PVC Scotch 88	(1 roll)
6	6WPG 7690-99-661-9067	Stage 'B' waterproofed equipment marker (WPG 9615)	(2)*
7	H4 8105-99-135-6190	Bag, plastic 450 mm x 255 mm	(2)*
8	F1 8020 99 943 0417	Brush, artist's flat fitch No. 2	(1)
9	H21 4020 99 942 5038	Rope, fibrous	(10 m)
10	F1 8020 99 125 5009	Brush 1 in. wide	(1)
11	H10 7930 99 244 6936	Container, spray	(1)
12	6MT1 5340 99 618 3776	Cable tie	(2)

11.2 Stores or suitable equivalent to be obtained locally.

Item No.	NSN	Designation	Qty per veh
13	6WPG 2540 99 816 2664	Prestik P5408 2 ft pack (WPG 8120)	1
14	6WPG 5970 99 225 1703	Compound, silicone 100 g tube	1
15	6WPG 6850 99 224 5311	PX-24 water displacing fluid	1 litre
16	6WPG 9150 99 224 8885	Grease XG-286 or approved equivalent	3 kg
17	H1 6850 99 356 7379	Lec Klene solvent cleaner 300 ml	1

11.3 Special tools or suitable equivalent to be obtained locally.

Item No.	NSN	Designation	Qty per veh
18	F1 5120 99 127 8258	Wrench, torque	1

NOTES

- (1) The item numbers of Para 11 are used as reference throughout this instruction.
- (2) * Denotes a spare is provided to cater for defective or damaged goods.
- (3) Item number of Para 11.3 is required for Vehicle Mechanic (VM) assistance tasks.

GENERAL INSTRUCTIONS

- 12 The instructions in this publication describe the action to be taken before and after fording, to protect the equipment against damage resulting from immersion in sea water.
- 13 Waterproofing is carried out in stages and each stage is to be completed in the sequence given in this instruction. The tasks within each stage are shown in the most suitable sequence, but this may be varied according to circumstances. Where a complete task coverage requires more than one page, the task should be read in its entirety before commencing a page by page progression.
- 14 **CLEANLINESS IS THE FIRST ESSENTIAL OF SUCCESSFUL SEALING.** When applying compounds, ensure that the hands are clean and free from grease and that all surfaces to which sealing compounds are to be applied are scrupulously clean. Mud, oil, grease or water will spoil adhesion.
- 15 **REMEMBER THAT ALL WATERPROOFING MUST BE 100% SUCCESSFUL.** One carelessly treated component may cause failure at a critical moment, so take great care with every detail. Whenever waterproofing is being carried out during wet weather, suitable shelter should be arranged over the vehicle.
- 16 The equipment load must be made secure to prevent any movement whilst the vehicle is ascending or descending the ramp on the ship or craft.
- 17 If difficulties are encountered, the Unit (MTO) should be consulted.

MATERIALS, USES AND APPLICATION**WARNING**

HEALTH AND SAFETY. MATERIALS USED IN WATERPROOFING ARE REQUIRED TO MEET OBLIGATIONS INTRODUCED UNDER THE CONTROL OF SUBSTANCES HAZARDOUS TO HEALTH REGULATIONS 2002 (COSHH). SAFETY INFORMATION RELATING TO MATERIALS USED IS CONTAINED IN JSP (F) 395-CATALOGUE OF HAZARDOUS STORES.

- 18 Lec Klene solvent cleaner: Used for cleaning and degreasing surfaces before applying any of the various waterproofing materials. Lec Klene is a flammable liquid, therefore suitable precautions should be taken.
- 19 Prestik P5408: A plastic sealing compound which, when moulded to joints and apertures prevents water entry. It is also used in some cases to cover electrical components and connections to prevent failure of the electrical system.
- 19.1 It is supplied as a strip 24 in. x 1 1/2 in. wide, in a protective wrapping.
- 19.2 The application of Prestik P5408 is shown in Fig 1. It must not be removed from its wrapping until actually required for application. When handling, the hands must be clean and free from grease. Remove the backing strip as shown in Fig 1. Where a considerable length is called for in a particular task, it is better to apply a series of short lengths, overlapping the strips as shown in Fig 1, and moulding the top layer to the under layer. This allows ease of handling and avoids excessive stretch. It is important that strips of the correct length are used as detailed in this instruction.

NOTE

Always keep Prestik P5408 clean and dry. The biggest hindrances to successful waterproofing are oil, dirt, and water, therefore, all surfaces to be waterproofed must be perfectly clean and dry. The fingers may, however, be slightly moist to prevent the Prestik P5408 sticking to them.

- 20 Cover elastic waterproofing: Manufactured from rubber and used to enclose various components. Before use, examine carefully and repair tears, splits or pin holes with adhesive tape. A spare cover of each type required to waterproof the equipment is provided in the kit.

21 Grease: Is used for the protection against sea water corrosion on certain parts. The surface should be thoroughly covered with an even, unbroken film of grease. A lumpy coating is wasteful and provides no better protection.

22 Silicone compound: Supplied in 100 g tubes and 12 oz. aerosol containers for junction boxes, fuse holders and other electrical components which must remain operative at all times. The components should be covered with a generous, unbroken, even film of silicone compound.

23 Scotch Super 88 Electrical Insulation Tape: A waterproof adhesive tape suitable for repairing and sealing PVC bags, breathers, apertures, joints and components. The width of the tape can be increased by overlapping to the required width.

24 Fluid, water displacing, PX-24: Supplied in 1 litre containers. It is used for corrosion prevention and to wash sea water from components as detailed in this AESP.

25 Bag, envelope PVC:

25.1 These bags are manufactured in varying sizes from a waterproof material, which are used to enclose parts of the vehicle as detailed in this instruction and other items as may be desired.

25.2 Before use, the bag must be inspected for pin holes, tears or split seams, which can be repaired with suitable lengths of adhesive tape or Prestik P5408.

WATERPROOFING ARRANGEMENTS

26 The operations are to be carried out by Unit personnel unless otherwise stated. **THE WORK IS TO BE PLANNED AND CONTROLLED BY AN OFFICER WHO MUST ARRANGE FOR STAFF, TRAINED IN WATERPROOFING, TO INSPECT ALL TASKS PROGRESSIVELY TO ENSURE THAT THEY ARE COMPLETED SUCCESSFULLY.** A check list to assist operators will be found at the end of this instruction, it should be photocopied and used to check completion of each task. This list must be initialled by the operator as each task is passed as satisfactory.

CHECKING THE WATERPROOFING KIT

27 Before commencing waterproofing the equipment, the kit must be checked against the kit list provided.

WATERPROOFING OF CARGO

28 Should it be desired to waterproof items of stores and equipment carried as cargo for which a waterproofing kit or specified suitable container is not available, use may be made of the range of BAGS, WATERPROOFING detailed below and available from RLC sources:

29 The following two PVC bags are reusable types fitted with zip closures, and primarily for use in 1/2 ton, 3/4 ton and 1 ton cargo trailers:

29.1 6WPG 2540 99 815 9470 Bag PVC cargo 72 in. x 36 in. x 18 in. (WPG 9031).

29.2 6WPG 2540 99 815 9471 Bag PVC cargo 36 in. x 36 in. x 18 in. (WPG 9032).

PREPARATORY SERVICING

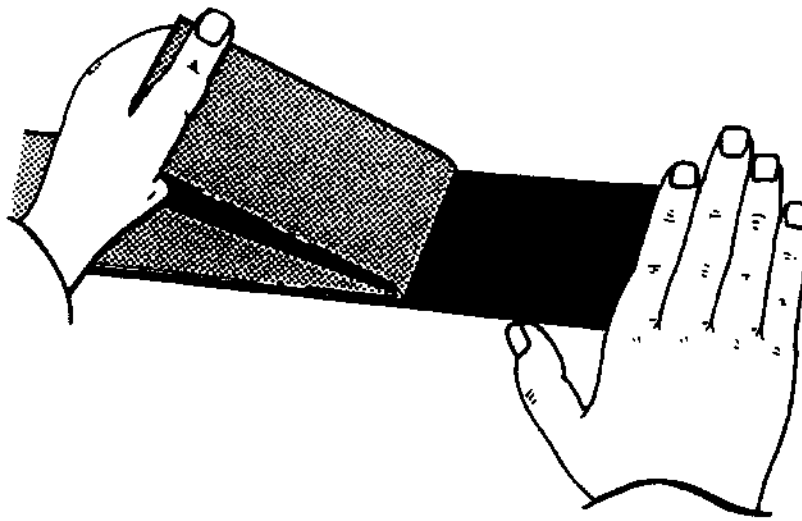
CAUTION

EQUIPMENT PREPARATION. Waterproofing demands maximum efficiency of equipment performance. Ensure that your equipment is 100 % fit for the task.

30 Carry out 20000 kms (12000 miles) maintenance of the equipment as detailed in Maintenance Schedule AESP 2330-E-202-601, to ensure full serviceability for fording.

Prestik P5408 application

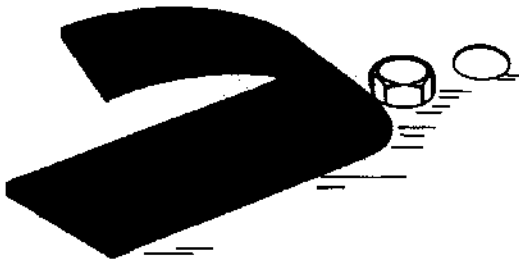
- 31 Lay the strip on a clean surface, tear open the outer polythene envelope wrapping at one end, and slide out the Prestik P5408 strip.
- 32 Remove the plain backing paper. **INSPECT PRESTIK P5408**; sections showing signs of dryness or cracks must be removed by cutting out suspected section of the strip.
- 33 Cut off the required length for use.

**NOTE**

Remove the remaining backing paper on the job.

APPLYING PRESTIK P5408 TO AN UNEVEN SURFACE

Using fingers, mould well down around uneven surfaces making sure no air pockets remain beneath the Prestik P5408.

**JOINING STRIPS OF PRESTIK P5408**

Always overlap like this and using fingers, lightly mould joint together.

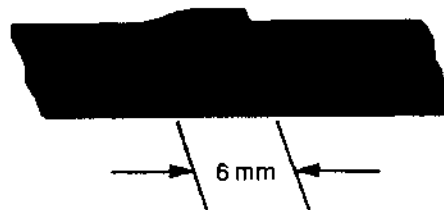
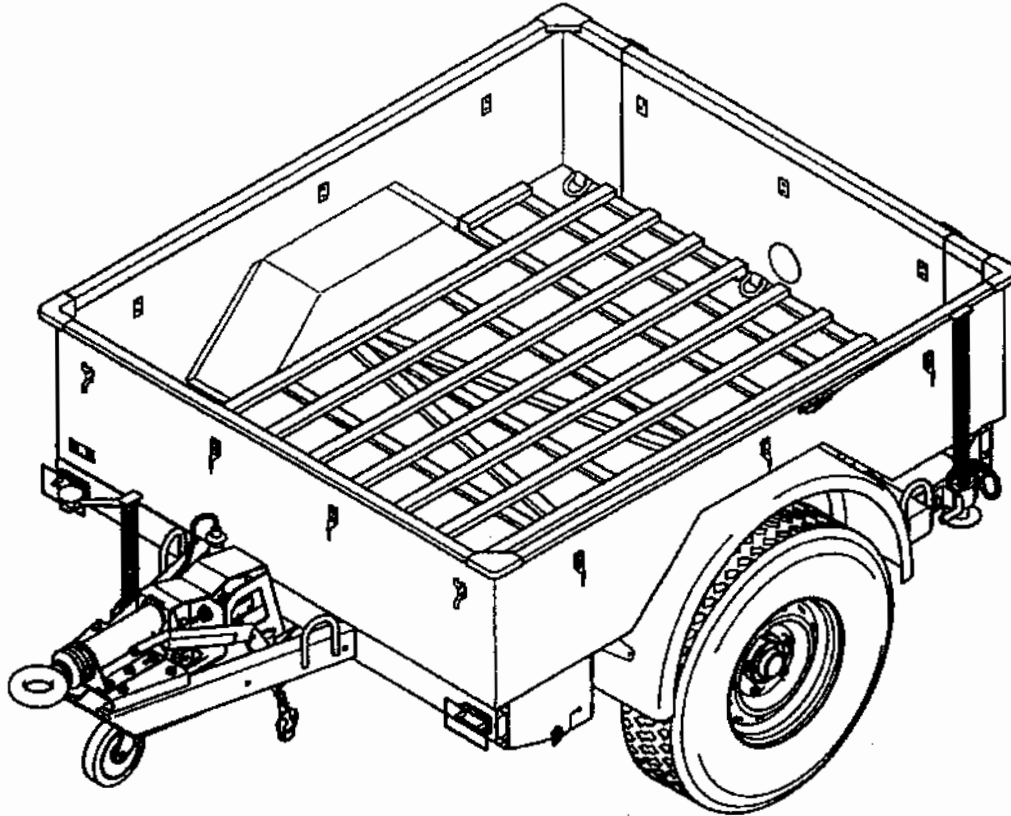


Fig 1 Application of Prestik P5408

Waterproofed equipment marking

- 34 Ensure equipment marking is displayed correctly.



Colour meaning		Action
<div style="background-color: black; color: white; padding: 5px; display: inline-block; font-weight: bold; font-size: 24px;">B</div> Red with white 'B' in centre	SEMI-PERMANENT Stage 'B' completed, equipment passed for disembarkation	Onboard landing ship or embarkation area
<p>NOTE</p> <p>The stage 'B' marking must be covered with black adhesive tape when stage 'C' or 'D' have been completed. The marking must be uncovered when stage 'B' is completed for further fording operations.</p>		

Fig 2 Waterproofed equipment markings

WATERPROOFING STAGE 'B'**WARNING**

PERSONNEL HAZARD. ENSURE THE REAR STANDS ARE LOWERED BEFORE COMMENCING ANY WATERPROOFING PREPARATION.

SEQUENCE OF OPERATIONS

35 Carry out this Preparation for Special Environment as follows:

TASK 1 BRAKE FLUID RESERVOIR**WARNING**

BRAKE FLUID. HYDRAULIC FLUID IS A TOXIC SUBSTANCE WHICH MUST NOT BE CONSUMED OR ALLOWED TO COME INTO SKIN/EYE CONTACT. IN THE EVENT OF SLIGHT SKIN/EYE CONTACT, THOROUGHLY RINSE THE AFFECTED AREA WITH WATER. IF THERE IS EXCESSIVE SKIN/EYE CONTACT OR INGESTION/INHALATION SEEK MEDICAL ATTENTION IMMEDIATELY.

CAUTION

BRAKE FLUID. Brake fluid is corrosive, if any brake fluid comes into contact with the paintwork, immediately wash down with a large quantity of freshwater and wipe clean with a soft cloth.

NOTE

It is essential that the reservoir cap rubber cover is in serviceable condition, and that the rubber diaphragm is correctly located on the reservoir body, in order ensure a watertight seal. If the cover or diaphragm is found unserviceable it must be renewed prior to fording.

36 Release the securing screw and remove the brake master cylinder protection cover.

36.1 Remove the reservoir cap. Ensure that the rubber diaphragm is seated correctly on the reservoir body. Refit and tighten the reservoir cap taking care that the diaphragm is not displaced during refitting.

36.2 Refit the master cylinder protection cover.

TASK 2 TOWING ELECTRICAL CABLE

37 Open the spring loaded cover of the towing cable plug. Apply an even coat of silicone compound (item 14) to the plug terminals using a fitch brush (item 8). Close the cover.

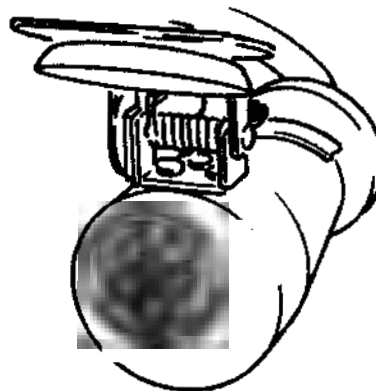


Fig 3 Electrical cable plug

Silicone compound

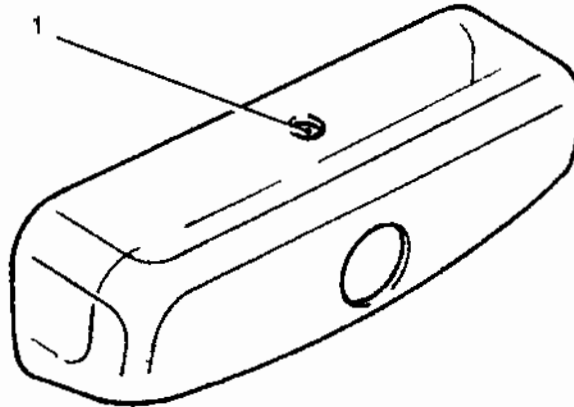
TASK 3 NUMBER PLATE LIGHT

NOTE

This task to be carried out with the assistance of a vehicle mechanic.

38 Remove the number plate light cover and lens.

38.1 Drill a 5 mm diameter hole centrally in the underside of the lens to provide free drainage following fording.



1 Drilled hole, 5mm diameter

Fig 4 Lens drilling

38.2 Apply an even coat of silicone compound (item 14) over the bulb body and terminal, electrical connectors and the light base plate using a fitch brush (item 8).

38.3 Refit the light cover and lens.

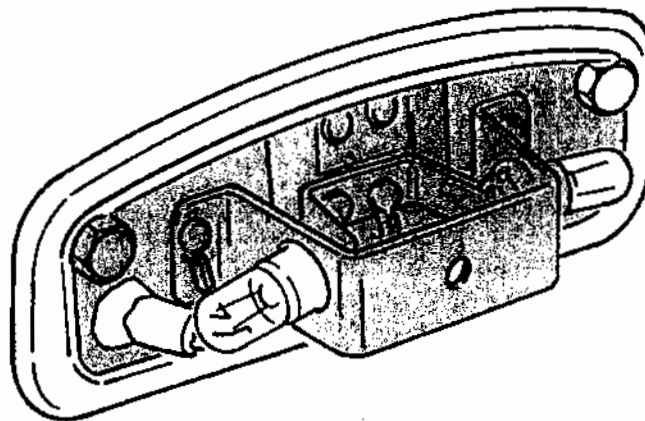


Fig 5 Number plate lamp

Silicone compound

TASK 4 CARGO

39 Fit the cargo bag (item 4) into the trailer positioning the bag centrally over the axle. Place all items of cargo likely to suffer damage due to sea water immersion in the bag. Small items of equipment can be placed in PVC bags (item 3) prior to stowage in the bag. Seal the cargo bag in accordance with the instructions for use supplied with each bag.

39.1 Secure the bag to the trailer using the cargo retaining straps provided with the trailer. Ensure the bag is firmly secured to prevent it moving during fording operations. All sharp edges of cargo will need padding to ensure the bag is not damaged when secured.

TASK 5 TAILGATE

40 Prop the tailgate open using the two tailgate stays (item 2). Secure the stays with the pins provided and the original tailgate retaining pins.

40.1 Open the closure plate on the tailgate.

NOTE

Tailgate stays are fitted to allow quick flooding of the trailer to prevent flotation.

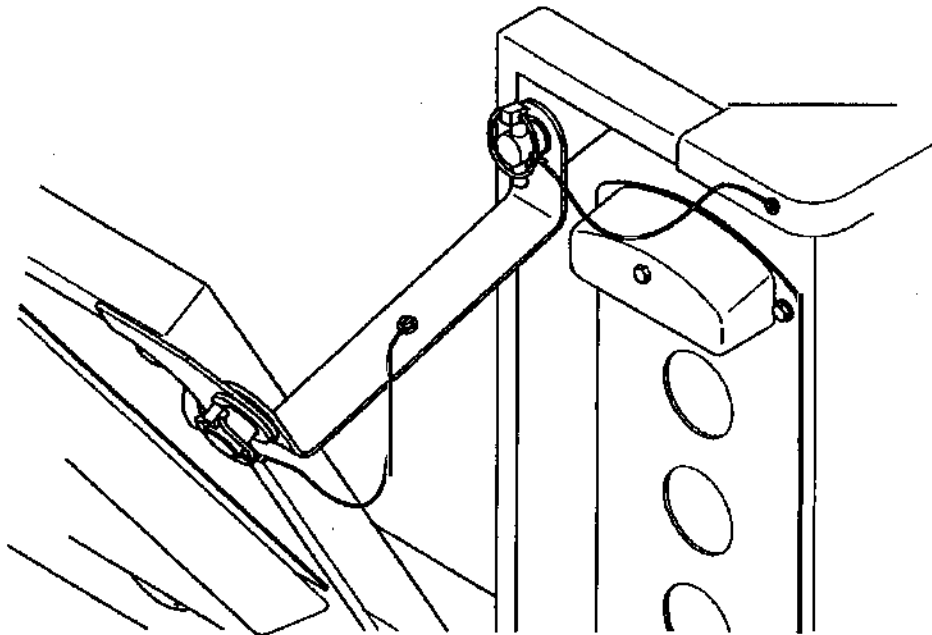


Fig 6 Tailgate stay

TASK 6 PRESERVATION

41 Apply an even coat of grease XG-286 (item 16) using the brush (item 10) for preservation against sea water immersion to the following areas:

- 41.1 Handbrake linkage and pivot points.
- 41.2 Rear support stand linkages and hinge pins.
- 41.3 Road wheel nuts.
- 41.4 Jockey wheel pivots and pins.

TASK 7 WATERPROOFED EQUIPMENT MARKING STAGE 'B'

42 Apply the red stage 'B' waterproofed equipment marker (item 6) as instructed in Para 34 of this AESP. Clean the surface with Lec Klene (item 17) before applying the marker to the trailer.

TASK 8 PROTECTING THE AESP AND REMAINING ITEMS OF WATERPROOFING KIT

43 Place this AESP in a plastic bag (item 7). Seal bag with adhesive tape (item 5). Retain the AESP in a safe place on the prime mover, it will be required for de-waterproofing stages 'C' and 'D' and wet shod re-embarkation if required.

43.1 Place the Lec Klene solvent cleaner, Prestik P5408, PX-24, spray container, silicone grease and all remaining unused items of waterproofing kit in a bag (item 3). Seal the bag with adhesive tape (item 5) and stow in the cargo bag. These items are required for use in de-waterproofing stages 'C' and 'D'.

43.2 Return the two stands at the rear of the trailer to the stowed position.

43.3 Connect the towing electrical cable to the prime mover vehicle.

DE-WATERPROOFING STAGE 'C'

CAUTIONS

(1) **TIME LIMITATION.** The following Tasks must be conducted within 1 hour of leaving the water.

(2) **DEFECT REPORTING.** All defects including occurrences of water ingress found during stage 'C' de-waterproofing, must be reported to a senior member of Unit ES staff as soon as operationally possible, for appropriate Equipment Failure Report (EFR) action.

TASK 9 TAILGATE

44 Remove the two tailgate stays and close and secure the tailgate. Close the tailgate closure plate. Retain the two stays for future waterproofing use.

TASK 10 WATERPROOFED EQUIPMENT MARKING STAGE 'C'

45 Cover the RED stage 'B' marker (refer to Fig 2) with adhesive tape (item 5).

TASK 11 TEMPORARY HALT PROCEDURE

46 If a temporary halt procedure is necessary the following precautions should be actioned:

46.1 Disconnect the 12-pin towing electrical plug from the prime mover.

46.2 Chock road wheels.

46.3 Leave the trailer handbrake in the 'OFF' position.

WET SHOD RE-EMBARKATION**CAUTION**

EQUIPMENT DAMAGE. Following completion of wet shod re-embarkation, de-waterproofing stages 'C' and 'D' must be carried out in accordance with this AESP.

SUMMARY

47 This instruction details action to be taken when the equipment will wet shod re-embark on the landing craft after disembarking operations have been completed.

- 47.1 Complete a thorough check of waterproofing carried out in stage 'B' waterproofing and rectify any damage.
- 47.2 Complete task 5.
- 47.3 Remove the black adhesive tape from the RED stage 'B' marker (see Fig 2).
- 47.4 Complete Task 8.

DE-WATERPROOFING STAGE 'D'**CAUTIONS**

- (1) **MILEAGE LIMITATION AFTER DISEMBARKATION.** Tasks 12, and 13 must be carried out 25 miles (40 km) or 2 hours, (whichever occurs first) from point of disembarkation if operationally possible. The remaining tasks should be carried out as soon as conditions permit but within 46 miles (75 km) or 3 days, (whichever occurs first) of landing.
- (2) **DEFECT REPORTING.** All defects including occurrences of water ingress found during stage 'D' de-waterproofing, must be reported to a senior member of Unit ES staff as soon as operationally possible, for appropriate Equipment Failure Report (EFR) action.

TASK 12 BRAKES

48 To prevent seizure of brakes when parked, every opportunity should be taken to:

- 48.1 Check the road wheels and leave the handbrake 'OFF'.

TASK 13 LIGHTS

49 Examine all lights for sea water contamination, remove lens and drain off any water present.

- 49.1 Flush out any contaminated lights with PX-24 (item 15) using the spray container (item 11).
- 49.2 Refit lens.

TASK 14 WASHDOWN

50 Wash down the equipment thoroughly with freshwater. Remove all traces of sand and salt deposits. Ensure the following areas are included:

- 50.1 Underside of body and axle.
- 50.2 Inside of stowage bins.
- 50.3 Rear support stands and jockey wheel mechanisms.
- 50.4 Operating mechanisms of cargo bag retaining straps

TASK 15 CARGOBAG

51 Remove the waterproofing cargo bag from the trailer. Retain the cargo bag (item 4) for future waterproofing use. Place the cargo retaining straps in one of the trailer stowage bins.

TASK 16 OVERRUNBRAKE DAMPER

WARNING

BRAKING EFFICIENCY. THE EFFICIENCY OF THE BRAKING SYSTEM MUST SATISFY ALL RELEVANT LEGAL REQUIREMENTS BEFORE THE EQUIPMENT IS RETURNED TO SERVICE.

NOTE

This task to be carried out with the assistance of a vehicle mechanic.

52 Remove the cable ties securing the towing eye rubber gaiter taking care not to damage the gaiter.

52.1 Turn back the large end of the gaiter and remove all sand and salt deposits from the gaiter and operating surface of the damper.

52.3 Reposition the gaiter correctly and secure with cable ties (item 12).

TASK 17 ROAD WHEEL HUBS AND BRAKES

WARNING

BRAKING EFFICIENCY. THE EFFICIENCY OF THE BRAKING SYSTEM MUST SATISFY ALL RELEVANT LEGAL REQUIREMENTS BEFORE THE EQUIPMENT IS RETURNED TO SERVICE.

NOTE

This task to be carried out with the assistance of a vehicle mechanic.

53 Strip and service the road wheel hubs and brakes ensuring that:

53.1 Road wheel hubs are free of contamination. If any of the hubs are contaminated, fit replacement oil seals.

53.2 Brake calipers, cables and linkages are in working order.

53.3 Refit the road wheels and tighten the wheel nuts to 102 to 115 Nm (75 to 85 lbf ft) using the torque wrench (item 18).

53.4 Test the braking system ensuring that all brakes are fully serviceable before the equipment is returned to service.

TASK 18 NUMBER PLATE LIGHT

54 Remove the number plate light cover and lens.

54.1 Clean the silicone compound from the light base plate, bulb holder and connectors.

54.2 Wash off the light with PX-24 (item 15) using the spray container (item 11) ensuring all traces of sand and salt deposits are removed.

54.2 Refit cover and lens to light.

TASK 19 TOWING ELECTRICAL CABLE

55 Clean the silicone compound from the towing cable electrical plug.

TASK 20 LUBRICATION

NOTE

This task to be carried out with the assistance of a vehicle mechanic.

56 Complete a 20000 kms (12000 miles) service of the equipment as detailed in the Maintenance Schedule AESP 2330-E-202-601.

TASK 21 WATERPROOFED EQUIPMENT MARKING

57 Remove and dispose of the waterproofed equipment marker.

TASK 22 FUTURE WATERPROOFING REQUIREMENTS

58 Examine the content and condition of the stage 'B' waterproofing kit. Re-demand replacement items detailed at Sub-Para 11.1 as necessary so that the kit is complete for future use. Stow the waterproofing kit and this instruction in a safe place so that they are readily available for use.

**TABLE 2 - WATERPROOFING TASK CHECK LIST -
TRAILER , LIGHTWEIGHT, GS, CARGO**

EQUIPMENT NO.

Page No. (1)	Para No. (2)	Item (3)	Initialed Completed (4)
10	-	WATERPROOFING STAGE 'B'	
10	35	Sequence of operations	
10	36	Task 1 Brake fluid reservoir	
10	37	Task 2 Towing electrical cable	
11	38	Task 3 Number plate light	
12	39	Task 4 Cargo	
12	40	Task 5 Tailgate	
12	41	Task 6 Preservation	
13	42	Task 7 Waterproofed equipment marking stage 'B'	
13	43	Task 8 Protecting the AESP and remaining items of waterproofing kit	
13	-	DE-WATERPROOFING STAGE 'C'	
13	44	Task 9 Tailgate	
13	45	Task 10 Waterproofed equipment marking stage 'C'	
13	46	Task 11 Temporary halt procedure	
14	-	WET SHODRE-EMBARKATION	
14	47	Summary	
14	-	DE-WATERPROOFING STAGE 'D'	
14	48	Task 12 Brakes	
14	49	Task 13 Lights	
14	50	Task 14 Wash down	
15	51	Task 15 Cargo bag	
15	52	Task 16 Overrun brake damper	
15	53	Task 17 Road wheel hubs and brakes	

(continued)

**TABLE 2 - WATERPROOFING TASK CHECK LIST -
TRAILER, LIGHTWEIGHT, GS, CARGO (continued)**

EQUIPMENT NO.

Page No. (1)	Para No. (2)	Item (3)	Initialed Completed (4)
		DE-WATERPROOFING STAGE 'D' (continued)	
15	54	Task 18 Number plate light	
15	55	Task 19 Towing electrical cable	
16	56	Task 20 Lubrication	
16	57	Task 21 Waterproofing equipment marking	
16	58	Task 22 Future waterproofing requirements	

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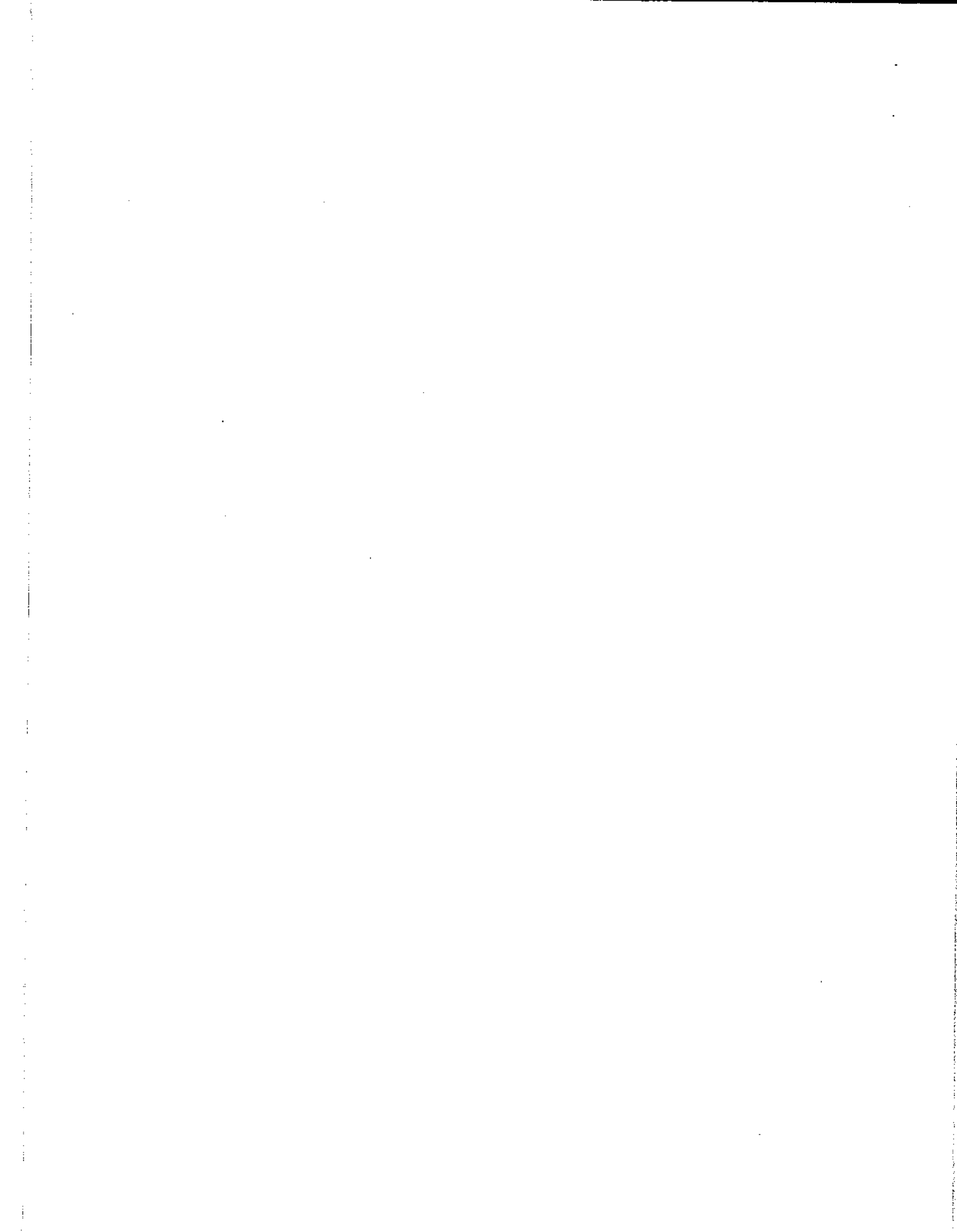
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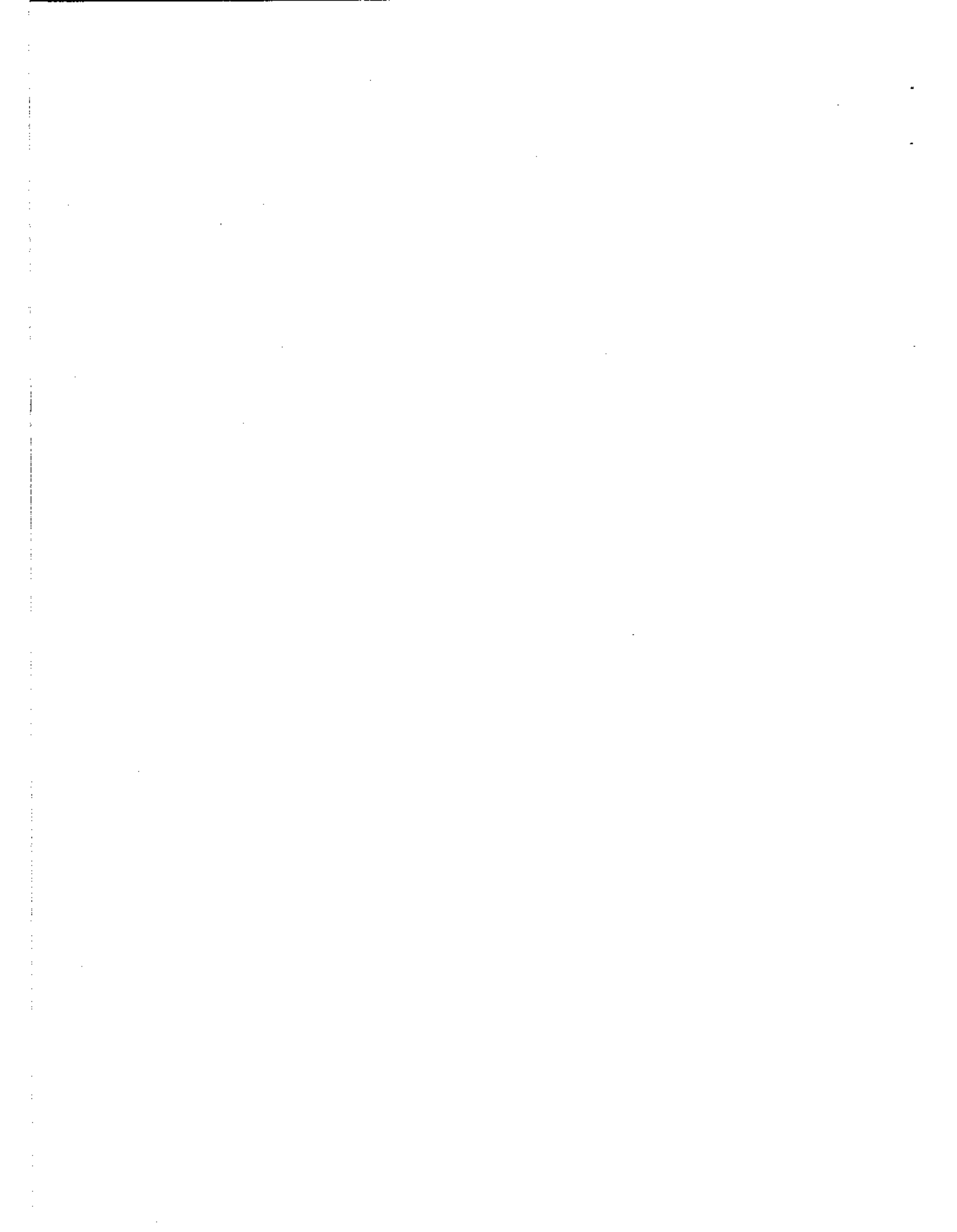
TRAILER LIGHTWEIGHT GS CARGO FAILURE DIAGNOSIS - LEVEL 2

This publication contains information covering the requirements of levels 2 and 3.

BY COMMAND OF THE DEFENCE COUNCIL

Kevin T. ...

Ministry of Defence
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FAILURE DIAGNOSIS - LEVEL 2

Chapter

- 1 General information
- 2 Braking system
- 3 Electrical system

PREFACE

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INTRODUCTION

1 Service users should forward any comments concerning this Publication through the channels prescribed in Army Equipment Support Publication (AESP) 0100-P-011-013. An AESP Form 10 is provided at the end of this publication; it should be photocopied and used for forwarding comments on this AESP.

2 AESPs are issued under Defence Council authority and, where AESPs specify action to be taken, the AESP will of itself be sufficient authority for such action and also for the demanding of the necessary stores, subject to the provisions of Para 3 below.

3 The subject matter of this publication may be affected by Defence Council Instructions (DCIs), Standard Operating Procedures (SOPs) or by local regulations. When any such Instruction, Order or Regulation contradicts any portion of this publication they are to be taken as the overriding authority.

4 For periods of servicing and lubricants to be used reference must be made to the Maintenance Schedule, Cat 601.

RELATED AND ASSOCIATED PUBLICATIONS

Rlated publications

5 The Octad for the subject equipment consists of the categories as detailed overleaf. All references are prefixed with the first eight digits of this publication. The availability of the publications can be checked by reference to the relevant Group Index (refer to AESP 0100-A-001-013).

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			1 User/ Operator	2 Unit Maintenance	3 Field Maintenance	4 Base Maintenance
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2	0	Operating Information	201	*	*	*
	1	Aide Memoire	*	*	*	*
	2	Training Aids	*	*	*	*
3		Technical Description	201	302	302	*
4	1	Installation Instructions	411	411	411	*
	2	Preparation for Special Environments	421	421	421	*
5	1	Failure Diagnosis	201	512	512	*
	2	Maintenance Instructions	201	522	522	*
	3	Inspection Standards	*	532	532	*
	4	Calibration Procedures	*	*	*	*
6		Maintenance Schedules	601	601	*	*
7	1	Illustrated Parts Catalogues	711	711	711	*
	2	Commercial Parts Lists	*	*	*	*
	3	Complete Equipment Schedule, Production	*	*	*	*
	4	Complete Equipment Schedule, Service Edition (Simple Equipment)	741	741	741	*
	5	Complete Equipment Schedule, Service Edition (Complex Equipment)	*	*	*	*
8	1	Modification Instructions	*	*	*	*
	2	General Instructions, Special Technical Instructions and Servicing Instructions	*	821	821	*
	3	Service Engineered Modification Instructions (RAF only)	*	*	*	*

* Category/sub-category not published

Associated publications

6 A full list of associated publications is as follows:

<u>Reference</u>	<u>Title</u>
AESP 2330-E-202	Trailer Lightweight GS Cargo

LIST OF ABBREVIATIONS

7 The following abbreviations are used in this publication:

AESP	Army Equipment Support Publication
Ah	Ampere Hour
CES	Complete Equipment Schedule
dB	Decibel
dc	Direct Current
DCIs	Defence Council Instructions
EMER	Electrical Mechanical Engineering Regulation
GIE	Government Issued Equipment
LCT	Landing Craft Tank
LST	Landing Ship Tank
NATO	North Atlantic Treaty Organisation
NSN	Nato Stock Number
SOPs	Standard Operating Procedures
UK	United Kingdom

WARNINGS

8 The following WARNINGS are applicable to this equipment.

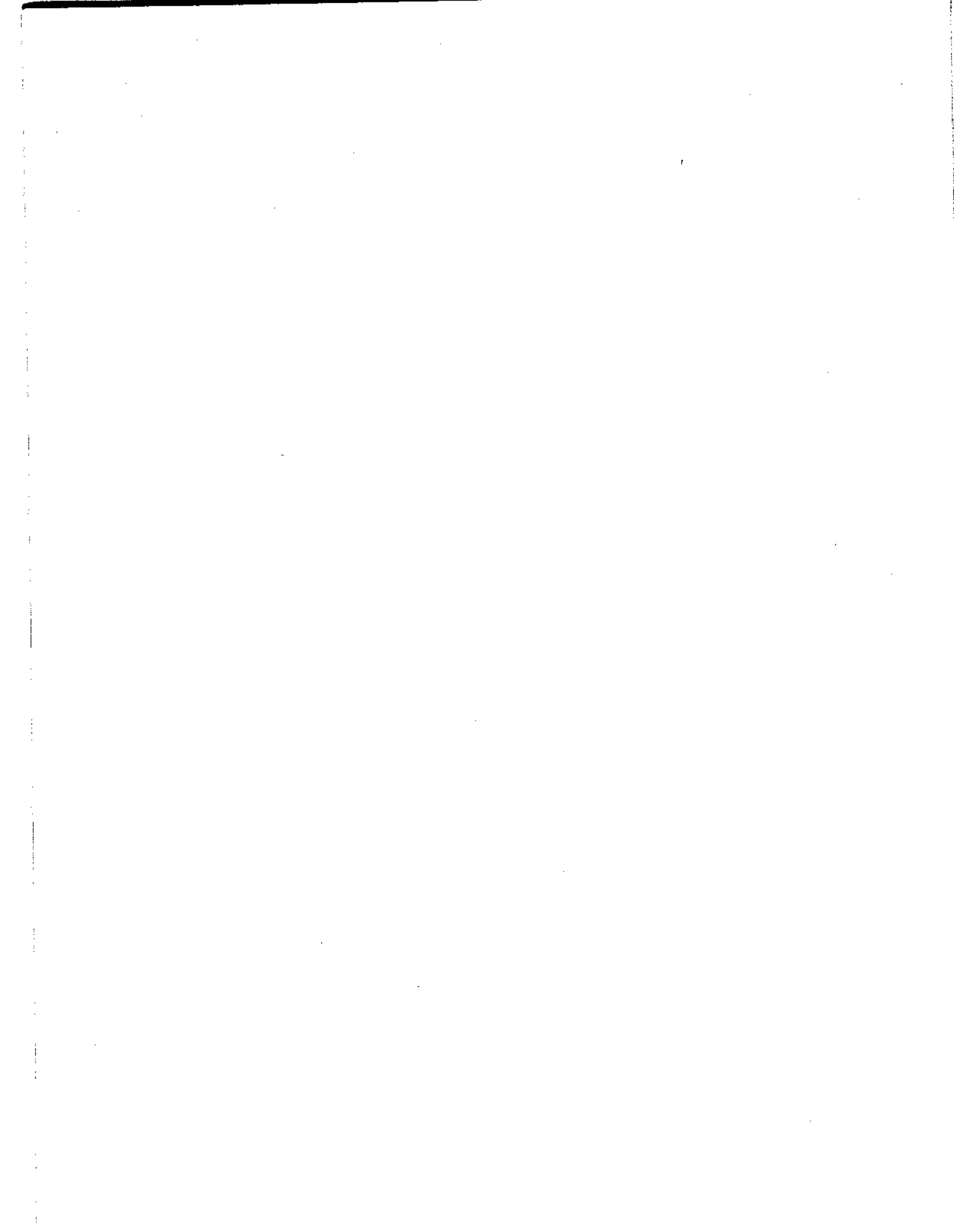
(1) PERSONAL SAFETY. WHEN PARKING THE TRAILER ENSURE THAT THE PARKING AREA IS AS FLAT AS POSSIBLE, THAT THE HANDBRAKE IS APPLIED FIRMLY, THAT THE REAR SUPPORT LEGS ARE LOWERED AND THE CLAMPING BOLTS ARE TIGHT, AND THAT THE JOCKEY WHEEL IS CLAMPED FIRMLY BEFORE BEING WOUND DOWN.

(2) PERSONAL SAFETY. OBSERVE ALL SAFETY INSTRUCTIONS CONCERNING JACKING AND SCOTCHING WHEN CHANGING WHEELS OR EXAMINING BRAKE PADS.

CAUTION

9 The following CAUTION is applicable to this equipment.

EQUIPMENT DAMAGE. If the towing vehicle has a 12V electrical system, the 24V lamps on the trailer must be changed to 12V lamps of an equivalent type and wattage. Additionally, an indelible and legible label must be fitted to the trailer, adjacent to the lighting cable, stating '12 VOLT SYSTEM'.



CHAPTER 1
GENERAL INFORMATION
CONTENTS

Para

- 1 Introduction
- 3 Level 2 repairs
- 4 Special tools and test equipment
- 5 Failure diagnosis chart symbols

Fig

Page

- 1 ISO flowchart symbols..... 2

INTRODUCTION

1 This publication details the procedures for failure diagnosis necessary to carry out repairs on the Trailer Lightweight GS Cargo.

2 The abbreviation Left-Hand (LH) and Right-Hand (RH) used in this publication refer to the left hand and right hand side of the trailer when standing at the rear facing forward.

Level 2 repairs

3 Level 2 repairs are limited to:

3.1 Replacement of defective components or minor assemblies, within the limits of the spares available.

3.2 Adjustment or repair of any component or assembly within the limitations of the tools and equipment available.

Special tools and test equipment

4 Where applicable, any items of special tools and test equipment are detailed as required.

Failure diagnosis chart symbols

5 The symbols used throughout the failure diagnosis charts in this publication are the ISO flow chart symbols as shown in Fig 1.

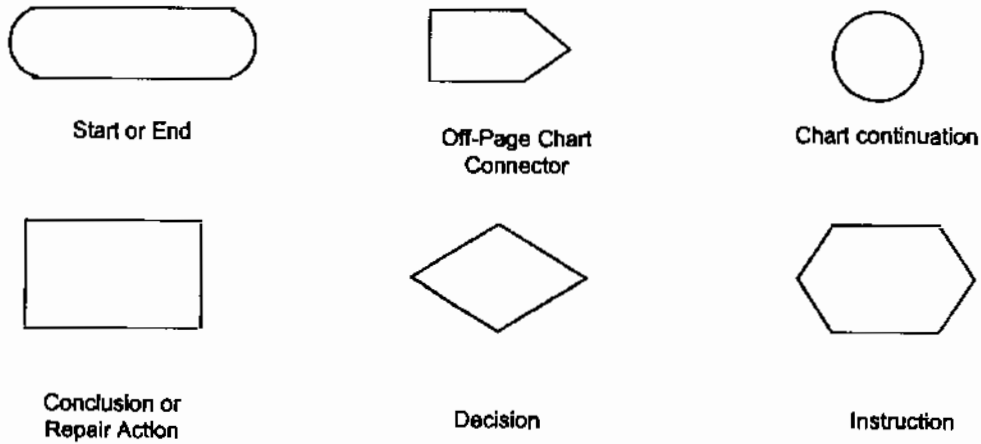


Fig 1 ISO flowchart symbols

CHAPTER 2
BRAKING SYSTEM
CONTENTS

Para

- 1 Introduction
- 2 Special tools and test equipment
- 3 Failure diagnosis procedure
- 5 Failure diagnosis chart symbols

Chart

	Page
1 Brake system failure diagnosis.....	2
2 Handbrake mechanical failure diagnosis.....	3

Fig

1 Brake system hydraulic circuit diagram.....	4
---	---

INTRODUCTION

1 This chapter details the failure diagnosis procedures applicable to the Trailer Lightweight GS Cargo.

SPECIAL TOOLS AND TEST EQUIPMENT

2 There are no special tools or test equipment required to carry out the failure diagnosis procedures detailed in this chapter.

FAILURE DIAGNOSIS PROCEDURE

3 The failure diagnosis charts detailed in this chapter make the following assumptions.

3.1 That all relevant Level 1 maintenance, failure diagnosis and rectification has been successfully carried out.

3.2 That the running gear and braking system are free from obvious obstructions.

4 The brake system hydraulic circuit diagram (Fig 1) should be used in conjunction with the failure diagnosis charts.

Failure diagnosis chart symbols

5 The symbols used throughout the failure diagnosis charts in this chapter are detailed in Chap 1.

CHART 1 BRAKE SYSTEM FAILURE DIAGNOSIS

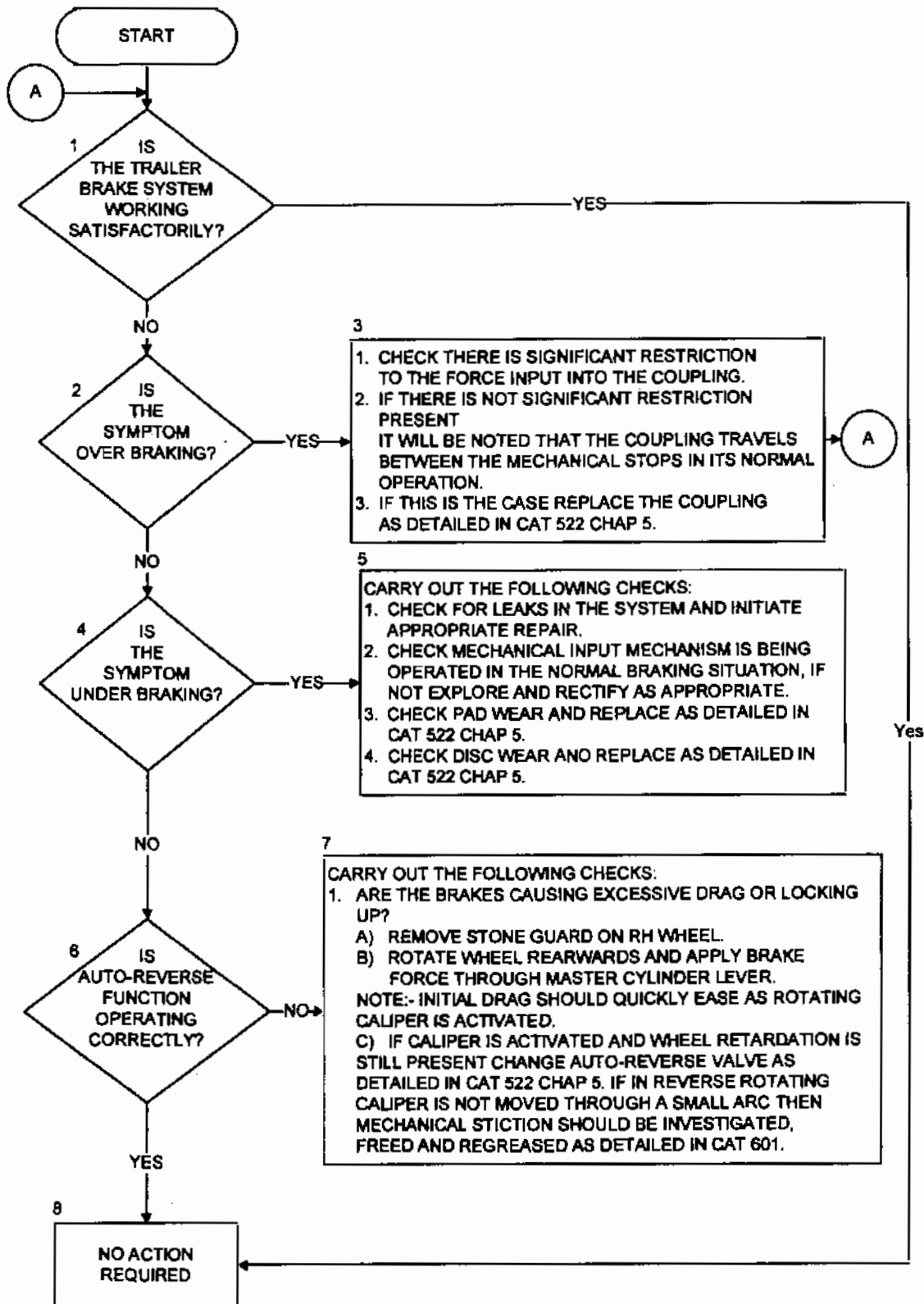
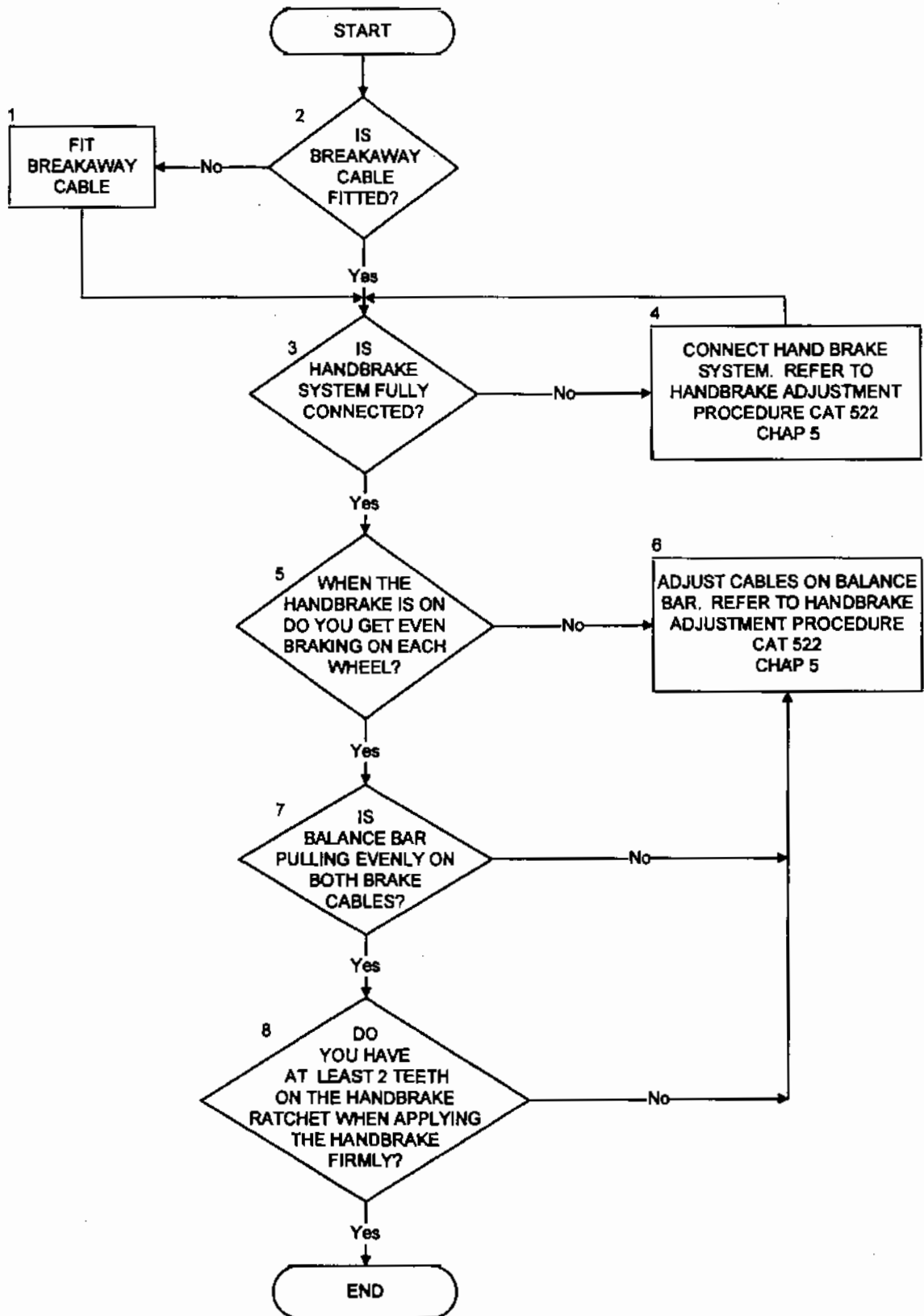
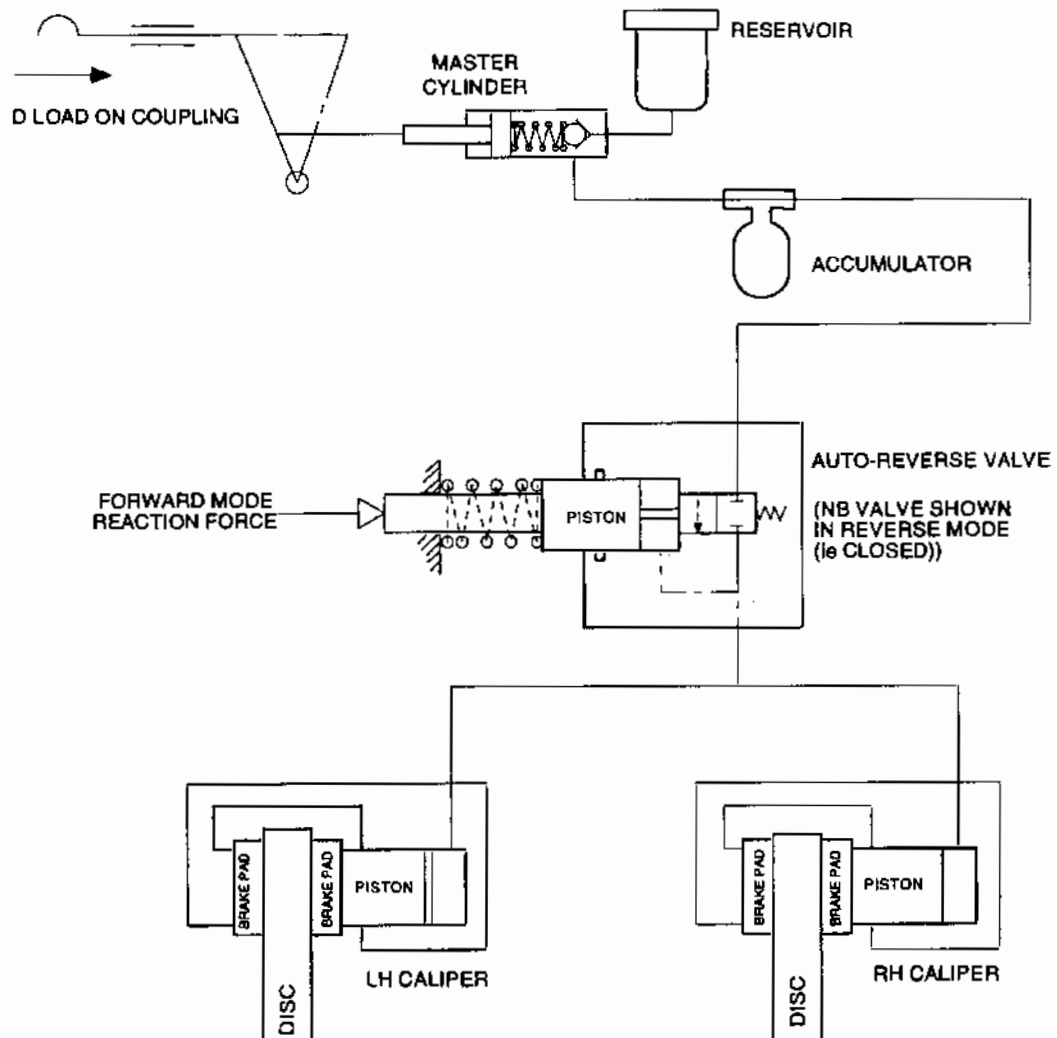


CHART 2 HANDBRAKE MECHANICAL FAILURE DIAGNOSIS





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Fig 1 Brak system hydraulic circuit diagram

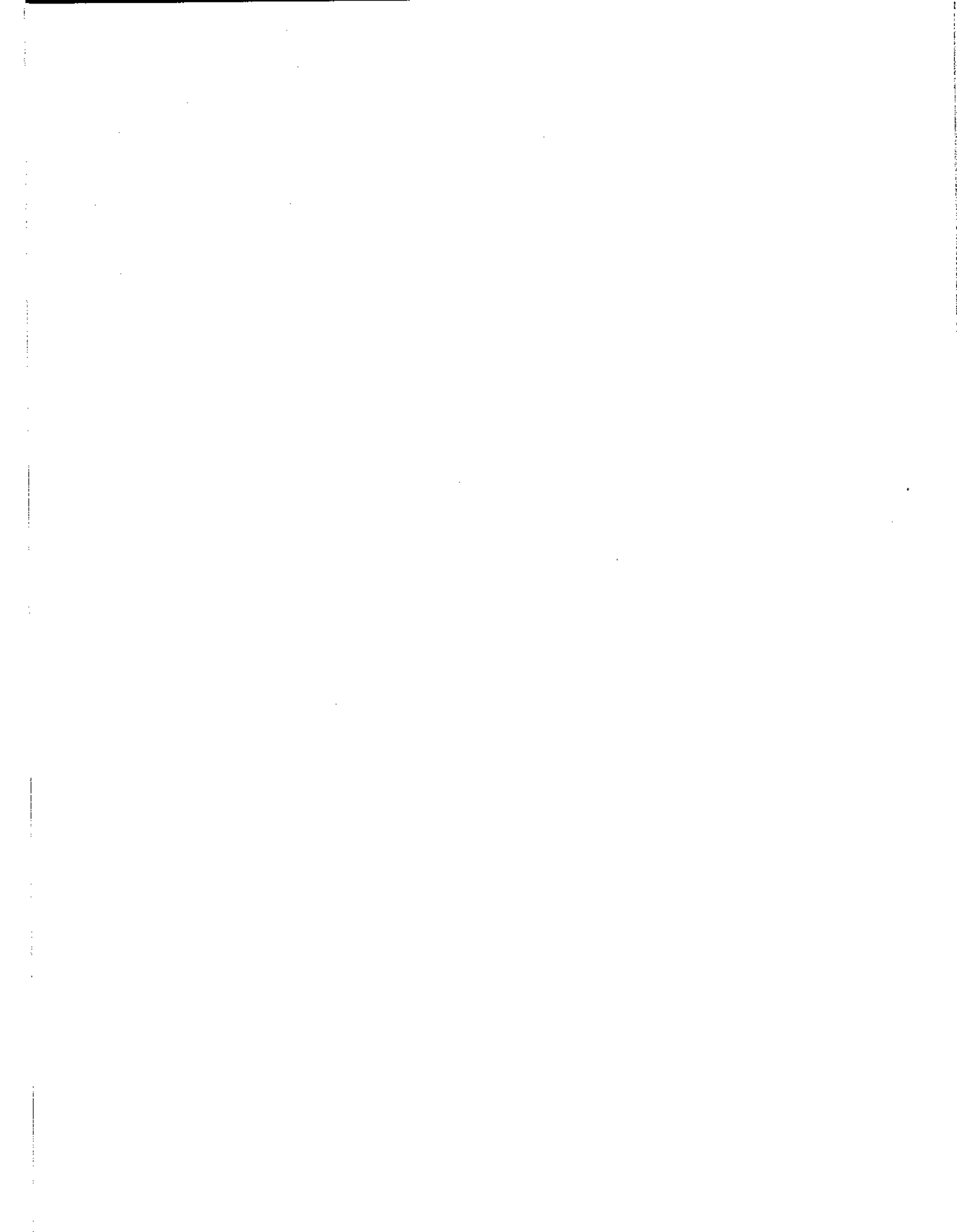
CHAPTER 3
ELECTRICAL SYSTEM
CONTENTS

Para

- 1 Introduction

INTRODUCTION

1 To preserve the waterproof integrity of the main wiring harness, no repairs to the harness are to be undertaken other than replacement of the harness as a complete assembly, as detailed in Cat 522 Chap 7.



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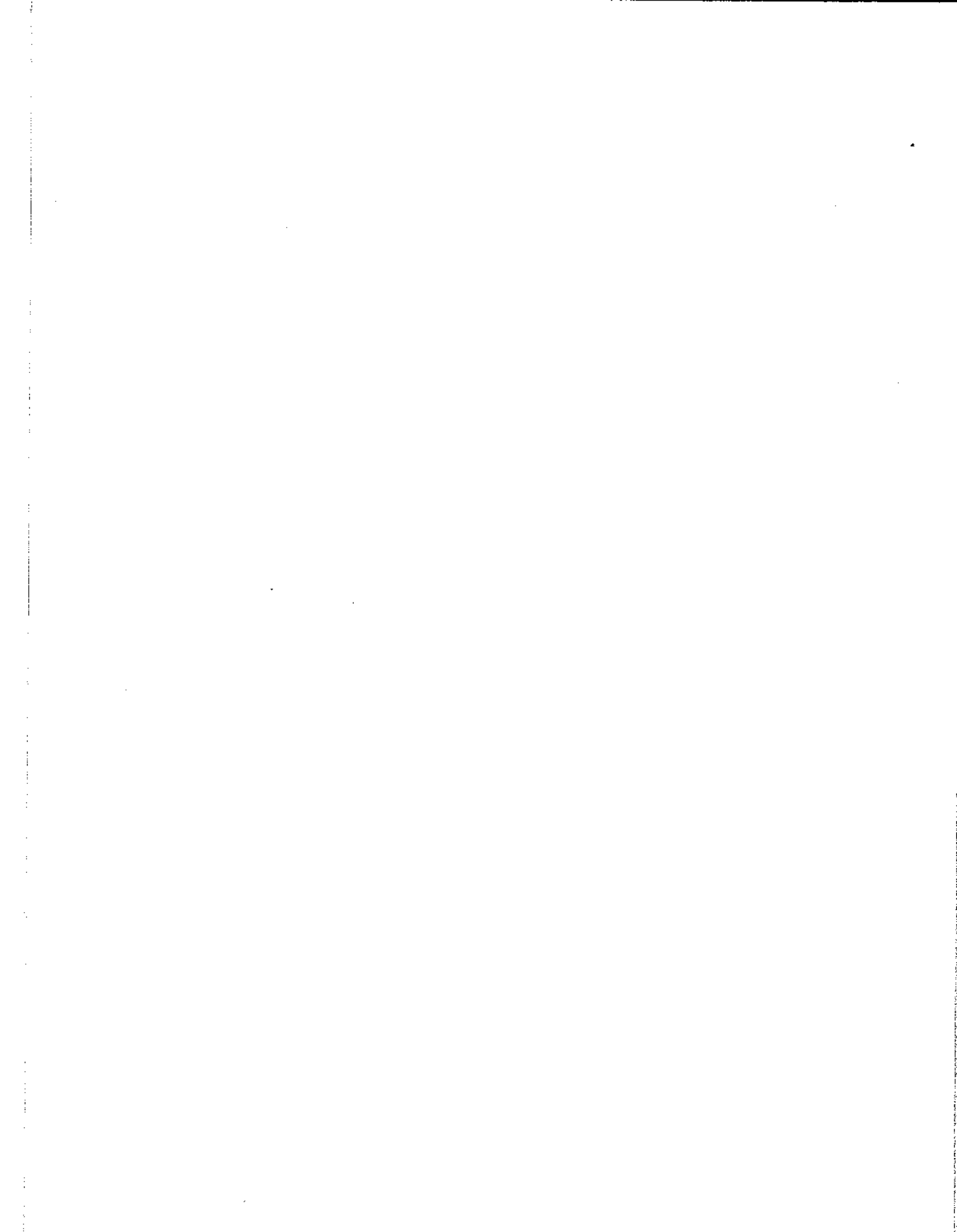
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**TRAILER LIGHTWEIGHT
GS CARGO
INSPECTION STANDARDS PART 1
COMPLETE EQUIPMENT**

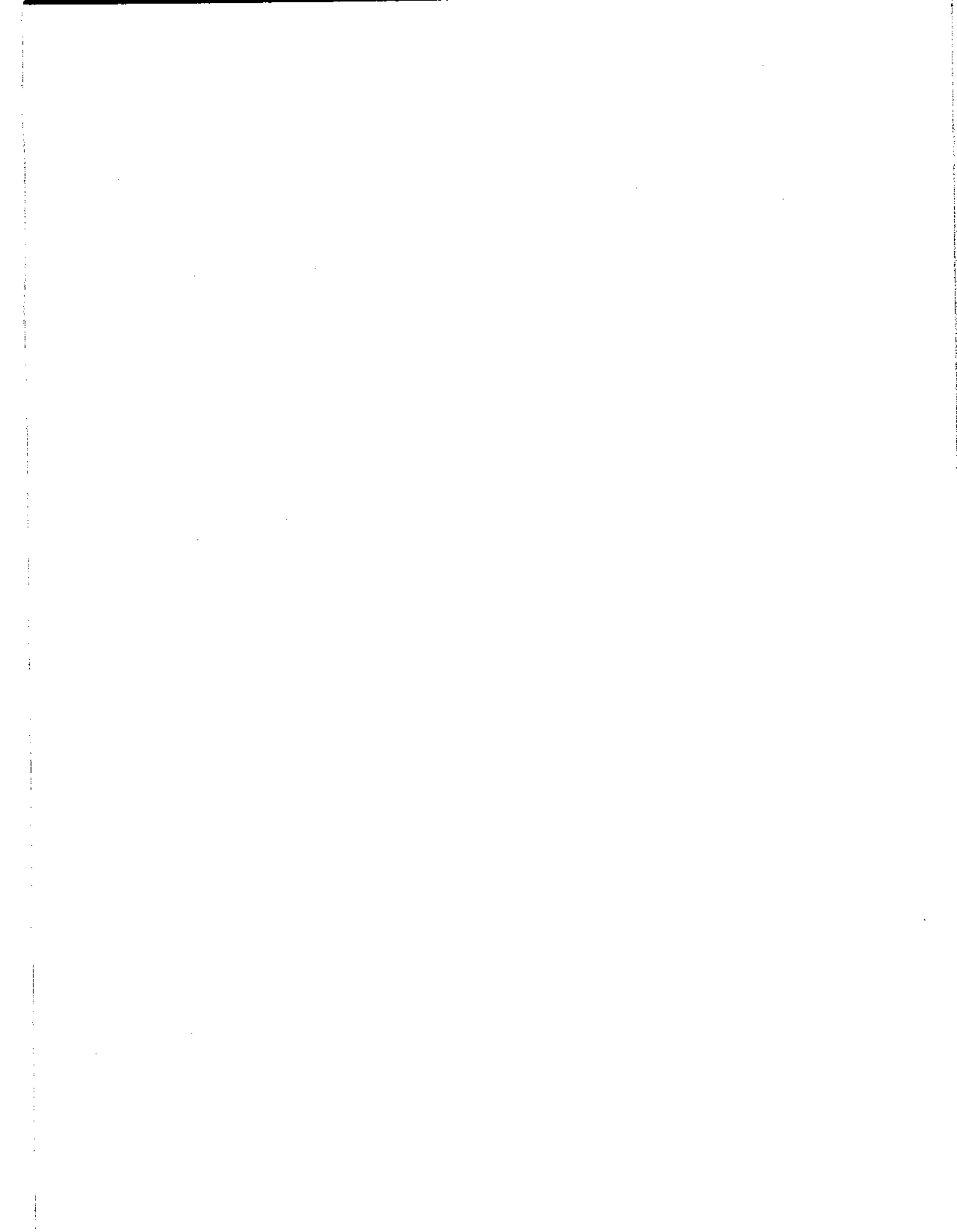
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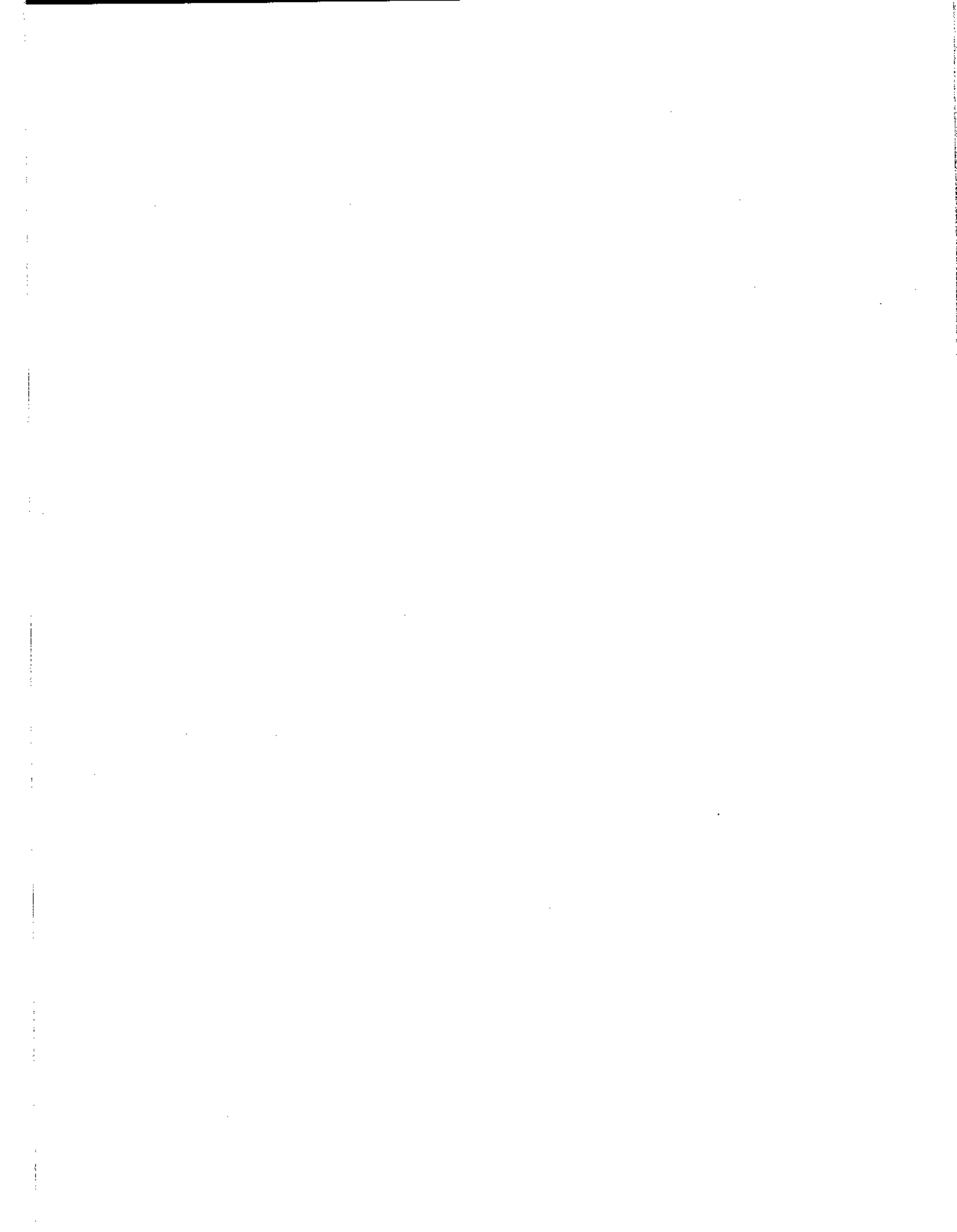
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INSPECTION STANDARDS PART 1

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- Introduction
- 1 General
- 2 Painting
- 3 Physical condition checks
- 4 Cleanliness
- 5 Test equipment

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1 External visual check	2

PREFACE

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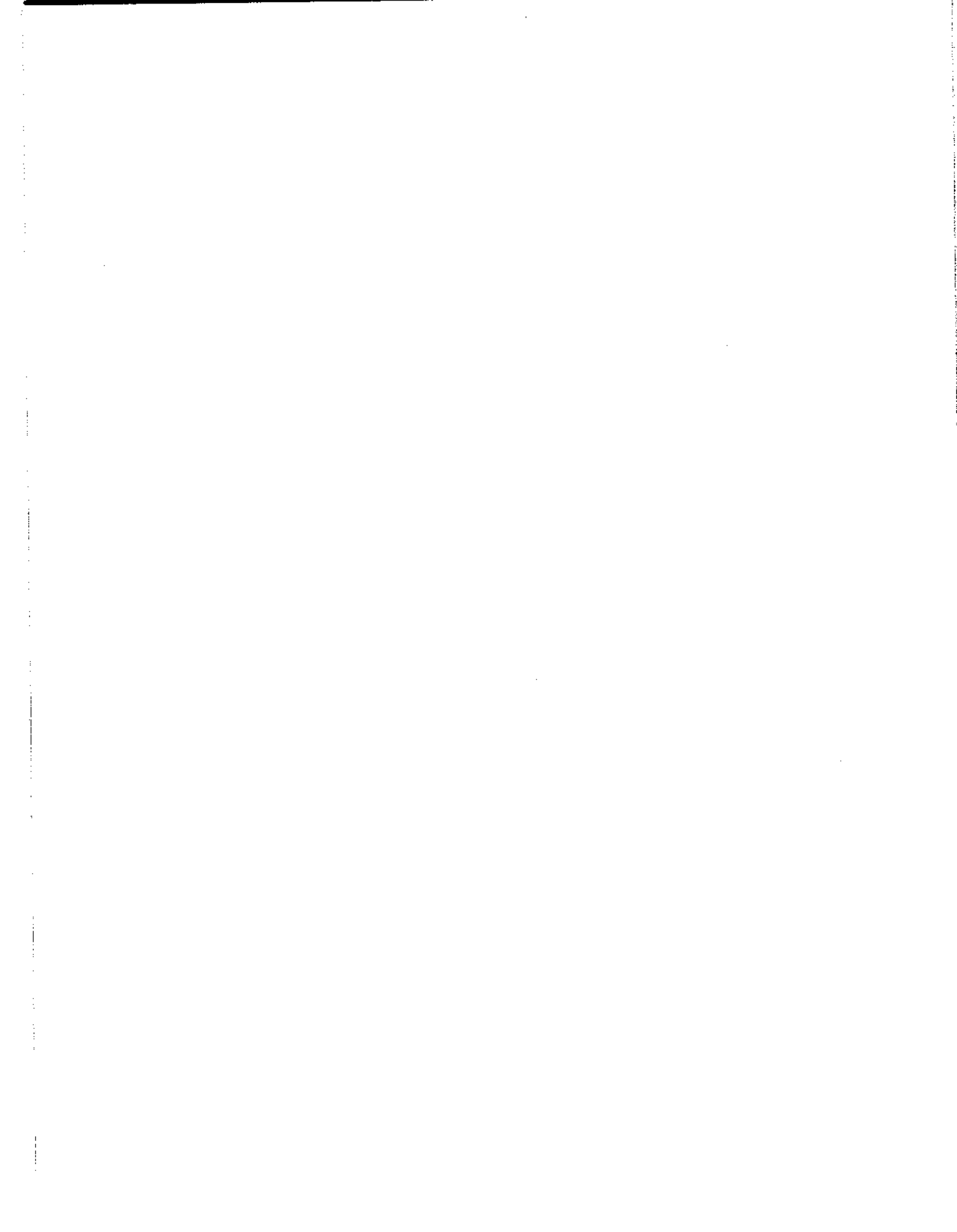
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AESP 2300-A-110	Vehicle and Trailer Electrical Circuits Installation Checks
AESP 0200-A-221-013	Painting of Service Equipment
AESP 2320-A-300-532	B Vehicle Cab Corrosion Inspection Standards
AESP 2300-A-310-201	B Vehicle Corrosion Prevention
AESP 2300-A-500	Material Quality Assessment - Principles and Practices in REME
AESP 2300-A-600	Waterproofing Regulations Vehicles and Equipment

WARNINGS

7 The following WARNINGS are applicable to this equipment.

(1) PERSONAL SAFETY. WHEN PARKING THE TRAILER ENSURE THAT THE PARKING AREA IS AS FLAT AS POSSIBLE, THAT THE HANDBRAKE IS APPLIED FIRMLY, THAT THE REAR SUPPORT LEGS ARE LOWERED AND THE CLAMPING BOLTS ARE TIGHT, AND THAT THE JOCKEY WHEEL IS CLAMPED FIRMLY BEFORE BEING WOUND DOWN.

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INSPECTION STANDARDS PART 1

INTRODUCTION

General

1 This chapter contains a guide to the inspection of the automotive aspects of the Trailer Lightweight GS Cargo. Limits and tolerances are detailed as necessary.

Painting

2 When examining vehicle paintwork, both internal and external, the following should be noted:

2.1 Painting and markings will be in accordance with AESP 0200-A-221-013.

2.2 Ensure that paint has not been applied so as to cover instruction plates, light bulbs, grease nipples, exposed screw threads, fabrics and rubber seals.

Physical condition checks⁴

3 Throughout the procedures detailed in this chapter, the inspector is directed to carry out physical condition checks of components and connecting cables. The acceptable states of the components and cables are detailed as follows:

3.1 All securing devices, such as nuts, bolts, locking pins, catches, locking wire, locking tabs, screws and washers must be correctly fitted and tightened. The surface of any rubber components must be clean and smooth with no cracks apparent.

3.2 Any light lens must be unbroken and free from obscurants such as paint or grease.

3.3 Controls, such as handies and knobs, should be complete, securely fitted and clean. The control should operate smoothly and latch into position correctly where appropriate.

3.4 Linkages should be clean, free from corrosion, undamaged and correctly lubricated. The linkage should operate smoothly.

3.5 Loose fitted covers should be undamaged and correctly fitted. Securing chains and cords should be undamaged with both ends correctly attached.

3.6 All welds are to be intact and free from cracks.

3.7 All seals are to be correctly fitted and free from damage.

3.8 Check that all connections are correctly made and that cables are undamaged and correctly routed and secured.

3.9 Brake fluid level is correct.

Cleanliness

4 Throughout the inspection of the equipment, check that all components are clean and free from leaks. Ensure that there are no loose bolts, nuts, cotton waste or other foreign matter on the floor or in the places where the efficiency of moving parts may be impaired.

Test equipment

5 No special tools or test equipment are required to carry out the inspections detailed in this chapter.

SCHEDULE 1 EXTERNAL VISUAL CHECK

NOTE

Entries denoting inspections which are performed on an annual basis only are identified in Column 2 by an asterisk (*).

Serial (1)	Periodicity (2)	Item (3)	AQL (4)
1		CHASSIS AND BODY Tow eye overrun damper. 1.1 Condition check. 1.2 No lubricant leak and resistance when pushed. 1.3 Mounting bolts. 1.4 Damper brake screw clearance.	When the eye thickness reaches 30 mm at any point replace the damper module complete. NOTE The new thickness is 40 mm. Use towing vehicle. 90 Nm 0.5 mm
2		Chassis frame. 2.1 Condition check. No cracks or distortions.	
3		Rear support leg. 3.1 Condition check. 3.2 Free fit in support tube. 3.3 Locking pins undistorted and secure.	
4		CES stowage bins. 4.1 Condition check. No cracks or distortions. 4.2 Lids free to hinge and lubricated. 4.3 Pin anchor secure and lanyard intact.	
5		Body tub. 5.1 Condition check. No cracks or distortions. 5.2 Security of mounting bolts. 5.3 Tailgate. Undistorted, free to hinge and secure. 5.4 Lashing eyes secure and undamaged. 5.5 Security of tailgate pegs.	
6		Front jockey wheel. 6.1 Condition and operation check. 6.2 Free fit in support tube. 6.3 Pivot bracket secure and lubricated.	(continued)

SCHEDULE 1 EXTERNAL VISUAL CHECK (continued)

Serial (1)	Periodicity (2)	Item (3)	AQL (4)
7		6.4 Locking pins undistorted and secure. 6.5 Wheel secure, no cracks or distortions. SUSPENSION Leaf springs. 7.1 Condition check. 7.2 No broken leaves. 7.3 Shackle bushes intact and secure. 7.4 U bolts and stud undistorted and secure.	187 Nm Stage 1 25 Nm Stage 2 40 Nm Stage 3 99 Nm
8		Shock absorbers. 8.1 No visible leak or scoring on piston rod. 8.2 Mounting bushes secure, no damage or signs of perishing. 8.3 Top and bottom bosses free, no cracks at welds.	Check at maximum extension/retraction. Top bolt 76 Nm Bottom nut 33 Nm
9		Rubber springs. 9.1 Condition check. No damage or signs of perishing. 9.2 Mounting bolt secure.	
10		Anti-roll bar. 10.1 Anti-roll bar and bushes intact, mounting secure. 10.2 Top bolt joint intact and secure. 10.3 Lower drop link intact and secure.	40 Nm 91 Nm
11		BRAKING SYSTEM Master cylinder. 11.1 Condition check. 11.2 Security of mounting bolts. 11.3 No leaks. Reservoir level correct.	20 Nm 10 to 12 mm below top of reservoir. Internal diaphragm seated correctly, visible through reservoir with outer cap removed.
12		Accumulator. 12.1 Condition check.	

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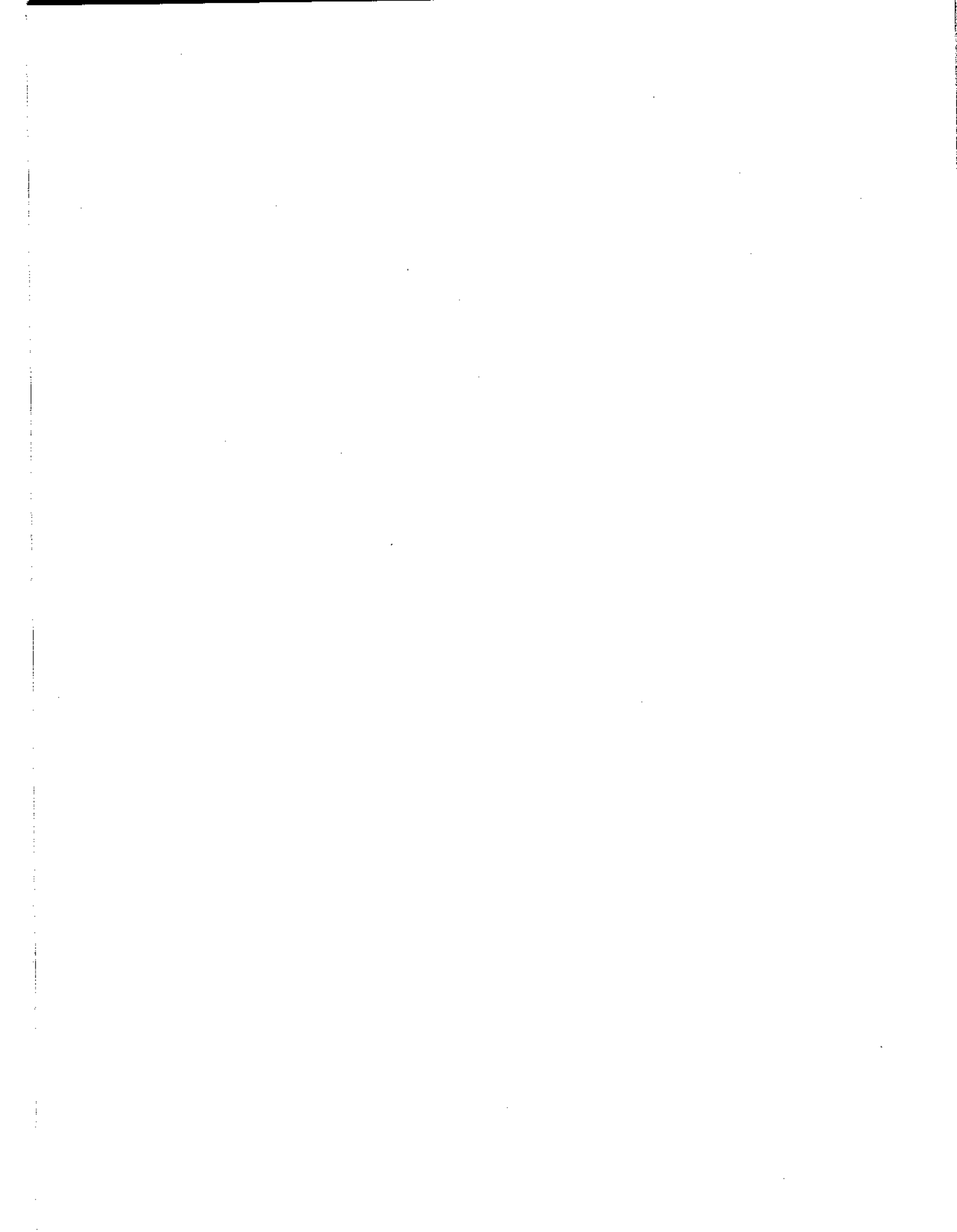
SCHEDULE 1 EXTERNAL VISUAL CHECK (continued)

Serial (1)	Periodicity (2)	Item (3)	AQL (4)
13		12.2 Security of mounting bracket.	20 Nm
		12.3 Manifold. No leaks. Security of mounting bolts.	
		Handbrake.	
		13.1 Condition check including ratchet pawl teeth.	
		13.2 Ratchet pawl to engage and hold.	
		13.3 Handbrake cables, secure no signs of fraying or kinking.	
		13.4 Brakelink pivot pin secure and lubricated.	140 Nm
14		13.5 Brakelink rod secure and free to operate.	
		Brake pads.	
15		14.1 Pad lining thickness.	11.7 - 3 mm
		Brake disc.	
16		15.1 Brake disc thickness.	24.5 - 22 mm
		AXLE	
		Roadwheels.	
		16.1 Wheels and tyres serviceable.	'WOLF' Landrover rims only
		16.2 Tyre pressure correct.	
		16.3 Check wheel nuts for tightness.	102 - 115 Nm
		16.4 Roadwheel studs undamaged.	
17		16.5 Jack up roadwheels and check for wheel bearing end float. Wheel should rotate freely with a slight drag.	No end float.
		16.6 Hub seals serviceable, no signs of leaks.	
		Caliper and pads.	
		17.1 Security of caliper to yoke.	95 Nm
		17.2 Security of stone guard.	12 Nm
18		17.3 Handbrake cable secure at stone guard and operating correctly.	
		Spring retainer plates.	
19		18.1 Check security of plates.	
		ELECTRICAL	
		Harness.	
		19.1 Secure and free of chaffing.	
		19.2 Routed correctly.	

(continued)

SCHEDULE 1 EXTERNAL VISUAL CHECK (continued)

Serial (1)	Periodicity (2)	Item (3)	AQL (4)
20		19.3 All connections intact and free of corrosion. Junction box. 20.1 Mounting bolts secure. 20.2 Waterproofing intact.	Replace harness if waterproof sealant is not intact.
21		Lights. 21.1 Security of all light fittings. 21.2 Lenses free of paint and crack free. 21.3 All lights operate correctly.	
22		ID PLATE Condition and security check.	
23		Confirm data corresponds with vehicle log book.	
24		REAR HITCH Condition and operation check.	
25		Mounting bolts secure.	
26		Locking pin free to move.	
27		Hitch free to rotate and lubricated.	
28		Lanyards intact.	
29		ROAD TEST Parking brake to hold trailer on gradient.	Held in both directions, gradient up to 33%.
30		Auto-reverse valve to operate correctly.	
31		Breakaway cable and D shackle serviceable and fully secure ensuring that connecting ring at base of handbrake is not distorted or deformed.	



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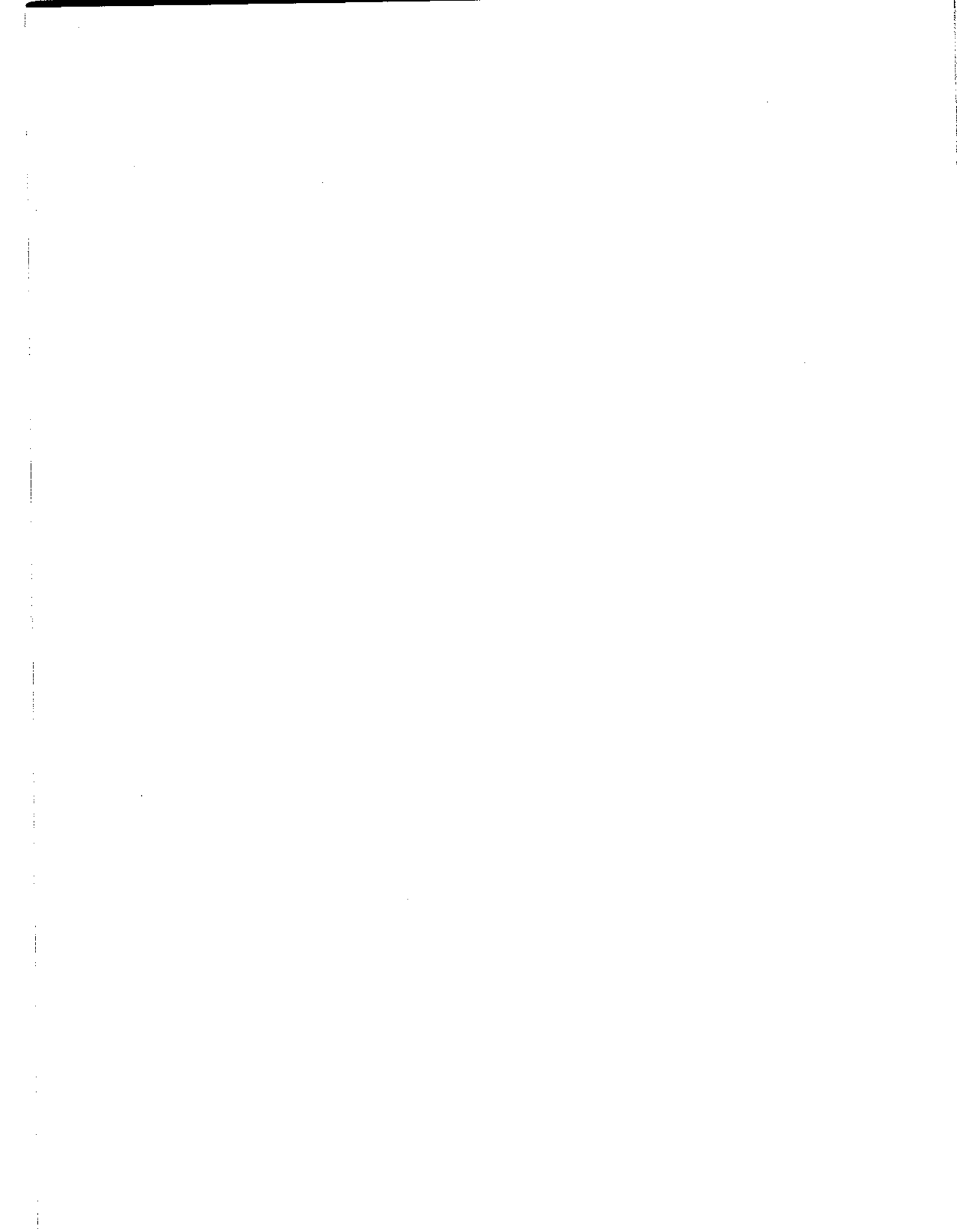
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**TRAILER LIGHTWEIGHT
GS CARGO
MAINTENANCE SCHEDULE
(JOINT SERVICE)**

This publication contains information covering the requirements of levels 1 and 2

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By

SPECIALIST AND LOGISTIC VEHICLE PROJECT TEAM

Publication Authority:

SPECIALIST AND LOGISTIC VEHICLE PROJECT TEAM

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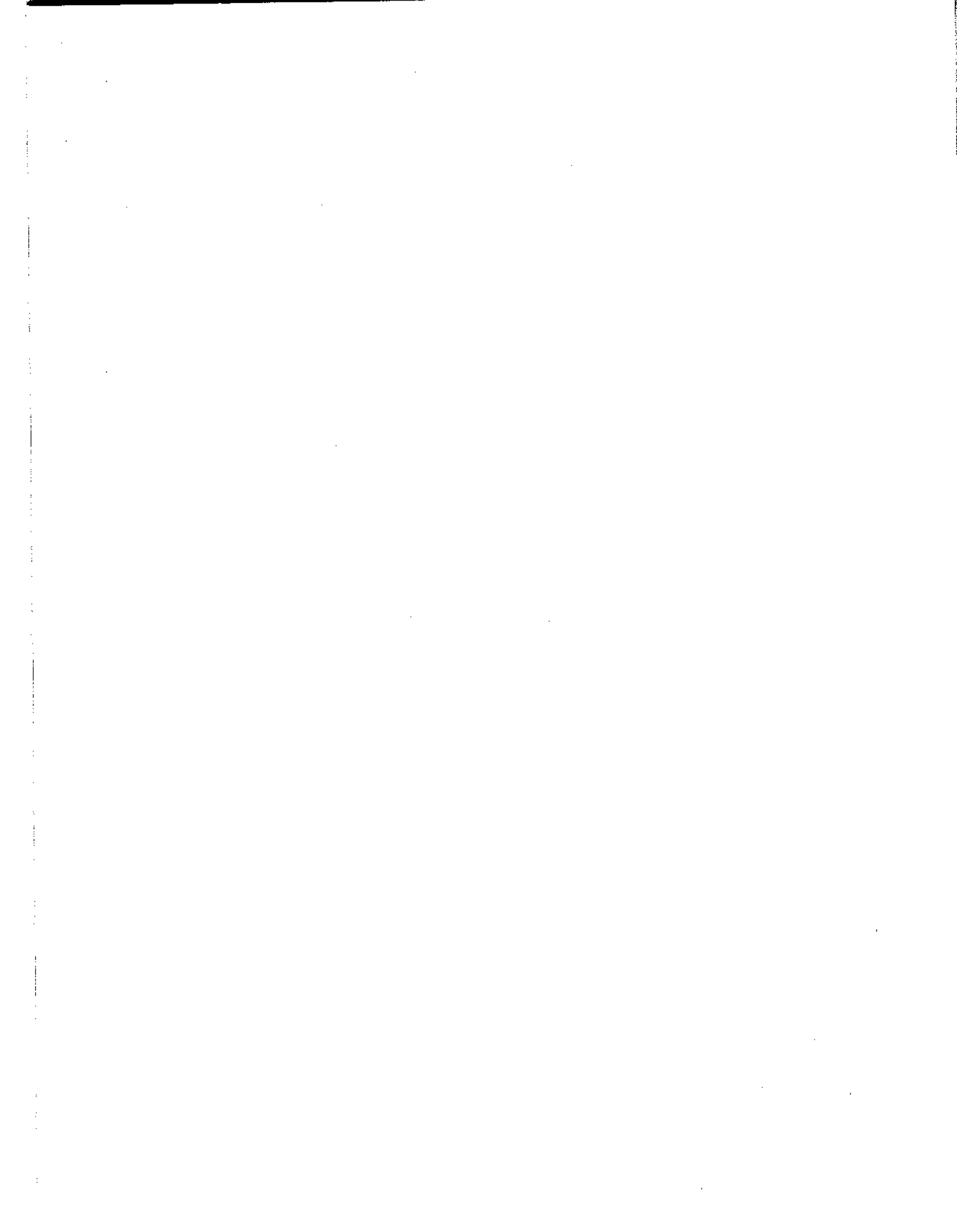
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AMENDMENT RECORD

Amdt No.	Incorporated by	Date
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MAINTENANCE SCHEDULE

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PREFACE

Sponsor: Specialist and Logistic Vehicles Project Team
File Ref: GSV/LLV/68/33/03

Publications Authority: 

INTRODUCTION

1 Service users should forward any comments on this publication through the channels prescribed in JSP (D) 543. Chapter 3.4.1. An AESP Form 10 is provided at the end of this publication; it should be photocopied and used for forwarding comments on this AESP.

2 This AESP is issued by the Defence Equipment and Support of the Ministry of Defence. Where AESPs specify action to be taken. The AESP will of itself be sufficient authority for such action and also for the demanding of the necessary stores, subject to the provisions of Para 3 below.

3 The subject matter of this publication may be affected by Defence Instructions and Notices (DINs), Standing Operating Procedures (SOPs) or by local regulations. When any such instruction, order or regulation contradicts any portion of this publication it is to be taken as the overriding authority.

RELATED AND ASSOCIATED PUBLICATIONS**Related publications**

4 The availability of publications can be checked by reference to the Design Repository Technical Documentation on Line (DR TDOL). Equipment Support Policy Directive is also available on Design Repository Technical Documentation on Line. Hard copies can also be demanded through Forms and Publications if required. All references are prefixed with the first eight digits of this publication. The AESP Octad for the subject equipment consists of the publications shown opposite.

Publication information

5 Any communication regarding this publication should be made to the controlling publication authority.

Publication authority

6 The publication authority for this AESP is as follows:



RELATED AND ASSOCIATED PUBLICATIONS

Related publications

The AESP Octad for the subject equipment consists of publications shown below. All references are prefixed with the first eight digits of this publication. The availability of the publications can be checked by reference to the relevant Group Index. Refer JSP D (543) available by e-mail only.

Category/ Sub-category			Information Level			
			1 User/ Operator	2 Unit Maintenance	3 Field Maintenance	4 Base Maintenance
1	0	Purpose and Planning Information	101	101	101	101
	1	Equipment Support Policy Directive	111	111	111	*
	2	Purpose and planning information Medical and Dental	*	*	*	*
2	0	Operating Information	201	*	*	*
	1	Aide Memoire	*	*	*	*
	2	Training Aids	*	*	*	*
3		Technical Description	201	302	302	*
4	1	Installation Instructions	411	411	411	*
	2	Preparation for Special Environments	421	421	421	*
5	1	Failure Diagnosis	201	512	512	*
	2	Maintenance Instructions	201	522	522	*
	3	Inspection Standards	*	532	532	*
	4	Calibration Procedures	*	*	*	*
6		Maintenance Schedules	601	601	*	*
7	1	Illustrated Parts Catalogues	711	711	711	*
	2	Commercial Parts Lists	*	*	*	*
	3	Complete Equipment Schedules, Production Edition	*	*	*	*
	4	Complete Equipment Schedules, Service Edition (Simple Equipment)	741	741	741	*
	5	Complete Equipment Schedules, Service Edition (Complex Equipment)	*	*	*	*
8	1	Modification Instructions	*	*	*	*
	2	General Instructions, Special Technical Instructions and Servicing Instructions	*	821	821	*
	3	Service Engineered Modification Instructions (RAF Only)	*	*	*	*

NOTE

* Category/ Sub-category not published.

Associated Publications

5 The following associated publications should be read in conjunction with this publication:

Reference	Title
AESP 2300-A-050-01 3	B Vehicle Test, Inspection and Certification
AESP 2320-A-300-532	B Vehicle Cab Corrosion Inspection Standards
AESP 2320-A-310-201	B Vehicle Corrosion Prevention
AB562	B Vehicle Record Book
AGAI Vol4	Equipment and Stores - Periodic REME Examination
AP 3260 Book 1	Mechanical Transport Maintenance Regulations for the Royal Air Force
AP 4545 Vol 2	Mechanical Transport - General Orders and Modifications (RAF only)
JSP 341	Road Transport Regulations
JSP 351	MT Driver's Handbook
JSP 886	Defence Logistics Support Chain Manual

ABBREVIATIONS

6 Throughout this publication any reference to right or left is seen as from the rear of the vehicle looking forward, unless otherwise stated. Where non standard abbreviations are used the full meaning is written out the first time the subject matter is mentioned in text followed by the abbreviations in brackets.

WARNING

7 The following WARNING is applicable to this equipment.

DRAUGHT EYE. THIS TRAILER HAS A DRAUGHT EYE OF THE NON ROTATING TYPE, IT IS NOT TO BE COUPLED TO A VEHICLE WITH A FIXED TOWING PINTLE.

CAUTIONS

8 The following CAUTIONS are applicable to this equipment.

(1) **COUPLING/UNCOUPLING.** Always use the front jockey wheel when coupling/ uncoupling the trailer.

(2) **EQUIPMENT DAMAGE.** Ensure the rear support legs and front jockey wheel are stowed prior to moving off.

(3) **EQUIPMENT DAMAGE.** If the towing vehicle has a 12V electrical system, the 24V lamps on the trailer must be changed to 12V lamps of an equivalent type and wattage. Additionally, an indelible and legible label must be fitted to the trailer, adjacent to the lighting cable, stating '**12 VOLT SYSTEM**'.

MAINTENANCE SCHEDULE

INTRODUCTION

- 1 This Maintenance Schedule is the authority for carrying out all scheduled maintenance tasks on the subject equipment and takes precedence over any other conflicting publication.
- 2 The person on a unit or formation with delegated responsibility for the specified equipment, who is also competent and experienced in that role, is responsible for ensuring that the operations detailed in the Maintenance Schedule are properly carried out. The operations are to be carried out by personnel who, through either professional trade training or an equipment specific formal training course are appropriately qualified. The aforementioned responsible person may also order any operation to be carried out more frequently than specified, if conditions under which the equipment operated render it necessary.
- 3 Scheduled Maintenance is to be recorded in the appropriate equipment document in accordance with JSP 341, Chap 16, and AP 3260, Book 1, Chap 3 (RAF only).

DEFINITIONS

- 4 As far as this document is concerned, the following definitions apply:
 - 4.1 Examine. Carry out a survey of the condition of an item without disassembling, unless specifically instructed to do so in the relevant task requirement. The condition of an item can be impaired by the following:
 - 4.1.1 Insecurity of attachment.
 - 4.1.2 Cracks or fractures.
 - 4.1.3 Corrosion, contamination or deterioration.
 - 4.1.4 Distortion.
 - 4.1.5 Loose or missing fasteners.
 - 4.1.6 Chafing, fraying, scoring or wear.
 - 4.1.7 Faulty or broken locking devices.
 - 4.1.8 Loose clips or packing, obstruction of, or leakage from pipelines.
 - 4.1.9 Discolouration due to overheating or leakage of fluids.
 - 4.1.10 Damage due to external sources.
 - 4.2 Check. Make a comparison of measurement of time, pressure, temperature, resistance, dimension or other quantity, with a known figure.
 - 4.3 Operate. As far as possible, ascertain that a component or system functions correctly without the use of test equipment or reference to measurement.
 - 4.4 Replenish. Refill a container to a pre-determined level, pressure or quantity. This includes any necessary cleaning of orifices, examination of caps, covers, gaskets and washers, renewal of locking devices, and clearing of vents.
 - 4.5 Replace. Remove an item and then fit a new or reconditioned item.

WARNINGS, CAUTIONS AND MAINTENANCE NOTES

5 Before any maintenance task is carried out, the WARNINGS, CAUTIONS and Maintenance Notes preceding the appropriate Table must be read and understood.

MAINTENANCE INTERVALS AND AREAS OF RESPONSIBILITY

6 Table 4 - Action on Receipt. The maintenance detailed in Table 4 covers the action taken when the equipment arrives on a unit. These operations will normally be of a once only nature, actions that are necessary to be undertaken before the equipment is put into service or actions that are only required during the running in period. The maintenance detailed in Table 4 must be carried out by the appropriately trained personnel, as described in Para 2.

7 Table 5 - Out of Phase Maintenance. The maintenance tasks detailed in Table 5 covers tasks that do not fall into line with the time/usage interval requirements of Table 6 or 7. The maintenance detailed in Table 5 maintenance must be carried out by appropriately trained personnel, as described in Para 2.

8 Table 6 - Driver/Operator Maintenance. The maintenance tasks detailed in Table 6, columns A, B and C must be carried out by appropriately trained personnel, as described in Para 2, as follows:

8.1 A - Daily before use (only on days used).

8.2 B - Daily after use (after the equipment has been operated).

8.3 C - Weekly whether the equipment is used or not.

8.4 The maintenance detailed in Table 6, Column D is to be carried out by appropriately trained personnel, as described in Para 2, at least every 3 months.

9 Table 7 - Time/Usage Maintenance. The maintenance detailed in Table 7, Maintenance Interval 1st, A, B and C must be carried out by appropriately trained personnel, as described in Para 2, at the following intervals:

9.1 1st (RAF Initial) - After the first 1,000 miles (1,600 km) or 3 months whichever occurs first.

9.2 A (RAF Lubrication) - Every 6,000 miles (10,000 km) or 6 months whichever occurs first.

9.3 B (RAF Minor) - Every 12,000 miles (20,000 km) or 12 months whichever occurs first.

9.4 C (RAF Major) - Every 24,000 miles (40,000 km) or 24 months whichever occurs first.

9.5 Column D contains the Area Maintenance indicator which may be used, at the discretion of the responsible person, identified at Para 2, to carry out Area Maintenance at the appropriate time/usage intervals.

NOTES (RAF only)

(1) Vehicles that do less than 6000 miles annually and are on Area Maintenance are to have a Lubrication Maintenance at 6 monthly intervals in accordance with AP 3260, Chap 2.

(2) The number in the Area Maintenance column indicates which Area is to be carried out.

(3) The Area Maintenance detailed is to be carried out in conjunction with its associated prime mover/specialist equipment scheduled maintenance if applicable.

9.6 The maintenance detailed in Table 7 will be carried out by:

9.6.1 REME Vehicle Mechanic (VM) where annotated (VM) in the table.

9.6.2 Unit appointed personnel, supervised by an Army Class 1 Driver. Where it is specifically indicated (VM), the task should be undertaken by a REME tradesman.

9.6.3 RAF MT Mechanic/Technician or General Mechanic/Technician Electrical as appropriate to the operation.

9.6.4 Qualified Tradesman (QT) - A person is qualified to carry out any task designated 'QT' when he/she has been formally taught how to carry out that task during a trade training course.

9.6.5 The civilian equivalent of the above tradesmen.

10 Table 8 - Out of Use Maintenance. For RAF equipment, out of use vehicles or vehicles in Second Echelon are to be maintained in accordance with AP 3260, Book 1, Chap 1, Para 9 and Chap 2, Para 27. Any specific operation appertaining to this equipment will be listed in Table 8. For Army equipment, this maintenance is to be carried out as follows:

10.1 When the equipment is taken out of use for periods exceeding one month on the advice of the local REME advisor/MT Officer.

10.2 Any equipment taken out of use for periods exceeding 4 months is to be put into preservation in accordance with AESP 2300-A-401, Short Term Storage all Vehicles.

10.3 The equipment is to be cleaned, dried and stored under cover where possible.

10.4 Any overdue maintenance is to be carried out when the equipment is brought back into use.

TABLE 1 EQUIPMENT APPLICABILITY

Serial (1)	Equipment Asset Code (2)	Designation (3)	Contract Numbers (4)
1	NB 2853-3107	Trailer Lightweight GS Cargo.	LLV/DBG/424

TABLE 2 FUELS, LUBRICANTS AND ASSOCIATED PRODUCTS

NOTES

(1) The products listed below are to be used on this equipment. Alternative products must not be used without the approval of an appropriate equipment manager.

(2) Oil changes at the -15 deg C point shall only be made on the advice of the responsible person identified at Para 2.

(3) The capacities listed are to be used as guide only. A physical check is to be carried out to ensure that all fluids are correct. This check should be carried out with the vehicle unladen and standing on level ground whenever possible.

Serial (1)	Assembly (2)	Product		Capacity	
		Above -15 deg C (3)	Below -15 deg C (4)	Litres (5)	Pints (6)
1	Oil can lubrication.	OMD 90	OMD 90	-	-
2	General greasing.	XG 279	XG 279	-	-
3	Hub bearings.	XG 279	XG 279	-	-
4	Brake compensator.	Coppercrest Anti-seize		-	-
5	Hydraulic brake fluid.	OX 8	OX 8	-	-

TABLE 3 EQUIPMENT DATA

Serial (1)	Item (2)	Detail (3)	
	WEIGHT		
1	Unladen weight.	██████	██████
2	Gross vehicle weight.	██████	██████
3	Drawbar preponderance	██████	██████
	TYRES		
4	Tyre size.	7.50 R16 C	
5	Tyre pressure.	3.2 bar	(46 lbf/in. ²)
	TORQUE SETTINGS		
6	Wheel nut.	102 - 115 Nm	(75 - 85 lbf ft)
7	Overrun brake damper nuts and bolts.		
	Damper to module bracket.	95 Nm	(70 lbf ft)
	Module bracket to chassis (M12).	78 Nm	(56 lbf ft)
	Module bracket to chassis (M10).	44 Nm	(32 lbf ft)
8	Brake caliper bolts.	95 Nm	(70 lbf ft)
9	Disc to hub bolts.	39 Nm	(29 lbf ft)
10	Spring 'U' bolts and stud (Tightened in pairs stage by stage).		
	Stage 1.	25 Nm	(18 lbf ft)
	Stage 2.	40 Nm	(30 lbf ft)
	Stage 3.	99 Nm	(73 lbf ft)
11	Shock absorber.		
	Top fixing bolt.	76 Nm	(56 lbf ft)
	Bottom fixing nut.	33 Nm	(24 lbf ft)
12	Brakelink pivot pin.	140 Nm	(103 lbf ft)
13	Anti-roll bar.		
	Drop link lower bolt.	91 Nm	(67 lbf ft)
	Top ball joint (castled nut).	40 Nm	(30 lbf ft)
14	Spring hangar bolt and nut.	187 Nm	(138 lbf ft)

TABLE 4 ACTION ON RECEIPT

Table 4 Maintenance is to be carried out in accordance with the instructions detailed in paragraph 6.

Serial (1)	Action (2)
1	Ensure the parking brake linkage is free and allows the brake to be fully applied and engage in the ratchet.
2	Ensure the breakaway cable is fitted and serviceable.
3	Ensure that the modules to chassis securing fasteners are correctly tightened as detailed in Table 3, Serial 7.

TABLE 5 OUT OF PHASE MAINTENANCE

Serial (1)	Action (2)	Interval (3)
1	Brake fluid drain and replenish.	Every 24 months

TABLE 6 DRIVER /OPERATOR MAINTENANCE

Table 6 Maintenance is to be carried out by the tradesmen and at the intervals detailed in Para 9 of this publication.

The following WARNINGS, CAUTIONS and Maintenance Notes must be read and understood before commencing these maintenance tasks.

WARNING

DRAUGHT EYE. THIS TRAILER HAS A DRAUGHT EYE OF THE NON ROTATING TYPE, IT IS NOT TO BE COUPLED TO A VEHICLE WITH A FIXED TOWING PINTLE.

CAUTIONS

- (1) **COUPLING / UNCOUPLING.** Always use the front jockey wheel when coupling / uncoupling the trailer.
- (2) **EQUIPMENT DAMAGE.** Ensure the rear support legs and front jockey wheel are stowed prior to moving off.

Serial (1)	Task (2)	Product (3)	Maintenance interval			
			A (4)	B (5)	C (6)	D (7)
1	Examine for any obvious signs of damage.	OX8	X	X	X	
2	Examine for any brake fluid leaks.		X			
3	Brake fluid reservoir: Examine, check fluid level and replenish as necessary.		X			
4	Brake fluid reservoir: Examine outer cover for damage, waterproofing integrity.		X			
5	Tyre pressures: check.		X			
6	Tyres: Examine for cuts, damage and uneven wear. Check tread depth.		X			
7	Wheel nuts: Check tightness of all wheel nuts to the recommended figure and security of spring restrainers.		X			
8	Lamps and direction indicators: Examine. Ensure correct operation.		X			
9	Reflectors: Examine.		X			
10	Inter-vehicle electrical cable and plug: Examine.		X			
11	Braking system: Ensure correct operation.		X			
12	Brake operating pivot: Lubricate.	XG279			X	
13	Handbrake pivot: Lubricate.	XG279			X	
14	Registration plates and other markings: Examine for damage and security of attachment.		X			
15	Tow eye and damper: Examine for any obvious signs of damage.		X			
16	Tow eye and damper: Lubricate.	XG279			X	

TABLE 6 DRIVER OPERATOR MAINTENANCE (continued)

Serial (1)	Task (2)	Product (3)	Maintenance Interval			
			A (4)	B (5)	C (6)	D (7)
17	Ensure breakaway cable is fitted and serviceable ensuring that connecting ring at base of handbrake is not distorted or deformed.	XG279	X			
18	Jockey wheel pivot: Lubricate.					X
19	Securing shackles: Check security		X			
20	Tailgate securing pegs: Check security		X			
21	Rear steady legs: Check security of cotter pins and condition of lanyard.		X			
22	CES equipment: Examine for serviceability and correct stowage.		X			
23	F658A (MT ON DETACHMENT DUTY) or (F814 VEHICLE RUNNING RECORD) as appropriate: Sign.(RAFonly)		X		X	X
24	Static Functional Test: Carry out to confirm the serviceability of all functions and particularly jockey wheel, electrical coupling, lights and accessories.		X			
25	Mobile Functional Test: Carry out a short mobile test to confirm the serviceability of all functions of towing and stopping the vehicle.		X			
26	AF G1084A Worksheet or STAMA Worksheet as appropriate (Tradesman and countersigning NCO): Sign. (RAF only).					X

TABLE 7 TIME/USAGE MAINTENANCE

Table 7 maintenance is to be carried out by the tradesman and at the intervals detailed in Para 9 of this publication.

The following WARNINGS and CAUTIONS and Maintenance Notes must be read and understood before commencing these maintenance tasks.

WARNING

DRAUGHT EYE. THIS TRAILER HAS A DRAUGHT EYE OF THE NON ROTATING TYPE; IT IS NOT TO BE COUPLED TO A VEHICLE WITH A FIXED TOWING PINTLE.

CAUTION

(1) **COUPLING/UNCOUPLING** Always use the front jockey wheel when coupling/ uncoupling the trailer.

(2) **EQUIPMENT DAMAGE.** Ensure the rear support legs and front jockey wheel are stowed prior to moving off.

Serial (1)	Task (2)	Product (3)	Maintenance interval				
			1st (4)	A (5)	B (6)	C (7)	D (8)
	CHASSIS AND BODY						
1	Chassis: Examine		X		X	X	1
2	Jockey wheel: Examine, operate and lubricate.	XG 279 OMD 90	X		X	X	1
3	Rear support legs: Examine, operate and lubricate.	OMD 90	X		X	X	1
4	Body: Examine, particularly for corrosion refurbish as necessary. (VM)		X		X	X	1
5	Tailgate: Examine, for security, lubricate hinges.	OMD 90	X		X	X	1
6	CES stowage bins: Examine, lubricate hinges.	OMD 90	X		X	X	1
7	Overrun damper: Examine, Check security of module and bracket. Lubricate. (VM)	XG279	X		X	X	1
8	Overrun damper: Examine wear on tow eye. (VM)				X	X	1
9	Rear hitch: Check security, damage and corrosion.		X		X	X	1
10	ID plate: Check security.		X		X	X	1
	SUSPENSION						
11	Leaf springs and bushes: Examine, Check security of spring U bolts and studs and spring hanger bolts and nuts. (VM)		X		X	X	2
12	Rubber suspension stop: Examine. Check security		X		X	X	2
13	Shock absorbers and bushes: Examine (VM)				X	X	2
14	Axle check straps: Examine		X		X	X	2

(Continued)

TABLE 7 TIME/USAGE MAINTENANCE (continued)

Serial (1)	Task (2)	Product (3)	Maintenance interval				
			1st (4)	A (5)	B (6)	C (7)	D (8)
15	Anti-roll bar and bushes: Examine. (VM)		X		X	X	2
16	Axle spring plates: Check for corrosion, damage and security of attachment to axle.		X		X	X	2
WHEEL ,HUB AND BRAKE ASSEMBLY							
17	Wheels: Examine.		X		X	X	3
18	Tyres. Examine, particularly for correct type. Check tread depth and pressures.		X		X	X	3
19	Wheel hub bearings: Examine hub bearings for freedom of rotation and play. Adjust as necessary (VM)	XG279	X		X	X	3
20	Auto-reverse valve pivot hub: Lubricate, ensure excess is removed. (VM).	XG279	X		X	X	3
21	Brake pads, calipers and discs: Examine. (VM)				X	X	3
22	Brake linkages and cables: Examine and lubricate.	XG279	X		X	X	3
23	Parking brake compensator: Examine and lubricate. (VM)	Copper-crest			X	X	3
24	Brake pipes and hoses: Examine. Check for leaks, damage, corrosion and security		X		X	X	3
25	Brake master cylinder: Examine, check level replenish as necessary	OX8	X		X	X	3
26	Accumulator: Examine.		X		X	X	3
27	Brake hydraulic system: Drain and replenish, bleed system. (VM) (See Table 5)	OX8				X	3
ELECTRICS							
28	Electrical wiring, junction box and conduit: Examine for signs of burning, chafing or other damage and for security of attachment.		X		X	X	4
29	Lamps and direction indicators: Examine. Ensure correct operation. Check condition of lamp holder O-ring.		X		X	X	4
30	Reflectors: Examine.		X		X	X	4
31	AF G1084A Worksheet or STAMA Worksheet as appropriate (Tradesman and countersigning NCO): Sign. (RAF only).		X	X	X	X	All
32	Road test (NCO MT Technician only): Carry out.		X	X	X	X	All
33	Brake test (NCO MT Technician only): Carry out. (in accordance with AP 4545, Vol2, Lflt A64 RAF only) (VM)		X		X	X	All
34	AF GI084A Worksheet or STAMA Worksheet: Insert co-ordinating signature. (RAF only)		X	X	X	X	All
35	Record action on JAMES / F MT 1004 (Vehicle Docs)		X		X	X	All

TABLE 8 OUT OF USE MAINTENANCE

Table 8 Maintenance is to be carried out in accordance with the instructions detailed in paragraph 10.

WARNINGS, CAUTIONS and Maintenance Notes preceding Tables 6 and 7 must be read and understood before commencing these maintenance tasks.

Serial (1)	Operation (2)
	Prior to vehicle entering storage:
1	Carry out Table 6, Columns A,B and C maintenance, and patch paint
2	Carry out next maintenance due if it falls during out of use period.
3	Rectify all faults affecting road task worthiness.
	Whilst in storage:
4	Operate equipment and all systems
5	Carry out Table 7: Columns A and B maintenance.
6	Carry out road test over 8 km(5miles) if possible
7	Update JAMES / F MT 104 (Vehicle Docs)

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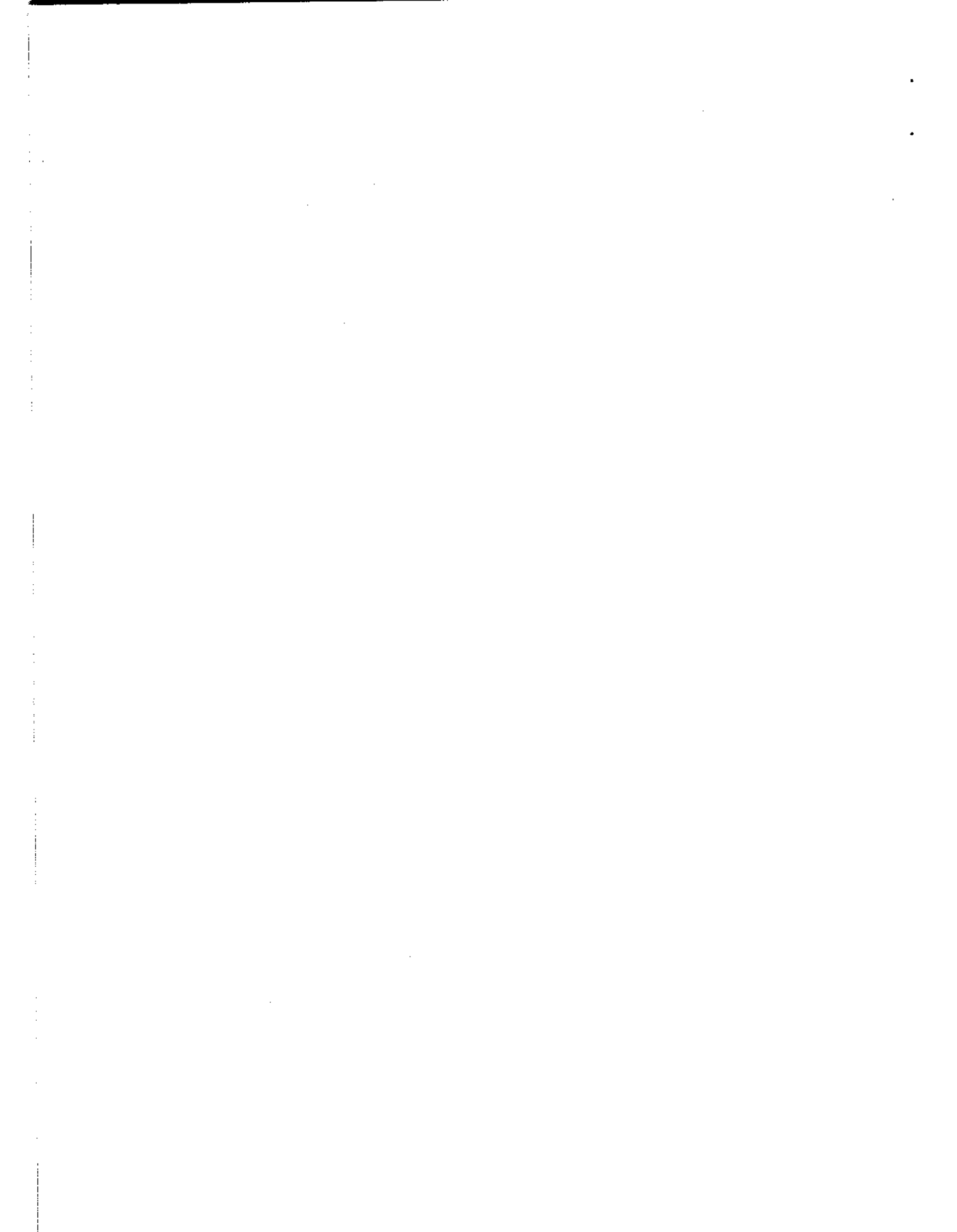
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TRAILER LIGHTWEIGHT GS CARGO

ILLUSTRATED PARTS CATALOGUE

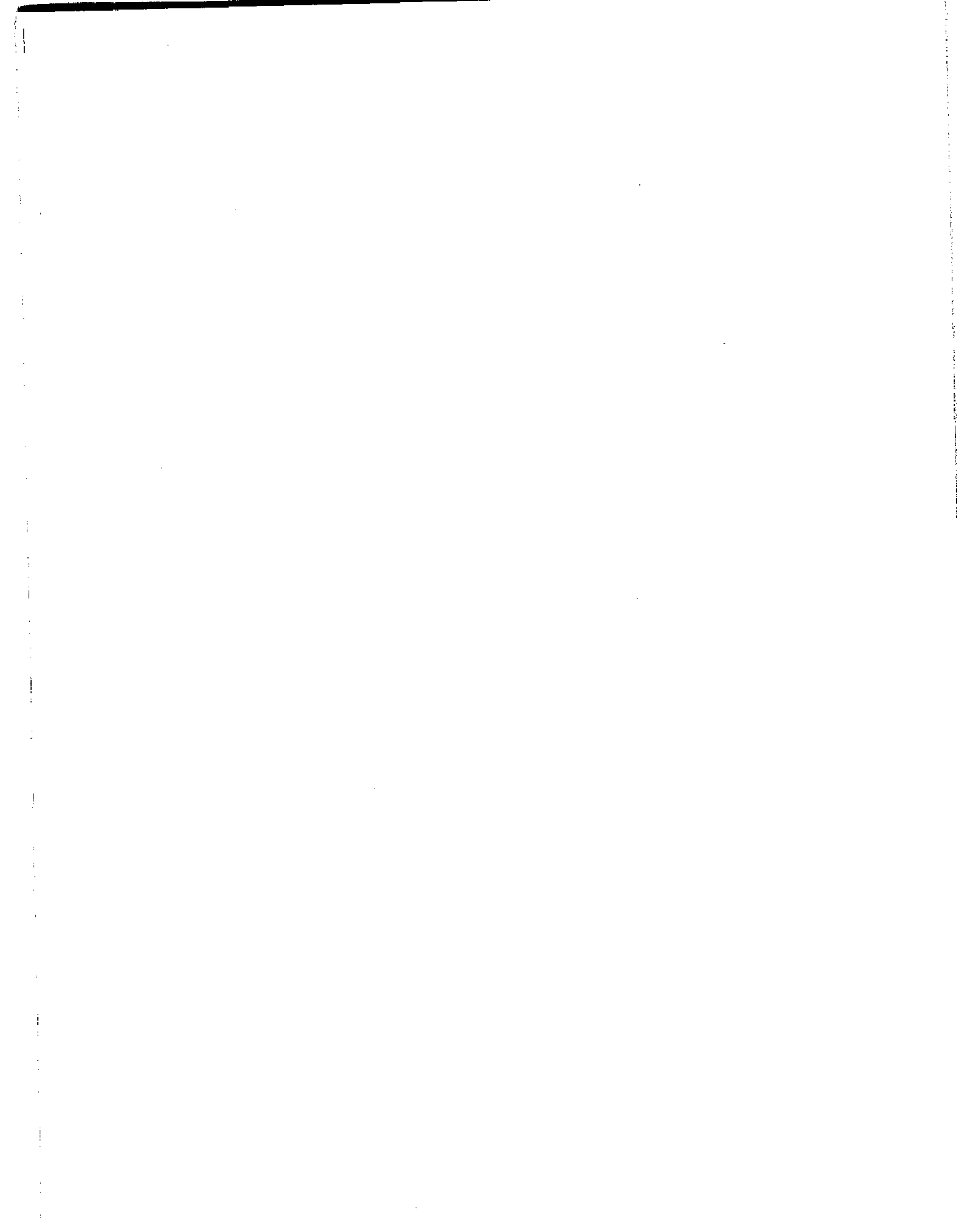
This publication contains information covering the requirements of levels 1, 2 and 3.

BY COMMAND OF THE DEFENCE COUNCIL

Kenn Trew

Ministry of Defence
Issued by
DEFENCE LOGISTICS ORGANISATION

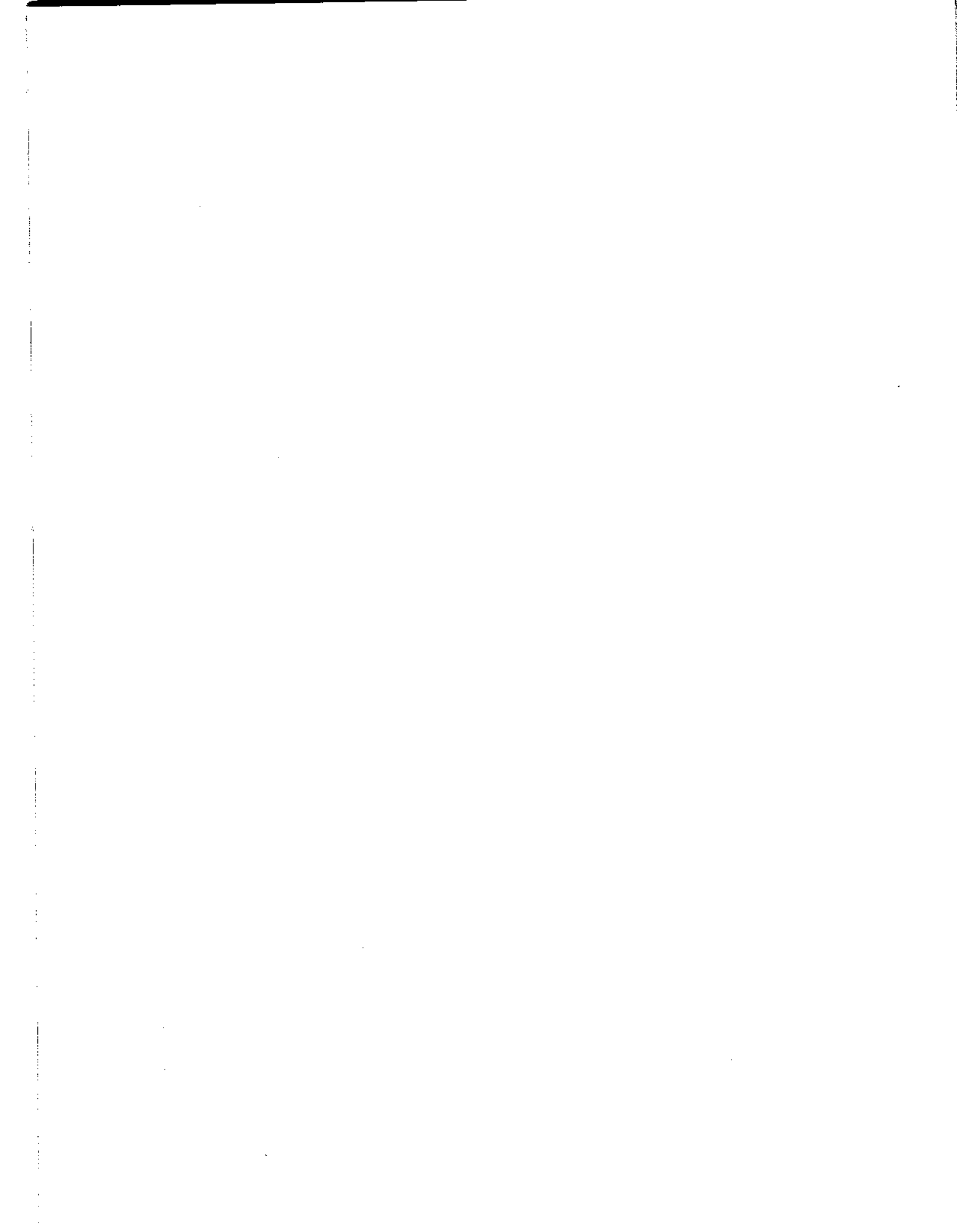
REPRINTED INCORPORATING AMDT 1



AMENDMENT RECORD

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ILLUSTRATED PARTS CATALOGUE

Chapter

- 1 General information
- 2 Parts lists
- 2-1 Body assembly
- 2-2 Chassis assembly
- 2-3 Electrical system
- 2-4 Labels and decals
- 3 Indexes
- 3-1 Index of NATO stock numbers to chapter, figure and item numbers
- 3-2 Index of manufacturers part/drawing numbers to chapter, figure and item numbers
- 3-3 Index of NATO stock numbers to item names and descriptions
- 3-4 Index of NATO supply codes for manufacturers to manufacturers name

PREFACE**Sponsor: DEC ELS****INTRODUCTION**

1 Service users should forward any comments on this publication through the channels prescribed in AESP 0100-P-011-013. An AESP Form 10 is provided at the end of this publication; it should be photocopied and used for forwarding comments on this AESP.

2 The subject matter of this publication may be affected by Defence Council Instructions (DCIs), Standing Operating Procedures (SOPs) or by local regulations. When any such Instruction, order or regulation contradicts any portion of this publication it is to be taken as the overriding authority.

3 This Illustrated Parts Catalogue (IPC) is designed as an aid to the identification of components parts or assemblies of parts of the equipment, and to provide the information necessary for the demanding of spares. This IPC should not be used as a dismantling, maintenance, repair, storage, transportation or operation guide.

4 This IPC may list some or all of the parts comprising the equipment concerned, but only those parts given a NATO Stock Number or Service Catalogue or Referencing Number will normally be available as spares. Should there be a requirement for an item not assigned a number, demands may be submitted quoting the IPC Number (Royal Navy), AP Number (Royal Air Force) or AESP Number (Army), Item Number, Figure Reference and Item Name. Where a manufacturer's number is known, this should also be quoted.

Hazardous material

5 This catalogue may list some items which are hazardous materials within the terms of the HSW Act (1974) and current COSHH Regulations refer to Safety Data Information published in JSP(F) 395, Material Regulations for the Army Volume 9 Pamphlet No. 1 or AP100B-10.

6 This catalogue is a guide to the selection and ordering of spare parts. It should not be used as a maintenance manual as no safety warnings are including in the catalogue.

Quantities

7 The figure in the 'No. off' column specifies the quantity required for the unit (or assembly, sub-assembly, etc) concerned; it does not indicate the quantity to be demanded.

Demands

8 When demanding Spare Parts the following particulars must be quoted:

- 8.1 Domestic Management Code (DMC).
- 8.2 NATO Stock Number (NSN).
- 8.3 Item Name.
- 8.4 Names of the Equipment for which the part is required.
- 8.5 Manufacturer's reference, if known.

NOTE

Alternatives quoted apply only to the Equipment covered by this IPC.

Modification records

9 Modification numbers indicating sub-chapter details applicable to the IPC are listed on the 'RECORD OF MODIFICATION' page in Chapter 2. Further detail is then identified on the 'RECORD OF MODIFICATION' page of the appropriate level sub-chapter.

Annotations

10 The following notations are used in this publication:

10.1 A/R (As required) - When appearing in the 'No. off' column indicates that the quantity is 'as required'.

10.2 NFD (Not fully defined) - when appearing in the 'Annotation' column indicates that the part number/drawing number for the item is not fully defined.

10.3 NI (Not illustrated) when appearing with a number in the 'Fig Item' column indicates that the item is not illustrated.

10.4 NP (Non-provisioned) - when appearing in the 'NATO Stock Number' column indicates that the item may be illustrated, but not available from stock as a replacement item.

10.5 REF (Reference) - When appearing in the 'No. off' column indicates that the item is listed for reference purposes only.

Abbreviations

11 Abbreviations and symbols used in this IPC are listed separately.

Amendments

12 Amendments to the catalogue will be published as and when necessary. These will be numbered consecutively, and the AMENDMENT RECORD sheet is to be completed for each Amendment List embodied.

13 New or amended matter will be highlighted by side lining to show the extent of the amendment.

Indentations

14 Items are listed in a logical assembly/disassembly order and are indented by the 'Dot System' in which each 'dot' depicts the relationship of the item to the main assembly:

MAIN ASSEMBLY

Attaching parts for main assembly

. FIRST LEVEL OF BREAKDOWN (Sub-assembly or detail part of main assembly)

. Attaching parts for first level

. . SECOND LEVEL OF BREAKDOWN (Sub-sub-assembly or detail part of Sub-assembly)

. . Attaching parts for second level

. . . THIRD LEVEL OF BREAKDOWN (Sub-sub-sub-assembly or detail part of Sub-sub-assembly)

. . . Attaching parts for third level

FOURTH LEVEL OF BREAKDOWN (sub-sub-sub-sub assembly or detail part of sub-sub-sub assembly).

Attaching parts for the fourth level.

NOTES

- (1) Attaching parts for the Main Assembly are listed at the end of the text of the Main Assembly.
- (2) NATO Stock Numbers (NSN's) quoted in this IPC will supersede any number that may have been allotted previously.

Publication information

15 Any communication regarding this catalogue should be made to the controlling publication authority.

RELATED AND ASSOCIATED PUBLICATIONS

Related publications

16 The Octad for the subject equipment consists of the publications shown overleaf. All references are prefixed with the first eight digits of this publication. The availability of the publications can be checked by reference to the relevant Group Index (see AESP 0100-A-001-013).

Category/Sub-category			Information Level			
			1 User/Operator	2 Unit Maintenance	3 Field Maintenance	4 Base Maintenance
1	0	Purpose and Planning Information	101	101	101	*
	1	Equipment Support Policy Directives	111	111	111	*
	2	Purpose and Planning Information, Medical and Dental	*	*	*	*
2	0	Operating Information	201	*	*	*
	1	Aide-Memoire	*	*	*	*
	2	Training Aids	*	*	*	*
3		Technical Instructions	201	302	302	*
4	1	Installation Instructions	411	411	411	*
	2	Preparation for Special Environments	421	421	421	*
5	1	Failure Diagnosis	201	512	512	*
	2	Repair Instructions	201	522	522	*
	3	Inspection Standards	*	532	532	*
	4	Calibration Procedure	*	*	*	*
6		Maintenance Schedule	601	601	*	*
7	1	Illustrated Part Catalogue	711	711	711	*
	2	Commercial Parts List	*	*	*	*
	3	Complete Equipment Schedule, Production	*	*	*	*
	4	Complete Equipment Schedule, Service Edition (Simple Equipment)	741	741	741	*
	5	Complete Equipment Schedule, Service Edition (Complex Equipment)	*	*	*	*
8	1	Modification Instructions	*	*	*	*
	2	General Instructions, Special Technical Instructions and Servicing Instructions	*	821	821	*
	3	Service Engineered Modification Instructions (RAF only)	*	*	*	*

* Categories/Sub-categories not published

Associated Publications

17 There are no associated publications complimentary to this publication.

APPLICABILITY DETAILS

18 This IPC relates to the following equipment:

<u>NSN</u>	<u>Veh Code</u>	<u>Contract</u>
2330-99-908-6472	NB 2853-3107	LLV/DBG/424

LIST OF ABBREVIATIONS

The following abbreviations are in accordance with the requirements of JSP187.

Each abbreviation is listed individually but may appear in the text coupled with others:- eg. ft/min, ft/sec, o/a lg, o/a dim, hex hd.

A	Ampere	dB	Decibel
ac	Alternating current	dc	Direct current
A/F	Across flats	deg	Degree
Ag	Silver	dia	Diameter
Al	Aluminium	dim	Dimension
ANC	American national coarse thread	DIN	German metric thread
ANF	American national fine thread	dp	Double pole
ANP	American national pipe thread	dpdt	Double pole, double-throw
ANPT	American national taper thread	dpst	Double pole, single-throw
approx	approximately	dt	Double throw
A/R	As required		
asb	Asbestos	ext	External
assy	Assembly		
Au	Gold	F	Fahrenheit
AWG	American wire gauge	F	Farad
		Fe	Iron
BA	British association screw thread	Fig	Figure
Be	Beryllium	flex	Flexible
bhp	Brake horse power	fl oz	Fluid ounce
br	Brass	ft	Foot, feet
BS	British Standard		
BSF	British standard fine thread	g	Gramme
BSP	British standard pipe thread	gal	Gallon
BSPT	British standard pipe taper thread	galv	Galvanised
BSW	British standard Whitworth thread		
Btu	British thermal unit	h	Height, high
		H	Henry
C	Celsius (centigrade)	h	Hour
c	Centi (one hundredth)	hd	Head
cc	Cubic centimetre	hex	Hexagon
ccw	Counterclockwise	Hg	Mercury
Cd	Cadmium	hp	Horse power
circ	Circumference	HSS	High speed steel
cm	Centimetre	HTS	High tensile steel
Co	Cobalt	Hz	Hertz
contd	Continued		
Cr	Chromium	id	Inside diameter
cres	Corrosion resistant steel	in.	Inch
csk	Countersunk	incl	Inclusive
Cu	Copper	int	Internal
cw	Clockwise		
c/w	Complete with	J	Joule
cwt	Hundredweight		
		k	Kilo (one thousand)
		kg	Kilogramme
		km	Kilometre
		kV	Kilovolt
		kW	Kilowatt
		lg	Long (length)
		lh	Left hand
		LT	Low tension

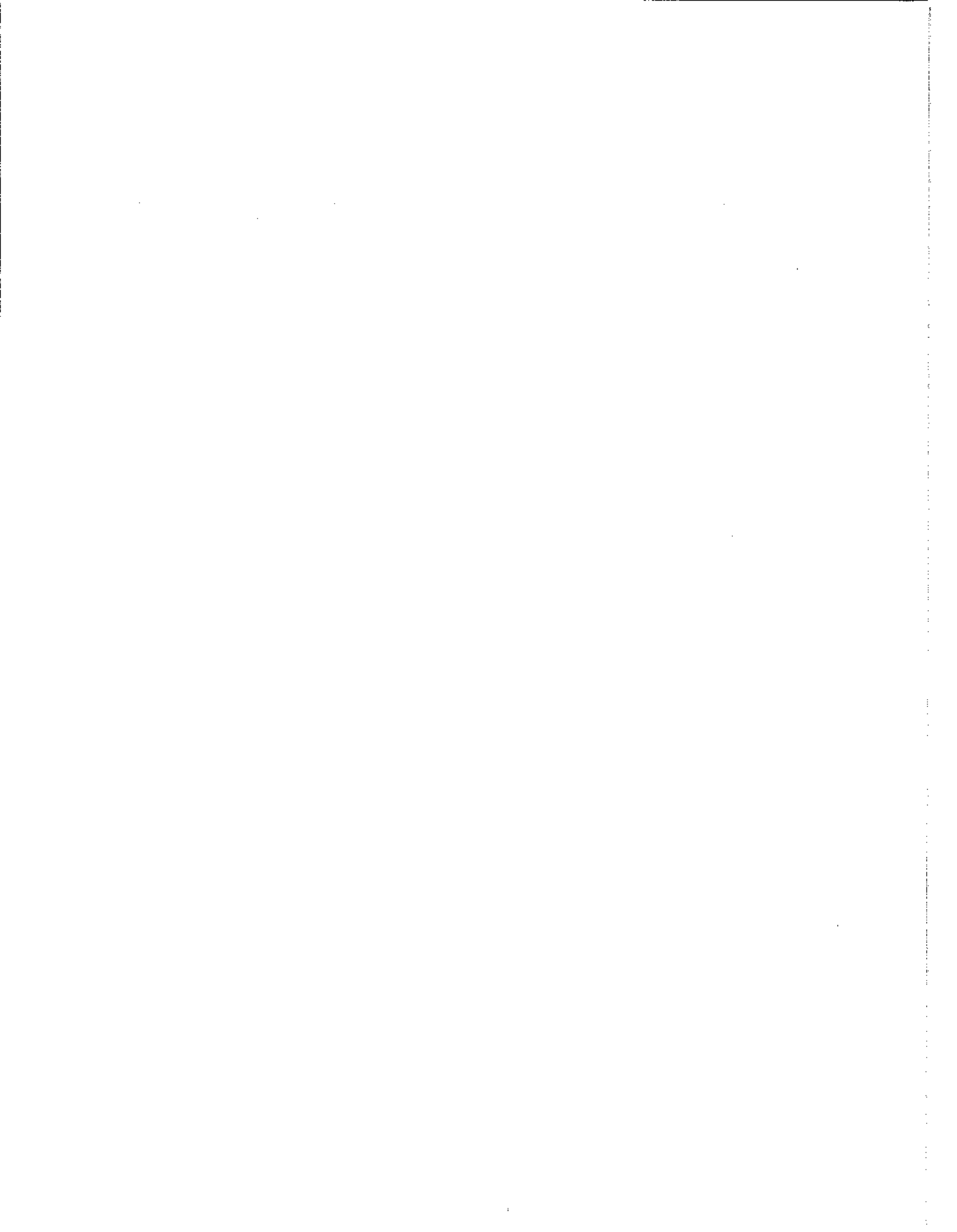
LIST OF ABBREVIATIONS (continued)

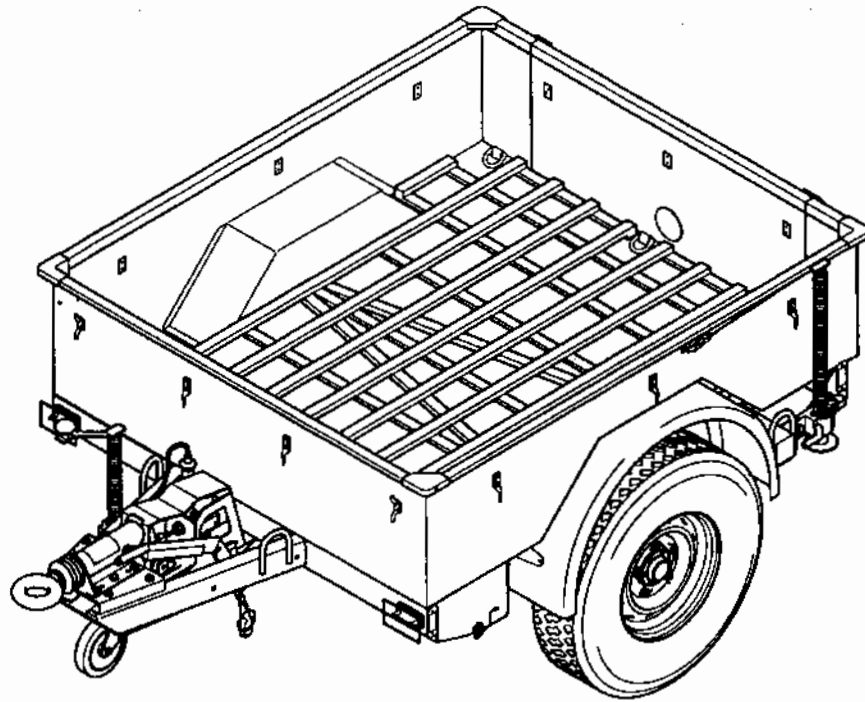
M	Mega (one million)	s	Second (time)
m	Metre	sect	Section
m	Milli (one thousandth)	sp	Single-pole
max	Maximum	spdt	Single-pole, double-throw
mb	Millibar	spst	Single-pole, single-throw
mfg	Manufacturing	sq	Square
mfr	Manufacturer	st	Single-throw
Mg	Magnesium	std	Standard
min	Minimum	SWG	Standard wire gauge
min	Minute (time)		
Mk	Mark	t	Tonne
ml	Millilitre	temp	Temperature
mm	Millimetre	thd	Thread
Mn	Manganese	thk	Thick
mod	Modification	Ti	Titanium
mtd	Mounted	tpi	Threads per inch
mtg	Mounting	tub	Tubular
matl	Material		
		?	Micro (one millionth)
n	Nano (one thousand-millionth)	UNC	Unified coarse thread
N	Newton	UNF	Unified fine thread
N	Nitrogen	u/s	Under-size
N/A	Not applicable	u/w	Used with
neg	Negative		
Ni	Nickel	V	Volt
NI	Not illustrated	var	Variable
No.	Number	vol	Volume
nom	Nominal		
NP	Non provisioned	W	Watt
NSN	NATO stock number	w	Width, wide
		w/	With
O	Oxygen	Whit	Whitworth
o/a	Over-all	wkg	Working
od	Outside diameter	w/o	Without
o/s	Over-size	wt	Weight
oz	Ounce		
		yd	Yard
Pb	Lead		
Phos B	Phosphor bronze	Zn	Zinc
pkg	Package		
pos	Positive		
pr	Pair		
psi	Pounds force per square inch		
Pt	Platinum		
pt	Pint		
PTFE	Polytetrafluoroethylene		
PVC	Polyvinyl Chloride		
%	Percent		
qty	Quantity		
rad	Radius		
rd	Round		
rect	Rectangular		
REF	Reference		
rh	Right hand		



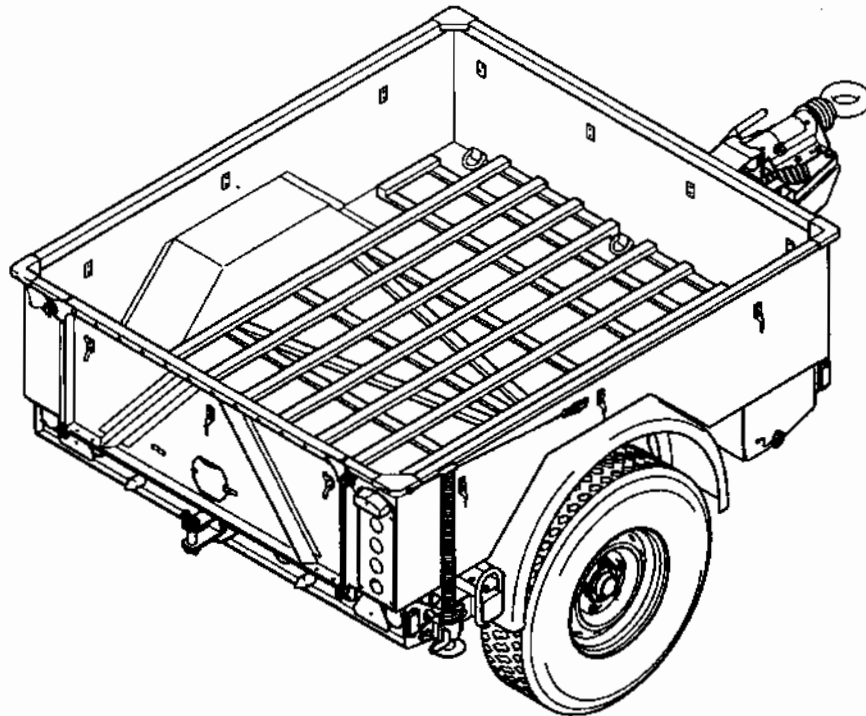
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Index of main assemblies and sub-assemblies to related IPCs or part/drawing numbers and chapters.....	7
Index of illustrations to chapter and figure numbers	8





3/4 View Front



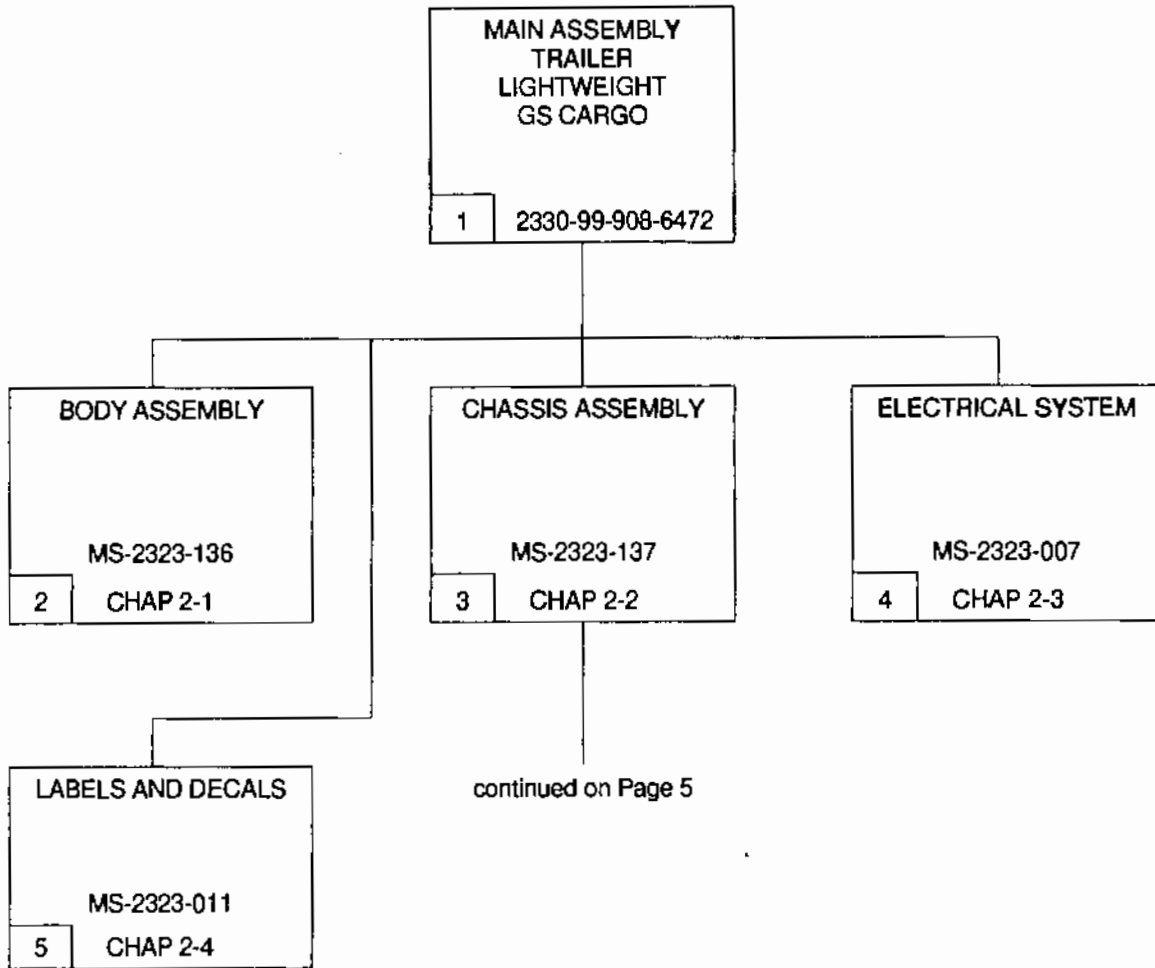
3/4 View Rear

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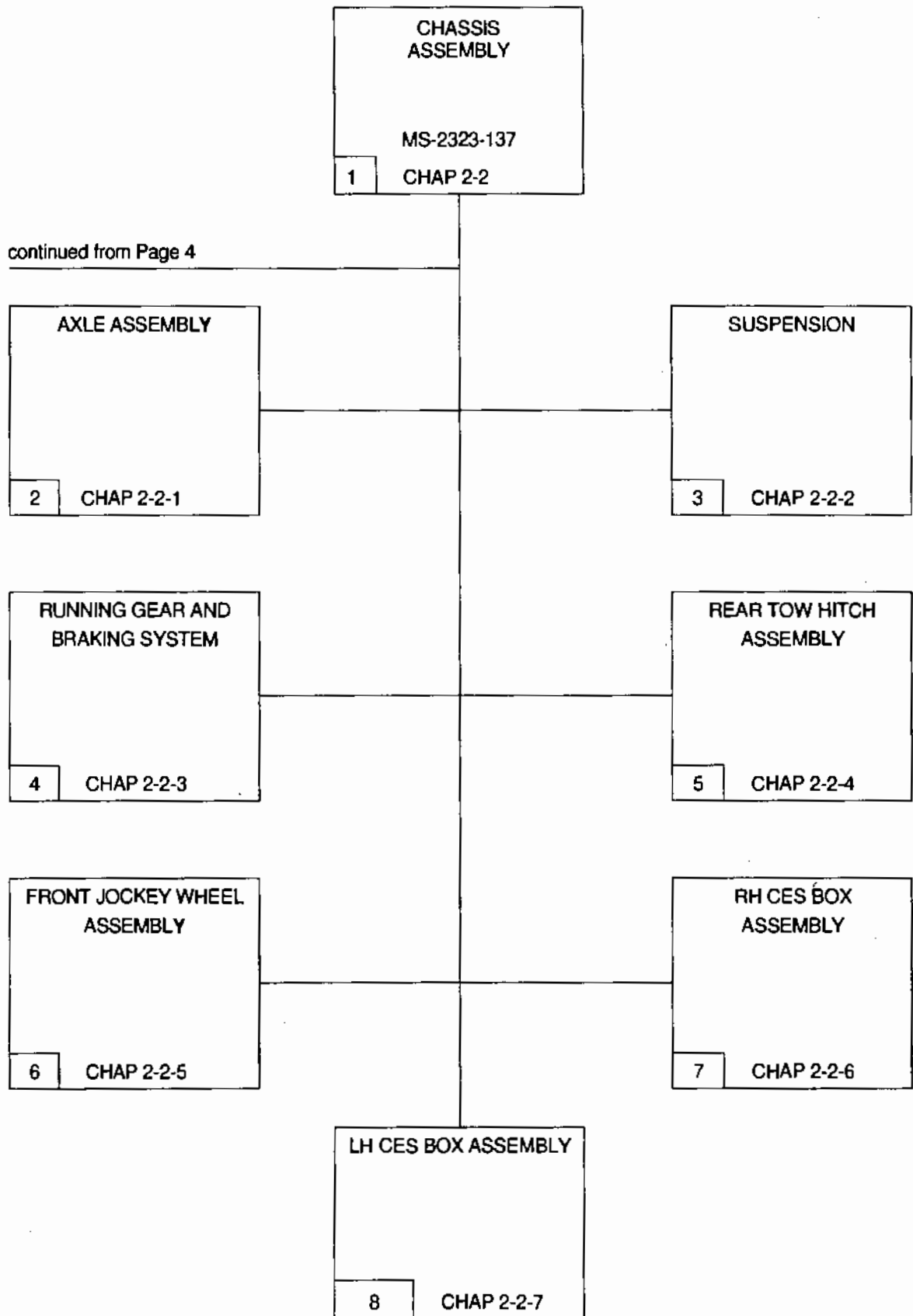
Trailer lightweight GS cargo

Chap 1

**FAMILY TREE
(PUBLICATION CHAPTER PLAN)**



FAMILY TREE
(PUBLICATION CHAPTER PLAN) (continued)



INDEX OF RELATED IPCS AND SUB-CHAPTERS

Chap Plan No.	Chap 2 Sub-Chap No.	Item Name and (if applicable) Related IPC Reference No.	Part No./Drawing No.	DMC Army	NATO Stock No.
1	-	TRAILER LIGHTWEIGHT GS CARGO (This IPC)	-	-	2330-99-908-6472

**INDEX OF MAIN ASSEMBLIES AND SUB-ASSEMBLIES
TO
RELATED IPCs OR PART DRAWING NUMBERS AND CHAPTER**

Item	Drawing No.	Chapter
Anti-roll Bar Assembly	MS-2323-139	2-2-2
Axle Assembly c/w Brakes	12041	2-2-1
Body Assembly	MS-2323-136	2-1
Chassis Assembly	MS-2323-137	2-2
Chassis Frame	MS-2323-052	2-2
Convoy Light Assembly	MS-2323-236	2-2
Electrical System	MS-2323-007	2-3
Front Jockey Wheel Assembly	12194	2-2-5
Labels and Decals	MS-2323-011	2-4
LH CES Box Assembly	MS-2323-265	2-2-7
Loom Assembly	AA-2323-204	2-3
Pipes and Rod Assembly	12042	2-2-3
Rear Tow Hitch Assembly	MS-2323-252	2-2
RH CES Box Assembly	MS-2323-277	2-2-6
Running Gear and Braking System	MS-2323-161	2-2-3
Suspension		2-2-2
Suspension Spring	AA-2323-103	2-2-2

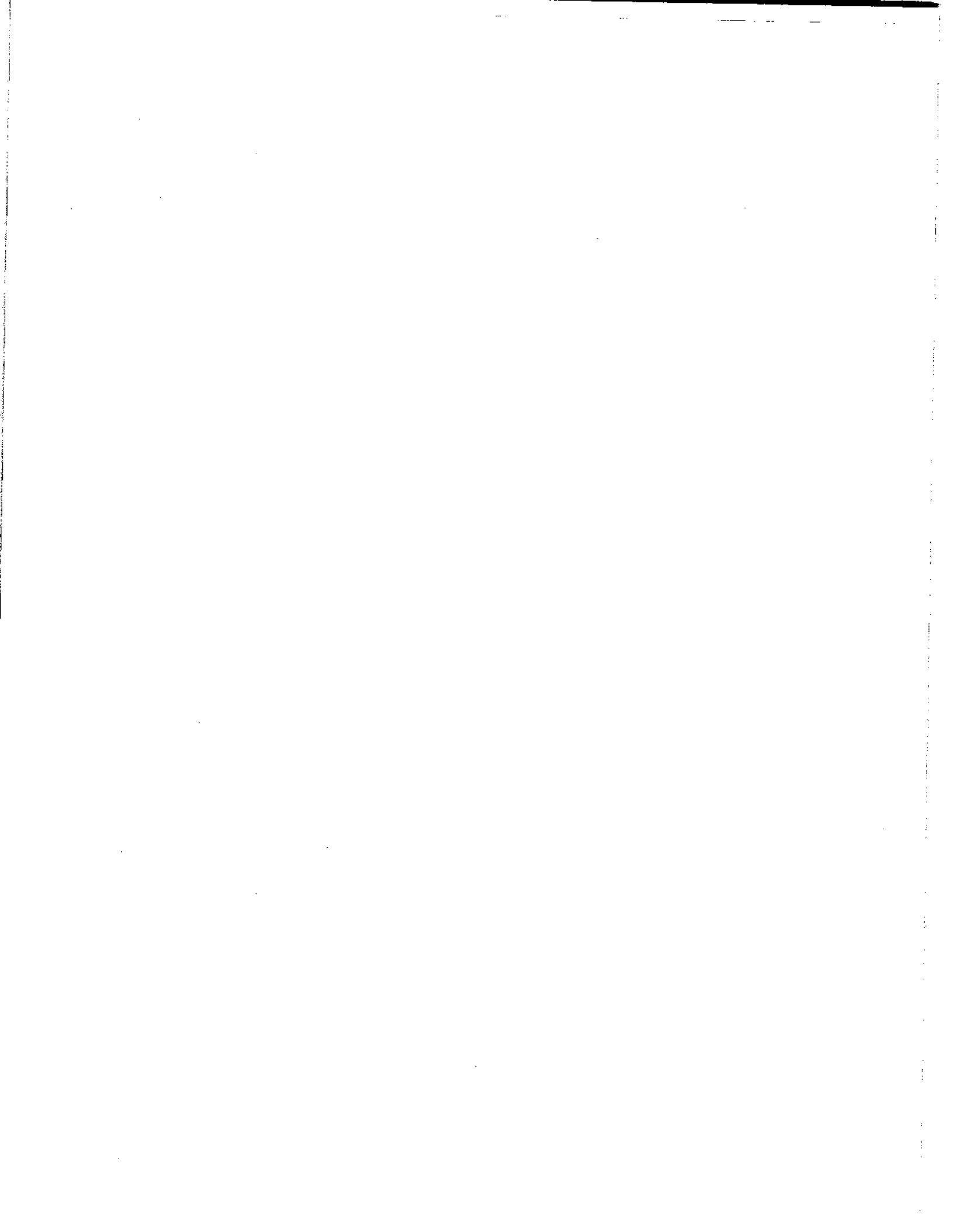
**INDEX OF ILLUSTRATIONS
TO
CHAPTER AND FIGURE NUMBERS**

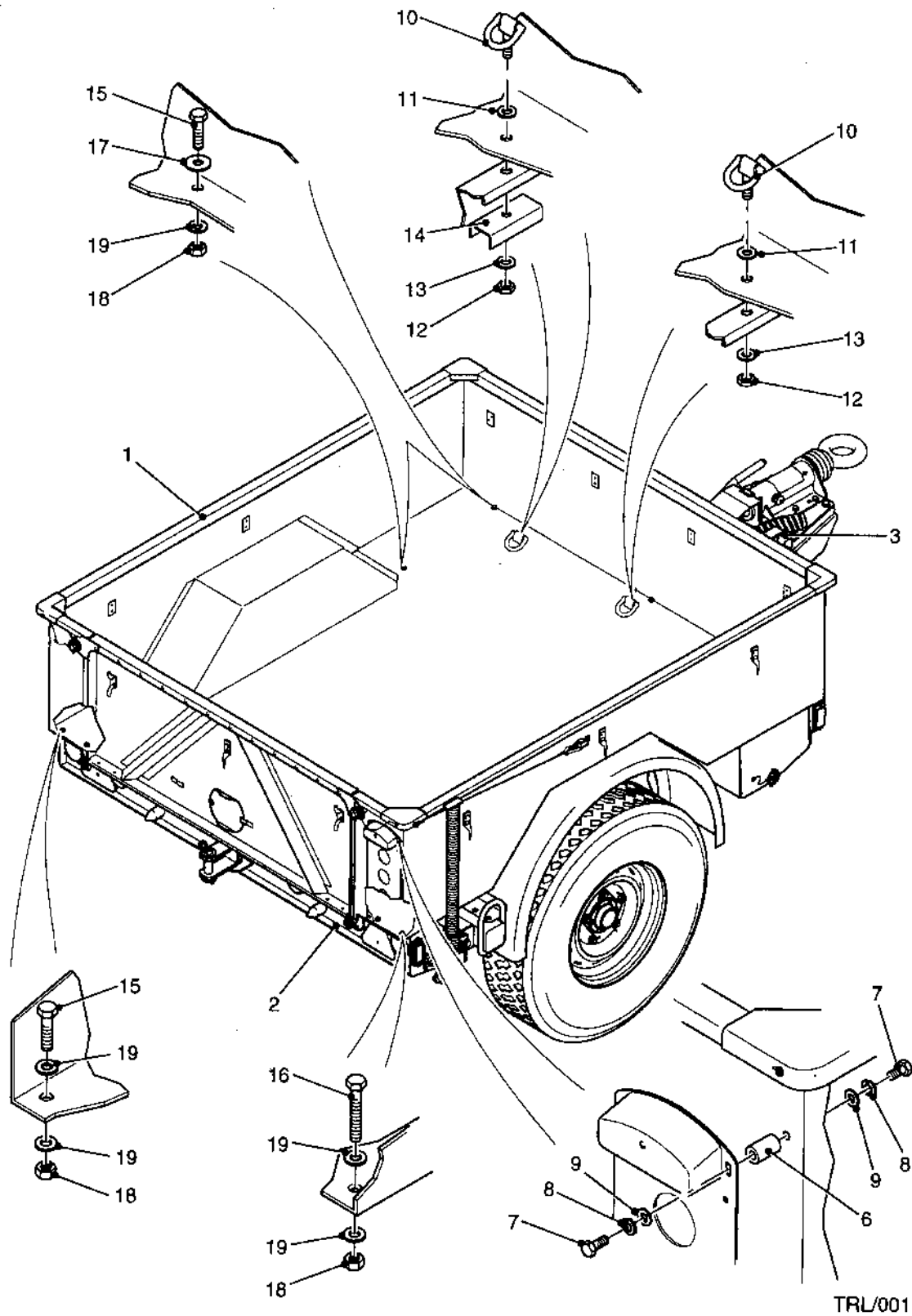
Item	Chapter	Fig
Axle Assembly Complete with Brakes	2-2-1	1
Body Assembly	2-1	1
Brake Pad Clip Set	2-2-1	3
Brake Pipes and Handbrake Rods	2-2-3	2
Central Brake Pipe Kits	2-2-3	3
Chassis Assembly	2-2	1
Convoy Light Assembly	2-2	2
Coupling, Brakelink and Handbrake	2-2-3	1
Electrical System	2-3	1
Front Jockey Wheel Assembly	2-2-5	1
Labels and Decals	2-4	1
LH CES Box Assembly	2-2-7	1
Rear Direction Indicator and Front Marker Lamps	2-3	3
Rear Tow Hitch	2-2-4	1
RH CES Box Assembly	2-2-6	1
Stop/Tail and Fog Lamps	2-3	2
Suspension - Anti Roll Bar	2-2-2	2
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CHAPTER 2
PARTS LIST
TRAILER LIGHTWEIGHT GS CARGO
2330-99-908-6472

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2-3 Electrical system	
2-4 Labels and decals	





TRL/001

Fig 1 Trailer lightweight GS cargo

PARTS LIST

Fig 1 Item	DMC Army	NATO stock number	Item name	Part No./ Dwg No.	No. off	Annotation (NSCM)
		2330-99-208-6472	TRAILER LIGHTWEIGHT GS CARGO	MS-2323-001	REF	
1			. BODY ASSEMBLY	MS-2323-136	REF	See Chap 2-1
2			. CHASSIS ASSEMBLY	MS-2323-137	REF	See Chap 2-2
3			. ELECTRICAL SYSTEM	MS-2323-007	REF	See Chap 2-3
NI 4			. LABELS AND DECALS	MS-2323-011	REF	See Chap 2-4
NI 5			. NUMBER PLATE	AA-2323-231	1	Specific to each trailer
6	7TR	5340-99-318-1120	. BUMPER, RUBBER	C-F-20-15-M6-57	1	) (K8232)
7	G1	5305-99-371-9043	. SCREW, MACHINE	F1101	2	) Number
8	G1	5310-99-666-0691	. WASHER, LOCK	F1058	2	) plate
9	G1	5310-99-309-1094	. WASHER, FLAT	F1056	2	) bracket
10	7TR	4030-99-790-4364	. SHACKLE	AA-2323-285	6	(K8232)
11			. WASHER	36456	6	
12			. NUT, THIN	F1046	6	
13			. WASHER, SPECIAL	F1047	6	
14	7TR	5340-99-500-6304	. BRACKET, DOUBLE ANGLE	AA-2323-168	2	Front outer shackles only (K8232)
15	G1	5305-99-585-8500	. SCREW, MACHINE	F1126	8	Body tub mounting
16			. SCREW, MACHINE	F1127	2	Body tub mounting RHR
17			. WASHER, PLAIN	F1017	6	Front six positions
18			. NUT, AEROTIGHT	F1014	10	
19			. WASHER, PLAIN	F1016	14	



CHAPTER 2-1
BODY ASSEMBLY
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2-1 Body assembly	



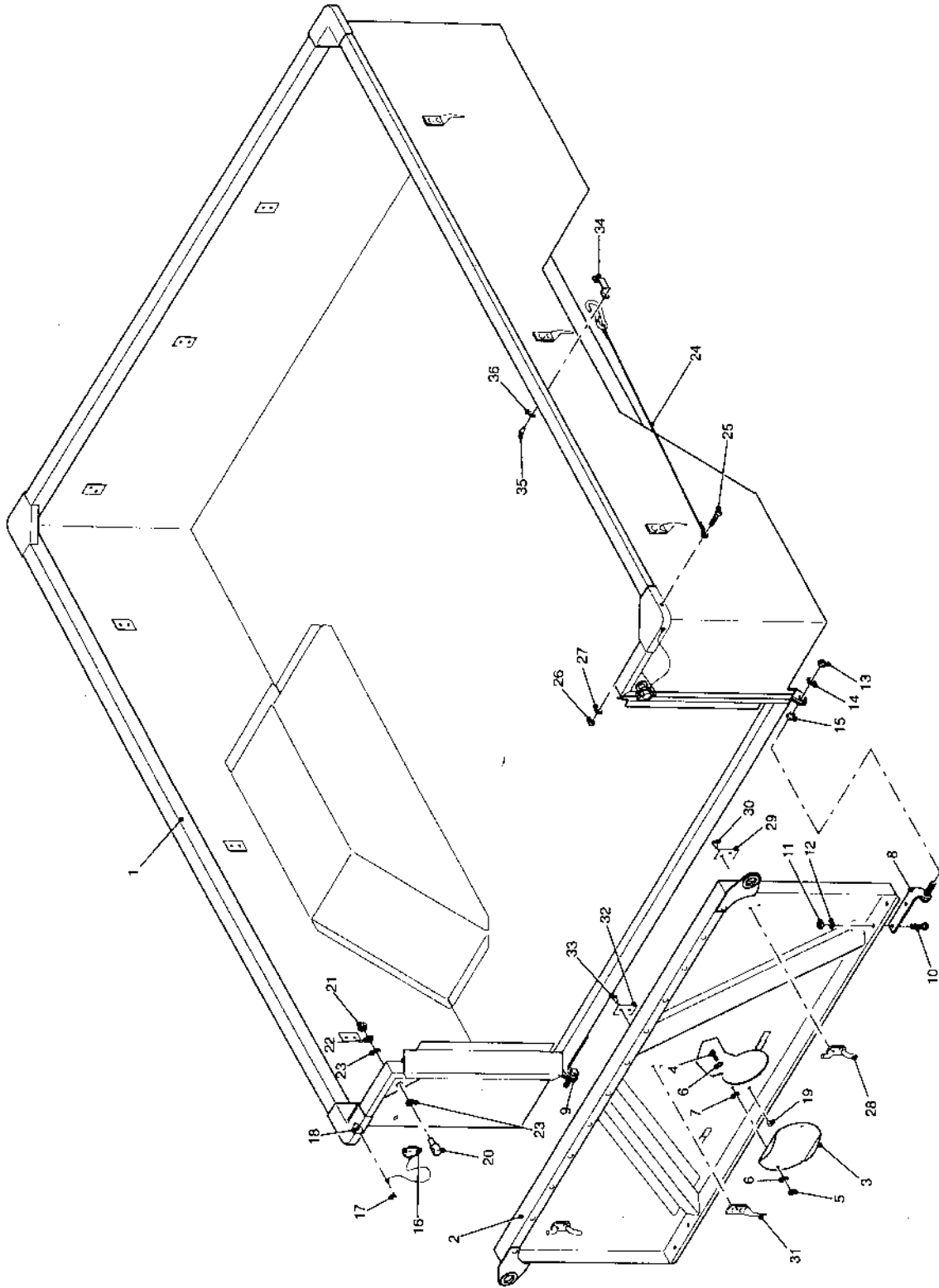
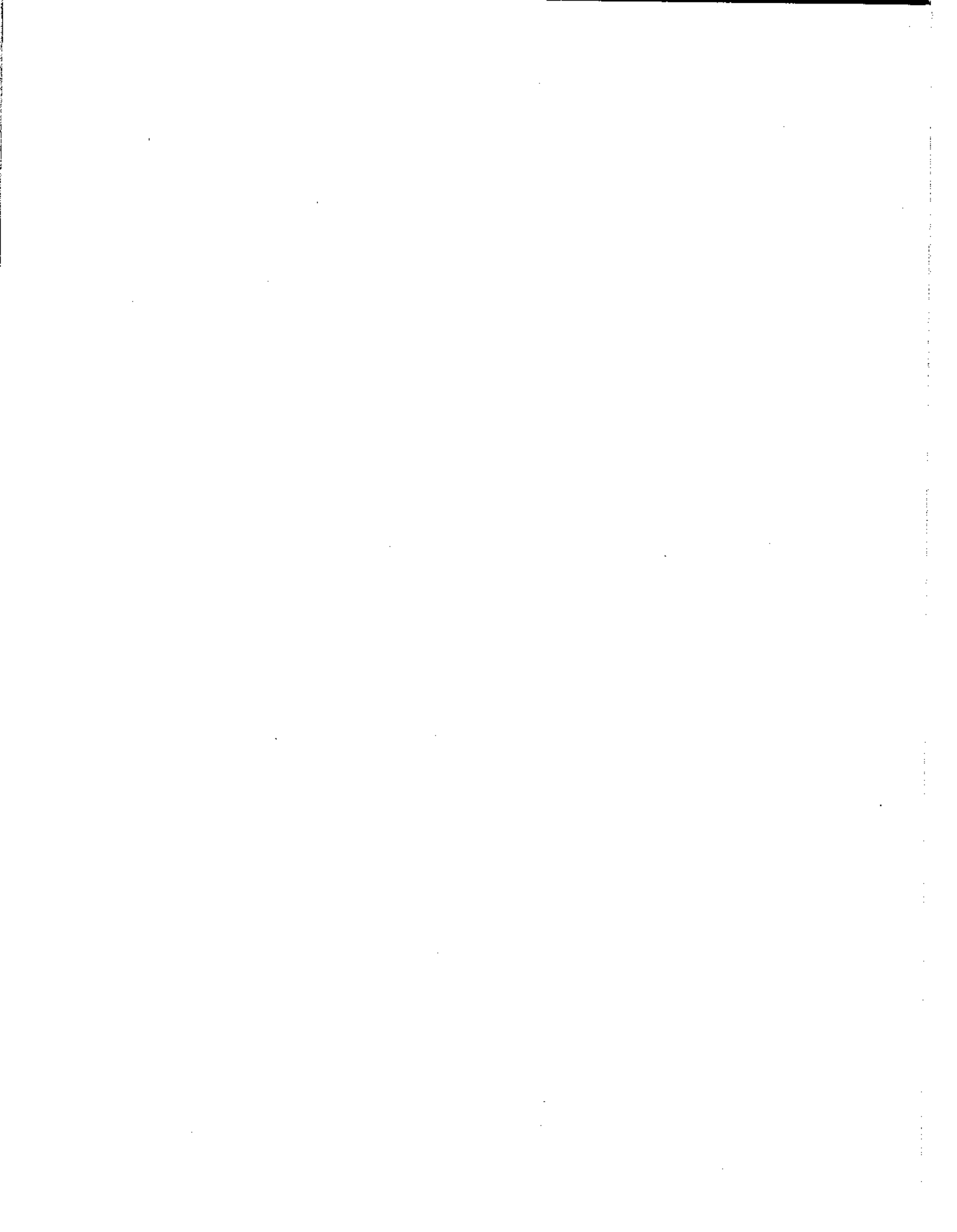


Fig 1 Body assembly

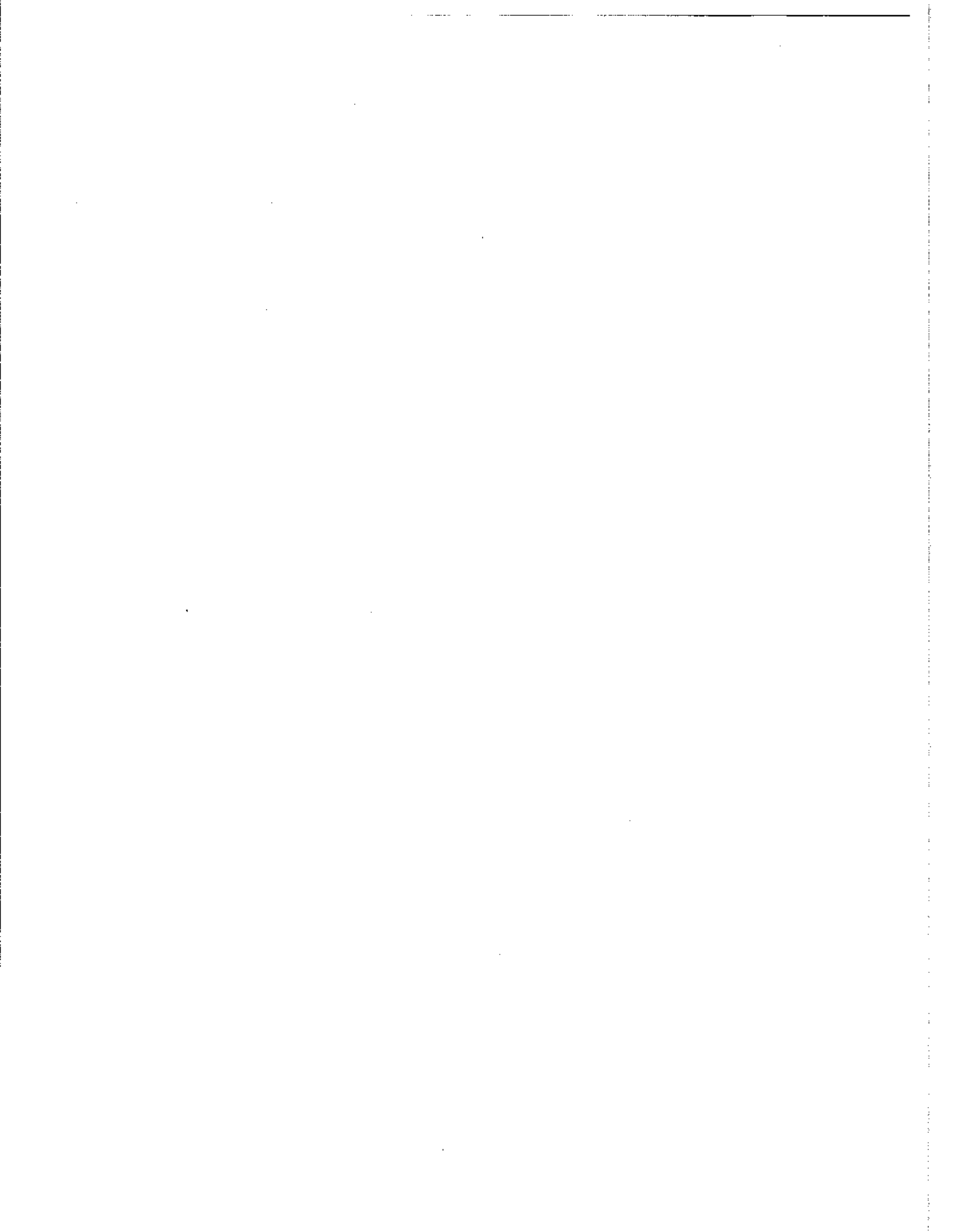
PARTS LIST

Fig 1 Item	DMC Army	NATO stock number	Item name	Part No./ Dwg No.	No. off	Annotation (NSCM)
			BODY ASSEMBLY	MS-2323-136	REF	
1	7TR	2510-99-582-5674	. BODY, TRAILER	MS-2323-126	1	(K8232)
2	7TR	2510-99-865-1738	. TAILGATE, VEHICLE	MS-2323-078	1	(K8232)
3	7TR	2510-99-833-4776	. PLATE, CLOSURE	AA-2323-149	1	(K8232)
4	G1	5305-99-216-9413	. SCREW, M6, S/STEEL	F1053	1	
5	G1	5310-99-212-6344	. NUT, SELF-LOCKING HEXAGON	F1057	1	
6	G1	5310-99-811-0479	. WASHER, FLAT, M6, S/STEEL	F1056	2	
7			. WASHER	032-0601-000-01	1	
8	7TR	2510-99-173-8076	. HINGE	MS-2323-292	1	(K8232)
9	7TR	2510-99-665-9761	. HINGE	MS-2323-293	1	(K8232)
10			. SCREW, MACHINE	F1125	4	
11			. NUT, AEROTIGHT	F1014	4	
12			. WASHER, PLAIN	F1016	4	
13	7TR	5310-99-131-8516	. NUT, AEROTIGHT	F1024	2	(K8232)
14	G1	5310-99-867-8397	. WASHER, PLAIN	F1026	2	
15	7TR	3120-99-589-8397	. BEARING, FLANGED	M250-1014-10	2	(K8758)
16	7TR	4020-99-212-5884	. COTTER PIN, SNAP RING C/W CORD	MS-2323-299	2	(K8232)
17			. SCREW, MACHINE	F022	2	
18	G1	5310-99-827-5524	. NUT, SELF-LOCKING, HEXAGON	F345	2	
19			. MONOBOLT	2771-0817	1	
20	7TR	5315-99-961-3054	. TAILGATE SECURING PEG	AA-2323-212	2	(K8232)
21	G1	5310-99-219-6431	. NUT, PLAIN M10	F1027	2	
22			. WASHER, LOCK	F1028	2	
23	G1	5310-99-867-8397	. WASHER, PLAIN	F1026	4	
24	7TR	4010-99-728-2055	. CABLE ASSEMBLY, TAILGATE SUPPORT	AA-2323-278	2	(K8232)
25	G1	5305-99-393-4378	. SCREW, MACHINE	F148	2	
26			. NUT, AEROTIGHT	F1014	2	
27			. WASHER, PLAIN	F1016	2	
28	6MT13	5340-99-804-7030	. CLEAT, ROPE	M19	4	(K1039)
29	7TR	2540-99-309-2254	. PLATE, STIFFENER	AA-2323-235	4	(K8232)
30			. HEMLOCK RIVET	02221-00813	8	
31	6MT13	5340-99-821-1372	. CLEAT, ROPE	M226	9	(K1039)
32	7TR	2540-99-927-5359	. PLATE, STIFFENER	AA-2323-234	9	(K8232)
33			. HEMLOCK RIVET	02221-00813	18	
34	7TR	5340-99-988-3691	. STAPLE, HASP	02-2216-01	2	(K4F32)
35			. RIVET	BE61-0611	4	
36	G1	5310-99-700-7444	. WASHER, FLAT, S/STEEL	F1070	8	



CHAPTER 2-2
CHASSIS ASSEMBLY
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2-2-5 Front jockey wheel assembly	
2-2-6 RH CES box assembly	
2-2-7 LH CES box assembly	



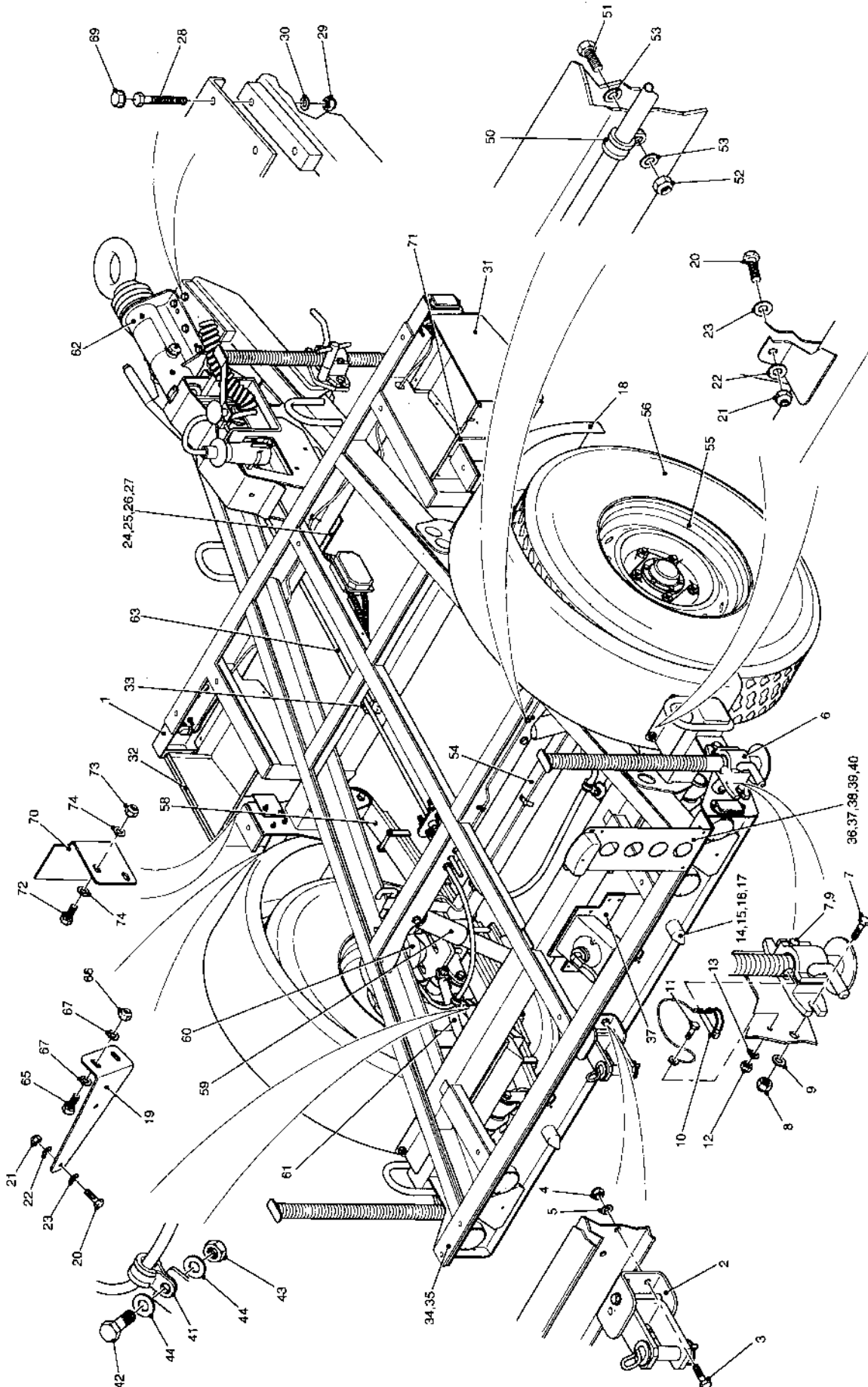


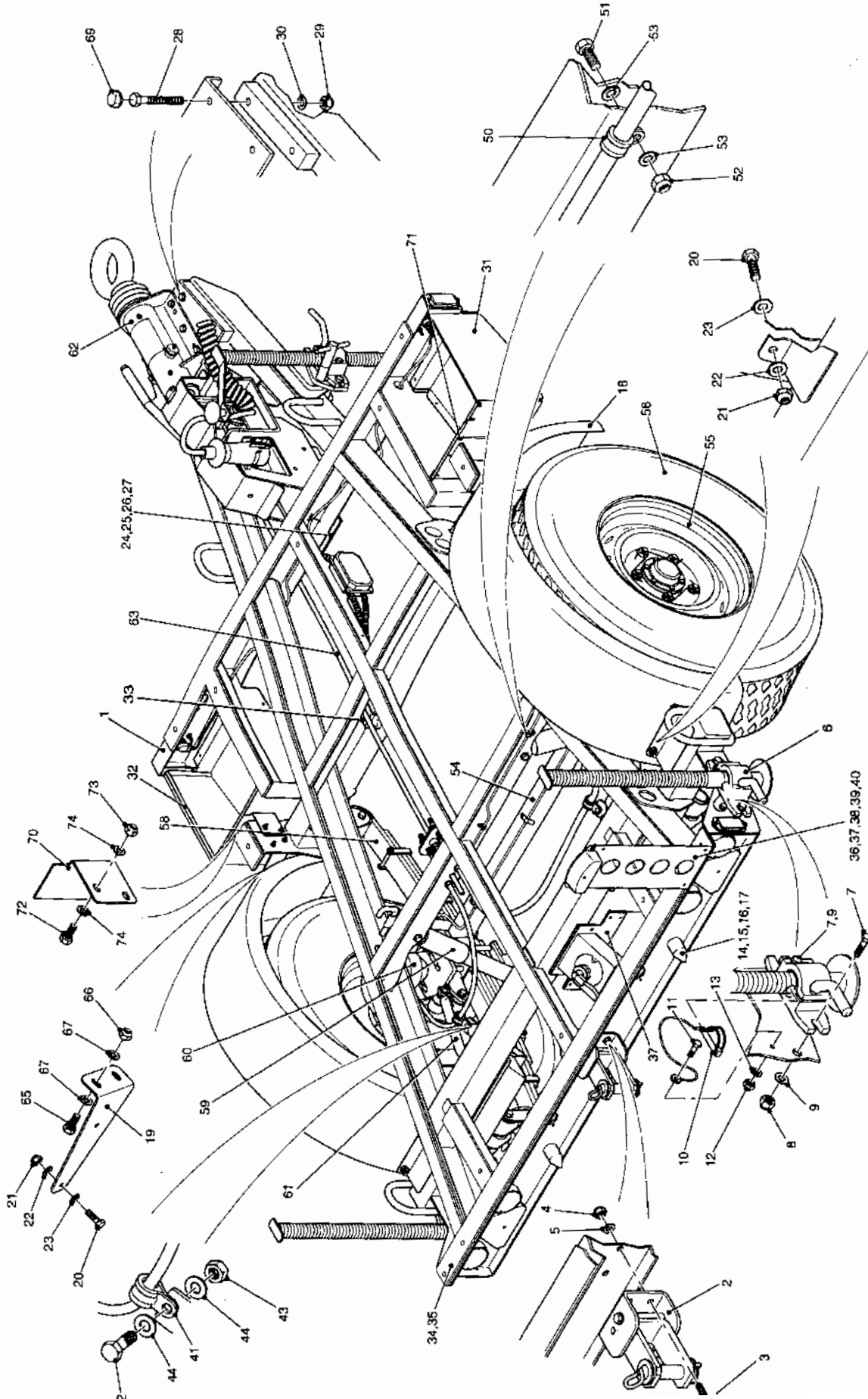
Fig 1 Chassis assembly

TRL/012

Feb 04

PARTS LIST

Fig 1 Item	DMC Army	NATO stock number	Item name	Part No./ Dwg No.	No. off	Annotation (NSCM)
			CHASSIS ASSEMBLY	MS-2323-137	REF	
1			. CHASSIS FRAME	MS-2323-052	1	
2			. REAR TOW HITCH ASSEMBLY	MS-2323-252	1	See Chap 2-2-4
3			. SCREW, MACHINE	F1155	4	
4	7TR	5310-99-131-8516	. NUT, AEROTIGHT	F1024	4	(K8232)
5	G1	5310-99-867-8397	. WASHER, PLAIN	F1026	4	
6	7TR	2950-99-002-0934	. SUPPORT, RETRACTABLE, TRAILER	AA-2323-082	2	(K8232)
7			. BOLT, MACHINE	F1246	6	
8			. NUT, AEROTIGHT	F1003	4	
9			. WASHER, PLAIN	F1006	6	
10	7TR	5315-99-440-1107	. COTTER PIN, SNAP RING C/W CORD	AA-2323-358	2	(K8232)
11			. SCREW, MACHINE	F1125	2	
12			. NUT, AEROTIGHT	F1014	2	
13			. WASHER, PLAIN	F1016	2	
14		5340-99-549-8089	. BUMPER, RUBBER	KP-D-50-88- M10X28-57	2	(K8232)
15	7TR	5310-99-462-9732	. WASHER, SPACER	AA-2323-305	2	(K8232)
16	7TR	5310-99-131-8516	. NUT, AEROTIGHT	F1024	2	(K8232)
17	G1	5310-99-867-8397	. WASHER, PLAIN	F1026	2	
18	7TR	2510-99-292-4698	. FENDER, VEHICLE	AA-2323-233	2	(K8232)
19	7TR	5340-99-887-8315	. BRACKET, MOUNTING FENDER	AA-2323-207	2	(K8232)
20	G1	5305-99-837-9041	. SCREW, MACHINE	F1105	8	
21	G1	5310-99-212-6344	. NUT, SELF-LOCKING, HEXAGON	F1057	8	
22	G1	5310-99-231-7188	. WASHER, FLAT, M6	F1059	8	
23	G1	5310-99-811-0479	. WASHER, FLAT, M6, S/STEEL	F1056	8	
24	7TR	2560-99-549-5998	. FRAME SECTION, STRUCTURAL	AA-2323-306	1	Module rear mount (K8232)
25			. SCREW, MACHINE	F1155	2	
26	7TR	5310-99-131-8516	. NUT, AEROTIGHT	F1024	2	(K8232)
27	G1	5310-99-867-8397	. WASHER, PLAIN	F1026	2	
28	G1	5306-99-461-1711	. BOLT, MACHINE	F1218	4	
29	7TR	5310-99-491-1336	. NUT, AEROTIGHT	F1041	4	(K8232)
30	G1	5310-99-735-6933	. WASHER, PLAIN	F1042	4	
31			. RH CES BOX ASSEMBLY	MS-2323-277	1	See Chap 2-2-6
32			. LH CES BOX ASSEMBLY	MS-2323-265	1	See Chap 2-2-7
33	7TR	2540-99-750-5070	. PROTECTOR, CHASSIS	11647M	1	Handbrake rod wear pad (U4F05)
34			. BALATA BELTING	AA-2323-365	A/R	
35			. DOUBLE SIDED TAPE	19180	A/R	For item 34
36	7TR	2590-99-338-4851	. BRACKET, MOUNTING, NUMBER PLATE	AA-2323-210	1	(K8232)
37			. CONVOY LIGHT ASSEMBLY	MS-2323-236	1	See Fig 2
38	G1	5305-99-837-9041	. SCREW, MACHINE	F1105	3	
39	G1	5310-99-212-6344	. NUT, SELF-LOCKING, HEXAGON	F1057	3	
40	G1	5310-99-811-0479	. WASHER, FLAT, M6, S/STEEL	F1056	3	
41	7TR	5340-99-282-7221	. CLIP	298-9047	3	(K2504)
42	G1	5305-99-496-0455	. SCREW, CAP, HEXAGON HEAD	F012	3	Handbrake
43	G1	5310-99-827-5524	. NUT, SELF-LOCKING, HEXAGON	F345	3	cables
44			. WASHER, PLAIN	F378	6)



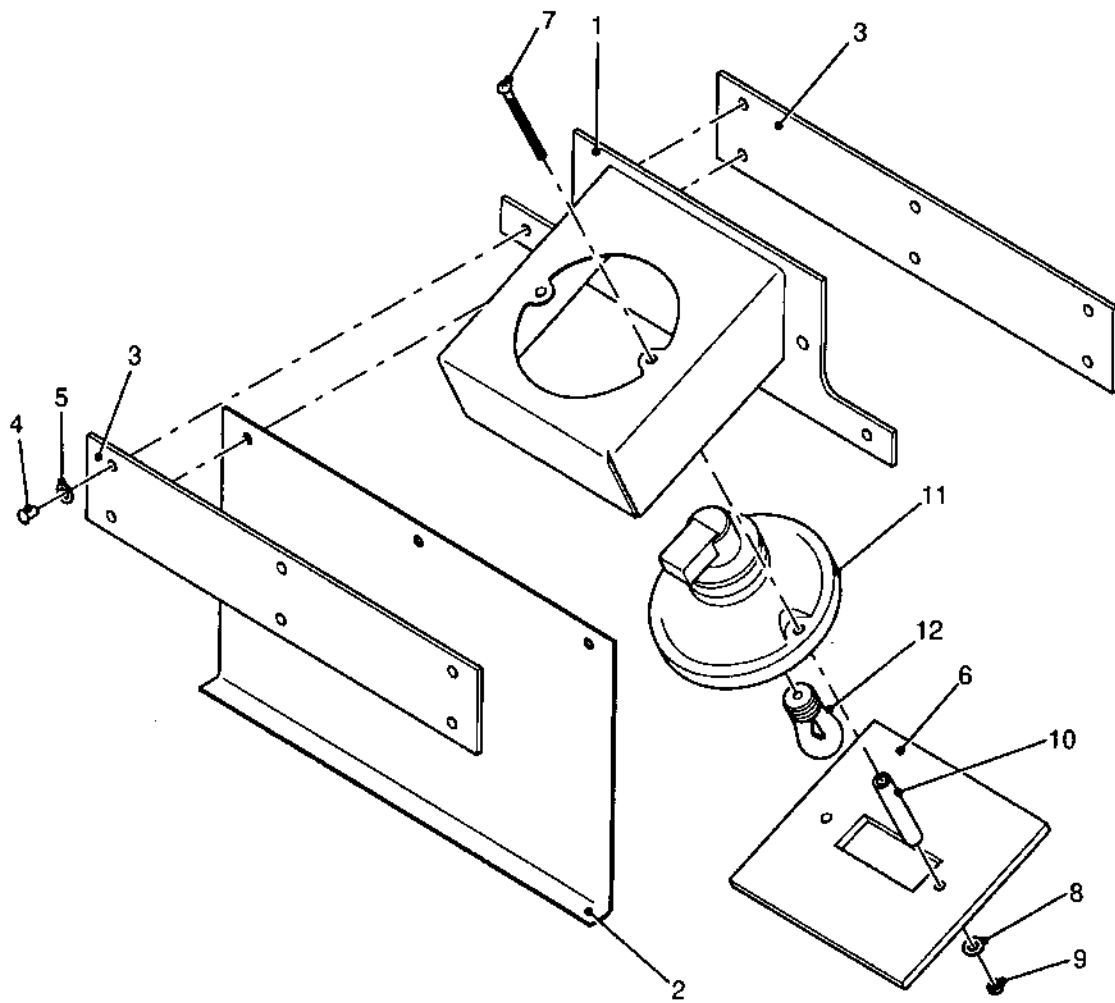
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Fig 1 Chassis assembly

PARTS LIST

Fig 1 Item	DMC Army	NATO stock number	Item name	Part No./ Dwg No.	No. of	Annotation (NSCM)
			CHASSIS ASSEMBLY - contd			
NI 45	7TR	5325-99-608-9236	. GROMMET, NON METALLIC	PV956	1	) (K7348)
NI 46	7TR	5340-99-499-8554	. CLAMP, PIPE	723-5045	4	) (K7437)
NI 47	G1	5305-99-496-0455	. SCREW, MACHINE	F012	4	) Longitudinal
NI 48	G1	5310-99-827-5524	. NUT, NYLOC	F345	4	) member
NI 49			. WASHER, PLAIN	F378	8)
50	7TR	5340-99-499-8554	. CLAMP, PIPE	723-5045	2	) (K7437)
51	G1	5305-99-4 96-0455	. SCREW, MACHINE	F012	2	) RH cross-
52	G1	5310-99-827-5524	. NUT, NYLOC	F345	2	) member
53			. WASHER, PLAIN	F378	4)
54			. AXLE ASSEMBLY C/W BRAKES	12041	REF	See Chap 2-2-1 (U1030)
55	7XD	2530-99-244-7869	. WHEEL, PNEUMATIC, TIRE	ANR4583PM	2	
56	6MT14	2610-99-405-6007	. TIRE, PNEUMATIC		2	
NI 57	7TR	2430-99-258-0413	. RETAINER, NUT AND BOLT	AA-2323-337	6	(K8232)
58	7TR	2510-99-858-1482	. ASSEMBLY, LEAF SPRING	AA-2323-103	REF	See Chap 2-2-2 (U5984)
59	7TR	2510-99-362-7337	. SHOCK ABSORBER, DIRECT ACTION	01.3U.00.26	REF	See Chap 2-2-2 (K6187)
60	7TR	2330-99-190-7113	. SPRING, AEON	6853011	REF	See Chap 2-2-2 (U4331)
61			. ANTI ROLL BAR ASSEMBLY	MS-2323-139	REF	See Chap 2-2-2
62			. RUNNING GEAR AND BRAKING SYSTEM	MS-2323-161	REF	See Chap 2-2-3
63			. HANDBRAKE ROD AND BALANCE BAR ASSEMBLY	12340	REF	See Chap 2-2-3
NI 64	7TR	2510-99-617-7645	. PLATE, METAL, BLANKING	AA-2323-298	1	(K8232)
65			. SCREW, MACHINE	F1125	4	
66			. NUT, AEROTIGHT	F1014	4	
67			. WASHER, PLAIN	F1016	8	
69			. NYLON NUT CAP, M12	12529	4	
70			. BRACKET	AA-2323-324	1	
71			. BRACKET	AA-2323-325	1	
72			. SCREW, MACHINE	F1125	4	
73			. NUT, AEROTIGHT	F1016	8	
74			. WASHER, PLAIN	F1014	4	

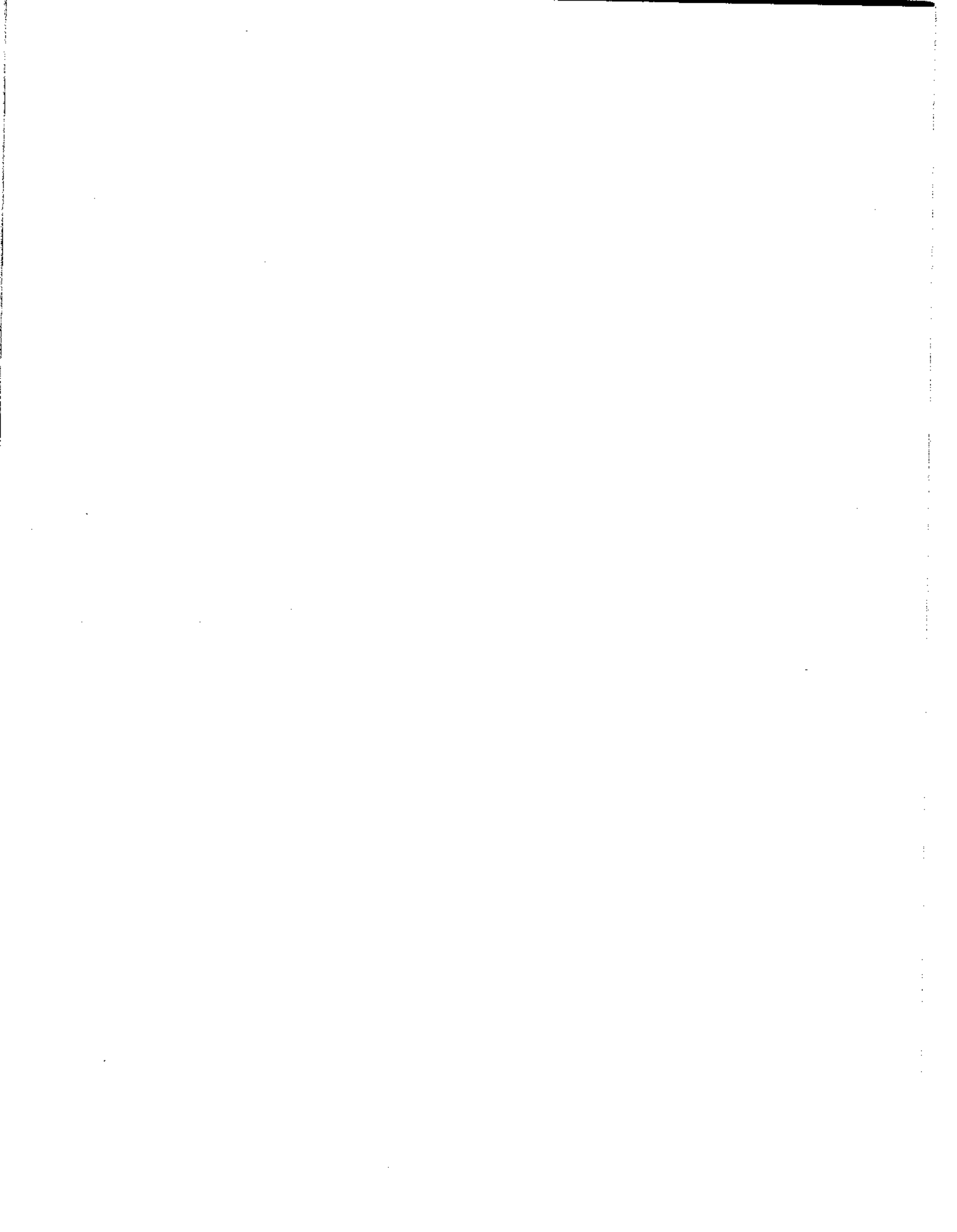


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Fig 2 Convoy light assembly

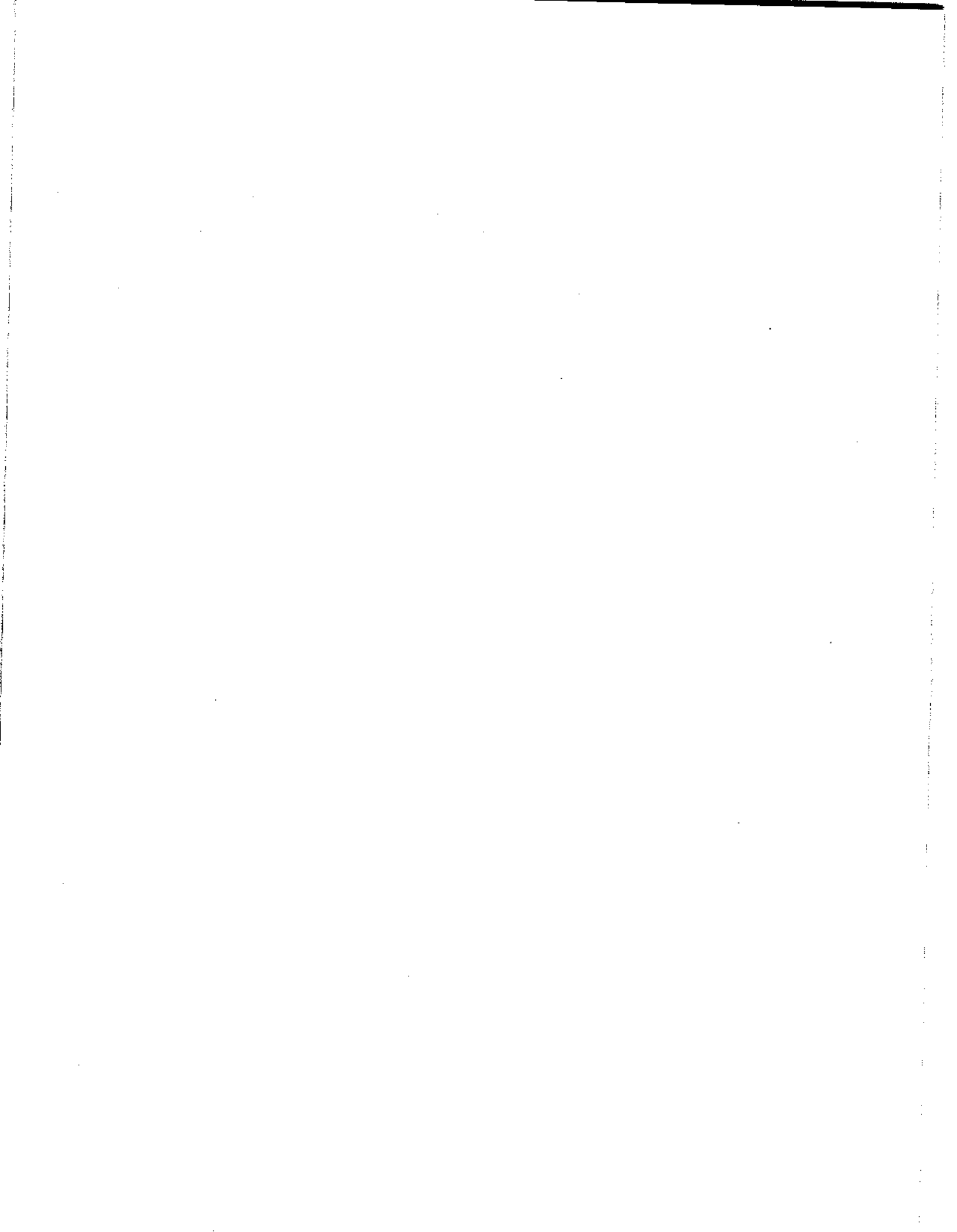
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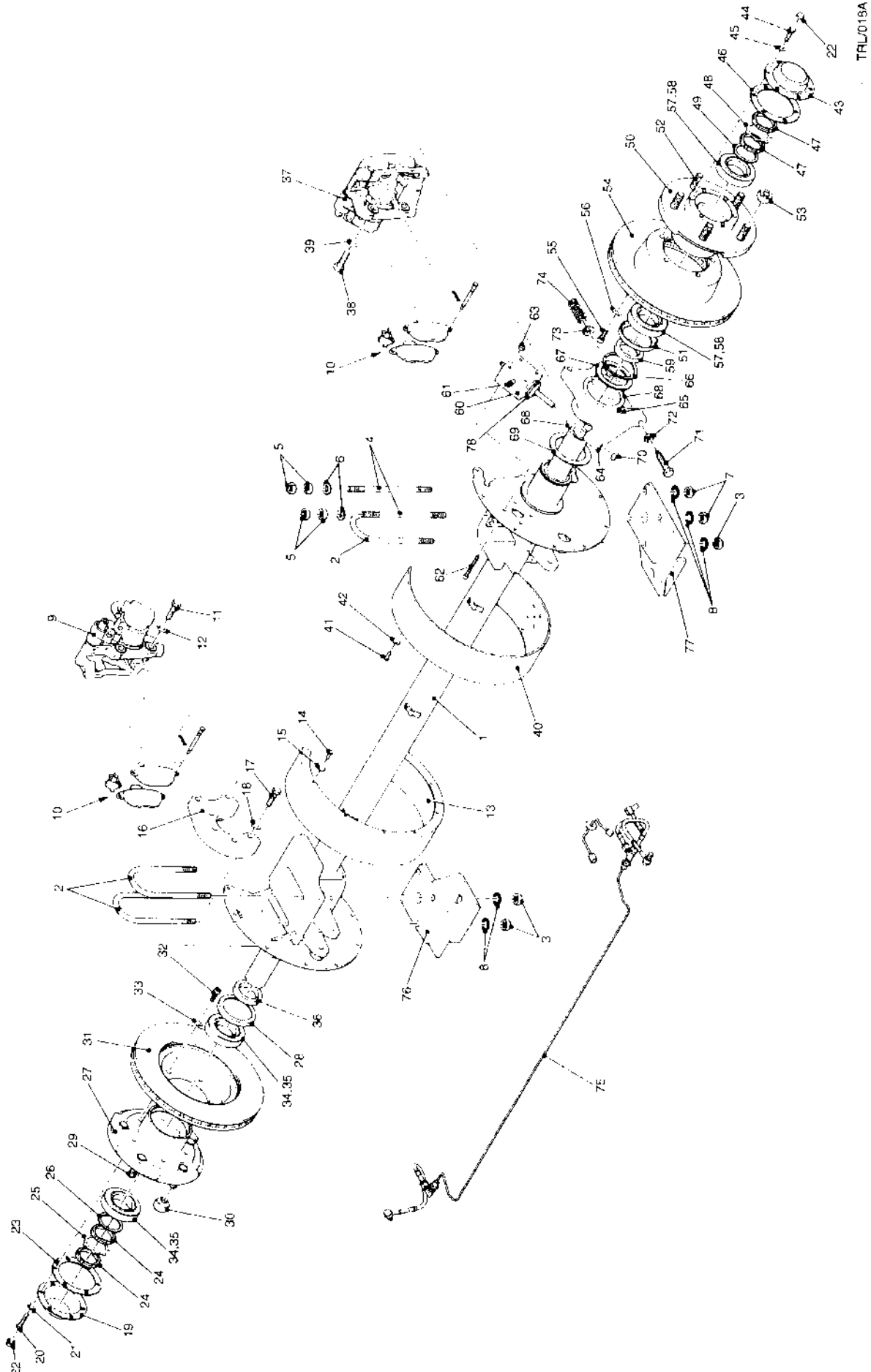
Fig 2 Item	DMC Army	NATO stock number	Item name	Part No./ Dwg No.	No. off	Annotation (NSCM)
			CHASSIS ASSEMBLY - contd			
			. CONVOY LIGHT ASSEMBLY	MS-2323-236	REF	
1	7TR	2590-99-131-6783	.. BRACKET, MOUNTING	MS-2323-238	1	(K8232)
2	7TR	2540-99-687-2052	.. PLATE, ILLUMINATED	AA-2323-240	1	(K8232)
3	7TR	5330-99-884-7659	.. RUBBER STRIP	AA-2323-241	2	(K8232)
4			.. RIVET	TD612GT	6	
5			.. WASHER, PLAIN	F1068	12	
6	7TR	2590-99-562-5747	.. PLATE, LENS COVER	AA-2323-312	1	(K8232)
7	G1	5305-99-777-5358	.. SCREW, MACHINE	F149	2	
8	G1	5310-99-122-3031	.. WASHER, FLAT	F374	4	
9	G1	5310-99-122-5643	.. NUT, SELF-LOCKING, HEXAGON	F341	2	
10	7TR	5365-99-359-6028	.. SPACER, SLEEVE	311-4320-400-50	2	(U5F79)
11	7TR	6220-99-131-6784	.. LIGHT, UTILITY, VEHICULAR	RL800 R/A 24V	1	(K7332)
12			.. LAMP, INCANDESCENT, 24V 5W	R5W BA 15S	1	
12 (1)			.. LAMP, INCANDESCENT, 12V 5W	LLB207	1	



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AXLE ASSEMBLY
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Fig. 1 Axle assembly complete with brakes

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Fig 1 Item	DMC Army	NATO stock number	Item name	Part No./ Dwg No.	No. off	Annotation (NSCM)
			AXLE ASSEMBLY CWV BRAKES	12041	REF	
1	7TR	2530-99-676-4702	AXLE TUBE, WELDED ASSEMBLY	12051	1	(K6226)
2	7TR	5306-99-170-6264	BOLT U	12074	3	(K6226)
3	G1	5310-99-752-5099	NUT, TITAN	12128	6	(K6226)
4	7TR	5307-99-833-7365	STUD	12336	2	(K6226)
5	G1	5310-99-869-9175	NUT, FULL	12350	4	
6	G1	5310-99-212-6477	WASHER, PLAIN	12126	2	
7	G1	5310-99-752-5091	NUT, TITAN	12128	2	(K6226)
8	G1	5310-99-131-8254	WASHER, LOCK, M12 CALIPER ASSEMBLY, DISC	F520	6	(K6226)
9			BRAKE	KIT B112	1	See Kit B113
10	7TR	2530-99-158-6989	DISC BRAKE SHOE SET comprising		1	(K6226)
			ANTI-SQUEAL SHIMS		2	
			PADS		4	
			SPRING CLIPS		2	
			R CLIPS		2	
			PINS		2	
11	G1	5306-99-212-6478	BOLT, MACHINE	12129	2	
12			WASHER, SPRING	12173	2	
13	7TR	2530-99-264-0392	SHIELD, BRAKE DISC	10969-1	1	(K6226)
14			SCREW, MACHINE	10967	8	
15			WASHER, SHAKEPROOF	M32006000042	5	
16			BRACKET, MOUNTING		1	See Kit B118
17			BOLT, MACHINE	12171	4	
18			WASHER, SPRING	12172	4	
19	7TR	2530-99-258-8997	CAP, GREASE	12176	6	(K6226)
20	G1	5305-99-666-0956	SCREW, MACHINE	12162	6	
21	G1	5310-99-316-6090	WASHER, SPRING	12161	6	
22			NYLON BOLT CAP	12530	12	
23	7TR	5330-99-354-0431	GASKET	11865	1	(K6226)
24	7TR	5310-99-248-4332	NUT, PLAIN, ROUND	11884	2	(K6226)
25	7TR	5307-99-502-2592	WASHER, KEY	11883	1	(K6226)
26	7TR	3120-99-433-1322	BEARING, WASHER, THRU-SH	11882	1	(K6226)
27	7TR	2530-99-743-0406	HUB, WHEEL, VEHICULAR CWV STUDS	12721	1	(K6226)
28	BM1	5330-99-109-8998	SEAL, PLAIN	DPSM639010	1	(K6226)
29	7TR	5307-99-912-0252	STUD, WHEEL	12159	5	(K6226)
30	7TR	5310-99-400-8025	NUT, PLAIN, CONE SEAT, HEXAGON	12158	5	(K6226)
31			BRAKE, DISC	12696	1	See Kit B110
32			SCREW, MACHINE	12936	5	
33			WASHER, PLAIN	12883	5	
34	G1		BEARING, CUP (INNER)		2	J See Kit
35			BEARING, CONE (OUTER)		2	J B106
36			RING, MACHINED, OIL SEAL		1	
37			CALIPER ASSEMBLY, DISC BRAKE	11860	1	
38	G1	5306-99-212-6478	BOLT, MACHINE	12129	2	See Kit B114
39			WASHER, SPRING	12173	2	(K6226)
40	7TR	2530-99-186-9143	SHIELD, BRAKE DISC	10969	1	(K6226)
41			SCREW, MACHINE	10967	8	
42			WASHER, SHAKEPROOF	M32006000042	5	
43	7TR	2530-99-258-8997	CAP, GREASE	12176	1	(K6226)
44	G1	5305-99-666-0956	SCREW, MACHINE	12162	6	

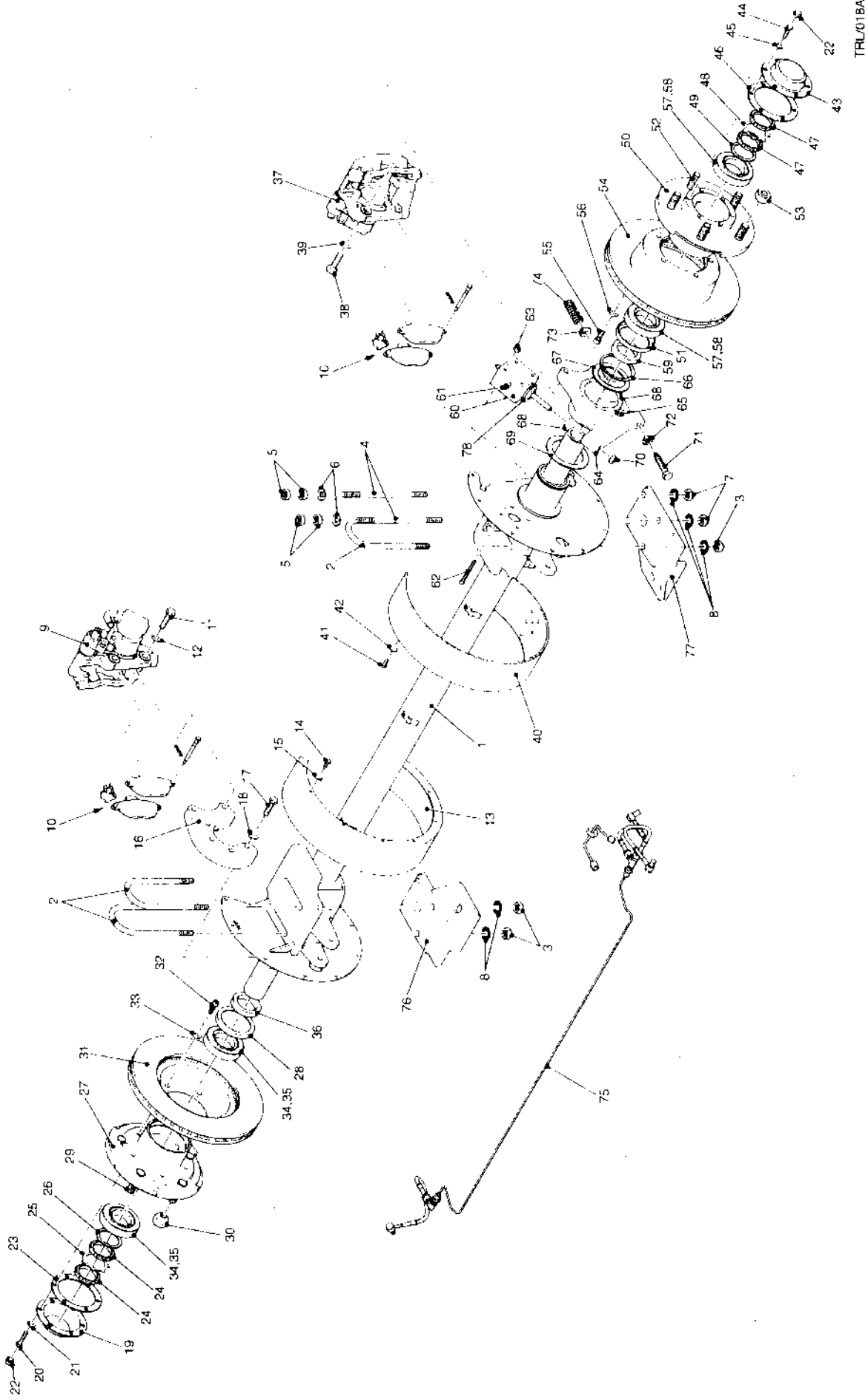


Fig 1 Axle assembly complete with brakes

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PARTS LIST

Fig 1 Item	DMC Army	NATO stock number	Item name	Part No./ Desig No.	No. off	Annotation (NSCM)
			AXLE ASSEMBLY C/W BRAKES - cont'd			
45	G1	5310-99-316-8160	WASHER, SPRING	12161	6	(K6226)
46	7TR	5330-99-354-0431	GASKET	11885	1	(K6226)
47	7TR	5310-99-248-4332	NUT, PLAIN, ROUND	11884	2	(K6226)
48	7TR	5310-99-502-2532	WASHER, KEY	11883	1	(K6226)
49	7TR	3120-99-423-1322	BEARING, WASHER, THRUST	11882	1	(K6226)
50	7TR	2530-99-743-0406	HUB, WHEEL, VEHICULAR C/W STUDS	12721	1	(K6226)
51	6MT1	5300-99-109-9996	SEAL, PLAIN	DPSM635010	1	(K6640)
52	7TR	5307-99-912-0252	STUD, WHEEL	12159	5	(K6226)
53	7TR	5310-99-400-9025	NUT, PLAIN, CONE, SEAT, HEXAGON	12158	5	(K6226)
54			BRAKE DISC	12896	1	See Kit 8110
55	55		SCREW, MACHINE	12306	5	
56	56		WASHER, PLAIN	12883	5	
57	58		BEARING, CUP (INNER)		1	See Kit 8108
59	59		BEARING, CONE (OUTER)		1	
60			RING, MACHINED, OIL SEAL, VALVE BLOCK	11880	1	
61			NIPPLE, BLEED, HYDRAULIC		1	See Kit 8119
62	G1	5305-99-588-6020	SCREW, SOCKET HEAD	10877	1	See Kit 8120
63	G1	5310-99-131-8515	NUT, NYLOC	12167	4	
64			HUB, PIVOT		4	See Kit 8111
65			NIPPLE, GREASE		1	
66	7TR	5305-99-748-4316	RING RETAINING	H00230100400	1	(K6226)
67			WASHER, SEAL	12317	1	See Kit 8137
68			O-RING		2	
69			WASHER, SEAL		1	
70	G1	5310-99-291-1319	NUT	12143	1	(K6226)
71	7TR	5306-99-666-1067	BOLT, OPERATING SPRING	10805	1	(K6226)
72	G1	5310-99-679-8242	NUT, LOCK	12164	1	(K6226)
73	7TR	5310-99-724-2375	WASHER, SPRING TENSION	10906	1	(K6226)
74	7TR	5300-99-131-8918	SPRING, HELICAL COMPRESSION	10716	1	(K6226)
75			KIT, BRAKE PIPE, AXLE		1	See Fig 2
76	7TR	5340-99-287-2134	BRACKET, MOUNTING	20095-1	REF	
77	7TR	5340-99-280-2402	BRACKET, MOUNTING	12095-2	1	(K6226)
78	7LWT	2590-99-250-1673	BELLOWS, VALVE BLOCK	KIT 8203	1	(K6226)
79	7TR	3120-99-744-3381	PARTS KIT, BEARING REPLACEMENT, MECH EQPT comprising: RING, MACHINED, OIL SEAL BEARING, CUP (INNER) BEARING, CONE (OUTER), GASKET WASHER, KEY NUT, PLAIN, ROUND SEAL, PLAIN BEARING, WASHER, THRUST WASHER, SPRING	KIT 8108	1	(K6226)

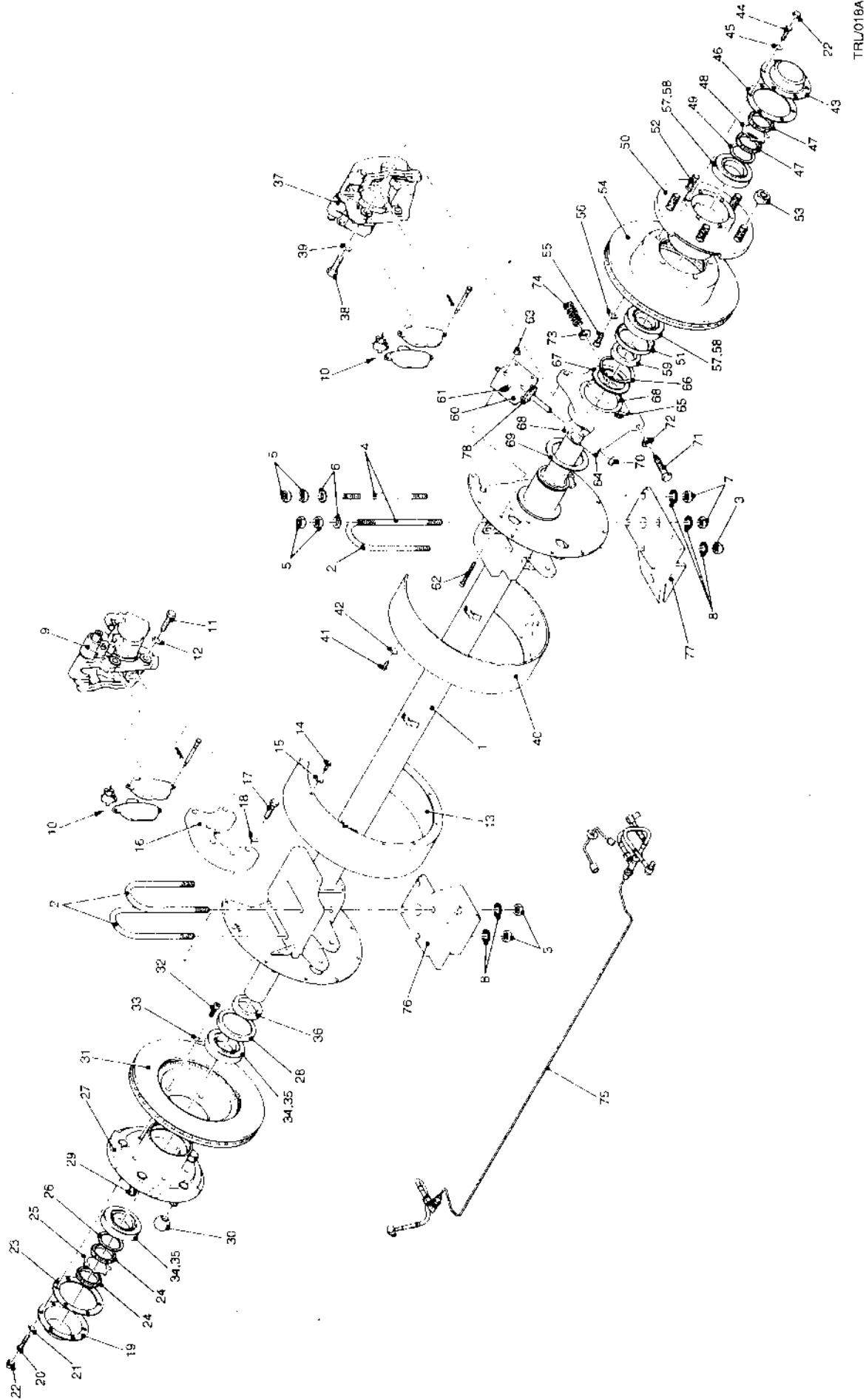


Fig 1 Axle assembly complete with brakes

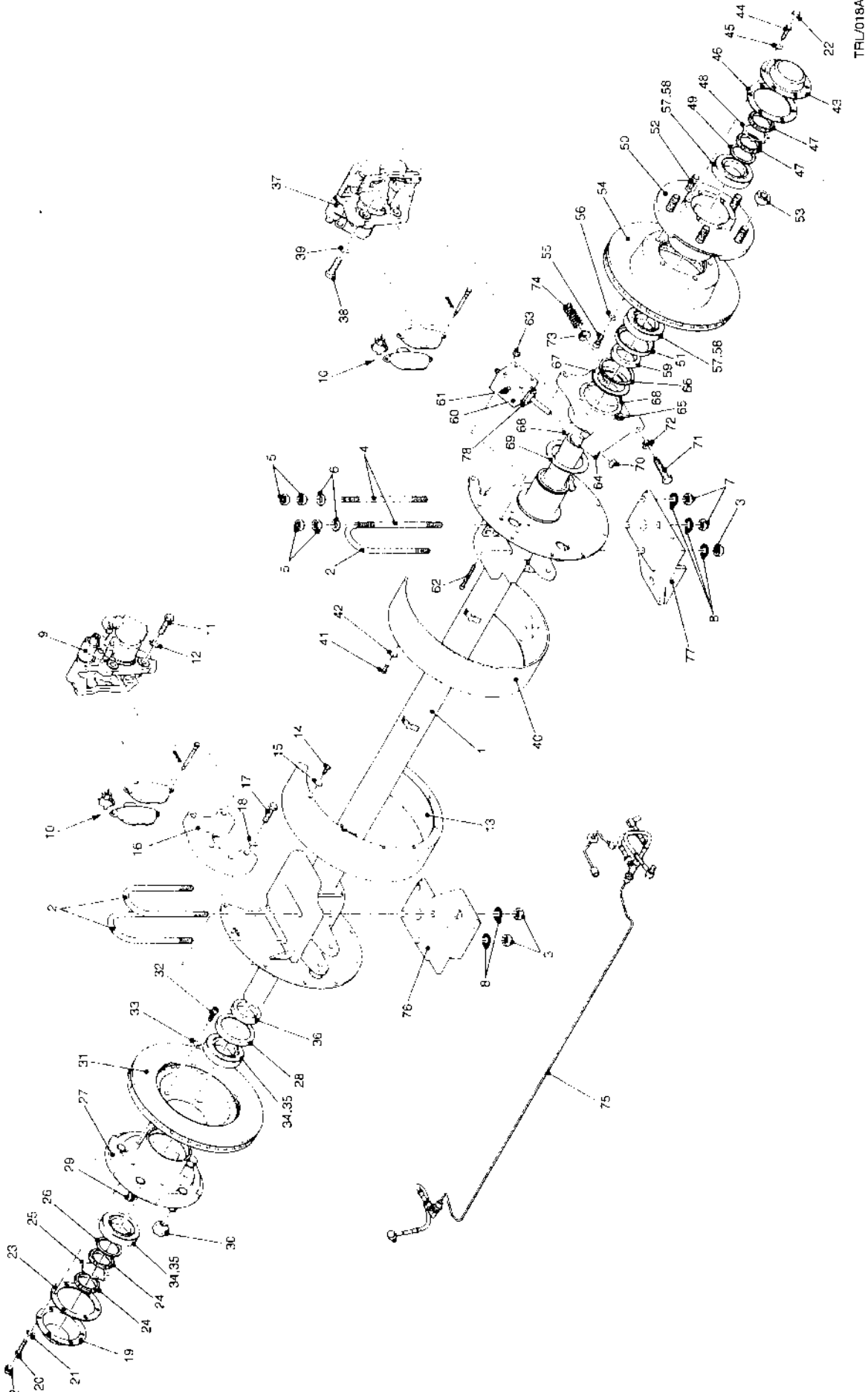
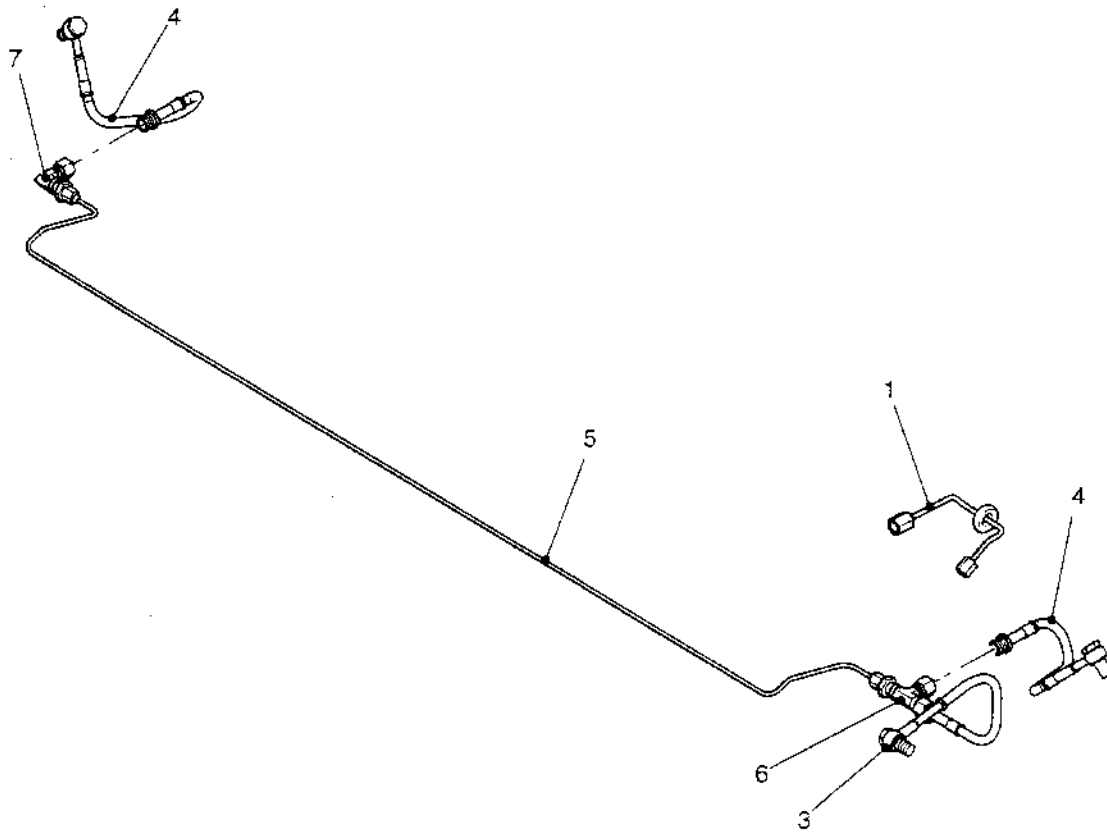


Fig 1 Axle assembly complete with brakes

PARTS LIST

Fig 1 Item	DMC Army	NATO stock number	Item name	Part No./ Dwg No.	No. off	Annotation (NSCM)
			AXLE ASSEMBLY C/W BRAKES - contd			
NI 87	7TR	5330-99-818-6130	GASKET AND SEAL SET comprising: WASHER, SEAL WASHER, SEAL O-RING RING RETAINING GASKET WASHER, KEY WASHER, SPRING	KIT 8137	1 1 1 2 1 2 2	(K6226) Fig 1-67 Fig 1-69 Fig 1-68 Fig 1-66 Fig 1-46 Fig 1-48 Fig 1-39
NI 88	7TR	4820-99-212-6486	KIT, CALIPER BLEED NIPPLE comprising: NIPPLE BLEED CALIPER BLEED NIPPLE CAP	KIT 8154	1 1 1	(K6226)

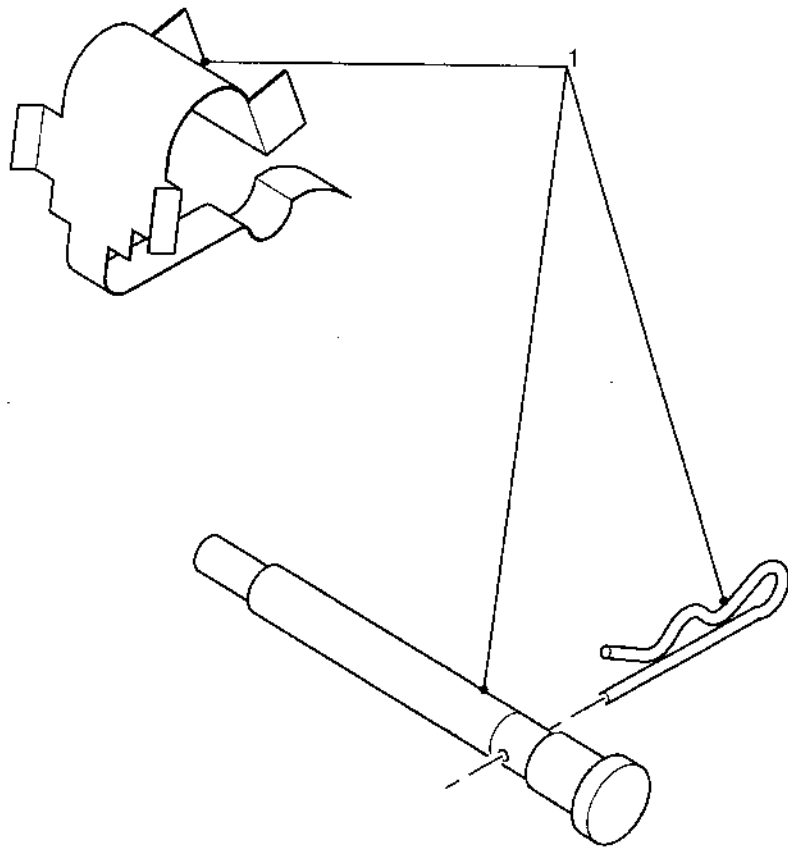


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Fig 2 Brake piping - axle

PARTS LIST

Fig 2 Item	DMC Army	NATO stock number	Item name	Part No./ Dwg No.	No. off	Annotation (NSCM)
			AXLE ASSEMBLY C/W BRAKES - contd			
1	7TR	4710-99-154-6542	. PIPE, BENT, METALLIC comprising: REAR SHORT HARD PIPE COMPLETE WITH UNION(S) GROMMET	KIT 8144	1	(K6226)
Ni	2		. KIT VALVE ADAPTOR, MALE TO MALE comprising: ADAPTOR MALE TO MALE WASHER, COPPER, M10	KIT 8166	1	
3	7TR	4720-99-884-6586	. HOSE, NONMETALLIC comprising: REAR VALVE FLEXIBLE PIPE COMPLETE WITH UNION(S) BANJO BOLT M10 WASHER M10	KIT 8145	1	(K6226)
4	7TR	4720-99-874-2584	. HOSE, NONMETALLIC comprising: REAR CALIPER FLEXIBLE PIPE COMPLETE WITH UNION(S) BANJO BOLT SHORT WASHER M10	KIT 8146	2	(K6226)
5	7TR	4710-99-934-0978	. PIPE, BENT, METALLIC comprising: REAR LONG HARD PIPE COMPLETE WITH UNION(S)	KIT 8143	1	(K6226)
6			. KIT, BULKHEAD ADAPTOR comprising: BULKHEAD ADAPTOR TEE LOCKNUT 3/8 in.	KIT 8167	1	
7			. KIT, BULKHEAD ADAPTOR comprising: BULKHEAD ADAPTOR 90 DEG LOCKNUT 3/8 in.	KIT 8168	1	

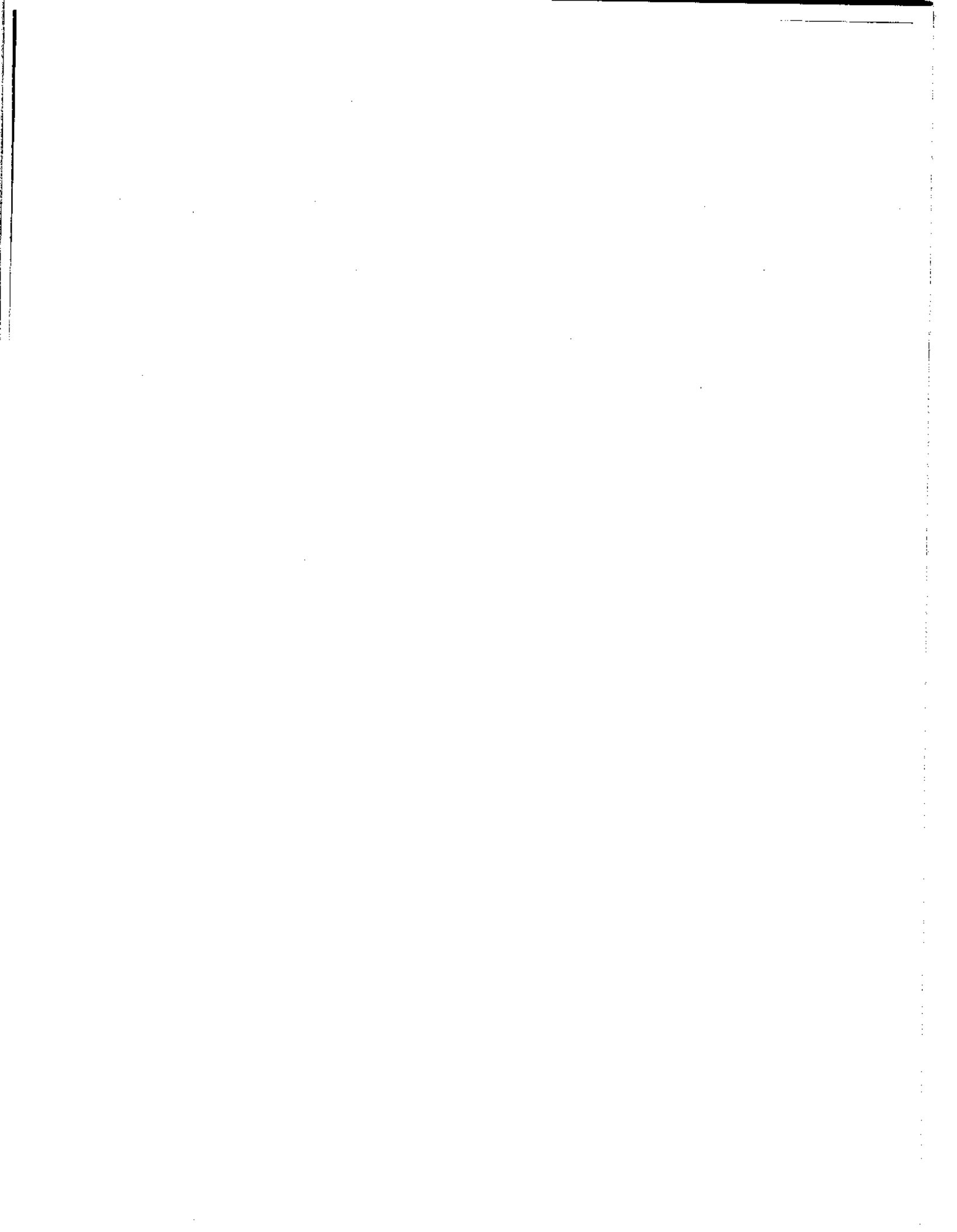


TRL/067

Fig 3 Brake pad clip set

PARTS LIST

Fig 3 Item	DMC Army	NATO stock number	Item name	Part No/ Dwg No.	No. off	Annotation (NSCM)
1	7TR	2530-99-391-1758	AXLE ASSEMBLY C/W BRAKES - contd .KIT, CLIP SET comprising: PIN R CLIP SPRING CLIP	KIT 8164	1 2 2 2	(K6226)



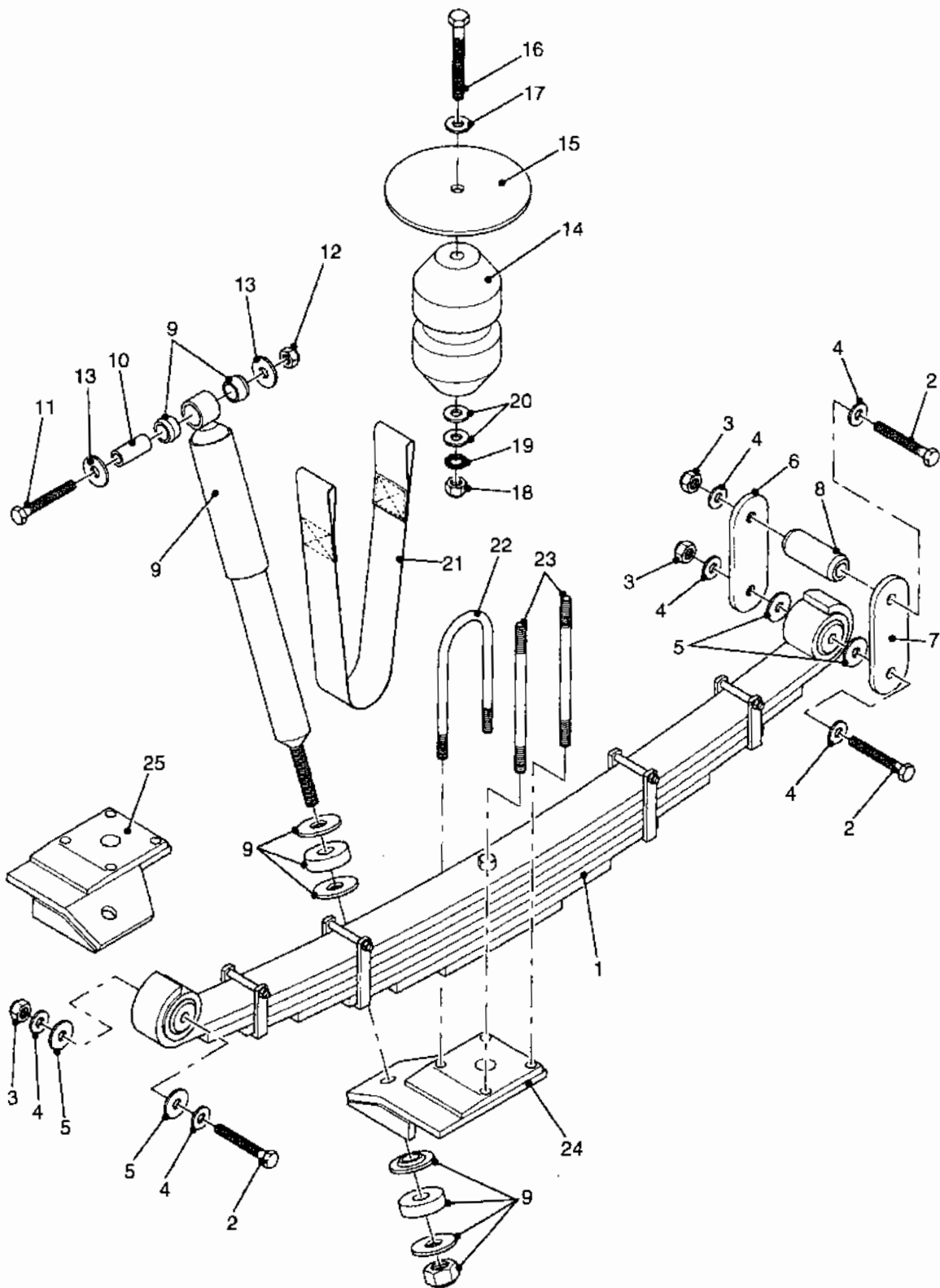
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SUSPENSION

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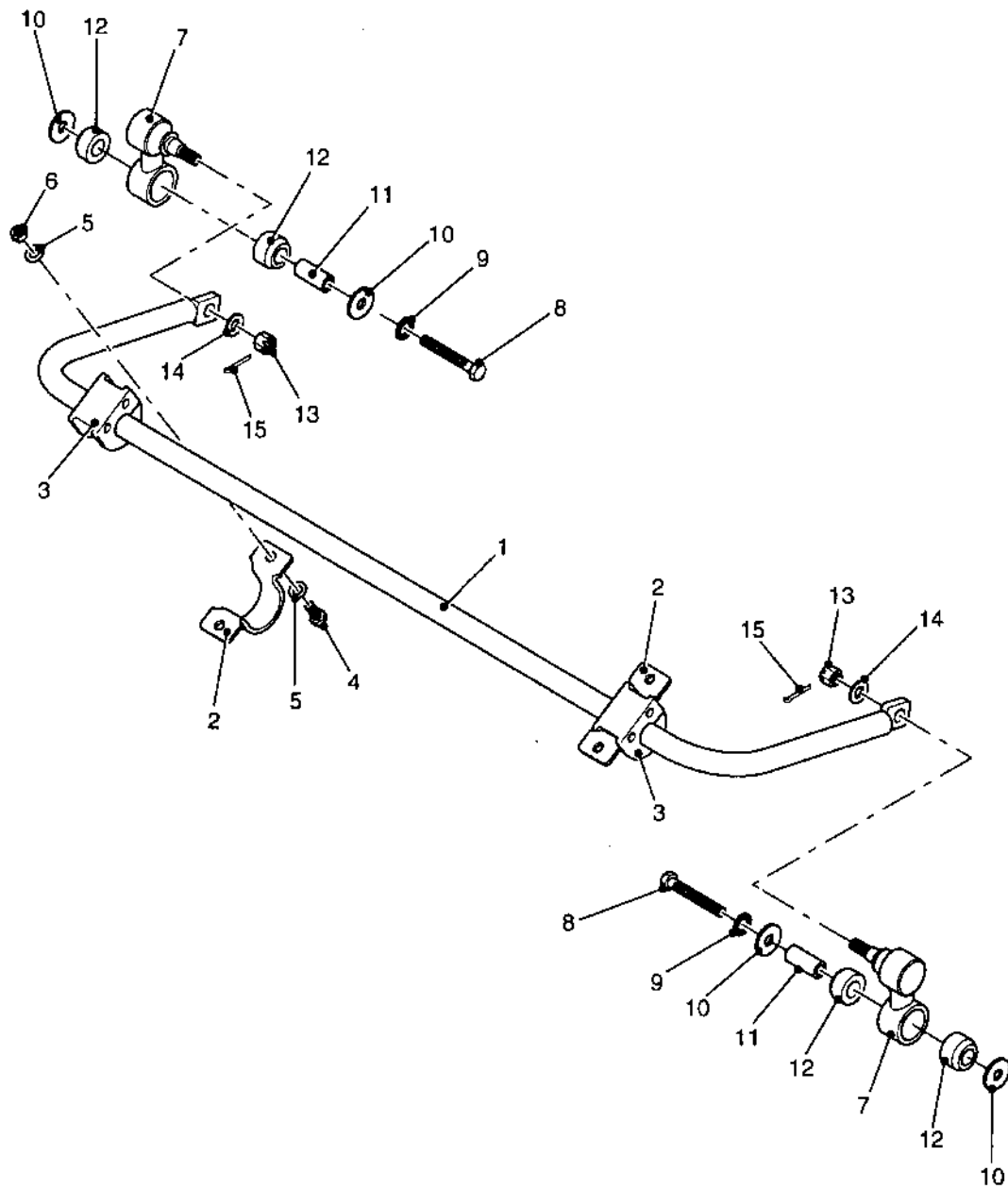


TRL/014

Fig 1 Suspension

PARTS LIST

Fig 1 Item	DMC Army	NATO stock number	Item name	Part No./ Dwg No.	No. off	Annotation (NSCM)
			SUSPENSION			
1	7TR	2510-99-858-1482	. ASSEMBLY, LEAF SPRING	AA-2323-103	2	(U5984)
2			. BOLT, MACHINE	F1256	6	
3			. NUT, AEROTIGHT	F1003	6	
4			. WASHER, PLAIN	F1006	12	
5			. THRUST WASHER	GTM-2442-015	8	
6	7TR	2510-99-707-2540	. HANGER, SPRING, VEHICLE, TAPPED	AA-2323-184	2	(K8232)
7	7TR	2510-99-957-9423	. HANGER SPRING, VEHICLE	AA-2323-183	2	(K8232)
8	7TR	5340-99-170-5262	. MOUNT, RESILIENT	BU311/S	2	(U5984)
9	7TR	2510-99-362-7337	. SHOCK ABSORBER, DIRECT ACTION	01.3U.00.26	2	(K6187)
10	7TR	5365-99-134-7782	. SPACER, SLEEVE	AA-2323-211	2	(K8232)
11	G1	5306-99-451-1711	. BOLT, MACHINE	F1218	2	
12	7TR	5310-99-491-1336	. NUT, AEROTIGHT	F1041	2	(K8232)
13	G1	5310-99-147-7220	. WASHER, FLAT, M12	F1043	4	
14	7TR	2330-99-190-7113	. SPRING, AEON	6853011	2	(U4331)
15			. SPACER, AEON SPRING	AA-2323-322	2	
16			. BOLT, MACHINE	F1214	2	
17	G1	5310-99-735-6933	. WASHER, PLAIN	F1042	2	
18	7TR	5310-99-491-1336	. NUT, AEROTIGHT	F1041	2	(K8232)
19	G1	5310-99-131-8254	. WASHER, LOCK, M12	F520	2	(K8232)
20	7TR	5310-99-248-4291	. WASHER, MOUNTING	AA-2323-194	4	(K8232)
21	7TR	5340-99-324-0080	. STRAP, CHECK	AA-2323-138	2	(K8232)
22			. BOLT U	12074	REF	) See
23			. STUD	12336	REF	) Chap 2-2-1
24	7TR	5340-99-280-2402	. BRACKET, MOUNTING	12095-2	REF)
25	7TR	5340-99-287-2134	. BRACKET, MOUNTING	12095-1	REF)



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Fig 2 Suspension - anti roll bar

PARTS LIST

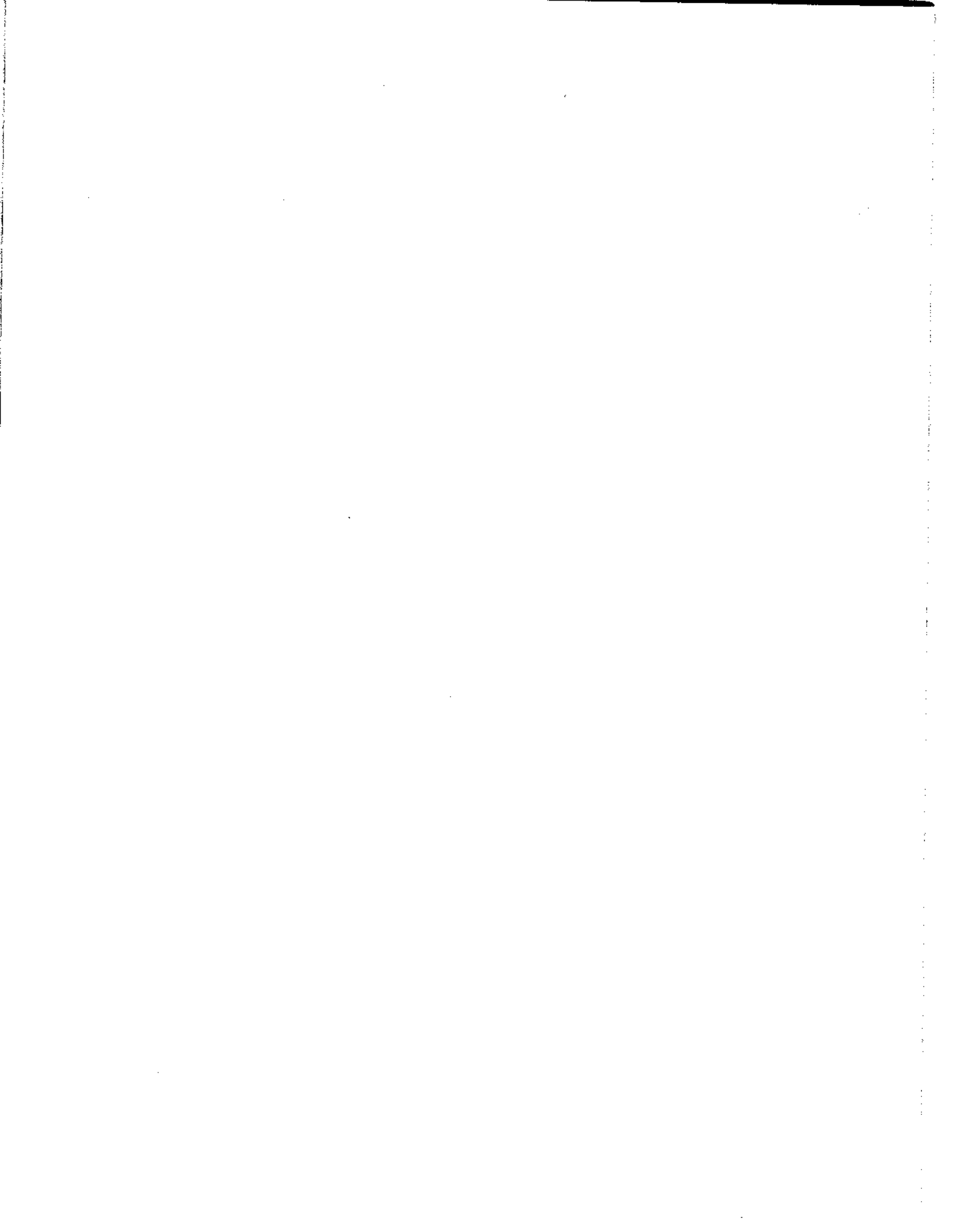
Fig 2 Item	DMC Army	NATO stock number	Item name	Part No/ Dwg No.	No. off	Annotation (NSCM)
			SUSPENSION - contd			
			. ANTI ROLL BAR ASSEMBLY	MS-2323-139	REF	
1	7TR	2510-99-238-1620	.. BAR, STABILIZER	AA-2323-157	1	(U5984)
2	7XD	5340-99-885-1189	.. STRAP, RETAINING	NTC6776	2	
3	7XD	5365-99-152-5237	.. BUSHING, NONMETALLIC	NTC6828	2	
4	G1	5305-99-875-3045	.. SCREW, MACHINE	F1154	4	
5	G1	5310-99-867-8397	.. WASHER, PLAIN	F1026	8	
6	7TR	5310-99-131-8516	.. NUT, AEROTIGHT	F1024	4	(K8232)
7	7RU	2530-99-563-4954	.. BALL JOINT LINK ASSEMBLY	NTC1888	2	(U1030)
8			.. BOLT, MACHINE	F1217	2	
9	G1	5310-99-131-8254	.. WASHER, LOCK, M12	F520	2	
10	G1	5310-99-147-7220	.. WASHER, FLAT, M12	F1043	4	
11	7TR	5365-99-134-7782	.. SPACER, SLEEVE	AA-2323-211	2	(K8232)
12	7RU	5340-99-809-1703	.. BUSHING, RUBBER	552819	4	(U1030)
13			.. NUT, CASTLE	419M12Z	2	
14	G1	5310-99-735-6933	.. WASHER, PLAIN	F1042	2	
15			.. SPLIT PIN	F559	2	



CHAPTER 2-2-3
RUNNING GEAR AND BRAKING SYSTEM

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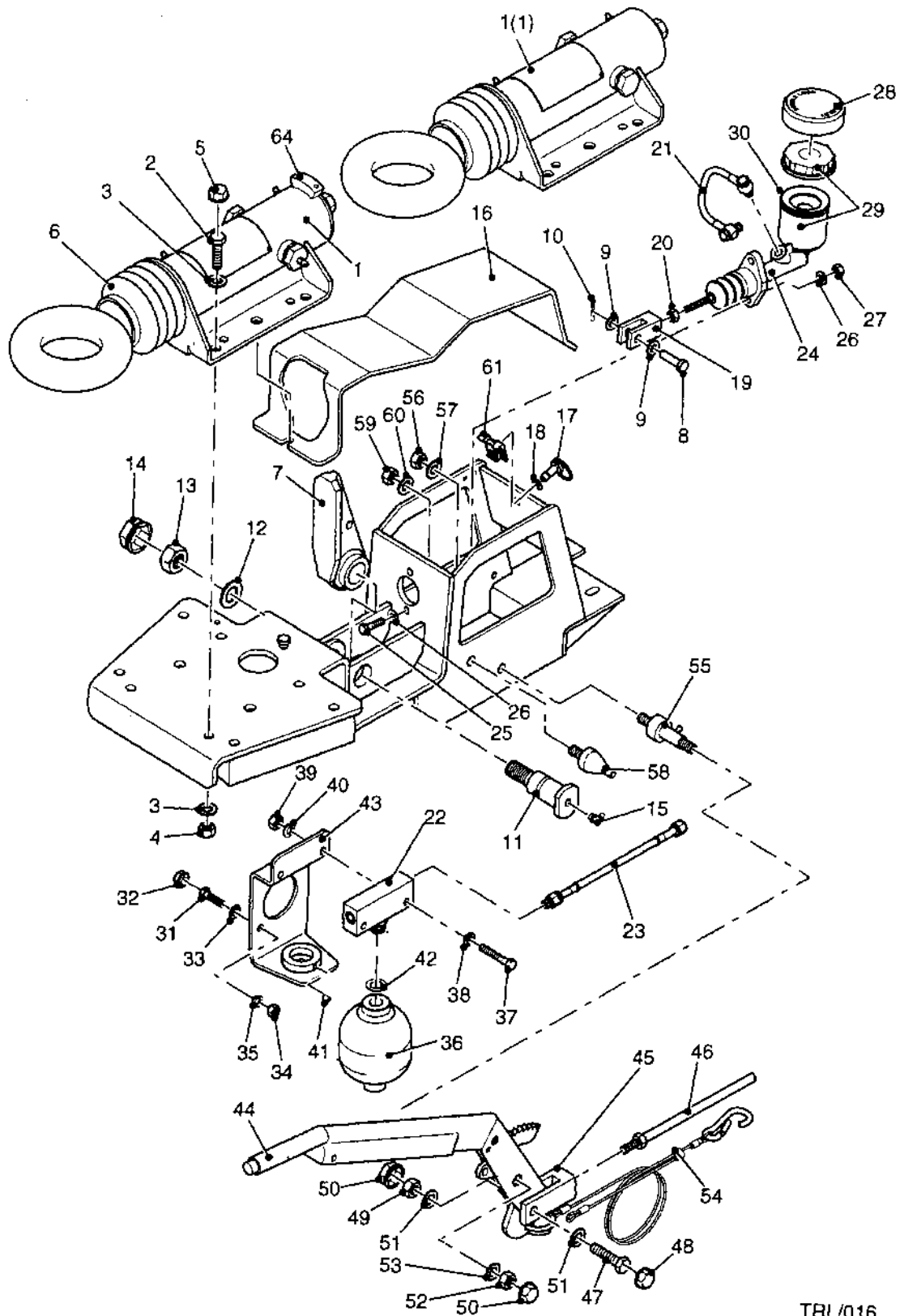
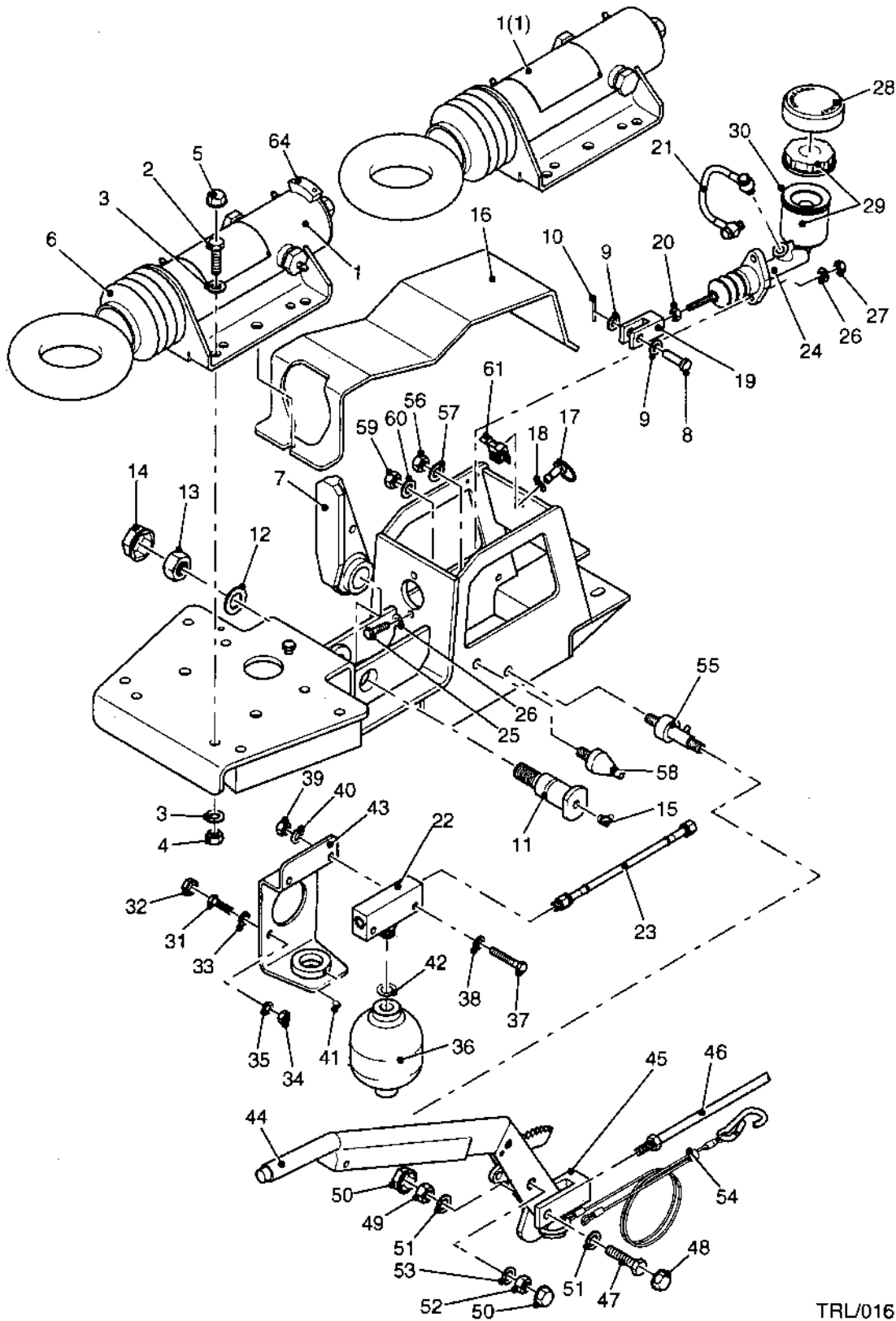


Fig 1 Coupling, brakelink and handbrake

TRL/016

PARTS LIST

Fig 1 Item	DMC Army	NATO stock number	Item name	Part No./ Dwg No.	No. off	Annotation (NSCM)
			RUNNING GEAR AND BRAKING SYSTEM	MS-2323-161	REF	
			.. COUPLING, B/LINK AND HBRAKE	12039	REF	
1			.. DAMPER ASSEMBLY, OVERRUN		1	See Kit 8100
1 (1)			.. DAMPER ASSEMBLY, OVERRUN		1	See Kit 8100
2	G1	5306-99-212-6478	.. BOLT, MACHINE	12129	6	
3	G1	5310-99-212-6477	.. WASHER, PLAIN	12126	12	
4	G1	5310-99-752-5091	.. NUT, TITAN	12128	6	(K6226)
5			.. NYLON BOLT CAP	12527	6	
6	7TR	1650-99-131-8998	.. BELLOWS, PROTECTION comprising: .. BELLOWS, HU9/10, RUBBER MH35	KIT 108M	1	(K6226)
			.. STRAP, PLASTIC, PCT 21, 530 x 8, TRAP		1	
			.. STRAP, PLASTIC, 14 in. x 4.8, TIEWRAPS		1	
7	7TR	2530-99-601-8569	.. LINK, ACTUATING BRAKE, VEHICULAR	11986-1	1	(K6226)
8	7TR	2530-99-570-0416	.. PIN, STRAIGHT, HEADED	10697	1	(K6226)
9		5310-99-782-3469	.. WASHER, FLAT	M30010000002	2	(K6226)
10	W2	5315-99-782-3460	.. PIN, COTTER, SPLIT	E43009010042	1	(K6226)
11	7TR	4010-99-131-6923	.. PIN, SHOULDER, HEADED	11496	1	(K6226)
12			.. WASHER, PLAIN	M30020000002	1	
13			.. NUT	12136	1	
14			.. NYLON BOLT CAP	12528	1	
15	7TR	4730-99-344-9118	.. NIPPLE, GREASE	12049	1	(K6226)
16	7TR	4010-99-290-6147	.. COVER, ACCESS	12101	1	(K6226)
17	G1	5310-99-787-6222	.. WASHER, PANEL FASTENER SCREW	12215	1	
18			.. COVER RING HEAD	12216	1	
19	7TR	5340-99-562-5761	.. CLEVIS, ROD END	12358	1	(K6226)
20			.. NUT, LOCK	E21031200012	1	
21	7TR	4720-99-778-0381	.. HOSE, NON-METALLIC MCYL TO ACCUMULATOR FLEXIBLE PIPE	KIT 8138	1	
22	7TR	4730-99-212-6301	.. MANIFOLD BLOCK C/W SEAL	KIT 8139	1	
23	7TR	4720-99-361-2737	.. FLEXIBLE PIPE, MANIFOLD TO CHASSIS HARD LINE C/W UNIONS	KIT 8140	1	
24	7TR	2530-99-133-4624	.. CYLINDER ASSEMBLY, HYDRAULIC BRAKE	10695	1	(K6226)
25	G1	5306-99-414-1239	.. BOLT	12141	2	(K6226)
26	G1	5310-99-131-8622	.. WASHER, PLAIN	12137	4	(K6226)
27			.. NUT	12138	2	
28			.. COVER, PROTECTIVE, DUST AND MOISTURE SEAL	12170	1	
29	7TR	2530-99-322-9480	.. RESERVOIR, BRAKE FLUID, C/W CAP	12329	1	(K6226)
30			.. MOISTURE BARRIER	11504	1	
31			.. BOLT, M8 x 25	12950	2	(K6226)
32			.. NYLON BOLT CAP	KIT 8163	2	
33	G1	5310-99-131-8622	.. WASHER, PLAIN	12137	2	(K6226)
34			.. NUT	12147	2	

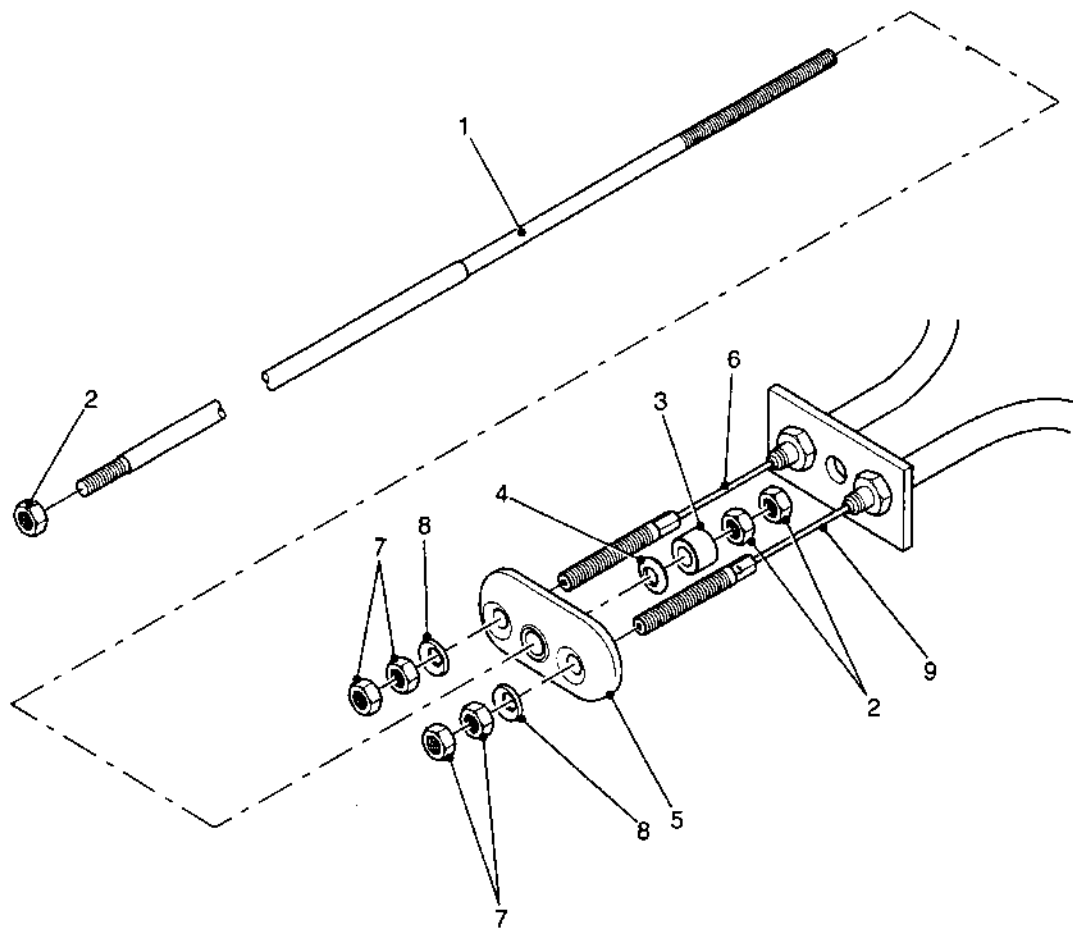


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Fig 1 Coupling, brakelink and handbrake

PARTS LIST

Fig 1 Item	DMC Army	NATO stock number	Item name	Part No./ Dwg No.	No. off	Annotation (NSCM)
			RUNNING GEAR AND BRAKING SYSTEM - contd			
			COUPLING, B/LINK AND HBRAKE - contd			
35	G1	5310-99-316-8060	.. WASHER, SPRING	12161	2	
36			.. ACCUMULATOR, BRAKE	12555	1	
37			.. BOLT, MACHINE	10706	2	
38	G1	5310-99-131-8622	.. WASHER, PLAIN	12137	2	(K6226)
39			.. NUT, FULL	12147	2	
40	G1	5310-99-316-8060	.. WASHER, SPRING	12161	2	
41			.. SCREW, MACHINE	12717	1	
42			.. SEAL	11498	1	
43			.. BRACKET ASSEMBLY, ACCUMULATOR	12000	1	
44	7TR	5340-99-759-7893	.. LEVER, MANUAL CONTROL CW QUADRANT	12236	1	(K6226)
45	7TR	5340-99-297-6955	.. CLEVIS, ROD END	11856	1	(K6226)
46			.. PIPES AND ROD ASSEMBLY	12042	REF	See Fig 2
47			.. BOLT, MACHINE	12139	1	
48			.. NYLON BOLT CAP	12527	1	
49	G1	5310-99-752-5091	.. NUT, TITAN	12128	1	(K6226)
50			.. NYLON NUT CAP	12529	2	
51			.. WASHER, PLAIN	12126	2	
52	G1	5310-99-752-5091	.. NUT, TITAN	12128	1	(K6226)
53			.. WASHER, PLAIN	12126	1	
54	7TR	4010-99-891-0371	.. CABLE, BREAKAWAY	12339	1	(K6226)
55	7TR	2530-99-580-3883	.. PIN, STRAIGHT, HEADLESS	11997	1	(K6226)
56	G1	5310-99-752-5091	.. NUT, TITAN	12128	1	(K6226)
57			.. WASHER, PLAIN	12126	1	
58	7TR	2530-99-936-3638	.. PIN, TAPERED, THREADED	11996	1	(K6226)
59	G1	5310-99-752-5091	.. NUT, TITAN	12128	1	(K6226)
60			.. WASHER, PLAIN	12126	1	
61			.. SPRING CLIP	12929	1	Replacement not welded in position. Refer to Cat 522, Chap 5 (K6226)
NI	62	7TR	2540-99-304-5425	KIT 8100	1	
			.. KIT, MH35 COUPLING comprising: .. DAMPER ASSEMBLY .. OVERRUN .. BOLT, MACHINE .. WASHER, PLAIN .. NUT, TITAN .. NYLON BOLT CAP .. BELLOWS, PROTECTION		1 6 12 6 6 1	Fig 1-1 Fig 1-2 Fig 1-3 Fig 1-4 Fig 1-5 Fig 1-6
NI	63	7TR	2530-99-574-0143	KIT 108M KIT 8105	1 1	(K6226)
			.. ACCUMULATOR, HYDRAULIC comprising: .. ACCUMULATOR, BRAKE .. SEAL .. SCREW, MACHINE		1 1 1	Fig 1-36 Fig 1-42 Fig 1-41
	64	7LWT	2590-99-351-4109	KIT 8172	1	For use with Item 1 only, not used on 1 (1) (K6226)
			.. END CAP ASSEMBLY comprising: .. END CAP .. GRUB SCREW		1 4	

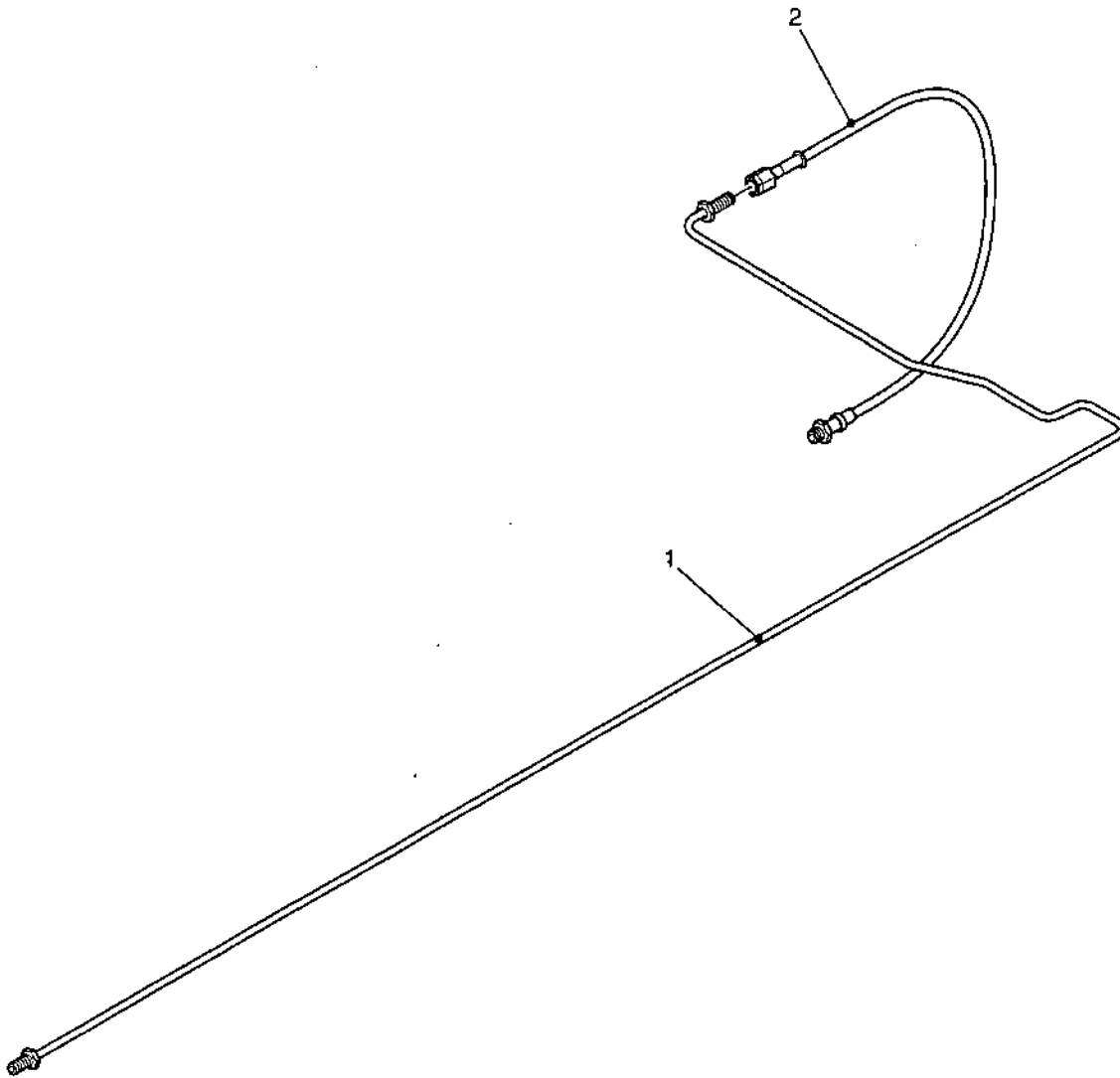


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Fig 2 Brake pipes and handbrake rods

PARTS LIST

Fig 2 Item	DMC Army	NATO stock number	Item name	Part No./ Dwg No.	No. off	Annotation (NSCM)
			RUNNING GEAR AND BRAKING SYSTEM - contd			
			PIPES AND ROD ASSEMBLY	12042	REF	
1	7TR	5306-99-426-0123	ROD, THREADED END	12145	1	(K6226)
2			NUT, FULL	12144	3	
3			SPACER, BRAKE ROD	9592	1	
4			WASHER, FORMED	A00351000401	1	
5			BALANCE BAR, PRESSING	A00572174400	1	
6			CABLE AND CONDUIT ASSEMBLY, VEHICULAR BRAKE		1)
7			NUT, FULL		4)
8			WASHER, FORMED	A00351000400	2	) See Kit 8133
9			CABLE AND CONDUIT ASSEMBLY, VEHICULAR BRAKE		1)
NI 10	7TR	2530-99-584-1946	CABLE AND CONDUIT ASSEMBLY, VEHICULAR BRAKE comprising NUT, FULL WASHER, FORMED CABLE AND CONDUIT ASSEMBLY, VEHICULAR BRAKE CABLE AND CONDUIT ASSEMBLY, VEHICULAR BRAKE	KIT 8133	1 4 2 1	(K6226) Fig 2-7 Fig 2-8 Fig 2-6
NI 11			BRAKE ROD FITTINGS comprising NUT, FULL SPACER, BRAKE ROD WASHER, FORMED BALANCE BAR, PRESSING WASHER, FORMED	KIT 8169	1 2 1 1 1 2	Fig 2-9 Fig 2-2 Fig 2-3 Fig 2-4 Fig 2-5 Fig 2-8

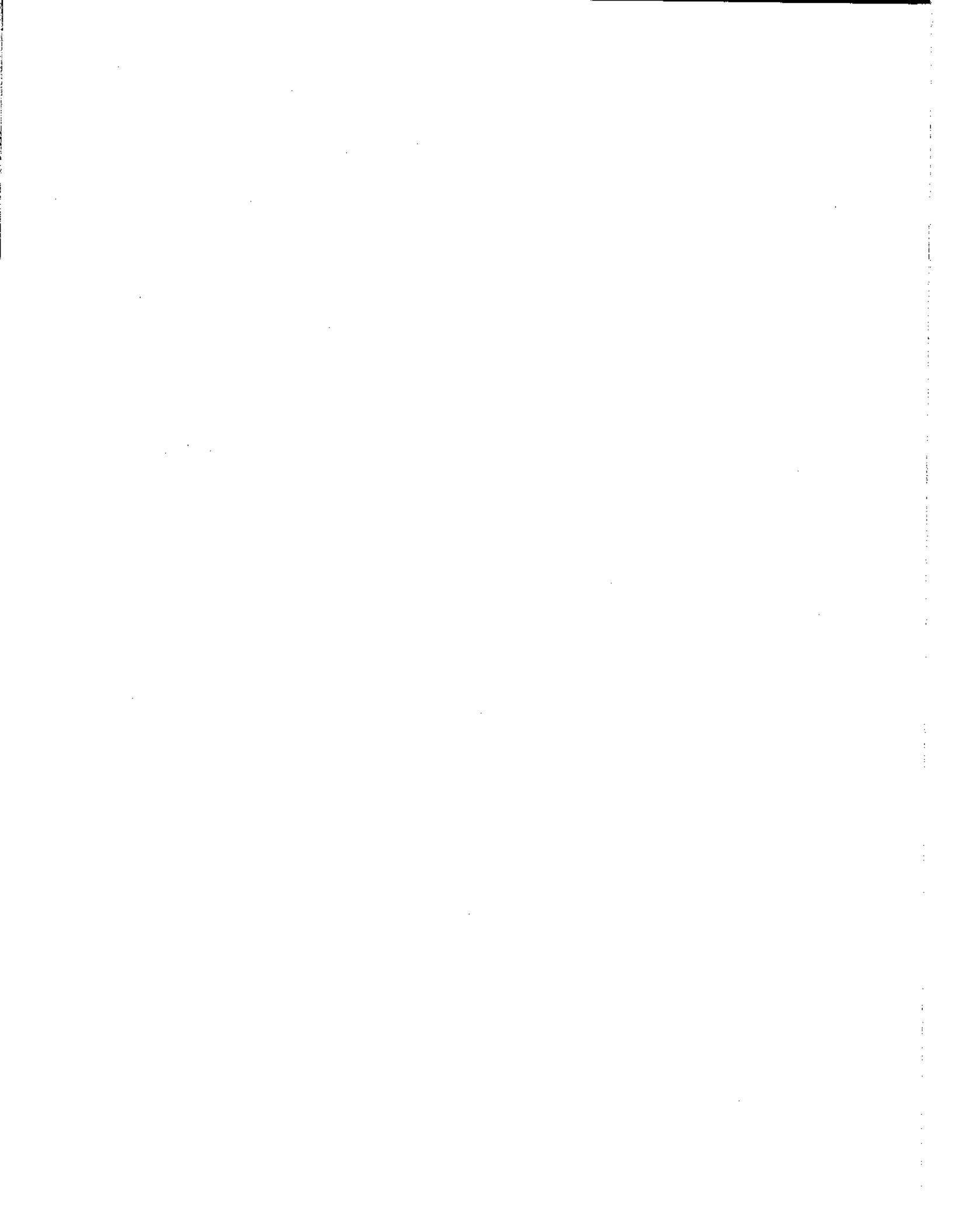


TRL/066

Fig 3 Central brake pipe kits

PARTS LIST

Fig 3 Item	DMC Army	NATO stock number	Item name	Part No./ Dwg No.	No. off	Annotation (NSCM)
			RUNNING GEAR AND BRAKING SYSTEM - contd			
1	7TR	4710-99-147-7140	PIPE, BENT, METALLIC comprising: MIDDLE HARD PIPE	KIT 8141	1	(K6226)
2	7TR	4720-99-225-8509	HOSE, NONMETALLIC C/W UNIONS comprising: MIDDLE FLEXIBLE AND FITTINGS LOCK NUT	KIT 8142	1 1 1	(K6226)



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REAR TOW HITCH ASSEMBLY
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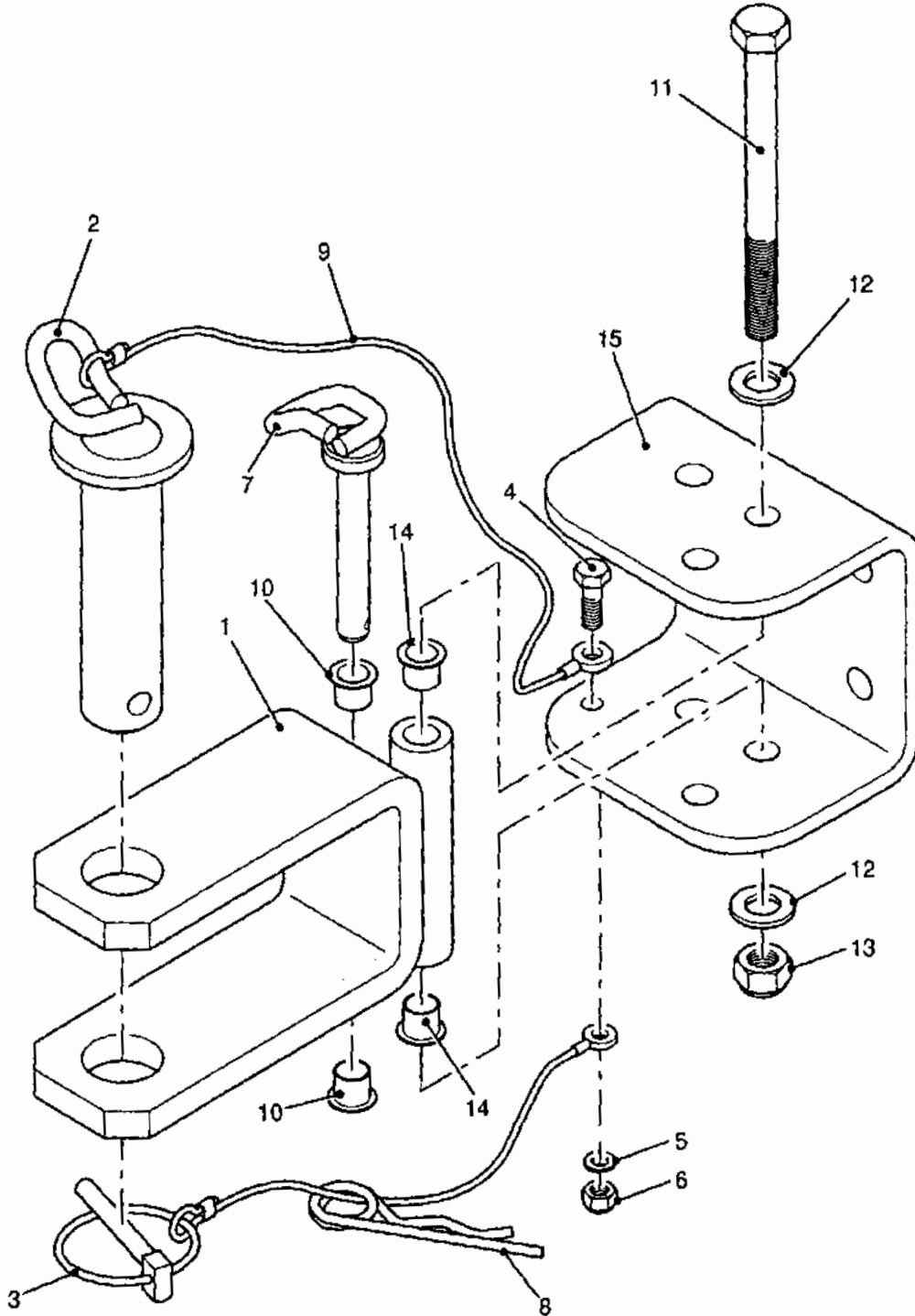


Fig 1 Rear tow hitch

TRL/005

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Fig 1 Item	DMC Army	NATO stock number	Item name	Part No./ Dwg No.	No. off	Annotation (NSCM)
			REAR TOW HITCH ASSEMBLY	MS-2323-252	REF	
1	7TR	2540-99-585-8484	. COUPLER, DRAWBAR, RING	MS-2323-254	1	(K8232)
2		2540-99-973-9528	. PIN, PINTLE C/W LANYARD	MS-2323-244	1	(K8232)
3	7TR	4020-99-212-5884	. COTTER PIN, SNAP RING C/W CORD	MS-2323-299	1	(K8232)
4	G1	5305-99-496-0455	. SCREW, CAP HEXAGON HEAD	F012	1	
5			. WASHER, PLAIN	F378	1	
6			. NUT, NYLOC	F1345	1	
7	7TR	5315-99-762-1764	. PIN, STRAIGHT, HEADED	MS-2323-297	1	(K8232)
8	7TR	5315-99-355-4300	. PIN, LOCK	AA-2323-315	1	(K8232)
9			. LANYARD		1	
10	7TR	3120-99-549-6599	. BEARING, FLANGED	GFM-1011-10	2	(K8758)
11			. BOLT, MACHINE	F1179	1	
12	G1	5310-99-867-8397	. WASHER, PLAIN	F1026	2	
13	7TR	5310-99-131-8516	. NUT, AEROTIGHT	F1024	1	(K8232)
14	7TR	3120-99-549-6599	. BEARING, FLANGED	GFM-1011-10	2	(K8758)
15	7TR	5340-99-930-3191	. PLATE, MOUNTING	AA-2323-253	1	(K8232)

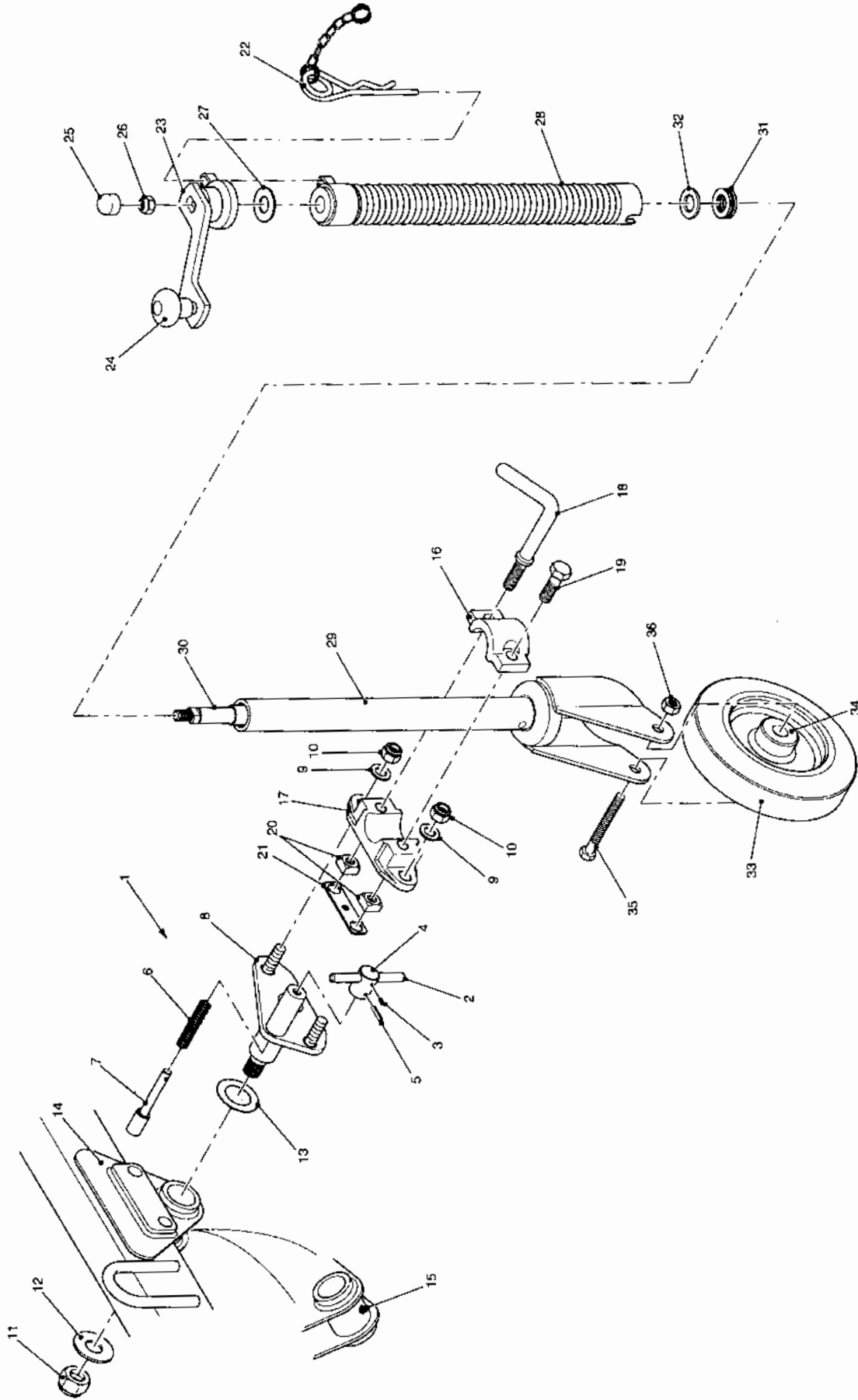


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FRONT JOCKEY WHEEL ASSEMBLY

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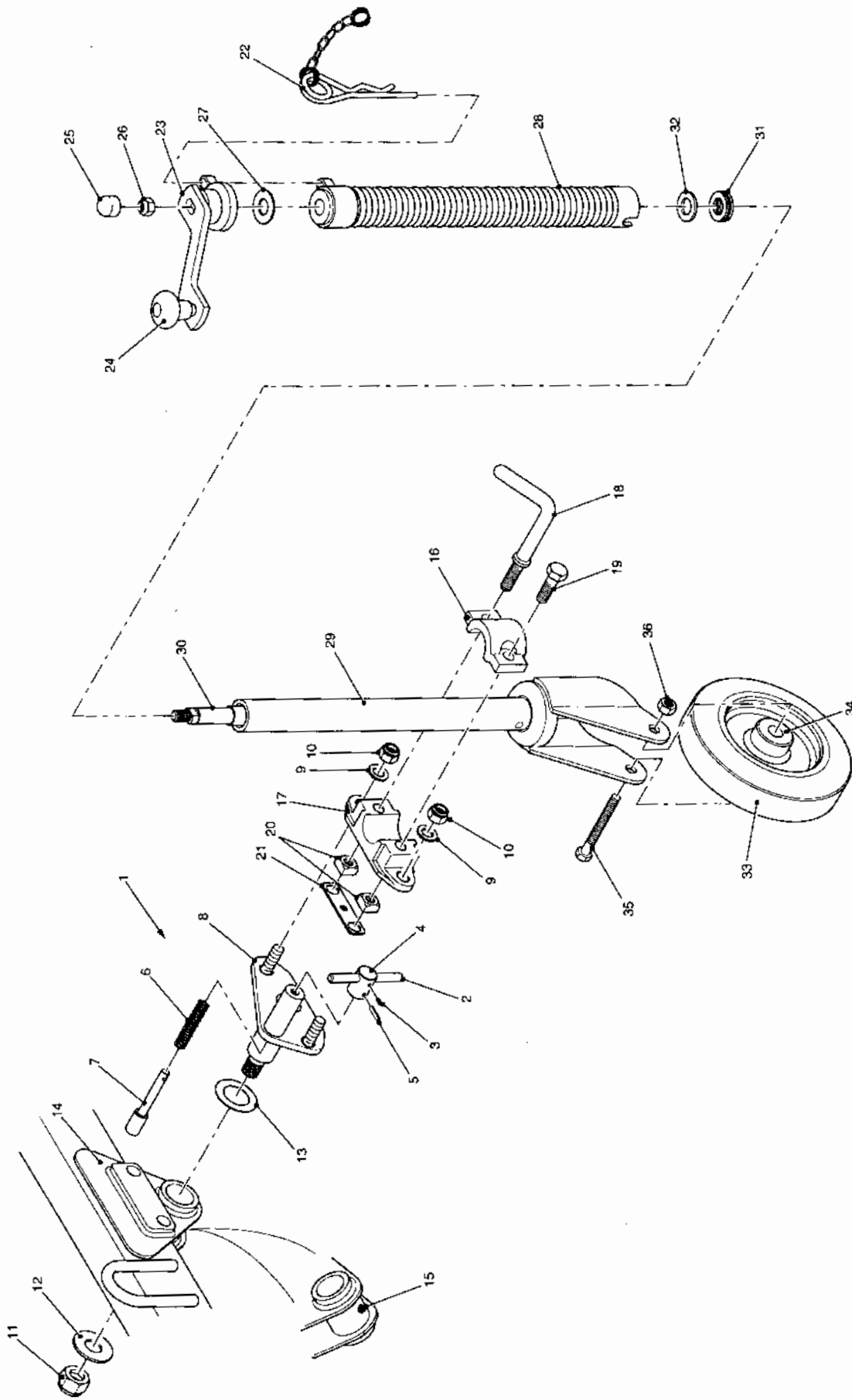
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Fig 1 Front jockey wheel assembly

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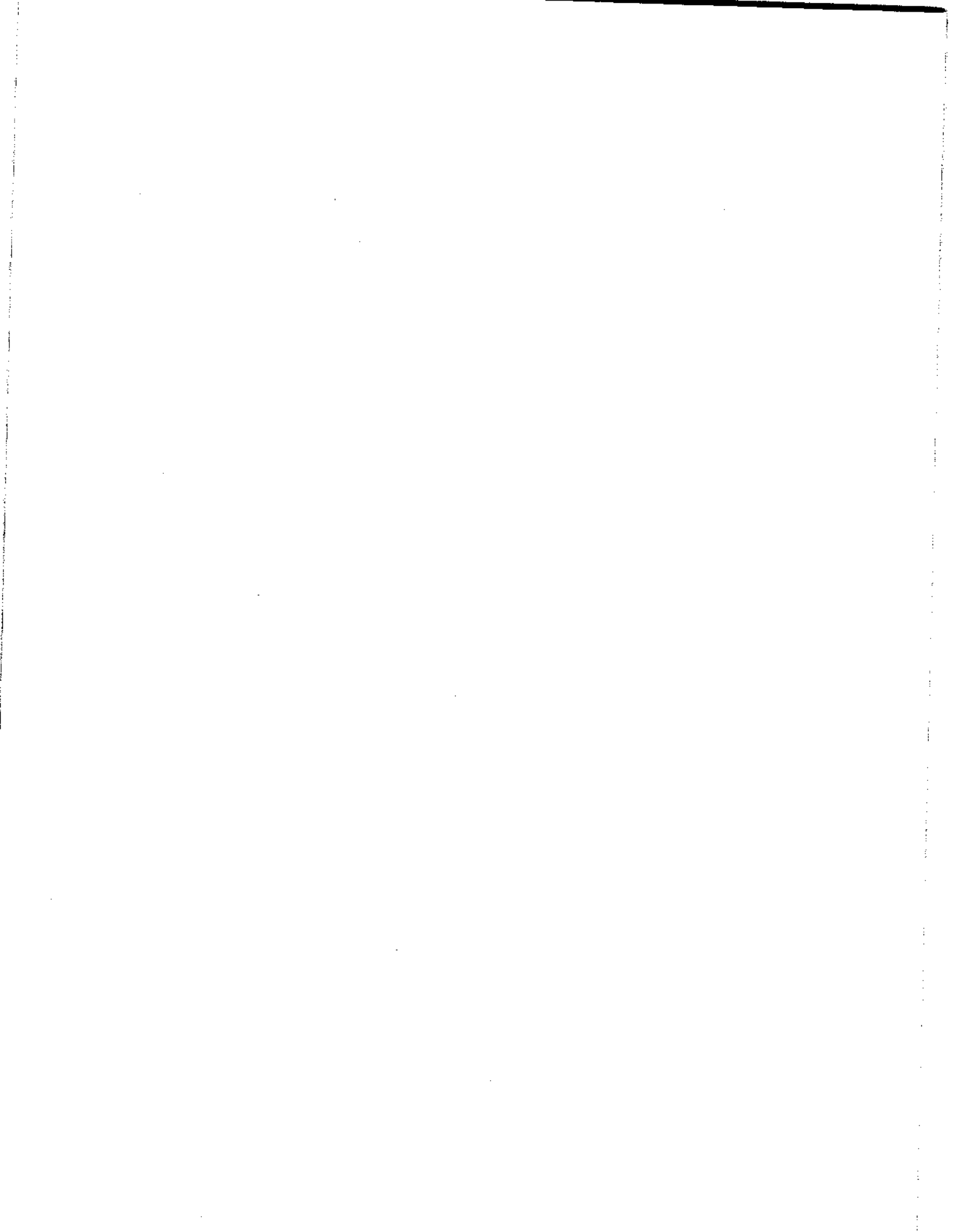
Fig 1 Item	DAIC Army	NATO stock number	Item name	Part No./ Dwg No.	No. off	Annotation (NSCM)
1			FRONT JOCKEY WHEEL ASSEMBLY	12154	1	
2			BRACKET SWIVEL comprising:	12044	1	
3			ITEMS 2-14 INC			
4			.. HANDLE LOCK	12107	1	
5			.. SCREW, MACHINE	10079	1	
6			.. BOSS LOCK, HANDLE	12113	1	
7			.. PIN, TENSION	12190	1	
8			.. SPRING	12189	1	
9			.. PIN LOCK	12114	1	
10			.. SWIVELLING BRACKET	12413	1	
11			.. NUT, LOCK	12187	2	
12			.. WASHER, PLAIN	12191	2	
13			.. NUT	12298	1	
14			.. WASHER, MUDWING	12297	1	
15			.. WASHER, SPACER	12110	1	
16			.. BRACKET, SWIVEL	12182	1	
17			.. NIPPLE, GREASE	12193	1	
18	W2	2530-99-767-0976	.. CAP	P01264200400	1	(K6226)
19			.. BRACKET, BOTTOM	P01274200402	1	
20			.. CLAMP, HANDLE	P01282001400	1	(K6226)
21			.. BOLT, MACHINE	11326	2	
22	SMT1	5340-99-782-9249	.. NUT, SQUARE	E28062400012	1	
			.. PLATE, NUT	10196	1	
			.. CLIP, CHAIN AND LOOP comprising:	KIT 153	1	(K6226)
			.. CLIP CHAIN AND LOOP, INCLUDING:		1	
			.. SAFETY R-CLIP		1	
			.. CHAIN WELDED 7 LINKS		1	
			.. TRIPLE LOOP SECURING		2	
23			.. HANDLE	12275	1	(K6226)
24	SETR	5355-99-302-7782	.. KNOB INCL GRUB SCREW	KIT 142	1	{See Kit 8170
25			.. COVER, NUT		1	
26			.. NUT, LOCK		1	{See Kit 8128
27			.. WASHER, BELLVILLE		1	
28			.. OUTER		1	
29			.. INNER		1	
30			.. SPINDLE		1	
31			.. BEARING, THRUST		1	
32			.. WASHER, BEARING		1	
33			.. WHEEL AND TYRE		1	{See Kit 8129
34			.. BUSH		1	
35			.. BOLT, MACHINE		1	
36			.. NUT, TITAN		1	



TRU/021

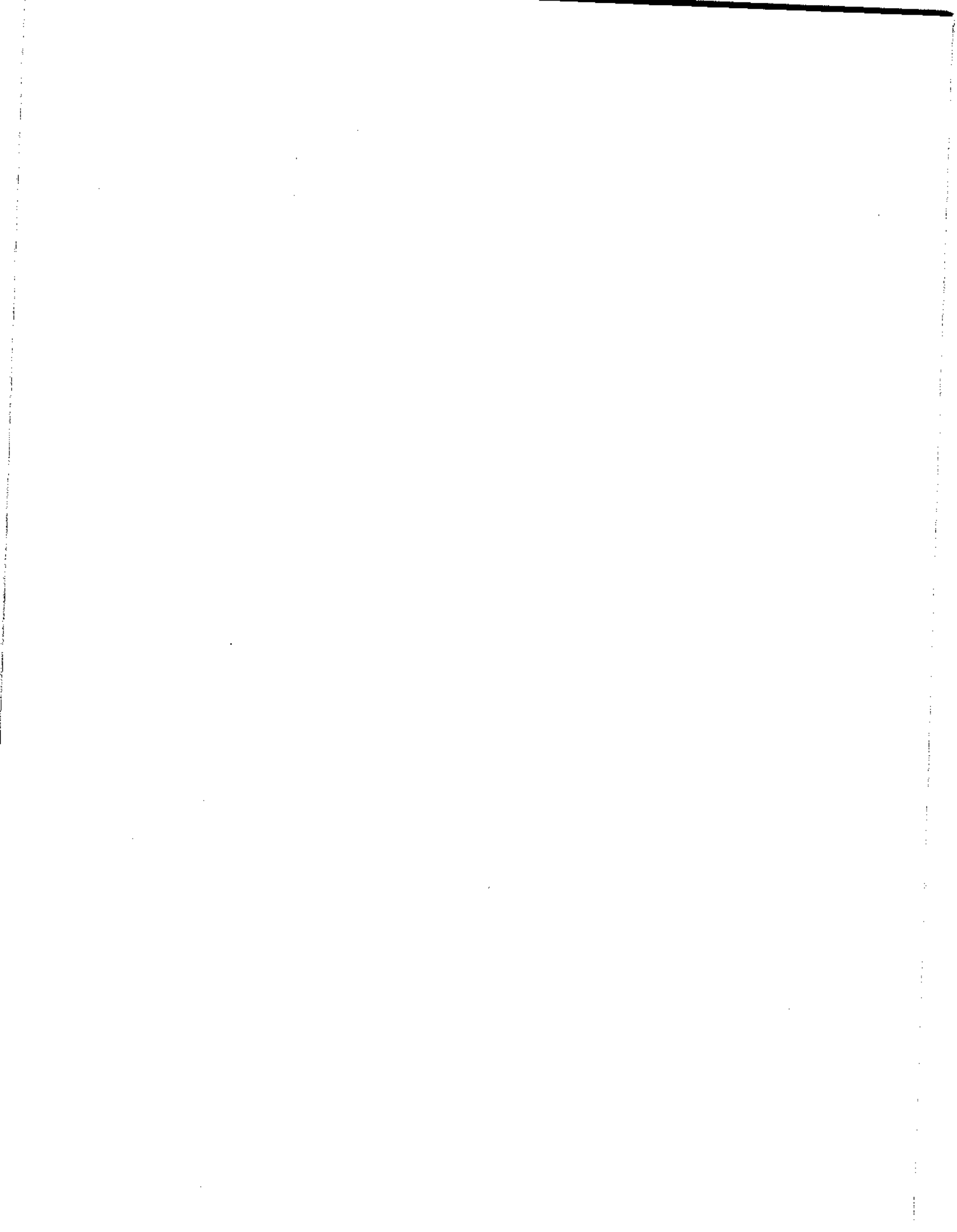
Fig 1 Front jockey wheel assembly

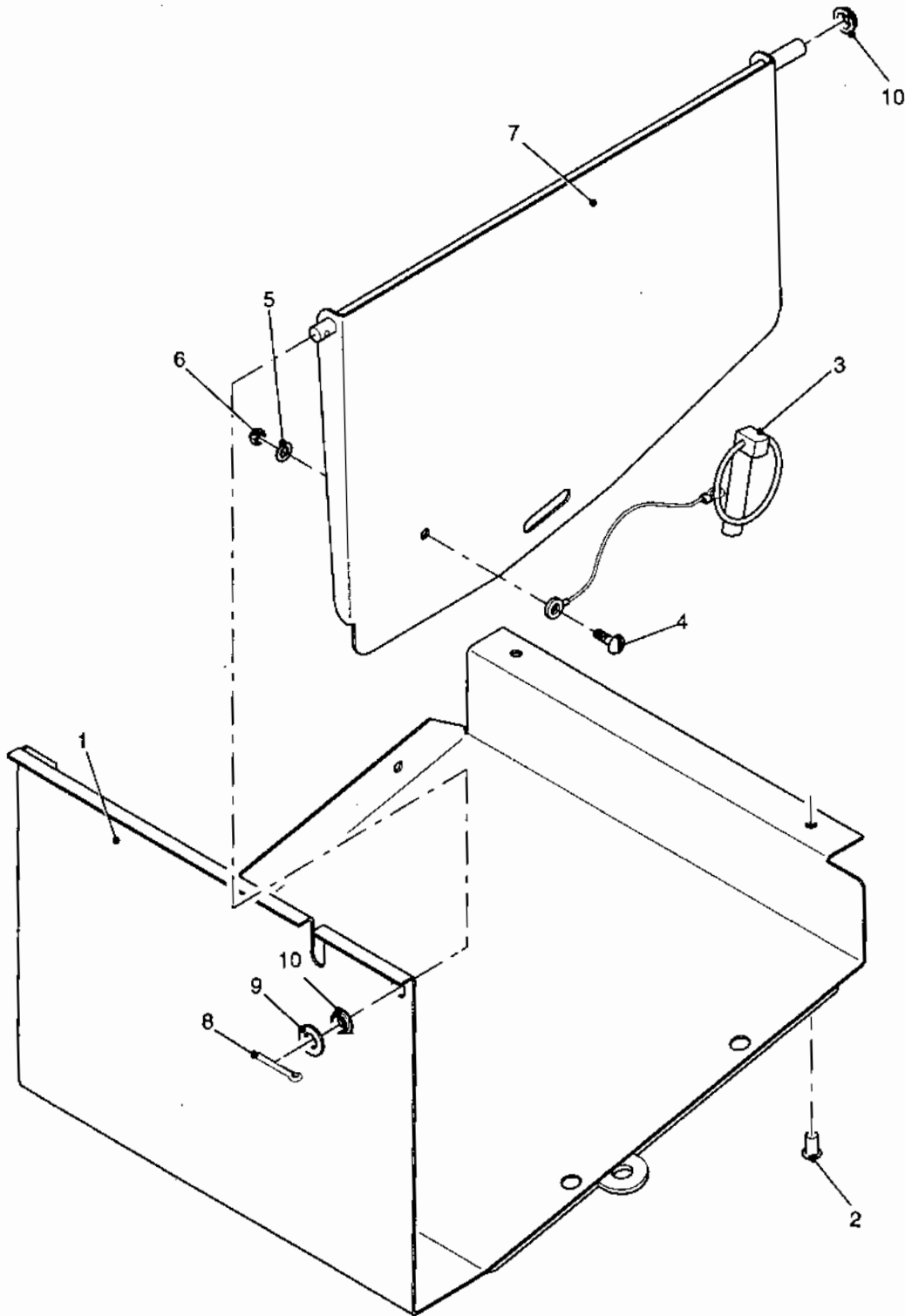
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RH CES BOX ASSEMBLY
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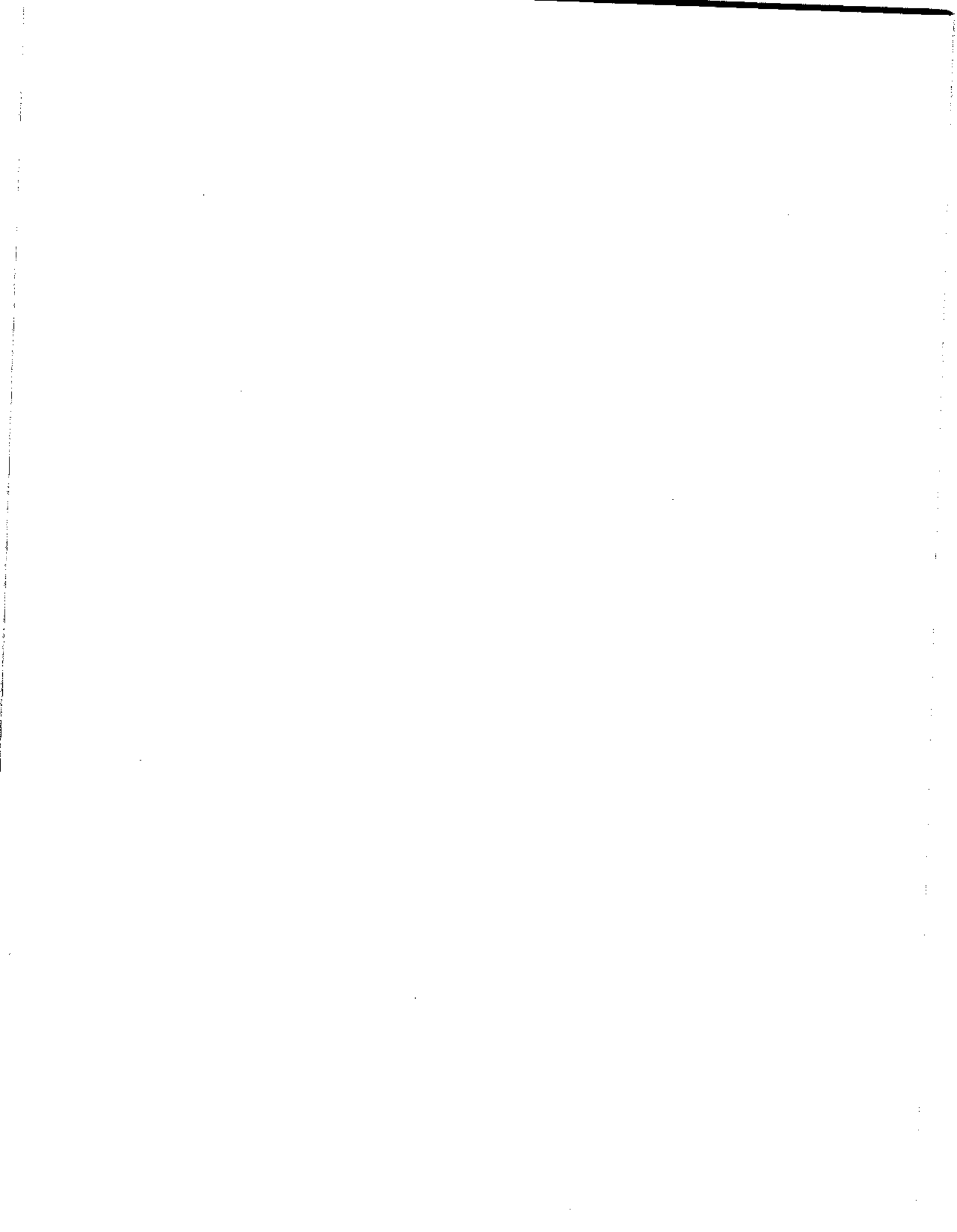


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Fig 1 RH CES box assembly

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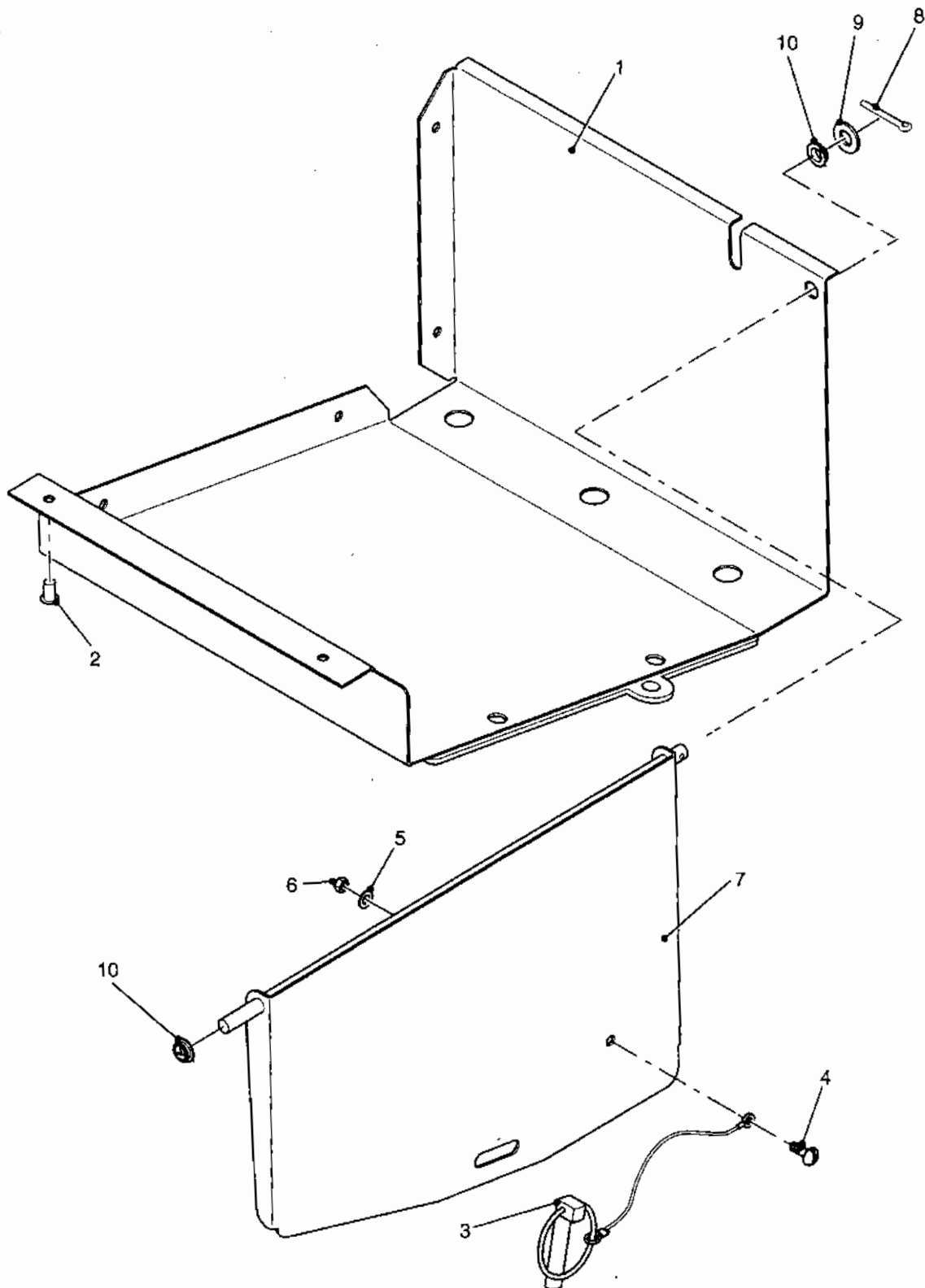
Fig 1 Item	DMC Army	NATO stock number	Item name	Part No./ Dwg No.	No. off	Annotation (NSCM)
			RH CES BOX ASSEMBLY	MS-2323-277	REF	
1	7TR	2540-99-503-3478	. BOX, ACCESSORIES STOWAGE	MS-2323-274	1	(K8232)
2			. RIVET, STAINLESS	OBS11-00618	6	
3	7TR	4020-99-212-5884	. COTTER PIN, SNAP RING C/W CORD	MS-2323-299	1	(K8232)
4			. SCREW, MACHINE	F021	1	
5			. WASHER, PLAIN	F378	1	
6	G1	5310-99-827-5524	. NUT, SELF-LOCKING, HEXAGON	F345	1	
7	7TR	2540-99-696-3154	. COVER, BOX, ACCESSORIES STOWAGE	MS-2323-276	1	(K8232)
8			. SPLIT PIN	F559	1	
9			. WASHER, PLAIN	F392	1	
10			. SHEET METAL BEARING	MCM-08-03	2	



CHAPTER 2-2-7
LH CES BOX ASSEMBLY
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Fig 1 LH CES box assembly

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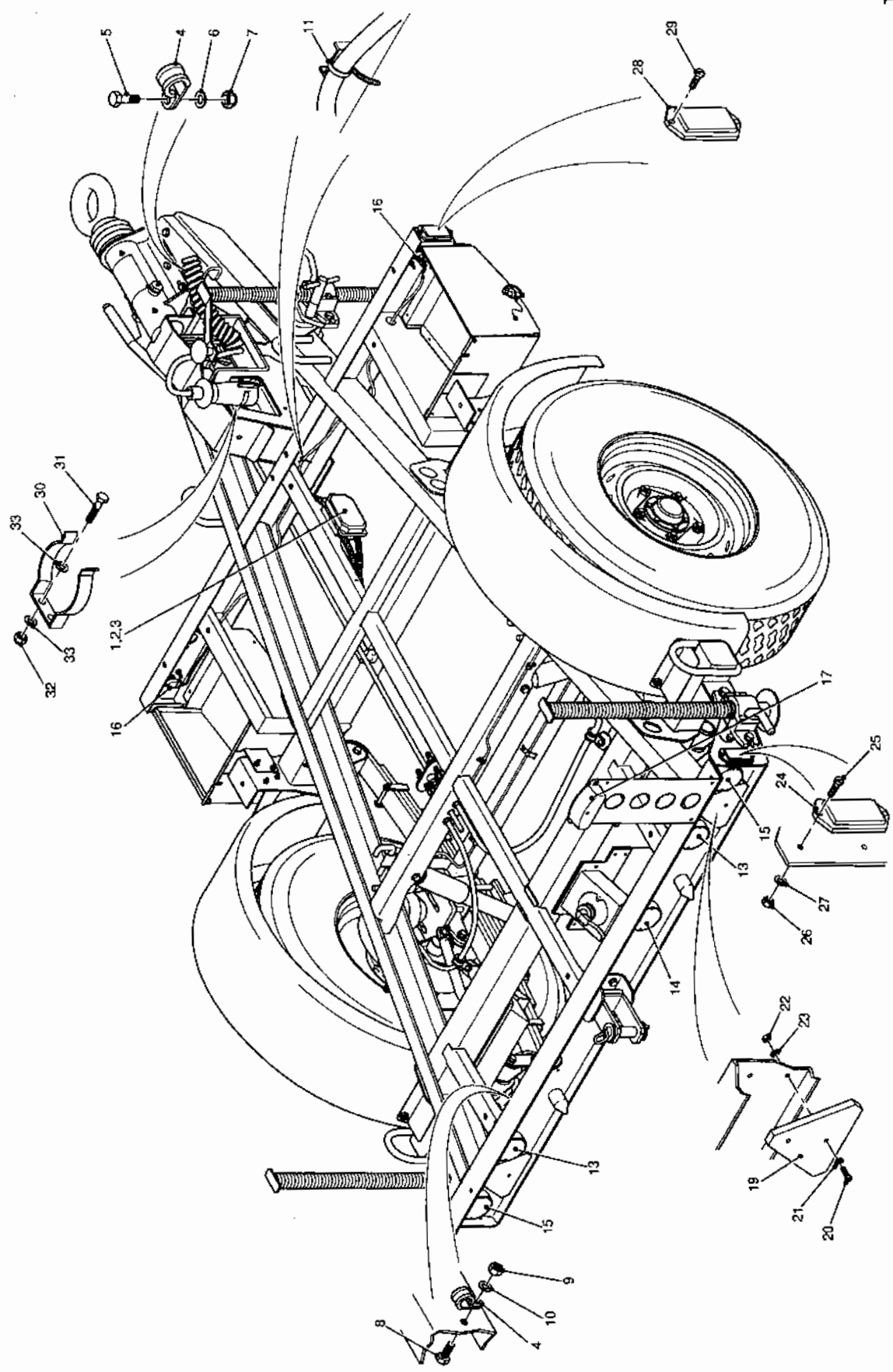
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			LH CES BOX ASSEMBLY	MS-2323-265	REF	
1	7TR	2540-99-212-5886	. ACCESSORIES BOX, STOWAGE	MS-2323-271	1	(K8232)
2			. RIVET, STAINLESS	OBS11-00618	6	
3	7TR	4020-99-212-5884	. COTTER PIN, SNAP RING CW CORD	MS-2323-299	1	(K8232)
4			. SCREW, MACHINE	F021	1	
5			. WASHER, PLAIN	F378	1	
6	G1	5310-99-827-5524	. NUT, SELF-LOCKING, HEXAGON	F345	1	
7	7TR	2540-99-741-4909	. COVER, BOX, ACCESSORIES STOWAGE	MS-2323-270	1	(K8232)
8			. SPLIT PIN	F559	1	
9			. WASHER, PLAIN	F392	1	
10			. SHEET METAL BEARING	MCM-08-03	2	



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ELECTRICAL SYSTEM
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TRU008

Fig 1 Electrical system

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Fig 1 Item	DMC Army	NATO stock number	Item name	Part No./ Dwg No.	No. off	Annotation (NSCM)
			ELECTRICAL SYSTEM	MS-2323-007	REF	
1	7TR	6150-99-975-7189	. WIRING HARNESS	AA-2323-204	1	(K8232)
2	G1	5310-99-212-6344	. NUT, SELF-LOCKING, HEXAGON	F1057	2	
3	G1	5310-99-811-0479	. WASHER, FLAT, M6, S/STEEL	F1056	2	
4	Z88	5340-99-728-0563	. CLAMP, LOOP	3330	2	(K7817)
5			. SCREW, MACHINE	F1106	1	) Front
6	G1	5310-99-212-6344	. NUT, SELF-LOCKING, HEXAGON	F1057	1	) P clip
7	G1	5310-99-811-0479	. WASHER, FLAT, M6, S/STEEL	F1056	1)
8	G1	5305-99-133-0431	. SCREW, ASSEMBLED WASHER	F027	1	) Rear
9	G1	5310-99-827-5524	. NUT, NYLOC	F345	1	) P clip
10			. WASHER, PLAIN	F378	1)
11			. CABLE TIE	TR6	19	
NI 12			. GROMMET, NATURAL RUBBER	RB6853	1	Rear loom section
13	7TR	6220-99-363-1913	. STOP LIGHT - TAILLIGHT, VEHICULAR	SL9 R/A 24V	2	See Fig 2 (K7332)
14	7TR	6220-99-190-7115	. LIGHT, FOG	RF7 R/A 24V	1	See Fig 2 (K7332)
15	7TR	6220-99-132-7655	. DIRECTIONAL LIGHT, VEHICULAR	FL25 R/A 24V	2	See Fig 3 (K7332)
16	7TR	6220-99-452-9999	. SIDELIGHT	FM10 24V	2	See Fig 3 (K7332)
17	7TR	6220-99-766-1372	. LIGHT, UTILITY, VEHICULAR	NPL3PENMAN24V	1	
NI 18			. LAMP INCANDESCENT 24V	T4W-24W	1	
NI 18 (1)			. LAMP INCANDESCENT 12V	LLB233	1	
19	6MT3	9905-99-842-0061	. REFLECTOR, INDICATING, CLEARANCE	171/01/000	2	(K1078)
20	G1	5305-99-135-0432	. SCREW, MACHINE	F023	4	
21			. WASHER	033-0600-00-01	4	
22	G1	5310-99-827-5524	. NUT, NYLOC	F345	4	
23			. WASHER, PLAIN	F378	4	
24	6MT3	9905-99-831-3338	. REFLECTOR, INDICATING, CLEARANCE	78/02/00	2	) (K1078)
25	G1	5305-99-133-0431	. SCREW, ASSEMBLED WASHER	F027	4	) Fitted to rear
26	G1	5310-99-827-5524	. NUT, NYLOC	F345	4)
27			. WASHER, PLAIN	F378	4)
28	6MT3	9905-99-831-3338	. REFLECTOR, INDICATING, CLEARANCE	78/02/00	2	) (K1078)
29	G1	5305-99-805-6811	. SCREW, TAPPING, THREAD FORMING	F454	4	) Fitted to front
30	9BTR	5340-99-874-2272	. CLIP, SPRING, TRAILER SOCKET	FV556226	1	) (U0795)
31			. SCREW, MACHINE	F150	2	
32	G1	5310-99-122-5643	. NUT, SELF-LOCKING, HEXAGON	F341	2	
33	G1	5310-99-122-3031	. WASHER, FLAT	F374	4	

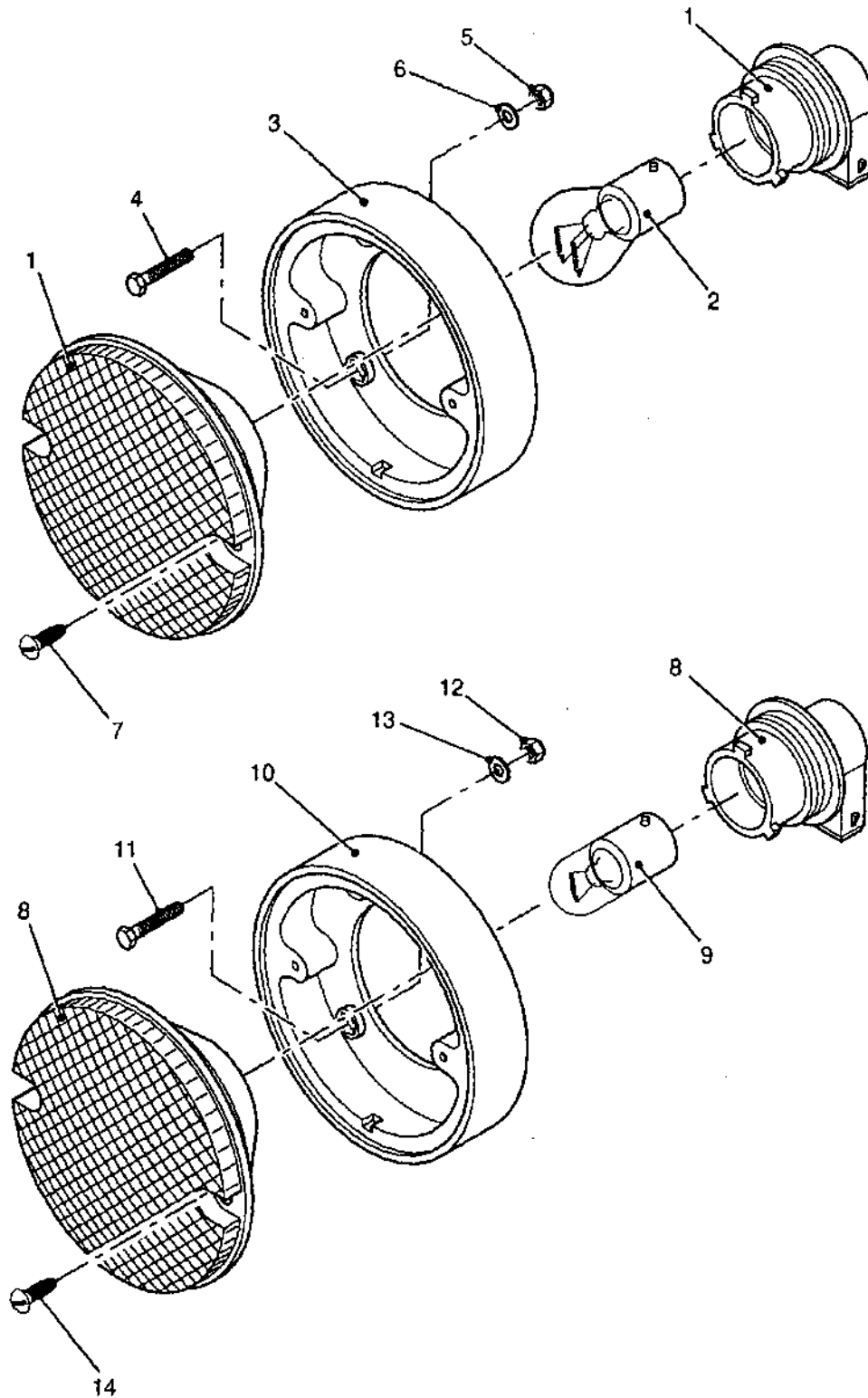
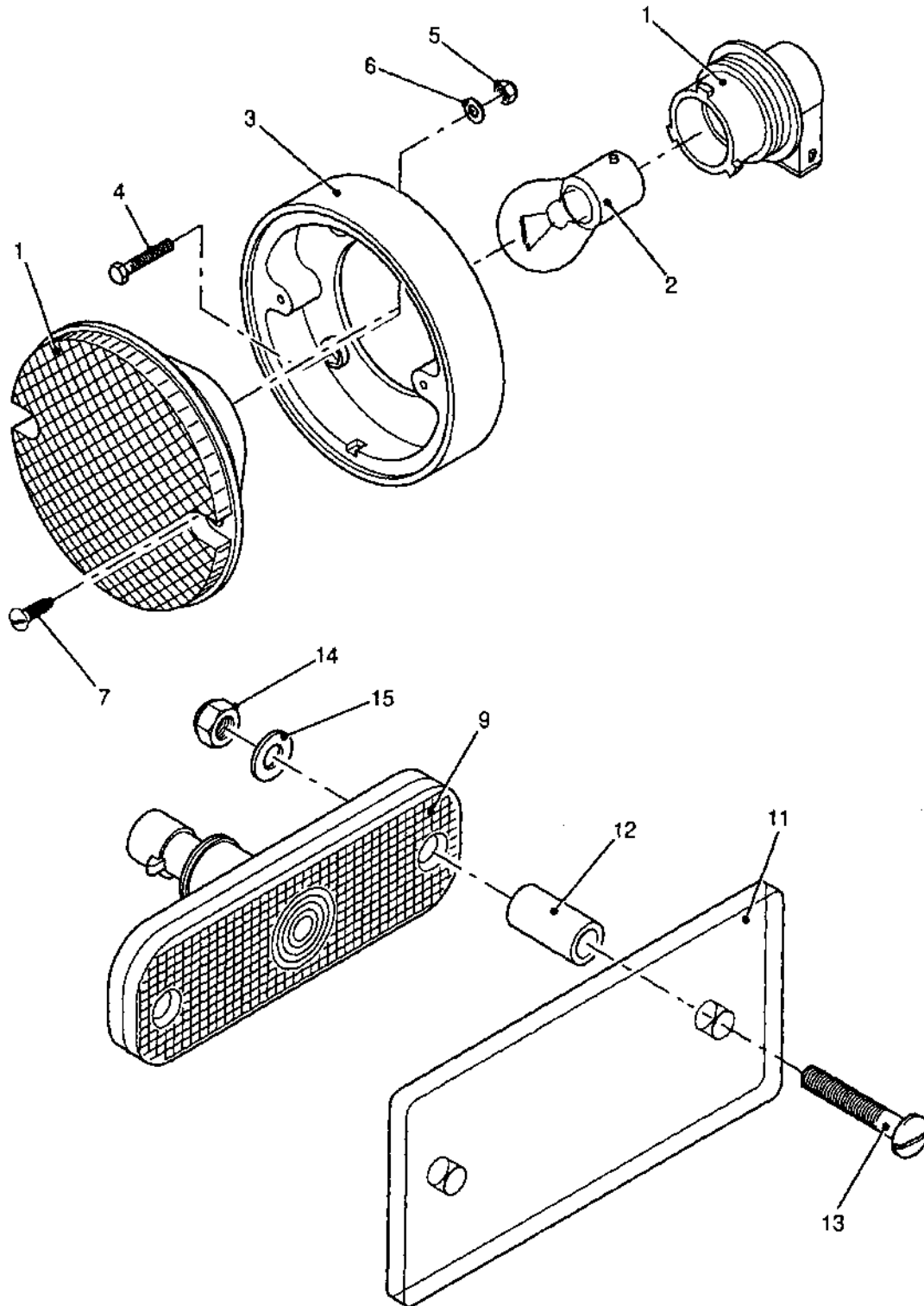


Fig 2 Stop/tail and fog lamps

TRL/009

PARTS LIST

Fig 2 Item	DMC Army	NATO stock number	Item name	Part No./ Dwg No.	No. of	Annotation (NSCM)
			ELECTRICAL SYSTEM - contd			
1	7TR	6220-99-363-1913	. STOP LIGHT - TAILLIGHT VEHICULAR	SL9 R/A 24V	2	(K7332)
2			. LAMP INCANDESCENT 24V	P21/5W-24V	2	
2			. LAMP INCANDESCENT 12V	LLB380	2	
(1)						
3	7TR	6250-99-666-0437	. BASE, LAMPHOLDER	N677800	2	(K7332)
4	G1	5305-99-254-4455	. SCREW, MACHINE	F013	4	
5	G1	5310-99-827-5524	. NUT, NYLOC	F345	4	
6			. WASHER, PLAIN	F378	4	
7	7XD	5305-99-730-5036	. SCREW	F445	4	Lamp holder to plinth
8	7TR	6220-99-190-7115	. LIGHT, FOG	RF7 R/A 24V	1	(K7332)
9	X5	6240-99-995-1337	. LAMP, FILAMENT	2348	1	(K1078)
9			. LAMP, FILAMENT 12 V	LLB382	1	
(1)						
10	7TR	6250-99-666-0437	. BASE, LAMPHOLDER	N677800	1	(K7332)
11	G1	5305-99-254-4455	. SCREW, MACHINE	F013	2	
12	G1	5310-99-827-5524	. NUT, NYLOC	F345	2	
13			. WASHER, PLAIN	F378	2	
14	7XD	5305-99-730-5036	. SCREW	F445	2	Lamp holder to plinth



TRL/010

Fig 3 Rear direction indicator and front marker lamps

PARTS LIST

Fig 3 Item	DMC Army	NATO stock number	Item name	Part No./ Dwg No.	No. off	Annotation (NSCM)
			ELECTRICAL SYSTEM - contd			
1	7TR	6220-99-132-7655	. DIRECTIONAL LIGHT, VEHICULAR	FL25 F/A 24V	2	(K7332)
2	X5	6240-99-995-1337	. LAMP, FILAMENT	2348	2	(K1078)
2			. LAMP, FILAMENT, 12V	LLB382	2	
(1)						
3	7TR	6250-99-666-0437	. BASE, LAMPHOLDER	N677800	2	(K7332)
4	G1	5305-99-254-4455	. SCREW MACHINE	F013	4	
5	G1	5310-99-827-5524	. NUT, NYLOC	F345	4	
6			. WASHER, PLAIN	F376	4	
7	7XD	5305-99-730-5036	. SCREW	F445	4	Lamp holder to plinth
9	7TR	6220-99-452-9999	. SIDELIGHT	FM10 24V	2	(K7332)
NI			. LAMP INCANDESCENT 24V	W5W-24V	2	
NI			. LAMP INCANDESCENT 12V	LLB501CAPLESS	2	
(1)						
11	7TR	6220-99-352-4404	. GUARD, LAMP	AA-2323-264	2	(K8232)
12	7TR	5365-99-359-6028	. SPACER, SLEEVE	311-4320-400-50	4	(U5F79)
13	G1	5305-99-777-5358	. SCREW, MACHINE	F149	4	
14	G1	5310-99-122-5643	. NUT, SELF-LOCKING HEXAGON	F341	4	
15	G1	5310-99-122-3031	. WASHER, FLAT	F374	8	



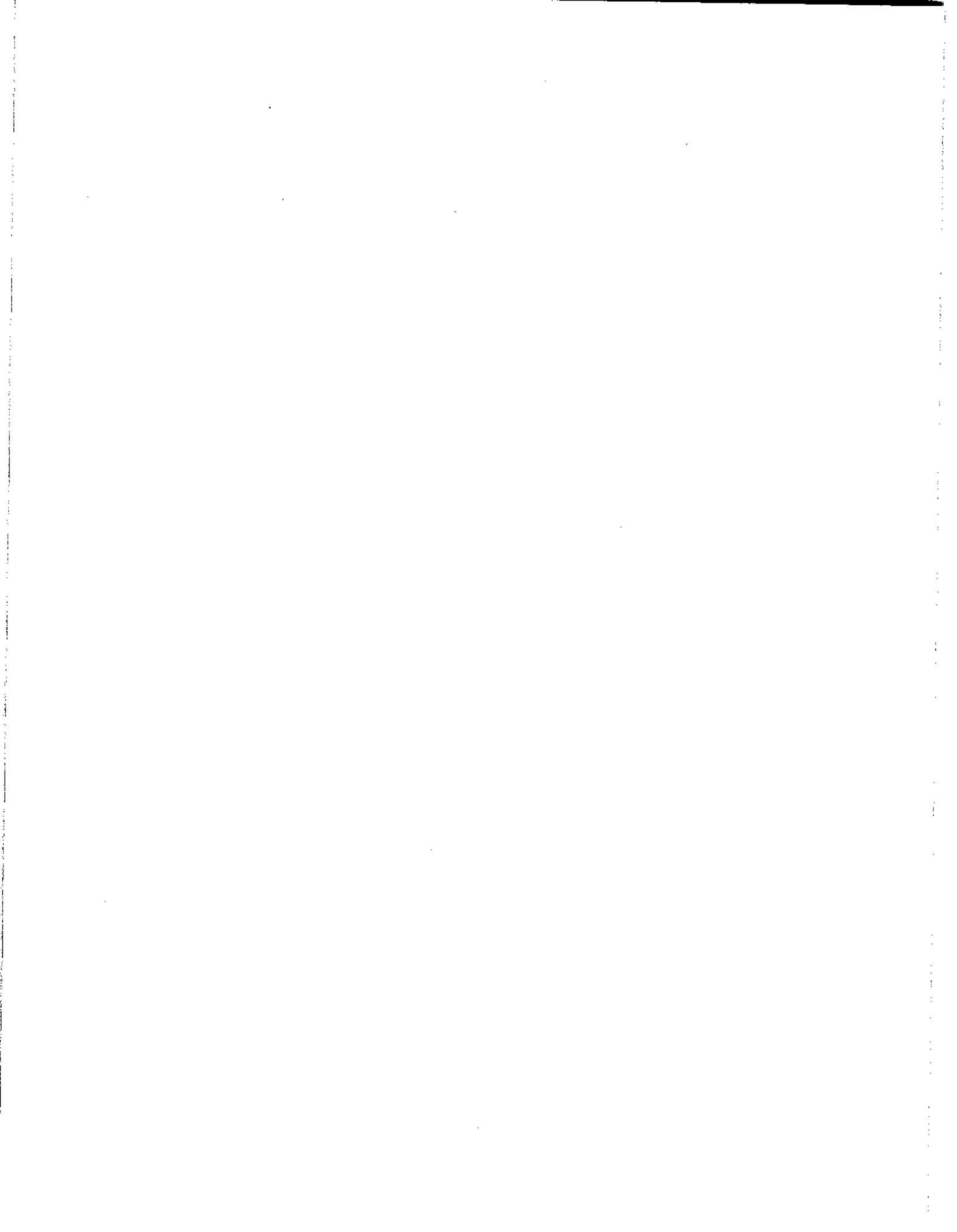
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Fig 1 Item	DMC Army	NATO stock number	Item name	Part No./ Dwg No.	No. off	Annotation (NSCM)
			LABELS AND DECALS	MS-2323-011	REF	
1	7TR	9905-99-399-7720	. PLATE, INSTRUCTION, DATA	AA-2323-280	1	(K8232)
2	7TR	9905-99-611-7596	. PLATE, INSTRUCTION, MOD RECORD	AA-2323-281	1	(K8232)
3	7TR	9905-99-783-1446	. PLATE INSTRUCTION, CONTRACT PLATE	AA-2323-295	1	(K8232)
4	7TR	9905-99-216-9394	. PLATE INSTRUCTION, PROPSTAND	AA-2323-300	2	(K8232)
5	7TR	9905-99-517-3824	. PLATE INSTRUCTION, REAR HITCH	AA-2323-301	1	(K8232)
6	7TR	9905-99-916-9737	. PLATE, INSTRUCTION, CHECKLIST	AA-2323-303	1	(K8232)
7	7TR	9905-99-386-7999	. PLATE, INSTRUCTION, MAX LOAD	AA-2323-304	1	(K8232)
8	7TR	7690-99-850-3683	. STENCIL, MARKING, TYRE PRESSURE	AA-2323-302	2	(K8232)
NI 9			. RIVET	1661-0414	22	Securing items 1, 2, 3, 5, 6 and 7
NI 10	7GVW	8030-99-611-3031	. SEALANT	SIKAFLEX 221	A/R	(U7452)



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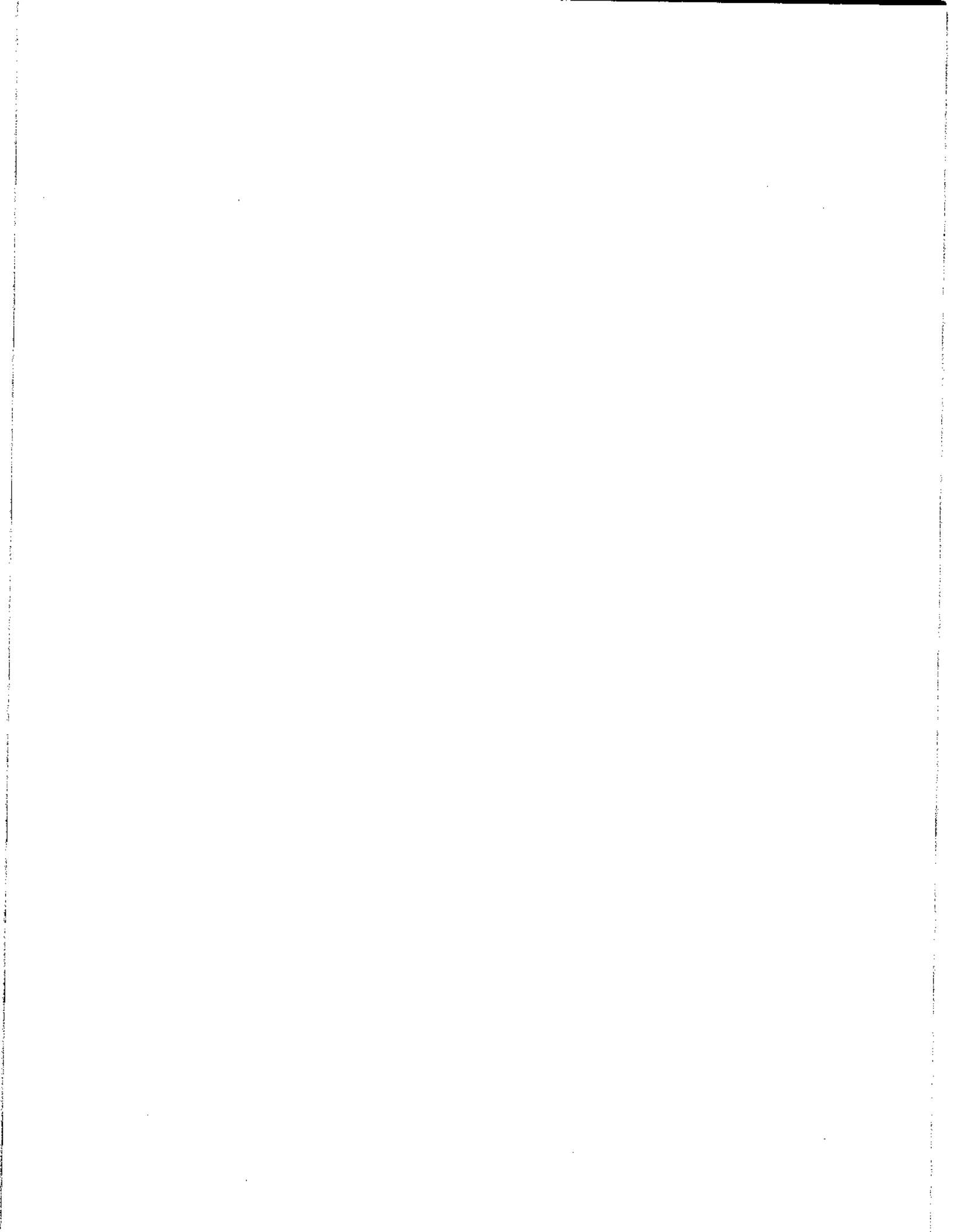
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- 3-1 Index of NATO Stock Numbers to Chapter, Figure and Item Numbers.
- 3-2 Index of Manufacturers Part/Drawing Numbers to Chapter, Figure and Item Numbers.
- 3-3 Index of NATO Stock Numbers to Item Names and Descriptions.
- 3-4 Index of NATO Supply Codes for Manufacturers to Manufacturers Name.

INTRODUCTION

- 1 This chapter identifies the number of indexes provided in support of the main Parts List.



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INDEX OF NATO STOCK NUMBERS
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5310-99-122-3031	2	2-8	2330-99-190-7113	2	1-60
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5310-99-122-5643	2	2-9		3	2-8
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	3	3-14		2-4	1-3
2590-99-131-6783	2	2-1		2-6	1-3
6220-99-131-6784	2	2-11		2-7	1-3
5360-99-131-6919	2-1	1-74	2540-99-212-5886	2-7	1-1
4010-99-131-6923	2-3	1-11	4730-99-212-6301	2-3	1-22
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5310-99-131-8254	2-1	1-8		2	1-21
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1650-99-131-8998	2-3	1-6	4720-99-225-8509	2-3	3-2
6220-99-132-7655	3	1-15	5310-99-231-7186	2	1-22
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5305-99-133-0431	3	1-8	2530-99-244-7869	2	1-55
	3	1-25	5310-99-248-4291	2-2	1-20
2530-99-133-4624	2-3	1-24	5310-99-248-4332	2-1	1-24
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4010-99-290-6147	2-3	1-16	5315-99-440-1107	2	1-10
5310-99-291-1319	2-1	1-70	5306-99-451-1711	2	1-28
2510-99-292-4698	2	1-18		2-2	1-11
5340-99-297-6955	2-3	1-45	6220-99-452-9999	3	1-16
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2530-99-348-1037	2-1	1-NI 81	9905-99-517-3824	4	1-5
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5330-99-354-0431	2-1	1-23		2-4	1-14
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5315-99-355-4300	2-4	1-8	2590-99-562-5747	2	2-6
5365-99-359-6028	2	2-10	5340-99-562-5761	2-3	1-19
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4720-99-361-2737	2-3	1-23	5305-99-568-6020	2-1	1-62
2510-99-362-7337	2	1-59	2530-99-570-0416	2-3	1-8
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5355-99-362-7782	2-5	1-24	2530-99-580-3883	2-3	1-55
6220-99-363-1913	3	1-13	2510-99-582-5674	1	1-1
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5305-99-371-9073		1-7	2540-99-585-8484	2-4	1-1
9905-99-386-7999	4	1-7	5305-99-585-8500		1-15
2530-99-391-1758	2-1	3-1	3120-99-589-8397	1	1-15
5305-99-393-4378	1	1-25	2530-99-601-8569	2-3	1-7
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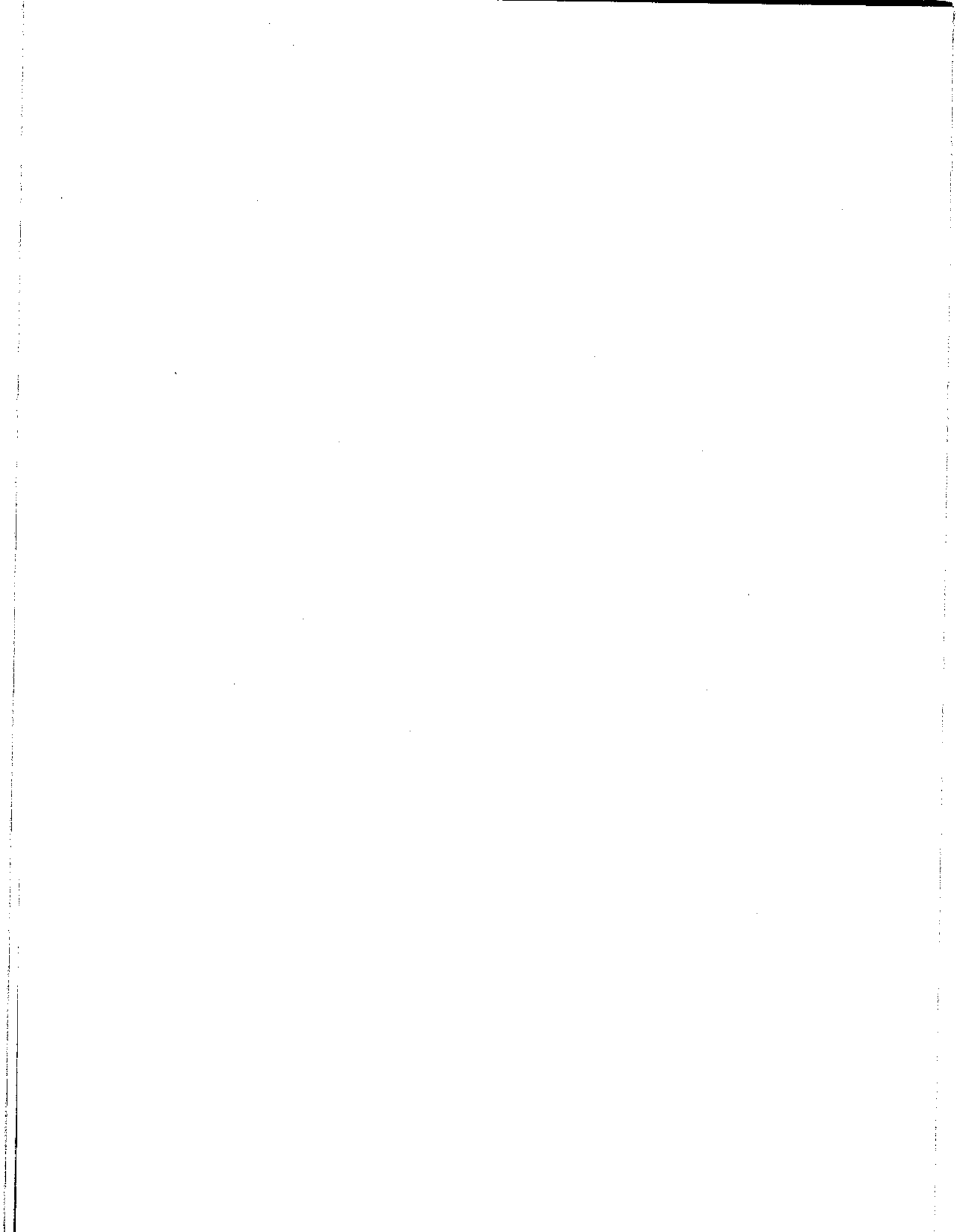
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2530-99-676-4702	2-1	1-1	2590-99-795-2353	2-5	1-30
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5310-99-700-7444	1	1-36	5340-99-809-1703	2-2	2-12
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5305-99-875-3045	2-2	2-4			
4720-99-884-6586	2-1	2-3			
5330-99-884-7659	2	2-3			
5340-99-885-1189	2-2	2-2			
5340-99-887-6315	2	1-19			
4010-99-891-0371	2-3	1-54			
5307-99-912-0252	2-1	1-29			
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9905-99-916-9737	4	1-6			
2540-99-927-5359	1	1-32			
5340-99-930-3191	2-4	1-15			
4710-99-934-0978	2-1	2-5			
2530-99-936-3638	2-3	1-58			
2510-99-957-9423	2-2	1-7			
5315-99-961-3054	1	1-20			
5340-99-968-3691	1	1-34			
5331-99-968-8101	2-1	1-70			
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5330-99-109-9998	SEAL, PLAIN	Rubber, jointless, steel casing, 63 mm shaft dia, 10 mm w, 90 mm hsg bore dia
5310-99-122-3031	WASHER, FLAT	Steel, zinc plated, 9 mm max od, 0.80 mm nom thk, 4.50 mm hole dia
5310-99-122-5643	NUT, SELF-LOCKING, HEXAGON	Hexagonal self-locking nut M4
2590-99-131-6783	BRACKET, MOUNTING	Steel multi-angled bracket
6220-99-131-6784	LIGHT, UTILITY, VEHICULAR	White lamp with 90 degree holder
5360-99-131-6919	SPRING, HELICAL, COMPRESSION	Metal spring
4010-99-131-6923	PIN, SHOULDER, HEADED	Shouldered pin, threaded one end, two flats at other
5340-99-131-8050	JOCKEY WHEEL GEAR	Jockey wheel raise/lower gear
5310-99-131-8254	WASHER, LOCK, M12	Lock washer M12
5310-99-131-8515	NUT NYLOC	Hexagonal self-locking nut
5310-99-131-8516	NUT, AEROTIGHT	Hexagonal self-locking nut M10
5310-99-131-8622	WASHER, PLAIN	Washer, plain, M8-A2
1650-99-131-8998	BELLOWS, PROTECTION	Bellows c/w retaining straps
6220-99-132-7655	DIRECTIONAL LIGHT, VEHICULAR	Rear direction marker with 90 degree lamp holder
5305-99-133-0431	SCREW, ASSEMBLED WASHER	Hexagonal headed screw
2530-99-133-4624	CYLINDER ASSEMBLY, HYDRAULIC BRAKE	Single valve cylinder c/w reservoir
5365-99-134-7782	SPACER, SLEEVE	Metal cylindrical sleeve
5305-99-135-0432	SCREW, MACHINE	Steel, pan head screw, 25 mm lg, M5
4710-99-147-7140	PIPE, BENT, METALLIC	Preformed rigid brake pipe
5310-99-147-7220	WASHER, FLAT, M12	Flat washer, M12
5365-99-152-5237	BUSHING, NONMETALLIC	Rubber, 23.25 mm id, 45 mm o/a h, 64 mm o/a f, 60.4 mm w
4710-99-154-6542	PIPE, BENT, METALLIC	Preformed rigid braka pipe and fittings
2530-99-158-4689	DISC BRAKE SHOE SET	Four brake pad, complete axle set
5340-99-170-5262	MOUNT, RESILIENT	A metal outer and inner sleeve with metal between
5306-99-170-5264	BOLT U	U shaped bar, threaded at both ends
2510-99-173-8076	HINGE	Right angled hinge, threaded end, (RH)
2530-99-186-9143	SHIELD, BRAKE DISC	Preformed metal circular guard, lh
2330-99-190-7113	SPRING, AEON	Solid rubber rebound spring
6220-99-190-7115	LIGHT, FOG	Rear fog lamp with 90 degree lamp holder
4020-99-212-5884	COTTER PIN, SNAP RING C/W CORD	Metal pin on circular ring attached to steel cable
2540-99-212-5886	BOX, ACCESSORIES STOWAGE	Preformed metal box without lid (LH)
4730-99-212-6301	MANIFOLD BLOCK C/W SEAL	Accumulator manifold c/w fixings and seal
5310-99-212-6344	NUT, SELF-LOCKING, HEXAGON	Hexagonal self-locking nut
5310-99-212-6477	WASHER, PLAIN	Plain washer
5306-99-212-6478	BOLT, MACHINE	Hexagonal headed bolt
4820-99-212-6486	KIT, CALIPER BLEED NIPPLE	Caliper bleed nipple kit
9905-99-216-9394	PLATE, INSTRUCTION, PROPSTAND	Self adhesive label
5305-99-216-9413	SCREW, M6, S/STEEL	Hexagonal headed screw, st/steel, M6
5310-99-219-6431	NUT PLAIN M10	Hexagonal nut, M10
4720-99-225-8509	HOSE, NON-METALLIC C/W UNIONS	Flexible brake fluid pipe assembly

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5310-99-231-7186	WASHER FLAT	Flat washer, M6
2510-99-238-1620	BAR, STABILIZER	U shaped, hole at either end
2530-99-244-7869	WHEEL, PNEUMATIC, TIRE	Irregularly shaped cross-section, 115.11 mm dia aperture, 5 stud holes csk equispaced on 165 mm PCD. 12 vent holes
5310-99-248-4291	WASHER, MOUNTING	Large washer to secure Aeon spring
5310-99-248-4332	NUT, PLAIN, ROUND	Circular slotted nut
2590-99-250-1673	BELLOWS, VALVE BLOCK	Synthetic rubber, black. 44.5 mm nom dia. 20 mm nom h, u/o auto-reverse valve
3040-99-251-5613	SHAFT ASSEMBLY, SHOULDERED	Handbrake pivot spacer c/w nuts and washers
5305-99-254-4455	SCREW, MACHINE	Hexagonal headed screw, steel, zinc passivate. M5. 20 mm nom lg
2430-99-258-0413	RETAINER, NUT AND BOLT	Preformed wire assembly, coiled loop either end
2530-99-258-8997	CAP, GREASE	Circular metal plate, holes around circumference
2530-99-264-0392	SHIELD, BRAKE DISC	Preformed metal circular guard, rh
5340-99-280-2402	BRACKET, MOUNTING	Welded fabricated bracket, 4 mounting holes, rh
5340-99-282-7221	CLIP	Metal clamp with rubber insert
5340-99-287-2134	BRACKET, MOUNTING	Welded fabricated bracket, 4 mounting holes, lh
4010-99-290-6147	COVER, ACCESS	Multi angled steel plate
5310-99-291-1319	NUT	Nut, M10 x 1.5 Din 980V-A2-70
2510-99-292-4698	FENDER, VEHICLE	Semi-circular mudguard with locating holes at either end
5340-99-297-6955	CLEVIS, ROD END	U shaped metal bracket, threaded hole one end, locating hole each leg
2950-99-302-0934	SUPPORT, RETRACTABLE, TRAILER	Straight, tubular leg with serrated edge, circular foot and locating hole
2540-99-304-5425	KIT, MH35 COUPLING	Damper assembly c/w mtg kit
5310-99-309-1094	WASHER FLAT	Flat washer, M6
2540-99-309-2254	PLATE, STIFFENER	Metal rectangular plate with two holes
5310-99-316-8060	WASHER SPRING	Lock washer
5340-99-318-1120	BUMPER, RUBBER	Tubular preformed rubber mounting
2530-99-322-9480	RESERVOIR, BRAKE FLUID, C/W CAP	Plastic container c/w threaded cap
5340-99-324-0080	STRAP, CHECK	Fibre material flat strap with loop at each end
2530-99-327-4327	MOUNTING KIT CALIPER	Mounting bracket c/w fixings
2590-99-338-4851	BRACKET, MOUNTING, NUMBER PLATE	Right angled metal bracket with locating holes for number plate and light
4730-99-344-9118	NIPPLE, GREASE	Grease nipple
2530-99-348-1037	HUB PIVOT KIT	14 piece pivot replacement kit
2590-99-351-4109	END CAP ASSEMBLY	Non circlip end cap c/w 4 x 6 mm lg socket head screws
6220-99-352-4404	GUARD, LAMP	Clear plastic guard
5330-99-354-0431	GASKET	Circular paper gasket, six bolt holes
5315-99-355-4300	PIN, LOCK	Steel spring clip
5365-99-359-6028	SPACER, SLEEVE	Cylindrical steel spacer
4720-99-361-2737	FLEXIBLE PIPE, MANIFOLD TO CHASSIS HARD LINE C/W UNIONS	Flexible brake fluid pipe assembly
2510-99-362-7337	SHOCK ABSORBER, DIRECT ACTION	Gas filled shock absorber

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5355-99-362-7782	KNOB INCL GRUB SCREW	One piece set
6620-99-363-1913	STOP LIGHT-TAILLIGHT, VEHICULAR	Stop and tail with 90 degree lamp holder
5305-99-371-9043	SCREW MACHINE	Hexagon head screw, M6, 8 mm lg
9905-99-386-7999	PLATE, INSTRUCTION, MAX LOAD	Rectangular aluminium plate w/two holes
2530-99-391-1758	KIT, CLIP SET	Brake pad pin and clip kit
5305-99-393-4378	SCREW MACHINE	Button head screw, M8, 30 mm lg
9905-99-399-7720	PLATE, INSTRUCTION, DATA	Rectangular aluminium plate w/hole in each corner
5310-99-400-8025	NUT, PLAIN, CONE. SEAT, HEXAGON	Hexagonal M16 nut
2610-99-405-6007	TIRE, PNEUMATIC	Radial, 10 ply, steel belted, tubeless, 7.50 x R16
5306-99-426-0123	ROD, THREADED END	Steel rod, threaded both ends
3120-99-433-1322	BEARING, WASHER, THRUST	Circular washer, flat machined surfaces
5315-99-440-1107	COTTER PIN, SNAP RING C/W CORD	Metal pin on circular ring attached to steel cable
5306-99-451-1711	BOLT MACHINE	Hexagon head bolt, M12, 80 mm lg
6220-99-452-9999	SIDELIGHT	Front marker with reflex reflector
5310-99-462-9732	WASHER, SPACER	Circular metal washer
4820-99-471-3131	KIT, VALVE BLEED NIPPLE	Valve bleed nipple kit
5310-99-491-1336	NUT, AEROTIGHT	Hexagonal self-locking nut M12
5305-99-496-0455	SCREW, CAP, HEXAGON HEAD	Steel, zinc plated, M5, hexagon hd, 16 mm nom lg
5340-99-499-8554	CLAMP, PIPE	Metal clamp with rubber insert
5340-99-500-6304	BRACKET, DOUBLE ANGLE	A single-holed, s/steel reinforcing plate
5310-99-502-2592	WASHER, KEY	Circular metal washer, 1 internal tab, several internal locking tabs
2540-99-503-3478	BOX, ACCESSORIES STOWAGE	Preformed s/steel box without lid (RH)
9905-99-517-3824	PLATE, INSTRUCTION, REAR HITCH	Plate, instruction, rear hitch
2590-99-549-5998	FRAME SECTION, STRUCTURAL	Metal right-angled plate
3120-99-549-6599	BEARING, FLANGED	Plain flanged cylindrical bearing
5340-99-549-8089	BUMPER, RUBBER	Preformed rubber pad
2590-99-562-5747	PLATE, LENS COVER	Square metal guard plate
5340-99-562-5761	CLEVIS, ROD END	U shaped metal bracket, threaded hole one end, locating hole each leg
2530-99-563-4954	BALL JOINT LINK ASSEMBLY	Anti-roll bar connector
5305-99-568-6020	SCREW SOCKET HEAD	Socket head screw
2530-99-570-0416	PIN, STRAIGHT, HEADED	Shouldered pin, split pin hole second end
2530-99-574-0143	ACCUMULATOR, HYDRAULIC	Accumulator c/w sealing washer and grub screw
2530-99-580-3883	PIN, STRAIGHT, HEADLESS	Pin, threaded both ends, machined spacer between
2510-99-582-5674	BODY, TRAILER	S/steel body: consists of floor and 3 sides
2530-99-584-1946	CABLE AND CONDUIT ASSEMBLY, VEHICULAR BRAKE	Two cable set c/w nuts and washers
2540-99-585-8484	COUPLER, DRAWBAR, RING	Damper assembly c/w tow eye
5305-99-585-8500	SCREW MACHINE	Hexagon head screw, M8, 30 mm lg
3120-99-589-8397	BEARING, FLANGED	Plain flanged cylindrical bearing
2530-99-601-8569	LINK, ACTUATING BRAKE, VEHICULAR	T formed lever, hole at one end

**INDEX OF NATO STOCK NUMBERS
TO
ITEM NAMES AND DESCRIPTIONS**

NATO stock number	Item name	Item description
5325-99-608-9236	GROMMET, NON METALLIC	Rubber circular grommet with groove round perimeter
8030-99-611-3031	SEALANT	Black, 310 cc aluminium cartridge
9905-99-611-7596	PLATE, INSTRUCTION, MOD RECORD	Rectangular aluminium plate w/hole in each corner
2510-99-617-7645	PLATE, METAL, BLANKING	Rectangular metal plate
2510-99-665-9761	HINGE	Right angled hinge threaded end. (LH)
6250-99-666-0437	BASE, LAMPHOLDER	Circular plastic base
5310-99-666-0891	WASHER LOCK	Lock washer, M6
5305-99-666-0956	SCREW MACHINE	Hexagon head screw
5306-99-666-1067	BOLT, OPERATING SPRING	Special bolt
2530-99-676-4702	AXLE TUBE, WELDED ASSEMBLY	Axle tube with spring and suspension mounts incorporated
5310-99-679-8242	NUT, LOCK	Locknut, M12, A2-70
2540-99-687-2052	PLATE, ILLUMINATED	Rectangular steel plate, one 90 degree flange
2540-99-696-3154	COVER, BOX, ACCESSORIES STOWAGE	Preformed metal lid with bar hinges at both top corners
5310-99-700-7444	WASHER, FLAT, S/STEEL	Flat washer, st/steel, M5
2510-99-707-2540	HANGAR, SPRING, VEHICLE, TAPPED	Straight metal plate with two holes, one threaded
5310-99-724-2375	WASHER, SPRING TENSION	Circular metallic dished washer
5340-99-728-0563	CLAMP, LOOP	Plastic, single loop, 16.6 in. nom lg
4010-99-728-2055	CABLE ASSEMBLY, TAILGATE SUPPORT	Plastic coated steel cable: eye 1st end spring clip 2nd end
5305-99-730-5036	SCREW	Machine screw
5310-99-735-6933	WASHER, PLAIN	Plain washer, M12
2540-99-741-4909	COVER, BOX, ACCESSORIES STOWAGE	Preformed metal lid with bar hinges at both top corners
2530-99-743-0406	HUB, WHEEL, VEHICULAR C/W STUDS	Circular, machined steel hub, 5 threaded studs, internal machining for bearings
3120-99-744-3361	PARTS KIT, BEARING REPLACEMENT, MECH EQPT	11 piece hub bearing kit
5325-99-748-4316	RING RETAINING	Spring steel clip
2540-99-750-5070	PROTECTOR, CHASSIS	Plastic right-angled bracket
5310-99-752-5091	NUT, TITAN	Hexagonal nut
5340-99-759-7893	LEVER, MANUAL CONTROL C/W QUADRANT	Preformed metal lever c/w spring, plunger knob, pawl, rack and lifter rod
5315-99-762-1764	PIN, STRAIGHT, HEADED	Steel pin with handle
6220-99-766-1372	LIGHT, UTILITY, VEHICULAR	Single built light unit
2530-99-767-0976		Threaded locking handle
5305-99-777-5358	SCREW, MACHINE	Steel, zinc coated, pan hd, M4, 40 mm nom lg
4720-99-778-0381	HOSE NON-METALLIC M/CYL TO ACCUMULATOR FLEXIBLE PIPE	M/cyl to accumulator flexible pipe
5315-99-782-3460	PIN, COTTER, SPLIT	Cotter pin, 1 in. lg
5340-99-782-8249	CLIP, CHAIN AND LOOP	One piece set
9905-99-783-1446	PLATE, INSTRUCTION, CONTRACT PLATE	Rectangular aluminium plate w/hole in each corner

**INDEX OF NATO STOCK NUMBERS
TO
ITEM NAMES AND DESCRIPTIONS**

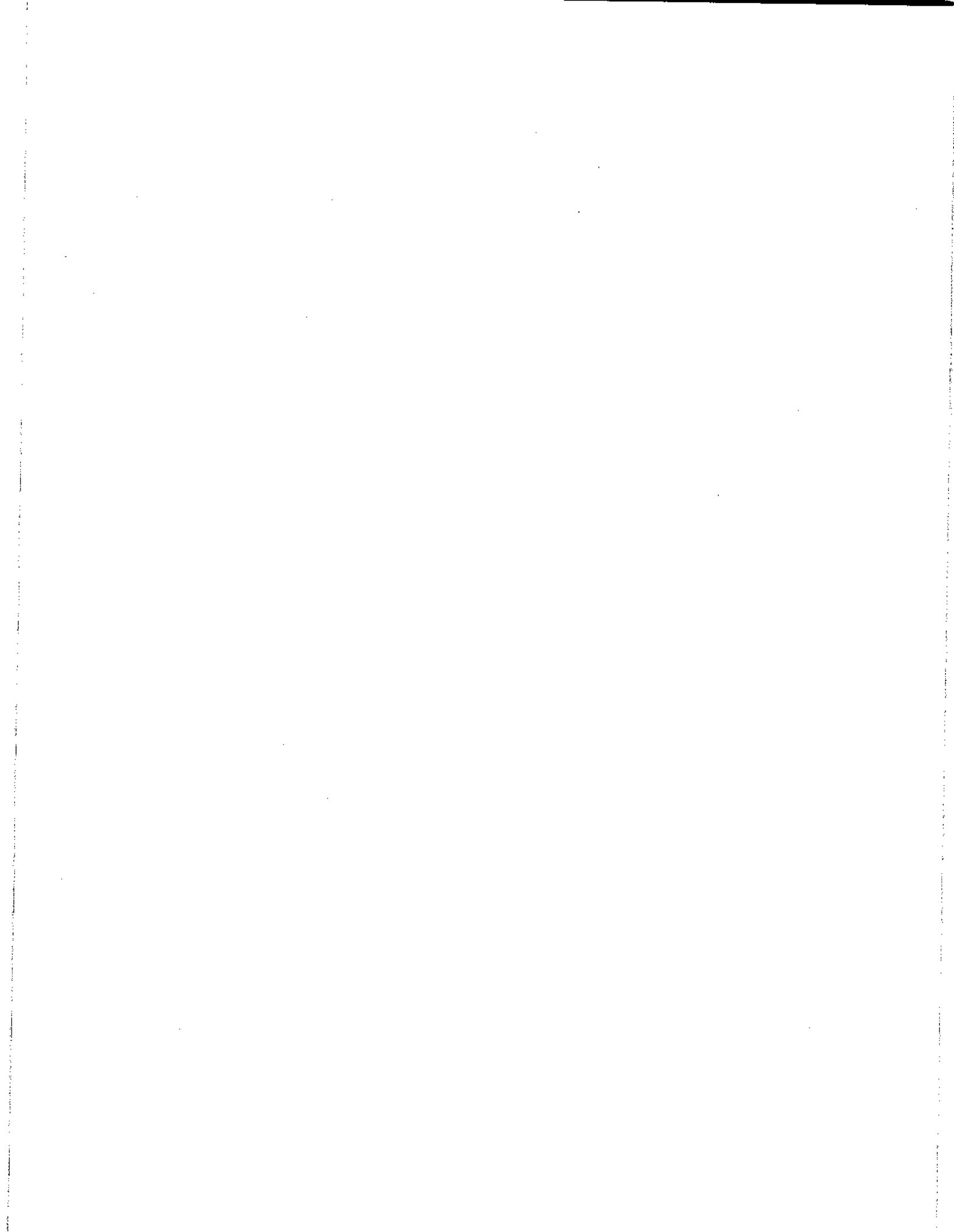
NATO stock number	Item name	Item description
5310-99-787-6222	WASHER, PANEL FASTENER SCREW	Steel, zinc plated w/chromate, 17 mm max od, 9.30 mm max id, 1 mm max matt thk, w/8 cutouts equipments on id
4030-99-790-4364	SHACKLE	D shaped ring swivelling on a threaded rod
4810-99-794-7961	VALVE BLOCK KIT	Valve c/w mtg kit
2530-99-799-0300	KIT, CALIPER N/S	Caliper c/w mtg kit
5305-99-805-6811	SCREW, TAPPING, THREAD FORMING	Steel, zinc plated w/chromatre, pan hd slotted drive, 0.375 in. nom lg
5340-99-804-7030	CLEAT, ROPE	Steel, double horn, 4 in. l, 1 1/4 in. h, 2 mtg holes
5340-99-809-1703	BUSHING, RUBBER	Synthetic, 3/4 in. id, 1 29/64 in. od, 7/8 in h
5310-99-811-0479	WASHER, FLAT, M6, S/STEEL	Fiat washer, st/steel, M6
5330-99-818-6130	GASKET AND SEAL SET	Nine piece set
2530-99-818-9336	PARTS KIT, DISC BRAKE	Brake disc, c/w bolts, washers and gasket
5340-99-821-1372	CLEAT, ROPE	Single closed base, single horn, w/2 mtg holes drilled in base
5310-99-827-5524	NUT, SELF-LOCKING, HEXAGON	M5, steel nut and plastic locking insert
9905-99-831-3338	REFLECTOR, INDICATING, CLEARANCE	Amber, rectangular shape, 10.25 mm l, 6.5 mm h, 48 mm w
2510-99-833-4776	PLATE, CLOSURE	Circular plate with two right angled flanges
5307-99-833-7952	STUD	Axle retaining stud
2530-99-837-3058	KIT, CALIPER O/S	Caliper c/w mtg kit
5305-99-837-9041	SCREW MACHINE	Hexagon head screw, M6 x 20 mm lg
9905-99-842-0061	REFLECTOR, INDICATING, CLEARANCE	Plastic, red, triangular shape, 2 part assy
7690-99-850-3683	STENCIL, MARKING, TYRE PRESSURE	Card stencil template
2510-99-858-1482	ASSEMBLY, LEAF, SPRING	Seven leaf spring held together with four clamps and secured to vehicle with U bolts
2510-99-865-1738	TAILGATE, VEHICLE	S/steel tailgate w/o fittings
2530-99-867-0451	WHEEL, SOLID RUBBER TIRE	Jockey wheel, bush and spindle
5310-99-867-8397	WASHER, PLAIN	Plain washer, M5 x 20 mm dia
5310-99-869-9175	NUT FULL	Nut full
5340-99-874-2272	CLIP, SPRING, TRAILER SOCKET	Spring clip for trailer socket
4720-99-874-2584	HOSE, NONMETALLIC	Rear caliper flexible pipe and fittings
5305-99-875-3045	SCREW MACHINE	Hexagon head screw, M10 x 30 mm lg
4720-99-884-6586	HOSE, NONMETALLIC	Rear valve flexible pipe and fittings
5330-99-884-7659	RUBBER STRIP	Rectangular rubber strip having six holes
5340-99-885-1189	STRAP, RETAINING	Steel, 57 mm h, 2 mtg holes, 30 mm w hoop
5340-99-887-6315	BRACKET, MOUNTING, FENDER	Right angled metal bracket
4010-99-891-0371	CABLE, BREAKAWAY	Twin wire cables joined at 1st end, spring clip at 1st end, loop at each of 2nd ends
5307-99-912-0252	STUD, WHEEL	Headed stud, spline located, M16 thread
9905-99-916-9737	PLATE, INSTRUCTION, CHECKLIST	Rectangular aluminium plate w/hole in each corner
2540-99-927-5359	PLATE, STIFFENER	Metal rectangular plate with two holes
5340-99-930-3191	PLATE, MOUNTING	U section steel bracket
4710-99-934-0978	PIPE, BENT, METALLIC	Preformed rigid brake pipe and fittings

**INDEX OF NATO STOCK NUMBERS
TO
ITEM NAMES AND DESCRIPTIONS**

NATO stock number	Item name	Item description
2530-99-936-3638	PIN, TAPERED, THREADED	Metal pin, tapered 1st end, parallel shaft 2nd end, tapered face between
2510-99-957-9423	HANGAR SPRING, VEHICLE	Straight metal plate with two holes
5315-99-961-3054	TAILGATE SECURING PEG	Metal peg, threaded at 1st end, hole in shank at 2nd end
5340-99-968-3691	STAPLE, HASP	Metal bracket with hole at either end
2540-99-973-9528	PIN, PINTLE	Steel pin with handle
6150-99-975-7189	WIRING HARNESS	Several cables in waterproof cover
6240-99-995-1337	LAMP, FILAMENT	Transparent bulb, 24V, 21w

**INDEX OF NATO STOCK NUMBERS
TO
ITEM NAMES AND DESCRIPTIONS**

NATO stock number	Item name	Item description
5315-99-961-3054	TAILGATE SECURING PEG	Metal peg, threaded at 1st end, hole in shank at 2nd end
5340-99-968-3691	STAPLE, HASP	Metal bracket with hole at either end
2540-99-973-9528	PIN, PINTLE	Steel pin with handle
6150-99-975-7189	WIRING HARNESS	Several cables in waterproof cover
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BFPO 794

From:
.....
.....
.....

Sender's Reference	BIN Number	Date
AESP* Title:		
Chapter(s)/Instruction	Page(s)/Paragraph(s)	
If you require more space, please use the reverse of this form or a separate piece of paper. Comment(s):		

Signed: Telephone No.:
Name (Capitals): Rank/Grade: Date:
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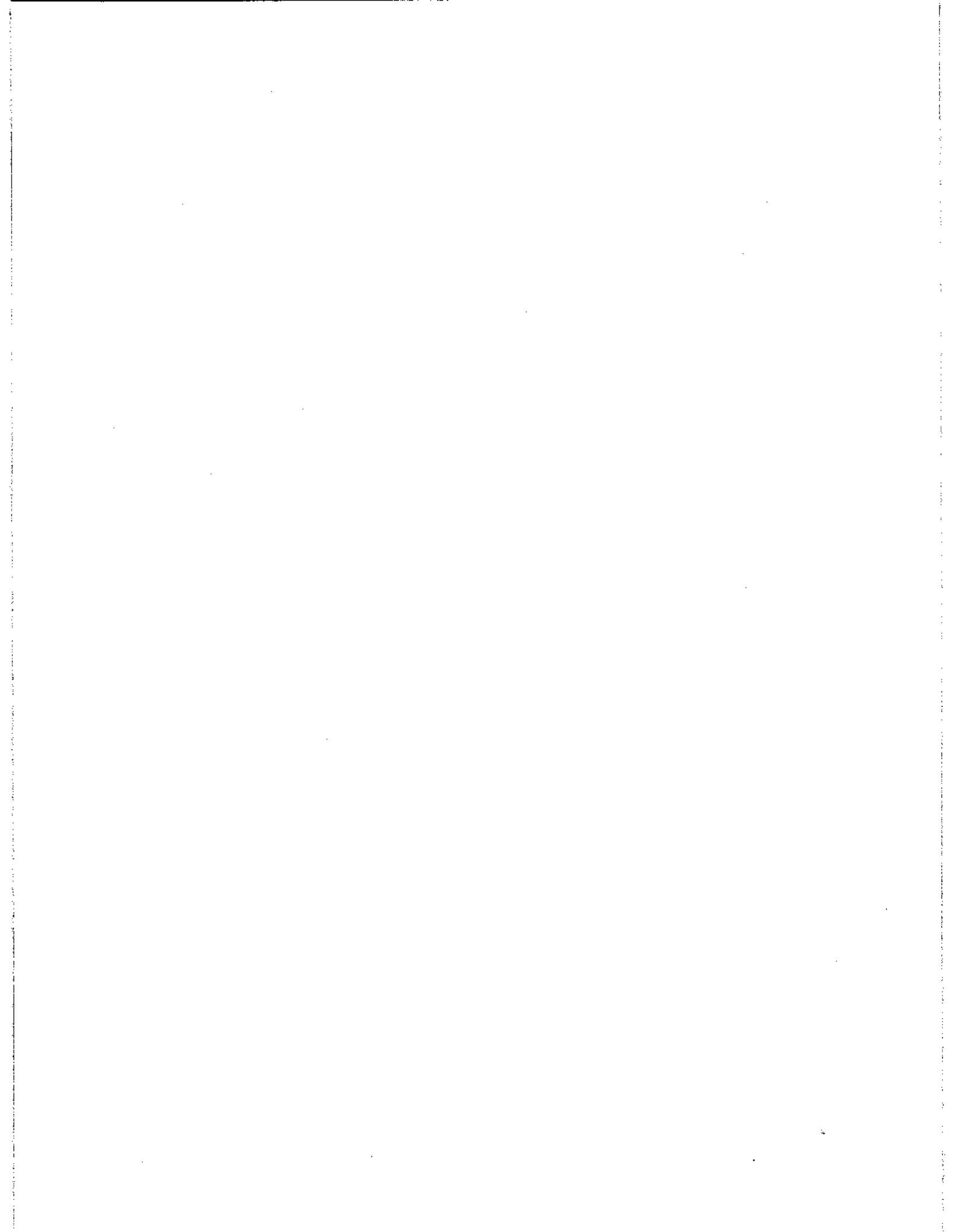
Thank you for commenting on AESP*:

Your reference: Dated:

Action is being taken to:	Tick	Tick
Issue a revised/amended AESP*		Under investigation
Incorporate comment(s) in future amendments		No action required
Remarks		

Signed: Telephone No.:
Name (Capitals): Rank/Grade: Date:

* AESP or EMER





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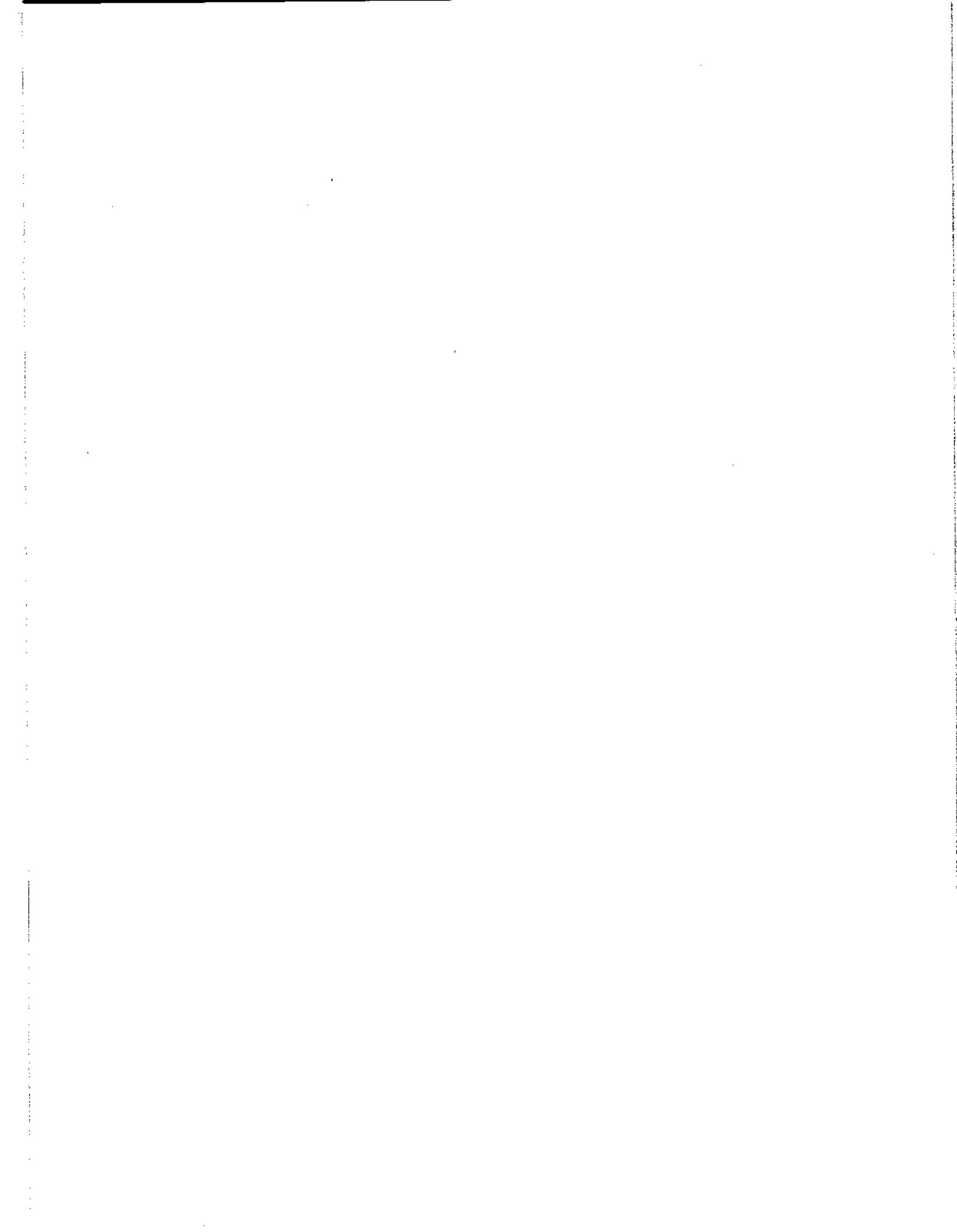
**TRAILER LIGHTWEIGHT
ALL VARIANTS
COMPLETE EQUIPMENT SCHEDULE
SERVICE EDITION
SIMPLE EQUIPMENT**

This publication contains information covering the requirements of levels 1, 2 and 3.

BY COMMAND OF THE DEFENCE COUNCIL

Kevin Trewin

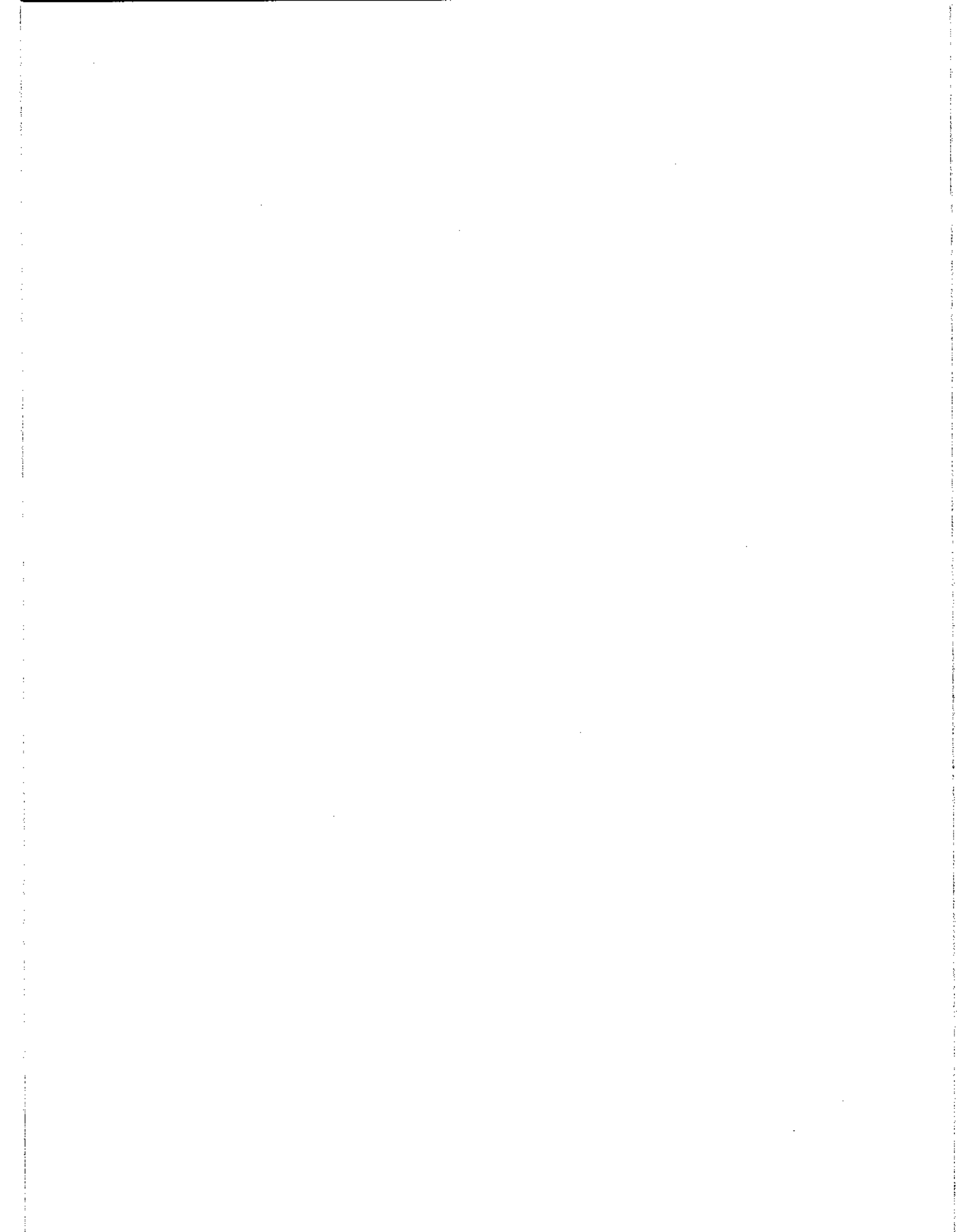
Ministry of Defence
Issued by
DEFENCE LOGISTICS ORGANISATION



AMENDMENT RECORD

Amdt No.	Incorporated by (Signature)	Date
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COMPLETE EQUIPMENT SCHEDULE (SERVICE)

Chapter

- 1 General information
- 2 CES - Trailer Lightweight
- 2-1 Trailer Lightweight GS Cargo
- 3 Indexes
 - 3-1 Index of NATO stock numbers to chapter, figure and item numbers
 - 3-2 Index of manufacturers part/drawing numbers to chapter, figure and item numbers
 - 3-3 Not issued
 - 3-4 Index of NATO supply codes for manufactures to manufacturers name.

PREFACE**Sponsor: DEC ELS****INTRODUCTION**

1 Any comments by service users on this publication should be forwarded through the channels prescribed in Army Equipment Support Publication (AESP) 0100-P-011-013. An AESP Form 10 is provided at the end of this publication; it should be photocopied and used for forwarding comments on this AESP.

2 Service users must register their requirements for this publication on the AESP Form 1(M) attached to this document. Failure to do so will result in the user not receiving the automatic issue of future amendments or additions. The Form 1(1M) should be completed and returned to DLO.

3 AESPs are issued under Defence Council authority and where AESPs specify action to be taken, the AESP will of itself be sufficient authority for such action and also for the demanding of the necessary stores, subject to the provisions of Para 4 below.

4 The subject matter of this publication may be affected by Defence Council Instructions (DCIs), Standard Operating Procedures (SOPs) or by local regulations. When any such Instruction, Order or Regulation contradicts any portion of this publication they are to be taken as the overriding authority.

Instructions for use by units

5 Detailed instructions for use by Units are given in Material Regulations for the Army Vol 1, Para 1.

Initial issues by Royal Logistics Corps

6 Initial issues by Royal Logistics Corps (RLC) are as described below:

6.1 One copy of the CES will be attached to the Units copy of the issue voucher and one further copy accompanying every equipment.

6.2 Deficiencies (if any) will be enfaced on the covering issue voucher by reference to the Serial Number of the items listed in the simple CES.

6.3 'To follow' vouchers will not be created.

6.4 All items listed in the CES can be issued separately. If any listed herein becomes unserviceable it should be extracted and exchanged and the equipment retained pending receipt. Transfers between equipment holders should normally be complete to CES.

In lieu items

7 Authorised 'in lieu' items held against this CES will not be replaced until such time as they are no longer serviceable. When replacement becomes necessary the correct item, as listed in the CES, will be demanded.

General notes

8 Certain items may be annotated as follows:

8.1 (E) - Expendable stores, consumable stores and material, 'NON LEDGER' spare parts of minor value.

8.2 (X) - ESSENTIAL ITEMS without which the RLC will not issue the equipment.

8.3 (*) - This asterisk indicated the accountability classification of the item.

8.4 (NI) - (Not illustrated) when appearing with a number in the 'Fig Item' column indicates that the item is not illustrated.

8.5 (NIV) - (Not in Vocabulary) indicates that the item is not available within the stores system.

Amendments

9 Amendments to the catalogue will be published as and when necessary. These will be numbered consecutively, and the Amendment record sheet is to be completed for each amendment list embodied. New or amended material will be highlighted by side lining to show the extent of the amendment.

Indentations

10 Items are listed in a logical assembly/disassembly order and are identified by the 'dot system' in which each 'Dot' depicts the relationship of the item to the assembly.

MAIN ASSEMBLY

Attaching parts for main assembly.

. FIRST LEVEL OF BREAKDOWN (Sub-assembly or detailed part of main assembly).
. Attaching parts for the first level.

. . SECOND LEVEL OF BREAKDOWN (Sub-sub-assembly or detailed part of sub-assembly).
. . Attaching parts for second level.

Description

11 The item Description and Annotation Block is also to convey additional information to the CES user, which will appear in brackets ie related location detail, eg another AESP or Chapter/Item within this AESP.

ADDITIONAL INFORMATION

Applicability details

12 This CES relates to the following equipment:

12.1	<u>NSN</u>	<u>Code</u>	<u>Contract</u>
	2330-99-908-6472	NB 2853-3107	LLV/DBG/424

RELATED AND ASSOCIATED PUBLICATIONS**Related publications**

13 The Octad for the subject equipment consists of the categories as detailed below. All references are prefixed with the first eight digits of this publication. The availability of the publications can be checked by reference to the relevant Group Index (refer to AESP 0100-A-001-013).

Category/Sub-category			Information Level			
			1 User/Operator	2 Unit Maintenance	3 Field Maintenance	4 Base Maintenance
1	0	Purpose and Planning Information	101	101	101	*
	1	Equipment Support Policy Directives	111	111	111	*
	2	Purpose and Planning Information, Medical and Dental	*	*	*	*
2	0	Operating Information	201	*	*	*
	1	Aide-Memoire	*	*	*	*
	2	Training Aids	*	*	*	*
3		Technical Instructions	201	302	302	*
4	1	Installation Instructions	411	411	411	*
	2	Preparation for Special Environments	421	421	421	*
5	1	Failure Diagnosis	201	512	512	*
	2	Repair Instructions	201	522	522	*
	3	Inspection Standards	*	532	532	*
	4	Calibration Procedure	*	*	*	*
6		Maintenance Schedule	601	601	*	*
7	1	Illustrated Part Catalogue	711	711	711	*
	2	Commercial Parts List	*	*	*	*
	3	Complete Equipment Schedule, Production	*	*	*	*
	4	Complete Equipment Schedule, Service Edition (Simple Equipment)	741	741	741	*
	5	Complete Equipment Schedule, Service Edition (Complex Equipment)	*	*	*	*
8	1	Modification Instructions	*	*	*	*
	2	General Instructions, Special Technical Instructions and Servicing Instructions	*	821	821	*
	3	Service Engineered Modification Instructions (RAF only)	*	*	*	*

* Categories/Sub-categories not published

Associated publications14 **Reference** **Title**

Nil

LIST OF ABBREVIATIONS AND SYMBOLS

ABBREVIATIONS

15 The following abbreviations are listed and included at the discretion of the publication authority.

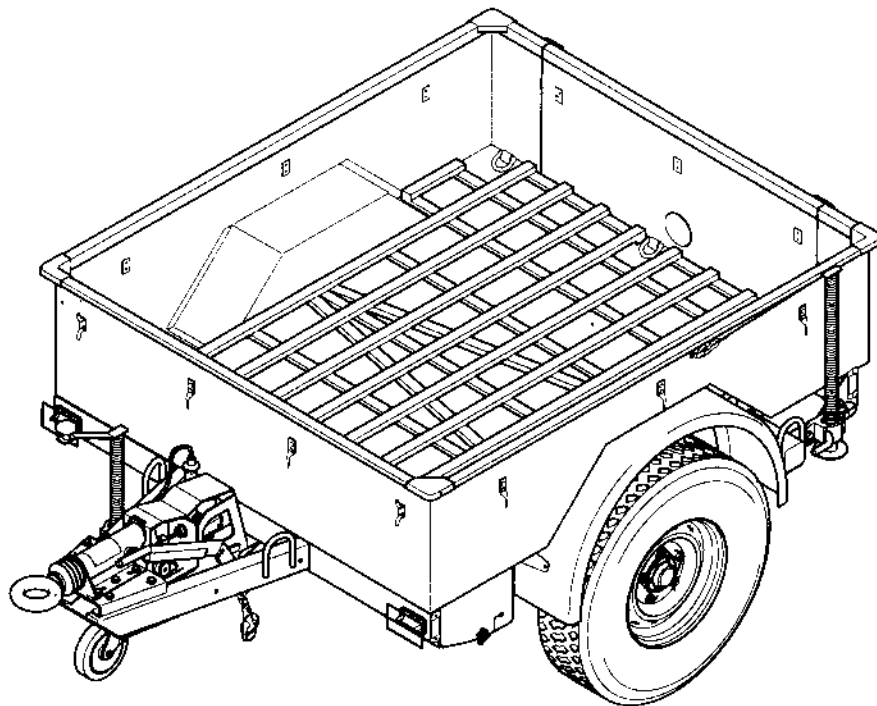
A	Ampere	dB	Decibel
ac	Alternating current	dc	Direct current
A/F	Across flats	deg	Degree
Ag	Silver	dia	Diameter
Al	Aluminium	dim	Dimension
ANC	American national coarse thread	DIN	German metric thread
ANF	American national fine thread	dp	Double pole
ANP	American national pipe thread	dpdt	Double pole, double-throw
ANPT	American national taper thread	dpst	Double pole, single-throw
approx	approximately	dt	Double throw
A/R	As required		
asb	Asbestos	ext	External
assy	Assembly		
Au	Gold	F	Fahrenheit
AWG	American wire gauge	F	Farad
		Fe	Iron
BA	British association screw thread	Fig	Figure
Be	Beryllium	flex	Flexible
bhp	Brake horse power	fl oz	Fluid ounce
br	Brass	ft	Foot, feet
BS	British Standard		
BSF	British standard fine thread	g	Gramme
BSP	British standard pipe thread	gal	Gallon
BSPT	British standard pipe taper thread	galv	Galvanised
BSW	British standard Whitworth thread		
Blu	British thermal unit	h	Height, high
		H	Henry
C	Celsius (centigrade)	h	Hour
c	Centi (one hundredth)	hd	Head
cc	Cubic centimetre	hex	Hexagon
ccw	Counterclockwise	Hg	Mercury
Cd	Cadmium	hp	Horse power
circ	Circumference	HSS	High speed steel
cm	Centimetre	HTS	High tensile steel
Co	Cobalt	Hz	Hertz
contd	Continued		
Cr	Chromium	id	Inside diameter
cres	Corrosion resistant steel	in.	Inch
csk	Countersunk	incl	Inclusive
Cu	Copper	int	Internal
cw	Clockwise		
c/w	Complete with	J	Joule
cwt	Hundredweight		
		k	Kilo (one thousand)
		kg	Kilogramme
		km	Kilometre
		kV	Kilovolt
		kW	Kilowatt
		lg	Long (length)
		lh	Left hand
		LT	Low tension

LIST OF ABBREVIATIONS AND SYMBOLS (continued)

M	Mega (one million)	s	Second (time)
m	Metre	sect	Section
m	Milli (one thousandth)	sp	Single-pole
max	Maximum	spdt	Single-pole, double-throw
mb	Millibar	spst	Single-pole, single-throw
mfg	Manufacturing	sq	Square
mfr	Manufacturer	st	Single-throw
Mg	Magnesium	std	Standard
min	Minimum	SWG	Standard wire gauge
min	Minute (time)		
Mk	Mark	t	Tonne
ml	Millilitre	temp	Temperature
mm	Millimetre	thd	Thread
Mn	Manganese	thk	Thick
mod	Modification	Ti	Titanium
mtd	Mounted	tpi	Threads per inch
mtg	Mounting	tub	Tubular
matl	Material		
		?	Micro (one millionth)
n	Nano (one thousand-millionth)	UNC	Unified coarse thread
N	Newton	UNF	Unified fine thread
N	Nitrogen	u/s	Under-size
N/A	Not applicable	u/w	Used with
neg	Negative		
Ni	Nickel	V	Volt
NI	Not illustrated	var	Variable
No.	Number	vol	Volume
nom	Nominal		
NP	Non provisioned	W	Watt
NSN	NATO stock number	w	Width, wide
		w/	With
O	Oxygen	Whit	Whitworth
o/a	Over-all	wkg	Working
od	Outside diameter	w/o	Without
o/s	Over-size	wt	Weight
oz	Ounce		
		yd	Yard
Pb	Lead		
Phos B	Phosphor bronze	Zn	Zinc
pkg	Package		
pos	Positive		
pr	Pair		
psi	Pounds force per square inch		
Pt	Platinum		
pt	Pint		
PTFE	Polytetrafluoroethylene		
PVC	Polyvinyl Chloride		
%	Percent		
qty	Quantity		
rad	Radius		
rd			

CHAPTER 1
GENERAL INFORMATION
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TRL/063

Trailer Lightweight

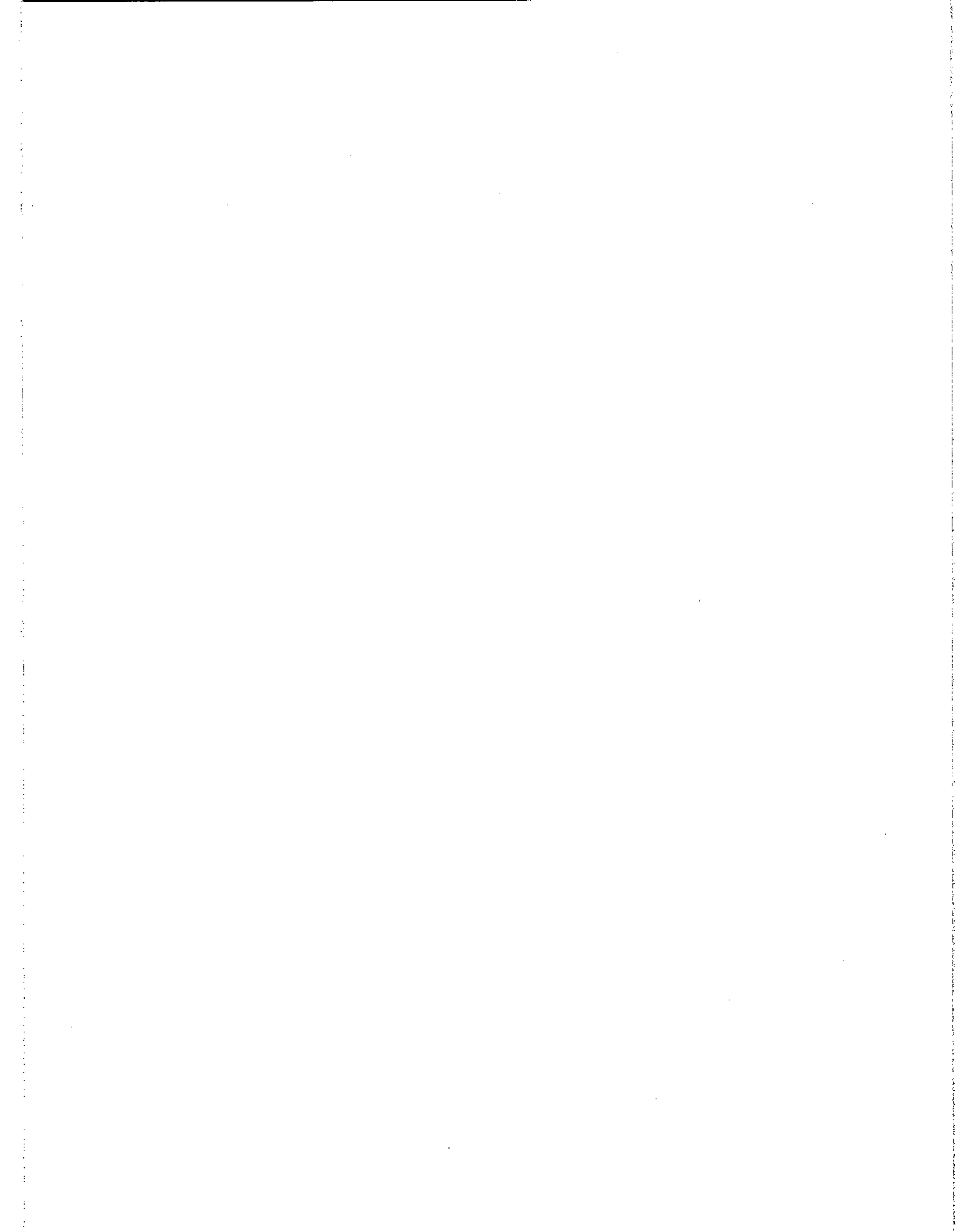


CHAPTER 2
COMPLETE EQUIPMENT SCHEDULE (SERVICE)
SIMPLE EQUIPMENT
TRAILER LIGHTWEIGHT

CONTENTS

Chapter

- 2-1 Trailer lightweight GS cargo

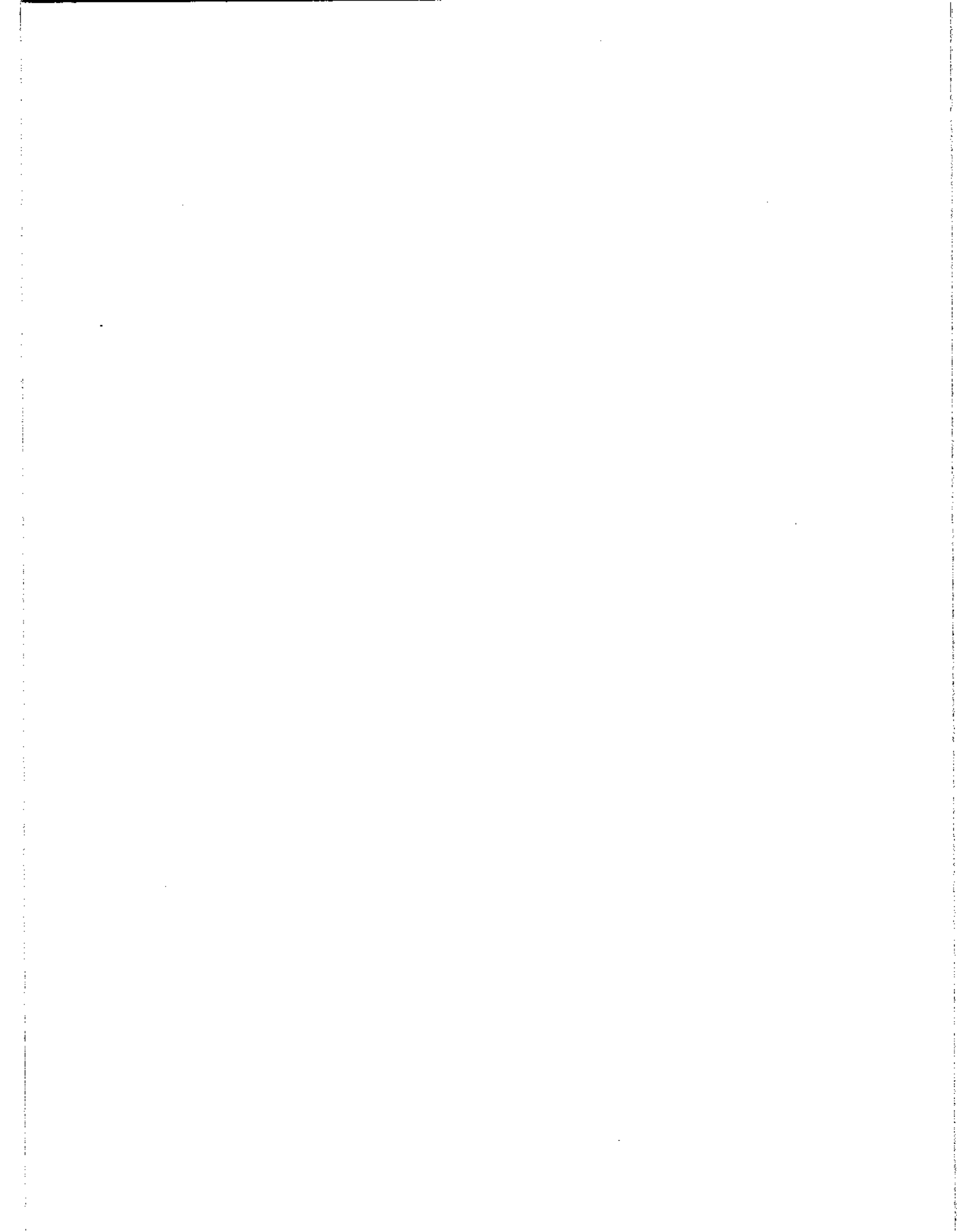


CHAPTER 2-1
COMPLETE EQUIPMENT SCHEDULE (SERVICE)
SIMPLE EQUIPMENT
TRAILER LIGHTWEIGHT GS CARGO

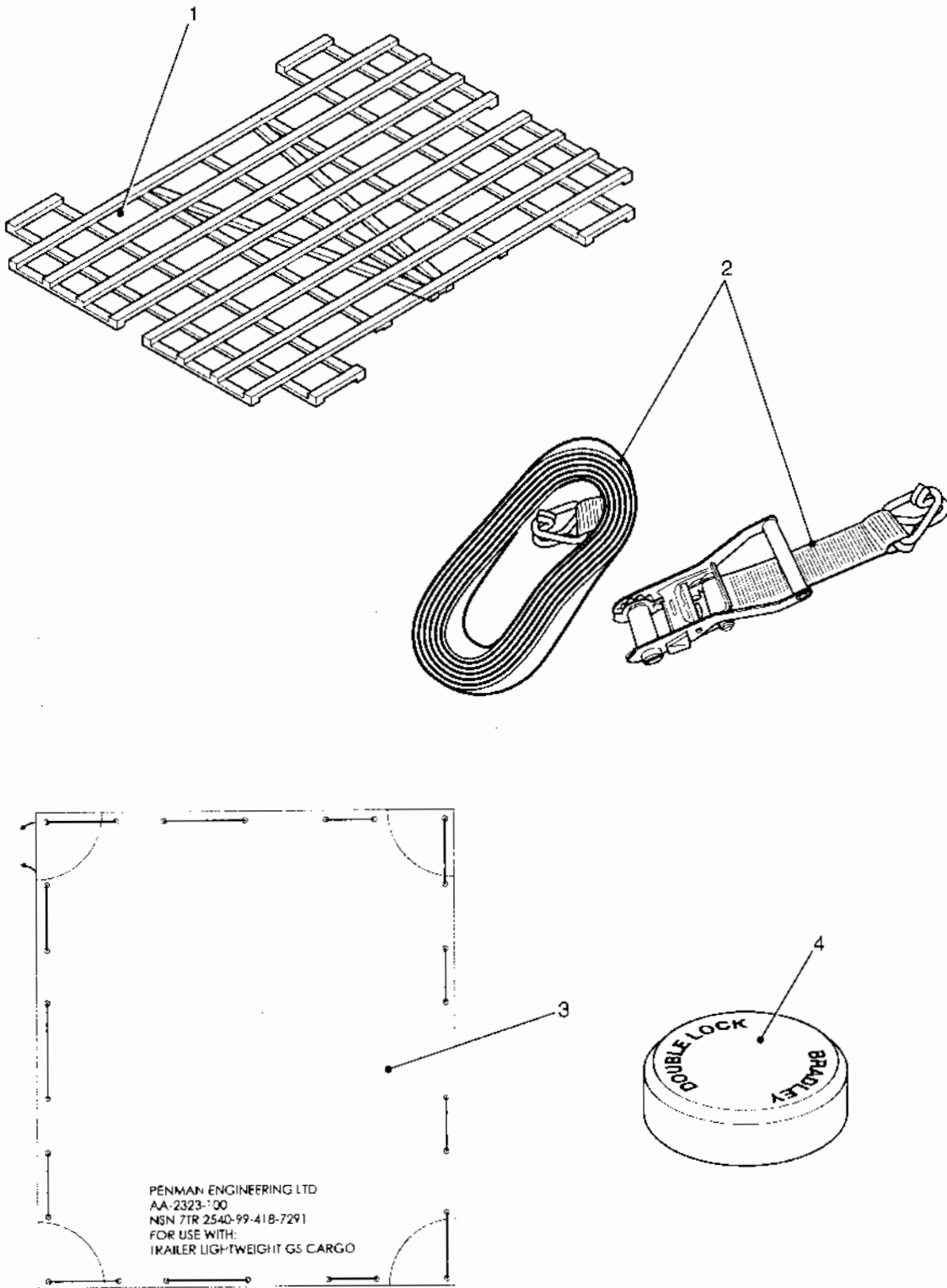
CONTENTS

Chapter

- 2-1 Trailer lightweight GS cargo
- 2-1-1 Main items
- 2-1-2 Literature



CHAPTER 2-1-1
COMPLETE EQUIPMENT SCHEDULE (SERVICE)
SIMPLE EQUIPMENT
MAIN ITEMS

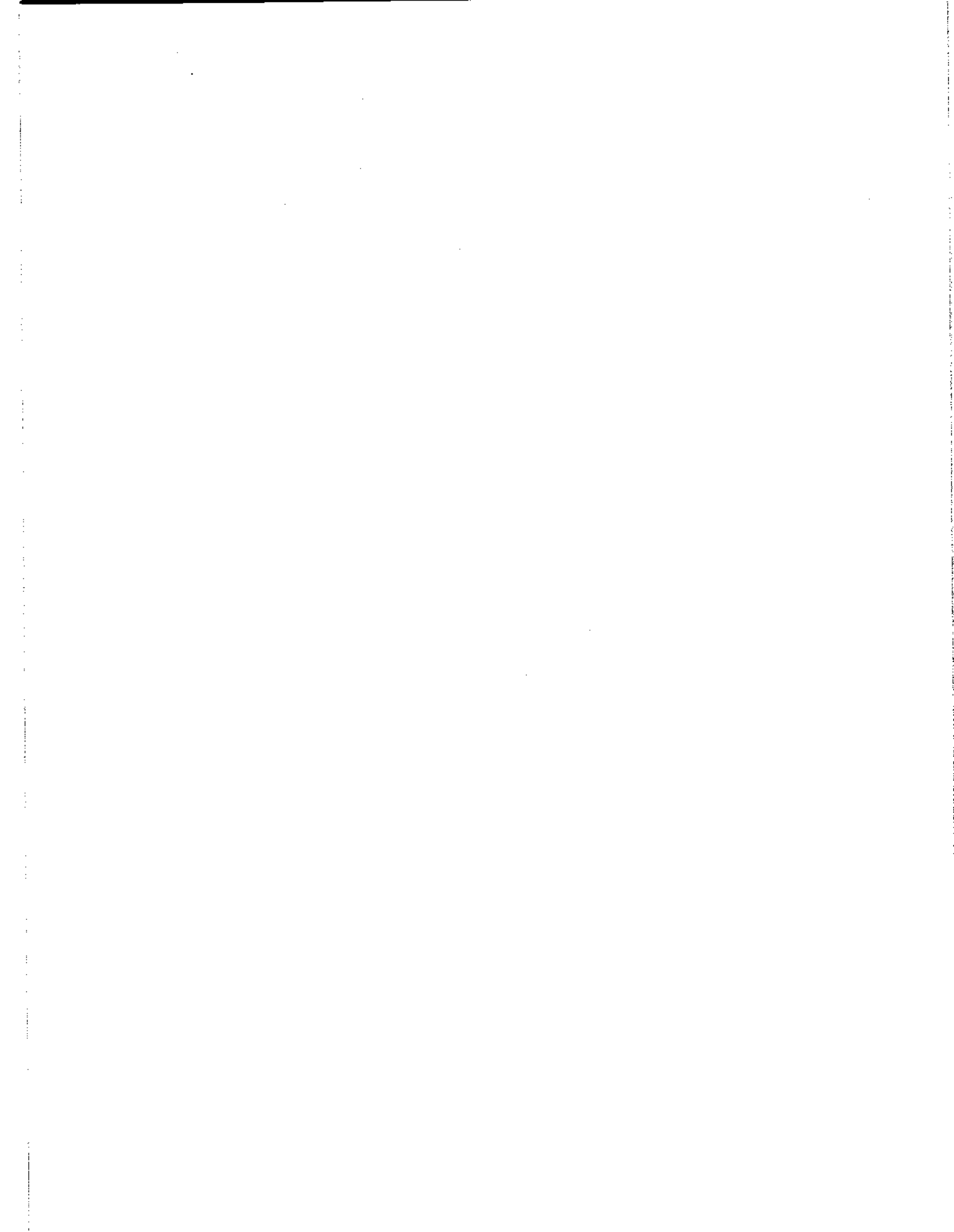


TRL/062

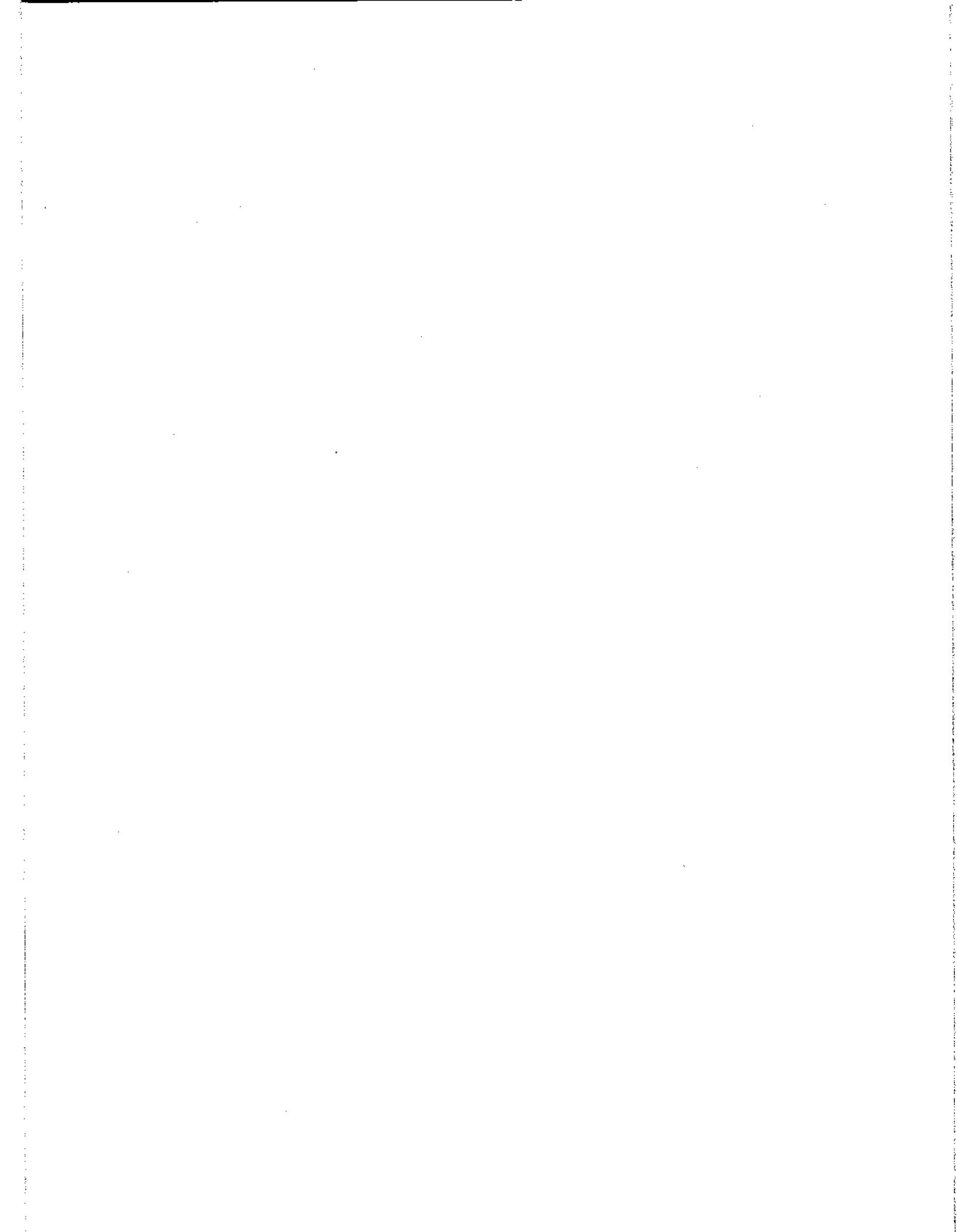
Fig 1 Main items

CES

Fig No. Item No.	DMC NSCM	Army NSN Part Number	Item Description and Annotations	No. Off D of Q	Quantity on Issue
1 NI	0	NIV	MAIN ITEMS	REF	
1	7TR K8232	2590-99-724-2328 AA-2323-232	. DUCKBOARD	1 EA	
2	7TR K8232	5340-99-269-1833 AA-2323-279	. STRAP, WEBBING	3 EA	
3	7TR K8232	2540-99-418-7291 AA-2323-100	. TARPULIN	1 EA	
4	6MT9 K6226	5340-99-811-6990 64476964	. COVER, PROTECTIVE, DUST AND MOISTURE SEAL	1 EA	

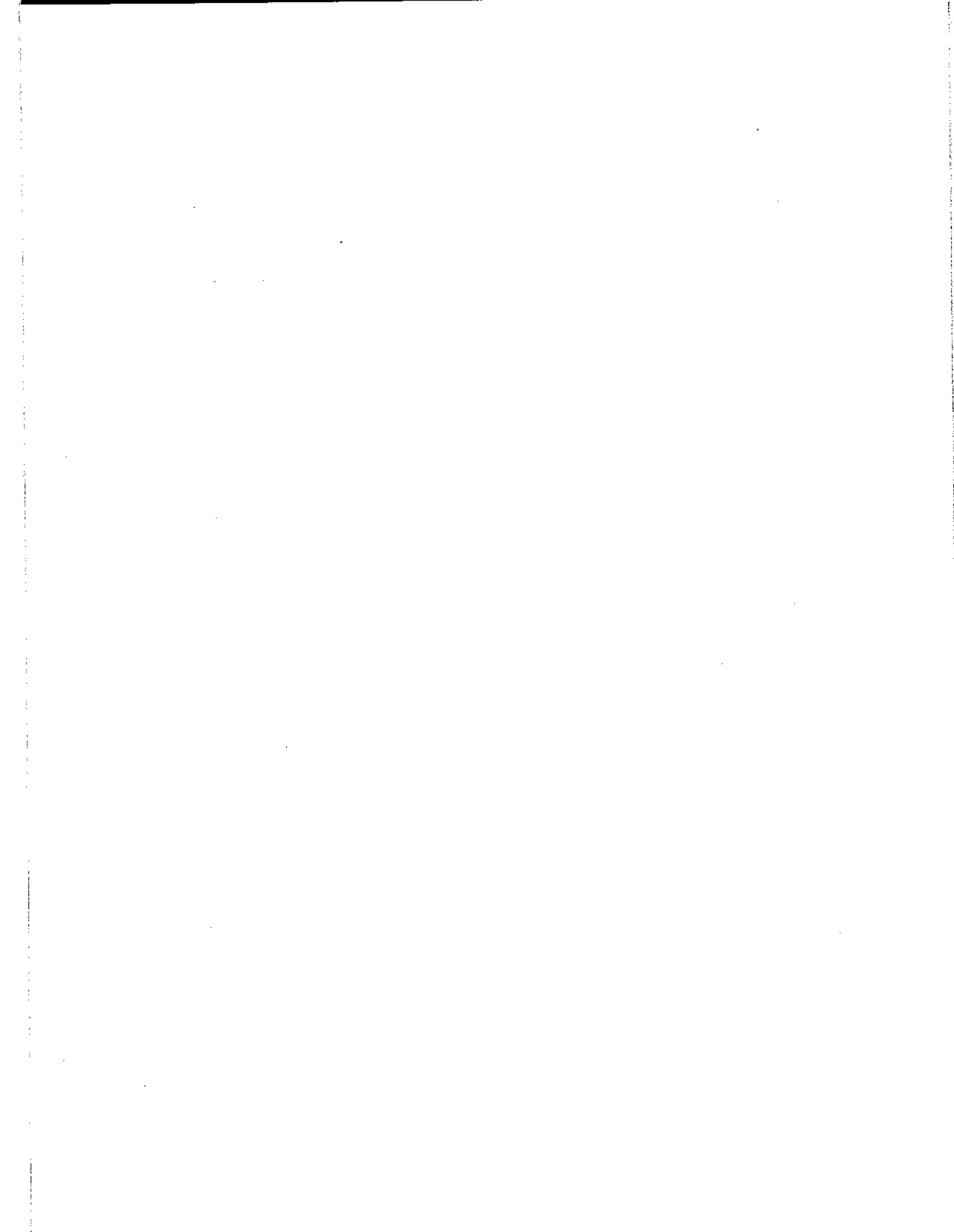


CHAPTER 2-1-2
COMPLETE EQUIPMENT SCHEDULE (SERVICE)
SIMPLE EQUIPMENT
LITERATURE



CES

Fig No. Item No.	DMC NSCM	Army NSN Part Number	Item Description and Annotations	No. Off D of Q	Quantity on Issue
1 NI	0	NIV	LITERATURE	REF	
NI	1	EQPT 2330-99-908-6472 AESP 2330-E-202-741	. TRAILER LIGHTWEIGHT GS CARGO COMPLETE EQUIPMENT SCHEDULE (SERVICE)	1 EA	
NI	2	NIV	. BINDER FOR EQUIPMENT RECORDS	1 EA	
NI	3	NIV AB 562	. EQUIPMENT RECORD BOOK	1 EA	
NI	4	NIV AESP 2330-E-202-201	. OPERATING INFORMATION	1 EA	
NI	5	NIV AESP 2330-E-202-601	. MAINTENANCE SCHEDULE	1 EA	



CHAPTER 3

INDEXES

CONTENTS

Para

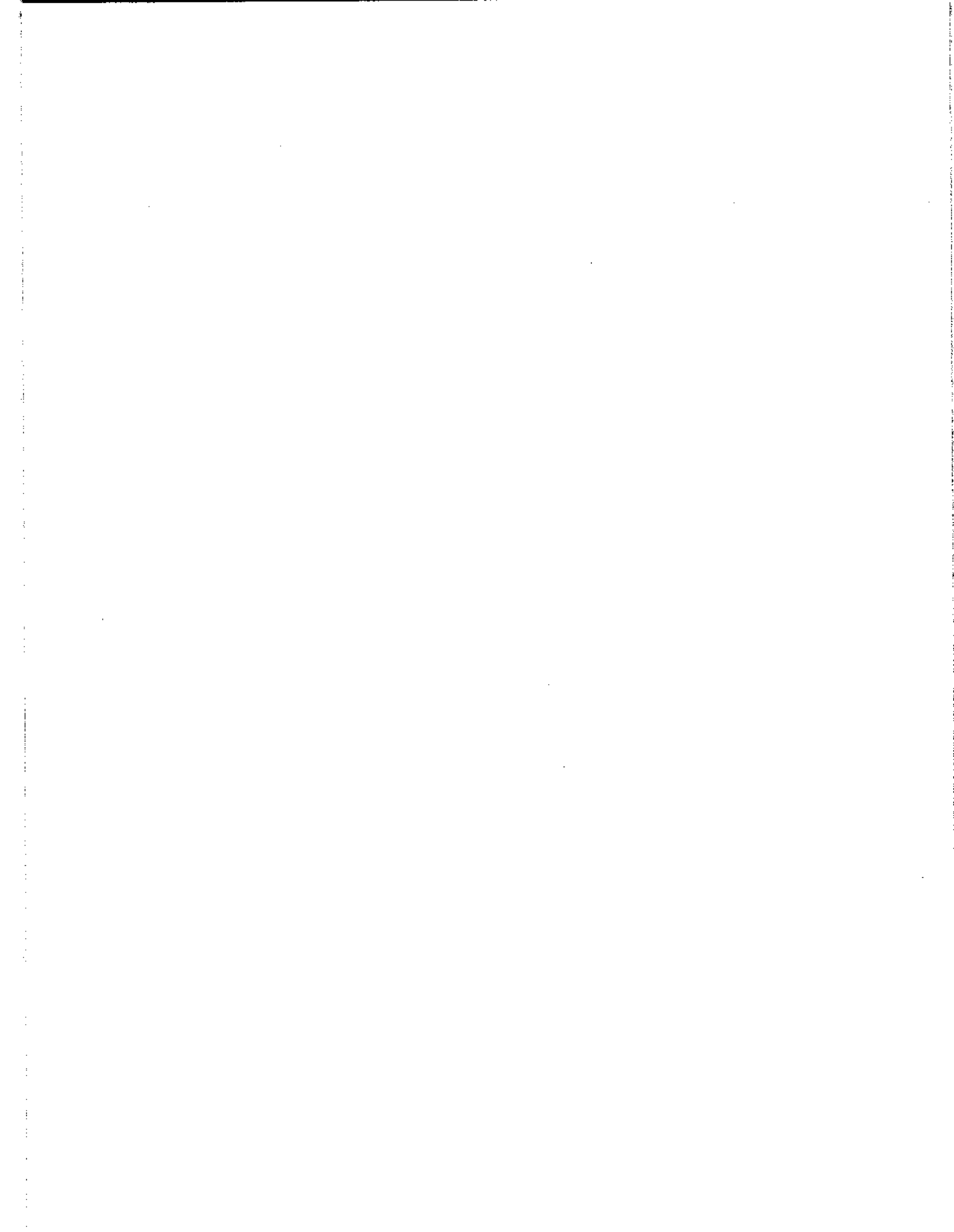
- 1 Introduction

Chapter

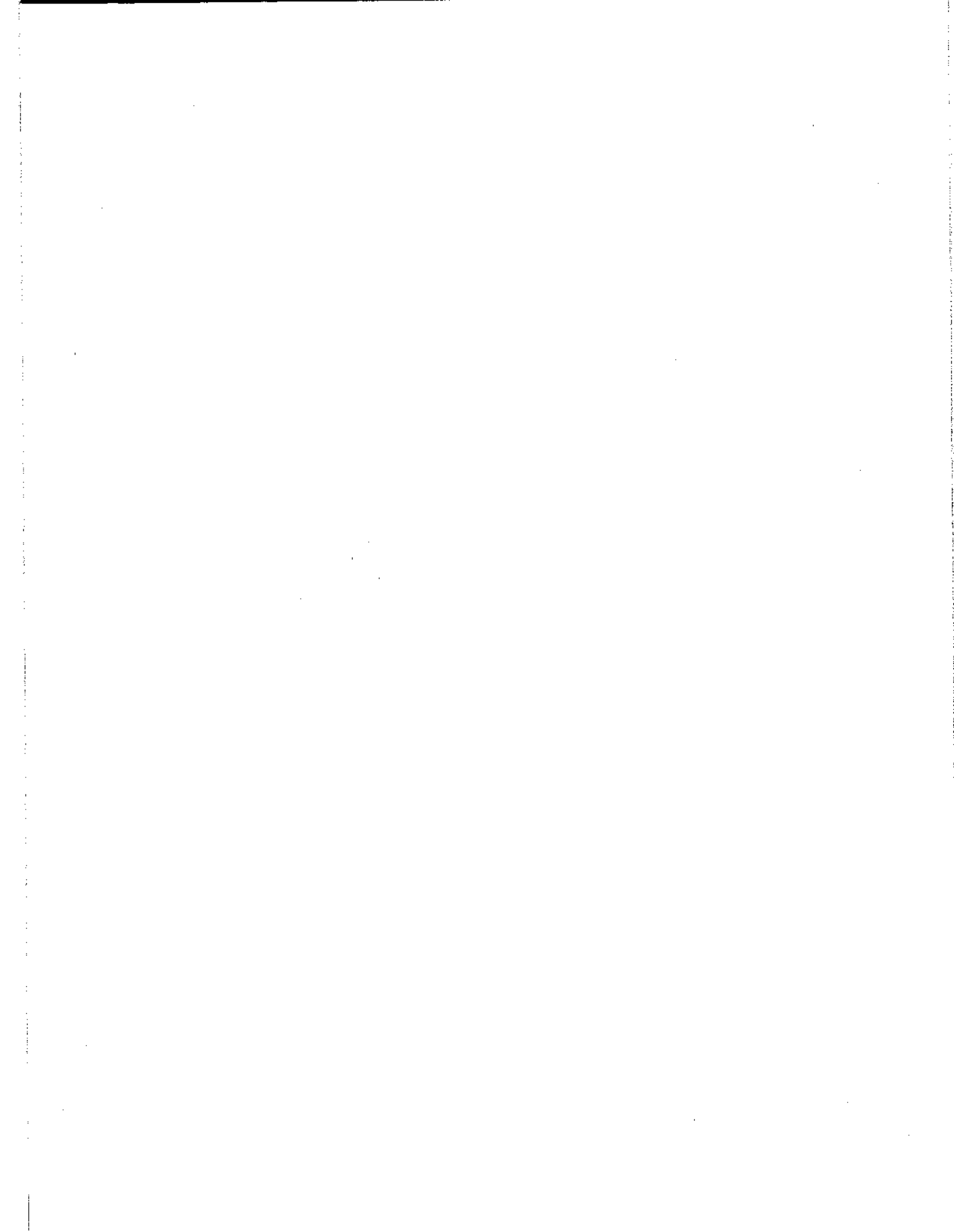
- 3-1 Index of NATO Stock Numbers to Chapter, Figure and Item Numbers.
- 3-2 Index of Manufacturers Part/Drawing Numbers to Chapter, Figure and Item Numbers.
- 3-3 Not Issued.
- 3-4 Index of NATO Supply Codes for Manufacturers to Manufacturers Name.

INTRODUCTION

- 1 This chapter identifies the number of indexes provided in support of the main Parts List.

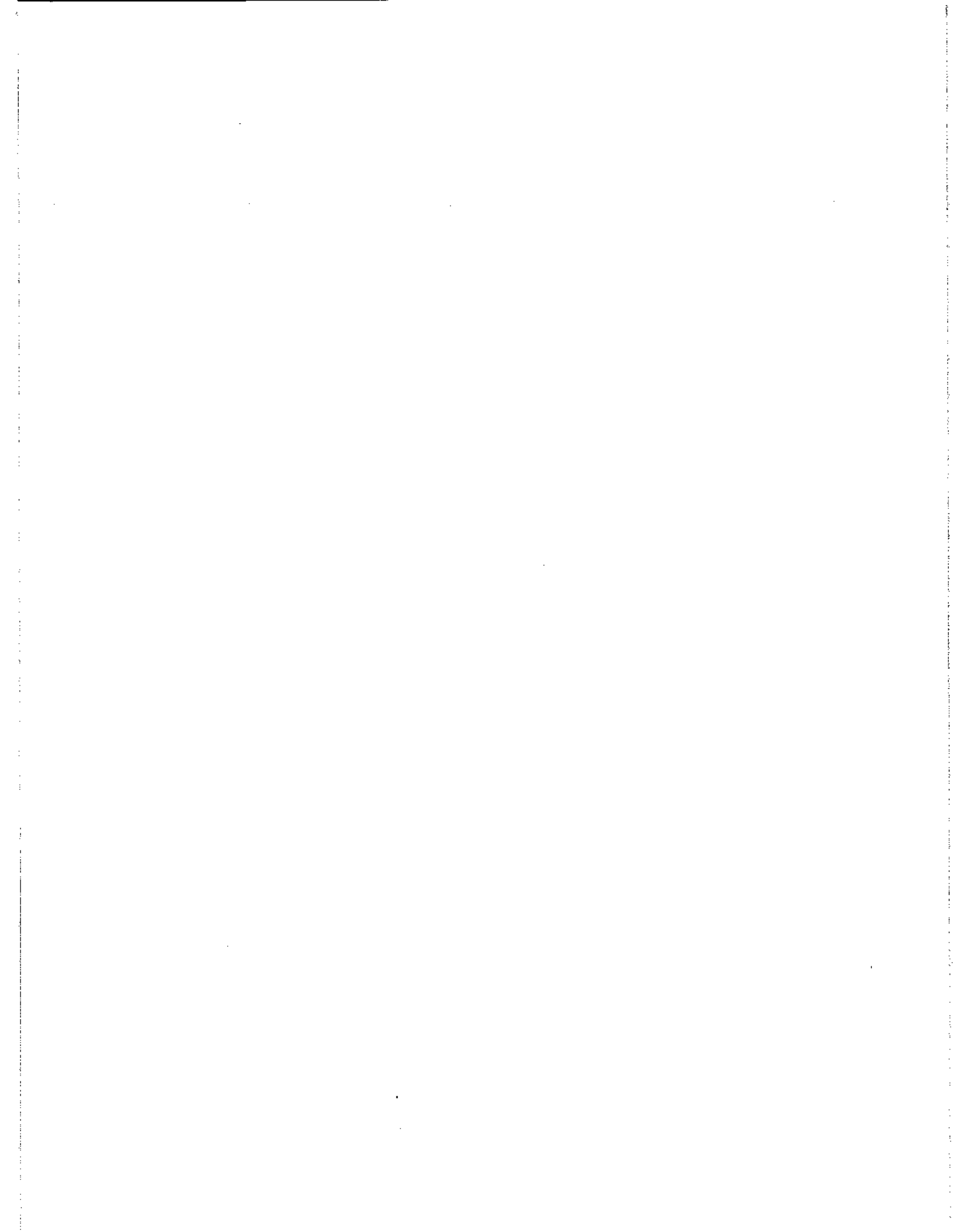


CHAPTER 3-1
INDEX OF NATO STOCK NUMBERS
TO
CHAPTER, FIGURE AND ITEM NUMBERS

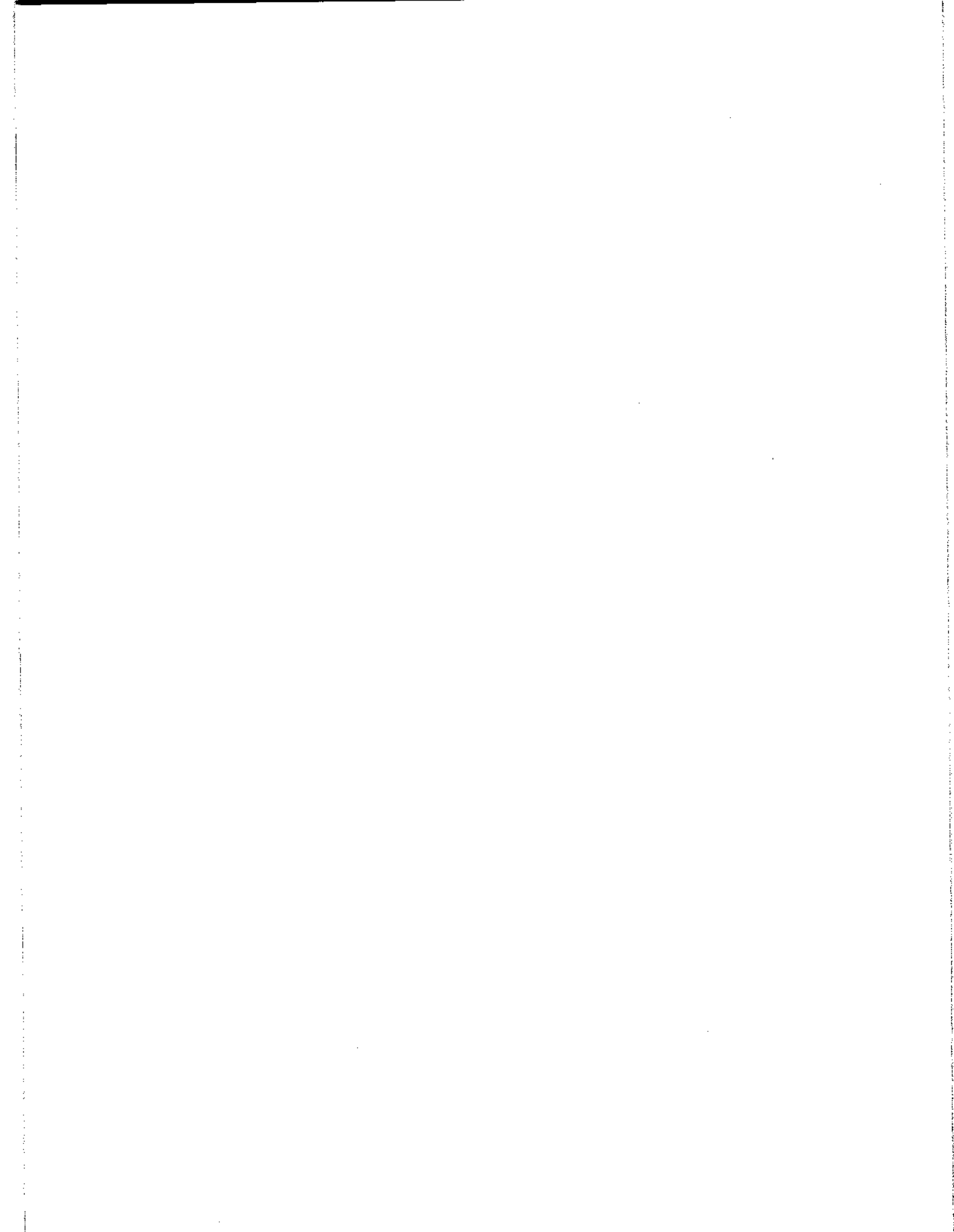


**INDEX OF NATO STOCK NUMBERS
TO CHAPTER, FIGURE AND ITEM NUMBERS**

NATO Stock Number	Chapter 2-Sub-chap	Fig & Item	NATO Stock Number	Chapter 2-Sub-chap	Fig & Item
5340-99-269-1833	1-1	1-2			
2540-99-418-7291	1-1	1-3			
2590-99-724-2328	1-1	1-1			
5340-99-811-6990	1-1	1-4			
2330-99-908-6472	1-2	1-N11			

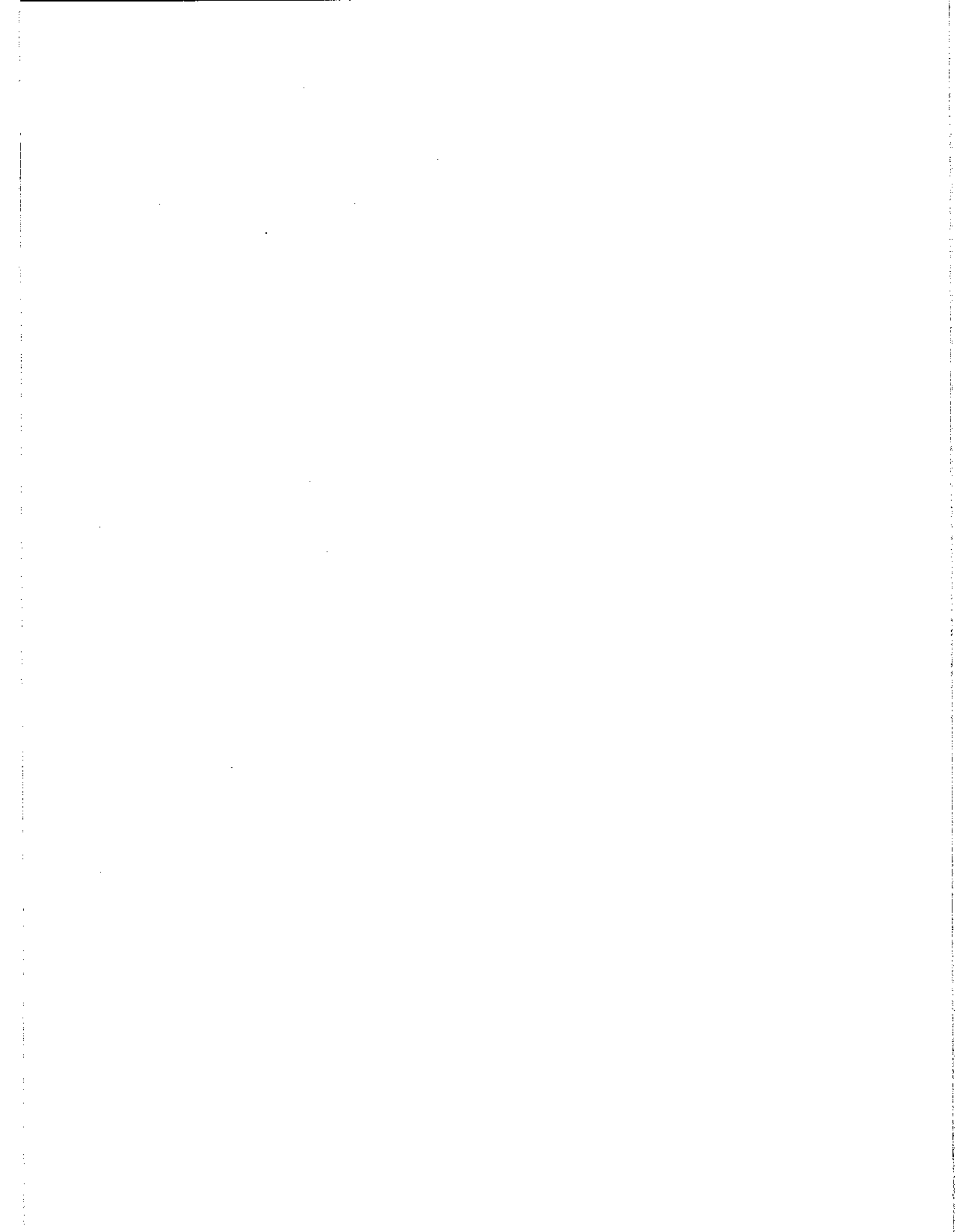


CHAPTER 3-2
INDEX OF MANUFACTURERS PART/DRAWING NUMBERS
TO
CHAPTER, FIGURE AND ITEM NUMBERS

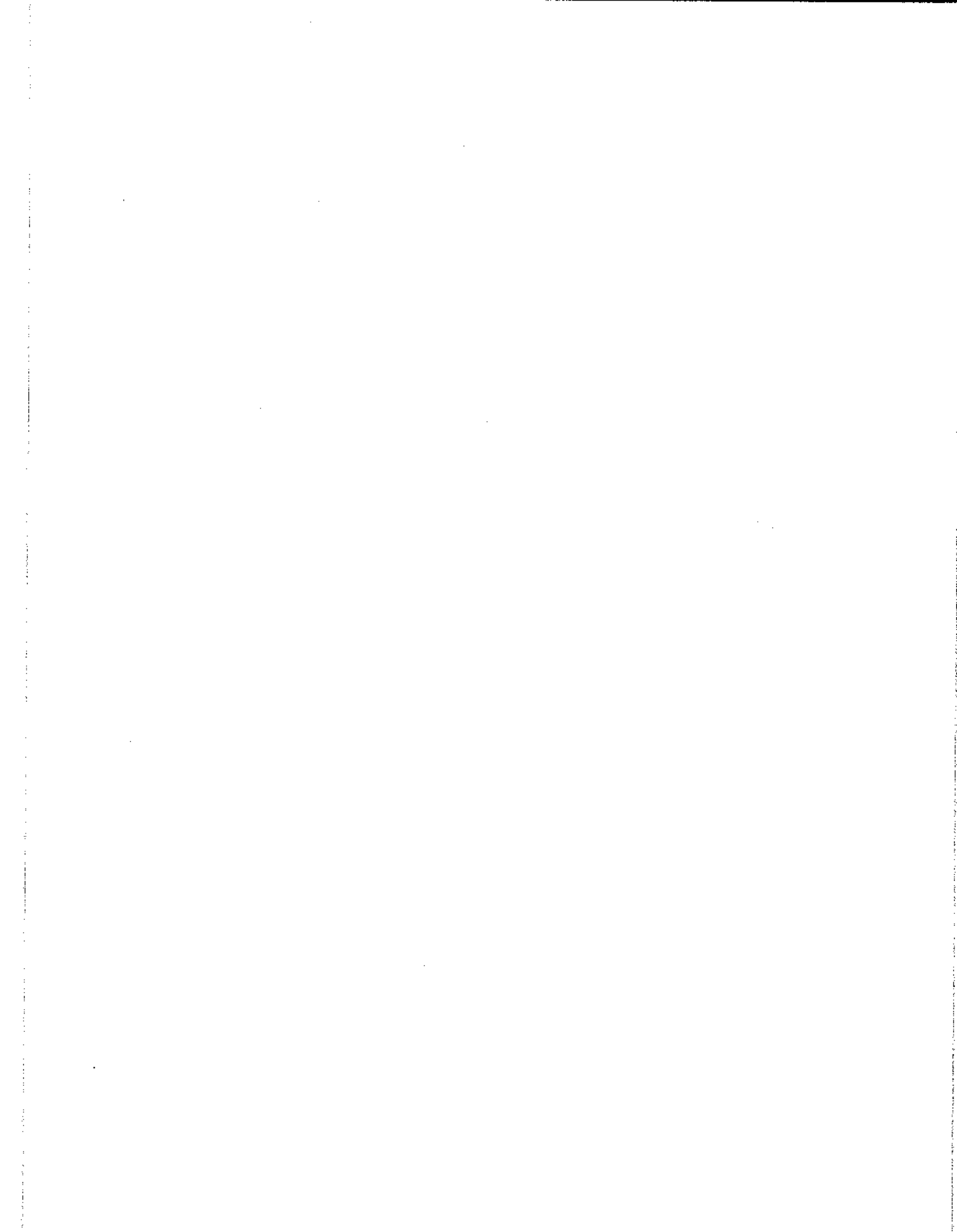


**INDEX OF MANUFACTURERS PART/DRAWING NUMBERS
TO CHAPTER, FIGURE AND ITEM NUMBERS**

Manufacturers Part or Drawing Numbers	Chapter 2- Sub-chap	Fig & Item
AA-2323-100	1-1	1-3
AA-2323-232	1-1	1-1
AA-2323-279	1-1	1-2
AB 562	1-2	1-NI 3
AESP 2330-E-202-201	1-2	1-NI 4
AESP 2330-E-202-601	1-2	1-NI 5
AESP 2330-E-202-741	1-2	1-NI 1
64476964	1-1	1-4

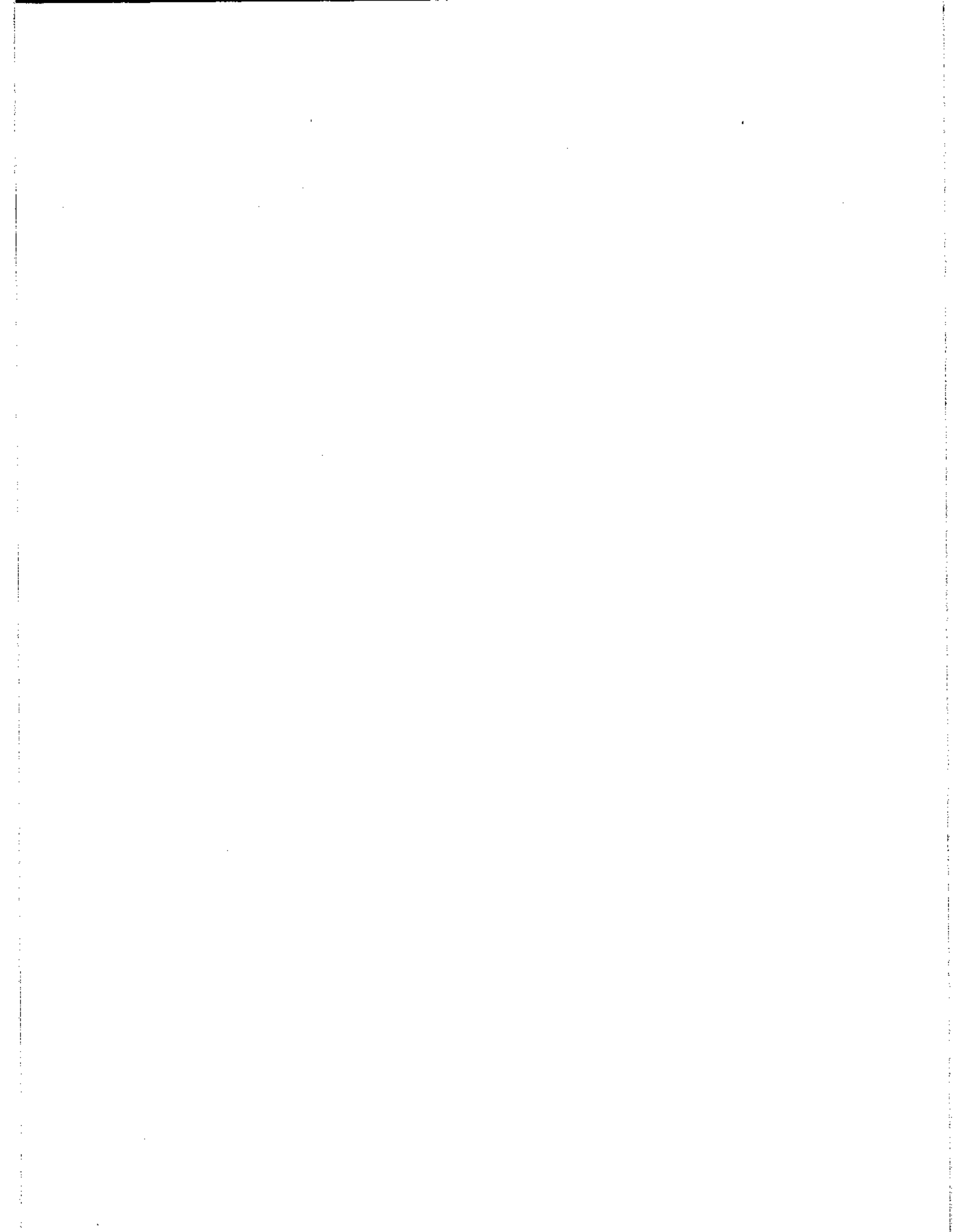


CHAPTER 3-4
INDEX OF NATO SUPPLY CODES FOR MANUFACTURERS
TO
MANUFACTURERS NAME



INDEX OF NATO SUPPLY CODES FOR MANUFACTURERS TO MANUFACTURERS NAME

NSCM	Manufacturer	NSCM	Manufacturer
K6226	Bradley Doublelock Ltd, Bingley, BD16 2NH		
K8232	Penman Engineering Ltd, Dumfries, DG1 3NY		



AESP REQUEST FORM 1 (M)

To: DSDC(L)7c Mwrwg Road Llangennech Llanelli Carmarthen SA14 8YP	BIN Number <table border="1" style="width:100%; height: 20px;"> <tr><td> </td><td> </td><td> </td><td> </td></tr> </table>					UIN Number <table border="1" style="width:100%; height: 20px;"> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> </table>							Demand Serial No <table border="1" style="width:100%; height: 20px;"> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> </table>									Demand Date <table border="1" style="width:100%; height: 20px;"> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> </table>								
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Unit Address

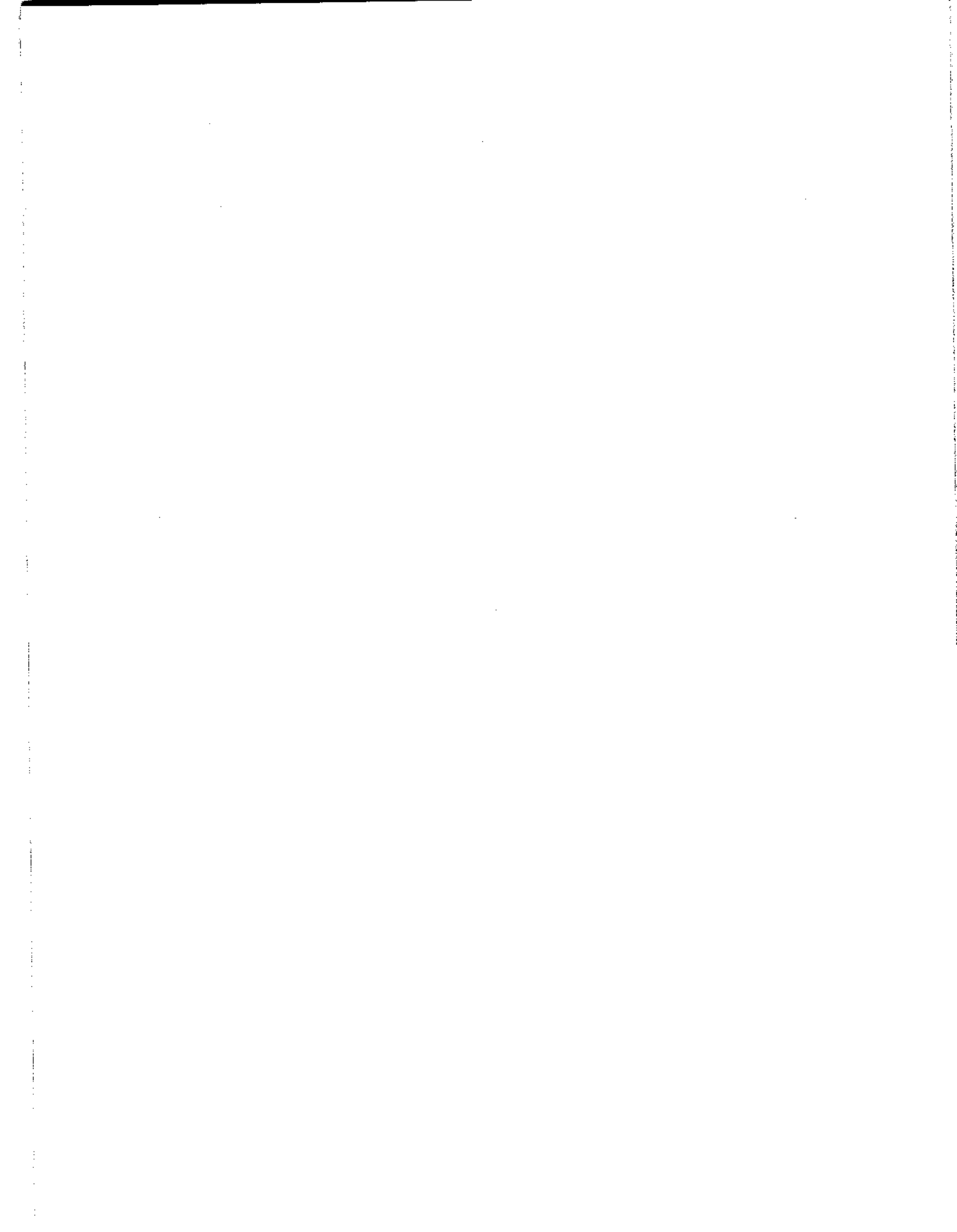
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2 War	
3 War Urgent	
4 War Routine	
5 Justified Urgent	
6 Urgent Exercise	
7 Urgent Inspection	
8 Routine	

ARMY EQUIPMENT
SUPPORT PUBLICATION

2330-E-202-741



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BFPO 794

From:
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Sender's Reference	BIN Number	Date
AESP* Title:		
Chapter(s)/Instruction	Page(s)/Paragraph(s)	
If you require more space, please use the reverse of this form or a separate piece of paper. Comment(s):		

Signed: Telephone No.:
Name (Capitals): Rank/Grade: Date:
X.....

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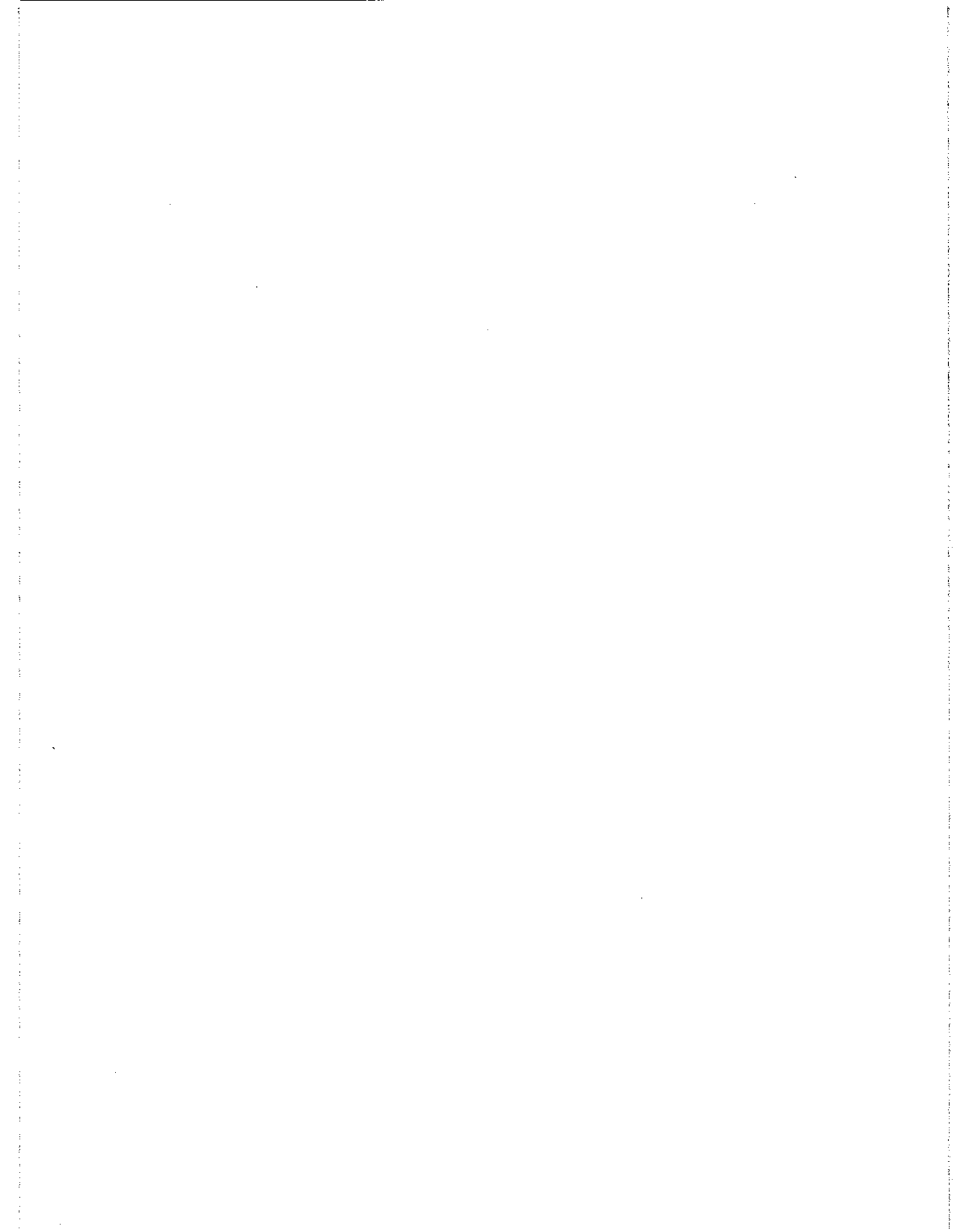
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Action is being taken to:	Tick	Tick
Issue a revised/amended AESP*		Under investigation
Incorporate comment(s) in future amendments		No action required
Remarks		

Signed: Telephone No.:
Name (Capitals): Rank/Grade: Date:

* AESP or EMER





TRAILER LIGHTWEIGHT GS CARGO

MODIFICATION INSTRUCTIONS AND INDEX

Sponsored for use in the

**UNITED KINGDOM MINISTRY OF DEFENCE
AND ARMED FORCES**

By

**DEFENCE EQUIPMENT & SUPPORT
SPECIALIST & LOGISTIC VEHICLE PROJECT TEAM**

**MOD Abbey Wood
Bristol
BS34 8JH**


**PUBLICATIONS AUTHORITY:
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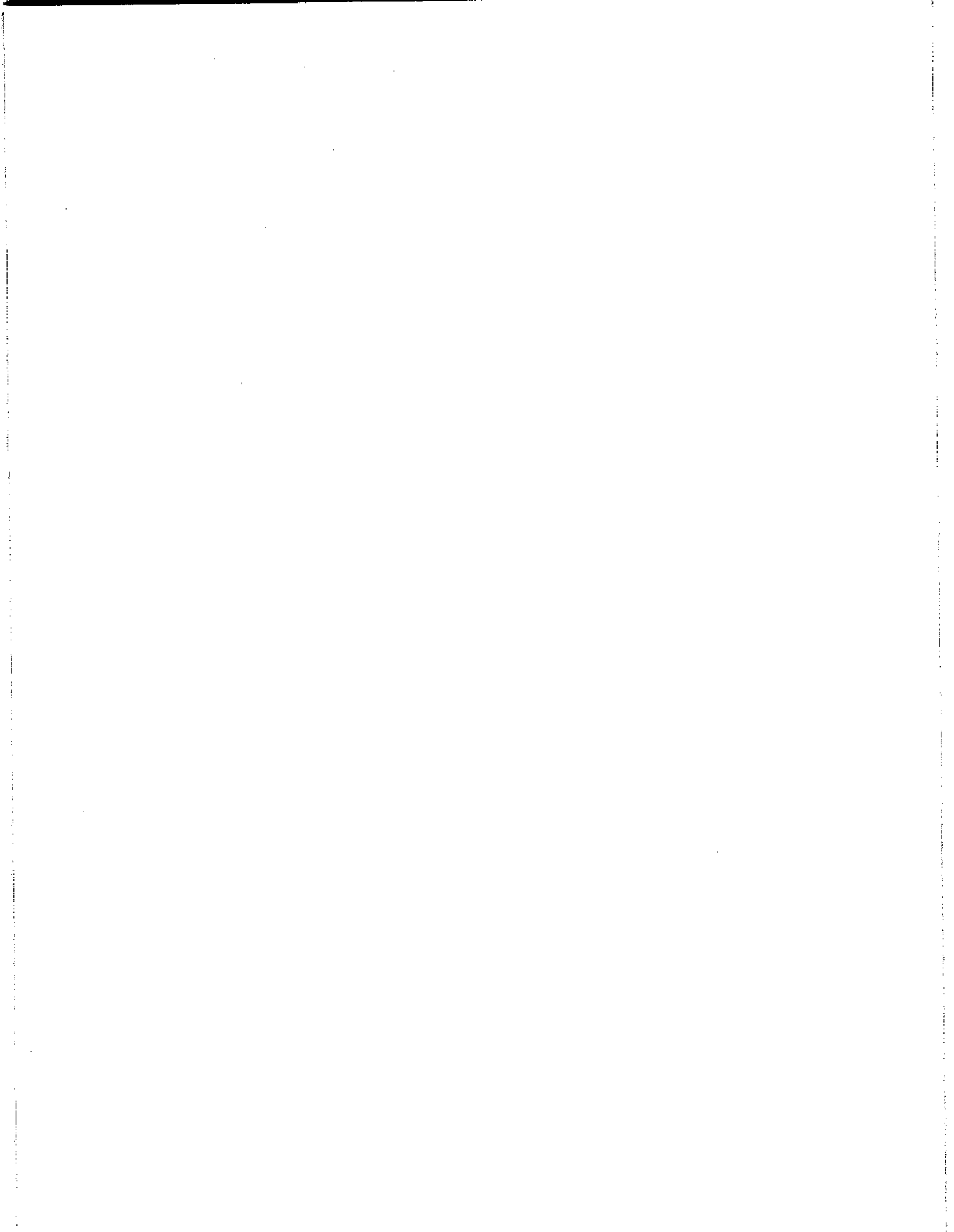
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PREFACE

Sponsor: SLV PT
Project Number:
File Ref: GSV/68/33/02

Publication Authority: DES LE GSG SLV OutSp TechDocs

INTRODUCTION

- 1 The Publication Sponsor is responsible for the allocation of instruction numbers.
- 2 All modification instructions as issued are to be recorded in manuscript by the recipient on the Numerical Modification Instruction Index provided. Amendments to individual instructions are to be recorded on the instruction amendment record. All extant instructions and amendments can be found listed in the main AESP index.

NOTE

- The Publication Sponsor is responsible for the preparation and maintenance of the Instruction Index and will advise the Distribution Authority on the issue of completed and subsequent blank index pages necessary
- 3 Service users should forward any comments on this publication through the channels prescribed in JSP (D) 543 Chapter 3.4.1. An AESP Form 10 is provided within this publication; it should be photocopied and used for forwarding comments on this AESP.
 - 4 AESP are issued under Defence Information Notices (DIN) authority and where AESPs specify action to be taken, the AESP will of itself be sufficient authority for such action and also for the demanding of the necessary stores.
 - 5 This edition is a new common AESP for Trailer Lightweight GS Cargo. It is produced under the prime number AESP Octad number for Support vehicle 2330-E-202
 - 6 All subsequent Modification Instructions will be contained in this Octad and will be applicable to Trailer Lightweight GS Cargo unless specified within the instruction.

MODIFICATION INSTRUCTION INDEX

Priority (Pty) is shown as: Immediate: I Routine: R

Instr No.	Pty	Page Nos.	Amendment No.	Subject	Applicability
(1)	(2)	(3)	(4)	(5)	(6)
1	R	1-16	1	Improvements to hydraulic braking system	GSV/04/0 145
2					
3					
4					
5					
6					
7					
8					
9					
10					

**TRAILER LIGHTWEIGHT
GS CARGO**

MODIFICATION INSTRUCTION NO. 1

Sponsor:
DE&S SLV PT

Publication Agency:
DES LE GSG SLV OutSp TechDocs
Project No:
File ref: DES LE GSV SLV OutSp TechDocs

AMENDMENT RECORD

Amdt No.	Incorporated By (Signature)	Date
1	[REDACTED]	Nov 10
2	[REDACTED]	May 11
3		

Amdt No.	Incorporated By (Signature)	Date
4		
5		
6		

SUBJECT: Improvement to hydraulic braking system.

(Approval No. GSV/04/0/145)

Reference:

A Letter Equip/SE/02/03/38 dated 12th October 2010

INTRODUCTION

1 This modification details the procedure to remove the brake accumulator and manifold from the existing hydraulic braking system and incorporate a Pressure Relief Valve (PRV).

1.1 Limitations on use of equipment. In order to maintain control and simplicity of policy for trailer usage, the following restrictions will be maintained on both modified and unmodified trailers until further notice.

1.2 Post embodiment of this Modification Instruction No 1 the speed limit will remain at 40 mph.

1.3 Post embodiment of this Modification Instruction No 1 the weight instruction will remain at a max 1410 Kg GVW.

1.4 Reference a above, detailed that trailers which had not been embodied with this Modification Instruction after November 2010 would be deemed non task worthy. Due to the delayed start of the embodiment programme this date has now been extended to June 2011.

APPLICABILITY

2 This instruction applies to Trailer Lightweight GS Cargo with the following Asset Codes:

2.1 NB 2853 3107 Trailer Lightweight General Service Cargo.

2.2 NB 2861 3100 Trailer Lightweight 1.13T 2 Wheeled with 4.5KW 240V AC/28V DC Diesel Genset Mawdsley Ltd.

2.3 NB 2861 3100 Trailer Lightweight 1.13T 2 Wheeled with 4.5KW 240V AC/28V DC Diesel Genset Mawdsley Ltd.

2.4 NB 2861 3102 Trailer Lightweight 2 Wheeled with 15/5 Generator

2.5 NB 2861 4100 Trailer Lightweight 1.13T 2 Wheeled with 3.5KVA 120/240V AC 50Hz Single Phase Petrol Genset Qnan.

2.6 [REDACTED]

2.7 [REDACTED]

2.8 [REDACTED]

2.9 [REDACTED]

2.10 NB 2865 1100 Trailer Lightweight 1.13T 2 Wheeled Mobile Aircraft Support Unit Forward Aircraft Repair

REASON FOR MODIFICATION

3 To remove the brake accumulator and manifold from the existing hydraulic braking system and incorporate a Pressure Relief Valve (PRV).

3.1 Code 4 - to improve maintainability.

PRIORITY

4

4.1 ARMY: Routine

4.2 RAF: Class 2

ESTIMATED TIME REQUIRED

5 Embodiment: 1 man hour

MODIFICATION IMPLEMENTATION PLAN

6

6.1 This instruction is to be implemented by:

6.1.1 ARMY - Units authorized to carry out levels 2, 3, 4 maintenance.

6.1.2 RAF - Units no later than the next schedule maintenance and Vehicle Depots before initial issue of trailer.

6.2 Associated instructions. AESP 2330-E-202

6.3 Strike plate action: As detailed in paragraph 7.2.2

Action required by

7

7.1 Units and establishments holding equipment:

- 7.1.1 Examine equipment documents to see if modification is applicable.
- 7.1.2 Examine equipment to see if modification is embodied or required and where necessary Units with 1st Line REME Support demand the stores required. Stores are to be demanded direct from the supplier listed on page 15/16.
- 7.1.3 ARMY - On receipt of stores, request REME Support workshops to modify equipment.
- 7.1.4 ARMY - Record the AESP and instruction number in equipment documents.
- 7.1.5 RAF - Record modification details on AF G1084A and Form 4870. Units operating STAMA are also to record modification details on ADP MTMS Job Certification Sheet and to follow the procedures laid down in AP 100C-08A.

7.2 Army units authorized to carry out levels 2, 3 and 4 maintenance and RAF units:

- 7.2.1 ARMY - When requested by units or during overhaul of equipment on charge without REME 1st Line Support, obtain the items listed in Para 8 and carry out this modification.
- 7.2.2 Erase Mod Strike 1 from the Trailer modification plate using a letter stamp.
- 7.2.3 Record completion details of modification against appropriate entry in vehicle document.
- 7.2.4 Complete AF G1084A when reporting completion of the modification to FORWARD (RAF) using the following code:

RAF: MODIFICATION CODE: AFB 082

NOTE

RAF units operating STAMA are also to complete ADP MTMS Job Certification Sheet and to follow the procedures laid down in AP 100C-08A.

- 7.2.5 Complete and return the modification embodiment form refer to Annex A.

7.3 All recipients of this instruction. Add particulars to AESP 2330-E-202-811 Mod Instruction Index.

Stores, tools and equipment

8

8.1 Stores to be demanded:

8.1.1 The following item(s)/set are/is to be demanded quoting this instruction as the authority.

8.1.2 Registration/Serial number of vehicle/engine/assembly for equipment held by user units.

Item No.	DMC	NSN/Part No.	Designation	Qty per eqpt
		2530-99-4147543	Mod Kit Comprising	(1)
1			Pressure relief valve	(1)
2			Bracket	(1)
3			Reservoir	(1)
4			Brake pipe master cylinder to PRV	(1)
5			Brake pipe PRV to rear brake pipe	(1)
6			Brake pipe reservoir to PRV	(1)
7			Fluid adaptor	(1)
8			Screw, M8 x 20 mm, s/steel	(2)
9			Nyloc nut, M8, s/steel	(2)
10			Screw, M5 x 40 mm, s/steel	(2)
11			Nyloc nut, M5, s/steel	(2)
12			Copper washer	(1)
13			Dowty sealing washer	(1)
14			Plain nut, 3/8 in.	(1)

8.2 Stores or suitable equivalent to be obtained locally:

15 ()

16 ()

8.3 Tools and stores to be manufactured:

17 ()

18 ()

8.4 Stores to be removed and returned through normal channels/reduced to scrap:

Item No.	DMC	NSN/Part No.	Designation	Qty per eqpt
19		12555	Accumulator	(1)
20	7LWT	4730-99-212-6301	Manifold block	(1)
21	7LWT	4720-99-778-0381	Hose	(1)
22	7LWT	2530-99-322-9480	Reservoir	(1)
23		12000	Bracket assembly	(1)
24	7LWT	4720-99-361-2737	Flexible pipe	(1)
25		12717	Screw, machine	(1)
26		11498	Seal	(1)
27		10706	Bolt, machine	(2)
28		12950	Bolt, M8 x 25	(2)
29	7LWT	5310-99-131-8622	Washer, plain	(4)
30	7LWT	5310-99-316-8060	Washer, spring	(4)
31		12147	Nut, full	(4)

8.5 Items/stores to be modified:

32				()
33				()

8.6 Special tools and test equipment required:

34				()
----	--	--	--	-----

Sequence of operations**WARNING**

BEFORE COMMENCING WITH THIS INSTRUCTION ENSURE THAT THE HANDBRAKE IS APPLIED AND THE JOCKEY WHEEL AND REAR STANDS ARE IN THE DOWN POSITION

NOTE

The item numbers of paragraph 8 are used as reference throughout this instruction.

9 Carry out this instruction as follows:

9.1 Position the trailer on a suitable work surface

9.2 Apply the handbrake and deploy the jockey wheel and rear stands as detailed in Cat 201, Chap 2.

9.3 Remove the master cylinder top cover (Fig 1 (2)) as detailed in Cat 201, Chap 3.

9.4 Vent the accumulator (Fig 1 (5)) to atmosphere using one of the following methods:

9.4.1 Standard accumulator fit (unrestricted access), proceed as follows:

9.4.1.1 Loosen the charge screw on the underside of the accumulator.

9.4.1.2 Allow the accumulator nitrogen charge to fully vent to atmosphere.

9.4.2 Non-standard accumulator fit (restricted access), proceed as follows:

9.4.2.1 Slacken the grub screw in the accumulator mounting bracket.

9.4.2.2 Remove one fastener from the accumulator mounting bracket.

9.4.2.3 Slacken but do not remove the second fastener in the accumulator mounting bracket.

9.4.2.4 Pivot the accumulator to gain access to the charge screw on the underside, loosen the charge screw.

9.4.2.5 Allow the accumulator nitrogen charge to fully vent to atmosphere.

9.5 To remove the brake components, proceed as follows:

9.5.1 Release the flexible pipe (Fig 1 (4)) item 20 at the chassis rigid brake pipe.

9.5.2 Remove and discard the banjo union from the hose (1) item 17 at the master cylinder (6).

9.5.3 Remove and discard the two bolts item 24, complete with plain washers item 25, lock washers item 26 and plain nuts item 27 securing the accumulator bracket item 19 to the trailer chassis. Remove the accumulator (Fig 2 (5)) item 15, accumulator bracket (7) item 19, manifold block (2) item 16, flexible pipe (3) and hose (1) from the trailer. Retain the nylon bolt caps.

9.5.4 Remove the hose from the manifold block; salvage the hose as steel.

9.5.5 Remove the flexible pipe from the manifold block; salvage the flexible pipe as steel.

- 9.5.6 Remove and discard the screw (6) item 21 from the accumulator bracket.
- 9.5.7 Remove and discard the two bolts (4) item 23, complete with plain washers' item 25, lock washers item 26 and plain nuts item 27. Separate the manifold block from the accumulator; salvage the manifold block as aluminium. Discard the seal item 22.
- 9.5.8 Salvage the accumulator and accumulator bracket as steel.
- 9.5.9 Remove and retain the cover, inner cap and moisture barrier from the reservoir (Fig 1 (3)).
- 9.5.10 Remove and retain the reservoir fluid adaptor (Fig 3 (2)), plain washer (3), rubber seal (4) and spacer (5). Note the orientation for refitting purposes. Discard the reservoir (1) item 18.
- 9.6 To assemble the replacement brake components, proceed as follows:
- 9.6.1 Secure the PRV (Fig 4 (2)) item 1 to the bracket (1) item 2 using the two screws (3) item 10 and nyloc nuts item 11. Remove the port blanking caps.

NOTE

When positioned correctly the PRV locates within the bracket with ports 'T' and 'P2' to the rear.

- 9.6.2 Fit the PRV bracket assembly (Fig 6 (5)) to the chassis using two screws (6) item 8 and nyloc nuts item 9. Refit the nylon bolt caps removed at Para 9.5.3.
- 9.6.3 Assemble the fluid adaptor (Fig 5 (5)) item 7, sealing washer (4) item 13, copper washer (2) item 12 and plain nut (1) item 14 to the replacement reservoir (3) item 3.
- 9.6.4 Connect the brake pipe (master cylinder to PRV) (Fig 6 (1)) item 4 to the master cylinder (7) and port 'P1' on the PRV.
- 9.6.5 Fit the assembled reservoir (2) (Para 9.6.3) to the master cylinder using the fittings retained at Para 9.5.10.
- 9.6.6 Connect the brake pipe (PRV to rear brake pipe) (4) item 5 to port 'P2' on the PRV and the rigid rear brake pipe.
- 9.6.7 Connect the brake pipe (reservoir to PRV) (3) item 6 to the reservoir fluid adaptor and port 'T' on the PRV

- 9.7 Bleed the Brakes as Follows:

NOTES

- (1) The brakes may be bled using a manual or pressure bleed system where the brake fluid pressure should be within 1.0 to 1.5 bar.
- (2) On the valve block side of the trailer the stone guard should be removed. It is secured by eight set screws and washers.
- 9.7.1 Release the handbrake. Ensure the Right-Hand (RH) wheel brake caliper assembly is held forward holding the auto-reverse valve open.
- 9.7.2 If fitted, remove the reservoir outer cover and cap.

CAUTION

EQUIPMENT DAMAGE. During the operations take all actions necessary to prevent the ingress of foreign bodies into the brake fluid and reservoir.

9.7.3 If fitted, remove the reservoir moisture barrier.

NOTE

The adjustment nut protruding from the back of the coupling and the clevis attached to the brake operating lever is pre-set at the factory and should not require any further adjustment.

9.7.4 Top up the reservoir with brake fluid (refer to Cat 601).

9.7.5 Start at the furthest bleed nipple from the master cylinder (Left-Hand (LH) side).

9.7.6 Remove the dust cap and attach a bleed pipe. The other end of the pipe should be immersed in a container with a quantity of brake fluid.

9.7.7 Open the bleed nipple.

9.7.8 Push the brake operating lever, with smooth even strokes.

9.7.9 Repeat this operation until the air has stopped bubbling from the pipe immersed in the container.

NOTE

(1) Observe the level in the reservoir and ensure this level does not drop below the danger level identified on the reservoir body at any time during the bleeding process.

(2) Ensure that the operator topping up the reservoir during the bleeding process does so slowly to minimise the risk of air bubbles entering the brake system.

9.7.10 Once this state is achieved, the brake operating lever should be held at the end of its stroke (pressure applied). Tighten the bleed nipple.

9.7.11 Release the brake operating lever smoothly.

9.7.12 Check the reservoir, top up if necessary.

NOTE

If no fluid can be passed through the bleed nipple when fully open, the rotating caliper carrier will require adjusting. This is located on the RH wheel assembly and as will be seen the mechanism is kept in a biased position by the employment of a compression spring. By screwing in the adjustment bolt this will increase the compression on the spring. It is recommended that a distance of 6 mm between the back face of the locking nut and the front face of the bolt be employed, which allows the valve within the valve block to be fully open. Care must however be taken to ensure that the spring is not compressed to its coil bound position and therefore it is recommended that a 5 mm allowance of further travel be left within the spring.

9.7.13 Carry out the bleed cycle on the RH wheel as detailed in Para 9.7.6 to 9.7.11.

9.7.14 Check the reservoir, top up if necessary

- 9.7.15 With the stone guard removed the auto-reverse valve bleed nipple is on the upper face of the auto-reverse valve
- 9.7.16 Repeat the bleed cycle on the auto-reverse valve as detailed in Para 9.7.6 to 9.7.11.
- 9.7.17 Check the reservoir, top up if necessary

NOTE

To check that the brake system is operating correctly the brake operating lever must be pushed back firmly with the trailer wheels clear of the ground, they should be rotated in the forward direction and should be met with resistance retarding and stopping the wheels. To check the auto-reverse feature rotate the RH wheel backwards, some initial resistance should be felt at which stage the valve will shut off the pressure coming from the brake operating lever and allow the wheel to rotate freely. The LH wheel should also be checked by a second person (it is worthy of note that if the auto-reverse feature is not initiated by rotating the RH wheel and kept in the reverse position the LH wheel will be retarded and held in a locked position).

- 9.7.18 Force the brake operating lever first to its stopped position (brakes hard on), then over to the master cylinder fully stroked position.
- 9.7.19 A resistance caused by the internal spring load will be felt against the effort applied, which should be held for 10 seconds.
- 9.7.20 If any air is seen rising from the bottom of the reservoir during and after Para 9.7.19 then repeat the bleed cycle as detailed in Para 9.7.5 to 9.7.19.
- 9.7.21 Refit the moisture barrier.
- 9.7.22 Refit the reservoir cap and outer cover.
- 9.7.23 Refit the master cylinder top cover.

TESTING AFTER EMBODIMENT

- 10 Carry out a full brake test.

EFFECT ON WEIGHT

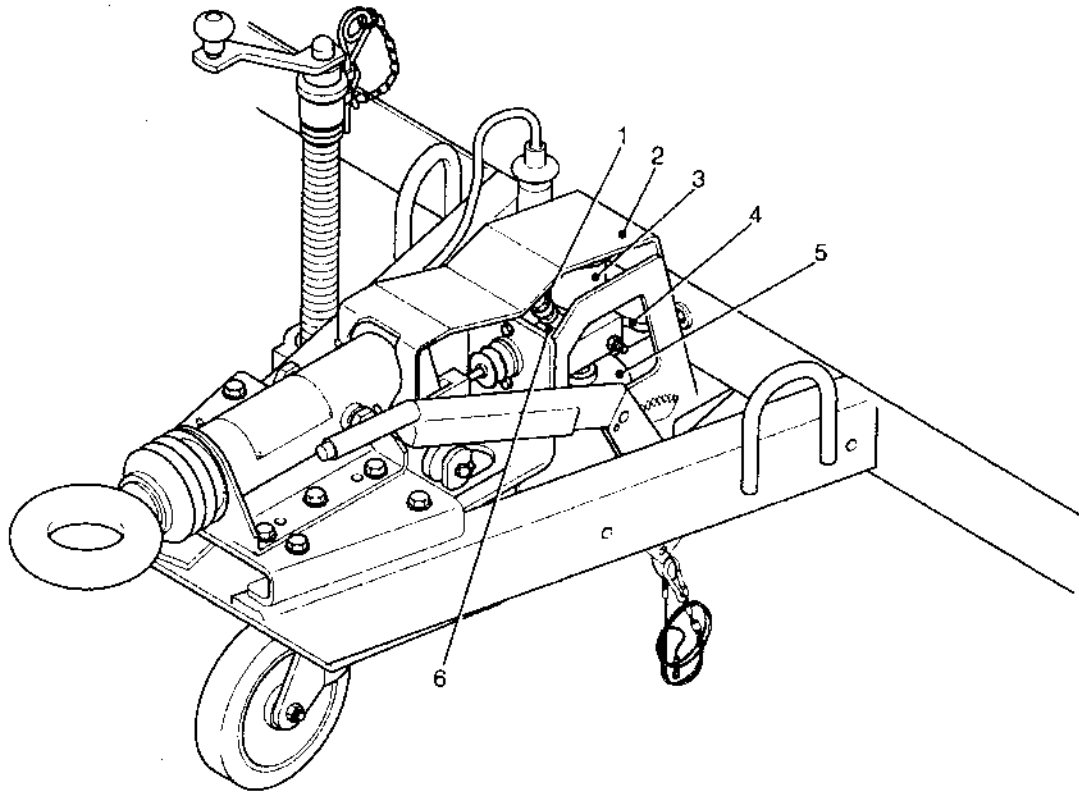
- 11 Nil

PUBLICATION AMENDMENTS

NOTE

Necessary amendments will be issued separately.

- 12 Users are to note: On completion of Modification Instruction No 1, the maintenance history on JAMES or FMT 1004 is to be updated to record that the Brake Fluid has been renewed. From this point on, the Brake Fluid should continue to be changed in line with the Servicing Schedule at 24 months regardless of when this modification has been embodied.

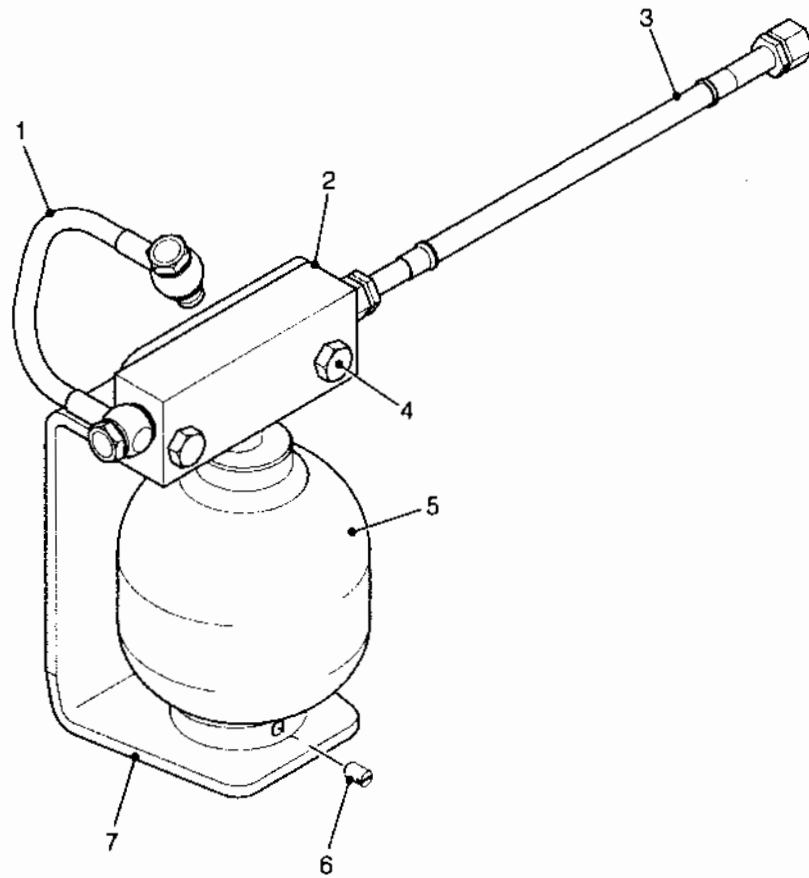


TRL/114

KEY TO FIG 1

- | | | | |
|---|-----------|---|-----------------|
| 1 | Hose | 4 | Flexible pipe |
| 2 | Top cover | 5 | Accumulator |
| 3 | Reservoir | 6 | Master cylinder |

Fig 1 Component location

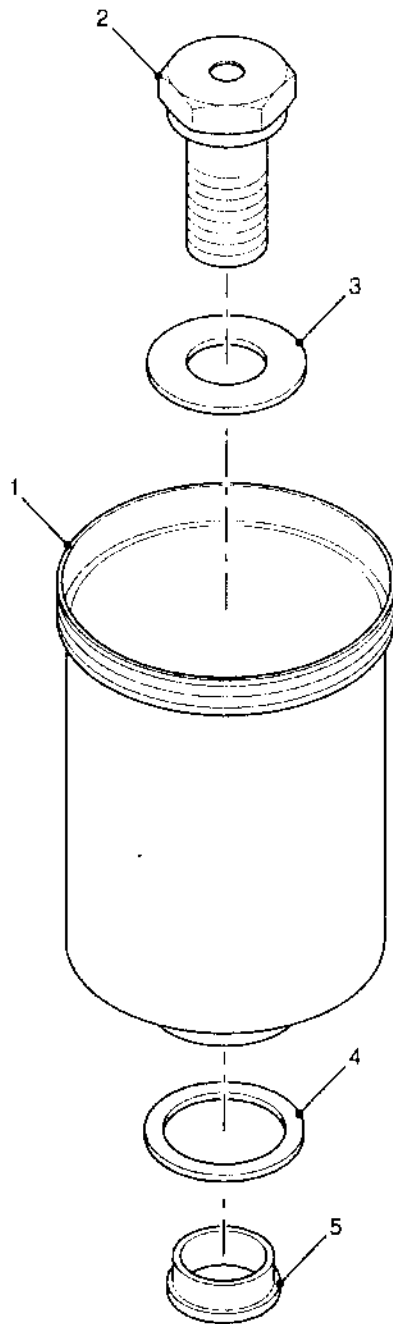


TRL/115

KEY TO FIG 2

- | | | | |
|---|----------------|---|---------------------|
| 1 | Hose | 5 | Accumulator |
| 2 | Manifold block | 6 | Screw |
| 3 | Flexible pipe | 7 | Accumulator bracket |
| 4 | Bolt | | |

Fig 2 Accumulator and manifold block

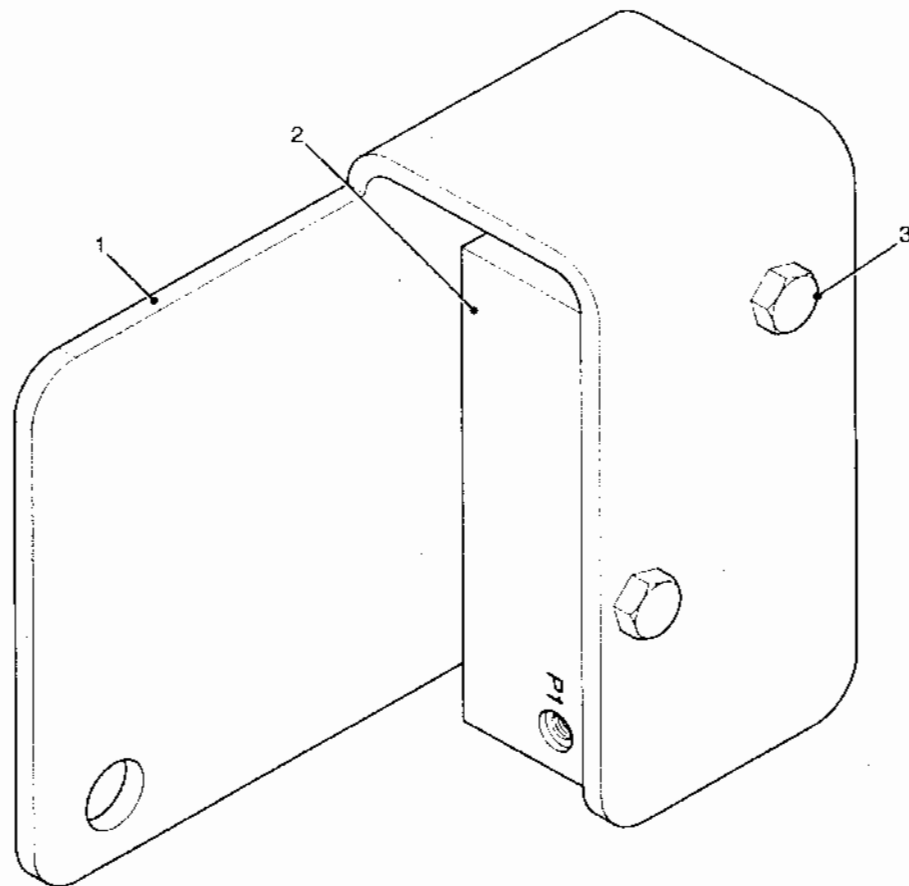


TRL/116

KEY TO FIG 3

- | | |
|-----------------|---------------|
| 1 Reservoir | 4 Rubber seal |
| 2 Fluid adaptor | 5 Spacer |
| 3 Plain washer | |

Fig 3 Reservoir and fittings

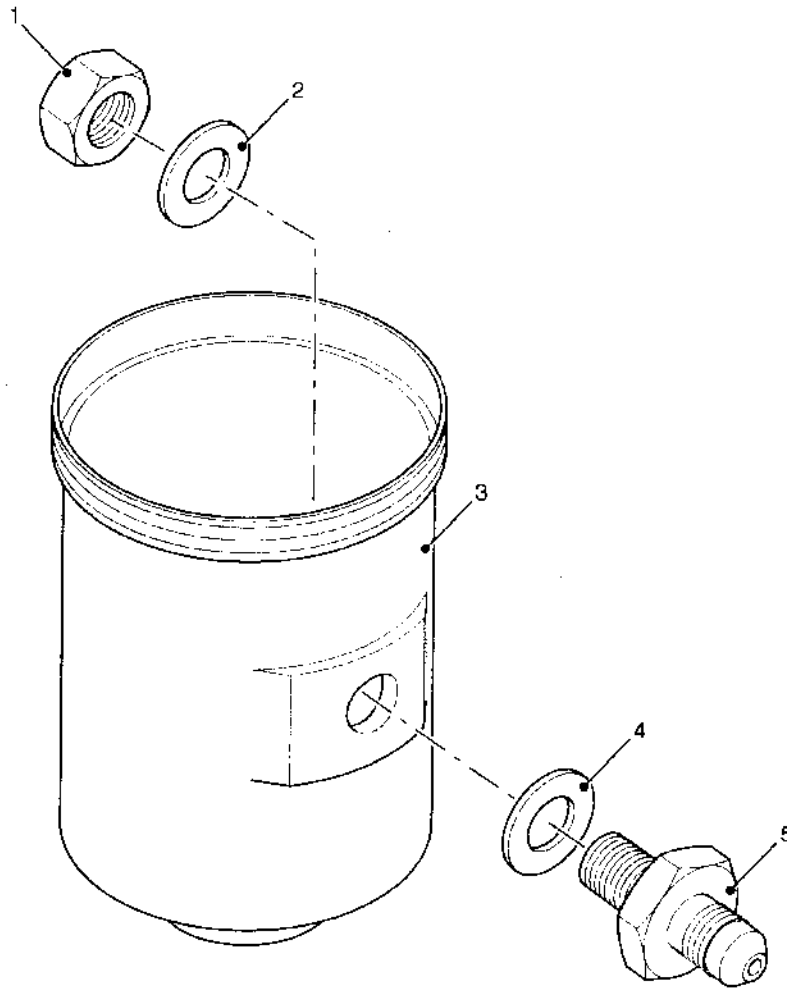


TRL/117

KEY TO FIG 4

- | | | | |
|---|-----------------------|---|-------|
| 1 | Bracket | 3 | Screw |
| 2 | Pressure relief valve | | |

Fig 4 Pressure relief valve and bracket

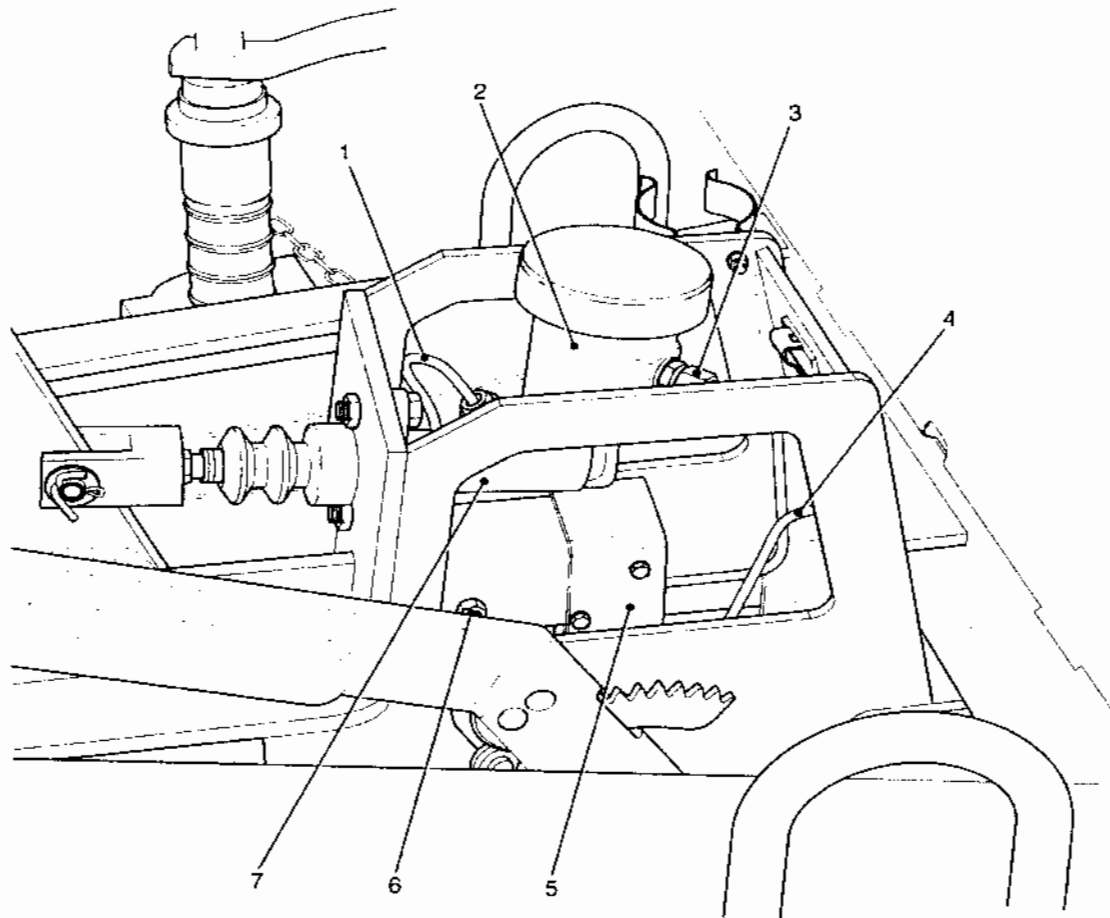


TRL/118

KEY TO FIG 5

- | | |
|-----------------|------------------|
| 1 Plain nut | 4 Sealing washer |
| 2 Copper washer | 5 Adaptor |
| 3 Reservoir | |

Fig 5 Replacement reservoir and fittings



TRL/114

KEY TO FIG 6

- | | |
|--------------|-------------------------------------|
| 1 Brake pipe | 5 Pressure relief valve and bracket |
| 2 Reservoir | 6 Screw |
| 3 Brake pipe | 7 Master cylinder |
| 4 Brake pipe | |

Fig 6 Assembled brake components

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**TRAILER LIGHTWEIGHT
GS CARGO**

MODIFICATION INSTRUCTIONS AND INDEX

MODIFICATION NO 1

ANNEX A

CONTENTS

Leaflet

- 1 Modification Embodiment Leaflet AA-2548-001

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MODIFICATION EMBODIMENT LEAFLET AA-2548-001

APPLICABILITY	TRAILER LIGHTWEIGHT GS CARGO
SUBJECT	Improvements to hydraulic braking system
APPROVAL NO.	GSV/04/0/145
MODIFICATION INST No 1	AESP 2330-E-202-811

I certify that this modification has been fully embodied on VRN.....

Date:

Signature:

Date:

Name:

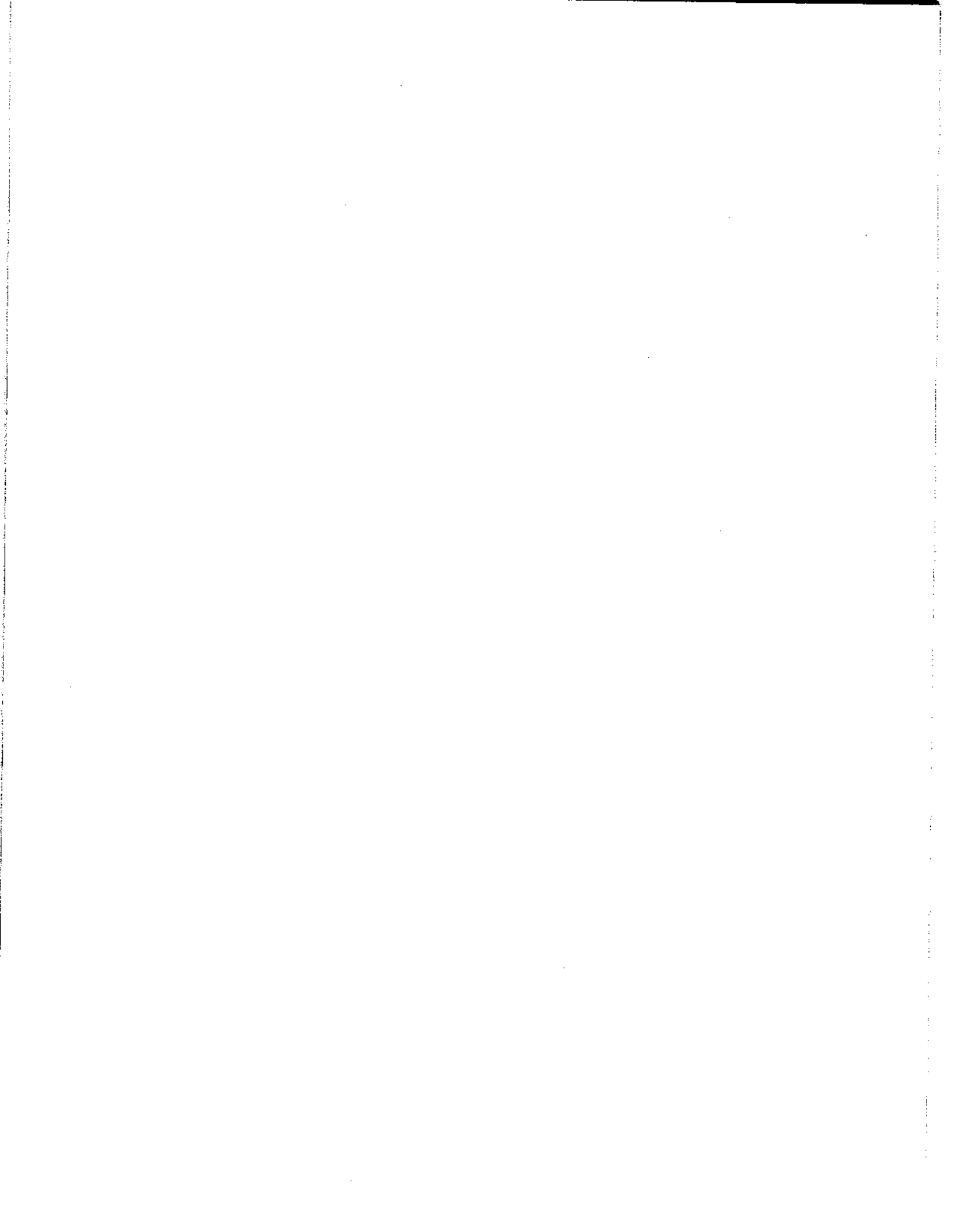
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AESP Form 10 (Issue 5 dated Dec 01)





TRAILER LIGHTWEIGHT GS CARGO

GENERAL INSTRUCTIONS AND INDEX

Sponsored for use in the

**UNITED KINGDOM MINISTRY OF DEFENCE
AND ARMED FORCES**

By

**DEFENCE EQUIPMENT & SUPPORT
SPECIALIST & LOGISTIC VEHICLE PROJECT TEAM**

**MOD Abbey Wood
Bristol
BS34 8JH**

**PUBLICATIONS AUTHORITY
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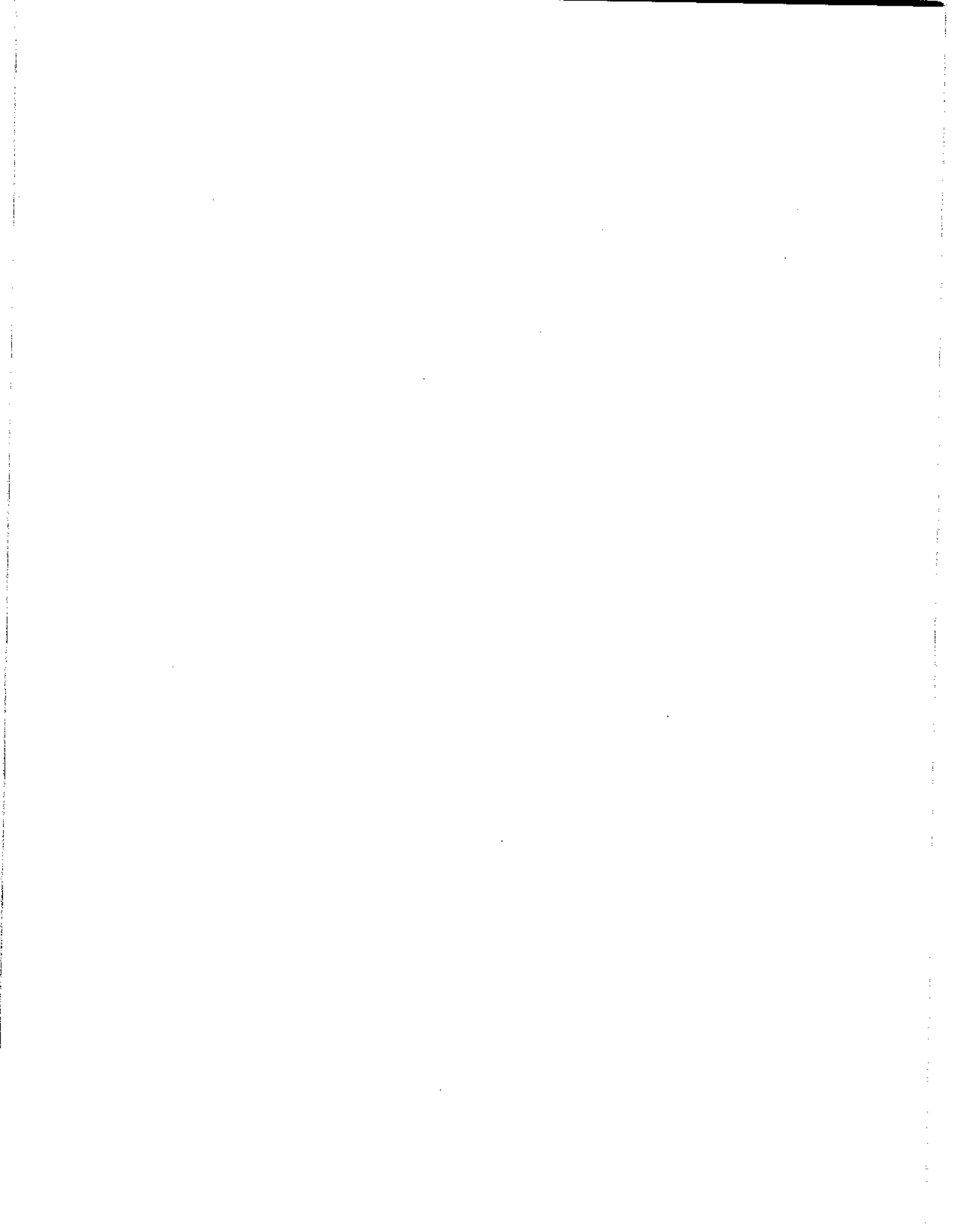
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PREFACE

Sponsor:	SLV PT
Project Number:	1624
File Ref:	DES LE GSG-SLV-OutSp-TechDocs
Publication Authority:	DES LE GSG-SLV-OutSp-TechDocs

INTRODUCTION

- 1 The Publication Sponsor is responsible for the allocation of instruction numbers.
- 2 All General instructions as issued are to be recorded in manuscript by the recipient on the Numerical General Instruction Index provided. Amendments to individual instructions are to be recorded on the instruction amendment record. All extant instructions and amendments can be found listed in the main AESP index.

NOTE

- The Publication Sponsor is responsible for the preparation and maintenance of the Instruction Index and will advise the Distribution Authority on the issue of completed and subsequent blank index pages necessary
- 3 Service users should forward any comments on this publication through the channels prescribed in JSP (D) 543 Chapter 3.4.1. An AESP Form 10 is provided after the preliminary pages of this publication; it should be photocopied and used for forwarding comments on this AESP.
 - 4 AESPs are issued under Defence Information Notices (DIN) authority and where AESPs specify action to be taken, the AESP will of itself be sufficient authority for such action and also for the demanding of the necessary stores.
 - 5 This edition is a new common AESP for Trailer Lightweight GS Cargo. It is produced under the prime AESP Octad number for Trailer Lightweight GS Cargo 2330-E-202.
 - 6 All subsequent General Instructions will be contained in this Octad and will be applicable to the Trailer Lightweight GS Cargo unless specified within the instruction.

Publication authority

- 7 The publication authority for this AESP is as follows:

SLV PT TECHNICAL DOCUMENTATION MANAGER
MAIL POINT #1315
SPRUCE 3C
MOD ABBEY WOOD
BRISTOL
BS34 8JH

GENERAL INSTRUCTION INDEX

SI: Servicing Instructions STI: Special Technical Instructions

Instr No. (1)	SI/STI No. (2)	Subject (3)	Approval No./ Remarks (4)
1		Ballast weights when conducting Brake Tests	GSV/ESM/001
2		Air in hydraulics rectification programme	GSV/04/0/145
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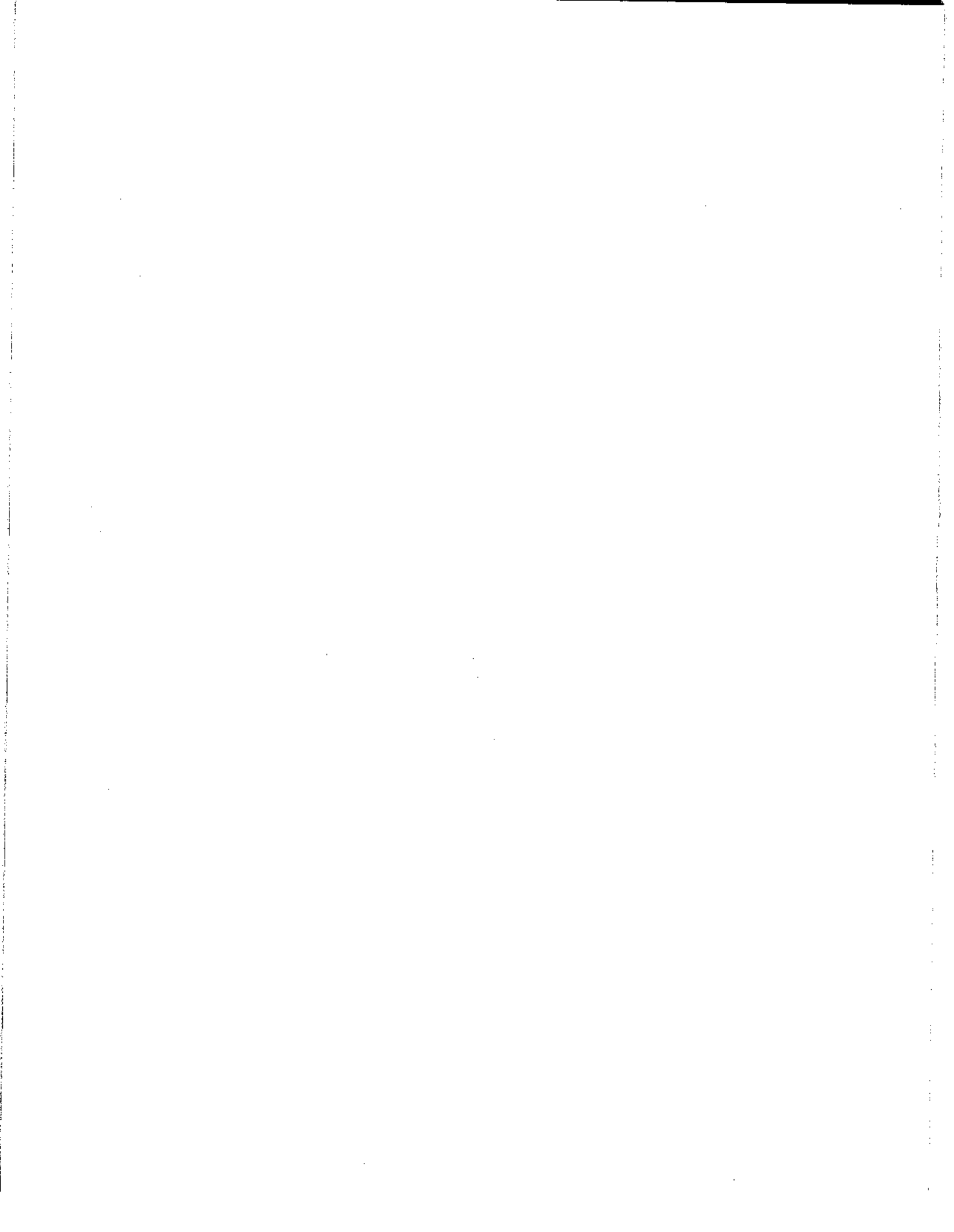
TRAILER LIGHTWEIGHT GS CARGO

GENERAL INSTRUCTION NO. 1

Sponsor: SLV PT
Project No: 1624
File ref: GSV/LLV/68/33/03
Publication Agency:
DES LE GSG-SLV-OutSp-TechDocs

Enter the following details on the index:

- A Title. Instruction to Vehicle Mechanics (VM) – Ballast weights when conducting Brake Tests.
- B Application.
- B1 Trailer Lightweight GS Cargo (Asset code NB 2853 3107)
 - B2 Applies to stored assets when removed from store to carry out any testing.
- C Reason for instruction.
- C1 To provide information to VM that when conducting brake tests, on the Trailer Lightweight GS Cargo, they should utilise any suitable identical containers of uniform size and that they should be filled with sand or water, to as close as possible replicate the Gross Vehicle Weight(GVW) of the trailer for the appropriate prime mover.
- D Inspection and Remedial Action.
- D1 Not applicable
- E Recording.
- E1 Not applicable
- F Reporting.
- F1 Not applicable
- G Action affecting compliance with the instruction.
- G1 The information in this instruction will remove the need for units to demand customised weights through the stores system. Removing unnecessary costs to the public accounts.
 - G2 Possible amendment action may follow to AESP Octad 2330-E-202.



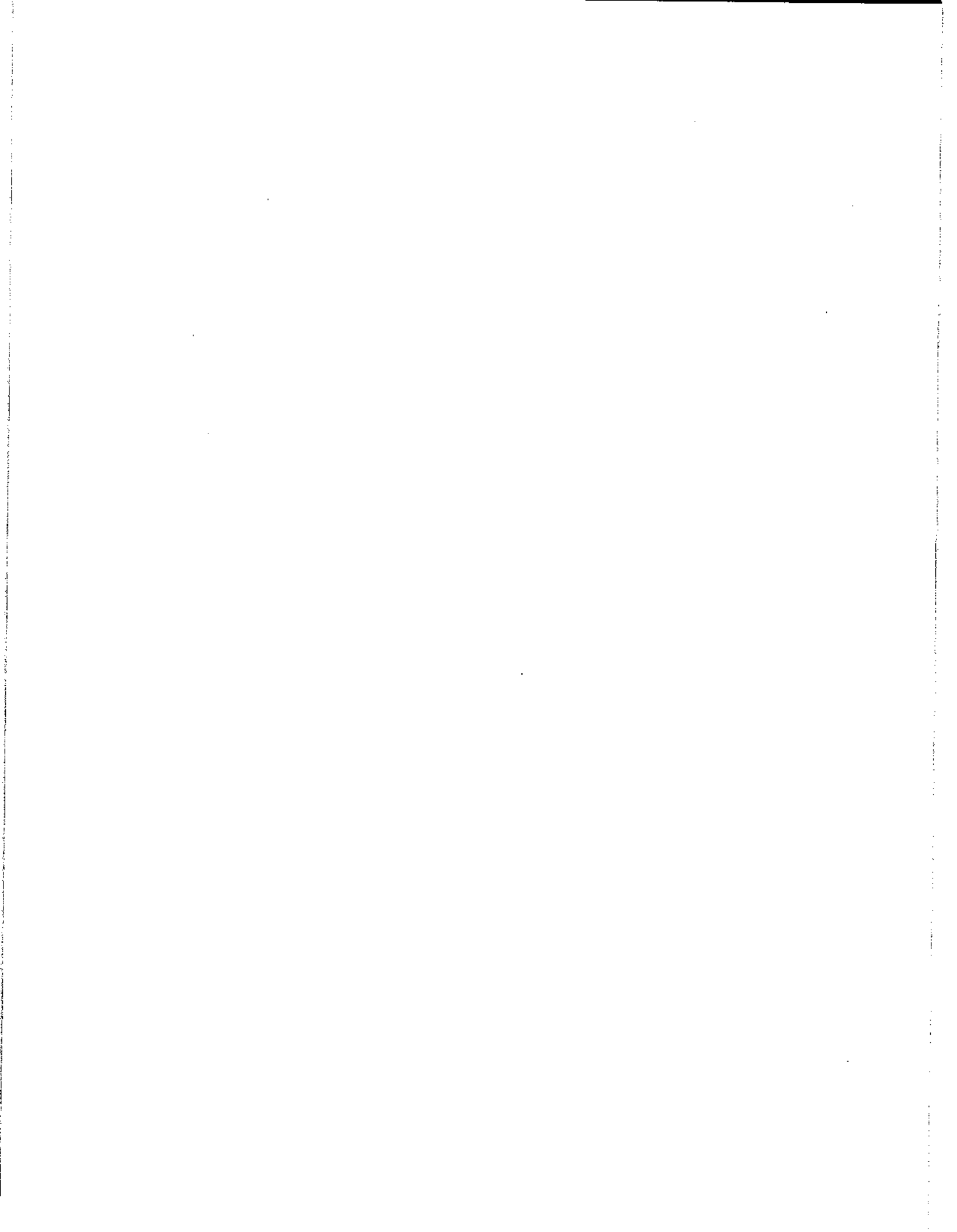
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GENERAL INSTRUCTION NO. 2

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Project No: 1624
File ref: GSV/LLV/68/33/03
Publication Agency:
DES LE GSG-SLV-OutSp-TechDocs

Enter the following details on the index:

- A Title. This General Instruction is issued as an explanatory instruction for all users of the Trailer Lightweight General Service Cargo.
- B Application.
- B1 Trailer Lightweight GS Cargo (Asset code NB 2853 3107)
- B2 This instruction applies equally to assets held in storage.
- C Reason for instruction.
- C1 The Trailer Lightweight GS Cargo has suffered from a problem of air in the hydraulics. A solution has now been found that satisfies all stakeholders and a rectification programme commenced April 2010.
- C2 This instruction covers the duration of the rectification programme, the time line of which is April 2010 until the end of June 2011.
- C3 The Modification Instruction No 1- Improvement to hydraulic braking system, Authority, GSV /04/0/145 AESP 2330-E-202-811 details the work required.
- D Inspection and Remedial Action.
- D1 Review of the SAFETY CASES - At the end of the rectification programme the safety case of the Trailer Lightweight GS Cargo Base Platform and all variants will be reviewed as per requirement.
- E Recording.
- E1 The Modification is to be recorded on Trailer strike plate.
- F Reporting.
- F1 The MOD strike plate will inform the user on the ground which trailers have been modified.
- G Action affecting compliance with the instruction.
- G1 Any trailers remaining unmodified at the end of the rectification programme will be deemed – Non Task worthy.
- G2 Possible cancelation of this Instruction following rectification programme.



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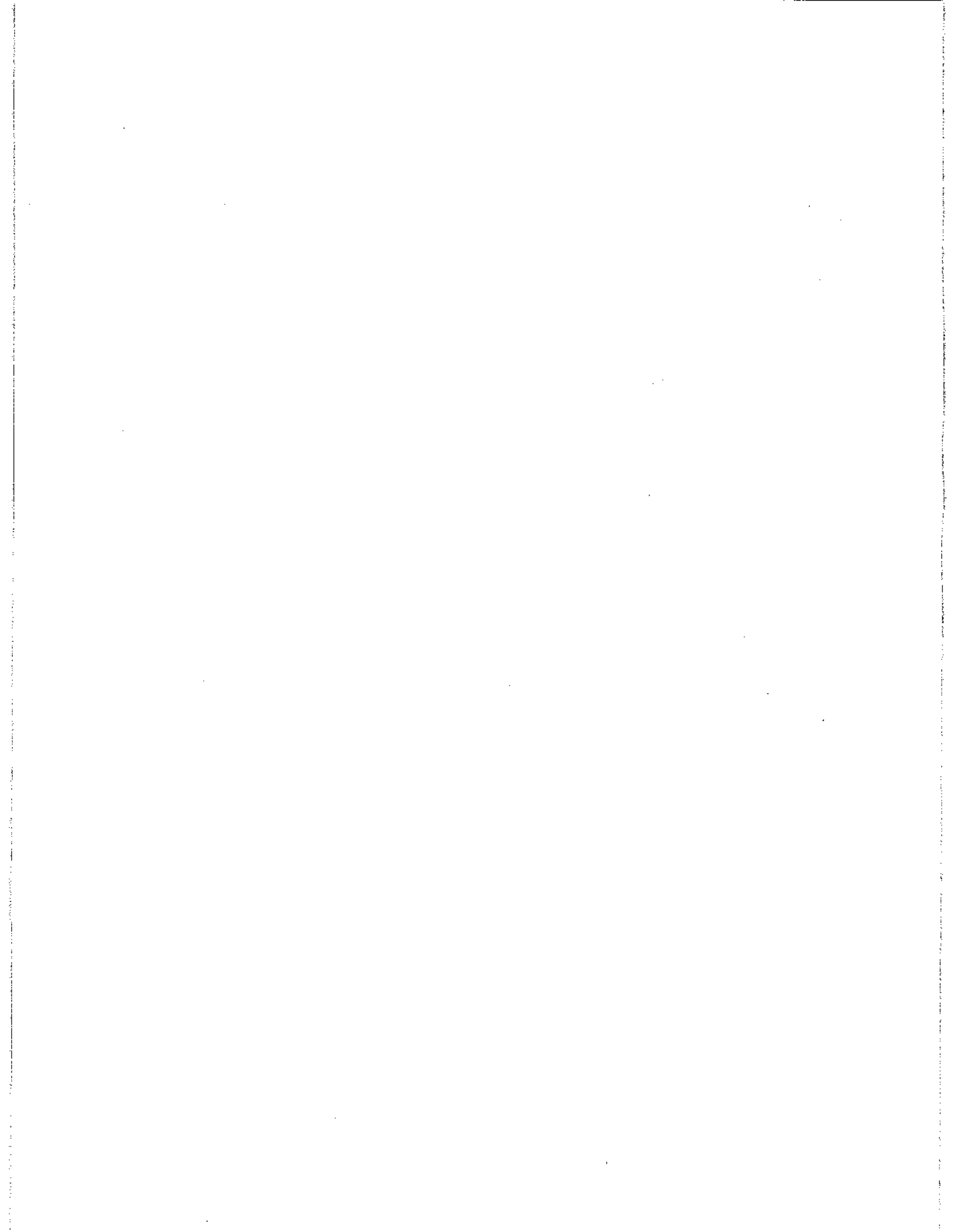
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'B' VEHICLE MAINTENANCE, INSPECTION, TEST AND CERTIFICATION

REPRINTED INCORPORATING AMDTS 1-8

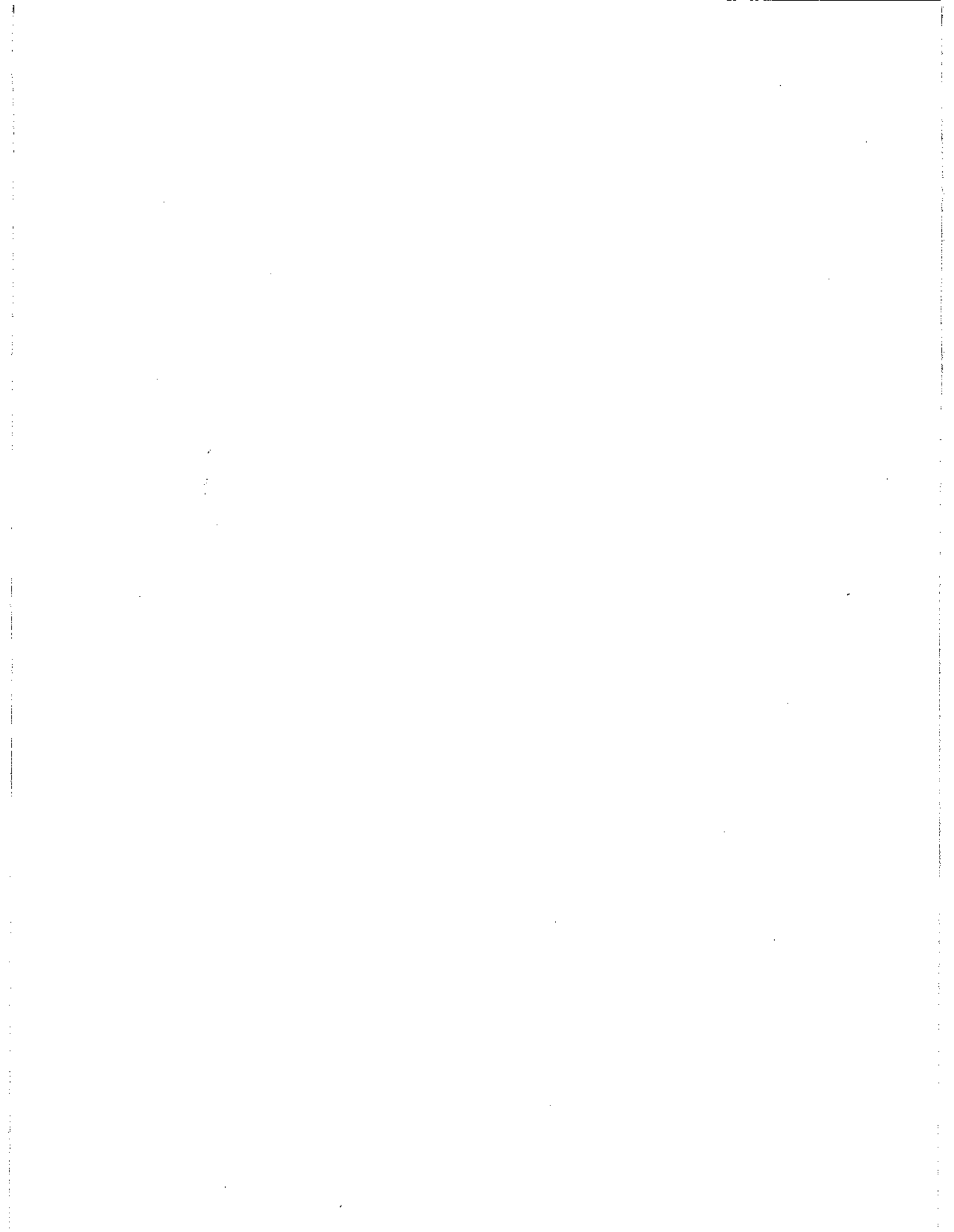
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'B' VEHICLE TEST, INSPECTION AND CERTIFICATION

Chapter

- 1 Maintenance and inspection policy
- 2 'B' vehicle maintenance and inspection procedure
- 3-0 Vehicle Inspectorate inspection manuals
 - 3-1 Heavy goods vehicles
 - 3-2 Public service vehicles
 - 3-3 Car and light commercial
 - 3-4 Motor cycle
- 4 MoD(A) brake testing policy
- 5 Calibration of Speed Limiters and Tachographs
- 6 Not taken up
- 7 Not taken up
- 8-0 Carriage of dangerous goods
 - 8-1 The testing and inspection of 'B' vehicles required to carry explosives, dangerous goods Class 1
 - 8-2 The testing and inspection of 'B' vehicles required to carry flammable liquids, dangerous goods Class 3

PREFACE

Sponsor:
Technical Director
File ref: TES ILS & Eng Pol/09/11/02

INTRODUCTION

1 Any comments by Service users on this publication should be forwarded through the channels prescribed in AESP 0100-P-011-013. An AESP Form 10 is provided at the end of this publication; it should be photocopied and used for forwarding comments on this AESP.

2 AESPs are issued under Defence Council authority and where AESPs specify action to be taken, the AESP will of itself be sufficient authority for such action and also for the demanding of the necessary stores, subject to the provisions of Para 3 below.

3 The subject matter of this publication may be affected by Defence Instructions and Notices (DINs), higher level policy documents issued by or on behalf of the AESP sponsor, theatre specific national regulations or under exceptional circumstances during operations on the orders of the theatre commander. When any such instruction, order or regulation contradicts any portion of this publication it is to be taken as the overriding authority.

4 For periods of servicing and lubricants to be used reference must be made to the relevant maintenance schedules.

5 To avoid frequent repetition of the cumbersome "he or she" and "his or hers", references to the male gender are to be taken to include females except where it is clearly inappropriate.

Amendments

6 New or amended material will be indicated by the marginal rule to show the extent of the amendment.

CHAPTER 1
MAINTENANCE AND INSPECTION POLICY
CONTENTS

Para

- 1 Introduction
- 2 Scope
- 4 Aim
- 5 Maintenance schedules
- 6 Maintenance organisation
- 7 Vehicle maintenance under Contract Repair arrangements
- 9 Annotation of Vehicle and Operator Services Agency DTp numbers in vehicle documents
- 10 Testing, inspection and certification
- 14 Competent Persons

Annexes

- A Relationship between lines of equipment support and levels of maintenance
- B Vehicle and Operator Services Agency Brake Testing Codes.
- C MOT Test Classes – extracted from the MOT Testing Guide

INTRODUCTION

1 The MOD uses the following terms, for the categorisation of 'B' vehicles; it should also be noted that reference to a 'B' Vehicle includes associated trailers as defined below:

1.1 'B' Vehicle. A tracked or wheeled land vehicle, self-propelled or towed, commercial or general service, which is not primarily designed for offensive purposes, but which may, in some cases, be armoured for defensive purposes and which is not otherwise specifically defined. Most Army vehicles fall into this category.

1.2 Trailer. A vehicle drawn by a motor vehicle (Road Traffic Act 1988 definition).

SCOPE

2 The scope of this Policy is primarily restricted to the Maintenance and Inspection of 'B' vehicles (including trailers) but may be applied to 'A' or 'C' vehicles at the direction of higher formation.

3 In recent years the terms 'white', 'green' and 'yellow' fleet vehicles have started to be used. For clarity they are defined as follows:

3.1 White Fleet (Commercial) Vehicle: A vehicle which is readily obtainable from commercial sources and can fulfil its role with little or no modification, but is not intended for operational deployment and does not, therefore, require military support.

3.2 Green Fleet (Operational) Vehicle: A vehicle which is specifically procured or designed to fulfil an operational role and, therefore, justifies formal introduction into service and military support. RAF Aircraft Handling Equipment (ACHE) is included in this category.

3.3 'Yellow' Fleet (Commercial) Vehicle: An item of Material Handling Equipment (MHE) that is contractor owned and maintained, but Service operated.

3.4 In certain roles some commercial vehicles may be classed as operational vehicles and may therefore be maintained and inspected as green vehicles.

AIM

- 4 The aim of this maintenance and inspection policy is to maintain vehicles to a standard that:
 - 4.1 Satisfies the requirements of statutory legislation by applying periodic and annual mandatory testing to the standards laid down by the Department for Transport (DTT).
 - 4.2 Ensures vehicles are maintained in a safe and roadworthy condition.
 - 4.3 Ensures operational, engineering and administrative tasks are adequately supported.
 - 4.4 Ensures vehicles complete their planned lives.
 - 4.5 Ensures economical use of maintenance resources.

MAINTENANCE SCHEDULES

5 The majority of Green Fleet 'B' vehicles are covered by maintenance schedules published under the AESP system as Category 6 of the relevant vehicle AESP Octad.

5.1 Maintenance Schedules. These are the authority for carrying out all scheduled maintenance tasks on the subject equipment and take precedence over any other conflicting publication. They give details of the maintenance tasks to be carried out at predetermined times, distances and in some cases running hours. The schedule is to be used in conjunction with other categories of the relevant AESP Octad and other associated publications as applicable. The schedule also states the competencies required to carry out the various maintenance tasks.

5.2 Electrical and Mechanical Engineering Regulations (EMERs), Army Codes (ACs), Air Publications (APs) and Air Diagrams (ADs). These are the equipment maintenance and support publications which preceded AESPs. They are still used on a small number of older vehicles. Retrospective action will not be taken to replace them, therefore they will continue in use until the vehicles are declared obsolete.

5.3 Manufacturers' Maintenance Schedules. Some small population vehicles are maintained using manufacturers' commercial schedules.

MAINTENANCE ORGANISATION

6 As a general rule the Service maintenance organisations, with slight differences to allow for single Service procedures, conform to the following scheme of maintenance. A table showing the relationship between lines and levels of maintenance is listed at Annex A.

6.1 Level 1 User Maintenance. User maintenance/1st Line Maintenance (RAF) is normally carried out by the driver/operator and consists of the following work:

- 6.1.1 Daily, before use maintenance.
- 6.1.2 Daily, after use maintenance, where applicable.
- 6.1.3 Weekly maintenance.
- 6.1.4 Vehicle cleaning.
- 6.1.5 Lubrication and servicing (Army only).
- 6.1.6 NCO's functional check and test, where applicable (Army only).
- 6.1.7 Maintenance of wheels, tyres and inner tubes (Army), Wheel changes (RAF).
- 6.1.8 'Patch' painting as necessary using non-toxic paint kits.

6.2 Level 2 Maintenance/2nd Line Maintenance (RAF). Level 2 maintenance is normally carried out by attached REME tradesmen/LAD (Army), MT Technicians/General Technicians Mechanical/General Technicians Electrical (RAF) (or equivalent) as identified in the maintenance schedule and consists of the following work:

- 6.2.1 Replacement of unserviceable components.
- 6.2.2 Repair of mechanical components by adjustment or replacement of parts which does not involve extensive dismantling.
- 6.2.3 Repair of electrical components by replacement of parts.
- 6.2.4 Embodiment of modifications and the satisfaction of relevant tech bulletins.
- 6.2.5 Minor repairs to chassis, body and cabs.
- 6.2.6 Time/usage maintenance (A, B and C) – Vehicle Mechanic/Qualified Technician tasks (Army).
- 6.2.7 Lubrication/Minor/Major/Area maintenance (RAF).
- 6.2.8 Initial maintenance of vehicles/components (RAF).
- 6.2.9 Vehicle acceptance checks (RAF).
- 6.2.10 Maintenance of wheels, tyres and inner tubes (RAF).

6.3 Level 3 Maintenance/3rd Line Maintenance (RAF). Level 3/3rd Line maintenance includes work deemed to be beyond first line workshop (Army) or Station/Unit MT Maintenance Facility (RAF) capacity, either because of the required specialist work content or the involvement of special tools and facilities.

6.4 Level 4 Maintenance. This work is normally of a repair nature and may include specialised repairs which are beyond second line workshop (Army) or 3rd line maintenance (RAF) capacity and require to be undertaken by the motor trade through Contract Repair (CR) procedures or third line support within Equipment Support.

6.5 Storage Maintenance (Army only). Maintenance for vehicles in a reduced state of readiness (i.e. stored in a base depot/Materiel Park Vehicles (MPV) etc) has aims supplementary to those detailed above. They are:

- 6.5.1 The return of the vehicle to full serviceability.
- 6.5.2 The periodic confirmation of serviceability of specialist systems, including classification where appropriate.

6.6 Theatre Fleet Support Units (TFSU). Maintenance of vehicles stored in TFSUs is covered in AESP 0200-A-400-013.

VEHICLE MAINTENANCE AND INSPECTION UNDER CONTRACT REPAIR ARRANGEMENTS

7 Generally MoD owned white fleet vehicles are maintained by contractors through CR. Maintenance and inspection of vehicles in this category is to be carried out as detailed below by competent agency staff (see Para 14 for definition of competent persons). In overseas locations where there is no suitable commercial repair agency, or where the security of military transport operations cannot be compromised, Div HQs/HQSTC have the authority to maintain and inspect white fleet vehicles using in-house resources.

7.1 Vehicles for which AESP, EMER, AP or AD Maintenance Schedules exist. Level 1 maintenance is normally carried out, by the user, in accordance with the maintenance schedule. Level 2 maintenance is to be carried out by the contractor, in accordance with the vehicle manufacturers' recommended periodicity and maintenance schedule.

7.2 Vehicles for which no AESP, EMER, AP or AD Maintenance Schedules exist. Level 1 maintenance is normally carried out, by the user, in accordance with the vehicle manufacturers' maintenance schedule. Level 2 maintenance is to be carried out by the contractor, in accordance with the vehicle manufacturers' recommended periodicity and maintenance schedule.

7.3 An annual DfT VOSA Roadworthiness, MOT or Plate test is to be carried out on the vehicle in accordance with the current civil legislation for the type of vehicle, (DfT test certificates are to be retained with the vehicle documents). Where an annual DfT VOSA test is impracticable and on the authority of the Div HQ/HQSTC an 'in-house' mandatory inspection to include a Roller Brake Test (RBT), is to be carried out by a competent person as defined in Para 14 and 15.

8 Div HQs/RAF HQSTC have the authority to extend the provision of contractor maintenance to green fleet vehicles where local situations dictate. Under this provision Safety or Six Monthly Inspections (to coincide with scheduled maintenance) can be carried out by contract using AF B6534 (vehicles nominally under 3.5t DGVW (MAM)) or AF G932(B) (vehicles over 3.5t DGVW (MAM)) forms as appropriate. Annual inspection to the procedures laid down in this AESP remains an in-house function carried out by competent staff (see paras 14 and 15) who are directly employed by the MOD; however, the following exceptions can be applied:

8.1 Part 1.

8.1.1 A roadworthiness inspection in-lieu of AF G932(B) Part 1 can be undertaken by relevant approved MOT VTS or VOSA Test Stations using VOSA certification where suitably qualified personnel are not available..

8.1.2 Where in-house facilities are not available, RBT, emission testing and headlamp alignment tests can be undertaken by relevant approved MOT VTS or VOSA Test Stations to support in-house inspections.

8.2 Part 2. Exceptionally, for specialist equipment where suitably qualified and/or experienced personnel are not available, Div HQs/RAF HQSTC can authorise contractors to undertake this inspection, providing both legislative and military standards/requirements are maintained.

ANNOTATION OF VEHICLE AND OPERATOR SERVICES AGENCY DTp NUMBER IN VEHICLE DOCUMENTS

9 Modern RBTs incorporate a computer system that calculates the brake efficiencies of the vehicle under test and prints out the results. The RBT software includes a database that contains the required reference information for all military vehicles, thus obviating the need to manually enter such details each time a vehicle is presented for test. Each vehicle type has been allotted a 'DTp' number by the DfT (VOSA) that will automatically reference the data stored in the RBT database. The only manual entries required therefore will be the DTp number (as given at Annex B) and the vehicle registration number. For ease of reference for operators and inspection staff, the DTp number is to be annotated at Section 1, Page 1004.1b, under miscellaneous, special features in the vehicle documents FMT 1004 (Army) or the STAMA vehicle notepad (RAF).

TESTING, INSPECTION AND CERTIFICATION

10 Section 47 of The Road Traffic Act 1988 states the requirements for DfT testing of vehicles. It is MoD policy that all 'B' Vehicles (including trailers) operated by the MoD, white or green, are inspected to DfT Test standards at annual intervals.

10.1 For MoD vehicles maintained in Service workshops, this requirement is to be met by a mandatory vehicle inspection. This is to be conducted annually, to coincide where possible with the 12 and 24 month time usage maintenance as called for in the relevant AESP Cat 601 and in accordance with the relevant DfT VOSA manual at Chapter 3 (i.e. to include RBT and exhaust emissions tests etc). Mandatory annual inspections are to be recorded using AF G932(B).

10.2 In addition to the mandatory annual inspection, 'B' vehicles maintained by the MoD which nominally exceed 3.5 tonnes DGWW (MAM) will be subjected to a safety inspection six months after the Annual Mandatory Inspection. The frequency of such inspections may be increased at the Unit Commander's, Unit Equipment Manager's (UEM), OC MT, Motor Transport Officer's (MTO), Transport Manager's or equivalent discretion on highly utilised vehicles (see also Chapter 2 for inspection period deviations). Safety inspections are also recorded using the AF G932(B).

10.3 Green Fleet 'B' Vehicles nominally under 3.5 tonnes DGWW (MAM) as described at Annex C operated by the MOD will be subjected to a six monthly Unit Inspection carried out by a suitably qualified person; the frequency of which may be increased at the Unit Commander's, UEM's or MTO's discretion on highly utilised vehicles. Unit inspections are recorded using the AF B6534 (Army only). The RAF Functional Check and Test completed after 6 monthly maintenance by a competent person as defined at para 14 meets this requirement for RAF controlled vehicles.

11 Contractor owned and maintained vehicles operated by the MoD and green fleet vehicles under maintenance contracts shall be subject to formal DfT VOSA testing, and are to receive safety inspections as necessary, in accordance with Chapter 2, Paragraphs 25 and 26. Safety inspections in this category can be recorded using contractor certification.

12 The original DfT VOSA test certificate/AF G932(B) and safety inspection reports are to be retained as follows:

- 12.1 With the vehicle documents. A copy is to be retained with the AF G1084A (Army).
- 12.2 Attached to the applicable STAMA ADP job sheet or AF G1084A (RAF).

NOTE

AF B6534 and Safety inspections as applicable should ideally be planned to coincide where possible with the six-monthly time usage maintenance as called for in the relevant AESP Cat 601. The three-monthly and the annual AF B6534 Unit Inspection are no longer required.

13 UK inspection standards shall be applied to all MoD vehicles in all theatres of operation. In the event that a host Nation demands a different standard of inspection, clarification should be sought through the relevant Service Chain of Command and referred to DLO Andover, TES ILS & Eng Pol.

COMPETENT PERSONS

14 Vehicle inspections are only to be carried out by a competent person as prescribed in the table below.

TABLE 1 - COMPETENCE OF VEHICLE INSPECTORS

Type of Inspection	Authorised Personnel	Remarks
Annual MEI. Recorded on AF G932(B) Parts 1 and 2.	Regular Army Class 1 VMs.	
	Regular Army Class 2 VMs that have gained equipment proficiency and have completed the Inspector Vehicles course (D827) held at SEME.	May only inspect vehicles they have achieved proficiency on (i.e. their Record of Experience Charts have been populated and signed off by an Engineering Officer ¹). The Engineering Officer is to authorise the tradesman concerned in writing specifying the vehicle types that he may inspect.
	Territorial Army Class 1 VMs provided they are authorised in writing by an Engineering Officer ² and meet one of the following criteria ³ : <ul style="list-style-type: none"> • Prior service as a Regular Army Class 1 VM. • Attended the Inspector Vehicles course (D827) held at SEME. • Hold a DfT VOSA approved Vehicle Inspector qualification. 	
	RAF WO/FS General Engineering Technician (Gen Eng Tech) (Q-MS-TG6).	
	RAF NCO MT Tech, NCO Gen Tech Mechanical (Q-MS-TG6).	Must have completed the MOD (RAF) vehicle inspection course and been awarded Q-MT-V-INSP ⁴ .
	RAF NCO Gen Tech Mechanical (Q-MS-TG5).	Must have completed Assimilation Training, the unit induction programme, been awarded X-500 and have completed the MOD (RAF) vehicle inspection course and been awarded Q-MT-V-INSP.
	MoD directly employed equivalent civilian tradesmen that have relevant qualifications and/or experience.	Must have completed one of the following courses ⁵ : <ul style="list-style-type: none"> a. SEME Inspector Vehicle (D827). b. MOD (RAF) Vehicle Inspector and been awarded Q-MT-V-INSP. c. VOSA Approved Vehicle Inspector.
Annual MEI Part 1 of AF G932(B). Roadworthiness element.	VOSA employed vehicle inspectors for vehicles over 3.5T.	The VOSA Roadworthiness Report must be stapled to the AF G932(B).
	MOT Test Centre inspectors for vehicles less than 3.5T.	The MOT Test Certificate must be stapled to the AF G932(B).
Annual MEI Part 2 of AF G932(B). Fitness for Role element for Specialist Equipment.	Specialist contractor personnel.	Div HQs can authorise contractors to undertake the inspection of specialist equipment where suitably qualified and/or experienced personnel are not available, providing both legislative and military standards/ requirements are maintained.

(continued)

¹ As prescribed in AESP 0200-A-090-013 - DEME(A) Engineering Standards.

² The Engineering Officer must satisfy himself that the tradesman concerned has sufficient trade related experience and meets the competency requirements prescribed in DEME(A) Engineering Standards.

³ The 3 year currency rule prescribed in DEME(A) Engineering Standards applies to each of these criteria.

⁴ Previously authorised "Grandfather Rights" - NCO MT Tech/Gen Tech M (Q-MS-TG6) are authorised as competent to carry out MEIs until Q-MT-V-INSP training is completed.

⁵ This requirement is applicable to all new appointees; existing inspectors who have not undertaken formal training are to be formally assessed by a local Engineering Officer and where appropriate authorised as competent in writing.

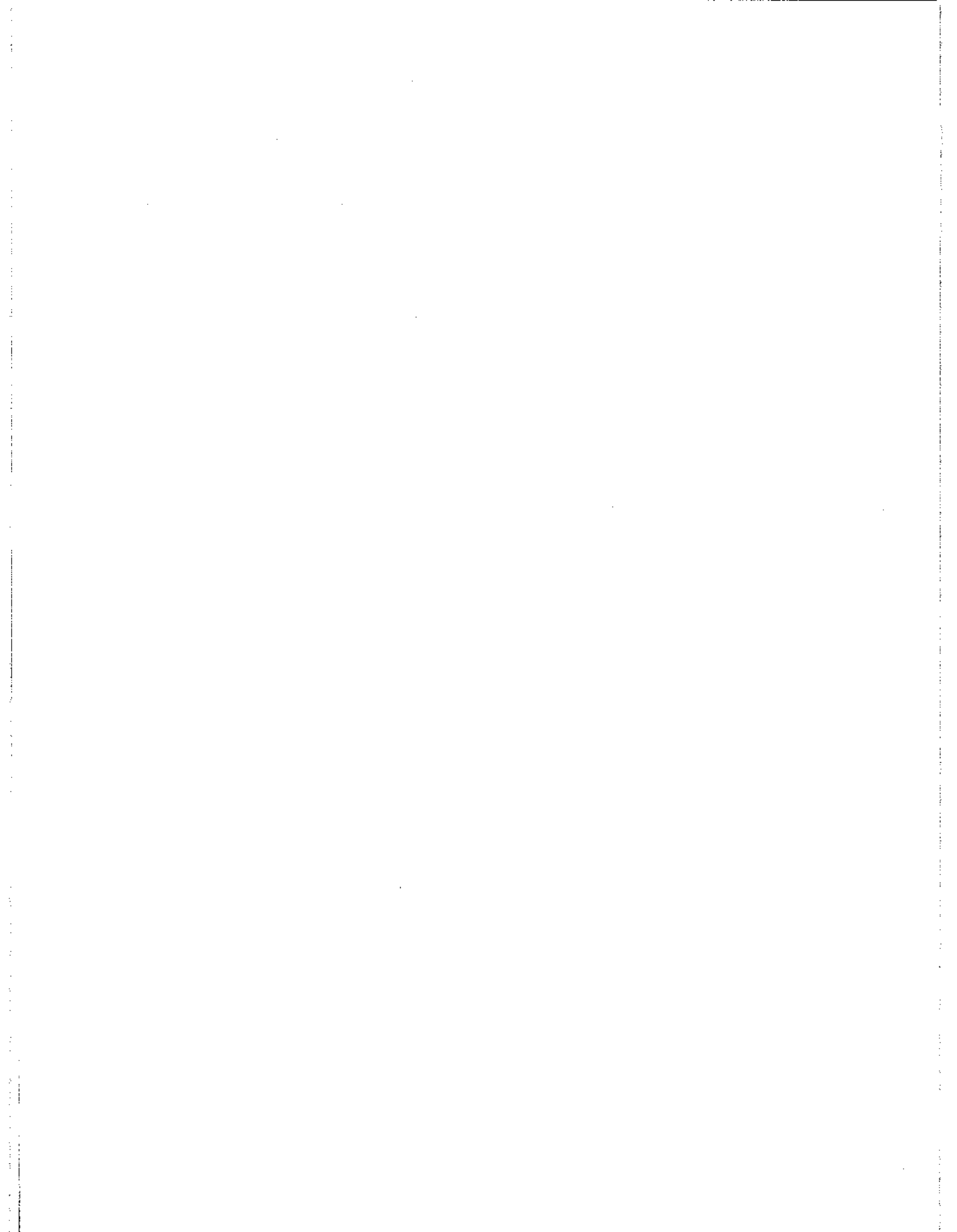
TABLE 1 - COMPETENCE OF VEHICLE INSPECTORS (continued)

Type of Inspection	Authorised Personnel	Remarks
6 monthly safety inspection on vehicles over 3.5T MAM (AF G932(B)).	All those authorised to carry out the annual MEI.	
	Suitably qualified contractor personnel.	
6 monthly unit inspection on vehicles under 3.5 T MAM (AF B6534) (Army only).	All those authorised to carry out the annual MEI.	
	Qualified unit personnel.	Class 1 Driver or equivalent.
	Suitably qualified contractor personnel.	
Functional Check and Test in lieu of AF B6534 (RAF only).	All those authorised to carry out the annual MEI.	
	Suitably qualified contractor personnel.	
Stage/Out inspection.	All those authorised to carry out the annual MEI.	
	Suitably qualified contractor personnel.	

15 Contractor personnel (other than VOSA employed and MOT test centre vehicle inspectors), irrespective of their qualification and/or experience, are not authorised to carry out the Part 1 Roadworthiness element of the annual MEI of military vehicles (MOT or Plate test equivalent). They are currently precluded from doing so under the provisions relating to the inspection of 'Crown' vehicles in the Road Traffic Act 1988.

CURRENCY

16 Competence is a mix of training, experience and currency. Currency, be it at trade working on equipment or in carrying out an associated function such as vehicle inspections, is maintained by regularly carrying out that particular function. Individuals that spend 3 years away from a particular competence area will lose their currency. A period of refresher training or supervised on-the-job-training is required before the individual is certified competent again. Proof of the refresher training undertaken and subsequent re-certification of competence is to be documented and retained by the Unit.



CHAPTER 1 ANNEX A

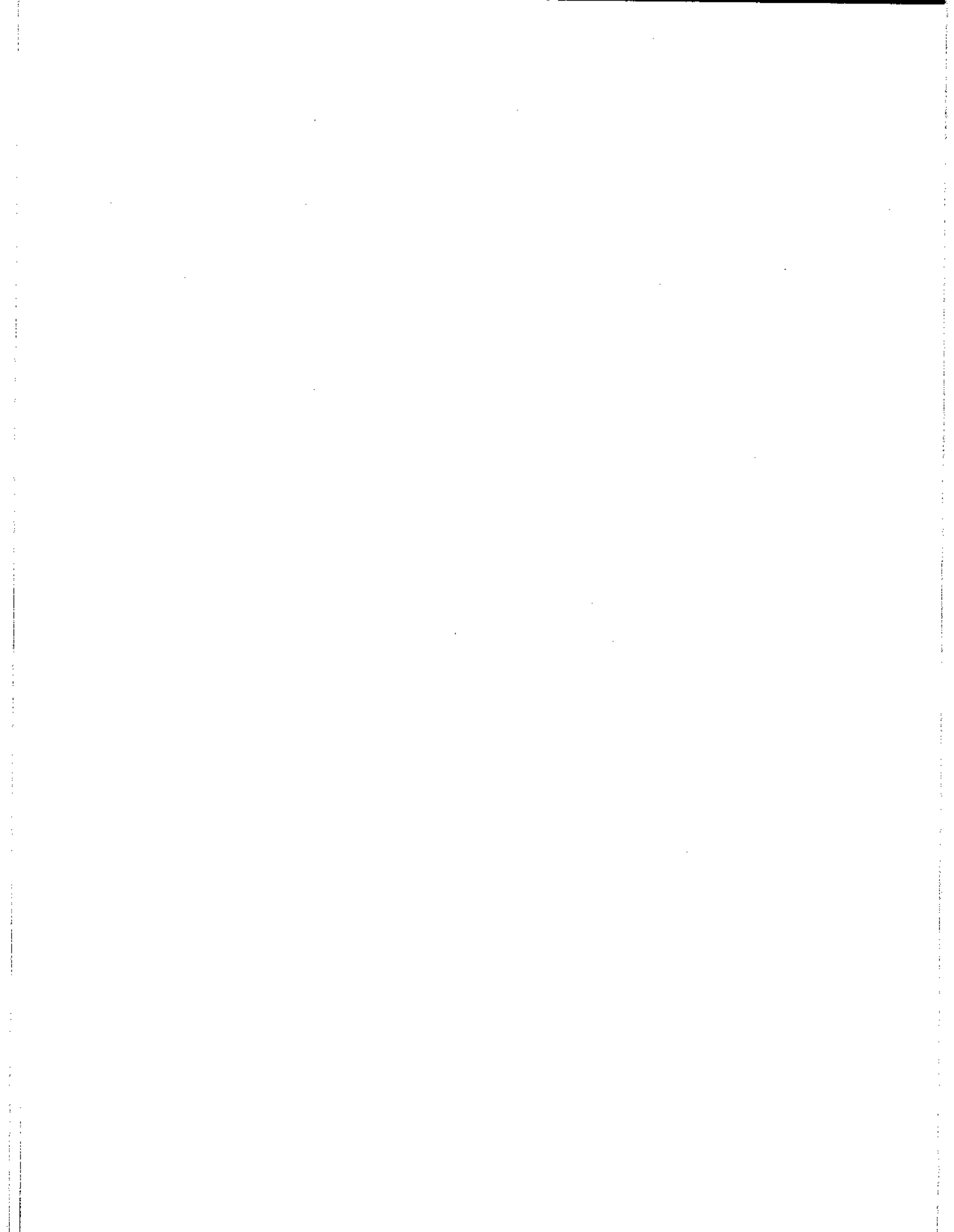
RELATIONSHIP BETWEEN LINES OF EQUIPMENT SUPPORT AND LEVELS OF MAINTENANCE

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1 Relationship between lines of equipment support and levels of maintenance	1/2

TABLE 1 - RELATIONSHIP BETWEEN LINES OF EQUIPMENT SUPPORT AND LEVELS OF MAINTENANCE

Lines of equipment support (Army)		Level of maintenance undertaken
Line	Definition	
User		Level 1.
First	The organisation immediately responsible for the maintenance of a unit's complete system or equipment.	Level 2 and in some cases, level 3 maintenance on the parent unit's specified equipment.
Second	The organisation responsible for providing maintenance support to specified first line organisations.	Level 3 (level 1/level 2 maintenance on their own vehicles and equipment).
Third	The organisation responsible for providing maintenance support to first or second line. Currently the ESO has no deployable third line maintenance organisations in the ORBAT; the organisations providing this line of support are static and non-deployable.	Levels 1, 2, 3 and 4.
Fourth	Industry providing, under contract, support to the Army.	Levels 1, 2, 3 and 4.
Lines of equipment support (RAF)		Level of maintenance undertaken
Line	Definition	
First	The Unit MT or user section.	Level 1 Elements (Daily and Weekly maintenance only).
Second	The Unit MTMF.	Levels 1 and 2.
Third	ABRO through arrangement with the RAF Field Engineer.	Levels 1, 2, 3 and 4.



CHAPTER 1 ANNEX B
VOSA BRAKE TESTING CODES
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1 Brake testing codes	1

TABLE 1 - BRAKE TESTING CODES

Vehicle Description	HGV (DTp) Code	Vehicle Description	HGV (DTp) Code
SUPACAT MPV	V0946	SCAMMEL COMMANDER	B991
SUPACAT THM	V0954	ALVIS UNIPOWER RIV	V0945
STEYR DAIMLER PUCH – TUM(HD)	B997	CARMICHAEL MFV	V0943
REYNOLDS BOUGHTON – TUH	B998	UNIPOWER BR90 – All Variants	B994
LEYLAND DAF 4 T – All Variants	B982	M3 BRIDGING	B992
BEDFORD 4 T – All Variants	B980	GROVES 315 – All Variants	V0952
BEDFORD 8 T – All Variants	B981	GROVES CRANE AT 422E	V0951
BEDFORD 14 T – All Variants	B983	GROVES CRANE RT 760	V0955
LEYLAND DAF – DROPS	B990		
FODEN – DROPS	B996		
VOLVO FL12 – SLDT	B985	Coach Description	PSV (DTp) Code
FODEN – TTF 12000Ltrs (10T)	B979		
FODEN – TTF 22500Ltrs (16T)	B984	DENNIS JAVELIN – 10, 11 & 12m	168202
SCAMMEL EKA Recovery	V0949		
FODEN Recovery	B986	'A' Vehicle Description	DTp Code
SEDDON ATKINSON – Tractor	B993		
OSHKOSH MMT – Tractor	V0953	GKN SAXON – All Variants	V0948
OSHKOSH HET – Tractor	BV0950		

(continued)

TABLE 1 - BRAKE TESTING CODES (continued)

Trailer Description	DTP Code	Trailer Description	DTP Code
KINGS - HET GTS 100	C90407	SPECIAL PURPOSE 2.5T FLAT PLATFORM (GVW 3.5T)	503511
TRAILMASTER 44 LT 'A' MOVER	344031	FEPS 3.5T GENERATOR	503511
BROSHUIS LIGHT 'A' MOVER	358738	THOMPSON CARMICHAEL - 32,000Ltr	319271
CRAVEN TASKER 20T	927061	REYNOLDS BOUGHTON HMT - POWER PACK	812011
REYNOLDS BOUGHTON DROPS MLRS CLOSE COUPLED	617311	AVRE	617326
KINGS DROPS DRAWBAR 15T	820431		

CHAPTER 1 ANNEX C

MOT TEST CLASSES – EXTRACTED FROM THE MOT TESTING GUIDE

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1 MOT test classes	1

TABLE 1 - MOT TEST CLASSES

Class	Description	Age first test required (years)
I	Motor bicycles (with or without sidecars) up to 200cm ³	3
II	All motor bicycles (including Class I)(with or without sidecars).	3
III	Motor Tricycle - Three wheeled vehicles with wheels symmetrically arranged, a max speed over 45km/h or engine size over 50cc, not more than 450kg ULW (see Note (1)).	3
IV	<p>Cars, passenger vehicles, motor caravans and dual purpose vehicles (see Note (2)) in all cases with up to eight passenger seats. Goods vehicles not exceeding 3,000kg Design Gross Weight(DGW) (see Note (3)).</p> <p>Motor Tricycle - Three wheeled vehicles with wheels symmetrically arranged, a max speed over 45km/h or engine size over 50cc, more than 450kg ULW.</p> <p>Quadricycle - Four wheeled vehicles with a max ULW of 400kg (550 kg for a goods vehicle) with a max net power of 15KW.</p> <p>Taxis and ambulances in either case with up to eight passenger seats.</p> <p>Passenger vehicles, ambulances, motor caravans and dual purpose vehicles in all cases with nine to twelve passenger seats that:</p> <ul style="list-style-type: none"> • are fitted with no more seat belts than the minimum required because of their construction; or • are identified as having been fitted with a type approved seat belt installation when built; or • have been tested as Class IVA, VA or VIA(PSV) with at least the same number of seat belts as are currently fitted. 	<p>3} } see Note (4) 3}</p> <p style="text-align: right;">1</p> <p style="text-align: right;">1</p>

(continued)

TABLE 1 - MOT TEST CLASSES (continued)

Class	Description	Age first test required (years)
IVA	<p><i>The Class IVA Test is the normal Class IV Test with the addition of a check on the installation of certain seat belts.</i></p> <p>Passenger vehicles, ambulances, motor caravans and dual purpose vehicles in all cases with nine to twelve passenger seats that:</p> <ul style="list-style-type: none"> • are fitted with more seat belts than the minimum required because of their construction and: • are not identified as having been fitted with a type approved seat belt installation when built; or • have not been tested as Class IVA, VA or VIA(PSV) with at least the same number of seat belts as are currently fitted 	1
V	<p>Private passenger vehicles, ambulances, motor caravans and dual purpose vehicles in all cases with thirteen or more passenger seats(including community buses, etc.) that:</p> <ul style="list-style-type: none"> • are fitted with no more seat belts than the minimum required because of their construction; or • are identified as having been fitted with a type approved seat belt installation to all seats when built; or • have been tested as Class VA or Class VIA(PSV) with at least the same number of seat belts as are currently fitted. 	1
VA	<p><i>The Class VA Test is the normal Class V Test with the addition of a check on the installation of certain seat belts.</i></p> <p>Passenger vehicles, ambulances, motor caravans and dual purpose vehicles in all cases with thirteen or more passenger seats(including community buses, etc.) that:</p> <ul style="list-style-type: none"> • are fitted with more seat belts than the minimum required because of their construction and: • are not identified as having been fitted with a type approved seat belt installation when built; or • have not been tested as Class VA or Class VIA(PSV) with at least the same number of seat belts as are currently fitted. 	1
VI and VIA	Public Service Vehicles (PSVs).	1
VII	Goods Vehicles over 3,000kg up to and including 3,500kg DGW.	3

NOTES

(1) Unladen Weight (ULW) is defined as:- the weight of a vehicle or trailer inclusive of the body and all parts (the heavier being taken where alternative bodies or parts are used) which are necessary to, or ordinarily used with, the vehicle or trailer when working on the road, but exclusive of the weight of fuel, water or batteries used for supplying power to propel the vehicle, as the case may be, of any vehicle by which the trailer is drawn, and of loose tools and loose equipment. (JSP 341 Reference).

(2) A 'Dual purpose vehicle' is one that is constructed or adapted for the carriage both of passengers and of goods or burden of any description; and has an ULW not exceeding 2,040kg; and which either:

(a) is constructed or adapted so that the driving power of the engine, is, or by the use of appropriate controls can be, transmitted to all the wheels of the vehicle; or

(b) satisfies the following conditions as to construction:

i. is permanently fitted with a rigid roof, with or without a sliding panel;

ii. the area to the rear of the drivers seat must be:

- permanently fitted with at least one row of transverse seats (fixed or folding) for two or more passengers, and those seats must be properly sprung or cushioned and provided with upholstered backrests, attached either to the seats or to a side or the floor of the vehicle; and

- lit on each side and at the rear by a window or windows of glass or other transparent material having an aggregate area of not less than 770cm² at the rear;

iii. the distance between the rearmost part of the steering wheel and the backrests of the row of transverse seats satisfying the requirements specified in the first paragraph of Note (b)ii (or, if there is more than one such row of seats, the distance between the rearmost part of the steering wheel and the backrests of the rearmost such row) must, when the seats are ready for use, be not less than one third of the distance between the rearmost part of the steering wheel and the rearmost part of the floor of the vehicle.

(3) Design Gross Weight is defined as: - the maximum gross weight that the vehicle was designed to operate at. This is normally found on a plate fixed to the vehicle by the manufacturer or in the case of older or heavier vehicles by a 'Ministry Plate'. Such plates are not required on all vehicles. (The MOT Testing Guide Reference).

(4) MoD Green Fleet Vehicles are to commence annual inspection and test from the one year point (and safety/unit inspection from the six monthly point). Sequentially from the last AFG 932(B) issued with the vehicle from the depot.

N.B. Trailers constructed or adapted for the carriage of goods or burden with an unladen weight of more than 1,020kg and vehicles forming part of an articulated combination are subject to heavy goods vehicle (HGV) plating and testing.

CHAPTER 2

B VEHICLE MAINTENANCE AND INSPECTION PROCEDURE

CONTENTS

Para

1	Introduction
2	AESP Maintenance Schedule format
4	Maintenance periodicity
6	Daily and weekly maintenance
8	Before and after use maintenance
9	Time/Usage maintenance
10	Out of use maintenance
12	Storage in Controlled Humidity Environment (CHE)
13	Maintenance inspection period deviations
14	Fault Reporting
15	Equipment Failure Reporting
16	Out inspections
19	Discretionary Inspections
20	Mandatory inspections
23	Safety inspections
26	AF G932(B) <u>Wheeled Vehicle Inspection Reporting procedure</u>
27	AF B6534 Unit Inspection Report (Army)
29	Mandatory annual DfT testing of vehicles owned and/or maintained by a Contractor
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Annex

A	<u>Wheeled Vehicle Inspection Report</u> AF G932(B)
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INTRODUCTION

1 This chapter describes the basic system of routine maintenance and inspection for 'B' vehicles, and explains the layout of maintenance schedules.

AESP MAINTENANCE SCHEDULE FORMAT

2 Maintenance Schedules for all green fleet 'B' vehicles are produced in Army Equipment Support Publications (AESPs) (Octad Cat 6), Air Publications (AP) or Air Diagrams (AD). These publications are unique to the particular vehicle model and contain detailed information written in objective terms and presented in a logical format. They enable units to ensure that the vehicle continues to meet operational and DfT VOSA roadworthiness requirements as necessary. Schedules are produced for both first and second line maintenance activities. Should a conflict with other MOD publications exist, the AESP Cat 6 is the authoritative document. Where no maintenance schedule is available, the Equipment Support Manager (ESM) via the ES chain of command is to be contacted for guidance.

3 AESP Cat 6 is formatted to give the following information:

3.1 Table 1 - Equipment Applicability: Specifies the vehicle type to which the Cat 6 applies.

- 3.2 Table 2 - Fuels, Lubricants and Associated products: Includes a list of fuel and lubricant (F & L) products and capacities.
- 3.3 Table 3 - Equipment Data: Includes data on adjustments, dimensions, weights, wheels, tyres and torque wrench settings:
- 3.4 Table 4 - Action on receipt: Includes the activities that are to be completed on receipt of the vehicle by the new holding unit.
- 3.5 Table 5 - Out of Phase Maintenance: Lists the maintenance activities, the periodicity of which falls outside those of the routine maintenance.
- 3.6 Table 6 - Driver/Operator Maintenance: Includes those activities which are to be completed on a Daily, Before Use, After Use, or Weekly Basis.
- 3.7 Table 7 - Time/Usage Maintenance: Includes the activities to be completed on 1st (Initial), A (Lubrication), B (Minor), C (Major) and, where applicable, Area Maintenance.
- 3.8 Table 8 - Out of Use maintenance: Includes the activities to be completed when a vehicle is taken out of use for periods exceeding one month and up to four months. These activities are additional to those called for in Para 13.
- 3.9 AESP Form 10 (final leaf) - Comment(s) on AESP: This form is to be used to raise any unsatisfactory features within the AESP.

MAINTENANCE PERIODICITY

4 The AESP Category 6 is the authoritative document on maintenance periodicities, which are listed in miles, months (Calendar) and on some equipment hours run. Calendar maintenance periodicities are specified in months, eg 3, 6, 12 or 24 months. The commencement of the next period is normally applied to the calendar month in which the previous maintenance was due. This enables the unit to plan its calendar maintenance on an annual basis to equalise the workload.

5 When calendar maintenance is not completed in the month for which it was scheduled, due to an extension being granted, the next maintenance period is to be calculated from the original month. However, if the delay is caused by the lack of spares or extensive rectification, the UEM/MTO may authorise the commencement of the next maintenance period from the date of completion. Adequate safeguards are to be taken to ensure that the annual mandatory vehicle inspection is not exceeded or that vehicles are not used whilst overdue maintenance.

DAILY AND WEEKLY MAINTENANCE

6 The daily and weekly maintenance schedules are listed in the AESP Category 6 Table 6 (Driver/Operator Maintenance). It details the minimum first line maintenance requirements of the vehicle on each day it is used, together with certain operations to be carried out at weekly intervals. Daily maintenance is to be completed when the vehicle is in use, at intervals not exceeding 24 hours (this does not absolve the driver from any obligations in JSP 341, Joint Service Transport Regulations). Daily maintenance is only to be completed on the days the vehicle is in use. The requirement for vehicles to undergo weekly maintenance 'whether used or not' is no longer deemed necessary whilst 'out of use'. Vehicles that subsequently forego weekly maintenance are to be subjected to both daily and weekly maintenance before next use.

7 The UEM/MTO (Army), OC MT/MTO/Transport Manager (RAF) or equivalent may authorise relaxed First Line maintenance for cars saloon and utility, vans light and medium and trucks utility which do not exceed 250 miles per week. Relaxed first line maintenance is defined as a maintenance cycle in which daily maintenance is carried out not less than once a week. Weekly maintenance is still to be completed on the date specified. Relaxed first line maintenance is to be authorised in the vehicle documents (FMT 1004) or the STAMA (RAF) running paperwork (F658) for each vehicle by the UEM/MTO (Army), OC MT/MTO/Transport Manager (RAF) or equivalent.

BEFORE AND AFTER USE MAINTENANCE

8 Some specialist vehicles require before and/or after use maintenance. The requirements are detailed in the maintenance schedule for the particular vehicle.

TIME/USAGE MAINTENANCE

9 The maintenance requirements, periodicity and competencies required to carry out the various maintenance tasks are contained in AESP Cat 6 Table 7 and Table 5 (Out of Phase) and consist of the following:

9.1 A, Army (Lubrication, RAF). In general terms, this maintenance includes a change of engine oil and filter element, a check of all oil levels, greasing and oil can lubrication, plus a visual examination of the vehicle to include the steering and braking systems. It may also include a road test by an authorised person.

9.2 B, Army (Minor, RAF). In general terms, this maintenance consists of an 'A' (Lubrication) maintenance accompanied by nominal adjustments and a minimal strip examination of high rate wear components. It may also include a road test by an authorised competent person.

9.3 C, Army (Major, RAF). In general terms, this maintenance includes those items covered by a 'B' (Minor) maintenance, change of oils, additional lubrication, a check of wear limits and clearances and the replacement of high rate wear components to enable the vehicle to commence a further maintenance cycle. It may also include a road test by an authorised person.

9.4 Area Maintenance – RAF Only. This regime is only to be applied where non-availability for extended periods of scheduled maintenance is unacceptable. Area maintenance is achieved by dividing the 24 month Minor/Major schedule into 12 functional packages of work. Specialist equipment Area Maintenance is to be completed concurrently with the associated vehicle areas in accordance with the relevant AESP Cat 601. A full out inspection is required after maintenance to brakes, steering and suspension.

OUT OF USE MAINTENANCE

10 When vehicles are taken out of use for periods exceeding one month and up to four months, out of use maintenance will be applied. The maintenance requirements and periodicity are contained in AESP Cat 6 Table 8; see also AESP 2300-A-401-013 – Short Term Storage of Vehicles.

11 When vehicles are stored in depot for long periods, in addition to the requirements prior to entering storage as detailed in the AESP Cat 6 Table 8 and any long term storage/preservation requirements, they shall also be subject to:

11.1 A mandatory vehicle inspection prior to entering storage.

11.2 A mandatory vehicle inspection prior to issue from storage if the period of storage exceeds six months.

STORAGE IN CONTROLLED HUMIDITY ENVIRONMENT (CHE)

12 When vehicles are to be stored in a Controlled Humidity Environment (CHE), they are to be prepared, inspected and maintained in accordance with AESP 0200-A-400-013.

MAINTENANCE/INSPECTION PERIOD DEVIATIONS

13 To permit flexibility in planning and to counter any adverse conditions which may prevail locally, UEMs/MTOs (Army), OC MT/MTO/Transport Manager (RAF) or equivalent may anticipate maintenance as required. Reasons for the increased frequency of maintenance are to be entered in the vehicle documents FMT 1004, on STAMA or Form 4870 (RAF) as applicable. Similarly a safety inspection (AF G932(B)) or a unit inspection (AF B6534) may be anticipated in order that maintenance and inspection activities can be co-ordinated. In such a case a second six monthly safety or unit inspection may be required within the year, or the annual mandatory brought forward by the same period.

13.1 In exceptional circumstances the Engineering Officer, (Authority Level K holding QR 640 authority (RAF)) may authorise an extension of 10% to a maintenance activity or safety inspection. Each extension is to be recorded by the authorising officer in the vehicle documents FMT 1004 or STAMA (RAF) as applicable. **Extensions are to be strictly controlled, and on no account is an extension to be granted other than for overriding operational requirements. No extension is allowed on annual mandatory vehicle inspections.**

13.2 For vehicles with extremely low utilisation, where the maintenance periodicity as listed in the relevant AESP Cat 6 may impose uneconomic penalties, applications for a local maintenance deviation to be granted are to be submitted as follows:

13.2.1 The OC Workshop or OC of the unit owning a vehicle may make a recommendation to the ESM through the chain of command (Army).

13.2.2 The unit OC MT/MTO/Transport Manager or equivalent should apply to HQ STC.

13.3 For maintenance period deviations for vehicles stored in CHE, refer to para 12.

FAULT REPORTING

14 Vehicle faults are to be reported to:

14.1 The relevant MT line manager using an FMT 1005, MOD Form 1084A or Authority To Use Document (ATUD) (Army).

14.2 The MT Control using FMT1005, STAMA F658 or as detailed in local RAF MT Orders (RAF).

EQUIPMENT FAILURE REPORTING

15 Any equipment fault that occurs which is not attributed to 'Fair Wear and Tear', misuse or neglect, shall be considered to be an equipment failure and shall be reported as such in accordance with JSP 336, Volume 12, Pamphlet 2.

OUT INSPECTIONS

16 An Out Inspection is an examination (without dismantling) and functional test where necessary, of the maintenance/repair work carried out on a vehicle. The Out Inspection is to be carried out by a competent person as defined at Chapter 1 para 14, commensurate with the level of maintenance activity and where practicable, has not been involved with the repair/maintenance activity itself (RAF refer to AP 100B 01). Out inspections are to be recorded in the vehicle FMT 1004, the AF G1084A or JAMES as applicable. Out Inspections are carried out:

16.1 As a quality control on work carried out on the vehicle.

16.2 As a safety examination following completion of work which may affect the safety and roadworthiness of the vehicle.

17 An Out Inspection, including a functional check and/or brake test (as applicable), is mandatory under the following circumstances:

17.1 **Out Inspection (Limited RAF):** An Out Inspection is required following any maintenance or specified repair involving dismantling or assembly of the braking, steering or suspension systems of a vehicle, or following any other repair that could affect safety and/or roadworthiness. It is limited to the area of work carried out and other vehicle safety systems that may have been affected by such work. For minor repairs that do not affect safety and/or roadworthiness, this inspection should be restricted to the specified repair(s).

17.2 **Full Out Inspection:** A Full Out Inspection is to be completed following significant 'in-depth' repairs or maintenance outside of the standard MEI/Safety Inspection periodicity, which affect vehicle roadworthiness or safety. Examples of in-depth repair include assembly changes which require the removal of cabs, full vehicle refurbishment etc. This inspection is to cover all repairs/maintenance completed together with all aspects of roadworthiness; Chapter 3 of this AESP and the AF G932(B) Part 1 may be used for guidance.

18 An appropriate inspection is to be completed following repair work or scheduled maintenance carried out by an outside agency through Contract Repair (CR) as follows:

18.1 **Army --** A Full or Limited inspection commensurate with the depth of repair is to be completed before being returned to use. Under exceptional circumstances, for units without integral first line maintenance support or affiliation, MTOs are to carry out a quality check to ensure the work has been completed satisfactorily and that the vehicle is roadworthy.

18.2 **RAF --** A Full out inspection is to be completed before being returned to use.

NB: Where Maintenance Activity Contracts exist, the Fleet Manager/Contract Monitoring Team (CMT)/MTO are to ensure that the above inspections have been carried out by the contractor. Additionally, CMTs are required to periodically audit this process and the associated maintenance records.

DISCRETIONARY INSPECTIONS

19 For Quality Control purposes, Front Line Commands and/or local Commanders may implement additional inspections at their discretion, as part of their equipment care plan or where the Carriage of Dangerous Goods Regulations requires additional roadworthiness checks. Discretionary Inspections for Equipment Care purposes should be specified on a random basis and not exceed a 10% sample of the tasks completed.

MANDATORY INSPECTIONS

20 A mandatory inspection is an examination (without dismantling) and functional test, where necessary, by a competent person as defined in Chap 1, Para 14, of a vehicle to ensure that it is maintained in a condition to meet the requirements of the annual DfT VOSA Inspection as applicable and to meet its Operational role.

21 All Service green fleet, 'B' vehicles are to receive a minimum of one mandatory vehicle inspection annually. The mandatory vehicle inspection will be recorded on the AF G932(B)(at Annex A) and annotated in the FMT 1004, on JAMES or on STAMA (RAF) as applicable. Where it is necessary to complete part of the inspection (RBT) prior to the date of inspection, the AF G932(B) is to be dated from the earliest major testable element of that inspection. The AF G932(B) is to be retained as follows:

21.1 **ARMY -** With the vehicle documents (FMT 1004). A copy is also to be retained with the AF G1084A by the issuing workshop.

21.2 **RAF -** With the FMT 1004 or STAMA ADP job sheet as applicable.

22 Contractor owned, and white fleet vehicles shall be tested in accordance with civilian, DfT VOSA, MOT or plate test requirements as applicable and the certificate retained in the vehicle documents. A copy of the test certificate is to be attached to the AF G1084A/STAMA ADP job sheet (RAF).

SAFETY INSPECTIONS

23 A safety inspection is an examination (without dismantling) and functional test where necessary, by a competent person, as defined in Chap 1, Para 14, of a vehicle of or exceeding 3.5 tonnes (nominal) DGWV (MAM). Vehicles presented for the Safety Inspection shall be accompanied by up to date maintenance documents (Army and RAF) and sub unit quarterly CES and tool check return (Army only). The Safety Inspection is conducted to:

23.1 Ensure that the vehicle is being maintained in a roadworthy condition.

23.2 Highlight any deterioration in the operating condition of the vehicle.

23.3 Satisfy the requirements of the DfT Code of Practice for the safe use of vehicles (this is the commercial equivalent of a Roadworthiness inspection).

24 A safety inspection will normally cover all the elements of a mandatory vehicle inspection (AF G932(B) Parts 1 & 2). Where test equipment including an RBT, exhaust emission tester or headlamp beam setter is not available, a functional or performance examination in lieu of a formal test is acceptable. **However, the use of an RBT, exhaust emission tester and headlamp beam setter is compulsory for the annual mandatory inspection; except under exceptional circumstances (Operations) where a functional or performance examination in lieu of a formal test can be authorised by Front Line Commands.**

25 All Service 'B' vehicles of or exceeding 3.5 tonnes DGWV (MAM) (nominal) shall be subject to safety inspections at the six month point after an annual mandatory inspection, the frequency of which may be increased at the UEMs/MTOs (Army), OC MT/MTO/Transport Manager (RAF) or equivalent, discretion on high utilised vehicles (see also Para 12). Vehicles in long term storage do not require to be subjected to periodic safety inspections; a mandatory inspection shall be conducted on issue from storage. Safety inspections shall be recorded on the AF G 932(B) and be retained as follows:

25.1 ARMY - With the vehicle documents (FMT 1004). A copy is also to be retained with the AF G1084A by the issuing workshop.

25.2 RAF - With the FMT 1004 or relevant AF G1084A/STAMA ADP job sheet as applicable.

AF G932(B) INSPECTION PROCEDURE

26 The correct procedure to be followed for the utilisation of the AF G932(B) is shown in Fig 1. It should be noted that:

26.1 Inspectors are to tick the relevant box at the top of the report form to indicate which type of inspection the report refers to.

26.2 Unit UEMs/MTOs may utilise suitably trained drivers to assist the competent person with regard to the inspection requirements of the AF G932(B) (Army only).

26.3 The use of test equipment including an RBT, exhaust emission tester and headlamp beam setter is compulsory for the annual mandatory inspection; except under exceptional circumstances (Operations) where a functional or performance examination in lieu of a formal test can be authorised by Front Line Commands.

26.4 All faults found must be reported and those which affect the safe use and roadworthiness of the vehicle render the vehicle 'Non-Taskworthy' until repairs are completed. Inspectors are to annotate on the AF G932(B) whether the vehicle is safe to drive back to Unit lines and/or a repair agency by adding the words 'THIS VEHICLE IS SAFE TO BE DRIVEN TO THE UNIT/REPAIR AGENCY AND RETURNED FOR RE-INSPECTION ONLY' (Army only). RAF vehicles are to remain

at the MTMS/F until repairs have been completed. Where possible re-inspection of a failed annual inspection is to be carried out by an inspector, who has not been involved in any remedial work carried out. Any component or system likely to have been affected by the rectification work also needs to be re-inspected. Depending on the level of the failure and the sentence, if the fault is considered to be a Level 1 maintenance responsibility then following the rectification of the fault the AF G932(B) can be counter signed by the Unit MTO or equivalent; however, where a level 1 fault effects roadworthiness, guidance is to be sought from the supporting Level 2 organisation (Army only).

26.5 If an equipment has been classified as 'Non-Taskworthy' the repairing agency has 28 days to rectify the 'Roadworthiness' faults. Once these have been completed and re-inspected (not necessarily by the same inspector, although he may wish to satisfy himself that the vehicle is otherwise serviceable), then the AF G932(B) is to be re-certified at Part 1 to show that the equipment is now 'Roadworthy'. Additionally, the vehicle sentence at Part 2 is to be amended to reflect the new status of 'Fully Fit' or 'Limited Role' as appropriate. A sentence of 'Limited Role' will require an entry against limitations on use.

26.6 If the 'Roadworthiness' faults are not rectified within 28 days, then the equipment is to be fully re-inspected and a new AF G932(B) raised.

26.7 The current state of the equipment/vehicle is to be recorded at Section 3 of the FMT 1004 (Army and RAF) or the STAMA Daily State (RAF).

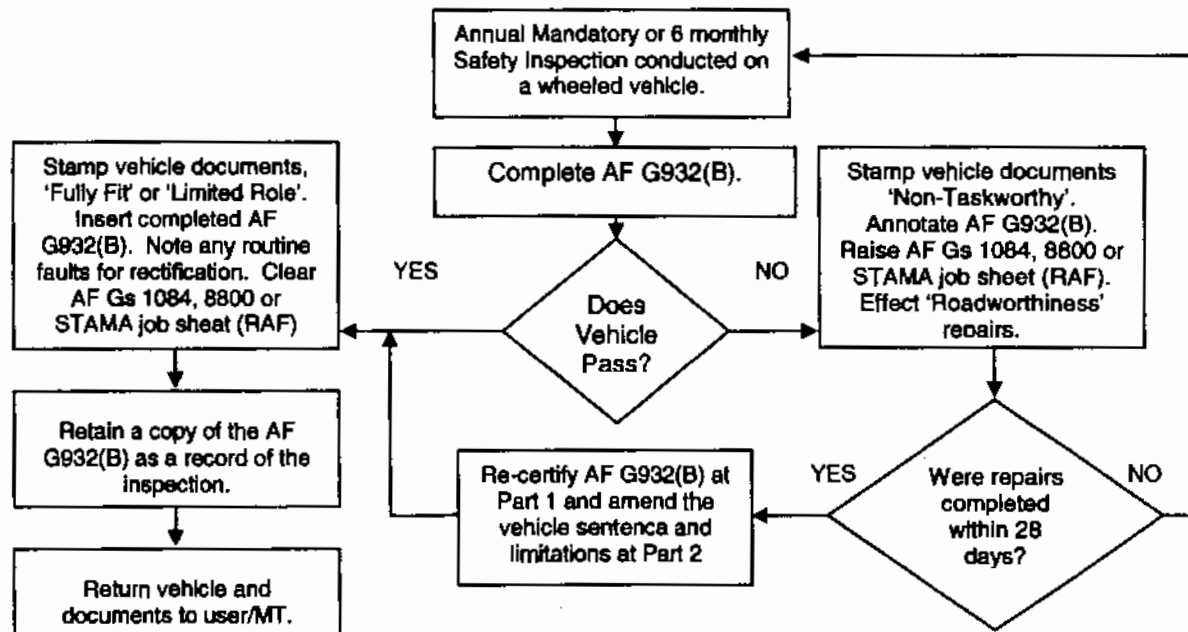


Fig 1 AF G932(B) Inspection procedure

AF B6534 UNIT INSPECTION (ARMY)

27 An AF B6534 Unit Inspection is an examination normally by a Class 1 driver (Minimum standard, see also Chap 1 para 14) to report on the condition and cleanliness of a 'B' vehicle under 3.5 tonne DGWW (MAM) (nominal) and in addition the completeness and serviceability of the CES. The AF B6534 Inspection is to be recorded in the vehicle's FMT 1004.

28 Green fleet, Army 'B' vehicles under 3.5 tonne DGWW (MAM) (nominal) shall be subject to AF B6534 inspections at the six month point after an annual mandatory inspection, the frequency of which may be increased at the UEMs/MTOs discretion on highly utilised vehicles (see also Para 13). All faults found must be reported and those which affect the safe use and roadworthiness of the vehicle are to be reported and the vehicle declared Non-Taskworthy until repairs are completed.

MANDATORY ANNUAL DFT TESTING OF VEHICLES OWNED AND/OR MAINTAINED BY A CONTRACTOR

29 Vehicles which are operated by the MoD but which are owned and/or maintained by civilian contractors, that are not subject to a mandatory vehicle inspection by the MoD are to undergo mandatory, annual, civilian DFT VOSA inspections as follows:

29.1 Large goods and public service type vehicles; on the first anniversary of receipt from depot/supplier and then at yearly intervals from the date of the previous certificate.

29.2 Cars, light commercial vehicles and motor cycles; on the third anniversary of receipt from trade and then at yearly intervals from the date of the previous certificate.

30 Vehicles that fail the DFT inspection are to have the faults rectified and be re-tested before the vehicle is returned for use. The DFT test certificate is to be retained with the vehicle documents and transferred with the vehicle on allotment.

31 The unit UEM/MTO shall ensure that a vehicle supplied by a contractor has a current test certificate prior to its use by MoD personnel.

32 Funding for testing of contractor supplied and maintained vehicles will be the responsibility of the contractor.

SAFETY/UNIT INSPECTIONS OF VEHICLES OWNED AND/OR MAINTAINED BY A CONTRACTOR

33 Vehicles of or exceeding 3.5 tonnes DGW (MAM) (nominal) which are operated by the MoD but which are owned and/or maintained by civilian contractors, are to undergo safety inspections at six-monthly intervals, the frequency of which may be increased at the UEMs/MTOs or contractors discretion on highly utilised vehicles. All faults found must be reported and those which affect the safe use and roadworthiness of the vehicle are to be reported and the vehicle declared Non-Taskworthy until repairs are completed.

34 Vehicles under 3.5 tonnes DGW (MAM) (nominal) which are operated by the MoD but which are owned and/or maintained by civilian contractors, are to undergo unit inspections (AF B6534) at six-monthly intervals, the frequency of which may be increased at the UEMs/MTOs or contractors discretion on highly utilised vehicles. All faults found must be reported and those which affect the safe use and roadworthiness of the vehicle are to be reported and the vehicle declared Non-Taskworthy until repairs are completed.

35 Safety/Unit inspections of contractor supplied and maintained vehicles will be the responsibility of and shall be funded by the contractor.

BRAKE TESTING

36 Vehicle brake efficiency tests are to be carried out in accordance with the procedures and performance requirements contained in the applicable DFT VOSA testing manual, AESP 2530-D-051-512 and the AP 3260, Bk 3 for the RAF. Chapter 4 expands the requirements for testing in operational theatres.

37 Trailers with an unladen weight of more than 1020kg and trailers forming part of articulated combinations are also subject to formal brake testing. Trailers under this weight and over-run braked trailers (which cannot currently be Roller Brake tested) are nevertheless to be inspected to ensure that brake systems are adjusted, function effectively and that they are maintained in a roadworthy condition.

RETENTION OF RECORDS

38 All Unit, Safety and Mandatory Inspection records, including civilian MOT/Plate Test certificates and Brake Test reports are to be retained for a minimum period as laid down in AESP 0200-A-090-013 and JSP 341, Part 4, Sect 3, Chap 11.

ROAD TESTING (ARMY)/FUNCTIONAL CHECK AND TEST (RAF)

39 The DfT VOSA statutory test does not specifically include a road test of the vehicle except for vehicles which cannot have the performance of their brakes tested on an RBT.

40 A road test or functional check and test, however, is permitted if the tester considers one is necessary to check the results of an inspection. The tester must be qualified and licensed for the class of vehicle to carry out the test, and must ensure it is safe to conduct that test.

VEHICLES SUBJECT TO MID-LIFE REFURBISHMENT

41 Vehicles with a high acquisition cost and a long planned life may be subjected to a mid-life refurbishment. When such vehicles are returned to the unit after a full mid-life refurbishment, their maintenance cycle is to commence anew with effect from the date of receipt at the unit, i.e. they are to be treated as new vehicles. For vehicles which undergo a limited or system only refurbishment, the maintenance regime shall continue uninterrupted.

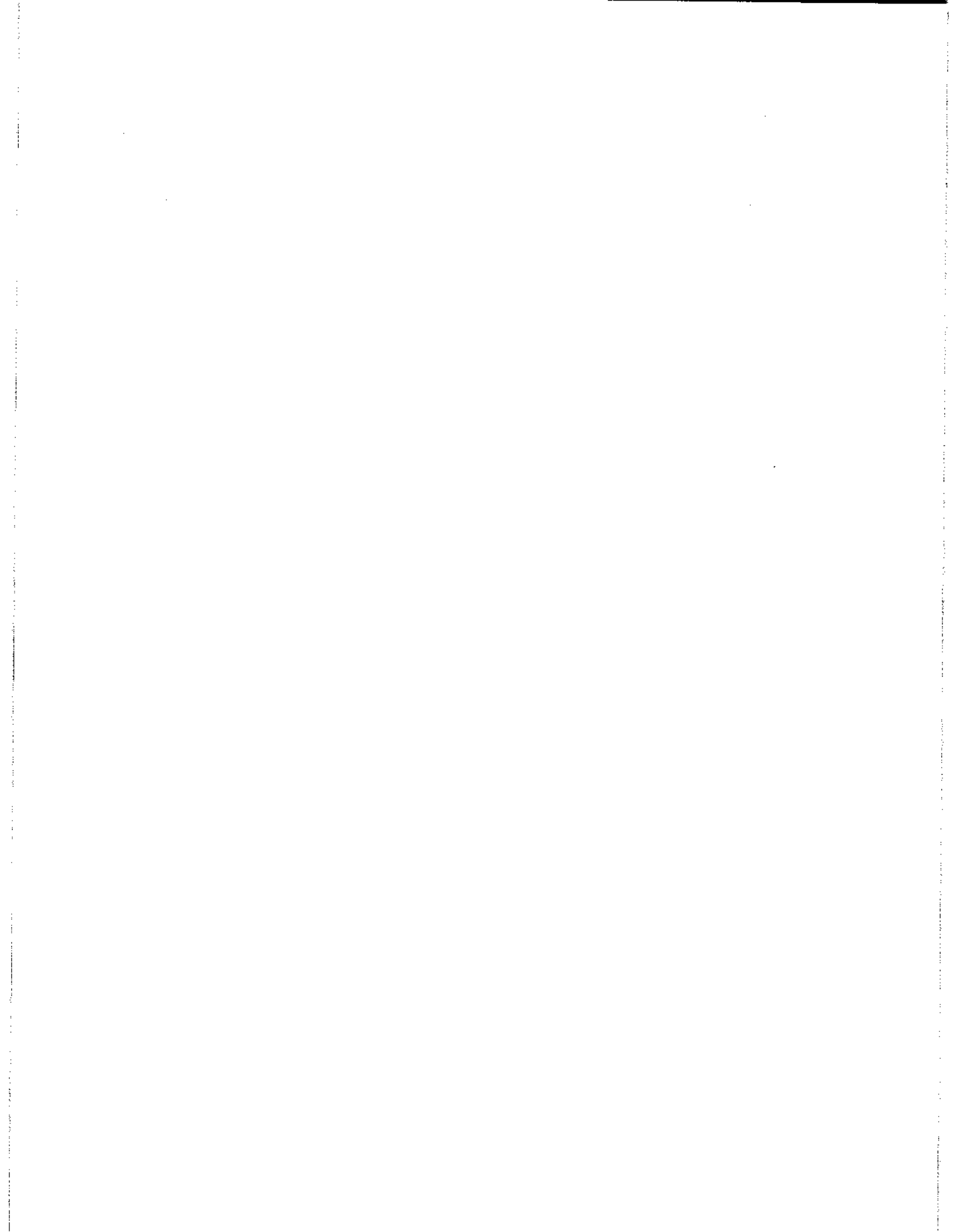
42 A receipt inspection is to be completed and the vehicle record book FMT 1004 or STAMA (RAF) are to be amended to reflect the revised maintenance plan for the vehicle.

COMPLETE EQUIPMENT SCHEDULE (CES) JACKS

43 CES Jacks issued to vehicles for the sole purpose of changing tyres and fitting snow chains require an annual thorough examination in accordance with EMER Test and Measurement A028 Chapter 650.

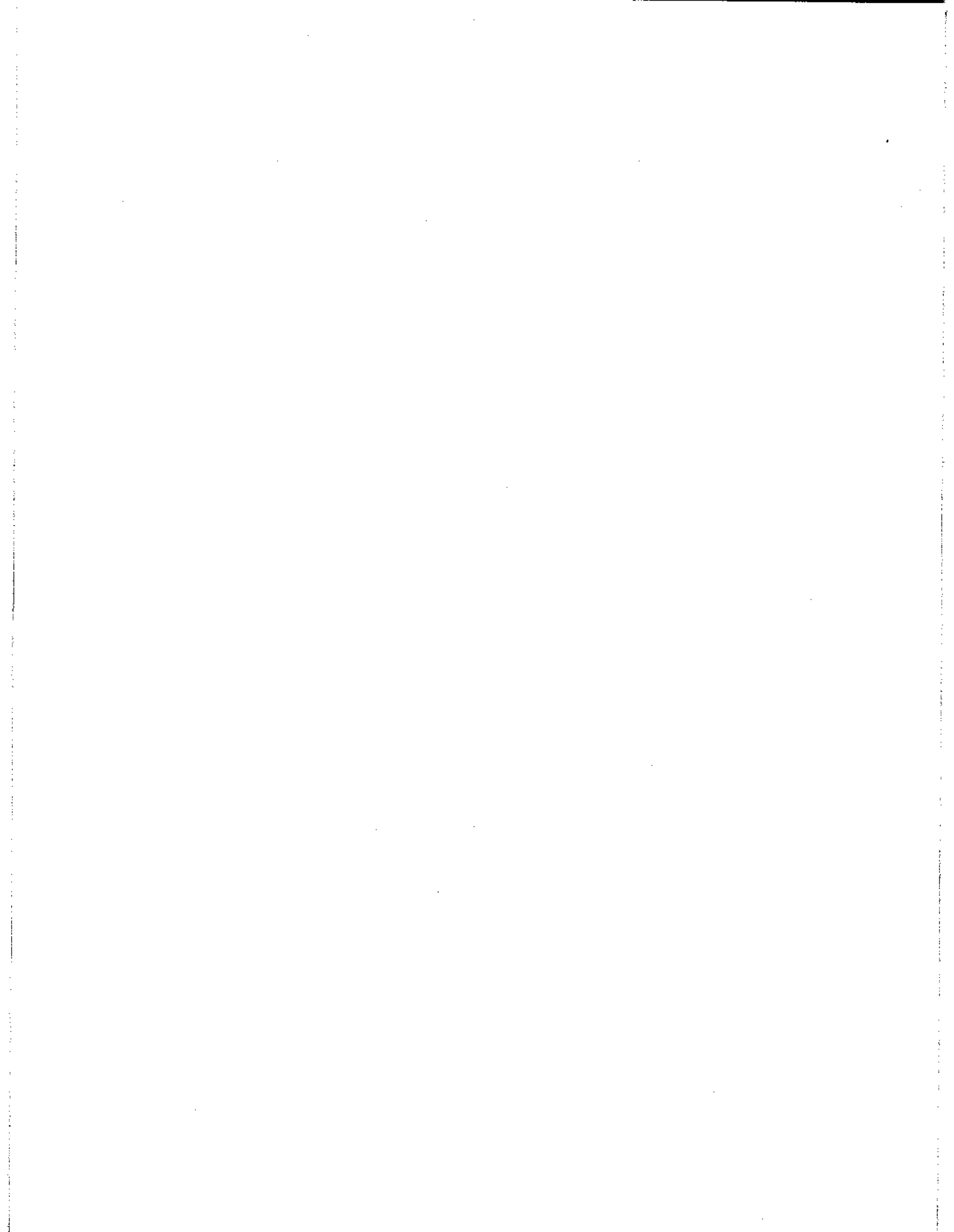
44 To identify each Jack a unique serial number is required; this is to be the host vehicle ERM. The ERM must be stamped on the jack, if the jack has a plastic body the serial number may be painted on it. If the jack has been previously permanently marked with a unique serial number other than the ERM, then the serial number must be preceded by the ERM. The jack is to be presented with the vehicle at its MEI/Safety inspection; the results of the thorough examination are to be recorded as a pass /fail in the relevant box at Part 2 of the AF G932(B). A jack presented for inspection which is not permanently marked with the vehicle ERM is to be recorded as a FAIL; similarly, if the jack is not presented with the vehicle for inspection, it is to be recorded as a FAIL and the MTO is to be advised.

45 CES jacks issued for reasons other than the sole purpose of changing tyres and fitting snow chains are not included under this requirement.



CHAPTER 2 ANNEX A
WHEELED VEHICLE INSPECTION REPORT
CONTENTS

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Wheeled Vehicle Inspection Report	3
Wheeled Vehicle Inspection Report continued	4



Wheeled Vehicle Inspection Report

Army Form G932(B)
(Revised 9/05)

Vehicle Description:						ERM			
Test Class:		MOT/Plate Test Certificate Attached <input type="checkbox"/>		Engine Number			Asset Code		
		Dangerous Goods Certificate Applies <input type="checkbox"/>							
Type of Inspection:		Date into Service		Chassis Number					
Annual <input type="checkbox"/> Safety <input type="checkbox"/>									
Receipt <input type="checkbox"/> Disposal <input type="checkbox"/>		Date of Manufacture		DGWW/MAM/GTW			Speedo Reading		
Holding Unit/Sub Unit						Insp Due Date			
Address						Unit Insp Ref			
						UIN			

Part 1 - Roadworthy Items

Manual Reference					Section Description	Pass	Fail	Manual Reference					Section Description	Pass	Fail
HGV	PSV	I,II	III,IV VI	V				HGV	PSV	I,II	III,IV VI	V				Section Description	Pass	Fail
63	63	1.1	1.1 9.1	1.1	Front & Rear Lamps etc			57	57	6.2	2.5	2.5	Transmission		
66	66	1.5	1.5 9.1	1.5	Indicators & Hazard Wng			46	46	7.1	7.1	6.3	Exhaust & Waste Systems		
63	63	1.2	1.2 8.1	1.2	Headlamps			44	44				Oil & Waste Leaks		
67	67	1.8	1.8	1.8	Aim of Headlamps			42	42				Electrical Wiring & Equipment		
63	63	1.3	1.3 9.1	1.3	Stop Lamps			16	16	8.2 8.4		6.5	Doors/Load Security		
62	62	1.4	1.4 8.1	1.4	Rear Markings & Reflectors			17	17 24				Drivers Accommodation & Steps/ Accessibility		
27	27	1.7	1.7	6.2	Horn			16	16	6.2		6.5	Drivers Seat		
25	25		6.2 8.8	6.1	Windscreen Wipers & Washers			22	22	6.1 8.8		6.6	Mirrors		
6	6	4.2	4.2	4.2	Road Wheels & Hubs			23	23	8.3 9.8	8.1 8.11		Glass & View of the Road		
7	7	4.1	4.1	4.1	Size & Type of Tyres			26	26			6.5	Speedometer/Tachograph		
6	6	4.1	4.1 9.4	4.1	Conditions of Tyres			26	26			6.10	Driving Controls		
9	9				Sideguards Under Run & Bumpers			30	30	2.1 9.2		2.1	Steering Controls		
11	11				Vehicle to Trailer Coupling			36	36	3.1/2 9.3		3.1	Hand Lever Operated Mech. Brakes		
10	10		6.4	6.5	Spare Wheel & Carrier			39	39	3.1	3.2	3.2	Hand Operated Brake Control Valves		
48	45	7.2	7.2	6.7	Fuel Tanks & Systems			33	33			6.9	Speed Limiter		
14	14				Spray Suppression, Wings			3	3	5.1 8.5		5.1	Seat Belts		
13					Trailer Landing Legs				21				Interior of Body		
19	19	5.1	6.1	6.5	Security of Body, Containers & Crane Support Legs			37	37	3.1	3.3 9.3	3.3	Service Brake Pedal		
20	20		6.1 8.4 9.8		Condition of Body Exterior/Bonnet Security			36	36		3.3 9.3	3.3	Service Brake Operation		
41	41	6.1/2	6.1 9.8	6.5	Condition of Chassis/Structure			71	71	3.3	3.7/8 9.3	3.8 9.10	Service Brake Performance		
15					Cab Security			72	72				Secondary Brake Performance		
34	34	2.2	2.2 9.2	2.2	Steering Mechanisms			34	34				Pressure/Vacuum Warning & Build Up		
		2.5 5.3			Wheel Alignment			36	36	3.1	3.4	3.4	ABS Warning System/Controls		
34	34		2.3	2.3	Power Steering			73	72	3.7 9.3		3.8	Parking Brake Performance		
43	43				Engine & Transmission Mountings			12					Trailer Brakes & Airlines		
59	59	3.2	3.3 3.6	3.5	Brake System Components			56	56			3.7	Additional Brake Devices		
48	48	2.3/4 5.2	2.4 5/6 9.7	2.4 5/6	Suspension			5	5	7.3/4 9.7		6.4	Exhaust Emissions		
48	48	2.3/4 5.2	2.7 9.2	2.6	Shock Absorbers					6.3	6.3		Registration Plates/VIN Details		
33	53	2.3/4 5.2	2.5/6 9.2	2.5/6	Axles/Stub Axles & Wheel Brgs			74	74				Other Dangerous Defects		
Repairs/Observations :												L1	L2	Repair Ref	

CHAPTER 3-0

VEHICLE INSPECTORATE INSPECTION MANUALS

CONTENTS

Para

- 1 Introduction

Chapter

- 3-0 Vehicle Inspection Manuals
3-1 Heavy Goods Vehicle
3-2 Public Service Vehicle
3-3 Car and Light Commercial
3-4 Motor Cycle

INTRODUCTION

1 This Chapter reproduces in four sub-chapters the Vehicle Inspectorate Testers Manuals as required by those appropriately competent unit personnel, as detailed in Chap 1, Para 14, to enable Units to implement the policy, for the Annual Mandatory and the Six-Monthly Safety Inspection as defined in Chap 1. Amendments to these manuals will be issued automatically through the AESP system, to those Units registered, by bin number.

2 Each section gives the application of specific relevant requirements, the procedures and standards to be used, an interpretation of the terms used in the section and the reasons for failure. **Inspecting personnel should be aware that the standards called for are the minimum acceptable standards and that a vehicle passing this inspection may not necessarily be fit for role.** The vehicle AESP inspection standards should be referred to in conjunction with these principles of inspection.

3 Each inspection has been allocated a number, which cross-refers to the AF G932(B) under the class of vehicle being inspected. A brief description of the light vehicle test classes is given at Chap 1 Annex C.

4 Vehicles that are either overdue or fail the roadworthy elements of the annual mandatory or safety inspection are to be considered as Non-Taskworthy and are not to be driven on public roads (see also Chap 2, Para 26.4). All faults found are to be rectified and the vehicle returned for re-inspection on those items on which it originally failed.

5 Inspecting personnel should be aware that these manuals are essentially commercial publications. Whilst every effort has been made to remove prelims that do not apply to the MoD some may still remain. Any conflicting points are to be highlighted through the appropriate ES chain of command to DLO Andover, TES, ILS & Eng Pol. Personnel should also complete an AESP Form 10 (Comment(s) on AESP).

CHAPTER 3-1
HEAVY GOODS VEHICLE INSPECTION MANUAL
CORRECTION

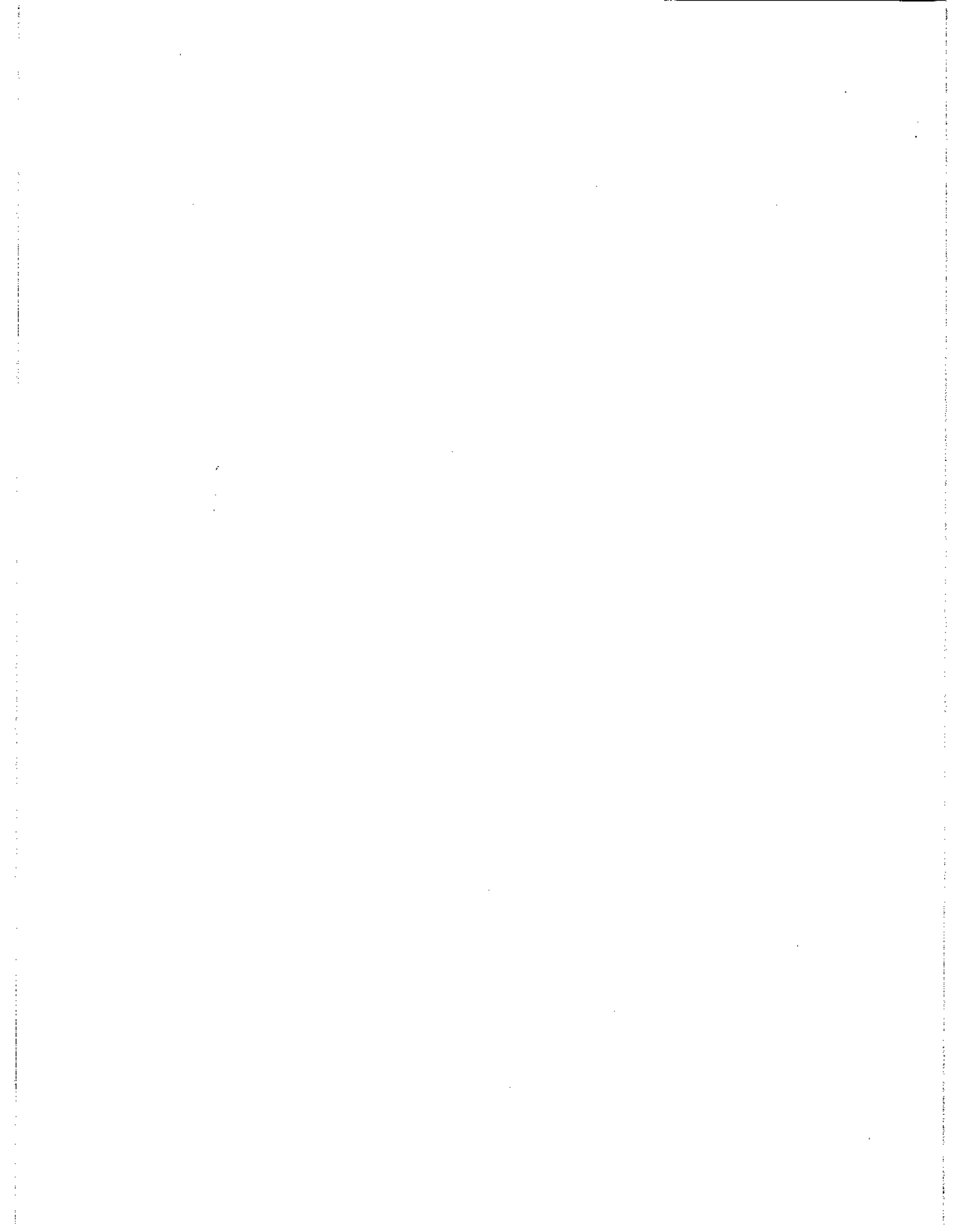
Inspection 71

The second Note in Procedures and Standards should now read:

Note: Brake effort fluctuation of more than 70% of the higher brake effort shown at steady pedal pressure is a Reason for Failure. For ease of calculation if the higher brake effort divided by the lower brake effort is greater than 3.3 this is a Reason for Failure.

Vehicle Inspectorate
July 1997

1/2



CHAPTER 3-1
HEAVY GOODS VEHICLES
CONTENTS

Para

- 1 Heavy Goods Vehicles

HEAVY GOODS VEHICLES

1 This Chapter explains to everyone engaged in the practical work of vehicle examination and maintenance:

- 1.1 The application of specific relevant requirements.
- 1.2 The procedures and standards to be used.
- 1.3 The reason for failure.

2 The procedures given assume that only the parts of a vehicle, which can readily be seen without dismantling, are to be examined. However, it may be necessary to remove panels or equipment where it is not otherwise possible to inspect safety critical items. Vehicle combinations will not normally be separated for the purpose of the test although it will be necessary to disconnect and reconnect air lines as required.

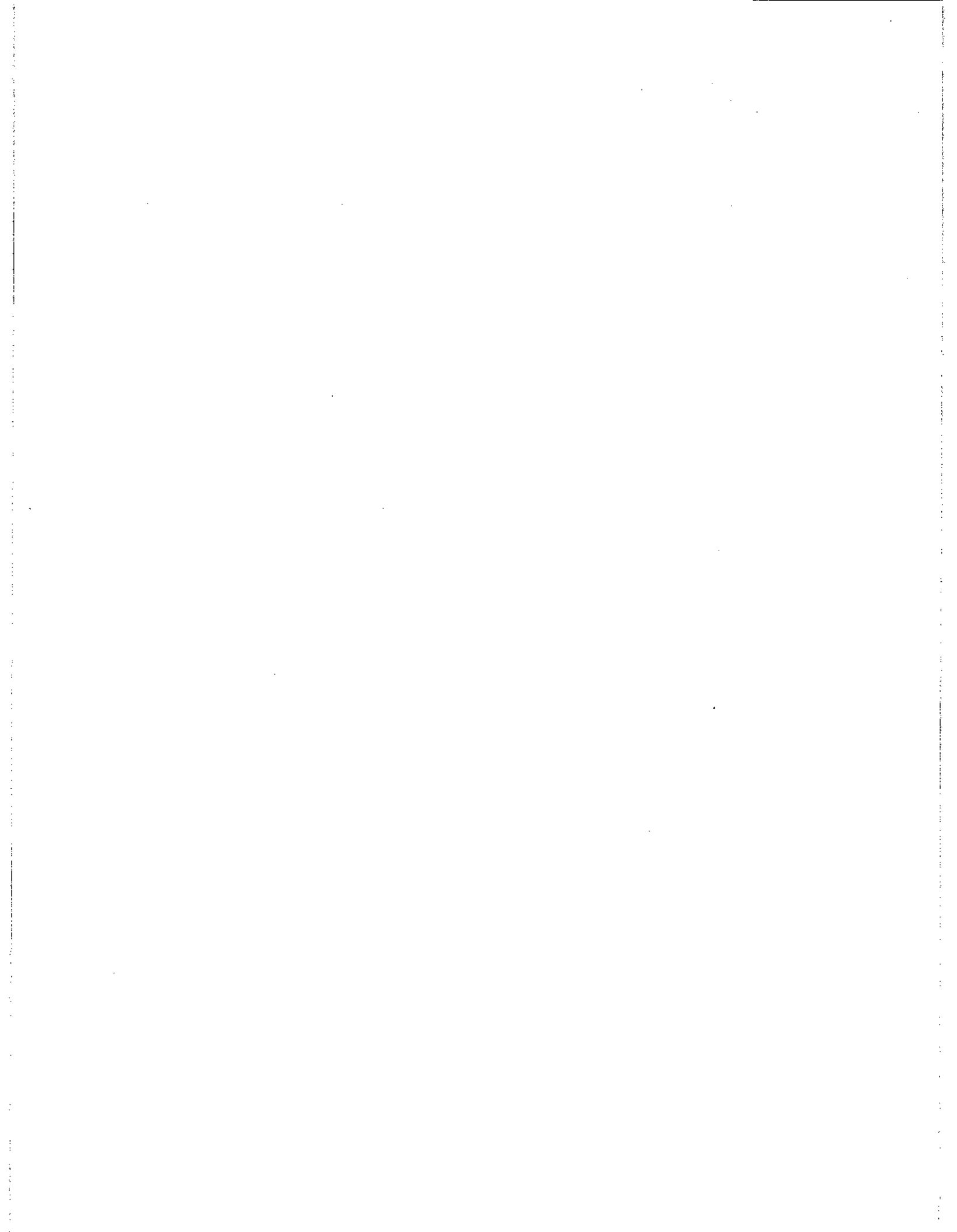
3 Each inspection has been allocated a number, which is given at the top of the page. This number is cross-referenced to entries in the column marked HGV, Tri on the AF G932(B). Not all inspection numbers have been allocated. Inspections marked with an asterisk do not apply to trailers.

4 As it is not practicable to lay down limits of wear or tolerance for components of specific vehicle types, the following points should be considered when carrying out the inspection:

- 4.1 Refer to the Vehicle Inspection Standard.
- 4.2 The function of the component and its contribution to the road safety of the vehicle.
- 4.3 Whether the component has clearly reached the stage where repair, replacement or adjustment is necessary to ensure the road safety of the vehicle.
- 4.4 Whether the condition of the component appears to break the law.

5 Inspectors should note that apart from those exemptions listed, against particular vehicle types, under specific inspections, that further exemptions apply to MOD vehicles. However where such items are fitted they should be serviceable. Where a testable item is not fitted as part of the original vehicle build standard, inspectors should assume that an exemption is in place. If in doubt clarification should be sought from the Equipment Support Policy Directive (ESPD) or through the appropriate ES chain of command to the ESM. The following are examples of some exemptions listed in this section:

- 5.1 Inspection number 9. Sideguards, Rear Under-Run Devices and Bumper Bars. Exempted vehicles include tractor units and refuse vehicles, etc, etc.
- 5.2 Inspection number 14. Spray Suppression, Wings and Wheel Arches. Exemptions include four wheel drive and vehicles with a high ground clearance, etc, etc.



Interpretation of Terms used in the Manual

Articulated vehicle

An articulated vehicle is a motor car or heavy motor car with a trailer so attached that part of the trailer is superimposed on the drawing vehicle and, when the trailer is uniformly loaded, not less than 20% of the weight of its load is borne by the drawing vehicle.

Corrosion

The effect of corrosion on the safety of a vehicle depends on:

- Its extent.
- The function of the section on which it has occurred.

A small amount of corrosion on an important part of a vehicle structure can make a vehicle unsafe where it destroys the continuity of the load bearing structure.

On the other hand heavy corrosion of unimportant sections may have no effect on the vehicles safety.

Assessment

The inspector should determine whether excessive corrosion exists first by visual inspection and then by finger and thumb pressure.

If necessary careful scraping or light tapping of the area is permitted.

Corrosion affected heavy gauge metal may be tapped harder than light gauge, but unwarranted force and damage must be avoided.

Failure Criteria.

Any part of a load bearing member or load bearing panelling should be rejected if it is weakened by corrosion to the extent that.

- By finger/thumb pressure it does not feel rigid, or
- It crumbles to leave a hole, or
- When tapped
there is penetration, or
it causes the metal to crumble or disintegrate.

Cracked

A flaw or split in a component.

Damage

When assessing the extent of damage it is important to consider whether the performance of the component/ system will be impaired or if the component/system is likely to fail prematurely.

Damage fulfilling either of these criteria is not acceptable and will be a reason for failure.

Interpretation of Terms used in the Manual *(continued)*

Deteriorated

This will be a reason for failure if the component or system is weakened to such an extent that it can no longer adequately perform its function.

Excessive travel

An abnormal amount of movement which clearly indicates that a component has reached a stage when it requires remedial action to enable it to either:-

- a. operate effectively as designed, or
- b. prevent it from reaching the end of its permitted travel, or
- c. prevent it from exceeding manufacturers' known maximum permitted limits.

Excessive wear

A component which is worn to such an extent that it is either:-

- a. likely to fail, or
- b. clearly not functioning effectively as designed, or
- c. visibly worn beyond manufacturers' known permitted limits, or
- d. likely to affect the operation or condition of another safety related component.

First use dates

Throughout this manual we have used the terms "before" and "from" when referring to first use dates. The term "from" should be taken to be the same as on or after a certain date.

Where there is a first use date quoted for a motor vehicle this will not normally apply if the vehicle was built more than 6 months before that date.

Fouling

This will only be a Reason for Failure if contact of two parts is likely to cause damage to, or restrict the movement of, a component.

Fractured/broken

Gap, opening or rupture where separation has taken place.

Insecure

The term "insecure" is used many times throughout this Guide to describe a defective condition. This term should be taken by vehicle inspectors to mean either:-

- that a component on the vehicle has relative movement (looseness) either at its fixings or in relation to an associated component where there should be none, or
- that a component is not safely or completely attached either at its fixing or to an associated component.

Interpretation of Terms used in the Manual *(continued)*

All components on a vehicle need to be safely attached while it is in use on the road, however, how safe a component needs to be attached depends on its function.

Areas of the vehicle which are considered critical in terms of the ability of the vehicle to endanger the driver, any passengers and other users of the road, can tolerate fewer fixings which are broken, loose, missing or otherwise ineffective than those in a less critical part of the vehicle.

The proportion will depend on factors such as the design of the component etc, but as a general rule, no more than 20% (1 in 5) of the fixing devices should be loose etc. More than this proportion means that the remaining fixing devices could be over-stressed and could therefore fail at any time. Examples of critical systems include (this is not an exhaustive list):-

- steering.
 - brakes.
 - suspension linkages.
 - leaf spring anchors.
 - trailer couplings.
 - five (ie moving) transmission components.
 - wheels and hubs.
- } Except those components not subject to heavy loads or forces
} eg power steering reservoirs or brake relay valves.

The proportion suggested above does not apply to:-

- components in a critical area or system secured by a single fixing device. If this device is loose, broken etc then the component is to be considered insecure.
- components in a critical area or system where detailed instructions are given in the manual (eg wheel studs/nuts). In such cases, these instructions must be used in preference.

Components that are not part of a critical system eg some body panels can tolerate a higher proportion of their fixings either loose, broken etc. Again the proportion will depend on the design of the component but as a general rule no more than 33% (1 in 3) of the fixing devices should be loose, broken missing or otherwise ineffective.

A component secured by a non-standard temporary means should be judged as if the temporary fixing was not fitted.

Obligatory

Required to be fitted by law.

Semi-trailer

A trailer which is constructed or adapted to form part of an articulated vehicle.

Interpretation of Terms used in the Manual *(continued)*

Trailer

Where the term trailer is used in this manual it refers to all types of trailers and semi-trailers.

Type Approved Vehicle

A vehicle manufactured from 1 October 1982 and first used from 1 April 1983 and has been issued with a Type Approval Certificate of Conformity, a Ministers Approval Certificate or a Type Approval Certificate issued by an EU member state.

Type Approved

A component or system fitted to a vehicle which has been issued with a Type Approval Certificate or Certificate of Conformity which shows that the system or component complies with the requirements of an EU Directive or ECE regulation.

Vehicle

Where the term vehicle is used in the application section of this manual it refers to all types of motor vehicle.

Standards for Prohibition Issue at Annual Test

This provides a standard for the issue of Prohibition Notices where serious defects are observed during statutory tests.

The aim of the policy is to:

- protect the public from vehicles returning from annual test where extremely serious defects have been observed.
- provide information about such occurrences to the enforcement wing of the organisation and to Traffic Commissioners.
- improve the consistency of the treatment of operators.
- let operators know what the rules are so that they know and understand our standards for prohibition issue at annual test.
- preserve a balance between providing a flexible customer focused testing service and providing the general public with protection from loss or injury from vehicles returning from test with serious roadworthiness defects.

9 The approach, in principle, is to apply the immediate prohibition criteria in the Categorisation of Defects to a core of safety critical items.

Note:

Where a Reason for Failure in the accompanying table is marked with ** this means that any failure for this item will result in the issue of an immediate prohibition.

Where a Reason for Failure is marked with * the examiner will need to assess the severity of the defect in line with the Categorisation of Defects criteria (outlined in the defects column of the table in the following pages) before deciding whether to issue an immediate prohibition.

Standards for Prohibition *(continued)*

Manual Reference	Defect	COD Page	Reason for failure
IM 6 Road Wheels and Hubs	Failure of a road wheel imminent Detachment of a road wheel or hub imminent	3-4	2a* 3a*
IM 8 Condition of Tyres	Tyre bulging caused by separation/failure of the tyre structure Tyre tread worn below the legal minimum on tyre fitted to a steered wheel A tyre so severely damaged that failure of the tyre is likely	6-8	1b* 1h* 1c*
IM 11 Vehicle to Trailer Coupling	Failure of the coupling and detachment of the trailer likely	11-13	1c* 1e*
IM 12 Trailer Parking, Emergency Brakes and Air Line Connections	Parking brake does not operate on at least two road wheels Brake mechanism fractured or defective to such an extent that the brake is inoperative or cannot be set Trailer brakes are not applied when the emergency brake line is disconnected Tap fitted preventing correct operation of the braking system Adapter not fitted or providing inadequate lift to the extent that the correct operation of the brake is affected	14-15	1a** 1b** 2a** 4** 3b*
IM 28 Driving Controls	Driving control defective to the extent that it is incapable of fulfilling its function and affect the control of the vehicle	41	1d*
IM 30 Steering Controls	Controls so defective that direction control of the vehicle is affected	43	1c* 1d* 2a*

Standards for Prohibition (continued)

Manual Reference	Defect	COD Page	Reason for failure
IM 34 Pressure/Vacuum Warning	Warning device fails to cease operating (indicating reservoirs not filling)- within 6 minutes for a rigid vehicle, 9 for vehicle/trailer combinations	45-46	3*
IM 36 Hand Lever Operating Mechanical Brakes	Cannot be operated to perform its function Cannot be set or likely to disengage	47	1d* 1f**
IM 37 Service Brake Pedal	Cannot be operated to perform its function	48	1c* 2b*
IM 38 Service Brake Operation	Vacuum assistance is not working	49	3a**
IM 39 Hand Operated Brake Control Valve	Valve unable to be set in the on position or moved over its original full travel	50	1d* 1g*
IM 44 Oil Leaks	Continuous flow of oil or serious risk of fire	54	1*
IM 45 Fuel tanks and systems	Detachment of tank imminent Filler cap missing or defective such as to prevent gushing Continuous fuel leak or a leak constituting a hazard to other road users	55	1a** 2b** 4a* 4c* 3a*
IM48 Suspension	Failure of a major suspension component imminent which would affect the control of the vehicle	57-61	This item covers all Reason for Failure. Examiners will need to consider will the defect affect the control of the vehicle

Standards for Prohibition (continued)

Manual Reference	Defect	COD Page	Reason for failure
IM 53 Axles, stub axles and wheel bearings	A main component so defective that failure is imminent and likely to affect the steering	62	This item covers all Reasons for Failure. Examiners will need to consider will the defect affect the control of the vehicle
IM 54 Steering mechanism	Steering mechanism so stiff or rough in operation that its operation is restricted Mechanism fractured or twisted to the extent that failure or detachment is imminent	63-66	1a* 2p* 2a* 2j*
IM 59 Brake Systems and Components	Any defect likely to lead to a total failure of a braking system	69-75	This item covers all Reasons for Failure. Examiners will need to consider will the defect affect the control of the vehicle
IM63 Lamps	Any defect or combination of defects which make all the stop lamps inoperative	80	1* 3a*
IM 71 Service Brake Performance	With the service brake applied: There is little or no brake effort at any wheel Braking effort from any wheel on a steered axle is less than 70% of the brake effort from another wheel on the same axle Efficiency significantly below legal requirements (before issuing the examiner must consider whether the vehicle, as presented, would pose an immediate danger to road safety)	83-84	4** 4b* 4c* 5a*
IM 72 Secondary Brake	Efficiency significantly below legal requirements (before issuing the examiner must consider whether the vehicle, as presented, would pose an immediate danger to road safety)	85-86	1b*

Standards for Prohibition *(continued)*

Manual Reference	Defect	COD Page	Reason for failure
<p align="center">IM 73 Parking Brake</p>	<p>Efficiency significantly below legal requirements (before issuing the examiner must consider whether the vehicle, as presented, would pose an immediate danger to road safety)</p>	<p align="center">87</p>	<p align="center">1b*</p>
<p align="center">IM 74 Other Dangerous Defects</p>	<p>A defect not described elsewhere in the Inspection Manual such that the use of the vehicle on the road would involve a danger of injury to any person</p>		<p align="center">1**</p>

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List of Inspections

- | | | | |
|-----|--|-----|--|
| 1 | Not Allocated | 27* | Horn |
| 2 | Not Allocated | 28* | Driving Controls |
| 3* | Seat Belts | 29 | Not Allocated |
| 4 | Not Allocated | 30* | Steering Control |
| 5* | Exhaust Emissions | 31 | Not Allocated |
| 6 | Road Wheels and Hubs | 32 | Not Allocated |
| 7 | Size and Type of Tyres | 33* | Speed Limiter |
| 8 | Condition of Tyres | 34* | Pressure/Vacuum Warning and Build Up |
| 9 | Sideguards, Rear Under-Run Devices And Bumper Bars | 35 | Not Allocated |
| 10 | Spare Wheel and Carrier | 36* | Hand Lever Operating Mechanical Brakes |
| 11 | Vehicle and Trailer Coupling | 37* | Service Brake Pedal |
| 12 | Trailer Park and Emergency Brakes and Air Line Connections | 38 | Service Brake Operation |
| 13 | Trailer Landing Legs | 39 | Hand Operated Brake Control Valves |
| 14 | Spray Suppression, Wings and Wheel Arches | 40 | Not Allocated |
| 15* | Cab Security | 41 | Conditions of Chassis |
| 16* | Cab Doors | 42 | Electrical Wiring and Equipment |
| 17* | Cab Floor and Steps | 43* | Engine and Transmission Mountings |
| 18* | Driver's Seat | 44 | Oil Leaks |
| 19 | Security of Body, Containers and Crane Support Legs | 45 | Fuel Tanks and Systems |
| 20 | Condition of Body | 46* | Exhaust Systems |
| 21 | Not Allocated | 47 | Not Allocated |
| 22* | Mirrors | 48 | Suspension |
| 23* | Glass and View of the Road | 49 | Not Allocated |
| 24 | Not Allocated | 50 | Not Allocated |
| 25* | Windscreen Washers and Wipers | 51 | Not Allocated |
| 26* | Speedometer/Tachograph | | |

List of Inspections *(continued)*

- 52 Not Allocated
- 53 Axles, Stub Axles and Wheel Bearings
- 54 Steering Mechanism
- 55 Not Allocated
- 56 Not Allocated
- 57 Transmission
- 58 Not Allocated
- 59 Brake System and Components
- 60 Not Allocated
- 61 Not Allocated
- 62 Rear Markings and Reflectors
- 63 Lamps
- 64 Not Allocated
- 65 Not Allocated
- 66 Direction Indicators and Hazard Warning Lamps
- 67* Aim of Headlamps
- 68 Not Allocated
- 69 Not Allocated
- 70 Not Allocated
- 71 Service Brake Performance
- 72* Secondary Brake Performance
- 73 Parking Brake Performance
- 74 Other Dangerous Defects

* Inspection does not apply to trailers

Seat Belts

Application

This inspection applies to all vehicles with seat belts fitted. The minimum requirement for the fitment of seat belts is detailed in the tables below. The only goods vehicles up to and including 3500kg dgw likely to be subject to this inspection are mini-articulated vehicles.

Procedure and standards

Minimum Requirements for Forward Facing Seats

Vehicles First Used from 1 October 2001 with A DGW in Excess of 3500kg

Drivers seat	Front passenger seats	Rear passenger seats
3 point belt (lap and diagonal) or lap belt	3 point belt (lap and diagonal), lap belt or disabled person's belt	No belt required

Vehicles First Used from 1 April 1980 up to and Including 3500kg DGW

Vehicle first used:	Drivers and specified front passenger seat (furthest from driver)	Other front passengers	Rear passengers
1/4/1980 to 31/3/1981	2 point belt (diagonal body restraining)	No belt required	No belt required
1/4/1981 to 31/3/1987	3 point belt (lap and diagonal)	No belt required	No belt required
1/4/1987 to 30/9/2001	3 point belt (lap and diagonal)	3 point belt, lap belt or disabled person's belt	No belt required
From 1/10/2001	3 point belt (lap and diagonal)	3 point belt (lap and diagonal), lap belt or disabled person's belt	No belt required

Note: Seat belts are not required on light goods vehicles with an ULW exceeding 1525kg, if the model of vehicle was first manufactured before 1 October 1979 and the vehicle was manufactured before 1 October 1981, or first used before 1 April 1982.

Seat Belts

Procedure and standards (cont'd)

Check that each seat that requires a seat belt is fitted with one of the appropriate type.

Check the condition of all seat belts fitted

As far as is practicable without dismantling, check the condition of the vehicle structure around the seat belt anchorage points (i.e. within 300mm (12") of the anchorage).

Where a seat belt is mounted to a seat frame this will apply to all seat mounting points. The floor-mounted anchorage points might need to be inspected from underneath the vehicle.

Pull each seat belt webbing against its anchorage to see that it is properly secured to the vehicle structure.

Note: For seats with integral seat belts, it may not be possible to examine the fixings of the seat belt to the seat.

Fasten each belt locking mechanism and try to pull the locked sections apart. On retracting seat belts, check that with the mechanism fastened and the seat adjusted to its rearmost position, excess webbing is wound into the retracting unit. If there is doubt about the operation of the retracting unit, this check should be carried out with the seat unoccupied.

Note: Some types of retracting belt might need manual help before they retract. Operate the release mechanism while pulling on the belt to check that the mechanism releases when required.

Examine flexible buckle stalks for:

- a) signs of corrosion or weakness. Pull the sheaths aside if this can be done without damage
- b) 'waggle' flexible buckle stalks and listen for a clicking noise indicating broken strands of a cable.

Examine the condition of all seat belt webbing for cuts or obvious signs of deterioration. Pay particular attention to webbing around anchorages, buckles and loops.

Examine the condition of the attachment fittings and adjusting fitting on each belt.

Check the seats to which seat belts are fitted for security and for cracks or fracture of the leg/s and frame.

Seat Belts

Reasons for Failure

1. Obligatory Seat Belt (see Table on first page):
 - a. missing.
 - b. of an incorrect type.

2. Anchorages:
 - a. with excessive corrosion, serious deterioration or a fracture in a load bearing member of the vehicle structure within 300mm (12") of the anchorage. (Where a seat belt is attached to a seat frame this will apply to all seat mounting points).
 - b. a seat belt not securely fixed to the seat or to the vehicle structure.

3. Locking Mechanism, Stalks, Retracting Mechanism and Fittings:
 - a. locking mechanism of a seat belt does not secure or release as intended.
 - b. an attachment or adjustment fitting fractured, badly deteriorated or not operating effectively.
 - c. corrosion or deterioration of a flexible stalk likely to lead to failure under load.
 - d. broken flexible stalk strands.
 - e. a retracting mechanism does not retract the webbing sufficiently to remove all the slack from the belt with the locking mechanism fastened.

4. Condition of Webbing:
 - a. a cut which causes the fibres to separate.
 - b. fluffing or fraying sufficient to obstruct correct operation of the belt or which has clearly weakened the webbing.
 - c. stitching badly frayed, insecure, incomplete or repaired.

5. Seat belt fittings:
 - a. any guide, stalk or pivot with obvious signs of structural weakness such that failure is likely.

Seat Belts

6. Seat or seats with seat belts attached to them:
 - a. insecure.
 - b. with a cracked or fractured leg or frame.

Exhaust Emissions

Application

This inspection applies to all Diesel and other Compression Ignition engines.

Procedure and Standards

Diesel Compression Ignition Engines

- Exhaust emissions must be tested using an approved and calibrated smoke meter.
- **Only in exceptional circumstances where it is not possible to use a smoke meter will a visual check be carried out.** Visual tests will not apply to Fast Pass or vehicles submitted for Reduced Pollution Certification.
- If the exhaust has been deliberately modified to prevent the smoke meter from being used a VTG 12 must be issued refusing to complete the test because the exhaust smoke emissions test cannot be carried out.
- Twin exhaust systems, **without a balance pipe.** Both systems must be individually tested for smoke emissions. It may be necessary to purge the exhaust system again prior to the second check.
- Supercharged engines should be tested by selecting the non-turbocharged option on the smoke meter.
- The test procedure for turbocharged and non-turbocharged engines is the same.
- It is not normally sufficient to run the engine with the vehicle stationary to warm it up to temperature, so the emissions should be tested as soon as possible after the vehicle arrives at the test station.
- With some types of smoke meter care must be taken to ensure that the probe is correctly aligned to the exhaust gas flow. Reference to meter manufacturers instruction may be necessary.

1. Free acceleration test using smoke meter

- a. Check that the engine is at or near normal operating temperature.
- b. Purge the inlet and exhaust systems fully by holding the engine speed steady at just below maximum governed speed for 30 seconds.
- c. Select the appropriate test programme on the smoke meter.
- d. Follow the meter prompts, depress the accelerator pedal quickly but not violently, to reach full fuel position **in less than 1 second.** Hold it there until a release prompt is given. If, at the end of the 1st acceleration, the smoke meter value is no more than 1.50m⁻¹ the vehicle will have met the **fast pass** limit.

Exhaust Emissions *(continued)*

- e. If the 1st meter reading is more than 1.50m¹ further accelerations will be required, following meter prompts, up to a maximum of 6 accelerations.

NOTE: A vehicle will pass the **statutory** test requirements if the opacity level is no greater than

2.50m¹ for non-turbocharged engines

3.00m¹ for turbocharged engines

2. Visual emission test

- **Only in exceptional circumstances where it is not possible to use a smoke meter will a visual check be carried out.** The visual test is only to be used when it is not possible to use the smoke meter or where risk to health and safety would arise. The procedure is the same for supercharged, turbocharged and non-turbocharged engines.
 - a. With the engine at or near normal operating temperature check the density of the exhaust emission visually.
 - b. Ask the driver to depress the accelerator pedal quickly but not violently, to reach full fuel position in **less than 1 second**. Immediately release when the engine reaches its maximum governed speed, allow the engine to return to idle speed.
 - c. Ignore smoke from the first acceleration.
 - d. Repeat up to a maximum of six times if necessary until the exhaust smoke is considered to be acceptable for two successive accelerations.

Caterpillar Engines

Inspectors should be aware of the Air Fuel Ratio Control (AFRC) fitted to Caterpillar engines. When the engine is stopped the control goes into an excess fuel position. When the engine is restarted the inlet manifold pressure necessary to reset the AFRC into its normal running position is normally greater than that generated during the free acceleration test. Vehicles should therefore either be checked at the start of the test if the engine has not been stopped or at the end of the test where the vehicle should be driven on the test track against the load of a partially applied brake sufficient to reset the AFRC prior to conducting the test.

3. Reduced Pollution Certificate (RPC) smoke meter test

- The RPC check is not part of the statutory test requirement.
 - a. Select appropriate RPC limit. Carry out procedures detailed at 1.a, b and c above.
 - b. Following meter prompts carry out three acceleration tests. Depress the accelerator pedal quickly but not violently, to reach full fuel position in **less than 1 second**. Hold it there until a release prompt is given. At the end of the 3rd acceleration the smoke meter will display the average smoke value and test result. If the RPC value is not met and the meter readings are above

Exhaust Emissions *(continued)*

the statutory limits, further accelerations up to a maximum of six may be prompted by the meter.

NOTE: A vehicle will pass the RPC metered test if the opacity level is no greater than

- 0.2 m⁻¹ for all vehicles fitted with a Particulate Trap
- 0.4 m⁻¹ vehicle fitted with an unmodified Euro - 2 engine
- 0.8 m⁻¹ vehicle fitted with an unmodified Euro - 1 engine
- 1.0 m⁻¹ vehicle retro-fitted with a Euro 2 engine

Reasons for Failure

1. Statutory Smoke Meter Test

- a. After a total of six accelerations have been completed, the average smoke opacity recorded for accelerations 4, 5 and 6 is more than
 - 2.5m⁻¹ for non-turbocharged engines
 - 3.0m⁻¹ for turbocharged engines.
- b. The exhaust emits excessive smoke or vapour of any colour, to an extent likely to obscure vision.

2. Statutory visual test

- a. After a maximum of six accelerations the exhaust emits smoke of a level greater than that of equivalent metered levels.
- b. The exhaust emits excessive smoke or vapour of any colour, to an extent likely to obscure vision.

NOTE: The criterion is **density** and **not volume** of smoke. The description 'dense smoke' includes any smoke or vapour which largely obscures vision.

Road Wheels and Hubs

Application

This inspection applies to all road wheels and hubs apart from spare wheels.

Procedure and standards

- Check all road wheels for carrying capacity, and road wheels, fixings and hubs for condition and security. A nut or stud is considered to be "loose" if it is not obviously carrying out its function of clamping the wheel to the hub. Where possible wheel nuts will be lightly tapped with a hammer to check for looseness, but any other evidence such as rust marks or elongation of bolt/stud holes must also be taken into account.
- With some vehicles it is not possible to see the road wheels completely from ground level, especially with twin wheels and where the body hides part of the wheels. In such cases the vehicle must be:-
 - Moved to expose hidden parts of the wheels, or
 - Examined from underneath

Whenever possible, presenters should remove wheel embellishers if they prevent a full examination.

Capacity Limitations of 11.75 x 22.5 Alcoa Aluminium Wheels

Wheels with the part number 813520/813523 may be stamped on the inside of the wheel, opposite the valve, with a maximum load rating of 4250kg or 4500kg and those with part number 813530/813533 with a rating of 4500kg.

It has been agreed that wheels with these part numbers and maximum load ratings are suitable for a maximum axle weight of 9150kg.

Capacity limitation of a wheel marked with a load index

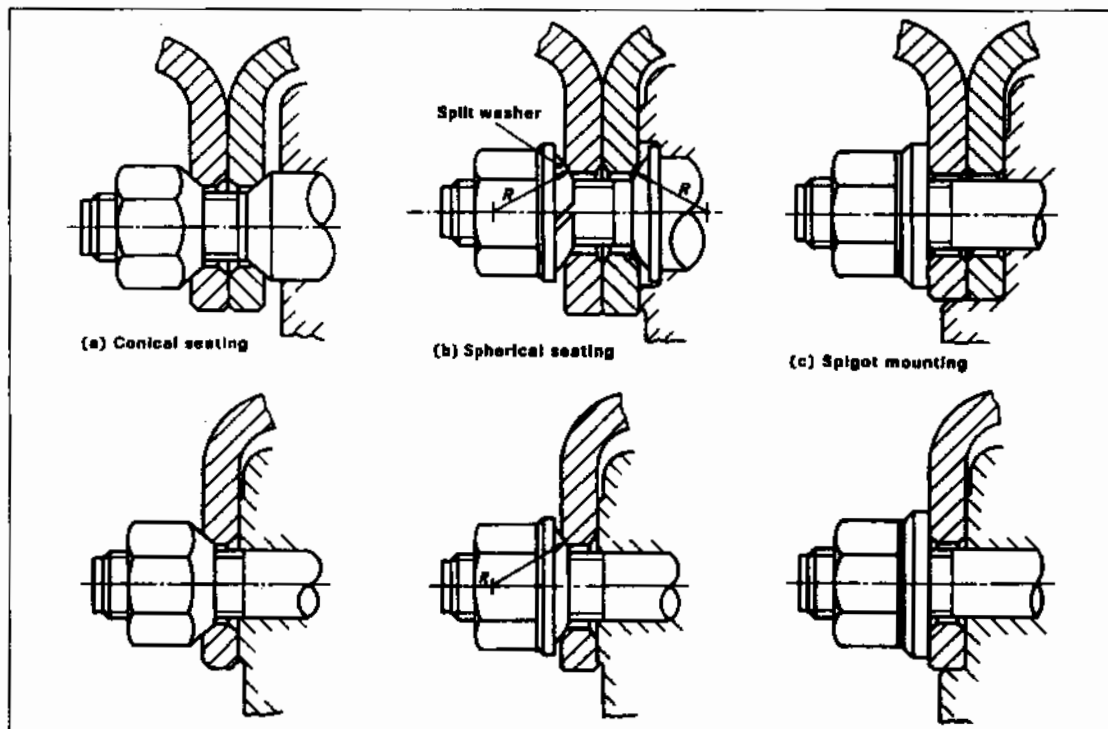
If a wheel is marked with a load index which indicates that the maximum load is lower than is required to support the axle load, the vehicle should be failed under Reason for Failure 2.i

Wheels not marked with a load index or load marking must be assumed to be capable of carrying the axle weight.

Road Wheels and Hubs (continued)

Compatibility of Wheel Fixings

- Vehicles with conical wheel fixings **MUST NOT** be fitted with wheels from vehicles designed for use with spherical fixings. (British built vehicles normally have conical wheel fixings).
- Vehicles with spherical wheel fixings **MUST NOT** be fitted with wheels from vehicles which are designed for use with conical fixings.
- Volvo wheels of the original spigot-mounting design **WILL NOT** interchange with another type. Volvo wheels designed for later type spigot mounting may be used in an emergency on British built trailers.
- Wheels with conical fixings **MUST NOT** be used on Volvo vehicles because they do not have a machine centre bore to fit hub.
- Spigots must extend to the outer wheel centre where twin wheels are fitted.



Road Wheels and Hubs *(continued)*

Reasons for Failure

1. A tyre retaining ring
 - a. fractured.
 - b. butting causing the flange to lift more than 1.5mm from the rim.
2. A wheel
 - *a. nut or stud missing or loose or not fulfilling the function of clamping the wheel to the hub.
 - b. with any visible elongation of a stud hole.
 - c. with a spigot wheel nut washer cracked.
 - d. badly damaged or distorted or with a locating spigot or dowel missing.
 - e. damaged by the corners of a wheel nut cutting into the material of the wheel.
 - f. and its fixings not compatible.
 - g. cracked (except at the bridge over the valve), weld breaking away or an inadequate repair.
 - h. made of aluminium alloy repaired by welding.
 - i. with a load rating less than that required to support the maximum permissible (GB) axle load.
3. A hub
 - *a. cracked, badly damaged, or with a half shaft bolt, stud or nut loose or missing.
 - b. with clearance between a spigot mounted wheel and the hub spigots that exceeds 3mm across the diameter.

Size and Type of Tyres

Application

This inspection applies to all tyres, apart from spare tyres.

Procedure and standards

Check that sizes, ply ratings, load indices, speed ratings and use markings of tyres are appropriate, bearing in mind

- published data on tyre capacities.
- the load on each axle when the vehicle is fully laden.
- the type of axle and vehicle to which the tyre is fitted.

Note: The use markings most likely to be encountered are "FRT" which indicates that the tyre is not suitable for use on a driven axle and "TRAILER USE ONLY". Tyres marked with a direction arrow pointing in the wrong direction should not be failed.

Tyres are usually identified by their nominal section size followed by the rim diameter eg 10.00-20, 750-16, etc (the majority of modern tyres carry millimetric markings eg 205-16 etc). (For identification of sidewall markings refer to the diagram at the end of this section.) All tyres on an axle must be of the same nominal size. If a tyre is dual marked one of the markings must be the same as the markings on the other tyres on the axle.

There are still a number of high load capacity tyres in use which are marked with a code to indicate the tyre size and capacity eg a 10.00-20 16 ply tyre may be marked D20 or 4-20 (a full list of these tyres is given at Table 1).

If tyres marked with a load capacity index are fitted the maximum permissible axle load for normal use can be found in Table 2 at the end of this section. The Load Index (LI) may consist of one or two numbers eg 154 or 146/143. Where two numbers are displayed the first refers to the use of the tyre in single formation and the second in twin formation. Reference to the table shows that the maximum loads for this tyre are 6000kg in single formation and 10900 in twin formation.

If a load index is not shown the carrying capacity of a tyre can be determined from the Ply Rating. The load capacity of ply rated tyres is shown at Table 3. If no ply rating can be found on the tyre it should be assumed to have the lowest load capacity listed for that size of tyre.

This information relates to tyres used without any restriction (ie with tyre use symbol 28 indicated on the plate or plating certificate). There are three other categories of vehicle use which allow tyres to be operated at lower speeds and higher loads. The details of the axle loads are in the Tyre Tables obtainable from the Vehicle Operator Services Agency at Welcombe House, 91/2 The Strand Swansea SA 1 2DH.





Size and Type of Tyres *(continued)*

2J SPEED RESTRICTED TO 40MPH

This category is applicable to "Municipal vehicles". "Municipal vehicles" means a motor vehicle or trailer limited at all times to use by a local authority, or a person acting in pursuance of a contract with a local authority, for road cleansing, road watering or the collection and disposal of refuse, night soil or the contents of cesspools, or the purposes of the enactments relating to weights and measures or the sale of food and drugs:

OR "Multi-stop local collection and delivery vehicles" being a motor vehicle or trailer used for multi-stop collection and delivery services to be used only within a radius of 25 miles from the permanent base at which it is normally kept.

2M SPEED RESTRICTED TO 40MPH

This category is applicable to a "low platform trailer" being a trailer fitted with tyres with a rim diameter size code of less than 20 and displaying a rectangular plate which is at least 225mm wide and at least 175mm high and bears two black letters "L" at least 125mm high and 90mm wide with a stroke width of 12mm.

2R SPEED RESTRICTED TO 50MPH

This category is applicable to any vehicle which displays a "50" plate in accordance with Schedule 13 of the C & U regulations.

SPEED SYMBOLS

The speed capability is represented by a letter which is displayed adjacent to the LI marking eg 146/143J. This indicates the speed at which the tyre can carry the load(s) indicated by the LI marking(s). In the above example the tyres carry a load of 6000/10900kg at 62mph.

The minimum required speed ratings are:

CLASS OF VEHICLE	PERMITTED SPEED (MPH)	MINIMUM SPEED SYMBOL REQUIRED
Rigid goods vehicles with maximum laden weight not exceeding 7.5 tonnes	70	L
Rigid goods vehicles with maximum laden weight exceeding 7.5 tonnes	60	J
Articulated vehicles	60	J
Trailers	60	J
Goods vehicles and trailers operating under 2J or 2M tyre use conditions	40	D
Restricted speed vehicles operating under 2R tyre use conditions	50	F

Size and Type of Tyres *(continued)*

ALTERNATIVE SPEED RATINGS

Certain vehicles can be fitted with tyres showing a lower speed rating than those shown above but the maximum axle loads will be reduced as shown below.

CLASS OF VEHICLE	NORMAL SPEED RATING	ALTERNATIVE SPEED RATING	REDUCTION IN AXLE LOAD
Motor vehicles not exceeding 7500kg plated weight	L	J	7%
		K	3%
Trailers	J	F	15%
		G	5%

Details of the reduced axle loads which tyres can carry are shown in Table 4.

STRUCTURE

- Examine all the tyres fitted and note the type of structure (radial, cross-ply or bias-belted) and the nominal size of tyres.
- All tyres on an axle must be of the same structure and nominal size.
- Tyres on an axle may be of different structures and nominal sizes to those on another axle with the following exceptions.
- All tyres on all steered axles must have the same structure.
- All tyres on all driven axles must have the same structure.
- On two axle motor vehicles where each axle is fitted with single wheels, if all the tyres are not of the same structure, the type of structure which is allowed to be fitted to each axle is shown in the table.

AXLE 1	AXLE 2
Cross-ply	Bias-belted
Cross-ply	Radial
Bias-belted	Radial

This does not apply to an axle on which wide single tyres with a road contact width of more than 300mm are fitted.



Size and Type of Tyres *(continued)*

Reasons for Failure

1. A tyre:
 - a. of which the nominal size, ply rating, load index or speed rating of any tyre is below that appropriate for the plated axle weight.
 - b. which has a tyre use marking inappropriate for the type of axle or vehicle to which it is fitted.
 - c. of a different nominal size to another on the same axle.
 - d. of a different structure to another on the same axle.
 - e. on a steerable axle which is not of the same structure as any other tyre on any steerable axle.
 - f. on a driven axle which is not of the same structure as any other tyre on any driven axle.

2. On a two axle motor fitted with single tyres on both axles a combination of tyres with structures which are not shown as acceptable in the table.

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Size and Type of Tyres *(continued)*

TABLE 1

CODE	TYRE SIZE
A16 or 1 — 16	750 — 16 — 12 PR
B16 or 2 — 16	825 — 16 — 14 PR
C16 or 3 — 16	900 — 16 — 14 PR
B17 or 2 — 17	825 — 17 — 14 PR
A20 or 1 — 20	750 — 20 — 12 PR
B20 or 2 — 20	825 — 20 — 14 PR
C20 or 3 — 20	900 — 20 — 14 PR
D20 or 4 — 20	1000 — 20 — 16 PR
E20 or 5 — 20	1100 — 20 — 16 PR
F20	1200 — 20 — 18 PR
G20	1400 — 20 — 22 PR
E22 or 5 — 22	1100 — 22 — 16 PR
B22.5 or 2 — 22.5	9 — 22.5 — 14 PR
C22.5 or 3 — 22.5	10 — 22.5 — 14 PR
D22.5 or 4 — 22.5	11 — 22.5 — 16 PR
E22.5	12 — 22.5 — 16 PR
C24 or 3 — 24	900 — 24 — 14 PR
E24	1100 — 24 — 16 PR

Size and Type of Tyres (continued)

TABLE 2
LOAD CAPACITY INDEX TABLE
 EXTRACT FROM ECE REG 54: "LOAD INDEX" TABLE AMENDED TO SHOW AXLE
LOADS

LOAD INDEX	SINGLE Kg	DUAL Kg	LOAD INDEX	SINGLE Kg	DUAL Kg	LOAD INDEX	SINGLE Kg	DUAL Kg
70	670	1340	110	2120	4240	150	6700	13400
71	690	1380	111	2180	4360	151	6900	13800
72	710	1420	112	2240	4480	152	7100	14200
73	730	1460	113	2300	4600	153	7300	14600
74	750	1500	114	2360	4720	154	7500	15000
75	774	1548	115	2430	4860	155	7750	15500
76	800	1600	116	2500	5000	156	8000	16000
77	824	1648	117	2570	5140	157	8250	16500
78	850	1700	118	2640	5280	158	8500	17000
79	874	1748	119	2720	5440	159	8750	17500
80	900	1800	120	2800	5600	160	9000	18000
81	924	1848	121	2900	5800	161	9250	18500
82	950	1900	122	3000	6000	162	9500	19000
83	974	1948	123	3100	6200	163	9750	19500
84	1000	2000	124	3200	6400	164	10000	20000
85	1030	2060	125	3300	6600	165	10300	20600
86	1060	2120	126	3400	6800	166	10600	21200
87	1090	2180	127	3500	7000	167	10900	21800
88	1120	2240	128	3600	7200	168	11200	22400
89	1160	2320	129	3700	7400	169	11600	23200
90	1200	2400	130	3800	7600	170	12000	24000
91	1230	2460	131	3900	7800	171	12300	24600
92	1260	2520	132	4000	8000	172	12600	25200
93	1300	2600	133	4120	8240	173	13000	26000
94	1340	2680	134	4240	8480	174	13400	26800
95	1380	2760	135	4360	8720	175	13800	27600
96	1420	2840	136	4480	8960	176	14200	28400
97	1460	2920	137	4600	9200	177	14600	29200
98	1500	3000	138	4720	9440	178	15000	30000
99	1550	3100	139	4860	9720	179	15500	31000
100	1600	3200	140	5000	10000			
101	1650	3300	141	5150	10300			
102	1700	3400	142	5300	10600			
103	1750	3500	143	5450	10900			
104	1800	3600	144	5600	11200			
105	1850	3700	145	5800	11600			
106	1900	3800	146	6000	12000			
107	1950	3900	147	6150	12300			
108	2000	4000	148	6300	12600			
109	2060	4120	149	6500	13000			

TABLE 3

1. Ply Rating Marked Tyres

How to use this table:

1. Locate the line entry corresponding to the size and ply rating marked on the tyre sidewall;
2. Read off the maximum axle load (kg) for these tyres in 'SINGLE' or 'TWIN' formation, as appropriate.

Nominal Tyre Size	Ply Rating	Maximum Axle Load (Kg)	
		Single Tyres |-----|	Twin Tyres H-----H
145 - 13C	6	970	1840
145 - 13C	8	1120	2120
560 - 13C	6	1020	1940
590 - 13C	6	1070	2090
640 - 13C	6	1280	2240
640 - 13C	8	1430	2750
670 - 13C	6	1380	2650
670 - 13C	8	1580	3050
1050 - 13	12	4320	7880
1050 - 13	14	4830	8900
155 - 14C	6	1070	2040
165 - 14C	6	1300	2460
165 - 14C	8	1460	2760
175 - 14C	6	1430	2680
175 - 14C	8	1550	3000
185 - 14	RADIAL	1200	2300
185 - 14	REINFORCED RAD	1340	2560
185 - 14	4	1340	2560
185 - 14C	6	1550	2920
185 - 14C	8	1700	3200
195 - 14	RADIAL	1300	2490
195 - 14	REINFORCED RAD	1500	2870
195 - 14C	6	1700	3210
195 - 14C	8	1900	3600
205 - 14	RADIAL	1420	2720
205 - 14	REINFORCED RAD	1650	3160
205 - 14C	6	1850	3510
205 - 14C	8	2060	3900
215 - 14C	8	2240	4240
590 - 14C	6	1170	2240
600 - 14C	8	1260	2400

Nominal Tyre Size	Ply Rating	Maximum Axle Load (Kg)	
		Single Tyres |-----|	Twin Tyres H-----H
640 - 14C	6	1330	2550
650 - 14	4	970	1860
650 - 14C	6	1300	2460
650 - 14C	8	1500	2840
670 - 14C	6	1430	2750
670 - 14C	8	1680	3160
700 - 14	4	1070	2050
700 - 14C	6	1380	2650
750 - 14	4	1200	2300
750 - 14C	6	1530	2950
750 - 14C	8	1730	3360
11-15	6	2240	—
145 - 15C	8	1230	2320
185 - 15C	8	1750	3400
590 - 15C	6	1220	2340
640 - 15C	6	1380	2650
670 - 15C	6	1530	2900
670 - 15C	8	1780	3460
670 - 15	10	2000	3900
700 - 15C	6	1750	3400
700 - 15C	8	1940	3760
700 - 15	12	2440	4580
750 - 15C	6	1830	3560
750 - 15C	8	2060	3970
750 - 15	10	2340	4370
750 - 15	12	2750	5340
750 - 15	14	3150	6100
750 - 15	16	3660	6860
825 - 15	12	3050	5590
825 - 15	14	3360	6360
825 - 15	18	4680	8540
825 - 15	20	5000	9440
1000 - 15	12	3870	7120
1000 - 15	14	4320	8130
1000 - 15	16	5020	9580
1000 - 15	18	5400	10170

Nominal Tyre Size	Ply Rating	Maximum Axle Load (Kg)	
		Single Tyres |-----|	Twin Tyres H-----H
175 - 16C	6	1500	2840
175 - 16C	8	1650	3100
185 - 16C	8	1800	3400
195 - 16C	8	1950	3700
205 - 16C	6	1900	3610
205 - 16C	8	2120	4000
215 - 16C	6	2120	4000
215 - 16C	8	2300	4360
235 - 85 - 16	10	2760	5040
600 - 16	6	1380	2550
600 - 16	8	1530	2920
600 - 16	10	1830	3300
650 - 16	6	1530	2920
650 - 16	8	1830	3460
650 - 16	10	2040	3900
700 - 16	6	1730	3260
700 - 16	8	2040	3870
700 - 16	10	2340	4480
700 - 16	12	2650	5000
750 - 16	6	2040	3870
750 - 16	8	2240	4270
750 - 16	10	2500	4720
750 - 16	12	2900	5600
825 - 16	8	2650	4880
825 - 16	10	2850	5440
825 - 16	12	3300	6400
825 - 16	14	3600	6800
900 - 16	6	2360	4360
900 - 16	8	2720	5140
900 - 16	10	3050	5600
900 - 16	12	4070	7200
900 - 16	14	4320	7800
1050 - 15	12	4580	8130

Size and Type of Tyres (continued)



Size and Type of Tyres (continued)



TABLE 3 (continued)

Nominal Tyre Size	Ply Rating	Maximum Axle Load (Kg)		Nominal Tyre Size	Ply Rating	Maximum Axle Load (Kg)		Nominal Tyre Size	Ply Rating	Maximum Axle Load (Kg)	
		Single Tyres	Twin Tyres			Single Tyres	Twin Tyres			Single Tyres	Twin Tyres
1400-16	18	7880	—	1000-20	12	4830	8640	9-22.5	10	3560	6610
1400-16	20	8390	—	1000-20	14	5340	9720	9-22.5	12	3820	7200
1400-16	22	9150	—	1000-20	16	6100	10900	9-22.5	14	4120	7800
9.50-16.5	6	2130	3750	10.5-20	6	2800	—	10-22.5	10	4070	7630
8.25-17	10	3260	5850	1100-20	12	5340	9660	10-22.5	12	4580	8240
8.25-17	12	3560	6200	1100-20	14	6100	10900	10-22.5	14	5000	9200
8.25-17	14	3820	7200	1100-20	16	6610	11600	11-22.5	12	4830	8640
8-17.5C	8	2300	4480	1200-20	14	6100	10600	11-22.5	14	5340	9720
8-17.5	10	2570	5090	1200-20	16	6860	12000	11-22.5	16	6100	10900
8.5-17.5	RADIAL	2960	5600	1200-20	18	7630	13010	13-22.5	18	7500	13000
9.5-17.5	RADIAL	3400	6400	12.5-20	10	3700	—	10.70-22.5	14	5000	9200
8-19.5	RADIAL	3100	6000	1300-20	16	7800	—	11.70-22.5	12	5300	9720
9-19.5	RADIAL	3800	7200	1300-20	18	8900	—	11.70-22.5	14	5600	10300
9.5-19.5	RADIAL	4240	7800	1300-20	20	9300	—	11.70-22.5	16	6100	10900
600-20	6	1430	2750	1400-20	18	9150	—	12.70-22.5	16	6610	11600
600-20	8	1630	3100	1400-20	20	9510	—	13.70-22.5	18	7630	13010
600-20	10	1830	3460	1400-20	22	10000	—	27570-22.5	RADIAL	5000	9200
650-20	6	1830	3460	14.5-20	10	4000	—	27570-22.5	16	6100	—
650-20	8	2240	4070	1500-20	20	10600	—	31570-22.5	16	6610	11600
650-20	10	2440	4680	1500-20	22	11600	—	900-24	12	5090	9150
700-20	8	2240	4680	1500-20	24	12600	—	900-24	14	5340	10170
700-20	10	2650	4880	1600-20	14	6100	—	1000-24	14	6100	10500
700-20	12	2850	5340	1600-20	16	6860	—	1100-24	12	5850	10300
750-20	8	2850	5340	1600-20	18	7300	—	1100-24	14	6610	11200
750-20	10	3260	6000	13/80-20	18	7300	13000	1100-24	16	7120	12300
750-20	12	3600	7000	14/80-20	18	8250	—	1200-24	14	6610	—
8.25-20	10	3560	6610	1100-22	12	5590	10170	1200-24	16	7370	—
8.25-20	12	3820	7200	1100-22	14	6100	10810	1200-24	18	8130	—
8.25-20	14	4120	7800	1100-22	16	6860	12000	1200-24	20	9000	—
900-20	10	4070	7630	1400-24	18	10000	—	1400-24	18	10000	—
900-20	12	4580	8240	1400-24	22	11200	—	1400-24	22	11200	—
900-20	14	5000	9200	11-24.5	14	5830	—	11-24.5	14	5830	10800

Note: Items marked '**' are not suitable in UK over 9200kg due to minimum tread width requirement of 300mm

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Size and Type of Tyres *(continued)*

**TABLE 4
MAX AXLE LOADS FOR "UNRESTRICTED" SPEED VEHICLES**

Tyre Load Index	Trailers permitted to exceed 50mph (up to 60mph)				Motor vehicles permitted to exceed 60mph (up to 70mph)			
	Speed Symbol F (-15%)		Speed Symbol G (-5%)		Speed Symbol J (-7%)		Speed Symbol K (-3%)	
	Single(Kg)	Dual(Kg)	Single(Kg)	Dual(Kg)	Single(Kg)	Dual(Kg)	Single(Kg)	Dual(Kg)
70	570	1140	640	1280	630	1250	650	1300
71	590	1180	660	1320	650	1290	670	1340
72	610	1210	680	1350	660	1330	690	1380
73	630	1250	700	1390	680	1360	710	1420
74	640	1280	720	1430	700	1400	730	1460
75	660	1320	740	1480	720	1440	760	1510
76	680	1360	760	1520	750	1490	780	1560
77	700	1410	790	1570	770	1540	800	1600
78	730	1450	810	1620	800	1590	830	1650
79	750	1490	830	1670	820	1630	850	1700
80	770	1530	860	1710	840	1680	880	1750
81	790	1580	880	1760	860	1720	900	1800
82	810	1620	910	1810	890	1770	930	1850
83	830	1660	930	1860	910	1820	950	1890
84	850	1700	950	1900	930	1860	970	1940
85	880	1760	980	1960	960	1920	1000	2000
86	910	1810	1010	2020	990	1980	1030	2060
87	930	1860	1040	2080	1020	2030	1060	2120
88	960	1910	1070	2130	1050	2090	1090	2180
89	990	1980	1110	2210	1080	2160	1130	2250
90	1020	2040	1140	2280	1120	2240	1170	2330
91	1050	2100	1170	2340	1150	2290	1200	2390
92	1080	2150	1200	2400	1180	2350	1230	2450
93	1110	2210	1240	2470	1210	2420	1270	2530
94	1140	2280	1280	2550	1250	2500	1300	2600
95	1180	2350	1320	2630	1290	2570	1340	2680
96	1210	2420	1350	2700	1330	2650	1380	2760
97	1250	2490	1390	2780	1360	2720	1420	2840
98	1280	2550	1430	2850	1400	2790	1460	2910
99	1320	2640	1480	2950	1450	2890	1510	3010
100	1360	2720	1520	3040	1490	2980	1560	3110
101	1410	2810	1570	3140	1540	3070	1610	3210
102	1450	2890	1620	3230	1590	3170	1650	3300
103	1490	2980	1670	3330	1630	3260	1700	3400
104	1530	3060	1710	3420	1680	3350	1750	3500
105	1580	3150	1760	3520	1730	3450	1800	3590
106	1620	3230	1810	3610	1770	3540	1850	3690
107	1660	3320	1860	3710	1820	3630	1900	3790
108	1700	3400	1900	3800	1860	3720	1940	3880
109	1760	3510	1960	3920	1920	3840	2000	4000
110	1810	3610	2020	4030	1980	3950	2060	4120
111	1860	3710	2080	4150	2030	4060	2120	4230
112	1910	3810	2130	4260	2090	4170	2180	4350
113	1960	3910	2190	4370	2140	4280	2240	4470
114	2010	4020	2250	4580	2200	4390	2290	4580

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Size and Type of Tyres (continued)

TABLE 4 (continued)
MAX AXLE LOADS FOR "UNRESTRICTED" SPEED VEHICLES

Tyre Load Index	Trailers permitted to exceed 50mph (up to 60mph)				Motor vehicles permitted to exceed 60mph (up to 70mph)			
	Speed Symbol F (-15%)		Speed Symbol G (-5%)		Speed Symbol J (-7%)		Speed Symbol K (-3%)	
	Single(Kg)	Dual(Kg)	Single(Kg)	Dual(Kg)	Single(Kg)	Dual(Kg)	Single(Kg)	Dual(Kg)
115	2070	4140	2310	4620	2260	4520	2360	4720
116	2130	4250	2380	4750	2330	4650	2430	4850
117	2190	4370	2450	4890	2390	4780	2500	4990
118	2250	4490	2510	5020	2460	4910	2570	5130
119	2320	4630	2590	5170	2530	5060	2640	5280
120	2380	4760	2660	5320	2610	5210	2720	5440
121	2470	4930	2760	5510	2700	5400	2820	5626
122	2550	5100	2850	5700	2790	5580	2910	5820
123	2640	5270	2950	5890	2890	5770	3010	6020
124	2720	5440	3040	6080	2980	5960	3110	6210
125	2810	5610	3140	6270	3070	6140	3210	6410
126	2890	5780	3230	6460	3170	6330	3300	6600
127	2980	5950	3330	6650	3260	6510	3400	6790
128	3060	6120	3420	6840	3350	6700	3500	6990
129	3150	6290	3520	7030	3450	6890	3590	7180
130	3230	6460	3610	7220	3540	7070	3690	7380
131	3320	6630	3710	7410	3630	7260	3790	7570
132	3400	6800	3800	7600	3720	7440	3880	7760
133	3510	7010	3920	7830	3840	7670	4000	8000
134	3610	7210	4030	8060	3950	7890	4120	8230
135	3710	7420	4150	8290	4060	8110	4230	8460
136	3810	7620	4260	8520	4170	8340	4350	8700
137	3910	7820	4370	8740	4280	8560	4470	8930
138	4020	8030	4490	8970	4390	8780	4580	9160
139	4140	8270	4620	9240	4520	9040	4720	9430
140	4250	8500	4750	9500	4650	9300	4850	9700
141	4380	8760	4900	9790	4790	9580	5000	10000
142	4510	9010	5040	10070	4930	9860	5150	10290
143	4640	9270	5180	10360	5070	10140	5290	10580
144	4760	9520	5320	10640	5210	10420	5420	10870
145	4930	9860	5510	11020	5400	10790	5630	11260
146	5100	10200	5700	11400	5580	11160	5820	11640
147	5230	10460	5850	11690	5720	11440	5970	11940
148	5360	10710	5990	11970	5860	11720	6120	12230
149	5530	11050	6180	12350	6050	12090	6310	12610
150	5700	11390	6370	12730	6240	12470	6500	13000
151	5870	11730	6560	13110	6420	12840	6700	13390
152	6040	12070	6750	13490	6610	13210	6890	13780
153	6210	12410	6940	13870	6790	13580	7090	14170
154	6380	12750	7130	14250	6980	13950	7280	14550
155	6590	13180	7370	14730	7210	14420	7520	15040
156	6800	13600	7600	15200	7440	14880	7760	15520
157	7020	14030	7840	15680	7680	15350	8010	16010
158	7230	14450	8080	16150	7910	15810	8250	16490
159	7440	14880	8320	16630	8140	16280	8490	16980
160	7650	15300	8550	17100	8370	16740	8730	17460
161	7870	15730	8790	17580	8610	17210	8980	17950
162	8080	16150	9030	18050	8840	17670	9220	18430
163	8290	16580	9270	18530	9070	18140	9460	18920

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Size and Type of Tyres (continued)

TABLE 4 (continued)
MAX AXLE LOADS FOR "UNRESTRICTED" SPEED VEHICLES

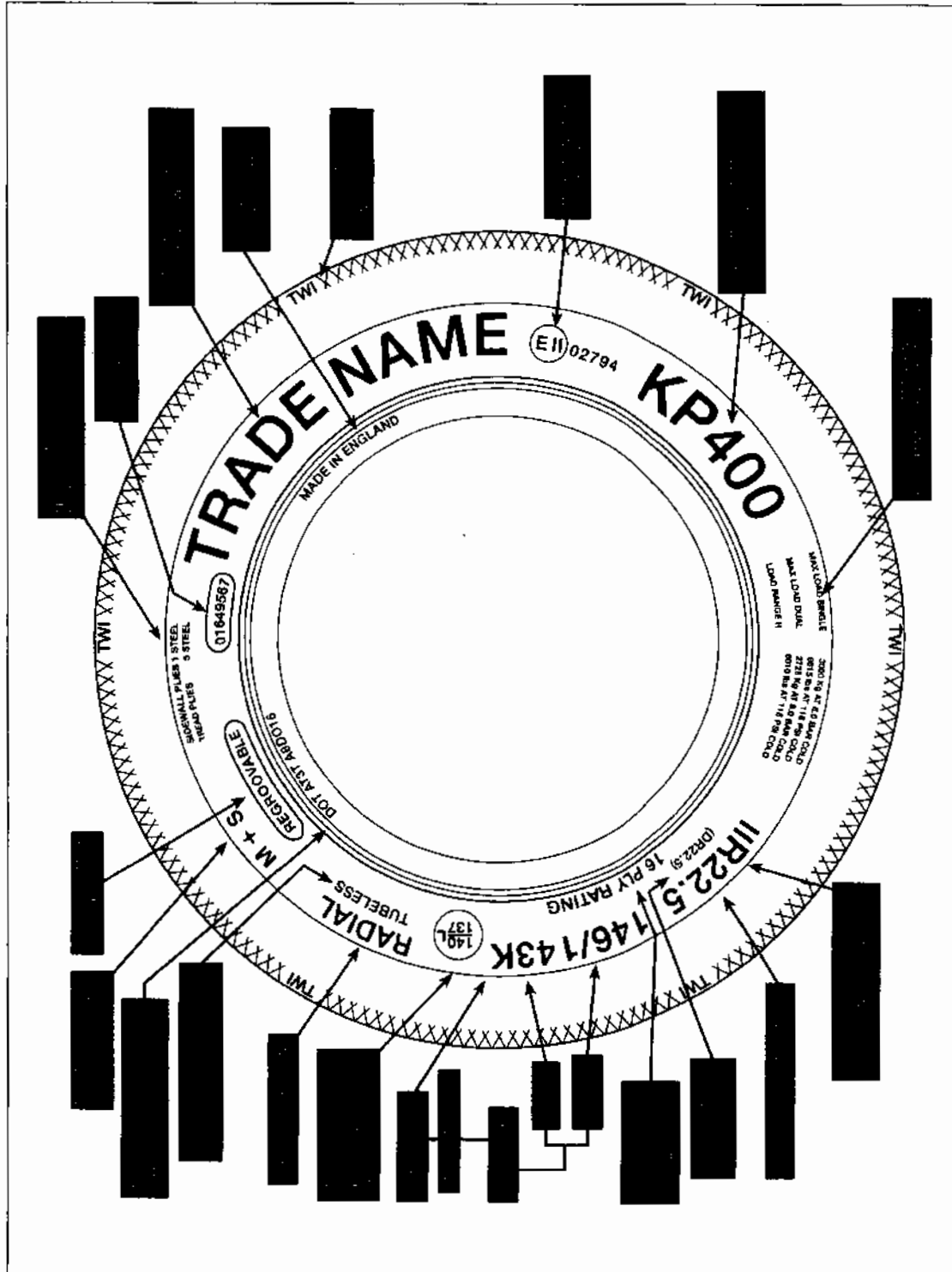
Tyre Load Index	Trailers permitted to exceed 50mph (up to 60mph)				Motor vehicles permitted to exceed 60mph (up to 70mph)			
	Speed Symbol F (-15%)		Speed Symbol G (-5%)		Speed Symbol J (-7%)		Speed Symbol K (-3%)	
	Single(Kg)	Dual(Kg)	Single(Kg)	Dual(Kg)	Single(Kg)	Dual(Kg)	Single(Kg)	Dual(Kg)
164	8500	17000	9500	19000	9300	18600	9700	19400
165	8760	17510	9790	19570	9580	19160	10000	19990
166	9010	18020	10070	20140	9860	19720	10290	20570
167	9270	18530	10360	20710	10140	20280	10580	21150
168	9520	19040	10640	21280	10420	20840	10870	21730
169	9860	19720	11020	22040	10790	21580	11260	22510
170	10200	20400	11400	22800	11160	22320	11640	23280
171	10450	20910	11690	23370	11440	22880	11940	23870
172	10710	21420	11970	23940	11720	23440	12230	24450
173	11050	22100	12350	24700	12090	24180	12610	25220
174	11390	22780	12730	25460	12470	24930	13000	26000
175	11730	23460	13110	26220	12840	25670	13390	26780
176	12070	24140	13490	26980	13210	26420	13780	27550
177	12410	24820	13870	27740	13580	27160	14170	28330
178	12750	25500	14250	28500	13950	27900	14550	29100
179	13180	26350	14730	29450	14420	28830	15040	30070

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Size and Type of Tyres (continued)

REPRODUCED BY COURTESY OF THE BRITISH RUBBER MANUFACTURERS ASSOCIATION

NOTE: A Tyre may not necessarily carry all of the markings.



Condition of Tyres

Application

This examination applies to all tyres fitted to vehicles and trailers apart from spare tyres.

Procedure and Standards

Check each tyre for:

- Cuts.
- Lumps, bulges or tears.

Note: Lifting of the tread rubber is a Reason for Failure. If a portion of the tread material is partially severed so that it is likely to fly off and cause danger for other road users it is a Reason for Failure.

A probe may be used when checking a cut in a tyre provided that care is taken that no further damage is caused to the tyre.

When checking bulges care must be taken to distinguish between bulges caused by separation or partial failure of the structure and the bulges which are due to normal manufacturing undulations in the tyre or due to a satisfactory repair. A bulge due to a repair will be solid, feeling firm to hand pressure and will not deflect as would a bulge associated with casing separation.

A recapped tyre may on occasions have unbonded surplus rubber at the tyre shoulder which may give the appearance of tread separation, although it is not.

- Exposed ply or cords.
- Damaged cords.

Check that tyre is seated correctly on the wheel and that it does not foul on any part of the vehicle or make wall contact with another tyre on a twin wheel.

Note: Some tyres with flexible side walls may make wall contact under load. This is not a Reason for Failure.

Check any tyre that appears to have been recut and determine whether it has been recut to the manufacturers' recut tread pattern. It is often difficult to identify tyres which have been skillfully recut, but extra care should be taken to check for exposure of the ply or cord at the bottom of the grooves.

Note: Recut tyres can only be fitted to motor vehicles with an unladen weight of 2540kg or more and to trailers with an unladen weight of more than 1020kg.

Details of manufacturers' recut tread patterns can be obtained from the
Vehicle & Operator Services Agency,
Technical Services,
Welcombe House,
91/2 The Strand,
Swansea,
SA1 2DH.

Condition of Tyres *(continued)*

Procedure and Standards (cont'd)

Check the tread pattern of each tyre and ensure that the base of any groove of the original tread pattern is visible. This does not apply to vehicles with DGWV 3500kg or less.

Note: The original tread pattern means:

- On a re-treaded tyre the tread pattern immediately after the tyre was re-treaded.
- On a recut tyre the manufacturer's recut tread pattern.
- On a partly recut tyre, the part which has been recut the manufacturer's recut tread pattern, on the other part the tread pattern when new.
- On any other tyre the tread pattern of the tyre when new.

When checking the tread pattern the "Breadth of Tread" is to be taken as that part of the tyre which can contact the road, under normal use, measured across the tyre.

The following should be disregarded when deciding which grooves need to be checked in regard to the "original tread pattern".

- grooves which wear out before the main grooves are worn to a depth of 5mm in the case of a truck tyre and 3mm in the case of a car tyre.
- other minor features such as sipes, small lateral extensions to the circumferential grooves and minor lateral grooving on the shoulders.

Check the tread pattern grooves to ensure that the minimum tread depth standards shown below are met.

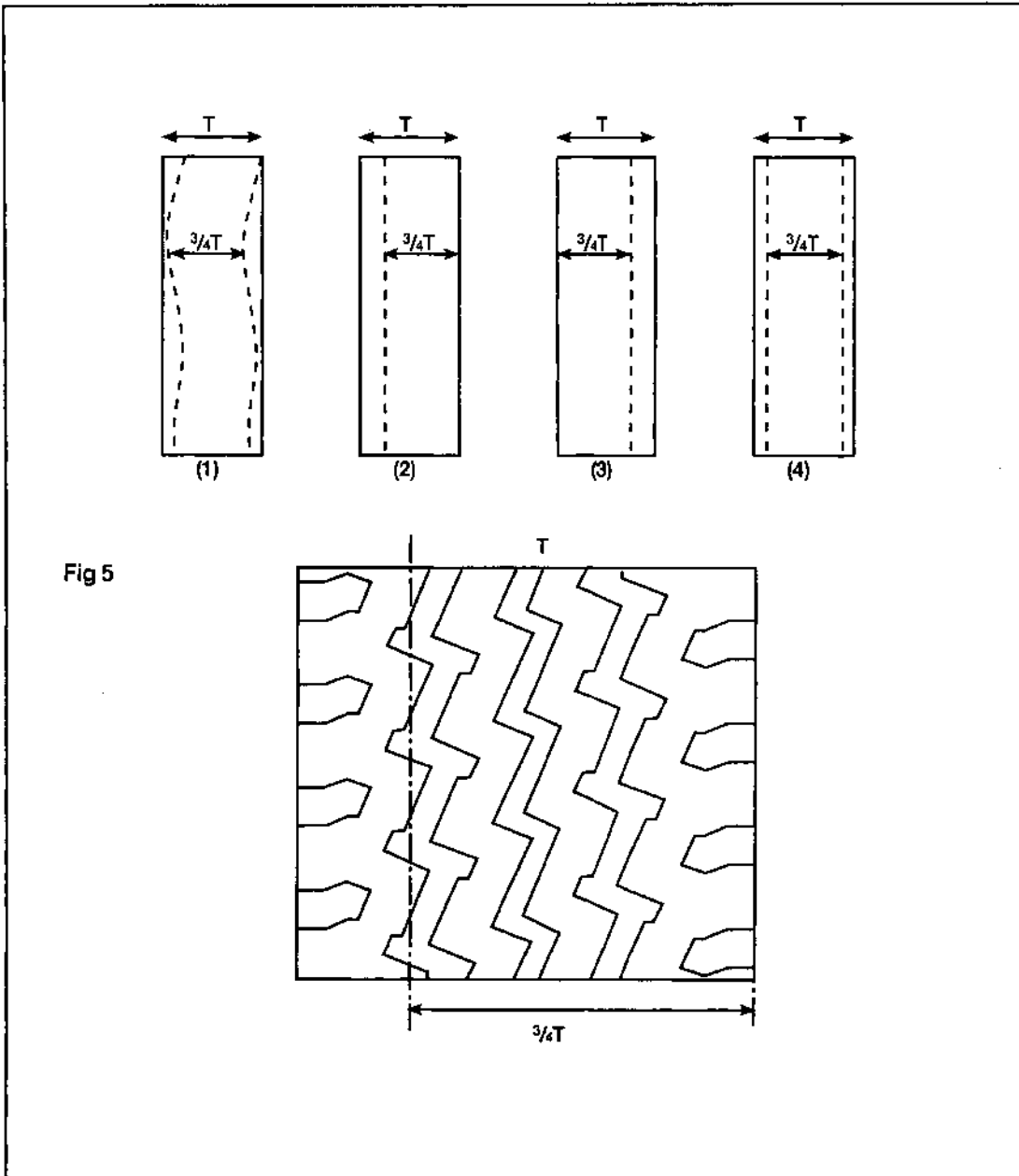
Design gross weight of vehicle or trailer	Over 3500kg	3500kg or less
Minimum tread depth	1mm, excluding any tie bar or tread wear indicator	1.6mm, excluding any tie bar or tread wear indicator
Position of minimum tread depth band	Form a continuous band covering at least any $\frac{3}{4}$ of the breadth of the tread around the entire circumference	Form a continuous band covering the central $\frac{3}{4}$ of the breadth of the tread around the entire circumference

The following diagrams show acceptable positions of the minimum tread depth band, for vehicles over 3500kg design gross weight, which must be measured at right angles to the axis of the wheel. Figures 1-4 show cambered wear and Figure 5 shows more detail of how the tread band is measured. For vehicles of 3500kg or less the band is the central $\frac{3}{4}$ of the breadth of tread and it is not necessary for tread depth to be visible on the remainder.

Figure 6 shows that for certain cross country tyres that it may be necessary to accept that the band of acceptable tread pattern may include a plain portion in the centre.

Condition of Tyres *(continued)*

Figs (1), (2), (3) and (4) T = Breadth of Tread
 $\frac{3}{4}$ T = Minimum width of continuous band.



In this case the lateral grooves are the same depth as the circumferential grooves and are included in the $\frac{3}{4}$ measurement.

The breadth of the tread is 'T'.

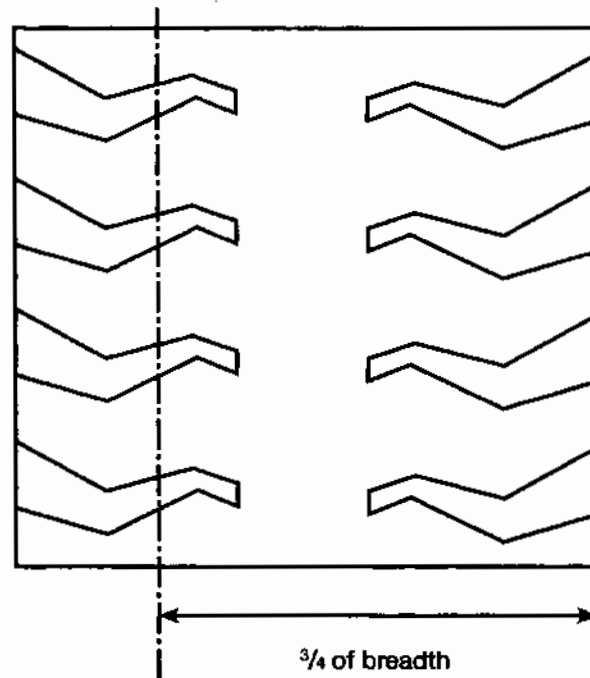
The $\frac{3}{4}$ of 'T' measurement can be taken over 'T' as in figures 1 to 4.

Condition of Tyres *(continued)*

This tyre has only lateral grooving.

The band of acceptable tread pattern includes the plain portion which existed when the tyre was new. The remaining tread area should contain grooves to a depth of 1mm.

Fig 6



Condition of Tyres *(continued)*

Reasons for Failure

1. A tyre
 - a. with a cut which is deep enough to reach the ply or cords, and is more than 25mm long, or 10% of the section width, whichever is greater.
 - **b. with a lump, bulge or tear caused by separation or partial failure of its structure, including any lifting of the tread rubber.
 - *c. with exposed ply or cord.
 - d. fouling on any part of the vehicle.
 - e. incorrectly seated on its wheel.
 - f. on a twin wheel making wall contact with another tyre.
 - g. where the base of any groove of the original tread pattern is not clearly visible (vehicles with DGWV greater than 3500kg).
 - *h. where the minimum tread depth and tread band requirements shown in the table above are not met.
2. A recut tyre:
 - a. fitted to a vehicle which should not have one.
 - b. on which the wholly or partly recut tread pattern is not to the manufacturer's recut tread pattern.

Sideguards, Rear Under-Run Devices & Bumper Bars

Application

Sideguards

Motor Vehicles first used from 1 April 1984 with a design gross weight exceeding 3,500kg and where the distance between the centres of any two consecutive axles exceeds 3m;

Trailers manufactured from 1 May 1983 with an unladen weight exceeding 1,020kg and where the distance between the centres of any two consecutive axles exceeds 3m; or in the case of a semi-trailer, where the distance between the centre of the kingpin position and the centre of the foremost axle exceeds 4.5m.

Semi-Trailers manufactured before 1 May 1983 which have a design gross weight exceeding 26,000kg and which form part of an articulated vehicle with a design gross train weight exceeding 32,520kg and where the distance between the centre of the kingpin and the centre of the foremost axle exceeds 4.5m. Where more than one kingpin is fitted it is the distance from the rearmost position which is taken into account.

Exempted Vehicles:-

- A vehicle or trailer constructed so that it can be unloaded by part of the vehicle being tipped sideways or rearwards.
- A vehicle or trailer designed solely for use in connection with street cleaning, the collection/disposal of refuse or the contents of gullies/cesspools. (Skip carrying vehicles are classed as refuse vehicles and as such are exempt).
- A trailer specially designed and constructed, and not merely adapted, to carry round timber, beams or girders, being items of exceptional length.
- Tractor units.
- A vehicle or trailer specially designed and constructed, and not merely adapted, to carry other vehicles loaded onto it from the front or rear. (Vehicles with a standard flat body fitted with a "beaver tail" are not exempt).
- A trailer with a load platform which is not more than 750mm from the ground throughout that part of its length under which a sideguard would have to be fitted.
- A semi-trailer incorporating a sliding bogie.
- A rigid motor vehicle or trailer designed for and constructed for the special purpose of carrying long (but not exceptionally long) timbers from an off road location in a forest.

To fulfil this definition the vehicle must meet the following criteria:-

- It must be of skeletal construction.
- It must have a minimum of two upright side supports (sidebolsters) fitted to each side of the vehicle.

Sideguards, Rear Under-Run Devices & Bumper Bars *(continued)*

Application (cont'd)

- It must not be fitted with a load platform, other than chassis rails, cross bearers and the minimum amount of flooring necessary to protect wiring or brake line components.

It is permissible for the vehicle to be fitted with the following:

- Loading equipment i.e. a Hiab crane or similar device.
- Cross bearers that do not have upright side supports.

Note:- This list is not exhaustive but covers the vehicles likely to be encountered within the testing scheme.

Rear Under-Run Devices

Motor Vehicles with a design gross weight exceeding 3,500kg and first used from 1 April 1984; or

Trailers manufactured from 1 May 1983 with an unladen weight exceeding 1,020kg.

Exempted Vehicles:-

- Tractor units.
- A vehicle or trailer fitted at the rear with apparatus specially designed for spreading material on a road.
- A vehicle or trailer so constructed that it can be unloaded by part of the vehicle being tipped rearwards.
- A vehicle or trailer specially designed and constructed, and not merely adapted, to carry other vehicles loaded onto it from the rear. (Vehicles with a standard flat body fitted with a "beaver tail" are not exempt).
- A trailer specially designed and constructed, and not merely adapted, to carry round timber, beams or girders, being items of exceptional length.
- A vehicle or trailer fitted with a tail lift so constructed that a lift platform, with a minimum length of 1m, forms part of the floor of the vehicle.
- A vehicle specially designed, and not merely adapted, for the carriage and mixing of concrete.

Note:- This list is not exhaustive but covers the vehicles likely to be encountered within the testing scheme.

Bumper Bars

This inspection applies to all vehicles and trailers.



Sideguards, Rear Under-Run Devices & Bumper Bars *(continued)*

Procedure and Standards

Sideguards

Check each sideguard and its fixing brackets for:-

- a. security.
- b. cracks, fractures, corrosion or damage that reduces its effectiveness.
- c. exposed surfaces which are not smooth (e.g. projecting brackets, jagged edges, bolt heads that are not dome shaped).
- d. external edges that are not radiused.

Check visually the:-

- e. dimensions of the guard.
- f. overall dimensions in relation to the vehicle.
- g. continuity along the vehicle length.
- h. guard increasing the overall width of the vehicle.
- j. height from the ground to the lowest edge of the guard which must be a maximum of 550mm (vehicle unladen or semi-trailer, unladen and with load platform horizontal).

Notes:-

Trailers manufactured before 1 May 1983 will not be failed if sideguards are not fitted, but the driver/operator notified that they may be required under certain circumstances.

Sideguards fitted to vehicles/trailers that do not require them will only be checked for items (a), (c) and (h) above.

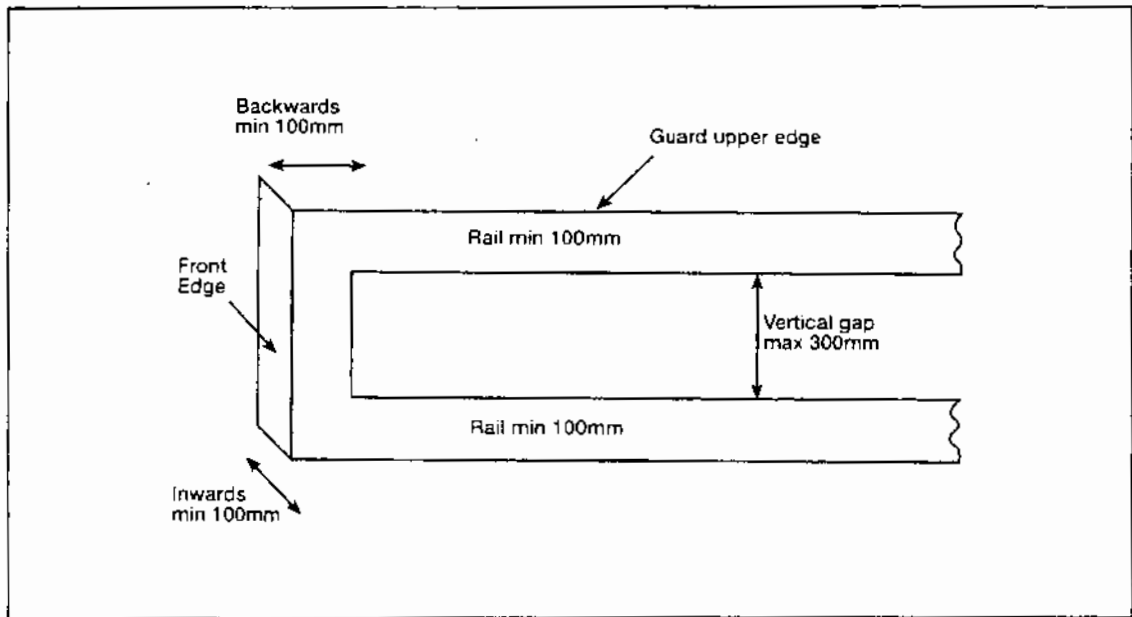
Sideguards, Rear Under-Run Devices & Bumper Bars *(continued)*

Procedure and Standards (cont'd)

Further Information Construction

- The guard should be as continuous as possible and the outermost surface smooth, essentially rigid and either flat or horizontally corrugated, but can be split into rails. Rails must be flat faced on the outside, at least 100mm wide and the distance between them not more than 300mm. Parts of the guard may be detachable for access, but must be securely fixed when the vehicle is in use.
- The front edge of the guard must have a continuous surface extending back for 100mm and turning inwards for 100mm. The upper edge must extend downwards at least 100mm and the lower edge extend upwards at least 100mm.
- On occasions a single rail may fulfil this requirement and it will be sufficient that the forward face only covers the depth of the rail.

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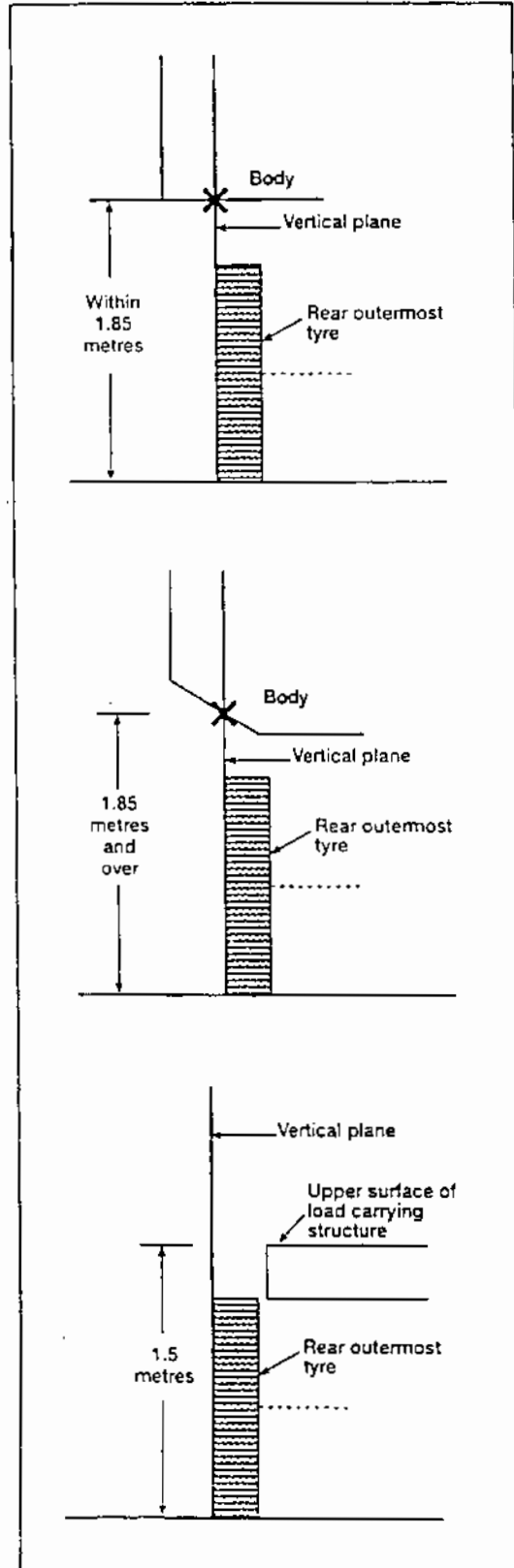


Minimum Height to Top Edge

To determine the height to the top edge it is necessary to imagine a vertical plane parallel to the vehicle centre line and just touching the outer edge of the outermost rear tyre (neglecting the bulge). The line where the vertical plane cuts the structure of the vehicle is taken as the datum and may not be straight, but will move up and down as the plane cuts through transverse floor members etc.

Sideguards, Rear Under-Run Devices & Bumper Bars *(continued)*

Procedure and Standards (cont'd)



If the point where the vehicle structure is cut by the vertical plane is 1.85m or less from the ground (fig.a) then the upper edge of the guard must not be more than 350mm below that point. If fitted with a side rave over the whole length of the sideguard area and the lower edge of the rave is not more than 150mm below the underside of the floor, then the upper edge of the guard must not be more than 350mm below the lower edge of the side rave.

In cases where the body is narrow or is shaped such that the vertical plane does not cut the body or cuts it over 1.85m from the ground (fig.b) the upper edge of the guard must not be less than 1.5m from the ground. On narrow bodied tanks the hose rack should be disregarded when considering the vertical plane to the 1.85m height.

Where the structure is not cut within 1.85m from the ground and the upper surface of the load carrying structure is less than 1.5m from the ground (fig.c), the upper edge of the guard must not be less than the height of that surface.

Sideguards, Rear Under-Run Devices & Bumper Bars *(continued)*

Procedure and Standards (cont'd)

In the case of vehicles designed for the carriage and mixing of concrete the upper edge must not be less than 1.0m from the ground.

Distance of Guard from Front Wheels (or landing legs) and Rear Wheels

Motor Vehicles

- The front edge of the guard must not be more than 300mm from the tyre on the front wheel (or second wheel if two front axles) and the guard must extend to within 300mm of the tyre on the first rear axle.

Draw-Bar Trailer

- The front edge of the guard must not be more than 500mm from the tyre on the front wheel and the guard must extend to within 300mm of the tyre on the rear wheel.

Semi-Trailer

- The front edge of the guard can be up to 250mm behind the centre line of the landing legs, but never more than 3m behind the centre of the king pin (in its rearmost position) and the guard must extend to within 300mm of the tyre on the first rear axle.

Lateral Projection

The guard must not project beyond the outside edge of the vehicle and it must not be more than 30mm inside the outer edges of the outermost rear tyre.

Components in the Sideguard Area

In general the regulations do not allow for the sideguard run to be broken if components such as fuel tanks and air reservoirs intrude. The components should be sited such that they do not interfere with the sideguard run. However, components may be incorporated if, by virtue of their shape and characteristics, they conform in all respects to the sideguard requirements. Where the guard is not continuous from front to rear; adjacent parts can overlap provided that the overlapping edge faces rearwards or downwards; or a gap of not more than 25mm measured longitudinally may be left, provided that the rearward part does not protrude outboard of the forward part.

If the sides of the vehicle are so designed and/or equipped that by virtue of their shape and characteristics the component parts together meet the requirements, they may be regarded as replacing the sideguards.

Chassis Mounted Cranes

Where cranes are fitted across the chassis the extendible legs are normally stowed and operate through the sideguard run.

The sideguard rail or rails are required to come within a distance of 25mm of the leg at each side, thus allowing working room.

Sideguards, Rear Under-Run Devices & Bumper Bars *(continued)*

Procedure and Standards (cont'd)

In the case of a front mounted crane however, it is often the case that due to the small distance involved the rails have not been continued forward of the leg to the rear of the mudwing. If this gap exceeds 300mm then a guard must be fitted in this area.

Sideguard Material

There is no legislation regarding the materials used for sideguards although there are regulations covering strength and deflection of these components. None of these however are subject to test.

Protrusions

Protrusions such as rivet or bolt heads are acceptable provided that they do not exceed 10mm and are suitably domed.

External corners and edges must be rounded.

Orange reflective strips are acceptable if fitted to sideguards provided that the front edge is rounded and it does not protrude more than 10mm.

Short Bodied Vehicles

Vehicles which have shortened bodies e.g. to facilitate the fitting of plant equipment usually have a large gap between the back of the cab and the body. There may therefore be a considerable length of sideguard area not covered by the body. In these cases the height of the guard covered by the body is the normal 350mm max below the structure, but the height of the guard in the area not covered by the body must be no lower than the body floor and may require more than 1 rail.

Type Approved Sideguards

If the presenter claims that the vehicle or trailer is fitted with type approved sideguards (this will most often be on an imported trailer) which comply with the requirements of the EC directive he should be asked to provide documentary evidence. The main dimensions which must be complied with are that the bottom rail must be a maximum distance of 550mm from the ground and the top rail must be 950mm from the ground. There is no requirement for a third rail on narrow bodied tankers.

Tankers

It is recognised that there are practical problems in the fitting of sideguards to some tankers and there can be differing views over what constitutes "so far as is practicable".

A. Tankers which Convey Dangerous Substances

- Vehicle Safety Division, the Society of Motor Manufacturers and Traders and the British Tank Manufacturers Technical Committee agreed on the design layout specification for sideguards on these vehicles. This agreement is summarised in the drawings that follow. In all other respects the guards must conform to the regulations.

Sideguards, Rear Under-Run Devices & Bumper Bars *(continued)*

Procedure and Standards (cont'd)

- B. Skeletal Trailers Carrying Frameless Tanks
(i.e. a tank or container which does not have a lower side rail or rave).
- Sideguards fitted to skeletal trailers carrying frameless tanks must incorporate a top rail, the upper edge of which should be at least 1.5m from the ground or to the height of the trailers upper tank carrying surface (e.g. twist locks) if this is less than 1.5m.
- C. Milk Tankers with External Cylindrical Tubes for Stowage of Hoses.
- An external cylindrical tube permanently fitted longitudinally to the side of a vehicle and intended for the stowage of a hose, can for the purpose of the sideguard positional requirements be considered part of the body.
 - This only applies to that side of the vehicle fitted with the cylindrical tube and where the tube completely extends over the length of the vehicle required to be fitted with sideguards. Any other type of hose support, e.g. rack or tray, should not be considered part of the bodywork.
- D. Hose Racks
- With the exception stated at "C" above, a hose rack fitted to a vehicle or trailer should be disregarded when making an assessment as to whether the body cuts the vertical plane as in the section dealing with Maximum Height to Top Edge.
 - It is however permissible for the hose rack to be taken as part of the sideguard if it meets the dimensional requirements.

Rear Under-Run Devices

Check the rear under-run device for:-

- a. insecurity.
- b. cracks or fractures.
- c. corrosion or damage likely to reduce its performance.
- d. jagged edges.

Check visually that the:-

- e. ground clearance is not more than 550mm (unladen).
- f. device does not extend beyond the outer edge of the outermost rear tyre. (see note).
- g. outer end of the device is not more than 100mm inboard of the outer edge of the outermost rear tyre (or more than 300mm inboard where a demountable body is fitted).
- h. device does not extend beyond the outermost width of the vehicle if it is fitted with a tail lift.



Sideguards, Rear Under-Run Devices & Bumper Bars *(continued)*

Procedure and Standards (cont'd)

Note:- Vehicles with tail lifts may be fitted with a guard up to 300mm wider than the outer edge of the outermost rear tyre provided it is no wider than the outermost edge of the vehicle.

Vehicles with bodies that satisfy the dimensional requirements for under-run devices are considered acceptable.

It is acceptable for a rigid vehicle to be presented for test without a rear under-run device fitted if it is towing a trailer but the device must be readily available for use when not towing.

Bumper Bars

Bumper bars and their mountings should be checked for:-

- a. security.
- b. jagged or projecting edges likely to cause injury.

Note:- Vehicles are not required to have separate bumper bars and these may be incorporated with the body in some cases.

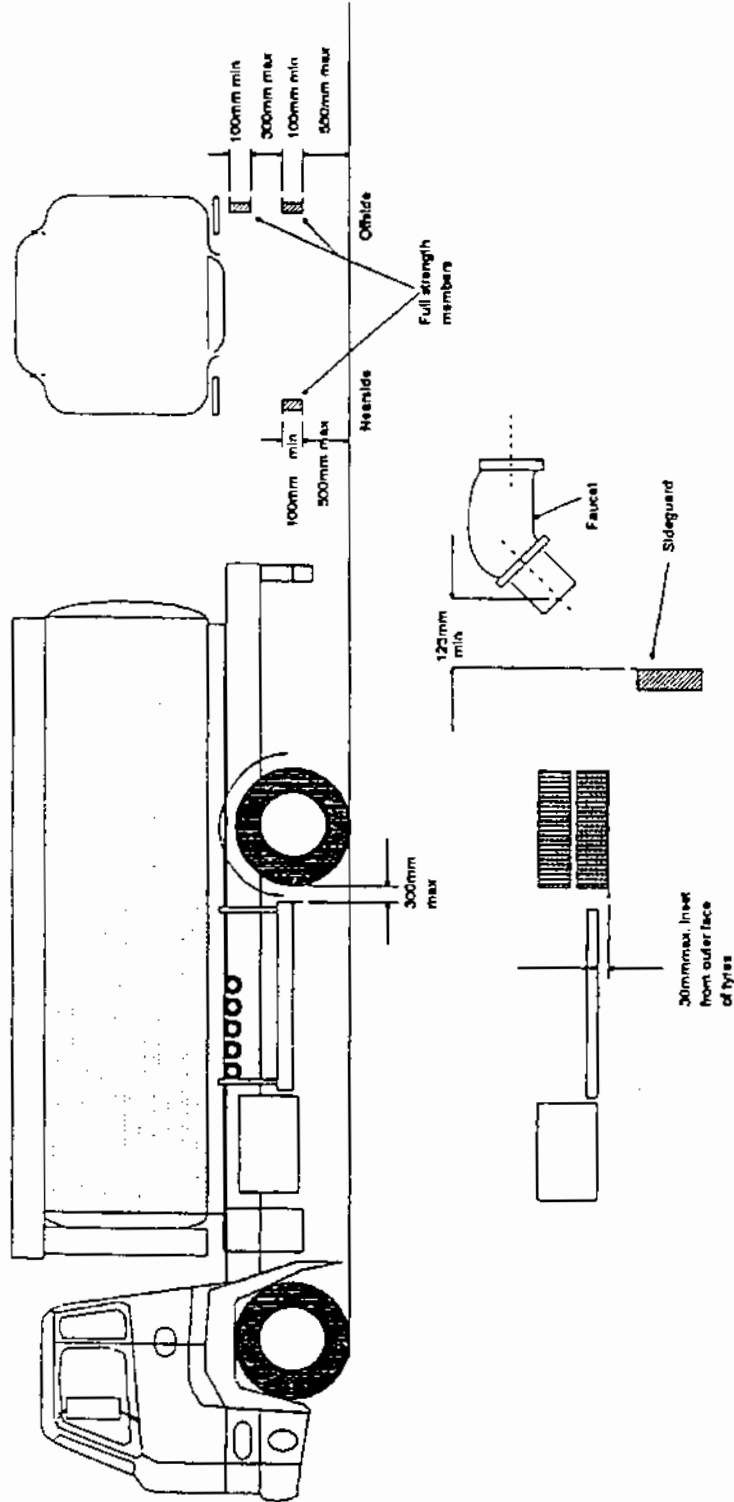
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Sideguards, Rear Under-Run Devices & Bumper Bars *(continued)*

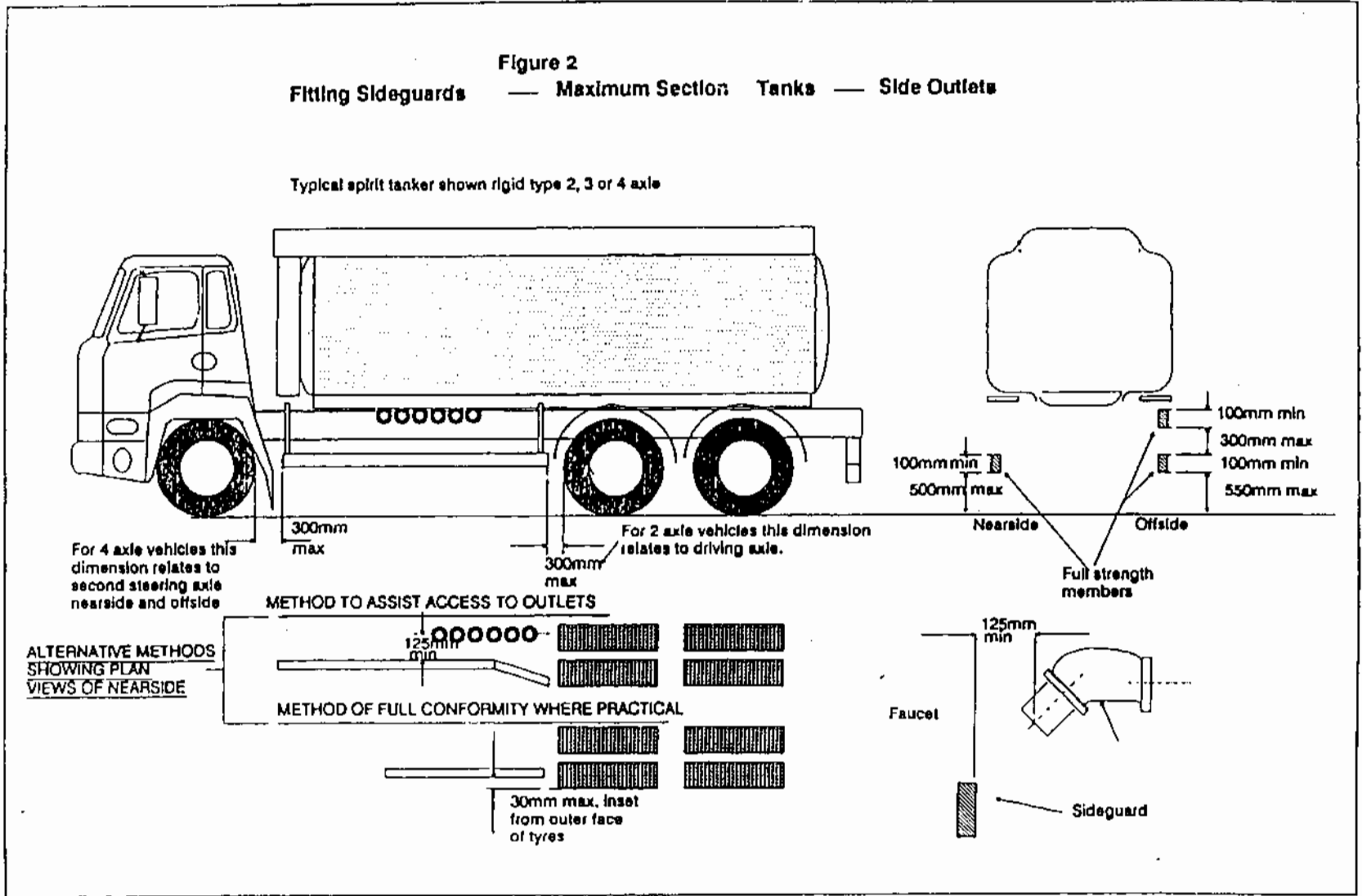
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Figure 1

Fitting Sideguards to N/S when Battery Box and Meter Equipment Fitted.



Sideguards, Rear Under-Run Devices & Bumper Bars (continued)



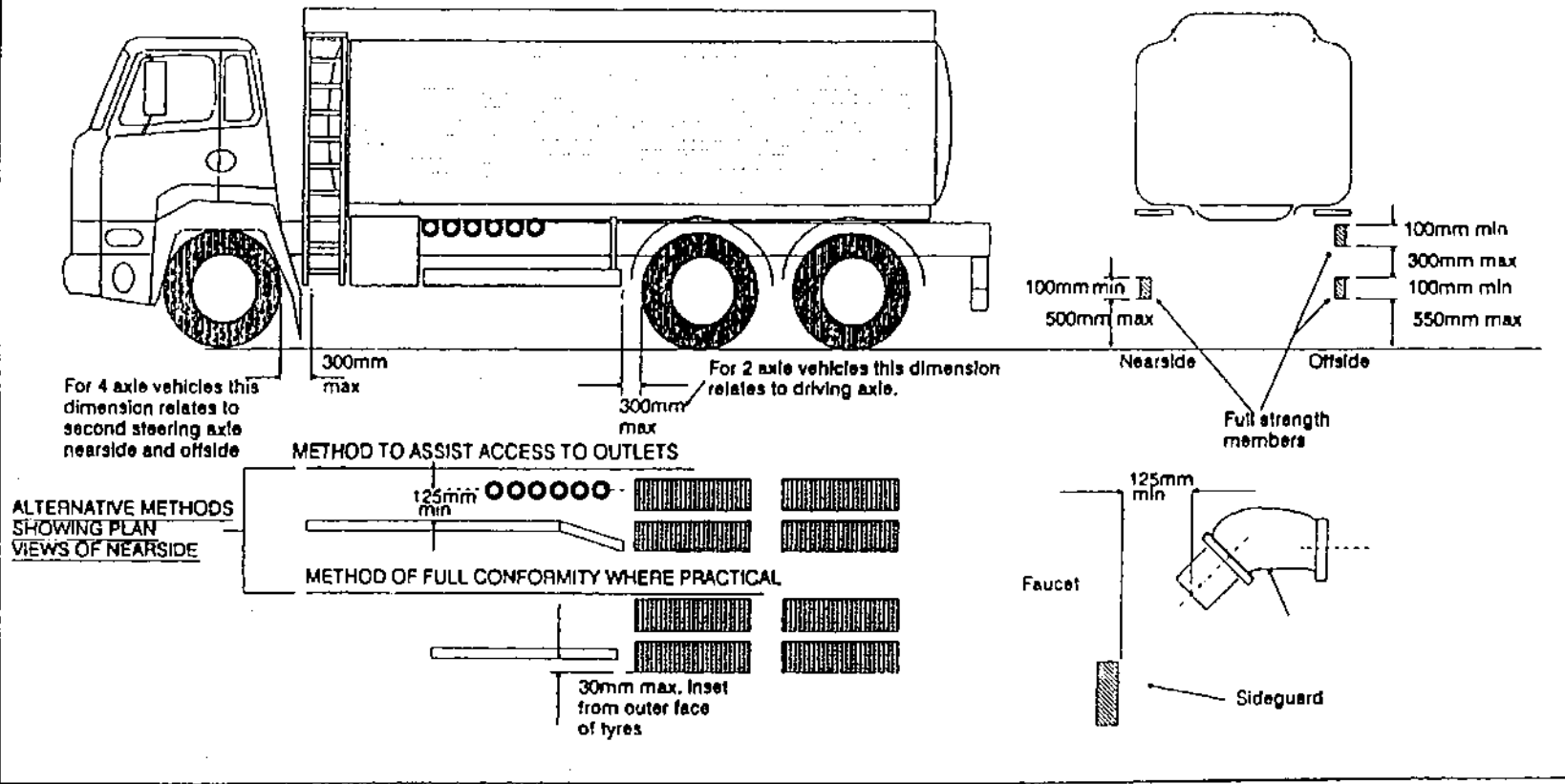
Sideguards, Rear Under-Run Devices & Bumper Bars (continued)

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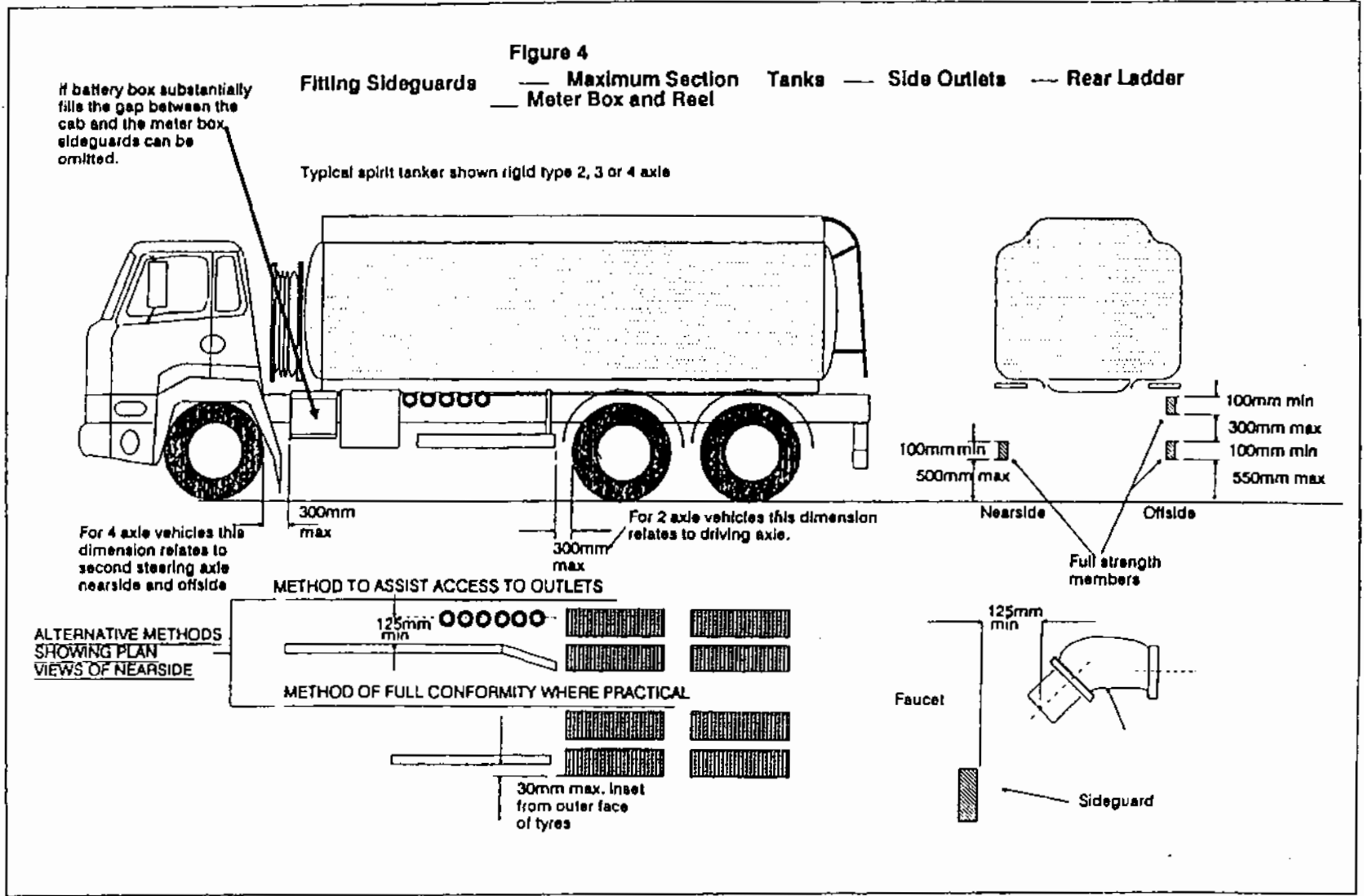
Figure 3

Fitting Sideguards — Maximum Section Tanks — Side Outlets — Side Ladder
— Meter Box and Reel

Typical split tanker shown rigid type 2, 3 or 4 axle

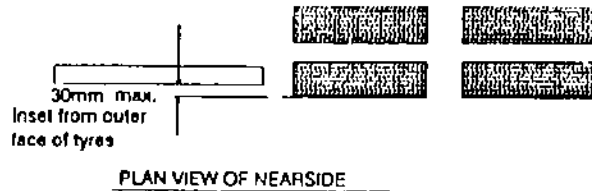
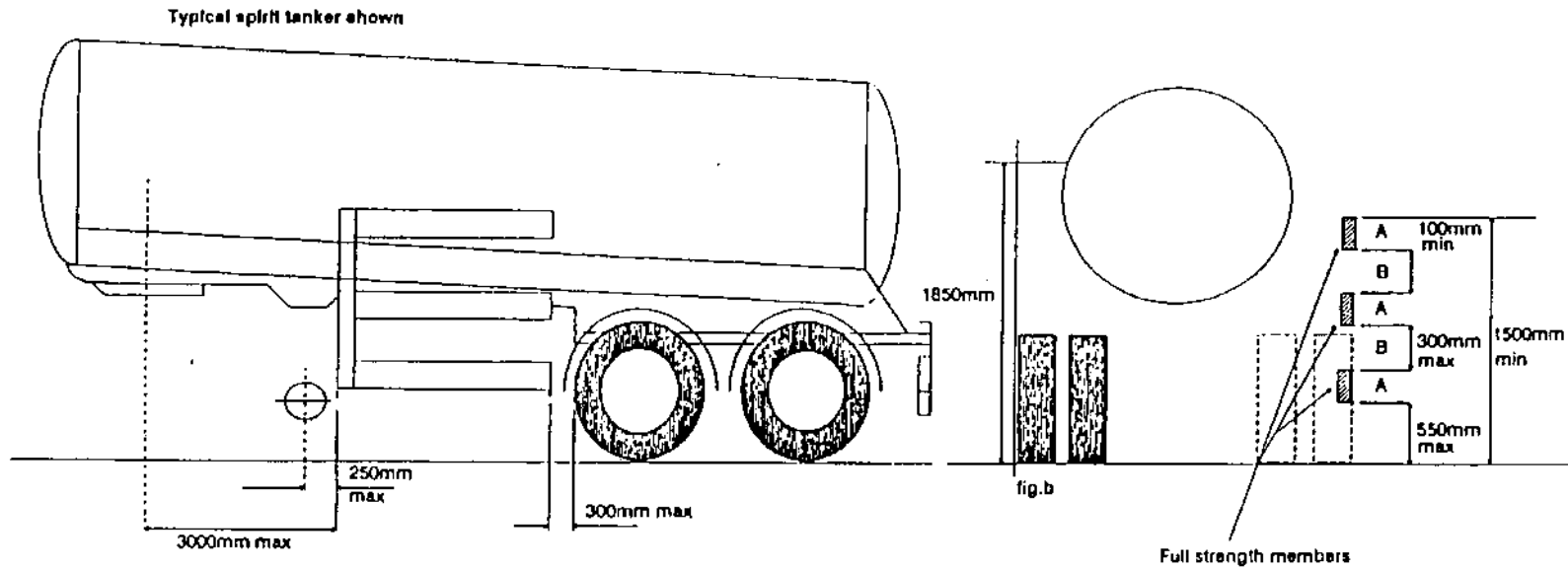


Sideguards, Rear Under-Run Devices & Bumper Bars (continued)



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Figure 5
Fitting Sideguards — Narrow Section Tanks — Semi-trailer

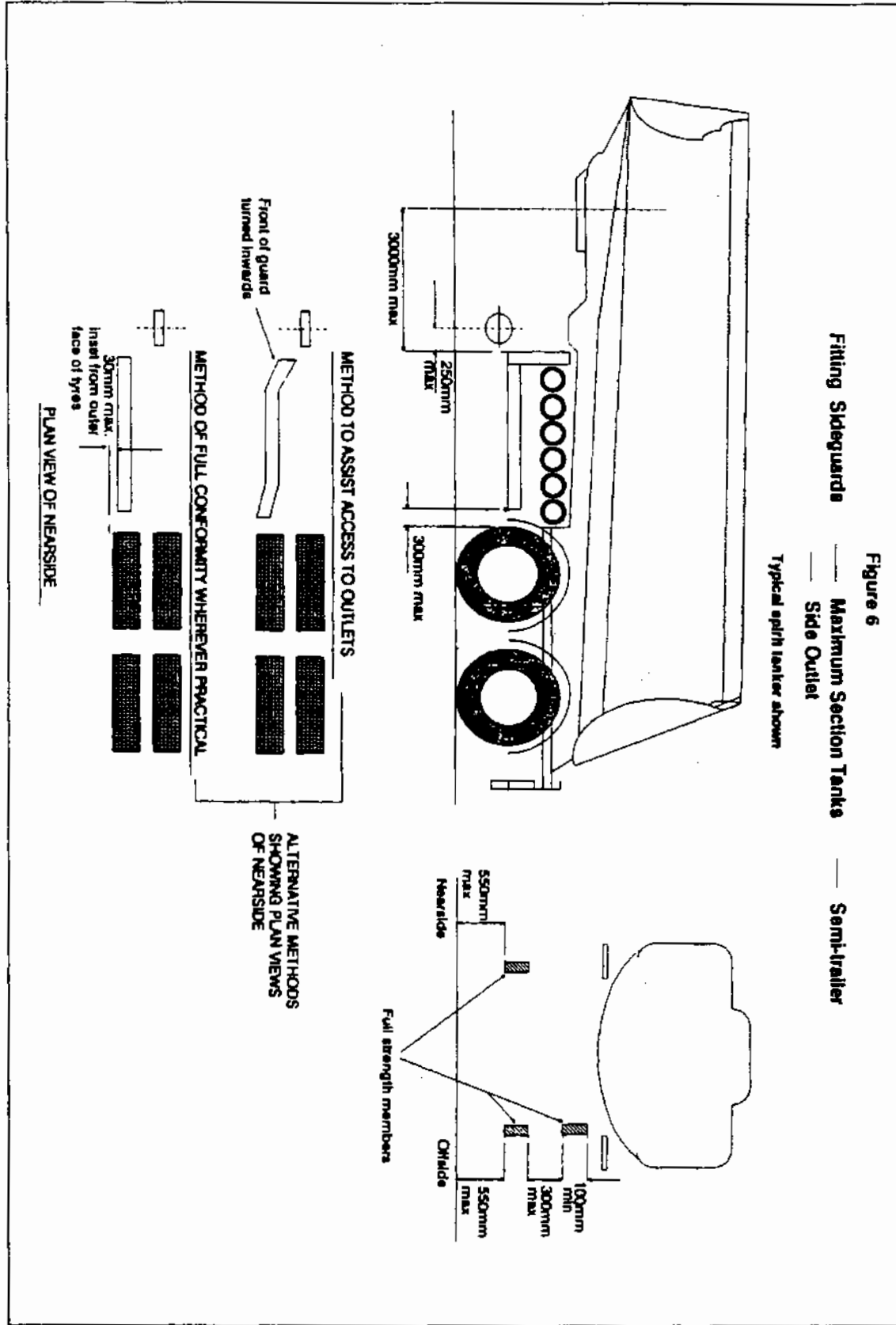


In cases where the body is narrow or is shaped such that the vertical plane does not cut the body or cuts it over 1.85 metres from the ground (fig.b) the upper edge of the guard must not be less than 1.5 metres from the ground.

Refer to O.M. 1.6.9 Item 3

Sideguards, Rear Under-Run Devices & Bumper Bars (continued)

Sideguards, Rear Under-Run Devices & Bumper Bars *(continued)*



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Sideguards, Rear Under-Run Devices & Bumper Bars *(continued)*

Reasons for Failure

Sideguards

1. Sideguards not fitted to a vehicle required to have them fitted.
2. A sideguard or bracket:
 - a. insecure.
 - b. cracked, fractured, corroded or damaged so that its effectiveness is reduced.
 - c. with exposed surfaces which are not smooth (eg. projecting brackets, jagged edges, bolt heads that are not dome shaped).
 - d. with external edges that are not radiused.
 - e. with incorrect dimensions.
 - f. that is not continuous along the vehicle length in other than accepted circumstances.
 - g. that increases the overall width of the vehicle.
 - h. with more than 550mm height from the ground to the lowest edge of the guard. (vehicle unladen or semi-trailer load platform horizontal).

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Rear Under-Run Devices

3. A device not fitted to a vehicle required to have one fitted.
4. A Rear Under-Run device:
 - a. insecure.
 - b. cracked, fractured, corroded or damaged enough to reduce its effectiveness.
 - c. that has a jagged edge.
 - d. with more than 550mm ground clearance. (unladen).
 - e. which extends beyond the outer edge of the outermost rear tyre. (see note in procedures).
 - f. with the outer end of the device more than 100mm inboard of the outer edge of the outermost rear tyre. (or more than 300mm inboard where a demountable body is fitted).
 - g. extends beyond the outermost width of the vehicle which is fitted with a tail lift.
 - h. incomplete.

Bumper Bars

5. A bumper bar or bracket which is:
 - a. insecure.
 - b. has a jagged or projecting edge likely to cause injury.

Spare Wheel & Carrier

Application

This inspection applies to all vehicles and trailers fitted with a spare wheel or carrier.

Procedure and Standards

Check the carrier and spare wheel for security.

Reasons for Failure

1. a. A spare wheel or carrier so insecure, damaged or positioned so that either is likely to fall from the vehicle.

Vehicle to Trailer Coupling

Application

This examination applies to all vehicles fitted with a trailer coupling [at the front or at the rear] and to all trailers. This inspection also covers fifth wheel couplings mounted on converter dollies.

Procedure and Standards

- If the vehicle has a coupled trailer it must not be uncoupled.
- To check for relative movement between the tractor and trailer apply the trailer brakes and ask the driver to lightly shunt the tractor back and forth.
- Check the trailer coupling on the drawing vehicle and the trailer for;
 - Distortion, cracking and excessive wear in components.

NOTE: When assessing wear/lift between bracket/bush or pin/bush consideration should be given to those bushes which have been designed to provide a cushioning effect in order to relieve shock loadings. The load when the bush is fully compressed is taken from the main plate directly onto the mounting bracket and therefore some degree of controlled lift, up to 8mm in some units is acceptable in the trunnion pin and bush. (Up to 12mm lateral movement is acceptable in some cases in fifth wheel couplings, lateral movement of draw-bar turntable top plate movement relative to the lower plate should not exceed 10mm).

Wear should be considered excessive if a drawing hitch, bar, hook, eye, ball or ball socket has the metal reduced to 3/4 of its original thickness.

If the inspection of the fifth wheel jaws is carried out without a trailer attached, then wear on the jaws in excess of 6mm would be considered a Reason for Failure.

- Security including bed plates and sub-frames on fifth wheel couplings, check also the coupling is secure to the trailer. (note; many manufacturers determine gross train weights by the number and size of bolts fitted to fifth wheel bed plates and sub-frames, these bolts are therefore considered to be mandatory.) Details of the required number of bolts are shown on the 5th wheel subframe microfiche and further information can be provided, if necessary by the Vehicle & Operator Services Agency's Technical Service Branch, Welcombe House, 91-2 the Strand, Swansea, SA 1 2DH.
- Presence of and operation of locking and or safety devices.

Vehicle to Trailer Coupling *(continued)*

Reasons for Failure

1. A drawing hitch, bar, hook, eye, bailor ball socket; or a fifth wheel king pin and its mounting or a turntable which:
 - a. is excessively worn.
 - b. is seriously deformed impairing its effectiveness and or weakens the component.
 - *c. is cracked.
 - d. is insecure.
 - *e. has excessive movement between the tractor and trailer.
 - f. has a missing, damaged and or inadequate safety or locking device.
2. A Fifth Wheel Coupling with:
 - a. insecurity between the fifth wheel and its mounting sub-frame and or chassis.
 - b. a mandatory bolt loose or missing.
 - c. jaws so worn or out of adjustment that the trailer kingpin might not be securely held.
 - d. a safety locking device is inoperative.
 - e. an articulating bracket or pivot excessively worn or insecure.
 - f. any crack in a load bearing member.
 - g. an operating member insecure or worn to such an extent the coupling is unsafe.

Trailer Parking and Emergency Brakes and Air Line Connections

Application

Parking and Emergency Brakes

- This inspection applies to all trailers.

Air Line Connections

- This inspection applies to **all trailers of whatever age and to drawing vehicles first used from 1 April 1989.**

Procedure and Standards

Parking Brake

- Check that the brake
 - Operates on at least two road wheels, and
 - can be securely set.
- Check the mechanism for security, cracks, excessive wear and/or corrosion.
- With the brake fully applied, check that the mechanism is not at the end of its working travel and there is no fouling of adjacent parts.

Emergency Brake and Air Line Connections

- Ensure that the air reservoirs on the drawing vehicle are fully charged.
- With the vehicle parking brake on and the trailer parking brake **off**, ask the driver to disconnect the service (yellow) and emergency (red) brake lines.
- Check that the trailer brakes are automatically applied when the emergency line is disconnected.
- Check, on vehicles and trailers fitted with "C" type couplings, that the coupling in the service (yellow) line - either fitted to the trailer or in the line itself - is fitted with an operating adaptor which can open the self sealing coupling in the connector from the drawing vehicle.
- Check that the operating adaptor lifts the indicator on the test coupling by the correct amount. The waisted portion of the indicator (coloured green) must be exposed, but no more than this.
- Check that any brake line on the drawing vehicle is not fitted with a manual shut-off tap.

The driver must be instructed to reconnect all couplings before the vehicle is moved



Trailer Parking and Emergency Brakes and Air Line Connections *(continued)*

Reasons for Failure

1. Trailer parking brake:
 - **a. does not operate on at least two wheels.
 - **b. cannot be securely set.
 - c. mechanism insecure, cracked, excessively worn and or badly corroded.
 - d. when fully applied the mechanism is at the end of its working travel or it is fouling adjacent parts of the vehicle.
2. Trailer emergency brake:
 - **a. not applied automatically when the emergency (red) brake line is disconnected.
3. Operating adaptor, to open self sealing coupling:
 - a. not fitted in service (yellow) line.
 - *b. produces incorrect amount of lift.
- **4. An airline fitted with a manual shut off tap.

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Trailer Landing Legs

Application

This inspection applies to all trailers fitted with landing legs.

Procedure and Standards

- Check for security.

Note: If any leg or part of a leg is missing it is not a Reason for Failure.

Reasons for Failure

1. a. A landing leg or any component part so insecure that it is likely to fall from the vehicle.

Spray Suppression, Wings and Wheel Arches

Application

Wings and Wheel Arches.

This inspection applies to all vehicles and trailers.

Spray Suppression

This inspection applies to those vehicles shown below unless listed as exempt.

Motor Vehicles

- a. exceeding 12 tonnes design GVW, and
- b. first used from 1 April 1986.

Trailers

- a. exceeding 3.5 tonnes design GVW and manufactured from 1 May 1985.
- b. exceeding 16 tonnes design GVW with 2 or more axles, whenever manufactured.

Exempted Vehicles:-

- Motor vehicle where the driving power of its engine is, or can by use of its controls be, transmitted to all the wheels on at least one front axle and on at least one rear axle;
- Vehicles with a high ground clearance (400mm minimum).
- A vehicle specially designed and not merely adapted for the carriage and mixing of concrete.
- A vehicle or trailer constructed so that it can be unloaded by part of the vehicle being tipped sideways or rearwards.
- A vehicle or trailer designed solely for use in connection with street cleaning, the collection/disposal of refuse or the contents of gullies/cesspools. (Skip carrying vehicles are classed as refuse vehicles and as such are exempt).
- A trailer specially designed and constructed, not merely adapted, to carry round timber, beams or girders being items of exceptional length.
- A rigid motor vehicle or trailer designed for and constructed for the special purpose of carrying long (but not exceptionally long) timbers from an off road location in a forest.

To fulfil this definition the vehicle must meet the following criteria:

It must be of skeletal construction.

Spray Suppression, Wings and Wheel Arches *(continued)*

Application (cont'd)

It must have a minimum of two upright side supports (side bolsters) fitted to each side of the vehicle.

It must not be fitted with a load platform, other than chassis rails, cross bearers and the minimum amount of flooring necessary to protect wiring or brake line components.

It is permissible for the vehicle to be fitted with the following:

- Loading equipment i.e. a Hiab crane or similar device.
- Cross bearers that do not have upright side supports.

Tractor units towing timber carrying trailers must comply with the spray suppression requirements.

Note: Tractor units drawing exempt trailers are not themselves exempt.

This list is not exhaustive but covers the vehicles likely to be encountered within the testing scheme.

Procedure and Standards

Wings and Wheel Arches

Roadwheels must have associated with them equipment or part of the body which, as far as is practicable, catches mud or water thrown up by the wheels as they rotate. Check that the wing covers the whole width of the tyre especially where wide "Super Single" tyres are fitted to the front axle.

Notes:-

Tractor Units and Skeletal Vehicles/Trailers.

With regard to the requirements for wings and wheel arches, a vehicle may be passed without wings if it is known that in normal use a semi-trailer/body/ container is carried which fulfils the requirements of a wing. It is important to note however that this does not apply to spray suppression and therefore vehicles subject to the spray suppression requirements must have complete wings.

Mudflaps

If a mudflap is an extension to a wing or similar fitting, a missing or damaged mud flap is **not** a Reason for Failure, unless the vehicle is required to have one to comply with spray suppression requirements.

Where a mudflap is fitted in place of a wing, ie it serves the purpose of a wing (as on some semi-trailers) it must be treated as a wing and be securely fixed to prevent excessive movement.

Spray Suppression

The test includes only a basic visual check for general compliance and it will normally not be necessary to take measurements. A simple gauge has been issued to assist staff in cases of doubt on certain key dimensions.

Spray Suppression, Wings and Wheel Arches *(continued)*

Procedure and Standards (cont'd)

Notes:-

Tractor units and Skeletal Vehicles/ Trailers

- They must be fitted with complete wings to fulfil the spray suppression requirements.

Lifting axles

- Are not exempt from the requirements and are therefore treated as a normal axle.

Vehicles/Trailers with Demountable Bodies

- These are **not** exempt from the requirements. In some cases it will therefore be necessary for the body to be in place since the mudwing or valance is often attached.
- Some **demountable bodies** can be unloaded by tipping, using a conventional ram attached to the vehicle. These are classed as tippers and are therefore exempt from the spray suppression requirements.

The **width** of the flap should cover the full breadth of the tyre(s).

The 200mm rearmost flap height can be increased to 300mm for trailers claimed to be used on **Ro-Ro ferry operations**.

The 200mm flap height can be increased to 300mm for any axle where the radial dimension to the lower edge of the valancing, or wheel guard, is not greater than the radius of the tyre.

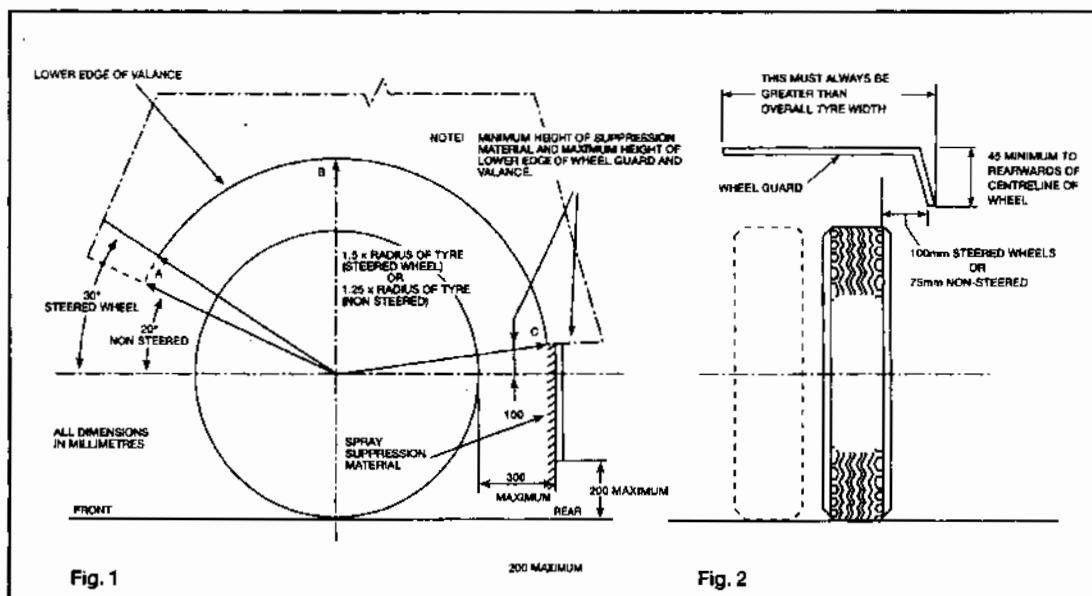
Spray Suppression, Wings and Wheel Arches *(continued)*

Procedure and Standards (cont'd)

Conventional Mudwing Types of Wheel Guards

Single Axle Arrangements or Multi-axle arrangements where distance between wheels is greater than 300mm.

The lower edge of the outer valance shall not exceed 1.5 x tyre radius on steerable wheels or 1.25 x tyre radius on non-steerable wheels at points A, B and C.



Wheel Flaps

Wheel flaps must be fitted behind each wheel and should cover the full breadth of the tyre(s) and be mounted to the wing without gaps that would permit the exit of spray.

Suppression material must be fitted to:-

- The forward face of the flap and
- to the forward face of that part of the wing (guard) if it reaches below a line 100mm above a line projected from the wheel centre line.

Wheel Guards

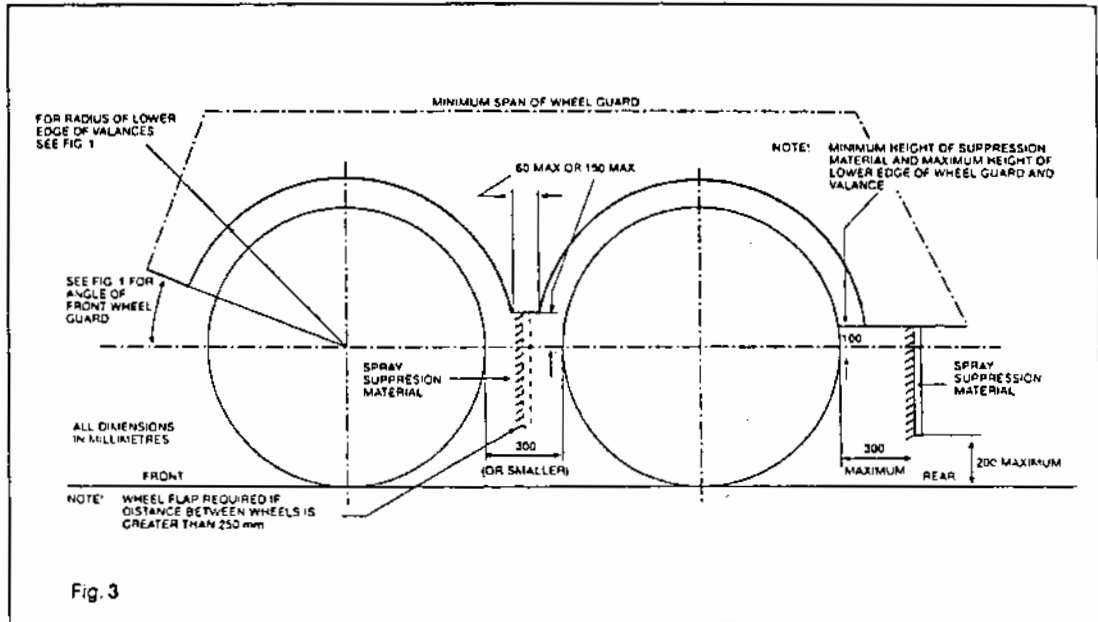
Where the wheel guard consists of several components there should be no gaps between or within individual parts when assembled that will permit the exit of spray when the vehicle is in motion.

Spray Suppression, Wings and Wheel Arches *(continued)*

Procedure and Standards (cont'd)

Conventional Mudwing Types of Wheel Guards

Multi-axle arrangements where distance between wheels is 300mm or less.



The lower edge of the outer valance shall not exceed 1.5 x tyre radius on steerable wheels or 1.25 x tyre radius on non-steerable wheels at points A, B and C as in the single axle diagram.

Wheel Flaps

Wheel flaps should cover the full breadth of the tyre(s) and be mounted to the wing without gaps that would permit the exit of spray.

Wheel flaps are required behind each wheel where the distance between tyres on a group of multiple axles is 250mm or more. Up to 290mm can be accepted where it is clear that the limit of 249mm is exceeded only by tyre wear.

Where the distance between tyres on a group of axles is less than 250mm, wheel flaps are only required on the rearmost axle of each group.

Suppression material must be fitted to:-

- The forward face of the flap and
- To the forward face of that part of the wing (guard) if it reaches below a line 100mm above a line projected from the wheel centre line.

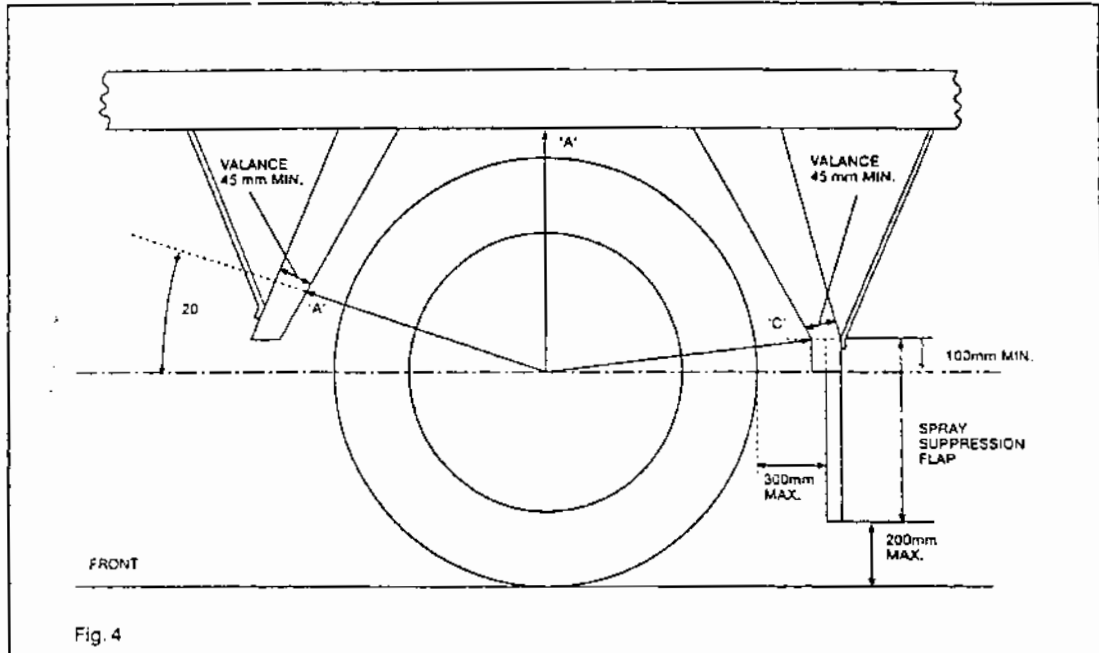
Wheel Guards

Where the wheel guard consists of several components there should be no gaps between or within individual parts when assembled that will permit the exit of spray when the vehicle is in motion.

Spray Suppression, Wings and Wheel Arches *(continued)*

Procedure and Standards (cont'd)

Single or Multi-axle arrangements using Half Wing and Valances.



The lower edge of the outer valance shall not exceed 1.5 x tyre radius on steerable wheels or 1.25 x tyre radius on non-steerable wheels at points A, B and C.

Wheel Flaps

Wheel flaps must be fitted behind each wheel and should cover the full breadth of the tyre(s) and be mounted to the wing without gaps that would permit the exit of spray.

Where the distance between tyres on a group of axles is less than 250mm, wheel flaps are only required on the rearmost axle of each group. Up to 290mm can be accepted if it is clear that the limit of 249mm is exceeded only by tyre wear.

Suppression material must be fitted to:-

- The forward face of the flap and
- to the forward face of that part of the wing (guard) if it reaches below a line 100mm above a line projected from the wheel centre line.

Wheel Guards

Where the wheel guard consists of several components there should be no gaps between or within individual parts when assembled that will permit the exit of spray when the vehicle is in motion.

Note that in the case of steerable wheels the 20 Deg. angle is increased to 30 Deg.

The breadth of the wing valance at points A and C must be at least 45mm as must be the body valance depth at point B.

Spray Suppression, Wings and Wheel Arches (continued)

Procedure and Standards (cont'd)

Flap and Valance Systems for Non-Steerable Axles.

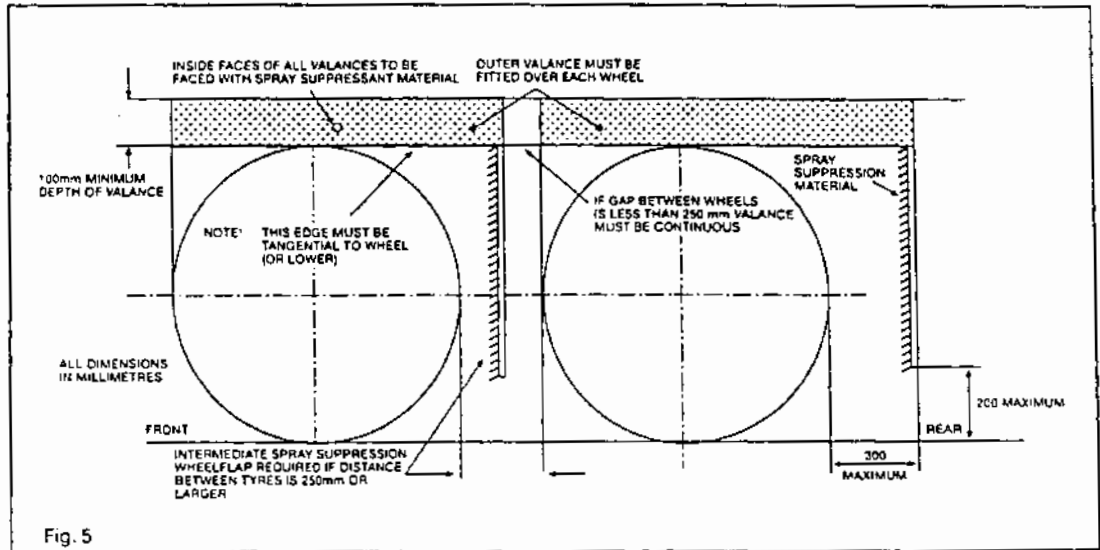


Fig. 5

The valance should cover the area extending from the underside of the body to at least a line formed by the tangent to the top of the tyres and between the outer edge of the wheel flap, with which it should form a seal and the vertical plane formed by the tangent at the front of the tyre. An outer valance must be fitted over each wheel.

The whole inner face of the outer valance, the depth of which should not be less than 100mm, must be fitted with a suppression material.

Wheel Flaps

Wheel flaps should extend to the underside of the vehicle structure. The whole of the forward facing part of the wheel flap should be fitted with a suppression material or device. There should be no gaps that would permit the exit of spray.

Suppression material must be fitted to

- The forward face of the flap and
- to the forward face of that part of the wing (guard) if it reaches below a line 100mm above a line projected from the wheel centre line.

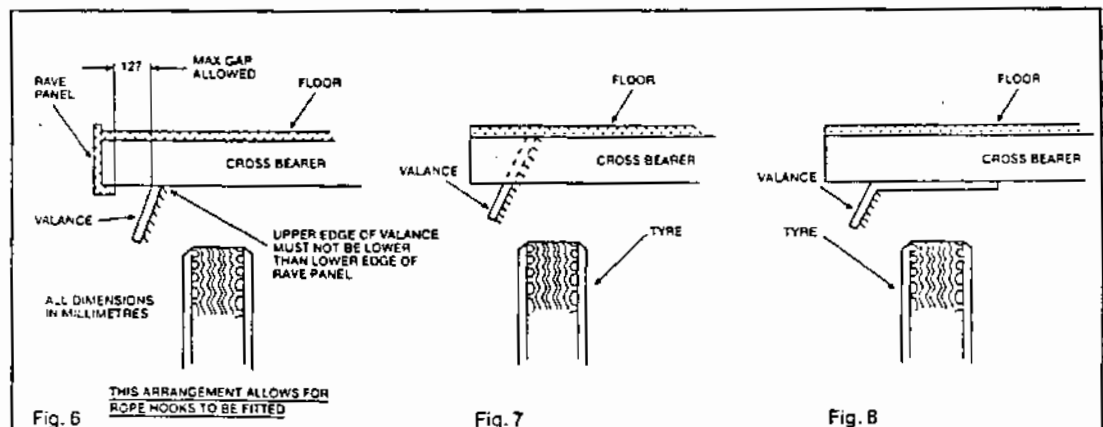


Fig. 6

Fig. 7

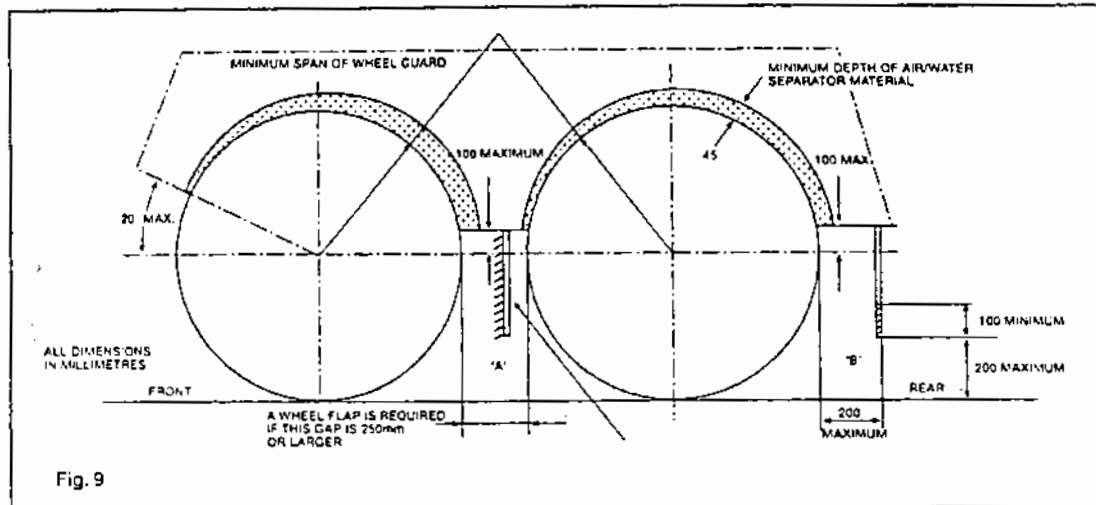
Fig. 8

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Spray Suppression, Wings and Wheel Arches *(continued)*

Procedure and Standards (cont'd)

Spray Suppression Systems with Air/Water Separation Devices on the Lower Edge of Valances ("Cats Whiskers" or "Netlon") Single axle and Multi-axled arrangements.



The Wheel Guards should comply in all respects with the requirements given for the conventional mudwing system.

Valances should have air/water separating material on their lower edges to a depth of not less than 45mm to the rear of the vertical centre line of the wheel. This depth may be progressively reduced forward of the centre line.

There should be no openings in outer valances or between outer valances or wheel guards that would allow spray to be emitted.

For non-steered wheels, the radius of the lower edge of the valance, including the air/water separating device, must not be greater than the radius of the tyre. With steered wheels however the radius of the lower edge can be up to approximately 25mm larger than the radius of the tyre.

Wheel flaps must be either

Fitted with suppression material to

- The forward face of the flap and
- to the forward face of that part of the wing (guard) if it reaches below a line 100mm above a line projected from the wheel centre line (as at "A" in the diagram above).

or

- the lower part should consist of an air/water separator, the length of which shall be at least 100mm. The maximum height of the bottom edge should not exceed 200mm and the maximum distance behind the tyre is reduced to 200mm (as at "B" in the diagram above).

Where the distance between tyres on a group of axles is less than 250mm, wheel flaps are only required on the rearmost axle of each group. Up to 290mm can be accepted if it is clear that the limit of 249mm is exceeded only by tyre wear.

Spray Suppression, Wings and Wheel Arches *(continued)*

Reasons for Failure

Wings and Wheel Arches.

1. A Wing or Wheel Arch:
 - a. missing or so insecure that it can fall off or rub on the tyre, or, in the case of a mud flap fitted as a wing, it is not restrained or constructed to stop wind lift.
 - b. so badly corroded or distorted to stop it acting as an adequate shield.
 - c. that has sharp edges that are likely to cause injury.
 - d. which is rubbing on a tyre.
 - e. which does not cover the whole width of a tyre when the wheel is in the straight ahead position.

Spray Suppression.

2. Spray Suppression:
 - a. not fitted where required.
 - b. incomplete or seriously defective.
 - c. dimensions do not comply with requirements.
 - d. with a wheel flap not restrained or stiff enough to stop excessive movement or wind lift in normal use.
 - e. with more than 25% of the minimum required wheel flap or spray suppression material area clogged with mud or debris.



Cab Security

Application

This inspection applies to all vehicles.

Procedure and Standards

- All means of securing the cab are to be inspected where practical.
- Check for security and condition by pushing and rocking the cab by hand where practical.
- Movement which is designed into mountings should not be confused with excessive wear.
- On tilt cabs examine the retention and/or locking devices for damage or security.
- Visually check wind deflectors and other cab mounted accessories for security.

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Reasons for Failure

1.
 - a. Any insecurity that is likely to affect the drivers control of the vehicle.
 - b. A retention and/or locking device on a tilt cab missing or defective.
 - c. Wear of front hinge pins and /or brackets such that safe control of the vehicle may be impaired.
 - d. Excessive corrosion or damage to a load bearing member which seriously reduces its strength near the cab mountings.
 - e. A wind deflector or other accessory so obviously insecure that it is likely to become detached.



Cab Doors

Application

This inspection applies to all vehicles.

Procedure and Standards

- Open and close each door and check that they will not open inadvertently.

NOTE: Only one operational door is required. On security vehicles this door may be fitted so that it does not open directly into the cab. Other doors which have deliberately been made inoperative should be considered part of the cab and not a door. A door with one handle missing should not be failed, if the door can be opened from inside using the remaining handle.

Reasons for Failure

A Door which:

- a. is missing.
- b. cannot be opened.
- c. is worn or damaged so that it is very difficult to open or close.
- d. will not remain closed or is likely to fly open inadvertently (if a door fitted with a two position catch will only engage in the first or semi-shut position, this will be regarded as a reason for failure).

Cab Floor and Steps

Application

This inspection applies to all vehicles.

Procedure and Standards

Examine the condition and security of the cab floor, steps and internal wheel arches.

Reasons for Failure

1. A cab floor or internal wheel arch which is so badly deteriorated and or insecure that it would impair the drivers control.
2. Any step or step ring so insecure or dangerous that it is likely to cause injury.

Driver's Seat

Application

This inspection applies to all vehicles.

Procedure and Standards

- This inspection relates only to the driver's seat.
- Check for condition and security of seat, seat back, cushion and mechanism.
- A seat adjusting mechanism which has been deliberately made inoperative or has seized is not a Reason for Failure.

Reasons for Failure

1. a. The seat, mounting or adjusting mechanism so insecure or in such a condition that it could cause the driver to lose control of the vehicle.

Security of Body, Containers and Crane Support Legs

Application

Security of Body

This inspection applies to all vehicles and trailers fitted with a body.

Security of Containers

This inspection applies to all vehicles and trailers constructed or adapted to carry removable shipping containers, whether a container is mounted or not. (Note: a dual purpose flatbed trailer from which all twistlocks have been removed is not subject to this inspection)

Security of Crane Support Legs

This inspection applies to all vehicles and trailers fitted with supporting legs for loading cranes.

Procedure and Standards

Security of Body

Check that the body is not displaced relative to the chassis.

Check for security, fracture, distortion, wear, corrosion and presence of:

- all fixings (eg brackets) securing the body to the chassis or to a sub-frame or supporting members
- fastenings e.g. securing bolts, rivets or welds for the fixings.
- structural (stressed) panels

Note: Defective fastenings do not necessarily mean that the body is insecure. The whole structure must be assessed and a failure will only be justified where sufficient bolts, rivets and welds etc are loose or defective to allow the body to move enough to cause a hazard for other road users.

Some designs of body mounting allow a limited amount of flexing between the body and chassis. This must not be confused with insecurity. On body mountings with tie-bars the securing nut on the tie-bar is correctly secured with a relatively low torque setting and this should not be mistaken for looseness.

Coach bolt failure due to corrosion may not be obvious, as the failed section may be in a position where it cannot be seen. Care should be taken to check that there is no sign of an abnormal movement of the structure which would indicate coach bolt failure.

Check the condition of the load bearing body members for corrosion, cracks or damage which could seriously weaken their strength.

Security of Body, Containers and Crane Support Legs *(continued)*

Procedure and Standards (cont'd)

Security of Containers

Check that container fastening devices are:

- present
- secure
- complete
- free to move
- fitted with an effective secondary locking device eg screw, detent or chain and clip.

Note: A secondary locking device is something that stops the primary fastening device coming open accidentally when the vehicle is in motion. To be effective it must give enough resistance to light hand pressure to remain closed.

Check any support bolsters and structures:

- for cracks, corrosion, damage and security such that a container would be unlikely to be supported or secured by it
- are fitted with locking pins or other securing method incorporating an effective secondary locking device. (See note on secondary locking devices above)

Note: Presenters should be asked to set any moveable supports or bolsters to a deployed position wherever possible prior to the commencement of the test to assist inspection. The presenter should reset them after the test within British legal length requirements before leaving the test station.

Security of crane support legs

Check supporting legs for security.

Check supporting leg retaining devices for:

- presence
- security
- condition.

Note: This inspection only applies where retaining devices were originally fitted. A suitable alternative retaining device is acceptable provided the support leg is adequately secured.

Security of Body, Containers and Crane Support Legs *(continued)*

Reasons for Failure

Security of Body

1. Body:
 - a. excessively displaced relative to the chassis
 - b. insecure.
2. A load bearing member:
 - a. so cracked, corroded or damaged that the body is seriously weakened.

Security of containers

3. A container fastening device:
 - a. missing when another of a matched pair is present
 - b. insecure
 - c. incomplete
 - d. seized
 - e. not fitted with an effective secondary locking device
 - f. in such a condition that a container is unlikely to be secured by it.
4. A support bolster or structure:
 - a. insecure, cracked, corroded or damaged such that a container is unlikely to be supported and secured by it
 - b. not fitted with locking pins or other securing method incorporating an effective secondary locking device.

Security of crane support legs

5. A Crane Support Leg
 - a. insecure
 - b. retaining device missing, insecure or in a condition that it would not adequately retain the leg.

Condition of Body

Application

This inspection applies to all vehicles.

Procedure and Standards

Check for defective items which would make the vehicle dangerous to other road users and pedestrians. The cumulative effect of any defects found must be considered or their influence on other items. Superficial damage which does not affect the strength of a component or which does not pose a danger to other road users is not a reason for failure.

Check for leaks from the load carrying compartment.

Check for any insecurity of glass panels or sharp edged glass on vehicles such as mobile shops and ice cream vans.

Reasons for Failure

1. Any headboard, rive, cross or longitudinal member, hinge or retaining device, tipping gear, glass panel or any part of the body designed to carry or contain the load (including the floor and main support pillars):
 - a. insecure.
 - b. fractured or cracked.
 - c. distorted, excessively worn or damaged.

and which in each case would make the vehicle dangerous to other road users.

2. A leak from the load carrying compartment.

Mirrors

Application

This inspection applies to all vehicles and the number and type of mirrors which have to be fitted are shown below.

DATE OF FIRST USE	MIRRORS REQUIRED
Before 1 April 1985	An exterior mirror on the offside and either an interior mirror (unless this would not give a view to the rear) or an exterior mirror on the nearside
From 1 April 1985	A main exterior mirror on both the offside and nearside
<i>The vehicles shown below require additional mirrors</i>	
From 1 October 1988 with DGWV greater than 12 tonnes	A close proximity mirror on the nearside in addition to those shown above
From 1 October 1988 articulated vehicles with DGWV greater than 12 tonnes	A wide angle mirror on the nearside in addition to those shown above

Procedure and Standards

- The vehicle must be checked to see that the correct number and type of mirrors are fitted. They must be checked for condition, security and position.
- Internal mirrors must be checked to see that the edges are surrounded by protective material. This does not apply to vehicles registered before April 1969.
- For the purpose of this inspection on a left hand drive vehicle the nearside is at the right and the offside at the left.
- Close proximity mirrors must be at least 2m from the ground. If a vehicle is fitted with a low mounted cab so that the mirror cannot be fitted at this height it is exempt from the requirement to fit a close proximity mirror.

Reasons for Failure

1. Not fitted with the correct number or type(s) of mirror.
2. Part of a close proximity mirror is fitted less than 2 metres from the ground.
3. A required mirror in such a condition that anyone sitting in the driving seat cannot see clearly towards the rear or nearside.
4. A mirror or its mounting bracket insecure or structurally deteriorated.
5. An internal mirror edge not surrounded by protective material or with damaged protective material.

Glass and View of the Road

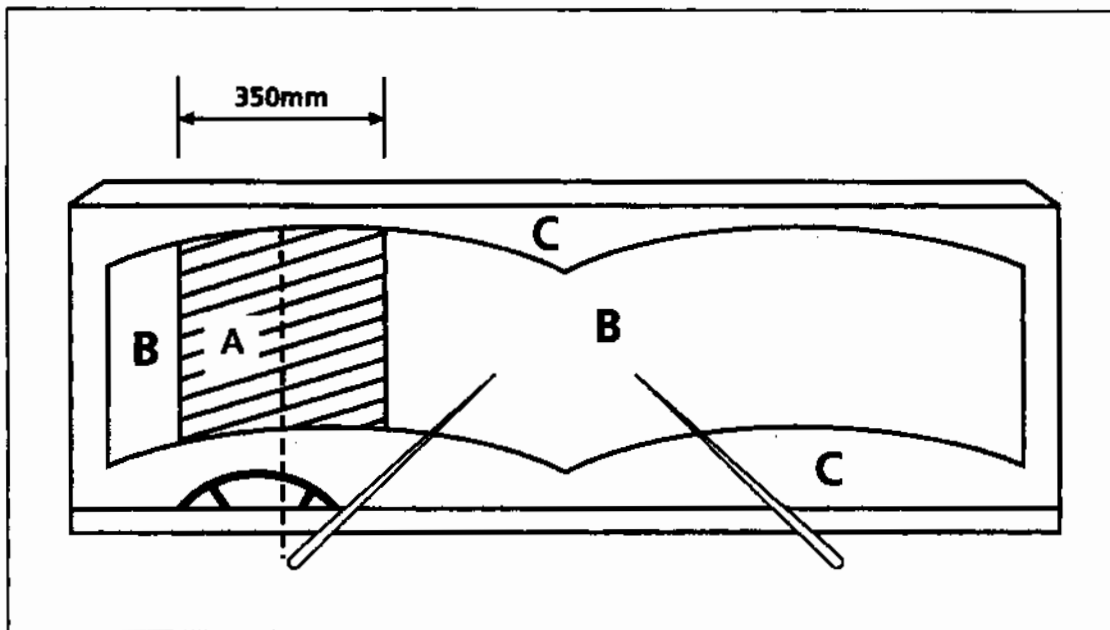
Application

This inspection applies to all vehicles.

Procedure and Standards

Check all glass or other glazing material fitted in the windscreen and any side windows normally used in driving, for cracks, discolouration or surface damage.

When checking the windscreen refer to the diagram below.



Zone "A" is 350mm wide, in the swept area of the screen and centred on the centre of the steering wheel.

Zone "B" is the remainder of the swept area.

Zone "C" is the remainder of the screen not covered by Zones "A" or "B".

Damage or discolouration will be a reason for failure if it impairs the drivers view of the road.

Windscreen.

Examiners should have regard for the three separate "zones" when assessing damage or discolouration. A greater amount of damage or discolouration could be accepted in zone "C" than in zone "B". Likewise a greater amount can be accepted in zone "B" than in zone "A" where relatively minor damage would be a Reason for Failure.

Glass and View of the Road *(continued)*

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Procedure and standards (cont'd)

Side Windows

Damage which prevents the driver from having a proper view through mandatory mirrors will be a Reason for Failure.

When assessing damage, light scratching should not be considered as damage.

Repaired windscreens must be inspected to the same criteria as original unrepaired screens. Repairs must be judged as to whether they interfere with vision.

Check the security of all windscreens and windows. Any crack passing through the swept area and reaching two points at the edge will be deemed to render the screen insecure.

Check the view of the road from the driver's seat. The view must not be obstructed by any changes to the original design such as the addition of stickers, pennants, cab decorations, stone-guards or other items which encroach more than 40mm into the swept area.

Notes:-

Video monitors when fitted to give a view to the rear are acceptable provided they do not obstruct the swept area more than a rear view mirror.

Official stickers are permitted to encroach more than 40mm if this is necessary to comply with other regulations.

Drivers aids such as blinds and their mountings are permitted to encroach into the relevant areas.

On many vehicles the original design will place things like instrument panel clusters inside the 40mm limits. Intrusions such as this which are original design features can be ignored, as can stickers placed inside the 40mm limit but which are hidden by a feature of the original design.

Glass and View of the Road *(continued)*

Reasons for Failure

1. A Windscreen:
 - a. with damage or discolouration which impairs the drivers view of the road.
 - b. with a crack passing through the swept area which renders the screen insecure or which impairs the drivers view.
 - c. with an obstruction which encroaches more than 40mm into the swept area.
 - d. with any crack where there is noticeable displacement of the surfaces on either side which has an adverse effect on the condition and operation of the windscreen wipers.
 - e. with damage which exposes the inner layer of a laminated screen.
2. A windscreen or window:
 - a. so insecure that it is likely to fallout.
 - b. with damage which presents a danger to occupants or to other road users.
3. Damage or obstruction of a side window which impairs the drivers view through a mandatory mirror.

Windscreen Wipers and Washers

Application

This inspection applies to all vehicles except those with an opening windscreen or where an adequate view can be obtained by some other means.

Procedure and Standards

- Check the operation of the washers and wipers.
- Wipers must be able to clear an adequate area of the screen to give the driver a view of the road to the front and in front of both sides of the vehicle.
- Washers must provide enough water to enable the wipers to clear the screen effectively.
- Frozen washers are to be considered ineffective.

Reasons for Failure

1. Switches:
 - a. missing or defective.
2. Wipers:
 - a. do not move over an adequate area.
 - b. do not work continually when switched on.
 - c. a blade missing, insecure or so deteriorated that it cannot clear the screen effectively.
3. Washers:
 - a. ineffective.

Speedometer/Tachograph

Application

This inspection applies to all vehicles.

- A vehicle must have a tachograph fitted unless the presenter claims that it is exempt from the tachograph regulations. Exempt vehicles may have either a tachograph or a speedometer fitted.

Procedure and Standards

All vehicles

A tachograph exemption form must be completed for all vehicles deemed as tachograph exempt, unless the vehicle technical record shows the vehicle is exempt or it is declared on the application form.

Check that a tachograph or speedometer is fitted and is complete.

Check for condition and that it can be illuminated.

Note: If the glass dial is cracked and this does not affect operation this is not a Reason for Failure but the presenter should be advised of the defect.

For vehicles fitted with a tachograph

If the tachograph head cannot be opened or if the calibration plaque does not match the vehicle to which it is fitted it should be treated as if the plaque and any relevant seals were not there

A non matching registration number may refer to a previous registration, the vehicle's technical record should be checked before failing

For vehicles required to be fitted with a tachograph

Check that the tachograph scale is marked in kilometres per hour. There is no requirement for a tachograph to be marked with miles per hour increments.

Note: The tachograph head must only be opened with the steering wheel in the straight ahead position and with the engine switched off.

Check the presence of the tachograph manufacturer's serial number/data plaque. This can be located on the back cover or on the edge of the head. Check for "e" marking.

Check tachograph installation/calibration plaque for presence and condition, and the date of calibration is clearly visible.

Note: Installation/calibration plaques expire after 6 years.

It is acceptable for the plaque to contain additional information (e.g. Registration Number, tyre pressures etc.). The plaque is designed to be tamper proof and should show signs of damage if it has been tampered with. The 2 year check is not part of this inspection. However if the examiner notices this plaque is not displayed the presenter must be advised.

Speedometer/Tachograph *(continued)*

Analogue tachographs

Check the "K factor" plaque for presence and condition and the "K factor" is clearly visible. The electronic check of the indicated K factor is conducted under IM33 but if it differs from the prescribed factor by more than + or – 50 it may be a reason for rejection under this section, unless it complies with a further check contained in IM 33.

Digital tachographs

Check K factor plaque for presence and condition.

Check tachograph DIL switch covers and all seals for presence and condition and that they are the correct type. It will be sufficient to check that they have an approved marking. It is not necessary to identify the sealer.

For vehicles not required to be fitted with a tachograph where a tachograph is used as a speedometer.

If a tachograph is used in place of a speedometer (even if the vehicle is tachograph exempt) it is only required to be marked in kilometres per hour, although it may be dual marked in miles per hour.

Check installation/calibration plaque for presence and condition, and the date of calibration is clearly visible.

Note: There is no requirement for a re-calibration of these systems after 6 years provided that the system has been initially calibrated and sealed, and that the calibration plaque and necessary seals remain intact.

Check DIL switch covers and seals for presence and condition and that they are the correct type. It will be sufficient to check that they have an approved marking. It is not necessary to identify the sealer.

Note: If a speed limiter is NOT required, or the speed limiter does not receive the speed signal from the tachograph head, it is only necessary to check the seals inside the tachograph head. There is no requirement for the gearbox sender unit to be sealed. The vehicle technical record will show if a vehicle is speed limiter exempt.

Vehicles fitted with Modular Tachographs.

There are presently two types of modular tachograph using encrypted sender units. They are VDO Keinzell 1324 and Stoneridge Electronics (formerly TVI) and are easily identified as they are shaped like a car radio.

Vehicles fitted with Modular Tachograph systems have received type approval that permits the use of a 4 wire data transmission cable instead of an armoured cable provided it is used to connect an encrypted sender unit to the tachograph. When used in this arrangement the approval also does not require the cable end connections to be sealed. However, the sender unit itself is still required to be sealed to the gearbox.

Identification of Encrypted Sender Units

These appear similar to other sender units and can be positively identified by the cream/beige colour of the sender unit 4 pin bayonet connector. This colour is the same whether the sender unit is the rotating type or a proximity type. It should be noted

Speedometer/Tachograph *(continued)*

that when the cable is connected that only a small part of the cream/beige coloured connector is visible.

Note: for the VDO Keinzel 1324 that there is an exception to the above colour code when the vehicle is fitted with a TELMA retarder, the socket housing will be red.

The electronic check of the K Factor will be carried out as part of the procedure for IM 33 but any failure where the electronically indicated figure differs from prescribed K factor by more than + or - 50 may be a Reason for Failure 3.f under this item unless it complies with a further check contained in IM 33.

Reasons for Failure

1. For all vehicles, a speedometer or tachograph:
 - a. not fitted
 - b. incomplete, clearly inoperative, or with dial glass broken or missing
 - c. cannot be illuminated
2. For all vehicles fitted with a tachograph
 - a. tachograph installation/calibration plaque missing, damaged
 - b. DIL switch cover missing, broken or damaged through interference.
3. For vehicles required to be fitted with a tachograph:
 - a. tachograph scale not marked in kilometres per hour
 - b. tachograph manufacturer's serial number/data plaque missing or not showing an "e" marking
 - c. tachograph installation/calibration plaque out of date.
 - d. "K" factor plaque missing.
 - e. seal missing, broken or where a clearly "non mandatory" seal has been fitted in place of an "official" seal.
 - f. an analogue or modular tachograph where the electronically indicated figure differs from prescribed K factor by more than + or - 50.
4. For vehicles not required to be fitted with a tachograph, where a tachograph is fitted in place of a speedometer:

If a speed limiter is required (which is sensed from the tachograph head):

- a. seal missing, broken or where a clearly "non-mandatory seal has been fitted in place of an "official seal".

If a speed limiter is not required:

- b. a seal (within the tachograph head) missing, broken, or where a clearly "non mandatory" seal has been fitted in place of an "official" seal. There is no requirement for the gearbox sender unit to be sealed.

Horn

Application

This inspection applies to all vehicles.

Procedure and Standards

Operate horn control and listen to sound emitted. Check controls and mounting. Vehicles first used from 1 August 1973 must have a horn that produces a continuous or uniform sound.

Reasons for Failure

1. Horn control:
 - a. missing.
 - b. cannot be reached easily from the driving seat.
 - c. insecure.
2. Horn:
 - a. does not work.
 - b. is not loud enough to be heard by other road users.
 - c. sound not continuous or uniform.
 - d. insecure.

Driving Controls

Application

This inspection applies to all vehicles.

Procedure and Standards

From the drivers seat operate driving controls, except those for brakes and steering which are checked under other items, to see that they function correctly and are complete.

Check that no rubbish or other items can impede the operation of the controls.

Operate engine stop control.

Reasons for Failure

1. A driving control:
 - a. insecure.
 - b. fractured, cracked, excessively corroded or incomplete.
 - c. obstructed or impeded in its travel.
 - *d. obviously not functioning correctly.
 - e. with the presence of rubbish or other items likely to interfere with the proper control of the vehicle.
 - f. pedal anti-slip provision missing, loose or incomplete.
2. Engine stop control:
 - a. missing or inoperative.

Steering Control

Application

This inspection applies to all vehicles

Procedure and Standards

- With the steered wheels in the straight ahead position lightly rotate the steering wheel to the left and right and note the amount of free play.
- Check for movement between the steering wheel, column and shaft by rocking the steering and applying upward and downward pressure at the wheel's rim and also by pushing and pulling at the rim.
- Check steering wheel for condition. Cracks in the plastic covering do not necessarily mean that a spoke is fractured.
- Free play at the steering rim in excess of 1/30 of the steering wheel diameter for a rack and pinion mechanism is considered a reason for failure. For other types of mechanism free play in excess of 1/5 of the wheel's diameter is considered a Reason for Failure. The acceptable free play for a range of wheels is shown below.

WHEEL DIAMETER	RACK AND PINION STEERING		OTHER TYPES OF STEERING
	CONVENTIONAL	WITH STEERING WHEEL AHEAD OF THE RACK AND WITH A NUMBER OF JOINTS	
380mm (15")	13mm (0.5")	48mm (1.9")	76mm (3")
455mm (18")	16mm (0.6")	57mm (2.3")	90mm (3.6")
530mm (21")	18mm (0.7")	67mm (2.6")	106mm (4.2")
610mm (24")	21mm (0.8")	77mm (3.3")	122mm (4.8")

Note: Unless specified by the manufacturer vehicles fitted with power steering must be checked with the engine running.

"Free Play" must not be confused with movement caused by the compression of steering joints etc.

Certain types of steering column might show some movement not due to excessive wear, eg those fitted with universal joints or flexible couplings.

Steering Control *(continued)*

Reasons for Failure

1. Steering column:
 - a with excessive movement of centre of steering wheel in line with the column (end float).
 - b. with excessive side play indicating a badly worn top bearing or insecure top mounting bracket.
 - *c. flexible coupling or universal joint deteriorated, with excessive wear or insecure.
 - *d. coupling clamp bolt or locking device loose or missing.
 - e. with an adjustment device worn to such an extent that it would render the column insecure
2. Steering Wheel:
 - *a. loose.
 - b. hub, spoke, or rim fractured or cracked.
 - c. cover torn with jagged edges which may injure the driver.
 - d. hub retaining device not fitted or loose.
3. Free play in system which is outside the prescribed limits.

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Speed limiter

Application

This inspection applies to all vehicles which are required to be fitted with a speed limiter.

Vehicles required to be fitted with a speed limiter are:

- A A vehicle first used from 1 January 1988 with
 - a design gross weight of more than 12000kg and
 - a maximum speed capability exceeding 56 mph (90 km/h), if a speed limiter were not fitted

- B A vehicle first used from 1 August 1992 until 30 September 2001 with
 - a design gross weight of more than 7500kg and not exceeding 12000kg and
 - a maximum speed capability exceeding 60mph (96.5km/h) if a speed limiter were not fitted

- C A vehicle first used from 1 October 2001 until 30 December 2004 with a Euro 3 Diesel or Gas engine (See note).
 - a design gross weight of more than 3500kg and not exceeding 7500kg and
 - a maximum speed capability exceeding 90km/h if a speed limiter were not fitted

must be fitted with a speed limiter from 1 January 2007 or 1 January 2006 if used in international traffic

- D A vehicle first used from 1 October 2001 until 30 December 2004 with
 - a design gross weight of more than 7500kg and not exceeding 12000kg and
 - a maximum speed capability exceeding 60 mph if a speed limiter were not fitted

must have a speed limiter set at 60 mph until 1 January 2007, or 1 January 2006 if used in international traffic, when a speed limiter set so that the vehicle cannot exceed 90 km/h will be required (see note).

- E A vehicle first used from 1 January 2005 with
 - a maximum design gross weight of more than 3500kg and not exceeding 7500kg and
 - a maximum speed capability exceeding 90km/h if a speed limiter were not fitted

Speed limiter *(continued)*

must be fitted with a speed limiter from 1 January 2008 or 1 January 2005 if used in international traffic

- F A vehicle first used from 1 January 2005 with
- a design gross weight of more than 7500kg and not exceeding 12000kg and
 - a maximum speed capability exceeding 90km/h if a speed limiter were not fitted

Note

Some vehicles first used from 1 October 2001 until 30 December 2004 may have been approved to Directive 70/220/EC or fitted with Euro 2 engines. These vehicles are exempt from the speed limiter fitting requirements for Group C and the 2006/2007 resetting requirements for Group D. Where exemption is claimed at time of test this should be accompanied by an operator's declaration of exemption and where necessary supported by manufacturer's confirmation of emission test standard, unless the vehicle is marked speed limiter exempt on the technical record. All Citroen, Ford Transit, LDV and Peugeot vehicles have already been confirmed by their manufacturers as being exempt and no further proof is required for these vehicles.

Procedure and Standards

Check that a speed limiter plate is securely fitted in the driver's compartment. It is acceptable for the plate to be fitted in the driver's door jamb. If fitted on a window and facing outward the details must be able to be read by a person of average height.

Check that the plate is clearly and indelibly marked with the speed at which the speed limiter has been set (the speed may be shown in mph or km/h).

Note: The character and composition of the plate and size of the lettering are not important provided the details are legible.

Check the presence and security of the device, the actuating mechanism, wiring and the tamperproof devices such as seals or lock nuts. This inspection is only for the parts which are visible without dismantling.

Note: It is acceptable for the limiter to be wired through the "ignition" switch but any other device which would allow disconnection of the speed limiter whilst driving is unacceptable.

Early tachographs had covers with a masked area over the access port to interrogate tachograph. These are still to be found although the tachograph scheme has been instructed to cease the fitting of such. Do not remove this type of DIL switch cover at the time of test as it is easy to inadvertently make contact with one of the switches and completely alter the K factor. This means that the test equipment cannot be used and the presenter should be asked to provide tachograph chart evidence of speed limiter operation as described below.

Speed limiter *(continued)*

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Clear DIL switch covers are acceptable at the time of test, although once again they are no longer acceptable under the Tachograph approved scheme and centres should no longer fit them.

Speed Limiter Integrity Check Using Electronic Device.

- Open the tachograph head. If seals need to be removed from within the tachograph head then do so. Plug the speed simulator jack plug into the tachograph head and close the head. Seals can only be removed and replaced by approved tachograph sealing centres or authorised VOSA staff.
- The machine will establish the pre set 'K' factor. Check that this is within + or - 50 digits of the 'K' factor displayed on the tachograph calibration plaque. A number of manufacturers have dual marked plaques where the W factor and the K factor are the same and are in the format "W=K=" followed by the associated figure. Other configurations found are no W or K on the plaque but marked Imps / km or Impulses per kilometre, as the K factor is the number of electronic impulses required to record the distance of one kilometre travelled, this is acceptable.
- Start engine and run at 1200-1500 rpm. Input a simulated speed to 80km/h. Check that the tachograph indicates the same speed. Gradually increase the simulated speed in 1 km/h steps. Note the speed indicated on simulator's digital display when the speed limiter operates. This can be identified by a reduction in the engine RPM, or a change in the engine note, or vibration indicating that the fuel supply is being reduced.

If it is found that the indicated figure differs by more than ± 50 from the prescribed "K" factor a further check should be made.

In line with normal procedures where the K factor indicated by the electronic device does not exactly match the displayed K factor, input the displayed K from the plaque into the electronic device.

NOTE: It is imperative that the tachograph head is closed before the remainder of the test is conducted so that no damage to the tachograph can take place should the vehicle's steering wheel be accidentally turned.

Set the simulated speed to 80 km/h and check the speed indicated by the tachograph. Note the difference, if any, in speed between that displayed on the electronic device and the tachograph.

If there is a difference in the electronic device's simulated speed and the speed indicated on the tachograph, and this difference is greater than 5km/h, either higher or lower, then the vehicle should be failed under Reason for Failure 3f of IM 26 as this defect relates to the tachograph rather than the speed limiter.

Continue to undertake a check of the vehicle's speed limiter. Remember to use the electronic device's simulated speed as the indication of the true road speed at which the road speed limiter operates.

On some vehicles, the electronic device will be unable to indicate the speed at which the speed limiter operates. Under these circumstances tachograph chart evidence of the vehicle while in service can be used to verify the operation of the speed limiter. The

Speed limiter *(continued)*

voluntary submission of 5 consecutive tachograph charts from the previous 28 working days can be used to establish the maximum operational speed. The vehicle should be failed for Reason for Failure 3a or 3b if the tachograph chart shows a speed trace of more than 95 km/h for vehicles in Groups A, C, E and F and of more than 106.5 km/h for vehicles in Groups B and D. The vehicle must have exceeded this speed for at least ten minutes.

If the speed simulator is unable to be used, and there are no tachograph charts available for inspection, the vehicle should be passed. VOSA Enforcement should be advised of the inability to check this test item.

A simulated response will reflect in-service road speed. The vehicle types and speed limiter test applications standards are as follows:

Vehicle group	Response speed at which vehicle will be failed
A C D after 1 January 2007 or 1 January 2006 if used internationally E F	92km/h or more
B D until 1 January 2007 or 1 January 2006 if used internationally	102km/h or more

Only speed limiter calibration certificates are acceptable at retest. If a certificate relating to the tachograph is presented the vehicle must be physically rechecked.

Reasons for Failure

1. Speed Limiter Plate:
 - a. missing.
 - b. insecure.
 - c. not in a conspicuous position.
 - d. not clearly and indelibly marked with the set speed.
2. Set Speed marked on Speed Limiter Plate greater than:
 - a. 90km/h (56 mph) for a vehicle described in Application section Groups A, C, E & F and also for a vehicle in Group D after 1 January 2007 or 1 January 2006 if used internationally or

60 mph (96.5 km/h) for a vehicle described in Application section Group B and also for a vehicle in Group D until 1 January 2007 or 1 January 2006 if used internationally.

Speed limiter *(continued)*

3. Response speed of
 - a. 92 km/h or more for a vehicle described in Application section Groups A, C, E & F and also for a vehicle in Group D after 1 January 2007 or 1 January 2006 if used internationally or
 - b. 102 km/h or more for a vehicle described in Application section Group B and also for a vehicle in Group D until 1 January 2007 or 1 January 2006 if used internationally.
4. Speed Limiter:
 - a. not fitted.
 - b. Insecure.
 - c. actuating rods/cables disconnected or damaged so that the operation is obviously affected.
 - d. wiring disconnected or can easily be disconnected by unauthorised means.
 - e. tamperproof device missing or defective or showing obvious signs of interference.

Pressure/Vacuum Warning and Build Up

Application

This inspection applies to all vehicles, except those with an unladen weight of less than 3050kg where the vacuum reservoir is coupled direct to the engine induction manifold. These vehicles do not require a pressure/vacuum warning device.

Vehicles used from 1 April 1983 can be fitted with either a visual warning device or an audible warning device. If both are fitted only one need work. Vehicles first used before 1 April 1983 must be fitted with a visual warning device. If an audible warning device is also fitted this is considered to be an addition to the mandatory requirement.

A Number of vehicles, among them Mercedes 515, 609, 612, 614, 709 and Iveco Daily models were approved without a warning device and should not be failed for a warning device not fitted.

If there is no reservoir in a vacuum system a warning device is not required.

Procedure and Standards

- Deplete the air or vacuum system by applying the foot brake, when the warning device operates there must be two further assisted brake applications.

Note: If the vehicle has **full power hydraulic brakes** gauges are not normally fitted and there are no appreciable sounds when the brakes are applied. To check for the above use the procedure shown in Item 71.

- Fully deplete the system and run the engine at just below governed speed and note the time for the warning device to show minimum effective working condition.

Note: If gauges are not marked, take 3 bar (45 psi) for air systems and 25 to 30cm (10 to 12 inches) for vacuum systems as indicating minimum effective working condition.

- The time to reach minimum effective working pressure should normally be within 3 minutes for pressure systems and 1 minute for vacuum systems. With Type Approved vehicles designed to draw a trailer a build-up time of 6 minutes is acceptable. If, however, the time recorded for the vehicle is appreciable longer than expected from that type of vehicle, this should be taken to indicate undue wear or a defect in the equipment.

Reasons for Failure

1. A mandatory visual warning device:
 - a. cannot be seen by the driver in all lighting conditions.
 - b. not fitted or not working correctly.
 - c. which cannot be seen by the driver.
 - d. not illuminated, or its functioning not visible in darkness to the driver.
2. Not enough pressure or vacuum to give at least two fully assisted brake applications after the warning device has indicated minimum effective working conditions.
- *3. Time to reach minimum effective working pressure is more than 3 minutes for pressure systems and 1 minute for vacuum systems.



Hand Lever Operating Mechanical Brakes

Application

This examination applies to all vehicles fitted with a mechanical parking brake.

Procedure and Standards

- With the lever in the off position check the condition of the lever, its pivot and the pawl mechanism.
- Slowly apply the brake and check the effectiveness of the mechanism and that it is not impeded in its travel.
- With the brake fully applied check:
 - a. If it can be disengaged by knocking the lever on each side and the top and,
 - b. If the lever is at the end of its working travel.
- Check for the presence of locking or retaining devices.

Reasons for Failure

- 914A
1. Brake lever:
 - a. fractured or cracked.
 - b. excessively corroded.
 - c. insecure.
 - *d. so positioned that it cannot be operated satisfactorily.
 - e. impeded in its travel.
 - **f. is not held in the "on" position when knocked.
 - g. has no further possible travel when the brake is fully applied.
 - h. pivot with side play such that it is likely to fail.
 2. Pawl mechanism:
 - a. and/or mountings in such a condition that early failure is likely.
 - b. pawl spring is not pushing teeth into positive engagement with ratchet teeth.
 3. Locking and/or retaining devices:
 - a. missing or insecure.



Service Brake Pedal

Application

This examination applies to all vehicles

Procedure and Standards

- Check the condition of the pedal and associated components.

Note: Power operated braking systems where the foot valve is fully open before the pedal is fully depressed do not require any reserve travel.

Reasons for Failure

1. Brake pedal:
 - a. anti-slip provision missing, loose or incomplete.
 - b. has excessive side play.
 - *c. fouling other parts of the vehicle.
 - d. insufficient reserve travel when fully depressed.
2. Brake pedal or assembly:
 - a. insecure.
 - *b. fractured, cracked, corroded or incomplete.

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Service Brake Operation

Application

This examination applies to all vehicles and trailers.

Vehicles and trailers on which anti-lock brakes are mandatory:

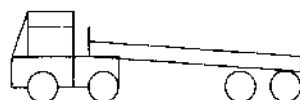
Type of Vehicle	Date
Motor vehicles with design GVW greater than 16000kg and authorised to tow a semi-trailer or a centre axle drawbar trailer with total design axle weights greater than 10000kgs or a drawbar trailer with design GVW greater than 10000kgs. (an O4 trailer) See examples 1 and 2 below to determine whether a motor vehicle needs antilock brakes	First used from 1 April 1992 and up to 30 April 2002
Motor vehicle with design GVW greater than 3500kg	First used from 1 May 2002
Semi-trailers and centre axle drawbar trailers with a design total axle weight of more than 10000kg.	Manufactured from 1 October 1991
Semi-trailers and centre axle drawbar trailers with a design total axle weight of more than 10000kg and which do not have a load sensing valve	Manufactured from 1 October 1982 to 30 September 1991
Semi-trailers and centre axle drawbar trailers with a design total axle weight of more than 3500kg	Manufactured from 1 May 2002
Full drawbar trailers (turntable type) with a design GVW of more than 10000kg.	Manufactured from 1 October 1991
Full drawbar trailers (turntable type) with a design GVW of more than 10000kg and which do not have a load sensing valve	Manufactured from 1 October 1982 to 30 September 1991
Full drawbar trailers (turntable type) with a design GVW of more than 3500kg	Manufactured from 1 May 2002

Exempt vehicles

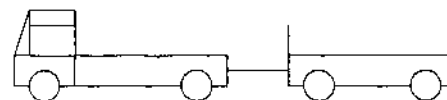
- A public works vehicle which has a maximum design GVW of 7500kg and which is specifically designed for use and used solely for the purpose of street cleansing.

How to determine if a drawing vehicle first used from 1st April 1992 and before 1 May 2002 needs antilock brakes

Example 1



Semi-Trailer



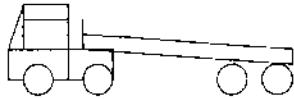
or Rigid and Drawbar Trailer

DGVW 18000kg
DGTW greater than 28000 (DGTW-DGVW>10000)

Anti-lock brakes required

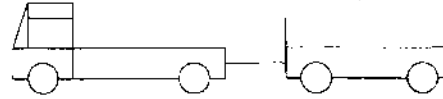
Service Brake Operation *(continued)*

Example 2



Semi-Trailer

or



Rigid and Drawbar Trailer

DGVW 18000kg
GTW 27000kg (DGTW-DGVW<10000)

Anti-lock brakes may be required if:

1. the drawing hitch is rated at more than 10000kg or
2. the tractor is presented for test with a semi-trailer which has Total Axle Weight greater than 10000kg or
3. the drawing vehicle is presented for test with a trailer which has DGVW greater than 10000kg

Note: The tow hitch should have a manufacturer's identification plate showing the hitch capacity.

Procedure and Standards

Air pressure systems and vacuum systems with reservoirs.

- With reservoir at maximum pressure or vacuum, fully depress the pedal and note the change in gauge readings to see if they give indications of a leak in the system.

Hydraulic systems (other than full power systems).

- Fully depress the pedal and keep it depressed under steady pressure. Check for sponginess and whether the pedal creeps down under full pressure.

Note: For some brake systems a small amount of creep may be due to elasticity in the brake components.

Brake systems assisted by engine vacuum.

- Deplete the vacuum, partly depress the pedal, start the engine, and check if the pedal can be felt to dip.

Full power hydraulic systems.

- Check that the system pressure is maintained for at least 10 minutes when the brakes are off and the engine is stopped. Loss of pressure will be indicated by the operation of the low pressure warning device (warning light or appearance of semaphore "flag" device).

Service Brake Operation *(continued)*

Vehicles and trailers fitted with anti-lock brakes.

- Check whether the vehicle is required to be fitted with anti-lock brakes.
- Check the anti-lock warning lamp sequence of operation. The sequence of operations shown on the manufacturer's information plate should be checked or if this is not available details for the main types of system are shown in the pages at the end of this item.
- If the trailer is fitted with ISO 7638 connections and this operation can be confirmed without the ISO 7638 cable attached a test certificate can be issued. If both the vehicle and trailer are fitted with ISO 7638 connections, but there is no cable between the connections, advise driver that if stopped outside on the road an immediate prohibition may be issued. If no warning lamp is available then issue a VTG12 for an incompatible drawing vehicle.

Note: For test purposes it will only be possible to check the static part of the warning light sequence. Some systems require movement of the vehicle but this is not part of the test.

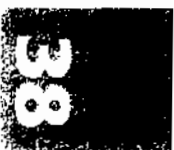
If a trailer is submitted for test coupled to a motor vehicle which has no power supply for the trailer anti-lock system the test should be suspended on the grounds that the trailer has not been accompanied by a suitable drawing vehicle. The presenter should be informed of this on form VTG12.

If a trailer does not have a warning light, this is acceptable provided that the drawing vehicle has a trailer warning light fitted in the cab. If neither the tractor or trailer have a warning light and there is a separate connector for the anti-lock system the test should be suspended as described above. If neither has a warning light and the trailer anti-lock is operated through the stop lamp circuit the trailer should be failed under Reason for Failure 5 below.

Service Brake Operation (continued)

Make	Model	Power Supply	Light Sequence	Indication of system fault
Bosch	Gamma System Motor Vehicle & Trailer	Permanent power via either 24S and or ISO7638, if fitted	Switch on ignition, warning lamp will illuminate and will remain on until speed exceeds 6km/h.	Light does not come on. Light remains on when speed exceeds 6km/h.
Knorr-Bremse	KB3-TA Trailer	Permanently Powered	Switch on ignition. Warning lamp will illuminate for 2 seconds and will go off.	Does not illuminate. Illuminates and stays on. Illuminates goes off and comes back on.
Knorr-Bremse	KB3-TA Trailer	Stop lamp powered	Switch on ignition and apply the footbrake. Trailer mounted warning lamp will come on for 2 seconds and then go off.	Does not illuminate. Illuminates and stays on. Illuminates goes off and comes back on.
Knorr-Bremse	A18 Trailer	Permanently Powered	Switch on ignition. Warning lamp will illuminate for 2 seconds and will go off.	Does not illuminate. Illuminates and stays on. Illuminates goes off and comes back on.
Knorr-Bremse	A18 Trailer	Stop lamp powered	Switch on ignition and apply the footbrake. Trailer mounted warning lamp will come on for 2 seconds and then go off.	Does not illuminate. Illuminates and stays on. Illuminates goes off and comes back on.
Knorr-Bremse	TEBS4 Trailer	Permanently Powered	Standard Mode of Operation. Switch on ignition, warning lamp will illuminate and go off after 2 seconds.	Does not illuminate. Illuminates and stays on.
Knorr-Bremse	TEBS4 Trailer	Permanently Powered	Alternative Mode of Operation. Switch on ignition. Warning lamp will illuminate for 2 seconds, momentarily go off and come back on, then go off once speed exceeds 15km/h	Does not illuminate. Illuminates and stays on. Does not come back on after momentarily going off. Does not go off when speed exceeds 15km/h.
Lucas Girling Grau (Haldex)	GX Motor Vehicle	Via Ignition	Switch on ignition. Warning lamp will illuminate and go off.	Does not illuminate. Illuminates and stays on. Illuminates goes off and comes back on.
Lucas Girling Grau (Haldex)	MGX/MGX1 Trailers Blue Moulded Casing	Stop lamp powered	With ignition on apply footbrake. Warning lamp on trailer headboard will illuminate and go off.	Does not illuminate. Illuminates and stays on. Illuminates goes off and comes back on.
Lucas Girling Grau (Haldex)	MGX/MGX1 Trailers Blue Moulded Casing	Permanently Powered	a) Switch on ignition, trailer warning lamp on tractor unit dashboard will illuminate and go off. b) Apply footbrake, switch ignition on, warning lamp on trailer headboard will illuminate and go off.	Does not illuminate. Illuminates and stays on. Illuminates goes off and comes back on.
Lucas Girling Grau (Haldex)	MGX2 Trailers Black Moulded Casing	Stop lamp powered	With ignition on apply footbrake. Warning lamp on trailer headboard will illuminate and go off.	Does not illuminate. Illuminates and stays on. Illuminates goes off and comes back on.
Lucas Girling Grau (Haldex)	MGX2 Trailers Black Moulded Casing	Permanently Powered	Switch on ignition, warning lamp on trailer will illuminate and go off. Note: On some installations there may be no warning lamp on the trailer. There must be a trailer warning lamp in the tractor unit.	Does not illuminate. Illuminates and stays on. Illuminates goes off and comes back on.

Antilock systems - Details of check if no manufacturer's instruction plate fitted.

Service Brake Operation (continued)

Antilock systems - Details of check if no manufacturer's instruction plate fitted.

Make	Model	Power Supply	Light Sequence	Indication of system fault
Lucas Girling Grau (Haldex)	MGX2E Trailers Grey Moulded Case	Stop Lamp Powered	With ignition on, apply footbrake, warning lamp on trailer headboard will illuminate and remain on until speed exceeds 10km/h. Note. When the footbrake is released the lamp will go off.	Does not illuminate. Illuminates and goes off with vehicle stationary. Illuminates and remains on when speed exceeds 10km/h with the footbrake applied.
Lucas Girling Grau (Haldex)	MGX2E Trailers Grey Moulded Case	Permanently Powered	Switch on ignition, warning lamp on trailer illuminates and remains on until speed exceeds 10km/h. Note. On some installations there may be no warning lamp on the trailer. There must be a trailer warning lamp in the tractor unit.	Does not illuminate. Illuminates and goes off while vehicle stationary. Illuminates and remains on when speed exceeds 10km/h.
Lucas Girling Grau (Haldex)	DGX/DGX1 Motor Vehicles and Trailers	Permanently Powered	Switch on ignition, warning lamp will illuminate for approximately 3 seconds, go off for one second, come back on and remain on until speed exceeds 10km/h.	Does not illuminate. Illuminates and remains on. After sequence does not come back on. Remains on at a road speed over 10km/h.
Lucas Girling Grau (Haldex)	Modal Trailer System	Stop lamp powered	<u>Static Test</u> Switch on ignition, apply footbrake, warning lamp on trailer will illuminate for 3 seconds, go off for one second and come back on and remains on as long as the footbrake is depressed. <u>Dynamic Test</u> Apply footbrake whilst speed exceeds 10km/h. Warning lamp will momentarily illuminate and go off.	Lamp does not illuminate. Illuminates and remains on. Does not come back on after 1 second pause. Does not illuminate. Illuminates and remains on during application.
Lucas Girling Grau (Haldex)	Modal Trailer System	Permanently Powered	Switch on ignition. Warning lamp will illuminate for 3 seconds, momentarily go off, come back on and will go off when speed exceeds 7km/h.	Does not illuminate. Illuminates and remains on. Illuminates, goes off but does not come back on. Remains on when speed exceeds 7km/h.
Lucas Girling Grau (Haldex)	MGX 100 Trailers, Green Moulded Casing	Stop lamp powered	<u>Static Test</u> Switch on ignition, apply footbrake, warning light will illuminate for 3 seconds, momentarily go off and come back on. <u>Dynamic Test</u> Apply footbrake whilst speed exceeds 10km/h. Lamp will momentarily illuminate and go off.	Does not illuminate. Illuminates and remains on. Illuminates for 3 seconds goes off and does not come back on. Does not illuminate. Illuminates and remains on during brake application.
Lucas Girling Grau (Haldex)	MGX 100 Trailers, Green Moulded Casing	Permanently Powered	Switch ignition on, warning lamp will illuminate for 3 seconds, momentarily go off, come back on and remain on until speed exceeds 10km/h.	Does not illuminate. Illuminates and remains on. Illuminates for 3 seconds, goes off but does not come back on. Remains on when speed exceeds 10km/h.
Maxaret	CR System for Motor Vehicles	Permanently Powered	Fully charge air system, apply footbrake and switch on ignition. A short exhaust of air will be heard and the warning lamp will come on and stay on.	Does not illuminate. Illuminates and goes off. No exhaust of air is heard.
Maxaret	MK III System for Motor Vehicles	Permanently Powered	Fully charge air system. Stop engine, apply footbrake and start engine. Warning lamp will illuminate and go off, a short exhaust of air will be heard.	Does not illuminate. Illuminates and goes off. No exhaust of air is heard.

Service Brake Operation (continued)

Make	Model	Power Supply	Light Sequence	Indication of system fault
Maxaret	MK IV System for Motor Vehicles	Permanently Powered	Fully charge air system. Warning lamp will illuminate and stay on.	Lamp does not illuminate. Lamp illuminates and goes off.
Maxaret	Trailer System	Permanently Powered	Check that warning lamp at trailer test point is off, press button switch warning lamp will illuminate, release button and warning lamp goes off.	Does not illuminate when button pressed. Stays on when button released.
Maxaret	Trailer System	Stop lamp powered	Apply footbrake, switch on ignition, warning lamp will illuminate and go off.	Does not illuminate. Illuminates and stays on.
WABCO	B & C Series for Motor Vehicles and Trailers	Stop Lamp Powered	Static Test Apply footbrake, warning light remains on with brake application. Dynamic Test Apply footbrake whilst speed exceeds 7km/h. Warning lamp will momentarily illuminate and go off.	Does not illuminate. Does not illuminate. Illuminates and remains on during brake application.
WABCO	B & C Series for Motor Vehicles and Trailers	Permanently Powered	Switch on ignition. Warning lamp will illuminate and remain on until speed exceeds 7km/h.	Does not illuminate. Illuminates and remains when speed exceeds 7km/h.
WABCO	Motor Vehicle C Series	Permanently Powered	Switch on ignition. Warning lamp will illuminate and remain on until speed exceeds 7km/h. (On Iveco lamp will go off after 2 seconds)	Does not illuminate. Illuminates and remains on when speed exceeds 7km/h.
WABCO	Motor Vehicle D Series	Permanently Powered	Switch on ignition. Warning lamp comes on for 2 seconds and goes off	Does not illuminate. Illuminates and remains on.
WABCO	Trailer Vario C	Permanently Powered via 24S and or ISO7638 if fitted	Switch on ignition. Warning lamp will illuminate and remain on until speed exceeds 7km/h.	Does not illuminate. Illuminates and remains on when speed exceeds 7km/h.
WABCO	Trailer Vario C	Stop lamp powered	Switch on ignition. Footbrake on. Warning lamp will stay on until speed exceeds 7km/h. Note. Footbrake off, lamp off.	Does not illuminate. Stays on when speed exceeds 7km/h with footbrake applied.
WABCO	Trailer VCS Up to September 1999	Permanently Powered via 24S and or ISO7638 if fitted	Switch on ignition. Warning lamp will illuminate and remain on until speed exceeds 7km/h.	Does not illuminate. Stays on when speed exceeds 7km/h.
WABCO	Trailer VCS Up to September 1999	Stop lamp powered	Switch on ignition. Footbrake on. Warning lamp will stay on until speed exceeds 7km/h. Note. Footbrake off, lamp off.	Does not illuminate. Stays on when speed exceeds 7km/h with footbrake applied.
WABCO	VARIO C and VCS produced after October 1999 Trailer	Permanently Powered via 24S and or ISO7638 if fitted	Switch on ignition. Warning lamp will illuminate for 2 seconds and go off.	Does not illuminate. Illuminates and remains on.
WABCO	VARIO C and VCS produced after October 1999 Trailer	Stop lamp powered	Switch on ignition. Footbrake on. Warning lamp will illuminate for 2 seconds and go off.	Does not illuminate. Illuminates and remains on.

Antilock systems - Details of check if no manufacturer's instruction plate fitted.

Service Brake Operation *(continued)*

Reasons for Failure

1. Air pressure or vacuum systems:
 - a. gauge reading drops when pedal depressed indicating a leak in the system.
2. Hydraulic systems (other than full power systems):
 - a. pedal creeps down when depressed.
 - b. sponginess when pedal depressed.
3. Brake systems assisted by engine vacuum:
 - **a. pedal does not dip when engine started, indicating lack of assistance.
4. Full pressure hydraulic systems:
 - a. system pressure is not maintained for 10 minutes when the brakes are off and the engine is stopped.
5. Vehicles and trailers fitted with anti-lock brakes:
 - a. anti-lock braking system not fitted on a vehicle or trailer on which it is a mandatory requirement.
 - b. anti-lock warning lamp does not follow its correct sequence.
 - c. A motor vehicle warning light not visible to driver
 - d. A defect that would obviously render the ABS inoperative

Hand Operated Brake Control Valves

Application

This examination applies to all hand operated valves on vehicles which operate secondary brakes, trailer brakes, spring brakes and lock actuators. It also applies to trailers fitted with hand operated spring brake valves.

Procedure and Standards

- Check the function and condition of the control valve.

Note: Certain air valves are subject to a slight amount of leakage and this is not a reason for failure.

Reasons for Failure

1. Control valve:
 - a. on a motor vehicle unable to be operated from the driving position.
 - b. insecure.
 - c. fractured, cracked, damaged or excessively corroded.
 - *d. impeded in its travel.
 - e. leaks.
 - f. excessive wear in the gate or lever locating mechanism.
 - *g. malfunctioning.

Condition of Chassis

Application

This inspection applies to all vehicles and trailers.

Procedure and Standards

- Check main, cross members and outriggers which have load restraining devices attached to them (e.g. twistlocks) for fractures, cracking, advanced corrosion and deformation. Check the security of fastenings between the frame and cross members including securing bolts and rivets. Check the soundness of any welds.
- On integral bodied vehicles and trailers where the body panels provide an important part of the strength of the vehicle check that where any replacement panels have been fitted that they are of a suitable material and that they have been secured in a way that ensures the strength of the structure will be maintained.

Note: For integral construction the term chassis should also be taken to apply to the underframe. For vehicles without a chassis those parts of the body must be examined which take the place of the chassis.

- When assessing corrosion it must only be regarded as a failure if it is sufficiently advanced to obviously impair the strength of a load bearing member.

Reasons for Failure

1. Any main or cross member or outrigger which has a load restraining device attached:
 - a. fractured or cracked or
 - b. with advanced corrosion or
 - c. deformed.so that the control of the vehicle is likely to be affected or the load will become insecure.
2. Frame and / or cross member fastenings:
 - a. insecure flitch plates and/or fastenings or
 - b. a weld breaking away.so that the control of the vehicle is likely to be affected or the load will become insecure.
3. Integral body replacement panels:
 - a. of an obviously unsuitable material.
 - b. not adequately secured by an appropriate method.

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A-

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B.

Electrical Wiring and Equipment

Application

This inspection applies to all vehicles and trailers.

Procedure and Standards

Check

- All visible wiring for condition, position and security.
- Battery for condition and security. If the battery is only held in place by the cables and by a lip on the carrier this cannot be considered to be secure.
- Switches controlling all obligatory lights.

Reasons for Failure

1. Wiring:
 - a. not adequately insulated or secured.
 - b. positioned so that it is chafing or likely to be damaged by heat.
2. Battery:
 - a. and/or carrier insecure and likely to become displaced.
 - b. case leaking.
3. Switch controlling an obligatory light:
 - a. insecure or malfunctioning.

Engine and Transmission Mountings

Application

This inspection applies to all vehicles.

Procedure and Standards

- Check condition of mountings and subframes and their security to the chassis or underframe.
- There will only be a failure under this item if a mounting is no longer capable of performing its function of location and support.
- Serious fractures in clutch or bell housings which affect the security of the engine or gearbox are a reason for failure.

Reasons for Failure

1. Any mounting or subframe:
 - a. loose.
 - b. cracked or fractured.
 - c. badly deteriorated.

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Oil Leaks

Application

This inspection applies to all vehicles and trailers.

Procedure and Standards

- Check for leakage of any type of oil other than fuel oil.
- Check without operating any equipment other than the engine which may be run at tick-over speed.
- Very bad oil leaks are a reason for refusing to carry out the test. If the test is suspended for this reason the presenter will be notified of this using form VTG12.
- Temporary means of preventing leaked oil reaching the ground are not acceptable. This does not apply to permanent fittings such as drip trays for feed pipes on tankers.

Reasons for Failure

1. Any oil leak from any assembly which can deposit oil at a rate of a 75mm diameter pool in 5 minutes or a number of leaks which collectively would deposit oil at the same rate.

Fuel Tanks and System

Application

This inspection applies to **all fuel tanks** which are permanently attached to vehicles and to trailers, including gas cylinders, bottles and other types of fuel container.

Procedure and Standards

- Tanks and supports must be checked for security.
- The system must be checked for leaks. Seepage is not a reason for failure.
- Filler caps must be checked for presence and to ensure that when in the closed position they will not allow spillage or leakage. Fabricated and "emergency" caps are acceptable provided that they function correctly. Where possible the tank cap should be opened to check the sealing arrangements.
- Pipework must be checked to see that it is secure and undamaged.
- Very bad fuel leaks are a reason for refusing to carry out the test. If the test is suspended for this reason the presenter will be notified of this using form VTG12.

Reasons for Failure

1. Tank:
 - **a. so insecure on its mountings that it is likely to drop away partially or completely when the vehicle is used.
2. A tank strap or support:
 - a. broken or missing.
 - **b. so insecure or weakened that the tank is likely to drop away partially or completely when the vehicle is used.
3. Fuel System:
 - *a. leaking.
 - b. pipes so damaged (restricted/chafed) insecure or with an inadequate repair such that they are likely to fail and leak which would cause danger to persons on the vehicle or to other road users.
 - c. pipes damaged or so positioned that they are fouled by moving parts of the vehicle.
4. Filler Cap:
 - *a. missing.
 - b. does not fasten securely.
 - by a positive means, or
 - such that pressure is not maintained on the sealing arrangement.
 - *c. sealing washer torn, deteriorated or missing, or a mounting flange/sealing method defective such that leakage of fuel is possible.

Exhaust Systems

Application

This inspection applies to all vehicles.

Procedure and Standards

- Examine the condition of the exhaust pipes and silencers and check for
 - Security.
 - Leaks.

Note: Where a diesel engine vehicle is failed for exhaust system leaking, the smoke emission test could be affected by the induction of air into the exhaust system. When presented for retest the smoke emission test should be rechecked.

Slight leaks are acceptable

- Check for the presence of the silencer and assess its effectiveness in reducing, so far as is reasonable, noise caused by the exhaust.

Reasons for Failure

1. An exhaust system:
 - a. so insecure that it might fall away partially or completely when the vehicle is in use.
 - b. leaking
 - c. positioned so that fumes are likely to enter the driver's cab.
2. An exhaust silencer:
 - a. missing.
 - b. ineffective.

Suspension

Application

This inspection applies to all vehicles and trailers.

Procedure and Standards

- Check all suspension components for condition and security.
- Insecurity of attachment points can best be assessed when the steering and/or brakes are operated.

Leaf spring systems:

- Check correct alignment of leaves.
- The fail criteria is that the leaves are so misaligned that each leaf is not taking a reasonable proportion of the load, or that they are likely to foul other parts of the vehicle.
- A leaf spring with a fracture or crack on the curled section which prevents the axle moving in the event of main leaf failure is a reason for failure.
- A "U" bolt should be regarded as loose if there is clear visual evidence that it is not properly fulfilling its function of securing a spring and, before it can do so it needs remedial action.

Spring Pins:

- Wear in pins & bushes: The maximum permissible wear in a pin and/or bush is 2mm for a 12mm diameter pin and 1/8 of the diameter for larger assemblies. For a threaded pin it is the diameter of the threaded part which should be taken into account when assessing wear. These criteria should not be used when checking rubber bushes which should be checked for deterioration of the rubber which could result in excessive movement.
- The maximum side play must not exceed 6mm. This does not apply to a threaded pin and bush assembly or to rubber bushes or to single spring bogie suspensions.
- Security of spring pins: Where an anchor/shackle pin is secured at one end the maximum amount of movement at the free end should not exceed 1mm for smaller assemblies, increasing to 2mm for larger assemblies.

Slipper brackets:

- Rebound pins where fitted as standard should be correctly located.

Air/Fluid systems:

- When assessing the significance of leaks it should be remembered that certain pneumatic components are subject to some degree of leakage. Slight seepage producing a thin film of oil on the component is not a Reason for Failure but any sign of dripping is unacceptable.
- Exposure of air bag structural cords is acceptable providing that they are not damaged.

Suspension *(continued)*

Procedure and Standards (cont'd)

- An air bag for holding a lift axle in the raised position must be considered against the same pass, fail criteria as any other suspension air bag.

Coil Springs:

- Check for correct location.

Adjustable radius and panhard rods:

- Check clamp bolts for security.

Shock Absorbers/Anti Roll Bars:

- Check shock absorbers for leaks. Slight seepage producing a thin film of fluid on a shock absorber is not a reason for failure but any sign of dripping is unacceptable.

A comprehensive list of vehicles where shock absorbers and/or anti roll bars are standard fitment is available from

Vehicle & Operator Services Agency,
Technical Services,
Welcombe House,
The Strand,
Swansea, SA1 2DH.

Reasons for Failure

1. All suspension types.

An attachment point and/or bracket including linkages, balance beams, panhard rods, spring saddle etc.:

- *a. insecure.
- *b. disconnected.
- *c. fractured or cracked.
- *d. so damaged, worn, distorted or corroded that it adversely affects its function.
- *e. incorrectly located or fitted.
- *f. bolt or rivet missing.
- *g. rubber or bonded bush deteriorated.
- *h. defective such that a wheel could foul any other part of the vehicle.
- *i. wear in a pin, bush or mounting exceeding the prescribed limit.

2. Leaf Springs and Fixings

- *a. wear in a pin and/or bush exceeding the prescribed limit.
- *b. a fractured or cracked leaf or one repaired by welding.
- *c. spring leaves splayed beyond the prescribed limits or fouling any other part of the vehicle.

Suspension *(continued)*

Reasons for Failure (cont'd)

- *d. movement in a spring fixing pin in excess of the prescribed limits.
 - *e. slipper bracket rebound pin missing or incorrectly located.
 - *f. relative movement or displacement between a spring and the axle.
 - *g. a missing shackle or anchor pin.
 - *h. a worn slipper bracket.
 - *i. so corroded, pitted or seriously weakened that it is likely to fail.
 - *j. an insecure or missing locking device from a shackle or anchor pin.
3. Coil Springs and Torsion Bars:
- *a. incomplete.
 - *b. fractured, cracked or repaired by welding.
 - *c. corroded, pitted, or seriously weakened so it is likely to fail.
 - *d. torsion bar fixings with excessive free play, insecure, or an adjustment assembly incorrectly fitted and/or insecurely locked.
4. Air/Fluid Suspension Systems.
- Valves, pipes, Valve linkage, Bellows and Displacer / Accumulator Unit:
- *a. displaced, deflated, kinked and/or so damaged/deteriorated that it is likely to fail.
 - *b. fouled by other parts or leaking.
 - *c. with check strap missing or defective.
 - *d. insecure.
 - *e. pipe insecure.
 - *f. leaking.
5. Bonded Suspension Units:
- *a. with failure of bonding between flexible element and metal so that part of the unit is likely to fail.
 - *b. unit is so damaged or deteriorated that it is no longer capable of carrying out its proper function.
6. Shock Absorber:
- *a. missing from a vehicle on which it is a standard component.
 - *b. with an anchorage fractured or unit insecure.

Suspension *(continued)*

Reasons for Failure (cont'd)

- *c. leaking .
 - *d. with an excessively worn rubber bush or pivot.
 - *e. linkage missing, linkage bracket cracked so that it is likely to fail, fractured or cracked or excessively worn.
 - *f. with a sleeve damaged so that the unit is not functioning correctly.
7. Anti roll bar:
- *a. missing from a vehicle on which it is a standard component.
 - *b. insecure.
 - *c. fractured, cracked or severely distorted.
 - *d. so corroded or worn that its strength is seriously reduced.
8. Anti roll bar linkage/bracket or bushes:
- *a. missing.
 - *b. fractured or cracked and likely to fail, or excessively worn.
9. All suspension types
- *a. a suspension unit so weak that the body or other part of the vehicle is fouling the road wheels or is likely to do so if the vehicle is laden.

Axles, Stub Axles and Wheel Bearings

Application

This inspection applies to the steered wheels of all vehicles and trailers.

A steered axle is one which has a king pin or ball joints and can be turned to a left and right lock. An axle ceases being steered when it is fixed in the straight ahead position.

Procedure and Standards

- When assessing excessive wear, play or lift account must be taken of any information given below and/or manufacturers' recommendations.
- Check for excessive lift between stub axle and axle beam or between swivel joint and housing. For vehicles fitted with a "Hives" type thrust bearing any lift greater than 1.6mm would be considered excessive and in the case of any other type of bearing lift greater than 1.0mm.

Note: This inspection may be carried out either while lifting and lowering the axle with a jack or by lifting each wheel with a heel bar whilst the vehicle is raised off the ground.

- Whilst the wheel is rocked, either by using wheel play detector plates in the side to side mode or by lifting the wheels clear of the ground and rocking each in turn with a bar, check for movement between
- Stub axle and axle beam.
- King pin and bushes. Any movement greater than 10mm on a 500mm diameter wheel is considered excessive. For wheels of different diameter the maximum allowable movement should be in proportion to this figure.
- Wheel bearings and housing.
- Swivel joint and housing.
- Swivel joint housing and stub axle.
- Swivel joint housing and suspension arms.

Note: Wheel bearing free play can be isolated by applying the service brake.

- Check axle beam and stub axle for cracks.
- Check king pin retaining device for presence and security.
- Check swivel joint retaining and locking devices for presence and security.

Axles, Stub Axles and Wheel Bearings *(continued)*

Reasons for Failure

1. Stub axle and axle:
 - *a. excessive lift between stub axle and axle beam.
 - *b. cracked.
2. King pin:
 - *a. excessively loose in axle beam.
 - *b. king pin or bush excessively worn.
 - *c. retaining device missing or insecure.
3. Swivel joint:
 - *a. excessively worn.
 - *b. insecure.
 - *c. retaining or locking device missing or insecure.
4. Wheel bearing:
 - *a. with excessive free play.

Steering

Application

This inspection applies to all vehicles and to trailers with steered axles.

A steered axle is one which has a king pin or ball joints and can be turned to a left and right lock. An axle ceases being steered when it is fixed in the straight ahead position.

Procedure and Standards

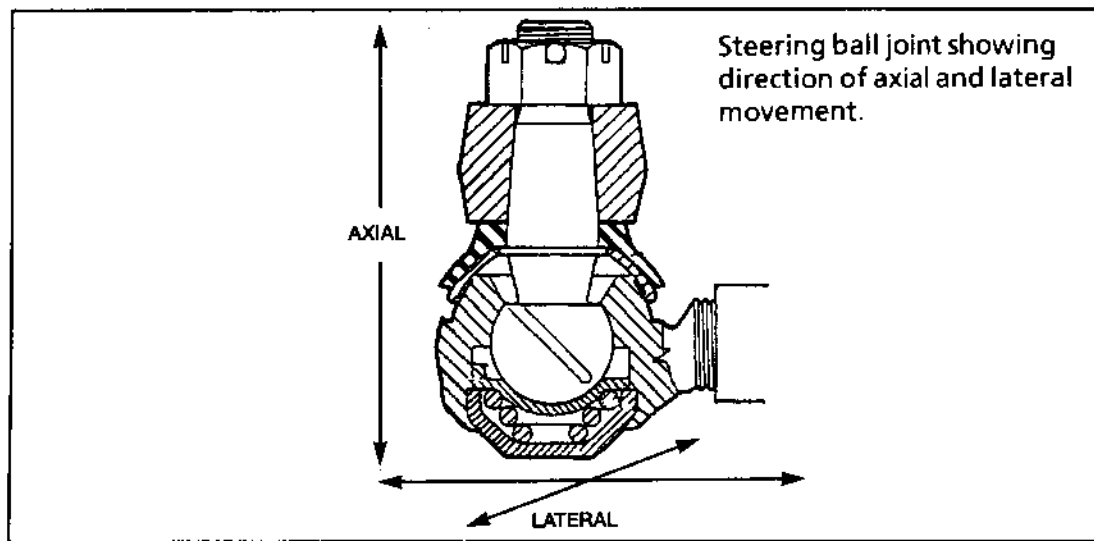
- Power steering must be inspected with the engine running. If vehicles are fitted with additional equipment, belt driven from the engine, where the belt may cause a hazard to the inspector they should be tested without the engine running. Examples are belt driven refrigeration compressors and air conditioning.

Exposure of structural cords on power steering hoses is acceptable provided that these cords are not damaged.

Note: Any leakage from a power steering system is a Reason for Failure.

- For steered wheels on trailers and on any self steered axle, visually check joints and components for wear and condition.
- With the road wheels on the ground rock the steering and check all steering joints and fixings.
- Visually check for axial and lateral movement of all ball joints. Where a ball joint is fitted with a spring to take up such movement, the compression of the spring must not be mistaken for excessive wear. If excessive wear is suspected check by using hand pressure.
- With road wheels off the ground, instruct the driver to rotate the steering wheel through its full working range. If a lock stop, which is known to be a standard fitment, is missing this is a Reason for Failure. It should be noted however that in some cases there is provision for extra lock stops which are not a standard item. Where two are fitted only one needs to fulfil the function on each lock. They may be integral with the steering mechanism.

Note: Vehicles with independent front suspension should be checked with the suspension in the normal running position.



Steering *(continued)*

Reasons for Failure

1. Power steering:
 - *a. not working correctly.
 - b. removed or disconnected when a standard fitment.
 - c. with an air/fluid leak from any part of the system.
 - d. pump insecure or its drive system missing or defective.
 - e. pipe or hose excessively corroded, damaged, bulging or fouling other parts of the vehicle.
 - f. with a cracked or damaged ram and/or ram body anchorage, any excessive free play at ram anchorage.
 - g. with excessive free play between ball and valve to the extent that separation is likely.
2. Steering with:
 - *a. a ball pin shank loose.
 - b. a sharp or deep groove at the neck of a ball pin.
 - c. a track rod or drag link end loose.
 - d. any abnormal movement in a joint.
 - e. movement between sector shaft and drop arm.
 - f. excessive wear in a pivot point (e.g. an intermediate drop arm).
 - g. a part fixed to the chassis insecure (e.g. an intermediate drop arm, pivot housing, steering box, ram arm).
 - h. movement between a steering arm and its fixings.
 - *j. a component fractured or so cracked, damaged, misaligned, deformed or so worn that it is likely to fail.
 - k. a retaining or locking device not fitted or insecure.
 - l. a steering lock stop insecure or missing.
 - m. a component repaired by welding or showing signs of excessive heat being applied.
 - n. any steering component, road wheel or tyre fouling any part of the vehicle.

Steering *(continued)*

Reasons for Failure (cont'd)

- o. track rod excessively deformed.
- *p. roughness or undue stiffness in the operation of the steering.
- q. excessive lift or end float of sector shaft.
- r. sector shaft cracked, twisted or splines twisted.
- s. excessive wear in steering rack.
- t. excessive movement of rack housing in mounting bushes.
- u. a rack gaiter (if rack originally fitted with gaiters) split, damaged, missing or displaced.

Transmission

Application

This inspection applies to all vehicles and to trailers with driven axles.

Procedure and Standards

- Check all relevant transmission components, where possible, for wear, security and condition.
- Check for contamination and deterioration of flexible couplings.
- Vehicles must be in neutral gear and with any transmission brake released during this inspection.
- The presenter should be advised if any shaft or carrier locking device is missing or ineffective.
- Failure for excessive wear of a universal joint is only justified when radial movement indicates that needle roller bearings are missing from one or more cups.
- Propeller shaft spline wear is not a Reason for Failure.

Reasons for Failure

1. All vehicles with:
 - a. a loose or missing propshaft flange bolt.
 - b. any flange cracked or loose.
 - c. excessive wear in a shaft bearing.
 - d. a bearing housing insecure, cracked or fractured.
 - e. excessive wear in a universal joint.
 - f. deterioration of a flexible coupling such that failure is imminent.
 - g. a seriously damaged or cracked shaft.
 - h. deterioration of a bearing housing flexible mounting such that failure is imminent.
 - i. evidence of a transmission shaft fouling on another component.
2. Front Wheel Drive with:
 - a. a constant velocity or universal joint excessively worn or insecure.
 - b. a flexible coupling severely cracked, softened or breaking up such that failure is imminent.
 - c. a gaiter protecting a constant velocity joint split, missing or insecure.

Brake Systems and Components

Application

This inspection applies to all vehicles.

Automatic slack adjusters must be fitted to motor vehicles first used from and trailers manufactured from 1 April 1995.

Procedure and Standards

Brake Components

- Check the condition and security of brake drums, back plates & shoes, discs, callipers, pads including friction material.
- Check the condition, security and operation of brake rods, relays, levers, including slack adjusters, clevis joints, linkages, cables, flexible and rigid pipes.

Note: A rod or lever reduced by more than one third of its original diameter is considered a failure.

A pipe with its wall thickness reduced by more than one third of its original thickness is considered a failure.

Cables, less than 10% of the wires fractured is not regarded as a reason for failure unless there is bunching, or likelihood of bunching, where the cable enters an outer cable, guide or sleeve (cables are usually made up of strands each containing a number of wires).

A hose should be rejected for surface cracking or damage by chafing only if the reinforcement is visible.

Repairs to metal air brake pipes by sleeving are acceptable, providing the repair appears to be good and sound. A pipe repaired in-situ by brazing is not considered acceptable. Repairs to hydraulic brake pipes are not acceptable. Compression joints of the type using separate ferrules are not considered suitable for joints on hydraulic pressure lines.

Lever slack adjusters; up to a total of 9.5mm radial movement at a radius of 150mm is considered acceptable within the slack adjuster and between the slack adjuster and cam cross shaft. Slack adjusters must have a secure fastening to the cross shaft including a locking device..

- Check that automatic slack adjusters are fitted to vehicles and trailers on which they are mandatory and check presence, condition and security of control brackets for all vehicles fitted with lever type automatic slack adjusters
- Check and compare travel of automatic slack adjusters across the same axle when service brakes are applied, and check that automatic slack adjuster levers return fully when brakes are released..

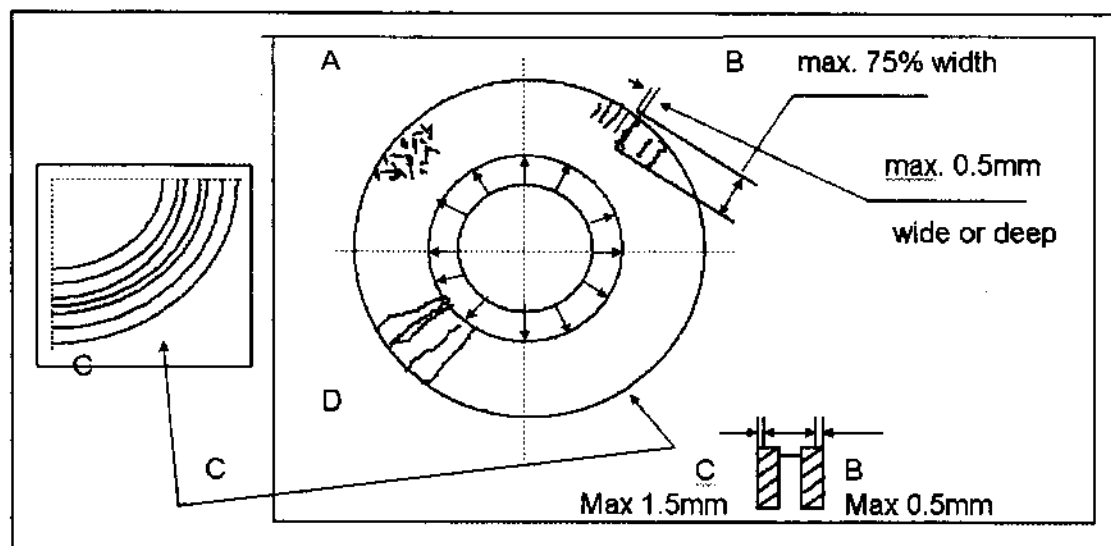
Brake Systems and Components *(continued)*

Procedure and Standards (cont'd)

Disc Brakes

The diagram below shows the type of damage which are likely to be found on brake discs and gives guidance on how much damage is acceptable before failing the vehicle. This should be a visual assessment.

- A. Interlinked cracks or surface crazing = acceptable
- B. Cracks running towards hub centre up to max. 75% of the width of the friction surface, and a maximum of 0.5mm wide or deep = acceptable
- C. Unevenness in the disc surfaces less than 1.5 mm = acceptable
- D. Cracks running from edge to centre = not acceptable



Reservoirs (The term reservoir includes accumulators and other types of vacuum & pressure vessels).

- Check for condition, security and leaks.

Brake Actuators, Hydraulic Master & Wheel Cylinders, Valves and Servos.

- Check for operation, condition, security and leaks.

Damp patches around valves or adjacent components are not a Reason for Failure. Only where there is evidence of heavy discharge of oil from the valve at the time of test should there be a failure.

Note: To check the condition of brake pipes, valves, hydraulic master & wheel cylinders it will be necessary to ask the driver to pressurise the braking systems. There is no requirement for a specific check on the operation of all valves, however where it is obvious that a valve is malfunctioning during any stage of the test, this is a Reason for Failure.

Brake Systems and Components *(continued)*

Procedure and Standards (cont'd)

When assessing the significance of leaks, it should be remembered that certain pneumatic components are subject to leakage to some degree.

Vented master cylinders as fitted in particular to some Bedford vehicles may be subject to some dampness around the vent, due to fluid in the bores of the cylinder used to lubricate the piston seals, this should not be treated as a defect.

Quick Release Valves/Spring Brake Systems; On trailers fitted with spring brake systems a controlled discharge of air may occur from the quick release valve when the service brake is applied with the spring brakes in the off position, this is acceptable and should not be treated as a defect.

Air Compressor Drive

- Where the air compressor is driven by belts, check for presence, condition and adjustment of compressor drive belt(s).

Trailer Secondary Brake (where fitted)

Pressurise the trailer secondary brake system and inspect functioning and operation.

The following vehicle/trailer types require an adapter to be fitted to inspect the trailer secondary brake operation and the following procedure should be carried out.

- Two line drawing vehicles coupled to three line trailers.
- Three line drawing vehicles with no separate secondary control coupled to three line trailers.

Supply a suitable adapter and request the driver to connect the tractor/drawing vehicle service line to the trailer secondary line.

Instruct the driver to apply the service brake, inspecting the appropriate hoses for weakness under pressure and general condition of hoses and brake pipes.

Note: If spring brake actuators are fitted to the vehicle/trailer inspect the components of this system with the park brake in the "off" position.

Instruct the driver to remove the adapter and reconnect the brake lines. Check the reconnection by instructing the driver to apply the footbrake and note the operation.

Reasons for Failure

Brake Components

1. A brake rod, clevis joint, linkage, relay, lever, pin, pivot, slack adjuster or cable:
 - *a. seriously weakened by excessive wear, corrosion or damage.
 - *b. with abnormal movement indicating incorrect adjustment or excessive radial free play.

Brake Systems and Components *(continued)*

- *c. with an ineffective, insecure or missing locking device.
 - *d. reduced in diameter by more than the prescribed limit.
 - *e. a brake cable knotted, or with more wires broken than permitted by the specified standard.
 - *f. automatic slack adjuster component missing, disconnected, insecure, distorted, fractured or inoperative.
 - *g. mandatory automatic slack adjuster not fitted.
 - *h. a brake fitted with an automatic slack adjuster exceeding one-third of the travel of the brake actuator, or obviously having a different travel from another brake on the same axle, or not returning fully when brakes are released.
2. Brake pipes and flexible hoses:
- *a. fouled by moving parts or excessively chafed or cracked with reinforcement cords exposed.
 - *b. excessively corroded or deteriorated.
 - *c. damaged.
 - *d. leaking.
 - *e. bulging.
 - *f. kinked, stretched or twisted.
 - *g. inadequately clipped or otherwise inadequately supported.
 - *h. inadequately repaired or with unsuitable joint fittings.
 - *j. a non-metallic pipe exposed to excessive heat.
3. Brake drums, back plates & shoes, discs, callipers, pads including friction material with:
- *a. an insecure, or cracked brake drum or disc.
 - *b. a brake back plate or calliper securing bolt loose or missing.
 - *c. a brake lining or pad insecure or less than 1.5mm thick at any one point.
 - *d. a brake disc excessively scored, pitted or worn.
 - *e. restricted movement of a brake component.

Brake Systems and Components *(continued)*

Reasons for Failure (cont'd)

4. Reservoirs:
 - *a. insecure, excessively corroded, or leaking.
 - *b. with dents that reduce the capacity or with angled dents.
 - *c. with a securing strap fractured, cracked, excessively corroded or chafing on the reservoir or other mounting.
 - d. Missing where it is known to be a standard fitting
5. Air actuators, hydraulic master & wheel cylinders, valves & servos:
 - *a. defective in operation.
 - *b. insecure.
 - *c. leaking air or fluid.
 - *d. fractured, cracked or damaged.
 - *e. excessively corroded.
 - *f. with a locking device missing or insecure.
 - *g. with excessive travel of operating mechanism indicating a need for adjustment.
 - *h. with a cap missing from a hydraulic master cylinder.
 - *i. with a valve with excessive discharge of oil.
 - *j. a load sensing valve removed or disconnected when it is known to be a standard fitment.
 - *k. a load sensing valve obviously seized or restricted in its free movement linkage or brackets cracked, defective or out of adjustment.
6. Air Compressor Drive:
 - *a. a drive belt missing, badly deteriorated and/ or so loose that it is likely to slip.
 - *b. a compressor drive pulley loose, cracked or missing.
7. Trailer Secondary Brake:
 - *a. defective in operation.

Rear Markings and Reflectors

Application

Rear Markings

This inspection applies to the vehicles and trailers listed below which must be fitted with rear markers. The type of marking which is acceptable is shown in the table below. The type numbers refer to the diagrams on the following pages.

Motor vehicles

- with a maximum gross weight exceeding 7500kg (not articulated tractors and vehicles constructed or adapted for transporting two or more boats, vehicles or vehicle bodies).

Overall length	Acceptable type of markings for vehicle first used before 1 April 1996	Acceptable markings for vehicle first used from 1 April 1996
13m or less	1,2,3,6,7,8 or 9	6,7,8 or 9
more than 13m	4,5,10,11,12 or 13	10,11,12 or 13

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Trailers

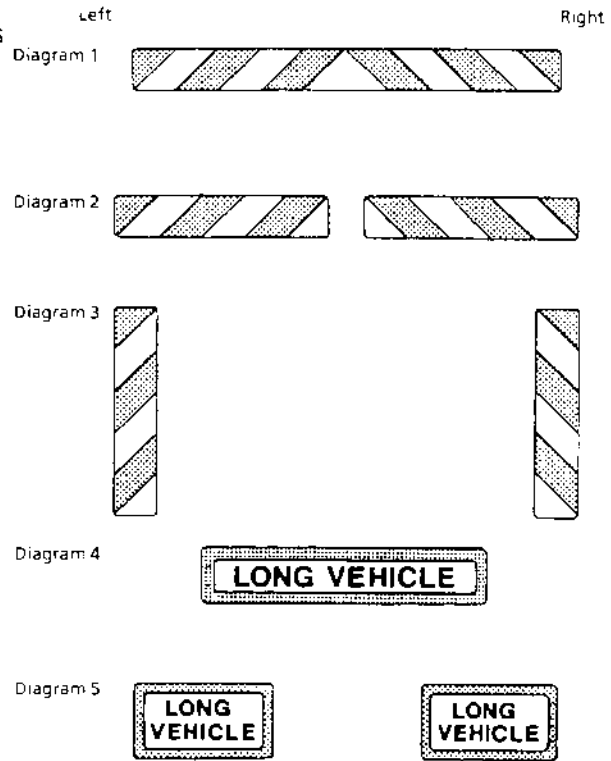
- with a maximum gross weight exceeding 3500kg (not trailers constructed or adapted for transporting two or more boats, vehicles or vehicle bodies).

Overall length of combination	Acceptable type of markings for trailers manufactured before 1 October 1995	Acceptable markings for trailers manufactured from 1 October 1995
11m or less	1,2,3,6,7,8 or 9	6,7,8 or 9
more than 11m but not more than 13m	Any type shown in the diagrams	6,7,8,9,10,11,12 or 13
more than 13m	4,5,10,11,12 or 13	10,11,12 or 13

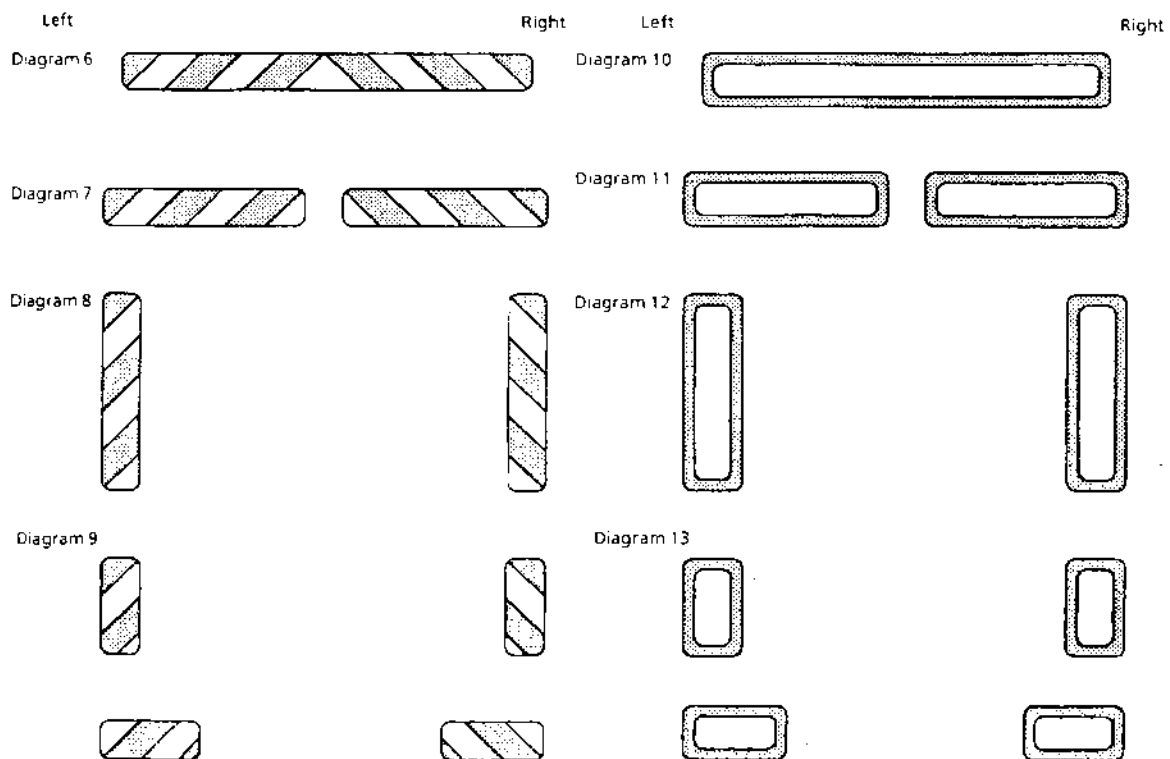
Rear Markings and Reflectors (continued)

The types of marking shown in diagrams 1-5 are those complying with the British Standard AU152 and the others are approved to ECE Regulation 70

Type 3 may be of a lower height and greater width than shown in the diagram. The minimum height of this is 140mm and it must have an area of at least 980cm².



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Rear Markings and Reflectors *(continued)*

Application

Reflectors

This inspection applies to all motor vehicles and trailers but only obligatory reflectors are to be checked.

- Every motor vehicle and trailer requires 2 red reflectors facing to the rear.
- Trailers manufactured from 1 October 1990 require two white reflectors facing to the front.

Side reflectors

This inspection applies to a motor vehicle.

- first used before 1 April 1986 with an overall length of more than 8m. first used from 1 April 1986 with an overall length of more than 6m.
- This inspection applies to trailers with an overall length of more than 5m excluding any drawbar.

Procedure and Standards

Check for type, position, security and effectiveness.

Rear markings

They must be fitted with the lower edge between 400mm and 1700mm from the ground.

A rear marker must not be more than 10% obliterated or obstructed.

Reflectors

The inspection does not include a check that the reflectors have the appropriate approval mark. Reflective plates or tape are not acceptable as a substitute for a reflector. The check for position should be visual and only vehicles with reflectors and markings obviously out of position should be failed for this reason.

Front Reflectors [trailers]

The maximum height from the ground is 900mm, if this is impractical it can be 1500mm.

Rear Reflectors

The maximum height from the ground is 900mm. There are some exceptions:

- If 900mm is impractical it can be 1200mm.
- For vehicles used before 1 April 1986 and trailers manufactured before 1 October 1985 the maximum height is 1525mm.

Trailers must be fitted with triangular reflectors. These are not acceptable on motor vehicles.

Side reflectors

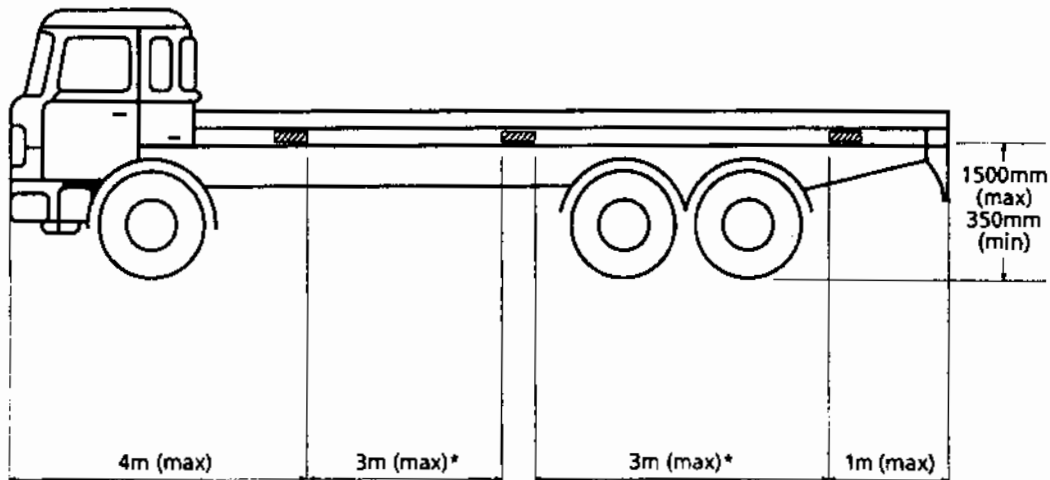
They must be positioned as shown on the next page. They must be amber in colour unless within 1 m of the rear of the vehicle or trailer when they may be red.

Rear Markings and Reflectors (continued)

Motor Vehicle first used from 1 April 1986

Trailer manufactured from 1 October 1985

Two or more side reflectors are required depending on the length of the vehicle

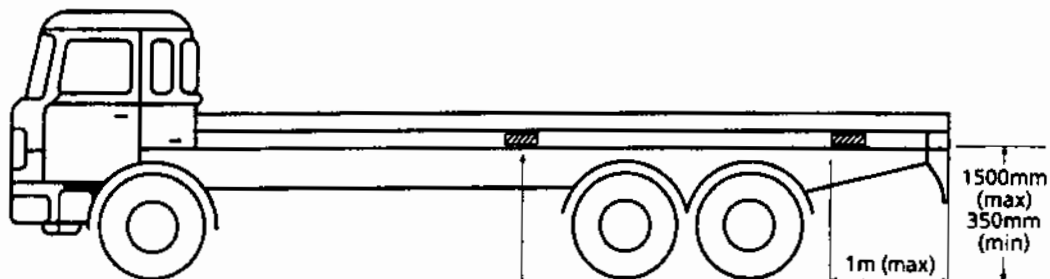


*Maximum separation distance may be 4m if 3m is not practicable

Motor vehicle first used before 1 April 1986

Trailer manufactured before 1 October 1985

Two side reflectors are required on each side



this reflector to be positioned
towards the centre of the vehicle

Rear Markings and Reflectors *(continued)*

Reasons for Failure

1. Rear marker and/or reflector:
 - a. incorrectly positioned.
 - b. missing.
 - c. insecure.
 - d. not clearly visible.
 - e. not facing squarely to the appropriate direction.
 - f. of the incorrect type fitted.
 - g. so dirty or ineffective that its function is impaired.
 - h. broken, damaged or incomplete to the extent that the reflecting area is significantly reduced.
2. A reflector:
 - a. not of the appropriate colour.

Lamps

Application

The inspection of front position lamps, headlamps, rear position lamps and registration plate lamps applies to all the obligatory lamps fitted to vehicles and trailers.

The inspection of stop lamps applies to any stop lamp fitted to vehicles and trailers.

The inspection of end outline marker lamps applies to the obligatory marker lamps fitted to

- vehicles first used from 1 April 1991.
- trailers manufactured from 1 October 1990.

and which in both cases are more than 2.1 m wide.

The inspection of rear fog lamps applies to any vehicle or trailer fitted with a rear fog lamp.

Rear fog lamps must be fitted to

- vehicles first used, and trailers manufactured from 1 April 1980.

Note: Fog lamps are not needed on modern trailers when drawn by old vehicles (see above for dates).

The inspection side marker lamps applies to all obligatory side marker lamps fitted to vehicles and trailers.

Side marker lamps must be fitted to:

- vehicles with an overall length exceeding 6m first used from 1 April 1991
- trailers with an overall length exceeding 6m manufactured from 1 October 1990
- trailers with an overall length exceeding 9.5m manufactured before 1 October 1990

Procedures and Standards

- The check for position should be visual and only vehicles with lamps obviously out of position should be failed for this reason. A summary of the main requirements for each type of lamp is shown on the last page of this section.

End Outline Marker Lamps

- These are not required on vehicles designed to carry demountable bodies if the overall width without the body fitted is less than 2.1 m.
- The front lamp and the rear lamp may be combined as for example on an articulated tractor.
- The rear marker lamps on vehicles such as tippers and tankers and those designed to carry demountable bodies may be fitted at chassis level.
- It is not acceptable for a position light to be used additionally as a marker lamp. A separate lamp must be fitted.

Lamps *(continued)***Procedures and Standards (cont'd)****Rear Fog Lamp**

- Inspection of non-obligatory rear fog lamps is restricted to a check of colour (RfF 1.d), whether operation of the brakes affects the fog lamp (RfF 2.b) and the separation distance from a stop lamp (RfF 1.e).
- No more than two rear fog lamps may be fitted.

Rear Registration Plate Lamp

- The registration plate lamp must be fitted in a position where it can illuminate the registration plate. A lamp fitted in a position where it cannot do this is not a registration plate lamp and this should be dealt with under Reason for Failure 1 (a).

Side Marker Lamps

Two or more marker lamps must be fitted at each side to ensure that the following is complied with:

Maximum distance of the foremost marker lamp from the front of the vehicle or trailer, including any drawbar	4m
Maximum distance of the rearmost marker lamp from the rear of the vehicle or trailer	1m
Maximum distance between the light emitting surfaces of adjacent marker lamps	3m or if this is not practicable 4m

Vehicles first used before 1 April 1996 and trailers manufactured before 1 October 1995 are exempt from the need to fit side marker lamps if they are fitted with all of the lighting and light signalling devices listed in items 1.5.7 to 1.5.20 of Annex 1 of Community Directive 76/756/EEC as amended. Motor vehicles which comply with these requirements will be fitted with a label showing a dipped headlamp and a percentage dip figure.

Matched Pair

- This means that the lamps emit light of the same colour and intensity and that both lamps are of the same size and are symmetrical to one another.
- If there is more than 1 bulb in the lamp at least 50% must work

Reasons for Failure

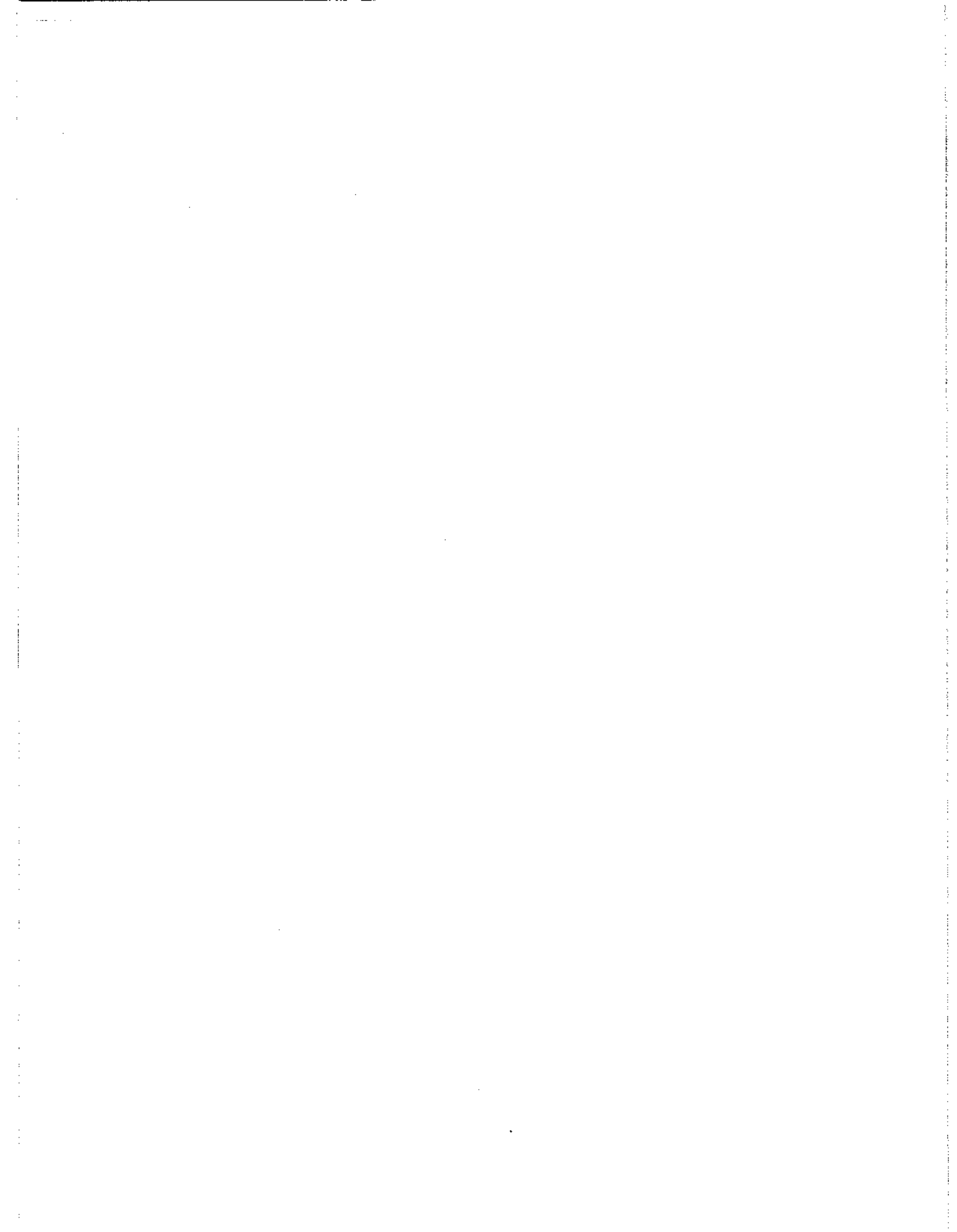
1. For all lamps:
 - a. an obligatory lamp missing or insecure.
 - b. a lamp dim, due to dirt or internal deterioration, or not working.
 - c. a lens missing, obscured, insecure, or damaged so it is likely to fall apart.
 - d. not showing a light of the right colour.

Lamps *(continued)*

- e. incorrectly positioned.
 - f. flickers when lightly tapped by hand.
 - g. is affected by the operation of any other lamp.
2. Fog lamp (in addition to the above):
- a. tell-tale light not fitted, not working or cannot be seen by the driver.
 - b. more than two rear fog lamps are fitted.
3. Stop lamp (in addition to the above):
- *a. does not show a steady red light when the brakes are applied, or does not go out when the brakes are released.
4. Headlamp (in addition to the above):
- a. not forming part of a matched pair.
 - b. not positioned symmetrically in relation to the other lamp.
 - c. one of a matched pair does not show a light of the same intensity and colour as the other.
 - d. a main beam headlamp cannot be switched off by operating one switch which at the same time leaves a pair of dipped beams.

Lamps (continued)

TYPE		DATE OF FIRST USE (MANUFACTURE FOR TRAILERS)	POSITION			COLOUR
			Max distance from side (mm)	Max height (mm)	Minimum height (mm)	
Front position lamps	Motor vehicles	From April 1986	400	1500 or if impracticable 2100	-	White or yellow if in a headlamp which shows yellow light
		Before April 1986	510	2300	-	
	Trailers	From October 1985	150	1500 or if impracticable 2100	-	white
		Before October 1985	510	2300	-	
Front End Outline Marker Lamp	Motor vehicles	From April 1991	400	-	The top of the lamp shall be no lower than the top of the windscreen	white
	Trailers	From October 1990	400	-	As high as possible with regard to the lateral position, being a pair and the use for which the vehicle is constructed	
Dipped Beam Headlamp		From 1972 (refer to Lighting regulations for earlier vehicles)	400	1200	500	white or yellow
Main Beam Headlamp		from 1931	No closer to the side than the dipped beam lamp	-	-	white or yellow
Rear Position lamps	Motor vehicles	From April 1986	400	1500 or if impracticable 2100	350	Red
	Trailers	From October 1985				
	Motor vehicles	Before April 1986	800	2100	-	
	Trailers	Before October 1985				
Rear End Outline Marker Lamps	Motor vehicles	From April 1991	400	-	As high as possible with regard to the lateral position, being a pair and the use for which the vehicle is constructed	Red
	Trailers	From October 1985				
Stop Lamps		From 1971 (refer to lighting regulations for earlier vehicles)	One on each side with a minimum separation distance of 400mm	1500 or if impracticable 2100	350	Red
Rear Registration Plate Lamp		All vehicles and trailers	-	-	-	white
Rear Fog Lamp	Motor vehicles and trailers	From April 1980	Where one lamp is fitted: On centre line or offside of vehicle. Where two are fitted they must be a matched pair.	1000	250	Red
Side marker lamps	Motor vehicles	1 April 1991	-	2300	-	Amber or red if within 1m of the rear of the vehicle
	Trailers	1 October 1990	-	2300	-	Amber or red if within 1m of the rear of the trailer or if fitted to a trailer built before October 1990 it may be white when viewed from the front and red when viewed from the rear.



Direction Indicators and Hazard Warning Lamps

Application

Direction indicators

This inspection applies to all vehicles first used after 1 January 1936 and trailers manufactured from 1 September 1965.

Side repeaters are required on motor vehicles first used from 1 April 1986.

Hazard warning lamps

This inspection applies to all vehicles fitted with hazard warning lamps.

They need not be fitted to vehicles first used before 1 April 1986.

If fitted to a vehicle first used from 1 April 1986 they must also operate the indicators of any trailer which is being towed.

Procedure and Standards

Check for correct operation, visibility, cleanliness, completeness and security.

Direction indicators

- Check that one or more indicators are fitted and visible to the front and to the rear on each side of the vehicle. All indicators fitted must work. Check that the indicators on a trailer operate on the same side as those on the towing vehicle.
- These must show amber light unless fitted to a vehicle first used before 1 September 1965 when both indicators may show white to the front or red to the rear.
- The tell-tale on direction indicators may be audible rather than visual but for hazard warning lamps it must be a flashing light. A tell tale is not required if the operation of one or more indicators on each side can be seen from the driver's seat.
- Check that they flash at between 60 and 120 times per minute. If they flash at a rate below 60 times per minute, recheck with the engine running.
- A semaphore indicator is acceptable. It must illuminate when in operation, must not stick and is not required to flash.

Hazard Warning Lights

The tell-tale shall be a flashing light which may operate in conjunction with any direction indicator tell-tale.

Direction Indicators and Hazard Warning Lamps *(continued)*

Reasons for Failure

1. Direction Indicator:
 - a. missing, inoperative, operating on the wrong side of a trailer, dim or not visible either to the front or to the rear.
 - b. side repeater missing or not visible to the rear.
 - c. lens missing, insecure or damaged so that it is likely to fall apart.
 - d. does not flash at between 60 to 120 times a minute.
 - e. does not show a light of the right colour.
 - f. tell-tale not fitted, is inoperative or cannot be seen/heard by the driver.
 - g. rate of flash or illumination is affected by any other lamp.
 - h. a semaphore indicator sticking.
2. Hazard warning lamp:
 - a. does not operate with the engine stopped and the ignition switched off.
 - b. all the direction indicator lamps do not operate simultaneously when switched on by one switch.
 - c. tell-tale not fitted, is inoperative or cannot be seen by the driver.

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Aim of Headlamps

Application

The headlamp aim criteria is applicable to all dipped beam headlamps.

Procedure and Standards

Align the headlamp aim testing equipment to the vehicle in accordance with the manufacturers instructions.

The standards to be applied are shown adjacent to the beam patterns likely to be encountered.

Notes:

Headlamp beam converters fitted to right hand dipping headlamps, of vehicles which are mainly used on the continent, which effectively mask/deflect the beam are acceptable provided that the pass/fail criteria is met.

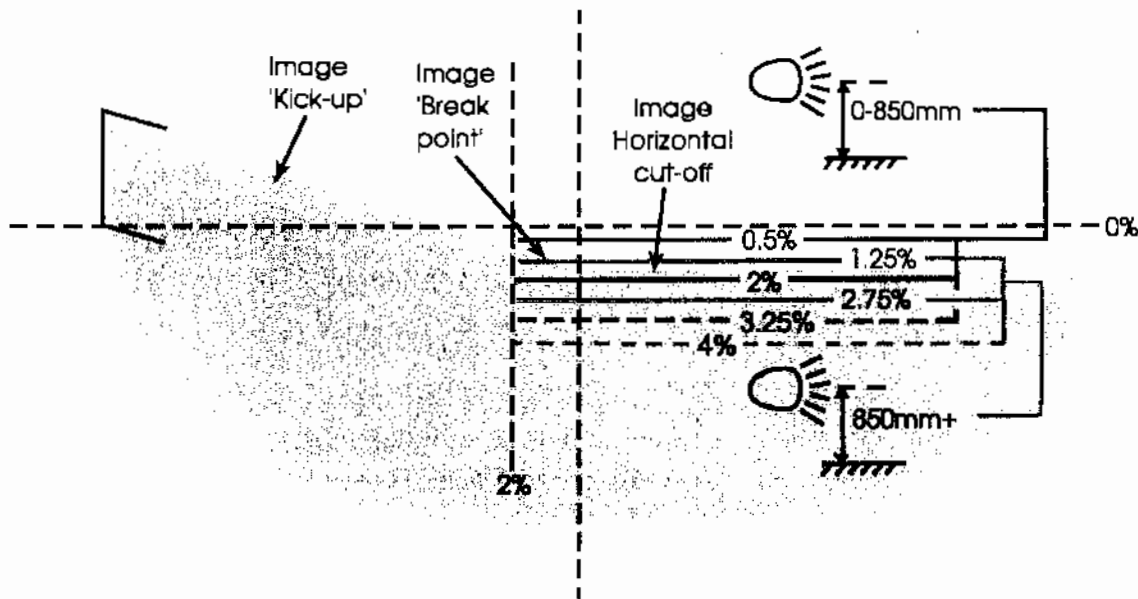
Some vehicles may be fitted with an "in-cab" headlamp adjustment device. This may be adjusted to enable both headlamps to meet the criteria; however both headlamps must comply with the requirements with the device set in one position.

Most modern vehicles are fitted with European headlamps. Dipped beam headlamps can be identified from the marking on the lamps. There will be a "C" shown above an "E" or "e" mark.

If the beam pattern is blurred due to condensation and does not show a distinctive cut off point for the examiner to determine whether the alignment is correct this will be a failure under Reason for Failure 1.

Reasons for Failure

European: Checked on Dipped Beam.



1. In relation to the 0% Horizontal line, the beam horizontal cut-off line is not between the limits listed in the table.

	Headlamp centres up to 850mm high	Headlamp centres Over 850mm high
Upper limit: All vehicles	0.5%	1.25%
Lower limit: Category "A" vehicles. See note below	2.0%	2.75%
Lower limit: Category "B" vehicles. See note below	3.25%	4.0%

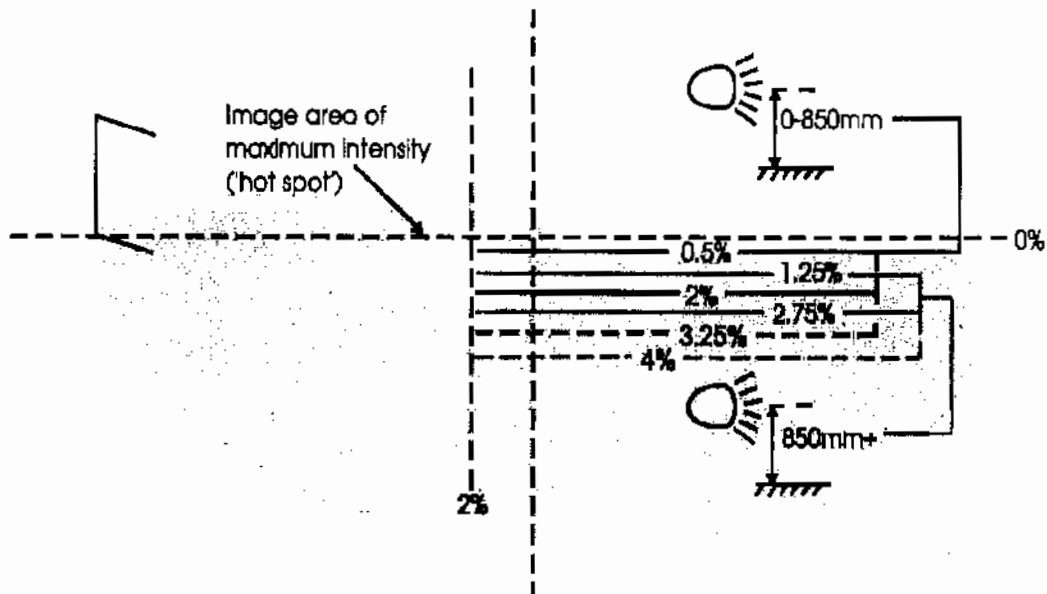
2. In any case the image break point is to the right, or more than 2.0% to the left, of the vertical 0% line.
3. A Headlamp dips to the right. (See note in Procedures and Standards).

Note: **Category "A" vehicles** are any vehicles not covered by category "B".

Category "B" vehicles are 2 or 3 axled rigid vehicles with a wheelbase of 5m or less (measured to the centre line of the bogie) and all 2 or 3 axled tractor units in either case not fitted with self levelling rear suspension, self levelling headlamps or a driver's headlamp aim adjustment control.

Reasons for Failure

British American: Checked on Dipped Beam.



4. In relation to the 0% Horizontal line, **the upper edge** of the "Hot Spot" is not between the limits listed in the table.

All headlamp heights

Upper limit: All vehicles	0%
Lower limit: Category "A" vehicles. See note below	2.75%
Lower limit: Category "B" vehicles. See note below	4.0%

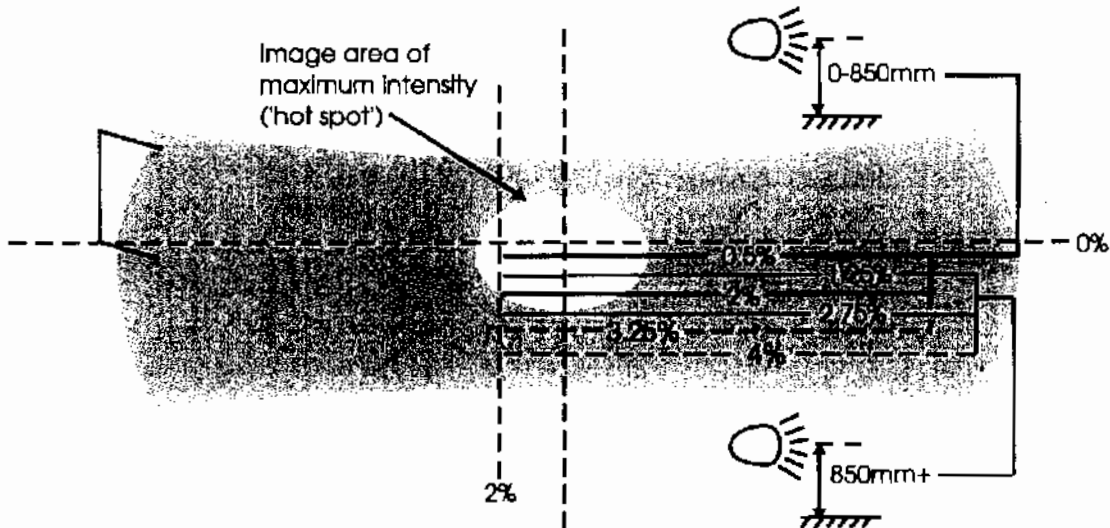
5. The right hand edge of the "Hot Spot" is to the right of the vertical 0% line or more than 2% to the left of it.
6. A Headlamp dips to the right. (See note in Procedures and Standards).

Note: **Category "A" vehicles** are any vehicles not covered by category "B".

Category "B" vehicles are 2 or 3 axled rigid vehicles with a wheelbase of 5m or less (measured to the centre line of the bogie) and all 2 or 3 axled tractor units in either case not fitted with self levelling rear suspension, self levelling headlamps or a driver's headlamp aim adjustment control.

Reasons for Failure

British American: Checked on Main Beam.



7. In relation to the 0% Horizontal line, **the centre** of the "Hot Spot" is not between the limits listed in the table.

	Headlamp centres up to 850mm high	Headlamp centres Over 850mm high
Upper limit: All vehicles	0%	0%
Lower limit: All vehicles.	2.0%	2.75%

8. In any case the centre of the "Hot Spot" is to the right, or more than 2.0% to the left of the vertical 0% line.

9. A Headlamp dips to the right. (See note in Procedures and Standards).

Service Brake Performance

Application

This inspection applies to all vehicles and trailers.

Procedure and Standards

To avoid damage to the vehicle or the equipment, no tyre must be obviously underinflated.

In the case of vehicle and trailer combinations, each unit of the combination is considered separately.

In this section of the manual, the term "drum" includes "discs".

If the vehicle can be tested on a roller brake test machine proceed, as follows:

Roller Brake Test Machines Operating With V.I. Computer Controlled Brake Test

Follow the sequence of instructions as displayed and prompted on screen. On completion of the test a result sheet is printed indicating the test result.

Other Roller Brake Test Machines

Following the manufacturer's instructions, for each wheel in turn:

- Check for binding.

Note: Before failing a vehicle for binding, examiners should be aware that drag at a wheel may be recorded which is not necessarily due to brakes, but may be due to transmission drag, or by the deformation of the tyres on the rollers, which on a fully laden 10,000 kg axle could be as much as 250kg. A recorded bind in excess of 4% of the measured axle weight should be considered a Reason for Failure.

- Apply the brake slowly and check for abnormal time lag in operation.
- Hold at a steady pedal pressure and check for brake force fluctuations.(This check only applies to steered wheels on motor vehicles).

Note: Brake effort fluctuation of more than 70% of the higher brake effort recorded at a steady pedal pressure is a Reason for Failure. For ease of calculation if the higher brake effort divided by the lower brake effort is greater than 3.3 this is a Reason for Failure.

- Continue to apply the foot brake until the road wheel is just at the point of slip relative to the rollers, or until the service brake is fully applied, whichever occurs first. Note the maximum recorded brake effort.

Note: The highest reading obtained should be recorded when the brake force from any one wheel is fluctuating in a regular manner between two readings,(eg, 1850kg should be recorded where the needle reading was fluctuating between 1750kg and 1850kg).

- Using the maximum recorded forces for each wheel on an axle, check that the braking effort from any wheel is 70% or more of the effort of the other wheel on the same axle. When wheels lock, this Reason for Failure will not apply if both the wheels lock, or if one wheel locks and the braking effort of the locked wheel is less than that of the other.

Service Brake Performance *(continued)*

Procedure and Standards (cont'd)

- Little or no brake effort recorded at any road wheel, should be considered a Reason for Failure if less than 5% of the measured axle weight is not attained.

Notes: In the case of a motor vehicle the brake data cards should be used wherever possible.

Locked Wheels.

If more than half the number of wheels lock, the specified brake effort can be considered to be met. On a motor vehicle where not more than half the wheels lock, the allowances contained in the data card information must be taken into account.

Load Simulation.

To obtain a higher reading for brake effort than is possible with the vehicle as presented, use a load simulator to apply a load whenever practicable, or have the vehicle loaded. Certain three axled tractor units can only be satisfactorily brake tested when presented coupled to a laden semi-trailer. Where this is the case stations must insist that the combination is suitably loaded so that axle weights are higher than 65% of the design axle weight.

Vehicles fitted with Load Sensing valves.

Where possible the load simulator should be used to apply a load, so that the valve operates. Where it is not possible to apply a load, the driver may be allowed to temporarily disconnect the valve linkage, or otherwise by-pass the valve, immediately before the brake test, to allow the required braking force to be achieved. The driver must ensure that the valve has been restored to its proper working condition before the vehicle leaves the Testing Station. Failure to do so may break the law.

Deceleration Test.

If the vehicle cannot be roller brake tested, or for any other reason a decelerometer test is required, proceed as follows;

1. Set the decelerometer on the vehicle in accordance with the instrument manufacturer's instructions.
2. At a speed of approximately 20mph, have the service brake applied, note the reading on the decelerometer and whether the vehicle deviates from a straight line.

Double Drive Rear Axle - Interposing Differential

Before carrying out a brake test on a vehicle fitted with a double drive rear axle it will be necessary to establish whether an interposing differential is fitted or not. A check can be carried out by using the R.B.T. in the following manner:

- Instruct the driver to release all brakes and ensure the gear lever is in the neutral position.

Service Brake Performance *(continued)*

Procedure and Standards (cont'd)

- Start the nearside roller in the forward direction and observe the offside wheel, if this turns in the reverse direction no interposing differential is fitted and the brake test will need to be carried out as explained in paragraphs * *.
- If the running of one wheel has no effect on the other on the same axle, then the test can be conducted as for a single drive axle.

* * If no interposing differential is fitted carry out the test as follows :

- Place chocks at front and rear of the wheels of the front axle.
- Press and hold on N/5 button and 0/5 reverse button simultaneously, the wheel under test must turn forward and the opposite wheel on the same axle must turn in the reverse direction.
- Carry out the brake test as described above.

Note: Do not run the rollers any longer than necessary to obtain an accurate reading.

- Release both buttons together.
- Change direction of rollers and carry out test on the 0/5 wheel brake.
- Repeat the above procedure for all brake systems at this axle.
- Move the vehicle forward and carry out the same procedure for the second driving axle.

Note: A transmission brake fitted to a vehicle of this type can not be tested on a roller brake tester.

Drop off of brake effort

If drop off of brake effort is noted during the roller brake test, first confirm that it is drop off and not simply due to the driver releasing the brake pedal. If drop off is confirmed it will be appropriate to consider a failure under Inspection Manual item 59 Reasons for Failure 3 or 5.

Service Brake Performance (continued)**Procedure and Standards (cont'd)**

SERVICE BRAKE EFFICIENCY REQUIREMENTS				
Motor Vehicles	2 Axle Rigid vehicle first used before 1 January 1968 and with no manufacturer's plate	Rigid vehicle with more than 2 axles or any articulated tractor first used before 1 January 1968 and with no manufacturer's plate	Any other vehicle	
Specified Efficiency	45% GVW	40% GVW	50% GVW	
Semi-trailers and centre axle draw-bar trailers	Manufactured before 1 January 1968 with GVW 6100 kg or more	Manufactured before 1 January 1968 with GVW less than 6100 kg	Manufactured from 1 January 1968 to 30 September 1982	Manufactured from 1 October 1982
Specified Efficiency	35% TAW	32% TAW	40% TAW	45% TAW
Full draw-bar trailers	Manufactured before 1 January 1968	Manufactured from 1 January 1968 to 30 September 1982	Manufactured from 1 October 1982	
Specified Efficiency	40% GVW	50% GVW	45% GVW	

GVW is Design Gross Vehicle Weight

TAW is Design Total Axle(s) Weight



Service Brake Performance *(continued)*

Reasons for Failure

Roller Brake Test

1. A brake on any wheel binding.
2. Brake mechanism on any wheel sticking, indicated by an abnormal time lag before, an increased reading is obtained.
3. With service brake applied at a steady pedal pressure, the indication of brake effort fluctuates regularly with each revolution of the road wheel, on a steered axle, so much that the ovality of any brake drum is obvious. A fluctuation of recorded reading in excess of 70%, between highest and lowest indicated readings is to be considered a Reason for Failure.
4. With the service brake fully applied:
 - **a. there is little or no brake effort at any wheel.
 - *b. braking effort from any wheel on an axle is less than 70% of the brake effort from another wheel on the same axle.
 - *c. the specified brake effort is not met.
5. Decelerometer test.
 - a. The braking efficiency recorded by decelerometer is below the specified efficiency for the vehicle under test, or the vehicle deviates appreciably from a straight line.

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Secondary Brake Performance

Application

This inspection applies to all motor vehicles.

Note: Certain vehicles may have brake systems split in such a way that it is impossible to assess separately with a roller brake tester, the performance of the secondary brake. In these cases, the vehicle should be accepted, unless there is clear evidence that either half of the system is defective.

Procedure and Standards

To avoid damage to the vehicle or the equipment, no tyre must be obviously underinflated.

Roller Brake Test Machines Operating With V.I. Computer Controlled Brake Test

Follow the sequence of instructions as displayed and prompted on screen. On completion of the test a result sheet is printed indicating the test result.

Other Roller Brake Test Machines

For each road wheel in turn apply the secondary brake until the:

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- road wheel is just at the point of slip relative to the rollers, or
- the secondary brake is fully applied, whichever occurs first.

Note the maximum braking effort indicated from the brake of each road wheel.

Where the nominated secondary braking system does not meet the specified braking requirement, the examiner may take into account the efficiency of any other system which is acceptable as a secondary system, providing the brake can be applied progressively.

Note: There may be occasions where the specified brake effort is met but, if the brake effort from any wheel on an axle is one third or less than the brake effort from another wheel on the same axle, it may be necessary to consider Reason for Failure 5a of Inspection 59. The notes relating to Locked Wheels and Load Simulation under Inspection 71 also apply to this inspection.



Secondary Brake Performance *(continued)*

Procedure and Standards (cont'd)

SECONDARY BRAKE EFFICIENCY REQUIREMENTS			
Motor Vehicles	2 Axle Rigid vehicle first used before 1 January 1968 and with no manufacturer's plate	Rigid vehicle with more than 2 axles or any articulated tractor first used before 1 January 1968 and with no manufacturer's plate	Any other vehicle
Specified Efficiency	20% GVW	15% GVW	25% GVW

GVW is Design Gross Vehicle Weight

Reasons for Failure

1. With the secondary brake fully applied:
 - a. There is little or no braking effort at any wheel equipped with a brake operated by the secondary brake system.
 - *b. The specified brake effort is not met.

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Parking Brake Performance

Application

This inspection applies to all vehicles.

Procedure and Standards

To avoid damage to the vehicle or the equipment, no tyre must be obviously under-inflated.

It is necessary to use an applied brake method of testing as described below, except for vehicles with transmission parking brakes, or if the R.B.T. is not capable of carrying out an applied test. In these cases it is necessary to use the ALTERNATIVE method as described below.

Roller Brake Test Machines Operating With V.I. Computer Controlled Brake Test

Follow the sequence of instructions as displayed and prompted on screen. On completion of the test a result sheet is printed indicating the test result.

Applied Brake Test on a Roller Brake Tester

Apply the parking brake fully and release any power assistance. The service brake may be used at this stage in setting the park brake. Start each brake machine roller in turn and note the maximum braking effort indicated for each wheel in turn.

Alternative method

With the roller brake test machine driving each road wheel in turn, apply the parking brake slowly until each road wheel is just at the point of slip relative to the rollers, or until the parking brake is fully applied, whichever occurs first. Note the braking maximum effort indicated from the brake of each road wheel.

Transmission Parking Brakes.

If the parking brake is a transmission brake, all wheels on the same axle braked by it must be driven by the roller test machine at the same time.

Roller Brake Test.

With the roller brake machine driving both road wheels together, instruct the driver to apply the transmission brake as slowly as possible, constantly keeping the release button depressed, until any road wheel is just at the point of slip relative to the rollers, then release the brake quickly. Note the braking effort indicated from the brake of each wheel.

Note: There may be occasions where the specified brake effort is met but, if the brake effort from any wheel on an axle is one third or less than the brake effort from another wheel on the same axle, it may be necessary to consider Reason for Failure 5a of Inspection 59. The notes relating to Locked Wheels and Load Simulation under Inspection 71 also apply to this inspection.

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Parking Brake Performance *(continued)*

Procedure and Standards (cont'd)

PARKING BRAKE EFFICIENCY REQUIREMENTS			
Motor Vehicles	Any vehicle first used before 1 January 1968	Any vehicle first used from 1 January 1968 apart from a Type Approved articulated tractor or drawing vehicle	A Type Approved* articulated tractor or drawing vehicle
Specified Efficiency	-	16% GVW	16% GVW 12% GTW
Semi-trailers and Draw-bar trailers	Manufactured before 1 January 1968	Any other trailer	
Specified Efficiency	-	16% GVW	

GVW is Design Gross Vehicle Weight.

GTW is Design Gross Train Weight.

TAW is Design Total Axle(s) Weight.

*Type Approved - Manufactured from 1 October 1982 and first used from 1 April 1983 and has been issued with a Type Approval Certificate of Conformity, a Ministers Approval Certificate or a Type Approval Certificate issued by an EU member state.

Reasons for Failure

1. With the parking brake fully applied:
 - a. There is little or no braking effort at any wheel equipped with a brake operated by the parking brake system.
 - *b. The specified brake effort is not met.

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Other Dangerous Defects

Application

This applies to all vehicles and trailers.

Procedure and Standards

Whilst this manual attempts to be comprehensive and cover all reasons for failure which could be dangerous it is inevitable that due to changes in design, or other reasons, from time to time dangerous defects may be found which are not described in any of the reasons for failure in the other items in this manual. If a defect of this type is found, which is such that the use of the vehicle on the road would involve a danger of injury to any person, this would justify a failure under this item. In addition it would be appropriate to issue an Immediate Prohibition for a defect of this nature.

It is not intended that this item should be used as a matter of routine but only for exceptional cases. If a failure is recorded under this item full details must be shown on the test card and a copy should be sent to Technical Services Branch so that any trends can be noted and amendments made to the manual if necessary.

Reasons for Failure

- **1. A defect not described elsewhere in the manual such that the use of the vehicle on the road would involve a danger of injury to any person.

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CHAPTER 3-2
PUBLIC SERVICE VEHICLES
CONTENTS

Para

- 1 Public service vehicles

PUBLIC SERVICE VEHICLES

1 This Chapter explains to everyone engaged in the practical work of vehicle examination and maintenance:

- 1.1 The application of specific relevant requirements.
- 1.2 The procedures and standards to be used.
- 1.3 The reason for failure.

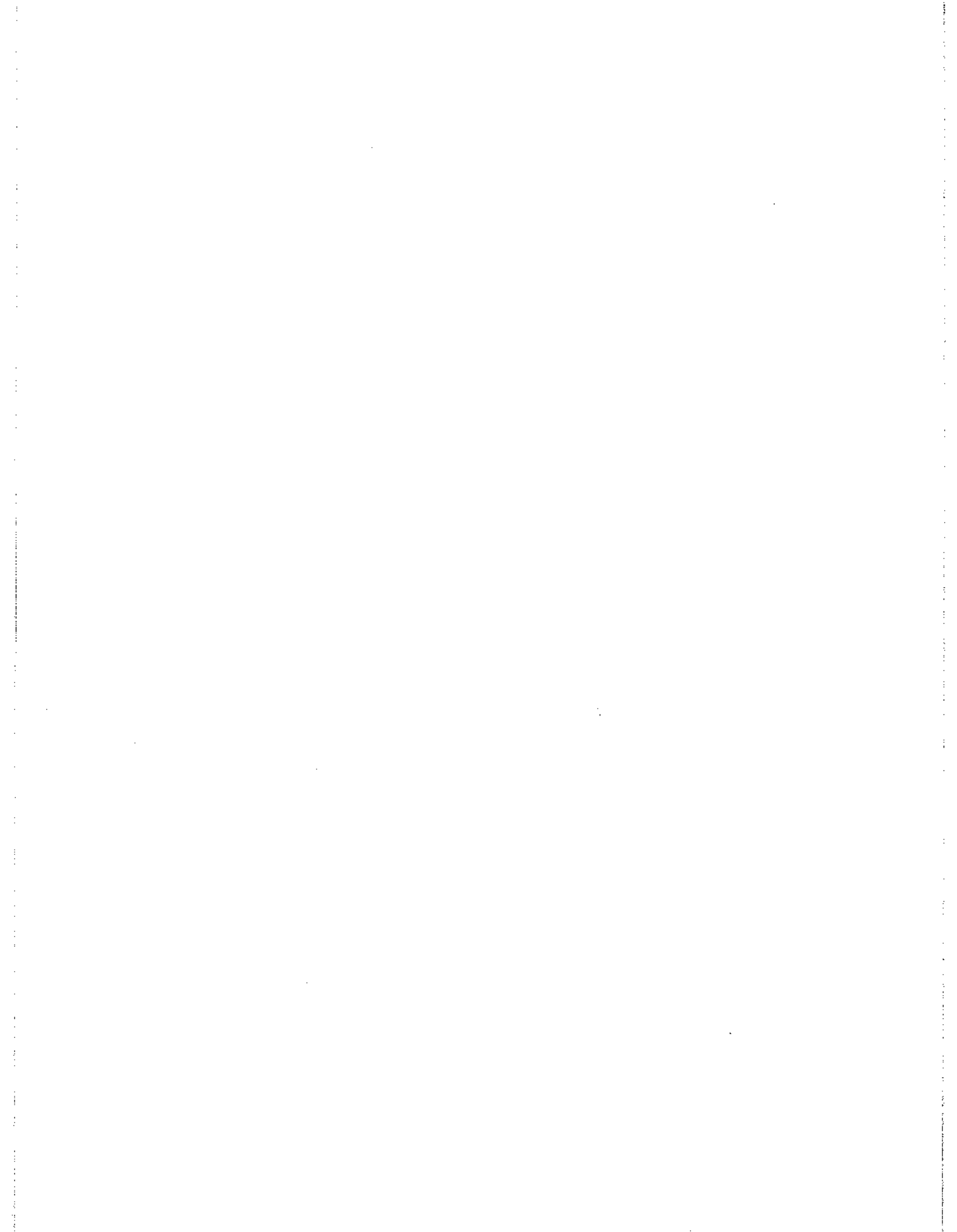
2 The procedures given assume that only the parts of a vehicle, which can readily be seen without dismantling, are to be examined. However, it may be necessary to remove panels or equipment where it is not otherwise possible to inspect safety critical items.

3 Each inspection has been allocated a number, which is given at the top of the page. This number is cross-referenced to the entries in the column marked PSV on the AF G932(B). Not all inspection numbers have been allocated.

4 As it is not practicable to lay down limits of wear or tolerance for components of specific vehicle types the following points should be considered when carrying out the inspection:

- 4.1 Refer to the Vehicle Inspection Standard.
- 4.2 The function of the component and its contribution to the road safety of the vehicle.
- 4.3 Whether the component has clearly reached the stage where repair, replacement or adjustment is necessary to ensure the road safety of the vehicle.
- 4.4 Whether the condition of the component appears to break the law.

5 Inspectors should note that apart from those exemptions listed, against particular vehicle types, under specific inspections, further exemptions apply to MoD vehicles. However where such items are fitted they should be serviceable. Where a testable item is not fitted as part of the original vehicle build standard, inspectors should assume that an exemption is in place. If in doubt clarification should be sought from the ESPD or through the appropriate ES chain of command to the ESM.



**Public Service Vehicle
Inspection Manual**

Interpretation of Terms used in the Manual

Annex VII

This means Annex VII to bus Directive 2001/85/EC and 'Annex VII vehicle' means a bus Directive vehicle required to comply with Annex VII.

Articulated Bus

An articulated bus is one which can be divided into two or more parts, normally by the use of workshop facilities. Passengers can move freely from one part of the bus to the other.

Automatically Operated Service Door

'automatically operated service door' means a power-operated service door which can be opened (other than by means of emergency controls) only after a control is operated by a passenger and after activation of the controls by the driver, and which closes again automatically.

Bus Directive Vehicle

This means a bus or coach which meets the requirements of the bus directive EC 2001/85. The vehicle may have a full type approval or may have been inspected to the requirements of the directive. The technical print for the vehicle will indicate "Bus Directive" vehicles.

Coach

Large bus with a maximum gross weight of more than 7.5 tonnes and a maximum speed exceeding 60mph.

Corrosion

The effect of corrosion on the safety of the vehicle depends on:

- Its extent.
- The function of the section on which it has occurred.

A small amount of corrosion on an important part of a vehicle structure can make a vehicle unsafe where it destroys the continuity of the load bearing structure.

On the other hand heavy corrosion of unimportant sections may have no effect on the vehicles safety.

Assessment

The inspector should determine whether excessive corrosion exists by visual inspection and then by finger and thumb pressure.

If necessary careful scraping or light tapping of the area is permitted.

Corrosion affected heavy gauge metal may be tapped harder than light gauge, but unwarranted force and damage must be avoided.

Interpretation of Terms used in the Manual *(continued)*

Failure Criteria.

Any part of a load bearing member or load bearing panelling should be rejected if it is weakened by corrosion to the extent that.

- By finger/thumb pressure it does not feel rigid, or
- It crumbles to leave a hole, or
- When tapped there is penetration, or it causes the metal to crumble or disintegrate.

Cracked

A flaw or split in a component.

Damage

When assessing the extent of damage it is important to consider whether the performance of the component/system will be impaired or if the component/system is likely to fail prematurely.

Damage fulfilling either of these criteria is not acceptable and will be a Reason for Failure.

Deteriorated

This will be a reason for failure if the component or system is weakened to such an extent that it can no longer adequately perform its function.

ECE Regulation vehicle

This means a bus which has been built or approved to ECE regulation 36 (buses with more than 22 passengers), ECE regulation 52 (buses with not more than 22 passengers) or ECE regulation 107 (Double Deck buses).

Excessive travel

An abnormal amount of movement which clearly indicates that a component has reached a stage when it requires remedial action to enable it to either:

- a. operate effectively as designed, or
- b. prevent it from reaching the end of its permitted travel, or
- c. prevent it from exceeding manufacturers' known maximum permitted limits.

Excessive wear

A component which is worn to such an extent that it is either:

- a. likely to fail, or
- b. clearly not functioning effectively as designed, or
- c. visibly worn beyond manufacturers' known permitted limits, or
- d. likely to affect the operation or condition of another safety related component.

Interpretation of Terms used in the Manual *(continued)*

First use dates

Throughout this manual we have used the terms "before" and "from" when referring to first use dates. The term "from" should be taken to be the same as on or after a certain date.

Where there is a first use date quoted this will not normally apply if the vehicle was built more than 6 months before that date.

Fouling

This will only be a Reason for Failure if contact of two parts is likely to cause damage to, or restrict the movement of, a component.

Fractured / broken

Gap, opening or rupture where separation has taken place.

Insecure

The term "insecure" is used many times throughout this Guide to describe a defective condition. This term should be taken by vehicle inspectors to mean either:

- that a component on the vehicle has relative movement (looseness) either at its fixings or in relation to an associated component where there should be none, or
- that a component is not safely or completely attached either at its fixing or to an associated component.

All components on a vehicle need to be safely attached while it is in use on the road, however, how safe a component needs to be attached depends on its function.

Areas of the vehicle which are considered critical in terms of the ability of the vehicle to endanger the driver, any passengers and other users of the road, can tolerate fewer fixings which are broken, loose, missing or otherwise ineffective than those in a less critical part of the vehicle.

The proportion will depend on factors such as the design of the component etc, but as a general rule, no more than 20% (1 in 5) of the fixing devices should be loose etc. More than this proportion means that the remaining fixing devices could be overstressed and could therefore fail at any time.

Examples of critical systems include (this is not an exhaustive list):

- steering
 - brakes
 - suspension linkages
 - leaf spring anchors
 - trailer couplings
 - live (ie moving) transmission components
 - wheels and hubs
- Except those components not subject to heavy loads or forces eg power steering reservoirs or brake relay valves.

Interpretation of Terms used in the Manual *(continued)*

The proportion suggested above does not apply to:

- components in a critical area or system secured by a single fixing device. If this device is loose, broken etc then the component is to be considered insecure.
- components in a critical area or system where detailed instructions are given in the manual (eg wheel studs/nuts). In such cases, these instructions must be used in preference.

Components that are not part of a critical system eg some body panels can tolerate a higher proportion of their fixings either loose, broken etc. Again the proportion will depend on the design of the component but as a general rule no more than 33% (1 in 3) of the fixing devices should be loose, broken, missing or otherwise ineffective.

A component secured by a non-standard temporary means should be judged as if the temporary fixing was not fitted.

Large bus

A vehicle constructed or adapted to carry more than 16 seated passengers in addition to the driver.

Minibus

A motor vehicle which is constructed or adapted to carry more than 8 but not more than 16 seated passengers in addition to the driver.

Obligatory

Required to be fitted by law.

Schedule 6 Minibus

Where a requirement in this manual refers to a Schedule 6 minibus this means a minibus first used from 1 April 1988.

Service Door

'service door' means a door intended for use by passengers in normal circumstances with the driver seated.

Type Approved

A component or system fitted to a vehicle which has been issued with a Type Approval Certificate or Certificate of Conformity which shows that the system or component complies with the requirements of an EU Directive or ECE regulation.

List of Inspections

1	Not allocated	27	Horn
2	Not allocated	28	Driving Controls
3	Seat Belts	29	Not allocated
4	Not allocated	30	Steering Control
5	Exhaust Emissions	31	Not allocated
6	Road Wheels and Hubs	32	Not allocated
7	Size and Type of Tyres	33	Speed Limiter
8	Condition of Tyres	34	Pressure/Vacuum Warning and Build Up
9	Bumper Bars	35	Not allocated
10	Spare Wheel and Carrier	36	Hand Lever Operating Mechanical Brakes
11	Vehicle to Trailer Coupling	37	Service Brake Pedal
12	Not allocated	38	Service Brake Operation
13	Not allocated	39	Hand Operated Brake Control Valves
14	Wings and Wheel Arches	40	Not allocated
15	Not allocated	41	Condition of Chassis
16	Passenger Doors, Drivers Doors and Emergency Exits	42	Electrical Wiring and Equipment
17	Driver's Accomodation	43	Engine and Transmission Mountings
18	Driver's Seat	44	Oil and Waste Leaks
19	Security of Body	45	Fuel Tanks and Systems
20	Exterior of Body, including Luggage Compartments	46	Exhaust and Waste Systems
21	Interior of Body, Passenger Entrance, Exit Steps and Platforms	47	Not allocated
22	Mirrors	48	Suspension
23	Glass and View of the Road	49	Not allocated
24	Accessibility Features	50	Not allocated
25	Windscreen Wipers and Washers	51	Not allocated
26	Speedometer/Tachograph		

List of Inspections *(continued)*

- 52 Not allocated
- 53 Axles, Stub Axles and Wheel Bearings
- 54 Steering Mechanism
- 55 Not allocated
- 56 Not allocated
- 57 Transmission
- 58 Additional Braking Devices
- 59 Brake Systems and Components
- 60 Not allocated
- 61 Not allocated
- 62 Reflectors and Rear Markings
- 63 Lamps
- 64 Not allocated
- 65 Not allocated
- 66 Direction Indicators and Hazard Warning Lamps
- 67 Aim of Headlamps
- 68 Not allocated
- 69 Not allocated
- 70 Not allocated
- 71 Service Brake Performance
- 72 Secondary Brake Performance
- 73 Parking Brake Performance
- 74 Other dangerous defects

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Standards for Prohibition Issue at Annual Test

This provides a standard for the issue of Prohibition Notices where serious defects are observed during statutory tests.

The aim of the policy is to:

protect the public from vehicles returning from annual test where extremely serious defects have been observed.

provide information about such occurrences to the enforcement wing of the organisation and to Traffic Commissioners.

improve the consistency of the treatment of operators.

let operators know what the rules are so that they know and understand our standards for prohibition issue at annual test.

preserve a balance between providing a flexible customer focused testing service and providing the general public with protection from loss or injury from vehicles returning from test with serious roadworthiness defects.

The approach, in principle, is to apply the immediate prohibition criteria in the Categorisation of Defects to a core of safety critical items.

Note:

Where a Reason for Failure in the accompanying table is marked with ** this means that any failure for this item will result in the issue of an immediate prohibition.

Where a Reason for Failure is marked with * the examiner will need to assess the severity of the defect in line with the Categorisation of Defects criteria (outlined in the defects column of the table in the following pages) before deciding whether to issue an immediate prohibition.

Manual Reference	Defect	COD Page	Reason for failure
IM 6 Road Wheels and Hubs	Failure of a road wheel imminent Detachment of a road wheel or hub imminent	3-4	2a* 3a*
IM 8 Condition of Tyres	Tyre bulging caused by separation/ failure of the tyre structure Tyre tread worn below the legal minimum on tyre fitted to a steered wheel A tyre so severely damaged that failure of the tyre is likely	6-8	1b** 1h* 1c*
IM 11 Vehicle to Trailer Coupling	Failure of the coupling and detachment of the trailer likely	11-13	1c* 4c*
IM 28 Driving Controls	Driving control defective to the extent that it is incapable of fulfilling its function and affect the control of the vehicle	41	1d*
IM30 Steering Controls	Controls so defective that direction control of the vehicle is affected	43	1c* 1d* 2a*
IM 34 Pressure/Vacuum Warning	Warning device fails to cease operating (indicating reservoirs not filling) – within 6 minutes for a rigid vehicle, 9 for vehicle /trailer combinations	45-46	3*
IM 36 Hand Lever Operating Mechanical Brakes	Cannot be operated to perform its function Cannot be set or likely to disengage	47	1d* 1f**
IM 37 Service Brake Pedal	Cannot be operated to perform its function	48	1c* 2b*
IM 38 Service Brake Operation	Vacuum assistance is not working	49	3a**
IM39 Hand Operated Brake Control Valve	Valve unable to be set in the on position or moved over its original full travel	50	1d* 1g*
IM 44 Oil and Waste leaks	Continuous flow of oil or serious risk of fire	54	1* 2* 3*
IM 45 Fuel tanks and systems	Detachment of tank imminent Filler cap missing or defective such as to prevent gushing Continuous fuel leak or a leak constituting a hazard to other road users.	55	1a** 2b** 4a* 4c* 3a*

Manual Reference	Defect	COD Page	Reason for failure
IM48 Suspension	Failure of a major suspension component imminent which would affect the control of the vehicle	57-61	This item covers all Reasons for Failure. Examiners will need to consider will the defect affect the control of the vehicle.
IM 53 Axles, stub axles and wheel bearings	A main component so defective that failure is imminent and likely to affect the steering	62	This item covers all Reasons for Failure. Examiners will need to consider will the defect affect the control of the vehicle.
IM 54 Steering mechanism	Steering mechanism so stiff or rough in operation that its operation is restricted Mechanism fractured or twisted to the extent that failure or detachment is imminent	63-66	1a* 2c* 2a* 2i*
IM 59 Brake Systems and Components	Any defect likely to lead to a total failure of a braking system	69-75	This item covers all Reasons for Failure. Examiners will need to consider will the defect affect the control of the vehicle.
IM 63 Lamps	Any defect or combination of defects which make all the stop lamps inoperative	80	3a*
IM 71 Service Brake Performance	With the service brake applied: There is little or no brake effort at any wheel Braking effort from any wheel on a steered axle is less than 70% of the brake effort from another wheel on the same axle. Efficiency significantly below legal requirements (before issuing the examiner must consider whether the vehicle, as presented, would pose an immediate danger to road safety)	83-84	4a** 4b* 4c* 5a*
IM 72 Secondary Brake	Efficiency significantly below legal requirements (before issuing the examiner must consider whether the vehicle, as presented, would pose an immediate danger to road safety)	85-86	1b*
IM 73 Parking Brake	Efficiency significantly below legal requirements (before issuing the examiner must consider whether the vehicle, as presented, would pose an immediate danger to road safety)	87	1b*

Manual Reference	Defect	COD Page	Reason for failure
IM74 Other Dangerous Defects	A defect not described elsewhere in the Inspection Manual such that the use of the vehicle on the road would involve a danger of injury to any person.		1**

Seat Belts

Application

This inspection applies to all buses which have seat belts fitted.

Procedure and Standards

Certain buses require seat belts regardless of their use (Obligatory belts). These are shown below along with the seat belts which are required. These must be checked to ensure that seat belts are fitted to the seats on which they were determined to be needed at the time of certification.

Minibuses with 9-12 passenger seats and with unladen weight not exceeding 2540kg first used before 1 October 1988.

Date of first use	Seat position	Type of belt
From 1 January 1965 to 31 March 1982	Driver's and any specified passenger's seat	Three point adult belt or body restraining belt
From 1 April 1982 to 30 September 1988	Driver's and any specified passenger's seat	Three point adult belt

Minibuses (not exceeding 3500 kg design gross weight) and coaches first used from 1 October 1988 until 30 September 2001:

Date of first use	Seat position	Type of belt
Seat Position	Minibus (not exceeding 3500 kg design gross weight)	Coach
Driver's	Three point adult belt Must be able to be locked and released by single action. (Exemption for disabled drivers)	Three point adult belt or a lap belt designed for an adult or a disabled persons belt. Must be able to be locked and released by single action. (Exemption for disabled drivers)
Specified passenger's	Three point adult belt If alongside the driver must lock and release with a single action	
Any other foremost forward facing front	Three point adult belt or a lap belt designed for an adult	Three point adult belt or a lap belt designed for an adult or a disabled persons belt
Other forward facing (not protected by high back seats) and crew seats		Three point adult belt or a lap belt designed for an adult or a disabled persons belt

Seat Belts *(continued)***Procedure and Standards (cont'd)**

Buses, coaches and minibuses first used from 1 October 2001 which are not authorised to carry standing passengers.

Seat Position	Not exceeding 3500 kg design gross weight	Exceeding 3500 kg design gross weight
All forward and rearward facing seats including the driver's seat.	<p>An inertia reel 3 point belt or</p> <p>A retractable lap belt (on rearward facing seats only) or</p> <p>A disabled person's belt or</p> <p>A child restraint</p> <p>Seat belts for the driver and specified passenger along side the driver must be able to be locked and released with a single action. (Exemption for disabled persons belt)</p>	<p>An inertia reel 3 point belt or</p> <p>A retractable lap belt or</p> <p>A disabled person's belt or</p> <p>A child restraint</p> <p>Buses</p> <p>Seat belts for the driver and specified passenger along side the driver must be able to be locked and released with a single action. (Exemption for disabled persons belt)</p> <p>Coaches</p> <p>Driver's seat belt must be able to be locked and released with a single action. (Exemption for disabled persons belt)</p>
On vehicles constructed for the secure transport of prisoners the driver's seat and any seat for front seat passengers	<p>An inertia reel 3 point</p> <p>Seat belts for driver and specified passenger along side the driver must be able to be locked and released with a single action. (Exemption for disabled person's belt)</p>	<p>An inertia reel 3 point</p> <p>Seat belts for driver and specified passenger along side the driver must be able to be locked and released with a single action. (Exemption for disabled person's belt)</p>

Note : a harness belt may be used as an alternative to a three point or lap belt. The requirement for a buckle to lock with a single action does not apply to harness belts

Seat belts may be fitted to all types of minibuses, buses and coaches, both single and double decked, and may be in addition to those required above. It will not be necessary to carry out the installational check unless extra belts have been fitted since the last test, but the condition check must be carried out on all belts and fittings on the vehicle.

Seat Belts *(continued)***Inspections required**

First Used	Inspection required
Before 1 October 2001	Condition check and standard installation check where seat belts or extra seat belts added since last test
From 1 October 2001	<p>Condition check</p> <p>Installation checks are not required on vehicles which have not been modified since certification.</p> <p>If the number of seats fitted with seat belts is greater than the number shown on the technical record for the vehicle see the section below on the Enhanced Installation Check</p>

Condition inspection of all seat belts fitted

As far as is practicable without dismantling, check the condition of the vehicle structure around the seat belt anchorage points (i.e. within 300mm (12") of the anchorage). Where a seat belt is mounted to a seat frame this will apply to all seat mounting points. The floor-mounted anchorage points might need to be inspected from underneath the vehicle.

Pull each seat belt webbing against its anchorage to see that it is properly secured to the vehicle structure.

Note: For seats with integral seat belts, it might not be possible to examine the fixing of the seat belt to the seat.

Fasten each belt locking mechanism and then try to pull the locked sections apart. On retracting seat belts, check that with the mechanism fastened and the seat unoccupied, excess webbing is wound into the retracting unit.

Note: Some types of retracting belt might need manual help before they retract. Operate the release mechanism while pulling on the belt to check that the mechanism releases when required.

Examine flexible buckle stalks for

- a) signs of corrosion or weakness. Pull the sheaths aside, if this can be done without damage
- b) 'waggle' flexible buckle stalks and listen for a clicking noise indicating broken strands of cable

Examine the condition of all seat belt webbing for cleanliness, cuts or obvious signs of deterioration. Pay particular attention to webbing around anchorages, buckles and loops.

Examine the condition of the attachment fittings and adjusting fitting on each belt.

Check the seats to which seat belts are attached for security and for cracks or fracture of the leg and frame

Seat Belts *(continued)*

Procedure and Standards (cont'd)

Standard Installation Check

All belts should be checked for installation, operation and wear, except for the following categories which shall be checked for operation and wear only:

1. seat belts provided for rear or side facing seats
2. disabled person's belts which are permanently attached to the vehicle.
3. child restraints which are permanently attached to the vehicle.
4. obligatory seat belts as specified above.

No check is required for disabled person's belts or child restraints which are not permanently attached to the vehicle.

It will be necessary to ask the operator to remove seat cushions and to open any access flap or luggage locker door, which was designed to be capable of being readily opened, to allow as much as possible of the seat belt installation to be seen. Some parts of the installation may only be visible with the vehicle on a pit or hoist.

Where a vehicle is fitted with a type approved belt installation it will not be necessary to carry out an installational check. These belts are at present only likely to be fitted to buses with factory installed belts. Details of the vehicles which are fitted with type approved seat belts are shown at the end of this section.

The seats and seat frames should be checked for security and damage. The seat belt anchorages should be checked for security.

If an operator has been provided with a documentary evidence to show that a seat belt installation complies with type approval standards (but has not been fully type approved) or that is traceable to an installation tested and shown to meet the requirements of ECE Regulation 14 or Community Directive 76/115 it should be produced at the time of test. It should show registration number or chassis number of the vehicle and the name and address of the installer. It should also show the test number and the date and location of the test of the installation. Original certificates are required. Photocopies are not acceptable. Presentation of the certificate would not replace the need for the examination to be conducted but it may support the quality of the installation and help resolve differences over the acceptability of the installation, e.g. reinforcement plates used.

Diagram 1 at the end of the section shows typical methods of attaching seat belts.

Where the word close is used it should generally be regarded as 50mm or less.

- A. Check that on all belts the buckle operates correctly and the seat belt adjusts satisfactorily. Subsequent cutting or reworking of the webbing will be a reason for failure. It is acceptable for the free end of looped belts or static belts to be reworked to the extent of folding and stitching the webbing so that it cannot pass back through the buckle to prevent the buckle from being dismantled. Any knots in the belt webbing are unacceptable.

Seat Belts *(continued)*

- B. Seat squabs should be removed, to aid the inspection of the condition of the belt and mountings. They must be replaced before the end of the test to allow inspection of the complete belt installation.
- C. Check for the presence of any sharp edges which the belt could rub on or pull across during use.
- D. Where seat belts, other than looped belts, are anchored to the seat frame or the vehicle floor they must be secured with mounting bolts in accordance with the following:

Minimum Acceptable Size and Grade of Bolts for Seat Belt Anchorages

Type of Anchorage	Minibus	Coach or Large Bus
Single Anchorage	M10 Standard Material	M8 High Tensile Steel M10 Standard Material
Double Anchorage	7/16" Standard Material M10 High Tensile Steel	7/16" Standard Material M10 High Tensile Steel

Note: Bolt head marks Standard Material = P, 4.6 or SAE equivalent
 High Tensile Steel = S, 8.8, or SAE equivalent
 No Markings = Standard Material

If the examiner cannot determine the grade of bolt it must be assumed to be of Standard Grade.

It is paramount that the appropriate sized bolt is used in the seat belt anchorage, i.e. an 8mm bolt should not be used in an 11.5mm diameter hole. The only exception to this is where a "stepped washer" or collar is used to eliminate the excessive clearance and a suitable washer is fitted between the bolt head and the anchorage to prevent the bolt pulling through. The use of smaller bolts, self tapping screws or wood screws is not acceptable.

- E. It is not acceptable to drill tubular seat frames to allow belts to be bolted to the frame except in cases where a manufacturer has approved the installation and the operator presents a certificate issued by the manufacturer or his agent declaring that the installation is satisfactory .
- F. Clamp type brackets are acceptable provided that they are properly secured (see Diagram 2).

Seat Belts *(continued)*

Procedure and Standards (cont'd)

- G. On seats constructed with a wooden frame it is unacceptable to mount the belts either directly to the frame or to a metal base which is attached to the frame only by wood screws. Unless there are additional reinforcement brackets fitted that provide a direct load path to the seat leg and side mounting the installation would be rejected. This reinforcement could take the form of steel angle sections or plates, alternative materials may be used provided that they are of comparable strength (see Diagrams 3 & 4 for details of a typical installation).
- H. Where seat belts are attached to thin sheet metal seat frames the bolts anchoring the belt must be of the minimum dimensions shown in paragraph D and must be adequately supported by the use of load spreading washers between the frame and the nut. Typically this would be 25 mm in diameter and 2 mm thick. If two belts are attached at the same point with a single bolt then a larger reinforcement plate 35mm diameter x 3mm thick (or a rectangular plate of minimum dimensions 21 x 46 x 3 mm) must be used. The sizes quoted are for steel reinforcement plates, alternative materials may be used but must provide comparable strength.
- I. Where seat belts are fitted to the rear seats of a vehicle check the anchorage to ensure that it is not anchored solely to the thin metal sheet which separates the boot area from the passenger compartment. It is essential that seat belt anchorages are secured to a strong cross member connected to the structural members of the vehicle. The connection should be to such a standard that there is confidence that it will be able to transfer the seat belt loads into the structure of the vehicle. This may involve the fabrication of an additional framework at the rear of the vehicle. An example of typical reinforcement of this area would be by the use of additional square section tubing 40 x 40 x 3 mm, or angle plate 50 x 50 x 4 mm across the full width of the vehicle. The sizes quoted are for steel reinforcement, alternative materials may be used but must provide comparable strength. A full width reinforcement that is only attached to the thin metal sheet is unacceptable and would be a reason for failure.
- J. Three point belts will only be accepted under the following circumstances:
- If the seat utilises tubular frames or tubular "H" pattern legs:
- The seats have been reinforced as detailed in Paragraph K or
 - A purpose built structure to which belts are attached is fitted to the vehicle, an example is shown in diagram 5,. Alternatively the belts may be attached to solid bodywork
- or
- If purpose made seats designed with integral three point belts as standard have been fitted.
- K. Where seats that are permanently mounted in the vehicle have been fitted with lap belts or 3 point belts integral to the seat, then, if the seat utilises

Seat Belts *(continued)*

tubular frames or tubular "H" pattern legs it must be reinforced. This will include welding metal buttresses, of similar thickness material as the foot, between the foot and the leg (see diagram 6). Also the welding of a diagonal brace, either in compression or tension, between the foot and the seat base attachment of each leg. Alternatively documentary evidence of compliance with Directive 76/115 or ECE Regulation 14 can be presented.

On quick release seats where the feet are mounted directly to tracking by a coupling it may not be practical to weld a buttress to the leg or a diagonal brace to the foot due to the presence of the coupling (see diagram 7).

The coupling would prevent any reinforcement being placed in an effective position, also the coupling could be damaged if welding occurred close to it. On this type of installation the belts can be attached directly to the tracking with quick release mounts or the legs should be modified to use an alternative method of attachment to the tracking.

On seats where the feet are mounted to a metal bar or tube which is then connected to tracking by a quick release coupling, then the seat has to be reinforced with buttresses and diagonal brace as detailed above..

On vehicles with floor mounted seat belts where the belt is anchored close to the seat mounting bolt then the rear foot of each leg must be buttressed to the leg.

- L. If lap belts are fitted and there is the possibility of passengers hitting their heads on any harsh object such as a grab rail or seat stanchion, padding or other suitable protection must be provided on these objects. The protection does not need to cover the full length of a seat grab rail but should cover a length of at least 300mm directly in front of each passenger. Padding must be compressible and of a depth of at least 50 mm, measured to the surface of the bar and not compress more than 25mm under reasonable thumb pressure, or 25mm thick and not compress more than 5mm. Ordinary seat foam or pipe lagging foam is unlikely to be of sufficient density for this purpose.
- M. Lower anchorages should be at least 320 mm apart. This need not be the distance between the anchorage points of the belt but it can be between two structural parts of the seat that the belt is routed round. If the measurement is between mounting bolts it should be measured between bolt centres. Check that the belt will not raise or significantly compress the seat cushion when subjected to a load. There will always be a small amount of compression which is acceptable
- N. Where belts are attached directly to a metal floor a load spreading washer must be used between the nut and the floor. The bolts must be at least the sizes specified in paragraph D. Typically this would be 25 mm in diameter and 2 mm thick. If two belts are attached at the same point with a single bolt then a larger reinforcement plate of minimum dimensions 35mm diameter x 3mm thick (or a rectangular plate of minimum dimensions 21 x 46 x 3 mm) must be used. The sizes quoted are for a steel reinforcement plates, alternative materials may be used but must provide comparable strength. Reinforcement plates should follow, as far as practicable, any contours in the floor to which they are attached.

Seat Belts *(continued)***Procedure and Standards (cont'd)**

- O. Where a belt is attached directly to a wooden floor each anchorage must be reinforced with a plate of minimum dimensions 35mm diameter x 3mm thick (or a rectangular plate of minimum dimensions 21 x 46 x 3 mm). If two belts are attached at the same point with a single bolt then the reinforcement plate must have minimum dimensions of 92mm diameter x 3mm thick (or a rectangular plate of minimum dimensions 65x 100 x 3 mm). If two belts are attached in close proximity to each other, then a single reinforcement plate of minimum dimensions of 92mm diameter x 3mm thick (or a rectangular plate of minimum dimensions 65x 100 x 3 mm) should be used ensuring that the bolt holes are not too close to the plate edge. Alternatively two steel reinforcement plates may be used, but they must be of minimum dimensions 52mm diameter x 3mm thick (or a rectangular plate of minimum dimensions 46x 46 x 3 mm). The sizes quoted are for a steel reinforcement plates, alternative materials may be used but must provide comparable strength. Reinforcement plates should follow, as far as practicable, any contours in the floor to which they are attached.
- P. Where mounting rails designed for the adjustment of seat pitch are fitted and utilise an angled claw type clamp(see Diagram 8) with a clamping face of less than 15mm wide it is not acceptable for a seat on which a belt is mounted to be merely clamped to the rail. The clamp to the rear foot of each leg must be modified by fitting a bolt which passes through the claw fitting, the rail, floor and a suitable structural member (as in most vehicles). The bolts must have appropriately sized load spreading washers fitted beneath the bolt head and underneath the retaining nut. A single bolt should be not less than 8 mm (5/16") diameter. Any alternative to this is only acceptable if documentary evidence is provided.
- Q. Parallel type claw fittings, for a seat on which a belt is mounted, will be considered satisfactory provided that the securing bolts are fully tightened. (see Diagram 9).
- R. If a seat, on which a belt is mounted, is bolted to a flat rail the bolts must pass through the leg, rail, floor and a suitable structural member.
- S. It is acceptable for seats to be attached to a purpose built tracking (e.g. keyhole, "T" slot) designed for securing seats and wheel chairs, providing the tracking is securely attached to the vehicle structure with bolts or fasteners in all the retaining holes or marks provided by the manufacturers.
- T. It is unacceptable to fit seats, with seat belts, directly to unsupported wooden floors unless additional reinforcement is provided. This will involve the fitting of steel reinforcement plates of minimum dimensions 92mm diameter x 3mm thick (or a rectangular plate of minimum dimensions 65x 100 x 3 mm), between the under side of the floor and the securing nut below the floor of the rear leg and between the leg and the topside of the floor of the front leg. If the area of the foot of the front leg is greater than 65 x 100 mm, then the front reinforcement plate is unnecessary.

Seat Belts *(continued)*

- U. A "looped" type seat belt fitting is acceptable provided it is not free to float along any part of the seat structure. Any free movement in excess of 25mm is a reason for failure.
- V. The upper anchorage point should be at least 475mm above the height of an uncompressed seat cushion. This dimension is to be measured parallel to the backrest. The upper anchorage point should be a minimum of 110mm from the centre line of the seat back to the side of the seat .
- W. A lap belt or the lap section of a 3 point belt must be positioned to lie across the wearer's pelvis and not the stomach. This is to reduce the risk of abdominal injury and to prevent "submarining". In practice this may result in the belt lying across the top quarter of the thigh.
- X. Seat belt components should not be fitted to seats in such a way that they significantly intrude into the gangway space and are likely to cause injury to passengers either by tripping or by hitting the component.

There may be occasions when carrying out the condition check, on a vehicle which had an installational check on a previous test, that obvious defects are found in an installational item. This will be a reason for failure.

Enhanced Installation Check

Vehicles certified from 1 November 2002 have either had evidence that they comply with directive requirements regarding anchorages, including the results of a pull test or have had an Enhanced Visual Inspection. In addition some altered vehicles which have had seats and or seat belts added will require this type of installation check rather than the original installation check specified on pages 3/3 to 3/8 of the Inspection manual. Only certifying officers will carry out the enhanced inspection or interpret the results of pull tests. Details of which vehicle requires which type of installation inspection following the fitting of additional seats and/or seat belts are in the table below.

Where an alteration involves the installation of seat belts, or an increase in the number of seat belts fitted, care must be taken to ascertain the relevant dates. This is vital in determining the action to take.

Seat Belts *(continued)***Procedure and Standards (cont'd)**

First Used	Installation Check
From 1 October 2001 with additional obligatory seat belts fitted.	Check whether any additional seats have been fitted since the vehicle was certified. This can be done by checking the technical record or the operators certificate of initial fitness (PSV 418) or carrying capacity authorisation (PSV445).
	If the vehicle has had additional seats fitted and there is no evidence that the seat belt installation has been checked the vehicle should be refused a test certificate using the Reason for Failure 8(w)
	Advise operator to submit a notifiable alteration (VTP5) and to arrange to have the installation checked by a certifying officer.
	The certifying officer, following a satisfactory inspection, will issue a revised carrying capacity authorisation (PSV445). When the operator represents the vehicle for retest check the new carrying capacity authorisation to ensure the number of seats corresponds with the number of seats on the vehicle.
From 1 October 2001 with voluntary seat belts fitted.	<p>Check whether extra seats and/or seat belts have been fitted since the last annual test. This can be done by checking the technical record or the operators certificate of initial fitness (PSV 418) or carrying capacity authorisation (PSV445) or the seat belt inspection form SB1 or SB2.</p> <p>The SB1 was used prior to November 2002 when it was superseded by the SB2.</p> <p>If fitted before 1 November 2002 carry out Standard Installation Check.</p> <p>If fitted after 1 November 2002 it will be necessary to submit a VTP5 notifiable alteration form. The operator/presenter will have to provide evidence to a Certifying Officer that the installation has been subjected to a pull test or will have to have a Certifying Officer carry out a satisfactory visual check to the enhanced requirements. Following a satisfactory check a form SB2 will be issued showing the number of seats fitted with belts.</p> <p>A test certificate should be refused if there is no SB2 form or other evidence that the seat belt anchorages have been checked under Reason for Failure 8(w).</p>

Seat Belts *(continued)*

Exempt vehicles

Ford Transits with type approved seat belt installations can be identified as follows.

- 12, 14, 15, 16 and 17 seat (including the driver) Transits manufactured after 1 October 1991 where the fourth character of the VIN Number is "E".
- 17 seat (including the driver) Transits where there is a six figure code EJA *CL or EJJ *CL marked in the box on the top right hand of the manufacturer's plate (in the type code box). In the code the fourth digit marked * may be any character.

LDV 200 & 400 series models with type approved seat belt installations can be identified as follows.

- chassis number from 933478 onwards and the seventh character of the VIN number is "S".

LDV Pilot and Convoy models with type approved seat belt installations can be identified as follows.

- chassis number from 000001 onwards and the seventh character of the VIN number is "S", "X", or "Z".

Mellor bodied Renault Masters which have been issued with a PSV Certificate of Conformity (PSV 408) in place of a Certificate of Initial Fitness. This can be checked on the vehicle's technical record.

Information on other makes will be circulated when it becomes available.

Important note: To be exempt from the check vehicles must have been fitted with the seat belt installation by the vehicle manufacturer when new. If you are aware that a vehicle with a chassis number shown above has had any seats / seat belts fitted by any other installer, e.g. where it has been adapted to carry wheelchairs and has removable seats on tracking, it will not be exempt and will require an installation check.

Seat Belts *(continued)*

Reasons for Failure

1. **Obligatory Seat Belt** (see Table on first page):
 - a. missing.
 - b. of an incorrect type.
 - c. is not a lap or lap and diagonal belt fixed at 3 points (vehicles first used from 1 April 1981).
 - d. does not restrain the upper part of the body (vehicles first used before 1 April 1981).
2. **Anchorage:**
 - a. with excessive corrosion, serious deterioration or a fracture in a load bearing member of the vehicle structure within 300mm (12") of the anchorage. (Where a seat belt is attached to a seat frame this will apply to all seat mounting points).
 - b. a seat belt not securely fixed to the seat or on the vehicle structure.
3. **Locking Mechanism, Stalks, Retracting Mechanism and Fittings:**
 - a. locking mechanism of a seat belt does not secure or release as intended.
 - b. an attachment or adjustment fitting fractured, badly deteriorated or not operating effectively.
 - c. corrosion or deterioration of a flexible stalk likely to lead to failure under load.
 - d. broken flexible stalk strands.
 - e. a retracting mechanism that does not retract the webbing sufficiently to remove all of the slack from the belt with the locking mechanism fastened and the seat unoccupied.
4. **Condition of Webbing:**
 - a. a cut which causes the fibres to separate.
 - b. fluffing or fraying sufficient to obstruct correct operation of the belt or which has clearly weakened the webbing.
 - c. stitching badly frayed, insecure, incomplete or repaired.
 - d. so dirty that it is likely to soil passengers' clothing.
5. **Seat Belt Fittings:**
 - a. any guide, stalk or pivot with obvious signs of structural weakness such that failure is likely.

Seat Belts *(continued)*

6. Seat or seats to which seat belts are attached
 - a. insecure.
 - b. with a cracked or fractured leg or frame.
7. Installational defect found on annual test.
 - a. any obvious installational defect found during the inspection.
8. Installational inspection
 - a. evidence that original webbing has been cut and/or reworked. (e.g. belts knotted, fraying or fluffing removed /sealed by burning etc.)
 - b. any part of the installation which has a sharp edge which could or is likely to cut or abrade the webbing.
 - c. a directly attached anchorage not secured by standard seat belt mounting bolts and washers as detailed in paragraph D.
 - d. an anchorage insecure.
 - e. a tubular seat frame that has been drilled for the purpose of attaching a seat belt.
 - f. a directly attached anchorage not attached to a load bearing member or without suitable reinforcement.
 - g. retro-fitted three point belt which is not mounted on a suitable structure.
 - h. tubular frame legs or tubular "H" pattern legs which have not been reinforced with buttressing and diagonal bracing, or buttressing where a floor mounted belt is fitted close to a seat leg.
 - i. belt fitted to a seat which has not been suitably reinforced or modified.
 - j. without suitable padding as detailed in paragraph L.
 - k. lower anchorages less than 320 mm apart.
 - l. in such a position that loading the belt causes the cushion to be raised or significantly compressed thus allowing the occupant to effectively move forward.
 - m. an anchorage attached to the floor without reinforcement plates of a suitable size and contour.
 - n. with load spreading washer(s) missing from anchorage bolt.
 - o. claw type seat mounting with inadequate means of securing claw.

Seat Belts *(continued)*

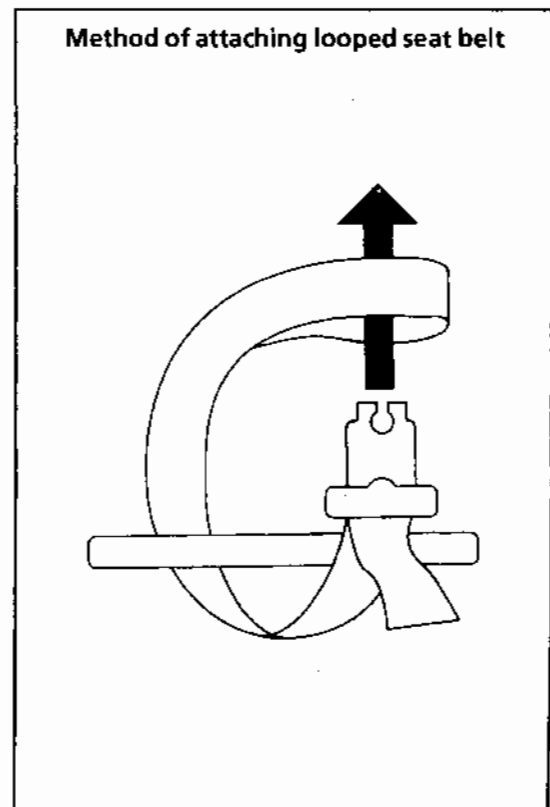
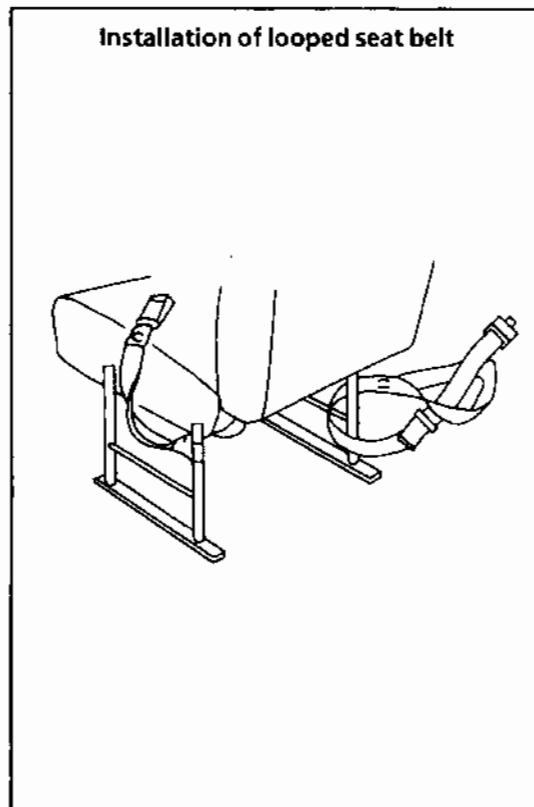
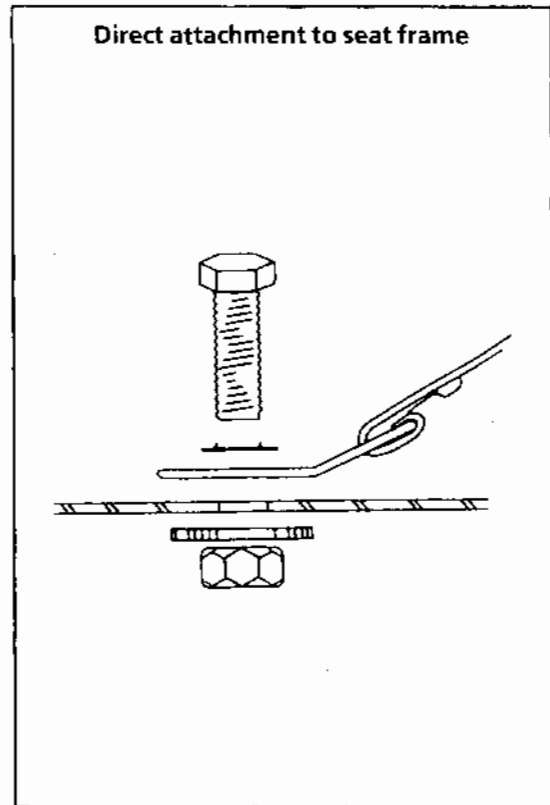
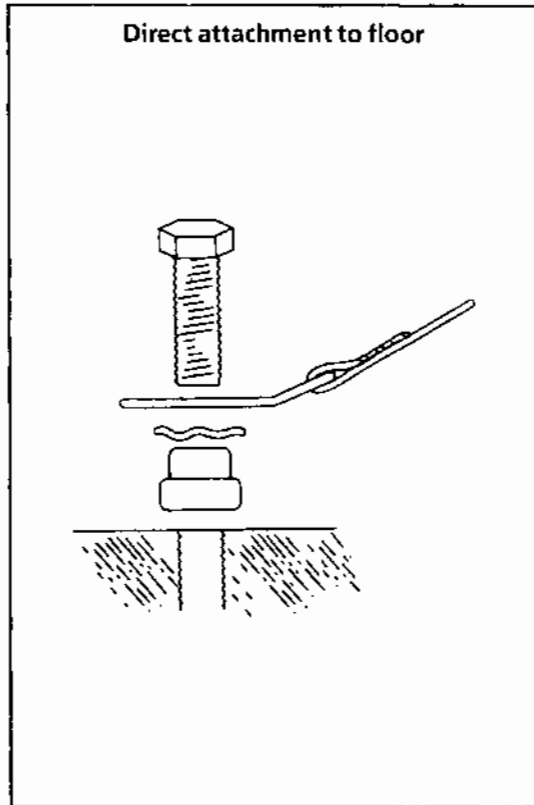
Reasons for Failure (cont'd)

- p. on a seat fitted to a flat rail the bolt does not pass through the leg, rail, floor and a suitable structural member or the floor has not been suitably reinforced.
- q. tracking for securing seats and wheelchairs insecure.
- r. free movement for a looped belt more than 25mm at the anchorage.
- s. upper anchorage of three point belt less than 475 mm above uncompressed seat cushion measured parallel to the seat back.
- t. upper anchorage of three point belt(s) less than 110 mm from centre line of seat.
- u. incorrect positioning of a lap belt or lap section of a three point belt. i.e. the belt lies across the stomach or forward of the top quarter of the thigh.
- v. a seat belt component fitted to a seat significantly intrudes into a gangway and is likely to cause injury to a passenger.
- w. for vehicles subject to enhanced seat belt requirements no evidence that seat belt anchorages are likely to meet the strength requirements of EC directive 76/115/EC as amended by directive 96/38/EC

Seat Belts *(continued)*

Typical Methods of Attaching Seat belts

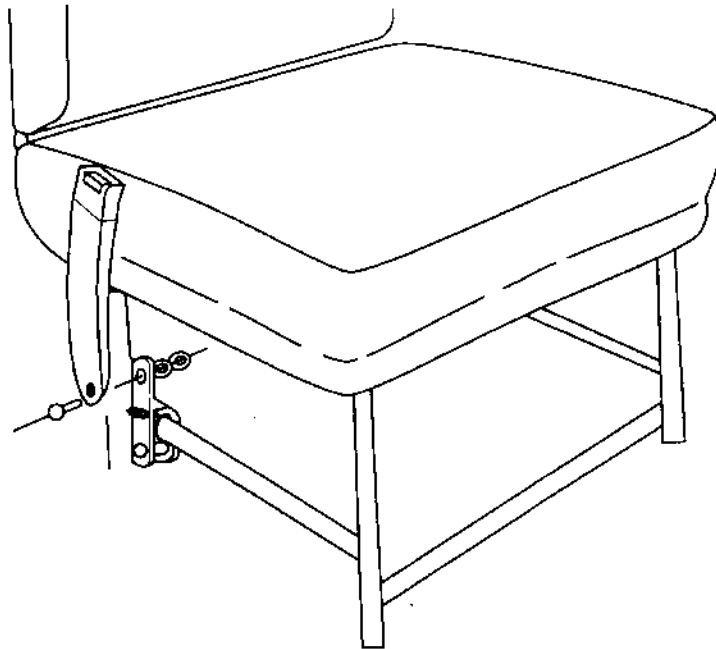
Diagram 1



Seat Belts *(continued)*

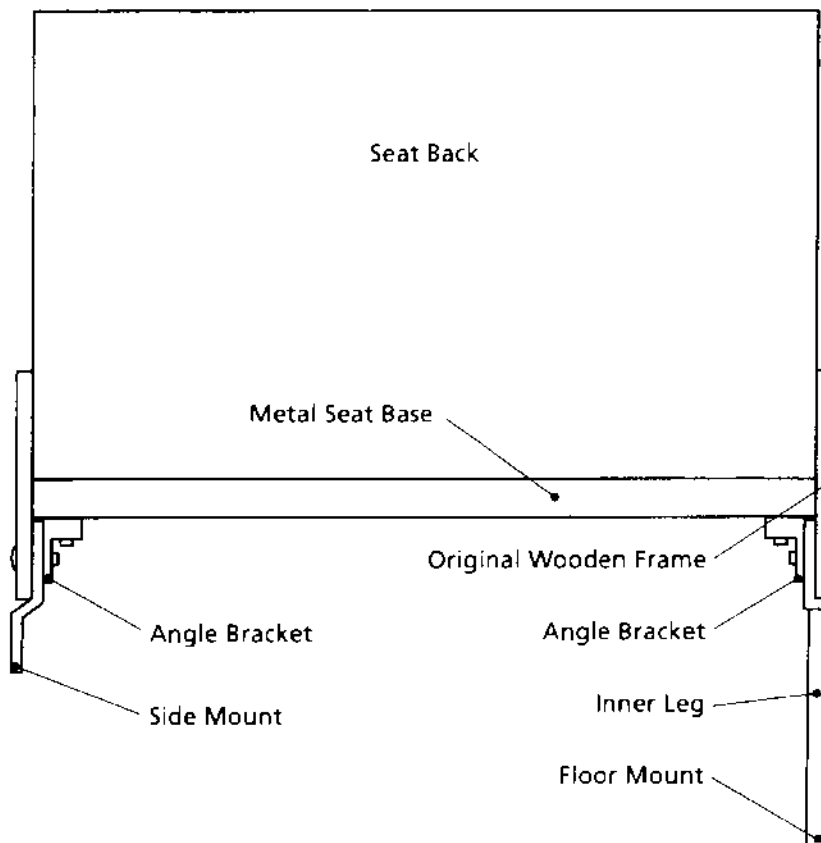
Example of a typical clamp bracket

Diagram 2



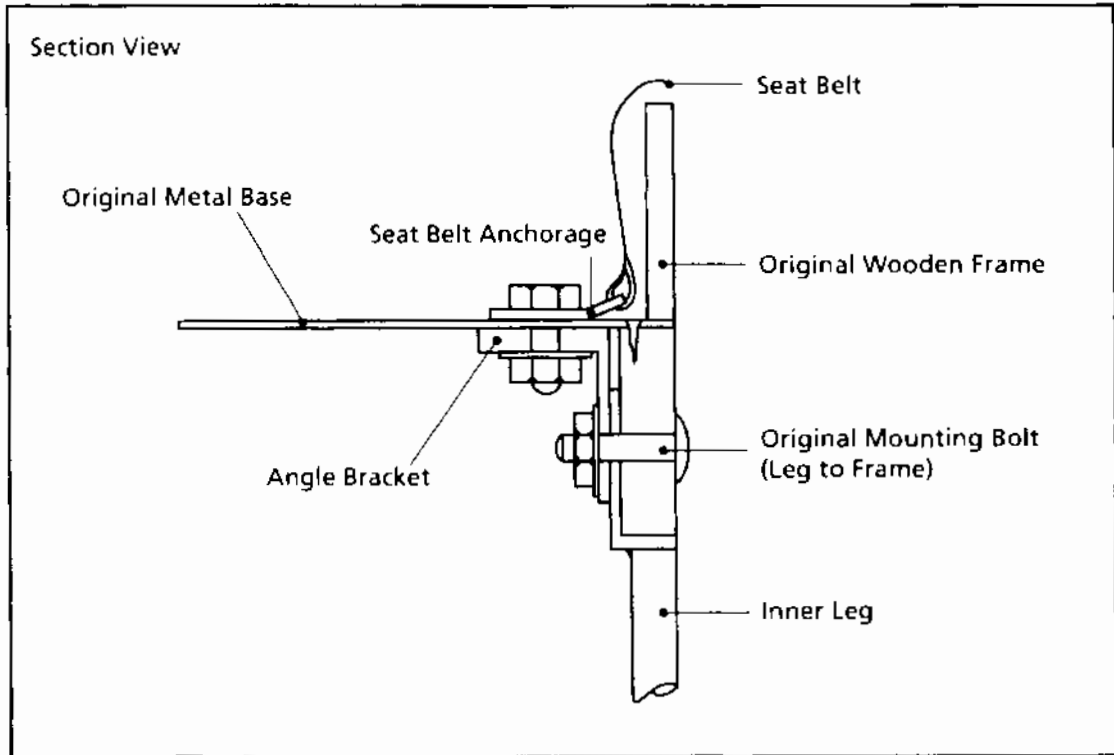
Wooden framed seats with a metal base – rear view

Diagram 3

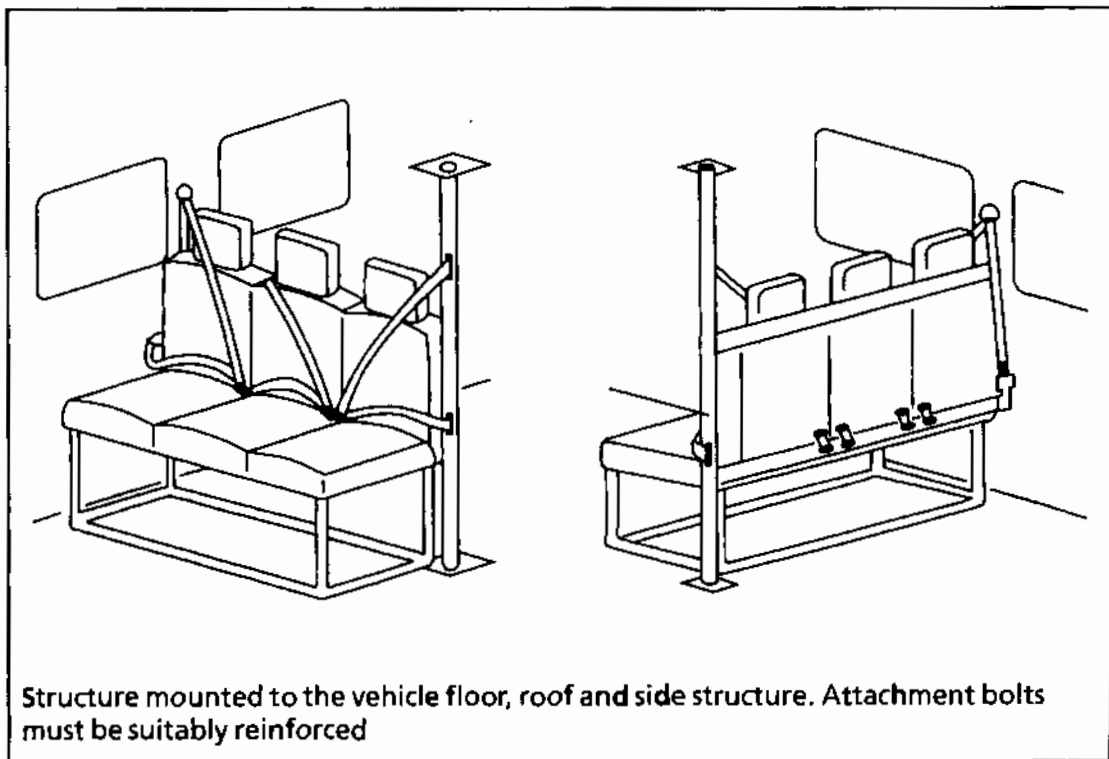


Seat Belts *(continued)*

Wooden framed seats with a metal base – Enlargement of Reinforcement **Diagram 4**

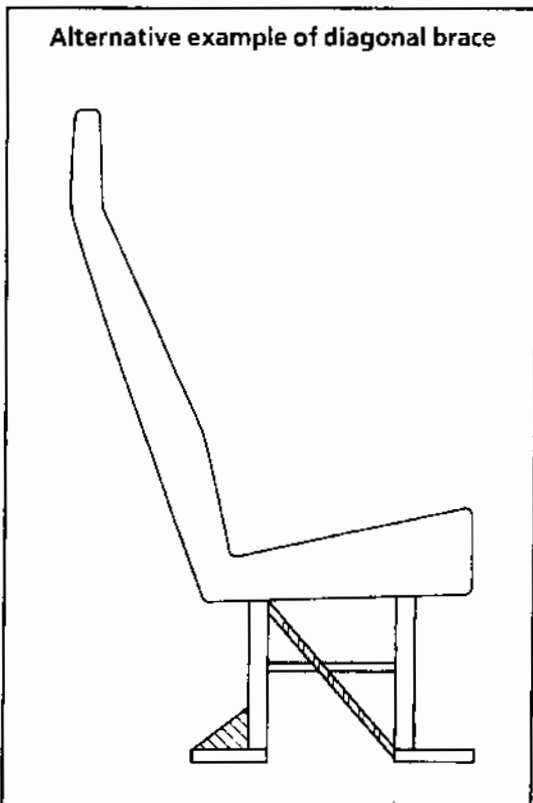
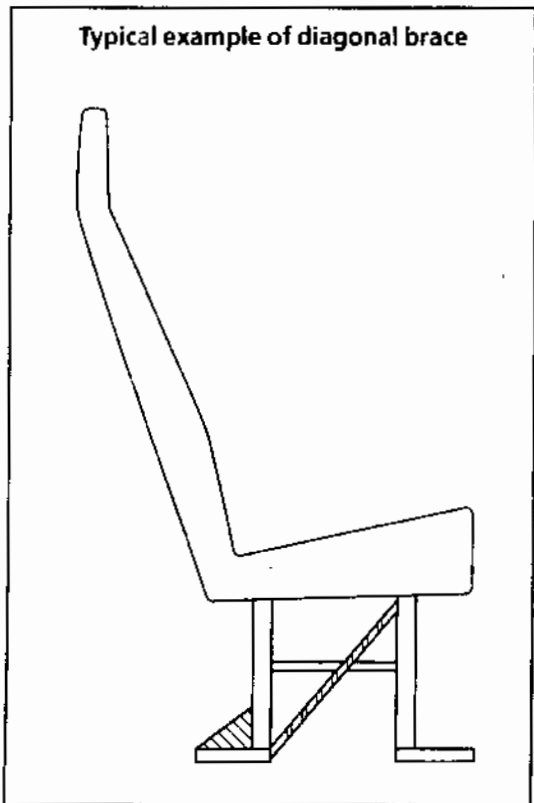
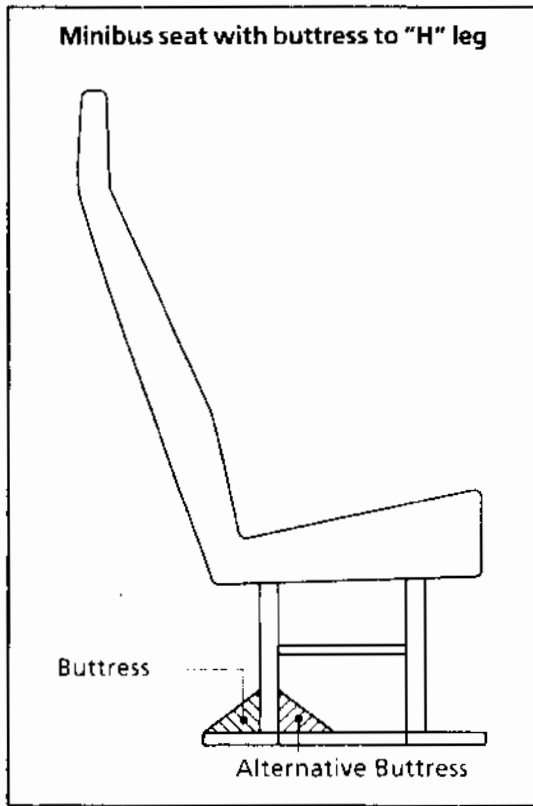
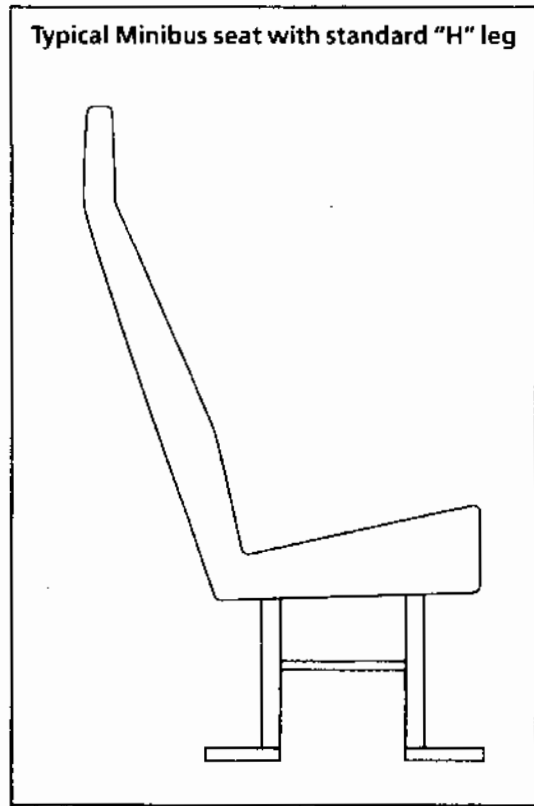


Example of Additional Structure for Support of Upper Anchorage Points **Diagram 5**



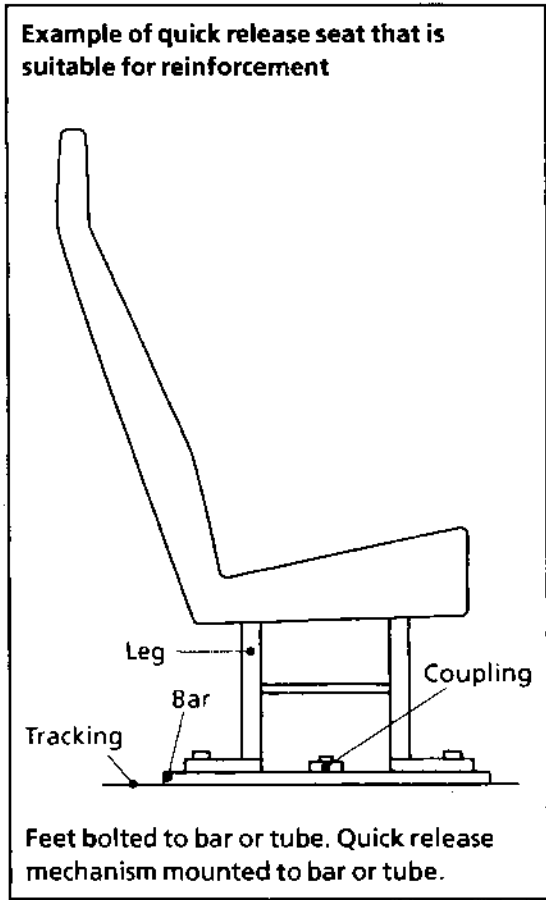
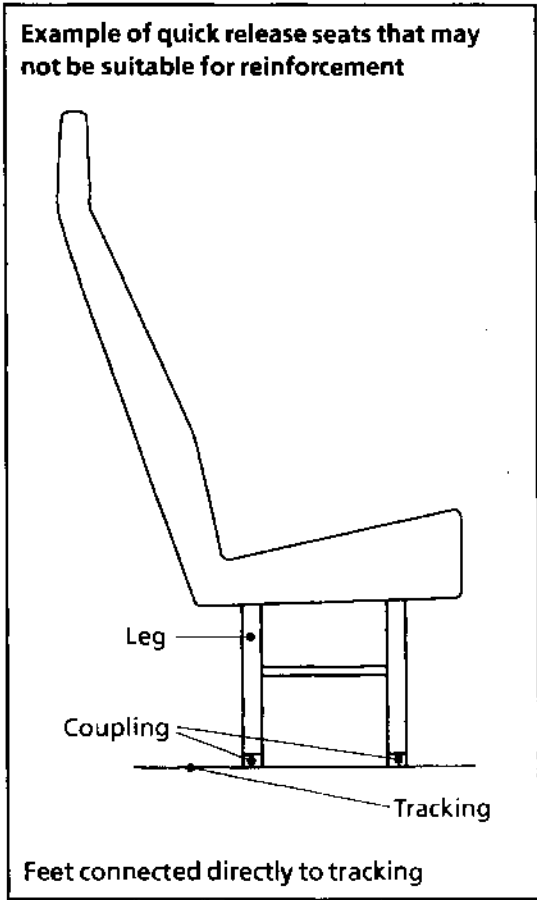
Seat Belts *(continued)*

Diagram 6



Seat Belts *(continued)*

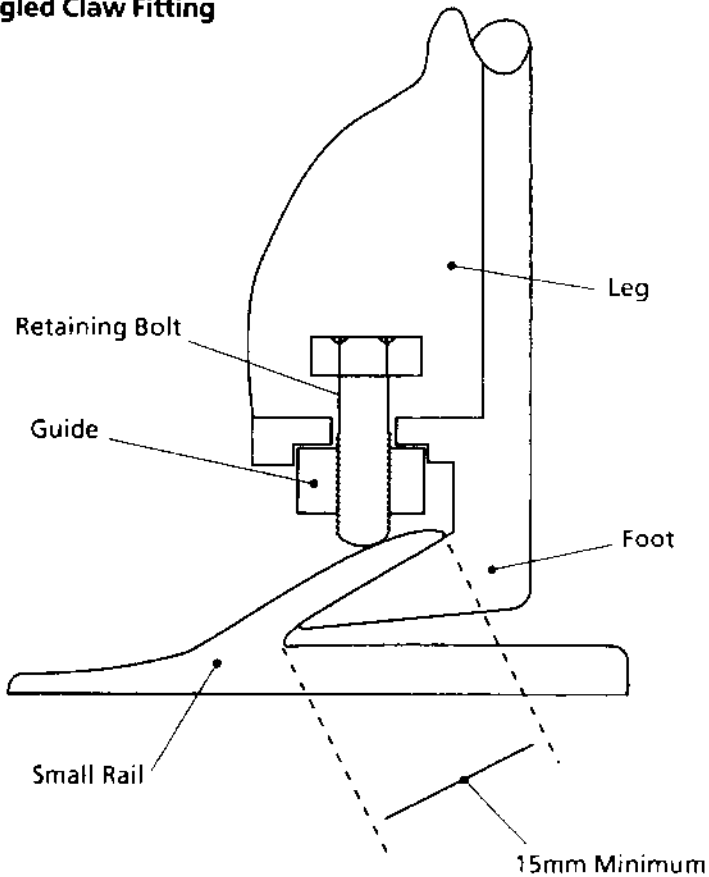
Diagram 7



Seat Belts *(continued)*

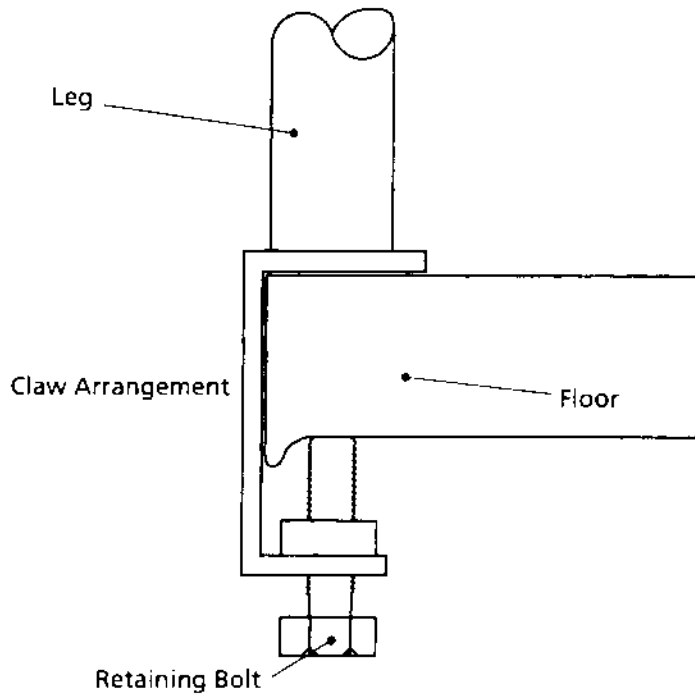
Typical Angled Claw Fitting

Diagram 8



Typical Parallel Claw Fitting

Diagram 9



Exhaust Emissions

Application

This inspection applies to all vehicles

Procedure and Standards

Diesel Compression Ignition Engines

- Exhaust emissions must be tested using an approved and calibrated smoke meter.
- **Only in exceptional circumstances where it is not possible to use a smoke meter will a visual check be carried out.** Visual tests will not apply to **Fast Pass** or vehicles submitted for **Reduced Pollution Certification**.
- If the exhaust has been deliberately modified to prevent the smoke meter from being used a VTP 12 must be issued refusing to complete the test because the exhaust smoke emissions test cannot be carried out.
- Twin exhaust systems, **without a balance pipe**. Both systems must be individually tested for smoke emissions. It may be necessary to purge the exhaust system again prior to the second check.
- Supercharged engines should be tested by selecting the non-turbocharged option on the smoke meter.
- The test procedure for turbocharged and non-turbocharged engines is the same.
- It is not normally sufficient to run the engine with the vehicle stationary to warm it up to temperature, so the emissions should be tested as soon as possible after the vehicle arrives at the test station.
- With some types of smoke meter care must be taken to ensure that the probe is correctly aligned to the exhaust gas flow. Reference to meter manufacturers instruction may be necessary.

1. Free acceleration test using smoke meter

- a. Check that the engine is at or near normal operating temperature.
- b. Purge the inlet and exhaust systems fully by holding the engine speed steady at just below maximum governed speed for 30 seconds.
- c. Select the appropriate test programme on the smoke meter.
- d. Follow the meter prompts, depress the accelerator pedal quickly but not violently, to reach full fuel position **in less than 1 second**. Hold it there until a release prompt is given. If, at the end of the 1st acceleration, the smoke meter value is no more than 1.50m³ the vehicle will have met the **fast pass** limit.
- e. If the 1st meter reading is more than 1.50m³ further accelerations will be required, following meter prompts, up to a maximum of 6 accelerations.

Exhaust Emissions *(continued)*

NOTE: A vehicle will pass the **statutory** test requirements if the opacity level is no greater than

- 2.50m¹ for non-turbocharged engines
- 3.00m¹ for turbocharged engines

2. Visual emission test

- **Only in exceptional circumstances where it is not possible to use a smoke meter will a visual check be carried out.** The visual test is only to be used when it is not possible to use the smoke meter or where risk to health and safety would arise. The procedure is the same for supercharged, turbocharged and non-turbocharged engines.
 - a. With the engine at or near normal operating temperature check the density of the exhaust emission visually.
 - b. Ask the driver to depress the accelerator pedal quickly but not violently, to reach full fuel position **in less than 1 second**. Immediately release when the engine reaches its maximum governed speed, allow the engine to return to idle speed.
 - c. Ignore smoke from the first acceleration.
 - d. Repeat up to a maximum of six times if necessary until the exhaust smoke is considered to be acceptable for two successive accelerations.

3. Reduced Pollution Certificate (RPC) smoke meter test

- The RPC check is **not** part of the statutory test requirement.
 - a. Select appropriate RPC limit. Carry out procedures detailed at 1.a, b and c above.
 - b. Following meter prompts carry out three acceleration tests. Depress the accelerator pedal quickly but not violently, to reach full fuel position **in less than 1 second**. Hold it there until a release prompt is given. At the end of the 3rd acceleration the smoke meter will display the average smoke value and test result. If the RPC value is not met and the meter readings are above the statutory limits, further accelerations up to a maximum of six may be prompted by the meter.

NOTE: A vehicle will pass the RPC metered test if the opacity level is no greater than

- 0.2 m¹ for all vehicles fitted with a Particulate Trap
- 0.4 m¹ vehicle fitted with an unmodified Euro - 2 engine
- 0.8 m¹ vehicle fitted with an unmodified Euro - 1 engine
- 1.0 m¹ vehicle retro-fitted with a Euro - 2 engine

Exhaust Emissions *(continued)*

Procedure and standards

Spark Ignition Engines

The exhaust emission must be checked visually on all vehicles and also using an approved and calibrated exhaust gas analyser to determine the hydrocarbon and carbon monoxide content on vehicles used from 1 August 1975

1. Visual Check

Ensure that the engine is at normal idling speed and operating temperature and is not subject to significant electrical loading. An Assistant may apply light throttle pedal pressure if the engine will not idle.

Raise the engine speed to around 2500rpm or half engine speed if this is lower and hold steady for 20 seconds to purge the exhaust system. Allow the engine speed to return to idle and allow the emissions to stabilise.

Assess the colour of the exhaust smoke.

2. Exhaust Gas Analyser Test

Follow the analyser manufacturer's instructions and carry out the full test procedure to determine the proportions of carbon monoxide (CO) and hydrocarbon (HC).

On LPG vehicles the HC result obtained must be divided by the PEF (propane/hexane equivalency factor) marked on the analyser to obtain the figure required to assess the test result. Some machines do this automatically.

Residual hydrocarbons, which are indicated by the analyser when it is sampling clean air, must be deducted from the HC reading for the vehicle.

If a vehicle meets the CO requirement at its **normal idling speed** but fails the HC check, recheck the HC level at a high idle speed of 2000rpm. If the HC reading is then 1200ppm or less, the vehicle will have met the CO and HC requirements. Light pedal pressure should be used to achieve the high idle speed. Cold start/cold running devices must not be used.

Some vehicles give unstable readings due to their fuel system design. Before failing a limit must have been exceeded constantly for at least 5 seconds.

If a vehicle fails the test because the exhaust is holed the emissions must be rechecked when the vehicle is retested

Exhaust Emissions *(continued)*

Reasons for Failure

Diesel (Compression Ignition) Engines

1. Statutory Smoke Meter Test
 - a. After a total of six accelerations have been completed, the average smoke opacity recorded for accelerations 4, 5, and 6 is more than:
 - 2.5m^{-1} for non-turbocharged engines
 - 3.0m^{-1} for turbocharged engines.
 - b. The exhaust emits excessive smoke or vapour of any colour, to an extent likely to obscure vision.
2. Statutory Visual Test
 - a. After a maximum of six accelerations the exhaust emits smoke of a level greater than that of equivalent metered levels
 - b. The exhaust emits excessive smoke or vapour of any colour, to an extent likely to obscure vision.

NOTE: The criterion is **density** and **not volume** of smoke. The description 'dense smoke' includes any smoke or vapour which largely obscures vision.

Spark Ignition Engines

3. Visual Check
 - a. The engine is idling at a speed clearly above the normal idling speed.
 - b. The exhaust emits dense blue or clearly visible black smoke for a continuous period of 5 seconds at idling speed.
4. Exhaust Gas Analyser Check
 - a. HC content greater than 1200ppm
 - b. CO content greater than
 - 3.5% for a vehicle first used from 1 August 1986
 - 4.5% for a vehicle first used from 1 August 1975 to 31 July 1986

Road Wheels and Hubs

Application

This inspection applies to all road wheels and hubs apart from spare wheels.

Procedure and Standards

- Check all road wheels for carrying capacity, and road wheels, fixings and hubs for condition and security. A nut or stud is considered to be "loose" if it is not obviously carrying out its function of clamping the wheel to the hub. Where possible wheel nuts will be lightly tapped with a hammer to check for looseness, but any other evidence such as rust marks or elongation of bolt/stud holes must also be taken into account.
- With some vehicles it is not possible to see the road wheels completely from ground level, especially with twin wheels and where the body hides part of the wheels. In such cases the vehicle must be:

Moved to expose hidden parts of the wheels, or

Examined from underneath

Whenever possible, presenters should remove wheel embellishers if they prevent a full examination.

Capacity Limitations of 11.75 x 22.5 Alcoa Aluminium Wheels

Wheels with the part number 813520/813523 may be stamped on the inside of the wheel, opposite the valve, with a maximum load rating of 4250kg or 4500kg and those with part number 813530/813533 with a rating of 4500kg.

It has been agreed that wheels with these part numbers and maximum load ratings are suitable for a maximum axle weight of 9150kg.

Capacity limitation of a wheel marked with a load index

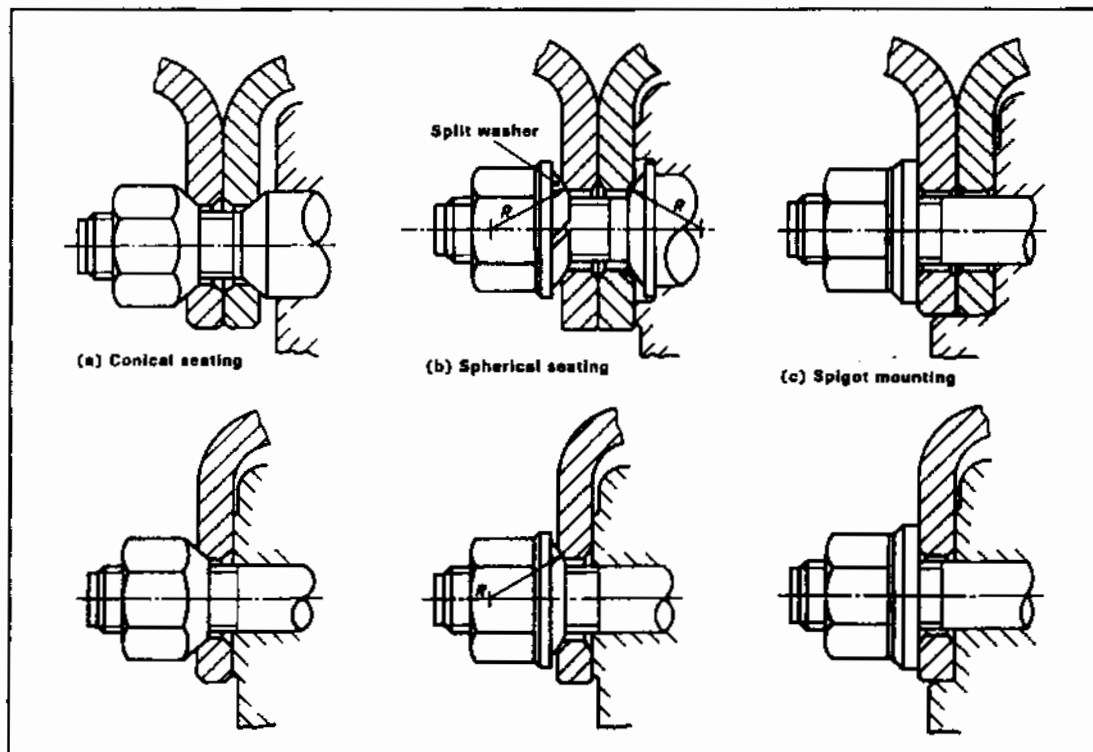
If a wheel is marked with a load index which indicates that the maximum load is lower than is required to support the axle load, the vehicle should be failed under Reason for Failure 2.i

Wheels not marked with a load index or load marking must be assumed to be capable of carrying the axle weight

Road Wheels and Hubs *(continued)*

Compatibility of Wheel Fixings

- Vehicles with conical wheel fixings **MUST NOT** be fitted with wheels from vehicles designed for use with spherical fixings. (British built vehicles normally have conical wheel fixings).
- Vehicles with spherical wheel fixings **MUST NOT** be fitted with wheels from vehicles which are designed for use with conical fixings.
- Volvo wheels of the original spigot-mounting design **WILL NOT** interchange with another type.
- Wheels with conical fixings **MUST NOT** be used on Volvo vehicles because they do not have a machined centre bore to fit hub.
- Spigots must extend to the outer wheel centre where twin wheels are fitted.



Road Wheels and Hubs *(continued)*

Reasons for Failure

1. A tyre retaining ring:
 - a. fractured.
 - b. butting causing the flange to lift more than 1.5mm from the rim.
2. A wheel :
 - *a. nut or stud missing or loose or not fulfilling the function of clamping the wheel to the hub.
 - b. with any visible elongation of a stud hole.
 - c. with a spigot wheel nut washer cracked.
 - d. badly damaged or distorted or with a locating spigot or dowel missing.
 - e. damaged by the corners of a wheel nut cutting into the material of the wheel.
 - f. and its fixings not compatible.
 - g. cracked (except at the bridge over the valve), weld breaking away or an inadequate repair.
 - h. made of aluminium alloy repaired by welding.
 - l. with a load rating less than that required to support the maximum permissible (GB) axle load.
3. A hub:
 - *a. cracked, badly damaged, or with a half shaft bolt, stud or nut loose or missing.
 - b. with clearance between a spigot mounted wheel and the hub spigots that exceeds 3mm across the diameter.

Size and Type of Tyres

Application

This inspection applies to all tyres, apart from spare tyres.

Procedure and Standards

Check that sizes, ply ratings, load indices, speed ratings and use markings of tyres are appropriate, bearing in mind

- published data on tyre capacities.
- the load on each axle when the vehicle is fully laden.
- the type of axle and vehicle to which the tyre is fitted.

Note: The use markings most likely to be encountered are "FRT" which indicates that the tyre is not suitable for use on a driven axle and "TRAILER USE ONLY". Tyres marked with a direction arrow pointing in the wrong direction should not be failed.

Tyres are usually identified by their nominal section size followed by the rim diameter eg 10.00-20, 750-16, etc (the majority of modern tyres carry millimetric markings eg 205-16 etc). (For identification of sidewall markings refer to the diagram at the end of this section.) All tyres on an axle must be of the same nominal size. If a tyre is dual marked one of the markings must be the same as the markings on the other tyres on the axle.

There are still a number of high load capacity tyres in use which are marked with a code to indicate the tyre size and capacity eg a 10.00-2016 ply tyre may be marked 020 or 420 (a full list of these tyres is given at Table 1).

If tyres marked with a load capacity index are fitted the maximum permissible axle load for normal use can be found in Table 2 at the end of this section. The Load Index (LI) may consist of one or two numbers eg 154 or 146/143. Where two numbers are displayed the first refers to the use of the tyre in single formation and the second in twin formation. Reference to the table shows that the maximum loads for this tyre are 6000kg in single formation and 10900 in twin formation.

If a load index is not shown the carrying capacity of a tyre can be determined from the Ply Rating. The load capacity of ply rated tyres is shown at Table 3. If no ply rating can be found on the tyre it should be assumed to have the lowest load capacity listed for that size of tyre.

This information relates to tyres used without any restriction (or plating certificate). There are two other categories of vehicle use which allow tyres to be operated at lower speeds and higher loads. These are "Local Service Bus" and "Restricted Speed Vehicle (i.e. a vehicle displaying a "50 plate "), both of which are restricted to a maximum speed of 50mph. The details of the axle loads for these vehicles are in the Tyre Tables obtainable from the Vehicle and Operator Services Agency at Welcombe House, 91/2 The Strand Swansea SA 1 20H.

Size and Type of Tyres *(continued)*

SPEED SYMBOLS

The speed capability is represented by a letter which is displayed adjacent to the LI marking eg 146/143J. This indicates the speed at which the tyre can carry the load(s) indicated by the LI marking(s). In the above example the tyres carry a load of 6000/10900kg at 62mph.

The minimum required speed ratings

CLASS OF VEHICLE	PERMITTED SPEED (MPH)	MINIMUM SPEED SYMBOL REQUIRED
Any bus other than a "Local Service Bus" or a "Restricted Speed Vehicle"	70	L
A "Local Service Bus" or a "Restricted speed vehicle"	50	F

ALTERNATIVE SPEED RATINGS

Certain vehicles can be fitted with tyres showing a different speed rating than those shown above but the maximum axle loads will be changed as shown below:

CLASS OF VEHICLE	NORMAL SPEED RATING	ALTERNATIVE SPEED RATING	CHANGE IN AXLE LOAD
A Bus other than a "Local service Bus" or a "Restricted speed vehicle"	L	J	-7%
		K	-3%
A "Local Service Bus" or a "Restricted speed vehicle"	F	J or higher	+10%

Details of the reduced axle loads which tyres can carry are shown in Table 4.

Size and Type of Tyres *(continued)*

Procedure and Standards (cont'd)

STRUCTURE

- Examine all the tyres fitted and note the type of structure (radial, cross-ply or bias-belted) and the nominal size of tyres.
- All tyres on an axle must be of the same structure and nominal size.
- Tyres on an axle may be of different structures and nominal sizes to those on another axle with the following exceptions.
- All tyres on all steered axles must have the same structure. This includes tyres on steered axles on articulated buses, although they may be on separate portions of the vehicle.
- All tyres on all driven axles must have the same structure.
- On two axle motor vehicles where each axle is fitted with single wheels, if all the tyres are not of the same structure, the type of tyre structure which is allowed to be fitted to each axle is shown in the table:

AXLE 1	AXLE 2
Cross-ply	Bias-belted
Cross-ply	Radial
Bias-belted	Radial

This does not apply to an axle on which wide single tyres with a road contact width of more than 300mm are fitted.

Reasons for Failure

1. A tyre:
 - a. of which the nominal size, ply rating, load index or speed rating of any tyre is below that appropriate for the plated axle weight.
 - b. which has a tyre use marking inappropriate for the type of axle or vehicle to which it is fitted.
 - c. of a different nominal size to another on the same axle.
 - d. of a different structure to another on the same axle.
 - e. on a steerable axle which is not of the same structure as any other tyre on any steerable axle.
 - f. on a driven axle which is not of the same structure as any other tyre on any driven axle.
 - g. on a two axle motor fitted with single tyres on both axles a combination of tyres with structures which are not shown as acceptable in the table above.

Size and Type of Tyres (continued)

TABLE 1

CODE	TYRE SIZE
A16 or 1 — 16	750 — 16 — 12 PR
B16 or 2 — 16	825 — 16 — 14 PR
C16 or 3 — 16	900 — 16 — 14 PR
B17 or 2 — 17	825 — 17 — 14 PR
A20 or 1 — 20	750 — 20 — 12 PR
B20 or 2 — 20	825 — 20 — 14 PR
C20 or 3 — 20	900 — 20 — 14 PR
D20 or 4 — 20	1000 — 20 — 16 PR
E20 or 5 — 20	1100 — 20 — 16 PR
F20	1200 — 20 — 18 PR
G20	1400 — 20 — 22 PR
E22 or 5 — 22	1100 — 22 — 16 PR
B22.5 or 2 — 22.5	9 — 22.5 — 14 PR
C22.5 or 3 — 22.5	10 — 22.5 — 14 PR
D22.5 or 4 — 22.5	11 — 22.5 — 16 PR
E22.5	12 — 22.5 — 16 PR
C24 or 3 — 24	900 — 24 — 14 PR
E24	1100 — 24 — 16 PR

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Size and Type of Tyres (continued)

TABLE 2
LOAD CAPACITY INDEX TABLE
EXTRACT FROM ECE REG 54 : "LOAD INDEX" TABLE AMENDED TO SHOW AXLE LOADS

LOAD INDEX	SINGLE Kg	DUAL Kg	LOAD INDEX	SINGLE Kg	DUAL Kg	LOAD INDEX	SINGLE Kg	DUAL Kg
70	670	1340	110	2120	4240	150	6700	13400
71	690	1380	111	2180	4360	151	6900	13800
72	710	1420	112	2240	4480	152	7100	14200
73	730	1460	113	2300	4600	153	7300	14600
74	750	1500	114	2360	4720	154	7500	15000
75	774	1548	115	2430	4860	155	7750	15500
76	800	1600	116	2500	5000	156	8000	16000
77	824	1648	117	2570	5140	157	8250	16500
78	850	1700	118	2640	5280	158	8500	17000
79	874	1748	119	2720	5440	159	8750	17500
80	900	1800	120	2800	5600	160	9000	18000
81	924	1848	121	2900	5800	161	9250	18500
82	950	1900	122	3000	6000	162	9500	19000
83	974	1948	123	3100	6200	163	9750	19500
84	1000	2000	124	3200	6400	164	10000	20000
85	1030	2060	125	3300	6600	165	10300	20600
86	1060	2120	126	3400	6800	166	10600	21200
87	1090	2180	127	3500	7000	167	10900	21800
88	1120	2240	128	3500	7200	168	11200	22400
89	1160	2320	129	3700	7400	169	11600	23200
90	1200	2400	130	3800	7600	170	12000	24000
91	1230	2460	131	3900	7800	171	12300	24600
92	1260	2520	132	4000	8000	172	12600	25200
93	1300	2600	133	4120	8240	173	13000	26000
94	1340	2680	134	4240	8480	174	13400	26800
95	1380	2760	135	4360	8720	175	13800	27600
96	1420	2840	136	4480	8960	176	14200	28400
97	1460	2920	137	4600	9200	177	14600	29200
98	1500	3000	138	4720	9440	178	15000	30000
99	1550	3100	139	4860	9720	179	15500	31000
100	1600	3200	140	5000	10000			
101	1650	3300	141	5150	10300			
102	1700	3400	142	5300	10600			
103	1750	3500	143	5450	10900			
104	1800	3600	144	5600	11200			
105	1850	3700	145	5800	11600			
106	1900	3800	146	6000	12000			
107	1950	3900	147	6150	12300			
108	2000	4000	148	6300	12600			
109	2060	4120	149	6500	13000			

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TABLE 3

Ply Rating Marked Tyres

How to use this table:

1. Locate the line entry corresponding to the size and ply rating marked on the tyre sidewall;

2. Read off the maximum axle load (kg) for these tyres in 'SINGLE' or 'TWIN' formation, as appropriate.

Nominal Tyre Size	Ply Rating	Maximum Axle Load (Kg)	
		Single Tyres |-----|	Twin Tyres ||-----||
5-13C	6	970	1840
5-13C	8	1120	2120
5-13C	6	1020	1940
5-13C	6	1070	2090
5-13C	6	1280	2240
5-13C	8	1430	2750
5-13C	6	1380	2650
5-13C	8	1580	3050
5-13	12	4320	7880
5-13	14	4830	8900
5-14C	6	1070	2040
5-14C	6	1300	2460
5-14C	8	1460	2760
5-14C	6	1430	2680
5-14C	8	1550	3000
5-14	RADIAL	1200	2300
5-14	REINFORCED RAD	1340	2560
5-14	4	1340	2560
5-14C	6	1550	2920
5-14C	8	1700	3200
5-14	RADIAL	1300	2490
5-14	REINFORCED RAD	1500	2870
5-14C	6	1700	3210
5-14C	8	1900	3600
5-14	RADIAL	1420	2720
5-14	REINFORCED RAD	1650	3160
5-14C	6	1850	3510
5-14C	8	2060	3900
5-14C	8	2240	4240
5-14C	6	1170	2240
5-14C	8	1260	2400

Nominal Tyre Size	Ply Rating	Maximum Axle Load (Kg)	
		Single Tyres |-----|	Twin Tyres ||-----||
640-14C	6	1330	2550
650-14	4	970	1860
650-14C	6	1300	2460
650-14C	8	1500	2840
670-14C	6	1430	2750
670-14C	8	1680	3160
700-14	4	1070	2050
700-14C	6	1380	2650
750-14	4	1200	2300
750-14C	6	1530	2950
750-14C	8	1730	3360
11-15	6	2240	
145-15C	8	1230	2320
185-15C	8	1750	3400
590-15C	6	1220	2340
640-15C	6	1380	2650
670-15C	6	1530	2900
670-15C	8	1780	3460
670-15	10	2000	3900
700-15C	6	1750	3400
700-15C	8	1940	3760
700-15	12	2440	4580
750-15C	6	1830	3560
750-15C	8	2060	3970
750-15	10	2340	4370
750-15	12	2750	5340
750-15	14	3150	6100
750-15	16	3660	6860
825-15	12	3050	5590
825-15	14	3360	6360
825-15	18	4680	8540
825-15	20	5000	9440
1000-15	12	3870	7120
1000-15	14	4320	8130
1000-15	16	5020	9580
1000-15	18	5400	10170

Nominal Tyre Size	Ply Rating	Maximum Axle Load (Kg)	
		Single Tyres |-----|	Twin Tyres ||-----||
175-16C	6	1500	2840
175-16C	8	1650	3100
185-16C	8	1800	3400
195-16C	8	1950	3700
205-16C	6	1900	3610
205-16C	8	2120	4000
215-16C	6	2120	4000
215-16C	8	2300	4360
235-85-16	10	2760	5040
600-16	6	1380	2550
600-16	8	1530	2920
600-16	10	1830	3300
650-16	6	1530	2920
650-16	8	1830	3460
650-16	10	2040	3900
700-16	6	1730	3260
700-16	8	2040	3870
700-16	10	2340	4480
700-16	12	2650	5000
750-16	6	2040	3870
750-16	8	2240	4270
750-16	10	2500	4720
750-16	12	2900	5600
825-16	8	2650	4880
825-16	10	2850	5440
825-16	12	3300	6400
825-16	14	3600	6800
900-16	6	2360	4360
900-16	8	2720	5140
900-16	10	3050	5600
900-16	12	4070	7700
900-16	14	4420	7800
1050-16	12	4580	8130

Size and Type of Tyres (continued)

Size and Type of Tyres (continued)



TABLE 3 (continued)

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Nominal Tyre Size	Ply Rating	Maximum Axle Load (Kg)		Nominal Tyre Size	Ply Rating	Maximum Axle Load (Kg)		Nominal Tyre Size	Ply Rating	Maximum Axle Load (Kg)	
		Single Tyres	Twin Tyres			Single Tyres	Twin Tyres			Single Tyres	Twin Tyres
1400-16	18	7880	3750	1000-20	12	4830	8640	9-22.5	10	3160	6610
1400-16	20	8390	5850	1000-20	14	5340	9720	9-22.5	12	3820	7200
1400-16	22	9150	6200	1000-20	16	6100	10900	9-22.5	14	4120	7800
9.5-16.5	6	2130	7200	10.5-20	6	2800	11600	10-22.5	10	4070	7630
8.5-17	10	3260	4480	1100-20	12	5340	9660	10-22.5	12	4380	8240
8.5-17	12	3560	5000	1100-20	14	6100	10900	10-22.5	14	5000	9700
8.5-17	14	3820	5600	1100-20	16	6610	11600	11-22.5	12	4830	8640
8-17.5C	8	2100	7200	1200-20	14	6100	10600	11-22.5	14	5300	9720
8-17.5	10	2570	8000	1200-20	16	6860	12000	11-22.5	16	6100	10900
8.5-17.5	RADIAL	2900	5600	1200-20	18	7630	13010	13-22.5	18	7500	13000
9.5-17.5	RADIAL	3400	6000	12.5-20	10	3700	—	10/70-22.5	14	5000	9200
8-19.5	RADIAL	3100	6000	1300-20	16	2800	—	11/70-22.5	12	5300	9720
9-19.5	RADIAL	3800	7200	1300-20	18	8900	—	11/70-22.5	14	5600	10400
9.5-19.5	RADIAL	4740	7800	1300-20	20	9300	—	11/70-22.5	16	6100	10900
600-20	6	1430	2750	1400-20	18	9150	—	12/70-22.5	16	6610	11600
600-20	8	1630	3100	1400-20	20	9510	—	13/70-22.5	18	7630	13010
600-20	10	1830	3460	1400-20	22	10000	—	275/70-22.5	RADIAL	5000	9200
650-20	6	1830	3460	14.5-20	10	4000	—	275/70-22.5	16	6100	—
650-20	8	2240	4070	1500-20	20	10500	—	315/70-22.5	16	6610	11600
650-20	10	2440	4680	1500-20	22	11600	—	900-24	12	5090	9150
700-20	8	2240	4480	1500-20	24	12600	—	900-24	14	5300	10170
700-20	10	2650	4880	1600-20	14	6100	—	1000-24	14	6100	10500
700-20	12	2850	5340	1600-20	20	11400	—	1100-24	12	5850	10300
750-20	8	2850	5340	1600-20	22	12500	—	1100-24	14	6610	11200
750-20	10	3260	6000	1600-20	24	13600	—	1100-24	16	7120	12300
750-20	12	3600	7000	1780-20	18	7300	13000	1200-24	14	6610	—
825-20	10	3560	6610	1480-20	18	8250	—	1200-24	16	7370	—
825-20	12	3820	7200	1100-22	12	5590	10170	1200-24	18	8130	—
825-20	14	4120	7800	1100-22	14	6100	10810	1200-24	20	9000	—
900-20	10	4070	7630	1100-22	16	6860	12000	1400-24	18	10000	—
900-20	12	4580	8240	1100-22	18	7630	—	1400-24	22	11200	—
900-20	14	5000	9700	1100-22	20	8250	—	11-24.5	14	5830	10800

Items marked ** are not suitable in UK over 9200kg due to minimum tread width requirement of 300mm

Size and Type of Tyres (continued)**TABLE 4**
MAX AXLE LOADS FOR "UNRESTRICTED" SPEED VEHICLES

Tyre Load Index	Trailers permitted to exceed 50mph (up to 60mph)				Motor vehicles permitted to exceed 60mph (up to 70mph)			
	Speed Symbol F (-15%)		Speed Symbol G (-5%)		Speed Symbol J (-7%)		Speed Symbol K (-3%)	
	Single(Kg)	Dual(Kg)	Single(Kg)	Dual(Kg)	Single(Kg)	Dual(Kg)	Single(Kg)	Dual(Kg)
70	570	1140	640	1280	630	1250	650	1300
71	590	1180	660	1320	650	1290	670	1340
72	610	1210	680	1350	660	1330	690	1380
73	630	1250	700	1390	680	1360	710	1420
74	640	1280	720	1430	700	1400	730	1460
75	660	1320	740	1480	720	1440	760	1510
76	680	1360	760	1520	750	1490	780	1550
77	700	1410	790	1570	770	1540	800	1600
78	730	1450	810	1620	800	1590	830	1650
79	750	1490	830	1670	820	1630	850	1700
80	770	1530	860	1710	840	1680	880	1750
81	790	1580	880	1760	860	1720	900	1800
82	810	1620	910	1810	890	1770	930	1850
83	830	1660	930	1860	910	1820	950	1890
84	850	1700	950	1900	930	1860	970	1940
85	880	1760	980	1960	960	1920	1000	2000
86	910	1810	1010	2020	990	1980	1030	2060
87	930	1860	1040	2080	1020	2030	1060	2120
88	960	1910	1070	2130	1050	2090	1090	2180
89	990	1980	1110	2210	1080	2160	1130	2250
90	1020	2040	1140	2280	1120	2240	1170	2330
91	1050	2100	1170	2340	1150	2290	1200	2390
92	1080	2150	1200	2400	1180	2350	1230	2450
93	1110	2210	1240	2470	1210	2420	1270	2530
94	1140	2280	1280	2550	1250	2500	1300	2600
95	1180	2350	1320	2630	1290	2570	1340	2680
96	1210	2420	1350	2700	1330	2650	1380	2760
97	1250	2490	1390	2780	1360	2720	1420	2840
98	1280	2550	1430	2850	1400	2790	1460	2910
99	1320	2640	1480	2950	1450	2890	1510	3010
100	1360	2720	1520	3040	1490	2980	1560	3110
101	1410	2810	1570	3140	1540	3070	1610	3210
102	1450	2890	1620	3230	1590	3170	1650	3300
103	1490	2980	1670	3330	1630	3260	1700	3400
104	1530	3060	1710	3420	1680	3350	1750	3500
105	1580	3150	1760	3520	1730	3450	1800	3590
106	1620	3230	1810	3610	1770	3540	1850	3690
107	1660	3320	1860	3710	1820	3630	1900	3790
108	1700	3400	1900	3800	1860	3720	1940	3880
109	1760	3510	1960	3920	1920	3840	2000	4000
110	1810	3610	2020	4030	1980	3950	2060	4120
111	1860	3710	2080	4150	2030	4060	2120	4230
112	1910	3810	2130	4260	2090	4170	2180	4350
113	1960	3910	2190	4370	2140	4280	2240	4470
114	2010	4020	2250	4580	2200	4390	2290	4580

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Size and Type of Tyres *(continued)*

TABLE 4 (continued)
MAX AXLE LOADS FOR "UNRESTRICTED" SPEED VEHICLES

Tyre Load Index	Trailers permitted to exceed 50mph (up to 60mph)				Motor vehicles permitted to exceed 60mph (up to 70mph)			
	Speed Symbol F (-15%)		Speed Symbol G (-5%)		Speed Symbol J (-7%)		Speed Symbol K (-3%)	
	Single(Kg)	Dual(Kg)	Single(Kg)	Dual(Kg)	Single(Kg)	Dual(Kg)	Single(Kg)	Dual(Kg)
115	2070	4140	2310	4620	2260	4520	2360	4720
116	2130	4250	2380	4750	2330	4650	2430	4850
117	2190	4370	2450	4890	2390	4780	2500	4990
118	2250	4490	2510	5020	2460	4910	2570	5130
119	2320	4630	2590	5170	2530	5060	2640	5280
120	2380	4760	2660	5320	2610	5210	2720	5440
121	2470	4930	2760	5510	2700	5400	2820	5626
122	2550	5100	2850	5700	2790	5580	2910	5820
123	2640	5270	2950	5890	2890	5770	3010	6020
124	2720	5440	3040	6080	2980	5960	3110	6210
125	2810	5610	3140	6270	3070	6140	3210	6410
126	2890	5780	3230	6460	3170	6330	3300	6600
127	2980	5950	3330	6650	3260	6510	3400	6790
128	3060	6120	3420	6840	3350	6700	3500	6990
129	3150	6290	3520	7030	3450	6890	3590	7180
130	3230	6460	3610	7220	3540	7070	3690	7380
131	3320	6630	3710	7410	3630	7260	3790	7570
132	3400	6800	3800	7600	3720	7440	3880	7760
133	3510	7010	3920	7830	3840	7670	4000	8000
134	3610	7210	4030	8060	3950	7890	4120	8230
135	3710	7420	4150	8290	4060	8110	4230	8460
136	3810	7620	4260	8520	4170	8340	4350	8700
137	3910	7820	4370	8740	4280	8560	4470	8930
138	4020	8030	4490	8970	4390	8780	4580	9160
139	4140	8270	4620	9240	4520	9040	4720	9430
140	4250	8500	4750	9500	4650	9300	4850	9700
141	4380	8760	4900	9790	4790	9580	5000	10000
142	4510	9010	5040	10070	4930	9860	5150	10290
143	4640	9270	5180	10360	5070	10140	5290	10580
144	4760	9520	5320	10640	5210	10420	5420	10870
145	4930	9860	5510	11020	5400	10790	5630	11260
146	5100	10200	5700	11400	5580	11160	5820	11540
147	5230	10460	5850	11690	5720	11440	5970	11940
148	5360	10710	5990	11970	5860	11720	6120	12230
149	5530	11050	6180	12350	6050	12090	6310	12610
150	5700	11390	6370	12730	6240	12470	6500	13000
151	5870	11730	6560	13110	6420	12840	6700	13390
152	6040	12070	6750	13490	6610	13210	6890	13780
153	6210	12410	6940	13870	6790	13580	7090	14170
154	6380	12750	7130	14250	6980	13950	7280	14550
155	6590	13180	7370	14730	7210	14420	7520	15040
156	6800	13600	7600	15200	7440	14880	7760	15520
157	7020	14030	7840	15680	7680	15350	8010	16010
158	7230	14450	8080	16150	7910	15810	8250	16490
159	7440	14880	8320	16630	8140	16280	8490	16980
160	7650	15300	8550	17100	8370	16740	8730	17460
161	7870	15730	8790	17580	8610	17210	8980	17950
162	8080	16150	9030	18050	8840	17670	9220	18430

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Size and Type of Tyres (continued)**TABLE 4 (continued)**
MAX AXLE LOADS FOR "UNRESTRICTED" SPEED VEHICLES

Tyre Load Index	Trailers permitted to exceed 50mph (up to 60mph)				Motor vehicles permitted to exceed 60mph (up to 70mph)			
	Speed Symbol F (-15%)		Speed Symbol G (-5%)		Speed Symbol J (-7%)		Speed Symbol K (-3%)	
	Single(Kg)	Dual(Kg)	Single(Kg)	Dual(Kg)	Single(Kg)	Dual(Kg)	Single(Kg)	Dual(Kg)
164	8500	17000	9500	19000	9300	18600	9700	19400
165	8760	17510	9790	19570	9580	19160	10000	19990
166	9010	18020	10070	20140	9860	19720	10290	20570
167	9270	18530	10360	20710	10140	20280	10580	21150
168	9520	19040	10640	21280	10420	20840	10870	21730
169	9860	19720	11020	22040	10790	21580	11260	22510
170	10200	20400	11400	22800	11160	22320	11640	23280
171	10460	20910	11690	23370	11440	22880	11940	23870
172	10710	21420	11970	23940	11720	23440	12230	24450
173	11050	22100	12350	24700	12090	24180	12610	25220
174	11390	22780	12730	25460	12470	24930	13000	26000
175	11730	23460	13110	26220	12840	25670	13390	26780
176	12070	24140	13490	26980	13210	26420	13780	27550
177	12410	24820	13870	27740	13580	27160	14170	28330
178	12750	25500	14250	28500	13950	27900	14550	29100
179	13180	26350	14730	29450	14420	28830	15040	30070

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Condition of Tyres

Application

This examination applies to all tyres apart from spare tyres

Procedure and Standards

Check each tyre for:

- Cuts
- Lumps, bulges or tears.

Note: Lifting of the tread rubber is a reason for failure. If a portion of the tread material is partially severed so that it is likely to fly off and cause danger for other road users is a reason for failure.

A probe may be used when checking a cut in a tyre provided that care is taken that no further damage is caused to the tyre.

When checking bulges care must be taken to distinguish between bulges caused by separation or partial failure of the structure and the bulges which are due to normal manufacturing undulations in the tyre or due to a satisfactory repair. A bulge due to a repair will be solid, feeling firm to hand pressure and will not deflect as would a bulge associated with casing separation.

A recapped tyre may on occasions have unbonded surplus rubber at the tyre shoulder which may give the appearance of tread separation, although it is not.

- Exposed ply or cords.
- Damaged cords.

Check that tyre is seated correctly on the wheel and that it does not foul on any part of the vehicle or making wall contact with another tyre on a twin wheel.

Note: Some tyres with flexible side walls may make wall contact under load. This is not a reason for failure.

Check any tyre that appears to have been recut and determine whether it has been recut to the manufacturers recut tread pattern. It is often difficult to identify tyres which have been skilfully recut, but extra care should be taken to check for exposure of the ply or cord at the bottom of the grooves.

Note: Recut tyres can only be fitted to motor vehicles with an unladen weight of 2540kg or more and to trailers with an unladen weight of more than 1020kg.

Details of manufacturers' recut tread patterns can be obtained from tyre manufacturers or from the Vehicle and Operator Services Agency at Welcombe House, 91/2 The Strand, Swansea, SA1 2DH.

Condition of Tyres *(continued)*

Procedure and Standards (cont'd)

Check the tread pattern of each tyre and ensure that the base of any groove of the original tread pattern is visible.

Note: The original tread pattern means:

- On a re-treaded tyre the tread pattern immediately after the tyre was re-treaded.
- On a recut tyre the manufacturer's recut tread pattern.
- On a partly recut tyre, the part which has been recut the manufacturer's recut tread pattern, on the other part the tread pattern when new.
- On any other tyre the tread pattern of the tyre when new.

When checking the tread pattern the "Breadth of Tread" is to be taken as that part of the tyre which can contact the road, under normal use, measured across the tyre.

The following should be disregarded when deciding which grooves need to be checked in regard to the "original tread pattern".

- grooves which wear out before the main grooves are worn to a depth of 5mm in the case of a truck tyre and 3mm in the case of a car tyre.
- other minor features such as sipes, small lateral extensions to the circumferential grooves and minor lateral grooving on the shoulders.

Check that the tread pattern grooves to ensure that the minimum tread depth standards shown below are met.

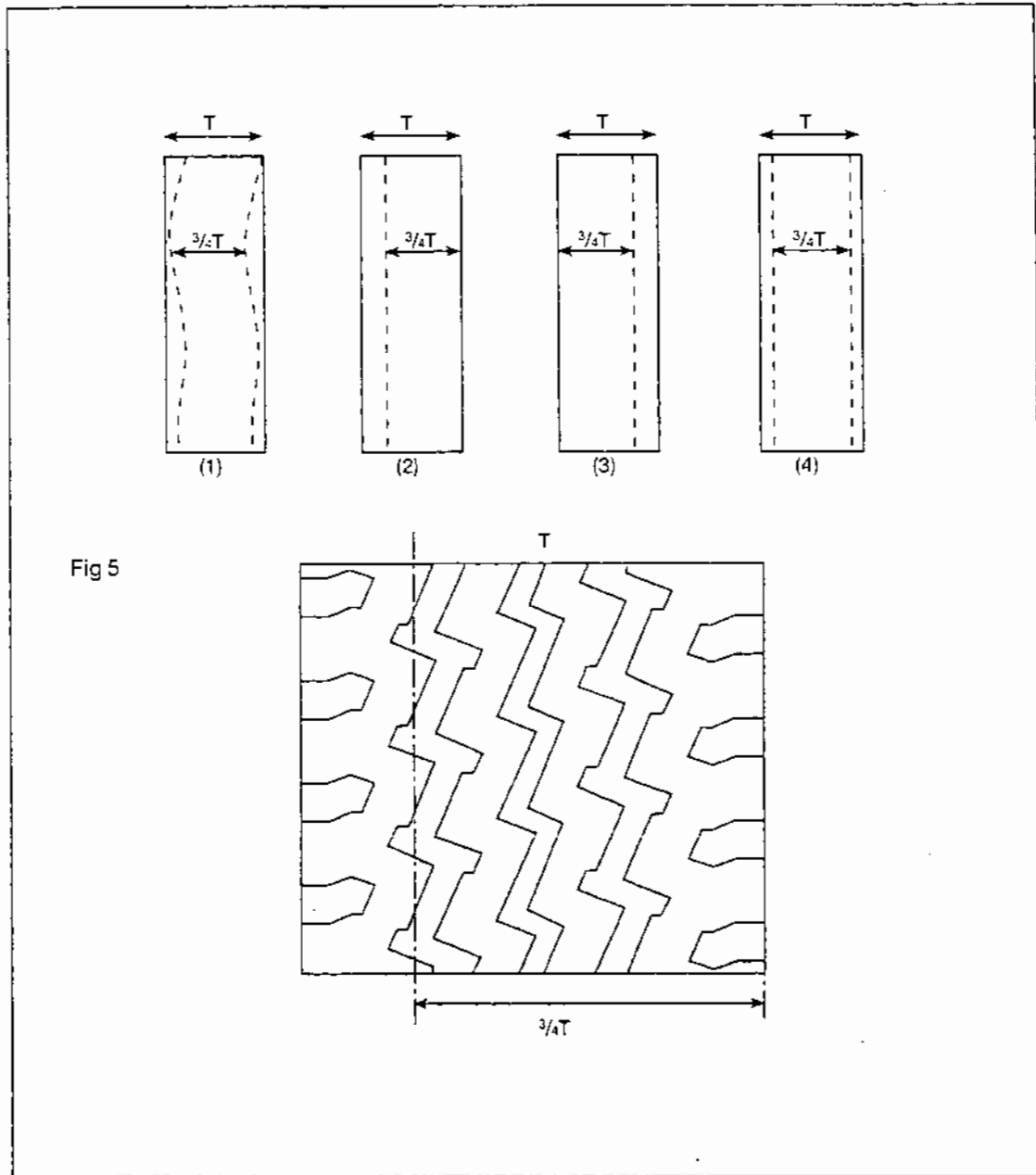
Design gross weight of vehicle	Over 3500kg	3500kg or less
Minimum tread depth	1mm, excluding any tie bar or tread wear indicator	1.6mm, excluding any tie bar or tread wear indicator
Position of minimum tread depth band	Form a continuous band covering at least any 3/4 of the breadth of the tread around the entire circumference	Form a continuous band covering the central 3/4 of the breadth of the tread around the entire circumference

The following diagrams show acceptable positions of the minimum tread depth band, for vehicles over 3500kg design gross weight, which must be measured at right angles to the axis of the wheel. Figures 1-4 show cambered wear and Figure 5 shows more detail of how the tread band is measured. For vehicles of 3500kg or less the band is the central 3/4 of the breadth of tread.

Figure 6 shows that for certain cross country tyres that it may be necessary to accept that the band of acceptable tread pattern may include a plain portion in the centre.

Condition of Tyres (continued)

Figs (1), (2), (3) and (4) T = Breadth of Tread
 $\frac{3}{4}T$ = Minimum width of continuous band.



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In this case the lateral grooves are the same depth as the circumferential grooves and are included in the $\frac{3}{4}$ measurement.

The breadth of the tread is 'T'.

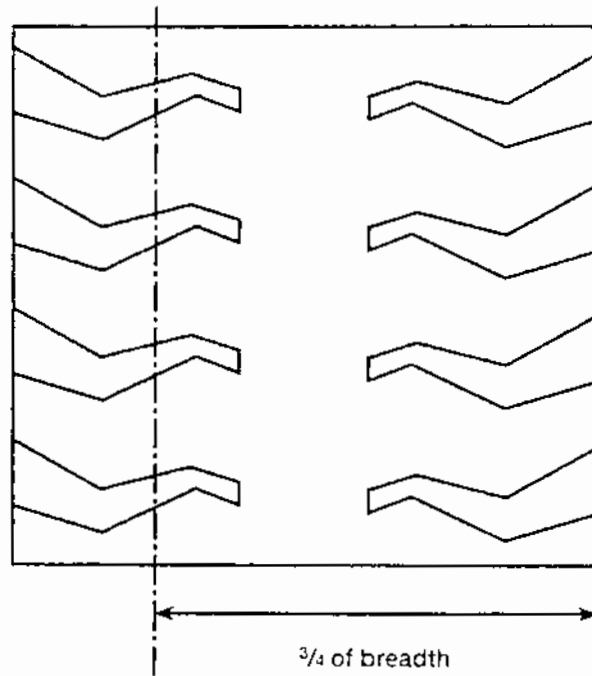
The $\frac{3}{4}$ of 'T' measurement can be taken over 'T' as in figures 1 to 4.

Condition of Tyres *(continued)*

This tyre has only lateral grooving.

The band of acceptable tread pattern includes the plain portion which existed when the tyre was new. The remaining tread area should contain grooves to a depth of 1mm.

Fig 6



Condition of Tyres *(continued)*

Reasons for Failure

1. A tyre:
 - a. with a cut which is deep enough to reach the ply or cords, and is more than 25mm long, or 10% of the section width, whichever is greater.
 - ** b. with a lump, bulge or tear caused by separation or partial failure of its structure. This includes any lifting of the tread rubber.
 - * c. with exposed ply or cord.
 - d. fouling on any part of the vehicle.
 - e. incorrectly seated on its wheel.
 - f. on a twin wheel making wall contact with another tyre.
 - g. where the base of any groove of the original tread pattern is not clearly visible.[vehicles with DGVW greater than 3500kg]
 - * h. where the minimum tread depth and tread band requirements shown in the table above are not met.
2. A recut tyre:
 - a. fitted to a vehicle which should not have one.
 - b. on which the wholly or partly recut tread pattern is not to the manufacturers recut tread pattern.

Bumper Bars

Application

This inspection applies to all vehicles.

Procedure and Standards

Check bumper bars for:

- Security
- Jagged edges or projections like to cause injury.

Note: Vehicles are not required to have separate bumper bars and these may be incorporated with the body in some cases.

Reasons for Failure

1. A bumper bar or bracket which:
 - a. is insecure
 - b. has a jagged or protruding edge which is likely to cause injury.

Spare Wheel & Carrier

Application

This inspection applies to all vehicles fitted with a spare wheel or carrier

Procedure and Standards

Check the carrier and spare wheel for security

Reasons for Failure

1. A spare wheel or carrier so insecure, damaged or positioned so that either is likely to fall from the vehicle.
2. A spare wheel positioned or not sufficiently restrained that it is likely to cause damage to the
 - Electrical wiring
 - Other vehicle components
 - Passengers' luggageor is likely to injure occupants.

Vehicle to Trailer Coupling

Application

This examination applies to all articulated buses and to all buses fitted with a trailer coupling.

Procedure and Standards

Articulated Buses

Examine the coupling and operating members for condition and security. The examination is limited to those parts which can be seen without dismantling or uncoupling. However the driver must part the bellows and lift trap doors and the turntable floor as far as is necessary to gain sight of the coupling. Ensure that these are replaced before the vehicle leaves the testing station.

Examine the condition and security of the turntable floor and of the concertina bellows and the presence and condition of sheathing on safety chains.

Buses fitted with a trailer coupling

If the vehicle has a coupled trailer it must not be uncoupled. Check the trailer coupling on the drawing vehicle for:

- Distortion, cracks, fractures and excessive wear in components.
- Security.
- Presence of and operation of locking and or safety devices.

Note: Wear in a pin, hitch or hook should be regarded as excessive if the thickness of the metal at any point is reduced to 3/4 of the original thickness.

Reasons for Failure

Articulated buses

1. Coupling articulating bracket, operating member or safety device:
 - a. insecure
 - b. excessively worn
 - *c. load bearing member cracked or fractured

Vehicle to Trailer Coupling *(continued)*

Reasons for Failure (cont'd)

2. Bellows:
 - a. insecure.
 - b. torn.
 - c. so damaged or deteriorated that injury to passengers is likely.
 - d. with safety chain sheathing so damaged or deteriorated that injury to passengers is likely.
3. Turntable floor:
 - a. insecure.
 - b. covering in such a condition that it could cause slipping or tripping.

Buses fitted with a trailer coupling

4. A drawing hitch, bar, hook, eye, ball or ball socket:
 - a. excessively worn.
 - b. seriously deformed impairing its effectiveness and or weakens the component.
 - * c. cracked or fractured.
 - d. insecure.
 - f. has a missing, damaged, inoperative and or inadequate safety or locking device.

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Wings and Wheel Arches

Application

This inspection applies to all vehicles

Procedure and Standards

Wheels must have associated with them equipment or part of the body which as far as practicable, catches mud or water thrown up by the wheels.

Note: If a mudflap is an extension to a wing or similar fitting, a missing or damaged mudflap is not a reason for failure.

Reasons for Failure

1. A wing or wheel arch:
 - a. missing or insecure.
 - b. so badly corroded or distorted that it is not an adequate shield.
 - c. with sharp edges that are likely to cause injury.
 - d. which is rubbing on a tyre.

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Passenger Doors, Drivers Doors and Emergency Exits

Application

This inspection applies to all vehicles

Procedure and Standards

Examine the condition, completeness, operation and security of :-

- All drivers and passenger doors including “continental doors” (for use when coaches are driven on the right hand side of the road)
- all emergency exits including crew emergency exits where there is separate crew accommodation.

Note: On Bus Directive and ECE Regulation vehicles there may not be a primary emergency exit if the vehicle has two service doors and on Bus Directive vehicles the primary emergency exit may be power operated. Floor hatches may be used as emergency exits on Bus Directive vehicles.

Note: For power operated emergency exits only the driver’s control will close the exit.

Note: A driver’s door with one handle missing is acceptable provided that the door can be opened by the remaining handle(s) from the inside and outside.

Doors and emergency exits should be opened to the fullest extent and closed. Power operated doors should be operated 5 times to check that they consistently open fully. If on one occasion the doors fail to open to their fullest extent they should be operated a further 5 times and if the doors fail to open fully on one further attempt this is a reason for failure. Ensure that sufficient air is available to allow this check to be carried out correctly.

Whilst carrying out the above, which should be done with the engine switched off, check, by observing the air gauges, that the continued operation of air operated doors does not deplete the braking system.

Check the emergency operation of power operated door controls and that markings describing how to open the doors in an emergency are readily visible on or adjacent to the door.

Check that where needed power operated doors are fitted with soft edges and that they are in good condition and not so damaged or deteriorated that they could cause injury to a person.

Check when power operated doors are closing that any safety systems for preventing a passenger from being trapped are working correctly. In general safety systems are required on

- All schedule 6 minibuses.
- Doors more than 500mm to the rear of the drivers seat on post 1 October 1990 vehicles (other than minibuses). These doors must re-open.

Passenger Doors, Drivers Doors and Emergency Exits *(continued)*

Procedure and Standards (contd)

- On any power operated doors without a soft rubber edge large enough to prevent passengers from being trapped.

Power operated doors with safety systems do not need to re-open or stop if they are within 50mm of being fully closed. However PSVs (other than minibuses) used from 1 October 1990 with power operated doors more than 500mm to the rear of the drivers seat **MUST** re-open within 30mm of being fully closed.

If plug doors are fitted check that they operate in a smooth and controlled manner and are not likely to injure persons outside the vehicle.

Where sliding doors are fitted the condition of runners, tracks and catches should be checked in both the "open" and "closed" positions

Check the operation of opening mechanisms of doors and emergency exits and that any device to hold a door, or on a Bus Directive or ECE Regulation vehicle a door or top hinged emergency window open at its fullest extent is effective.

Check that emergency exits are clearly identified both inside and outside of the bus and that the means of operation is readily visible on or adjacent to them. The exact wording of this may vary but variations are acceptable as long as it is clear that it is an emergency exit and the means of operation are clear. There is no requirement for the means of operation for a break glass window to be shown on the outside of the bus. There is no requirement to mark the exterior of a continental door where an alternative seating plan renders it inaccessible.

Check that tools or special equipment needed to open "break glass" or ejectable windows are:

- present and
- secured in readily accessible locations which can be broken or opened by the use of reasonable force.

Check that if an all over advert has been fitted over a break glass emergency exit, that a gap exists between the advert and the window frame or bonding surface and that no mandatory markings are obscured or no longer contrast with background.

Check for the presence and operation of any door or emergency exit "open" warning devices. These must be fitted to:

- Schedule 6 minibuses which do not have two stage slam locks.
- Buses with more than 20 passenger seats which are certified for one person operation and used on local services. A warning device must be fitted to each emergency door and hinged emergency window which is outside the driver's direct line of sight.
- Any external door or hinged exit (including any emergency exit) which is outside the driver's direct line of sight on a vehicle certified on or after 1 January 1997. This does not apply to a door of a minibus if that door is fitted with a two stage lock.

Passenger Doors, Drivers Doors and Emergency Exits *(continued)*

- "Continental doors"
- On any power operated door fitted more than 500mm behind the driver's seat on a vehicle registered after 1 October 1990. This must be a visual device.
- On any emergency door or floor hatch on a Bus Directive or ECE regulation vehicle. This must be an audible device
- On any hinged emergency window which is not clearly visible to the driver on a Bus Directive or ECE regulation vehicle. This must be an audible device
- On any emergency control for a power operated door fitted to a Bus Directive or ECE Regulation vehicle. This must be a visual and audible device

Check for the presence and operation of an interlock system on all vehicles fitted with power operated doors which project more than 80mm beyond the body at its **widest part**, when opening or fully open. The interlock may be linked with the handbrake control, clutch pedal, gearbox, accelerator, tachograph or propshaft. It may be necessary to move the vehicle to carry out this check. This does not apply to Schedule 6 minibuses, Bus Directive Vehicles or ECE Regulation vehicles

Note: Some vehicles built before 1 April 1984 were not fitted with interlocks. These should not be failed unless there is clear evidence that an interlock has been removed, either visual or from the vehicle record.

Check the presence and security of guards where originally fitted to prevent accidental opening of a door. This is particularly relevant where manually operated "continental doors" are fitted close to toilet doors.

Check that the operation of any supplementary locking devices fitted to doors and emergency exits can be overridden by one operation of the interior door handle. (This requirement does not apply to a Schedule 6 minibus.)

Service Doors on Bus Directive and ECE Regulation vehicles

Where fitted with a power operated service door that is not within the driver's direct field of vision, unless it is an automatically operated door an optical device is required, . Where this is the case check :

- for presence and condition of the optical device
- that the driver when seated in the driver's seat has a clear unobstructed view of the inside and outside of the door area.

Automatically operated service doors on Bus Directive and ECE regulation vehicles

Check that the driver can activate and de-activate the system. This may be done by either operating the door control switches or by an independent switch.

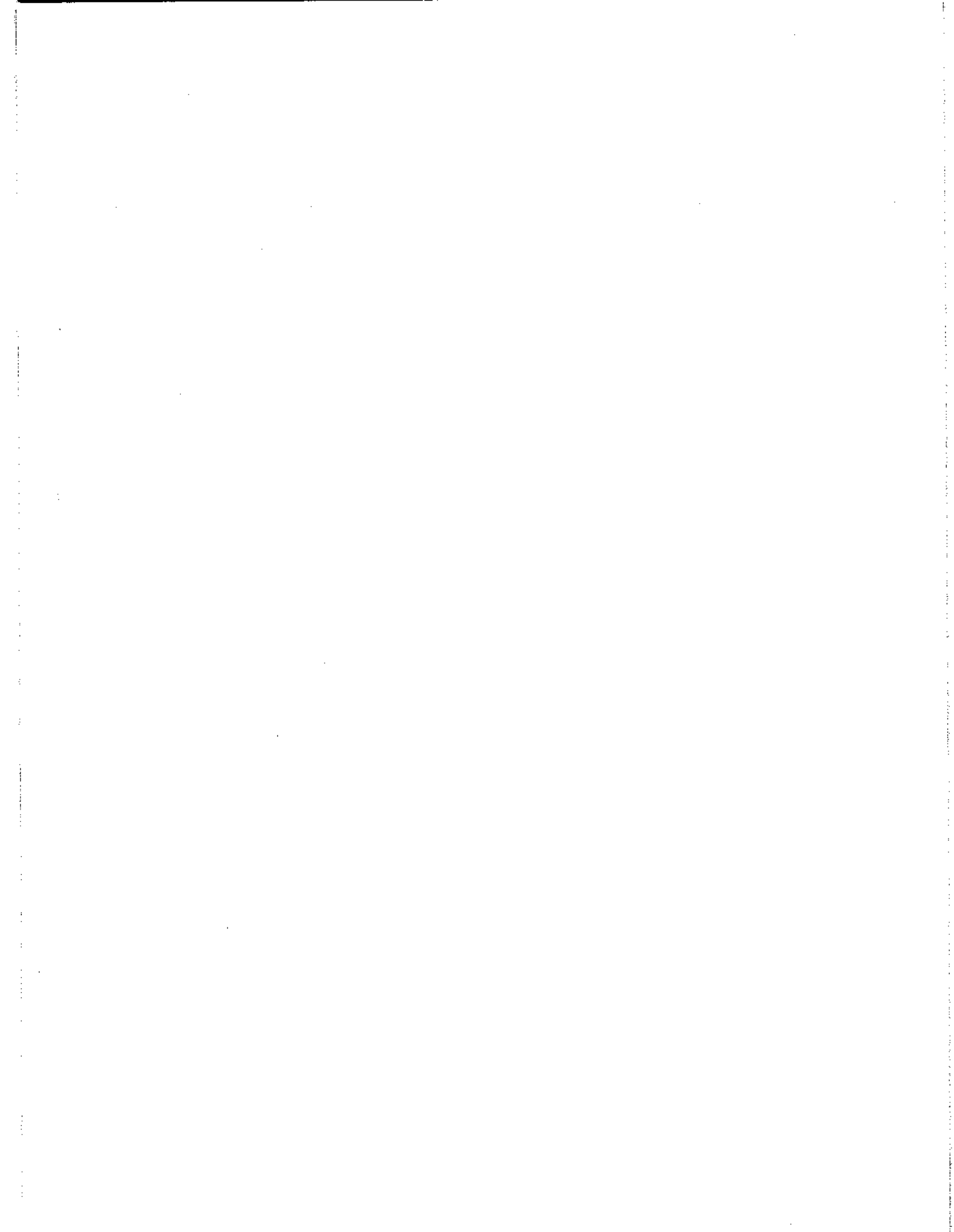
Passenger Doors, Drivers Doors and Emergency Exits *(continued)*

Reasons for Failure

1. A door or emergency exit:
 - a. incomplete or missing.
 - b. cannot be opened to its fullest extent.
 - c. will not remain securely closed or is likely to open inadvertently.
 - d. jammed or secured so that it can not be opened.
 - e. with a defective device for holding a door, or on a Bus Directive or ECE vehicle a door or top hinged emergency window , open.
 - f. with insecure, excessively worn or fractured hinges or pins or insecure door pillars which could adversely affect operation.
 - g. with a supplementary locking device which is not overridden by one operation of the interior door handle. [not Schedule 6 minibus]
 - h. with a release handle guard insecure or missing.
 - j. "Open" warning device missing or inoperative.,
 - k. a break glass window fitted with laminated glass
2. A sliding door
 - a. insecure or likely to become detached from a runner.
 - b. cannot be operated without undue effort.
3. A door or emergency exit opening or closing mechanism
 - a. defective, excessively worn or damaged so that it is difficult to open or close the door or exit.
 - b. control buttons loose, sticking or with excessive movement before operating.
4. A door and emergency exit marking
 - a. missing.
 - b. illegible.
 - c. method of operation not shown.
5. Power operated doors and emergency exits:
 - a. safety interlock device missing or inoperative.
 - b. repeated operation of the doors depletes the braking system(s) pressure below the level at which the circuit protection valve should operate.

Passenger Doors, Drivers Doors and Emergency Exits *(continued)*

- c. cannot be opened from inside or outside the vehicle using the emergency controls.
 - d. soft edge missing deteriorated or damaged so that injury could be caused to any person.
 - e. safety system does not operate correctly.
6. Plug door:
- a. opens or closes suddenly or with excessive force and is likely to injure persons outside the vehicle.
7. Emergency Exits:
- a. opening tool or device missing or not secured in a readily accessible place.
8. Break Glass Emergency Exit
- a. fitted with laminated glass or other unbreakable glazing
9. Automatically operated service door
- a. driver cannot activate or deactivate operation



Driver's Accommodation

Application

This inspection applies to all vehicles.

Procedure and Standards

Examine the condition and security of;

- Floor in the drivers area including wheel arches.
- Steps and step rings.
- Drivers grab handle.

Note: if a step ring has been removed to allow examination of a wheel in conjunction with IM 6, this shall not be a Reason for Failure.

Examine presence, condition and operation of;

- Demisting and defrosting equipment.
- Drivers emergency escape window on half cab buses.

Note: Schedule 6 Mini Buses. There is no requirement for these vehicles to have demisting or defrosting equipment. However if demisting & defrosting equipment is fitted it will be included in the test.

Reasons for Failure

1. Cab, floor and steps
 - a. floor in the drivers area or a wheel arch so badly deteriorated it is likely to impair the drivers control of the vehicle or is likely to cause injury.
 - b. a step or step ring or a drivers grab handle which is so insecure or in such a condition it is likely to cause injury.
2. Demisting or defrosting equipment:
 - a. missing, inoperative or ineffective.
3. Drivers escape window:
 - a. not provided.
 - b. cannot be opened.

Driver's Seat

Application

This inspection applies to all vehicles.

Procedure and Standards

- This inspection relates only to the driver's seat.
- Check for condition and security of seat, seat back, cushion and mechanism.
- A seat adjusting mechanism which has been deliberately made inoperative or has seized is not a Reason for Failure.

Reasons for Failure

1. a. The seat, mounting or adjusting mechanism so insecure or in such a condition that it could cause the driver to lose control of the vehicle.

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Security of Body

Application

This inspection applies to all vehicles.

Procedure and Standards

Check for security, fracture, distortion, wear and presence of:

- all fixings (eg brackets) securing the body to the chassis or to a sub-frame or supporting members
- securing bolts, rivets or welds for the fixings
- structural (stressed) panels

Note: Loose bolts and rivets and defective welds do not necessarily mean that the body is insecure. The whole structure must be assessed and a failure will only be justified where sufficient bolts, rivets and welds are loose or defective to allow the body to move enough to cause a hazard for other road users.

Some designs of body mounting allow a limited amount of flexing between the body and chassis. This must not be confused with insecurity.

Coach bolt failure due to corrosion may not be obvious as the failed section may be in an position where it cannot be seen. Care should be taken to check with this type of fixing that there is no sign of abnormal movement of the structure which would indicate coach bolt failure.

Check the condition of the load bearing body members for corrosion, cracks or damage which could seriously weaken their strength.

Reasons for Failure

1. Body:
 - a. insecure
2. A load bearing member:
 - a. so cracked, corroded or damaged that the body is seriously weakened.

Exterior of Body including Luggage Compartments

Application

This inspection applies to all vehicles

Procedure and Standards

Check the condition and security of:

- Body panels and frame members
- Body underparts
- Luggage compartments

Check for the presence condition and security of guard rails intended to guard the space between the wheels. In many cases this function is achieved by the normal body panels. Schedule 6 minibuses, Bus Directive and ECE regulation vehicles do not require guard rails.

Check that where access doors and/or flaps have been constructed to be secured in the open position that the means of doing so is effective and in good condition.

Check that all access doors and flap can be secured in the closed position.

Check that luggage locker or other doors do not obscure position lamps, direction indicators or rear retro reflectors when secured in the open position.

Reasons for Failure

1. Body panels, frame members, fittings or components:
 - a. insecure and/or likely to fall from the vehicle.
 - b. with jagged edges likely to cause injury.
2. Body underparts
 - a. so insecure, corroded or deteriorated that they are likely to endanger passengers, other road users or affect control of the vehicle.
3. Luggage compartment
 - a. structure defective allowing contents to protrude or fall onto a road, or in a condition to damage or soil luggage.
4. Luggage compartment or other access door:
 - a. likely to become detached.
 - b. which cannot be secured in open or closed position.
 - c. which when secured in the open position obscures a position lamp, direction indicator or rear retro reflector.

**Exterior of Body including
Luggage Compartments** *(continued)*

5. Guard Rails:
 - a. insecure, incomplete and/or missing.

Interior of Body, Passenger Entrance, Exit Steps and Platforms

Application

This inspection applies to all vehicles. Buses which have an accessibility certificate or a DDA special authorisation will have wheelchair facilities and disabled access examined under IM 24

Procedure and Standards

Check that access to exits and emergency exits is not obstructed

Check the condition, correct function and security of:-

- Steps and stairways, retractable steps, gangways, platforms, floor traps including floor coverings and mats.

Note: On Bus Directive and ECE regulation vehicles all steps must have a band of contrasting colours on the nosing

Note: Manual retractable steps on Bus Directive and ECE Regulation vehicles must be fitted with an audible warning to indicate that the steps have not been fully retracted into the travelling position. Power operated steps on these vehicles must have an interlock to prevent the vehicle being driven with the steps in the down position.

Check the condition, security, cleanliness and correct positioning of seats, including crew seats.

Crew seats should be marked "for crew use only" or similar. On Bus Directive and ECE Regulation vehicles the seat only needs to be identified for crew use and the wording is not specified.

Check the condition and security of:-

- parcel racks.
- grab rails, straps, stanchions, guard rails and barriers.
- ventilators, roof hatches and windows that open for ventilation.
- engine covers.

Removal of a parcel rack from a vehicle will not be a Reason for Failure unless a communication control or grab rail is an integral part of the parcel rack, and there are not sufficient alternatives to these items.

Check the operation of forced air ventilation systems. Failure of this will only be a Reason for Failure if more than 50% of the system is ineffective. Alternatively if there are adequate side opening windows or roof vents, failure, or partial failure of the forced ventilation system will not be a Reason for Failure. The requirements for ventilation do not apply to Schedule 6 minibuses.

Check that the interior lights provide adequate illumination of the interior of the vehicle. The only requirement for Schedule 6 minibuses is that any steps are illuminated.

Interior of Body, Passenger Entrance, Exit Steps and Platforms *(continued)*

Procedure and Standards (contd)

Check that the audible or visual device operated by passengers to request the driver to stop the vehicle is operating correctly. This is not required on buses with less than 13 passenger seats or Schedule 6 minibuses. If a visual and an audible system are fitted only one needs to operate, so long as it operates throughout the vehicle. Bus Directive and ECE regulation vehicles which do not have provision for standing passengers do not require a communication device. All Bus Directive and ECE regulation vehicles which carry standing passengers must have at least one illuminated sign which may be text or a pictogram to indicate to passengers that the bus is stopping.

Check interior surfaces, including roof linings, light covers, side panel coverings and their retaining mouldings for cleanliness, condition and security.

Examine the condition, and accessibility of:-

- First aid kit and fire extinguisher.
- Check that the first aid kit is not contaminated or the contents obviously deteriorated and that the receptacle which contains the first aid kit is prominently marked. If the receptacle is in a sealed compartment or closed glove box; the compartment or glove box should be clearly marked to indicate the position of the first aid kit. If the first aid kit is behind a glass panel the panel should not be removed for this inspection. If a break glass panel is fitted the shot blasted area should face inward to allow the glass to be easily broken. If it is facing outward this will be a Reason for Failure. An empty first aid box will be considered as missing.

Note: First aid kits are required for all large buses (apart from those used on local services) and on Schedule 6 Minibuses

If a large bus used on local services is presented for test with markings showing the presence of a first aid kit but no kit is carried this is a reason for failure unless the sign is removed or covered.

- Check that the fire extinguisher is of the correct type. They must contain water or foam and be marked BS 5423 or EN3 and have a minimum fire rating of at least 8A or 21B. If the extinguisher is behind a glass panel the panel should not be removed for this inspection. A glass panel with a shot blasted area is only readily breakable if the shot blasted surface faces inwards (ie towards the fire extinguisher). If a shot blasted area faces outwards this is a reason for failure. If the glass has been shot blasted in accordance with the above paragraph, then no other device for breaking the glass is required. Other acceptable means of gaining access to fire extinguishers or first aid kits covered by a glass panel, that we are currently aware of, are:
 - A ring pull which allows the easy removal of the glazing panel, or
 - Toughened glass with a break glass hammer provided.

There may be other acceptable methods which have been approved by certifying officers.

Interior of Body, Passenger Entrance, Exit Steps and Platforms *(continued)*

There are no requirements with regards to the height at which the fire extinguisher is placed.

Where a gauge is fitted to a fire extinguisher the reading shown should not be used to determine the condition of the extinguisher.

Examine all "other facilities" for correct installation, function and security. If any "other facility" is clearly inoperative and is not causing any danger to passengers this is not a Reason for Failure Those most likely to be seen are:-

- Wheelchair lifts and ramps. (If fitted to a bus with an accessibility certificate or a DDA special authorisation examine under Inspection Manual item 24)
- Wheelchair fixings and features. (If fitted to a bus with an accessibility certificate or DDA special authorisation examine under Inspection Manual item 24)
- Combustion heaters.
- Cookers/refrigerators.
- Drinks dispensers.
- Televisions/video monitors.

Note: When inspecting separately fuelled appliances such as combustion heaters or cookers any signs of scorching charring or melting will be a Reason for Failure.

Reasons for Failure

1. Body Interior:
 - a. Access to any exit obstructed.
 - b. Steps and stairways, retractable steps, gangways, platforms or floor traps so insecure or in such a condition that they are likely to collapse in normal use.
 - c. No band of contrasting colour(s) on the step nosing on Bus Directive and ECE Regulation vehicles
 - d. Condition of any floor and/or covering which is likely to endanger passengers.
 - e. A floor trap locking device worn or ineffective so that the trap may become displaced.
2. Retractable Steps with:
 - a. a step which will not retract or remain retracted.
 - b. a step which will not operate or operates incorrectly.

Interior of Body, Passenger Entrance, Exit Steps and Platforms *(continued)*

Reasons for Failure (contd)

- c. driver able to move vehicle without being aware that the step is in the down position, e.g. direct sight or mirror or warning device or interlock.
 - d. driver able to move vehicle without being given an audible warning when a manually operated step is not fully retracted on Bus Directive and ECE regulation vehicles.
 - e. driver able to move vehicle when a power operated step is in the down position on Bus Directive and ECE regulation vehicles.
 - f. without an effective safety device to prevent the power operated steps from operating with the vehicle in motion on Bus Directive and ECE regulation vehicles.
 - g. a step insecure.
 - h. non-slip material defective.
3. Seats
- a. A seat insecure, damaged or weakened so that the damaged seat structure or covering could endanger passengers or damage their clothing.
 - b. A seat layout which has been changed without approval and which could endanger passengers.
 - c. With covering(s) in such a condition that they are likely to soil passengers clothing.
 - d. Crew seats which encroach into gangways and do not automatically retract when not in use.
 - e. Crew seats without a legible notice saying **"for crew use only"** or similar on or adjacent to the seat or not identified as for crew use on a Bus Directive and ECE regulation vehicle.
4. Parcel racks, grab rails, straps, stanchions, guard rails and barriers.
- a. missing or insecure or likely to endanger passengers.
 - b. constructed in such a manner that allows articles to fall onto the driver or passengers.
5. Ventilation
- a. Forced ventilation equipment ineffective. (not Schedule 6 minibuses)
 - b. Any ventilator, opening windows or roof hatches insecure.

Interior of Body, Passenger Entrance, Exit Steps and Platforms *(continued)*

- c. More than 50% of the ventilation system (i.e. opening windows, ventilators and roof hatches) inoperative where forced air ventilation is not available.
6. Engine interior covers:
 - a. missing, contaminated to a degree which constitutes a fire risk.
 - b. which allow fumes to penetrate passenger saloon.
7. Interior lights:
 - a. Inadequate illumination of saloon interior, steps, platform, staircase and other facilities. (interior lights only apply to steps for Schedule 6 minibuses)
8. Passenger Communication with driver:
 - a. missing or inoperative.
 - b. does not give a visual indication to passengers that the bus is stopping on Bus Directive and ECE regulation vehicles which carry standing passengers.
9. Interior surfaces:
 - a. insecure or damaged so that it is likely to cause injury to passengers.
 - b. contaminated so that they are likely to soil passengers clothing.
10. First aid kit:
 - a. missing, inaccessible or in poor or contaminated condition.
 - b. receptacle not marked.
11. Fire extinguisher:
 - a. missing, inaccessible, discharged, incorrect type or in an obviously poor condition.
12. Any "other facility" (including those listed in 13-17 below) which is:
 - a. incomplete, insecure and/or incorrect function and is likely to endanger passengers.
13. Wheelchair lifts/ramps:
 - a. the strength of the lift or ramp is significantly impaired.
 - b. there are sharp edges or other protrusions on a lift or ramp which are likely to cause injury.
 - c. defective in operation to the extent that it is likely to injure passengers, pedestrians or other road users.

Interior of Body, Passenger Entrance, Exit Steps and Platforms *(continued)*

Reasons for Failure (contd)

- d. non-slip surface on ramp defective.
 - e. a lift or ramp which cannot be secured in stored position.
14. Wheelchair spaces
- a. any wheelchair floor fitting loose or likely to cause passengers to trip.
 - b. any padded backrest missing (when known to be an original fitting), insecure or in a condition which is likely to cause injury to passengers.
 - c. any stanchion, retractable rail / movable device, partition or panel relating to the wheelchair area missing, insecure or in a condition which is likely to cause injury to passengers.
15. Combustion Heater with:
- a. fuel filler inside vehicle.
 - b. no fuel cut off device fitted or the device inoperative.
16. Cookers/refrigerators/drinks dispenser:
- a. in such a condition that they are likely to endanger passengers.
17. Television/Video for passenger entertainment with
- a. the screen placed where driver can view whilst driving.

Mirrors

Application

This inspection applies to all vehicles and the number and type of mirrors which have been fitted are shown below.

Date of first use	Mirrors required
Before 1 April 1983.	An exterior mirror on the offside and either an interior mirror (unless this would not give a view to the rear) or an exterior mirror on the nearside.
From 1 April 1983.	A main exterior mirror on both the offside and nearside.

Procedure and Standards

The vehicle must be checked to see that the correct number and type of mirrors are fitted. The mirrors and periscope, if fitted, must be checked for condition, security and position.

Internal mirrors must be checked to see that the edges are surrounded by protective material. This does not apply to vehicles registered before April 1969.

Reasons for Failure

1. Not fitted with the correct number or type(s) of mirror.
2. A required mirror in such a condition that anyone sitting in the driving seat cannot see clearly towards the rear or nearside.
3. A mirror or its mounting bracket insecure or structurally deteriorated.
4. An internal mirror edge not surrounded by protective material or with damaged protective material.
5. A mirror or periscope insecure and in such a condition that it is likely to injure the driver or passengers.

Glass and View of the Road

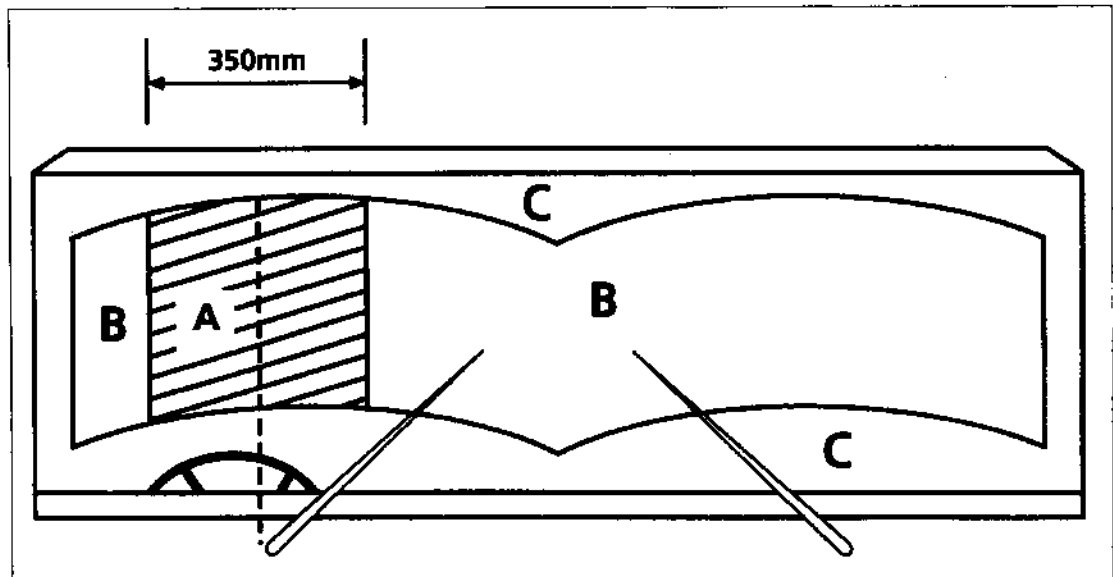
Application

This inspection applies to all vehicles.

Procedure and Standards

Check all glass or other glazing material fitted in the windscreen, all windows (including those in the roof) and any glazed internal partitions for cracks, surface damage or discoloration.

When checking the windscreen refer to the diagram below.



Zone "A" is 350mm wide, in the swept area of the screen and centred on the centre of the steering wheel.

Zone "B" is the remainder of the swept area,

Zone "C" is the remainder of the screen not covered by zones "A" and "B".

Damage or discoloration will be a reason for failure if it impairs the drivers view of the road,

Windscreen.

Examiners should have regard for the three separate "zones" when assessing damage or discoloration. A greater amount of damage or discoloration could be accepted in zone "C" than in zone "B", Likewise a greater amount can be accepted in zone "B" than in zone "A" where relatively minor damage would be a Reason for Failure.

Glass and View of the Road *(continued)***Procedure and Standards (cont'd)****Side Windows**

Damage or obstruction which prevents the driver from having a proper view through mandatory mirrors will be a Reason for Failure.

When assessing damage, light scratching should not be considered as damage.

Repaired windscreens must be inspected to the same criteria as original unrepaired screens. Repairs must be judged as to whether they interfere with vision.

Check the presence and security of all windscreens.

Check the presence and security of all windows, internal screens and partitions and that water is not leaking into passenger areas.

Check for the presence, security and condition of any guard rails or barriers at windows, internal screens or partitions.

Check that the correct type of glass or safety glazing is fitted to the windows specified in the table below.

VEHICLE FIRST USE	WINDSCREEN	WINDOW AT EITHER SIDE OF DRIVER'S SEAT	FORWARD FACING WINDOW OTHER THAN A WINDSCREEN	OTHER WINDOWS	WINDOWS IN INTERNAL PARTITIONS SCREENS AND DOORS
From 1 April 1988	Safety glass	Safety glass	Safety glass or safety glazing	Safety glass or safety glazing	Safety glass or safety glazing
From 1 June 1978	Safety glass	Safety glass	Safety glass or safety glazing	Safety glass or safety glazing	No requirement
From 1 January 1959	Safety glass if glass fitted	Safety glass if glass fitted	Safety glass if glass fitted	Safety glass if glass fitted	No requirement
Before 1 January 1959	Safety glass if glass fitted	No requirement	Safety glass if glass fitted. The glass fitted to the upper deck of a double decker need not be safety glass	No requirement	No requirement

Note: Plastic safety glazing or laminated glass is not suitable for use in "Break Glass" emergency exits

Glass and View of the Road *(continued)*

Procedure and Standards (cont'd)

Check that all safety glass is properly marked. Acceptable markings include:

- BS 857
- BS AU 178
- An "e" mark followed by a number in a square
- BS 5282 (only on vehicles first used before April 1985)
- TP GS or TP GSE (Glass made in France only acceptable on vehicles first used before October 1986)
- An "E" mark including the number 43R

Note: Glass marked only with a kite mark and BS 6206 is not acceptable. The glass must be marked with one of the other acceptable markings.

In the past some buses were certified where the only marking on the glass was a kite mark. If a bus has glass marked in this way and there is no reason to believe it is not safety glass this is acceptable.

If an acceptable marking has become faint or deteriorated this is not a reason for failure.

Marking of glass is not required for vehicles first used before 1 June 1978

Where glass is replaced with a piece from a stock sheet and the repairer has evidence of the standard to which the stock sheet complied, it is acceptable for them to mark the glass with the standard reference number but must be accompanied by a permanent mark by which the person/company can be identified.

"Safety glazing" means material (other than glass) which is so constructed or treated that if fractured it does not fly into fragments likely to cause severe cuts. There is a large range of materials which can be fitted as safety glazing and it is not possible to identify these positively at the test, as there is no requirement for marking.

Check the view of the road from the driver's seat. The view must not be obstructed by any changes to the original design such as the addition of stickers, pennants, cab decorations, stone-guards or other items which encroach more than 40mm into the swept area.

Notes:

- Video monitors when fitted in the area at the top of the screen to give a view to the rear are acceptable provided they do not obstruct the swept area more than a rear view mirror would. Monitors fitted on the dash must not encroach into the swept area by more than 40mm.

Glass and View of the Road *(continued)*

Procedure and Standards (contd)

- Official stickers are permitted to encroach more than 40mm if this is necessary to comply with other regulations, and include road fund licence, operators licence, section 19 permits, vehicle anti-theft scheme stickers issued by a Police Authority, toll payment tags/stickers, vehicle distance or lane indicator lenses and security passes. These should only be considered a reason for failure if they seriously restrict the view to the front.
- Drivers aids such as blinds and their mountings are permitted to encroach into the relevant areas.
- On many vehicles the original design will place things like instrument panel clusters inside the 40mm limits. Intrusions such as this which are original design features can be ignored, as can stickers placed inside the 40mm limit but which are hidden by a feature of the original design.
- Grooves in the windscreen designed to clean wiper blades should not be failed unless they seriously restrict the view to the front.

Reasons for Failure

1. a. Damage or discoloration of the windscreen which impairs the drivers view of the road.
b. Damage or obstruction of a side window which impairs the drivers view through a mandatory mirror.
c. A windscreen with a crack passing through the swept area which renders the screen insecure or which impairs the drivers view.
d. A windscreen, or any other outside window missing, or any windscreen, window, internal screen or partition so insecure that it is likely to fall out in normal use or cause injury to any person on the vehicle.
e. An obstruction which encroaches more than 40mm into the swept area.
f. Any crack where there is noticeable displacement of the surfaces on either side which has an adverse effect on the condition and operation of the windscreen wipers.
g. Damage which exposes the inner layer of a laminated screen
2. A windscreen or window:
 - a. not made from safety glass or safety glazing as specified in the table above.
 - b. made of safety glass which does not show an acceptable marking.
 - c. which allows water to leak into passenger areas.
3. a. A guard rail or barrier at a window, internal screen or partition missing, insecure or damaged to the extent that injury to passengers is likely.

Accessibility Features

Application

This inspection applies to all vehicles, which have been issued with an Accessibility Certificate or a (DDA) Special Authorisation. As an alternative to Schedules 1, 2 or 3 some vehicles with accessibility certificates will be Bus Directive vehicles and will include compliance with Annex VII and the route and destination requirements of Schedule 2 or 3. These will have been issued with a Notification Form PSV501. This will have been noted on the technical record for the vehicle.

Procedure and Standards

A: Vehicles which comply with Schedule 1 (Wheelchair Accessibility) of The PSV Accessibility Regulations 2000 or with Annex VII

Wheelchair spaces

For each wheelchair space designed for a forward facing wheelchair check:

- wheelchair restraint system for presence, security, condition and function including ease of release.
- wheelchair user restraint for presence, security, condition and function including ease of release. This is not required on Annex VII vehicles if the passenger seats in the vehicle are not required to be fitted with any form of occupant restraint.

The wheelchair and wheelchair user restraints may form part of a combined restraint system.

For each wheelchair space designed for a rearward facing wheelchair check:

- padded backrest for presence, security and condition. On Annex VII vehicles the backrest need not be padded and, as an alternative to a backrest, a device which acts as a support for the wheels of the wheelchair may be provided.
- each side of the space for a stanchion, retractable rail, partition or sidewall for presence, condition and security and in the case of a movable device for function.
- on one side of the space for a fixed handrail for presence, security and condition.

Boarding devices – lifts, ramps and portable ramps

Depending on the type of device check :

- the device for presence, function, security (excluding a portable ramp) and for visible structural weaknesses.

Accessibility Features *(continued)*

Procedure and Standards (contd)

- the ramp or lift can be deployed or lowered to the surface on which the vehicle is sitting. On an Annex VII vehicle a ramp need not lower to the surface on which the vehicle is sitting but must lower to within 150mm above that surface.
- that the device is free from sharp edges or other protrusions likely to cause injury.
- the band of contrasting colour around and abutting the edges of the ramp surface or lift platform for presence and condition. On an Annex VII vehicle this is only required on a powered ramp and it may be red and white striped or a single band of contrasting colour.
- that a lift surface has a device to prevent the wheelchair from rolling off the platform and the function of this device.
- that the ramp or lift can be safely stowed.
- that any means to retain the device in the stowed position can be easily released and if that means requires any form of power that the device can be easily released in the event of power failure, if necessary with the use of a tool carried on the vehicle.
- that the vehicle cannot be driven normally unless the lift or ramp is at its normal position for vehicle travel. (See the note below relating to portable ramps).

Note: Any portable ramp with a positive means to prevent the ramp being easily detached from the vehicle when driven (e.g. locating pins) must comply with this requirement. Portable ramps without this positive means to prevent easy detachment do not have to meet this requirement.

Power operated lifts and power operated ramps (additional requirements)

In the case of a power operated lift or ramp check:

- the controls for correct operation. This includes all internal and external controls relating to the operation or stopping of the lift or ramp. Where controls are available adjacent to the lift or ramp check that controls that initiate operation can be isolated by a control in the driver's cab.
- that an audible device sounds when in operation, In addition, a ramp fitted to an Annex VII vehicle must be fitted with a yellow flashing warning lights indicating that the ramp is operating.
- that it is capable of being operated manually. If there is more than one lift or ramp only one needs to operate manually. As an alternative the vehicle may carry a portable ramp.
- that it is not capable of being operated when the vehicle is in motion.

Accessibility Features *(continued)*

- the function of sensors or other safety devices fitted to reduce the risk of injury. In the case of a lift, once stopped it must be capable of being reversed. Safety devices are not required for a ramp if the force of the ramp is unlikely to cause injury or a lift if the operating control is adjacent to the lift.

Portable ramps (additional requirements)

Check the portable ramp has a suitable stowage position and when stowed it is unlikely to cause injury to any passenger, driver or crew.

Entrance and exits

Where fitted with a power operated lift or ramp that is not within the driver's direct field of vision, and where the operating control is not adjacent to the lift or ramp, check :

- for presence and condition of the optical device
- that the driver when seated in the driver's seat has a clear unobstructed view of the inside and outside of the door area in which the lift or ramp operates either through mirrors or another optical device such as CCTV or optical cable.

Signs and markings

For each wheelchair space check:

- there is a sign or instruction indicating the direction a wheelchair and user should face during travel. In the case of an Annex VII vehicle a sign need not indicate the direction that a wheelchair should face.
- there are safety instructions explaining the use of the wheelchair space including any wheelchair restraint system and wheelchair occupant restraint system. Does not apply to Annex VII vehicles.

Communication devices

Every wheelchair space must have a communication device to signal the driver, check:

- for presence, condition and operation.

Every entrance for a wheelchair user outside the direct view of the driver must have an external communication device, check:

- for presence and operation.

Lighting

Sufficient lighting is required to illuminate the interior and exterior of a vehicle to allow a wheelchair user to board and alight in safety, check:

- for presence and operation.

Accessibility Features *(continued)*

Note: The operation of this lighting may be operated by the general interior lighting control(s), separate control(s) or automatically by opening the doors.

B: Vehicles, which comply with Schedules 2 or 3 (General Accessibility) of The PSV Accessibility Regulations 2000 and Annex VII vehicles

Floors and gangways

- Check the condition of slip resistant surfaces.

Steps

- Check the condition of the step slip resistant material.
- Check the band of contrasting colour on the front edge of each step for presence, condition and visibility. Bus Directive and ECE Regulation vehicles will have had this checked under IM 21.
- In the case of a step which projects beyond the body of the vehicle and is likely to injure pedestrians, check that the step can fold or retract and the vehicle is not capable of being driven normally unless the step is folded or retracted. In the case of Annex VII vehicles this last requirement is only for vehicles fitted with power operated steps.
- In the case of a power operated step check that the step is incapable of being operated with the vehicle in motion and the function of any safety device, which stops the motion of the step to prevent injury. Safety devices are not required if the force of the step is unlikely to cause injury.

Kneeling systems (if applicable)

Check the kneeling system :

- control(s) are clearly identified.
- control(s) which are intended to stop and reverse the lowering process.
- interlock which renders the vehicle incapable of being driven at a speed in excess of 5km/h when the vehicle is lower than normal height of travel.

Reasons for Failure

1. Wheelchair spaces

- a. any wheelchair restraint components missing, badly deteriorated, insecure or defective.
- b. any wheelchair user restraint components missing, badly deteriorated, insecure or defective.
- c. any padded backrest missing, insecure or in a condition which is likely to cause injury to passengers.

Accessibility Features *(continued)*

- d. any stanchion, retractable rail / movable device, partition or panel relating to the wheelchair area missing, insecure or in a condition which is likely to cause injury to passengers.
2. Boarding lifts and boarding ramps
 - a. a lift or ramp missing, insecure or the strength of the lift or ramp is significantly impaired.
 - b. a lift or ramp which does not function as intended or does not operate through the required range of movement.
 - c. there are sharp edges or other protrusions on a lift or ramp which are likely to cause injury.
 - d. the band of contrasting colour on a lift or ramp surface edge is missing or has deteriorated to the extent that it is visually ineffective.
 - e. a lift surface does not have an effective device for preventing wheelchairs from rolling off or the device is ineffective.
 - f. cannot be safely stowed or failure or malfunction of any stowage retaining device including failure to release without power supplied where appropriate.
 - g. the safety device intended to prevent the vehicle being driven normally when the lift or ramp is not in its intended position for vehicle travel, is ineffective.
 3. A power operated lift or ramp (additional requirements)
 - a. defective in operation to the extent that it is likely to injure passengers, pedestrians or other road users.
 - b. with an audible device missing or inoperative (except an Annex VII vehicle with a powered lift).
 - c. on an Annex VII vehicle with a powered ramp the yellow warning lights are missing or defective.
 - d. incapable of being operated manually and the vehicle does not have a portable ramp.
 - e. without an effective safety device to prevent the lift or ramp from operating with the vehicle in motion.
 - f. safety device to stop the extension or retraction of a ramp or lift on meeting an obstruction inoperative and is likely to cause injury.
 4. Portable Ramp (additional requirements)
 - a. a portable ramp with no suitable storage position and likely to cause injury to any passenger or crew.

Accessibility Features *(continued)*

5. Entrance and exit optical device to allow driver to view wheelchair entrances and exits
 - a. missing, insecure or defective.
 - b. ineffective.
6. Signs and markings
 - a. a required sign / instruction or safety instruction missing or illegible.
7. Communication devices
 - a. any internal wheelchair space communication device missing or inoperative.
 - b. any external communication device missing or inoperative.
8. Lighting specifically intended for wheelchair users to board or alight in safety
 - a. missing, inoperative or deteriorated to the extent that the illumination is significantly reduced. See the note (under Lighting) in the Procedures and Standards section A.
9. Floors and gangways
 - a. slip resistant material deteriorated to the extent that it is no longer effective.
10. Steps with
 - a. slip resistant material deteriorated to the extent that it is no longer effective.
 - b. band of contrasting colour is missing or deteriorated to the extent that it is no longer visually effective.
 - c. any interlock and / or safety device applicable to folding, extendable and / or power steps is inoperative.
11. Kneeling suspension which
 - a. has an operating control, which is inadequately marked.
 - b. has controls which are incapable of stopping and reversing the lowering process.
 - c. does not have an effective interlock to prevent the vehicle from being driven at speeds in excess of 5km/h with the vehicle lower than normal height.

Note : If there is reason to believe a vehicle has had accessibility features changed or removed since being approved, the local Certifying Officer should be informed.

Windscreen Wipers and Washers

Application

This inspection applies to all vehicles except those with an opening windscreen or where an adequate view can be obtained by some other means.

PSVs used for "local service" operation do not require windscreen washers.

Procedure and Standards

Check the operation of the washers and wipers.

Wipers must be able to clear an adequate area of the screen to give the driver a view of the road to the front and in front of both sides of the vehicle.

Washers must provide enough water to enable the wipers to clear the screen effectively. Frozen washers are to be considered ineffective.

Reasons for Failure

1. Switches:
 - a. missing or defective.
2. Wipers:
 - a. do not move over an adequate area.
 - b. do not work continually when switched on.
 - c. a blade missing, insecure or so deteriorated that it cannot clear the screen effectively.
3. Washers:
 - a. ineffective.

Speedometer/Tachograph

Application

This inspection applies to all vehicles.

- A vehicle must have a tachograph fitted unless the presenter claims that it is exempt from the tachograph regulations. Exempt vehicles may have either a tachograph or a speedometer fitted.

Procedure and Standards

All vehicles

A tachograph exemption form must be completed for all vehicles deemed as tachograph exempt, unless the vehicle technical record shows the vehicle is exempt or it is declared on the application form.

Check that a tachograph or speedometer is fitted and is complete.

Check for condition and that it can be illuminated.

Note: If the glass dial is cracked and this does not affect operation this is not a Reason for Failure but the presenter should be advised of the defect.

For vehicles fitted with a tachograph

If the tachograph head cannot be opened or if the calibration plaque does not match the vehicle to which it is fitted it should be treated as if the plaque and any relevant seals were not there.

A non matching registration number may refer to a previous registration, the vehicles technical record should be checked before failing.

For vehicles required to be fitted with a tachograph.

Check that the tachograph scale is marked in kilometres per hour. There is no requirement for a tachograph to be marked with miles per hour increments.

Note: The tachograph head must only be opened with the steering wheel in the straight ahead position and with the engine switched off.

Check the presence of the tachograph manufacturer's serial number/data plaque. This can be located on the back cover or on the edge of the head. Check for "e" marking.

Check tachograph installation/calibration plaque for presence and condition, and the date of calibration is clearly visible.

Note: Installation/calibration plaques expire after 6 years.

It is acceptable for the plaque to contain additional information (e.g. Registration Number, tyre pressures etc.). The plaque is designed to be tamper proof and should show signs of damage if it has been tampered with. The 2 year check is not part of this inspection. However if the examiner notices this plaque is not displayed the presenter must be advised.

Speedometer/Tachograph *(contd)*

Analogue tachographs

Check the "K factor" plaque for presence and condition and the "K factor" is clearly visible. The electronic check of the indicated K factor is conducted under IM33 but if it differs from the prescribed factor by more than + or - 50 it may be a reason for rejection under this section, unless it complies with a further check contained in IM 33.

Digital tachographs

Check K factor plaque for presence

Check tachograph DIL switch covers and all seals for presence and condition and that they are the correct type. It will be sufficient to check that they have an approved marking. It is not necessary to identify the sealer.

For vehicles not required to be fitted with a tachograph where a tachograph is used as a speedometer.

If a tachograph is used in place of a speedometer (even if the vehicle is tachograph exempt) it is only required to be marked in kilometres per hour, although it may be dual marked in miles per hour.

Check installation/calibration plaque for presence and condition, and the date of calibration is clearly visible.

Note : There is no requirement for a re-calibration of these systems after 6 years provided that the system has been initially calibrated and sealed, **and that the calibration plaque and necessary seals remain intact.**

Check DIL switch covers and seals for presence and condition and that they are the correct type. It will be sufficient to check that they have an approved marking. It is not necessary to identify the sealer.

Note : If a speed limiter is NOT required, or the speed limiter does not receive the speed signal from the tachograph head, it is only necessary to check the seals inside the tachograph head. There is no requirement for the gearbox sender unit to be sealed. The vehicle technical record will show if a vehicle is speed limiter exempt.

Vehicles fitted with Modular Tachographs.

There are presently two types of modular tachograph using encrypted sender units. They are VDO Keinzel 1324 and Stoneridge Electronics(formerly TVI) and are easily identified as they are shaped like a car radio.

Vehicles fitted with Modular Tachograph systems have received type approval that permits the use of a 4 wire data transmission cable instead of an armoured cable provided it is used to connect an encrypted sender unit to the tachograph. When used in this arrangement the approval also does not require the cable end connections to be sealed. However, the sender unit itself is still required to be sealed to the gearbox.

Identification of Encrypted Sender Units

These appear similar to other sender units and can be positively identified by the cream/beige colour of the sender unit 4 pin bayonet connector. This colour is the same whether the sender unit is the rotating type or a proximity type. It should be noted that when the cable is connected that only a small part of the cream/beige coloured connector is visible.

Speedometer/Tachograph *(contd)*

Note: for the VDO Keinzl 1324 that there is an exception to the above colour code when the vehicle is fitted with a TELMA retarder, the socket housing will be red.

The electronic check of the K factor will be carried out as part of the procedure for IM33 but any failure where the electronically indicated figure differs from the prescribed K factor by more than + or - 50 may be a reason for failure 3f under this item unless it complies with a further check contained in IM33

Reasons for Failure

1. For all vehicles, a speedometer or tachograph:
 - a. not fitted
 - b. incomplete, clearly inoperative, or with dial glass broken or missing
 - c. cannot be illuminated
2. For all vehicles fitted with a tachograph
 - a. tachograph installation/calibration plaque missing, damaged
 - b. DIL switch cover missing, broken or damaged through interference.
3. For vehicles required to be fitted with a tachograph:
 - a. tachograph scale not marked in kilometres per hour
 - b. tachograph manufacturer's serial number/data plaque missing or not showing an "e" marking
 - c. tachograph installation/calibration plaque out of date.
 - d. "K" factor plaque missing
 - e. seal missing, broken or where a clearly "non mandatory" seal has been fitted in place of an "official" seal.
 - f. an analogue or modular tachograph where the electronically indicated figure differs from prescribed K factor by more than + or - 50
4. For vehicles not required to be fitted with a tachograph, where a tachograph is fitted in place of a speedometer:

If a speed limiter is required (which is sensed from the tachograph head):

- a. seal missing, broken or where a clearly "non-mandatory seal has been fitted in place of an "official" seal".

If a speed limiter is not required:

- b. a seal (within the tachograph head) missing, broken, or where a clearly "non mandatory" seal has been fitted in place of an "official" seal. There is no requirement for the gearbox sender unit to be sealed.

Horn

Application

This inspection applies to all vehicles.

Procedure and Standards

Operate horn control and listen to sound emitted. Check controls and mounting. Vehicles first used from 1 August 1973 must have a horn that produces a continuous or uniform sound.

Reasons for Failure

1. Horn control:
 - a. missing.
 - b. cannot be reached easily from the driving seat.
 - c. insecure.
2. Horn:
 - a. does not work.
 - b. is not loud enough to be heard by other road users.
 - c. sound not continuous or uniform.
 - d. insecure.

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Driving Controls

Application

This inspection applies to all vehicles.

Procedure and Standards

From the drivers seat operate driving controls, except those for brakes and steering which are checked under other items, to see that they function correctly and are complete.

Check that no rubbish or other items can impede the operation of the controls.

Operate engine stop control.

Reasons for Failure

1. A driving control:
 - a. insecure.
 - b. fractured, cracked, excessively corroded or incomplete.
 - c. obstructed or impeded in its travel.
 - 238 * d. obviously not functioning correctly.
 - e. with the presence of rubbish or other items likely to interfere with the proper control of the vehicle.
 - f. pedal anti-slip provision missing, loose or incomplete.
2. Engine stop control:
 - a. missing or inoperative.

Steering Control

Application

This inspection applies to all vehicles.

Procedure and Standards

- With the steered wheels in the straight ahead position lightly rotate the steering wheel to the left and right and note the amount of free play.
- Check for movement between the steering wheel, column and shaft by rocking the steering and applying upward and downward pressure at the steering wheel's rim and also by pushing and pulling at the rim.
- Check steering wheel for condition. Cracks in the plastic covering do not necessarily mean that the spoke is fractured.
- Free play at the steering rim in excess of 1/30 of the steering wheel diameter for a rack and pinion mechanism is considered a Reason for Failure. For other types of mechanism free play in excess of 1/5 of the wheel's diameter is considered a Reason for Failure. The acceptable free play for a range of wheels is shown below.

WHEEL DIAMETER	RACK AND PINION STEERING		OTHER TYPES OF STEERING
	CONVENTIONAL	WITH STEERING WHEEL AHEAD OF THE RACK AND WITH A NUMBER OF JOINTS	
380mm (15")	13mm (0.5")	48mm (1.9")	76mm (3")
455mm (18")	16mm (0.6")	57mm (2.3")	90mm (3.6")
530mm (21")	18mm (0.7")	67mm (2.6")	106mm (4.2")
610mm (24")	21mm (0.8")	77mm (3.3")	122mm (4.8")

Note: Unless specified by the manufacturer vehicles fitted with power steering must be checked with the engine running.

"Free Play" must not be confused with movement caused by compression of steering joints etc.

Certain types of steering column might show some movement not due to excessive wear, e.g. those fitted with universal joints or flexible couplings.

Reasons for Failure

1. Steering column:
 - (a) With excessive movement of centre of steering wheel in line with the column (end float).
 - (b) With excessive side play indicating a badly worn top bearing or insecure top mounting bracket.
 - (*c) Flexible coupling or universal joint deteriorated, with excessive wear or insecure.
 - (*d) Coupling clamp bolt or locking device loose or missing.
 - (e) With a faulty adjustment device such that it would render the column insecure.
2. Steering Wheel:
 - (*a) Loose.
 - (b) Hub, spoke, or rim fractured or cracked.
 - (c) Cover torn with jagged edges which may injure the driver.
 - (d) Hub retaining device not fitted or loose.
3. Free play in system which is outside the prescribed limits.

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Speed limiter

Application

This inspection applies to all vehicles which are required to be fitted with a speed limiter.

Vehicles required to be fitted with a speed limiter are:

A A vehicle first used from 1 April 1974 until 31 December 1987 with:

- More than 16 passenger seats and;
- A design gross weight of more than 7500kg and;
- A maximum speed capability exceeding 70mph (112.65km/h), if a speed limiter were not fitted.

Must be fitted with a speed limiter set at a maximum of 70mph (112.65km/h).

B A vehicle first used from 1 January 1988 until 30 September 2001 with:

- More than 8 passenger seats and;
- A design gross weight of more than 7500kg and less than 10001kg;
- A maximum speed capability exceeding 100km/h (62.14mph), if a speed limiter were not fitted.

Must be fitted with a speed limiter set at a maximum of 100km/h.

C A vehicle first used from 1 October with:

- More than 8 passenger seats and;
- A design gross weight of more than 7500kg and less than 10001kg;
- A maximum speed capability exceeding 100km/h (62.14mph), if a speed limiter were not fitted.

Must be fitted with a speed limiter set at a maximum stabilized speed of 100km/h.

D A vehicle first used from 1 January 1988 until 31 December 2004 with:

- More than 8 passenger seats and;
- A design gross weight of more than 10000kg;
- A maximum speed capability exceeding 100km/h (62.14mph), if a speed limiter were not fitted.

Must be fitted with a speed limiter set at a maximum of 100km/h.

E A vehicle first used between 1 October 2001 and 31 December 2004 with a Euro 3 diesel or gas engine (see note) and:

- More than 8 passenger seats and;

- A design gross weight of less than 7501kg and;
- A maximum speed capability exceeding 100km/h if a speed limiter were not fitted.

Must be fitted with a speed limiter set at a maximum stabilized speed of 100km/h from 1 January 2007 or from 1 January 2006 if used in international traffic.

F A vehicle first used from 1 January 2005 with:

- More than 8 passenger seats and;
- A design gross weight up to 7500kg;
- A maximum speed capability exceeding 100km/h (62.14mph), if a speed limiter were not fitted.

Must be fitted with a speed limiter set at a maximum stabilized speed of 100km/h from 1 January 2008 or from 1 January 2005 if used in international traffic.

G A vehicle first used from 1 January 2005 with:

- More than 8 passenger seats and;
- A design gross weight of from 5001kg and less than 7500kg;
- A maximum speed capability exceeding 100km/h (62.14mph), if a speed limiter were not fitted.

Must be fitted with a speed limiter set at a maximum stabilized speed of 100km/h from 1 January 2005.

H A vehicle first used from 1 January 2005 with:

- More than 8 passenger seats and;
- A design gross weight in excess of 10000kg;
- A maximum speed capability exceeding 100km/h (62.14mph), if a speed limiter were not fitted.

Must be fitted with a speed limiter set at a maximum stabilized speed of 100km/h from 1 January 2005.

Note: Some vehicles first used from 1 October 2001 until 31 December 2004 may have been approved to Directive 70/220/EC or fitted with Euro 2 engines. These vehicles are exempt from the speed limiter fitting requirements for Group E. Where exemption is claimed at time of test this should be accompanied by an operator's declaration of exemption and where necessary supported by manufacturer's confirmation of emission test standard, unless the vehicle is marked speed limiter exempt on the technical record. All the following listed vehicles have already been confirmed by their manufacturers as being exempt and no further proof is required for these vehicles:

Citroen Relay 2.0 litre and 2.2 litre HDi engines
Fiat Ducato with 2.0 litre engines (engine code RHV)
Ford Transit (all)
LDV (all)
Nissan Interstar with FQ9 engines. (all Primastar models)
Peugeot Boxer 2.0 litre and 2.2 litre HDi engines
Renault Master with FQ9 engines. (all Trafic models)
Vauxhall/Opel Movano with E, F, G, J, K, L, M, N, P, T or W as the 7th VIN character
Vauxhall/Opel Vivaro (all)
Volkswagen (all except 2.5lt/2.8lt 109bhp/158bhp engine codes AVR & AUH respectively)

Procedures and Standards

Check that a speed limiter plate is securely fitted in the driver's compartment. It is acceptable for the plate to be fitted in the driver's door jamb. If fitted on a window and facing outward the details must be able to be read by a person of average height.

Check that the plate is clearly and indelibly marked with the speed at which the speed limiter has been set (the speed may be shown in mph or km/h).

Note: The character and composition of the plate and size of the lettering are not important provided the details are legible.

Check the presence and security of the device, the actuating mechanism, wiring and the tamperproof devices such as seals or lock nuts. This inspection is only for the parts which are visible without dismantling.

Note: It is acceptable for the limiter to be wired through the "ignition" switch but any other device which would allow disconnection of the speed limiter whilst driving is unacceptable.

Early tachographs had covers with a masked area over the access port to interrogate tachograph. These are still to be found although the tachograph scheme has been instructed to cease the fitting of such. Do not remove this type of DIL switch cover at the time of test as it is easy to inadvertently make contact with one of the switches and completely alter the 'K' factor. This means that the test equipment cannot be used and the presenter should be asked to provide tachograph chart evidence of speed limiter operation as described below.

Clear DIL switch covers are acceptable at the time of test, although once again they are no longer acceptable under the Tachograph approved scheme and centres should no longer fit them.

Clear DIL switch covers are acceptable at the time of test, although once again they are no longer acceptable under the Tachograph approved scheme and centres should no longer fit them.

Speed Limiter Integrity Check Using Electronic Device. Not applicable to vehicles fitted with digital tachographs. Refer to section 26 headed digital tachographs.

- Open the tachograph head. If seals need to be removed from within the tachograph head then do so. Plug the speed simulator jack plug into the tachograph head and close the head. Seals can only be removed and replaced by approved tachograph sealing centres or authorised VOSA staff.
- The machine will establish the pre set 'K' factor. Check that this is within + or - 50 digits of the 'K' factor displayed on the tachograph calibration plaque. A number of manufacturers have dual marked plaques where the 'W' factor and the 'K' factor are the same and are in the format "W =K= " followed by the associated figure. Other configurations found are no 'W' or 'K' on the plaque but marked Imps / km or Impulses per kilometre, as the K factor is the number of electronic impulses required to record the distance of one kilometre travelled, this is acceptable.
- Start engine and run at 1200-1500 rpm. Input a simulated speed to 80km/h. Check that the tachograph indicates the same speed. Gradually increase the simulated speed in 1 km/h steps. Note the speed indicated on simulator's digital display when the speed limiter operates. This can be identified by a reduction in the engine RPM, or a change in the engine note, or vibration indicating that the fuel supply is being reduced.

If it is found that the indicated figure differs by more than ± 50 from the prescribed "K" factor a further check should be made.

In line with normal procedures where the 'K' factor indicated by the electronic device does not exactly match the displayed 'K' factor, input the displayed 'K' from the plaque into the electronic device.

NOTE: It is imperative that the tachograph head is closed before the remainder of the test is conducted so that no damage to the tachograph can take place should the vehicle's steering wheel be accidentally turned.

Set the simulated speed to 80 km/h and check the speed indicated by the tachograph. Note the difference, if any, in speed between that displayed on the electronic device and the tachograph.

If there is a difference in the electronic device's simulated speed and the speed indicated on the tachograph, and this difference is greater than 5km/h, either higher or lower, then the vehicle should be failed under Reason for Failure 3f of IM 26 as this defect relates to the tachograph rather than the speed limiter.

Continue to undertake a check of the vehicle's speed limiter. Remember to use the electronic device's simulated speed as the indication of the true road speed at which the road speed limiter operates.

On some vehicles, the electronic device will be unable to indicate the speed at which the speed limiter operates. Under these circumstances tachograph chart evidence of the vehicle while in service can be used to verify the operation of the speed limiter. The voluntary submission of 5 consecutive tachograph charts from the previous 28 working days can be used to establish the maximum operational speed. The vehicle should be failed for Reason for Failure 3a, 3b or 3c if the tachograph chart shows a speed trace of more than 110 km/h for vehicles in Groups B, C, D, E, F and G and of more than 123 km/h for vehicles in Group A. The vehicle must have exceeded this speed for at least ten minutes.

If the speed simulator is unable to be used, and there are no tachograph charts available for inspection, the vehicle should be passed. VOSA Enforcement should be advised of the inability to check this test item.

A simulated response will reflect in-service road speed. The vehicle types and speed limiter test applications standards are as follows:

Vehicle group	Response speed at which Vehicle will be failed
A	118 km/h or more
B D	107 km/h or more
C E F G	102km/h or more

Only speed limiter calibration certificates are acceptable at retest. If a certificate relating to the tachograph is presented the vehicle must be physically rechecked.

Reasons for Failure

1. Speed Limiter Plate:
 - (a) Missing.
 - (b) Insecure.
 - (c) Not in a conspicuous position.
 - (d) Not clearly and indelibly marked with the set speed.
2. Set Speed marked on Speed Limiter Plate greater than:
 - (a) 70mph (113km/h) for a vehicle described in paragraph A in the Application section.
 - (b) 100 km/h (62.14 mph) for a vehicle described in paragraph B, C, D, E, F and G in the Application section.
3. Response speed of:
 - (a) 107 km/h or more for a vehicle described in paragraph B and D in the Application section.
 - (b) 118 km/h or more for a vehicle described in paragraph A in the Application section.
 - (c) 102 km/h or more for a vehicle described in paragraph C, E, F and G in the Application section.
4. Speed Limiter:
 - (a) Not fitted.
 - (b) Insecure.
 - (c) Actuating rods/cables disconnected or damaged so that the operation is obviously affected.
 - (d) Wiring disconnected or can easily be disconnected by unauthorised means.
 - (e) Tamperproof device missing or defective or showing obvious signs of interference.

Pressure/Vacuum Warning and Build Up

Application

This inspection applies to all vehicles, except those with an unladen weight of less than 3050kg where the vacuum reservoir is coupled direct to the engine induction manifold. These vehicles do not require a pressure/vacuum warning device.

Vehicles used from 1 April 1983 can be fitted with either a visual warning device or an audible warning device. If both are fitted only one need work. Vehicles first used before 1 April 1983 must be fitted with a visual warning device. If an audible warning device is also fitted this is considered to be an addition to the mandatory requirement.

A number of vehicles, among them Mercedes 515, 609, 612, 614, 709 and Iveco Daily models were approved without a warning device and should not be failed for a warning device not fitted.

If there is no reservoir in a vacuum system a warning device is not required.

Procedure and Standards

- Deplete the air or vacuum system by applying the foot brake, when the warning device operates there must be two further assisted brake applications.

Note: If the vehicle has **full power hydraulic brakes** gauges are not normally fitted and there are no appreciable sounds when the brakes are applied. To check for the above, use the procedure shown in Item 71.

- Fully deplete the system and run the engine at just below governed speed and note the time for the warning device to show minimum effective working condition.

Note: If gauges are not marked, take 3 bar (45 psi) for air systems and 25 to 30cm (10 to 12 inches) for vacuum systems as indicating minimum effective working condition.

- The time to reach minimum effective working pressure should normally be within 3 minutes for pressure systems and 1 minute for vacuum systems.

Reasons for Failure

1. A mandatory visual warning device:
 - a. cannot be seen by the driver in all lighting conditions.
 - b. not fitted or not working correctly.
 - c. which cannot be seen by the driver.
 - d. not illuminated, or its functioning not visible in darkness to the driver.
2. Not enough pressure or vacuum to give at least two fully assisted brake applications after the warning device has indicated minimum effective working conditions.

Pressure/Vacuum Warning and Build Up *(continued)*

- *3. Time to reach minimum effective working pressure is more than 3 minutes for pressure systems and 1 minute for vacuum systems.

Hand Lever Operating Mechanical Brakes

Application

This examination applies to all vehicles fitted with a mechanical parking brake.

Procedure and Standards

- With the lever in the off position check the condition of the lever, its pivot and the pawl mechanism.
- Slowly apply the brake and check the effectiveness of the mechanism and that it is not impeded in its travel.
- With the brake fully applied check:
 - a. If it can be disengaged by knocking the lever on each side and the top and,
 - b. If the lever is at the end of its working travel.
- Check for the presence of locking or retaining devices.

Reasons for Failure

1. Brake lever:

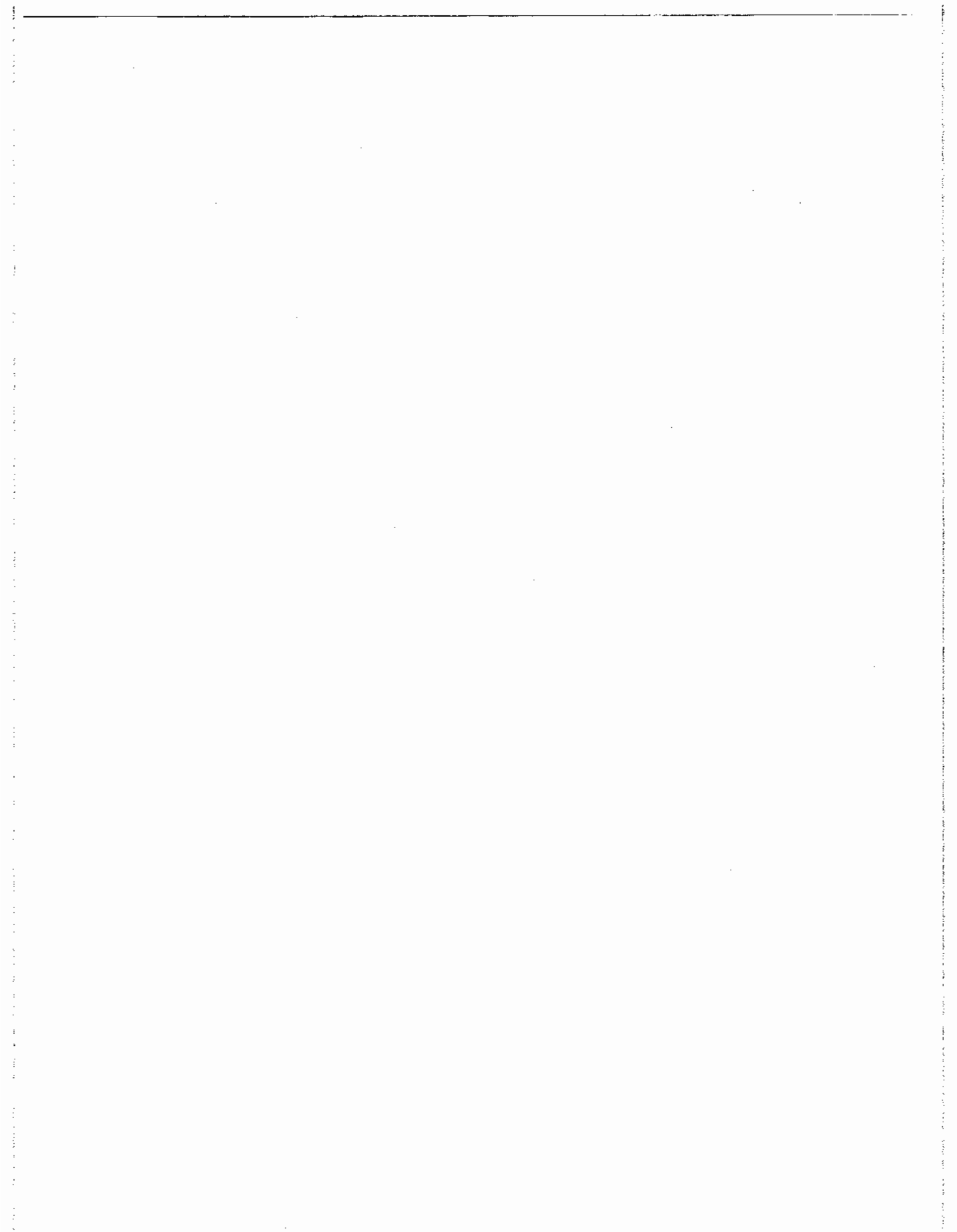
- a. fractured or cracked.
- b. excessively corroded.
- c. insecure.
- *d. so positioned that it cannot be operated satisfactorily.
- e. impeded in its travel.
- **f. is not held in the "on" position when knocked.
- g. has no further possible travel when the brake is fully applied.
- h. pivot with side play such that it is likely to fail.

2. Pawl mechanism:

- a. and/or mountings in such a condition that early failure is likely.
- b. pawl spring is not pushing teeth into positive engagement with ratchet teeth.

3. Locking and/or retaining devices:

- a. missing or insecure.



Service Brake Pedal

Application

This examination applies to all vehicles.

Procedure and Standards

- Check the condition of the pedal and associated components.

Note: Power operated braking systems where the foot valve is fully open before the pedal is fully depressed do not require any reserve travel.

Reasons for Failure

1. Brake pedal:
 - a. anti-slip provision missing, loose or incomplete.
 - b. has excessive side play.
 - *c. fouling other parts of the vehicle.
 - d. insufficient reserve travel when fully depressed.
2. Brake pedal or assembly:
 - a. insecure.
 - *b. fractured, cracked, corroded or incomplete.

Service Brake Operation

Application

This examination applies to all vehicles.

Anti-lock brakes are mandatory on coaches first used from 1 April 1992 with design GVW greater than 12000kg, and all passenger carrying vehicles with more than eight passenger seats in addition to the driver first used from 1st May 2002.

Procedure and Standards

Air pressure systems and vacuum systems with reservoirs.

- With reservoir at maximum pressure or vacuum, fully depress the pedal and note the change in gauge readings to see if they give indications of a leak in the system.

Hydraulic systems (other than full power systems).

- Fully depress the pedal and keep it depressed under steady pressure. Check for sponginess and whether the pedal creeps down under full pressure.

Note: For some brake systems a small amount of creep may be due to elasticity in the brake components.

Brake systems assisted by engine vacuum.

- Deplete the vacuum, partly depress the pedal, start the engine, and check if the pedal can be felt to dip.

Full power hydraulic systems.

- Check that the system pressure is maintained for at least 10 minutes when the brakes are off and the engine is stopped. Loss of pressure will be indicated by the operation of the low pressure warning device (warning light or appearance of semaphore "flag" device).

Vehicles with anti-lock brakes.

- Check whether the vehicle is required to be fitted with anti-lock brakes
- Check the anti-lock warning lamp sequence of operation. The sequence of operations shown on the manufacturer's information plate should be checked.

Note: For test purposes it will only be possible to check the static part of the warning light sequence. Some systems require movement of the vehicle but this is not part of the test.

Reasons for Failure

1. Air pressure or vacuum systems:

Service Brake Operation *(contd)*

- a. Gauge reading drops when pedal depressed indicating a leak in the system.
2. Hydraulic systems (other than full power systems):
 - a. Pedal creeps down when depressed.
 - b. Sponginess when pedal depressed.
3. Brake systems assisted by engine vacuum.
 - **a. Pedal does not dip when engine started, indicating lack of assistance.
4. Full pressure hydraulic systems:
 - a. System pressure is not maintained for 10 minutes when the brakes are off and the engine is stopped.
5. Vehicles with anti-lock brakes:
 - a. Anti lock braking system not fitted on a vehicle on which it is a mandatory requirement.
 - b. Anti-lock warning lamp does not follow its correct sequence.
 - c. A warning light not visible to the driver.
 - d. A defect that would obviously render the ABS inoperative.

Hand Operated Brake Control Valves

Application

This examination applies to all hand operated valves on vehicles which operate secondary brakes, trailer brakes, spring brakes and lock actuators. It also applies to trailers fitted with hand operated spring brake valves.

Procedure and Standards

- Check the function and condition of the control valve

Note: Certain air valves are subject to a slight amount of leakage and this is not a Reason for Failure.

Reasons for Failure.

1. Control valve:
 - a. on a motor vehicle unable to be operated from the driving position.
 - b. insecure.
 - c. fractured, cracked, damaged or excessively corroded.
 - *d. impeded in its travel.
 - e. leaking.
 - f. with excessive wear in the gate or lever locating mechanism.
 - *g. malfunctioning.

Condition of Chassis

Application

This inspection applies to all vehicles.

Procedure and Standards

- Check main and cross members for fractures, cracking, advanced and deformation. Check the security of fastenings between the frame and cross members including securing bolts and rivets. Check the soundness of any welds.
- On integral bodied vehicles where the body panels provide an important part of the strength of the vehicle check that where any replacement panels have been fitted that they are of a suitable material and that they have been secured in a way that ensure the strength of the structure will be maintained.

Note: For integral construction the term chassis should also be taken to apply to the underframe. For vehicles without a chassis those parts of the body must be examined which take the place of the chassis.

- When assessing corrosion it must only be regarded as a failure if it is sufficiently advanced to obviously impair the strength of a load bearing member.

Reasons for Failure

1. Any main or cross member:
 - a. fractured or cracked or
 - b. with advanced corrosion or
 - c. deformed.

so that the control of the vehicle is likely to be affected.

2. Frame and cross member fastenings:
 - a. insecure flitch plates and/or fastenings or
 - b. a weld breaking away.

so that the control of the vehicle is likely to be affected.

3. Integral body replacement panels:
 - a. of an obviously unsuitable material.
 - b. not adequately secured by an appropriate method.

Electrical Wiring and Equipment

Application

This inspection applies to all vehicles

Procedure and Standards

Check

- All visible wiring for condition, position and security.
- Battery for condition and security. If the battery is only held in place by the cables and by a lip on the carrier this cannot be considered to be secure.
- Switches controlling all obligatory lights.
- That the function is clearly marked on all switches and warning lights necessary to control obligatory lights and equipment.

Switches not on the main switch or control panel and which are not likely to confuse the driver by their presence are not required to be marked

- That circuits of over 100 volts are protected by double pole switches or isolating switches, situated inside the vehicle and accessible to the driver or crew.

Note: This inspection includes external mains power supplied to the vehicle.

- That any television receiver is so positioned that the driver cannot view it whilst driving.

Note: Video monitors used as an aid to manoeuvring are exempt from this requirement.

- That the ignition or charging system is suppressed so as not to interfere with TV or radio reception.

Reasons for Failure

1. Wiring:
 - a. not adequately insulated or secured.
 - b. positioned so that it is chafing or likely to be damaged by heat.
2. Battery:
 - a. and/or carrier insecure and likely to become displaced.
 - b. case leaking.
 - c. container inadequately vented.

Electrical Wiring and Equipment *(contd)*

- d. cell closures missing or insecure.
- 3. Switch controlling an obligatory light insecure or malfunctioning.
- 4. Switch controlling an obligatory light or warning light associated with it which does not have its function clearly marked.
- 5. Television receiver visible to the driver whilst driving.
- 6. Ignition or charging system not adequately suppressed

Engine and Transmission Mountings

Application

This inspection applies to all vehicles.

Procedure and Standards

- Check condition of mountings and subframes and their security to the chassis or underframe.
- There will only be a failure under this item if a mounting is no longer capable of performing its function of location and support.
- Serious fractures in clutch or bell housings which affect the security of the engine or gearbox are a reason for failure.

Reasons for Failure

1. Any mounting or subframe:
 - a. loose.
 - b. cracked or fractured.
 - c. badly deteriorated.

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Oil and Waste Leaks

Application

This inspection applies to all vehicles.

Procedure and Standards

- Check for leakage of any type of oil other than fuel oil.
- Check without operating any equipment other than the engine which may be run at tick-over speed.
- Very bad oil leaks are a reason for refusing to carry out the test. If the test is suspended for this reason the presenter will be notified of this using form VTP12.
- Oil deposited onto bodywork, exhaust or brake systems should not result in failure unless the leak causing the deposit exists at the time of test.
- Temporary means of preventing leaked oil reaching the ground are not acceptable.
- 252 • "Waste" includes effluent from toilets and other devices but does not include water from sinks.

Reasons for Failure

- *1. Any oil leak or combination of leaks from any assembly which can create a pool 75 mm diameter in 5 minutes or a number of leaks which collectively would deposit oil at the same rate.
- *2. Leakage of waste which is likely to cause unpleasant or dangerous conditions for other road users or damage road surfaces.
- *3. Leakages which, when the vehicle is in motion, can heavily contaminate the vehicle such that it causes a health or fire risk.

Fuel Tanks and System

Application

This inspection applies to **all fuel tanks** which are permanently attached to the vehicle, including gas cylinders, bottles and other types of fuel container.

Procedure and Standards

- Tanks and supports must be checked for security (tanks includes gas containers).
- The system must be checked for leaks. Seepage is not a reason for failure.
- Filler caps must be checked for presence and to ensure that when in the closed position they will not allow spillage or leakage. Fabricated and "emergency" caps are acceptable provided that they function correctly. Where possible the tank cap should be opened to check the sealing arrangements.
- Pipework must be checked to see that it is secure and undamaged and that on other than diesel powered vehicles it does not run immediately adjacent to or in contact with electrical wiring, unless the wiring is encased in a sleeve or is protected so that the insulation of the wiring is not in direct contact with the pipe.
- All vehicles must be checked to ensure that no spilled or leaked fuel can contaminate or accumulate inside the vehicle and on the bodywork, and that petrol engined vehicles are fitted with a carburettor drip tray and drainage pipe. (This is not required on Schedule 6 minibuses).
- Check the condition, accessibility, operation and marking of the emergency fuel cut-off device. (This is not required on Schedule 6 minibuses). The "Off" position must be marked and the position of the device if it is not visible from outside the vehicle. An additional device may be fitted but it is only necessary for one to operate. (This is not required on Schedule 6 minibuses).
- Bus Directive and ECE Regulation vehicles do not require an external fuel cut-off device. However vehicles built to ECE regulations 36 and 107 must have an emergency switch, within reach of the driver, which stops the engine and isolates the batteries, but leaves the circuits which supply emergency lighting and the hazard warning lights operational.
- On all vehicles with combustion heaters first used from 1 August 1984 (B prefix onwards) check the condition, accessibility, operation and marking of the heater fuel cut-off device.
- Very bad fuel leaks are a reason for refusing to carry out the test. If the test is suspended for this reason the presenter should be notified of this using form VTP12.

Reasons for Failure

1. Tank:
 - (**a) So insecure on its mountings that it is likely to drop away partially or completely when the vehicle is used.
2. A tank strap or support:
 - (a) Broken or missing.
 - (**b) So insecure or weakened that the tank is likely to drop away partially or completely when the vehicle is used.
3. Fuel System:
 - (*a) Leaking.
 - (b) Pipes so damaged (restricted/chafed) insecure or with an inadequate repair such that they are likely to fail and leak which would cause danger to persons on the vehicle or to other road users.
 - (c) Pipes damaged or so positioned that they are fouled by moving parts of the vehicle.
 - (d) With a pipe immediately adjacent to or in contact with electrical wiring.
 - (e) Where spilt or leaking fuel can contaminate or accumulate inside the vehicle.
 - (f) Carburettor drip tray and/or drain pipe missing.
4. Filler Cap:
 - (*a) Missing.
 - (b) Does not fasten securely.
 - (i) By a positive means, or
 - (ii) Such that pressure is not maintained on the sealing arrangement.
 - (*c) Sealing washer torn, deteriorated or missing, or a mounting flange/sealing method defective such that leakage of fuel is possible.
5. Emergency Fuel Cut-off (including those for heater fuel):
 - (a) Missing, inaccessible, defective or its location and method of operation not clearly marked.
6. Emergency switch on a ECE Regulation 36 or 107 vehicle:
 - (a) Missing or defective in operation.



Exhaust Systems

Application

This inspection applies to all vehicles.

Procedure and Standards

- Examine the condition of the exhaust pipes and silencers and check for:
 - Security.
 - Leaks.

Note: Where a vehicle is failed for exhaust system leaking, the emission test could be affected by the induction of air into the exhaust system. When presented for retest the emission test should be rechecked.

Slight leaks are acceptable.

- The position of the exhaust outlet which should be at the rear or offside of the vehicle. This is not a requirement for a Bus Directive or ECE Regulation vehicle.
- The exhaust system is not , or likely to be a fire hazard.
- Check for the presence of the silencer and assess its effectiveness in reducing, so far as is reasonable, noise caused by the exhaust.
- Check that the exhaust and waste systems do not foul or are not likely to contaminate, or be a fume hazard.

Note: This inspection includes ancillary equipment such as toilets, cooking, heating, catering, entertaining and any other special features.

Check for the presence and adequacy of grease shields to hot exhaust.

Note: This inspection is only concerned with shields approved at the time of certification or where there is evidence that grease is being thrown onto the hot part of an exhaust pipe. There is no requirement for Schedule 6 minibuses to be fitted with exhaust grease shields.

Reasons for Failure

1. An exhaust system:
 - (a) So insecure that it might fall away partially or completely when the vehicle is in use.
 - (b) Leaking.
 - (c) Wrongly positioned, or positioned so that fumes are likely to enter the driver's or the passengers' area.
 - (d) Likely to cause a fire hazard..
2. An exhaust silencer:
 - (a) Missing.
 - (b) Ineffective.
3. Any exhaust or waste system fouling or likely to cause a fume hazard.
4. Missing or inadequate grease shields to hot exhausts.

Suspension

Application

This inspection applies to all vehicles.

Procedure and Standards

- Check all suspension components for condition and security.
- Insecurity of attachment points can best be assessed when the steering and/or brakes are operated.

Leaf spring systems:

- Check correct alignment of leaves.
- The fail criteria is that the leaves are so misaligned that each leaf is not taking a reasonable proportion of the load, or that they are likely to foul other parts of the vehicle.
- A "U" bolt should be regarded as loose if there is clear visual evidence that it is not properly fulfilling its function of securing a spring and , before it can do so it needs remedial action.

Spring Pins:

- **Wear in pins & bushes:** The maximum permissible wear in a pin and/or bush is 2mm for a 12mm diameter pin and 1/8 of the diameter for larger assemblies. For a threaded pin it is the diameter of the threaded part which should be taken into account when assessing wear. These criteria should not be used when checking rubber bushes which should be checked for deterioration of the rubber which could result in excessive movement.
- The maximum side play must not exceed 6mm. This does not apply to a threaded pin and bush assembly or to rubber bushes or to single spring bogie suspensions.
- **Security of spring pins:** Where an anchor/shackle pin is secured at one end the maximum amount of movement at the free end should not exceed 1mm for smaller assemblies, increasing to 2mm for larger assemblies.

Slipper brackets:

- Rebound pins where fitted as standard should be correctly located.

Air/ Fluid systems:

- When assessing the significance of leaks it should be remembered that certain pneumatic components are subject to some degree of leakage. Slight seepage producing a thin film of oil on the component is not a reason for failure but any sign of dripping is unacceptable.
- Exposure of air bag structural cords is acceptable providing that they are not damaged.

Coil Springs:

- Check for correct location.

Suspension *(contd)*

Adjustable radius and panhard rods:

- Check clamp bolts for security.

Procedure and Standards (contd)

Shock Absorbers/ Anti Roll Bars:

- Check shock absorbers for leaks. Slight seepage producing a thin film of fluid on a shock absorber is not a reason for failure but any sign of dripping is unacceptable.

Reasons for Failure

1. All suspension types

An attachment point and/or bracket including linkages, balance beams, panhard rods, spring saddle etc.:

- *a. insecure.
- *b. disconnected.
- *c. fractured or cracked.
- *d. so damaged, worn, distorted or corroded that it adversely affects its function.
- *e. incorrectly located or fitted.
- *f. bolt or rivet missing.
- *g. rubber or bonded bush deteriorated.
- *h. defective such that a wheel could foul any other part of the vehicle
- *i. Wear in a pin or bush exceeding the prescribed limit

2. Leaf Springs and Fixings:

- *a. wear in a pin and/or bush exceeding the prescribed limit.
- *b. a fractured or cracked leaf or one repaired by welding.
- *c. spring leaves splayed beyond the prescribed limits or fouling any other part of the vehicle.
- *d. movement in a spring fixing pin in excess of the prescribed limits.
- *e. slipper bracket rebound pin missing or incorrectly located.
- *f. relative movement or displacement between a spring and the axle.
- *g. a missing shackle or anchor pin.
- *h. a worn slipper bracket.

Suspension *(contd)*

- *i. so corroded, pitted or seriously weakened that it is likely to fail.
- *j. an insecure or missing locking device from a shackle or anchor pin

3. Coil Springs and Torsion Bars:

- *a. incomplete.
- *b. fractured, cracked or repaired by welding.
- *c. corroded, pitted, or seriously weakened so it is likely to fail.
- *d. torsion bar fixings with excessive free play, insecure, or an adjustment assembly incorrectly fitted and/or insecurely locked.

4. Air/Fluid Suspension Systems

Valves, Pipes, Valve Linkage, Bellows and Displacers / Accumulator Units:

- *a. displaced, deflated, kinked and /or so damaged/deteriorated that it is likely to fail.
- *b. fouled by other parts or leaking.
- *c. with check strap missing or defective.
- *d. insecure.
- *e. pipe insecure.
- *f. leaking.

5. Bonded Suspension Units:

- *a. failure of bonding between flexible element and metal so that part of the unit is likely to fail.
- *b. unit is so damaged or deteriorated that it is no longer capable of carrying out its proper function.

6. Shock Absorber

- *a. missing from a vehicle on which it is a standard component.
- *b. with an anchorage fractured or unit insecure.
- *c. leaking.
- *d. with an excessively worn rubber bush or pivot.

Suspension *(contd)*

Reasons for Failure (contd)

- *e. linkage missing, linkage bracket cracked so that it is likely to fail, fractured or cracked or excessively worn.
- *f. with a sleeve damaged so that the unit is not functioning correctly.

7 Anti roll bar:

- *a. missing from a vehicle on which it is a standard component.
- *b. insecure.
- *c. fractured, cracked or severely distorted.
- *d. so corroded or worn that its strength is seriously reduced.

8 Anti roll bar linkage/bracket or bushes:

- *a. missing.
- *b. fractured or cracked and likely to fail, or excessively worn.

9 All suspension types:

- *a. a suspension unit so weak that the body or other part of the vehicle is fouling the road wheels or is likely to do so if the vehicle is laden.

Axles, Stub Axles and Wheel Bearings

Application

This inspection applies to the steered wheels of all vehicles.

Procedure and Standards

- When assessing excessive wear, play or lift account must be taken of any information given below and/or manufacturers' recommendations.
- Check for excessive lift between stub axle and axle beam or between swivel joint and housing. For vehicles fitted with a "Hives" type thrust bearing any lift greater than 1.6mm would be considered excessive and in the case of any other type of bearing lift greater than 1.0mm.

Note: This inspection may be carried out either while lifting and lowering the axle with a jack or by lifting each wheel with a heel bar whilst the vehicle is raised off the ground.

- Whilst the wheel is rocked, either by using wheel play detector plates in the side to side mode or by lifting the wheels clear of the ground and rocking each in turn with a bar, check for movement between
 - Stub axle and axle beam
 - King pin and bushes. Any movement greater than 10mm on a 500mm diameter wheel is considered excessive. For wheels of different diameter the maximum allowable movement should be in proportion to this figure
 - Wheel bearings and housing
 - Swivel joint and housing
 - Swivel joint housing and stub axle
 - Swivel joint housing and suspension arms

Note: Wheel bearing free play can be isolated by applying the service brake.

- Check axle beam and stub axle for cracks
- Check king pin retaining device for presence and security
- Check swivel joint retaining and locking devices for presence and security

Axles, Stub Axles and Wheel Bearings

(contd)

Reasons for Failure

1. Stub axle and axle:
 - *a. with excessive lift between stub axle and axle beam.
 - *b. cracked.
2. King pin:
 - *a. excessively loose in axle beam.
 - *b. king pin or bush excessively worn.
 - *c. retaining device missing or insecure.
3. Swivel joint:
 - *a. excessively worn
 - *b. insecure
 - *c. retaining or locking device missing or insecure.
4. Wheel bearing:
 - *a. with excessive free play.

Steering

Application

This inspection applies to all vehicles.

Procedure and Standards

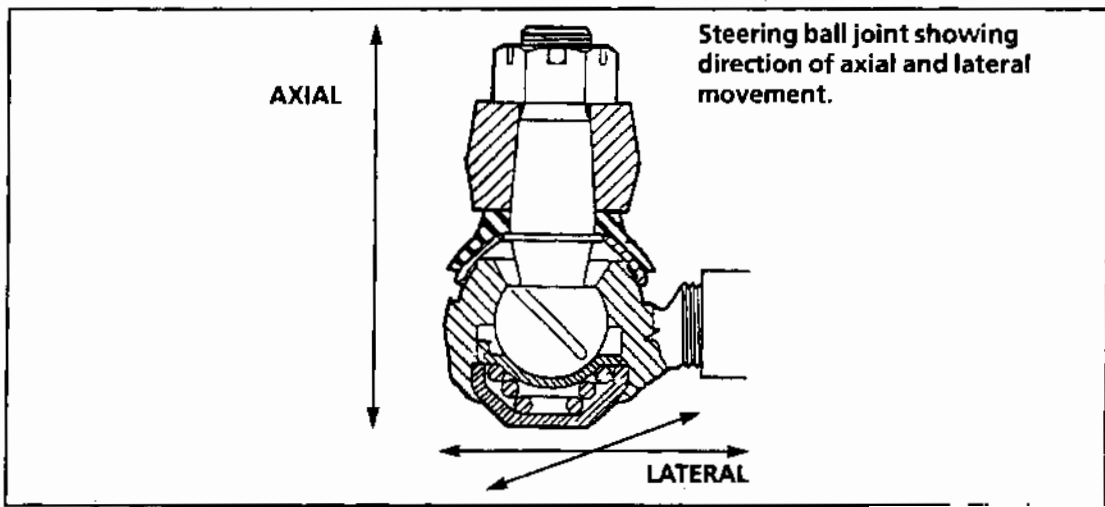
- Power steering must be inspected with the engine running. If vehicles are fitted with additional equipment, belt driven from the engine, where the belt may cause a hazard to the inspector they should be tested without the engine running. Examples are belt driven refrigeration compressors and air conditioning.

Exposure of structural cords on power steering hoses is acceptable provided that these cords are not damaged.

Note: Any leakage from a power steering system is a reason for failure.

- For articulated buses with steered wheels on the trailer and on any self steered axle, visually check joints and components for wear and condition.
- With the road wheels on the ground rock the steering and check all steering joints and fixings.
- Visually check for axial and lateral movement of all ball joints. Where a ball joint is fitted with a spring to take up such movement, the compression of the spring must not be mistaken for excessive wear. If excessive wear is suspected check by using hand pressure.
- With road wheels off the ground, instruct the driver to rotate the steering wheel through its full working range. If a lock stop, which is known to be a standard fitment, is missing this is a Reason for Failure. It should be noted however that in some cases there is provision for extra lock stops which are not a standard item. Where two are fitted only one needs to fulfil the function on **each lock**. They may be integral with the steering mechanism.

Note: Vehicles with independent front suspension should be checked with the suspension in the normal running position.



Steering *(contd)*

Reasons for Failure

1. Power steering:
 - *a. not working correctly.
 - b. removed or disconnected when a standard fitment.
 - c. with an air/fluid leak from any part of the system.
 - d. pump insecure or its drive system missing or defective.
 - e. pipe or hose excessively corroded, damaged, bulging or fouling other parts of the vehicle.
 - f. with a cracked or damaged ram and/or ram body anchorage, any excessive free play at ram anchorage.
 - g. with excessive free play between ball and valve to the extent that separation is likely.
2. Steering with:
 - *a. a ball pin shank loose.
 - b. a sharp or deep groove at the neck of a ball pin.
 - c. a track rod or drag link end loose.
 - d. any abnormal movement in a joint.
 - e. movement between sector shaft and drop arm.
 - f. excessive wear in a pivot point (eg an intermediate drop arm).
 - g. a part fixed to the chassis insecure (eg an intermediate drop arm, pivot housing, steering box, ram arm).
 - h. movement between a steering arm and its fixings.
 - *j. a component fractured or so cracked, damaged, misaligned, deformed or so worn that it is likely to fail.
 - k. a retaining or locking device not fitted or insecure.
 - l. a steering lock stop insecure or missing
 - m. a component repaired by welding or showing signs of excessive heat being applied.
 - n. any steering component, road wheel or tyre fouling any part of the vehicle.
 - o. track rod excessively deformed.

Steering *(contd)*

- *p. roughness or undue stiffness in the operation of the steering.
- q. excessive lift or end float of sector shaft.
- r. sector shaft cracked, twisted or splines twisted.
- s. excessive wear in steering rack.
- t. excessive movement of rack housing in mounting bushes.
- u. a rack gaiter (if rack originally fitted with gaiters) split, damaged, missing or displaced.



Transmission

Application

This inspection applies to all vehicles.

Procedure and Standards

- Check all relevant transmission components, where possible, for wear, security and condition.
- Check for contamination and deterioration of flexible couplings.
- Vehicles must be in neutral gear and with any transmission brake released during this inspection.
- The presenter should be advised if any shaft or carrier locking device is missing or ineffective.
- Failure for excessive wear of a universal joint is only justified when radial movement indicates that needle roller bearings are missing from one or more cups.
- Propeller shaft spline wear is not a Reason for Failure.

Reasons for Failure

1. All vehicles with:
 - a. a loose or missing propshaft flange bolt.
 - b. any flange cracked or loose.
 - c. excessive wear in a shaft bearing.
 - d. a bearing housing insecure, cracked or fractured.
 - e. excessive wear in a universal joint.
 - f. deterioration of a flexible coupling such that failure is imminent.
 - g. a seriously damaged or cracked shaft.
 - h. deterioration of a bearing housing flexible mounting such that failure is imminent.
 - i. evidence of a transmission shaft fouling on another component.
2. Front Wheel Drive with:
 - a. a constant velocity or universal joint excessively worn or insecure.
 - b. a flexible coupling severely cracked, softened or breaking up such that failure is imminent.
 - c. a gaiter protecting a constant velocity joint split, missing or insecure.

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Additional Braking Devices

Application

This inspection applies to most buses with a maximum gross weight greater than 5000kg first used from 1 April 1983. A small but significant number of buses have been approved without additional braking devices due to the engine developing sufficient retardation without the need for an additional braking device. Whether the bus requires an additional braking device will have been determined at certification and will be recorded on the technical record for the vehicle. The requirements for a particular vehicle can be confirmed by the Technical Services Branch at Welcombe House, Swansea.

Procedure and Standards

The device, its contacts and other components should be checked for condition and security

The device may be an electromagnetic retarder, a hydraulic retarder, a friction retarder or an exhaust brake. It may be integral with the engine, gearbox or other transmission components.

It should be checked, as far as is possible for condition, security, clearance with other components. Heat shields, if required, should be checked and the surroundings for signs of overheating.

The condition of any electrical wiring should be checked.

The device should be checked to see if there are any oil or exhaust gas leaks.

Reasons for Failure

Additional Brake Device:

- a. missing when known to be a mandatory item.
- b. inoperative, damaged, component missing, contaminated or insecure.
- c. with inadequate clearance with other components.
- d. heat shield missing.
- e. component or its surroundings overheating.
- f. with exhaust gas or oil leaks from the device.
- g. wiring insecure, badly positioned or damaged.

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Brake Systems and Components

Application

This inspection applies to all vehicles.

Automatic slack adjusters must be fitted to motor vehicles first used from 1 April 1995.

Procedure and Standards

Brake Components

- Check the condition and security of brake drums, back plates & shoes, discs, callipers, pads including friction material.
- Check the condition, security and operation of brake rods, relays, levers, including slack adjusters, clevis joints, linkages, cables, flexible and rigid pipes.

Note: A rod or lever reduced by more than one third of its original diameter is considered a failure.

A pipe with its wall thickness reduced by more than one third of its original thickness is considered a failure.

Cables, less than 10% of the wires fractured is not regarded as a reason for failure unless there is bunching, or likelihood of bunching, where the cable enters an outer cable, guide or sleeve (cables are usually made up of strands each containing a number of wires).

A hose should be rejected for surface cracking or damage by chafing only if the reinforcement is visible.

Repairs to metal air brake pipes by sleeving are acceptable, providing the repair appears to be good and sound. A pipe repaired in-situ by brazing is not considered acceptable. Repairs to hydraulic brake pipes are not acceptable. Compression joints of the type using separate ferrules are not considered suitable for joints on hydraulic pressure lines.

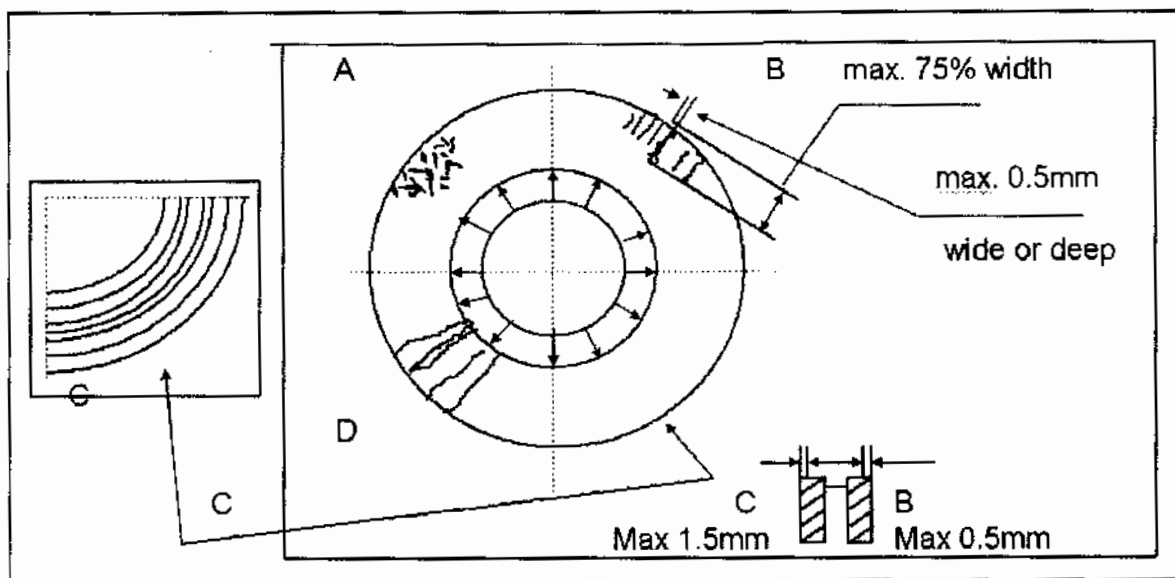
Lever slack adjusters; up to a total of 9.5mm radial movement at a radius of 150mm is considered acceptable within the slack adjuster and between the slack adjuster and cam cross shaft. Slack adjusters must have a secure fastening to the cross shaft including a locking device.

- Check that automatic slack adjusters are fitted to vehicles and trailers on which they are mandatory and check presence, condition and security of control brackets for all vehicles fitted with lever type automatic slack adjusters
- Check and compare travel of automatic slack adjusters across the same axle when service brakes are applied, and check that automatic slack adjuster levers return fully when brakes are released.

Disc Brakes

The diagram below shows the type of damage which are likely to be found on brake discs and gives guidance on how much damage is acceptable before failing the vehicle. This should be a visual assessment.

- A. Interlinked cracks or surface crazing = acceptable
- B. Cracks running towards hub centre up to max. 75% of the width of the friction surface, and a maximum of 0.5mm wide or deep = acceptable
- C. Unevenness in the disc surfaces less than 1.5 mm = acceptable
- D. Cracks running from edge to centre = not acceptable



Reservoirs (The term reservoir includes accumulators and other types of vacuum & pressure vessels).

- Check for condition, security and leaks.

Brake Actuators, Hydraulic Master & Wheel Cylinders, Valves and Servos.

- Check for operation, condition, security and leaks.

Damp patches around valves or adjacent components are not a Reason for Failure. Only where there is evidence of heavy discharge of oil from the valve at the time of test should there be a failure.

Note: To check the condition of brake pipes, valves, hydraulic master & wheel cylinders it will be necessary to ask the driver to pressurise the braking systems. There is no requirement for a specific check on the operation of all valves, however where it is obvious that a valve is malfunctioning during any stage of the test, this is a Reason for Failure.

When assessing the significance of leaks, it should be remembered that certain pneumatic components are subject to leakage to some degree.

Vented master cylinders as fitted in particular to some Bedford vehicles may be subject to some dampness around the vent, due to fluid in the bores of the cylinder used to lubricate the piston seals, this should not be treated as a defect.

Air Compressor Drive

- Where the air compressor is driven by belts, check for presence, condition and adjustment of compressor drive belt(s).

Reasons for Failure

Brake Components

1. A brake rod, clevis joint, linkage, relay, lever, pin, pivot, slack adjuster or cable:
 - (*a) Seriously weakened by excessive wear, corrosion or damage.
 - (*b) With abnormal movement indicating incorrect adjustment or excessive radial free play.
 - (*c) With an ineffective, insecure or missing locking device.
 - (*d) Reduced in diameter by more than the prescribed limit.
 - (*e) A brake cable knotted, or with more wires broken than permitted by the specified standard.
 - (*f) Automatic slack adjuster component missing, disconnected, insecure, distorted, fractured or inoperative.
 - (*g) Mandatory automatic slack adjuster not fitted.
 - (*h) A brake fitted with an automatic slack adjuster exceeding one-third of the travel of the brake actuator, or obviously having a different travel from another brake on the same axle, or not returning fully when brakes are released.
2. Brake pipes and flexible hoses:
 - (*a) Fouled by moving parts or excessively chafed or cracked with reinforcement cords exposed.
 - (*b) Excessively corroded or deteriorated.
 - (*c) Damaged.
 - (*d) Leaking.
 - (*e) Bulging.

- (*f) Kinked, stretched or twisted.
 - (*g) Inadequately clipped or otherwise inadequately supported.
 - (*h) Inadequately repaired or with unsuitable joint fittings.
 - (*j) A non-metallic pipe exposed to excessive heat.
3. Brake drums, back plates & shoes, discs, callipers, pads including friction material with:
- (*a) An insecure, or cracked brake drum or disc.
 - (*b) A brake back plate or calliper securing bolt loose or missing.
 - (*c) A brake lining or pad insecure or less than 1.5mm thick at any one point.
 - (*d) A brake disc excessively scored, pitted or worn.
 - (*e) Restricted movement of a brake component.
4. Reservoirs:
- (*a) insecure, excessively corroded, or leaking.
 - (*b) with dents that reduce the capacity or with angled dents.
 - (*c) with a securing strap fractured, cracked, excessively corroded or chafing on the reservoir or other mounting.
 - (*d) Missing where it is known to be a standard fitting.
5. Air actuators, hydraulic master & wheel cylinders, valves & servos:
- (*a) Defective in operation.
 - (*b) Insecure.
 - (*c) Leaking air or fluid.
 - (*d) Fractured, cracked or damaged.
 - (*e) Excessively corroded.
 - (*f) With a locking device missing or insecure.
 - (*g) With excessive travel of operating mechanism indicating a need for adjustment.
 - (*h) With a cap missing from a hydraulic master cylinder.
 - (*i) With a valve with excessive discharge of oil.

- (*) A load sensing valve removed or disconnected when it is known to be a standard fitment.
 - (*k) A load sensing valve obviously seized or restricted in its free movement linkage or brackets cracked, defective or out of adjustment.
6. Air Compressor Drive:
- (*a) A drive belt missing, badly deteriorated and/ or so loose that it is likely to slip.
 - (*b) A compressor drive pulley loose, cracked or missing.

INTENTIONALLY BLANK

Reflectors and Rear Markings

Application

Reflectors

This inspection applies to all vehicles but only obligatory reflectors are to be checked
Every vehicle requires 2 red reflectors facing squarely to the rear

Rear Markings

This inspection applies only to articulated buses. The type of marking which is acceptable is shown in the table below. The type numbers refer to the diagrams on the following pages

Overall length	Acceptable type of markings for vehicle first used before 1 April 1996	Acceptable markings for vehicle first used from 1 April 1996
more than 13m	4, 5, 10, 11, 12 or 13	10, 11, 12 or 13

Procedure and Standards

- Check for type, position, security and effectiveness. The check for position should be visual and only vehicles with reflectors and markings obviously out of position should be failed for this reason.
- Triangular reflectors can only be fitted to trailers.
- Rear markings must be fitted with the lower edge between 400mm and 1700mm from the ground.
- A rear marker must not be more than 10% obliterated or obstructed.
- The maximum height of a reflector from the ground is 900mm. There are some exceptions.
If 900mm is impractical it can be 1200mm.
For vehicles used before 1 April 1986 the maximum height is 1525mm

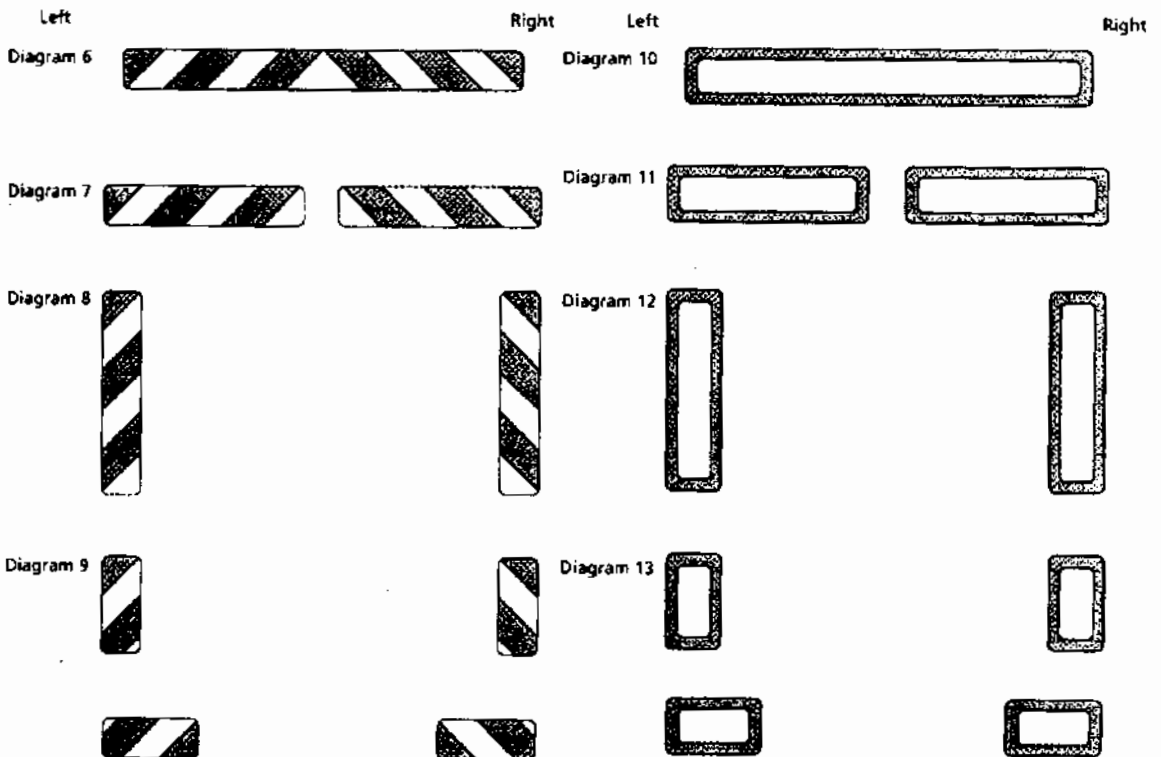
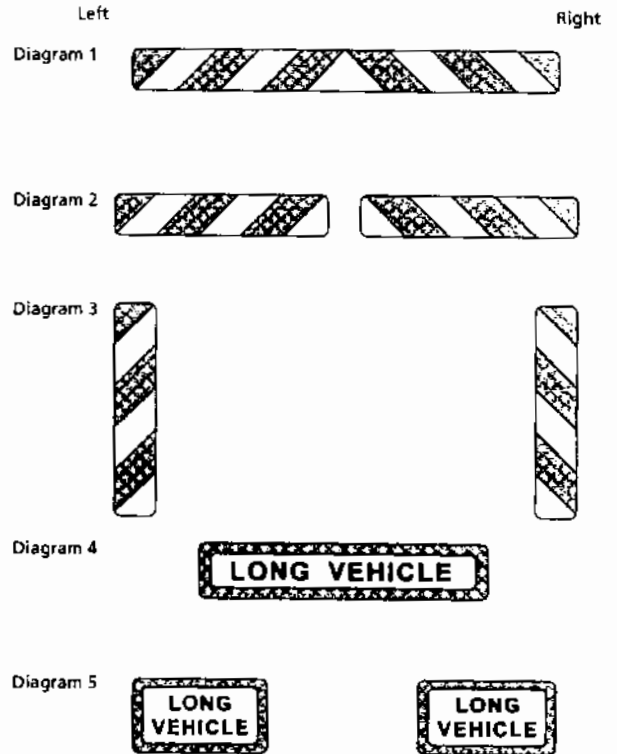
Reasons for Failure

1. Rear marker and/or reflector:
 - a. incorrectly positioned.
 - b. missing.
 - c. insecure.
 - d. not clearly visible.
 - e. not facing squarely to the appropriate direction.
 - f. of the incorrect type fitted.
 - g. so dirty or ineffective that its function is impaired.
 - h. broken, damaged or incomplete to the extent that the reflecting area is significantly reduced.
2. A reflector not of the appropriate colour.

Reflectors and Rear Markings (contd)

The types of marking shown in diagrams 1-5 are those complying with the British Standard AU152 and the others are approved to ECE Regulation 70

Type 3 may be of a lower height and greater width than shown in the diagram. The minimum height of this is 140mm and it must have an area of at least 980cm².



Lamps

Application

The inspection of front position lamps, headlamps, rear position lamps and registration plate lamps applies to all the obligatory lamps fitted.

The inspection of stop lamps applies to any stop lamp fitted.

The inspection of end outline marker lamps applies to the obligatory marker lamps fitted to vehicles first used from 1 April 1991 which are more than 2.1m wide.

The inspection of rear fog lamps applies to any vehicle fitted with a rear fog lamp.

They must be fitted to vehicles first used from 1 April 1980.

Procedure and Standards

- The check for position should be visual and only vehicles with lamps obviously out of position should be failed for this reason. A summary of the main requirements for each type of lamp is shown on the following page.

End Outline Marker Lamps

- The front lamp and the rear lamp may be combined.

Rear Fog Lamp

- Inspection of non-obligatory rear fog lamps is restricted to a check of colour (RfF 1.d), whether operation of the brakes affects the fog lamp (RfF 2.b) and the separation distance from a stop lamp (RfF 1.e)
- No more than two rear fog lamps may be fitted.

Matched Pair

- This means that the lamps emit light of the same colour and intensity and that both lamps are of the same size and are symmetrical to one another.
- If there is more than 1 bulb fitted in the lamp at least 50% must work.

Lamps (contd)

Reasons for Failure

1. For all lamps:
 - a. an obligatory lamp missing or insecure.
 - b. a lamp dim or not working.
 - c. a lens missing, obscured, insecure, or damaged so it is likely to fall apart.
 - d. not showing a light of the right colour.
 - e. incorrectly positioned.
 - f. flickers when lightly tapped by hand.
 - g. is affected by the operation of any other lamp.
2. Fog lamp (in addition to the above):
 - a. tell-tale light not fitted, not working or cannot be seen by the driver.
 - b. more than two fog lamps are fitted.
3. Stop lamp (in addition to the above):
 - *a. does not show a steady red light when the brakes are applied, or does not go out when the brakes are released
4. Headlamp (in addition to the above):
 - a. not forming part of a matched pair.
 - b. not positioned symmetrically in relation to the other lamp.
 - c. one of a matched pair does not show a light of the same intensity and colour as the other.
 - d. a main beam headlamp cannot be switched off by operating one switch which at the same time leaves a pair of dipped beams.

Lamps (contd)

TYPE	DATE OF FIRST USE	POSITION			COLOUR
		Max distance from side (mm)	Max height (mm)	Minimum height (mm)	
Front Position Lamps	From April 1986	400	-	-	White or yellow if in a headlamp which shows yellow light
	Before April 1986	510	-	-	
Front End Outline Marker Lamps	From April 1991	400	-	The top of the lamp shall be no lower than the top of the windscreen	White
Dipped Beam Headlamps	From 1972 (refer to Lighting regulations for earlier vehicles)	400	1200	500	White or Yellow
Main Beam Headlamps		No closer to the side than the dipped beam lamp	-	-	White or Yellow
Rear Position Lamps	From April 1986	400	1500 or if impracticable 2100	350	Red
	Before April 1986	800	2100	-	
Rear End Outline Marker Lamps	From April 1991	400	-	As high as possible with regard to the lateral position, being a pair and the use for which the vehicle is constructed	Red
Stop Lamps	From 1971 (refer to Lighting regulations for earlier vehicles)	One on each side with a minimum separation distance of 400mm	1500 or if impracticable 2100	350	Red
Rear Registration Plate Lamp		-	-	-	White
Rear Fog lamps	From April 1980	Where one lamp is fitted: On centre line or offside of vehicle. Where two are fitted they must be a matched pair.	1000	250	Red

Direction Indicators and Hazard Warning Lights

Application

Direction indicators

This inspection applies to all vehicles first used after 1 January 1936.
Side repeaters are required on vehicles first used from 1 April 1986.

Hazard warning lamps

This inspection applies to all vehicles with hazard warning lamps.
They need not be fitted to vehicles first used before 1 April 1986.

Procedure and Standards

- Check for correct operation, visibility, cleanliness, completeness and security.

Direction indicators

- Check that one or more indicators are fitted and visible to the front and to the rear on each side of the vehicle. All indicators fitted must work.
- These must show amber light unless fitted to a vehicle first used before 1 September 1965 when both indicators may show white to the front or red to the rear.
- The tell-tale on direction indicators may be audible rather than visual but for hazard warning lamps it must be a flashing light. A tell tale is not required if the operation of one or more indicators on each side can be seen from the driver's seat.
- Check that they flash at between 60 and 120 times per minute. If they flash at a rate below 60 times per minute, recheck with the engine running.
- A semaphore indicator is acceptable. It must illuminate when in operation, must not stick and is not required to flash.
- From a point 6m to the rear of a side repeater lamp and 600mm outward from the side of the vehicle at its widest point, part of the side repeater should be visible.

Hazard Warning Lights

- The tell-tale shall be a flashing light which may operate in conjunction with any direction indicator tell-tale.

Reasons for Failure

1. Direction Indicator:
 - a. missing, inoperative, dim or not visible either to the front or to the rear.
 - b. side repeater missing or not visible to the rear.

- c. lens missing, insecure or damaged so that it is likely to fall apart.
 - d. does not flash at between 60 to 120 times a minute
 - e. does not show a light of the right colour
 - f. tell-tale not fitted, is inoperative or cannot be seen/heard by the driver
 - g. rate of flash or illumination is affected by any other lamp
 - h. a semaphore indicator sticking
2. Hazard warning lamp:
- a. does not operate with the engine stopped and the ignition switched off.
 - b. all the direction indicator lamps do not operate simultaneously when switched on by one switch.
 - c. tell-tale not fitted, is inoperative or cannot be seen by the driver.



Aim of Headlamps

Application

The headlamp aim criteria is applicable to all dipped beam headlamps.

Procedure and Standards

Align the headlamp aim testing equipment to the vehicle in accordance with the manufacturers instructions.

The standards to be applied are shown adjacent to the beam patterns likely to be encountered.

Notes:

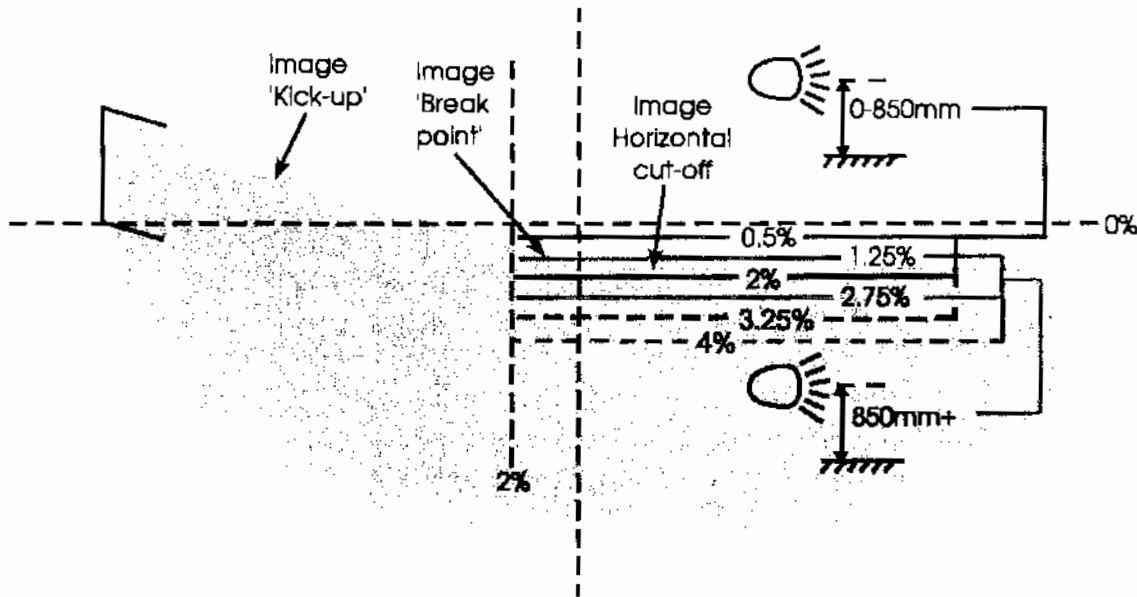
Headlamp beam converters fitted to right hand dipping headlamps, of vehicles which are mainly used on the continent, which effectively mask/deflect the beam are acceptable provided that the pass/fail criteria is met.

Some vehicles may be fitted with an **"in-cab" headlamp adjustment** device. It is permissible to allow adjustment of such a device to enable the criteria to be met for both headlamps.

Buses first used before 1 October 1969, with only one dipping headlamp are only required to have the beam checked to see that it does not cause undue dazzle or discomfort to other road users.

Reasons for Failure

European: Checked on Dipped Beam.



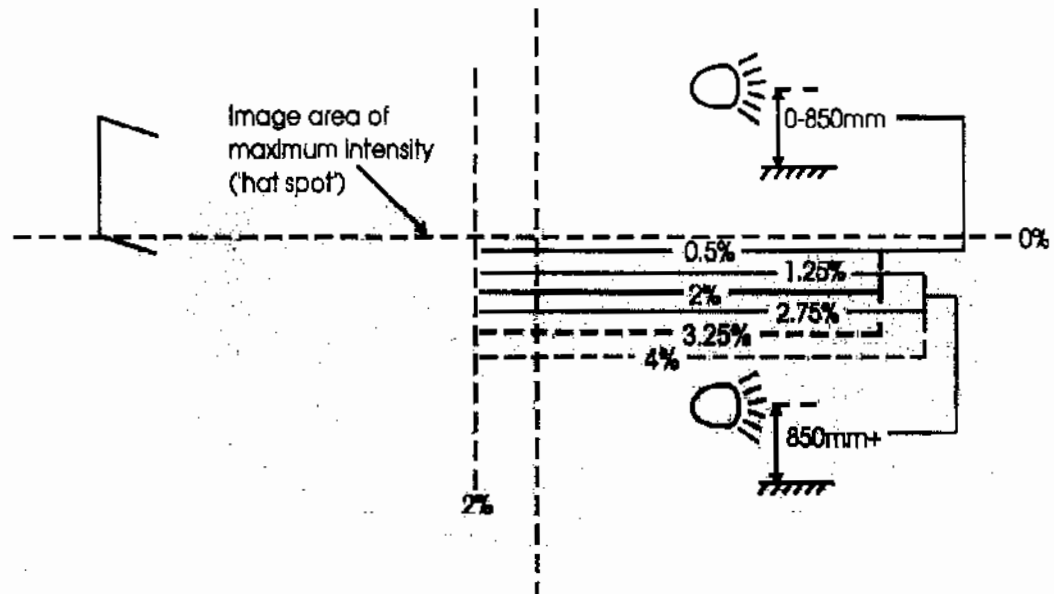
1. In relation to the 0% Horizontal line, the beam horizontal cut-off line is not between the limits listed in the table.

	Headlamp centres up to 850mm high	Headlamp centres Over 850mm high
Upper limit: All vehicles	0.5%	1.25%
Lower limit: All vehicles.	2.0%	2.75%

2. In any case the image break point is to the right, or more than 2.0% to the left, of the vertical 0% line.
3. A Headlamp dips to the right. (See note in Procedures and Standards).

Reasons for Failure

British American: Checked on Dipped Beam.



- In relation to the 0% Horizontal line, the upper edge of the "Hot Spot" is not between the limits listed in the table.

All headlamp heights

Upper limit: All vehicles

0%

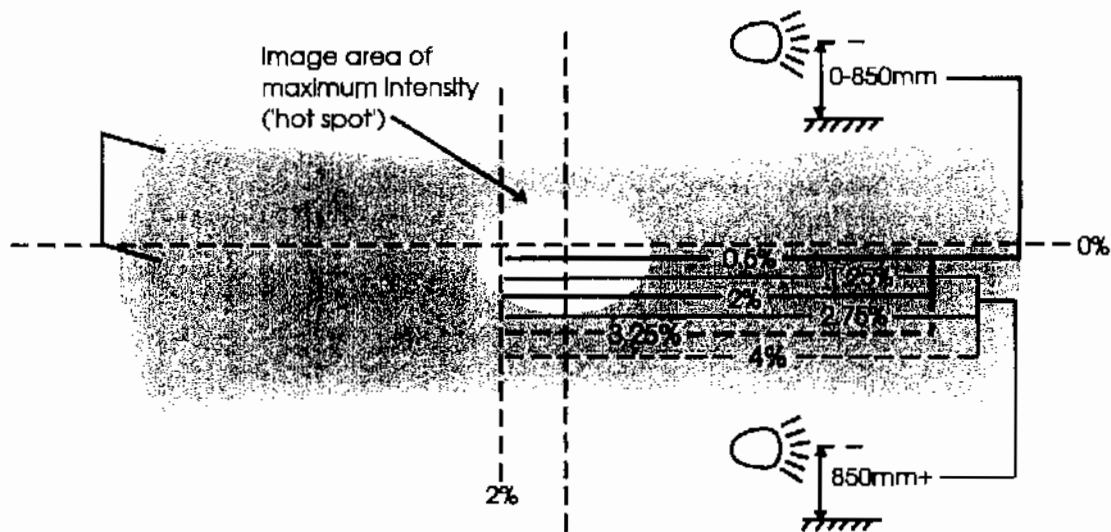
Lower limit: All vehicles.

2.75%

- The right hand edge of the "Hot Spot" is to the right of the vertical 0% line or more than 2% to the left of it.
- A Headlamp dips to the right. (See note in Procedures and Standards).

Reasons for Failure

British American: Checked on Main Beam.



7. In relation to the 0% Horizontal line, **the centre** of the "Hot Spot" is not between the limits listed in the table.

	Headlamp centres up to 850mm high	Headlamp centres Over 850mm high
Upper limit: All vehicles	0%	0%
Lower limit: All vehicles.	2.0%	2.75%

8. In any case the centre of the "Hot Spot" is to the right, or more than 2.0% to the left of the vertical 0% line.

9. A Headlamp dips to the right. (See note in Procedures and Standards).

10. **For buses first used before 01/10/69, with only one dipping headlamp.** The aim of the dipped beam is set so that it could dazzle or cause discomfort to other road users.

Service Brake Performance

Application

This inspection applies to all vehicles.

Procedure and Standards

To avoid damage to the vehicle or the equipment, no tyre must be obviously under-inflated.

Articulated buses should be treated as one vehicle.

In this section of the manual, the term "drum" includes "disc".

Note: To avoid damage to the vehicle or the test equipment, no tyre must be obviously under-inflated.

If the vehicle can be tested on a roller brake test machine proceed, as follows:

Roller Brake Test Machines Operating With VOSA Computer Controlled Brake Test.

Follow the sequence of instructions as displayed and prompted on screen. On completion of the test a result sheet is printed indicating the test result.

Other Roller Brake Test Machines.

Following the manufacturers instructions, for each wheel in turn:-

- Check for binding.

Note: Before failing a vehicle for binding, examiners should be aware that drag at a wheel may be recorded which is not necessarily due to brakes, but may be due to transmission drag, or by the deformation of the tyres on the rollers, which on a fully laden 10,000kg axle could be as much as 250kg. A recorded bind in excess of 4% of the measured axle weight should be considered a reason for failure.

- Apply the brake slowly and check for abnormal time lag in operation.
- Hold at a steady pedal pressure and check for brake force fluctuations.(This check only applies to steered wheels on motor vehicles).

Note: Brake effort fluctuation of more than 70% of the minimum brake effort recorded at a steady pedal pressure is a Reason for Failure. For ease of calculation if Maximum Brake Effort divided by Minimum Brake Effort is greater than 1.7 this is a Reason for Failure.

- Continue to apply the footbrake until the road wheel is just at the point of slip relative to the rollers, or until the service brake is fully applied, whichever occurs first. Note the maximum recorded brake effort.

Note: The highest reading obtained should be recorded when the brake force from any one wheel is fluctuating in a regular manner between two readings,(eg, 1850kg should be recorded where the needle reading was fluctuating between 1750kg and 1850kg).

Service Brake Performance *(contd)*

Procedure and Standards *(contd)*

- Using the maximum recorded forces for each wheel on an axle, check that the braking effort from any wheel is 70% or more of the effort of the other wheel on the same axle. When wheels lock, this reason for failure will not apply if both the wheels lock, or if one wheel locks and the braking effort of the locked wheel is less than that of the other.
- Little or no brake effort recorded at any roadwheel, should be considered a reason for failure if less than 5% of the measured axle weight is not attained.

Drop off of brake effort

If drop off of brake effort is noted during the roller brake test, first confirm that it is drop off and not simply due to the driver releasing the brake pedal. If drop off is confirmed it will be appropriate to consider a failure under Inspection Manual item 59 Reasons for Failure 3 or 5 .

The brake force requirements for each individual vehicle can normally be found on the PSV technical prints, from the Computer technical records or from Technical Services Branch at Swansea. If this information is not available the adequacy of braking performance is established in one of three ways depending on the number of wheels which lock during the roller brake test, as follows:-

PSV SERVICE BRAKE EFFICIENCY REQUIREMENTS			
First used	First used before 1 January 1968	First used from 1 January 1968 and before 1 April 1982	Any other vehicle
Specified Efficiency	45% Calculated Gross weight	50% Calculated Gross weight	50% GVW

GVW is Design Gross Vehicle Weight

Calculated Gross Weight (CGW) is found using the formula

$$CGW = X + 63.5 (Y + Z)$$

where

- X is the unladen weight.
- Y is the number of passengers that the bus is constructed to carry (in addition to the driver).
- Z is, for a bus with a standing capacity more than 8, the number of standing passengers minus 8.

All weights are in kilograms.

Locked Wheels.

If more than half the number of wheels lock, the specified brake effort can be considered to be met.

Service Brake Performance *(continued)*

Procedure and Standards (cont'd)

Vehicles with full power hydraulic braking systems.

If necessary to confirm compliance with Test Item 34 for PSVs with full powered hydraulic braking systems, the following additional tests should be made.

1. Position the vehicle so that each axle in turn is located on the roller brake tester.
2. With the engine stopped, deplete the brake pressure by repeated applications of the service brake pedal until commencement of operation of the low pressure warning device.
3. With the roller brake test machine driving the wheels of each axle in turn;
 - a. apply the service brake slowly, and check for first indication of braking effort. Release brake immediately. Re-apply brake, check for second time for indication of braking effort, and release brake immediately.
 - b. Repeat test sequence for each axle in turn.

Deceleration Test.

If the vehicle cannot be roller brake tested, or for any other reason a decelerometer test is required, proceed as follows;

1. Set the decelerometer on the vehicle in accordance with the instrument manufacturer's instructions.
2. At a speed of approximately 20mph, have the service brake applied, note the reading on the decelerometer and whether the vehicle deviates from a straight line.

Reasons for Failure

Roller brake test

1. A brake on any wheel binding.
2. Brake mechanism on any wheel sticking, indicated by an abnormal time lag before, an increased reading is obtained.
3. With service brake applied at a steady pedal pressure, the indication of brake effort fluctuates regularly with each revolution of the road wheel so much that the ovality of any brake drum is obvious. A fluctuation of recorded reading in excess of 70%, between highest and lowest indicated readings is to be considered a Reason for Failure.
4. With the service brake fully applied:
 - ** a. there is little or no brake effort at any wheel.
 - * b. braking effort from any wheel on an axle is less than 70% of the brake effort from another wheel on the same axle.
 - * c. the specified brake effort is not met.

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Service Brake Performance *(continued)*

Decelerometer Test

- *5. The braking efficiency recorded by decelerometer is below the specified efficiency for the vehicle under test or the vehicle deviates appreciably from a straight line.

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Secondary Brake Performance

Application

This inspection applies to all vehicles.

Note: Certain vehicles may have brake systems split in such a way that it is impossible to assess separately with a roller brake tester, the performance of the secondary brake. In these cases, the vehicle should be accepted, unless there is clear evidence that either half of the system is defective.

Procedure and Standards

To avoid damage to the vehicle or the equipment, no tyre must be obviously underinflated.

Roller Brake Test Machines Operating With V.I. Computer Controlled Brake Test.

Follow the sequence of instructions as displayed and prompted on screen. On completion of the test a result sheet is printed indicating the test result.

Other Roller Brake Test Machines.

For each road wheel in turn apply the secondary brake until the:

- road wheel is just at the point of slip relative to the rollers, or
- the secondary brake is fully applied, whichever occurs first.

Note the maximum braking effort indicated from the brake of each road wheel.

Where the nominated secondary braking system does not meet the specified braking requirement, the examiner may take into account the efficiency of any other system which is acceptable as a secondary system, providing the brake can be applied progressively.

Note: There may be occasions where the specified brake effort is met but, if the brake effort from any wheel on an axle is substantially less than the brake effort from another wheel on the same axle, it may be necessary to consider Reason for Failure 5a of inspection No. 59.

PSV SECONDARY BRAKE EFFICIENCY REQUIREMENTS			
First used	First used before 1 January 1968	First used from 1 January 1968 and before 1 April 1982	Any other vehicle
Specified Efficiency	20% Calculated Gross weight	25% Calculated Gross weight	25% GVW

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Secondary Brake Performance *(continued)*

Procedure and Standards (cont'd)

GVW is Design Gross Vehicle Weight

Calculated Gross Weight (CGW) is found using the formula

$$CGW=X+63.5(Y+Z)$$

where

X is the unladen weight.

Y is the number of passengers that the bus is constructed to carry (in addition to the driver).

²⁸⁶ Z is, for a bus with a standing capacity more than 8, the number of standing passengers minus 8.

All weights are in kilograms.

Locked Wheels.

If more than half the number of wheels lock, the specified brake effort can be considered to be met.

Reasons for Failure

1. With the secondary brake fully applied:

- a. there is little or no braking effort at any wheel equipped with a brake operated by the secondary brake system.
- * b. the specified brake effort is not met.

Parking Brake Performance

Application

This inspection applies to all vehicles first used from 1 January 1968.

Procedure and Standards

To avoid damage to the vehicle or the equipment, no tyre must be obviously underinflated.

It is necessary to use an applied brake method of testing as described below, except for vehicles with transmission parking brakes, or if the R.B. T. is not capable of carrying out an applied test. In these cases it is necessary to use the ALTERNATIVE method as described below.

Roller Brake Test Machines Operating With VOSA Computer Controlled Brake Test.

Follow the sequence of instructions as displayed and prompted on screen. On completion of the test a result sheet is printed indicating the test result.

Applied Brake Test on a Roller Brake Tester.

Apply the parking brake fully and release any power assistance. The service brake may be used at this stage in setting the park brake. Start each brake machine roller in turn and note the maximum braking effort indicated for each wheel in turn.

Alternative method

With the roller brake test machine driving each road wheel in turn, apply the parking brake slowly until each road wheel is just at the point of slip relative to the rollers, or until the parking brake is fully applied, whichever occurs first. Note the braking maximum effort indicated from the brake of each road wheel.

Transmission Parking Brakes.

If the parking brake is a transmission brake, all wheels on the same axle braked by it must be driven by the roller test machine at the same time.

Roller Brake Test.

With the roller brake machine driving both road wheels together, instruct the driver to apply the transmission brake as slowly as possible, constantly keeping the release button depressed, until any road wheel is just at the point of slip relative to the rollers, then release the brake quickly. Note the braking effort indicated from the brake of each wheel.

Note: There may be occasions where the specified brake effort is met but, if the brake effort from any wheel on an axle is one third or less than the brake effort from another wheel on the same axle, it may be necessary to consider Reason for Failure 5a of Inspection 59. The notes relating to Locked Wheels and Load Simulation under Inspection 71 also apply to this inspection.

The brake force for each individual vehicle can normally be found on the PSV technical prints, from the computer technical records or from Technical Services Branch at Swansea. If this information is not available the adequacy of braking performance is established in one of 3 ways depending on the number of wheels which have locked during the roller brake test as follows :

Parking Brake Performance *(continued)***Procedure and Standards (cont'd)**

PSV PARKING BRAKE EFFICIENCY REQUIREMENTS			
First used	First used before 1 January 1968	First used from 1 January 1968 and before 1 April 1982	Any other vehicle
Specified Efficiency	No requirement	16% Calculated Gross weight	16% GVW

GVW is Design Gross Vehicle Weight

Calculated Gross Weight (CGW) is found using the formula

$$CGW = X + 63.5(Y + Z)$$

where

X is the unladen weight.

Y is the number of passengers that the bus is constructed to carry (in addition to the driver).

Z is, for a bus with a standing capacity more than 8, the number of standing passengers minus 8.

All weights are in kilograms.

Locked Wheels.

If more than half the number of wheels lock, the specified brake effort can be considered to be met.

Reasons for Failure

1. With the parking brake fully applied
 - a. there is little or no braking effort at any wheel equipped with a brake operated by the parking brake system.
 - *b. the specified braking effort is not met.

Other Dangerous Defects

Application

This applies to all vehicles.

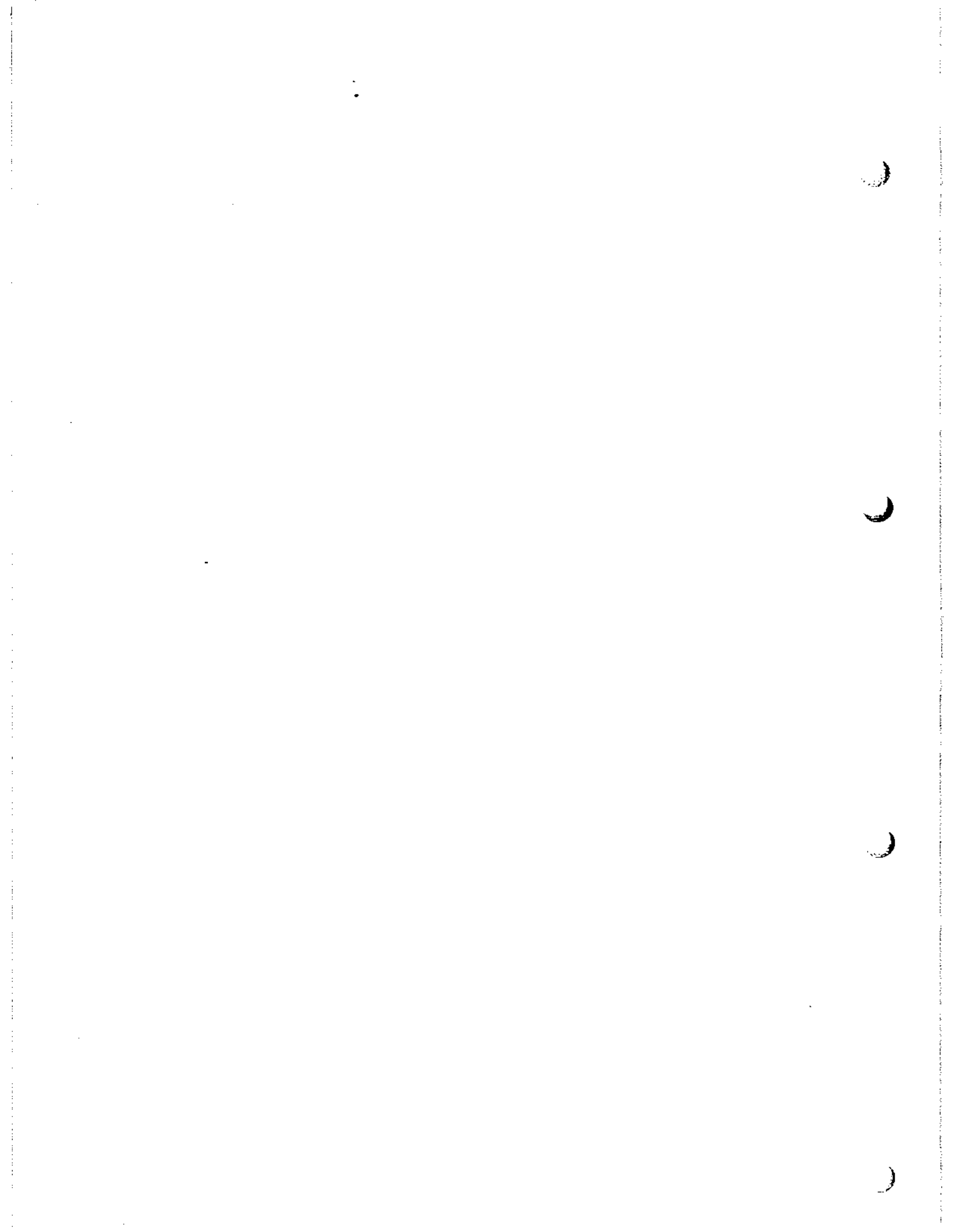
Procedure and Standards

Whilst this manual attempts to be comprehensive and cover all reasons for failure which could be dangerous it is inevitable that due to changes in design, or other reasons, from time to time dangerous defects may be found which are not described in any of the reasons for failure in the other items in this manual. If a defect of this type is found, which is such that the use of the vehicle on the road would involve a danger of injury to any person, this would justify a failure under this item. In addition it would be appropriate to issue an Immediate Prohibition for a defect of this nature.

It is not intended that this item should be used as a matter of routine but only for exceptional cases. If a failure is recorded under this item full details must be shown on the test card and a copy should be sent to Technical Services Branch so that any trends can be noted and amendments made to the manual if necessary.

Reasons for Failure

- 289/290
- **1. A defect not described elsewhere in the manual such that the use of the vehicle on the road would involve a danger of injury to any person.



CHAPTER 3-3
CAR AND LIGHT COMMERCIAL
CONTENTS

Para

- 1 Car and light commercial

CAR AND LIGHT COMMERCIAL

1 This Chapter explains to everyone engaged in the practical work of vehicle examination and maintenance:

- 1.1 The application of specific relevant requirements.
- 1.2 The procedures and standards to be used.
- 1.3 The reason for failure.

2 The procedures given assume that only the parts of a vehicle, which can readily be seen without dismantling, are to be examined. However, it may be necessary to remove panels or equipment where it is not otherwise possible to inspect safety critical items.

3 Each inspection has been allocated a number, which is given at the top of the page. This number is cross-referenced to entries in the column marked III, IV, VII on the AF G932(B). Not all inspection numbers have been allocated.

4 As it is not practicable to lay down limits of wear or tolerance for components of specific vehicle types the following points should be considered when carrying out the inspection:

- 4.1 Refer to the Vehicle Inspection Standard.
- 4.2 The function of the component and its contribution to the road safety of the vehicle.
- 4.3 Whether the component has clearly reached the stage where repair, replacement or adjustment is necessary to ensure the road safety of the vehicle.
- 4.4 Whether the condition of the component appears to break the law.

5 Inspectors should note that apart from those exemptions listed, against particular vehicle types, under specific inspections, further exemptions apply to MoD vehicles. However where such items are fitted they should be serviceable. Where a testable item is not fitted as part of the original vehicle build standard, inspectors should assume that an exemption is in place. If in doubt clarification should be sought from the ESPD or through the appropriate ES chain of command to the ESM.

6 The VOSA Appendices A and B have not been included in this section; any reference to these within this section should therefore be ignored.

Introduction

Abbreviations and Definitions, Introduction (including a typical inspection routine) and How to Use This Manual.

Section 1 Lighting and Signalling Equipment

1. Front and Rear Position Lamps, Rear Registration Plate Lamps, Rear Fog Lamps
2. Headlamps
3. Stop Lamps
4. Rear Reflectors
5. Direction Indicators and Hazard Warning Lamps
6. Headlamp Aim
7. Audible warning (Horn)

Section 2 Steering (including suspension)

1. Steering Control
2. Steering System
3. Power Steering
4. Suspension – General
5. Front Suspension, Wheel Bearings and Drive Shafts
6. Rear Suspension and Wheel Bearings
7. Shock Absorbers

Section 3 Brakes

1. Parking Brake Lever Mechanism and Associated Mountings
2. Hand Operated Brake Control Valves
3. Service Brake Control
4. Anti-Lock Braking System
5. Mechanical Brake Components
6. Hydraulic, Air and Vacuum Systems
7. Brake Performance
8. Method of Calculating Brake Performance
9. Examples of the latest type 'Ministry' and Manufacturers plates
10. Brake Efficiency Table

Section 4 Tyres and Roadwheels

1. Tyres
2. Roadwheels

Section 5 Seat Belts

1. Seat Belts

Section 6 Body and Structure

1. Vehicle Structure, body security and condition
2. Doors and Seats
3. Registration Plates and VIN Details
4. Load Security and Spare Wheel Carrier

Section 7 Fuel and Emissions

1. Exhaust System
2. Fuel System
3. Exhaust Emissions – Spark Ignition
4. Exhaust Emissions – Compression Ignition

Section 8 Drivers View of the Road

1. Mirrors
2. Wipers and Washers
3. Windscreen
4. Bonnet

Section 9 Motor Tricycles and Quadricycles

1. Lighting
2. Motorcycle Derived Steering / Suspension Systems
3. Brakes
4. Tyres
5. Seat Belts
6. Body and Structure
7. Emissions
8. Drivers View of the Road

Appendix

- A Amendment Record
- B Vehicle Identification Numbers
- C Structural Integrity and Corrosion

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Introduction

ARMY EQUIPMENT
SUPPORT PUBLICATION

Section Contents

Subject	Page
Abbreviations and Definitions	2
Introduction	4
How to Use This Manual	8
Recommended Inspection Routine	10

Abbreviations and Definitions

AE Authorised Examiner – the organisation that operates and manages one or more VTSs and is responsible for controlling the quality of testing carried out. Except in the case of a 'sole trader' the AE is not a person but a legal entity (e.g. a company or partnership).

Bodied vehicles A bodied vehicle is defined as 'a vehicle with a structure consisting/comprising of a floor pan and panels which, with a roof fully encloses the vehicle occupants and without a roof encloses them other than where a roof would be'.

As a guide, if the driver sits in the vehicle with surrounding structure it would be classed as bodied.

DGW Design Gross Weight – i.e. the maximum gross weight that the vehicle was designed to operate at within the UK. This is normally found on a plate fixed to the vehicle by the manufacturer or in the case of older or heavier vehicles by a 'Ministry Plate'. Such plates are not required on all vehicles.

Immediately Means as soon as is reasonably practical and certainly within 24 hours.

NT Nominated Tester – a person 'nominated' by an AE to carry out tests and who is also acceptable to VI and entered on the list of nominated testers (VT 26)

QC Quality Control.

Replacement Manual pages Replacement pages are normally sent out under an SN. They must be inserted into the manual immediately. Superseded pages should be removed and Manual Appendix A completed.

SN Special Notice – an official notice issued from time to time by VI to inform AEs and NTs of changes to the testing scheme. They may also be used to highlight areas of concern and to keep AEs and NTs in touch with developments of the scheme and should be filed in the back of the MOT Testing Guide and the manual should be noted when appropriate.

Unladen weight The weight of a vehicle inclusive of the body and all parts which are ordinarily used with the vehicle when working on a road. Unladen weight does not include the weight of water or fuel used for the propulsion of the vehicle, or of loose tools and loose equipment

VOSA Vehicle and Operator Services Agency.

VTS Vehicle Test Station.

VT20/VT20W An MOT Test certificate and its Welsh counterpart.

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Abbreviations and Definitions

ARMY EQUIPMENT
SUPPORT PUBLICATION

VT30	A notification of refusal to issue a Test Certificate.
Working days	Working days exclude Saturdays, Sundays and public holidays.

2300-A-050-013

Introduction

1. Application

This manual is a detailed guide to the inspection for statutory MOT testing of the following classes:

Class III: 3 wheeled vehicles not more than 450kg unladen weight (excluding motorcycles with side cars).

Class IV: Cars, including 3 wheeled vehicles more than 450kg unladen weight, Taxis, Minibuses and Ambulances up to 12 passenger seats, Goods Vehicles not exceeding 3000 kg Design Gross Weight (DGW), Motor caravans and Dual Purpose Vehicles.

Class VII: Goods Vehicles over 3000 up to and including 3500 kg DGW. If a vehicle is presented with a manufacturer's and a 'Ministry plate' the weights to be used are those on the 'Ministry plate'.

Detailed definitions are given in the MOT Testing Guide.

Tricycles and Quadricycles are tested under classes III or IV and these vehicles can present particular problems at MOT test, especially where motorcycle derived steering and/or suspension components are fitted.

Section 9 of this manual provides additional information for testing these types of vehicles, with the exception of sub-section 9.2. This replaces Sections 2.1 and 2.2 of this manual, where motorcycle derived steering and/or suspension components are fitted.

Table to determine the vehicle class and test requirements for Tricycles and Quadricycles

Vehicle type	Description	Tested in class
Moped	Three wheeled vehicle with max speed of 45km/h, not over 50cc for a petrol engine or 4KW for any other engine or electric motor, not more than 450kg ULW.	III
Moped	Three wheeled vehicle with max speed of 45km/h, not over 50cc for a petrol engine or 4KW for any other engine or electric motor, more than 450kg ULW.	IV
Motor Tricycle	Three wheeled vehicle with wheels symmetrically arranged, a max speed over 45km/h, or engine size over 50cc, not more than 450kg ULW.	III
Motor Tricycle	Three wheeled vehicle with wheels symmetrically arranged with a max speed over 45km/h, or engine size over 50cc, more than 450kg ULW.	IV
Light Quadricycle (classed as a moped)	Four wheeled vehicle with a max ULW of 350kg, max speed of 45km/h and not over 50cc for a petrol engine or 4KW for any other engine or electric motor.	IV
Quadricycle	Four wheeled vehicle with a max ULW of 400kg (550kg for a goods vehicle) with a max net power of 15KW.	IV

If any of the above vehicles are electrically powered, their unladen weight must not include the weight of the batteries.

If there is doubt about the power output or the weight of the vehicle, the presenter must provide documentary evidence.

Cont'd

2300-A-050-013

ARMY EQUIPMENT
SUPPORT PUBLICATION

Introduction

2. Refusal to test

This manual does not include the reasons for refusing to test a vehicle in the Reasons for Rejection columns.

VTS's may only test those classes and types of vehicle that they are authorised to test and which are of a size and weight that can be accommodated by the authorised equipment.

If any of the following reasons apply, the test should not be carried out, the vehicle presenter informed and any fee paid for the test must be returned. It is therefore advised that 'refusal' items are checked before starting the test.

The reasons for refusing to carry out the test are:

- a. The registration document or other evidence of the date of first use is not produced if the information therein, is necessary for the test to be carried out.

Note: Normally this evidence is only necessary if the vehicle has a 'cherished' registration mark or if the registration mark's year letter does not make clear the standard that should be applied – for instance, regarding seat belt requirements for D prefix vehicle.

- b. The vehicle, or any part of the equipment on the vehicle is so dirty that examination is unreasonably difficult.
- c. The vehicle is not fit to be driven when necessary to complete the test because of a lack of fuel, or oil, or for any other reason.
- d. The NT considers insecurity of a load or other items would prevent a proper test being carried out – unless the load is secured or removed.
- e. The VTS asks for the fee to be paid in advance and this is not done.

- f. The vehicle emits **substantial** quantities of **avoidable** smoke.
- g. A proper examination cannot be carried out because any door, tailgate, boot, engine cover, fuel cap or other device designed to be readily opened cannot be readily opened.
- h. The condition of the vehicle is such that, in the opinion of the NT, a proper examination would involve a danger of injury to any person or damage to the vehicle or other property. This would cover, refusal to test a diesel where the engines maintenance history or condition is suspect.

In addition to this an NT must decline to test any vehicle that is not of a class they are authorised to test or it is of such a size, weight or configuration it cannot be properly or safely tested on the approved facilities.

If despite due care initially, it becomes apparent during a test that the test cannot be completed for one of the above reasons, you must fail the vehicle because the test could not be satisfactorily completed.

Any re-examination and fee must be in line with normal policy (see Fees and Appeals poster) treating the component which could not be examined, as a failure item.

Cont'd

Introduction

3. Inspection Procedure

The entire test should be carried out by one NT whose name is on the list of NT's with suitable assistance when necessary. The whole of the test should be carried out without interruption.

The diagrams on pages 10 and 11 show a typical inspection routine which will aid the tester in making a thorough inspection of a vehicle. This routine might have to be varied to suit different test bay layouts and test equipment types.

For example, at some testing stations, where the roller brake tester is positioned in advance of the lift or pit, it might be more convenient to conduct the brake performance test before inspecting the underside of the vehicle on the lift or pit.

This practice is permissible, but it must be noted that a tester should not proceed with the brake performance test if there is a defect which could cause;

- Injury to any person;
- Or damage to the vehicle or other property.

It is advisable to examine, as far as possible, the underside of a vehicle before carrying out a brake performance test.

A full inspection must be made on a vehicle presented for test or re-examination except for permitted free re-examinations (see fees and appeals poster).

4. Re-examination following failure

If the vehicle stays at the test station for repair you must carry out a partial re-examination of all the failed items including those affected by the repair.

If the vehicle leaves the test station having **only** failed on one or more of the items listed on the fees and appeals poster and is returned before the end of the next working day – carry out a partial examination.

In any other case a **full examination must** be carried out.

5. Recording defects

Dangerous defects

If in the opinion of the NT the vehicle has a dangerous defect, which is also a test failure; record in the reason for failure column and box C of the VT30. If the vehicle has a dangerous defect which is not a testable item and the vehicle has failed its test, record the defect in box C of the VT30.

If the vehicle has passed its test, issue an advisory document explaining the nature of the defect with the VT20. In all cases dangerous defects should be clearly explained to the vehicle presenter.

Other defects

The vehicle presenter should be notified of:

- Any items which are near to, but which have not yet reached the point of test failure.
- Any peculiarities of the vehicle identified during the inspection, for example front passenger seat not fitted.
- Any defects on non-testable items which are found during the inspection procedure.

Advisory items should ideally be noted on a numbered and dated sheet, such as a checklist, a copy of which should be retained by the VTS. A reasonable alternative to this practice is acceptable.

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Introduction

6. Testing Personnel

Inspections must be carried out by a qualified NT with an assistant working under supervision.

In appropriate cases, the person submitting the vehicle ('the vehicle presenter') is permitted to act as an assistant, if they are willing, the NT is satisfied with their competence and that all Health and Safety requirements are met. For example, the vehicle presenter will normally be capable of operating light switches etc., but might not be able to properly push, pull or lever road wheels etc.

Only the NT carrying out the inspection is empowered to make a decision about the results of the inspection of a particular item.

7. The MOT Testing Guide

The guide explains what is required of people and organisations authorised to conduct statutory tests on certain motor vehicles. It includes amongst other things, the definitions of vehicle classes and dual purpose vehicles. It explains how to complete test documentation.

It also includes details of application, disciplinary procedures, and training requirements.

At least one up to date paper copy of the Guide must be available to testing staff at all times in all testing stations.

8. Road Testing

The statutory test does not specifically include a road test of the vehicle, except for vehicles which cannot have the performance of the brakes tested on a roller or plate brake tester.

A road test, however, is permitted if the tester considers one is necessary to check the results of an inspection. The tester must be qualified to carry out the road test, and must ensure it is safe to conduct that test.

9. Health and Safety

AE's and their staff are reminded that they are obliged to adhere to all relevant Health and Safety Legislation while MOT testing.

Advice can be obtained from your local Health and Safety Enforcement Officer or Local Authority Environmental Health Officers as appropriate.

Nov 05 (Amend 7)

Chap 3-3

How To Use This Manual

1. The Manual

This Manual is written on the assumption that the inspection will be carried out by a qualified NT, with an assistant working under their direction.

It should be read in conjunction with all current Class III, IV & VII SNs which may contain guidance on or updates to this Manual.

2. Page Layout;

a) Information Columns

These contain important details a NT needs to know.

b) Method of Inspection Columns

These detail:

- The way in which the inspection of items on the vehicle must be carried out, and
- The equipment to be used.

The MOT test must be carried out without any dismantling, so it is not always practicable to inspect testable items completely.

Bonnets, engine covers, luggage compartments, access flaps and passenger compartment doors must be opened where this is necessary to inspect testable items which cannot otherwise be seen.

If, because a bonnet, door etc., cannot be opened or has been significantly reduced in size, you cannot gain access to a testable item, which was originally accessible **only** through a bonnet, door etc., you must refuse to carry out the test or fail the vehicle (see Item 2 of the introduction).

c) Reasons for Rejection Columns

These list the defects which result in a vehicle failing the MOT test.

d) Notes

When carrying out each inspection, the NT should pay particular attention to the 'Notes' since they give valuable guidance on the conduct of the test and the scope of the various inspections.

3. Vehicle 'first used' dates – application of test criteria

A vehicle's 'first used' date is;

- Its date of manufacture, if the vehicle was originally used without being registered in GB (e.g., an imported vehicle or ex-HM Forces vehicle), or
- Vehicles having a Q plate registration when presented for MOT are to be treated as follows: **For emission purposes only**, all these types are to be considered as vehicles first used before **1st August 1975**. **For all other testing purposes** they are to be considered as being first used on **1st January 1971**, or
- In any other case, the earlier of either
 - Its date of first registration, or
 - The date six months after it was manufactured.

Examples of 'first used' dates

- The requirement for rear seat belts apply to vehicles first used after 31 March 1987, but vehicles manufactured at least 6 months previously (i.e., before October 1986) do not require rear seat belts.
- The exhaust emission test for a vehicle first used before August 1975 is a visual check only. Vehicles first used on or after 1st August 1975 are also subject to only a visual check if they were manufactured before February 1975 (i.e. 6 months before August 1975).

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How To Use This Manual

4. Assessment of Component Wear and Deterioration

Because it is not practicable to lay down limits of wear and tolerances for all types of components on different models of vehicle, a NT is expected to use experience and judgement in assessing the condition of a component. The main criteria to be used when making such assessments are;

- i. whether the component has reached the stage where it is obviously likely to affect adversely the roadworthiness of the vehicle;
- ii. whether the condition of the component has clearly reached the stage when replacement, repair or adjustment is necessary.

5. Use of Equipment

The statutory test must be conducted using **only** equipment designated as acceptable for the test, and the designated equipment must always be used for the test.

In the event of failure of any item of designated equipment the local VI office must be notified and testing must cease immediately. Where the failure is to a roller brake tester, testing may continue using a calibrated decelerometer for 2 working days, but **only** for vehicles previously booked in before the breakdown occurred.

6. Use of an Assistant

Some parts of the inspection require the use of an assistant to conduct an adequate examination of a component or system, for example some steering checks.

7. Disabled Drivers Controls

A defective disabled driver's control or fitment that is a testable item justifies failure in the normal way.

The defect description must include an explanation of the control type or fitment and its clear function so that it is clear it only applies to disabled driver's equipment.

If the disabled driver's controls or fitments are **additional** to and do not adversely affect the normal vehicle equipment, they are **not** testable items. Any defective additional control or fitment found during the test should be reported to the vehicle presenter.

8. Amendments and Additions

Changes to the Inspection Manual will be marked by the use of a vertical line located to the immediate left beside the change in the same column. This will help to highlight any amendments and additions when using the Manual. The vertical line will always show the **latest** changes to the manual.

9. Special Notices (SNs) and Manual Replacement Pages

SNs and replacement pages containing amendments or additions to the Manual must be retained and acted upon. (SNs must be filed in the back of the MOT Testing Guide. It may also be wise to copy appropriate items into the Manual).

Replacement pages must be inserted in the Manual and superseded pages removed.

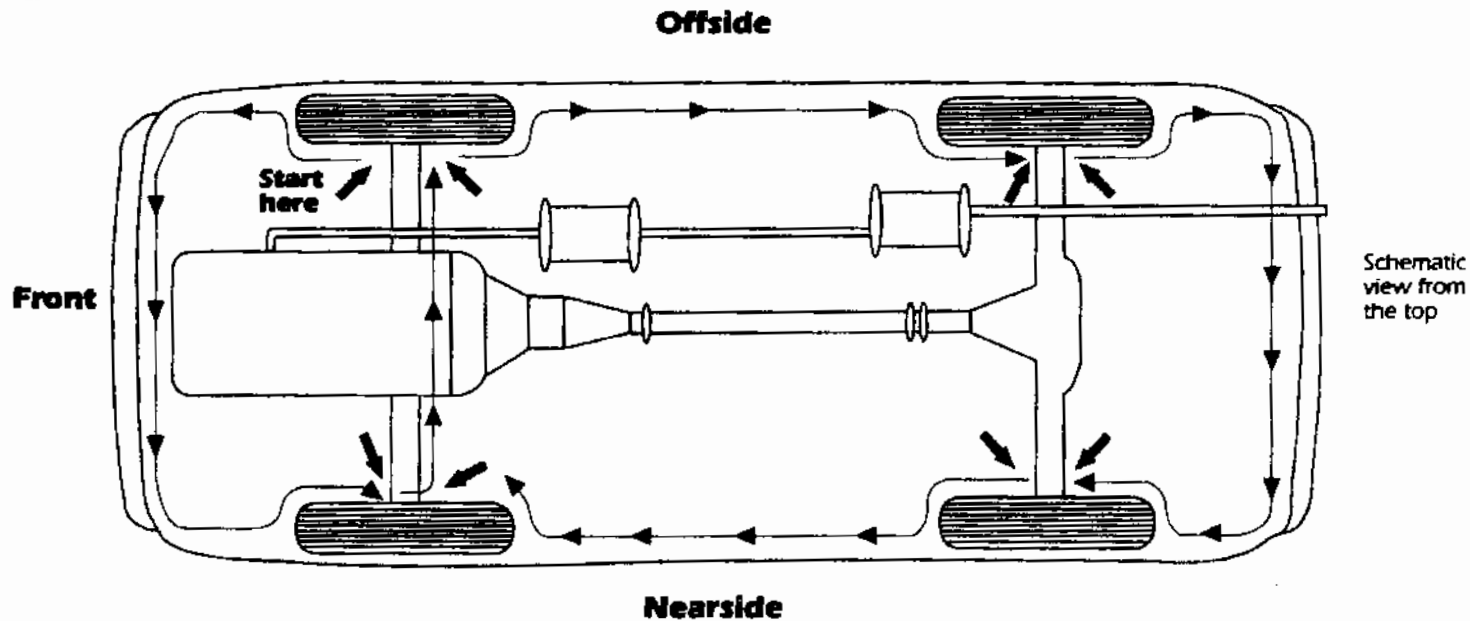
All Manual amendments must be signed off using the table in Appendix A.

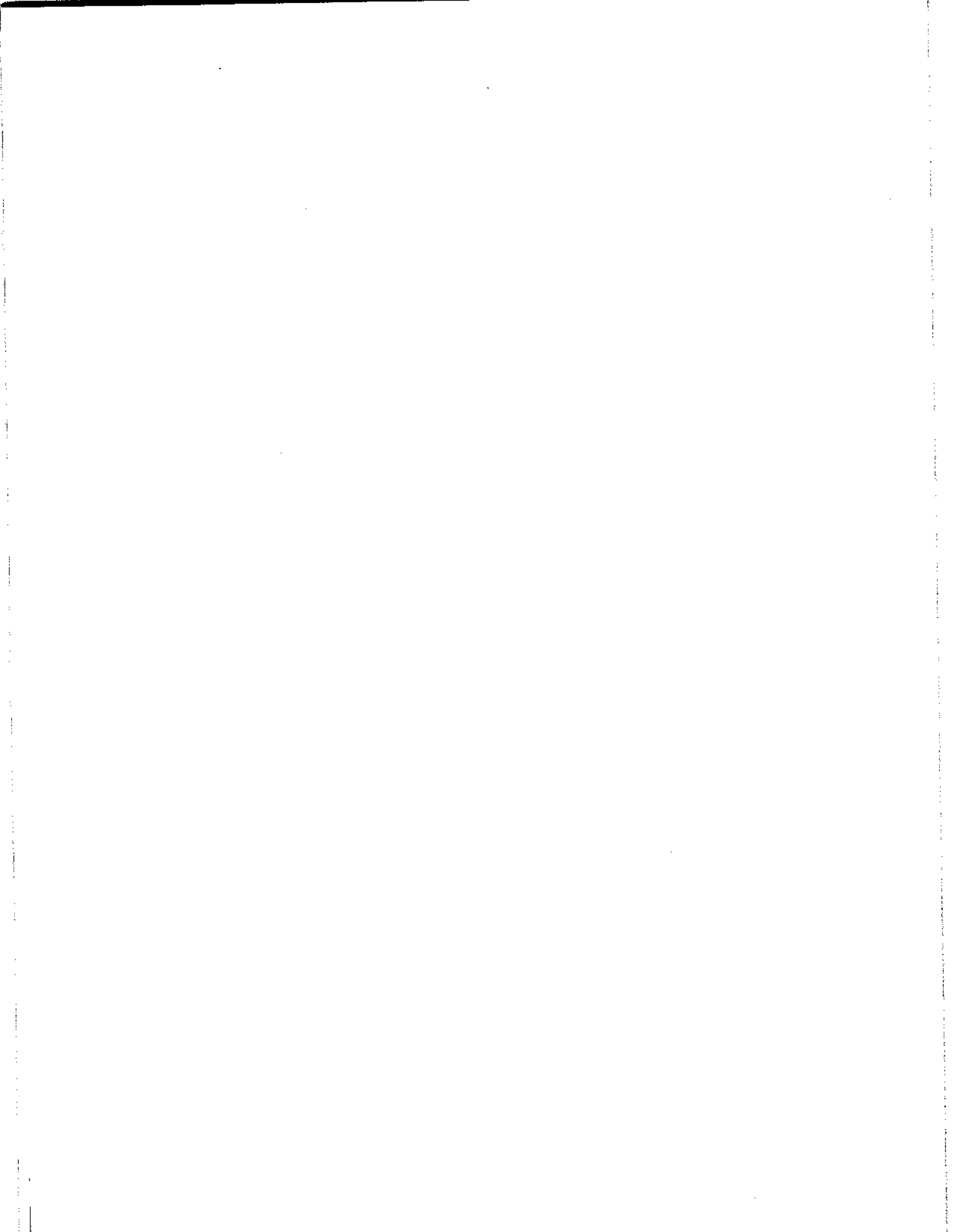
305.4

Recommended underside inspection routine

Operations

1. With the wheels in the straight-ahead position and supporting the vehicle weight, inspect the vehicle underside following the routine shown
2. Jack up the front wheels to check relevant items.
3. Jack up the rear wheels to check relevant items.





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Section 1

Lighting and Signalling Equipment

Section contents

Sub-Section	Subject	Page
1.1	Front and Rear Position Lamps, Registration Plate Lamps, Rear Fog Lamps	2
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1.3	Stop Lamps	7
1.4	Rear Reflectors	9
1.5	Direction Indicators and Hazard Warning Lamps	10
1.6	Headlamp Aim	12
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1.1 Front and Rear Position Lamps, Registration Plate Lamps, Rear Fog Lamps

Information

This inspection applies to: all vehicles, except those which either have no front or rear position lamps or have such lamps permanently disconnected, painted over or masked that are

- only used during daylight hours, and
- not used at times of seriously reduced visibility

If this situation occurs, the vehicle presenter should be issued with an advisory notice recording the above and it should also be recorded on the carbon copy of the VT20.

Obligatory front position lamps

Lamps required by Regulations to be fitted to a vehicle to indicate its presence and width when viewed from the front.

They must show a steady **white** light to the front, or a **yellow** light, if incorporated in a headlamp which emits yellow light.

The light must be visible from a reasonable distance.

On vehicles fitted with dim-dip headlamp systems, the front position lamps must be checked for operation with the ignition switched off. This may involve the operation of a separate switch.

Method of Inspection

1. Check that two front and two rear position lamps are fitted to the vehicle, one of each on each side.
2. Check the presence, condition, security and operation of the switch.
3. Check that the front and rear position lamps show light of the correct colour.
4. Check that the lamps
 - a. are complete, in good working order and clean
 - b. are secure, not obscured, and face to the front or rear as appropriate.
Note: At least 50% of each lamp must be visible from the front or rear as appropriate
 - c. do not flicker when tapped lightly by hand

Reason for Rejection

1. An obligatory lamp missing.
2. A switch missing, faulty, insecure, or not able to be operated from the normal driving position.
3.
 - a. A front position lamp shows a light other than **white** to the front, (or yellow if incorporated in a yellow headlamp)
 - b. A rear position lamp shows a light other than **red** to the rear.
4. A front position lamp or rear position lamp
 - a. incomplete, not in good working order or not clean, i.e. damaged or deteriorated, or not visible from a reasonable distance
Note: An effective repair (eg lens repair tape, etc.) must be assessed on its merits, considering security, colour, light output and durability.
 - b. insecure, obscured, or does not face to the front or rear as appropriate
 - c. flickers when tapped lightly by hand

Cont'd ▼

Cont'd ▼

Front and Rear Position Lamps, Registration Plate Lamps, Rear Fog Lamps **1.1**

Information

Obligatory rear position lamps (rear lamps)

Lamps required by Regulations to be fitted to a vehicle to indicate its presence and width when viewed from the rear.

They must show a steady **red** light to the rear, visible from a reasonable distance.

Optional Lamps

Any additional position lamps are optional and **are not included** in the inspection.

Combined lamps

Stop Lamps or Direction Indicators may be combined in the same lamp housing as Front and Rear Position Lamps (ref. Reason for Rejection 4d) [see Sections 1.3 and 1.5].

Registration Plate Lamps

Registration plate lamps are the lamps that illuminate the rear registration plate. Some vehicles may have these lamps fitted behind the number plate.

Multiple Registration Plate Lamps

Where more than one rear registration plate lamp, or bulb is fitted, any one inoperative lamp or bulb is a reason for rejection.

Method of Inspection

- d. are not adversely affected by the operation of any other lamp
- e. are not obviously out of position.
Note: The precise position of obligatory front and rear position lamps is **not** part of the inspection, but **check visually** that the lamps are at about
 - the same height, and
 - the same distance from the side of the vehicle.
5. With the front and rear position lamps switched on, check that the rear registration plate lamp(s)
 - a. is fitted
 - b. is secure
 - c. is working
 - d. is correctly positioned
 - e. does not flicker when tapped lightly by hand and
 - f. does not show white light to the rear

Reason for Rejection

- d. adversely affected by the operation of any other lamp, eg dual-function lamps on foreign vehicles
- e. obviously incorrectly positioned.
5. A rear registration plate lamp
 - a. not fitted
 - b. insecure
 - c. with any bulb not working
 - d. not illuminating the rear registration plate
 - e. flickers when tapped lightly by hand,
 - f. shows white light directly to the rear.

Cont'd ▼

Cont'd ▼

1.1 Front and Rear Position Lamps, Registration Plate Lamps, Rear Fog Lamps

Information

Method of Inspection

Reason for Rejection

Rear Fog Lamps

The inspection of rear fog lamps is confined to the **one** rear fog lamp which is required to be fitted to the **centre** or **offside** of vehicles first used on or after 1 April 1980.

Note: On some vehicles the front fog lamps need to be switched on before the rear fog lamp(s) will work.

Note: A rear fog lamp is permitted to operate independently of headlamp, position lamp or ignition systems.

6. With dipped headlamps and the ignition switched on, operate the rear fog lamp switch and check that a rear fog lamp
 - is fitted to the centre or offside of the vehicle
 - is working, and
 - does not flicker when tapped lightly by hand.

Check also that the driver's tell-tale works properly.

7. Check the presence, condition, security and operation of the switch.

6. A mandatory rear fog lamp
 - a. is missing, does not emit a steady red light or emits a light other than red
 - b. incomplete, not in good working order or not visible from a reasonable distance
 - c. is insecure, obscured or not facing to the rear
 - d. flickers when tapped lightly by hand
 - e. tell-tale does not work
 - f. adversely affected by the operation of any other lamp.
7. A rear fog lamp switch
 - a. missing
 - b. faulty
 - c. insecure
 - d. not able to be operated from the normal driving position.

Headlamps 1.2

Information

Headlamps are lamps used to illuminate the road ahead of the vehicle, but are not fog lamps.

This inspection does not apply to: vehicles used only during the hours of daylight, which are fitted with neither front nor rear position lamps, etc. (See 1.1)

This inspection applies to: all obligatory headlamps fitted.

Note: Headlamps are not required on vehicles first used before 1 January 1931, but they may have one or more optional main or dipped beam headlamps.

'Matched pair'

A "matched pair" is a pair of lamps which

- both emit light of substantially the same colour and intensity, and
- are both the same size and shape, so that they are symmetrical to one another.

Note: Pre 1st January 1931 Vehicles

For vehicles that are fitted with one or two optional headlamps;

- where one is fitted it must dip
- where two are fitted, either both must dip or one must dip and the other switches off.

Cont'd ▼

Method of Inspection

1. Check that the vehicle is fitted with obligatory headlamps, as follows
 - a. a matched pair of main beam headlamps, and
 - b. a matched pair of dipped-beam headlamps**Note:** Main-beam and dipped-beam functions **may be provided** by a single pair of headlamps.
2. Check the presence, condition, security and operation of the switch.
3. Switch on each main-beam headlamp and check that
 - all main beams are switched off by one switch (dip switch) which leaves a matched pair of dipped-beam headlamps switched on,or
 - the main beam headlamp reflectors are deflected by a driver's control, to make them dipped beams.

Cont'd ▼

Reason for Rejection

1. A missing obligatory headlamp.
Note: Class 3 vehicles may not require two headlamps (matched pair).
2. A missing, faulty or insecure switch.
3.
 - a. A headlamp does not operate immediately when selected on dipped beam or on main beam
 - b. Operation of the dip switch does not
 - extinguish all main beam headlamps, and leave on at least one pair of dipped-beam headlamps, or
 - deflect the main beams to make them dipped beams.

Cont'd ▼

1.2 Headlamps

Information

Class 3

Vehicles first used;

- before 1 January 1972, or
- on or after 1 January 1972 with
 - an unladen weight of 400kg or less, and
 - an overall width of 1300mm or less require only one headlamp.

Headlamp aim

See 1.6 for the inspection of headlamp aim.

Method of Inspection

4. Check that each obligatory headlamp
 - a. is in good working order.
Note: Any adverse effects due to headlamp lens damage or deterioration can also be assessed on checking beam aim (see 1.6). A repaired lens must be assessed on its merits
 - b. is secure
 - c. does not flicker or extinguish when tapped lightly by hand
 - d. if intended to be one of a matched pair
 - emits light of substantially the same colour as its counterpart
 - is the same size
 - is correctly positioned**Note:** In a four-headlamp system the outer pair of headlamps need not emit the same colour light as the inner pair.
Note: The measurement of the precise position of headlamps is not part of the inspection, but check visually that the lamps are at about
 - the same height, and
 - the same distance inboard from the side of the vehicle
 - e. is of the correct colour either white or yellow.

Reason for Rejection

4. An obligatory main or dipped beam headlamp
 - a. not in good working order and in clean condition, ie damaged or deteriorated to such an extent that
 - the light output is well below that required to illuminate the road ahead, or
 - the beam image is adversely affected
 - b. insecure
 - c. flickers or extinguishes when tapped lightly by hand
 - d. the headlamps provided to form a matched pair
 - do not emit light of the same colour
 - are not the same size
 - are obviously not correctly positioned.
 - e. does not emit light that is either substantially white or yellow.

Stop Lamps 1.3

Information

This inspection applies to all stop lamps fitted.

Vehicles first used before 1 January 1936 are not required to be fitted with a stop lamp. Stop lamps are not a legal requirement if the vehicle is fitted with neither front nor rear position lamps etc. (see 1.1).

Vehicles first used before 1 January 1971 must be fitted with **one** stop lamp either on or to the offside of the vehicle centre line.

If such a vehicle has **two** lamps fitted, it should be treated as a vehicle first used on or after 1 January 1971.

Vehicles first used on or after 1 January 1971 must be fitted with at least **two** obligatory stop lamps.

Additional stop lamps

Any additional stop lamps fitted and connected must be tested. Where extra lamps are fitted and there is doubt as to whether they are connected, the benefit of this doubt should be given to the presenter.

Cont'd ▼

Method of Inspection

1. Check that the correct number of stop lamps are fitted.
2. Check that each stop lamp
 - a. operates when the service brake is applied
 - b. is complete, in good working order and in clean condition
 - c. emits a steady red light
 - d. is securely fitted
 - e. faces the rear

Cont'd ▼

Reason for Rejection

1. An obligatory stop lamp missing.
2. A stop lamp
 - a. does not operate when the brake is applied
 - b. is incomplete, not in good working order or in clean condition, ie so damaged or deteriorated that its function is impaired.

Note: An effective repair (eg lens repair tape etc.) must be assessed on its merits considering security, colour, light output and durability
 - c.
 - emits other than a steady red light when the service brake is applied, or
 - remains on when all the brakes are released
 - d. insecure
 - e. does not face the rear

Cont'd ▼

1.3 Stop Lamps

Information

High level stop lamps

These are lamps usually fitted in the rear window or boot spoiler of a vehicle and may consist of a number of light sources.

The lamp is one unit, so as long as at least one of the light sources illuminates when the brake pedal is pressed the lamp is deemed to be working.

Dual function lamps

On vehicles first used before 1 September 1965, it is acceptable for a direction indicator lamp to be incorporated with a stop lamp.

Method of Inspection

- f. is not obscured, and is not obviously incorrectly positioned
Note: At least 50% of the lamp must be visible from the rear
Note: The precise position of stop lamps is not part of the inspection, but, where two lamps are fitted, check visually that each lamp is located at about
- the same height, and
 - the same distance inboard from the side of the vehicle
- g. is not adversely affected by the operation of any other lamp.

Reason for Rejection

- f. obscured or obviously incorrectly positioned
- g. adversely affected by the operation of another lamp.

Rear Reflectors 1.4

Information

This inspection applies to: obligatory rear reflectors only. That is, those required by Regulation to be fitted.

Each vehicle is required to be fitted with two reflectors, one on each side fitted symmetrically

Exceptions: those where it is claimed that the vehicle is used only during the hours of daylight, and which

are fitted with neither front nor rear position lamps etc. (See 1.1)

Approval mark

The inspection does not include a check that reflectors have the appropriate approval mark.

Reflective tape

Reflective tape is not acceptable as a substitute for a rear reflector.

Effects of paint

Some reflectors may be rendered inoperative by being painted over; this is a failure for obscurity.

Method of Inspection

1. Check that the required amount of reflectors are fitted.
2. Check that the reflector/s are
 - a. facing to the rear
 - b. the correct colour
 - c. in good working order and clean condition
 - d. not obscured

Note: At least 50% of the reflecting surface must be visible from the rear
 - e. securely fitted
 - f. not obviously incorrectly positioned.

Reason for Rejection

1. There are less than the required amount of reflectors facing to the rear or where two are fitted they are not symmetrical.
2. A reflector
 - a. not facing the rear
 - b. not red in colour
 - c. not in good working order or not in clean condition, ie so damaged or deteriorated that its function is impaired
 - d. obscured
 - e. insecure
 - f. obviously incorrectly positioned.

1.5 Direction Indicators and Hazard Warning Lamps

Information

This inspection applies to:

All direction indicators and hazard warning devices fitted.

Exempt vehicles

Direction indicators and hazard warning devices **are not required** by Regulations on vehicles not fitted with any front or rear position lamps (see 1.1), nor are they required on vehicles first used before 1 January 1936.

But, if they are fitted, they must be tested.

Vehicles first used before 1 September 1965

Direction indicators may be incorporated with stop lamps, or combined with side or rear lamps.

Vehicles first used on or after 1 April 1986

These must be fitted with one side repeater indicator on each side. Instead of a separate lamp, the side repeater might be part of the front direction indicator if it includes a wraparound lens.

(See information on following page).

Cont'd ▼

Method of Inspection

Flashing Type

- A1. Operate the left and right direction indicators in turn and check
 - a. that all lamps are present and secure
 - b. that all lamps are complete, in good working order and clean
 - c. the flashing rate
Note: It may be necessary to run the engine when checking the flashing rate
 - d. that every direction indicator emits amber light, except vehicles first used before 1 September 1965 where both front indicators may be white and both rear indicators red
 - e. that their operation is separate from, and not adversely affected by, the operation of any other lamp.
2. Check the selector switch for presence, security, condition and operation.
3. Check the driver's 'tell-tale' warning device for presence and operation.
Note: A 'tell-tale' may be audible or visual, it **is not required** if one or more direction indicators on each side can be seen by the driver from the driver's seat.

Cont'd ▼

Reason for Rejection

- A1. A direction indicator
 - a. missing or insecure
 - b. incomplete, not in good working order or not clean, ie so damaged or deteriorated that its function is impaired
Note: An effective proprietary repair (eg lens repair tape, etc.) must be assessed on its merits considering security, colour, light output and durability.
 - c. does not flash 60 to 120 times per minute
 - d. does not show light of the appropriate colour
 - e. adversely affected by the operation of another lamp eg dual function lamps on foreign vehicles.
2. A missing, insecure or faulty selector switch.
3. The driver's 'tell-tale' missing or inoperative.

Cont'd ▼

Direction Indicators and Hazard Warning Lamps 1.3

Information

Acceptable wraparound lens marking

Lamps incorporating a side repeater are marked either with an 'E' mark in a circle or an 'e' mark in a rectangle above which is a number 5. Some vehicles are fitted with a wraparound lens with no European approval markings. These can be tested by standing approximately 1000mm to the side of the vehicles rear bumper with indicator on. If amber light can be seen coming through the front lens (not a reflection) this is acceptable.

Vehicles first used before 1 April 1986

A hazard warning device is not required by Regulation, but, if one is fitted, it must be tested.

The hazard warning lamp 'tell tale' may be a separate light or the same as the indicator 'tell-tale'. However, it must be a flashing light.

Cont'd ▼

Method of Inspection

4. Check that the hazard warning device is present, secure and operates using only one switch with the ignition switched both on and off. While it operates, check that all the direction indicators flash simultaneously and the 'tell-tale' is working correctly.

Semaphore Type

- B1. Operate the direction indicators and check
 - a. the operation of each indicator
 - b. that every direction indicator emits an amber light

Note: A semaphore arm must illuminate when in operation. It may flash, but is not required to do so

 - c. selector switch presence, security, condition and operation.
2. Check the correct operation of the 'tell-tale'.

Note: A 'tell-tale' may be audible or visual. A 'tell-tale' **is not required** if one or more direction indicators on each side of the vehicle can be seen by the driver from the driver's seat.

Cont'd ▼

Reason for Rejection

4. A hazard warning device
 - a. does not cause all the direction indicators to flash in phase with the ignition both on and off
 - b. 'tell-tale' not working correctly
 - c. a switch missing, insecure or faulty.
 - d. operated by more than one switch
- B1. A semaphore arm
 - a. does not extend or retract smoothly
 - b. does not show an amber light to the front and rear
 - c. a selector switch missing, insecure or faulty.
2. The 'tell-tale' is missing or not working correctly.

Cont'd ▼

1.6 Headlamp Aim

Information

This inspection applies to: all obligatory headlamps, and optional (additional) dip beam headlamps.

Type of headlamp

The aim of headlamps must be checked on main or dipped beam according to their type. See diagrams 1, 2 or 3 on pages 14 - 16, which include details appropriate to each headlamp type.

These methods of inspection involve the use of beam checking equipment with a collecting lens.

Masks or converter kits

Right hand dip headlamps can be temporarily altered for use in the UK by fitting masks or converter kits which remove the beam 'kick-up' to the right.

A headlamp altered in this way is not a reason for rejection, if

- the headlamp aim is not rejected for the reasons listed under diagram 1 (except that the top of the beam image will be a straight line)
- the light output is not unduly reduced - not usually a problem with commercially produced kits
- the mask or converter is securely attached

Cont'd ▼

Method of Inspection

To check headlamp aim

A1. Position the vehicle on the designated headlamp aim standing area.

follow the headlamp tester manufacturer's user manual instructions, and align the headlamp aim equipment with the longitudinal axis of the vehicle

align the centre of the collecting lens with the centre of the headlamp under test.

With an assistant sitting in the driving seat, switch on the headlamps to the beam on which the headlamp is to be checked.

Note: When checking headlamp aim on vehicles with hydro-pneumatic suspension systems, it is necessary to have the engine idling.

Determine the appropriate headlamp beam image and its aim (See diagrams 1, 2 and 3). Older vehicles (approx. pre 1950) headlamps beam image may not conform to either diagrams 1, 2 or 3. In such cases check

- **dip beam** headlamps are aimed so they do not dazzle, ie the beam image brightest part is aimed at least 0.5% below the horizontal
- or for headlamps which cannot be checked on dip beam, check
- **main beam** headlamps are aimed so that the beam image centre is on or slightly below the horizontal.

Reason for Rejection

A1. An old (approx. pre 1950) vehicle with a headlamp which does not conform to diagrams 1, 2 & 3 that has a beam image which is aimed so that it dazzles other road users.

Headlamp Aim 1.6

ARMY EQUIPMENT
SUPPORT PUBLICATION

Information

Driver's beam aim controls

Where these are fitted the beam aim should be tested without altering the controls setting except where this would result in failure for beam aim being too low. In such cases the beam aim should be re-checked with the control set at its 'highest' position.

Testing headlamps with complex lens systems.

Complex headlamp systems are those that have more than one lamp behind a single lens.

It is essential that the headlamp aim test equipment is aligned exactly on the centre of the dipped beam pocket.

If when carrying out a normal test a clearly defined headlamp pattern cannot be seen, it will be necessary to move the vehicle closer to the test equipment.

It is essential that the car headlamp and test equipment are as close together as possible, otherwise the whole of the beam pattern may not be visible.

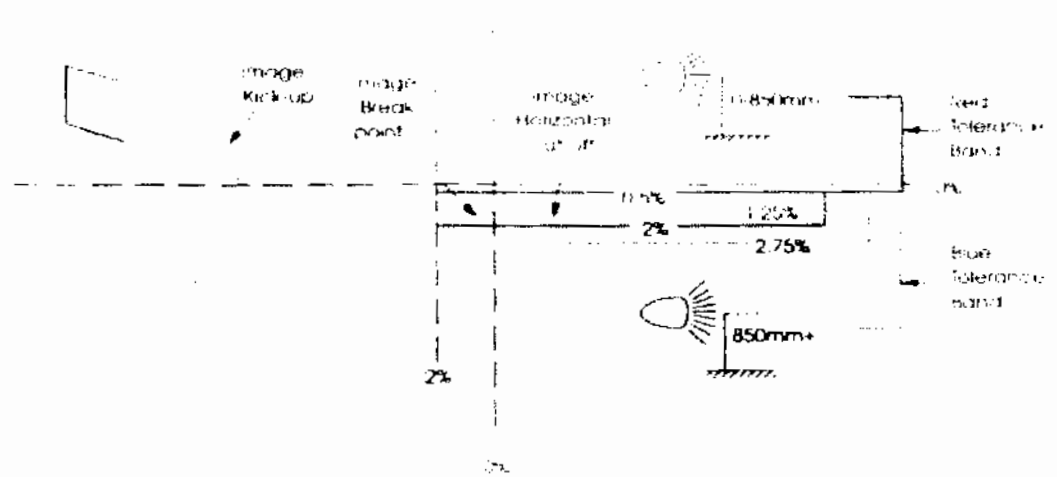
1.6 European 'E' Beam Headlamp (Checked on Dipped Beam)

Information

Diagram 1

Dipped beam image

Check the position of the 'break point' and horizontal cut-off)



European type headlamp

Characteristics

(a) an asymmetric dipped beam pattern with

- a distinctive horizontal cut-off on the right, and
- a 15 degree wedge of light above the horizontal (the 'Kick up') towards the left

(b) a lens with one or more asymmetric stepped patterns moulded in the glass

(c) a lens may carry

- a European approval mark - a circle containing an 'E' and a number, or
- a rectangle containing an 'e', and a number

The European approval mark should incorporate a single or double-headed arrow.

A dip beam is denoted by either:

- a capital letter 'C' above a capital 'E'
- a capital letter 'C' above an 'e'

Note: Setting 'E' Beam Headlamp Aim

Repairs or adjustment must not be carried out during an MOT test.

These dip beam headlamps should be set to aim downwards the amount shown on a marking which is either close to the vehicle manufacturer's plate or the headlamp.

For vehicles without a marking, the downward aim should be set to

- 1.3%, if the headlamp centre is **not more than 850 mm** from the ground
- 2.0%, if the headlamp centre is **more than 850 mm** from the ground

Reason for Rejection

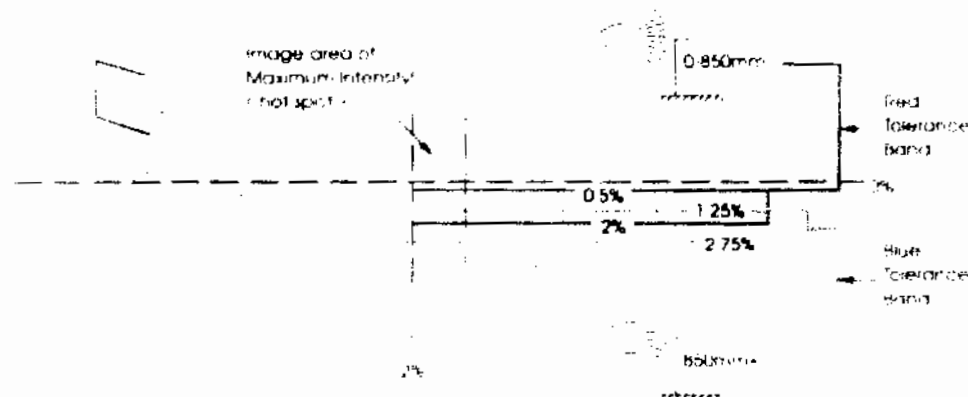
1. The beam image 'kick-up' is to the offside.
2. For headlamps with centres not more than 850 mm from the ground the beam image horizontal cut-off is not between the horizontal 0.5% and 2% lines, ie the red tolerance band.
3. For headlamps with centres more than 850 mm from the ground, the beam image horizontal cut-off is not between the horizontal 1.25% and 2.75% lines, ie the blue tolerance band.
4. The beam image 'break point' is:
 - to the right of the 0% vertical line, or
 - to the left of the vertical 2% line.

British American Type (Checked on Main Beam) 1.6

Diagram 2

Main beam image

Check the position of the centre of the area of maximum intensity ('hot spot')



British American type (checked on main beam) - Characteristics:

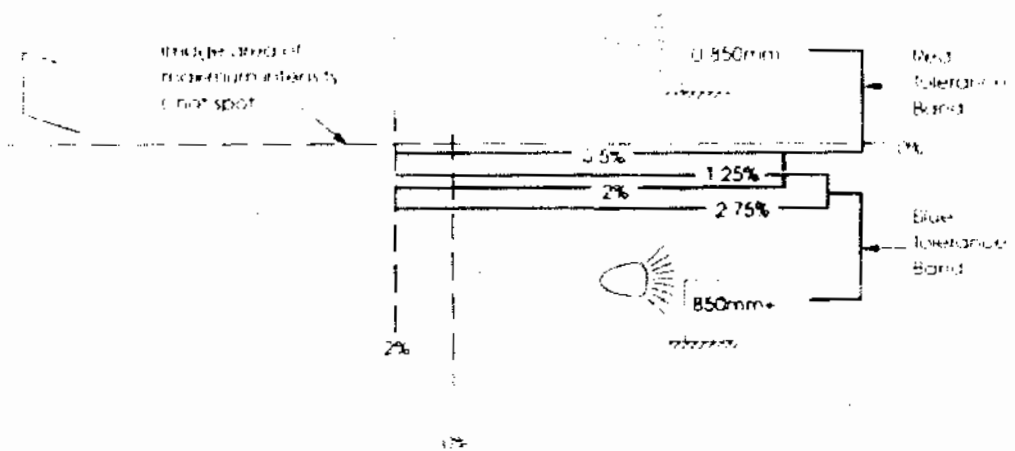
- headlamps tested on main beam have a symmetrical main beam pattern with a central area of maximum intensity (hot spot)
- this type of lamp generally has a circular lens which may be marked with a figure '1' followed by an arrow indicating the direction of dip

Reason for Rejection

- The 'hot spot' centre is above the horizontal 0% line.
- The 'hot spot' centre is to the right of the vertical 0% line, or to the left of the vertical 2% line.
- For headlamps whose centre is **not more than 850 mm** from the ground the 'hot spot' centre is below the horizontal 2% line.
- For headlamps whose centre is **more than 850 mm** from the ground, the 'hot spot' centre is below the horizontal 2.75% line.
- When dipped the brightest part of the image does not move downwards or downwards to the nearside.

1.6 British American Type (Checked on Dipped Beam)

Diagram 3
Dipped beam image
Check the position of the upper and right hand area of maximum intensity ('hot spot')



British American type (checked on dipped beam) - Characteristics:

- (a) an asymmetric dipped beam pattern with an area of high intensity intended to be directed along the nearside of the road
- (b) a circular lens marked with the figure 2 which may also have an arrow showing the direction of dip.

Reason for Rejection

- 1. The upper edge of the 'hot spot' is **above** the horizontal 0% line.
- 2. The upper edge of the 'hot spot' is **below** the horizontal 2.75% line.
- 3. The right hand edge of the 'hot spot' is **to the right** of the vertical 0% line or **to the left** of the vertical 2% line.
- 4. The raised portion of the (beam) image is to the right/offside of the centre line.

Audible Warning (Horn)

1.1

Information

Pre 1906 vehicles

Vehicles certified by the London Science Museum as being designed before 1 January 1905 and constructed before 31 December 1905 can have a gong, bell or siren audible warning.

Method of Inspection

1. Operate the horn control and note the volume and character of the sound emitted.

Reason for Rejection

1.
 - a. the horn control missing, insecure or not readily accessible to the driver
Note: Inform the driver if the horn is insecure
 - b. the horn does not function
 - c. the sound emitted by the horn is not loud enough to be heard by another road user
 - d. a gong, bell, siren or two or more tone horn fitted
Note: When operated, a two or more tone horn automatically produces a sound which alternates at regular intervals between fixed notes
A vehicle is allowed to be fitted with a bell, gong or siren, but not two-tone only as part of an anti-theft device
 - e. for a vehicle first used on or after 1 August 1973, a sound emitted by the horn is
 - not a constant note
 - not continuous or uniform
 - harsh or grating.

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Section 2

Steering (including Suspension)

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2.1 Steering Control

Information

Preparation

Before carrying out this inspection, make sure that any mechanism for adjusting the steering column is fully locked. Exert reasonable pressure only on the steering wheel, particularly when the steering column is collapsible.

Access to some components

For a full inspection of some components you may need to examine them from under bonnet, underside or in the footwell area, using an inspection lamp and an assistant to operate the steering where necessary.

Method of Inspection

1. Check the strength and condition (including any modifications) of the steering wheel by applying reasonable force.
2. Push the steering wheel rim in various directions at right angles to the column, while applying light pressure downward and upward. Check for
 - a. insecurity of adjustable steering column
 - b. movement between column shaft and steering wheel
 - c. excessive play in **top** column bearing
 - d. insecurity at column **top** mounting bracket.
3. Pull and push the steering wheel in line with the column. Check for any movement at the centre of the steering wheel.
Note: Certain types of steering column (eg those fitted with universal joints or flexible couplings) may show some movement which is not due to excessive wear or deterioration.

Reason for Rejection

1. Steering wheel weakened by modification, cracks, fractures, in a condition that hampers proper control or likely to injure the driver's hands.
Note: Cracks or incompleteness of the covering skin of a steering wheel or hub, are not a reason for rejection.
2.
 - a. an adjustable steering column will not lock in a fixed position
 - b. movement between the shaft and steering wheel
 - c. excessive radial movement (play) at the **top** of the steering column between the column and the shaft indicating a badly worn **top** bearing
Note: Some vehicles have flexible **top** bearings for the steering column. With these more than average movement is acceptable
 - d. insecurity at the steering column **top** mounting bracket.
3. Excessive steering shaft end float.

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Steering Control 2.1

Method of Inspection

4. Turn the steering wheel clockwise and anti-clockwise, checking steering column couplings and clamp bolts for security.
5. Check the presence and security of retaining and locking devices.
Note: The inspection is not concerned with the type of locking device, only its presence and security.

Reason for Rejection

4. Insecurity, excessive play or deterioration of a flexible coupling or universal joint.
5. A retaining or locking device missing or insecure.

2.2 Steering System

Information

Types of suspension covered

This inspection applies to the steering mechanism of all types of front suspension.

Where to inspect

The inspection must be carried out with the vehicle over a pit or on a raised lift.

Power Steering

If power steering is fitted, the engine must be running for all checks requiring steering movement.

Method of Inspection

A. Free Play

1. With the road wheels on the ground pointing straight ahead, lightly turn the steering wheel left and right as far as possible without moving the road wheel.

Check the amount of free play at the circumference of the steering wheel.

Note: Play due to wear or maladjustment must not be confused with apparent play due to the construction of the mechanism, such as caused by the deflection of flexible joints or spring compression in external power steering systems.

Note: The steering wheel free play limit is a general rule for standard diameter steering wheels, (380mm). Lower or higher limits should be set with larger or smaller diameter steering wheels.

Reason for Rejection

1. A point on the rim of the steering wheel moves, without the road wheels moving, for more than
 - a. 75 mm for non rack and pinion
 - b. 13mm for rack and pinion steering.
Note: Where there are several joints between the steering wheel and the rack, movement up to 48mm on a 380mm diameter wheel may be accepted.

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Steering System 2.4

Information

Access to steering system

As well as the underside inspection it may be necessary to open the engine compartment to examine some steering components on some vehicles (eg steering rack mounted on upper part of the bulkhead etc). If power steering is fitted,

- the engine must be running, and
- care must be taken when inspecting components in the engine compartment.

Components enclosed by gaiters

Because dismantling is not permitted, it is accepted that visual examination of some components which are enclosed by protective gaiters will not be possible.

Steering joint dust covers.

If a steering joint dust cover is split or missing greater care must be taken when testing the joints. If no other defects are found the tester should advise the presenter.

Types of movement

Relative movement due to excessive wear MUST be distinguished from relative movement due to built-in clearance or spring loading of a joint

Bonded joints

These show movement due to elasticity. Slight deterioration is acceptable.

Cont'd ▼

Method of Inspection

B. Play Under Load

1. With the front road wheels on the ground ask the assistant to rock the steering wheel in both directions firmly against resistance, examine the complete steering mechanism.

Check for

- a. insecurity of any components
- b. relative movement between sector shaft and drop arm
- c. loose ball pin shanks
- d. loose track rod end or drag link ends
- e. weak or broken socket springs
- f. excessive play in ball joints
Note: Play must not be regarded as excessive unless it is clear that replacement, repair or adjustment of the component is necessary
- g. excessive play at pivot points
Note: Play must not be regarded as excessive unless it is clear that replacement, repair or adjustment of the component is necessary
- h. relative movement between the steering arm and its fixings

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Reason for Rejection

1.
 - a. insecurity of any part fixed to the vehicle structure, eg steering box, rack housing or intermediate drop arm pivot housing
 - b. relative movement between the sector shaft and the drop arm
 - c. a loose ball pin shank
 - d. a loose track rod or drag link end
 - e. a weak or broken socket spring
 - f. excessive play in a ball joint
 - g. excessive play in a pivot point (eg an intermediate drop arm)
 - h. relative movement between a steering arm and its fixings

Cont'd ▼

2.2 Steering System

Information

Method of Inspection

Reason for Rejection

i. the condition and security of rear wheel steering components, including front to rear connecting shafts

j. if the rear wheel steering is inoperative, check

- the position of the rear wheels and
- whether it affects the front wheel steering.

i.

- a rear wheel steering component insecure
- excessive play in a rear wheel steering mechanism connection or ball joint
- hydraulic fluid leaking from a rear wheel steering system

j. Inoperative rear wheel steering where,

- the rear wheels are not held substantially in the straight ahead position, or
- the front wheel steering is adversely affected.

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Steering System 2.2

Information

When to carry out these inspections

The inspections in this sub-section may be carried out at the same time as the inspections in sub-sections 2.2B and 2.2D.

Cont'd ▼

Method of Inspection

C. Static Inspection

1. With the road wheels on the ground and the steering wheel and system stationary.

Check for

- a. wear in the neck of ball pins
- b. track rod or drag link ends misaligned
- c. components fractured, cracked, damaged, excessively corroded or deformed

Note: This inspection also applies to rear wheel steering systems including front to rear connecting shafts

- d. repairs, especially by welding, or evidence that excessive heat has been applied, to steering components or structural members
- Note:** This inspection also applies to rear wheel steering systems including front to rear connecting shafts

Cont'd ▼

Reason for Rejection

1.
 - a. sharp or deep grooves in the neck of a ball pin
 - b. track rod or drag link ends seriously misaligned
 - c. a component fractured, cracked, damaged, excessively corroded or deformed so that it is unserviceable
 - d. structural repair by welding to a steering linkage component, or signs of excessive heat having been applied
- Note:** Reasons for Rejection c and d also apply to rear wheel steering. An inoperative rear wheel steering system is not a reason for rejection if
- the rear wheels are held substantially in a straight ahead position
 - the front wheel steering is not adversely affected

Cont'd ▼

2.2 Steering System

Information

Method of Inspection

Reason for Rejection

- e. fluid leakage from a steering damper seal or gland
- f. the presence and security of retaining and locking devices
Note: Some locking devices are not obvious. In such cases, the vehicle presenter should be informed of any evidence of disturbance or insecurity
- g. excessive corrosion, severe distortion or a fracture in the chassis or integral body attachment area of a main steering component eg steering box or rack, idler arm mounting, etc.

- e. fluid leakage from a steering damper seal or gland to such an extent that it is clear that the seal or gland has failed
- f. a retaining or locking device missing or insecure
- g. deliberate modification which significantly reduces the original strength, excessive corrosion, severe distortion, a fracture or an inadequate repair of a load bearing member or its supporting structure or supporting panelling within 30cm of a steering component mounting, that is, within a 'prescribed area'.
See Appendix C.

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Steering System 2.2

Information

Types of suspension covered

This sub-section applies to all suspension types.

Note: Vehicles with a beam axle can alternatively be raised from the ground as in Fig 1, page 29, and this inspection carried out at the same time as the inspections in sub-section 2.5a.

Method of Inspection

D. Lock to Lock Check

1. With the front steered wheels resting on turning plates, ask the assistant to turn the wheels from lock to lock using the steering wheel.

It is important that this inspection is carried out

- with the suspension substantially in the normal running position
- on vehicles **not** fitted with a beam axle with the steered wheels resting on turning plates that move freely.

Check for

- a. fouling, particularly brake hoses
- b. brake hoses or brake pipes stretched or twisted
- c. security and correct adjustment of lock stops if fitted
Note: Some vehicles have lock stops comprising soft metal pads on the body for the front tyres to rub against. These are acceptable if they are properly maintained so that they do not damage the tyres.
- d. condition and security of steering rack gaiters
Note: Expand steering rack gaiters for proper examination
- e. tightness or roughness in the steering mechanism.

Reason for Rejection

1.
 - a. a component of the steering mechanism, road wheels or tyres fouling any part of the vehicle
 - b. a brake pipe or brake hose stretched, twisted or seriously damaged
 - c.
 - an incorrectly adjusted lock stop
 - a loose, damaged or insecurely locked lock stop
 - d. an insecure, split or missing steering rack gaiter
 - e. excessive tightness or roughness in the steering mechanism.

2.3 Power Steering

Information

Power Steering

This inspection applies to all types of power/assisted steering systems.

The engine must be running for this inspection.

Steering linkage

The inspection of all parts of steering linkage associated with the power steering mechanism is detailed in sub-sections 2.2B and 2.2C.

Method of Inspection

- i. With the front road wheels on the ground, vehicle in neutral gear and the parking brake applied, run the engine and rock the steering wheel in both directions.
Check
 - a. by feel at the steering wheel, that the system is operating
 - b. for leaks in the system
Note: Make sure the fluid has leaked from the power steering system and not from another source
 - c. that pipes are free from damage and are not chafing on other parts of the vehicle.
2. Where practicable, check the security of the power steering pump and the condition of its drive system.

Reason for Rejection

1.
 - a. Power steering malfunctioning or inoperative
 - b. a leak in the system showing that a component joint or seal has failed
 - c. a fluid pipe excessively damaged, or fouling other parts of the vehicle.
2. Pump insecure or its drive system missing or defective.

Suspension - General 2.4

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Information

This sub-section applies to

Both front and rear suspensions.

How to inspect

The inspections must be carried out with the vehicle over a pit or on a raised lift.

The examination of some front suspension components requires the steered wheels to be jacked up as described in Section 2.5, MOI A1 and the examination of some rear suspension components require the rear wheels to be jacked as described in Section 2.6.

Checking for wear or play

A small pinch bar should be used to check for wear or play in many of the suspension components covered in this section.

Checking for corrosion

Guidance for assessing corrosion and the use of the Corrosion Assessment Tool is given at Appendix C.

Main load bearing structure

The condition of the vehicle main load bearing structure not in a 'prescribed area' is checked under Section 6.

Method of Inspection

A. All Suspension Types

1. Check
 - that there is enough clearance of the axle or suspension with the bump stop or chassis, and
 - whether any suspension unit is so weak that it does not hold the body far enough away from the road wheels.
2. Examine the vehicle structure around any sub-frame, spring or suspension component mounting for
 - excessive corrosion (ie within the 'prescribed area', see Appendix C)
 - distortion
 - fractures

Note: It is usually necessary to open the bonnet to inspect front suspension components. It may be necessary to inspect the inside of a luggage compartment or boot to effectively check prescribed areas and testable items that otherwise would not be seen.

Reason for Rejection

1.
 - Inadequate clearance of the axle or suspension with the bump stop or chassis, or
 - a suspension unit so weak that the body or other part of the vehicle fouls a road wheel or would do so if the vehicle was laden.

Note: a missing bump stop rubber is not a reason for rejection.
2. Deliberate modification which significantly reduces the original strength, excessive corrosion, severe distortion, a fracture or an inadequate repair of a load bearing member or its supporting structure or supporting panelling within 30cm of any sub-frame, spring or a suspension component mounting, that is, within a 'prescribed area', see Appendix C.

2.4 Suspension - General

Method of Inspection

Reason for Rejection

B. Leaf Springs

1. Examine each leaf spring assembly, check
 - a. the condition of spring leaves

 - b. the condition of spring eyes
 - c. the lateral location of spring leaves (particularly leaf splay)

 - d. leaves for longitudinal displacement
 - e. the correct location of the springs to the axle for symmetry.
2. Check the security and the amount of play at the spring anchor bracket pin/bush and both pins/bushes of the spring shackle.

3. Check that
 - a. anchor/shackle pins are correctly positioned and secure

 - b. retaining and any locking devices are present and secure.

Cont'd ▼

1.
 - a. A cracked or fractured leaf, or one which has been repaired by welding or is permanently distorted due to damage or so deteriorated that it is seriously weakened
 - b. a defective spring eye
 - c. the leaves of a multi-leaf spring splayed to such an extent that the action of the spring is impaired, or will foul other parts of the vehicle
 - d. a spring leaf longitudinally displaced
 - e. a spring so fitted that the axle is misaligned.
2. Excessive wear in a pin and/or bush, for example more than
 - 2mm for a 12mm diameter pin
 - 3mm for a 25mm diameter pin
 - 10% of the pin diameter for pins over 25mm diameter
 - deterioration of a rubber bush resulting in excessive movement.
3.
 - a. A shackle, anchor or linkage pin missing, fractured, not correctly positioned or excessively loose in its bracket
 - b. a shackle, anchor or linkage pin retaining or locking device, missing or insecurely fitted.

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Suspension - General **2.4**

Method of Inspection

Reason for Rejection

4. Check the side play at spring eyes.
Note: For normal leaf suspension, side play at the spring eye should not exceed 6mm.
5. Check that the spring anchor and shackle brackets are
 - a. secure and free from signs of movement
Note: Attachment of suspension units, eg anchor brackets, may be by bolts, nuts, rivets, welding etc
Note: When modified spring anchor or shackle brackets are fitted, there may be more holes in the bracket than holes in the chassis. This is not a reason for rejection.
 - b. free from cracks or fractures
 - c. complete with all nuts, bolts and rivets
 - d. free from excessive damage or corrosion.
Note: Damage includes damage by weld, eg weld blow holes or cuts which seriously weaken the component.
6. Check the security of spring and saddle to the axle.

4. Excessive side play at spring eye.
5. An anchor or shackle bracket
 - a. loose to chassis
 - b. cracked or fractured
 - c. with a nut, bolt or rivet missing
 - d. damaged or corroded so that it is seriously weakened.
6.
 - a. Evidence that a spring saddle is fractured or moving relative to the spring
 - b. a nut or bolt securing the spring to the axle not secure or missing.

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2.4 Suspension - General

Information

Shortened or lowered coil springs

Take care when jacking vehicles with shortened or lowered springs fitted. Provided the spring ends locate correctly when the vehicle is lowered into the normal running position, without assistance this is not a reason for rejection.

Method of Inspection

C. Coil Springs

1. Examine each coil spring for general condition. In particular, look for cracks or fractures.
2. Check that both ends of the spring are correctly located.
3. Check that the spring mountings are
 - a. secure
 - b. free from cracks and fractures
 - c. free from excessive damage or corrosion.

Reason for Rejection

1. A coil spring
 - a. incomplete, cracked or fractured
 - b. worn or corroded so its cross sectional area is reduced such that it is seriously weakened
 - c. repaired by welding or damaged by excessive heat.
2. A coil spring not correctly located.
3. A coil spring mounting
 - a. loose
 - b. cracked or fractured
 - c. seriously weakened by damage or corrosion.

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Suspension - General **2.4**

Information

Care must be taken not to cause damage to body work when pushing down on the suspension.

Method of Inspection

D. Fluid/Gas/Air Suspension

1. Check suspension units and accumulators for
 - a. displacement
 - b. damage or serious deterioration
 - c. fouling by moving parts.
2. Check for any leak in the system.
3. Check suspension units' supply pipes or interconnecting pipes for damage or corrosion.
4. Check the security of
 - a. levelling valves
 - b. fluid supply pipes and interconnecting pipes.
5. At each corner of the vehicle, where practicable, push down (or pull down from underneath), and note the amount of suspension movement.

Reason for Rejection

1. A suspension unit or accumulator
 - a. displaced or totally deflated
 - b. damaged or deteriorated so that it is likely to fail
 - c. fouled by moving parts likely to cause damage or restrict travel.
2. A leak in the system.
3. A suspension unit supply pipe or interconnecting pipe damaged or corroded so that it is seriously weakened.
4.
 - a. an insecure levelling valve
 - b. an insecure fluid supply pipe or interconnecting pipe.
5. No suspension movement.
Note: Large vehicle suspensions can be difficult to move. Ensure there is a defect before rejection.

2.4 Suspension - General

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Method of Inspection	Reason for Rejection
<p>E. Torsion Bars</p> <ol style="list-style-type: none">1. Examine the bars for<ol style="list-style-type: none">a. cracks and fracturesb. excessive corrosion and pitting.c. welding or excessive heat.2. Check the end fixings for<ol style="list-style-type: none">a. securityb. excessive free play.3. Examine the adjustment assemblies for security.4. Check that the attachments of bars are<ol style="list-style-type: none">a. secure to frame and suspensionb. free from cracks or fracturesc. free from excessive damage or corrosion.	<ol style="list-style-type: none">1. A torsion bar<ol style="list-style-type: none">a. cracked or fracturedb. deteriorated by corrosion or pitting so that its cross sectional area is reduced and seriously weakenedc. repaired by welding or damaged by excessive heat.2. Insecurity or excessive play at an end fixing.3. Adjustment assembly inadequately locked.4. A torsion bar attachment bracket<ol style="list-style-type: none">a. looseb. cracked or fracturedc. seriously weakened by damage or corrosion.

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Suspension - General **2.4**

Information

This inspection applies to bonded suspension spring units ie rubber cone suspension. Bonded mountings and bushes are to be inspected in accordance with sub-section 2.4G.

Method of Inspection

F. Bonded Suspension Units

1. Check that the attachments of units are
 - a. secure
 - b. free from cracks and fractures
 - c. free from excessive damage or corrosion.
2. Examine the bonding of the flexible element to its associated metal fixing.
3. Check the general condition of the unit for damage and deterioration of the flexible element.

Reason for Rejection

1. A bonded unit attachment
 - a. loose
 - b. cracked or fractured
 - c. seriously weakened by damage or corrosion.
2. Failure of the bonding between flexible element and the metal so that part of the unit is likely to become displaced.
3. The unit is so damaged or deteriorated that it is no longer capable of carrying out its proper function.

2.4 Suspension - General

Information

Carrying out this inspection

The inspections in sub-section 2.4G can be carried out in conjunction with the inspections in

- sub-section 2.5 (Front Suspension, Wheel Bearings and Drive Shafts), and
- sub-Section 2.6 (Rear Suspension and Wheel Bearings).

Method of Inspection

G. Suspension Arms and Linkages, Sub-Frames, etc

1. Check the following members for cracks, fractures, distortion, corrosion, wear and insecurity
 - a. suspension arms (wishbone etc)
 - b. trailing arms
 - c. radius arms
 - d. tie bars/rods
 - e. panhard rods
 - f. torque/reaction arms
 - g. anti-roll bars and linkages
 - h. MacPherson strut casings
 - i. sub-frames.

Note: Some vehicles use comparatively thin gauge steel pressings for some highly stressed suspension components.

Many of these parts have hollow 'box sections' or upfacing areas where road dirt impregnated with salt or other chemicals collects and causes serious but often very local corrosion.

Special attention should be paid to these components. See Appendix C for further guidance.

2. Check that an anti-roll bar is fitted to an axle on which it is standard.

Reason for Rejection

1. A member
 - cracked, fractured or insecure
 - severely distorted
 - seriously weakened by corrosion or wear
 - which is adjustable and is loose in its adjustment threads, or its locking device insecure or missing
 - inadequately repaired (see Appendix C)
 - seriously weakened as a result of deliberate modification.
2. An anti-roll bar not fitted to an axle on which it is standard.

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Suspension - General 2.4

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Method of Inspection

3. Check the security and the amount of play at pins/bushes/mountings and ball joints locating
 - a. upper and lower suspension arms/wishbones
 - b. trailing arms
 - c. radius arms
 - d. tie-bars/rods
 - e. panhard rods
 - f. torque/reaction arms
 - g. anti-roll bars and linkages
 - h. sub-frames.

4. Check that
 - a. linkage pins are correctly positioned and secure
 - b. retaining and any locking devices are fitted and secure.

Cont'd ▼

Reason for Rejection

3.
 - Excessive play in a pin/bush or pin/bearing, for example more than
 - 2mm for a 12mm diameter pin
 - 3mm for a 25mm diameter pin
 - 10% of the diameter for pins over 25mm diameter
 - excessive play in ball joint
 - deterioration of a rubber, synthetic bush or mounting resulting in excessive movement
 - deterioration of the bonding of a rubber bush/mounting resulting in excessive movement.
Note: Some rubber/synthetic bushes are designed to provide a comparatively high degree of compliance. They are therefore likely to show some movement.
Such components should normally only be rejected when serious deterioration of the bonding or flexible material is evident.

4. A suspension link locating pin
 - a. incorrectly positioned or insecure
 - b. retaining or locking device missing or not properly locked.

Cont'd ▼

2.4 Suspension - General

Method of Inspection

5. Check the following suspension attachment brackets and mountings for security, cracks, fractures, excessive damage or corrosion and tightness of nuts, bolts etc.
 - a. suspension arms (wishbone etc)
 - b. trailing arms
 - c. radius arms
 - d. tie bars/rods
 - e. panhard rods
 - f. torque/reaction arms
 - g. anti-roll bars
 - h. sub-frames.
6. On vehicles which have a drive shaft which forms part of the suspension, check
 - a. the shaft for distortion, damage and serious corrosion
 - b. the universal joint bearings for excessive play
 - c. the flanges and bolts for presence and security.

Reason for Rejection

5. A suspension attachment linkage bracket or mounting
 - insecure
 - cracked or fractured
 - damaged, corroded or worn to such an extent that its strength is seriously reduced
 - nut, bolt or rivet missing, or weld cracked
 - inadequately repaired (see Appendix C)
 - seriously weakened as a result of deliberate modification.
6.
 - a. distorted, damaged or excessively corroded drive shaft
 - b. excessive play in a universal joint bearing
 - c.
 - an incorrectly seated universal joint flange
 - a loose, missing or inadequately locked flange bolt.

Front Suspension, Wheel Bearings and Drive Shafts **2.5**

Information

How to Inspect

The inspections, under this sub-section, must be carried out with the vehicle over a pit or on a raised lift. For many of these inspections an assistant must be used.

Inspecting front suspension components

The inspection of front suspension components described in sub-section 2.4G, suspension arms and linkages, sub-frames etc, can be carried out in conjunction with this sub-section.

Cont'd ▼

Method of Inspection

A. Suspension Joints and Wheel Bearings (wheels jacked)

1. See page 29 for the jacking positions of various suspension types.

Jack up the front of the vehicle so that the front wheels are clear of the ground.

Note: Observe relative vertical movement between components during jacking up. Carry out the following examinations by placing a suitable bar under each wheel in turn and levering upwards.

- a. For suspension types on page 29 fig 1, check for excessive vertical movement between stub axles and axle beams
- b. For suspension types on page 29 fig 2 and 2a, check for vertical movement between swivel and housing, and movement in wishbone bearings.
Note: It is important that fig 2 and 2a page 29 type suspensions are jacked so that the suspension spring force is removed from the ball joints, ie suspension arms must be clear of their stops. Failure to do this can result in defective joints being overlooked

Cont'd ▼

Reason for Rejection

1. Excessive movement
 - a. between a stub axle and an axle beam
Note: Some vehicles (especially with ball thrust races) are designed to have a small amount of vertical movement
 - b. between a swivel joint and its housing

Cont'd ▼

2.5 Front Suspension, Wheel Bearings and Drive Shafts

Information

Reason for rejection 2 does not apply to a vehicle where it is not possible to rotate the wheel due to a design characteristic or its drive configuration.

Method of Inspection

- c. For suspension types as page 29 figs 3, 3a and 4, check for movement in suspension ball joints, tie bar joints and MacPherson strut upper attachment

Repeat Methods of Inspection a, b and c above using the assistant to place a suitable bar under each wheel in turn and levering upwards while the tester examines the relevant items.

2. With the steered wheels clear of the ground, rotate each wheel in turn and listen for any sound indicating roughness in the bearing.
3. Rock each wheel by hand or, where appropriate, with a bar in the wheel. (This inspection may alternatively be carried out at Class VII testing stations using wheel oscillating equipment, where available, in the "side-to-side" mode.)
Check
 - a. the amount of movement between the stub axle and the axle beam, or

Reason for Rejection

- c.
 - at a suspension ball joint, tie bar joint, wishbone bearing, pin or bush
 - at a MacPherson strut upper attachment.

Note: some MacPherson strut top bushes are designed to have lateral play when the suspension is hanging free. Rejection is only justified when play is due to wear and/or maladjustment, etc.

2. Roughness, in a front wheel bearing.
3.
 - a.
 - King pin loose in axle beam or its pin retaining device missing
 - excessive play in king pin and/or bush such that it is likely to adversely affect the steering of the vehicle.

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Cont'd ▼

Front Suspension, Wheel Bearings and Drive Shafts **23**

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Method of Inspection

- b. the movement in the swivel joints, and the security of their attachment to the stub axle and suspension arms
Note: Suspension ball joints can have free play lift as a feature of their design, and rejection is only justified when the lift exceeds the manufacturer's limit
- c. the movement of the wheel relative to the stub axle, and note the amount of play in the wheel bearings

Repeat Methods of Inspection a, b and c above using the assistant to rock the wheel by hand or where appropriate with a bar in the wheel while the tester examines the relevant items.

4. Check the presence and effectiveness of front suspension retaining and locking devices.
Note: It is not always possible to determine the 'effectiveness' of some types of locking device by normal test methods, eg self-locking nuts. Only the presence of these devices is a test requirement.
5. Check axle beam and stub axles for cracks, damage and distortion.

Reason for Rejection

- b.
- excessive play in swivel joint
 - excessive play in any suspension swivel pin or suspension ball joint
 - a swivel joint insecure in a suspension arm or in a stub axle
- c. excessive play in a front wheel bearing.
4. A front suspension retaining or locking device missing or ineffective.
5. Cracked or distorted axle beam or stub axle.

2.5 Front Suspension, Wheel Bearings and Drive Shafts

Method of Inspection

Reason for Rejection

B. Suspension Joints (wheels on turning plates)

For vehicles with suspension types figs 3, 3a and 4 shown on page 29, lower the front wheels so that they

- bear the weight of the vehicle, and
- are resting on turning plates which enable the wheels to be turned freely lock to lock

Inspect as follows

1. Grasp **the top** of each front wheel and rock it vigorously in and out to check for play. This method of inspection is to be repeated using the assistant to rock the top of the wheel in and out while the tester examines the relevant items.
 - a. in the upper and lower suspension ball joints and wishbone bearing

1.

a.

- excessive play in a suspension ball joint
- a ball joint securing nut loose or not locked
- excessive play in a pin or bush in an inner wishbone bearing pin or bush (cross check with sub section 2.4G MOI 3)

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Front Suspension, Wheel Bearings and Drive Shafts **2.5**

Method of Inspection

- b.
 - at MacPherson strut sliding bushes and glands
 - at MacPherson strut upper support bearings.

2. Grasp each front wheel at **3 o'clock and 9 o'clock**, and shake vigorously to determine the condition of the outer ball joints and track control arm inner bushes.

3. Examine the condition of the bonding between the metal and flexible material in the MacPherson strut upper support bearing, if visible.

Repeat method of inspections 2 and 3 above using the assistant to shake the wheel vigorously at 3 o'clock and 9 o'clock while the tester examines the relevant items.

Reason for Rejection

- b.
 - excessive play in a MacPherson strut sliding bush or gland
 - excessive movement in a MacPherson strut upper support bearing assembly
 - roughness or stiffness in a MacPherson strut upper support bearing (cross check with sub section 2.2D MOI 1e).

2.

- a. Excessive play in an outer ball joint
- b. excessive play in a track control arm inner bush.

3.

- a. Serious deterioration of the bonding between metal and flexible material of an upper support bearing
- b. a loose or insecurely locked unit in the upper support bearing assembly.

2.5 Front Suspension, Wheel Bearings and Drive Shafts

Method of Inspection

Reason for Rejection

C. Front Wheel Drive Shafts and Couplings

Inspect as follows while the front wheels are jacked up

1. With the vehicle in neutral gear, rotate the wheels when they are on each lock in turn, and check visually the gaiters of the outer constant velocity joints while the pleats are expanded.

2. Check
 - a. the front wheel drive shafts for straightness and damage
 - b. drive shaft couplings' condition and security.

1.
 - a. an outer constant velocity joint gaiter missing, split or insecurely mounted to its housing
 - b. a drive shaft constant velocity joint excessively worn or insecure
 - c. a drive shaft coupling excessively worn or insecure
 - d. a drive shaft flexible rubber or fabric coupling unit severely cracked or breaking up
 - e. a drive shaft flexible rubber or fabric coupling softened by oil contamination, insecure or fouling any other part of the vehicle.

2.
 - a. a drive shaft bent or damaged
 - b. an insecure or fractured fastener securing a drive shaft coupling bearing.

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Rear Suspension and Wheel Bearings 2.0

Information

How to Inspect

The checks in this sub-section must be carried out

- with the vehicle over a pit or on a raised lift, and
- the rear of the vehicle jacked up so that ideally the suspension hangs freely with both wheels clear of the ground.

Other testable items may be more easily examined while the vehicle is jacked, particularly when the rear suspension is hanging freely.

Reason for rejection 1 does not apply to a vehicle where it is not possible to rotate the wheel due to a design characteristic or its drive configuration.

Method of Inspection

1. Rotate each wheel in turn and listen for any sound indicating roughness in the bearing.
2. Rock each wheel by hand or when appropriate With a bar in the wheel, and check the movement of the wheel relative to the axle to assess the amount of play in the wheel bearings.

Note: It may be an advantage to use an assistant when carrying out this check.

Reason for Rejection

1. Excessive roughness in a rear wheel bearing.
2. Excessive play in a rear wheel bearing, indicating severe maladjustment or wear.

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2.7 Shock Absorbers

Information

Care must be taken to select where to push down to avoid damage or injury.

Method of Inspection

1. Check for the presence of shock absorbers where these are a standard item.
2. Examine each shock absorber for damage, corrosion and security of attachment.
Note: For shock absorbers incorporated in MacPherson struts, inspect in conjunction with items under sub-section 2.5.
3. Examine each shock absorber for fluid leaks.
Note: Ensure that any fluid near the unit is from the shock absorber and not from another source.
Slight seepage causing a thin fluid on a shock absorber is not a reason for rejection.
4. Examine the condition of any linkages, pivots or rubber bushes.
5. At each corner of the vehicle, where practicable, push down (or pull down from beneath) and note the rebound of the body to determine if each shock absorber is producing a damping effect on the suspension.

Reason for Rejection

1.
 - a. No shock absorbers fitted to a vehicle in which they are known to be fitted as standard
 - b. a shock absorber missing.
2.
 - a. External damage or corrosion to the casing of a shock absorber so that the unit does not function
 - b. an insecure or detached shock absorber.
3. A fluid leakage serious enough to indicate that the fluid seal of a shock absorber has failed.
4. An excessively worn shock absorber linkage, pivot or bush.
5. A shock absorber which has negligible damping effect.

Suspension Type

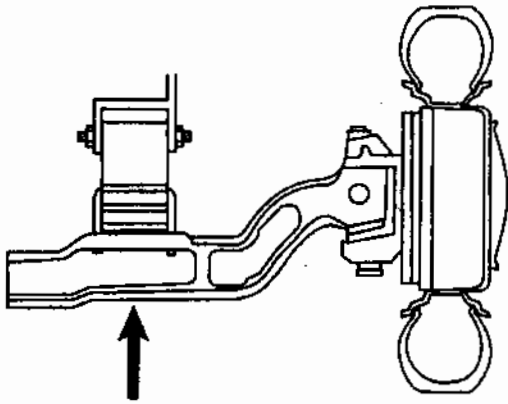


Figure 1

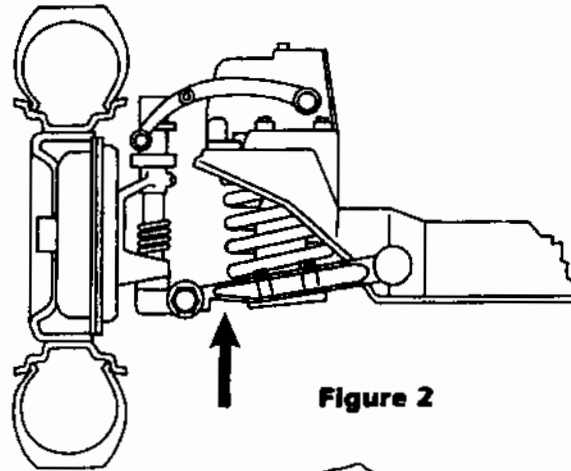


Figure 2

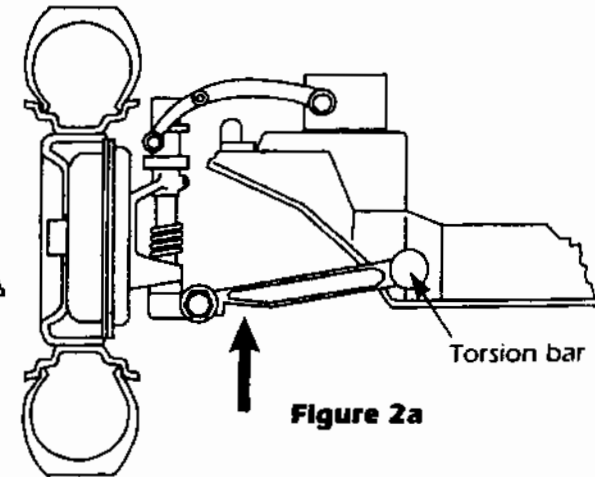


Figure 2a

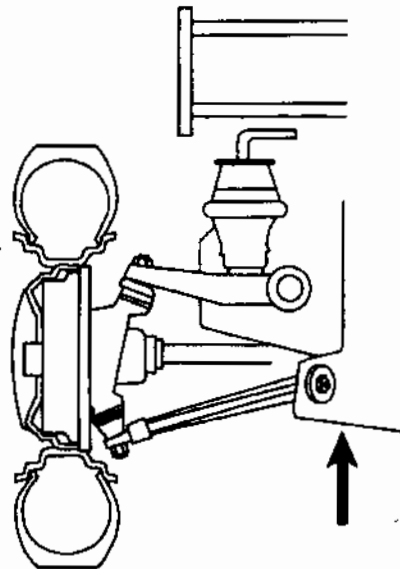


Figure 3

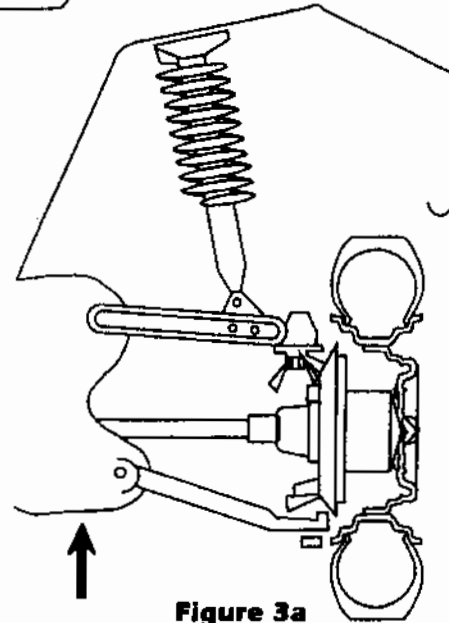


Figure 3a

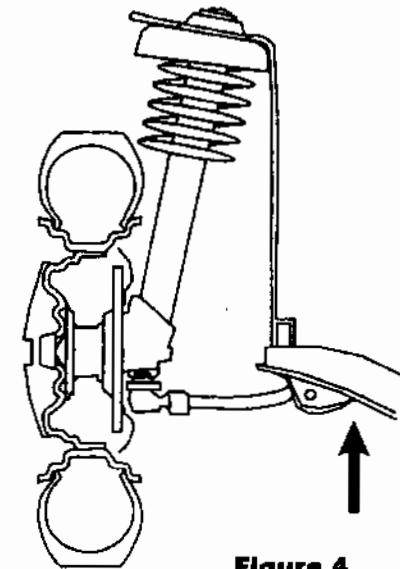


Figure 4

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Section 3

Brakes

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3.1 Parking Brake Lever Mechanism and Associated Mountings

Information	Method of Inspection	Reason for Rejection
Type of parking brake mechanism	<ol style="list-style-type: none">1. Check that the vehicle has a parking brake designed to prevent<ul style="list-style-type: none">■ at least two wheels from turning, or■ with a three-wheeled vehicle, at least one wheel from turning.2. Check the method of operation.3. Examine the condition of the brake lever and its location.4. With the brake lever in the "off" position<ol style="list-style-type: none">a. Check the amount of side play in the lever pivot by moving the lever from side to side. Note: Some vehicles have sideways movement of the parking brake lever when new. Movement is a reason for rejection only when<ul style="list-style-type: none">■ the pawl is moved clear of the ratchet, and■ the brake does not hold in the 'on' positionb. check the security of the lever and pawl mechanism pivots, their associated mountings and the presence and effectiveness of retaining and locking devices. Note: Items not possible to check fully from the driver's seat should be checked from beneath the vehicle. Opening the bonnet to inspect fully the parking brake mechanism might also be necessary.	<ol style="list-style-type: none">1. The vehicle does not have a parking brake designed to prevent<ul style="list-style-type: none">■ at least two wheels from turning■ with a three-wheeled vehicle, at least one wheel from turning.2. For vehicles first used on or after 1 January 1968 the parking brake is not capable of being maintained in operation by direct mechanical action only.3. The brake lever is defective or so located that it cannot be operated satisfactorily.4.<ol style="list-style-type: none">a. side play in the brake lever pivot to the extent that the pawl may inadvertently disengageb. the lever or pawl mechanism pivots and their associated mountings are insecure or a locking or retaining device is insecure or missing.

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355 355 Parking Brake Lever Mechanism and Associated Mountings 3.1

Method of Inspection

5. Without operating the pawl mechanism, apply the parking brake slowly and check the effective operation of the pawl mechanism by listening for definite and regular clicks as the pawl moves over the ratchet teeth.
6. When the brake is fully applied
 - a. knock the top and each side of the lever and check that the lever stays in the "on" position
 - b. check that the lever is not at the end of its working travel and that there is no fouling of adjacent parts
 - c. check that the lever is not impeded in its travel.
7. Check the vehicle structure around the mounting of the parking brake and associated mountings for fractures, cracks, corrosion and distortion.
Note: It may be necessary to check the parking brake lever mounting 'prescribed area' from the vehicle underside when it cannot be checked from the inside.

Reason for Rejection

5. The pawl spring is not pushing the pawl positively into the ratchet teeth or the ratchet has broken, or excessively worn, teeth.
6.
 - a. when knocked, the lever is not held in the "on" position
 - b. when the brake is fully applied there is no possibility of further travel of the lever because the lever is
 - at the end of its working travel on the ratchet, or
 - fouling adjacent parts of the vehicle
 - c. the lever is impeded in its travel.
7. Deliberate modification which significantly reduces the original strength, excessive corrosion, severe distortion, a fracture or an inadequate repair of a load bearing member or its supporting structure or supporting panelling within 30cm of the parking brake mechanism or any associated mounting(s), that is, within a 'prescribed area', see Appendix C.

3.2 Hand Operated Brake Control Valves

Information

This inspection :

- Applies to all vehicles with a secondary brake operating mechanism in addition to, or in place of, the normal parking brake lever
- Includes hand operated valves fitted to control spring brakes or lock actuators

Method of Inspection

1. Examine the control for
 - a. fractures, damage or excessive corrosion
 - b. security of operating valve spindle
 - c. amount of travel
 - d. loose connections or leaks
 - e. wear in gate and/or lever locating mechanism
 - f. damping of the lever gate on valves controlling lock actuators.
2. Check the valve unit for
 - a. security of its mounting
 - b. location
 - c. correct functioning.

Reason for Rejection

1.
 - a. Deliberate modification which significantly reduces the original strength, excessive corrosion, damage, fracture or an inadequate repair of the control
 - b. an insecure operating valve spindle
 - c. the control cannot be moved over its full travel
 - d. a loose connection or a leak in the system
 - e. a gate and/or locating mechanism so worn that the lever is not safely retained in the "on" or "off" position
 - f. insufficient or no damping of the lever gate on valves controlling lock actuators.
2.
 - a. An insecure valve unit
 - b. the lever located so that it cannot be operated satisfactorily from the normal driving position
 - c. a valve malfunctioning.

Service Brake Control 3.3

Information

Vehicles with a smooth brake pedal pad which from manufacture did not incorporate grooves or the fitting of an anti-slip material should not be subject to rejection.

The provision of a pedal rubber which is itself an anti-slip material is not regarded as a reason for rejection if the design pattern is worn smooth.

Method of Inspection

A. All types of braking systems

1. Check
 - a. the condition of the brake pedal and brake actuating linkage (eg. to remote master cylinders)
 - b. the anti-slip face on the pedal pad
 - c. the security of the pedal pad to the pedal and the pedal to operating lever
 - d. the condition of the pedal bearing or pivot
 - e. for chafed rods or levers
 - f. for frayed or knotted cables
 - g. for any corroded or damaged rod, lever or linkage. Wear in eyes of relay levers, clevis joints, stationary pins or pivots
 - h. for abnormal movement of levers, indicating maladjustment or excessive wear.

Cont'd ▼

Reason for Rejection

1.
 - a. The pedal or actuating linkage fractured, excessively corroded or functionally incomplete
 - b. the anti-slip provision on the brake pedal pad is missing, incomplete, loose or worn smooth
 - c. a pedal pad or operating lever not secured to the pedal
 - d. excessive side movement of the pedal at right angles to its normal movement indicating a badly worn pedal bearing or pivot
 - e. a brake rod or lever reduced in thickness by more than 1/3rd
 - f. a brake cable
 - knotted or,
 - with wires broken so that the cable is weakened significantly
 - g. serious weakening of any part due to excessive wear or damage
 - h. abnormal movement of levers indicating maladjustment or excessive wear.

Cont'd ▼

3.3 Service Brake Control

Method of Inspection

2. Examine the vehicle structure near actuating linkage and mounting points for excessive corrosion, distortion and fracture.
3. On vehicles first used on or after 1st Jan 1968, check that a brake is applied to all the wheels (this may need to be substantiated during the brake test).
4. Depress the pedal and check for fouling on parts of the vehicle.
5. Depress the pedal fully and check the position of the pad relative to the floor.

B. Hydraulic systems (including Servo Assisted)

1. Fully depress the pedal twice, first slowly and then rapidly each time to a point where sustained pressure can be held. Check for creep and sponginess.
2. If a vacuum servo is fitted, then with the engine off, totally deplete the stored vacuum by repeatedly applying the service brake. Fully apply the brake and hold at a constant pressure and whether the pedal can be felt to travel further when the engine is started.

Reason for Rejection

2. Deliberate modification which significantly reduces the original strength, excessive corrosion, severe distortion, a fracture or an inadequate repair of a load bearing member, its supporting structure or supporting panelling within 30cm of an actuating linkage mounting point, that is, within a 'prescribed area' see Appendix C.
3. On vehicles first used on or after first Jan 1968 a brake is not applied to all the wheels
4. The pedal is fouling parts of the vehicle so that free movement of the pedal is obstructed.
5. When the pedal is fully depressed, there is not enough reserve pedal movement.
Note: This does not apply to power operated braking systems, providing the foot valve is fully open before the pedal is fully depressed.

B.

1. a. The pedal tends to creep down while the pedal is held under pressure
b. sponginess indicating air in the hydraulic system
2. No dip can be felt when the engine is started, indicating vacuum assistance is not working satisfactorily.

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Service Brake Control 3.5

Information

This inspection applies to:

All diesel engined vehicles where pedal creep has been detected when pressurising the brakes with the engine running.

On some vehicles the low vacuum warning light will illuminate as soon as the ignition is switched on. In these circumstances it is not a reason for rejection unless the warning light stays on after the engine has been started

Cont'd ▼

Method of Inspection

C. Diesel engined vehicles with high servo boost

1. Check the brake fluid level in the reservoir then pump the brake pedal several times and check that the fluid level in the reservoir is unchanged.
2. With the vacuum depleted ensure the pedal is not spongy or does not creep.
3. With servo assistance fully depress the pedal.

D. Full power hydraulic braking systems

1. Check that a warning device is fitted.
2. Check whether a warning device fitted is audible or visible to driver.
3. With the engine switched off, repeatedly apply the service brake until the warning device operates. Check that at least two further applications of the brakes are available. In case of doubt the availability of two further applications can be established when testing the brakes on a Roller Brake Tester.

Note: Hydraulic braking systems operate quietly. It is normally necessary to use a roller brake tester to verify that the brakes are applied.

Cont'd ▼

Reason for Rejection

1. After several applications of the brake pedal the fluid level in the reservoir has decreased.
 2. With the vacuum depleted the pedal is spongy or creeps.
 3. With servo assistance the pedal creeps down and touches the floor.
-
1. No warning device fitted.
 2.
 - a. A warning device not visible (or audible) to the driver
 - b. a visual warning device not readily visible to the driver in darkness.
 3.
 - a. A warning device not working correctly
 - b. insufficient reserve pressure to give at least two further applications of the brakes after the warning device has operated.

Cont'd ▼

3.3 Service Brake Control

Information

This inspection applies to:

vehicles registered on or after 1 October 1937.

A vehicle of 3050kg or less unladen, with

- a reservoir coupled direct to the induction manifold, or
- a reservoir integral in a servo unit

is not necessarily required to be fitted with a warning device.

Warning device

A defective audible warning device is not a reason for rejection if fitted in addition to an operational visual device.

For vehicles first used on or after 1 April 1983, a defective visual warning device is not a reason for rejection if fitted in addition to an operational audible device.

Method of Inspection

E. Air and vacuum systems (including 'over hydraulic')

1. Check that a visual warning device or, as an alternative for vehicles first used on or after 1 April 1983, an audible warning device is
 - a. fitted
 - b. working correctly
2. Check that any visual warning device is
 - a. visible from the driving seat
 - b. illuminated, or otherwise visible from the driver's seat in darkness.
3. For systems fitted with a pressure or vacuum gauge, with the reservoir at a maximum pressure or vacuum, note the reading on the gauge and then fully depress the pedal. Keep the pedal depressed and watch the gauge reading.
Note: All vehicles must also be checked for pressure or vacuum leaks during the under-vehicle inspection of the brake system.
4. Check that the operation of any air or vacuum powered system (e.g. wipers etc.) does not adversely affect the operation of the braking system.

Reason for Rejection

1.
 - a. A mandatory warning device not fitted
 - b. a mandatory warning device not working correctly.
2. A visual warning device
 - a. not visible from the driver's seat
 - b. not illuminated, or its function not visible from the driver's seat in darkness.
3. The gauge reading drops whilst the pedal is kept depressed, indicating a leak in the brake system.
4. The repeated operation of any ancillary air or vacuum system completely depletes the stored air or vacuum for the braking system.

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Method of Inspection

5. By applying the service brake repeatedly, gradually empty the braking system, and
- a. if a gauge is fitted, note that
 - the reading on the gauge falls steadily each time the brake pedal is depressed, and
 - when the gauge needle has reached the "warning mark", there is still enough pressure or vacuum in the system to allow the brake to be applied at least twice more with pressure or vacuum assistance

Note:**Pressure gauge**

If the pressure gauge has no warning mark, use 45psi (3.1 kg/sq cm or 3 bar) as a reference.

Vacuum gauge

If the vacuum gauge has no warning mark, use 10" to 12" (25 to 30cm) as a reference.

- b. If a warning light or other device is fitted, check that, after the warning has operated there is still enough pressure or vacuum in the system to allow the brake to be applied at least twice more with pressure or vacuum assistance.

Cont'd ▼

Reason for Rejection

- 5.
- a. Insufficient pressure or vacuum to give assistance to brakes for at least two or more applications after the gauge has reached the warning mark
 - b. Insufficient pressure or vacuum to give assistance to brakes for at least two or more applications after the warning light or other device has operated.

Cont'd ▼

3.3 Service Brake Control

Information

Method of Inspection

Reason for Rejection

6. Completely empty the reservoir by repeatedly pressing the service brake pedal. Start the engine and if diesel run it at just below the governed speed or 2000 rpm if petrol. Note the time it takes for the warning device to stop operating.

6. The time between starting the engine and
 - the warning device ceasing to operate, or
 - the gauge showing a safe reading indicates that build-up of pressure/vacuum is low.For example
 - more than 3 minutes for pressure systems
 - 1 minute for vacuum systems.

Information

This ABS inspection applies to all systems fitted as 'standard', and to 'optional' systems fitted.

When testing vehicles that have ABS fitted the road wheels should not be allowed to rotate clear of the standing surface with the ignition on as this can cause the ABS system to indicate a fault which may require specialist equipment to rectify

Missing components

Where a vehicle is presented for test with an ABS component obviously missing but, follows the correct sequence of operation, the defect must be brought to the attention of the presenter.

Method of Inspection

1. If the vehicle is fitted with an anti-lock braking system, check that
 - a. a warning lamp is fitted
 - b. the lamp illuminates
 - c. the lamp follows the correct sequence of operation
 - d. does not indicate a fault.
- Note:** The sequence varies with the type of system. Refer to the manufacturer's or other reliable data, eg purpose produced charts, books, etc.

Reason for Rejection

1. The warning lamp
 - a. is missing
 - b. does not illuminate
 - c. does not follow the correct sequence of operation
 - d. indicates an ABS fault.

3.5 Mechanical Brake Components

Information

It is acceptable to fit cable expanders to reduce maladjustment.

Some inspections in this section will require the assistant to pull the hand brake on and off whilst components are checked on the underside/under bonnet of the vehicle.

Method of Inspection

1. Check the mechanical brake components for
 - a. chafed rods or levers
 - b. frayed or knotted cables
 - c. free rotation of clevis joints between cables and levers (this includes cable linkages between brake pedals and remote mounted servos)
 - d. a corroded or damaged rod, lever or linkage. Wear in eyes of relay levers, clevis joints, stationary pins or pivots.
 - e. abnormal movement of levers, indicating maladjustment or excessive wear
 - f. security and excessive wear of brake linings/pads
 - g. contamination of brake discs and drums by leaking brake fluid, oil or grease.
 - h. the condition and security of brake drums and discs
 - i. presence and security of brake back plates, wheel cylinders and calipers
 - j. restriction of free movement

Reason for Rejection

1.
 - a. A brake rod or lever reduced in thickness by more than 1/3rd
 - b. a brake cable
 - knotted or,
 - with wires broken so that the cable is weakened significantly
 - c. seizure of clevis joint pivots which causes strain or wear to cables to an extent likely to lead to premature failure of the cable
 - d. serious weakening of any part due to excessive wear, damage or corrosion
 - e. abnormal movement of levers indicating maladjustment or excessive wear
 - f. a brake lining or pad insecure or less than 1.5 mm thick at any point
 - g. a brake disc or drum contaminated by brake fluid, oil or grease
 - h. a brake disc or drum insecure, cracked or excessively scored, pitted or worn
 - i. a brake back plate, wheel cylinder or caliper securing device loose, missing or excessively deteriorated
 - j. restricted free movement of brake components

Cont'd ▼

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Exhaust Emissions – Compression Ignition 7.4

2300-A-050-013

Information

Method of Inspection

If the mean smoke level is too high, carry out further accelerations up to a maximum of 6 in total.

After each acceleration, check the mean reading. This part of the test is complete when either:

- the mean of any 3 consecutive smoke readings is at or below the appropriate limit, or
 - six accelerations have been performed.
3. Assess whether the smoke emitted from the exhaust, regardless of measured density, is likely to obscure the vision of other road users.

Reason for Rejection

3. Exhaust emits excessive smoke or vapour of any colour to an extent likely to obscure the vision of other road users.

Note: The criterion is **density** and not **volume** of smoke. The description 'dense smoke' includes smoke or vapour which largely obscures vision.

7.4 Exhaust Emissions - Compression Ignition

Information	Method of Inspection	Reason for Rejection
	<p>Check that the smoke meter probe can be inserted into the tailpipe.</p> <ol style="list-style-type: none"> 1. Insert the probe fully and securely, in line with the gas flow. Restart the engine. <p>Fast Pass</p> <p>Following the meter prompts, depress the accelerator pedal quickly and continuously but not violently, to reach full fuel position in less than 1 second. Hold it there until a release prompt is given, then immediately release the pedal. Allow the engine, and any turbocharger fitted, to return to idle speed.</p> <p>At the end of the 1st acceleration read the smoke level displayed on the meter. If it is at or below 1.50m⁻¹ the vehicle has passed this part of the test and a pass result will be displayed on the meter.</p> <p>Go to Method of Inspection 3.</p>	<ol style="list-style-type: none"> 1. The emissions cannot be measured because a tailpipe accessory is fitted or a deliberate modification has been made which prevents insertion of the smoke meter probe. <p>Note: There is no reason for rejection for vehicles that do not meet the fast pass criteria.</p>
	<ol style="list-style-type: none"> 2. If the 1st acceleration smoke level is greater than 1.50m⁻¹ carry out two further accelerations following the meter prompts. At the end of the 3rd acceleration, read the mean smoke level displayed on the meter. If it is at or below the appropriate limit, the vehicle has passed this part of the test and a pass result will be displayed on the meter. Go to Method of Inspection 3. 	<ol style="list-style-type: none"> 2. After 6 free accelerations, the mean of the last 3 smoke levels is: <ol style="list-style-type: none"> a. for a non-turbocharged engine, more than 2.50m⁻¹ b. for turbocharged engines, more than 3.00m⁻¹

Exhaust Emissions - Compression Ignition 7.4

Information	Method of Inspection	Reason for Rejection
<p>Smoke meter probe</p> <p>With some types of smoke meter care must be taken to ensure that the probe is correctly aligned to the exhaust gas flow. Reference to meter manufacturers instruction may be necessary.</p> <p>Suitable smoke meters</p> <p>Suitable smoke meters are those accepted by the Vehicle Inspectorate and calibrated and maintained in accordance with the Inspectorate's instructions.</p> <p>Suitable engine temperature measuring devices</p> <p>Suitable engine temperature measuring devices are only those accepted by the Vehicle Inspectorate.</p> <p>Automatic transmission</p> <p>When testing vehicles fitted with automatic transmission care must be taken to avoid overheating the transmission system.</p> <p>Do not carry out unnecessary engine acceleration or prolonged high revving if the engine. Reference to vehicle manufacturers instruction may be necessary.</p>	<p>B. Vehicles first used on or after 1 August 1979</p> <p>Where possible check that:</p> <ul style="list-style-type: none"> ▪ There is sufficient oil in the engine ▪ The oil pressure is not too low ▪ The camshaft belt is in a satisfactory condition ▪ There is no abnormal engine noise ▪ The governor has not been tampered with ▪ The engine is at normal operating temperature <p>If appropriate, remove oil temperature probe. Raise the engine speed to around 2500rpm, or half the maximum engine speed if this lower and hold for 30 seconds to fully purge the inlet and exhaust system.</p> <p>Raise the engine speed slowly to maximum to check the operation of the governor. Once the engine speed has stabilised or if it becomes clear that the governor is not working, release the pedal, return to idle and stop the engine.</p> <p>Prompt the meter to carry out a zero check.</p>	<p>B. Vehicles first used on or after 1 August 1979</p>

7.4 Exhaust Emissions - Compression Ignition

Information

This inspection applies to

All compression ignition engines with four or more wheels.

Reasons for not carrying out a smoke test

Do not carry out a smoke test if the engine is not in a safe condition to do so. This will involve questioning the vehicle presenter and a brief examination of the engine condition. A smoke test must not be carried out if the oil temperature is below 60°C. The reason for not conducting a smoke test must be clearly recorded on the Notification of Refusal (VT30)

When to do the test

The smoke test must only be completed when the engine is at normal operating temperature. It is not normally sufficient to run the engine with the vehicle stationary to warm it up to temperature.

The engine oil temperature measured by a probe in the oil level dipstick tube is to be at least 80°C, or normal operating temperature if lower (60°C minimum). Testing an engine below normal operating temperature may affect the result.

If owing to vehicle configuration temperature measurement is impractical, the establishment of the engine's normal operating temperature may be made by some other means, for example by the operation of the cooling fan or the engine block temperature measured by the level of infra-red radiation to be at least an equivalent temperature.

Cont'd ▼

Method of Inspection

A. Vehicles first used before 1 August 1979

Where possible check that:

- There is sufficient oil in the engine
- The oil pressure is not too low
- There is no abnormal engine noise
- The governor has not been tampered with
- The engine is at normal operating temperature

(see information column)

Raise the engine speed to around 2500rpm, or half the maximum engine speed if this lower.

Hold this speed steady for 30 seconds to ensure that the inlet and exhaust system is fully purged.

Allow the engine to return to idle and the emissions to stabilise.

1. Assess the smoke emitted from the tailpipe
2. Rapidly increase the engine speed to around 2500rpm or half the maximum engine speed if this lower and assess the smoke emitted from the tailpipe during acceleration.

Reason for Rejection

A. Vehicles first used before 1 August 1979

1. The exhaust emits dense blue or clearly visible black smoke for a period of 5 seconds at idle.
2. The exhaust emits dense blue or clearly visible black smoke during acceleration which would obscure the view of other road users.

Note: The criterion is **density** and not **volume** of smoke. The description 'dense smoke' includes smoke or vapour which largely obscures vision.

Older vehicles, particularly pre-1960, sometimes emit unavoidable smoke due to their design. Such smoke is **not** a reason for rejection.

Exhaust Emissions - Spark Ignition - CAT Test **7.3**

2300-A-050-013

Method of Inspection

- Cooling fan had cut in or coolant pipes were hot.
- e. perform a HC hang-up check and ensure that HC<20ppm before continuing. Insert the analyser sample probe.
 - f. **1st Fast Idle Test:** Raise the engine speed to the vehicle specific fast idle speed and maintain for 30 seconds. If the engine speed drifts outside the fast idle speed range, begin the 30 second countdown again. During the last 5 seconds note the readings for CO, HC and Lambda, and record the results.
 - g. if the vehicle has passed the first fast idle test, then go to paragraph (j), otherwise go to paragraph (h).
 - h. **additional engine pre-conditioning:** Run the engine between 2000-3000rpm for 3 minutes or until the emissions are within limits. If the engine speed goes outside the fast idle range, then freeze the countdown until the engine speed is within range once again.
 - i. **2nd Fast Idle Test:** Repeat the procedure as laid down in paragraph (f), then go to paragraph (j).
 - j. **catalyst stabilisation:** Raise the engine speed to the vehicle specific fast idle speed and maintain for 30 seconds. If the engine speed drifts outside the fast idle speed range then begin the 30 second countdown again.
 - k. **idle test:** Allow the engine to idle during a 30 second countdown. During the last 5 seconds, note the CO reading and record the result.
 - l. Remove analyser sample probe and engine speed measuring device.

ARMY EQUIPMENT
SUPPORT PUBLICATION

7.3 Exhaust Emissions - Spark Ignition - CAT Test

Information

When to do the test

It is recommended that the extended test is carried out as soon as possible after the BET Test. This allows the test to be carried out on a fully warmed up engine.

Printouts and check sheets

The 1996 specification analysers will produce two printouts. One printout must be retained ideally with the VT20/VT30 records and the other printout must be given to the vehicle presenter.

Working environment

To prevent the build up of fumes, the test should be carried out in a well ventilated area.

Gas analyser probe

It is important to ensure that the gas analyser probe is inserted as fully as possible into the exhaust tailpipe and is secure.

Cosmetic engine covers

Where engine speed can only be measured by the removal of a cosmetic engine cover, the engine speed must be measured if the cover can be easily un-clipped. Otherwise, engine speed measurement may be by-passed.

Method of Inspection

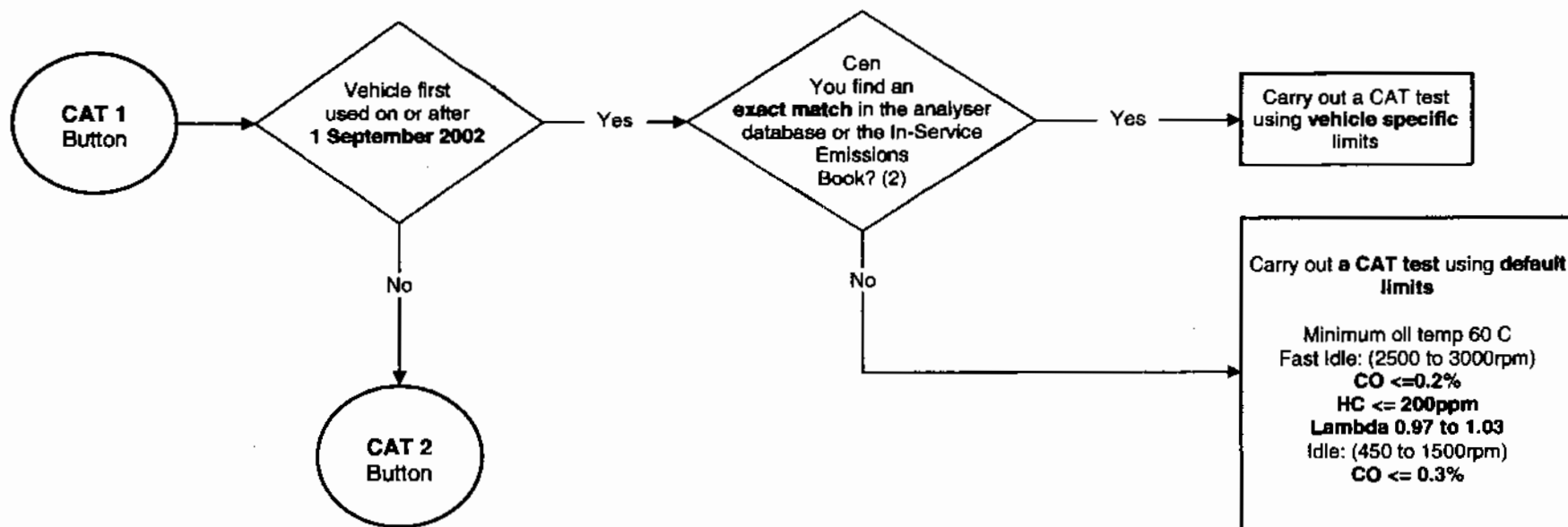
1. A suitable exhaust gas analyser will be needed to perform this inspection. Check that the analyser probe can be inserted into the tailpipe.
2.
 - a. Ensure that the analyser's daily leak check has been performed.
 - b. Identify the vehicle specific test limits using the flow charts.
 - c. Connect the engine speed measuring device and insert the engine oil temperature measuring probe into the dipstick hole.
Note: Engine speed and engine oil temperature must be measured whenever possible. If the engine speed cannot be measured then the vehicle tachometer should be used if fitted. Otherwise, a subjective estimate should be made. If engine oil temperature cannot be measured, see note in paragraph d below.
 - d. **engine pre-conditioning:** Check the engine oil temperature. If it is below the minimum vehicle specific requirement, raise the engine speed to between 2000rpm and 3000rpm and maintain this speed until the minimum oil temperature has been reached. Remove temperature measuring probe and replace dipstick.
Note: Where in exceptional circumstances, the engine oil temperature cannot be measured (e.g. in the case of a dry sump engine), check one of the following: temperature gauge showed warm engine,

Cont'd ↓

Reason for Rejection

1. The emissions cannot be measured because a tailpipe accessory is fitted which prevents insertion of the analyser probe.
2.
 - a. The engine idle speed is clearly above the vehicle specific limit.
Note: If the engine speed is clearly above the vehicle specific limit and this can be easily adjusted, a tester may perform the adjustment and complete the test – the adjustment is not, however, part of the MOT test.
 - b. In the 2nd fast idle test, one or more of the following exceeds the vehicle specific or default limits continuously for the last 5 seconds of the 30 second countdown:
 - Carbon monoxide (CO)
 - Hydrocarbons (HC)
 - Lambda(λ)
 - c. In the idle test, the following gas exceeds the vehicle specific or default limit continuously for the last 5 seconds of the 30 second countdown:
 - Carbon monoxide (CO).

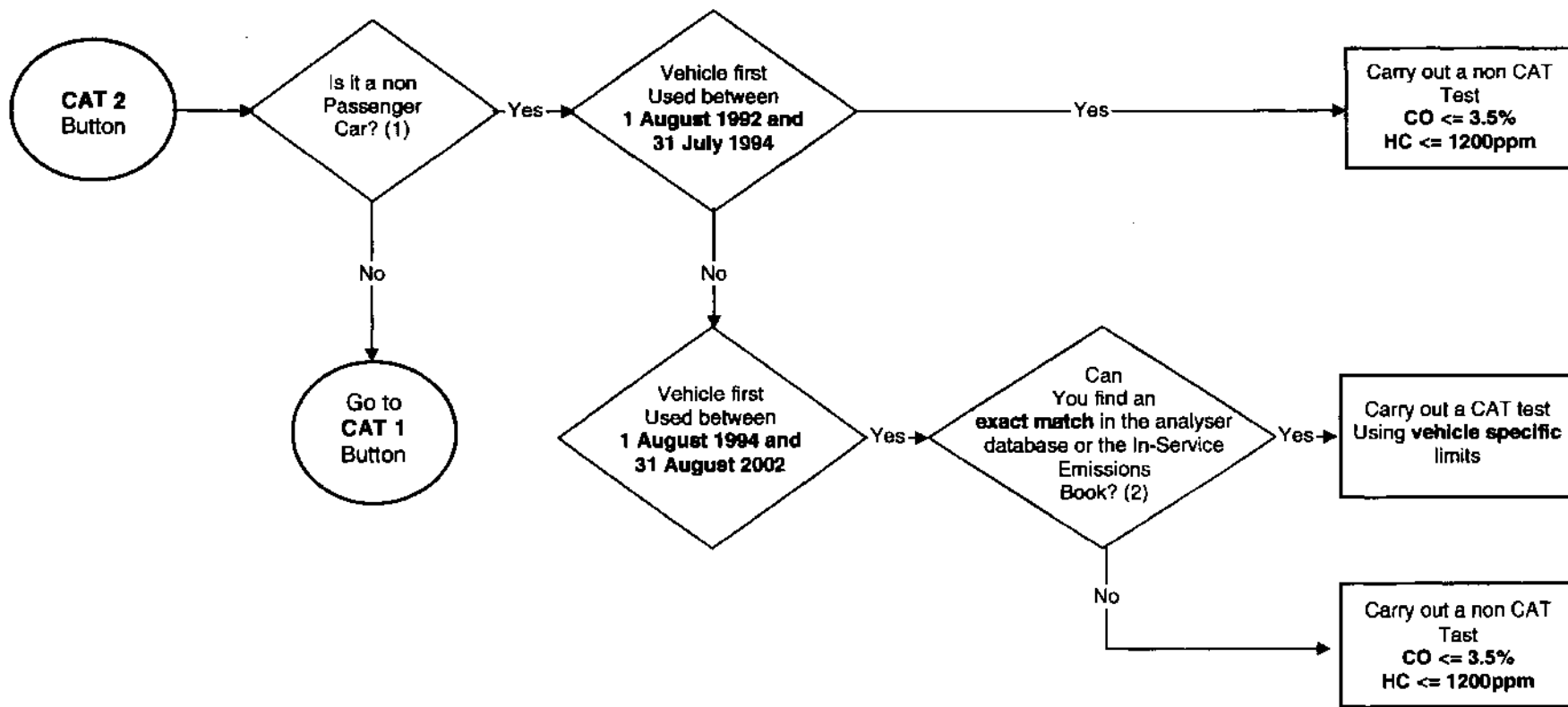
7.3 Exhaust Emissions - Spark Ignition – All vehicles used on or after 1 September 2002



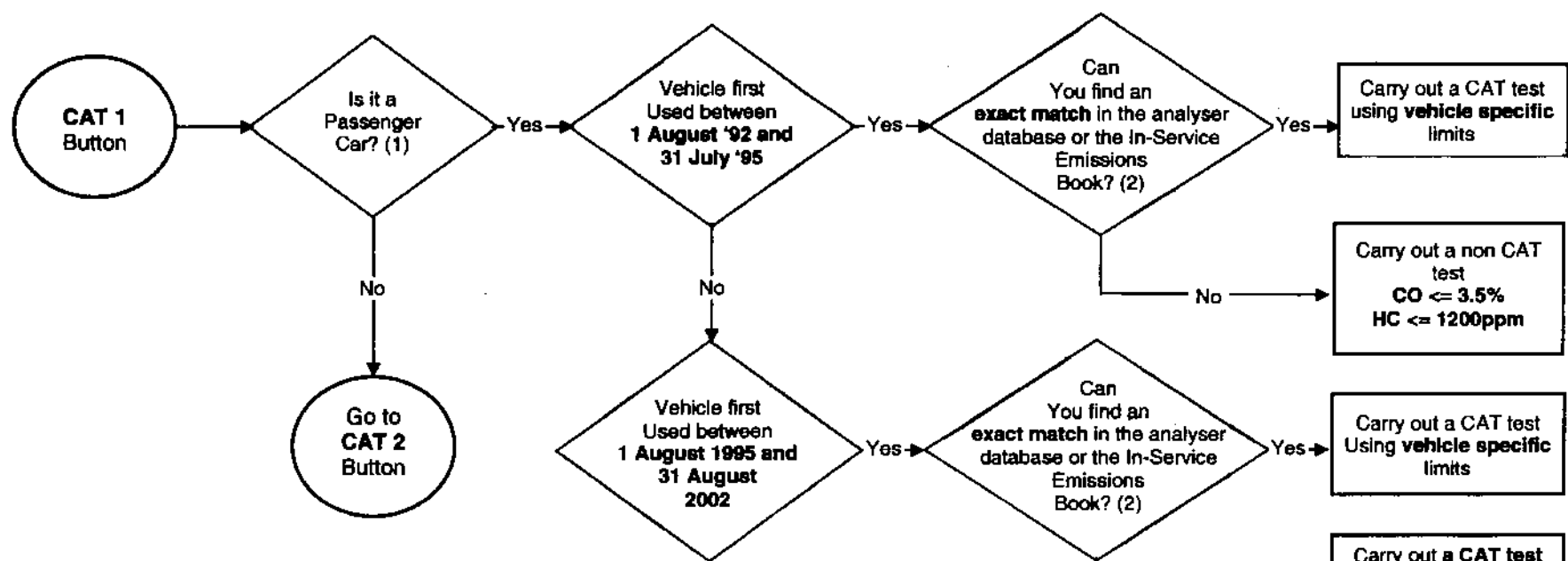
NOTE 2. Exact Match:

To find an exact match in the current emissions data book, you will need the make, model and other data such as engine size, model code, engine code, VIN code or serial number. If after normal cleaning and/or scraping processes a particular code is unreadable or inaccessible, carry on as if no exact match can be found. Test to default limits, carry out that test, but use the less demanding of either the default limits or the specific limits for any vehicle which is an exact match in everything but an unreadable code.

Exhaust Emissions – Spark Ignition – Non Passenger Cars 1 August 1992 to 31 August 2002 7.3



Passenger Cars 1 August 1992 to 31 August 2002



NOTE 1. Passenger car:
 For emissions purposes, a "passenger car" is: constructed or adapted for the carriage of passengers, has no more than 5 seats in addition to the driver, has a maximum gross weight not exceeding 2500kg, is not a "goods vehicle" (e.g. Car derived van, van, pick-up or truck).

NOTE 2. Exact Match:
 To find an exact match in the current emissions data book, you will need the make, model and other data such as engine size, model code, engine code, VIN code or serial number.
 If after normal cleaning and/or scraping processes a particular code is unreadable or inaccessible, carry on as if no exact match can be found.
 If the flow chart leads to a non catalyst test then carry out that test.
 If the flow chart leads to a catalyst test to default limits, then carry out that test, but use the less demanding of either the default limits or the specific limits for any vehicle which is an exact match in everything but an unreadable code.

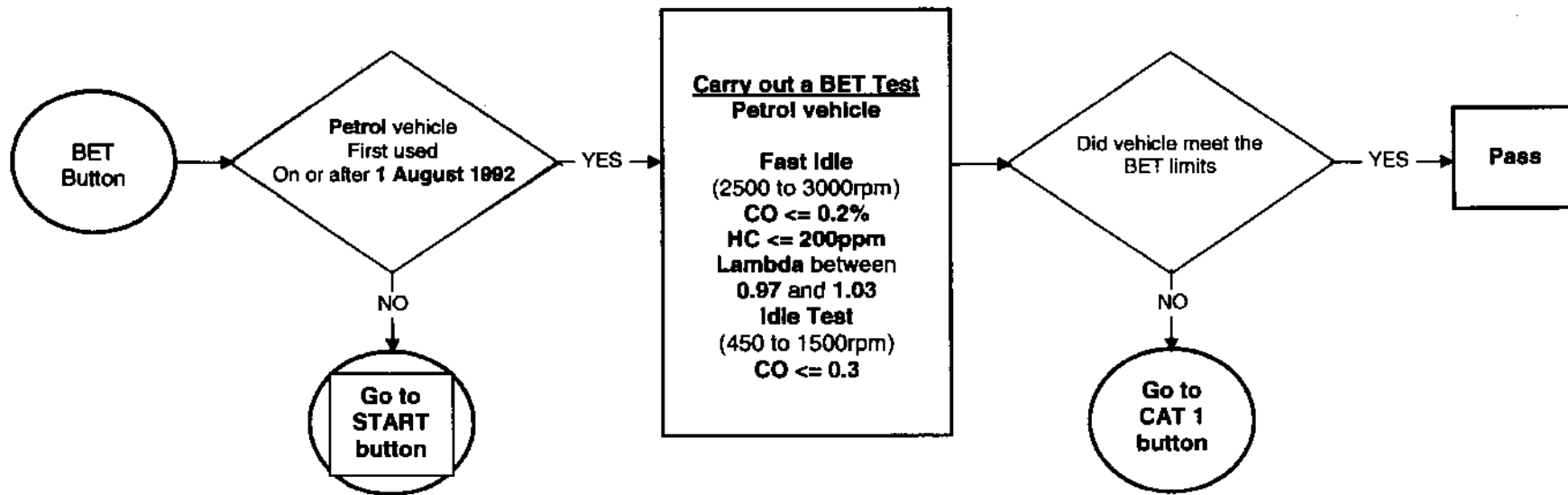
Carry out a CAT test using default limits

Minimum oil temp 60 C

Fast Idle: (2500 to 3000rpm)
 CO <= 0.3%
 HC <= 200ppm
 Lambda 0.97 to 1.03

Idle: (450 to 1500rpm)
 CO <= 0.5%

Exhaust Emissions – Spark Ignition BET Test 7.3



Notes for BET test

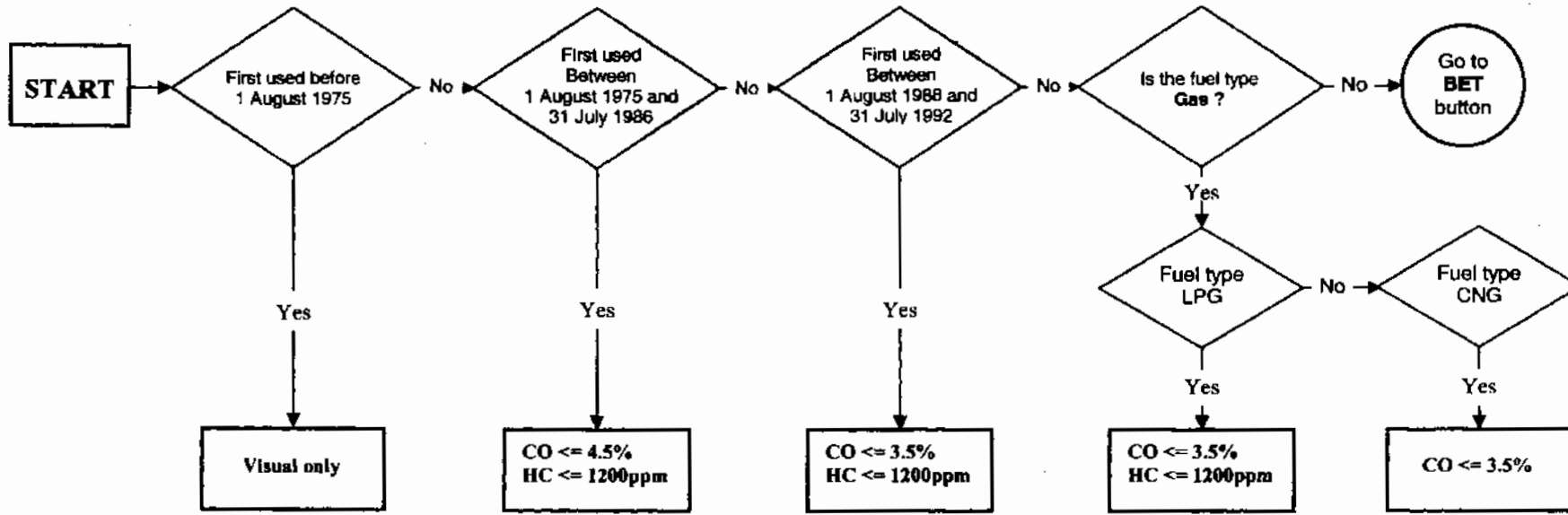
1. Ensure that the engine is hot enough to test
e.g. temperature gauge, cooling fan cut-in or hot coolant hoses.
2. Ensure that the engine idle speed is normal.
3. For the purposes of this test an engine speed measuring device will normally be required.

7.3 Exhaust Emissions - Spark Ignition - BET Test

Information	Method of Inspection	Reason for Rejection
<p>Suitable Exhaust Gas Analysers</p> <p>Exhaust gas analysers must be approved to the Vehicle Inspectorate's 1996 specification. Analysers must be calibrated and maintained in accordance with the Inspectorate's instructions.</p> <p>1996 Specification Analysers</p> <p>All 1996 Specification analysers will prompt when to carry out specific operations, e.g. "run the engine at fast idle". You must follow these prompts closely. The method of inspection opposite is given for reference purposes only.</p> <p>Printouts and check sheets</p> <p>The 1996 specification analysers will produce two printouts. One printout must be retained ideally with the VT20/VT30 records and the other printout must be given to the vehicle presenter.</p> <p>Gas analyser probe</p> <p>It is important to ensure that the gas analyser probe is inserted as fully as possible into the exhaust pipe and is secure.</p>	<ol style="list-style-type: none"> 1. a. A suitable exhaust gas analyser will be needed to perform this inspection. Check that the analyser probe can be inserted into the tailpipe. b. Ensure that the analyser's daily leak check has been performed. 2. From 1 August 1992 onwards Basic Emission Test (BET) <ol style="list-style-type: none"> a. Carry out the test using the flowchart. b. ensure that the engine is hot by checking for example -- temperature gauge, cooling fan cut-in or hot coolant hoses. If the engine is not at normal temperature raise the engine speed to between 2000 and 3000rpm and maintain this speed until normal temperature has been reached. c. Attach engine speed measuring device. It is permissible for the purposes of this check to use the vehicle tachometer. d. Ensure the engine is idling normally. e. Perform a HC hang-up check and ensure that HC<20ppm before continuing. Insert the analyser sample probe. f. Fast idle test: Raise the engine speed to a fast idle between 2500 and 300rpm and hold steady. Note the readings for CO, HC and lambda, and record the results. g. Idle test: Allow the engine to idle. Note the CO reading and record the result. h. Remove analyser sample probe. 	<ol style="list-style-type: none"> 1. The emissions cannot be measured because a tailpipe accessory is fitted which prevents insertion of the analyser probe. 2. If the vehicle does not meet the BET limits go to CAT1 button. Note: There is no reason for rejection for vehicles that do not meet the BET limits.

Exhaust Emissions – Spark Ignition – non CAT Test 7.3

Emission test and limits selection



Information: All Non Catalyst Tests

This inspection applies to:

All spark ignition engined vehicles with four or more wheels in Class IV and VII.

1. Use the flowchart to select the correct limits and emission test.
2. When using the flowchart reference should be made to the notes on page 4.

For emissions purposes only, kit cars and amateur built vehicles first used before 1 August 1998 and Wankel rotary-engined vehicles first used before 1 August 1987 are to be considered first used before 1 August 1975. Kit cars and amateur built vehicles first used on or after 1 August 1998 ("S" reg) are required to obtain Single Vehicle Approval and should be tested to the limits stated on the registration document.

7.3 Exhaust Emissions - Spark Ignition - non CAT Test

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Information

When to do the test

It is recommended that the engine is tested as soon as possible after driving on the road.

Working Environment

To prevent the build up of fumes, the test should be carried out in a well ventilated area.

Method of Inspection

B. Vehicles first used on or after 1 August 1975

1. Check that the analyser probe can be inserted into the tailpipe.
2. Use a suitable exhaust gas analyser to determine the proportions of carbon monoxide (CO) and hydrocarbons (HC) in the exhaust gas over a period of at least 5 seconds at idle.

Note: Any residual hydrocarbons (ie those indicated by the analyser when it is sampling only clean air) should be deducted from the HC reading obtained from the vehicle.

Note: If a vehicle meets the CO requirement at its normal idling speed but fails the HC check, re-check the HC level at a high idle speed of 2000rpm. If the HC reading is 1200 ppm or less, the vehicle will meet both the CO and HC requirements.

- the CO requirement must be met with the engine running at its normal (low) idling speed
- do not use a cold start/cold running mechanism to achieve a high idle speed. Instead, apply light pressure to the throttle pedal.
- HC not applicable to Compressed Natural Gas (CNG) fuelled vehicles.

Reason for Rejection

B. Vehicles first used on or after 1 August 1975

1. The emissions cannot be measured because a tailpipe accessory is fitted which prevents insertion of the analyser probe
2. The exhaust gas contains
 - a. a carbon monoxide content exceeding the limit for a continuous period of 5 seconds
 - b. a hydrocarbon content exceeding the limit for a continuous period of 5 seconds.

Exhaust Emissions - Spark Ignition - General **7.3**

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7. Multi fuel vehicles

Vehicles which run on more than one fuel (eg petrol and LPG) should be tested on the fuel they are running on when presented.

There is a slight difficulty with LPG vehicles: the hydrocarbons emitted are propane rather than hexane. So the HC reading obtained must be divided by the "propane/hexane equivalency factor" (PEF) marked on the gas analyser. For example:

An LPG vehicle gives a reading of 700 ppm.

The PEF marked on the machine is 0.48.

So the actual MOT value is

$$\frac{700}{0.48} = 1458 \text{ ie fail.}$$

Some exhaust gas analysers have an automatic facility for doing this.

8. Vehicles which only just pass

Many modern vehicles will normally run well below the MOT limits. Where such a vehicle just passes the MOT test, but the tester knows that it is capable of more efficient operation, the owner should be informed. Vehicles should normally be tuned to the manufacturer's recommended settings wherever possible, but tuning is **not** part of the MOT test.

9. Vehicles which are incapable of passing

Regulations do not require vehicles to achieve CO or HC readings below the

original capability of the engine when new. A very few vehicles may never have been able to meet the MOT limits.

Where a vehicle owner claims that this is the case, and has sound supporting evidence (eg a letter from the vehicle manufacturer), the vehicle should be considered exempt from the CO and HC emission requirements.

If the owner does not have sound supporting evidence, a Test Certificate should be refused.

Catalyst test

1. The exhaust emission test

The catalyst test is part of the MOT test for most class IV spark ignition petrol engined passenger cars with four or more wheels first used on and after 1 August 1992.

Carbon monoxide (CO), hydrocarbons (HC) and lambda (λ) are checked at fast idle speed and carbon monoxide (CO) is checked again at idle speed.

The test should be self explanatory using the automated routine on 1996 specification exhaust gas analysers. The following points should be borne in mind.

2. Electric cooling fans and other accessories

If, during the catalyst emission test, the engine cooling fan cuts in or out, this is not a problem and the test should continue as normal. All other vehicle

accessories (eg headlamps, air conditioning, heaters) shall be turned off during the test.

3. Total gas emitted

This paragraph should be read in conjunction with paragraph 6 on page 6.

If a vehicle, which is subject to the catalyst emissions test, has a dual exhaust system, the test should be performed on both tail pipes and the results averaged. This is done by adding together the results and dividing by two, eg

Fast idle test

1st pipe : 0.4% CO, 25ppm HC, $\lambda = 1.01$

2nd pipe : 0.2% CO, 15ppm HC, $\lambda = 1.03$

$$\text{Average CO : } \frac{0.4 + 0.2}{2} = 0.3\%$$

$$\text{Average HC : } \frac{25 + 15}{2} = 20\text{ppm}$$

$$\text{Average } \lambda : \frac{1.01 + 1.03}{2} = 1.02$$

Idle test

1st pipe: 0.45% CO

2nd pipe: 0.35% CO

$$\text{Average CO: } \frac{0.45 + 0.35}{2} = 0.4\%$$

4. Holed exhaust

Refer to paragraph 5 of on page 6.

7.3 Exhaust Emissions - Spark Ignition - General

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Non-catalyst test

1. The Exhaust Emission Test

A check of exhaust emissions is part of the MOT test for all 4-stroke spark ignition engined vehicles with 4 or more wheels in Classes IV and VII.

Two of the exhaust gases are included

- carbon monoxide (CO)
- hydrocarbons (HC)

Assessment on most vehicles is straightforward, but a number of factors should be borne in mind.

2. Conducting the Test

The test should be conducted with the engine warm. Testing a cold engine could lead to an unjustified failure.

It is important to ensure that any enrichment device is not operating.

The engine should be idling normally during the test and should not be subject to significant electrical loading such as heated seats or heated rear windows.

If an engine will not idle, an assistant may apply light throttle pedal pressure.

To assess that these conditions are met, MOT Testers can either

- Use their own judgement, or
- Refer to manufacturer's or other reliable data.

3. Electric engine cooling fans

Many modern vehicles are fitted with electric engine cooling fans which can cut in during an emission test. The extra load on the alternator reduces the idle speed, which causes the engine management system to react. This gives rise to highly variable readings.

If this happens during a test, wait until the fan switches off and the readings stabilise before continuing.

4. Unstable readings

Some vehicles give unstable readings due, for example, to their carburettor or fuel injection system design. Before failing a vehicle, is it important to establish that a particular limit has been exceeded constantly for a period of 5 seconds.

5. Holed exhaust

A holed exhaust can allow air to be sucked in, causing artificially low readings.

Where a vehicle has an exhaust holed to the extent that MOT failure is warranted, the emissions should be rechecked when the exhaust is repaired even if the vehicle does not leave the testing station in the meantime. Owners should be made aware that any emission readings taken with a leaking exhaust might be incorrect.

Holes not justifying MOT failure do not normally have a significant effect on the constitution of the exhaust gases at the tailpipe and can be ignored.

6. Total gas emitted

The MOT limits prescribed relate to the total exhaust gas being emitted by the vehicle.

If a vehicle has a dual exhaust system, then the emissions from the tailpipes should be averaged. This is done by adding together the readings and dividing by two, eg

1st pipe emits 6% CO, 400 ppm HC
2nd pipe emits 4% CO, 500 ppm HC
Average CO reading is

$$\frac{6 + 4}{2} = 5\%$$

Average HC reading is:

$$\frac{400 + 500}{2} = 450 \text{ ppm}$$

Single exhaust systems

A single exhaust system has at least one point in the system where all the exhaust gases from the engine travel through the same pipe, even though the system may split at some point to separate silencers or tailpipes. Only one of these need be checked.

Dual exhaust system

A dual exhaust system has two separate pipes from the engine manifold all the way back to the tailpipes. An exhaust system with a balance tube between separate pipes is still considered a dual exhaust.

Exhaust Emissions - Spark Ignition - General **7.3**

Engine speed and temperature

When checking exhaust emissions, the engine must be at its normal idle speed and normal operating temperature.

Engine speeds and temperature can be assessed either subjectively or by reference to manufacturer's or other reliable data.

Gas analyser probe

It is important to ensure that the gas analyser probe is inserted as fully as possible into the exhaust pipe and is secure.

Suitable Exhaust Gas Analysers

Suitable exhaust gas analysers are those accepted by the Vehicle Inspectorate and calibrated and maintained in accordance with the Inspectorate's instructions. MOT stations with 1996 specification equipment may use the automated routine to complete the non-catalyst inspection (after completing the MOI A1c opposite).

Early catalyst vehicles

The flowcharts and notes must be carefully followed. If a vehicle is fitted with a catalyst it does not necessarily mean a 'CAT' test is required.

Working environment

To prevent the build up of fumes, the test should be carried out in a well ventilated area.

A. All vehicles

1. Raise the engine speed to around 2500 rpm or half the maximum engine speed if this is lower. Hold this speed steady for 20 seconds to ensure that the inlet and exhaust system is properly purged. Allow the engine to return to idle and the emissions to stabilise.
 - a. assess the engine idle speed.
 - b. assess the smoke emitted from the tailpipe at idle.
 - c. rapidly increase the engine speed to around 2500rpm or half maximum engine speed if this is lower and assess the smoke emitted from the tailpipe. Allow the engine to return to idle.

A. All vehicles

1. The engine
 - a. is idling at a speed clearly above its normal idling speed
 - b. emits dense blue or clearly visible black smoke for a continuous period of 5 seconds at idle
 - c. emits excessive dense blue or clearly visible black smoke during acceleration which would obscure the view of other road users.

Note: Older vehicles, particularly pre-1960, may emit unavoidable smoke due to their design. Such smoke is **not** a reason for rejection.

7.3 Exhaust Emissions - Spark Ignition - General

This inspection applies to all spark ignition engined vehicles with four or more wheels in Classes IV and VII.

Contained within this section are flowcharts. Carefully use these flowcharts to accurately establish which type of emission test is applicable to the vehicle being tested.

Vehicles fitted with modified engines:

If an engine has been modified in any way, it still has to meet the exhaust emission requirements according to the age of the vehicle.

Personal Imports: The vehicle will be tested according to its age from first use. The only exemption to this is if the vehicle owner can present to the tester at time of test a letter from the vehicle manufacturer stating that the particular engine as originally installed could not meet the equivalent British emission standards. If this is the case, then test to the next lower emission standard.

e.g. A 1995 car first used in Africa has a letter from the engine manufacturer stating that the particular engine (engine number to be stated) cannot meet Catalyst emission limits, then use the pre cat limits of CO 3.5%, HC 1200ppm.

Vehicles fitted with a different engine:

Test according to which is older, engine or vehicle.

e.g. A 1995 car fitted with a 1991 engine (of whatever make), test to 1991 standards for emission purposes.

Note: The onus is on the vehicle presenter to prove engine age.

The following notes should be used in conjunction with the flowcharts on the following pages.

- (1) Two stroke engines do not require an emissions test unless they are subject to the catalyst test.
- (2) \leq less than or equal to
- (3) **Advice on establishing whether the design gross weight of a large car exceeds 2500kg**
 - i) it may be shown on the manufacturers VIN plate (example shown in Section 3.9, page 29)
 - ii) it may be listed only in Section 2 of the current emissions data book
 - iii) refer to any readily available data, e.g. handbook or data book
 - iv) if still unsure, assume it to be over 2500kg dgw.
- (4) Vehicles, which have been the subject of specialist conversions, are to be treated, for emissions purposes, as if they had not been converted, e.g. a motor caravan or ambulance converted from a goods vehicle is still to be treated as **not being a "passenger car"**; an ambulance converted from a **"passenger car"** or a **"passenger car"** with seats added is still to be treated as **being a "passenger car"**.

A vehicle originally built with 6 or more seats, in addition to the driver, which has had seats removed is still to be treated as **not being a "passenger car"**.

- (5) The full title of the Department of Transport Emissions book is "In-Service Exhaust Emission Standards for Road Vehicles". The latest edition must be used.

Fuel System 7.4

Information

This inspection applies to all petrol, diesel and gas powered vehicles.

Running the engine

This inspection is to be carried out both with and without the engine running.

Opening the luggage compartment

It may be necessary to open the luggage compartment to carry out a full inspection of the fuel system.

Locking fuel caps

If access cannot be gained to the fuel cap because it is locked and the key is not readily available or because it cannot be opened for some other reason see heading 2 of the introduction to this manual.

Method of Inspection

1. Check the following for leaks or insecurity:
 - a. fuel tank(s)
 - b. all visible fuel hoses, pipes and unions
 - c. all visible fuel system components.
2. Check fuel tank cap for positive fit and condition of sealing washer and flange.

Reason for Rejection

1.
 - a. Fuel leaking
 - b. a fuel system component insecure.
2.
 - a. Fuel tank cap does not fasten securely
 - by a positive means, and
 - such that pressure is not maintained on the sealing arrangement
 - b. fuel cap sealing washer torn, deteriorated or missing, or a mounting flange/sealing method defective such that the leakage of fuel is possible.

7.1 Exhaust System

Information

Method of Inspection

Reason for Rejection

1. Examine the condition of the whole exhaust system, including the silencers and mountings, for security, deterioration and completeness.

2. With the engine running
 - a. check the exhaust system for leaks
Note: A durable repair to an exhaust system which effectively prevents leaks is acceptable providing the system is structurally sound
 - b. assess subjectively the effectiveness of the silencer in reducing exhaust noise to a level considered to be average for the vehicle.

1.
 - a. A part of the system missing or excessively deteriorated
 - b. an exhaust system mounting missing, or in such condition that it does not fully support the exhaust system.
Note: An alternative mounting device is acceptable providing the system is secure and the fixing is not likely to fail prematurely.

2.
 - a. A major leak of exhaust gases from any part of the system
Note: A minor exhaust leak from, for example, a connection joint or a pin hole, is not a Reason for Rejection
 - b. a silencer in such condition, or of such a type, that the noise emitted from the vehicle is clearly unreasonably above the level expected from a similar vehicle with a silencer in average condition.

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Section 7

Fuel and Emissions

Section contents

Sub-Section	Subject	Page
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Load Security, Spare Wheel and Carrier **6.4**

Information	Method of Inspection	Reason for Rejection
<p>Load Security</p> <p>Original Design Original vehicle design characteristics are to be accepted.</p> <p>Temporary Fixings Components secured with, for example, rope are not acceptable.</p>	<p>Load Security</p> <ol style="list-style-type: none">1. Check that any bootlid, tailgate, loading door, hinged tailboard or dropside is or can be secured in the closed position. <p>Spare wheel and carrier</p> <ol style="list-style-type: none">2. Check that any externally fitted spare wheel and/or carrier is securely attached to the vehicle.	<p>Load Security</p> <ol style="list-style-type: none">1. A bootlid, tailgate, loading door, hinged tailboard or dropside cannot be secured in the closed position. <p>Spare wheel and carrier</p> <ol style="list-style-type: none">2. An externally fitted spare wheel or carrier insecure to the extent that it is likely to fall off.

6.3 Registration Plates and VIN Details

The registration mark must be set out in one of the following ways:

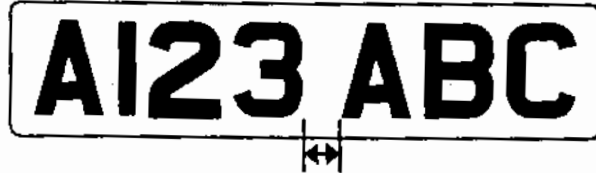
Layout 1

Letters on one line, figures on another.



Layout 2

The gap between letters and figures must be at least double the gap between adjacent letters or figures.



Note 1: A year identifying letter is regarded as a figure

Note 2: Vehicles with foreign or diplomatic registrations need not conform to these layouts

New style registration format introduced from 1st September 2001



This gap must be greater than the gap between adjacent letters or figures

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Registration Plates and VIN Details **6.3**

Information

Vehicle Identification Number

A Vehicle Identification Number (VIN or chassis number) is required on all vehicles first used on or after 1 August 1980, except those which are

- kit cars
- amateur built vehicles

If a VIN cannot be found the vehicle presenter should be advised of the likely location of the VIN and to thoroughly search for the number with the aid of the registration document. If following this action the VIN cannot be found the vehicle presenter should contact the nearest Vehicle Registration Office.

If more than one different VIN is found, the vehicle presenter should contact the nearest Vehicle Registration Office.

Cont'd ▼

Method of Inspection

3. Check that the vehicle is permanently displaying a legible Vehicle Identification Number (this can either be
 - on a VIN plate secured to the vehicle, or
 - stamped or etched on the vehicle body or chassis).

Note: A guide as to the likely location of a VIN is given in appendix B.

Cont'd ▼

Reason for Rejection

3.
 - a. a Vehicle Identification Number not permanently displayed or not legible, or
 - b. more than one different Vehicle Identification Number displayed

Cont'd ▼

5.3 Registration Plates and VIN Details

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Information	Method of Inspection	Reason for Rejection
<p>Registration Plates</p> <p>Unregistered vehicles</p> <p>Unregistered vehicles need not be fitted with registration plates.</p> <p>Style of letters/figures</p> <p>Letters/figures must be of equal width along their entire length.</p> <p>Letters or figures of a particular style, eg 'computer' or 'sloped' are not to be regarded as a reason for rejection unless they are likely to be misread.</p> <p>Note: a three-wheeled vehicle, which has a motorcycle derived front end, does not require a front number plate.</p>	<ol style="list-style-type: none">1. Check that there is a registration plate both at the front and the rear of the vehicle, and check each one for security and condition.2. Refer to page 6 and check visually that the letters and figures are correctly formed, spaced, and are not obviously likely to be misread due to, for example, badly positioned or uncovered retaining bolts etc (see information column 'Style of letters/figures').	<ol style="list-style-type: none">1. A registration plate:<ol style="list-style-type: none">a. missing or incorrectb. so insecure that it is likely to fall offc. letter or figure missing or incompleted. faded, dirty, deteriorated or obscured, (for example by a towbar so that it is likely to be misread or is not easily legible by a person standing approximately 20 metres to the front/rear of the vehicle)2. A registration plate with:<ol style="list-style-type: none">a. letters and figures obviously incorrectly spacedb. a letter or figure not correctly formed or likely to be misreadc. a letter or figure which is obviously not of equal width along its entire lengthd. any feature on a number plate that has the effect of changing the appearance or legibility of any of the characters, so that the true identity of the vehicle is less easily identified.

Cont'd ▼

Cont'd ▼

Cont'd ▼

Doors and Seats 6.2

407

Information

Doors

This inspection does not apply if no driver's or front passenger's doors were fitted as part of the original design of the vehicle.

A lack of door handles because of original design characteristics or specialist modification is not a reason for rejection provided the door can be latched securely in the closed position.

Seats

Original Design

Original design characteristics and specialised modifications (eg to enable wheelchair access) are to be accepted.

Luggage

Luggage or other items need not be removed from the vehicle in order to carry out this inspection.

Method of Inspection

Doors

1. Open and close the driver's and passengers' doors. Check that each latches securely in the closed position. Check also that front doors can be opened from both inside and outside the vehicle.

Seats

2. Check the driver's and front passengers' seats for security.
3. Check that the backrests of all seats (front and rear) can be secured in their normal upright position.

Reason for Rejection

Doors

1.
 - a. A driver's or **any** passenger's door does not latch securely in the closed position
 - b. a driver's or **front** passenger's door cannot be opened from both inside and outside the vehicle from the relevant control in each case.
Note: Reason for rejection 1b does not apply to:
 - goods vehicles modified for the carriage of high value cargoes such as armoured security vehicles
 - front passenger doors if the door aperture has been permanently 'filled' as part of a specialised customisation provided that there are no obvious aperture gaps.

Seats

2. The security of the driver's or front passenger's seat is significantly reduced.
3. A seat back that cannot be secured in the upright position.

6.1 Vehicle Structure, Body Security and Condition

Information

Vehicle Structure

Appendix C figures A to D show typical different vehicle structures where the shaded portions indicate the important load-bearing parts.

Body Security

This part of the examination applies to vehicles with separate bodies.

Individual defects

Individual defects are not subject to Reason for Rejection 2 or 3 unless their cumulative effect is likely to reduce significantly the overall body security.

Body condition

This part of the examination applies to all vehicles.

Method of Inspection

Vehicle Structure

1. With the vehicle over a pit or on a raised hoist, check the vehicle structure for any fracture, damage or corrosion, not within the prescribed areas, which is likely to affect prejudicially the correct functioning of the braking system or the steering gear.

Note: The prescribed areas are those specifically detailed in Sections 2, 3 and 5 of the manual.

Body Security

2. Examine the following items for presence, security, fracture, distortion, excessive wear or damage
 - a. all fixings (eg brackets) securing the body and its supporting members to the chassis
 - b. all fixings (eg brackets) securing the body to a sub-frame or supporting members, and all securing bolts, rivets or welds for all the above fixings.
3. Check the condition of the body and chassis in the vicinity of the mounting points.

Body condition

4. Examine the body work for excessive corrosion or damage resulting in sharp edges which are likely to cause injury.

Reason for Rejection

Vehicle Structure

1. Any deliberate modification, excessive corrosion, damage, fracture or inadequate repair not within a prescribed area which adversely affects braking or steering by severely reducing the strength or continuity of a main load bearing structural member.

Body Security

2.
 - a. Excessive displacement of the body relative to the chassis which might lead to loss of control of the vehicle when driven
 - b. insecurity of the body or its supporting members to the chassis so that it is clear that there would be a danger to other road users.
3. Any deliberate modification, excessive corrosion, damage, cracks or inadequate repair of a load bearing body or chassis member which seriously affects its strength within 30 cm of the body mountings.

Body Condition

4. A sharp edge or projection, caused by corrosion or damage, which renders the vehicle dangerous to other road users, including pedestrians.

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Section 6

Body and Structure

Section contents

Sub-Section	Subject	Page
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6.4	Load Security, Spare Wheel and Carrier	7

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Vehicles Exempt from Seat Belt Installation Checks

Notes

Ford Transits with type approved seat belt installations can be identified as follows:

- 12 and 15 seat (including the driver) Transits manufactured after 1 October 1991 where the fourth character of the VIN Number is "E".
- 17 seat (including the driver) Transits where there is a six figure code **EJA*CL** or **EJJ*CL** marked in the top right hand of the manufacturer's plate (in the type code box). In the code the fourth digit marked * can be any character.

LDV 200 series models with type approved seat belt installations can be identified as follows:

- chassis number from 933478 onwards and the seventh character of the VIN number is "S".

LDV 400 series models with type approved seat belt installations can be identified as follows:-

- chassis number from 933478 onwards and the seventh character of the VIN number is "S" or "V".

LDV Pilot and Convoy models with type approved seat belt installations can be identified as follows:

- chassis number from 000001 onwards and the seventh character of the VIN number is "S" or "X"

Land Rover Defender 110 Station Wagon with type approved seat belt installations can be identified as follows:

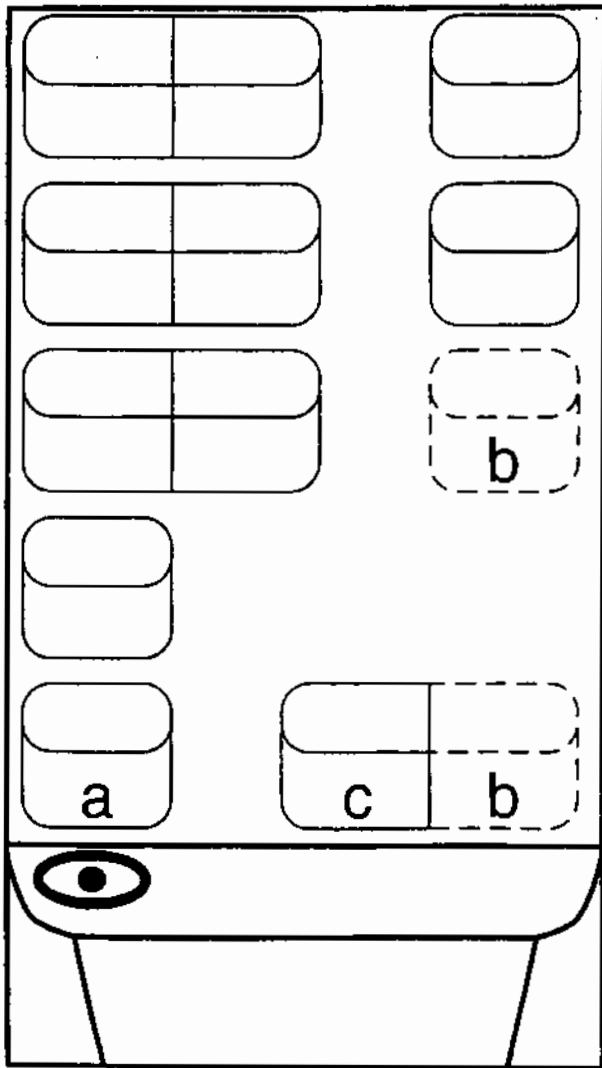
- manufactured 1990 - from chassis number 455758
- manufactured 1991 onwards - all chassis numbers.

Information on other makes will be circulated when it becomes available.

Important note: To be exempt from the check, vehicles must have been fitted with the seat belt installation by the vehicle manufacturer when new. If you are aware that a vehicle with a chassis number shown above has had any seats/seat belts fitted by any other installer, eg. where it has been adapted to carry wheelchairs and has removable seats on tracking, it will not be exempt and will require an installation check.

Legal Minimum Seat Belt Requirements for Vehicles fitted with 9-12 Passenger Seats

L02



1. Vehicles first used between 1 January 1965 and 30 September 1988 not exceeding 2540 kg unladen weight must have seat belts fitted to the drivers seat (a) and the specified front passenger seat (b) (two seat belts in total).

2. Vehicles first used after 30 September 1988 not exceeding 3500kg design gross weight must have seat belts fitted to the drivers seat (a), the specified front passenger seat (b), and if fitted, the centre front seat (c) (three seat belts in total).

Note: The 'specified front passenger seat' requiring a seat belt is the seat which is

- Foremost in the vehicle, and
- Furthest from the driver's seat

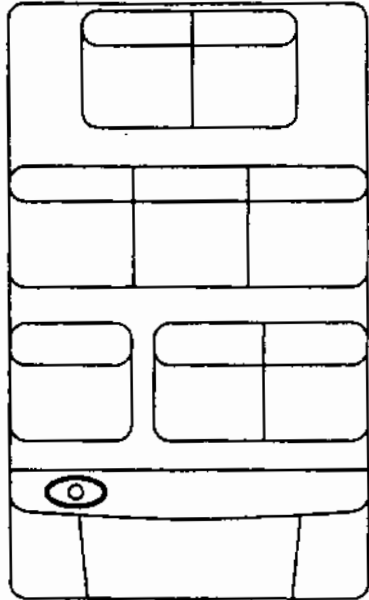
unless there is a fixed partition separating the passenger seat from a space in front of it which is alongside the driver's seat, eg. certain types of taxis, buses etc.

In the diagram, the dotted lines illustrate where a specified front passenger seat could be located.

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Additional information (Forward facing rear seats)

MORE THAN THREE REAR SEATS



Options →

'A' If one out board seat has a 3-point inertia reel type belt, then at least one other seat in the rear must have an **acceptable belt**.

or

'B' If any seat has a 3-point static belt, then at least one other seat in the rear must have either a child restraint or disabled person's belt.

or

'C' If the vehicle does not comply with 'A' or 'B' above, then **each seat** in the rear must have an **acceptable belt**.

- Acceptable belts** are
- Lap belts
 - Disabled person's belt
 - Child restraint
 - 3-point belt (static or inertia reel)

Note 1: Outboard seats are seats closest to the vehicle sides.

Note 2: Rear seat belts are not required for vehicles with more than 8 passenger seats in any configuration.

Note 3: Rear facing or side facing seats are not required to be fitted with seat belts.

Note 4: Occasional seats that fold when not in use, fitted in the rear of extended limousines, are not required to be fitted with seat belts.

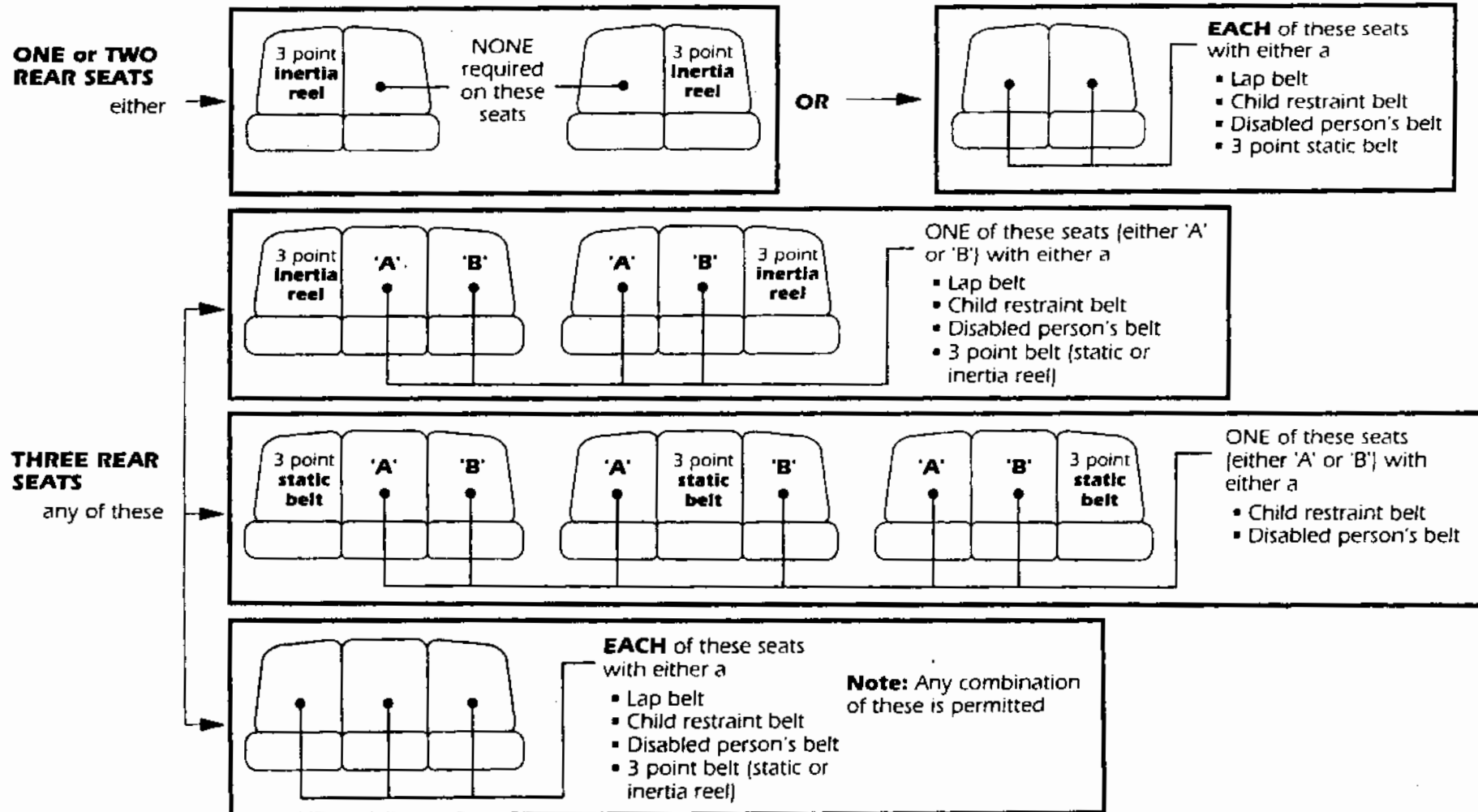
Note 5: Seats fitted to the rear of the driver's compartment in a goods vehicle do not require to be fitted with seat belts (unless the seat is the specified passenger seat, see Note 1, page 4).

Note 6: A goods vehicle (eg. a car derived van) which has been converted to a passenger vehicle specification (ie. fitted with rear seats and side window etc) is required to comply with the 'passenger vehicle' requirements.

Seat Belts

Additional information (Forward facing rear seats)

Vehicles first used after 31 March 1987. Forward facing rear seats must have **at least** the type and number of seat belts shown below.



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Seat belt requirements for vehicles first used after 31 March 1987 (or in the case of minibuses, motor caravans and ambulances 30 September 1988)

Seat Position

Vehicle Description	Driver's and "Specified Front Passenger's" Seat (See Note 1 page 14)	Centre Front seat	Forward Facing rear seats
<p>Passenger and dual purpose vehicles with no more than 8 passenger seats</p> <p>Except 3-wheeled vehicles</p> <ul style="list-style-type: none"> ■ with an unladen weight of 255kg or less or ■ with an unladen weight over 255kg but less than 410kg - equipped with a driving seat of a type requiring the driver to sit astride it, <p>and</p> <ul style="list-style-type: none"> - constructed or assembled by a person not ordinarily engaged in the trade or business of manufacturing vehicles of this type. 	3 point belts for each seat. (See Notes 2 & 3, page 4)	3 point belt, lap belt or a disabled person's belt.	<p>A. Vehicles with not more than 2 rear seats:</p> <p>Either</p> <ul style="list-style-type: none"> I. a three point inertia reel belt for at least one seat; <p>or</p> <ul style="list-style-type: none"> II. a three point belt, lap belt, disabled person's belt <p>or</p> <p>B. Vehicles with more than two 2 rear seats:</p> <p>Either</p> <ul style="list-style-type: none"> I. A 3 point inertia reel belt on an outboard seat and a 3 point static or inertia reel belt, lap belt, disabled persons belt or child restraint for at least one other seat; <p>or</p> <ul style="list-style-type: none"> II. A static 3 point belt for one seat and a disabled person's belt or child restraint for at least one other seat; <p>or</p> <ul style="list-style-type: none"> III. A 3 point belt, lap belt, disabled person's belt or child restraint to each seat. <p>See additional information on pages 6 & 7</p>
<p>Motor caravans and Ambulances with up to eight passenger seats</p>	3 point belts for each seat. (See Notes 2 & 3, page 4)	3 point belt, lap belt or a disabled person's belt	No requirement
<p>Minibuses, motor caravans and ambulances (9-12 seats) with a design gross weight NOT exceeding 3500kg</p>	3 point belts for each seat. (See Notes 2 & 3, page 4)	3 point belt, lap belt or a disabled person's belt	No requirement
<p>Minibuses, motor caravans and ambulances (9-12 seats) with a design gross weight exceeding 3500kg</p>	No requirement	No requirement	No requirement
<p>Goods vehicles & living vans (with a design gross weight not exceeding 3500kg)</p>	3 point belts for each seat. (See Notes 2 & 3, page 4)	3 point belt, lap belt or a disabled person's belt	No requirement (see notes 5 & 6 page 7)

Seat belt requirements for vehicles first used before 1 April 1987 (or in the case of minibuses, motor caravans and ambulances 1 October 1988)

Seat Position

Vehicle Description

Vehicle Description	Driver's and "Specified Front Passengers" Seat (See Note 1)	Centre Front seat	Forward Facing rear seats
<p>3-wheeled vehicles</p> <ul style="list-style-type: none"> ■ with an unladen weight over 410kg first used on or after 1 January 1965, * <p>or</p> <ul style="list-style-type: none"> ■ with an unladen weight over 255kg first used on or after 1 September 1970 * <p>* Except vehicles less than 410kg unladen, equipped with a driving seat of a type requiring the driver to sit astride it, and constructed or assembled by a person not ordinarily engaged in the trade or business of manufacturing vehicles of this type.</p>	<p>A. Vehicles first used before 1 April 1981: A belt which restrains the upper part of the body (but need not include a lap belt) for each seat.</p> <p>B. Vehicles first used after 31 March 1981: A 3 point (lap/diagonal) belt for each of these seats (see Note 2)</p>	No requirement	No requirement
<p>Passenger and dual purpose vehicles with no more than 8 passenger seats</p> <ul style="list-style-type: none"> ■ with 4 or more wheels first used on or after 1 January 1965 	as above	No requirement	No requirement
<p>Minibuses (9-12 passenger seats inclusive), motor caravans and ambulances first used on or after 1 January 1965 not exceeding 2540kgs unladen</p>	as above	No requirement	No requirement
<p>Goods vehicles & living vans</p> <ul style="list-style-type: none"> ■ first used on or after 1 April 1967 ■ with an unladen weight not exceeding 1525kg <p>or</p> <ul style="list-style-type: none"> ■ first used on or after 1 April 1980 ■ with a design gross weight not exceeding 3500kg # <p># except those first used before 1 April 1982 or manufactured before 1 October 1981, if they are of a model of vehicle which was manufactured before 1 October 1979 with an unladen weight exceeding 1525kg</p>	as above	No requirement	No requirement

Notes:

1. the "specified front passenger seat" requiring a seat belt is the seat which is
 - foremost in the vehicle and
 - furthest from the drivers seat

Unless there is a fixed partition separating the passenger seat from a space in front of it which is alongside the driver's seat, e.g. certain types of taxis, buses etc.
 2. '3 point belt' means a seat belt which
 - i. restrains the upper and lower parts of the torso
 - ii. includes a lap belt
 - iii. is anchored at not less than three points
 - iv. is designed for use by an adult
 3. an adult harness belt comprising a lap belt and shoulder straps bearing a British Standard marking is an acceptable alternative to any of the seat belt types listed.
 4. for passenger carrying vehicles and motor caravans converted from a goods vehicle see note 6 on page 7
- The definition of a motor caravan and a living van can be found in Section A of the 5th edition MOT Testing Guide.

Seat Belts 5.1

Information

- Extra seat belts have been fitted since a previous installation check MOT.

Compare the number of seat belts now fitted with the number shown on the last MOT certificate.

Note: If it is obvious that the vehicle is capable of carrying more than 8 seated passengers (for example, by having wheelchair tracking/clamps fitted) the presenter of the vehicle should be asked how many passengers the vehicle carries in normal use to establish the seating capacity.

Seat belt pre-tensioners

Some seat belts are fitted with pre-tensioners.

Once activated, a 'flag' or similar shows on the seat belt stalk.

In itself a seat belt that has had the pre-tensioner activated is NOT a reason for rejection.

The vehicle presenter should be advised.

Method of Inspection

- Examine flexible buckle stalks for
 - signs of corrosion or weakness. Pull the sheaths aside, if this can be done without damage
 - 'waggle' flexible buckle stalks and listen for a clicking noise indicating broken strands of cable.

- Fasten each belt locking mechanism and try to pull the locked sections apart. On retracting seat belts, check that with the mechanism fastened and the seat unoccupied, excess webbing is wound into the retracting unit.

Note: Some types of retracting belt might need manual help before they retract.

Operate the release mechanism while pulling on the belt to check that the mechanism releases when required.

- As far as is practicable without dismantling, check the condition of the vehicle structure around the seat belt anchorage points (ie within the 'prescribed area' (see Appendix C). The floor-mounted anchorage points might need to be inspected from underneath the vehicle.

Reason for Rejection

- Corrosion or deterioration of a flexible stalk likely to lead to failure under load
 - broken strands of a flexible stalk cable.
- The locking mechanism of a seat belt does not secure or release the belt as intended
 - a retracting mechanism does not retract the webbing sufficiently to remove **all** the slack from the belt with the locking mechanism fastened and the seat **unoccupied**.
Note 1: In doubtful cases, this should be checked with the seat base set in its rearmost position.
Note 2: The vehicle presenter should be advised of and given the opportunity to remove any temporarily fitted device likely to cause failure under this reason for rejection before notification of refusal is issued.
- Deliberate modification which significantly reduces the original strength, excessive corrosion, severe distortion, a fracture or an inadequate repair of a load bearing member or its supporting structure or supporting panelling within 30cm of a seat belt anchorage.
Note: With a seat belt attached to a seat frame this reason for rejection will apply to **ALL** seat mounting points.

5.1 Seat belts

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Information

This inspection applies to all seat belts fitted including child seats/restraints etc. However the reasons for rejection should only be applied to those permanently attached to the vehicle ie secured by nuts, bolts etc.

If a belt is fitted, but there is no corresponding seat it is NOT considered to be a seat belt, for the purpose of this inspection.

IMPORTANT

Vehicles fitted with more than 8 passenger seats may be subject to a seat belt installation check. This can only be carried out by Class V authorised test stations. It is essential therefore that you correctly identify vehicles that require a seat belt installation check.

A vehicle will require a seat belt installation check if **ALL** the following applies

It has more than 8 passenger seats fitted (see note below)

It has more than the legally required number of seat belts fitted (see page 8 for guidance)

There is no proof that all the seat belt installations have been fully type approved (see page 9)

There is no proof that a seat belt installation check has been previously carried out (this will be by a previous VT 20 being produced at time of test showing that the vehicle has had an installation check)

Cont'd ▼

Method of Inspection

A. Statutory fitment

1. Check that each seat that requires a seat belt is fitted with one of the appropriate type (see pages 4-9)

B. Condition of ALL seat belts fitted

1. Pull each seat belt webbing against its anchorage to see that it is properly secured to the vehicle structure.
Note: For seats with integral seat belts, it might not be possible to examine the fixing of the seat belt to the seat.
2. Examine the condition of all seat belt webbing for cuts or obvious signs of deterioration. Pay particular attention to webbing around anchorages, buckles and loops.
3. Examine the condition of the attachment fitting and adjusting fitting on each belt.

Cont'd ▼

Reason for Rejection

1. A seat belt missing or of the wrong type.
 1.
 - a. A seat belt not securely fixed to the seat or to the structure of the vehicle. For example, a fixing bolt not secure.
 - b. for seats with seat belts attached to them; any insecure attachment of the seat to the vehicle structure
 - c. for seats with seat belts attached to them; a cracked or damaged seat frame.
 2.
 - a. A cut which causes the fibres to separate
 - b. fluffing or fraying sufficient to obstruct correct operation of the belt or which has clearly weakened the webbing
 - c. stitching badly frayed, not secure, incomplete or repaired.
 3. An attachment fitting or adjustment fitting of a seat belt fractured or badly deteriorated.
Note: damage or deterioration of the plastic covering of a component is not a reason for rejection unless it affects the operation of the belt.

Cont'd ▼

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Section 5

Seat Belts

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Tyre Size, Ply Rating and Load Index Tables

Nominal Tyre Size	Ply Rating	Load Index	Maximum Axle Load (Kg)	
			Single Tyres —|—	Twin Tyres H—|—H
185-16C	8	104/102	1800	3400
195-16C	8	107/105	1950	3700
205-16	-	106/104	1900	3600
205-16C	6	-	1900	3610
205-16C	8	110/108	2120	4000
215-16C	6	110/108	2120	4000
215-16C	8	113/111	2300	4360
600-16	-	95/92	1380	2520
600-16	6	-	1380	2550
600-16	8	-	1530	2920
600-16	-	103/101	1750	3300
600-16	10 & RADIAL	-	1830	3300
650-16	-	98/97	1500	2920
650-16	6	-	1530	2920
650-16	-	104/102	1800	3400
650-16	8	-	1830	3460
650-16	-	108/107	2000	3900
650-16	10 & RADIAL	-	2040	3900
700-16	-	102/100	1700	3200
700-16	6	-	1730	3260
700-16	-	108/106	2000	3800
700-16	8	-	2040	3870
700-16	-	113/112	2300	4480
700-16	10	-	2340	4480
700-16	-	117/116	2570	5000
700-16	12 & RADIAL	-	2650	5000
750-16	-	108/106	2000	3800
750-16	6	-	2040	3870
750-16	-	112/110	2240	4240
750-16	8 & RADIAL	-	2240	4270
750-16	10	-	2500	4720
750-16	12 & RADIAL	116/114	2500	4720
750-16	-	-	2900	5600
750-16	-	121/120	2900	5600
825-16	8	-	2650	4880
825-16	10	-	2850	5440
900-16	6	-	2340	4370
900-16	-	114/111	2360	4360
900-16	8	-	2720	5140
900-16	-	119/117	2720	5140
900-16	10	-	3050	5600
175/75-16	-	101/99	1650	3100
185/75-16	-	104/102	1800	3400
195/75-16	-	104/102	1800	3400
195/75-16	-	107/105	1950	3700
205/75-16	-	110/108	2120	4000
215/75-16	-	113/111	2300	4360
225/75-16	-	116/114	2500	4720
225/75-16	-	118/116	2640	5000

The tyre load index table below shows the maximum axle load for tyres in single and dual (twin) formation that may not be listed in the Size-Load table of this Annex.

Load Index	Single Kg	Dual Kg
70	670	1340
71	690	1380
72	710	1420
73	730	1460
74	750	1500
75	774	1548
76	800	1600
77	824	1648
78	850	1700
79	874	1748
80	900	1800
81	924	1848
82	950	1900
83	974	1948
84	1000	2000
85	1030	2060
86	1060	2120
87	1090	2180
88	1120	2240
89	1160	2320
90	1200	2400
91	1230	2460
92	1250	2520
93	1300	2600
94	1340	2680
95	1380	2760
96	1420	2840
97	1460	2920
98	1500	3000
99	1550	3100
100	1600	3200
101	1650	3300
102	1700	3400
103	1750	3500
104	1800	3600
105	1850	3700
106	1900	3800
107	1950	3900
108	2000	4000
109	2060	4120
110	2120	4240
111	2180	4360
112	2240	4480
113	2300	4600
114	2360	4720
115	2430	4860
116	2500	5000
117	2570	5140
118	2640	5280
119	2720	5440
120	2800	5600
121	2900	5800
122	3000	6000

Tyre Size, Ply Rating and Load Index Tables

How to use this table:

1. Locate the line entry corresponding to the size and ply rating or load index marked on the tyre sidewall;
2. Read off the maximum axle load (kg) for these tyres in 'SINGLE' or 'TWIN' formation, as appropriate.

3. These tables show the maximum axle load for tyres in single and dual (twin) formation. If a tyre has only one load index marked, then that index refers to use in single formation. Such tyres can be used in dual formation by applying the following formula:

Max. load in dual formation = Max. load shown for single x 1.91

Nominal Tyre Size	Ply Rating	Load Index	Maximum Axle Load (Kg)	
			Single Tyres |-----|	Twin Tyres |-----|
145-13C	6	83/81	970	1840
145-13C	8	88/86	1120	2120
560-13C	6		1020	1940
590-13C	6		1070	2090
640-13C	6		1280	2240
640-13C	8		1430	2750
670-13		94/93	1340	2600
670-13C	6		1380	2650
670-13		99/98	1550	3000
670-13C	8		1580	3050
155-14C	6		1070	2040
175-14		96/94	1420	2680
175-14C	6		1430	2680
175-14C	8	99/98	1550	3000
185-14			1200	2300
185-14			1340	2560
185-14		94	1340	2560
185-14C	6	99/97	1550	2920
185-14C	8	102/100	1700	3200
195-14		102/100	1700	3200
195-14C	6		1700	3210
195-14C	8	106/104	1900	3600
205-14		105/103	1850	3500
205-14C	6		1850	3510
205-14C	8	109/107	2060	3900
215-14C	8	112/110	2240	4240
590-14C	6		1170	2240
600-14C	8	92/90	1260	2400
640-14C	6		1330	2550
650-14	4		970	1860
650-14C	6	93/91	1300	2460
650-14C	8		1500	2840
670-14C	6		1430	2750
670-14		101/99	1650	3100
670-14C	8		1680	3160

Nominal Tyre Size	Ply Rating	Load Index	Maximum Axle Load (Kg)	
			Single Tyres |-----|	Twin Tyres |-----|
700-14C	4		1070	2050
700-14		94/93	1340	2600
700-14C	6		1380	2650
750-14	4		1200	2300
750-14		98/96	1500	2840
750-14C	6		1530	2950
750-14		102/101	1700	3300
750-14C	8		1730	3360
175/75-14		98/99	1550	3000
185/75-14		102/100	1700	3200
195/75-14		106/104	1900	3600
205/75-14		109/107	2060	3900
215/75-14		112/110	2240	4240
145-15C	8	91/89	1230	2320
185-15C	8	103/102	1750	3400
590-15C	6		1220	2340
640-15C	6		1380	2650
670-15		98/96	1500	2840
670-15C	6		1530	2900
670-15		103/102	1750	3400
670-15C	8		1780	3460
670-15	10	108/107	2000	3900
700-15C	6		1750	3400
700-15C		103/102	1750	3400
700-15C	8		1940	3760
700-15	12		2440	4580
750-15C	6		1830	3560
750-15C	8		2060	3970
750-15	10		2340	4370
750-15	12		2750	5340
255/75-15		118/116	2640	5000
175-16C	6	98/96	1500	2840
175-16C	8	101/99	1650	3100

Information

This inspection applies to:
 the road wheels fitted to the vehicle at the time of the inspection **only**. The vehicle presenter should be informed if a defect is noticed on a spare wheel.

Method of Inspection

1. Check all road wheels for
 - a. cracks, damage and distortion, particularly the rim
 - b. security
 - c. presence and tightness of wheel fixing nut(s), stud(s), bolt(s) etc.
Note: the condition of the spare wheel is not included in the inspection. However, if a defect is seen, inform the vehicle presenter.
Note: Removal of wheel hub caps etc is not required.

Reason for Rejection

1.
 - a. A wheel badly damaged, distorted or cracked, or with a badly distorted bead rim
 a wheel which has a spoke(s) missing, cracked or excessively
 - loose
 - bent, or
 - corroded
 - b. a wheel insecure
 - c. loose or missing wheel nut(s), stud(s) or bolt(s).

4.1 Tyres

Information

A 1.0mm minimum tread depth applies to

- A passenger-carrying vehicle with more than 8 passenger seats excluding the driver's seat.
- A vehicle first used before 3 January 1933.

Method of Inspection

1.0 mm tread depth

2. Check the tread pattern over the complete circumference of the tyre. Check also that the tread depth meets the requirements using, as necessary, a depth gauge accepted for MOT testing.

Reason for Rejection

2. A tyre with a tread pattern
 - a. not visible over the whole tread area, and
 - b. the depth of which is not at least 1mm throughout a single band
 - round the entire outer circumference of the tyre
 - of at least three-quarters of the breadth of tread.

Note: The 1.0mm tread depth requirement applies to the whole tread width if the original tread pattern did not extend beyond three-quarters of the tyre width when new.

Information

Tread

A tread pattern is the combination of plain surfaces and grooves extending across the breadth of the tread and round the entire circumference.

The tread pattern excludes any tie-bars, tread wear indicators, or features designed to wear out substantially before the remainder of the pattern, and other minor features. Grooves that had not been cut as deep as those containing the wear indicators when new, are not to be considered as part of the tread pattern.

Breadth of tread

The part of the tyre which can contact the road under normal conditions of use measured at 90 degrees to the peripheral line of the tread.

A 1.6mm minimum tread depth applies to

A vehicle first used after 2 January 1933 that is either

- a. a passenger carrying vehicle (car, motor caravan etc) with not more than 8 passenger seats, excluding the driver's, or
- b. a goods vehicle or dual purpose vehicle not exceeding 3500kg maximum gross weight

Method of Inspection

D. Breadth and depth of tread

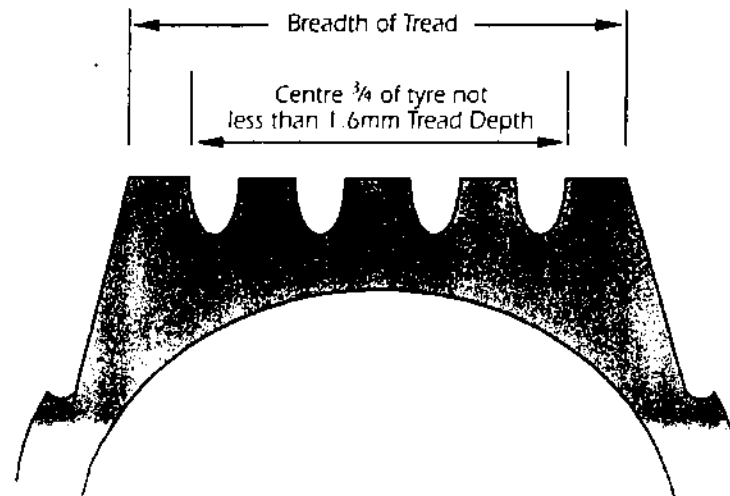
1.6mm tread depth

1. Check the tread pattern over the complete circumference of the tyre. Check also that the tread depth meets the requirements using, as necessary, a depth gauge accepted for MOT testing.

Reason for Rejection

1. The grooves of the tread pattern are not at least 1.6mm throughout a continuous band comprising
 - the central three-quarters of the breadth of tread, and
 - round the entire outer circumference of the tyre.

Note: Each side of the central band of the tyre can be devoid of tread (i.e. 'bald') and still meet the pass standard. See diagram below.



4.1 Tyres

Method of Inspection

2. Check tyres for fouling a part of the vehicle.
3. Check tyres on twin wheels for wall contact.

Reason for Rejection

2. A tyre fouling a part of the vehicle.
Note: This does not apply to vehicles designed to permit tyre contact with the chassis or frame eg. steering lock stop function.
3. Tyres on twin wheels making wall contact due to under-inflation or incorrect fitment.
Note: Some tyres, eg radial ply tyres, with flexible side walls may touch under load. Wall contact in these circumstances **is not** a reason for rejection.

Information**Inspecting the tyres**

It is not possible to see every part of a tyre, in particular the tread contact area, when twin wheels are fitted or when the body shrouds the tyres. If necessary, the vehicle must be moved to expose the hidden parts and the examination completed from under the vehicle.

Recut tyres

Recut tyres are permitted on

- a goods vehicle at least 2540 kg unladen weight having at least 405 mm (16 inch) diameter wheels
- a vehicle with at least 8 passenger seats, excluding the driver's seat, and over 2540 kg unladen weight
- a vehicle over 3050 kg unladen weight

Method of Inspection**C. Condition of Tyres**

1. Examine each tyre for
 - a. cuts
 - b. lumps, bulges, tears, exposure of the ply or cord, or tread separation
Note: On radial ply tyres, care should be taken to distinguish between normal undulations in the carcass, resulting from manufacturing, and lumps or bulges caused by structural deterioration
 - c. a recut tread
 - d. incorrect seating in the wheel rim
 - e. valve condition and alignment
 - f. correct fitting
 - g. under-inflation
Note: Under-inflation of a tyre is not in itself a reason for rejection. However,
 - a brake test might be inadvisable, because of possible damage, or
 - a headlight test might be affected, if the under-inflation is affecting alignment.

Cont'd ▼

Reason for Rejection

1.
 - a. A tyre has a cut the length of which is at least 25 mm or 10% of section width, whichever is greater, deep enough to reach the ply or cords
 - b. a tyre has
 - a lump, bulge or tear caused by separation or partial failure of its structure. This includes any lifting of the tread rubber
 - any of its ply or cord exposed
 - c. a re-cut tyre fitted to a vehicle not permitted to be so equipped
 - d. a tyre incorrectly seated on the wheel rim
 - e. a seriously damaged or misaligned valve stem which could cause sudden deflation of the tyre
 - f. a tyre not fitted in compliance with the manufacturers sidewall instruction, eg an asymmetric with a sidewall marked 'outer' fitted with the marking to the inner side of the wheel.

Cont'd ▼

4.1 Tyres

Information

Permitted laden weight of an axle

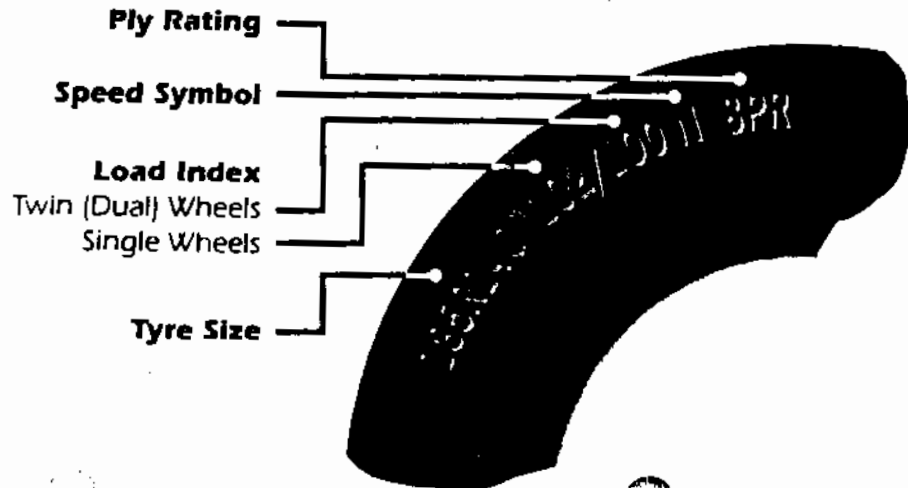
This is the relevant axle weight in the column headed 'WEIGHTS NOT TO BE EXCEEDED IN GREAT BRITAIN' (GB WEIGHTS) shown on the Department of Transport plate (Ministry plate) fitted to the vehicle.

Vehicles not fitted with Ministry plate

If a Ministry plate is not fitted to the vehicle, the relevant axle GB WEIGHT is that shown on the manufacturer's plate (See section 3, page 29).

Some vehicles first used before 1968 might not be fitted with a Ministry plate or a manufacturer's plate displaying axle weights.

The load capacity of tyres on such vehicles must be assumed suitable, unless there is indisputable evidence to the contrary.



Method of Inspection

B. Load Index and Speed Rating (Applicable to Class VII only)

1.
 - a. check for a load index (or ply rating and tyre size) marked on at least one sidewall of each tyre. (See page 10 & 11 for the identification of tyre load index, ply rating and tyre size)
Note: A tyre not marked with a load index or ply rating is assumed to have the lowest 'load capacity' of its size.
 - b. check the load index is adequate for the maximum laden weight of the axle.
2. Check for a speed rating letter marked on the sidewall of each tyre.

Reason for Rejection

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1.
 - a. a tyre not marked with its size on at least one sidewall. (See pages 10 & 11)
 - b. a tyre that has a load index (or ply rating and tyre size) that is inadequate for the permitted maximum laden weight of the axle to which it is fitted. (See pages 10 & 11 for the determination of tyre load capacity)
2. A tyre marked with one of the following speed rating letters: A, B, C, D, E, F, G, J or K.
Note: Some tyres are not marked with a 'speed rating' and the absence of such a mark is not a reason for rejection.

Method of Inspection

2. Type of structure, ie bias-belted, cross-ply or radial.
Note: Steel and fabric radial-ply tyres are to be regarded as the same structure type.

Reason for Rejection

- 2.
- a. One tyre is of a different type of structure from another tyre on the same axle
 - b. a 3- or 4-wheeled vehicle fitted with single wheels, and
 - i) a cross-ply tyre or bias-belted tyre fitted on rear axle and radial-ply tyre is fitted on front axle, or
 - ii) a cross-ply tyre fitted on rear axle and a bias-belted tyre fitted on front axle.

Note: Any tyre 'type' mix **between different axles** is acceptable for vehicles that have

- 2 axle and 'twin' wheels on the rear axle
- 3 axles, one steering and one driving.

Note: This does not apply to vehicles with an axle fitted with tyres having a road contact area at least 300mm wide.

Cont'd ▼

Cont'd ▼

4.1 Tyres

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Information

This inspection applies to

Tyres fitted to the road wheels **only**. The vehicle presenter should be informed when it is noticed that there is a defective tyre on a spare wheel.

Identifying tyre size and type

To identify the size and type of tyres, it might be necessary to rotate the wheels or move the vehicle.

Only one sidewall of a tyre needs to be marked.

Section height: section width ratio (aspect ratio)

Unless marked otherwise, "standard" car tyres have a nominal aspect ratio of 82%. Some tyres have an aspect ratio of 80%. These have "780" included in their size marking eg 165/80 R13.

Dual size marking of tyres

Some tyre manufacturers are now dual marking certain sizes of tyres.

For example, a 185/75R14 tyre may be dual marked 185R14.

Where a tyre is found to be dual marked by the manufacturer on the sidewall, either markings can be accepted.

Method of Inspection

A. Type of Structure

On all the tyres fitted, check the

1. Nominal size and aspect ratio.

Note: It cannot be assumed that there is a difference in the nominal sizes of tyres because either twin wheel is not in contact with the ground.

Note: A Class III or IV vehicle tyre which appears to be of inadequate size, ply or speed rating for the vehicle or its use is not a reason for rejection. However, the vehicle presenter should be informed.

Reason for Rejection

1.
 - a. One tyre is of a different nominal size or aspect ratio to any other on the same axle.
 - b. special lightweight or space saving wheels and tyres fitted as road wheels

Note: Tyres with aspect ratios of 80% and 82% are almost identical in size and can be safely mixed in any configuration on a vehicle. Where this is done, Reason for Rejection 1 **does not** apply.

In all other cases of mixed aspect ratios on the same axle, rejection is justified.

Cont'd ▼

Section 4

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Tyres and Roadwheels

Section contents

Sub-Section	Subject	Page
4.1	Tyres	2
	A. Type of structure	2
	B. Loading index and speed rating (applicable to Class VII only)	4
	C. Condition of Tyres	5
	D. Tread pattern, breadth of tread and depth of tread	7
4.2	Roadwheels	9

3.10 Brake Efficiency Table

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CLASS OF VEHICLE	MINIMUM BRAKE EFFICIENCIES REQUIRED		
	SERVICE BRAKE	PARKING BRAKE	
		Vehicle with a single line braking system	Vehicle with a split (dual) braking system
Vehicles with 4 or more wheels having a service brake (foot-brake) operating on at least 4 wheels and a parking (handbrake) operating on at least 2 wheels.	50%	25%	16%
Vehicles with 3 wheels with a service brake operating on ALL wheels and a parking brake operating on at least one wheel which were first used:			
i) before 1 January 1968	40%	25%	16%
ii) on or after 1 January 1968	50%	25%	16%
Vehicles first used before 1 January 1968 which do NOT have one means of control operating on at least 4 wheels (or 3 for three wheeled vehicle) and which have one brake system with two means of control or two brake systems with separate means of control.	30% from first means of control	25% from second means of control	
Vehicles first used before 1 January 1915.	One efficient braking system required.		

NOTE 16% parking brake efficiency equates to a vehicle holding on a gradient of 1 in 6.25

Examples of late type Ministry and Manufacturer's Plates **3.9**

PLATE VTG 8T		Department of Transport Road Traffic Act 1990, Sections 41, 49, 57 and 58 Examination of Goods Vehicles		T3 821889	
(1) DESCRIPTION OF WEIGHTS APPLICABLE TO VEHICLE		(2) WEIGHTS NOT TO BE EXCEEDED IN G.T. BRITAIN		(3) DESIGN WEIGHTS	
AXLE WEIGHT AXLE 1 AXLE 2 AXLE 3 AXLE 4 GROSS WEIGHT TRAIN WEIGHT		kg kg kg kg kg kg		kg kg kg kg kg kg	
				Date of issue WARNING	

MINISTRY PLATE

- 'Ministry' and Manufacturer's plates are usually located inside the vehicle cab and on the nearside. The example left shows the VTG 8T, later vehicles may display a VTG 6T.
- On the 'Ministry' and manufacturer's plates there is a provision to show vehicle 'DESIGN WEIGHTS' also 'WEIGHTS NOT TO BE EXCEEDED IN G.T. BRITAIN' (GB WEIGHTS). In cases where there is not a DESIGN GROSS WEIGHT shown on a plate then the GROSS GB WEIGHT is used for brake percentage efficiency calculations. Some vehicles first used before 1968 may not be fitted with a 'Ministry' plate displaying gross weight. The brake percentage efficiency of such vehicles must be determined by Decelerometer Test - see sub-section 3.7 B1.

Note:

If the presented vehicle is fitted with a 'Ministry' plate, then the information displayed on that plate relating to axle, gross vehicle and gross train weight will always override the information displayed on the manufacturer's plate. The registration number and chassis number on the 'Ministry' plate must be cross checked to ensure the plate relates to that vehicle.

Whole vehicle EEC or National Type Approval number (if any)			Manufacturers Name
Vehicle Identification Number			
Max gross weight in Gt. Britain			Max design gross weight
Max train weight in Gt. Britain (only for motor vehicles designed to draw a trailer)			Max design train weight
Max axle weights in Gt. Britain. This example is for a 3 axle vehicle. Other types will have more or fewer spaces dependent upon the number of axles	1	kg	Max design axle weights
	2	kg	
	3	kg	

MANUFACTURER'S PLATE

3.8 Method of calculating Brake Performance

380.

8.1 Brake Efficiency

Total up the braking effort recorded from all the wheels of the vehicle when the service brake is applied. Total up the braking effort recorded from the appropriate wheels when the parking brake is applied.

Calculate the service brake and parking brake percentage efficiencies by following the procedures detailed below according to the Class of vehicle tested.

Class III and IV Vehicles

Determine the weight of the vehicle from the current Brake Data Chart (the data includes an element of 140kg or 300lbs for the weight of the driver, fuel, tools, etc.)

Calculate the service brake percentage efficiency by dividing the total brake effort achieved when the service brake is applied by the vehicle weight and then multiplying the result by 100.

$$\text{i.e. } \frac{\text{Total brake effort} \times 100}{\text{Vehicle Weight}} = \% \text{ Efficiency}$$

Calculate the parking brake percentage efficiency by dividing the total brake effort achieved when the parking brake is applied by the vehicle weight and then multiplying the result by 100, as above.

Class VII Vehicles

Obtain the vehicle Design Gross Weight (DGW) from the Department of Transport plate (commonly called 'Ministry' plate) fitted to the vehicle. If a Ministry plate is not fitted to the vehicle then obtain the DGW from the manufacturer's plate fitted to the vehicle (see Notes 1 and 2 on page 29).

Calculate the service brake percentage efficiency by dividing the total brake effort achieved when the service brake is applied by the vehicle DGW and then multiplying the result by 100.

$$\text{i.e. } \frac{\text{Total brake effort} \times 100}{\text{DGW}} = \% \text{ Efficiency}$$

Calculate the parking brake percentage efficiency by dividing the total brake effort achieved when the parking brake is applied by the vehicle DGW and then multiplying the result by 100, as above.

Note: Plate Brake Test Only

Vehicles with a presented weight of 2000kg or more must be tested to the above criteria. On vehicles with a presented weight of less than 2000kg, the brake efficiency must be calculated using a nominal DGW figure of 2600kg.

$$\text{i.e. } \frac{\text{Total brake effort} \times 100}{2600} = \% \text{ Efficiency}$$

8.2 Brake Out-of-Balance

The out of balance of the braking effort on the front steered wheels when the service brake is applied is obtained by comparing the brake efforts at each front wheel when they are tested simultaneously (see sub-section 3.7.2, page 20). Carry out the following calculation to determine the percentage imbalance:

$$\frac{(\text{Higher brake effort} - \text{Lower brake effort}) \times 100}{\text{Higher brake effort}} = \% \text{ imbalance}$$



3.7 Brake Performance

Information

Method of Inspection

Plate Brake Testing

The brake performance test must be carried out on a properly calibrated and maintained plate brake tester designated as acceptable for the statutory test. (Alternatively a slow-speed roller-brake tester can be used - see section 3.7'A).

Vehicles which only just pass

With some vehicles, the required brake efficiency is just obtained or just exceeded, but the tester knows that a higher performance figure is normally obtained for the type of vehicle.

Although the vehicle has passed the brake performance test, the tester should advise the vehicle presenter that the braking system appears to need adjustment or repair.

Testing transmission handbrakes

When using a plate tester to test a transmission handbrake, keep the ratchet disengaged for as long as the brake is applied. Take the efficiency reading without the occurrence of transmission snatch or judder.

C. Plate Brake Test

Preparation

1. Determine whether the vehicle has a single or dual (split) braking system.
Note: To determine whether the vehicle has a dual (split) braking system, check the number of pipes **from** the hydraulic master cylinder or air foot valve. Dual (split) systems normally have at least two pipes.

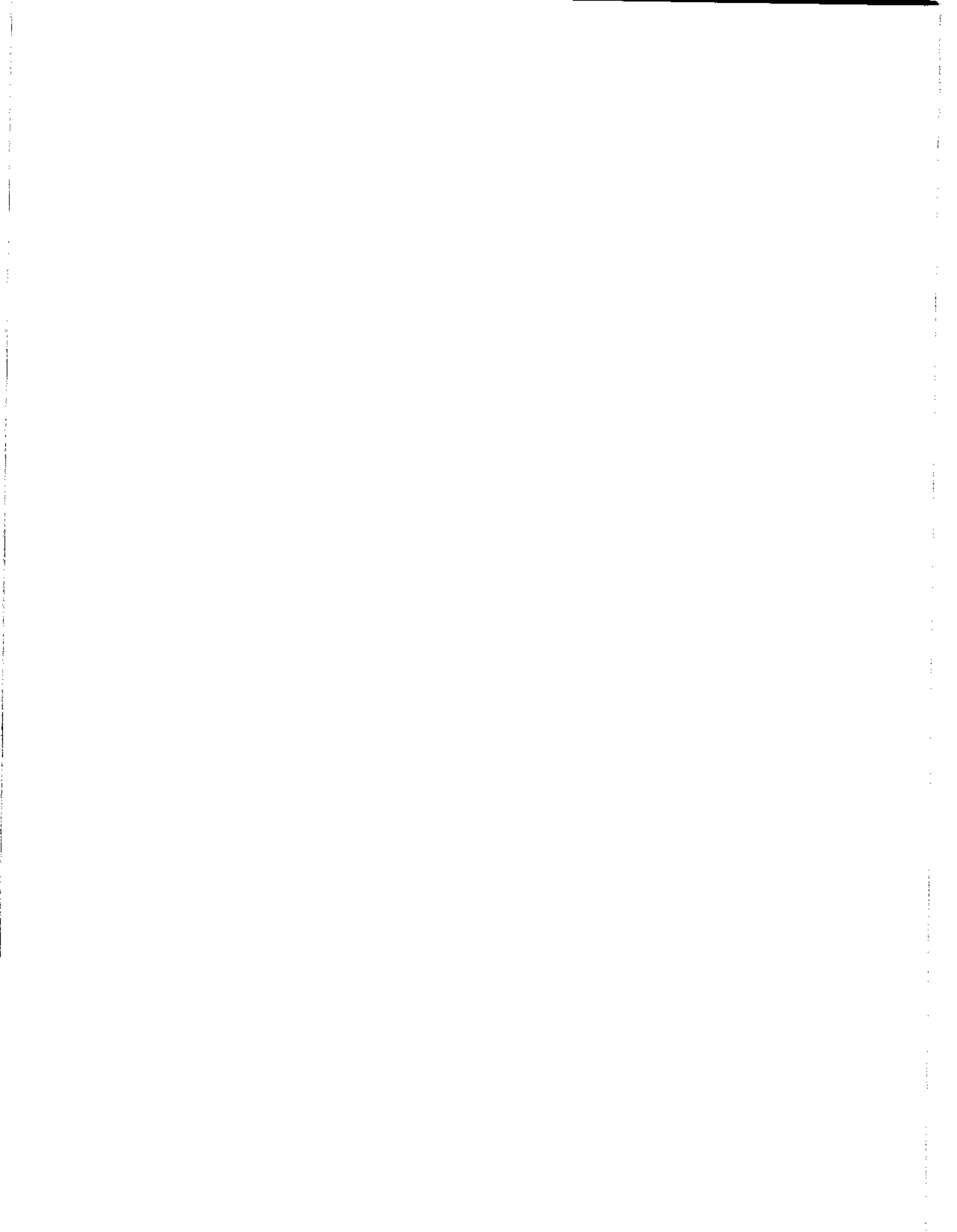
Some hydraulic systems have two master cylinders.

2. **Class IV vehicles:** Obtain the vehicle test weight from the data chart.

Class VII vehicles: Establish the vehicle actual presented weight.

The brake efficiency on class VII vehicles will be calculated using either:

- the actual DGW where the presented weight is 2000kg or over (the DGW is obtained from the Department of Transport plate or the manufacturers plate fitted to the vehicle - see notes 1 and 2 on page 29), or
 - a nominal DGW figure of 2600kg if the presented weight is less than 2000kg.
3. Enter the appropriate data to conduct the test.



3.7 Brake Performance

Information

To avoid possible damage, the parking brake efficiency requirement should be calculated using the appropriate vehicle weight before the brake is tested.

Testing of the brake should cease as soon as the minimum efficiency requirement is reached when progressively applying the brake

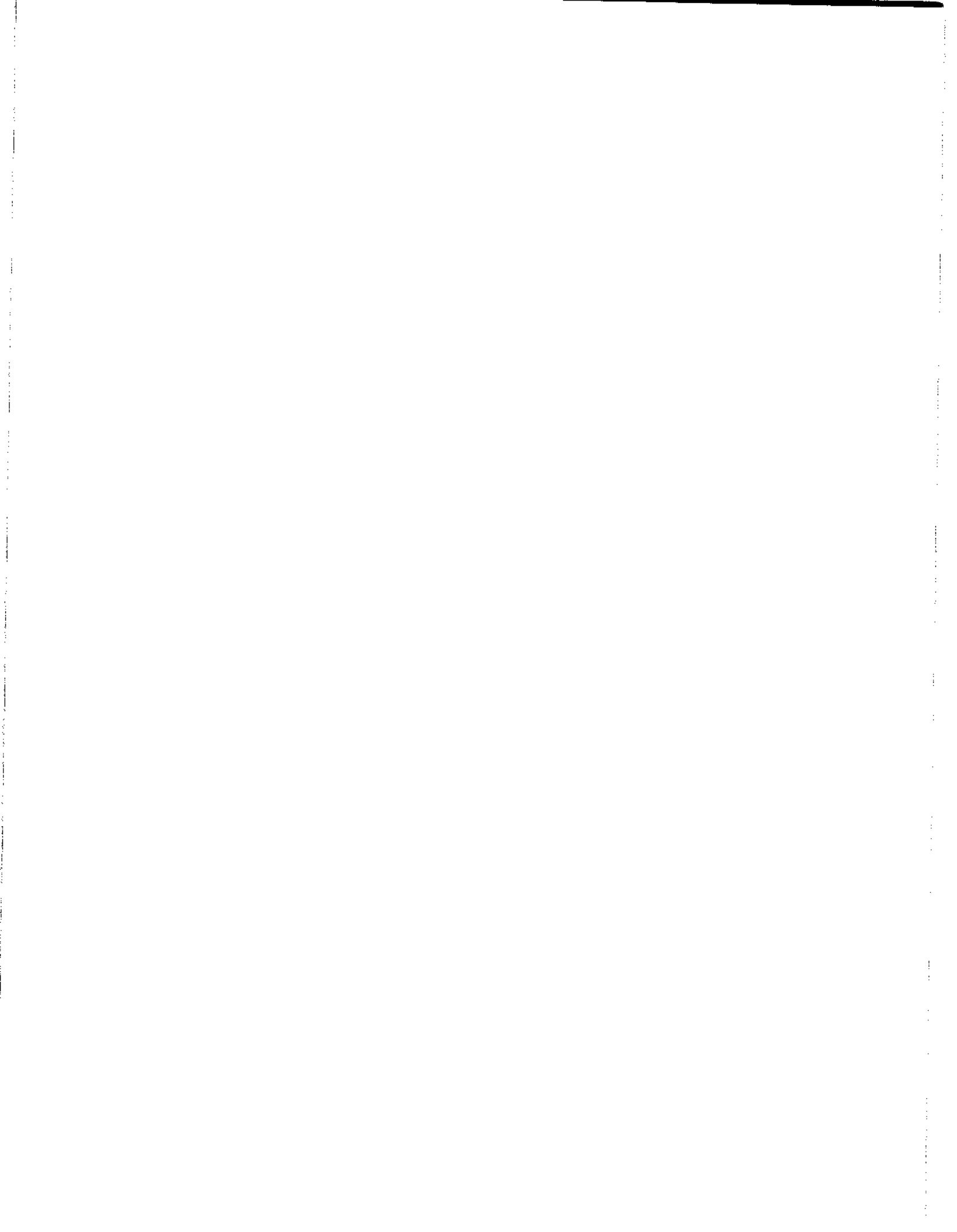
Method of Inspection

Testing Transmission (prop shaft) Handbrakes

10. Carry out the following procedure
 - Place the wheels to be tested in the rollers.
 - Run both sets of rollers together to align the vehicle.
 - Chock the other wheels of the vehicle fore and aft.
 - Run both sets of rollers together.
 - Keep the handbrake ratchet disengaged for as long as the brake is applied.
 - Apply the brake slowly and progressively without causing transmission snatch.
 - Note the gauge readings and calculate the brake efficiency (see Method of Calculating Brake Efficiency on page 28).

Reason for Rejection

10. The transmission brake 'parking' efficiency is too low (see Brake Efficiency Table on page 30).



3.7 Brake Performance

Method of Inspection

5. Start both sets of rollers and note whether a significant brake effort is recorded from any wheel without a brake being applied. Gradually depress the service brake and watch how the braking effort for each wheel increases.

From the previous tests you will know the value at which wheelslip occurs. Aim to stop just short of this.

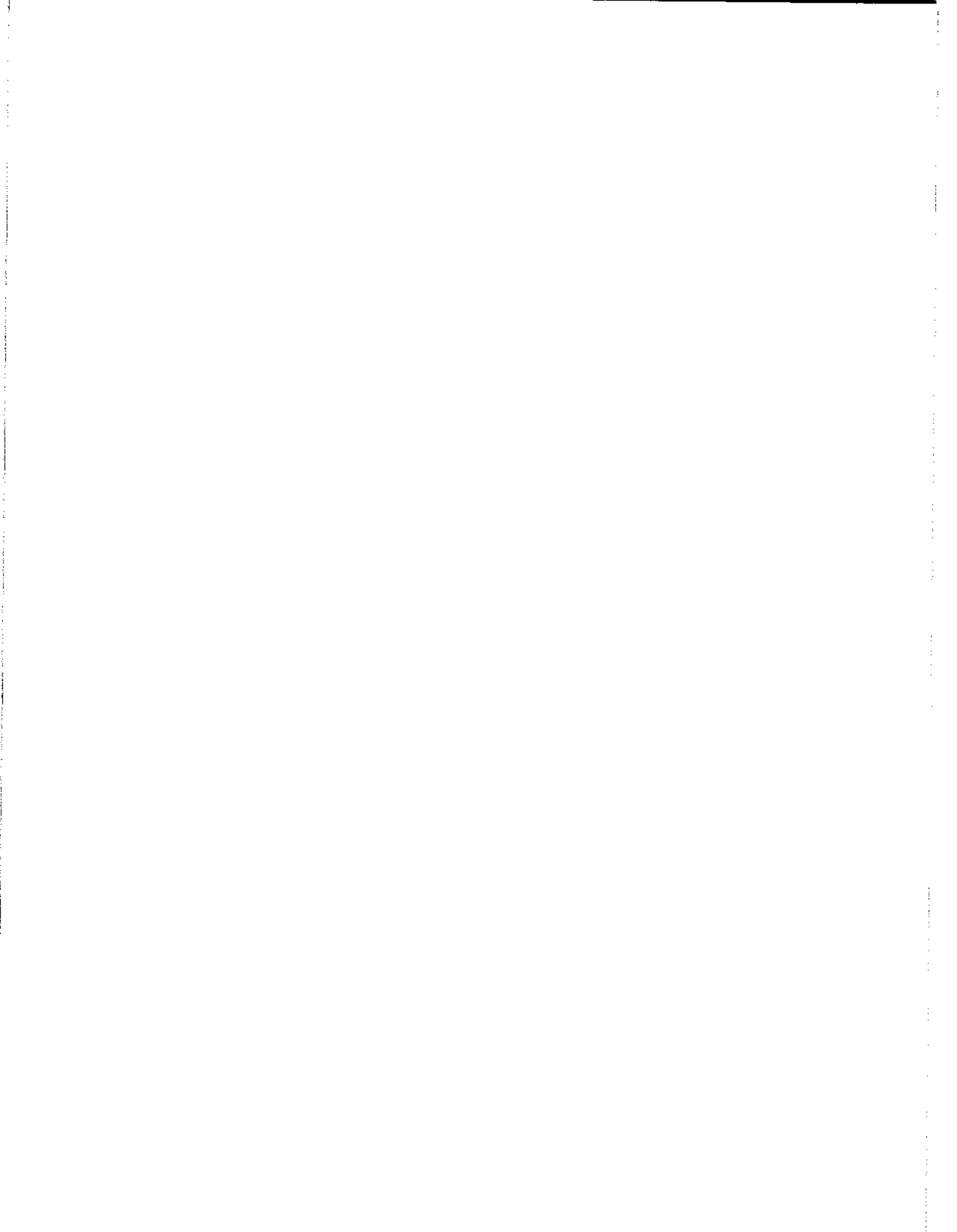
However, if wheelslip is caused unintentionally, start the test again.
6. Gradually release the service brake and watch how the braking effort at each wheel reduces. Stop the rollers.
7. If the vehicle has a parking brake (handbrake) which operates on the rear wheels, repeat the process as outlined in 3 above using this brake and keeping the "hold-on" button or trigger in the disengaged position the whole time.
Note: For testing transmission (prop-shaft) handbrakes, see MOI 10.

Reason for Rejection

5.
 - a. A significant effort recorded on a roadwheel, even though the brake is not applied indicating that a brake is binding.
 - b. Evidence of severe brake grabbing or judder as the brake is applied.
 - c. The braking efforts at the roadwheels do not **increase** at about the same rate when the service brake is applied gradually.
6. The braking efforts at the roadwheels do not **reduce** at about the same rate when the service brake is released gradually.
7.
 - a. Little or no braking effort is recorded from the parking brake on any wheel, indicating clearly that the brake is not functioning correctly
 - b. See Reason for Rejection 9.

Cont'd ▼

Cont'd ▼



3.7 Brake Performance

Information

Method of Inspection

Reason for Rejection

Servo-assisted or power brakes

For vehicles with servo assisted or power braking systems, the engine must be idling while the service brake is being tested.

Note: With a veteran car or a vehicle with special controls the driver should be allowed to drive during the test, if he/she wishes.

Note: Where it is not possible to read the gauges of the roller brake tester while sitting in the driver's seat, an assistant may apply the vehicle brakes during the test.

Vehicles which only just pass

With some vehicles, the required brake efficiency is just obtained or just exceeded, but the tester knows that a higher performance figure is normally obtained for the type of vehicle.

Although the vehicle has passed the brake performance test, the tester should advise the vehicle presenter that the braking system appears to need adjustment or repair.

Old pre-1906 vehicles

Vehicles certified by the London Science Museum as being designed before 1 January 1905 and constructed before 31 December 1905 do not require a parking brake.

Cont'd ▼

Testing the front wheels

1. With one set of rollers revolving at a time, gradually depress the service brake until maximum effort is achieved, or until the wheel locks and slips on the rollers.

Record the reading at which the maximum braking effort is achieved and whether "lock-up" occurs. Release the service brake.

2. Start both sets of rollers and note whether a significant brake effort is recorded from any wheel without a brake being applied. Gradually depress the service brake and watch how the braking effort for each wheel increases.

From the previous tests you will know the value at which wheelslip occurs. Aim to stop just short of this.

However, if wheelslip is caused unintentionally, start the test again.

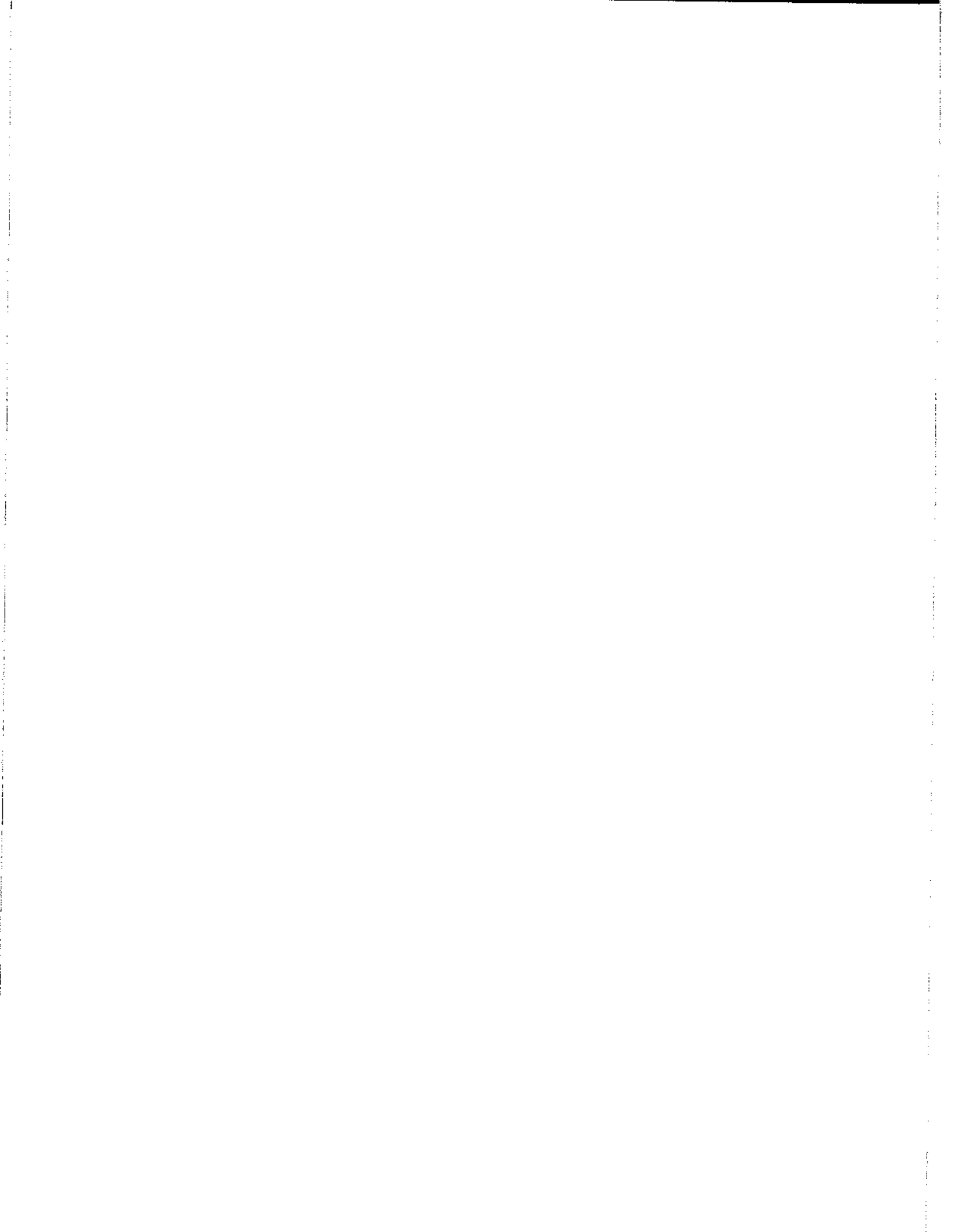
Gradually release the service brake and observe how the braking effort at each wheel reduces. Stop the rollers.

Note the out-of-balance in braking effort between wheels on either side of the vehicle.

Cont'd ▼

1.
 - a. Little or no braking effort is recorded from the brake on any wheel, indicating clearly that the brake is not functioning correctly
 - b. See Reason for Rejection 8.
2.
 - a. Significant braking effort recorded on a roadwheel, even though the brake is not applied, indicating that a brake is binding
 - b. Evidence of severe brake grabbing or judder as the brake is applied
 - c. The braking efforts at the roadwheels do not **increase** at about the same rate when the service brake is applied gradually
 - d. The braking efforts at the roadwheels do not **reduce** at about the same rate when the service brake is released gradually
 - e. The out-of-balance of the brakes on the steered road wheels is greater than 25% at any time (see Method of Calculating Brakes Out-of-Balance on Page 28).
Note: Disregard any service brake imbalance when the brake effort from **each** front wheel is less than 40kg.

Cont'd ▼



3.6 Hydraulic, Air and Vacuum Systems

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Method of Inspection

Reason for Rejection

G. Air Brake Actuators

1. Check each brake cylinder/actuator for security, damage, corrosion and operation.
2. Check that all retaining and locking devices are secure.
3. Check the travel of operating pistons/diaphragm and mechanisms.

1. A cracked, damaged, insecure, inoperative or excessively corroded actuator.
2. An actuator retaining or locking device insecure.
3. Excessive travel of the operating mechanism indicating need for adjustment.

H. Pumps and Compressors

1. Check the security of the vacuum pump or air compressor.
2. Check the condition of the vacuum pump or air compressor drive system.

1. A vacuum pump or air compressor insecure.
2. Drive belts excessively loose, excessively deteriorated, missing or drive system missing or defective.
Note: If more than one drive belt is fitted as standard then it is not a reason for rejection unless all belts are missing.



3.6 Hydraulic, Air and Vacuum Systems

Method of Inspection

Reason for Rejection

D. Servos

1. Check servos for
 - a. presence
 - b. security of mounting
 - c. excessive corrosion
 - d. damage
 - e. vacuum pipe deteriorated, kinked, split, collapsed, excessively chafed
 - f. leaks.
2. Where an adjustment indicating rod is provided, check if brake adjustment is necessary
3. Examine the condition of chassis or body structure and panelling around the master cylinder or combined master cylinder / servo mounting.

E. Reservoirs (Air/Vacuum) (including accumulators, pressure and vacuum vessels).

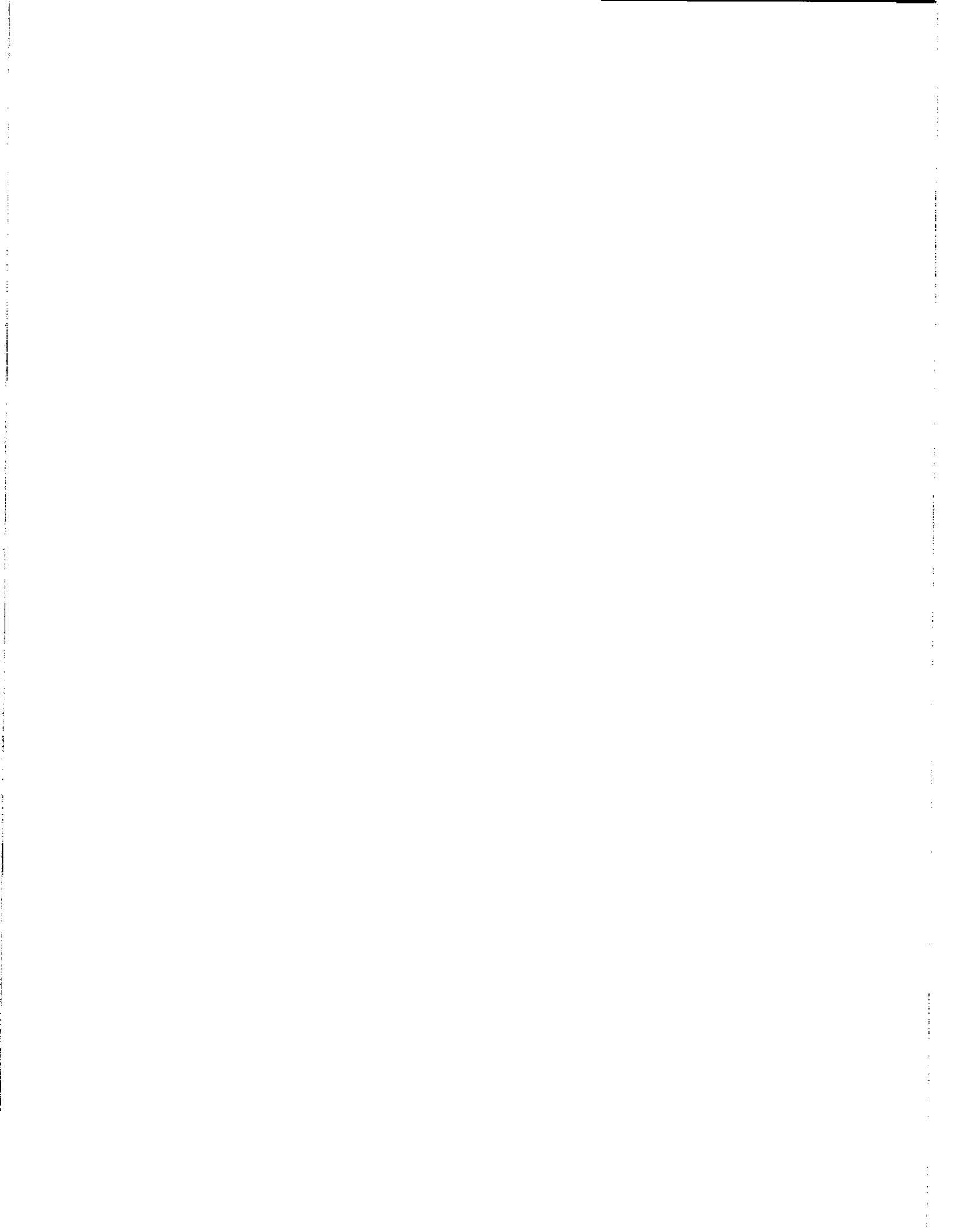
1. Examine reservoirs for
 - a. security of mounting
 - b. structural damage
 - c. excessive corrosion.

1. A servo
 - a. missing when fitted as standard
 - b. insecurely mounted
 - c. excessively weakened by corrosion
 - d. damaged to the extent that its function is impaired
 - e. vacuum pipe deteriorated, kinked, split, collapsed, excessively chafed
 - f. leaking.
2. Adjustment indicating rod shows brake adjustment is necessary.
3. Deliberate modification which significantly reduces the original strength, excessive corrosion, severe distortion, a fracture or an inadequate repair of a load bearing member or its supporting structure or supporting panelling within 30cm of the master cylinder/servo mounting, that is, within a 'prescribed area', see Appendix C.

1. A reservoir
 - a. insecurely mounted
 - b. structurally damaged (eg angled dents)
 - c. excessively corroded.

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Cont'd ▼



3.6 Hydraulic, Air and Vacuum Systems

Information

Access to brake system

It may be necessary to open the engine compartment to examine some brake system components on some vehicles.

If the vehicle is fitted with vacuum or power operated brakes the engine must be running during these inspections.

Method of Inspection

A. Leaks

1. Check for leaks in any part of the braking system with and without the brakes being applied.

B. Brake Pipes and Flexible Hoses

1. Check that rigid brake pipes are securely held and not free to vibrate.
2. Check all accessible rigid brake pipes for
 - a. fouling by a moving part
 - b. kinks
 - c. chafing, corrosion and damage

Note: To assess correctly the condition of corroded metal pipes, surface dirt might have to be removed. This might require light scraping with the Corrosion Assessment Tool 'spade end'. Care must be taken not to damage any protective coating.

- d. repairs.

Reason for Rejection

1. A leak in any part of a braking system.

1. A rigid brake pipe inadequately clipped or otherwise supported.

2. A rigid brake pipe.

- a. fouled by moving parts
- b. kinked
- c. excessively chafed, corroded or damaged

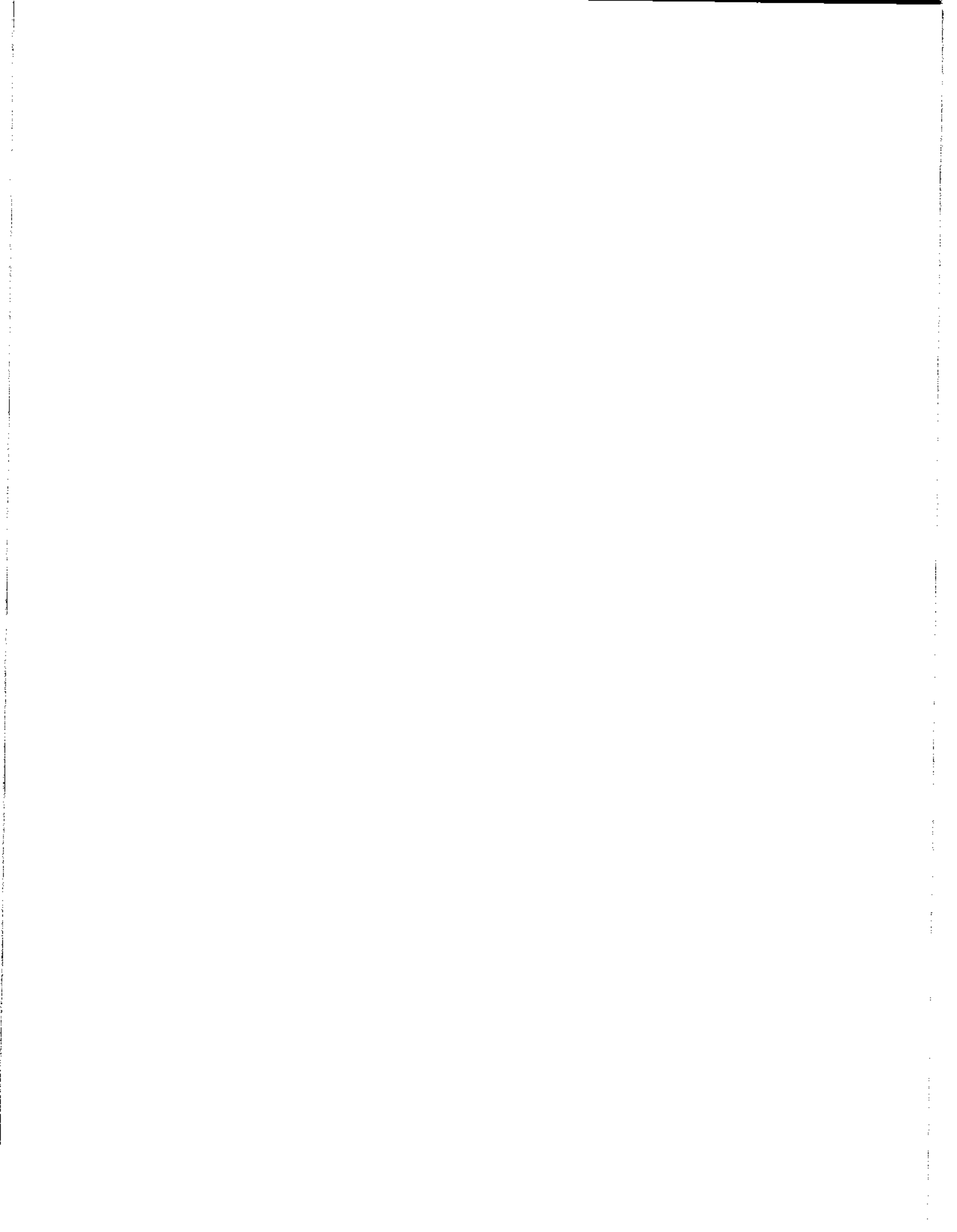
Note: Chafing, corrosion of, or damage to, a rigid brake pipe so that its wall thickness is reduced by 1/3 (eg approximately 0.25 mm for typical hydraulic brake pipe) is a reason for rejection.

- d. inadequately repaired or with unsuitable joint fittings.

Note: Repairs to the pressure lines of hydraulic brake systems are unacceptable unless suitable connectors are used. Compression joints of a type using separate ferrules are not suitable.

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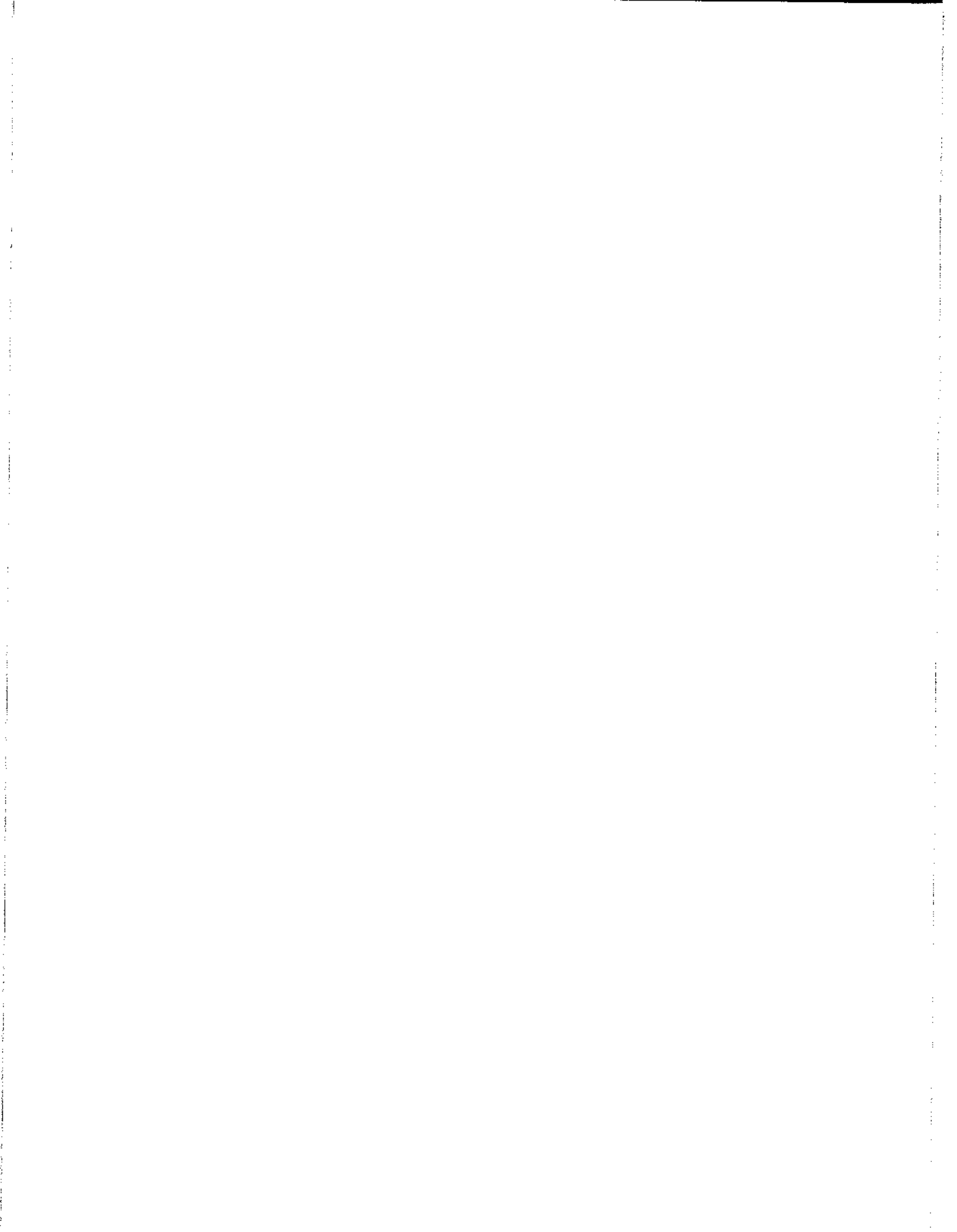
Section 8

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Drivers View of the Road

Section contents

Sub-Section	Subject	Page
8.1	Mirrors	2
8.2	Wipers and Washers	3
8.3	Windscreen	4
8.4	Bonnet	6



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Wipers and Washers 8.2

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Information

Wipers and Washers

This inspection applies to

All vehicles, except those

- with an opening windscreen, or
- with some other means of providing the driver with an adequate view.

Method of Inspection

Wipers and Washers

1. Operate the washers and the wipers and note the swept area of the windscreen.

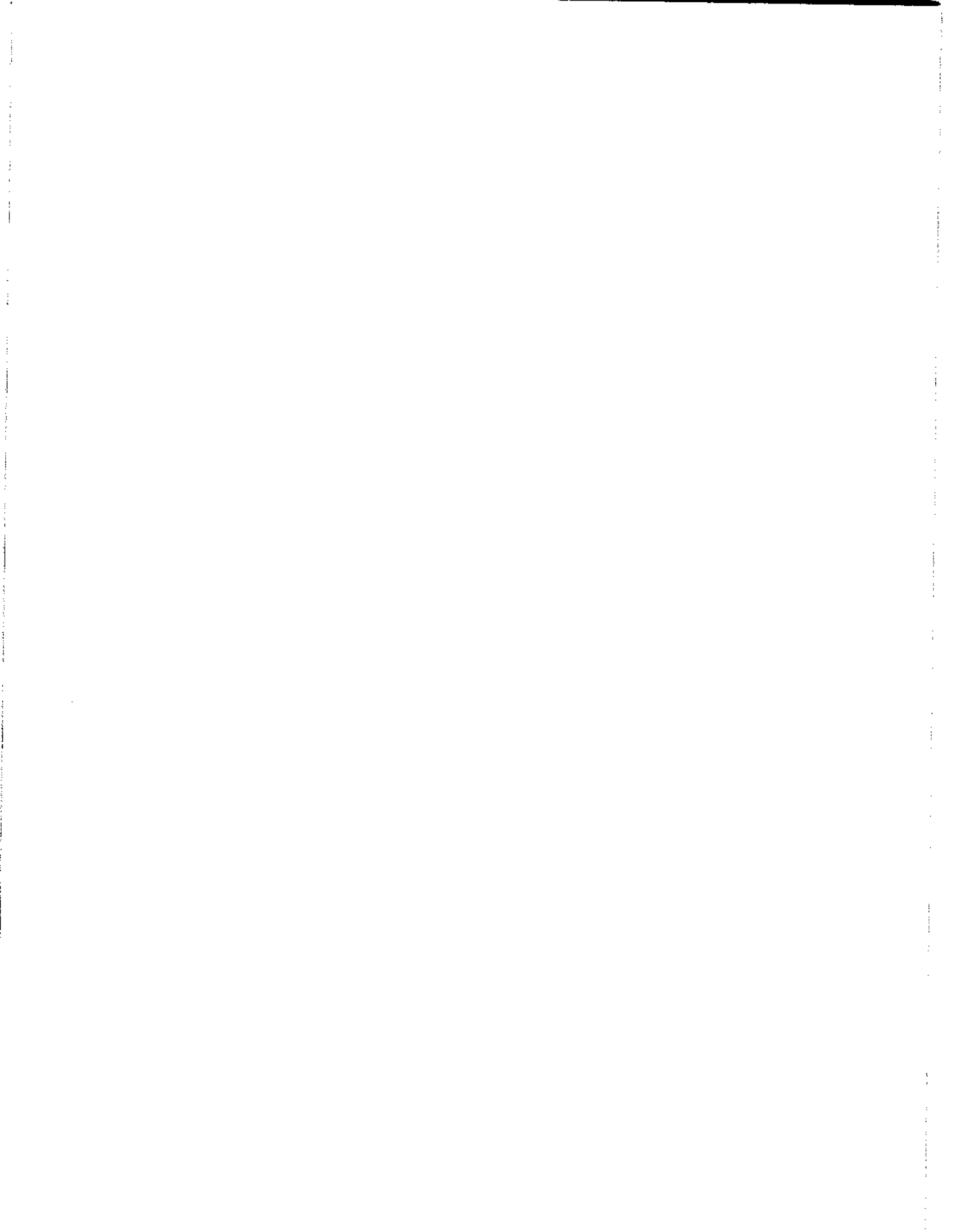
2. Examine the condition, security and effectiveness of the wiper blades and their contact with the windscreen.

3. Check the function of the windscreen washers.

Reason for Rejection

Wipers and Washers

1.
 - a. A wiper or washer control missing or inaccessible to the driver
 - b. a wiper does not continue to operate automatically when switched on
 - c. a wiper installed for the use of the driver does not operate over an area of the windscreen large enough to give the driver an adequate view of the road (through the windscreen) to the left and right sides of the vehicle, as well as to the front.
2. A wiper blade insecure, missing, or in such a condition that it does not clear the windscreen effectively to give the driver an adequate view of the road (through the windscreen) to the left and right sides of the vehicle, as well as to the front.
3. The windscreen washers do not provide enough liquid to clear the windscreen in conjunction with the wiper(s)



Information

'Official' stickers

'Official' stickers that are not readily removable - such as vehicle licences, parking and access permits - are only a reason for rejection if they seriously restrict the driver's view. 'Official' stickers should be taken to be any sticker that is used in connection with 'road enforcement', 'security' or 'crime prevention' matters.

These include: Disabled Persons Badges/permits, Parking Permits, Licences and Vehicle Anti-Theft Scheme stickers issued by a Policy Authority.

Advice to vehicle presenters

the vehicle presenter should be advised of and given the opportunity to remove any item likely to fail under Reason for Rejection 1b or 1e before a Notification of Refusal is issued.

In certain circumstances, windscreen damage may be safely repaired. If a repair is to be contemplated, a vehicle owner should be recommended to seek advice from a service provider competent of repairing to the British Standard Codes of Practice BSAU242 and BSAU251.

Opaque edging

Opaque edging on a windscreen (usually black, particularly at the lower edge) found on some modern vehicles is not to be regarded as part of the windscreen when assessing the driver's view through the windscreen within 8.3 item 1 of the Inspection Manual.

Additional Opaque Films

Additional opaque films are subject to reason for rejection 1 whether fitted on the inside or outside of the windscreen.

Windscreen protection

Windscreen protection or additional strengthening supports fitted to vehicles which have a security role, eg bullion vehicles, Post Office vehicles etc intended to aid security, are not to be considered a reason for rejection when assessing obstructions to vision.

Wiper Blades

Wiper blades that park automatically in a position that obscures the view through the windscreen are subject to reason for rejection 1.

Sunvisors

Sunvisors fitted to the driver's side, which cannot be stowed in the 'off screen' position and which drop down obstructing the view through the swept area of the windscreen are a reason for rejection. A similar defect on the passenger side sunvisor is not a reason for rejection.

Taxi signs

Taxi signs displayed in the front windscreen of Hackney Carriage vehicles of the type used to indicate when the vehicle is 'for hire' (usually by being illuminated) are only a reason for rejection if they seriously restrict the driver's view.

Mascots

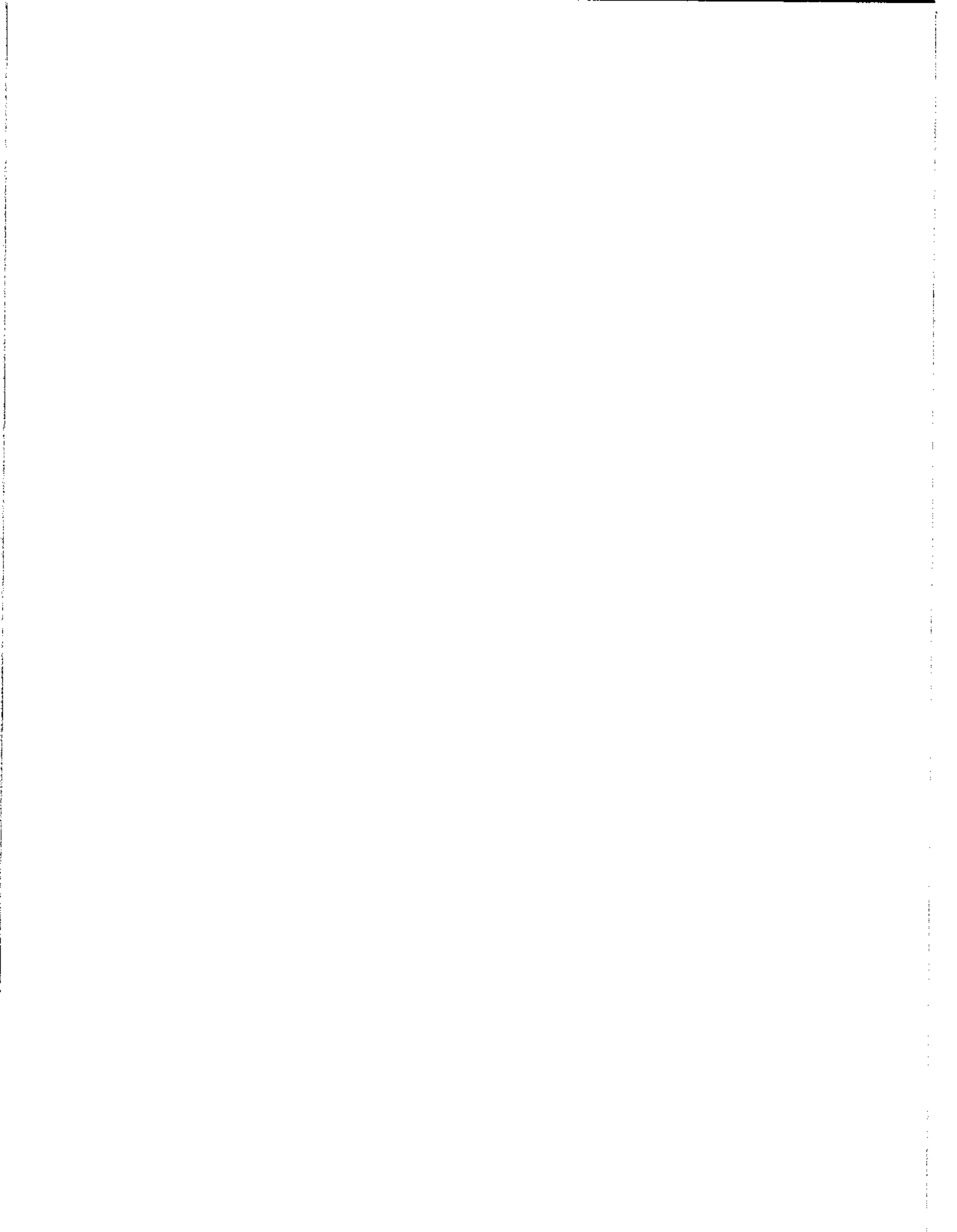
Mascots and other external mountings forward of the windscreen are not part of the test.

Additional mirrors and tinting films

Additional mirrors and tinting films are not subject to Reason for Rejection 1.

Original design

Original vehicle design characteristics are to be accepted.



Section 9

Tricycle and Quadricycle Testing

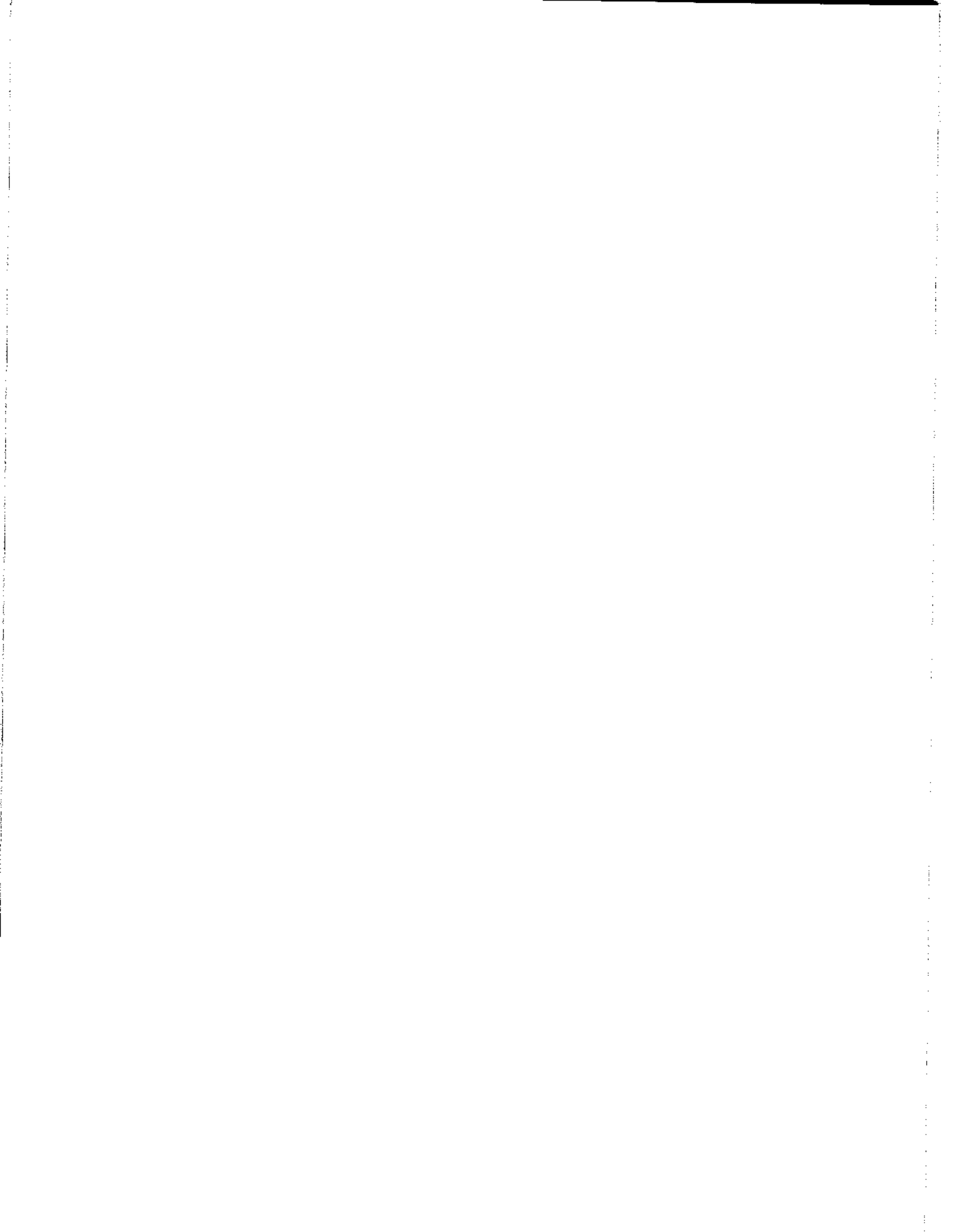
ARMY EQUIPMENT
SUPPORT PUBLICATION

Section contents

Sub-Section	Subject	Page
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9.2	Motorcycle Derived Steering / Suspension Systems	4
9.3	Braking Systems and Requirements	8
9.4	Tyres	10
9.5	Seat Belts	11
9.6	Body and Structure	12
9.7	Emissions	13
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2300-A-050-013



Lighting 9.1

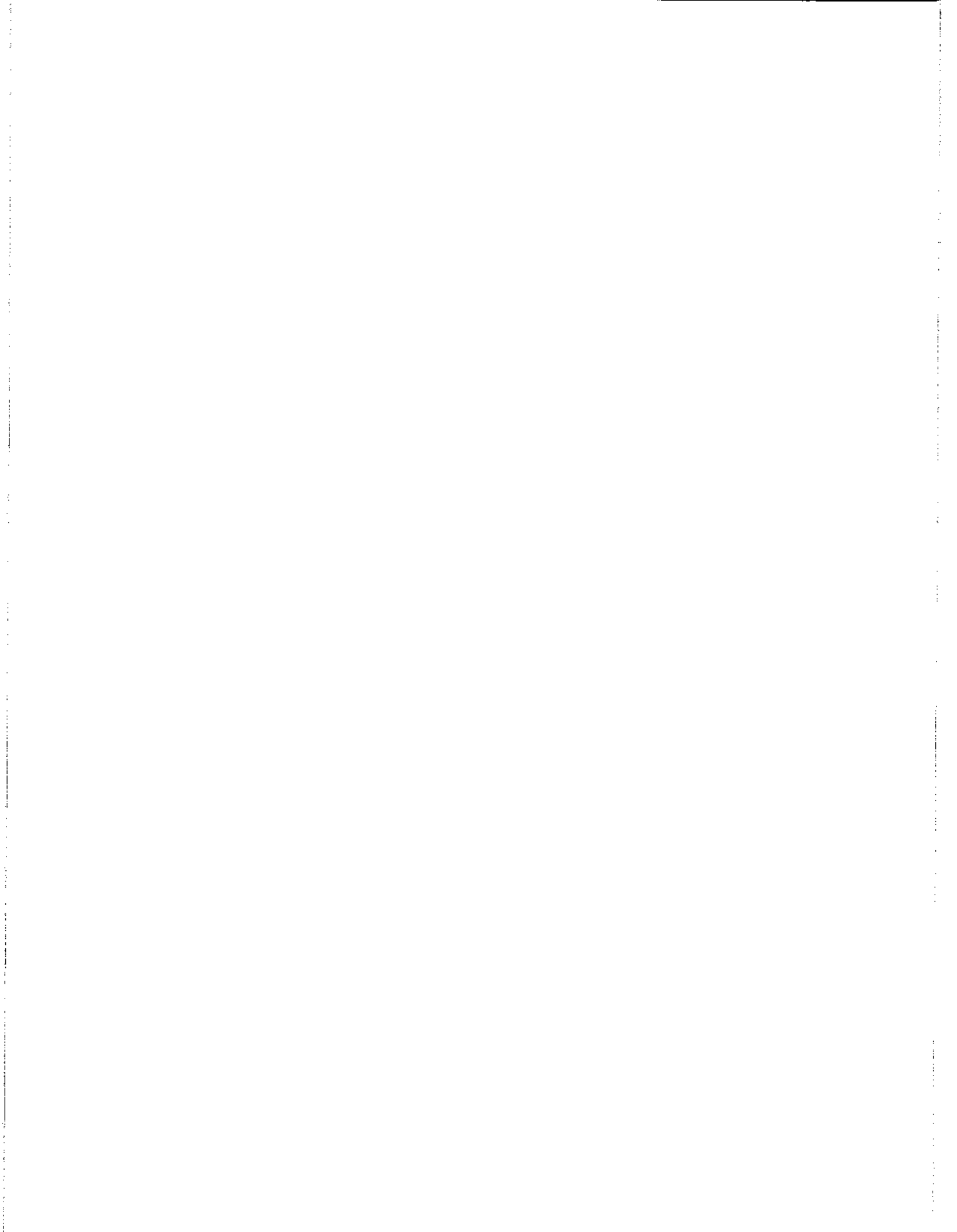
ARMY EQUIPMENT
SUPPORT PUBLICATION

Information

Requirements for tricycles and quadricycles

LAMP	NUMBER	REMARKS
Main beam headlamp	1 or 2	If one, it must be mounted centrally, or adjacent to another lamp (e.g. dipped beam lamp) they must be mounted symmetrically about the centre. If the maximum vehicle width exceeds 1300mm, two main beam headlamps are required (1700mm for motorcycle derived tricycles).
Dipped beam headlamp	1 or 2	If one, it must be mounted centrally, or adjacent to another lamp (e.g. main beam lamp) they must be mounted symmetrically about the centre. If the maximum vehicle width exceeds 1300mm, two dipped beam headlamps are required (1700mm for motorcycle derived tricycles).
Front position lamp	1 or 2	If one, it must be mounted centrally, or if adjacent to another front lamp (e.g. a headlamp) they must be mounted symmetrically about the centre. If the maximum vehicle width exceeds 1300mm, two front position lamps are required.
Rear position lamp	1 or 2	If one, it must be mounted centrally. If the maximum vehicle width exceeds 1300mm, two rear position lamps are required.
Stop lamps	1 or 2	If one, it must be mounted centrally. If the maximum vehicle width exceeds 1300mm, two stop lamps are required.
Direction indicators	2 front 2 rear	A telltale must be fitted.
Hazard warning lamps	2 front 2 rear	A telltale must be fitted.
Rear reflector	1 or 2	If one, it must be mounted centrally. If the maximum vehicle width exceeds 1000mm, two reflectors are required.
Registration plate lamp	1	May be combined with the rear position lamp.

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Motorcycle Derived Steering / Suspension Systems 9.2

ARMY EQUIPMENT
SUPPORT PUBLICATION

Information

Method of Inspection

Reason for Rejection

3. Examine the steering damper.

3. A steering damper

- a. insecure
- b. ineffective
- c. impairing the steering action.

4. Examine the steering head bearings.

4. Excessive free play in the steering head bearings.

5. Examine the front fork assembly.

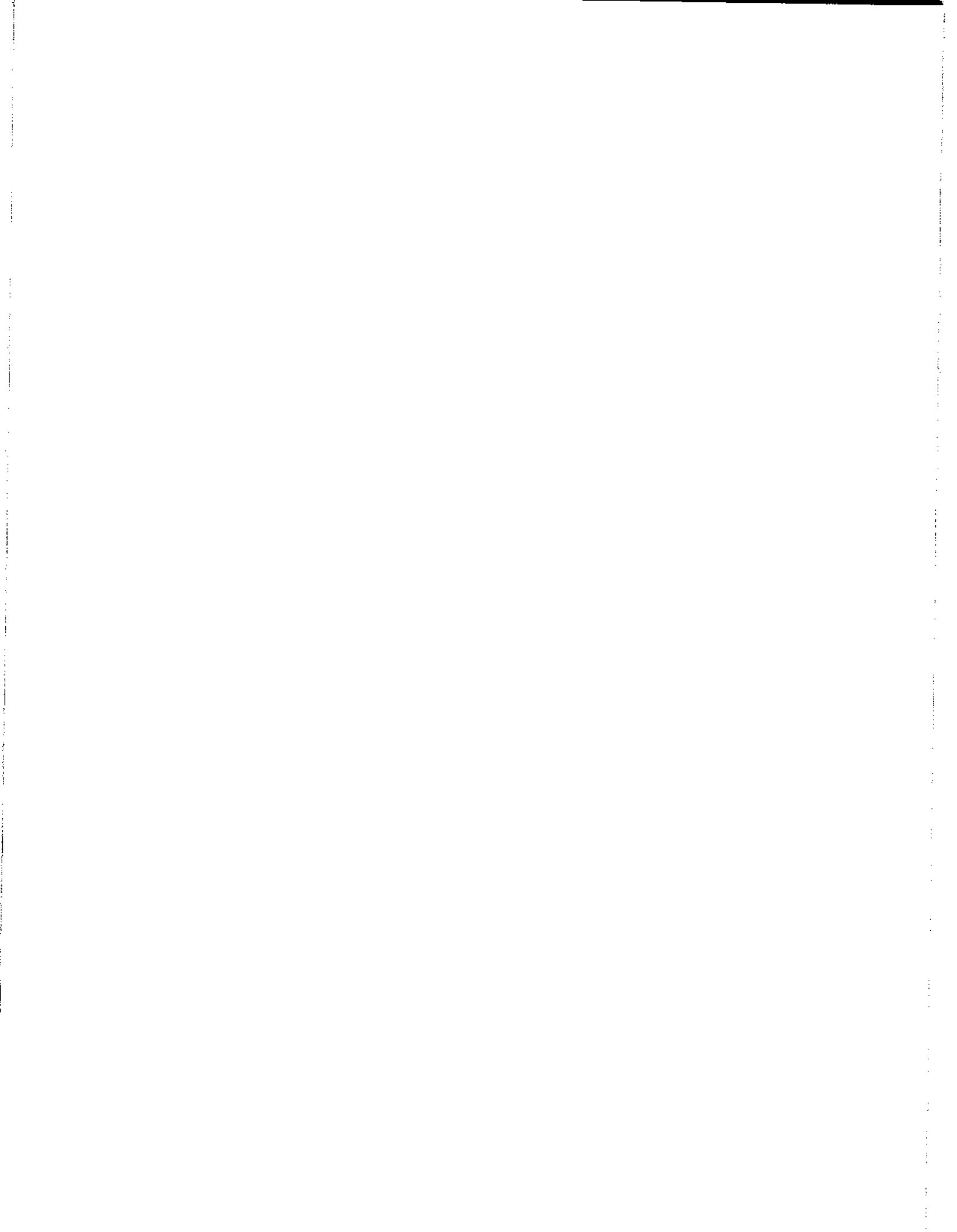
5. A fork assembly component which is

- a. Missing
- b. Loose
- c. Cracked
- d. excessively bent, misaligned, corroded, worn, or has excessive free play between the sliding members of the forks, the pivot bearings or bushes
- e. restricted in operation
- f. fouling.

Cont'd

Cont'd

Cont'd



Motorcycle Derived Steering / Suspension Systems **9.2**

ARMY EQUIPMENT
SUPPORT PUBLICATION

Information

Method of Inspection

Reason for Rejection

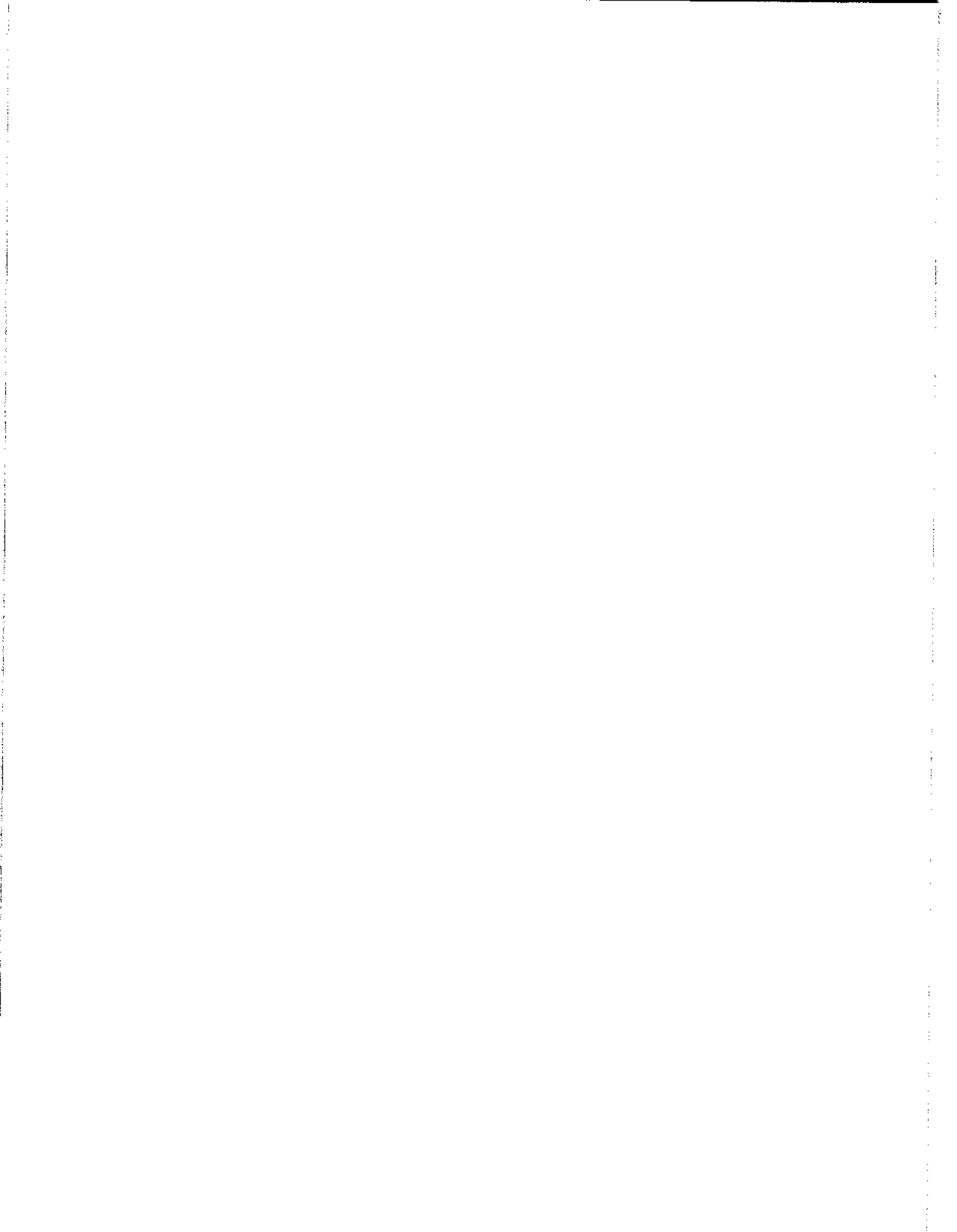
8. Examine the hub/wheel assembly.

8. A hub/wheel assembly with
- a. a loose spindle or securing nut(s)
 - b. a spindle securing nut locking device missing or insecure
 - c. excessive roughness, tightness or free play in the bearings
 - d. any part of the assembly fouling another component.

9. Examine the vehicle structure.

9. Deliberate modification which significantly reduces the original strength, excessive corrosion, severe distortion, a fracture or an inadequate repair of a load bearing member or its supporting structure or supporting panelling within 30cm of any sub frame, suspension or steering component mounting, that is within a prescribed area.

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Brakes 9.3

Information

This section must be read in conjunction with section 3 of this manual.

Where a linked system is operated by one control, the retarding force used in the efficiency calculation is the total from all wheels when operated by that control only.

When testing vehicles not listed on the brake data chart, conduct brake performance checks set out in Section 3.

When calculating total efficiencies use the locked wheel criteria explained in the notes in Section 3.7, page 23.

If the vehicle does not meet this standard then a further brake test using a decelerometer may be conducted in order to assess the brake efficiency **only where it is safe to do so**. If it is not safe, then the presenter should be asked to provide evidence of the unladen weight of the vehicle and the efficiencies should be calculated using the unladen weight plus 140kg (300lbs).

Brake Performance Requirements

A quadricycle with a single service brake control that operates the brakes on all wheels

Service brake	Parking brake	
50%	25% if a single line system	16% if a split (dual) system

A tricycle, three wheeled moped, quadricycle or light quadricycle with two service brake systems each having a separate means of operation

Service brake	Parking brake	
30% from either system	25% from the other system	16%

A tricycle with a single service brake control that operates the brakes on all wheels first used on or after 1 January 1968

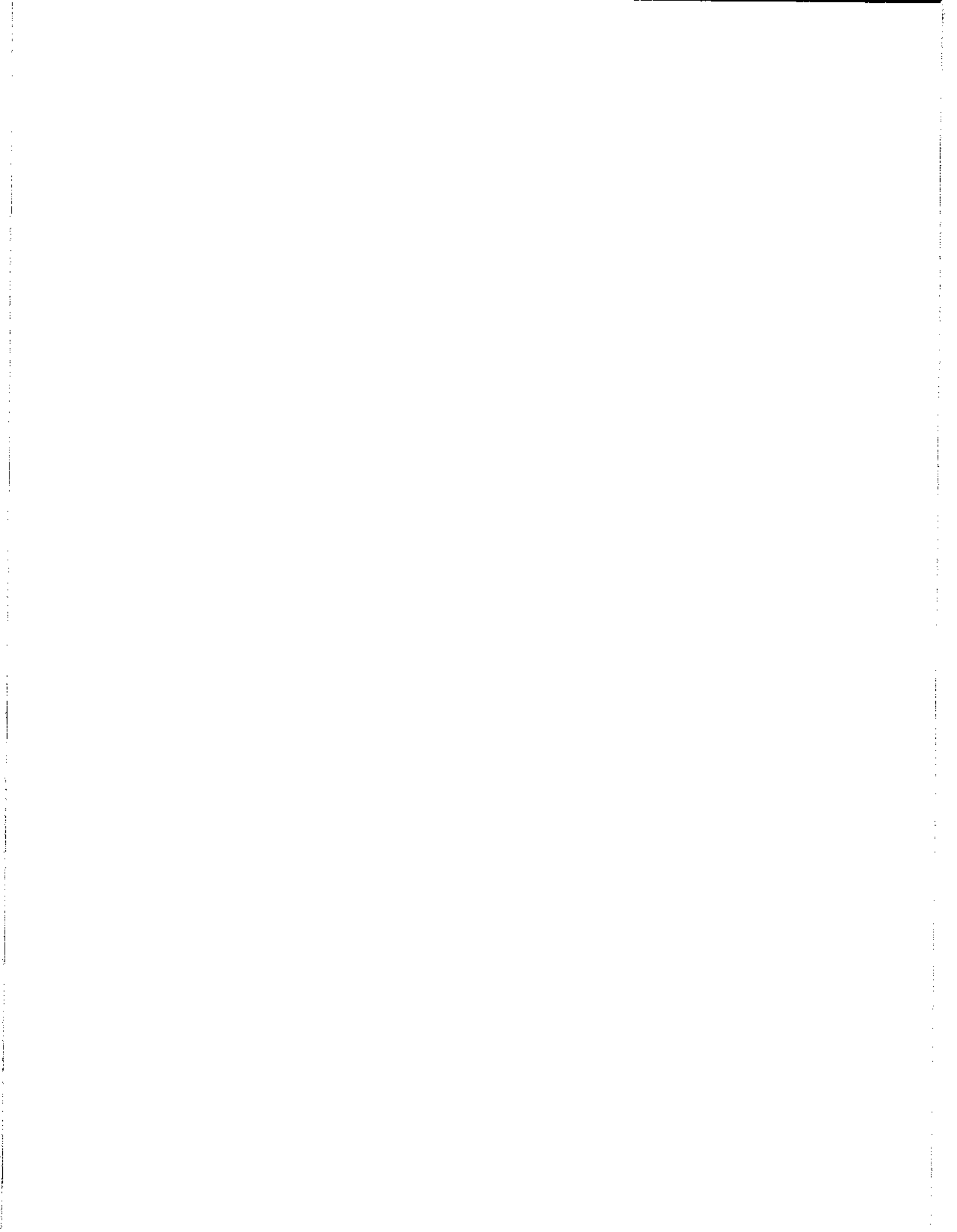
Service brake	Parking brake	
50%	25% if a single line system	16% if a split (dual) system

A tricycle with a single service brake control that operates the brakes on all wheels first used before 1 January 1968

Service brake	Parking brake	
40%	25% if a single line system	16% if a split (dual) system

A three wheeled moped or light quadricycle with a single service brake control that operates the brakes on all wheels

Service brake	Parking brake	
40%	25% if a single line system	16% if a split (dual) system



Seat Belts 9.5

Information

This section should be read in conjunction with Section 5.1 of this manual.

The seat belt inspection applies to all tricycles and quadricycles except

- 3 wheeled mopeds and quadricycles having an unladen weight of not more than 250kg.
- tip up occasional seats fitted to any vehicle.
- a sit astride, saddle type drivers seat on an unbodied tricycle or quadricycle, or any sit astride, saddle type passenger seat that is immediately in front or behind the driver in a longitudinal plane.
- Some unbodied vehicles may have been Type Approved without seat belts. These are acceptable, provided there is evidence that they have been Type Approved to 92/61/EEC or 2002/24/EC. This information will normally appear on the manufacturers plate.

The requirements for tricycles and quadricycles first used before 17 June 1999 are covered by section 5 of this manual.

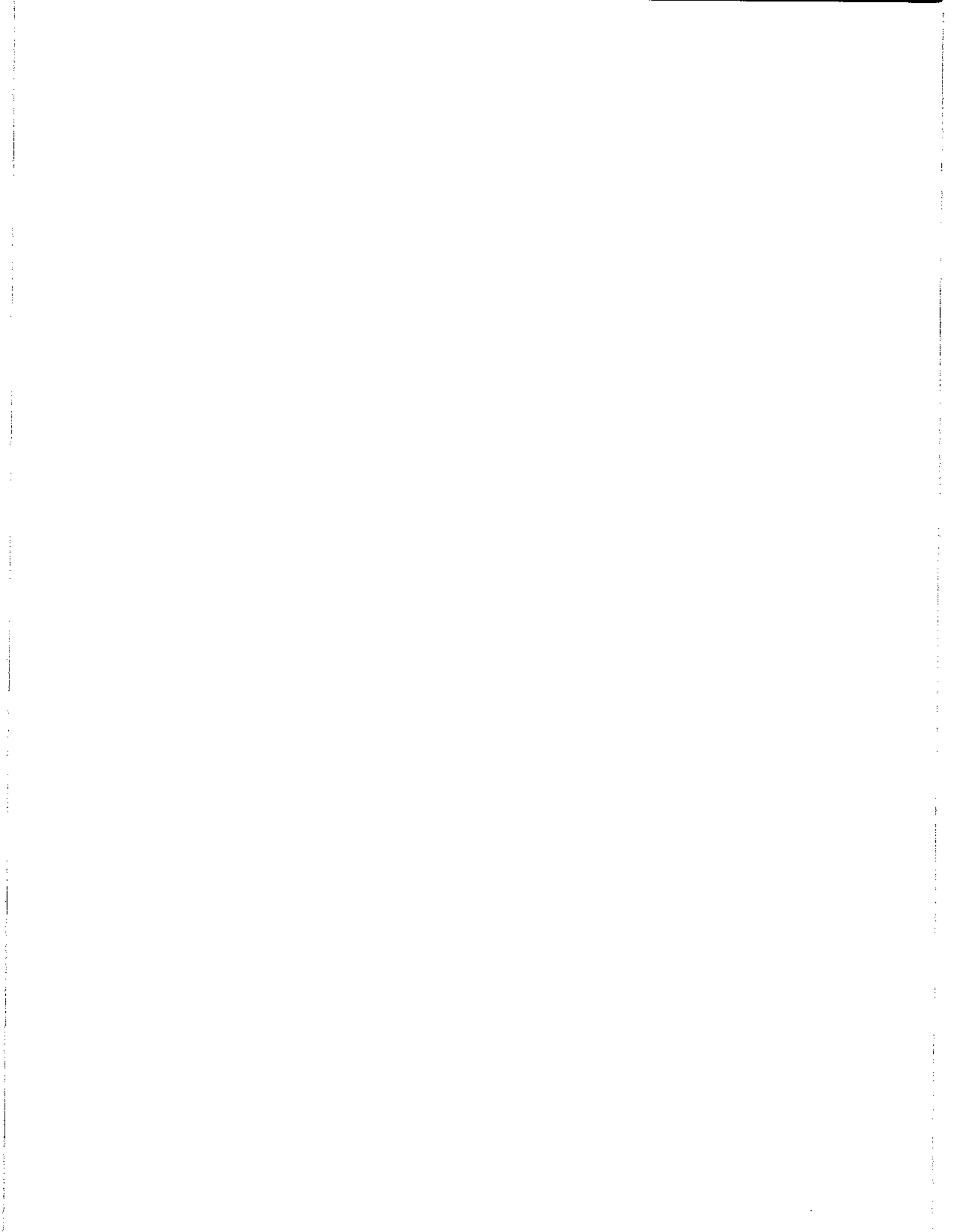
Note: Additional seats to the side of, and non sit astride seats directly behind the driver/passenger are required to be fitted with a minimum of a lap belt.

Requirements

Table of minimum seat belt requirements for tricycles and quadricycles first used on or after 17 June 1999

Drivers seat	Outboard (front) passenger seat	Centre front seat	Forward facing rear seats*
3 point lap and diagonal belt (may be static or inertia), harness belt or disabled persons belt.	3 point lap and diagonal belt (may be static or inertia), harness belt or disabled persons belt.	A lap belt, 3 point lap and diagonal belt (may be static or inertia), harness belt or disabled persons belt	A lap belt, 3 point lap and diagonal belt (may be static or inertia), harness belt, disabled persons belt or child restraint.

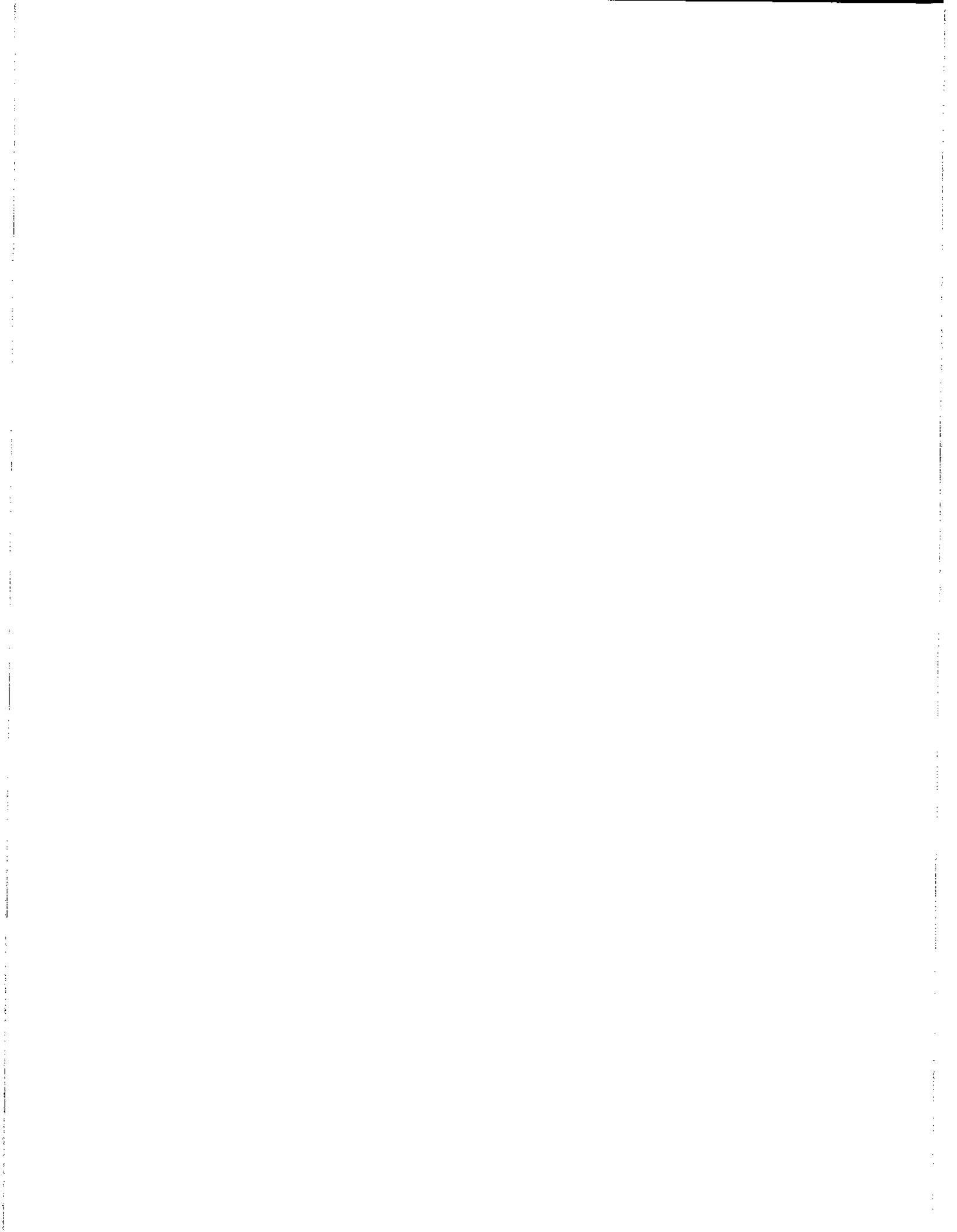
* Includes outboard forward facing seats fitted to unbodied tricycles.



Emissions 9.7

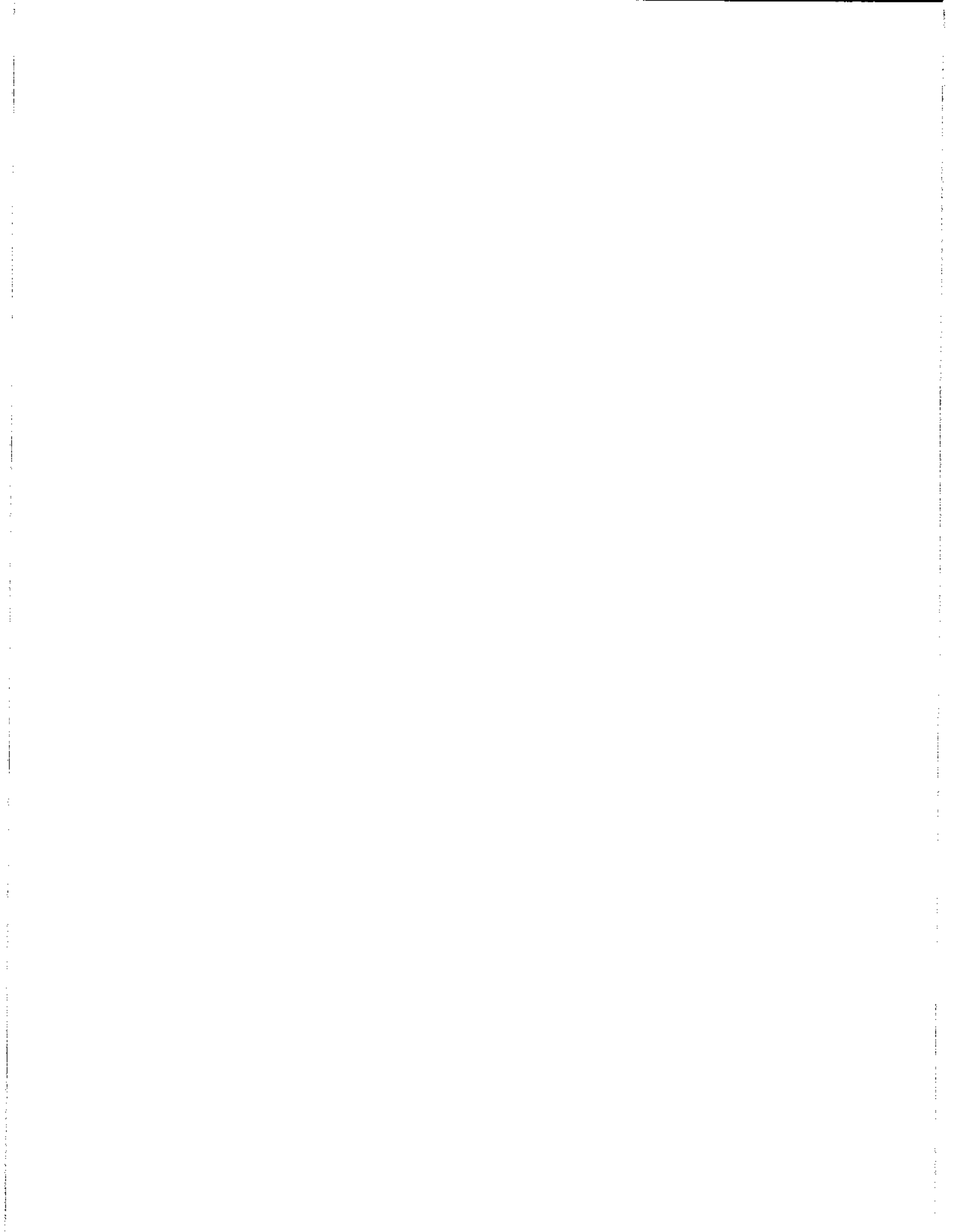
Information

All tricycles and quadricycles are exempt from emissions testing.



Vehicle Identification Numbers

Make	Model	Stamped Chassis/VIN Position
Alfa Romeo	Alfa Sud 1.3, 1.5, 1.5 Sprint Arna, GTV6 2L and 2.5L, Giulietta 1.6, 1.8, Alfa 6, Alfetta 2000 and GTVSE 33 75, 90	Front of forward bulkhead just to offside of centre Offside bulkhead Middle bulkhead Offside boot floor pan, close to boot edge
Aston Martin	All models	Offside chassis under wheel arch
Audi	All models	Centre bulkhead
Austin	Mini, Metro Maestro Montego Ital Ambassador	Drain channel engine compartment <ul style="list-style-type: none"> ■ Beside offside suspension top ■ Centre engine compartment drain channel ■ Tailgate drain channel Next to suspension top Offside inner wing Offside bulkhead stamped through a piece of plastic tape
BMW	Series 3 and 333 Series 5 Series 7 and 635	Engine bay bulkhead Front offside inner wing Offside or centre bulkhead
Bristol	All models	Nearside chassis leg
Caterham/Lotus	-	Offside space frame engine support strut by clutch cable
Citroen	2 CV Visa VA, VB, AX, BX CX Series, GS Series	Stamped on floor drivers side Offside inner wing or gutter Engine comp offside wheel arch - bonnet/water drain channel
Dacia	All models	Offside suspension leg
Daihatsu	Domino, Charade, Charmant Four Track	Centre or offside bulkhead Nearside chassis behind front tyre



Vehicle Identification Numbers

Appendix

B

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Make	Model	Stamped Chassis/VIN Position
Lamborghini	Jalpa Countach, Silhouette, Urraco	Top of rear offside suspension turret Bar in engine compartment, which runs parallel to the screen
Lancia	Y10 HPE Estate Prisma, Delta Gamma, Thema	Offside engine comp bulkhead Back of forward bulkhead offside On top of offside MacPherson strut Offside inner wing
Land Rover	All models	Front offside chassis member viewed through front wheel arch
Lotus	Eclat Esprit	Offside chassis member in engine compartment Engine comp (rear). Centre rear chassis member. Under 6" rubber grommet
Maserati	All models	Both front inner wings
Mazda	323, 626, 929, RX7 B2000	Bulkhead offside Front offside chassis leg
Mercedes Benz	All models	On the bonnet catch panel towards the offside, centre of the bulkhead or on angle of bulkhead offside
MG	Metro Maestro Montego	Drain channel engine compartment <ul style="list-style-type: none"> ■ Beside offside suspension top ■ Centre engine compartment drain channel ■ Tailgate drain channel Next to suspension top
Mitsubishi	Starion, Spacewagon, Lancer (1976-1983) Tredia, Cordia, Sapporo, sigma Lancer (May 94-), Gallant Shogun	Centre of bulkhead Bulkhead inside engine compartment Chassis leg near rear offside shock absorber
Morgan	All models	Cross member under or just to the rear of the drivers seat
Nissan	All models	Bulkhead centre or offside
Opel	All models	Under carpet flap between drivers floor and sill



F
G

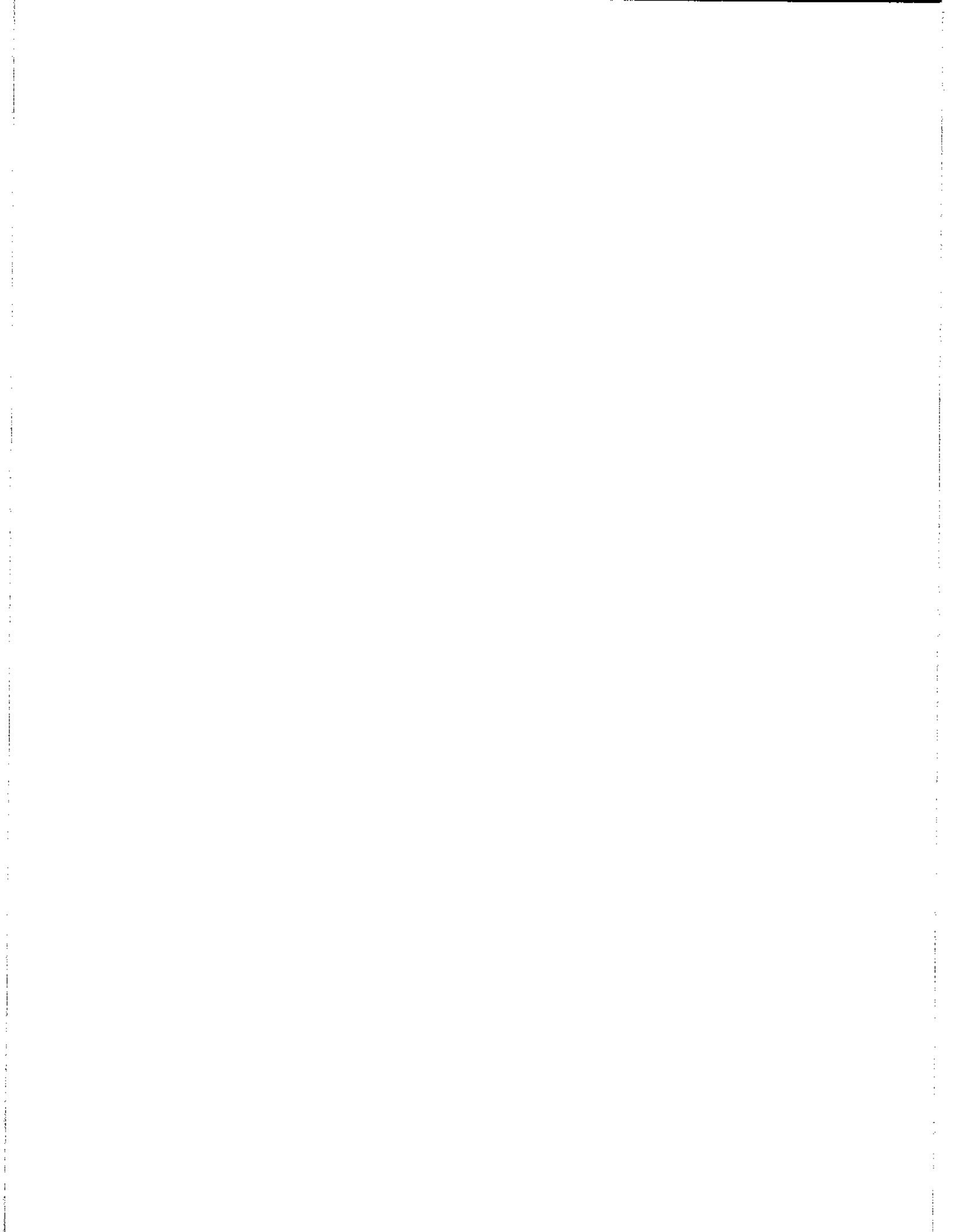
Appendix



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Vehicle Identification Numbers

Make	Model	Stamped Chassis/VIN Position
Suzuki	Swift LJ80 OF ST80V (Van), ST80K (pick up)	Centre of bulkhead Front of offside longitudinal chassis member forward of the front offside wheel arch in cab on offside wheel arch under the drivers seat
Talbot	Alpine, Samba, Horizon	Offside inner wing near bulkhead or over wheel arch
Toyota	Starlet, Corrola, MR2, Camry, Tercel, Carina, Celica, Supra Spacecruiser, Hilux Pick up, Landcruiser	On bulkhead Offside chassis in front wheelarch
Triumph	Acclaim	Through plastic tape covering on centre top of bulkhead
TVR	Tasmin Tairmar 280, 350i, AS (formally Tasmin)	Offside radiator support strut Offside of engine compartment to the front On metal plate to the top of the tubular chassis (below alternator)
Vauxhall	All models	Under carpet flap between drivers door and sill
Volkswagen	Polo, Passat, Santana Golf MK 1 Golf 2, Jetta 2, Scirocco Jetta 1	Centre of bulkhead Top of offside suspension housing Bulkhead offside Top of offside suspension housing
Volvo	340, 360, 480ES 244, 240, 264, 265 740, 760	Bulkhead Offside drivers door pillar (Estate: offside panel on inside of storage compartment) Offside drivers door pillar B post
Yugo	511, 311, 45A, 55A Caribbean 1100, 1300	Offside suspension strut Centre offside inner wing





UK-2

A highly stressed component should be rejected if it has been

- Seriously reduced in overall thickness by corrosion, or
- Local corrosion has resulted in even a small hole or split.

6. Corrosion Assessment Tool

The Corrosion Assessment Tool **must be used carefully** to avoid unnecessary damage. The tool comprises of

- A durable engineering plastic head for light tapping, and
- An aluminium alloy shaft with a curved 'spade end' for light scraping. The alloy shaft can also be used as small lever.

WARNING

The curved spade end must only be used for light scraping and not to prod and poke the vehicle structure.

7. Safety Precautions

Eye protection is recommended when assessing corrosion in vehicle structures and components. Any sharp edges on the Corrosion Assessment Tool should be removed.

8. General Guidance

Corrosion which has not reduced the metal thickness sufficiently to weaken it will clearly not warrant rejection. However, the tester should inform the vehicle presenter that corrosion has started.

On the other hand, where there is severe corrosion, it may be necessary to refuse to carry out a brake test if this could cause danger or further damage.

9. Thin gauge steel pressings

In some vehicles, comparatively thin gauge steel pressings are used for certain steering and suspension components, mountings, sub-frames and cross members.

Many of these parts have hollow sections or upfacing areas in which road dirt impregnated with salt or other chemicals collects causing serious but often very localised corrosion.

In some cases where large quantities of salt are used on roads, corrosion has caused the failure of steering and suspension components within three years. Some components have been known to fail completely at one end and still be undamaged at the other.

10. Platform or underframe

Some vehicle types (such as VW "Beetle" etc.) have bodies and various mechanical parts attached to a platform or underframe that is the main load bearing structure. Defective body panels considered to be part of a load bearing structure should only be rejected if they

- a. play an active part in directly supporting the steering, suspension, braking components or seat belt anchorages, or
- b. are likely to adversely affect the correct functioning of the braking system or steering gear (eg by fouling a wheel).

11. Corrosion around drainage holes

Corrosion can be more prevalent in areas around drainage holes due to the ingress of moist air, dirt, road salt etc. Therefore, special attention should be paid to these areas of the important structural and testable components.

12. Method of Repair

It is essential that repairs to corroded areas are properly carried out. Only welding is acceptable for repairs to 'prescribed areas'.

Suitable materials of appropriate gauge or thickness should be used for repairs so that

- Any plating or welding extends to a sound part of a load bearing component, and

Cont'd ▼

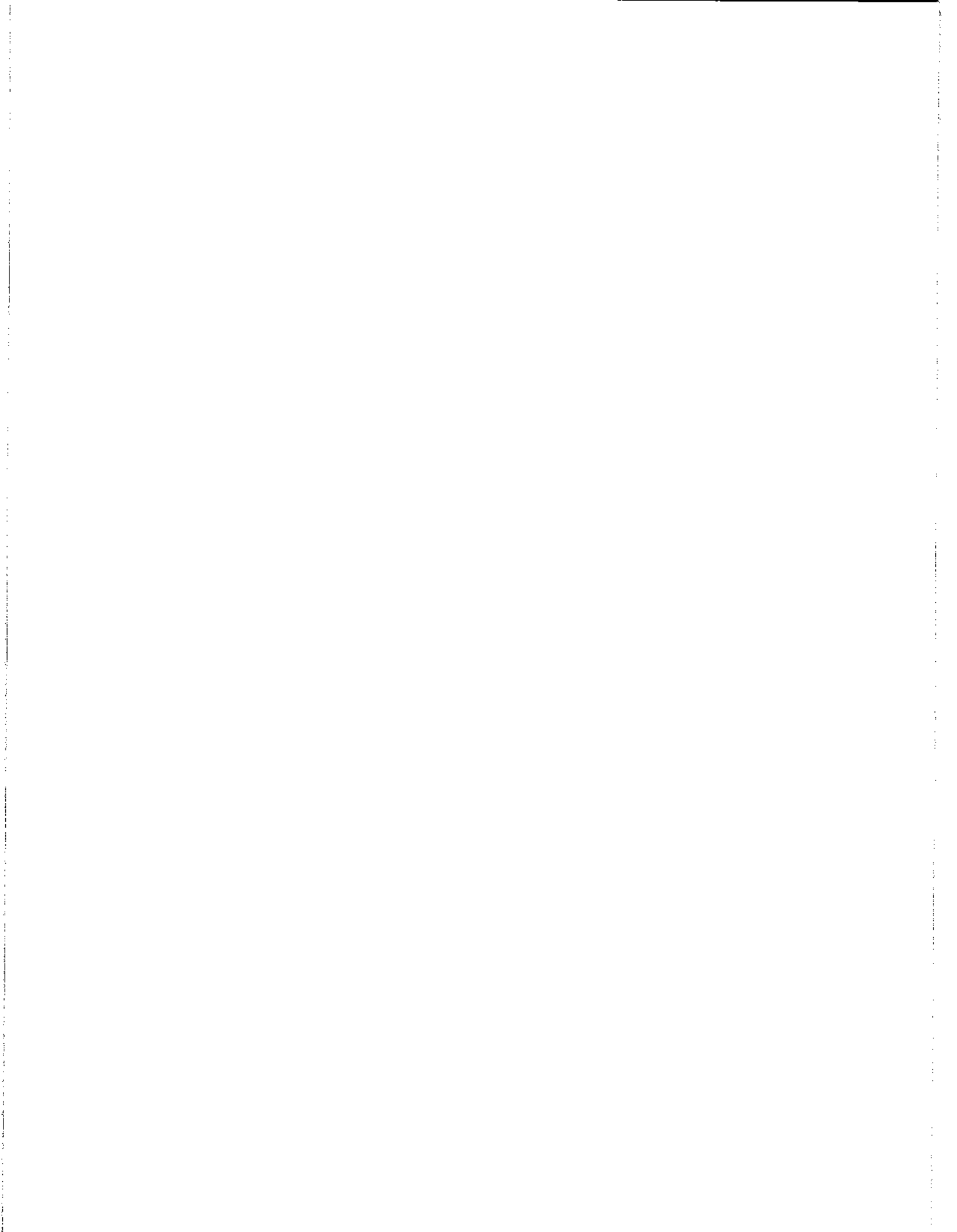
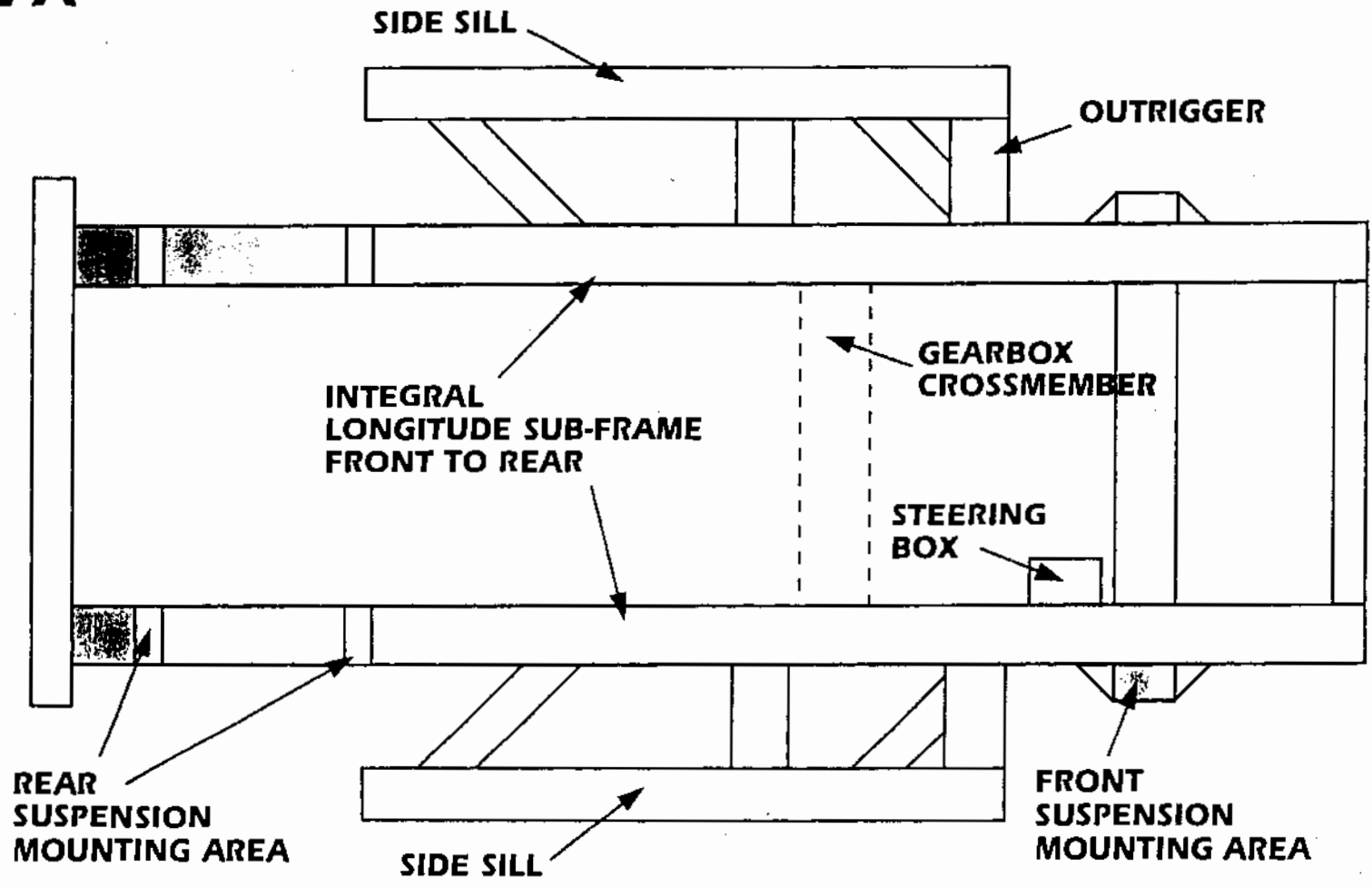




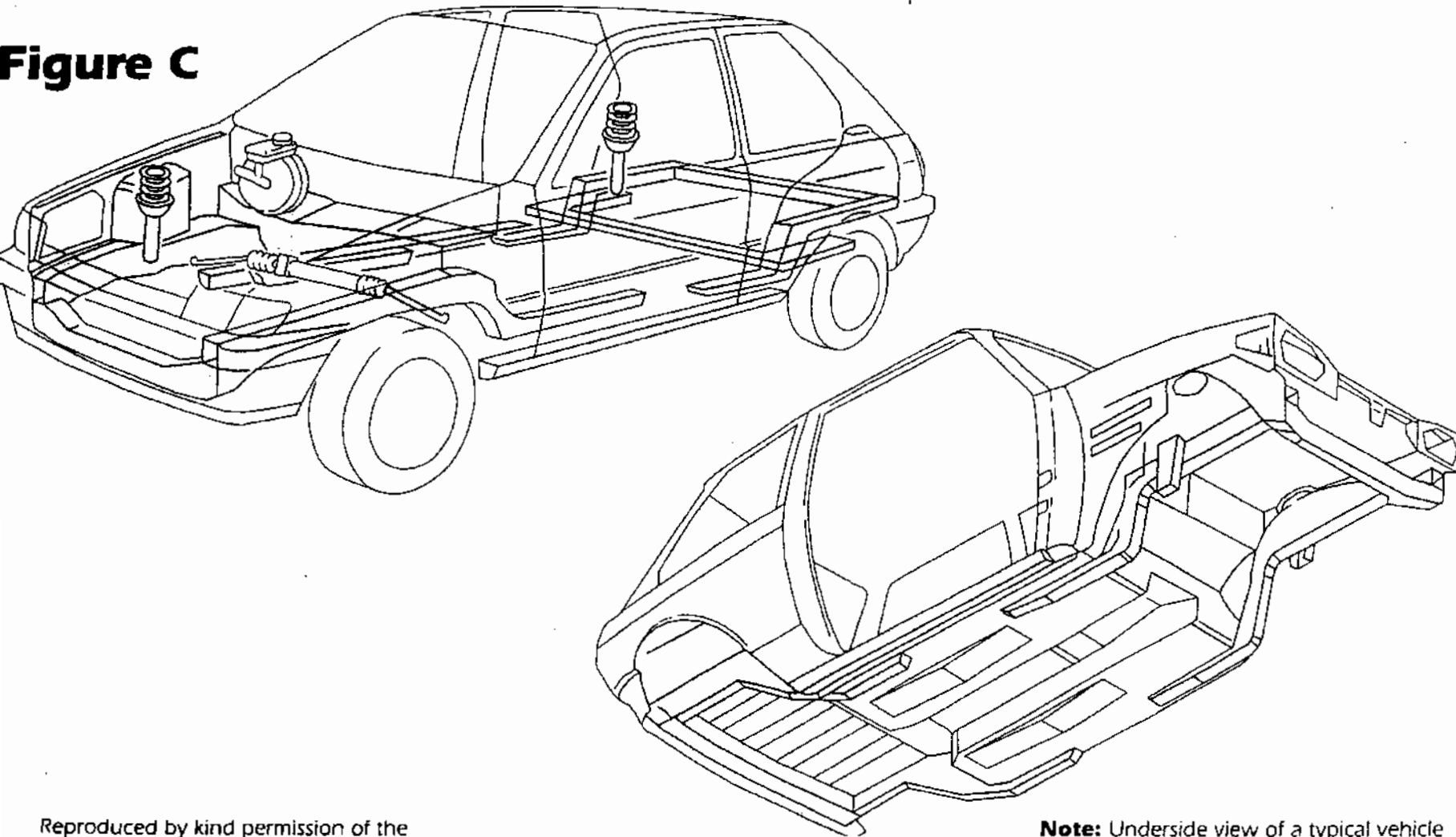
Figure A





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Figure C



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Note: Underside view of a typical vehicle monocoque construction without doors or front wings fitted.



CHAPTER 3-4
MOTOR BICYCLE AND SIDE CAR

CONTENTS

Para

- 1 Motor bicycle and Side car

MOTOR BICYCLE AND SIDE CAR

1 This Chapter explains to everyone engaged in the practical work of vehicle examination and maintenance:

- 1.1 The application of specific relevant requirements.
- 1.2 The procedures and standards to be used.
- 1.3 The reason for failure.

2 The procedures given assume that only the parts of a vehicle, which can readily be seen without dismantling, are to be examined. However, it may be necessary to remove panels or equipment where it is not otherwise possible to inspect safety critical items.

3 Each inspection has been allocated a number. This number is cross-referenced to entries in the column marked I, II on the AF G932(B). Not all inspection numbers have been allocated.

4 As it is not practicable to lay down limits of wear or tolerance for components of specific vehicle types the following points should be considered when carrying out the inspection:

- 4.1 Refer to the Vehicle Inspection Standard.
- 4.2 The function of the component and its contribution to the road safety of the vehicle.
- 4.3 Whether the component has clearly reached the stage where repair, replacement or adjustment is necessary to ensure the road safety of the vehicle.
- 4.4 Whether the condition of the component appears to break the law.

5 Inspectors should note that apart from those exemptions listed, against particular vehicle types, under specific inspections, further exemptions apply to MoD vehicles. However where such items are fitted they should be serviceable. Where a testable item is not fitted as part of the original vehicle build standard, inspectors should assume that an exemption is in place. If in doubt clarification should be sought from the ESPD or through the appropriate ES chain of command to the ESM.

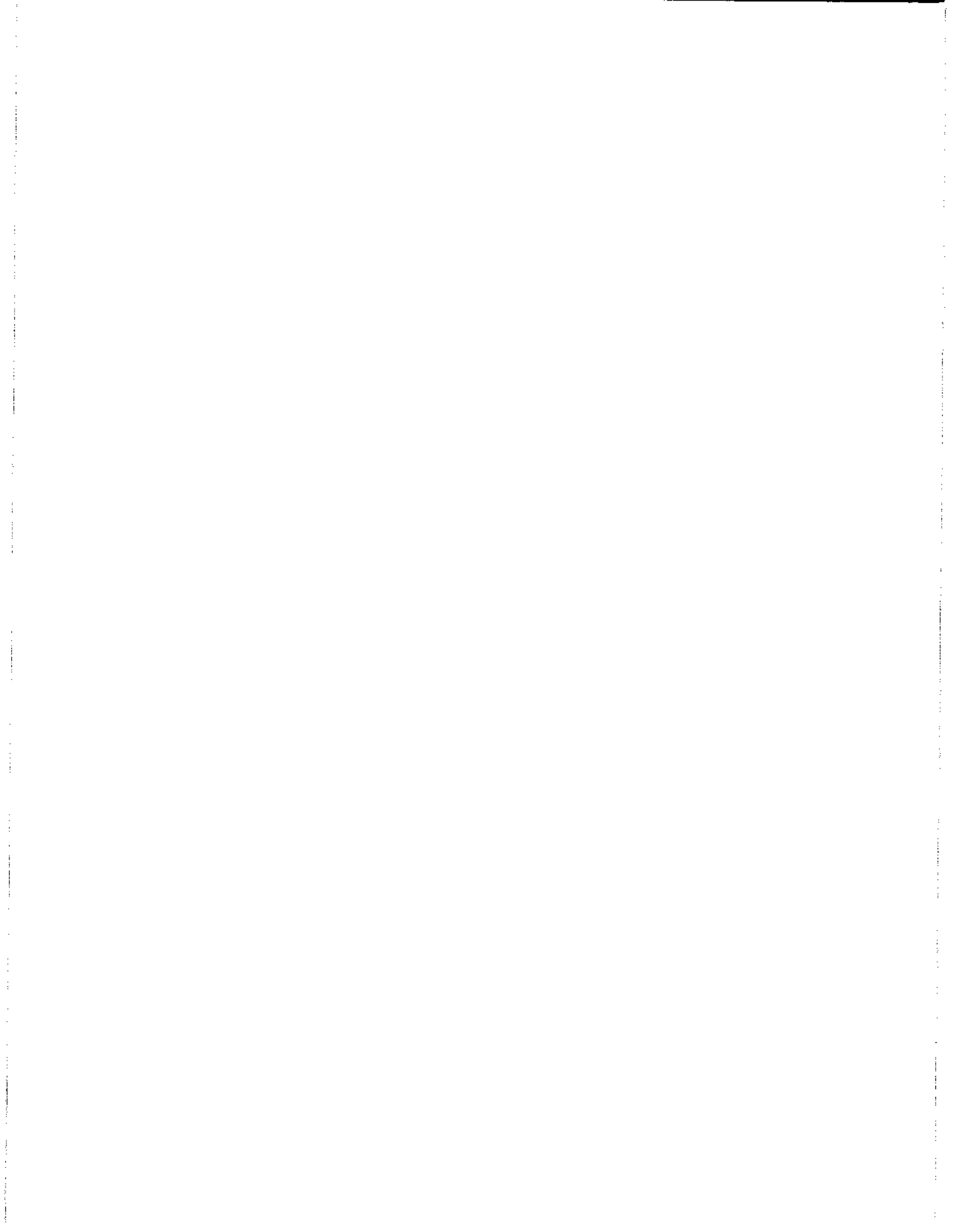
6 The VOSA Introduction and Appendix A have not been included in this section; any reference to these within the section should therefore be ignored.



Introduction

Notes on the use of the manual

Section	1	Lighting and Signal Equipment <ol style="list-style-type: none">1. Front and Rear Position Lamps2. Headlamps3. Stop Lamps4. Rear reflectors5. Direction Indicators6. Headlamp Aim7. Audible Warning	5	Side Cars <ol style="list-style-type: none">1. Security2. Suspension and Wheel Bearings3. Wheel Alignment	
	2	Steering and Suspension <ol style="list-style-type: none">1. Steering Controls2. Steering System3. Front Suspension and Wheel Bearing4. Rear Suspension and Wheel Bearing5. Wheel Alignment (solo Machines)		6	General Items <ol style="list-style-type: none">1. Condition of Structure2. Seats Footrests and Transmission
	3	Brakes <ol style="list-style-type: none">1. Brake Controls2. Brake System3. Brake Performance		7	Exhaust <ol style="list-style-type: none">1. Exhaust System
	4	Tyres and Wheels <ol style="list-style-type: none">1. Tyres2. Wheels	Appendix	A	Amendment Record
				B	Assessment of Corrosion



Introduction – How to use this manual

the machine has a "cherished" registration mark or if the year letter on the registration mark does not make it clear which standard should be applied - e.g. direction indicator requirements on machines first used after 1st August 1986;

- b. the machine is presented in such a dirty condition that examination is unreasonably difficult;
- c. the machine cannot be driven or has insufficient fuel or oil to enable the test to be completed;
- d. the tester considers that an insecure load or other items would prevent a proper test being carried out unless the load is secured or removed;
- e. the VTS asks for the test fee to be paid in advance and this is not done;
- f. a proper examination cannot be carried out because any cover or other device designed to be readily opened cannot be readily opened, e.g. a seat is locked down and lifting is required in order to inspect the structure of the machine;
- g. the condition of the machine is such that, in the opinion of the tester a proper examination would involve a danger of injury to any person or damage to the vehicle or other property.

If, despite due care initially, it becomes apparent during a test that the test cannot be completed **for any one of the above reasons**, you must fail the machine because the test could not be satisfactorily completed. Any re-test and fee must be in line with normal policy (see

fees poster) treating the component which could not be checked as a failure item.

Note: Decline to test a machine if:

- (i) if it is of such a size, weight or configuration that it cannot be properly or safely tested on the approved facilities,
- (ii) any motor bicycle the frame of which is stamped 'not for road use' or words to that effect.

7. Inspection Procedure The entire test must be carried out by one tester whose name is on the list of Nominated Testers (VT26).

8. Inspection Manual Layout

Information

The 'information' columns contain details a tester needs to know that are relevant to that part of the inspection. The information is in note form and referenced in the Method of Inspection and Reason for Rejection columns. The notes give valuable guidance on the conduct of the test and the scope of the various inspections.

Method of Inspection

This column describes the way that each component or system is to be tested.

Reason for Rejection

This column describes how severe a defect must be to fail the test. Only those reasons for rejection found here may be applied.

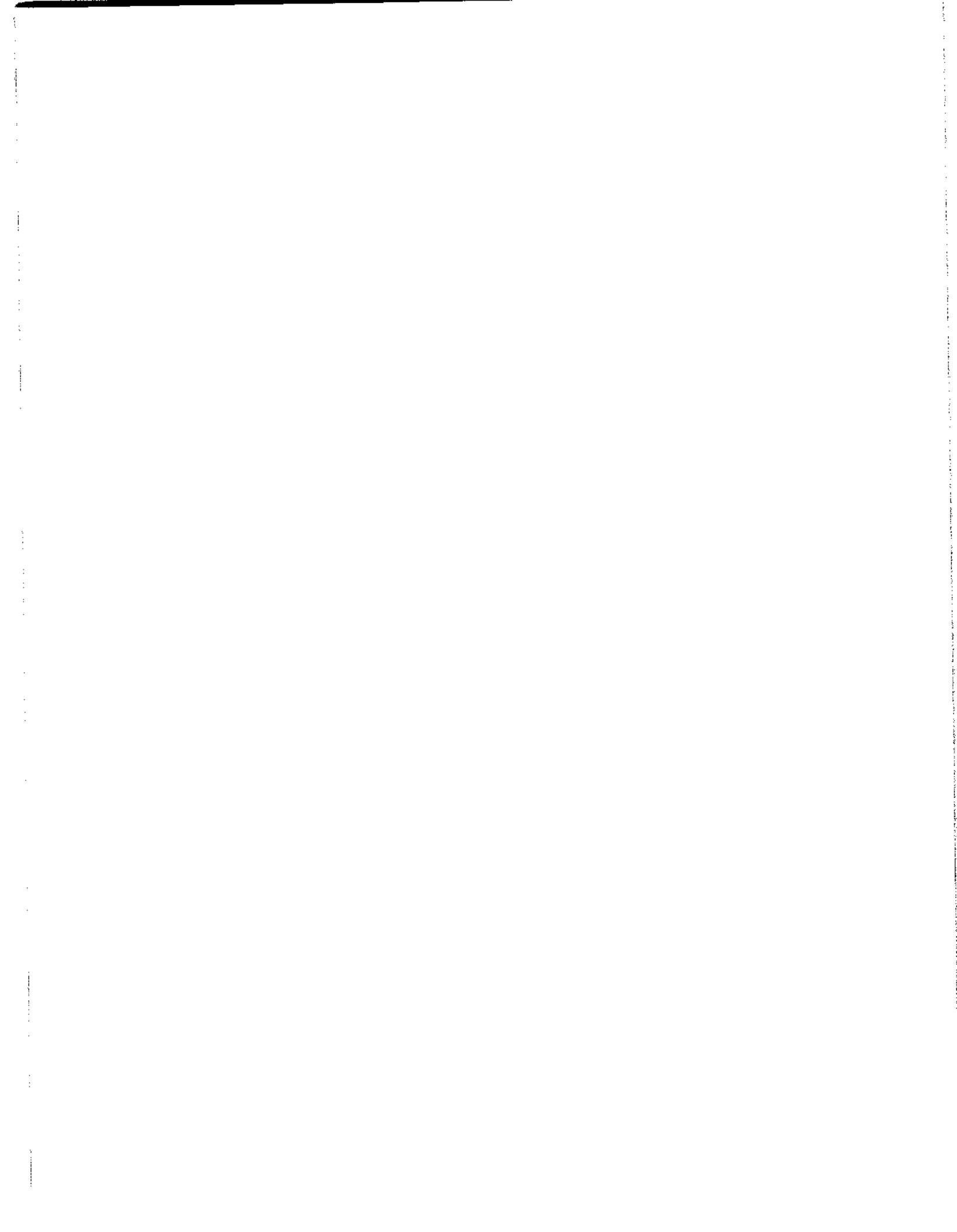
9. 'First used' dates

A machine's 'first used' date is either

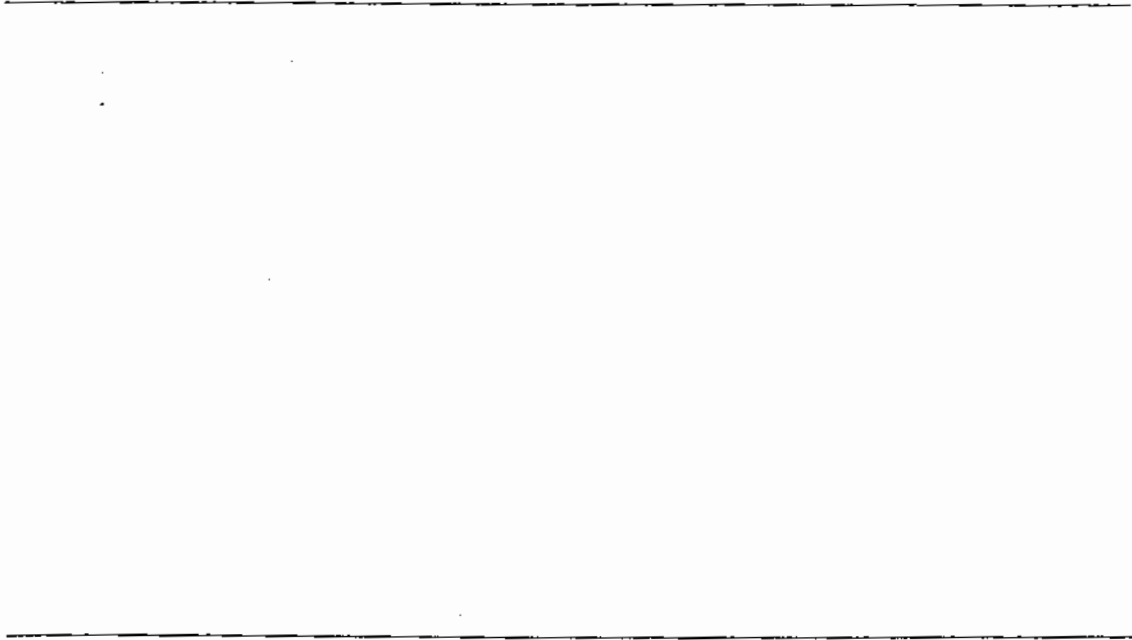
- (a) Its date of manufacture, if the machine was originally used without being registered (eg, an imported vehicle, an ex-*HM Forces* vehicle etc), or
- (b) In any other case, the earlier of either
 - Its date of first registration, or
 - The date six months after it was manufactured

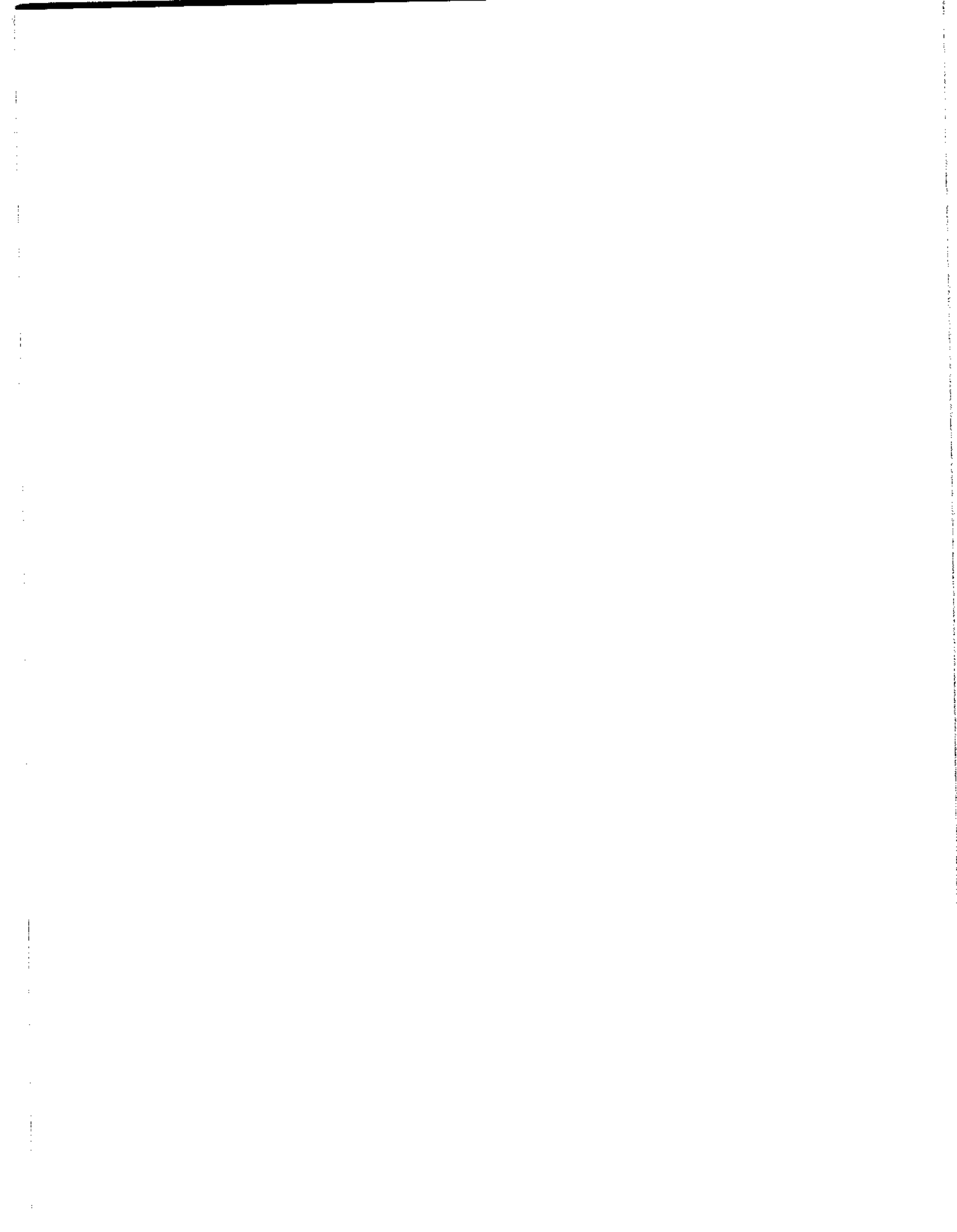
10. 'O' plate registered vehicles

'O' plate registration is issued if the machine is of 'indeterminate age'. For MOT Testing purposes assume the machine to have been first used on 1st January 1971.



Introduction – How to use this manual





Section 1

Lighting and Signalling Equipment

Section Contents

Sub-Section	Subject	Page
1.1	Front and rear Position Lamps	2
1.2	Headlamps	4
1.3	Stop Lamps	6
1.4	Rear Reflectors	7
1.5	Direction Indicators	8
1.6	Headlamp Aim	10
1.7	Audible warning	15



Front and Rear Position Lamps

1.1

Information

On machines without a battery or with an insufficiently charged battery, it will be necessary to run the engine.

Fog lamps and amber lamps

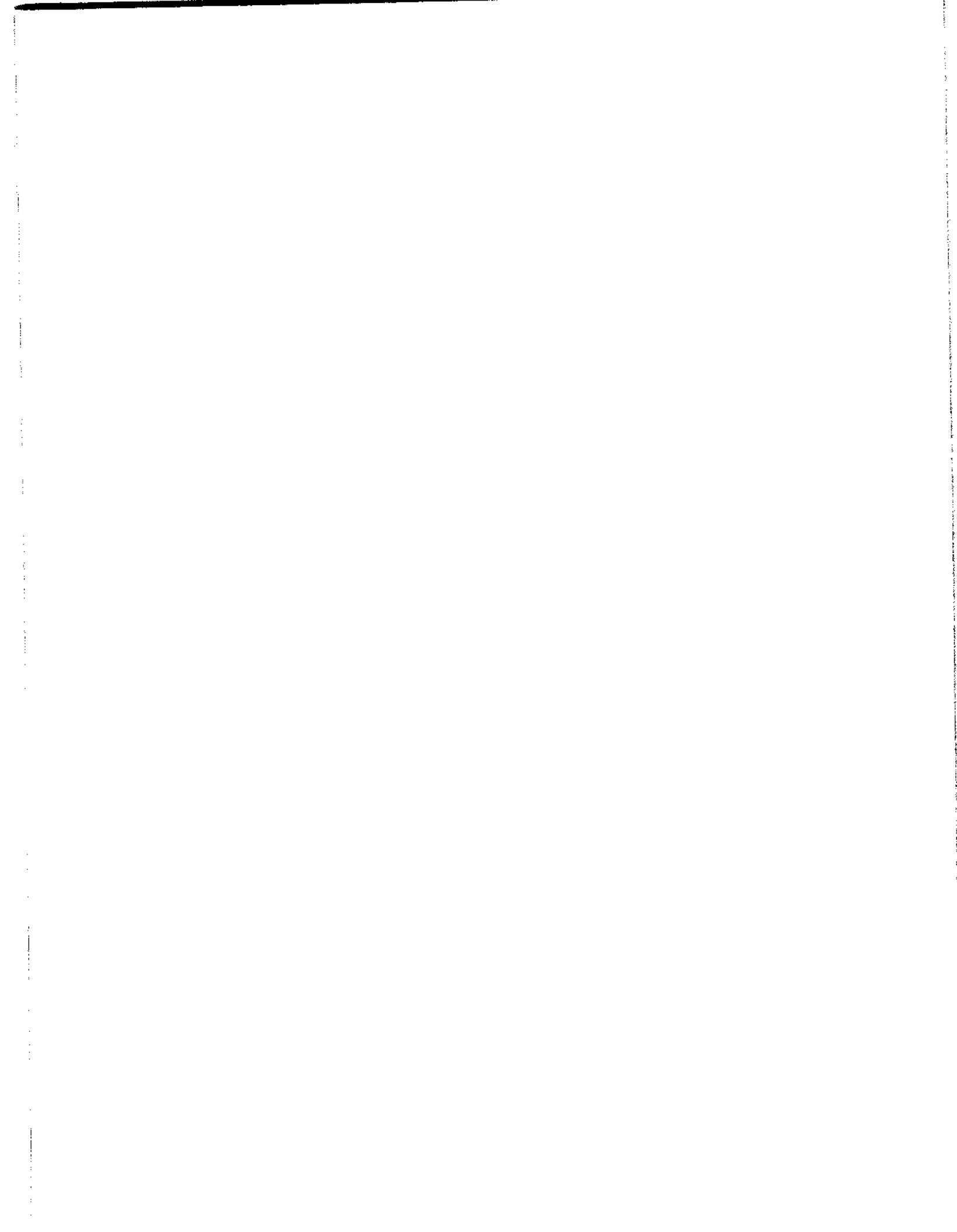
The inspection (1.1) does NOT include rear fog lamps or amber lamps located within the indicators.

Method of Inspection

4. Check the switch for condition and security. Check the front and rear position lamps are operated by a single switch.

Reason for Rejection

4. A switch which
 - a. is faulty
 - b. is insecure, or
 - c. does not operate the front and rear position lamps.



Headlamps

1.2

Information

Twin headlamp systems

On twin headlamp systems only one or both headlamp may to be illuminated for either dipped or main beam. Each headlamp that can be illuminated on dipped beam must meet the requirement for dipped beam headlamps. Twin headlamps must be mounted either one above the other or symmetrically without regard to any side car and not more than 200mm apart measured from the edge of the reflecting surface. The tester should advise if both headlights should illuminate for either function and only one does so.

On machines without a battery or with an insufficiently charged battery, it will be necessary to run the engine.

Method of Inspection

4. Check the condition operation and security of the switch.

Reason for Rejection

4. A faulty or insecure switch.



Rear Reflectors

Information

This inspection applies to: all machines except those which either have no front or rear position lamps or have such lamps permanently disconnected, painted over or masked that are

- only used during daylight hours, and
- not used at times of seriously reduced visibility

If this situation occurs the machine presenter should be issued with an advisory notice recording the above and it should also be recorded on the carbon copy of the VT20.

Statutory reflectors

Mopeds and motor bicycles require one unobscured red reflector which is aligned to the vehicles longitudinal centre line and is positioned to reflect squarely to the rear. If the motorcycle is fitted with a side car the side car will also require a reflector fitted towards the nearside and positioned to reflect squarely to the rear.

Extra reflectors fitted to a motorcycle are not included in this inspection.

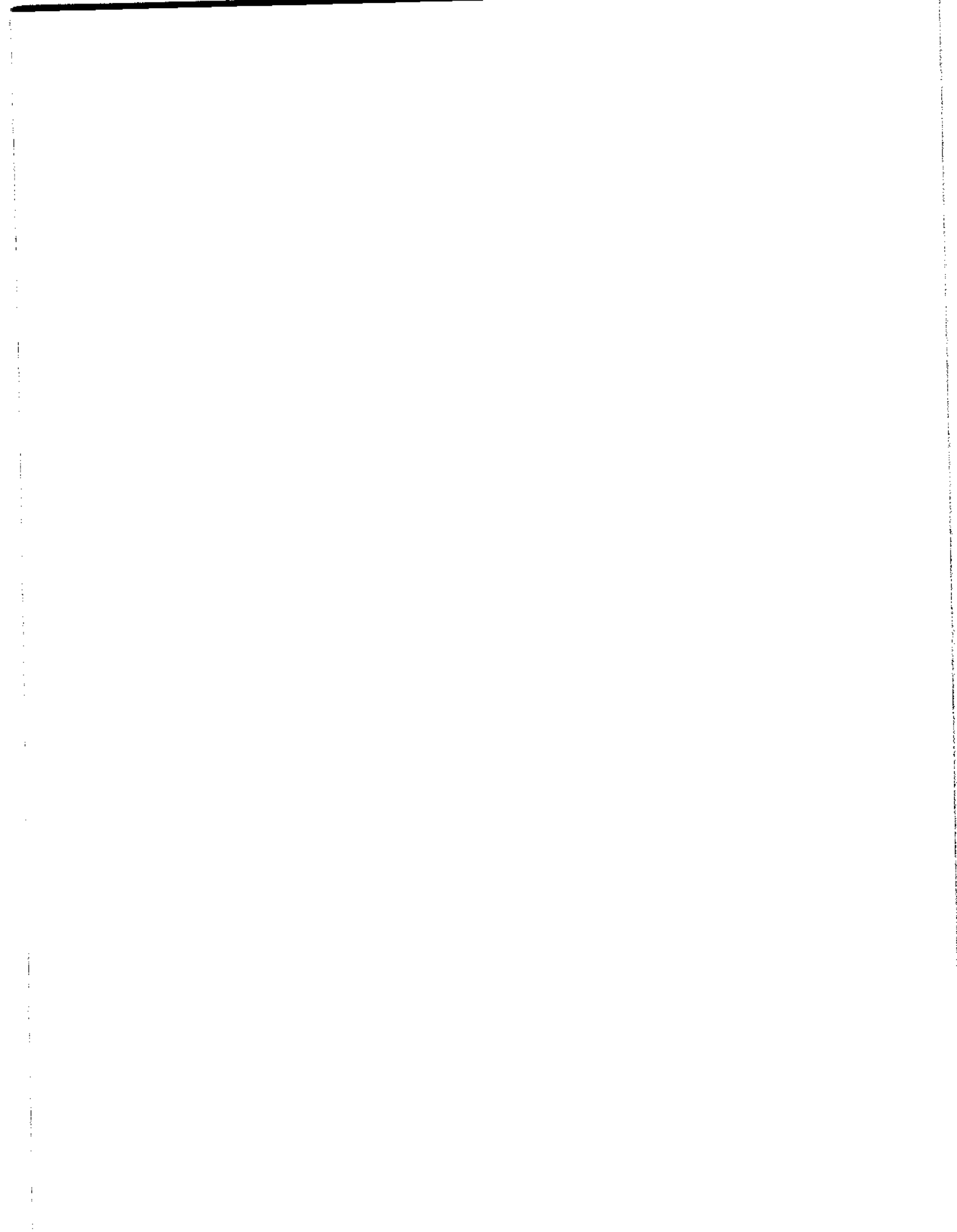
Reflecting and Retroreflective tape must NOT be regarded as a substitute for an obligatory reflector.

Method of Inspection

1. Check the presence and colour of the rear reflector (two in the case of a motorcycle combination, one on the motorcycle and the other on the side car). (see information column).
2. Examine the reflector(s) for condition, security position and that it is not obscured.

Reason for Rejection

1. There is not one unobscured RED reflector (in the case of a motorcycle combination one on the machine and one on the side car) positioned to reflect squarely to the rear.
2. A reflector
 - a. so damaged, dirty or deteriorated that its function is impaired
 - b. obscured
 - c. insecure
 - d. obviously incorrectly positioned



Direction Indicators

17

1.5

Information

Motorcycles first used before 1 September 1965 may be fitted with direction indicators showing a WHITE light to the front and a RED light to the rear.

On motorcycles without a battery or with an insufficiently charged battery, it will be necessary to run the engine. The 'tell tale' may be audible, visual or both.

Amber lamps located within the indicator lamp must not adversely affect the operation of the indicator i.e. the indicator must go on and off to function not dim and bright.

Method of Inspection

Reason for Rejection



1.6

Headlamp Aim

Information

Method of Inspection

Reason for Rejection

USING AN AIMING SCREEN
Place the machine on the standing area. Position the machine or motorcycle part of a combination, with the headlamp lens the appropriate distance from away from the aiming screen and its longitudinal centre line at right angles to the screen.
Clamp the front wheel or otherwise support the machine so that it is upright and adequately supported.
Align the screen vertical zero line with the motorcycle *headlamp* centre line.
With an assistant sitting on the machine in the normal riding position align the horizontal zero line with the horizontal axis of the headlamp using the headlamp height measuring equipment. Switch the headlamp to the beam on which it is to be checked.

Cont'd



British American Type (Checked on Main Beam)

1.6

Information

headlamps tested on main beam have a symmetrical main beam pattern with a central area of maximum intensity (hot spot)

This type of lamp generally has the following characteristics:

- a. a circular lens which may be marked with a figure 1 followed by an arrow indicating the direction of dip;
- b. likely to be of sealed beam construction.

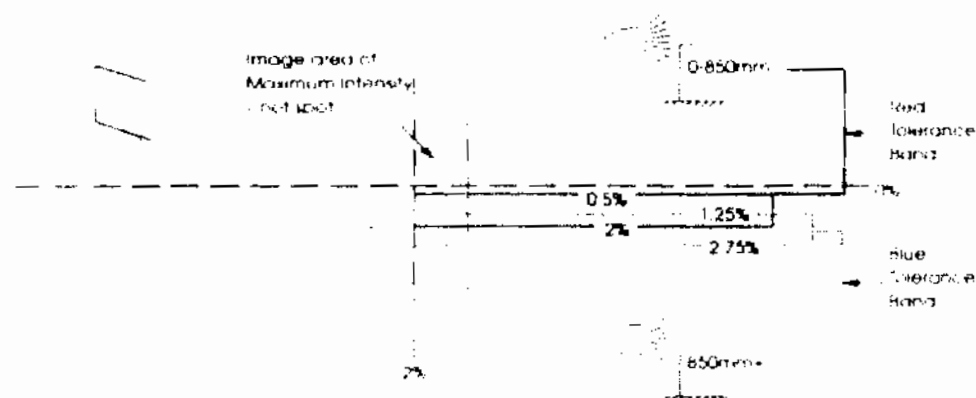


Diagram 2

Main beam image

Check the position of the centre of the area of maximum intensity ('hot spot')

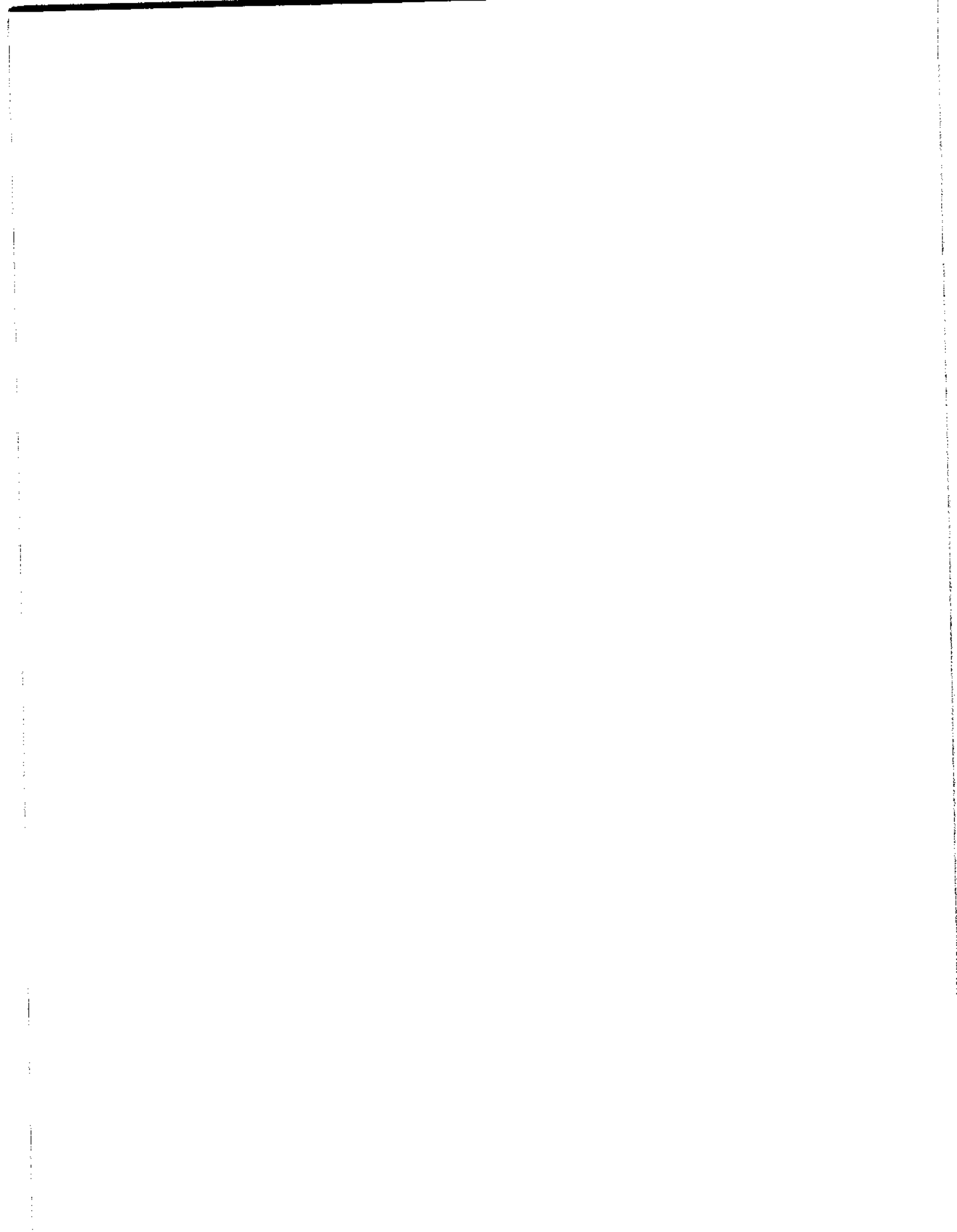
Reason for Rejection

1. The 'hot spot' centre is above the horizontal 0% line.
2. The 'hot spot' centre is to the right of the vertical 0% line, or to the left of the vertical 2% line.
3. For headlamps whose centre is **not more than** 850 mm from the ground the 'hot spot' centre is below the horizontal 2% line.
4. For headlamps whose centre is **more than** 850 mm from the ground, the 'hot spot' centre is below the horizontal 2.75% line.
5. When dipped the brightest part of the image does not move downwards or downwards to the nearside.



Horn (Audible Warning) 1.1

Information	Method of Inspection	Reason for Rejection
<p>On a motor bicycle without a battery or an insufficiently charged battery which is fitted with an electrically operated horn, it will be necessary to run the engine.</p> <p>An audible warning device is usually an electrical horn. A horn is defined as an instrument, not being a bell, gong or siren, capable of giving audible and sufficient warning of the approach or position of a vehicle.</p> <p>A motor bicycle first used before 1 August 1973 may be fitted with a bulb horn.</p>	<ol style="list-style-type: none"> 1. Check that the motor bicycle is fitted with a horn. 2. Check the accessibility and operation of the horn control. 3. Operate the horn and listen to the sound emitted. 	<ol style="list-style-type: none"> 1. A horn missing. 2. A horn control <ol style="list-style-type: none"> a. defective or not readily accessible b. not functioning. 3. <ol style="list-style-type: none"> a. A horn not working or not loud enough to be heard by another road user b. a motor bicycle fitted with a gong, bell, siren or horn which emits two or more alternating tones c. in the case of a motor bicycle first used on or after 1 August 1973 a sound which is <ul style="list-style-type: none"> • not a constant note • not continuous or uniform • harsh or grating.



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Section 2

Steering (including suspension)

Section Contents

Sub-Section	Subject	Page
2.1	Steering Control	2
2.2	Steering System	4
2.3	Front Suspension and Wheel Bearings	5
2.4	Rear Suspension and Wheel Bearings	7
2.5	Wheel Alignment (Solo Machines)	10



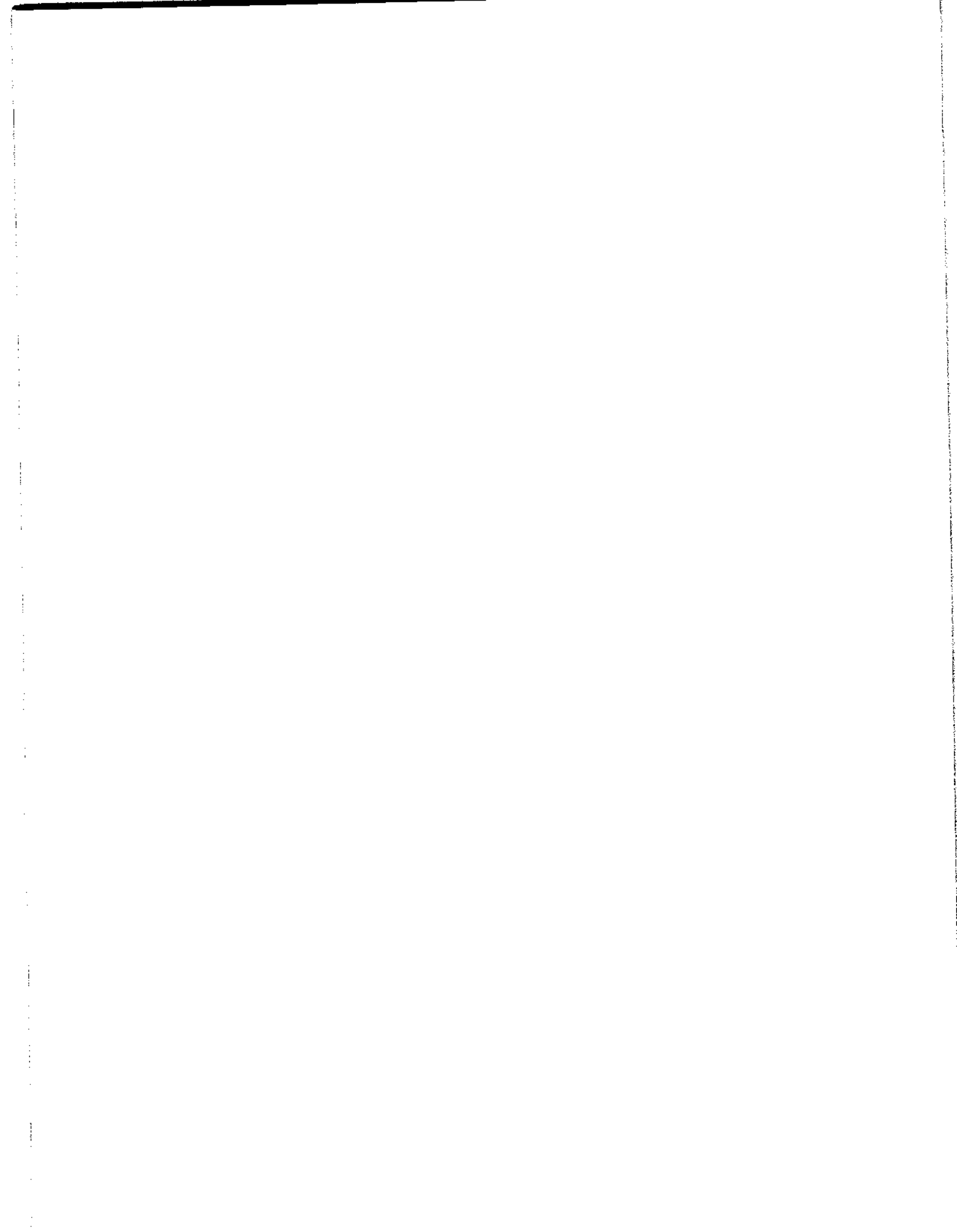
Steering Controls 2.1

Information

Method of Inspection

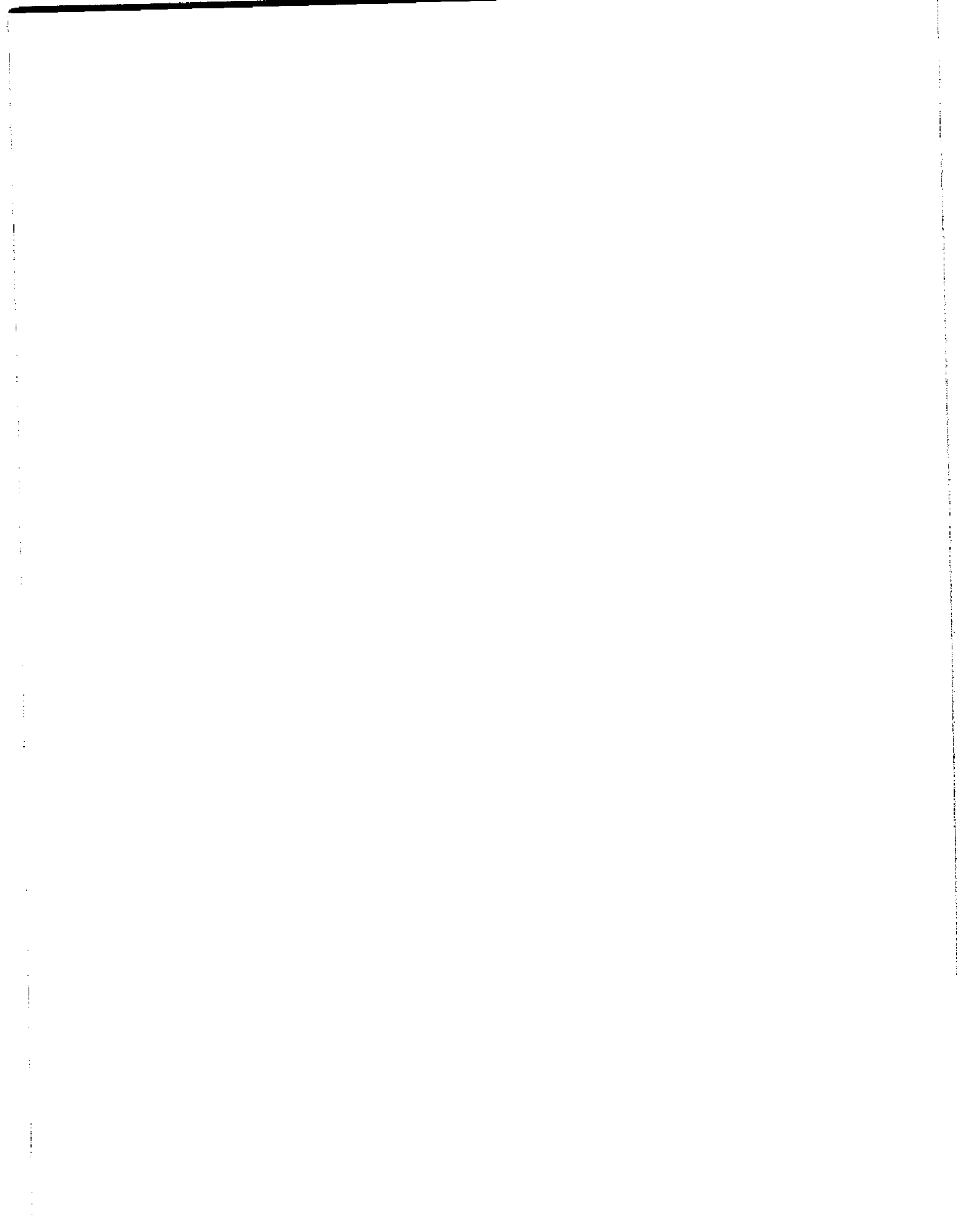
Reason for Rejection

- | Information | Method of Inspection | Reason for Rejection |
|-------------|---|---|
| | <p>c. the control cables are not pulled taut on full lock and that they are not likely to be trapped or caught on a projection</p> <p>d. any steering damper fitted is properly secured, effective and is not likely to impede control of the motor bicycle</p> <p>e. fairings or leg shields do not impede the steering.</p> | <p>c. restriction to the movement of the handlebars by cables being pulled taut, becoming trapped or by being caught on a projection</p> <p>d. a steering damper which is insecure, ineffective or in such a condition that the steering action is impaired. (see Sub-Section 2.2 information column)</p> <p>e. any fairing or leg shield insecure or so located it is likely to impede the steering.</p> |
| | <p>3. Examine steering lock stops (if fitted).</p> | <p>3. A loose, missing, maladjusted, or ineffective steering lock stop.</p> |
| | <p>4. Check for any change in the engine speed with the front wheel on the ground, the engine running and turning the steering from lock to lock.</p> | <p>4. A significant change in engine speed.</p> |



Front Suspension and Wheel Bearings

Information	Method of Inspection	Reason for Rejection
<p>Anti-dive front forks Many high performance machines are fitted with anti-dive front forks which lock when the brake is applied. In these cases the front wheel will need to be placed against a solid object when checking the damping.</p> <p>It is important to distinguish between play in the forks and that in the wheel bearings.</p> <p>Light rubbing contact between a fork leg or damper body and its shroud is acceptable.</p> <p>Some smaller machines are not fitted with dampers on the front suspension.</p> <p>Some fork arrangements rely on the bracing incorporated in the mudguard fixings to maintain their alignment. A mudguard insecurely fixed to the forks may therefore adversely affect the handling of the machine.</p> <p>Light misting of the stanchion is acceptable but if evidence of oil running down the fork leg is apparent the reason for rejection would apply.</p>	<ol style="list-style-type: none"> 1. <ol style="list-style-type: none"> a. Check the condition, alignment and security of the front fork assembly. b. Check condition of suspension springs c. Check shock absorbers for oil leakage due to seal failure 2. Check for wear in the front fork assembly by one of the following methods: <ol style="list-style-type: none"> a. whilst the machine is held upright grip the front wheel <i>firmly</i> and attempt to turn the handlebars from side to side looking for free play in the forks; b. on leading or trailing link type suspensions, with the wheel raised, attempt to move the swinging fork from side to side and look for play in the pivot bearings or bushes. 	<ol style="list-style-type: none"> 1. <ol style="list-style-type: none"> a. a fork assembly component which is missing, loose, cracked, or excessively bent, misaligned or corroded. b. a road spring: <ol style="list-style-type: none"> (i) incomplete, cracked or fractured (ii) worn or corroded so that its cross sectional area is reduced such that it is seriously weakened; (iii) repaired by welding. c. Oil leakage indicating failure of the seal. 2. Excessive free play between the sliding members of the forks or in the pivot bearings. (see information column).
<i>Cont'd</i>	<i>Cont'd</i>	<i>Cont'd</i>



Rear Suspension and Wheel Bearings

Information

Motorcycles need not be fitted with rear suspension; some customised machines take advantage of this on the rear suspension, eg 'chopper' or 'lowrider' motorcycles.

It is important to distinguish between play in the rear suspension bearings and that in the wheel bearings.

Light rubbing contact between the body and shroud of a shock absorber is acceptable.

Smaller machines

Shock absorbers fitted to the rear of some small machines may have limited damping.

Access

It may be necessary to remove side panels or remove the seat to carry out a full examination (Intro item 4).

If no centre stand is fitted, care should be taken when jacking the machine. It may be desirable to use an assistant.

Cont'd

Method of Inspection

A ALL SUSPENSION TYPES

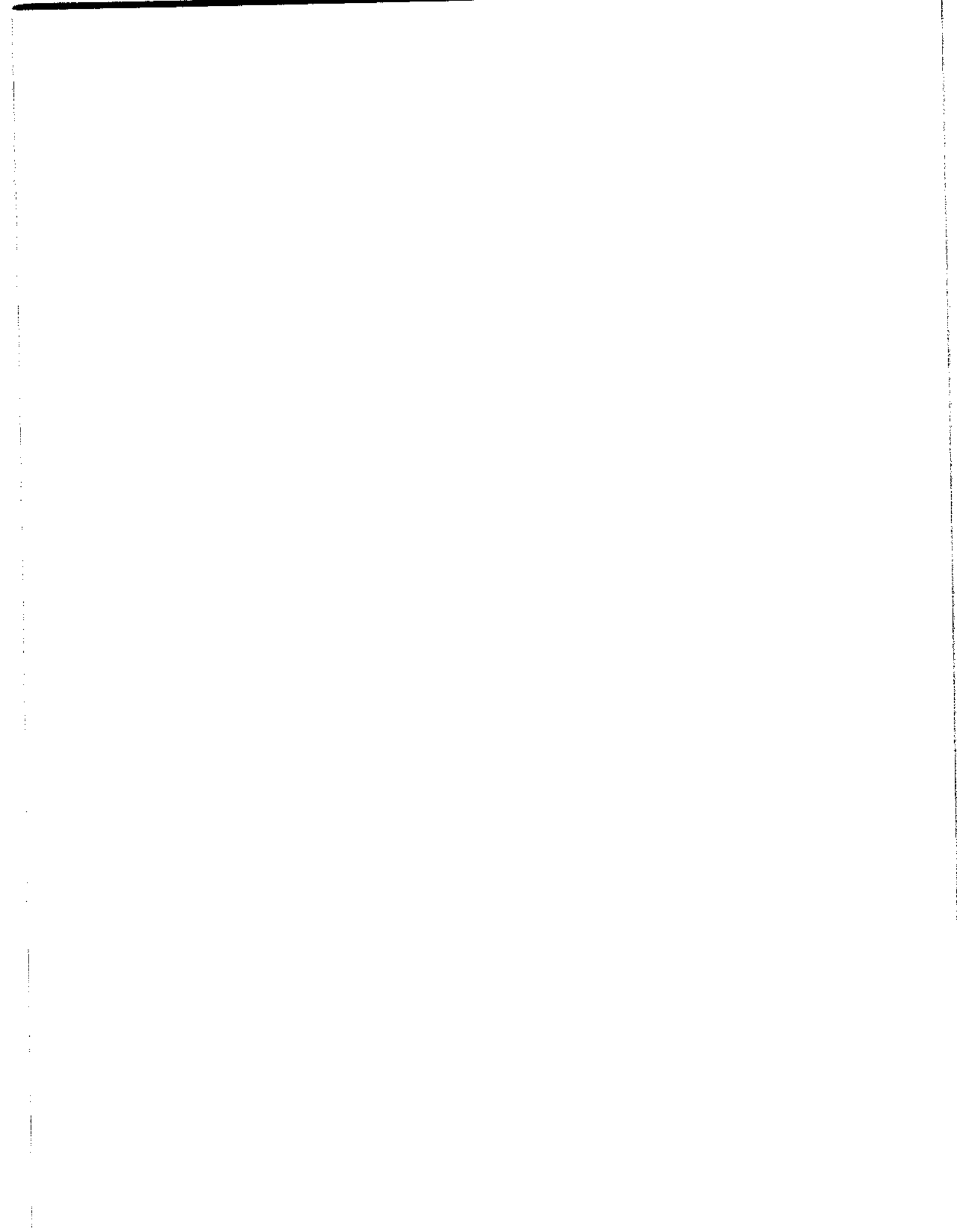
1.
 - a. Check the condition, security and alignment of the rear suspension components.
 - b. Check condition of suspension springs
 - c. Check shock absorbers for oil leakage due to seal failure
2. With the rear wheel clear of the ground:
 - a. look for play in the suspension bearings or bushes by attempting to move the suspension from side to side and up and down;
 - b. ensure that the wheel, it's fixings and locking devices are present and secure and check the wheel bearings for tightness or play;

Cont'd

Reason for Rejection

1. a rear suspension component which is:
 - a. loose, cracked, excessively bent, misaligned or excessively corroded
 - b. A road spring. (see information column.)
 - (i) incomplete, cracked or fractured;
 - (ii) worn or corroded so that it's cross sectional area is reduced such that it is seriously weakened;
 - (iii) repaired by welding.
 - c. Oil leakage indicating failure of the seal.
2.
 - a. (i) Excessive free play or deterioration in bearing or bush. (see information column).
 - (ii) a seized component.
 - b. a loose wheel spindle or securing nut(s) or locking device missing or insecure.

Cont'd



Rear Suspension and Wheel Bearings

Information

Method of Inspection

Reason for Rejection

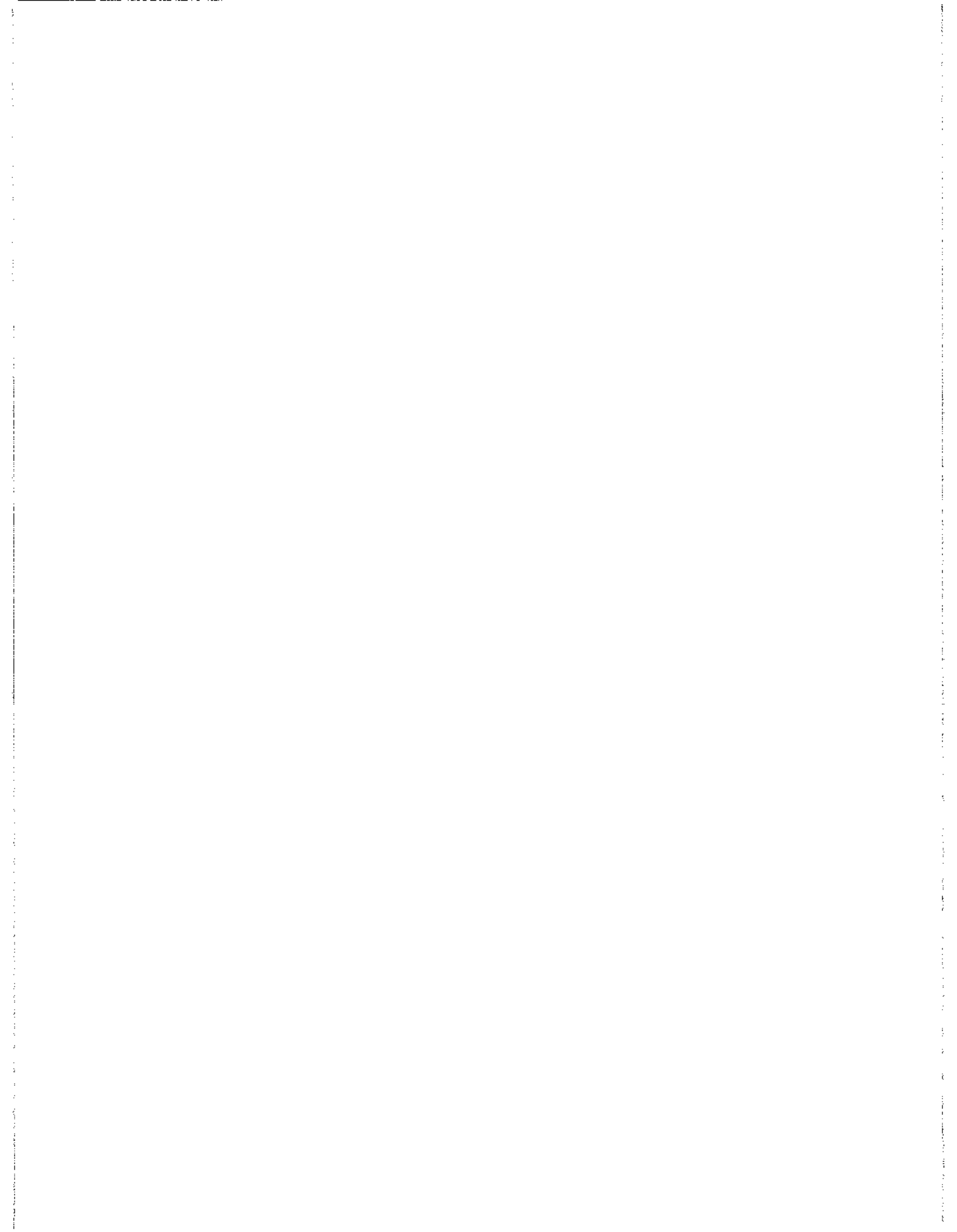
B Mono-shock type suspension

4. On machines fitted with mono-shock type suspension, check as far as possible the condition of pivot points for wear and security (See information column)

4. Seizure excessive wear or insecurity at a pivot point.

Cont'd

Cont'd



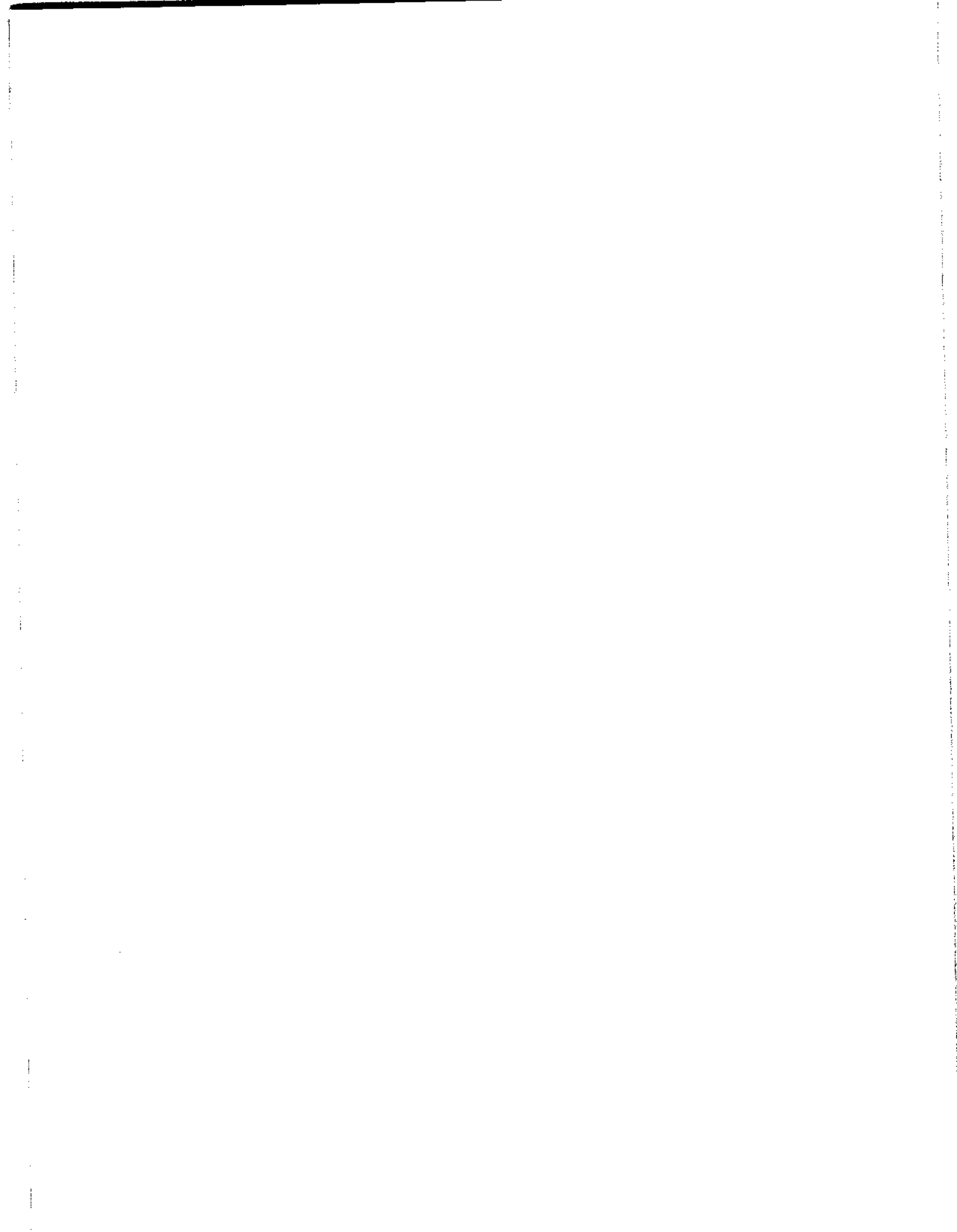
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Section 3

Brakes

Section Contents

Sub-Section	Subject	Page
3.1	Brake Controls	2
3.2	Brake Systems	4
3.3	Brake Performance	8



Brake Controls

3.1

Information

Method of Inspection

Reason for Rejection

4. In the case of hydraulic systems, fully apply the control twice, first slowly and then rapidly, each time to a point where sustained pressure can be held and check for creep and sponginess.
5. *Check components for corrosion, distortion and modifications*

4.
 - a. a hydraulic system control which creeps under load
 - b. sponginess indicating air in the hydraulic system.
5. *deliberate modification which significantly reduces the original strength of any component. Excessive corrosion, severe distortion, a fracture or an inadequate repair to a component.*



Brake Systems

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3.2

Information

Method of Inspection

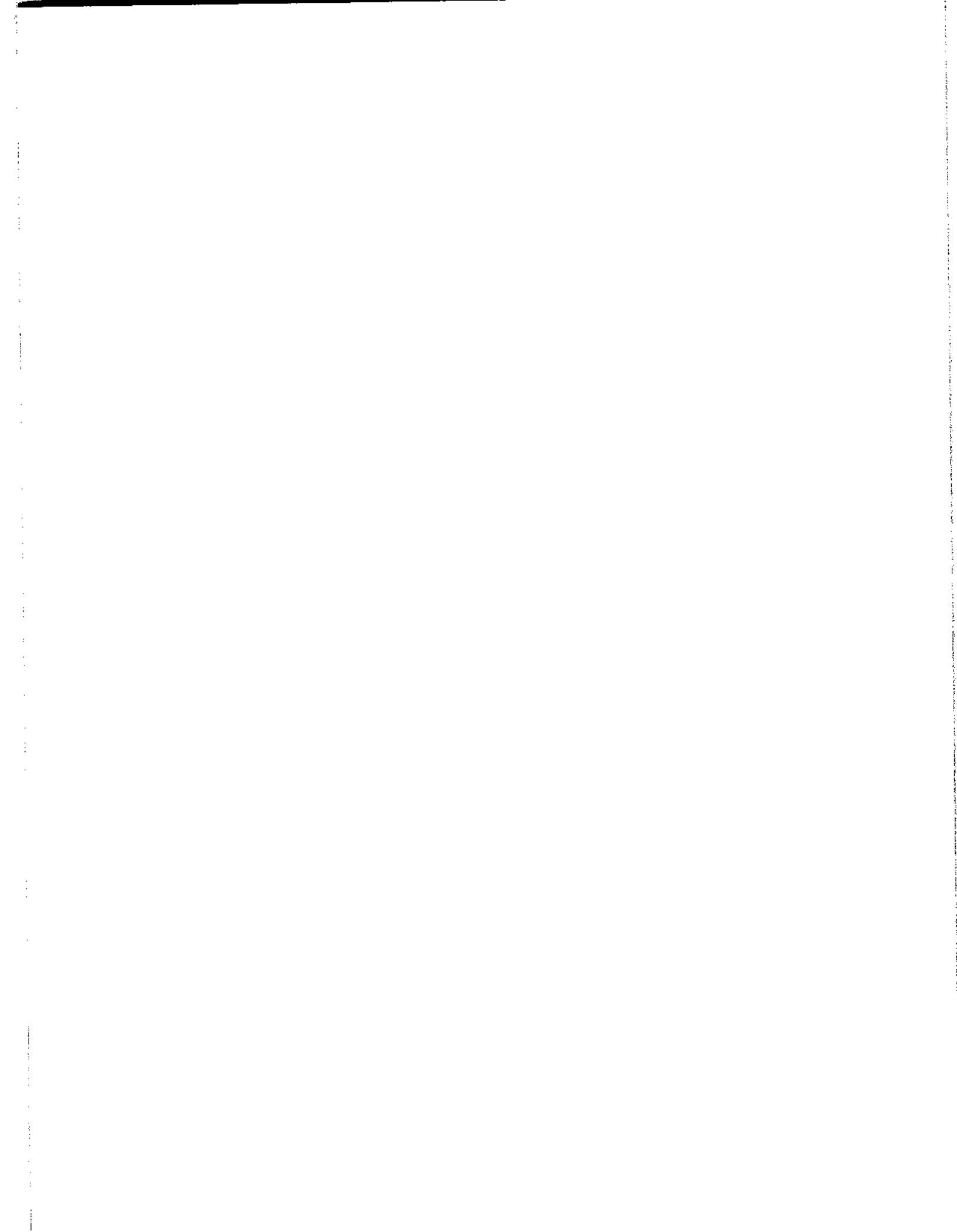
Reason for Rejection

- h. any restriction to the free movement of the mechanism
- i. abnormal movement of levers indicating maladjustment or excessive wear
- j. insecurity of brake back plates, reaction brackets or calipers;
- k. contamination of friction surfaces by oil or grease;
- l. brake disc scoring, pitting or wear;
- m. brake disc run-out.

- h. any restriction to the free movement of the system likely to impede its operation
- i. abnormal movement of levers indicating maladjustment or excessive wear. (see information column)
- j. an insecure brake back plate, reaction bracket or caliper. Securing bolts loose or missing. (see information column)
- k. contamination of friction surfaces by oil or grease
- l. An excessively scored, excessively pitted or excessively worn brake disc
- m. Excessive run out or distortion of a brake disc.

Cont'd

Cont'd



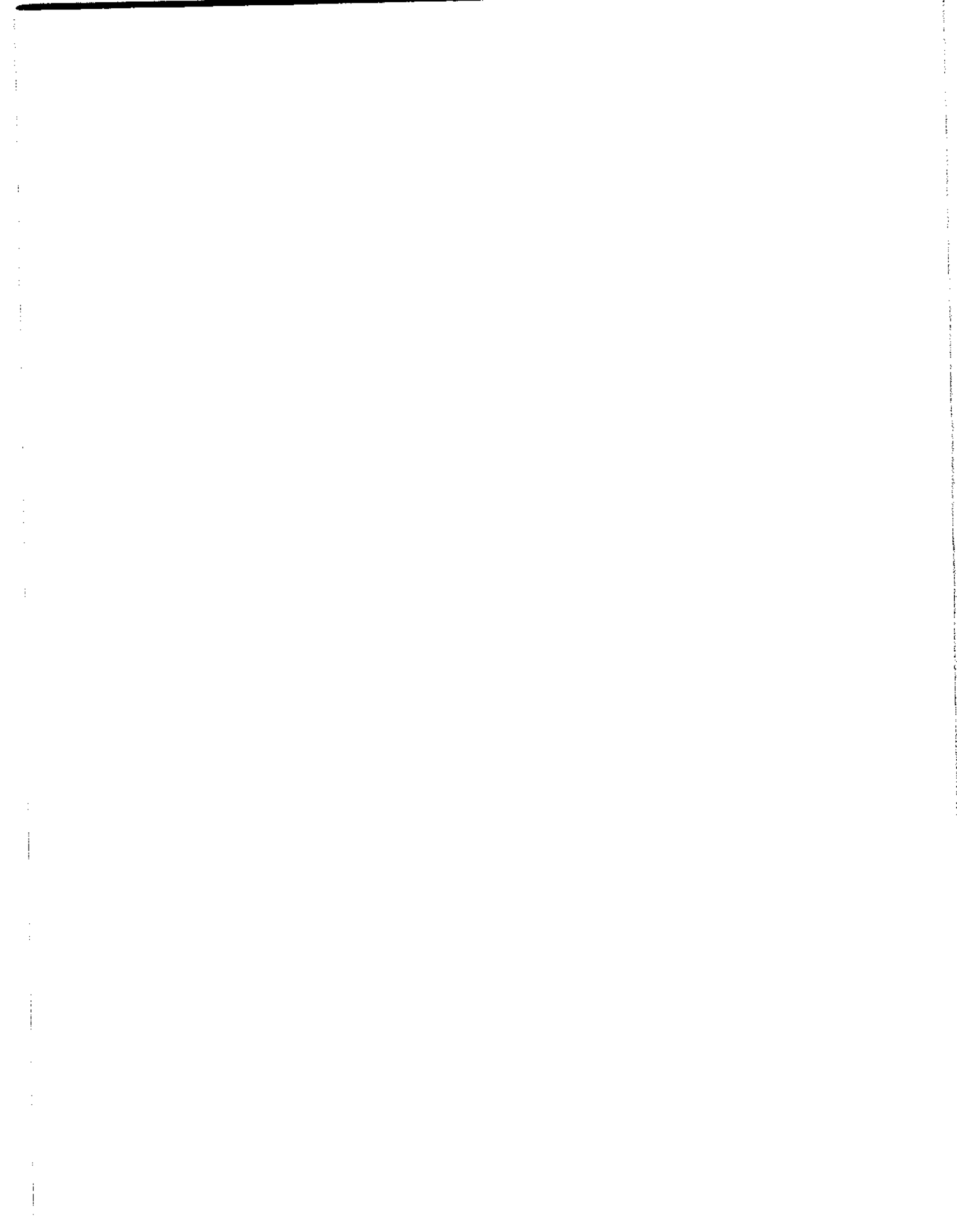
3.2 Brake Systems

Information	Method of Inspection	Reason for Rejection
<p>When testing motorcycles, fitted with replacement brake hoses with anodised alloy banjo fittings, give close attention to the union nuts, as all alloy fittings are not recommended for road use.</p>	<ol style="list-style-type: none"> 3. Examine all flexible hoses for <ol style="list-style-type: none"> a chafing, twisting or kinking b deterioration, stretching, fouling. 4. Withn each hydraulic system held under pressure, check for fluid leakage and hose(s) bulging. 5. On machines with linked type braking systems check all master cylinder and caliper pivot points for freedom of movement and wear. 	<ol style="list-style-type: none"> 3. A hose which is excessively <ol style="list-style-type: none"> a chafed, twisted or kinked b deteriorated, fouling or can be stretched by steering or suspension movement. 4. A hose which bulges or any part of the system leaking fluid. 5. An excessively worn or seized master cylinder or caliper pivot.



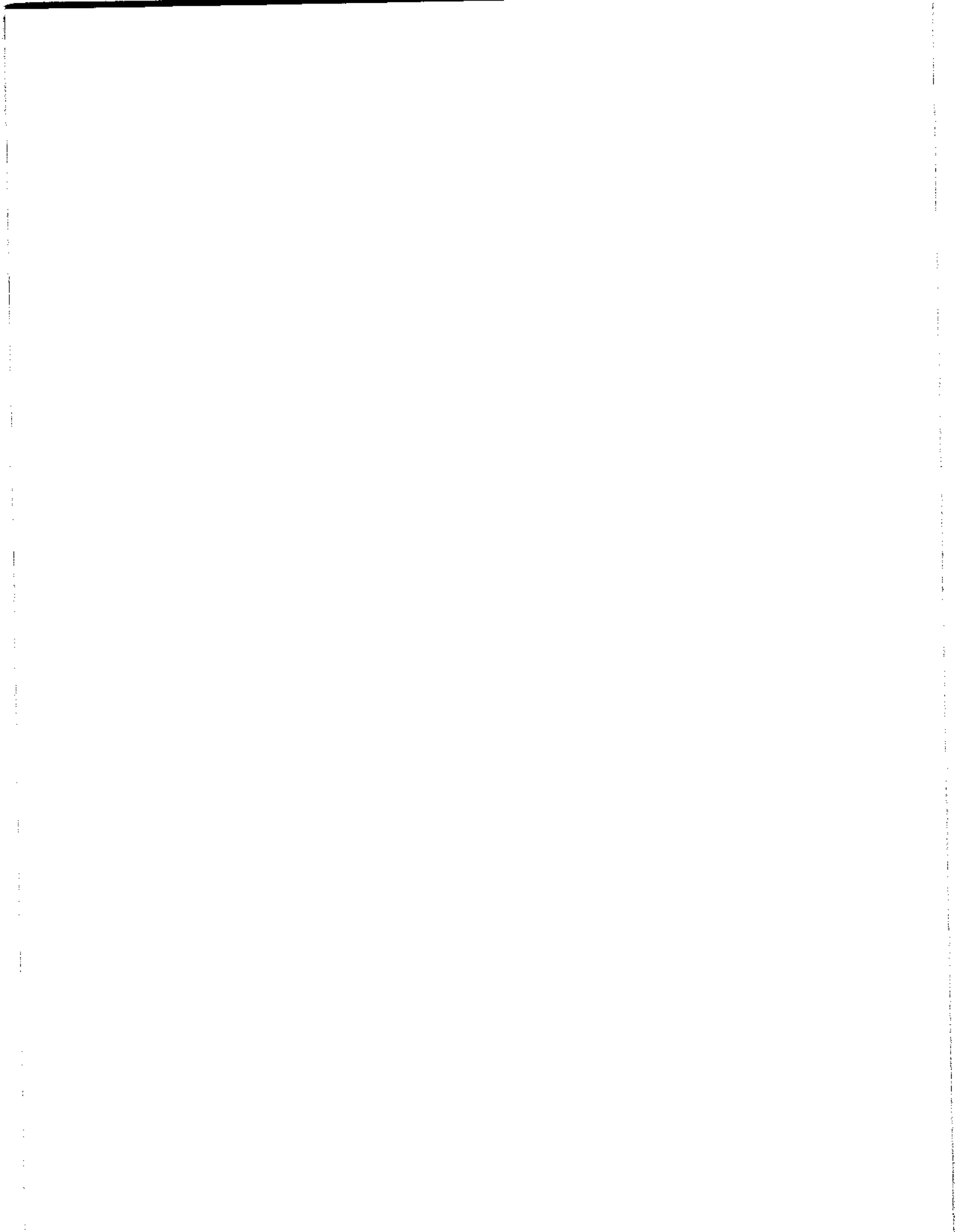
3.3 Brake Performance

Information	Method of Inspection	Reason for Rejection
<p>The efficiency of each system operated by a single brake control is the ratio of the total retarding force generated by that system divided by the weight of the machine and rider</p> $\text{Efficiency \%} = \frac{\text{Total retarding force for one system}}{\text{Weight of machine plus Rider (tester)}} \times 100$ <p>Most machines have two controls, one operating the front wheel brake and the other the rear wheel brake. The efficiency for front and rear wheels can then be calculated as above, (or checked by a gradient test).</p> <p>Where a linked or dual system is operated by one control, the retarding force used in the efficiency calculation is the total from both wheels when operated by that control only. In this case, the other control will probably operate on one wheel. The reason for failure 1 and 2 apply whether single or dual systems are fitted.</p> <p>Motorcycles first registered on or after 1 January 1927 require two means of operating the brakes, one achieving a minimum efficiency of 30% and the other a minimum of 25%. Machines before this date are only required to have one means of operating the brakes, which shall have an efficiency of at least 30%.</p> <p style="text-align: right;">Cont'd ↓</p>	<p>Move the machine forward until the rear wheel is located in the rollers. Repeat procedures 3.3A1 and 3.3A2.</p> <p>Check the side car wheel brake if applicable (see information column) as in procedures 3.3A1 and 3.3A2.</p> <p>2. Record the appropriate results of the brake test via the VTS Device, which will calculate the results. Where the VTS Device is unserviceable see the Introduction section paragraph 3.</p>	<p>2. a neither brake control achieves an efficiency of 30%.</p> <p>b the less effective brake control does not achieve an efficiency of 25% (Note: this RFR is only to be applied if 1 control achieves 30% and the other control fails to achieve 25%).</p> <p>c neither brake control achieves an efficiency of 25%.</p>



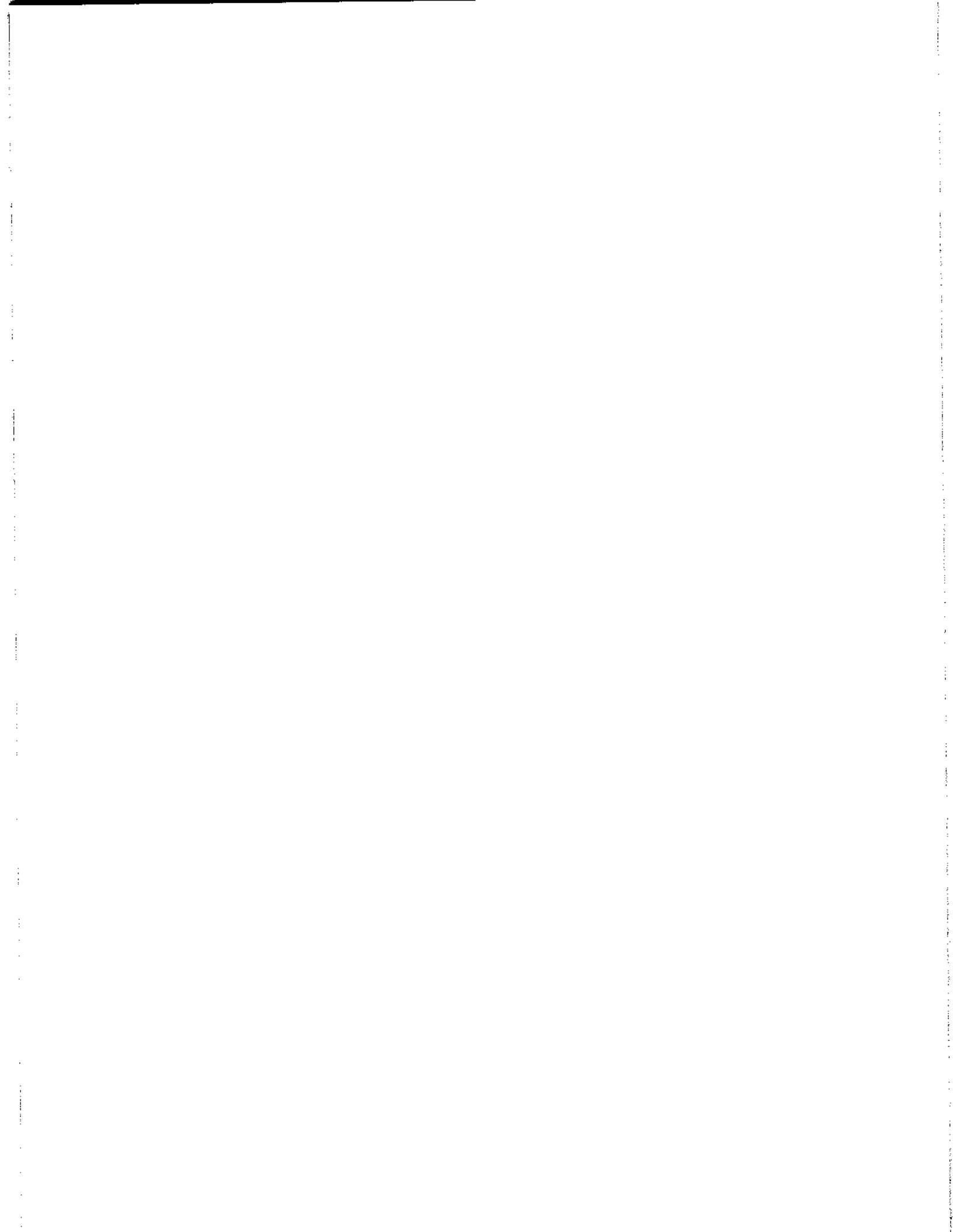
3.3 Brake Performance

Information	Method of Inspection	Reason for Rejection
<p>As 3.3A</p>	<p>B. PLATE BRAKE TEST</p> <p>To calculate the brake efficiency it is necessary to determine the combined weight of the motorcycle and the tester while seated in the normal riding position.</p> <p>1. At a steady speed of approximately 4 mph drive the machine onto the plate tester. As soon as the front wheel is on the plate high friction braking surface gradually apply the front brake until the maximum effort is achieved or the wheel locks or skids. Note the way in which the brake effort increases and the maximum value achieved.</p> <p>Repeat procedure 1. above for the motorcycle rear wheel and in appropriate cases (see information column) the sidecar wheel.</p> <p>Calculate the efficiency of each braking system (see information column).</p> <p style="text-align: right;">Cont'd ↓</p>	<p>1. a. a sticking or binding brake (see information column).</p> <p>b. severe grab or judder (see information column).</p> <p>c. a braking effort that does not rise or fall in proportion to the lever or pedal force applied.</p> <p>d. excessive fluctuation of brake effort with steady application of the brake (see information column).</p> <p style="text-align: right;">Cont'd ↓</p>



3.3 Brake Performance

Information	Method of Inspection	Reason for Rejection
As 3.3A	<p>C. THE FLOOR TEST</p> <p>The apparatus required for this test comprises a spring balance and system of pulleys so arranged that the effort required to pull a machine and rider forward against the brakes may be measured. The spring balance may be used to determine the weight of the motorcycle and rider.</p> <p>With the machine held upright and in a straight ahead position, attach the cable from the spring balance to the front of the motorcycle using a strap around the front forks or the headstock.</p> <p>The tester should sit astride the machine operating each brake in turn and note the readings while the assistant operates the spring balance system.</p> <p>1. With each brake applied in turn record the effort required to move the motorcycle and rider forward.</p> <p>Record the appropriate results of the brake test via the VTS Device, which will calculate the results. Where the VTS Device is unserviceable see the introduction section paragraph 3.</p>	<p>1. a neither brake control achieves an efficiency of 30%.</p> <p>b the less effective brake control does not achieve an efficiency of 25% (Note: this RFR is only to be applied if 1 control achieves 30% and the other control fails to achieve 25%).</p> <p>c neither brake control achieves an efficiency of 25%.</p> <p>d a sticking or binding brake (see information column).</p> <p>e severe grab or judder (see information column).</p>

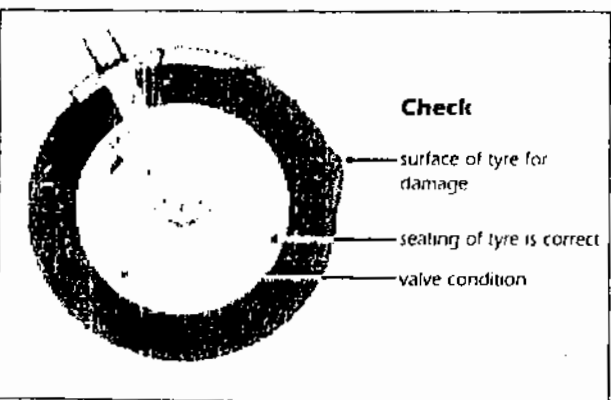
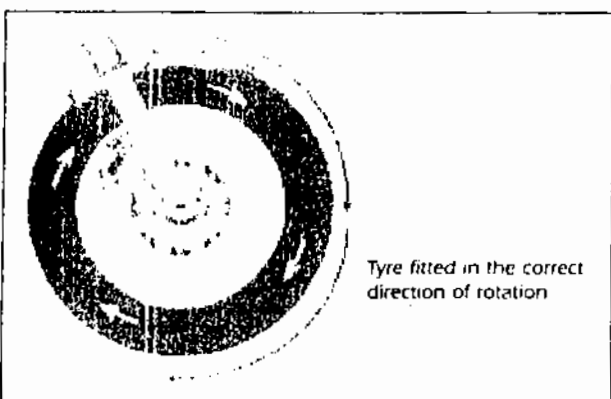


Tyres

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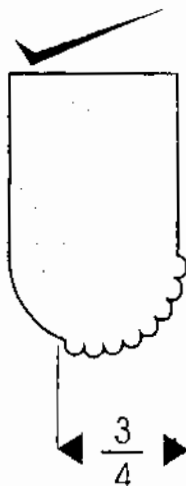
Information

A Metzeler 100/80 - 17 52s ME22 tyre is suitable for fitment to the rear wheel of an Aprilia AF 50 motorcycle provided it is fitted in the reverse to the direction of rotation indicated on the tyre wall.



Tread pattern

A continuous band of at least 3/4 of the breadth of the tread and ALL THE WAY around the tyre



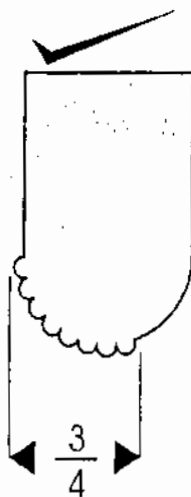
Tread pattern

A continuous band of at least 3/4 of the breadth of the tread and ALL THE WAY around the tyre



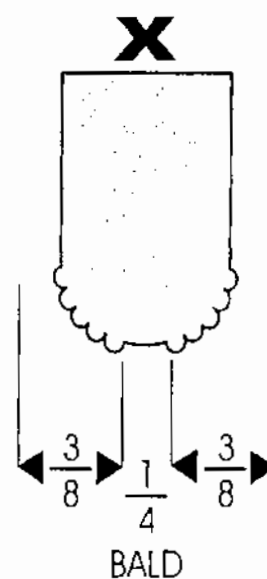
Tread pattern

A continuous band of at least 3/4 of the breadth of the tread and ALL THE WAY around the tyre



Tread pattern

NOT a continuous width 3/4 of the breadth of the tread





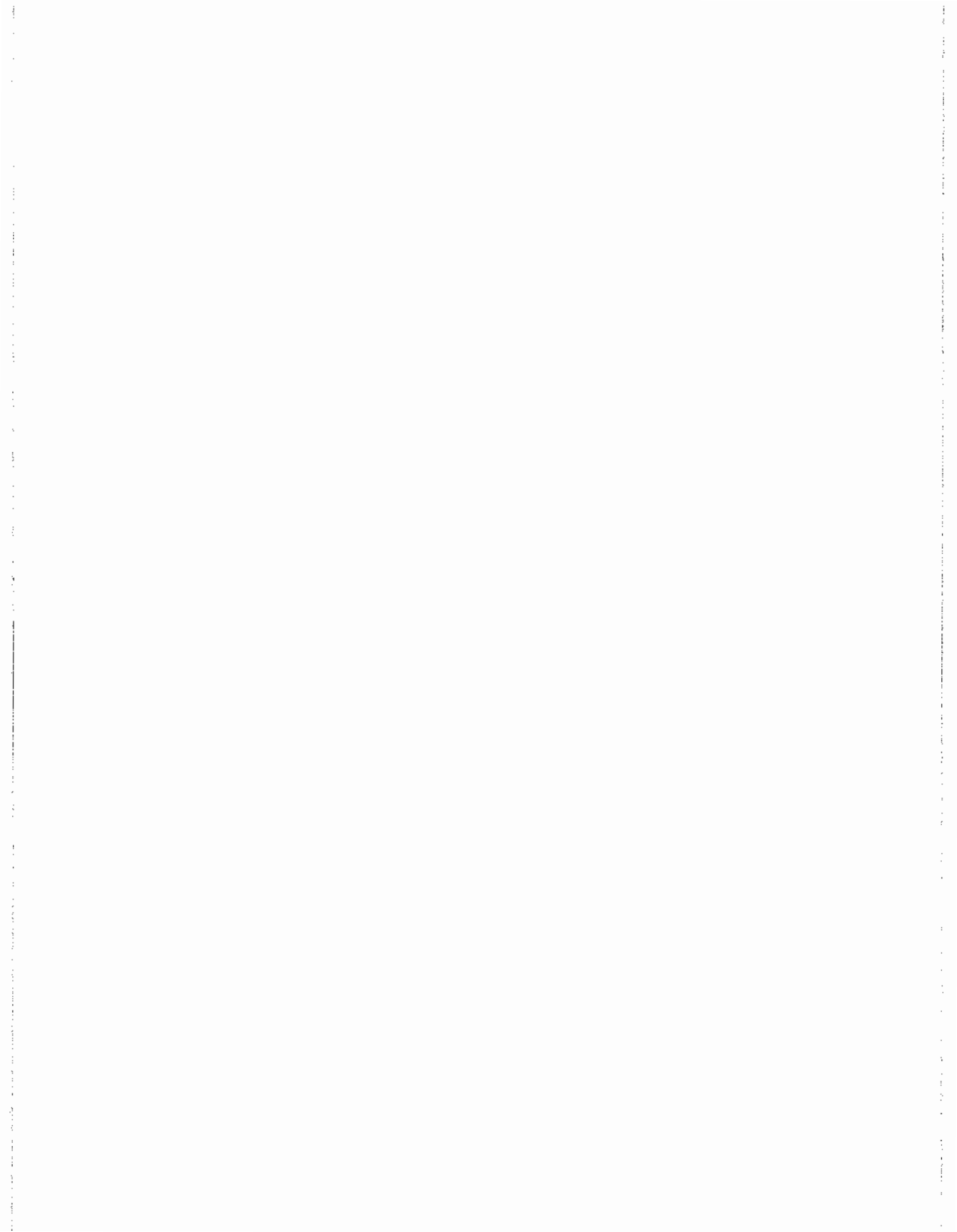
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Section 5

Side cars

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5.2	Suspension and Wheel Bearings	3
5.3	Wheel Alignment	4



Suspension and Wheel Bearings

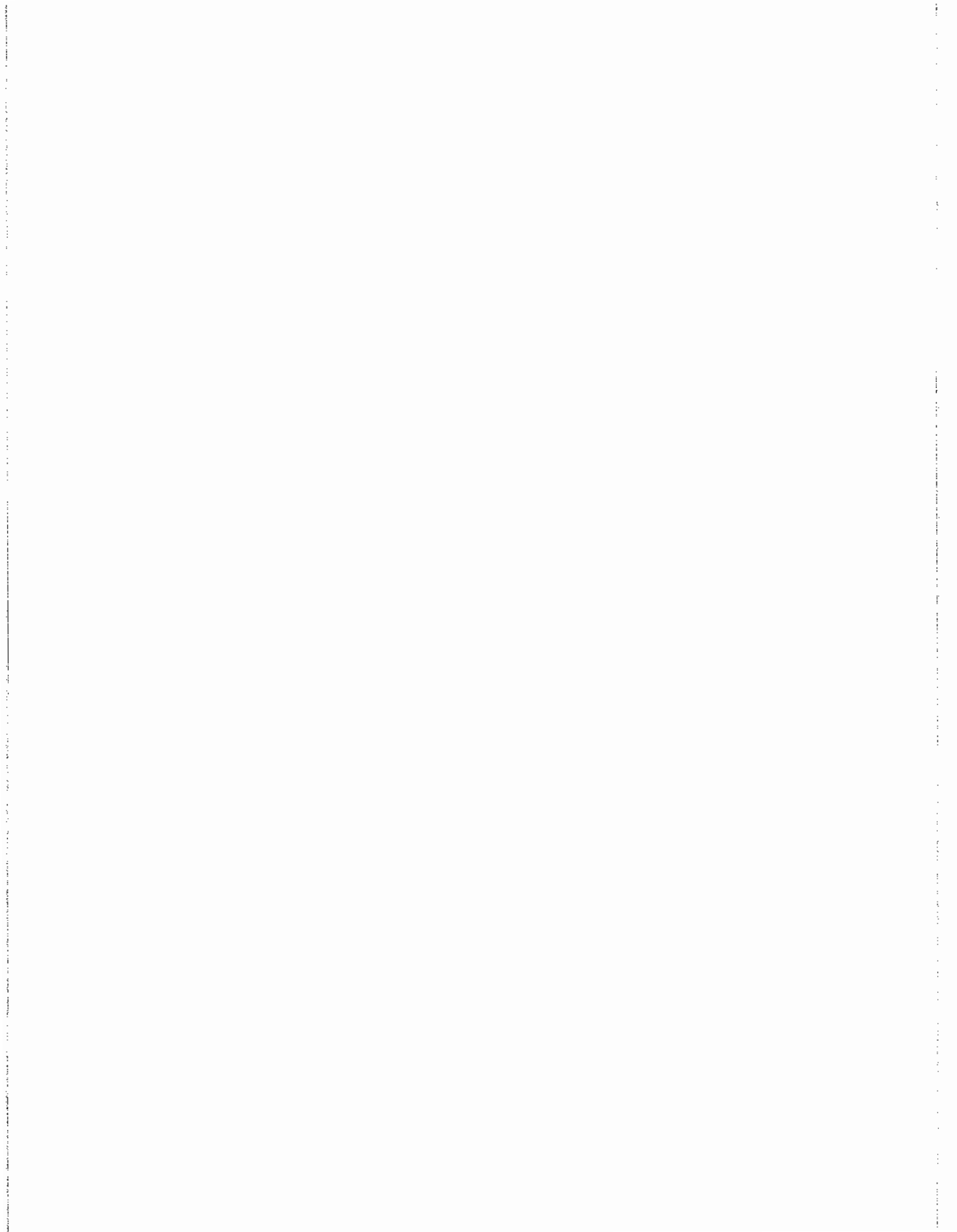
Information

Method of Inspection

Reason for Rejection

1. Using body weight, depress the suspension as far as possible and check for freedom of movement and security of the suspension unit.
2. Check for evidence of fouling between fixed and moving parts.
3. With the side car wheel raised check that the wheel is secure and that the wheel bearings are not excessively tight or do not have excessive free play. Spin the wheel and listen for roughness in the bearings.
4. Check shock absorbers for oil leakage due to seal failure

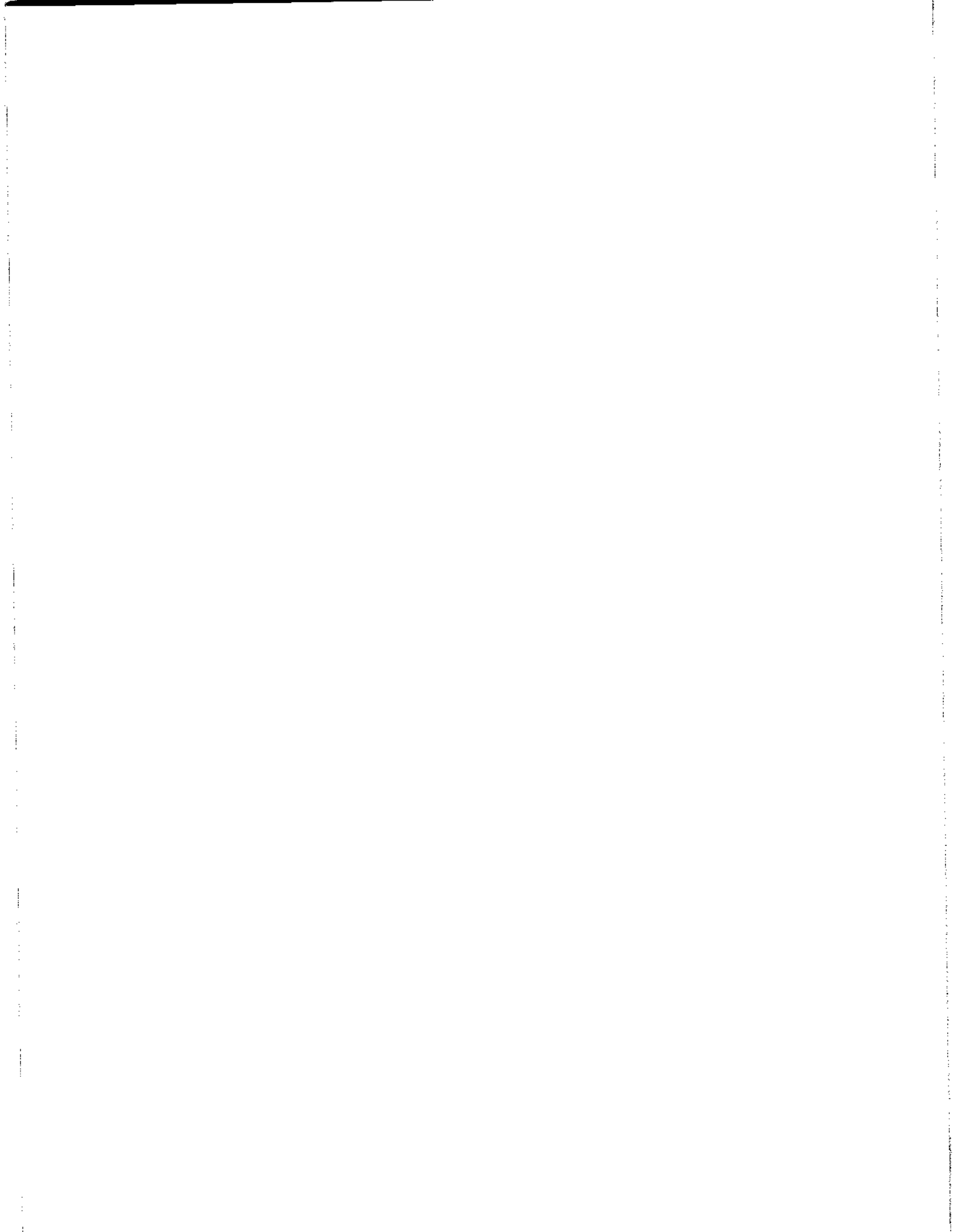
1. Excessive stiffness of movement such as might be caused by partial seizure of the suspension units.
2. Fouling between fixed and moving parts which affects the movement of the suspension.
3.
 - a. an insecure suspension unit.
 - b. a loose wheel spindle or securing nuts or locking device loose or missing.
 - c. excessive tightness or free play in the wheel bearings.
 - d. excessive roughness in a wheel bearing whilst the wheel is rotating indicating early failure likely.
4. Oil leakage indicating failure of the seal.



Section 6

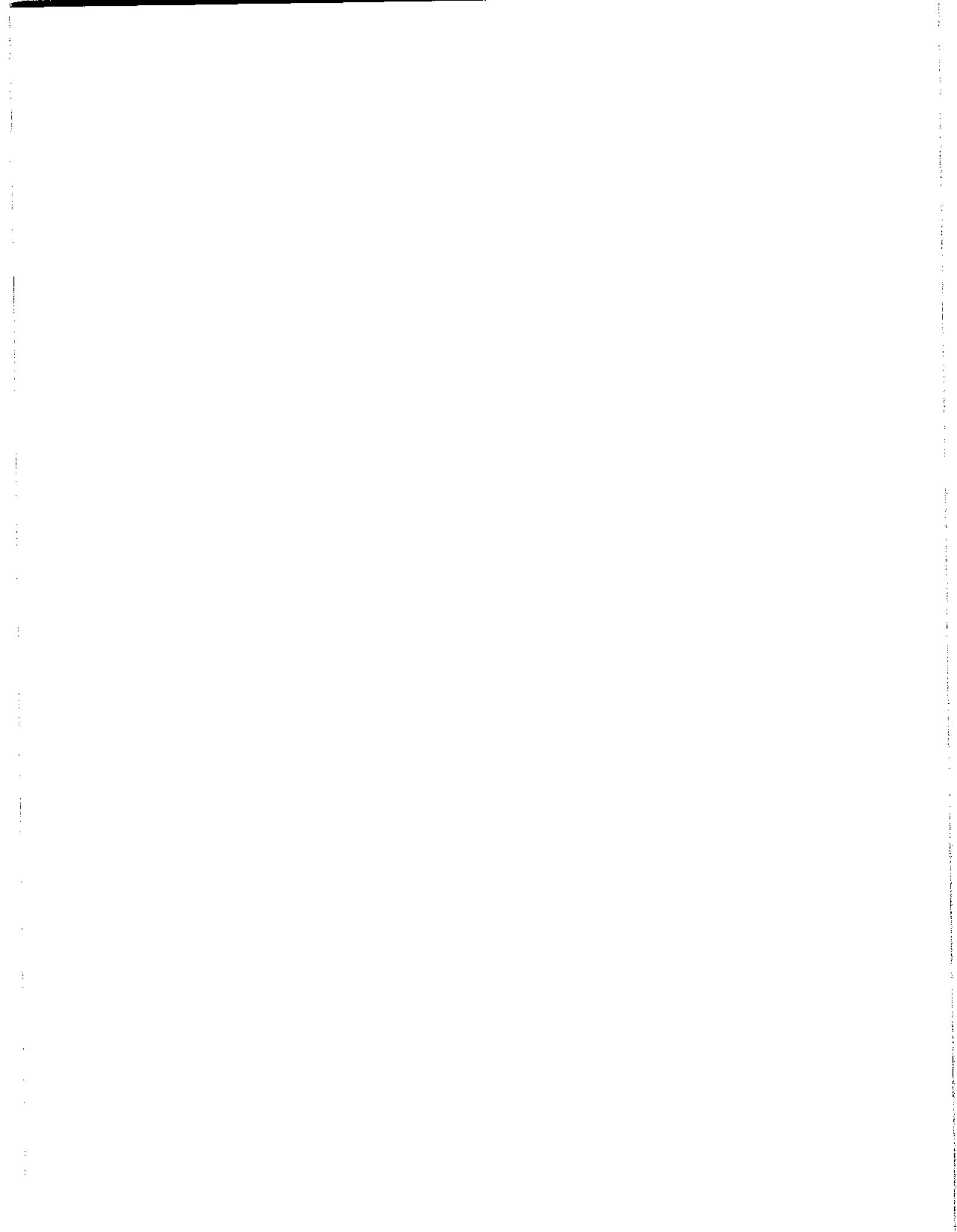
Structure

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6.1 Condition of Structure

Information	Method of Inspection	Reason for Rejection
<p>Particular attention should be paid to all highly stressed parts of the motor bicycle and side car, if fitted such as frame joints and connections, reaction brackets and attachment points of shields and fairings.</p> <p>It is particularly important to check for corrosion of box sections and fabricated parts (see Appendix B).</p> <p>It may be necessary to remove or raise panels to permit the further examination of the structure (see Introduction item 4).</p>	<ol style="list-style-type: none">1. Examine the structure of the motor bicycle and side car (if fitted) for fractures, damage, distortion and corrosion.	<ol style="list-style-type: none">1.<ol style="list-style-type: none">a. Any fracture, damage, distortion or corrosion in the motor bicycle or side car structure which is likely to affect the correct functioning of the steering or brakingb. any deliberate modification which significantly reduces the original strength.



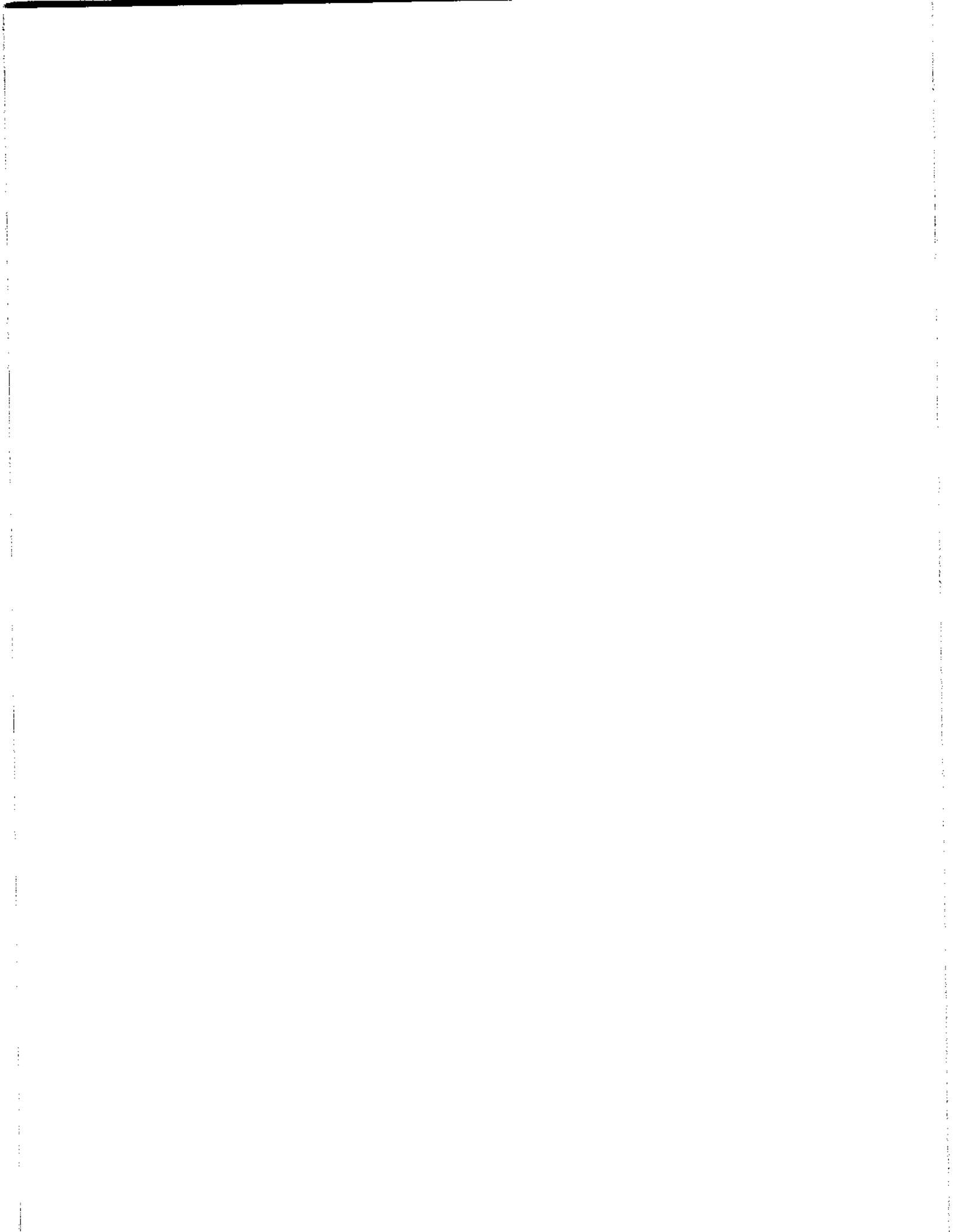
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Section 7

Exhaust

Section Contents	Sub-Section	Subject	Page
	7.1	Exhaust System	2



Assessment of Corrosion

The effect of corrosion on the safety of a motorcycle is a difficult matter to resolve as it depends not only on the extent of corrosion but also on the function of the component in which it has occurred. A small amount of corrosion which substantially weakens an important component or part of a structure would render the machine unsafe, whilst significant corrosion of a less important part may be acceptable.

Where corrosion is present the tester must make an assessment of its severity and identify whether it is in a load bearing member or a highly stressed part such as a frame or suspension component, reaction bracket etc. The extent of the corrosion should be determined by pressing hard with a finger and thumb. If necessary careful tapping and light tapping of the affected areas with the Corrosion Assessment Tool is permitted. Sharp instruments or heavy blows must not be used. Excessively corroded metal or metal treated with filler (which may camouflage corrosion) emits a duller sound than uncorroded metal.

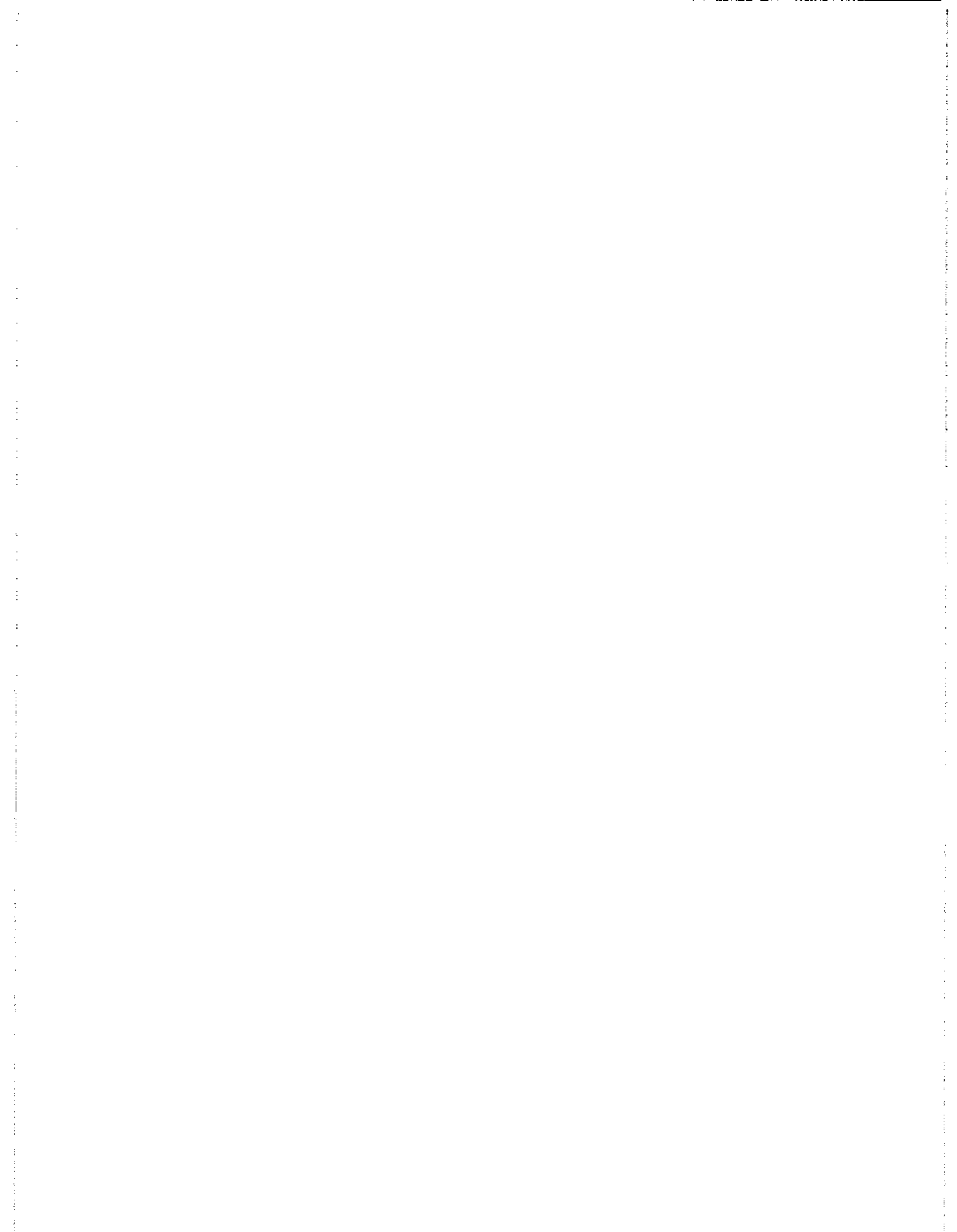
When determining the extent of the corrosion the tester must use his experience in judging whether the degree or position of the corrosion has significantly affected the strength of the part having regard to the amount of sound metal remaining. A further criterion which may be applied in judging a part which is excessively corroded is whether it is likely to make the machine dangerous to use on the road under any condition of use including fast cornering,

emergency braking etc. If the tester considers the machine would be safe to use the component should not be regarded as defective; however the tester should advise the owner of the presence and location of this corrosion. On the other hand if the strength of certain parts is very seriously reduced by corrosion the tester may refuse to carry out a brake test. (Ref: Introduction: item 6).

Where a corroded part has been repaired it is essential that this has been carried out using suitable materials and techniques so that it is virtually as strong as the original part. Repairs to load bearing members or sections by pop riveting or glass fibre are not acceptable, but in some cases these methods may be used for repairs to non load bearing parts. Welded repairs to highly stressed components such as suspension arms etc are not normally acceptable. If in doubt consult the vehicle or component manufacturer. Brazing, soldering, glass fibre and body filler are bonding processes; they are not regarded as strong enough for repairs to load bearing members although they are normally adequate for other repair work. Brazing, bonding and riveting are only acceptable where used by the vehicle manufacturer and the standard of any such repair must be comparable to the original.

It is sometimes difficult to distinguish between welding and brazing after the repair has been covered in paint or underseal. However, brazing may be detected by the smooth fillet of filler or a

gold colouration at the edge of a joint. Glass fibre, body filler, aluminium etc may often be detected by a difference in appearance, in sound when tapped, or by the use of a magnet.



CHAPTER 4
MOD BRAKE TESTING POLICY

CONTENTS

Para

1	Introduction
3	General
5	Application
6	Methods and Procedures
13	Testing of Bulk Refuelling Equipment vehicles
15	Testing of motor cycles
16	Testing of quadricycles
18	Testing over-run trailer brakes
20	Identification and correct fitment of self-sealing couplings in inter-vehicle air connections
22	Examination of connectors and operating adaptors

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Annex

A	Wheeled vehicle air braking system inspection procedure
B	Brake testing of specialist vehicles
C	Load simulator operating instructions
D	Assessment of automatic slack adjusters
E	Goods vehicle anti-lock and electronic braking systems

INTRODUCTION

1 In order for a vehicle to meet current Department for Transport (DfT) Regulations, codes of practice and EC Regulations, certain brake testing and performance measurement requirements are called for. This Chapter, which supersedes EMER T&M A028 Chapter 151 details the brake testing policy for MoD road-going wheeled vehicles as detailed in Chapter 1 of this AESP. Vehicles are to be tested to the inspection standards listed in the VOSA Inspection Manuals as reproduced in Chapter 3 with supplementary requirements detailed in this chapter. For the purpose of this testing policy the figures quoted in Chapter 3 take precedence over any conflicting figures given in specific vehicle AESPs. The combined requirement is:

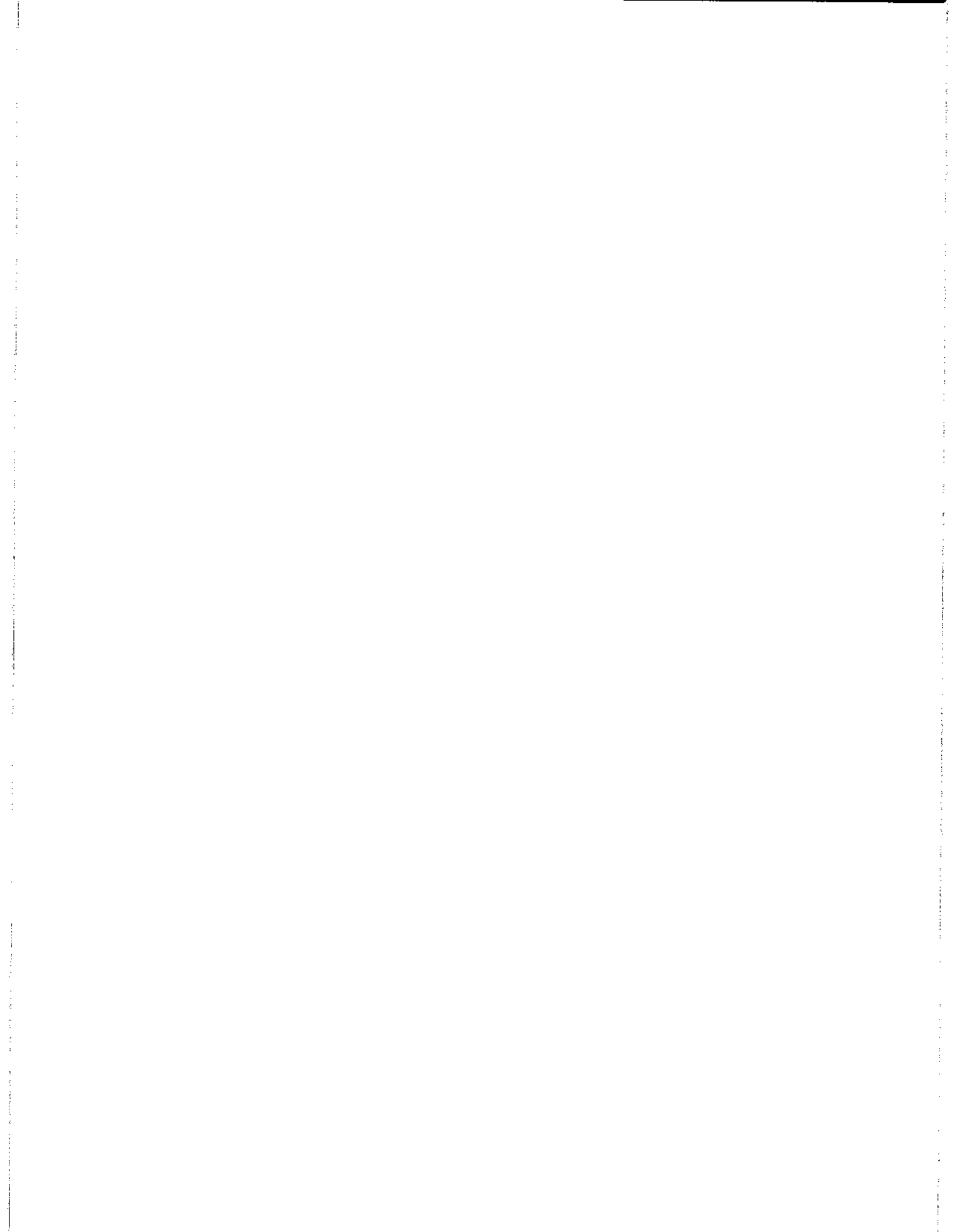
1.1 An annual recorded brake performance test carried out on a Roller Brake Tester (RBT). For certain vehicle types and conditions of use as described in this chapter a decelerometer may be used. (See Note below and Para 9).

NOTE – If the maintenance period is extended for operational commitments, an annual recorded brake test must be carried out no later than the brake test anniversary.

2 In addition to the annual recorded brake performance test, it is MoD policy that a combined functional and performance test utilising a RBT, decelerometer or road test as appropriate, is to be carried out on the following occasions:

2.1 After scheduled or out of phase maintenance when called up in the equipment AESP Cat 6/servicing schedule/manufacturers maintenance schedule. Also after Area Maintenance as required depending on the type of maintenance completed (RAF only).

2.2 After any repair/adjustment to brakes/brake system or other vehicle component where the efficiency of the braking system is likely to be affected.



NOTES

- (1) Care is to be taken to ensure that the Total Axle Weight (TAW) is not exceeded when using the Load Simulator (LS).
- (2) Where affiliated units or outside agencies are used, the vehicle must pass a functional brake test preferably using a decelerometer carried out by a 'competent person' prior to delivery to the testing unit/agency.
- (3) The 'locked wheels' provision, as an indication of braking effort and as part of brake testing procedure as detailed in the VOSA Testers Manuals reproduced at Chapter 3 is acceptable provided the RBT is operating on VOSA approved software appropriate to the vehicle under test. However, where the RBT does not operate on VOSA approved software, the locked wheels provision is not to be generally accepted for MoD vehicle brake testing. Units experiencing difficulty in obtaining the required efficiency are to contact DE&S Andover DLS Eng Pol for advice.

8 ROLLER BRAKE TEST PROCEDURE. The procedures for carrying out roller brake tests are as follows:

8.1 Testing is to be carried out by a competent person as defined at Chapter 1 Table 1. The following additional training requirements are to be met in order to reduce risk to personnel and prevent damage to equipment:

VLT RBT

8.1.1 Army/RM/MoD civilian operators are to hold the VLT familiarisation Certificate. Through life support for the VLT RBT includes in-service familiarisation training by VLT representatives. Units requiring familiarisation training are to submit the request on the VLT fault report form to the ESM at WSS IPT, DLO Andover. A record of all certificated users is maintained by WSS IPT. Personnel that have completed the Inspector Vehicle course (D827) are deemed competent to operate the VLT RBT.

8.1.2 RAF operators are to be formally trained and awarded TQA Q-MT-RBT1; the TQA is to be recorded on the individual's F4820, SAMA or JAP database. Q-MT-RBT1 will also be awarded to tradesmen holding Q-MT-RBT, following local familiarisation on the VLT RBT equipment by an instructor from VLT. Units requiring familiarisation from VLT are to contact HQAC A4 OpsSpt MT2b. MT engineering tradesmen other than those listed at Chap 1 Table 1 may also be trained in the use of RBT equipment by VLT personnel for diagnostic purposes only.

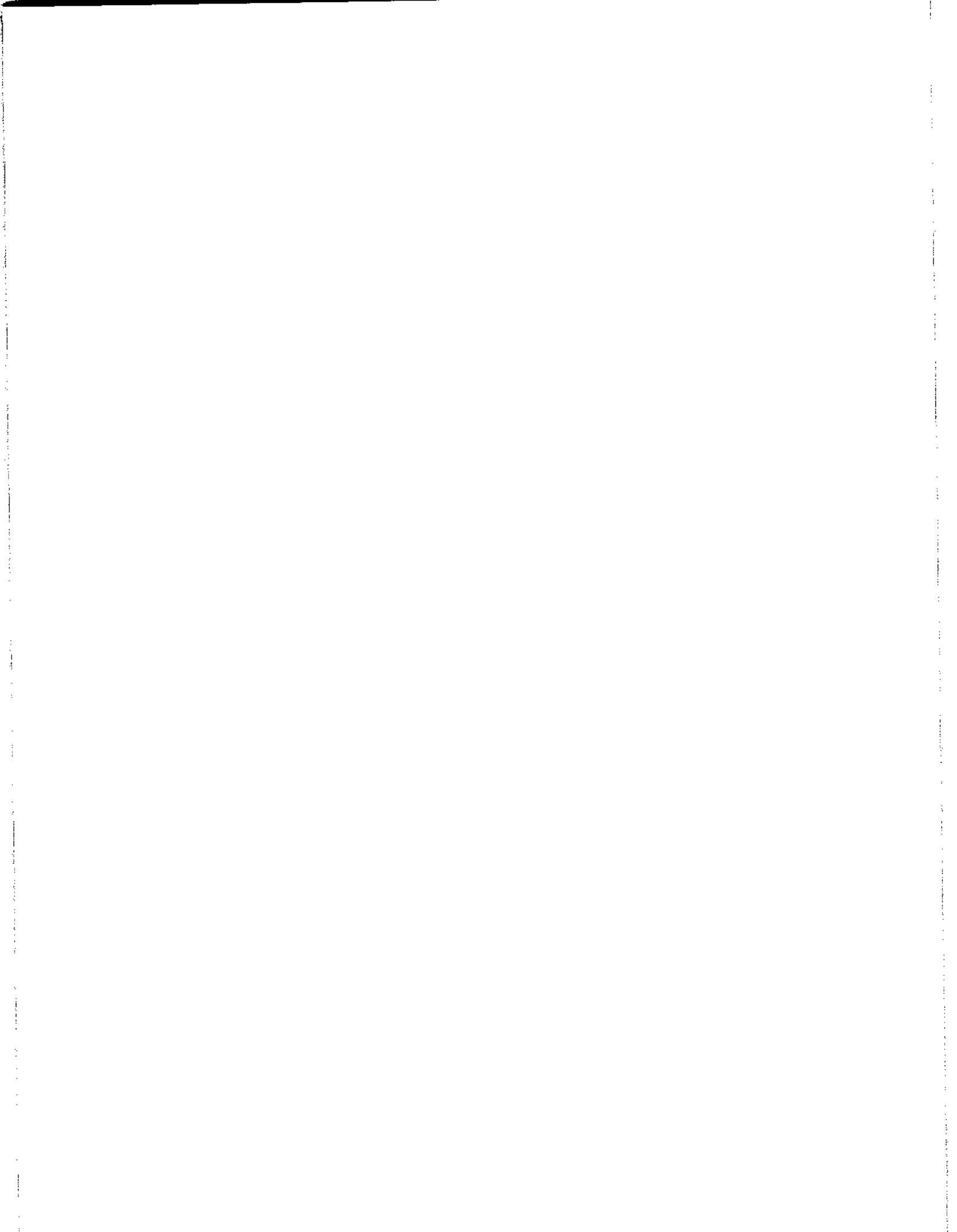
OTHER FIXED RBT

8.1.3 RAF operators are to be formally trained and awarded TQA Q-MT-RBT; the TQA is to be recorded on the individual's F4820, SAMA or JAP database. Competent personnel as defined at Chap 1 Table 1 who have received local training by a tradesmen holding Q-MT-RBT can be awarded a local engineering authorisation for RBT. MT engineering tradesmen other than those listed at Chap 1 Table 1 may be locally trained in the use of RBT equipment by personnel holding Q-MT-RBT for diagnostic purposes only.

8.1.4 Army and MoD civilian operators are to be authorised by the local engineering officer following appropriate familiarisation training.

MOBILE RBT

8.1.5 Units deploying on operations with mobile RBTs are to request pre-deployment contractor training through their respective ES Branch; the training contract is managed by the WSS IPT mobile RBT equipment support manager.



10 DECELEROMETER TEST PROCEDURE. The procedures for carrying out decelerometer tests are as follows:

10.1 Testing is to be carried out at GWW (As close to GWW as reasonably practicable for specialist vehicles) by a competent person as defined at Chapter 1 Table 1, who is qualified to drive the relevant vehicle type. Where possible a clearly marked brake test area within MoD property confines is to be used. The chosen road surface is to be flat, free from loose material, offering good adhesion and of sufficient length and width to allow tests to be completed in safety. When using the Churchill/Brake Safe tester, the completed recording card is to be attached to the AF G8800, MOD Form 1084A, AF G932(B) or other worksheet as appropriate. When using the Tapley tester, the results are to be annotated on the relevant work sheet.

NOTES

(1) If the above test is used as a confirmation of brake performance prior to delivery for a formal annual RBT, vehicles may be presented in the unladen condition. Where minimum efficiencies cannot be achieved due to the vehicle being fitted with ABS or LSV, or poor wheel to road adhesion, sufficient load may be applied to cause the device to operate.

(2) Prior to carrying out the brake test, the tester is to confirm the operation of the vehicle brakes at approximately 15 mph.

10.2 Using the service brakes and with the transmission disengaged, braking effort should be applied with steadily increasing pressure to the maximum possible without locking the brakes. Tests can be taken accurately from speeds of 10 mph upwards and should be conducted in accordance with the test equipment manufacturer's instructions. Transmission brakes are not to be tested whilst the vehicle is moving. (See also Para 12).

10.3 BrakeSafe Brake Tester. The BrakeSafe is a sensitive instrument which must be aligned and restrained in the direction of travel in accordance with the manufacturer's instructions. The print-out from the device also records the deviation percentage 'g' (mean) which is to be used for guidance only; however, an indicated pull Left/Right of up to a nominal 2% 'g' (mean) is acceptable, **providing the tester does not detect any undue pulling to one side/swerving during the test**. Should undue pulling be detected or a pull greater than 2% 'g' (mean) be indicated, **then the vehicle is to be failed** and the fault investigated.

10.4 Trailers. To decelerometer test trailers which are required to be subjected to a formal brake test as described at Para 5.2, the tester is to:

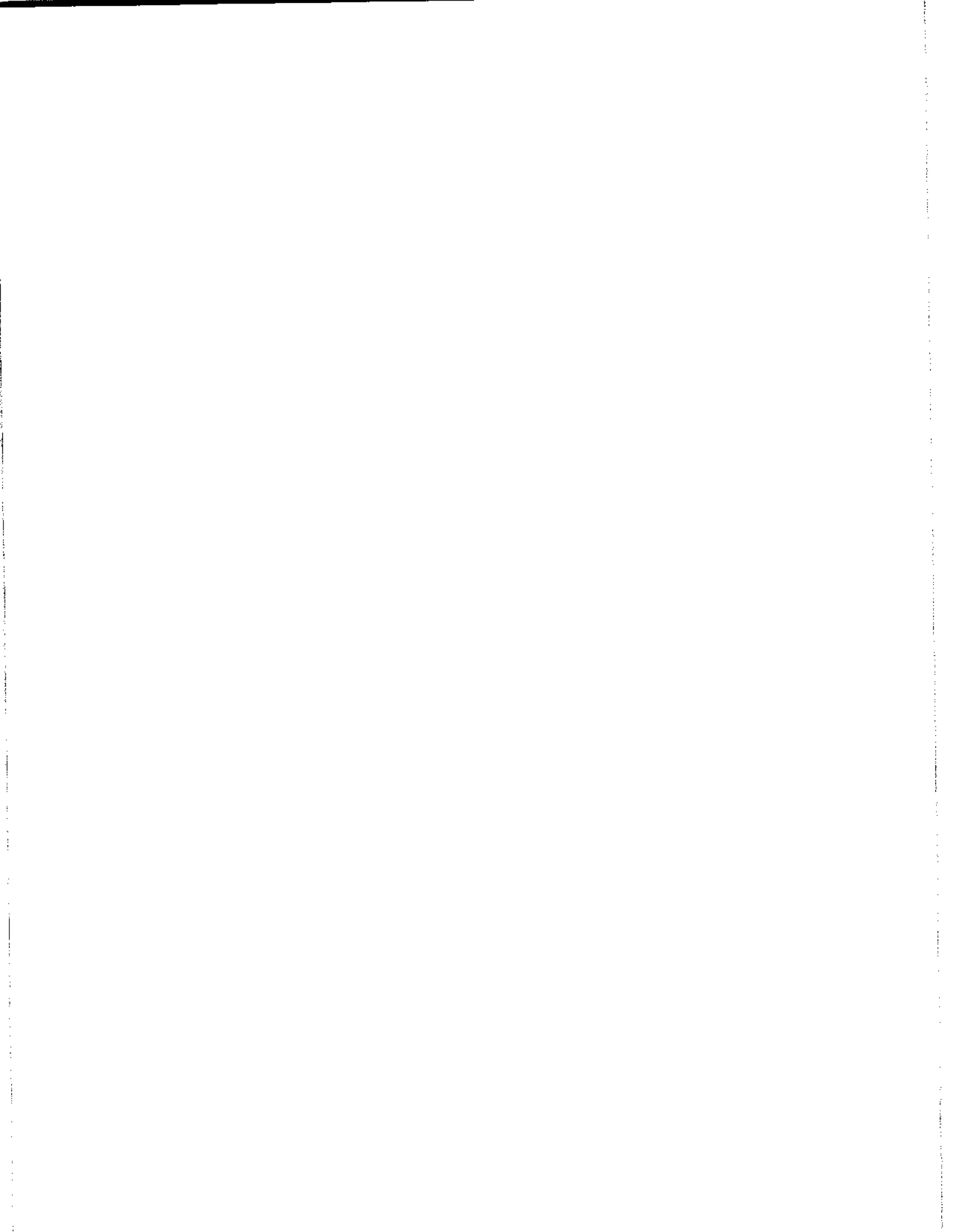
10.4.1 Carry out an independent recorded brake test in accordance with Para 6.1 for the prime mover in order to prove the results of the combination test.

10.4.2 Carry out the test on the prime mover/trailer combination with the trailer laden to GWW and note the efficiency readings.

10.4.3 If the readings indicated are below those prescribed in the VOSA tester's manual reproduced at Chapter 3, or the combination deviates appreciably from the straight line, remedial action must be taken.

11 FUNCTIONAL TEST. Where due to vehicle configuration it is impossible to carry out tests with an RBT or decelerometer, a functional brake test within the working role of the vehicle is to be completed on the occasions detailed at Para 2. Procedures and measurements, as provided for the particular vehicles, are to be used where available. However, a functional test is to be carried out by a suitable competent person as defined at Chapter 1 Table 1, who is qualified to drive the relevant vehicle type.

12 GRADIENT TEST. Parking brakes should where possible, be tested on an RBT. In cases where the parking brake cannot be tested by means of a RBT (for example, transmission brakes), a gradient test is to be carried out. The parking brake of vehicles or trailers or vehicle combinations must be capable of holding the combination stationary on a gradient of at least 16% (1 in 6.25). The test should be carried out with the vehicle in both the ascending and descending mode.



NOTE

- (1) To check the efficiency of 30%, one end of the platform must be raised to a height equivalent to 30% of the platform length (i.e. 840mm for a 2.8m platform).
- (2) Similarly, to check the efficiency of 25%, one end of the platform must be raised to a height equivalent to 25% of the platform length (i.e. 700mm for a 2.8m platform).

TESTING OF QUADRICYCLES

- 16 Certain sit-aside quadricycles cannot be tested on an RBT due to:
 - 16.1 Their drive configuration.
 - 16.2 A narrow wheel track.
 - 16.3 A linked braking system which only operates on the rear brake(s) when the machine is in motion, using dynamic forces to operate valves that then apply the rear brake(s) accordingly.
- 17 Machines as described above, that are unsuitable for testing by means of an RBT, are not to be tested by use of current in-service conventional freestanding decelerometers. Such machines are to be tested through Contract Repair arrangements at testing stations equipped with VOSA approved clamp-on fitment decelerometers.

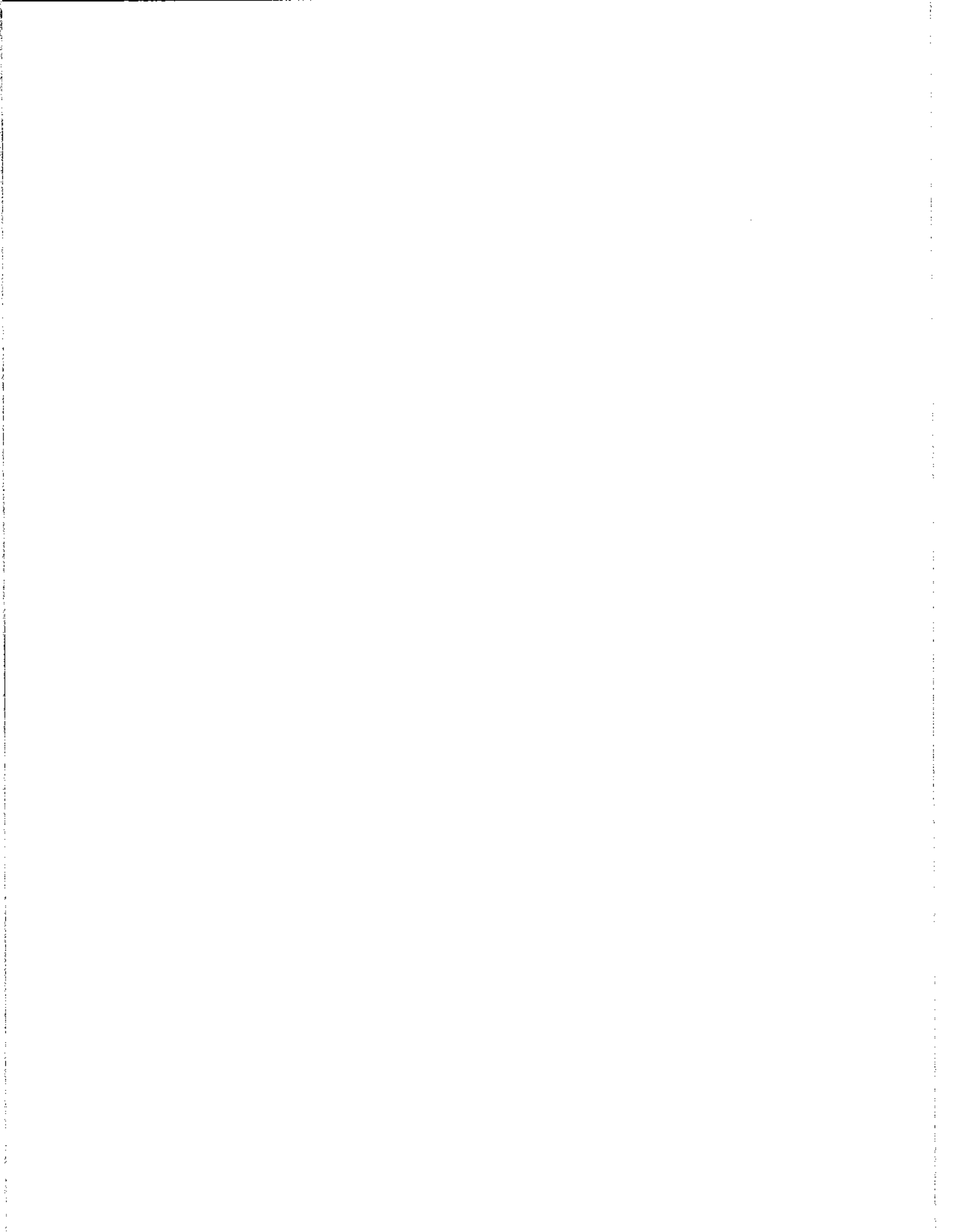
TESTING OF OVER-RUN TRAILER BRAKES

- 18 Over-run brakes may be fitted to trailers not exceeding 3500 kg gross weight (or 3560 kg for trailers manufactured before 27 February 1977). Testing of these brakes is exempted under Statutory Instruction 1988 No. 1478 – The Goods Vehicles (plating and testing) Regulations 1988 (Schedule 2). This exemption does not however absolve the operator from the responsibility to comply with Construction and Use Regulations, specifically Reg 18, which states:
 - 18.1 Maintenance and efficiency of brakes. "Every part of the braking system and the means of operation thereof fitted to a vehicle shall be maintained in good and efficient working order and be properly adjusted". To satisfy this requirement for in-service testing of over-run brakes, the trailer is to be decelerometer tested in accordance with paragraph 10.4 of this Chapter.

- 19 Examiners must satisfy themselves that over-run brake couplings are damped and matched with the brake linkages, and that all parts of the trailer braking system works efficiently.

IDENTIFICATION AND CORRECT FITMENT OF SELF-SEALING COUPLINGS IN INTER-VEHICLE AIR CONNECTIONS

- 20 Under EEC Directive 85/647 and British Statutory Instrument No. 676: 1987, tractors have had to be fitted with self-seal connections since Apr 89 (this has been British practice for many years). Vehicles have been found to be running without trailer brakes working due to defective self-sealing couplings in the inter-vehicle air connections. This may be caused by:
 - 20.1 Male connectors fitted with a self-sealing valve not opening, due to a female operating adaptor not being fitted.
 - 20.2 Sealing washers fitted to male and female connectors which exceed the design thickness.
 - 20.3 Some male adaptors are not long enough to open the sealing valve.
- 21 It is essential that all self-sealing valves are opened when the inter-vehicle brake connections are made.



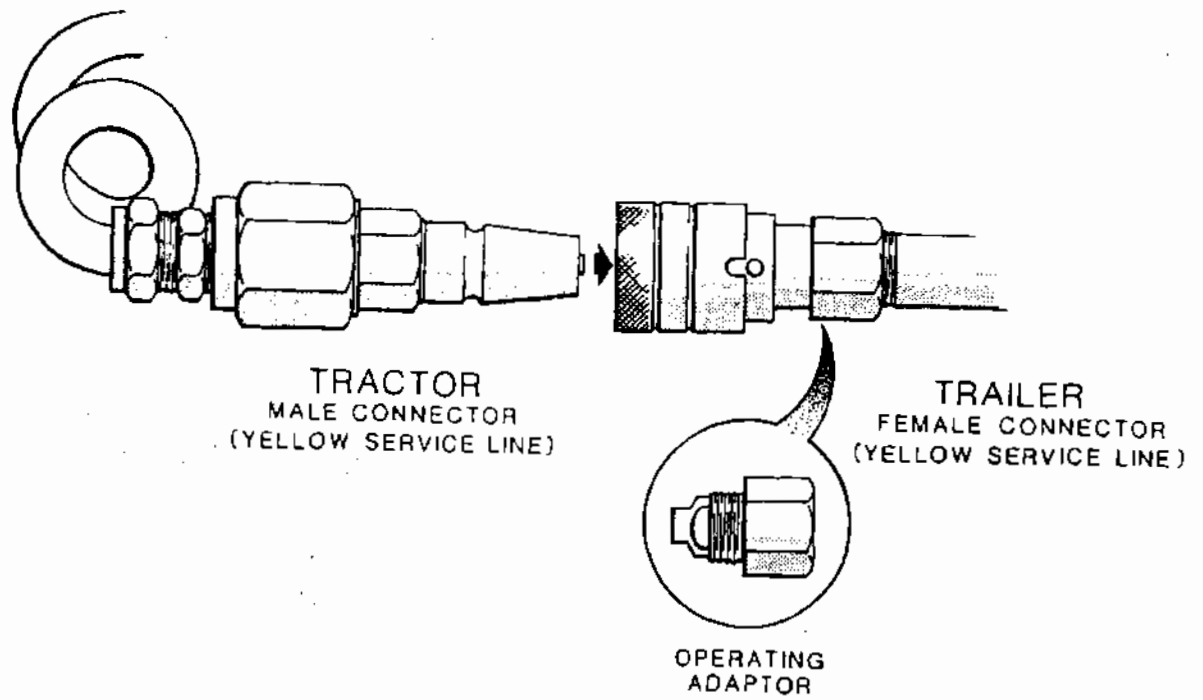


Fig 1 Service line connections with operating adaptor

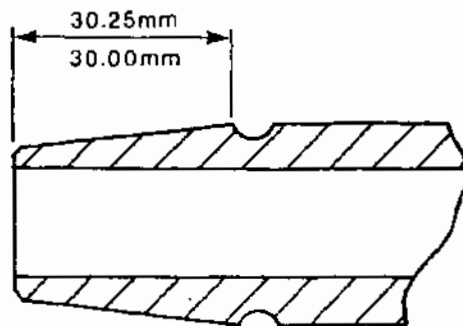
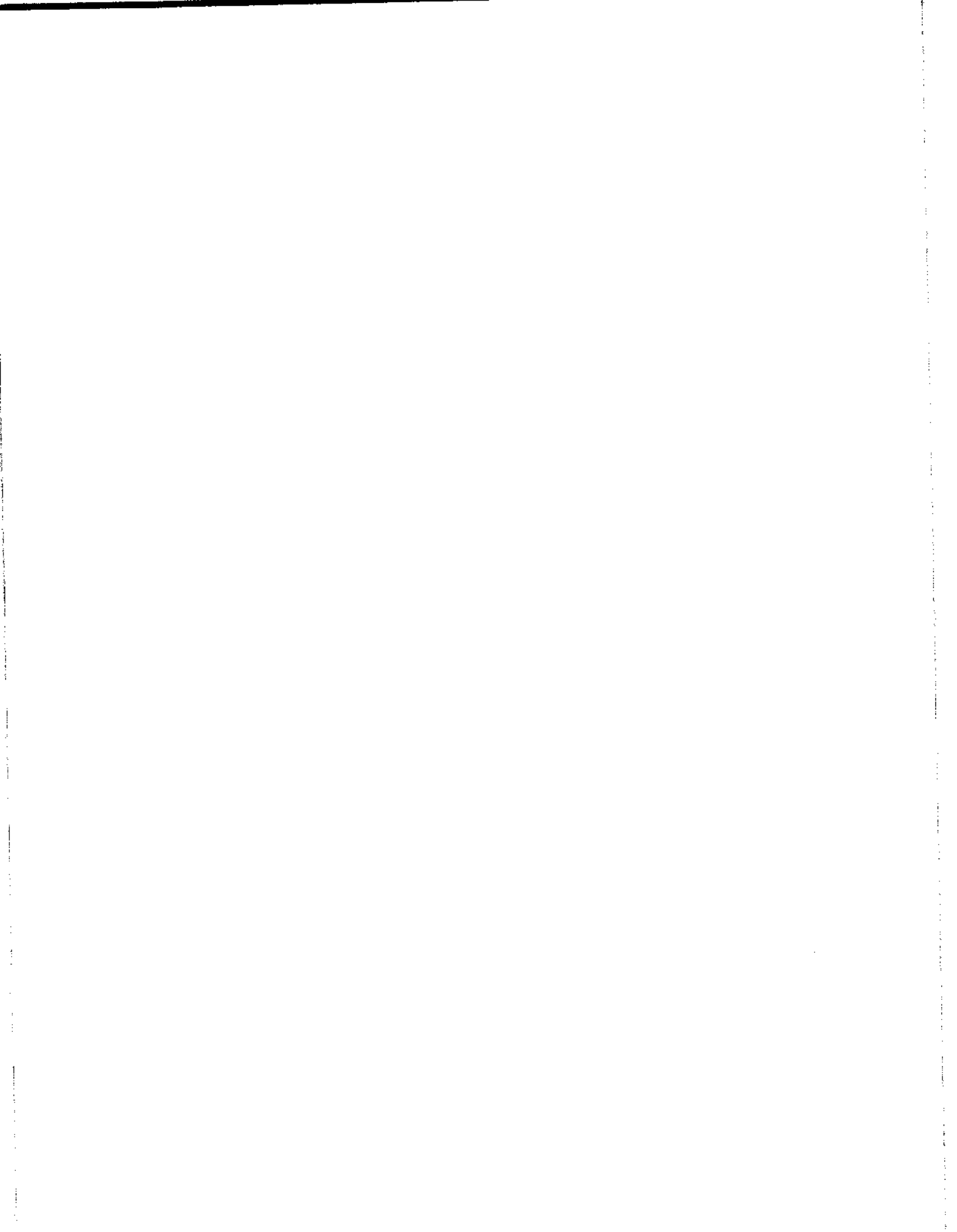


Fig 2 Male connector



CHAPTER 4 ANNEX A
WHEELED VEHICLE AIR BRAKING SYSTEM INSPECTION PROCEDURE
CONTENTS

Para

- 1 Introduction
- 2 Safety
- 3 Special Tools and Test Equipment (STTE)
- 4 Test Preliminaries
- 5 Test 1
- 7 Test 2
- 9 Test 3 (CAUTION)
- 11 Test 4
- 13 Test 5 (CAUTION)
- 15 Test 6

Table

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- | | | |
|---|----------------------|---|
| 1 | Stroke Lengths | 3 |
|---|----------------------|---|

INTRODUCTION

- 1 This inspection procedure supersedes AESP 2530-D-051-512.

1.1 The six static tests outlined in this procedure have been designed to discover the presence of air leaks and/or sluggish performance in an air braking system. The entire system, from the compressor through to the actuators, can easily be diagnosed in a short period of time by performing these tests.

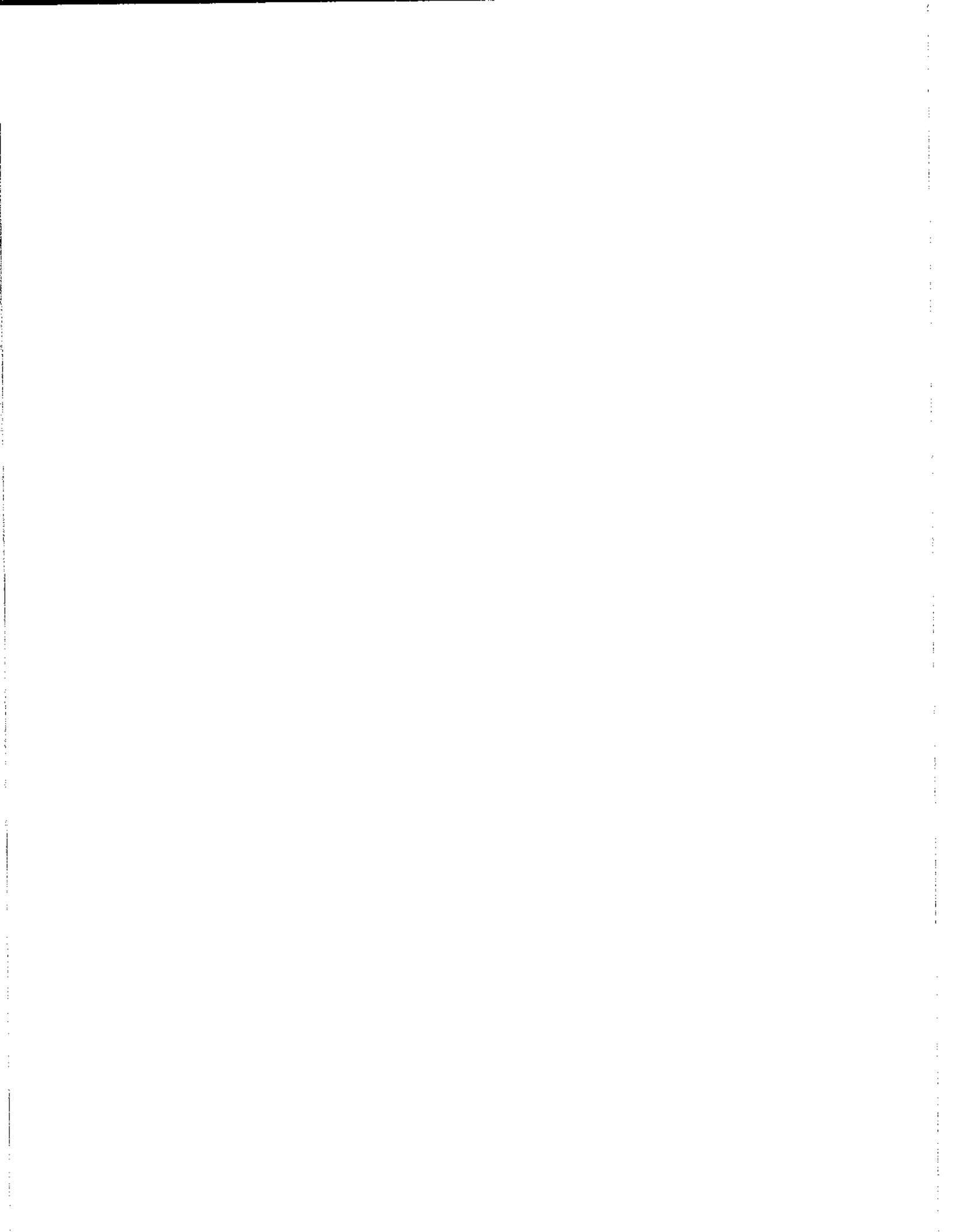
1.2 The test procedures given in this Annex are of a generic nature; results may vary depending on the configuration or design of the braking system under test. The designated vehicle AESP is always to be used as the authoritative document.

1.3 After completion, tradesmen will be able to determine whether or not the system is building pressure rapidly enough, if there is any leakage and if emergency components are functioning correctly.

SAFETY

- 2 Before working on or around air brake systems and components, the following precautions should be observed:

- 2.1 Stop the engine before working under the vehicle.
- 2.2 Always chock the wheels because depleting vehicle air system pressure may cause the vehicle to roll.
- 2.3 Keep hands away from actuator push rods and slack adjusters; they may apply as system pressure drops.
- 2.4 Never connect/disconnect a hose or line containing air pressure; it may whip as air escapes. Never remove a component, pipe or plug unless you are sure that all system pressure has been depleted.
- 2.5 Never exceed recommended air pressure and always wear safety glasses when working with air pressure. Never look into air jets or direct them at anyone.



7.2.3 Tractor and trailers: 0.55 bar maximum for each reservoir.

8 Make all necessary repairs and re-test before proceeding to Test 3.

CAUTION

SPRING BRAKE ACTUATORS. Spring brake actuators may operate automatically as air pressure falls; they are to be maintained in accordance with the relevant vehicle AESP Category 601. Under no circumstances are spring brake actuators to be dismantled for repair.

TEST 3

9 This test is designed to check for service air delivery leakage and should be carried out with the system fully charged and with the engine stopped.

9.1 Make and hold a brake application (the foot brake valve may be held down by an assistant).

9.2 Allow pressure to stabilise for one minute; then begin timing for two minutes whilst watching the dashboard gauges or a pressure drop.

9.2.1 Single vehicle: 0.3 bar maximum for each reservoir.

9.2.2 Tractor and trailer: 0.4 bar maximum for each reservoir.

9.2.3 Tractor and trailers: 0.55 bar maximum for each reservoir.

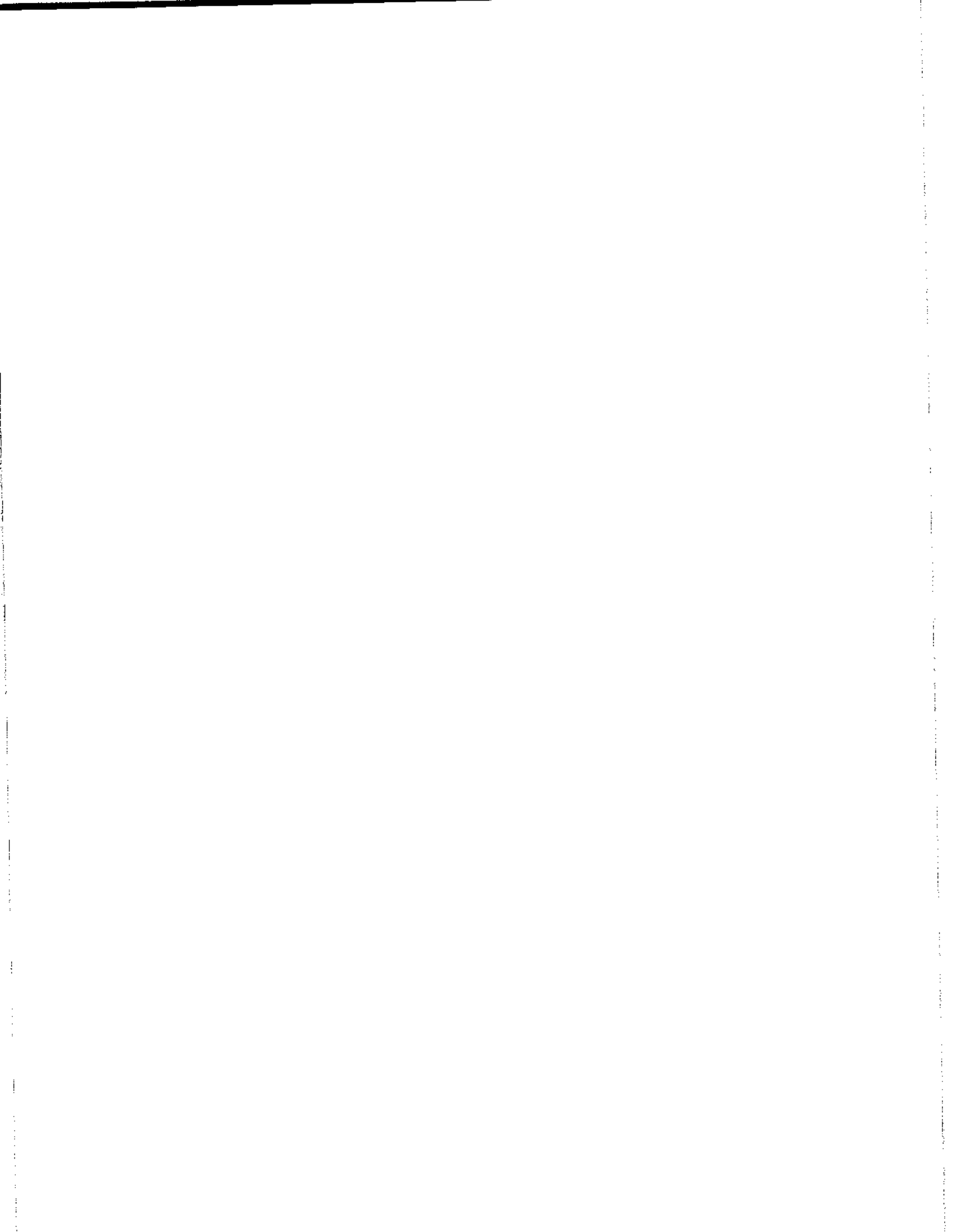
9.3 Check the angle formed between the brake chamber push rod and the slack adjuster arm (minimum 90 degrees with brakes applied).

9.4 Check the brake chamber push rod travel (difference in push rod extension before and after releasing brakes).

TABLE 1 - STROKE LENGTHS

Serial (1)	Brake Chamber (2)	Maximum stroke before readjustment (3)
1	12	35mm
2	16	45mm
3	20	45mm
4	24	45mm
5	30	51mm
6	36	57mm

10 Make all necessary repairs and re-test before proceeding to Test 4.



- 13.6 Without recharging the rear axle reservoir, make a brake application:
 - 13.6.1 The front axle brakes should apply and release.
 - 13.6.1 On combination vehicles; the trailer brakes should apply and release.
 - 13.6.3 All stop lights should come on.
- 13.7 Recharge the rear axle reservoir and drain the reservoir supplying the spring brakes.
 - 13.7.1 The spring brake actuators should apply.
 - 13.7.2 On combination vehicles; the trailer brakes should apply.
 - 13.7.3 The spring brake cab warning light and stop lights should come on.
- 13.8 Recharge the spring brake reservoir and drain the trailer supply reservoir.
 - 13.8.1 The trailer brakes should apply.
 - 13.8.2 The tractor spring brakes should not apply.
- 13.9 If the spring brake supply and trailer supply is combined in one reservoir, drain the reservoir.
 - 13.9.1 Tractor spring brakes should apply.
 - 13.9.2 Trailer brakes should apply.
- 13.10 Recharge reservoir, vent the trailer control (service) line and make a full brake application. The supply dump valve or equivalent trailer control valve feature should drop the supply (emergency) line pressure and activate the trailer service brakes.

14 Make all necessary repairs and re-test before proceeding to Test 6.

TEST 6

15 This test is designed to confirm the operation of the Load Sensing Valve (LSV) and should be carried out with the system fully charged, the engine stopped and the vehicle unladen.

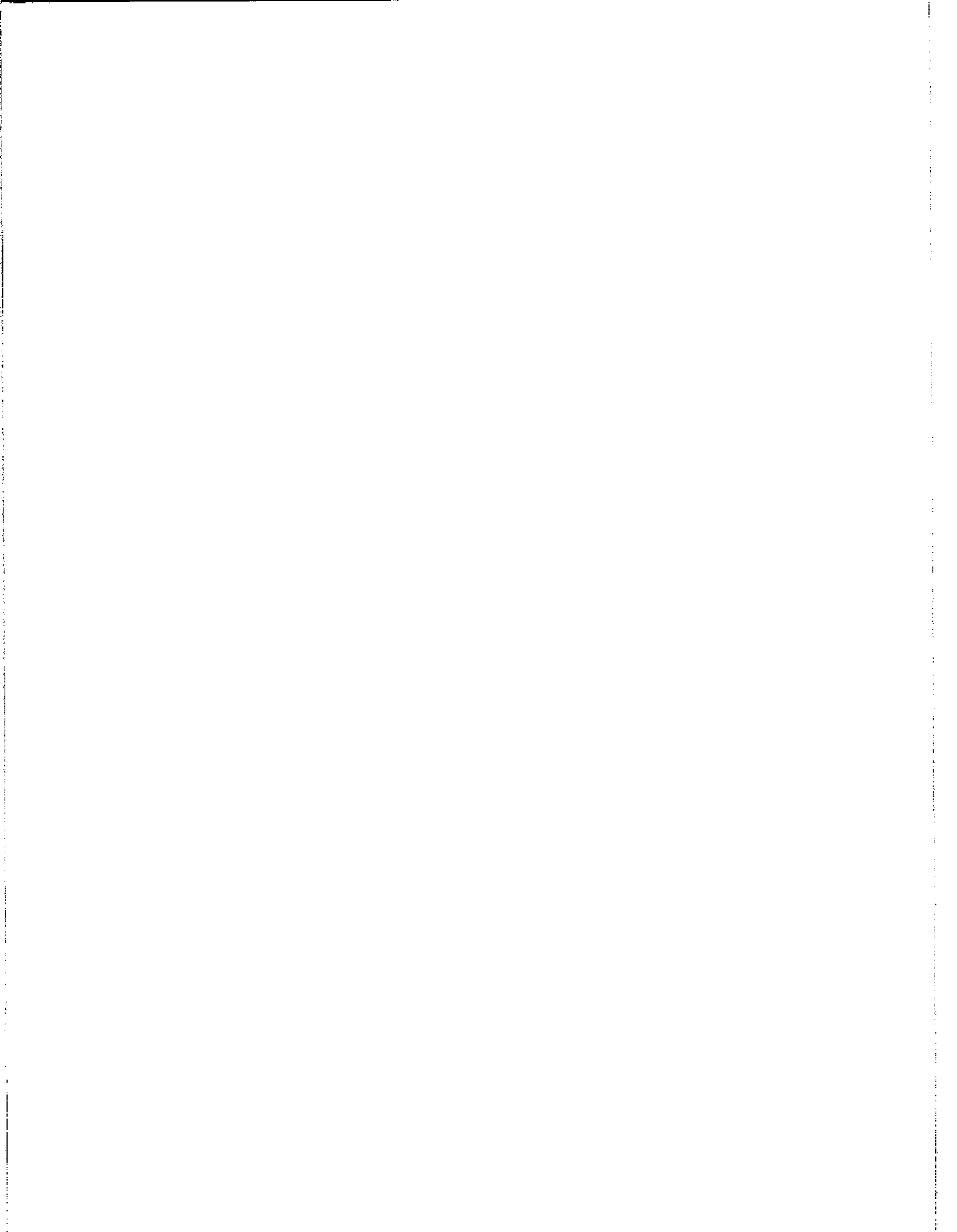
15.1 Make a full pressure brake application (The foot brake valve may be held down by an assistant). Allow one minute for pressures to stabilise. Using a test gauge (Test Kit Air Braking Oakrange or vehicle specific STTE), measure the pressure at the inlet and discharge ports of the valve.

15.2 The difference between the two pressures should be in accordance with the information referred to in the relevant vehicle AESP Category 532 or 601.

15.3 Repeat the above check with the vehicle fully laden.

15.4 As an aid to maintainers, manufacturers have affixed an LSV data plate to relevant vehicles. From the data provided, it is possible to assess the performance of the LSV; the minimum information provided on the data plate is:

- 15.4.1 Number of axles.
- 15.4.2 Unladen axle weight(s).
- 15.4.3 Laden axle weight(s).
- 15.4.4 Maximum design weight(s).
- 15.4.5 Maximum deflection of LSV arm.



CHAPTER 4 ANNEX B
BRAKE TESTING OF SPECIALIST VEHICLES
CONTENTS

Para

- 1 Introduction
- 2 Wheeled 'A' Vehicles
- 3 Wheeled 'B' Vehicles (WARNING)
- 4 Wheeled 'C' Vehicles

INTRODUCTION

1 Certain A, B and C vehicle types, such as those that are not fitted with inter-posing differentials and those fitted with belt driven transmissions, a limited slip differential or tracks, by their design are not suitable for brake performance testing by use of RBT equipment.

WHEELED 'A' VEHICLES

2 The preferred method of brake performance testing for wheeled 'A' vehicles is by means of the RBT using the codes given at Chapter 1 Annex B Table 1 of this AESP. For those vehicles where a RBT code does not exist because the vehicle is not appropriate by its design for testing on a RBT, the vehicle is to be decelerometer tested in accordance with Chapter 4 paragraph 9 of this AESP, or brake performance tested in accordance with EMER A028 Chapter 151 in conjunction with the equipment specific AESP/EMER/TM inspection standard as appropriate. Specific equipment guidance should be sought through the ES chain of command from the appropriate Integrated Project Team (IPT) Equipment Support Manager (ESM). The ESM is responsible for the provision of the RBT code where applicable from WSS IPT. Where a specific equipment support publication does not specify a performance requirement within the equipment inspection standard, the following minimum standards are to be applied:

- 2.1 Vehicle Service brake – 50% DGWW.
- 2.2 Vehicle Secondary brake – 25% DGWW.
- 2.3 Vehicle Parking brake – 16% DGWW/12%DGTW.
- 2.4 Centre axle trailer Service brake – 45% TAW.
- 2.5 Centre axle trailer Parking brake – 16% DGWW.

WHEELED 'B' VEHICLES

3 Wheeled 'B' vehicles are to be tested in accordance with the policy given at Chapter 4 of this AESP and the appropriate VOSA manual for the class of vehicle under test as reproduced at Chapter 3; however, the following equipment specific exceptions are to be applied:

- 3.1 **STGO VEHICLES.** STGO vehicles, including contractor owned and maintained equipment operated by MOD personnel, unless inappropriate by design, are to be subjected to a RBT for the purpose of annual MEI; such vehicles are to meet the performance standards given at Chapter 3.1 of this AESP. Where the vehicle is oversize and/or weight for testing on in-service test equipment, the vehicle is to be tested through Contract Repair.



CHAPTER 4 ANNEX C
LOAD SIMULATOR OPERATING INSTRUCTIONS

CONTENTS

Para

- 1 Introduction
- 2 Maintenance Notes
- 3 Operating Instructions
- 4 Test Preliminaries

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1	Chain location	3/4
2	Front chain obstruction – side view	3/4
3	Rear chain obstruction – side view	3/4
4	Chain obstruction – rear view	3/4

INTRODUCTION

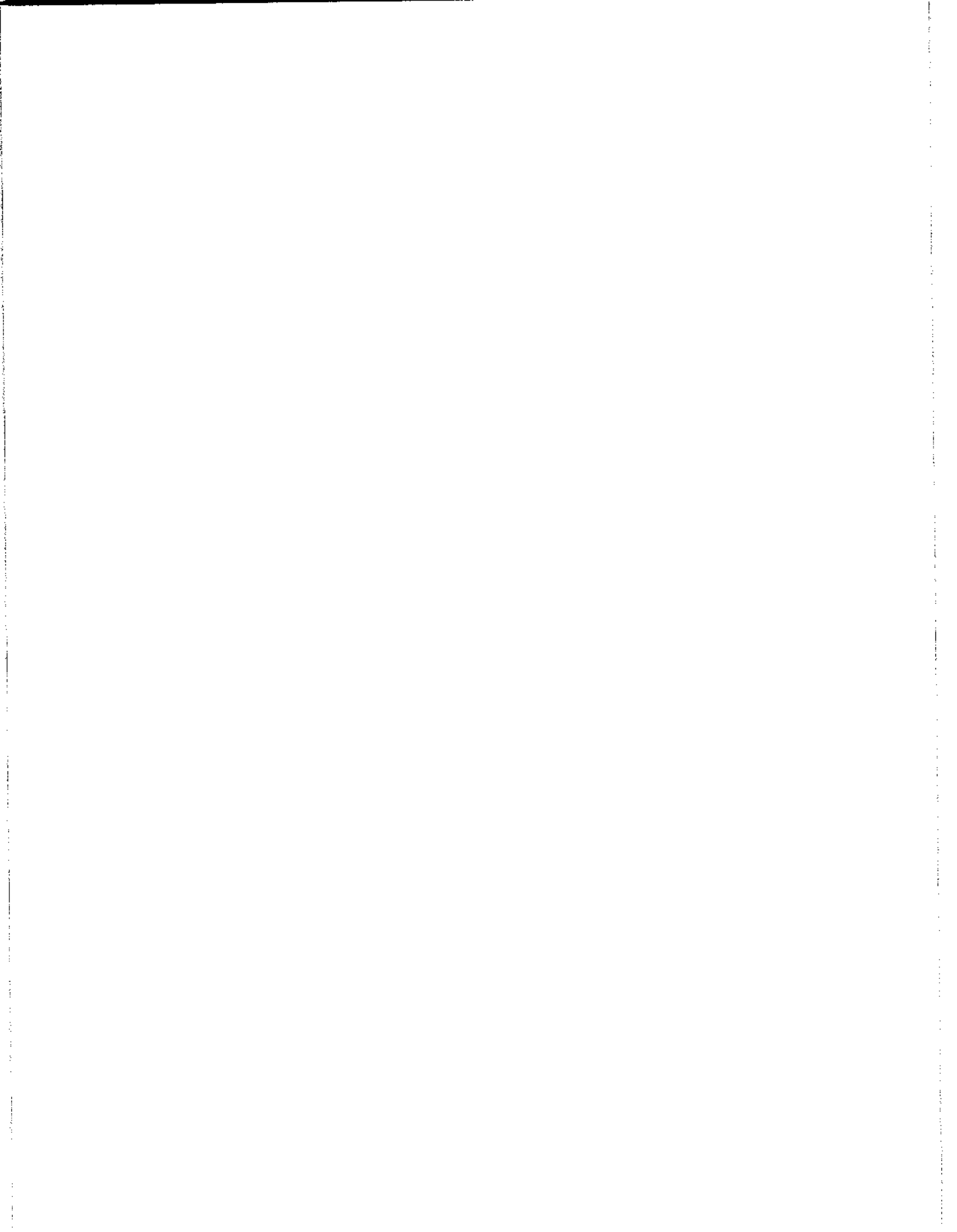
1 The operating instructions given below apply to the Raworth Load Simulator where fitted to the Crypton 630BT Roller Brake Tester (RBT). However, the general principles of operation equally apply to the VLT simulator.

MAINTENANCE NOTES

- 2 The following maintenance practices are to be observed:
 - 2.1 Always untwist chains before and after use.
 - 2.2 Ensure that the chains are fully extended before use, by pulling them up by hand. Each chain should be of the safe length.
 - 2.3 Always lock load chains securely in the slots to ensure safety under load.
 - 2.4 If necessary, lift brake pipes clear of the axle to avoid damage by chains.
 - 2.5 Fig 1 to 4 illustrate as a guide, graphic examples of axle restraint, other variations are possible.

OPERATING INSTRUCTIONS

- 3
 - 3.1 Withdraw the load chains, removing all twists from the chains.
 - 3.2 Open valves on the pump; pull on chains to ensure that they are fully extended.
 - 3.3 Position (centralised) the vehicle on the RBT.
 - 3.4 Where a load sensing valve is fitted on the vehicle, this must be disconnected and set to the full load position while the test is in progress.



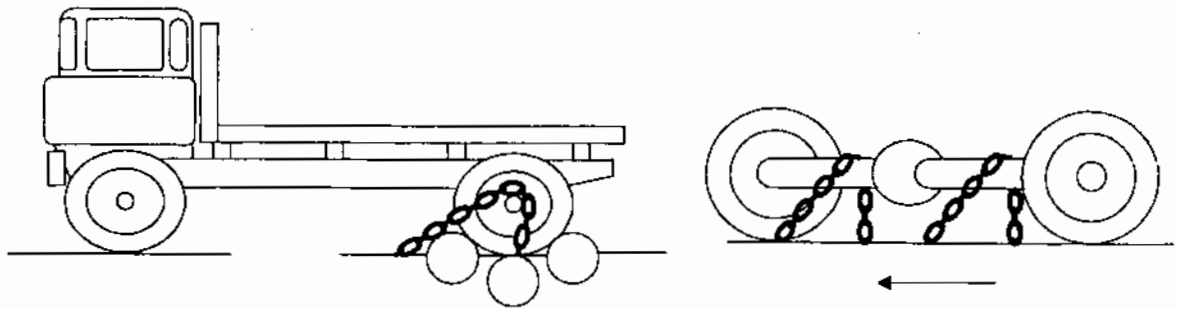


Fig 1. Chain location

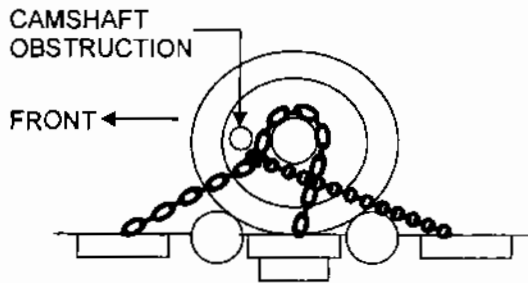


Fig 2. Front chain obstruction - side view

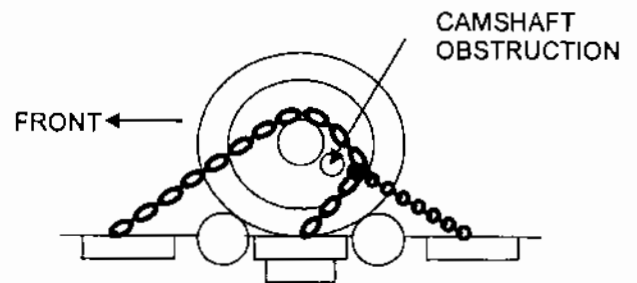
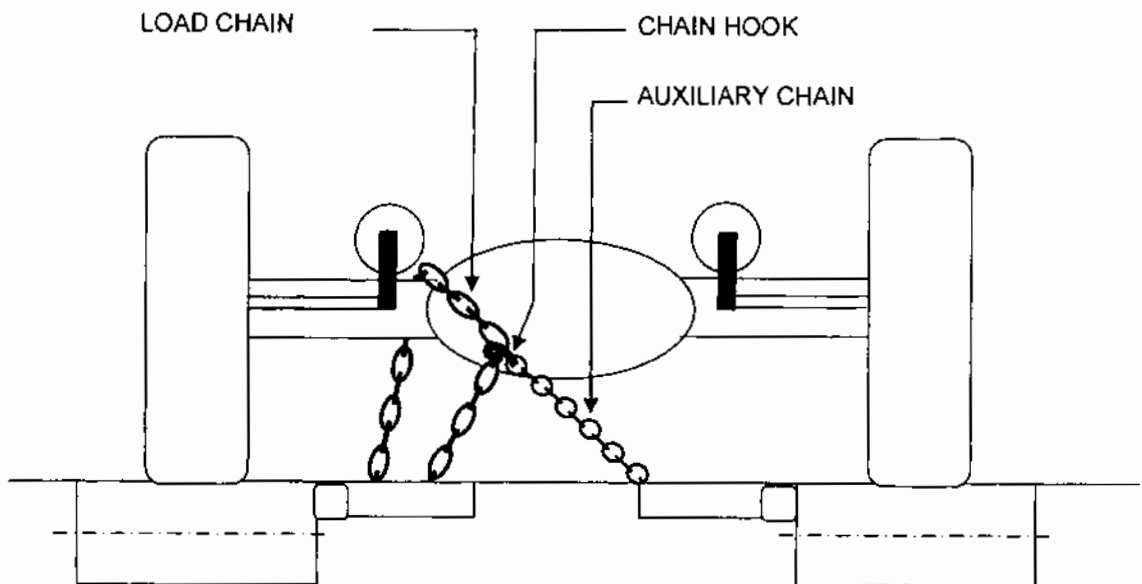
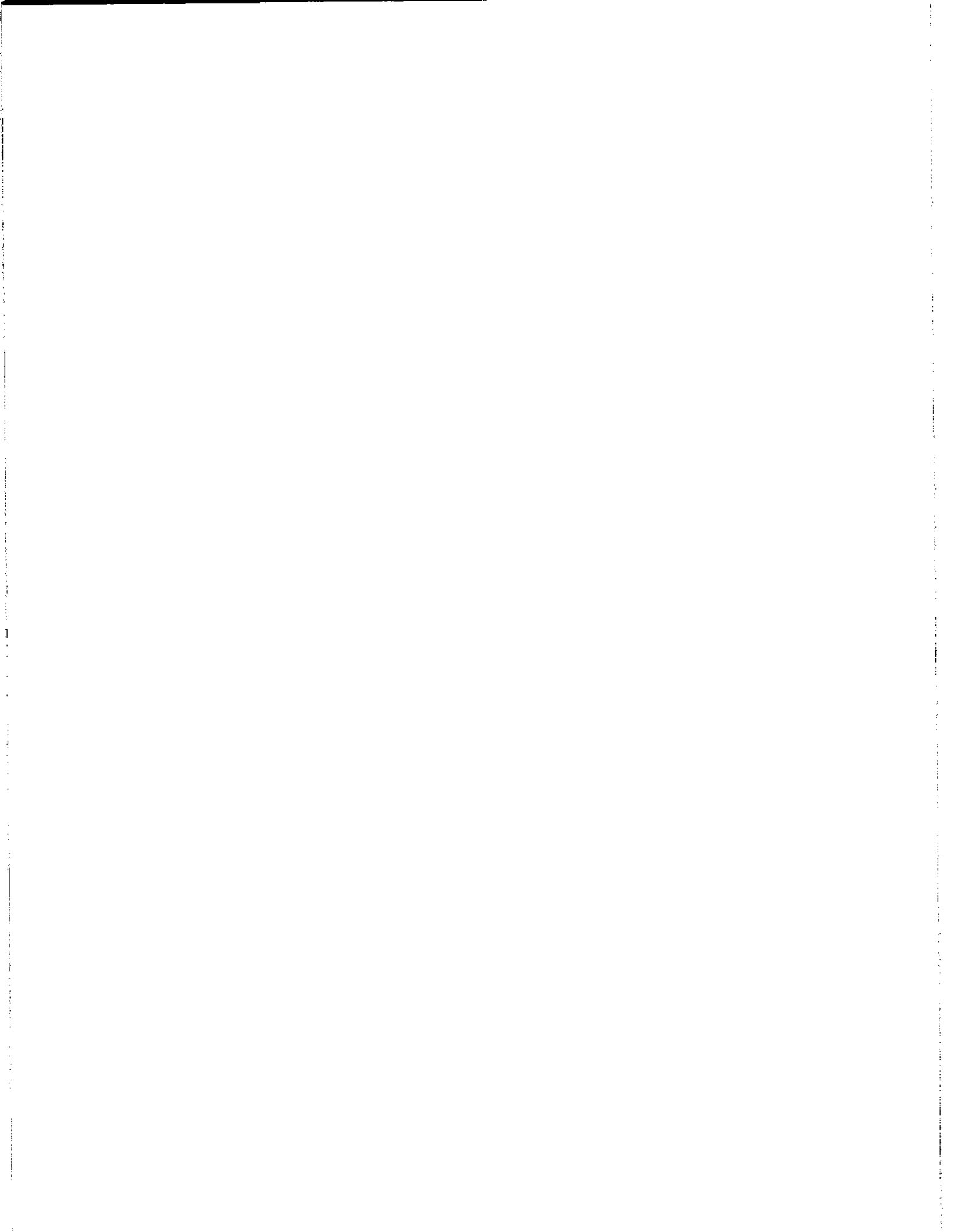


Fig 3. Rear chain obstruction - side view



For clarity, only one set of chains is shown; however, both sides would normally be restrained.

Fig 4. Chain obstruction - rear view



CHAPTER 4 ANNEX D

ASSESSMENT OF AUTOMATIC SLACK ADJUSTERS

CONTENTS

Para

- 1 Introduction
- 3 Adjuster Category (CAUTION)
- 4 Procedure and Standards

INTRODUCTION

1 It is a requirement that all Heavy Goods Vehicles (HGV), trailers and Public Service Vehicles (PSV) over 3.5T manufactured from 1995 are fitted with Automatic Slack Adjusters (ASA). ASA are subject to wear and it is essential that their operation is correctly assessed. An ASA that requires regular manual adjustment is not functioning as an ASA; it is therefore not meeting the requirement and is to be replaced as necessary.

2 The checks listed within this annex are a guide to best commercial practice and should be completed in addition to those elements given under 'Brake Systems and Components' in the relevant VOSA Inspection Manual for the class of vehicle under test, as reproduced at Chapter 3 to this AESP. Where an adjustment, or wear limit conflicts with the standards given in a specific vehicle support publication, then the equipment specific values are to be applied.

CAUTION

SPRING BRAKE ACTUATORS. Spring brake actuators may operate automatically as air pressure falls. Under no circumstances are spring brake actuators to be dismantled for repair.

ADJUSTER CATEGORY

- 3 There are two basic types of ASA:
 - 3.1 Clearance Sensing (Typically manufactured by Knorr Bremse, Arvin Meritor/ROR and Haldex).
 - 3.2 Stroke Sensing (Typically manufactured by BPW and Wabco).

PROCEDURE AND STANDARDS

- 4 Clearance Sensing – In addition to greasing, the following checks are to be applied:
 - 4.1 Check the stroke 'Free Travel', this should not exceed one third of the total chamber travel; however, there must be at least a minimal movement to permit automatic adjustment.
 - 4.2 Check that the adjuster returns fully without any fouling.
 - 4.3 Check the control arm bracket and yokes (if fitted) for cracks, bending and sheared bolts, these failures are normally associated with camshaft bearing wear.
 - 4.4 Check for cam shaft 'end float' and bearing wear; both should be minimal.
 - 4.5 Confirm operation of the ASA by:
 - 4.5.1 Slacken the hexagon screw with a torque wrench; a minimum torque of 18Nm is required. If the required torque is below 18Nm, the unit should be replaced.

CHAPTER 4 ANNEX E
GOODS VEHICLE ANTI-LOCK AND ELECTRONIC BRAKING SYSTEMS

CONTENTS

Para

- 1 Introduction
- 2 Description
- 5 Connections

Fig

- 1 Annual MEI reference guide for trailers

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Table

- 1 RBT of EBS trailers

Page

4

INTROOUCION

1 The aim of this annex is to provide sufficient information for competent persons involved in the inspection of vehicles and trailers to be able to understand and apply a uniform standard of approach to such inspections. Anti-lock Braking Systems (ABS) and Electronic Braking Systems (EBS) provide significant safety enhancements over conventional pneumatic braking systems, which improve stability under braking, reduce combination response times and improve braking compatibility between towing vehicles and their trailers.

DESCRIPTION

2 Anti-lock Braking System (ABS). The purpose of this system is to prevent the wheels from locking when the brakes are applied and the brake force generated exceeds that which can be transmitted to the road via the tyre. ABS provides the maximum exploitation of the available road surface friction during braking; consequently, braking distances are considerably reduced and the vehicle is easier to control under emergency braking. The ABS is governed by a micro-computer control unit which receives signals from wheel speed sensors triggered by exciter rings or pole wheels mounted to the brake disc or drum assemblies. The signals from the sensors are processed by the control unit, which via solenoid valves, governs the braking pressure to the individual wheel brake actuators. Where axles form a bogie, it may only have sensors fitted to one of the axles forming the bogie. The system will also include built in self test functionality; should a fault occur, the driver is informed by a visual warning lamp mounted on the instrument panel, or for a trailer by a lamp visible to the driver mounted on the front of the trailer. There are a number of ABS categories:

2.1 Category 1 (Towing vehicles). The ABS will operate on at least one front axle and one rear axle and have the ability to utilise the higher adhesion when braking on a split friction surface. This will require one of the axles, usually the rear axle, to have independent control. A typical system would have four sensors and four modulators but could effectively have four sensors and 2 or 3 modulators. In the latter case the front axle could use one modulator with a "Select Low" control philosophy where modulation action is taken on the first wheel to lock. This system will protect the towing vehicle from brake induced jack-knifing and enable the driver to steer during braking by preventing the directly controlled wheels from locking.

2.2 Category 2 (Towing vehicles). The ABS will operate on at least one front axle and one rear axle. The system will have a minimum of four sensors and two modulators (one for each axle). The system will generally operate on a "Select Low" control philosophy where modulation action will be taken on the first wheel to lock. This system will protect the towing vehicle from brake induced jack-knifing and enable the driver to steer during braking by preventing the directly controlled wheels from locking.



5.3 ISO 7638. This is associated with the braking system only and provides connections for ABS/EBS, warning lamp and CAN data lines. This data line is used when both the vehicle and the trailer of a combination are fitted with EBS and it allows the two systems to communicate. The data line can also be used by non EBS trailers as a brake wear warning indicator.

5.4 ISO 12098. This is a continental lighting socket which is used in place of the 24N and 24S connections, but does not include a power source for ABS or EBS.

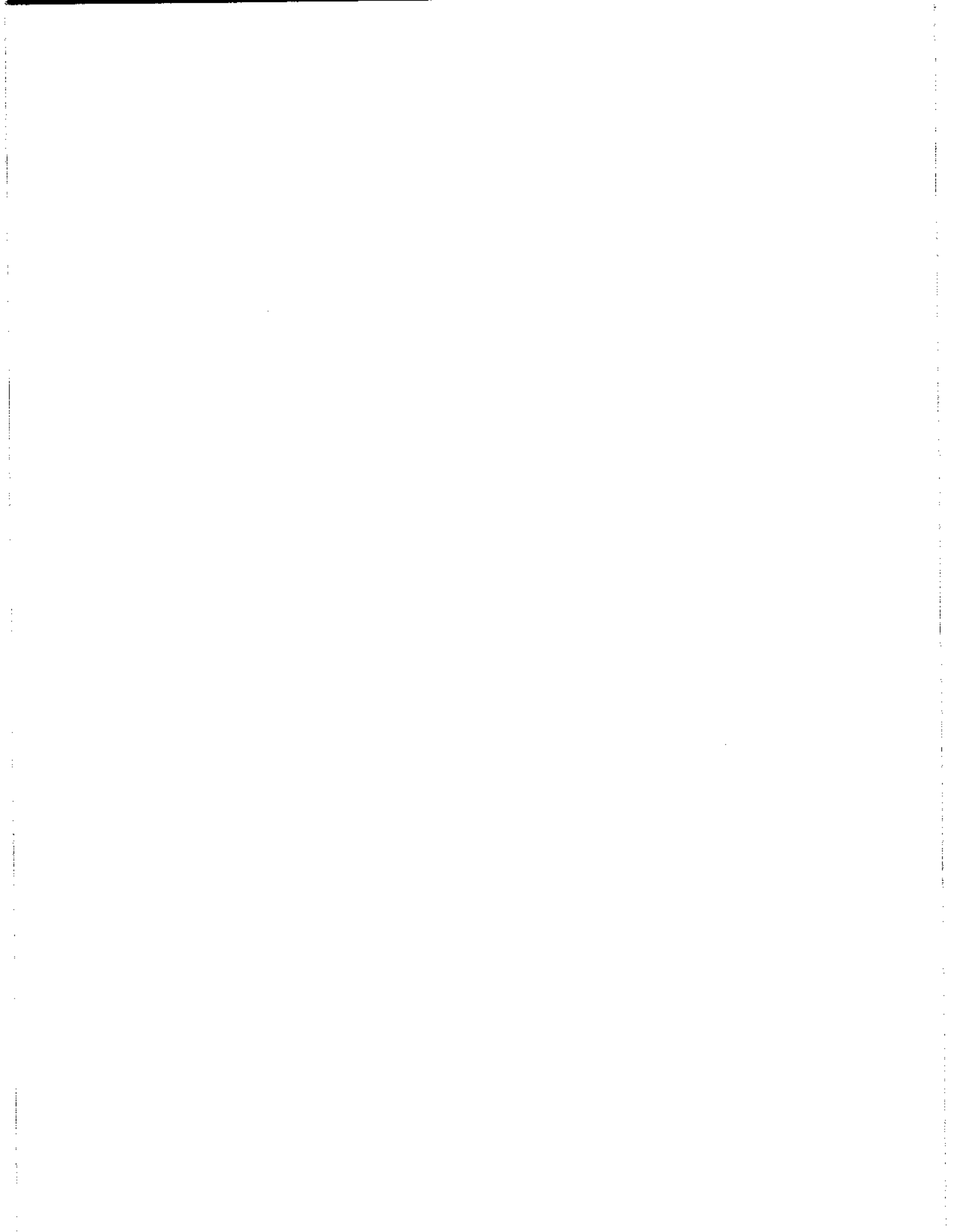
6 NOTE

6.1 ABS may take a power source from the 24N (from the stop lamp circuit), 24S or ISO 7638 connection.

6.2 EBS can only source a permanent feed from the 24S or ISO 7638 connection.

6.3 If the vehicle and trailer are fitted with 24N, 24S and ISO 7638 connections, they should all be used.

6.4 If the vehicle and trailer are fitted with a NATO socket and ISO 7638 connections, they should both be used.



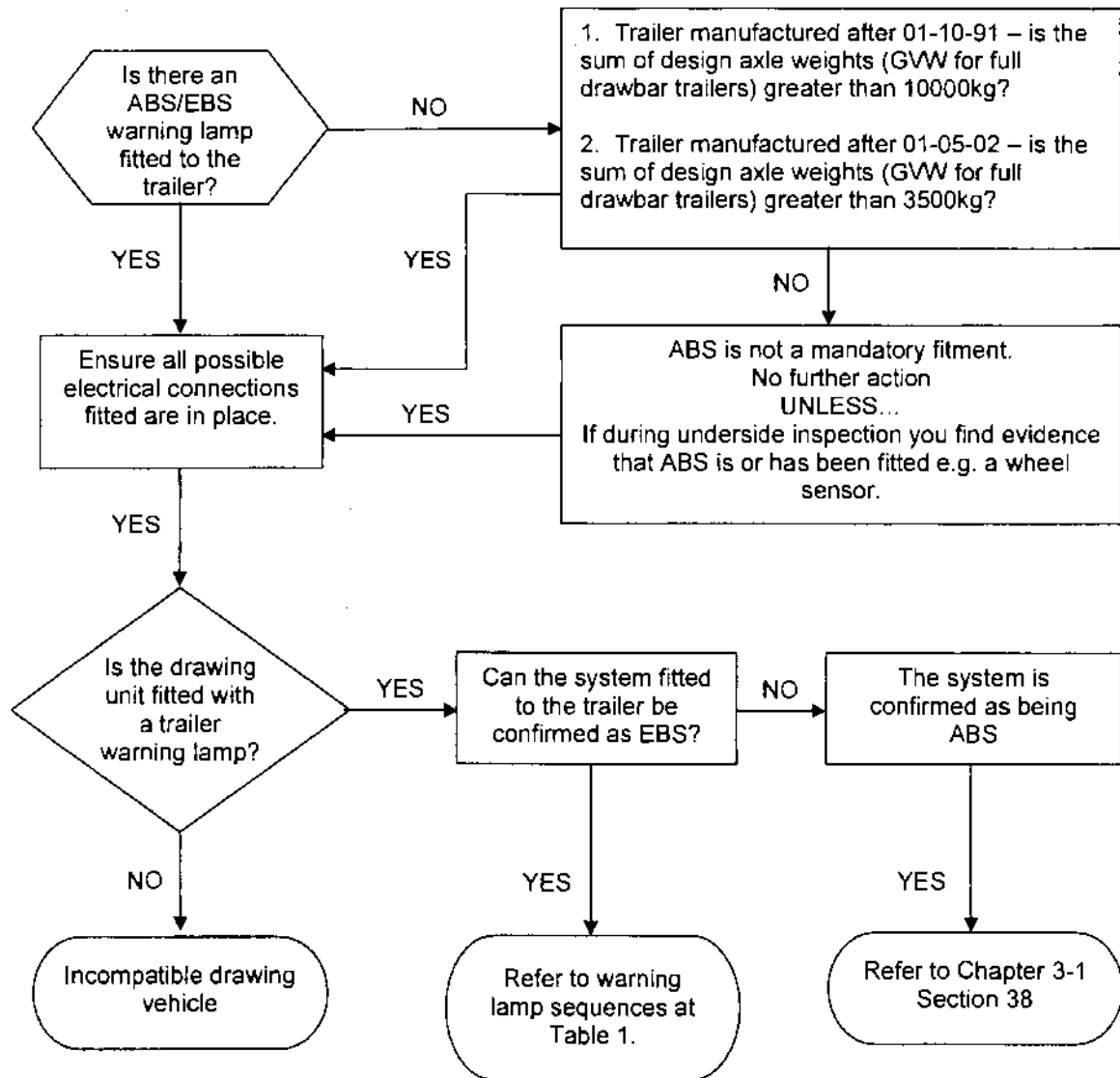
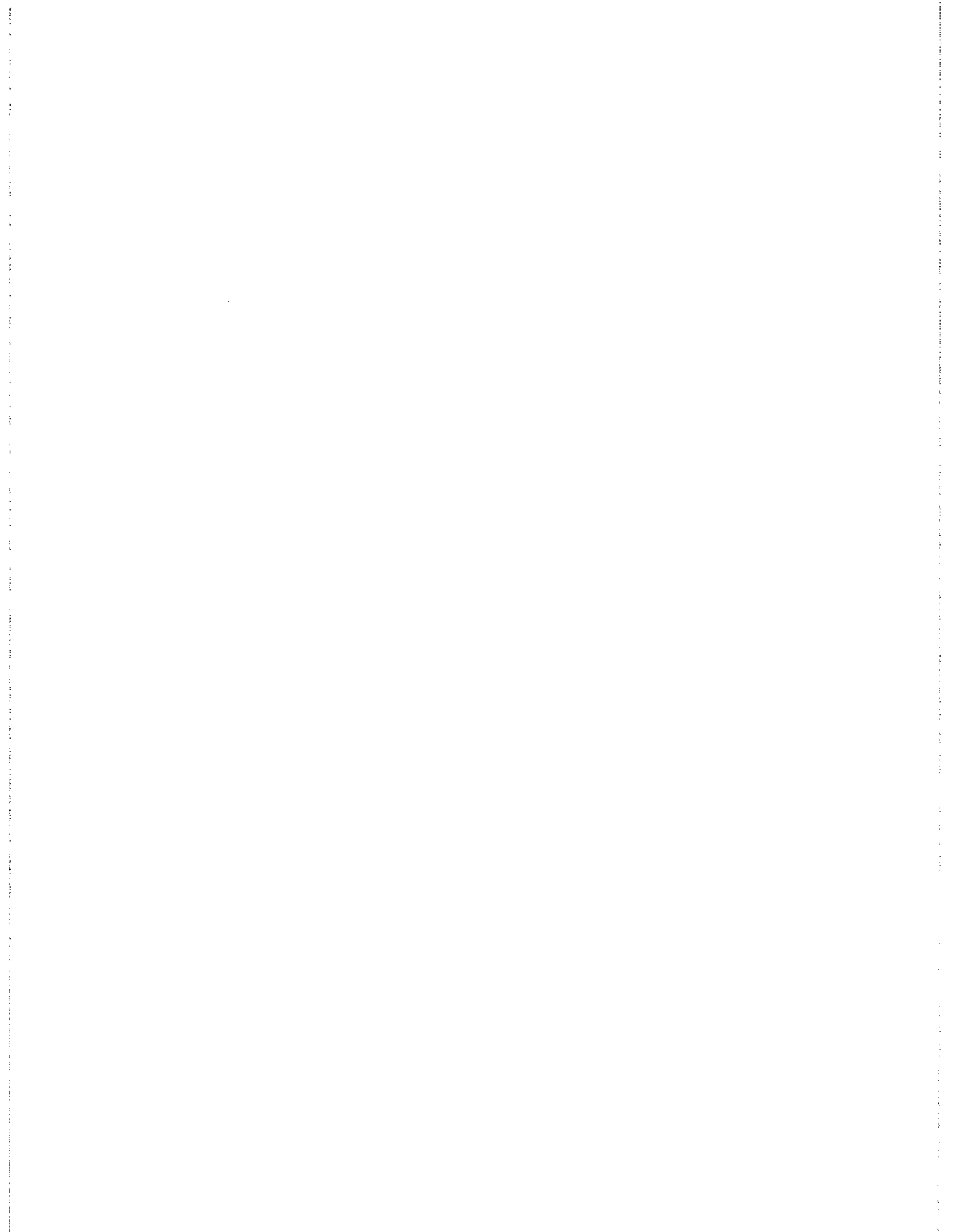


Fig 1. Annual MEI reference guide for trailers



CHAPTER 5
CALIBRATION OF SPEED LIMITERS AND TACHOGRAPHS
CONTENTS

Para

- 1 Introduction
- 2 Guidance instructions for Units in Germany
- 3 Engine speed limiters, identification, examination, sealing and calibration procedure
- 4 Ministry of Defence (MoD) and armed forces exemption from tachograph regulations
- 5 Non exemption of tachograph regulations for contractors operating MoD owned vehicles
- 6 Calibration periods for tachographs
- 7 Tachograph annual examination, repair, sealing and calibration procedure

INTRODUCTION

1 This chapter details the action to be taken in the event of failure or replacement of a legally calibrated component, resulting in the requirement of adjustment or re-calibration.

GUIDANCE INSTRUCTIONS FOR UNITS IN GERMANY

2 Units operating in Germany which require the calibration of speed limiters or tachographs are, in the first instance, to contact the SO1 ES Branch, HQ UKSC(G) for guidance on Rheindahlen ext 4517.

ENGINE SPEED LIMITERS, IDENTIFICATION, EXAMINATION, SEALING AND CALIBRATION PROCEDURE

3 Engine speed limiters are normally pre-set at manufacture in accordance with current Department of the Environment, Transport and the Regions (DETR) regulations. This setting should remain constant for the life of the vehicle unless, due to failure or tampering, the limiter requires adjustment or calibration.

3.1 Engine speed limiters can be identified by the manufacturers' unique identification plate fitted to the speed limiter body.

3.2 Engine speed limiters are to be examined during routine maintenance in accordance with Chapter 3 Section 1 Inspection number 33 of this publication.

3.3 If the examination results in a failure as specified in 'Reasons for Failure', the vehicle must be referred to one of the engine speed limiter manufacturers' authorised centres for sealing, calibration or repair. The manufacturers' contact details are listed below.

Groeneveld UK Ltd
The Greentec Centre
Gelders Hall Road
Shepshed
Leicestershire
LE12 9NH

Telephone: 01509-600033
FAX: 01509-602000
E-mail: Groeneveld.uk@talk21.com

STURDY-EUROPE
5 Alston Drive
Bradwell Abbey
Milton Keynes
MK13 9HA

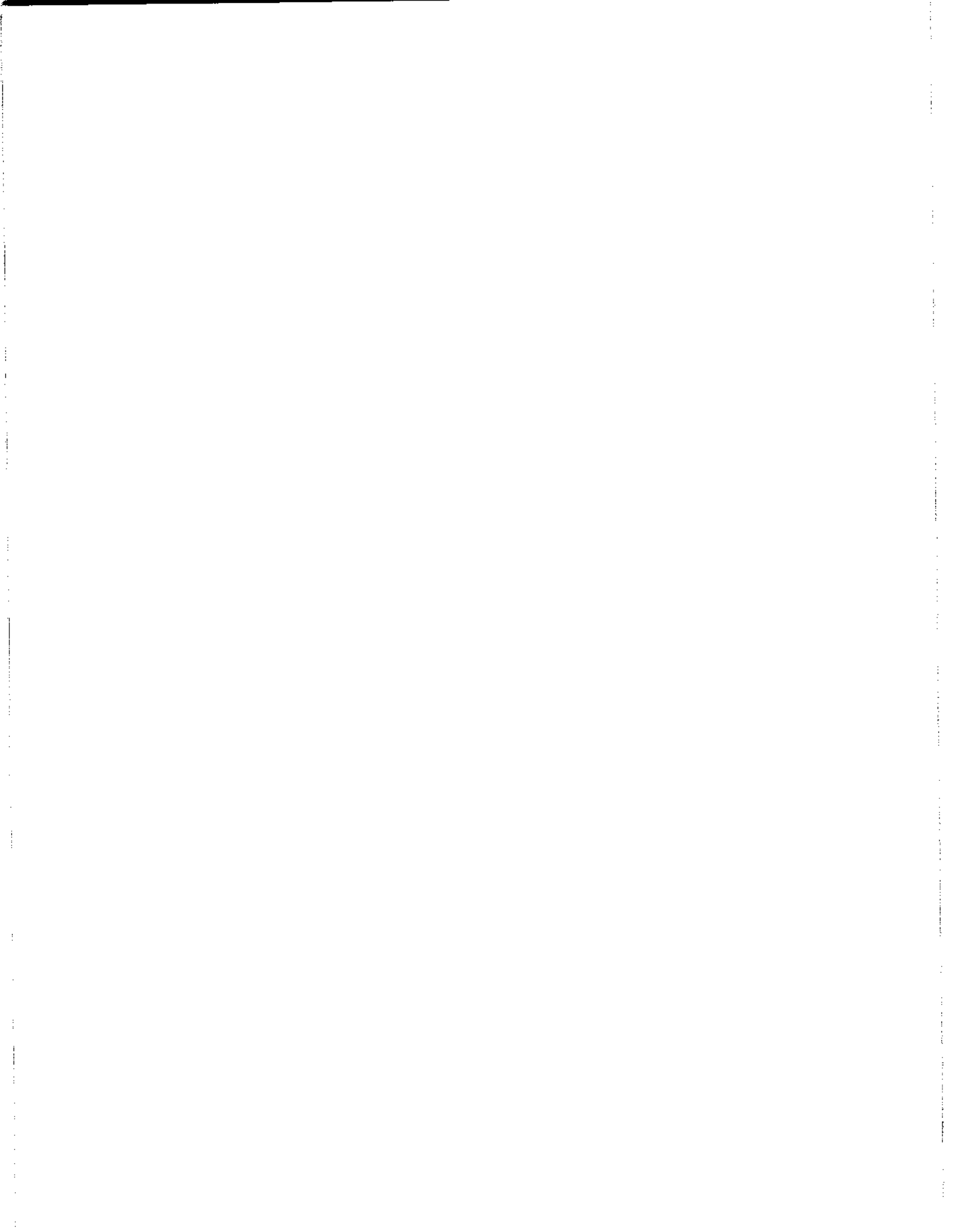
Telephone: 01908-220147
FAX: 01908-220145
E-mail: sturdy@time-instruments.co.uk

CHAPTER 8-0
CARRIAGE OF DANGEROUS GOODS

CONTENTS

Chapter

- 8-0 Carriage of dangerous goods
- 8-1 The testing and inspection of 'B' vehicles required to carry explosives, dangerous goods class 1
- 8-2 The testing and inspection of 'B' vehicles required to carry flammable liquids, dangerous goods class 3



CHAPTER 8-1

THE TESTING AND INSPECTION OF 'B' VEHICLES
REQUIRED TO CARRY EXPLOSIVES, DANGEROUS GOODS CLASS 1

CONTENTS

Para

- 1 Introduction
- 2 Scope
- 3 Aim
- 4 General
- 6 Outline
- 8 Dangerous Goods Safety Advisors (DGSA's)
- 10 Training

Annexes

- A Procedure for obtaining ADR certification
- B Ministry of Defence (MoD) declaration of roadworthiness
- C Forms used for ADR

INTRODUCTION

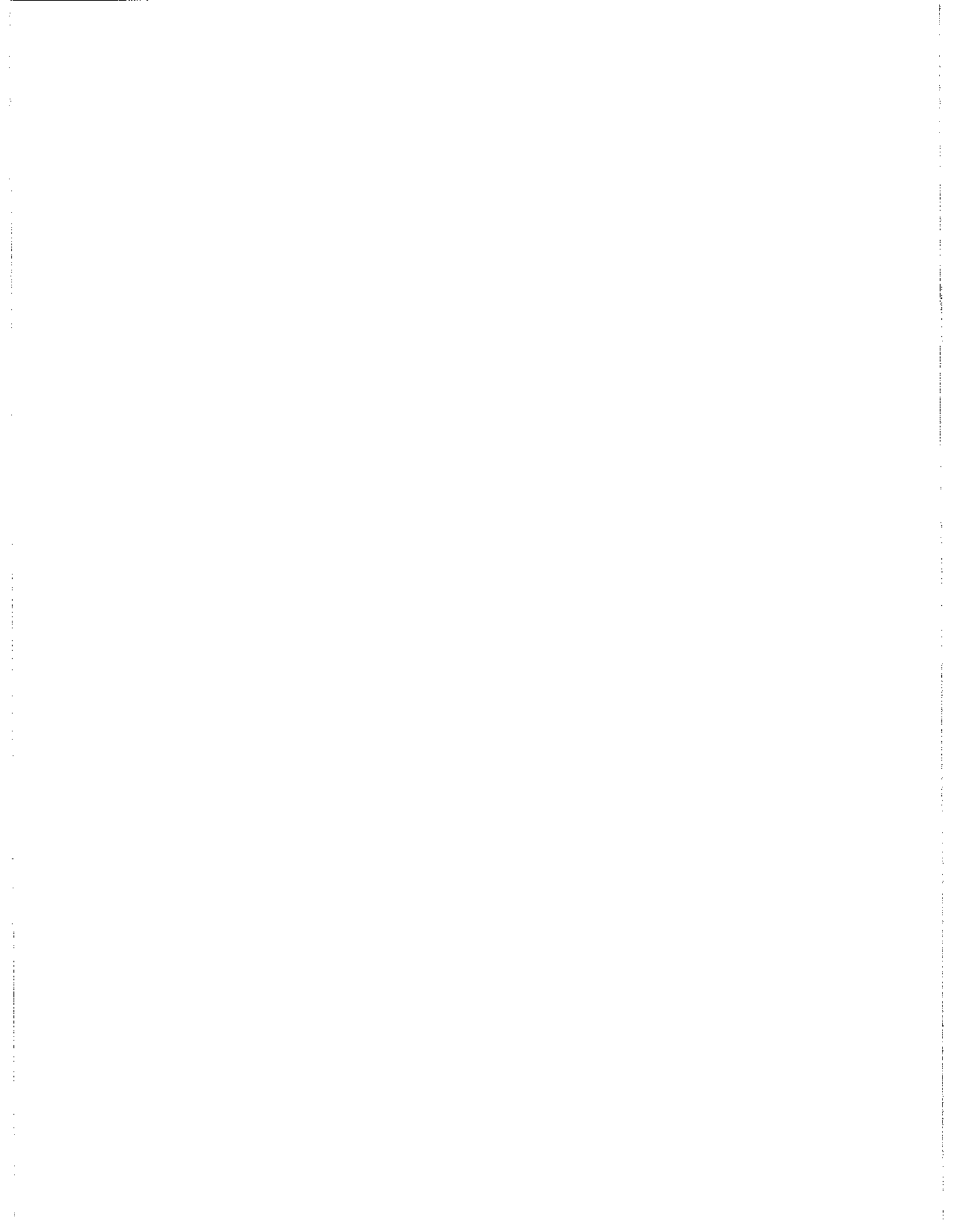
1 This chapter describes the basic system of examination and certification for vehicles that are required to carry Explosive (EX) products, dangerous goods Class 1, and deals with the maintenance policy and construction of compliant vehicles. These instructions will only apply to EX Type II and III vehicles built after 1st April 1999 (ADR compliant, B3 certification required), although information on previous build standards is included for reference.

SCOPE

2 This chapter is only for the use of maintenance personnel that are required to maintain EX vehicles. These Regulations prescribe maintenance requirements and responsibilities applicable to the vehicles that carry EX.

AIM

3 The aim of this instruction is to draw together all the relevant regulations, pertaining to vehicles that carry EX, and advise units of their responsibilities to ensure service vehicles comply with statutory legislation so they can be adequately maintained.



4.2 ADR. The ADR is an agreement made under the auspices of the Inland Transport Committee of the United Nations Economic Commission for Europe. An English text of the Agreement is published by TSO and is colloquially referred to as the 'Orange Book'. Parties to the agreement undertake to permit the international transport of dangerous goods through their territory provided that the goods are packaged and labelled in accordance with the agreement and are carried in vehicles which comply with the provisions of the agreement. Additionally, dangerous goods carried under ADR to or from the United Kingdom must not only comply with the provisions of ADR, but also with the International Maritime Dangerous Goods Code (IMDG) if transited by sea; or if transiting via the channel tunnel with Regulations concerning the International carriage of Dangerous goods by Rail (RID).

4.3 Operators engaged in the international transport of dangerous goods by road are to ensure that their transport units (vehicles) comply with the provisions of the annexes to ADR. The Secretary of State for Transport is the competent authority in the UK for the purpose of this agreement and policy work is carried out on his behalf by the Department of Transport, Dangerous Goods Branch. The technical inspection of transport units requiring certification is carried out by the Vehicle Inspectorate (VI). It should be noted that the Agreement is concerned only with the dangerous goods aspect of international road haulage.

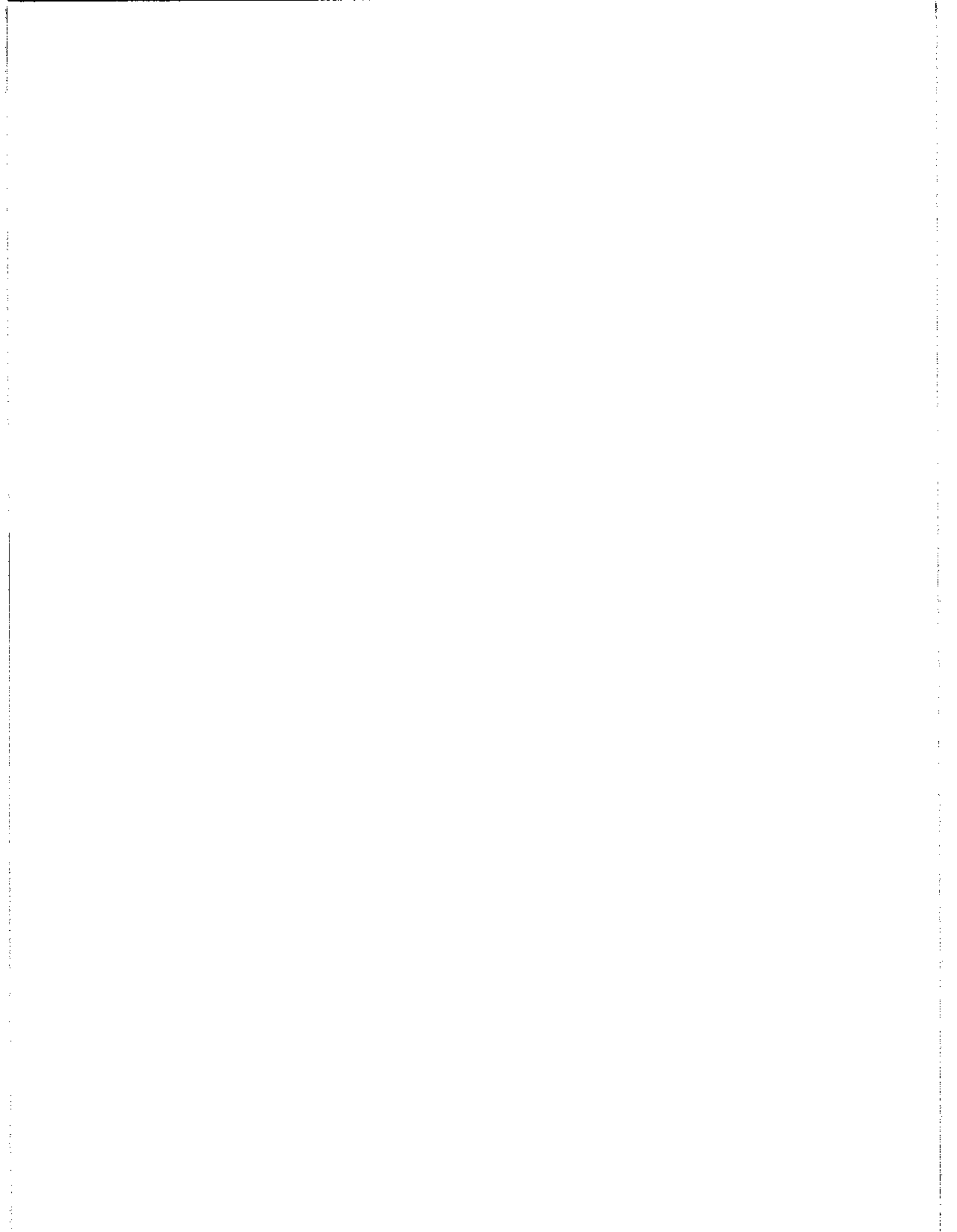
4.4 From 1 Jan 97 Type Explosive II (EX/II) vehicles have been added to the list of vehicles requiring ADR inspection and certification as follows:

4.4.1 MoD vehicles built before 1 Jan 97 categorised as OGVs under the ACOP presented to the VI for ADR inspection and certification will be required to meet the construction requirements of a Type EX/II vehicle as laid down in the AEVR and in the relevant marginals as referred to in marginal 11 204 in the ADR Agreement Volume II.

5 The procedure for obtaining ADR certification is given at Annex A. Vehicles operated/stationed outside the UK in countries having applied ADR to their national regulations, are to be certified in accordance with instructions issued by HQ ES Branch in theatre (i.e. SQ1 ES Branch, HQ UKSC(G) in Germany).

TRAINING

10 All units are to ensure all personnel engaged in the transport of dangerous goods (including maintainers, inspectors and operators) shall receive training in the contents of dangerous goods requirements commensurate with their responsibilities. It can range from general awareness training to function-specific and safety training. Arrangements for formal training will be notified under single service arrangements. Training records are to be kept by units for a minimum of 5 years.



CHAPTER 8-1 ANNEX A

PROCEDURE FOR OBTAINING ADR CERTIFICATION

CONTENTS

Para

- 1 Procedure for obtaining ADR certification

PROCEDURE FOR OBTAINING ADR CERTIFICATION

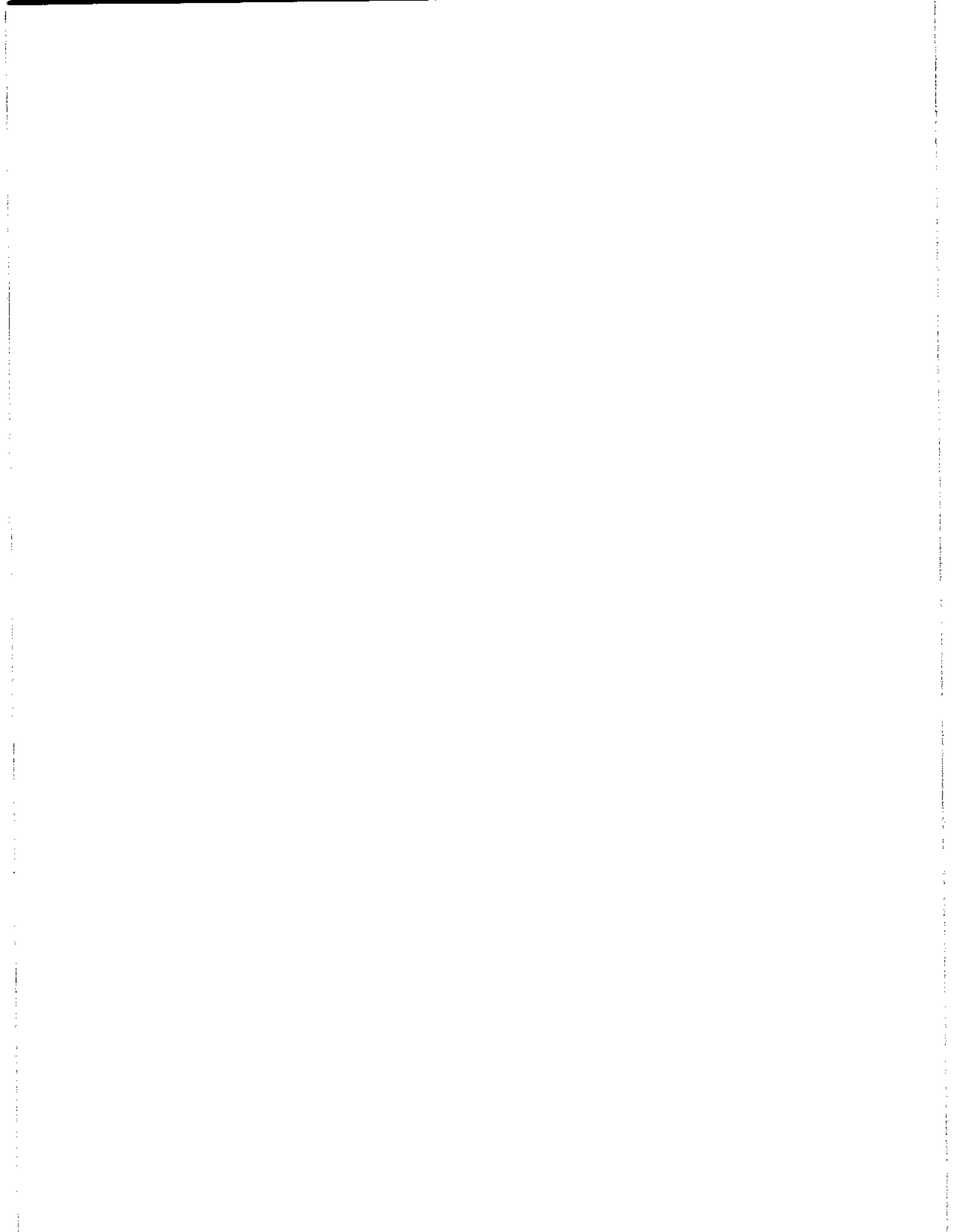
1 Units requiring ADR certification for vehicles under their control are firstly to ensure that the vehicle meets all the general and construction requirements as laid down in the ADR Agreement for the type and quantities of dangerous goods to be carried. New to Service vehicles will have been constructed to the relevant type approval standard. An international approval mark will be affixed in the cab, consisting of a circle surrounding the letters ADR followed by the identity number of the state which has granted the approval. A declaration as to the vehicle's suitability for carrying certain types of dangerous goods under the requirements of ADR will also be issued by the manufacturer. The declaration must be retained with the vehicle documents for the life of the vehicle. Some older vehicles may meet the construction requirements for type EX/II vehicles. When satisfied that all the requirements have been met Units should proceed as follows:

2 The Ministry of Defence (MOD) has a responsibility under duty of care to ensure that all its vehicles which are required to carry dangerous goods on the public highway are maintained and certified to national or international standards as appropriate. To this end vehicles are required to undergo an annual roadworthiness inspection. The inspection must be no less stringent than the statutory annual UK heavy goods vehicle test carried out by the VI.

3 Declaration of Roadworthiness. MoD vehicles are normally exempt from plating and testing inspections at VI testing stations; however, the system set up by the VI requires that the ADR examinations are conducted at the same time as the annual Large Goods Vehicle (LGV) plating and testing inspections. The VI has circulated information to all its testing stations stating that MoD vehicles will not be required to have a roadworthiness test as part of the ADR certification but a declaration must be obtained before the ADR test can be carried out. Vehicles are to have an annual roadworthiness inspection conforming to the requirements of the VI Plating and Testing Inspection. This inspection may be carried out at the time of Minor or Major maintenance or at the annual Periodic REME Examination. A Declaration of Roadworthiness (Annex B) is to be raised and signed by the inspecting officer (REME Class 1 VM a SNCO RAF MT Technician or civilian equivalent).

4 Application for ADR 1 (B3) Certificate. All applications for ADR Certification must be made to the ADR Section, Vehicle Inspectorate, Technical Services, Welcombe House, 91-92 The Strand, Swansea, West Glamorgan, SA1 2DH and must include the following:

- 4.1 Completed ADR 111 application form (obtainable from VI testing stations or Welcombe House).
- 4.2 Current Declaration of Roadworthiness.
- 4.3 A photocopy of both sides of the current or most recent ADR1 (B3) certificate is to be enclosed with the application.
- 4.4 The appropriate test fee; this is currently set by the "International Carriage of Dangerous Goods by Road (Fees) Regulations" 1988 (SI 1988/370). The VI test stations or Technical Services, Swansea, will provide information on current fees.



CHAPTER 8-1 ANNEX B

MINISTRY OF DEFENCE (MOD) DECLARATION OF ROADWORTHINESS

CONTENTS

Fig	Page
MoD declaration of roadworthiness form	1/2

Vehicle registration No. _____

Chassis No. _____

I confirm that the vehicle indicated above is owned and operated by the MOD and has been subjected to an annual technical inspection by the MOD to ensure that all roadworthiness requirements of the UK are met

The roadworthiness inspections have been carried out by MOD staff no less frequently and no less comprehensively than those legally required for non MOD Heavy Goods Vehicles. The roadworthiness inspection standards are no less stringent than those applying to normal UK heavy goods vehicles at the time of the Statutory test.

Signed _____

Date _____

Name _____

Rank/Grade and Post _____

Unit Address _____

Unit Stamp

Fig 1 MoD declaration of roadworthiness form



CHAPTER 8-1 ANNEX C

FORMS USED FOR ADR

CONTENTS

Para

- 1 Forms used for ADR

FORMS USED FOR ADR

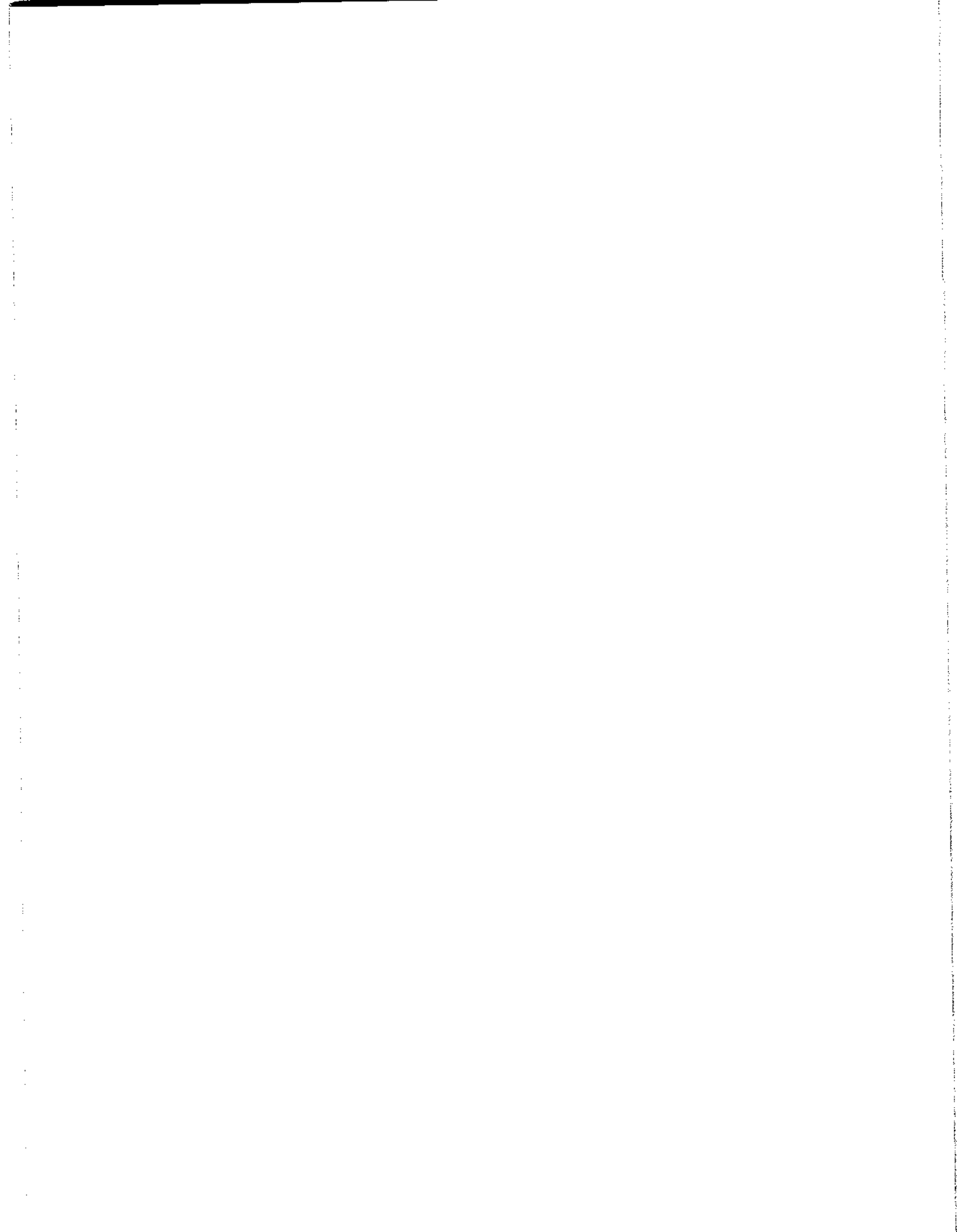
1 ADR1 (B3). Certificate of Approval for vehicles carrying certain dangerous goods. Issued after successful completion of an ADR inspection. The certificates are prepared by Technical Services, ADR Section and signed and issued by LVG testing station based ADR inspectors. One certificate is issued for a rigid vehicle and separate certificates are normally issued for each part of an articulated or drawbar trailer combination. The former practice of issuing a single certificate for a combination for carrying explosives has been abandoned. Under the terms of the Agreement drawbar trailers carrying explosives may now be hauled by non ADR rigid vehicles.

2 ADR 111. Application for a certificate of approval for a road vehicle. To be completed by the operator and sent to Technical Services, ADR Section along with the test application, fee, and other supporting documentation.

3 ADR 9. List of Department of Transport Goods Vehicle Testing Stations where the ADR inspections are carried out. Issued along with the document pack for each application.

4 ADR 10a. Appointment for an ADR test.

5 ADR 11. Notification of refusal of a certificate of approval.



CHAPTER 8-2

THE TESTING AND INSPECTION OF 'B' VEHICLES
REQUIRED TO CARRY FLAMMABLE LIQUIDS, DANGEROUS GOODS CLASS 3

CONTENTS

Para

- 1 The testing and inspection of 'B' vehicles required to carry flammable liquids, dangerous goods class 3

THE TESTING AND INSPECTION OF 'B' VEHICLES REQUIRED TO CARRY FLAMMABLE LIQUIDS,
DANGEROUS GOODS CLASS 3

1 The maintenance procedures for the testing and inspection of 'B' vehicles required to carry flammable liquids, dangerous goods Class 3, are detailed in and are to be carried out in accordance with the following publications (in subordinate order):

- (1) JSP 317 Joint Service Safety regulations for storage handling of fuels and lubricants
- (2) AESP 2320-A-100-522 Gas freeing cleaning examination and repair of trucks tanker fuel servicing and unit bulk refuelling equipment
- (3) JSP 445 Transit of dangerous goods by road, rail and sea (Ammo and Explosives and other dangerous goods)

2 Vehicles operated/stationed outside the UK in countries having applied ADR to their national regulations, are to be certified in accordance with instructions issued by the HQ ES Branch in theatre (i.e. for Germany, SO1 ES Branch, HQ UKSC(G)).



COMMENT(S) ON AESP*

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 BFPO 794.

From:

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Chapter(s)/Instruction	Page(s)/Paragraph(s)	
If you require more space, please use the reverse of this form or a separate piece of paper. Comment(s)		

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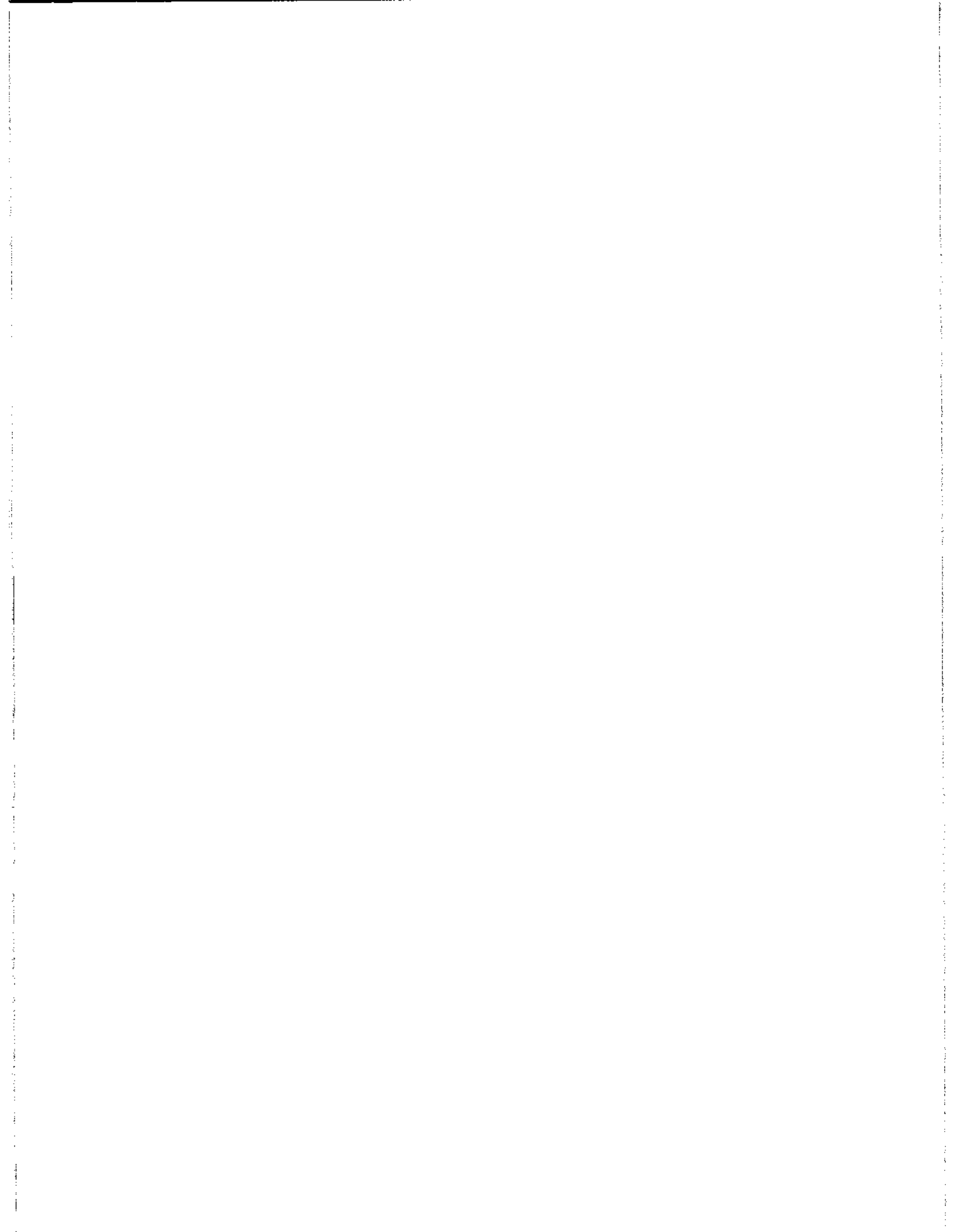
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Incorporate comment(s) in future amendments		No action required
Remarks		

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* AESP or EMER



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VEHICLE AND TRAILER ELECTRICAL CIRCUITS INSULATION CHECKS

BY COMMAND OF THE DEFENCE COUNCIL

W. J. G. J. J.

Ministry of Defence

Sponsor:

DGEME(A)

File ref: 0/DGEME/125/2/15/EME 7b(1)

Publications Authority:

Vehs & Wpns Br REME

Project No: 7b(2)2281(2)

File ref: 7b(2)2281/EEP

100 % CHECK

V3/94

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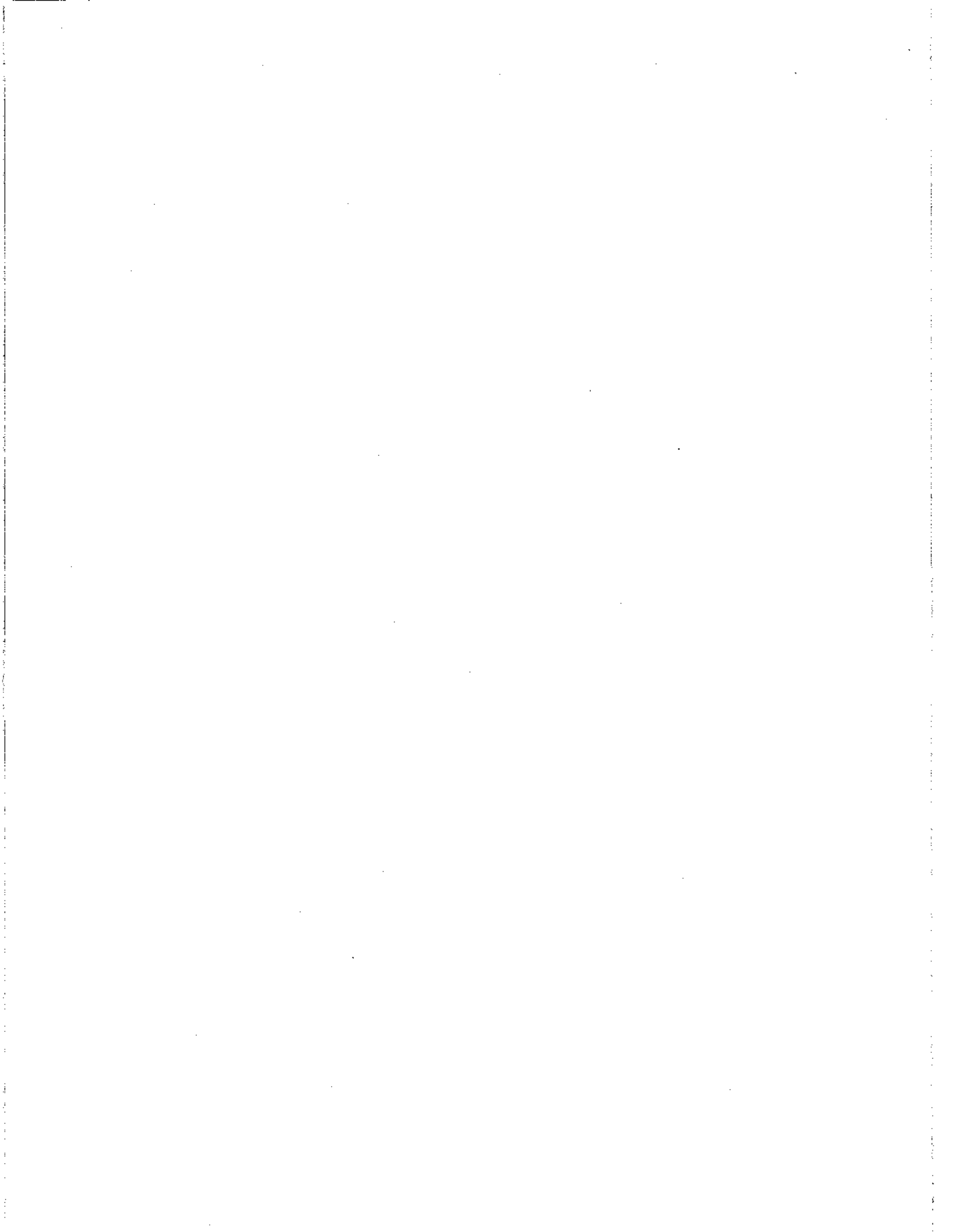
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MOD Form 656 Emergency Resuscitation	

Frame Para

- Warning
- Caution
- Introduction
- 1 General
- 3 Test equipmnt
Procedure
- 4 Insulation check
- 5 Rotating electrical components
- 6 Leakage current
- 7 Trailers
- 8 Periodicity

Table	<u>Page</u>
1 Test equipment	1

PREFACE

1 Amendments are identified by marginal side lining.

2 Comments on this publication are to be forwarded in accordance with AESP 0100-P-011-013 to Vehicles and Weapons Branch REME, Chobham Lane, Chertsey, Surrey KT16 0EE.

WARNING ...

TEST EQUIPMENT WHICH IS NOT INTRINSICALLY SAFE MUST NOT BE USED WITHIN 1.5 M OF THE BULK FUEL CONTAINER FITTED TO REFUELLER/TANKER VEHICLES AND TRAILERS. USE LONGER LOCALLY PRODUCED LEADS.

CAUTION ...

If a positive or negative to earth short circuit exists on a vehicle fitted with an insulated return system then connecting an ammeter from the negative or positive battery terminal to earth will damage the ammeter. Ascertain that no short circuit exists by carrying out procedure in Para 4 first.



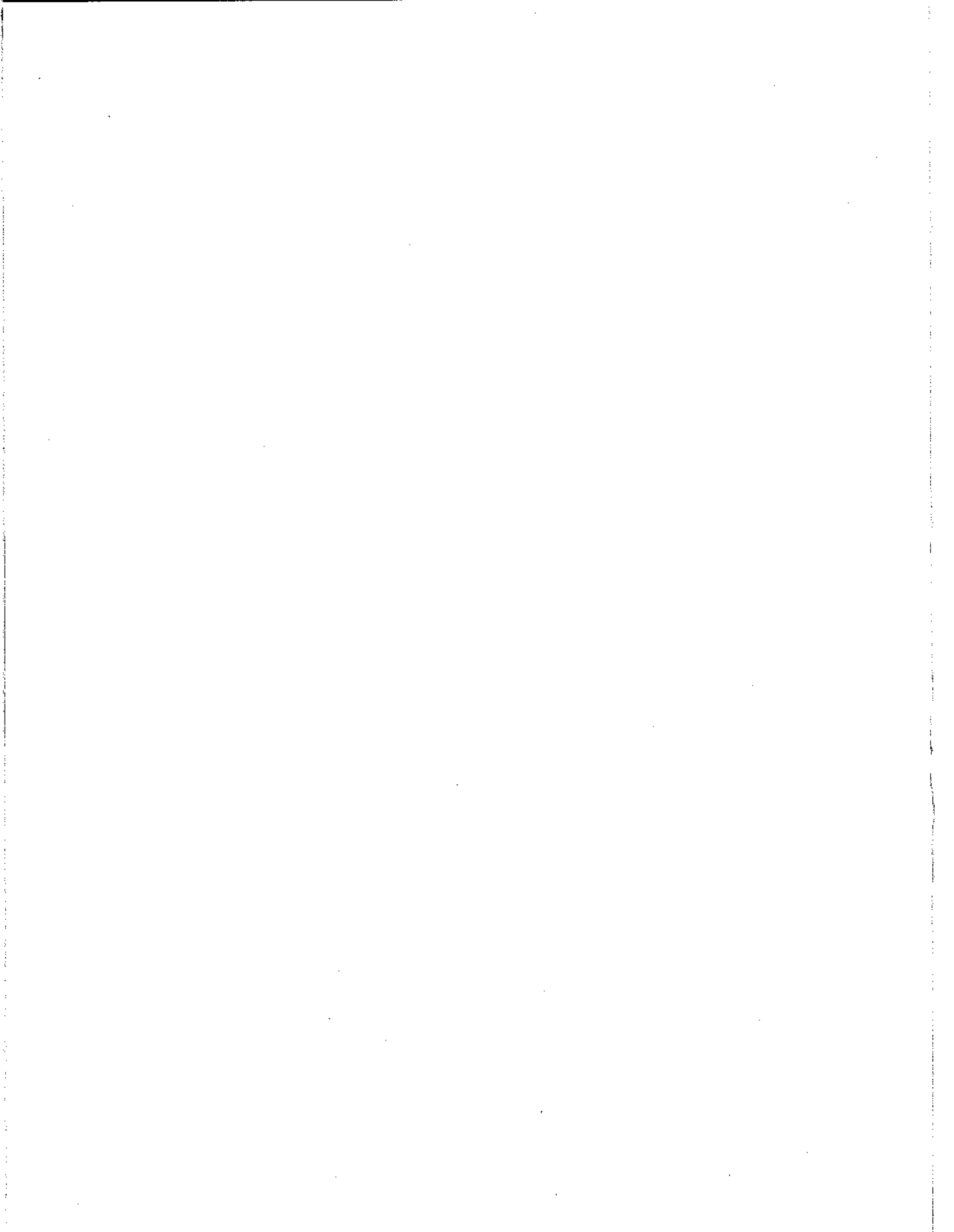
RESUSCITATION

TREATMENT OF THE NON-BREATHING CASUALTY

NOTICE

The inclusion of the emergency resuscitation placard (MOD Form 656) in Military Technical Publications has been discontinued.

This notice is to be retained in the publication until removed by amendment instruction.



INTRODUCTION

General

1 A safety hazard exists when a trailer is coupled to a vehicle with a different electrical return system, ie earth return or insulated return. If a 'positive to earth' fault exists on a tractor unit with an insulated return system then a short circuit will result when a trailer with an earth return system is coupled to the tractor.

2 This publication details the method and periodicity for checking the insulation of insulated return systems fitted to vehicles, prime movers, tractor units, trailers and semi-trailers.

TEST EQUIPMENT

3 The test equipment required is detailed in Table 1.

TABLE 1 TEST EQUIPMENT

Serial	Part Number	Designation	Purpose
(1)	(2)	(3)	(4)
1	Z4/6625-99-252-3606	Multimeter Set GP Hand Held	To measure resistance and current

PROCEDURE

Insulation check

4 Proceed as follows:

4.1 Disconnect the battery positive lead.

4.2 Switch all electrical loads ON.

4.3 Connect the multimeter between the battery positive lead and a suitable earth point on the vehicle chassis.

4.4 Switch the multimeter to the ohms range and note the resistance reading.

4.5 Repeat Para 4.4 with the multimeter connected to the battery negative lead.

4.6 In each case the resistance reading is to be greater than 1 k Ω .

4.7 Remove the multimeter and replace the battery positive lead.

Rotating electrical components

5 Carry out the procedure detailed in Para 4. If the resistance reading is satisfactory proceed as follows:

- 5.1 Connect the multimeter between the battery positive terminal and a suitable earth point on the vehicle chassis.
- 5.2 Switch the multimeter, initially, to the highest current range.
- 5.3 Switch on the rotating electrical component and read the leakage current on the multimeter.
- 5.4 Repeat Para 5.3 to 5.4 with the multimeter connected to the battery negative lead.
- 5.5 In each case the leakage current is to be less than 30 mA.

Leakage current

6 Carry out the procedure detailed in Para 4 and 5. If satisfactory proceed as follows:

- 6.1 Connect the multimeter between the battery positive terminal and a suitable earth point on the vehicle chassis.
- 6.2 Switch the multimeter, initially, to the highest current range.
- 6.3 Switch all electrical loads and rotating electrical components ON.
- 6.4 Note the leakage current reading.
- 6.5 Repeat Para 6.2 to 6.4 with the multimeter connected to the battery negative terminal.
- 6.6 In each case the leakage current is not to exceed 30 mA.

TRAILERS

7 When checking trailers, it will be necessary to connect the trailer to a suitable prime mover whose insulation has been checked in accordance with Para 4 to 6.

PERIODICITY

8 The insulation check is to be carried out on initial issue of vehicles or trailers to Units, and all subsequent annual REME inspections.



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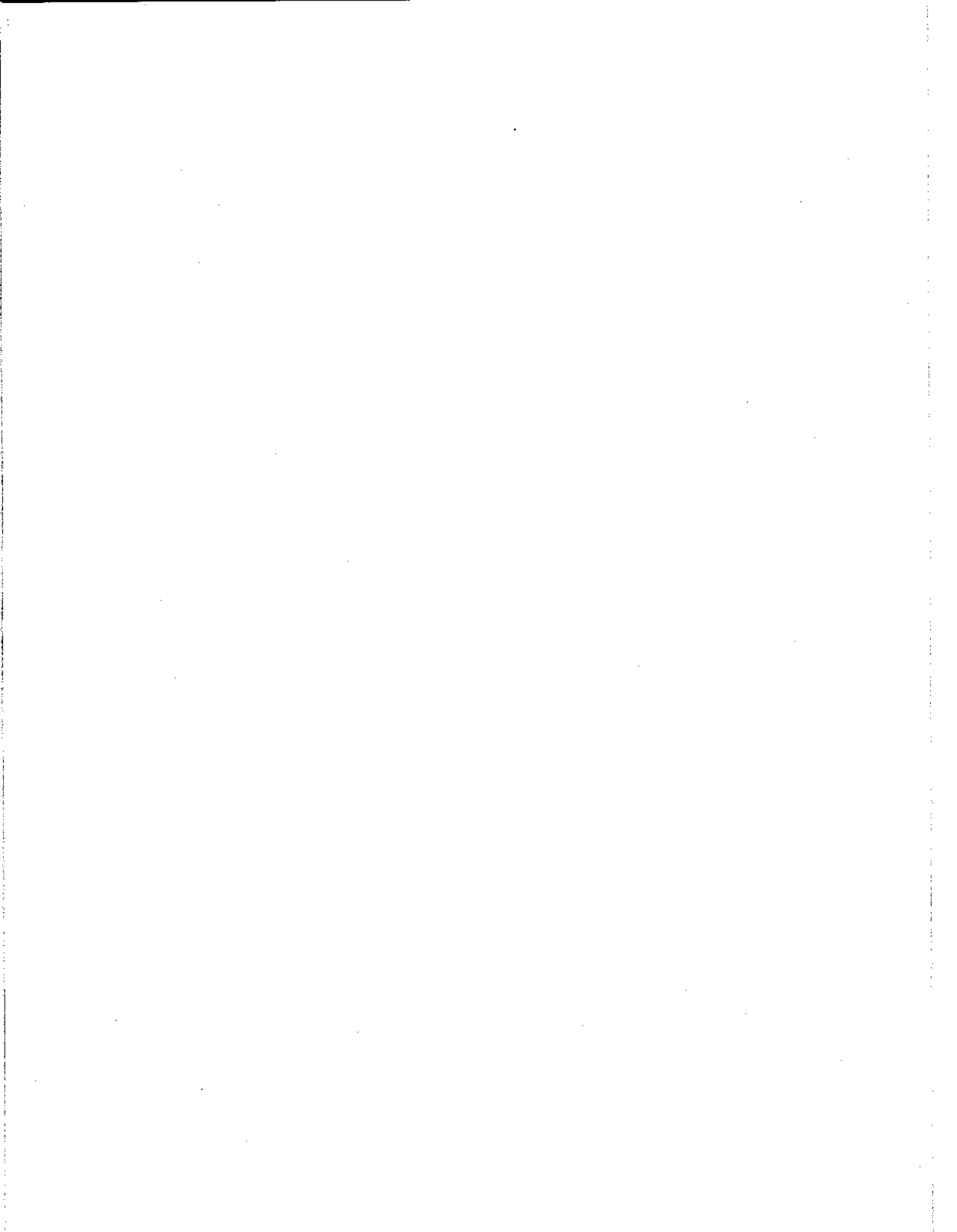
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PAINTING OF LAND EQUIPMENT

BY COMMAND OF THE DEFENCE COUNCIL

Ministry of Defence
Issued by
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COMMENT(S) ON AESP	Final leaf

PAINTING OF LAND EQUIPMENT

Chap

- 1 Introduction, Land policy and general rules
- 2 Safety considerations
- 3 Paint spraying - health, safety and environmental guidance
- 4 Cleaning, preparation and pre-treatments
- 5 Paints for service use
- 6 Protection of underfloor and internal cavity areas of thin skinned vehicles
- 7 Application and removal of Temporary Camouflage Coatings (TCC)
- 8 Powder coating process
- 9 Application and removal of peelable coatings

PREFACE

Sponsor: MIG ETS

Project No.:

File ref:

Publication Authority: TES TIG Andover

INTRODUCTION

- 1 Service users should forward any comments on this publication through the channels prescribed in AESP 0100-P-011-013. An AESP Form 10 is provided at the end of this publication; it should be photocopied and used for forwarding comments on this AESP.
- 2 AESPs are issued under Defence Council authority and where AESPs specify action to be taken, the AESP will of itself be sufficient authority for such action and also for the demanding of the necessary stores, subject to the provisions of Para 3 below.
- 3 The subject matter of this publication may be affected by Defence Instruction Notices (DINs), Standing Operating Procedures (SOPs) or by local regulations. When any such instruction, order or regulation contradicts any portion of this publication it is to be taken as the overriding authority.
- 4 Reference is made to Defence Standards for paints since the supply labels will have this information however the supply or codification may change. Existing NATO Stock Numbers are listed against Defence Standards in Chap 5, Annex A.

RELATED AND ASSOCIATED PUBLICATIONS**Associated publications**

<u>Reference</u>	<u>Title</u>
AESP 0200-A-209-013	Cleaning, De-rusting and Phosphating of Steel
AESP 0200-A-223-013	Preparation for the Repair of Vehicle Fuel Tanks and other Metal Containers for Flammable Substances
AESP 6500-A-022	Repainting and Finishing of Electro-Medical Equipment
AESP 0200-A-227-013	Preparation for the Repair of Vehicle Fuel Tanks and other Metal Containers for Flammable Substances
AESP 0200-A-232-013	Timber Selection, Preservation and Finishing
AESP 0200-A-092-013	DEME(A) Engineering Health and Safety Guide
AESP 1000-A-003-013	Policy and Procedures for Armourers, Light Weapons and Workshops
AESP 2320-A-100-522	Degassing, Cleaning, Examination and Repair of Refuelling Equipment
AESP 0200-A-209-013 /EMER Wksp G300	Cleaning, De-rusting and Phosphating of Steel
AP 119A-0801	Surface Finishing and Marking of Service Equipment

Army Code 62030 (Pam 1)	Dangerous Substances Data Sheets
ASRPs, Vol 2, Pam 4,	Pretreatment and Painting of Services Vehicles and Section 4 Equipments
BR 3939	Hull Preservation Processes
D/DGES(A) 238/8	Health and Safety Management in the Equipment
Army Code 63723	Support organisation and ESO/REME Units
Def Stan 00-23	Infra Red Reflecting (IRR) Requirements for Painting of Military Equipment NATO Infra Red Reflection (IRR) Green Colour for Painting Military Equipment
Def Stan 00-72	Chemical Agent Resistance Requirements for Coatings Applied to Military Equipment
Def Stan 03-32	Pretreatment and Painting of Vehicles, Engineer Equipments and Components
Def Stan 80-Series	Paints, Sealers and Adhesives
EMER Tels A760	Repainting of Electronic Equipment
EMER T&M A028 Chap 652	Examination and Testing of Air Receivers and Steel Pressure Vessels
EMER Gen N800/AESP 0200-A-0330-013	Timber Selection, Preservation and Finishing
Health and Safety at Work Act (1974) and Regulations made under this Act	
The Special Waste Regulations 1996	
HMIP Technical Guidance Note D1	Guidelines on Discharge Stack heights for Polluting Emissions, 1993
HSE Engineering Sheet No. 18	Isocyanate Health Surveillance in Motor Vehicle Repair, 1997
HSE Guidance Note EH9	Spraying of Highly Flammable Liquids, 1977
HSE Guidance Note EH16	Isocyanates - Toxic Hazards and Precautions, 1984
HSG37	Introduction to Local Exhaust Ventilation, 1993
HSG53	Respiratory Protective Equipment - A Practical Guide, 1998
HSG54	Maintenance, Examination and Testing of Local Exhaust Ventilation, 1998
HSG178	The Spraying of Flammable Liquids, 1998
JSP 341, Chap 12	Defence Road Transport Regulations, 4 th Edition
JSP 336	Defence Supply Chain Manual, 3 rd Edition
JSP 515	Hazardous Stores Information System

Process Guidance Note 6/34b (06)

Respraying of Road Vehicles, 2006

STANAG 4360

Specification for Paint and Paint Systems Resistant to
Chemical Agents and Decontaminants for the protection of
Land Military Equipment**Related publications**

6 <u>Reference</u>	<u>Title</u>
BS 7079	Preparation of Steel Substrates before Application of Paints and Related Products. Divided into several Parts.
BS 7195	Guide for Prevention of Corrosion of Metals caused by Vapours from Organic Materials
Def Stan 03-1	Impregnation of Porous Castings
Def Stan 03-2	Cleaning and Preparation of Metal Surfaces
Def Stan 03-4	The Pre-treatment and Protection of Steel Parts of Specified Maximum Tensile Strength Exceeding 1450 N/mm ²
Def Stan 03-11	Phosphate Treatment of Iron and Steel
Def Stan 03-18	Chromate Conversion Coating (Chromate Filming Treatment) for Aluminium and Aluminium Alloys
Def Stan 03-30	Treatments for the Protection of Metal Parts of Services Stores and Equipment Against Corrosion
Def Stan 03-32	Pretreatment and Painting of Vehicles, Engineer Equipment and Components
Def Stan 80-9	Paint, Aluminium, Flame Resisting
Def Stan 80-11	Paint, Aluminium, Flame Resisting, Stoving
Def Stan 80-15	Paint, Pre-treatment Primer Etching Primer
Def Stan 80-27	Paint, Ammunition Finishing, Brushing, Spraying and Dipping Types: Semi Gloss, Matt
Def Stan 80-31	Paint, Finishing, General Service, Aluminium
Def Stan 80-37	Paint, Finishing, Cellulose Nitrate Oil-Resisting
Def Stan 80-41	Paint, System, Defence Equipment, IRR Matt
Def Stan 80-48	Paint, Finishing, General Service, Gloss, Stoving
Def Stan 80-54	Paint, Finishing, General Service, Gloss
Def Stan 80-55	Paint, Finishing, Ammunition, General Service Quick Dry, Semi Gloss Types: Brushing, Dipping, Spraying.
Def Stan 80-68	Paint, Marking, Types: Brushing, Brush Stencilling, Spray Stencilling, Silk Screen Stencilling, Ink Jet Spraying.

Def Stan 80-69	Paint, Paste, Marking
Def Stan 80-56	Paint, Finishing Epoxide, Stoving, Black, for Small Arms, Spraying.
Def Stan 80-72	Paint, System, Acid and Alkali Resisting
Def Stan 80-97	Paint, System for the Interior of Bulk Fuel Tanks and Fittings
Def Stan 80-114	Paint, Priming, Defence Equipment, Zinc Chrome/Phosphate
Def Stan 80-122	INTERIM - Powder Coating, High Durability, Stoving
Def Stan 80-124	Paint, Priming, Stoving, Defence Equipment
Def Stan 80-125	Paint, Finishing, Emulsion, for Canvas
Def Stan 80-126	Paint, Priming, Zinc Phosphate, Air Drying
Def Stan 80-152	Paint System, Epoxide, Stoving
Def Stan 80-161	Paint System, Epoxide, (Multi) Two pack
Def Stan 80-166	Paint, Priming, Zinc Phosphate Two Pack
Def Stan 80-168	Compound, protective for vehicle Underbodies, Water-Based
Def Stan 80-206	Paint, Priming, Zinc Phosphate, Non-Aircraft Use, Low VOC single or Multi-Pack
Def Stan 80-207	Paint, Priming, Zinc Chromate, Non-Aircraft Use, Low VOC single or Multi-Pack
Def Stan 80-208	Paint, Finishing, Polyurethane Multi-pack, Matt, IRR, Chemical Agent Resistant, Non-Aircraft Use, Low VOC
Def Stan 80-209	Paint, Finishing, Polyurethane Multi-pack, Gloss, IRR, Chemical Agent Resistant, Non-Aircraft Use, Low VOC
Def Stan 80-213	Paint Finishing, Polyurethane, Two-Pack, Anti-Slip, for Land Vehicles, Low VOC
Def Stan 80-215	Paint Finishing, Temporary Camouflage, Alkali Removable-Non Aerospace Use
Def Stan 80-218	Temporary Camouflage Coating (TCC) Remover - Non-Aircraft Use
Def Stan 80-220	Paint Finishing, Temporary Camouflage, Peelable
BS 381C	Specification for Colours for Identification, Coding and Special Purposes
BS 871	Specification for Abrasive Papers and Cloths
BS 1336	Specification for Knotting
BS 3416	Specification for Bitumen-based Coating for Cold Application, Suitable for use in Contact with Potable Water

0200-A-221-013

ARMY EQUIPMENT
SUPPORT PUBLICATION

BS 3900: Part C5

Methods of Tests for Paints: Determination of Film
Thickness

BS 4652

Specification for Metallic Zinc-Rich Priming Paint Organic
Media

BS 7956

Specification for Primers for Woodwork

BS ISO 21948

Coated Abrasives-Plain Sheet

BS EN ISO 11124

Specification for Metallic Blast Cleaning Abrasives

BS EN 13284

Stationary Source Emissions - Determination of Low Range
Mass Concentration of Dust. Part 1 - Manual Gravimetric
Method

BS EN 529

Respiratory Protective Devices - Recommendations for
Selection, Use, Care and Maintenance - Guidance
Document

BS EN 12021

Respiratory Protective Devices - Compressed Air for
Breathing Apparatus

BS 2X 32

Specification for Pretreatment Etch Primer for Aerospace
Purposes

COMMENT(S) ON AESP*

To: FRACAS
BFPO 794

From:
.....
.....
.....

Sender's Reference	BIN Number	Date
AESP* Title:		
Chapter(s)/Instruction	Page(s)/Paragraph(s)	
If you require more space, please use the reverse of this form or a separate piece of paper. Comment(s):		

Signed: Telephone No.:
Name (Capitals): Rank/Grade: Date:
X.....

FOR AESP* SPONSOR USE ONLY

To: From:
.....
.....

Thank you for commenting on AESP*:

Your reference: Dated:

Action is being taken to:	Tick	Tick
Issue a revised/amended AESP*		Under investigation
Incorporate comment(s) in future amendments		No action required
Remarks		

Signed: Telephone No.:
Name (Capitals): Rank/Grade: Date:

* AESP or EMER

CHAPTER 1

INTRODUCTION, LAND POLICY AND GENERAL RULES

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18	Vehicle painting finish status
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INTRODUCTION

1 This Regulation defines Land Policy for the maintenance of the paintwork of vehicles, equipment and stores for Service use and specifies the methods and materials to be employed in cleaning, pre-treatment and painting.

2 Equipments requiring special treatment and finishes are not covered by this Regulation and reference should be made to the relevant equipment publication.

SAFETY

3 Materials and processes described in the various chapters of this publication carry health hazards. COSHH and Risk assessments are to be made prior to initial use and afterwards, as required by the Health and Safety at Work Act, 1974. Advice on general safety aspects is to be read in conjunction with those chapters outlining processes or materials in this publication.

LAND COMMAND POLICY FOR THE EXTERNAL PAINTING OF ARMY EQUIPMENT

Introduction

4 The need to adopt a coating compliant with the United Kingdom (UK) Environmental Protection Act (EPA) together with the requirement for the resistance to chemical agents and camouflage properties had created a need for a high performance coating system. The requirements of STANAG 4360 that are incorporated in Def Stan 00-72 provide a Chemical Agent Resistant Coating (CARC), together with the camouflage requirements specified in Def Stan 00-23 are now contained in Def Stan 80-208 finish. Primers conforming to either Def Stan 80-206 for ferrous or Def Stan 80-207 for non-ferrous substrates, are employed with the Def Stan 80-208 finish.

5 Def Stan 80-208 finish paints were developed to meet the Infra-Red Reflectance (IRR) (Def Stan 00-23), CARC (Def Stan 00-72), as well as other performance requirements for military use. The finish paints are compliant with the EPA and their use is detailed in this publication.

Aim

6 The aim of this publication is to provide the equipment and vehicle painting policy for Land taking into consideration the introduction of a compliant finish to Def Stan 80-208 and application and use of Temporary Camouflage Coatings (TCC) to Def Stan 80-215 and Def Stan 80-220.

Responsibilities for painting of vehicles

7 The DLO IPT is responsible for ensuring that material and equipment procured for Army use meets the paint specification set out in the statement of user requirement. Fig 1 shows the management responsibility for painting of Land equipment.

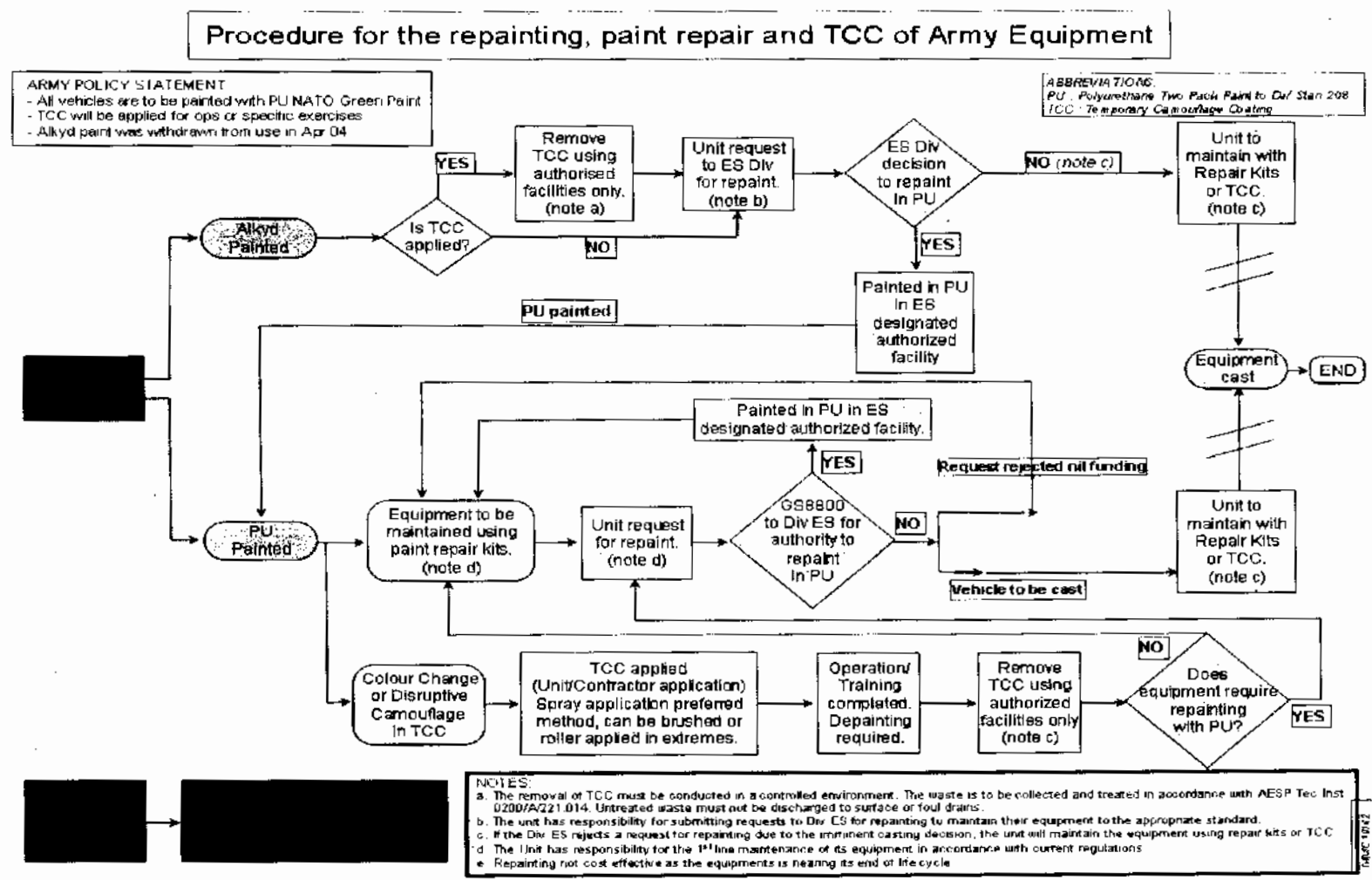


Fig 1 Management responsibility for painting of Land equipment

Painting policy

- 8 All Army operational green equipment is to be painted in a base finish colour of NATO Green BS381C Colour Number 285, IRR, CARC paint to Def Stan 80 - 208, and primers, to either Def Stan 80-206 for ferrous or Def Stan 80-207 for non-ferrous substrates.
- 9 For War Fighting operations or training exercises where complete colour changes or camouflage disruptive pattern are authorised, Temporary Camouflage Coatings (TCC) to Def Stan 80-215 or to Def Stan 80-220 will be applied.
- 10 All existing alkyd painted vehicles are to be repainted subject to Divisional ES assessment, with an EPA compliant paint system with a finish to Def Stan 80-208.
- 11 All new equipment entering service is to be painted with an EPA compliant paint system with a finish to Def Stan 80-208.
- 12 Alkyd Paint to Def Stan 80-41 is now withdrawn.
- 13 TCC to Def Stan 80-215 or to Def Stan 80-220 can be applied over vehicles and equipment painted with a finish coat to Def Stan 80-208.
- 14 For overseas units equipped with non-operational 'waste out' vehicles who cannot justify a compliant painting facility, a NATO Green IRR and Light Stone, **non-CARC** brushing paint (to Def Stan 80-41) is available on demand:

- 14.1 H1 8010-99-224-8907 NATO Green, IRR, non CARC (Def Stan 80-41).
- 14.2 H1 8010-99-225-3766 Light Stone, IRR, non CARC (Def Stan 80-41).

Issues will be restricted to the following authorised units only.

14.3	British Army Training Unit Kenya	(BATUK)	UIN A2918A
14.4	British Army Training Unit Suffield	(BATUS)	UIN A2971A
14.5	British Army Training Support Unit (Wainwright)	(BATSU(W))	UIN A2971A
14.6	British Army Training Support Unit Belize	(BATSUB)	UIN A5745A
14.7	British Forces Falkland Islands	(BFFI)	UIN D2236A
14.8	British Forces Gibraltar	(BFGIB)	UIN A5853A
14.9	British Ghurkhas Nepal	(BGN)	UIN A7105A
14.10	Brunei Garrison	(BG)	UIN A5762A

Painting methods

- 15 Full permanent re-spray:
- 15.1 Trained and qualified personnel can only carry this out in an authorised compliant facility. The resultant finish to Def Stan 80-208 is durable for 5 years.
- 15.2 All equipment re sprays will continue to be carried out by ABRO, civilian contractors or Army facilities, depending on funding. Regional Division ES organisation will control these tasks and will only authorise repainting to meet legislation or operational requirements or those tasks directly affecting collective training. Assessment for repainting will be based on operational requirement, age and role (Keeping the Army in the Public Eye, (KAPE) etc).

16 Temporary Camouflage Coating (TCC):

16.1 TCC may be applied by unit personnel over equipment painted with paint finish to Def Stan 80-208. TCC can be applied by spray, roller or brushing. It is suitable for unit / contractor application, requiring the minimum of personal protective equipment (PPE) and health and safety (H&S) awareness. Since removal of TCC is film thickness dependent, spray application is the preferred method of application as it produces an even coating. Basic training in the spray application of TCC is required to ensure constant thickness.

16.2 Instructions for the application and removal of TCC are presently in accordance with the manufacturer's material, health, safety and technical data sheet. TCC to Def Stan 80-215 is removed by using an alkaline cleaner to Def Stan 80-218, H1 7390-99-474-5700, followed by a final wash using a high-pressure water jet. TCC removal must be conducted in a controlled environment, the untreated TCC waste **MUST NOT** (see Chap 7 of this publication) be discharged to the surface or foul water system. TCC conforming to Def Stan 80-220 is a peelable material and is stripped manually.

17 Maintenance 'patch' repairs

17.1 Maintenance repair patch painting will be a unit responsibility carried out by brush application using two-pack repair kits. The kits comprise paint and require an applicator gun, H1 4940-99-665-5377 which will be issued on demand and retained in the AF G1098.

17.2 Green Basic Repair Kits, H1 8010-99-131-2563, will be issued on demand.

17.3 Where REME and RE personnel undertake in-depth field repairs necessitating paint removal, Workshop Repair Kits, H1 8010-99-593-1968, consisting of a paint stripper and a conversion coating will be issued on demand. Vehicle marking (tac signs etc) will be applied using TCC.

Vehicle painting finish status

18 The system identification will be such that once painted in PU the Div ES painting contractor will be required to stamp the equipment indent plate with 'PU DS 80-208'. At the end of each month each Div ES will submit a list to ES (LAND) Census Team, Bldg 154, Chetwynd Bks, Chilwell, of all the vehicles painted in PU that month, detailing: Registration number, colour painted, and unit UIN. ES (LAND) Census Team will then enter the information onto the MERLIN database.

19 This policy is applicable to all the MOD (L) operational green vehicles and equipment. ES Branch HQ LAND will ensure that confidence checks are carried out on a range of vehicles using Def Stan 80-208 paint system until all equipment has been correctly painted.

General rules

20 The reasons for painting are, in order of priority:

20.1 To prevent corrosion and so prevent the degradation of equipment. To protect the equipment from its operating environment

20.2 For camouflage purposes.

20.3 For appearance.

21 Exceptionally, there are five classes of equipment where the repainting and maintenance of which is limited to that prescribed in instructions issued by the appropriate approving authority:

- 21.1 Ammunition and guided weapons and associated stores and packaging.
- 21.2 Small arms, machine guns and ancillary stores.
- 21.3 Aircraft.
- 21.4 Optical instruments and lasers.
- 21.5 Medical and dental equipment and stores.

22 Units are responsible for disruptive camouflage painting and the application of special markings not applied to equipments as issued, except as prescribed in separate instructions issued by the appropriate authorities.

23 The painting and paintwork maintenance of vehicles, equipment and stores held at depot stocks is an RLC responsibility.

24 Except in REME units formed on REME sponsored establishments, REME personnel are not provided for the purpose of carrying out paintwork maintenance on any vehicle, equipment or stores held on unit charge. REME personnel are not to undertake such work in or for non-REME units except as provided for in this publication.

25 The painting of any class of vehicles, equipment or store simply for cosmetic effect is to be actively discouraged. Some exceptions to this policy have been authorized by MOD and others may be granted, from time to time, by theatre, command or other headquarters. REME units are not to carry out painting for cosmetic effect unless the authority of the appropriate higher headquarters has been given.

26 Units receiving equipments or stores in non-standard paints or surface finishes which might require maintenance or restoration by painting techniques should seek the advice of the appropriate approving authority before repainting.

Ammunition and associated stores

27 RLC is responsible for the painting and masking of ammunition, guided weapons and associated stores and packaging. Instructions, including instructions to units, are contained in Ammunition and Explosives Regulations, issued by DLSA.

CHAPTER 2
SAFETY CONSIDERATIONS

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INTRODUCTION

1 Safety in the preparation and painting of equipment will be included in the health and safety management of the unit by way of safety inspections, audits and risk assessments in common with other processes. This chapter highlights those hazards resulting from the particular nature of the work and material used.

ASSOCIATED PUBLICATIONS

- 2 Health and Safety at Work Act (1974) and related publications.
 - 2.1 Chemicals (Hazard Information and Packaging for Supply) Regulations, 2002.
 - 2.2 Management of Health and Safety at Work Regulations, 1992, SI No. 2051 (MHSWR).
 - 2.3 Provision and Use of Work Equipment Regulations, 1992, SI No. 2932 (PUWER).
 - 2.4 Workplace Health and Safety Regulations, 1992, SI No. 3004 (WHSR).

- 2.5 Manual Handling Operations Regulations, 1992, SI No. 2793 (MHOR).
- 2.6 Personal Protective Equipment at Work Regulations, 1992, SI No. 2966 (PPE).
- 2.7 Control of Substances Hazardous to Health, 1994, SI No. 3246 (COSHH) Amended 1995 and 1996.
- 2.8 Noise at Work Regulations, 1989.
- 2.9 Pressure Systems and Transportable Gas Regulations, 1989, SI No. (PSTGR).
- 2.10 Guide to the Pressure Systems and Gas Regulations, 1989, HS (R) 30 ISBN 011885516.
- 2.11 Guide to Compressed Air Safety (S) (G) 39, ISBN 011885582.
- 2.12 Fire Precautions Act 1971 SI No. (FPA).
- 2.13 The Factories (Cleanliness of Walls and Ceilings) Order, 1960. Amd SI 427/1974.
- 2.14 Protection of Eyes Regulations, 1974, SI No. 1681. Amended by SI No. 303.1975.
- 2.15 Highly Flammable and Liquefied Petroleum Gases Regulations, SI No. 917/1972.
- 2.16 Army Fire Prevention and Fire Fighting Regulations, Army Code 60737.
- 2.17 Health and Safety Management in ESO/REME, Army Code 63723.
- 2.18 MOD Health and Safety Handbook, JSP 375, Vols 1 and 2.
- 2.19 MOD Environmental Manual, JSP 418.
- 2.20 Guidance Notes for COSHH Assessors, JSP 424.
- 2.21 Occupational Exposure Limits, EH 40 (published annually).
- 2.22 Spraying of Highly Flammable Liquids, EH9 ISBN 0118830341.
- 2.23 Isocyanates: Toxic Hazards and Precautions, EH16 ISBN 0118835815.

Guidance notes

3 Guidance notes are published by the HSE under the following broad headings and are available from the REME HS&E advisor at HQ DEME (A).

- 3.1 Chemical Safety (CS).
- 3.2 General Series (GS).
- 3.3 Plant and Machinery (PM).
- 3.4 Environmental Hygiene (EH).
- 3.5 Medical Series (MS).
- 3.6 Methods of Detection of Hazardous Substances (MDHS).
- 3.7 Approved Codes of Practice (ACOP).

4 The guidance notes are listed in HSE Publications and also in the Catalogue of Current HSE Publications (published twice annually) and listed in the Guidance Notes themselves. The notes give guidance on the operation and compliance with relevant regulations and have a special significance in law to the effect that safety standards not in accord with their contents are required to be shown to be at least as effective.

GENERAL REQUIREMENTS

5 Materials and processes described in this AESP carry health hazard. Risk assessments are to be made prior to initial use, and afterwards, as required by the regulations, particularly the Management of Health and Safety at Work Regulations 1992 made under the Health and Safety at Work Act, 1974, and the Control of Substances Hazardous to Health Regulations, 1994. This chapter gives general advice on safety aspects and is to be read in conjunction with those chapters covering processes and materials.

DEFINITIONS

6 The following are accepted definitions of relevant terms:

6.1 Hazard. Hazard is the potential cause of harm.

6.2 Risk. Risk is the probability of the hazard noted in the safety inspection, taking effect causing harm in the working conditions. A safety inspection to identify hazards may be carried out concurrently with the assessment of probability and possible harm.

6.3 Severity. Severity is the degree of harm that will occur.

6.4 Significance. Significance is the produce of risk, or likelihood, of the hazard occurring times the severity of harm if it did.

6.5 Risk assessment. This is the assessment of the probability of potential hazards taking effect and of the severity of harm, on simple scales, usually 1 to 6, to obtain relative significances of the dangers in the workplace.

6.6 Risk control. The implementation of measures to eliminate or reduce risks.

6.7 Occupational exposure limit (OEL). OEL refers to a limit of exposure by an employee to an airborne substance. The following are occupational exposure limits, ie MEL, OES, LTEL and STEL.

6.8 Maximum exposure limit (MEL). A MEL is the maximum concentration of an airborne substance averaged over a reference period to which employees may be exposed by inhalation under any circumstances. These are specified in Schedule 1 of the COSHH Regulations and repeated in EH 40. It is not an aim but a maximum for normal work and precautions and controls are to be used with due care to maintain the concentration as low as reasonably practicable.

6.9 Occupational exposure standard (OES). An OES is the concentration of an airborne substance averaged over a reference time, at which there is no known evidence that it is likely to be injurious by inhalation to employees exposed daily to that concentration. Although exceeding an OES may be deemed adequate providing the reason for exceeding the OES has been identified and action taken to remedy the cause and reduce the concentration to the OES or below. The overall practice is to reduce the concentration as low as reasonably practicable.

6.10 Time weighted average (TWA). The time weighted average refers to the concentration of an airborne substance averaged over a reference time, normally eight hours for a long term exposure limit (LTEL) and 15 minutes for a short time exposure limit (STEL).

6.11 Short term exposure limit (STEL). The short term exposure limit refers to the limit of exposure to an airborne substance averaged over 15 minutes period. Some substances are allocated short term limits which apply throughout the work period and are not averaged over that period, ie the maximum exposure permitted is that of the STEL.

6.12 However for substances allocated both a long term exposure limit (LTEL) and a STEL, the maximum duration of exposure in any 24 hour period to the STEL is one hour. Further, the LTELs given in Schedules 1 and 2 of the COSHH Regulations are for eight hour exposures in a 24 hour period, unless otherwise stated. Thus if a work period of 16 hours was worked, then the average concentration over the 16 hours would be doubled to give the time weighted average for a reference period of eight hours.

TYPES OF HAZARD

7 In painting operations, hazards are due to the use of harmful substances containing solvents, pigments, resins. The hazards are caused by either airborne dust during preparation, or as mist or vapour during paint application. Hazards will be dealt with by the risk assessments made under COSHH, but risk assessments also need to be carried out in order to minimise the risks to health from all sources in the paint workshop. Compressed air systems and tools, electrical equipment, manual movement of work pieces and lifting gear are normally present in the working environment.

GENERAL PRACTICE

Personal protective equipment (PPE)

8 Coveralls, gloves, face protection and skin protection creams are to be worn in addition to respiratory protection as appropriate. Suitable skin cleansing products are to be readily available and after work preparations are recommended to maintain good skin condition. Industrial solvents and paint thinners are **not** to be used for skin cleansing.

Health and safety data sheets

9 These health and safety data sheets are to be obtained for the paints and other materials in use and studied to ensure that the safety requirements are known and met.

Electrical equipment

10 All electrical equipment used or sited in areas where flammable solvent vapours are produced, is to be flameproof to the standard required, as advised by the unit or local fire officer.

Housekeeping

11 A good standard of housekeeping is to be maintained, in particular the replacing of lids on containers, safe removal of spillage, safe disposal of solvent contaminated wipes, control of protective clothing and replacement when soiled or damaged. Floors are to be kept free of paint as far as reasonably practicable, to ensure safe footing and reduce the effects should a fire occur.

Welfare

12 Ensure that washing, eating and rest facilities are in good order and used.

Personnel

13 Workers who are to be employed in paint operations are to be screened for medical sensitivities that can be exacerbated by exposure in such work, e.g chest or skin problems and allergies.

COMMON AREAS OF HAZARD

14 In the following paragraphs, the common areas of hazard are briefly outlined. More detailed assistance can be obtained from TES MIG.

Dust hazard in preparation

15 During preparation the production of dust is to be avoided, by the use of controlled vacuum extraction.

Mixing of paints

16 In addition to requiring the wearing of general Personal Protection Equipment (PPE), this operation, when carried out with opened containers, can result in accelerated emission of solvent vapour. Mixing of paints is to be carried out in correctly ventilated conditions with similar precautions as for paint application (i.e. Zone 1 environment).

Ventilation

17 This is to be sufficient to remove solvent vapours or dusts to minimal levels, at least to result in exposures below the relevant OEL/MELs. For spraying operations of most paints the requirements of Guidance Note EH9 of 0.7m/s (150 ft/min) air flow past the spray nozzle is the minimum to be achieved. For paints containing isocyanates, the requirements of EH16 are to be met in addition to the EH9 requirement of 1.0 m/s (220 ft/min) of air past the spray gun. The direction of air flow is to be from the spray gun or other solvent source away from the operator into the extraction intake in all cases.

Isocyanate materials

18 Due to the sensitising nature of isocyanates, operatives spraying paints containing isocyanates, eg polyurethane paints, are to wear appropriate RPE in addition to the ventilation requirements (of Guidance Note EH16) being met.

Authorised paint spray facilities

19 Due to the requirements for isocyanate materials and the presence of chromate and cobalt salts in commonly used paints, only authorised compliant paint spray facilities are permitted to carry out paint spraying. Paints with lower solvent contents, termed 'compliant' paints are used to satisfy the requirements of the Environmental Protection Act, 1990 (EPA) and its amendments. The compliant facility shall be maintained in accordance with the latest legislation. Specific instructions and guidance for paint spraying only are detailed in Chap 3 of this publication.

Spray booths

20 Where spray booths are used, the spraying operation is to take place within the fully extracted volume within the booth. If items are too large and are to be sprayed in front of the booth, then the side walls and roof are to be extended around the work point to ensure the required air movement is achieved at the spraying point.

21 Oversprayed paint on walls, fan filter and ductwork is to be kept to the minimum reasonably practicable by good practice and is to be removed at suitable regular intervals. The use of disposable coverings or coatings such as Tak Strip is recommended to simplify the removal. The build up of paint in the booth system can reduce the efficiency of its extraction and constitute a fire hazard.

Electrical equipment

22 Electrical wiring and equipment, including lights, are to be intrinsically safe in accordance with Zone 1 requirements.

Store building

23 Paint is to be stored as laid down in Fire Prevention and Fire Fighting Regulations - Army Department (Army Code 60737) Section 4, see also Materiel Regulations Vol 9, Pam 1 and appropriate product safety data sheets. The store is to be designed to maintain the paints in the temperature range 10 to 15°C as advised by leading suppliers of paint to MOD specifications, and within the extreme range of 5 to 35°C under difficult conditions. These storage measures in addition to minimising paint deterioration, will minimise damage to the containers by corrosion or excess vapour pressure which may lead to leaks, failure or bursting of the containers. Such failures can occur in handling or opening containers with potentially hazardous effects, including to the skin and eyes.

24 The building is to be sealed at floor level, including a bund wall at the entrance, to prevent the spread of flammable liquid in the event of accidental spillage or fire. A warning notice is to be placed at the entrance if the bunding results in step down.

Store practices

25 Stock control and movement should be performed to ensure that containers are used in the order of receipt, i.e 'first in first out'.

26 When opening containers, a cloth is to be placed over the lid to prevent liquid being ejected over the operator and surroundings.

27 Containers of paint that are partly emptied in use are to be securely resealed and labelled before replacing in store, either in 'in-use' storage or in the main store.

SPILLAGE

Action plan

28 Assessment of the hazards presented by the spillage are to be made as soon as practicable. The assessment is to be made in anticipation of such accidents in order that safe action can be taken quickly and copies of the procedure posted at appropriate places.

Paint and solvent spillage

29 Paint and solvent spillage is to be soaked up in accordance with the manufacturers' instructions.

Disposal

30 The disposal of contaminated absorbent materials is to be in accordance with the manufacturers' instructions, local authority and MOD regulations. The materials are to be contained in leak and solvent proof containers whilst awaiting disposal, unless local authority permits evaporation of the solvent in the open air.

Solvents and solvent based materials

31 Solvents and solvent based materials are not to be allowed to enter drains, sewers or water courses. Apart from the environmental impact, vapours may be produced in sewers, etc and give rise to fire or toxic hazards in other areas unaware of their presence.

Chemical spillage

32 Chemical spillage shall be treated in accordance with the manufacturers' instructions.

FIRE

33 Fire fighting actions are to be included in fire orders, and the precautions and methods posted at fire points as appropriate, as decided by the unit fire officer. Storage of paints, solvents and chemicals is to be included on the fire plan for the unit and stores are to display the requisite safety warning signs at entry points.

34 Dry foam, carbon dioxide or foam extinguishers are suitable, according to circumstances. Sand may be used for small fires.

35 Water spray may be used to cool containers not directly involved in the fire, if this can be done without personal hazard.

36 In all cases, the alarm is to be given as soon as possible, and local fire fighting is only to be done in accordance with the fire orders and avoiding personal danger.

37 Breathing of vapours, fumes and mists produced by the fire is to be avoided and the danger of this hazard is to be emphasised.

FIRST AID

38 Refer to the manufacturers' instructions.

CHAPTER 3

PAINT SPRAYING - HEALTH, SAFETY AND ENVIRONMENTAL GUIDANCE

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62	Schedule for breathing air inspection 36
63	Staff responsible for inspecting breathing air quality 36
64	Quality of breathing air 36
65	Breathing air quality test schedule 36
66	Staff responsible for checking the quality of breathing air 36
67	Task list for maintaining the breathing air equipment 37
68	Schedule for maintaining the breathing air equipment 37
69	Staff responsible for maintaining breathing air equipment 37
70	Form BAQ1 - breathing air quality inspection 37
71	Form BAQ2 - breathing air quality testing 38
72	Form BAQ3 - breathing air quality maintenance 39
73	Task list for health surveillance 39
74	Schedule for health surveillance (schedule at discretion of medical advisor) 40
75	Staff responsible for performing health surveillance 40
76	Personal record 41
77	Check list for routine environmental inspection 42
78	Solvent use account 43
79	Emission limit values 44
80	Emission testing 44
81	Check list for recording waste output 45
82	Waste arising 46
83	Check list for process waste water sources 47/48

INTRODUCTION

- 1 The guidance in this Chapter deals with regular inspection, testing and maintenance of plant and equipment associated with paint spraying. It is designed to assist paint shop supervisors meet their obligations under the Health and Safety at Work Act 1974, Control of Substances Hazardous to Health Regulations 1994 and the Environmental Protection Act 1990. The manual is intended to provide consistent procedures and reporting standards for all Land Systems paint spraying facilities.
- 2 This chapter assumes that the equipment in place is suitable and satisfactory for the duty to be performed. Adoption of the procedures in this publication should identify any intrinsic weaknesses in the local exhaust ventilation (LEV) systems or personal protective equipment (PPE).
- 3 Where concerns about the suitability of equipment are identified these should be addressed. However, this chapter does not cover the design and selection of LEV systems and PPE.
- 4 General aspects of health, safety and environmental protection, including definitions of terms and operator responsibilities are dealt with in Chap 2 of this publication.
- 5 This Chapter is divided into sections covering: Document Check List, Equipment Inspection, Testing and Maintenance, Personal Health Protection and Training and Environment.

DOCUMENTATION CHECK LIST

- 6 The check list presented below (Table 1) has been designed to assist in maintaining suitable records on site equipment and personnel employed in spray painting.
- 7 Maintaining appropriate records and documentation is a legal requirement and essential for effective management.
- 8 Documents should be kept in suitable, secure filing system and be readily available for inspection by internal audit teams and regulatory bodies
- 9 Monthly charts are provided to allow the supervisor to record the fact that assigned tasks have been carried out.
- 10 Each facility must have available on file the documentation contained in Table 1.
- 11 The available documentation should be assessed quarterly and updated when changes, such as the introduction of new materials or plant, are made.

TABLE 1 CHECK LIST FOR FACILITY DOCUMENTATION

Item	Available Yes / No	Last Updated Date
A list of personnel engaged in paint spraying and an organisation chart showing responsibilities and reporting channels.		
An inventory of plant and equipment used in each paint shop. This inventory should identify: inventory number plant / equipment description location manufacturer design capacity performance rating		
A site plan and diagram showing the layout of plant and equipment in the paint shop. Each item of plant should be numbered for reference. This diagram should include the route and dimensions of local exhaust ventilation systems. Each duct serving a particular piece of plant / equipment should be numbered and each exhaust chimney or vent should be numbered.		
Site drainage plan		
An inventory of materials used in the paint shop.		
Materials purchase / stock records and job cards		
An organic solvent use account		
Safety Data Sheets for materials used in the paint shop.		
Technical data sheets for materials used.		
Operating and Maintenance Manuals for plant and equipment.		
Copies of health & safety risk assessments		
Copies of operating permits		
Copies of waste consignment notes		
Inventory of waste generated		
Inventory of waste water discharges		
Results of any release monitoring		
Employee health checks and training records		
Copies of applicable regulations and HSE Guidance notes		

Monthly charts

12 The supervisor will record the task in the appropriate box and initial the box when the task has been completed. The supervisor will also sign off at the end of each month to show that all tasks have been carried out for the month. The tasks to be performed are defined in the relevant paragraphs of this chapter. Charts for each month (Tables 2-13) are provided.

TABLE 2 JANUARY

	JANUARY		
	Inspection	Testing	Maintenance
Week 1	Spray Booth Task 2 <input type="checkbox"/> Spray Equipment Tasks 2, 3(a), 3(c) <input type="checkbox"/> LEV System Task 2 <input type="checkbox"/> PPE Tasks 2, 3 <input type="checkbox"/> Breathing Air Quality Task 1 <input type="checkbox"/>	Spray Booth Task 1 (wet back) <input type="checkbox"/> Spray Equipment Task 1 <input type="checkbox"/>	Spray Booth Task 1 <input type="checkbox"/> Spray Equipment Tasks 1, 2(a) <input type="checkbox"/>
Week 2	Spray Booth Task 2 <input type="checkbox"/> Spray Equipment Tasks 2, 3(a), 3(c) <input type="checkbox"/> LEV System Task 2 <input type="checkbox"/> PPE Tasks 2, 3 <input type="checkbox"/> Breathing Air Quality Task 1 <input type="checkbox"/>	Spray Equipment Task 1 <input type="checkbox"/>	Spray Booth Task 1 <input type="checkbox"/> Spray Equipment Tasks 1, 2(a) <input type="checkbox"/>
Week 3	Spray Booth Task 2 <input type="checkbox"/> Spray Equipment Tasks 2, 3(a), 3(c) <input type="checkbox"/> LEV System Task 2 <input type="checkbox"/> PPE Tasks 2, 3 <input type="checkbox"/> Breathing Air Quality Task 1 <input type="checkbox"/>	Spray Equipment Task 1 <input type="checkbox"/>	Spray Booth Task 1 <input type="checkbox"/> Spray Equipment Tasks 1, 2(a) <input type="checkbox"/>
Week 4	Spray Booth Tasks 1, 2, 3, 4 <input type="checkbox"/> Spray Equipment Tasks 1, 2, 3(a), 3(c) <input type="checkbox"/> LEV System Task 1, 2 <input type="checkbox"/> PPE Tasks 1, 2, 3 <input type="checkbox"/> Breathing Air Quality Task 1 <input type="checkbox"/>	Spray Booth Task 5 <input type="checkbox"/> Spray Equipment Task 1 <input type="checkbox"/> LEV System Task 2 <input type="checkbox"/> Breathing Air Quality Tasks 1, 2 <input type="checkbox"/>	Spray Booth Task 1 <input type="checkbox"/> Spray Equipment Tasks 1, 2(a) <input type="checkbox"/>
Signature			

TABLE 3 FEBRUARY

	FEBRUARY		
	Inspection	Testing	Maintenance
Week 1	Spray Booth Task 2 <input type="checkbox"/> Spray Equipment Tasks 2, 3(a), 3(c) <input type="checkbox"/> LEV System Task 2 <input type="checkbox"/> PPE Tasks 2, 3 <input type="checkbox"/> Breathing Air Quality Task 1 <input type="checkbox"/>	Spray Booth Task 1 (wet back) <input type="checkbox"/> Spray Equipment Task 1 <input type="checkbox"/>	Spray Booth Task 1 <input type="checkbox"/> Spray Equipment Tasks 1, 2(a) <input type="checkbox"/>
Week 2	Spray Booth Task 2 <input type="checkbox"/> Spray Equipment Tasks 2, 3(a), 3(c) <input type="checkbox"/> LEV System Task 2 <input type="checkbox"/> PPE Tasks 2, 3 <input type="checkbox"/> Breathing Air Quality Task 1 <input type="checkbox"/>	Spray Equipment Task 1 <input type="checkbox"/>	Spray Booth Task 1 <input type="checkbox"/> Spray Equipment Tasks 1, 2(a) <input type="checkbox"/>
Week 3	Spray Booth Task 2 <input type="checkbox"/> Spray Equipment Tasks 2, 3(a), 3(c) <input type="checkbox"/> LEV System Task 2 <input type="checkbox"/> PPE Tasks 2, 3 <input type="checkbox"/> Breathing Air Quality Task 1 <input type="checkbox"/>	Spray Equipment Task 1 <input type="checkbox"/>	Spray Booth Task 1 <input type="checkbox"/> Spray Equipment Tasks 1, 2(a) <input type="checkbox"/>
Week 4	Spray Booth Tasks 2, 3, 4 <input type="checkbox"/> Spray Equipment Tasks 2, 3(a), 3(c) <input type="checkbox"/> LEV System Task 2 <input type="checkbox"/> PPE Tasks 2, 3 <input type="checkbox"/> Breathing Air Quality Task 1 <input type="checkbox"/>	Spray Booth Task 5 <input type="checkbox"/> Spray Equipment Task 1 <input type="checkbox"/> LEV System Task 2 <input type="checkbox"/> Breathing Air Quality Tasks 1, 2 <input type="checkbox"/>	Spray Booth Task 1 <input type="checkbox"/> Spray Equipment Tasks 1, 2(a) <input type="checkbox"/>
Signature			

TABLE 4 MARCH

	MARCH		
	Inspection	Testing	Maintenance
Week 1	Spray Booth Task 2 <input type="checkbox"/> Spray Equipment Tasks 2, 3(a), 3(c) <input type="checkbox"/> LEV System Task 2 <input type="checkbox"/> PPE Tasks 2, 3 <input type="checkbox"/> Breathing Air Quality Task 1 <input type="checkbox"/>	Spray Booth Task 1 (wet back) <input type="checkbox"/> Spray Equipment Task 1 <input type="checkbox"/>	Spray Booth Task 1 <input type="checkbox"/> Spray Equipment Tasks 1, 2(a) <input type="checkbox"/>
Week 2	Spray Booth Task 2 <input type="checkbox"/> Spray Equipment Tasks 2, 3(a), 3(c) <input type="checkbox"/> LEV System Task 2 <input type="checkbox"/> PPE Tasks 2, 3 <input type="checkbox"/> Breathing Air Quality Task 1 <input type="checkbox"/>	Spray Equipment Task 1 <input type="checkbox"/>	Spray Booth Task 1 <input type="checkbox"/> Spray Equipment Tasks 1, 2(a) <input type="checkbox"/>
Week 3	Spray Booth Task 2 <input type="checkbox"/> Spray Equipment Tasks 2, 3(a), 3(c) <input type="checkbox"/> LEV System Task 2 <input type="checkbox"/> PPE Tasks 2, 3 <input type="checkbox"/> Breathing Air Quality Task 1 <input type="checkbox"/>	Spray Equipment Task 1 <input type="checkbox"/>	Spray Booth Task 1 <input type="checkbox"/> Spray Equipment Tasks 1, 2(a) <input type="checkbox"/>
Week 4	Spray Booth Tasks 2, 3, 4 <input type="checkbox"/> Spray Equipment Tasks 2, 3(a), 3(c) <input type="checkbox"/> LEV System Task 2 <input type="checkbox"/> PPE Tasks 2, 3 <input type="checkbox"/> Breathing Air Quality Task 1 <input type="checkbox"/>	Spray Booth Task 5 <input type="checkbox"/> Spray Equipment Task 1 <input type="checkbox"/> LEV System Task 2 <input type="checkbox"/> Breathing Air Quality Tasks 1, 2 <input type="checkbox"/>	Spray Booth Task 1 <input type="checkbox"/> Spray Equipment Tasks 1, 2(a) <input type="checkbox"/>
Signature			

TABLE 5 APRIL

	APRIL		
	Inspection	Testing	Maintenance
Week 1	Spray Booth Task 2 <input type="checkbox"/> Spray Equipment Tasks 2, 3(a), 3(c) <input type="checkbox"/> LEV System Task 2 <input type="checkbox"/> PPE Tasks 2, 3 <input type="checkbox"/> Breathing Air Quality Task 1 <input type="checkbox"/>	Spray Booth Task 1 (wet back) <input type="checkbox"/> Spray Equipment Task 1 <input type="checkbox"/>	Spray Booth Task 1 <input type="checkbox"/> Spray Equipment Tasks 1, 2(a) <input type="checkbox"/>
Week 2	Spray Booth Task 2 <input type="checkbox"/> Spray Equipment Tasks 2, 3(a), 3(c) <input type="checkbox"/> LEV System Task 2 <input type="checkbox"/> PPE Tasks 2, 3 <input type="checkbox"/> Breathing Air Quality Task 1 <input type="checkbox"/>	Spray Equipment Task 1 <input type="checkbox"/>	Spray Booth Task 1 <input type="checkbox"/> Spray Equipment Tasks 1, 2(a) <input type="checkbox"/>
Week 3	Spray Booth Task 2 <input type="checkbox"/> Spray Equipment Tasks 2, 3(a), 3(c) <input type="checkbox"/> LEV System Task 2 <input type="checkbox"/> PPE Tasks 2, 3 <input type="checkbox"/> Breathing Air Quality Task 1 <input type="checkbox"/>	Spray Equipment Task 1 <input type="checkbox"/>	Spray Booth Task 1 <input type="checkbox"/> Spray Equipment Tasks 1, 2(a) <input type="checkbox"/>
Week 4	Spray Booth Tasks 2, 3, 4 <input type="checkbox"/> Spray Equipment Tasks 2, 3(a), 3(c) <input type="checkbox"/> LEV System Task 2 <input type="checkbox"/> PPE Tasks 2, 3 <input type="checkbox"/> Breathing Air Quality Task 1 <input type="checkbox"/>	Spray Booth Task 5 <input type="checkbox"/> Spray Equipment Task 1 <input type="checkbox"/> LEV System Task 2 <input type="checkbox"/> Breathing Air Quality Tasks 1, 2 <input type="checkbox"/>	Spray Booth Task 1 <input type="checkbox"/> Spray Equipment Tasks 1, 2(a) <input type="checkbox"/>
Signature			

TABLE 6 MAY

	MAY		
	Inspection	Testing	Maintenance
Week 1	Spray Booth Task 2 <input type="checkbox"/> Spray Equipment Tasks 2, 3(a), 3(c) <input type="checkbox"/> LEV System Task 2 <input type="checkbox"/> PPE Tasks 2, 3 <input type="checkbox"/> Breathing Air Quality Task 1 <input type="checkbox"/>	Spray Booth Task 1 (wet back) <input type="checkbox"/> Spray Equipment Task 1 <input type="checkbox"/>	Spray Booth Task 1 <input type="checkbox"/> Spray Equipment Tasks 1, 2(a) <input type="checkbox"/>
Week 2	Spray Booth Task 2 <input type="checkbox"/> Spray Equipment Tasks 2, 3(a), 3(c) <input type="checkbox"/> LEV System Task 2 <input type="checkbox"/> PPE Tasks 2, 3 <input type="checkbox"/> Breathing Air Quality Task 1 <input type="checkbox"/>	Spray Equipment Task 1 <input type="checkbox"/>	Spray Booth Task 1 <input type="checkbox"/> Spray Equipment Tasks 1, 2(a) <input type="checkbox"/>
Week 3	Spray Booth Task 2 <input type="checkbox"/> Spray Equipment Tasks 2, 3(a), 3(c) <input type="checkbox"/> LEV System Task 2 <input type="checkbox"/> PPE Tasks 2, 3 <input type="checkbox"/> Breathing Air Quality Task 1 <input type="checkbox"/>	Spray Equipment Task 1 <input type="checkbox"/>	Spray Booth Task 1 <input type="checkbox"/> Spray Equipment Tasks 1, 2(a) <input type="checkbox"/>
Week 4	Spray Booth Tasks 2, 3, 4 <input type="checkbox"/> Spray Equipment Tasks 2, 3(a), 3(c) <input type="checkbox"/> LEV System Task 2 <input type="checkbox"/> PPE Tasks 2, 3 <input type="checkbox"/> Breathing Air Quality Task 1 <input type="checkbox"/>	Spray Booth Task 5 <input type="checkbox"/> Spray Equipment Task 1 <input type="checkbox"/> LEV System Task 2 <input type="checkbox"/> Breathing Air Quality Tasks 1, 2 <input type="checkbox"/>	Spray Booth Task 1 <input type="checkbox"/> Spray Equipment Tasks 1, 2(a) <input type="checkbox"/>
Signature			

TABLE 7 JUNE

	JUNE		
	Inspection	Testing	Maintenance
Week 1	Spray Booth Task 2 <input type="checkbox"/> Spray Equipment Tasks 2, 3(a), 3(c) <input type="checkbox"/> LEV System Task 2 <input type="checkbox"/> PPE Tasks 2, 3 <input type="checkbox"/> Breathing Air Quality Task 1 <input type="checkbox"/>	Spray Booth Task 1 (wet back) <input type="checkbox"/> Spray Equipment Task 1 <input type="checkbox"/>	Spray Booth Task 1 <input type="checkbox"/> Spray Equipment Tasks 1, 2(a) <input type="checkbox"/>
Week 2	Spray Booth Task 2 <input type="checkbox"/> Spray Equipment Tasks 2, 3(a), 3(c) <input type="checkbox"/> LEV System Task 2 <input type="checkbox"/> PPE Tasks 2, 3 <input type="checkbox"/> Breathing Air Quality Task 1 <input type="checkbox"/>	Spray Equipment Task 1 <input type="checkbox"/>	Spray Booth Task 1 <input type="checkbox"/> Spray Equipment Tasks 1, 2(a) <input type="checkbox"/>
Week 3	Spray Booth Task 2 <input type="checkbox"/> Spray Equipment Tasks 2, 3(a), 3(c) <input type="checkbox"/> LEV System Task 2 <input type="checkbox"/> PPE Tasks 2, 3 <input type="checkbox"/> Breathing Air Quality Task 1 <input type="checkbox"/>	Spray Equipment Task 1 <input type="checkbox"/>	Spray Booth Task 1 <input type="checkbox"/> Spray Equipment Tasks 1, 2(a) <input type="checkbox"/>
Week 4	Spray Booth Tasks 2, 3, 4 <input type="checkbox"/> Spray Equipment Tasks 2, 3(a), 3(c) <input type="checkbox"/> LEV System Task 2 <input type="checkbox"/> PPE Tasks 2, 3 <input type="checkbox"/> Breathing Air Quality Task 1 <input type="checkbox"/>	Spray Booth Task 5 <input type="checkbox"/> Spray Equipment Task 1 <input type="checkbox"/> LEV System Task 2 <input type="checkbox"/> Breathing Air Quality Tasks 1, 2 <input type="checkbox"/>	Spray Booth Task 1 <input type="checkbox"/> Spray Equipment Tasks 1, 2(a) <input type="checkbox"/>
Signature			

TABLE 8 JULY

	JULY		
	Inspection	Testing	Maintenance
Week 1	Spray Booth Task 2 <input type="checkbox"/> Spray Equipment Tasks 2, 3(a), 3(c) <input type="checkbox"/> LEV System Task 2 <input type="checkbox"/> PPE Tasks 2, 3 <input type="checkbox"/> Breathing Air Quality Task 1 <input type="checkbox"/>	Spray Booth Task 1 (wet back) <input type="checkbox"/> Spray Equipment Task 1 <input type="checkbox"/>	Spray Booth Task 1 <input type="checkbox"/> Spray Equipment Tasks 1, 2(a) <input type="checkbox"/>
Week 2	Spray Booth Task 2 <input type="checkbox"/> Spray Equipment Tasks 2, 3(a), 3(c) <input type="checkbox"/> LEV System Task 2 <input type="checkbox"/> PPE Tasks 2, 3 <input type="checkbox"/> Breathing Air Quality Task 1 <input type="checkbox"/>	Spray Equipment Task 1 <input type="checkbox"/>	Spray Booth Task 1 <input type="checkbox"/> Spray Equipment Tasks 1, 2(a) <input type="checkbox"/>
Week 3	Spray Booth Task 2 <input type="checkbox"/> Spray Equipment Tasks 2, 3(a), 3(c) <input type="checkbox"/> LEV System Task 2 <input type="checkbox"/> PPE Tasks 2, 3 <input type="checkbox"/> Breathing Air Quality Task 1 <input type="checkbox"/>	Spray Equipment Task 1 <input type="checkbox"/>	Spray Booth Task 1 <input type="checkbox"/> Spray Equipment Tasks 1, 2(a) <input type="checkbox"/>
Week 4	Spray Booth Tasks 1, 2, 3, 4 <input type="checkbox"/> Spray Equipment Tasks 1, 2, 3(a), 3(c) <input type="checkbox"/> LEV System Task 1, 2 <input type="checkbox"/> PPE Tasks 1, 2, 3 <input type="checkbox"/> Breathing Air Quality Task 1 <input type="checkbox"/>	Spray Booth Task 5 <input type="checkbox"/> Spray Equipment Task 1 <input type="checkbox"/> LEV System Task 2 <input type="checkbox"/> Breathing Air Quality Tasks 1, 2 <input type="checkbox"/>	Spray Booth Task 1 <input type="checkbox"/> Spray Equipment Tasks 1, 2(a) <input type="checkbox"/>
Signature			

TABLE 9 AUGUST

	AUGUST		
	Inspection	Testing	Maintenance
Week 1	Spray Booth Task 2 <input type="checkbox"/> Spray Equipment Tasks 2, 3(a), 3(c) <input type="checkbox"/> LEV System Task 2 <input type="checkbox"/> PPE Tasks 2, 3 <input type="checkbox"/> Breathing Air Quality Task 1 <input type="checkbox"/>	Spray Booth Task 1 (wet back) <input type="checkbox"/> Spray Equipment Task 1 <input type="checkbox"/>	Spray Booth Task 1 <input type="checkbox"/> Spray Equipment Tasks 1, 2(a) <input type="checkbox"/>
Week 2	Spray Booth Task 2 <input type="checkbox"/> Spray Equipment Tasks 2, 3(a), 3(c) <input type="checkbox"/> LEV System Task 2 <input type="checkbox"/> PPE Tasks 2, 3 <input type="checkbox"/> Breathing Air Quality Task 1 <input type="checkbox"/>	Spray Equipment Task 1 <input type="checkbox"/>	Spray Booth Task 1 <input type="checkbox"/> Spray Equipment Tasks 1, 2(a) <input type="checkbox"/>
Week 3	Spray Booth Task 2 <input type="checkbox"/> Spray Equipment Tasks 2, 3(a), 3(c) <input type="checkbox"/> LEV System Task 2 <input type="checkbox"/> PPE Tasks 2, 3 <input type="checkbox"/> Breathing Air Quality Task 1 <input type="checkbox"/>	Spray Equipment Task 1 <input type="checkbox"/>	Spray Booth Task 1 <input type="checkbox"/> Spray Equipment Tasks 1, 2(a) <input type="checkbox"/>
Week 4	Spray Booth Tasks 2, 3, 4 <input type="checkbox"/> Spray Equipment Tasks 2, 3(a), 3(c) <input type="checkbox"/> LEV System Task 2 <input type="checkbox"/> PPE Tasks 2, 3 <input type="checkbox"/> Breathing Air Quality Task 1 <input type="checkbox"/>	Spray Booth Task 5 <input type="checkbox"/> Spray Equipment Task 1 <input type="checkbox"/> LEV System Task 2 <input type="checkbox"/> Breathing Air Quality Tasks 1, 2 <input type="checkbox"/>	Spray Booth Task 1 <input type="checkbox"/> Spray Equipment Tasks 1, 2(a) <input type="checkbox"/>
Signature			

TABLE 10 SEPTEMBER

	SEPTEMBER		
	Inspection	Testing	Maintenance
Week 1	Spray Booth Task 2 <input type="checkbox"/> Spray Equipment Tasks 2, 3(a), 3(c) <input type="checkbox"/> LEV System Task 2 <input type="checkbox"/> PPE Tasks 2, 3 <input type="checkbox"/> Breathing Air Quality Task 1 <input type="checkbox"/>	Spray Booth Task 1 (wet back) <input type="checkbox"/> Spray Equipment Task 1 <input type="checkbox"/>	Spray Booth Task 1 <input type="checkbox"/> Spray Equipment Tasks 1, 2(a) <input type="checkbox"/>
Week 2	Spray Booth Task 2 <input type="checkbox"/> Spray Equipment Tasks 2, 3(a), 3(c) <input type="checkbox"/> LEV System Task 2 <input type="checkbox"/> PPE Tasks 2, 3 <input type="checkbox"/> Breathing Air Quality Task 1 <input type="checkbox"/>	Spray Equipment Task 1 <input type="checkbox"/>	Spray Booth Task 1 <input type="checkbox"/> Spray Equipment Tasks 1, 2(a) <input type="checkbox"/>
Week 3	Spray Booth Task 2 <input type="checkbox"/> Spray Equipment Tasks 2, 3(a), 3(c) <input type="checkbox"/> LEV System Task 2 <input type="checkbox"/> PPE Tasks 2, 3 <input type="checkbox"/> Breathing Air Quality Task 1 <input type="checkbox"/>	Spray Equipment Task 1 <input type="checkbox"/>	Spray Booth Task 1 <input type="checkbox"/> Spray Equipment Tasks 1, 2(a) <input type="checkbox"/>
Week 4	Spray Booth Tasks 2, 3, 4 <input type="checkbox"/> Spray Equipment Tasks 2, 3(a), 3(c) <input type="checkbox"/> LEV System Task 2 <input type="checkbox"/> PPE Tasks 2, 3 <input type="checkbox"/> Breathing Air Quality Task 1 <input type="checkbox"/>	Spray Booth Task 5 <input type="checkbox"/> Spray Equipment Task 1 <input type="checkbox"/> LEV System Task 2 <input type="checkbox"/> Breathing Air Quality Tasks 1, 2 <input type="checkbox"/>	Spray Booth Task 1 <input type="checkbox"/> Spray Equipment Tasks 1, 2(a) <input type="checkbox"/>
Signature			

TABLE 11 OCTOBER

	OCTOBER		
	Inspection	Testing	Maintenance
Week 1	Spray Booth Task 2 <input type="checkbox"/> Spray Equipment Tasks 2, 3(a), 3(c) <input type="checkbox"/> LEV System Task 2 <input type="checkbox"/> PPE Tasks 2, 3 <input type="checkbox"/> Breathing Air Quality Task 1 <input type="checkbox"/>	Spray Booth Task 1 (wet back) <input type="checkbox"/> Spray Equipment Task 1 <input type="checkbox"/>	Spray Booth Task 1 <input type="checkbox"/> Spray Equipment Tasks 1, 2(a) <input type="checkbox"/>
Week 2	Spray Booth Task 2 <input type="checkbox"/> Spray Equipment Tasks 2, 3(a), 3(c) <input type="checkbox"/> LEV System Task 2 <input type="checkbox"/> PPE Tasks 2, 3 <input type="checkbox"/> Breathing Air Quality Task 1 <input type="checkbox"/>	Spray Equipment Task 1 <input type="checkbox"/>	Spray Booth Task 1 <input type="checkbox"/> Spray Equipment Tasks 1, 2(a) <input type="checkbox"/>
Week 3	Spray Booth Task 2 <input type="checkbox"/> Spray Equipment Tasks 2, 3(a), 3(c) <input type="checkbox"/> LEV System Task 2 <input type="checkbox"/> PPE Tasks 2, 3 <input type="checkbox"/> Breathing Air Quality Task 1 <input type="checkbox"/>	Spray Equipment Task 1 <input type="checkbox"/>	Spray Booth Task 1 <input type="checkbox"/> Spray Equipment Tasks 1, 2(a) <input type="checkbox"/>
Week 4	Spray Booth Tasks 2, 3, 4 <input type="checkbox"/> Spray Equipment Tasks 2, 3(a), 3(c) <input type="checkbox"/> LEV System Task 2 <input type="checkbox"/> PPE Tasks 2, 3 <input type="checkbox"/> Breathing Air Quality Task 1 <input type="checkbox"/>	Spray Booth Task 5 <input type="checkbox"/> Spray Equipment Task 1 <input type="checkbox"/> LEV System Task 2 <input type="checkbox"/> Breathing Air Quality Tasks 1, 2 <input type="checkbox"/>	Spray Booth Task 1 <input type="checkbox"/> Spray Equipment Tasks 1, 2(a) <input type="checkbox"/>
Signature			

TABLE 12 NOVEMBER

	NOVEMBER		
	Inspection	Testing	Maintenance
Week 1	Spray Booth Task 2 <input type="checkbox"/> Spray Equipment Tasks 2, 3(a), 3(c) <input type="checkbox"/> LEV System Task 2 <input type="checkbox"/> PPE Tasks 2, 3 <input type="checkbox"/> Breathing Air Quality Task 1 <input type="checkbox"/>	Spray Booth Task 1 (wet back) <input type="checkbox"/> Spray Equipment Task 1 <input type="checkbox"/>	Spray Booth Task 1 <input type="checkbox"/> Spray Equipment Tasks 1, 2(a) <input type="checkbox"/>
Week 2	Spray Booth Task 2 <input type="checkbox"/> Spray Equipment Tasks 2, 3(a), 3(c) <input type="checkbox"/> LEV System Task 2 <input type="checkbox"/> PPE Tasks 2, 3 <input type="checkbox"/> Breathing Air Quality Task 1 <input type="checkbox"/>	Spray Equipment Task 1 <input type="checkbox"/>	Spray Booth Task 1 <input type="checkbox"/> Spray Equipment Tasks 1, 2(a) <input type="checkbox"/>
Week 3	Spray Booth Task 2 <input type="checkbox"/> Spray Equipment Tasks 2, 3(a), 3(c) <input type="checkbox"/> LEV System Task 2 <input type="checkbox"/> PPE Tasks 2, 3 <input type="checkbox"/> Breathing Air Quality Task 1 <input type="checkbox"/>	Spray Equipment Task 1 <input type="checkbox"/>	Spray Booth Task 1 <input type="checkbox"/> Spray Equipment Tasks 1, 2(a) <input type="checkbox"/>
Week 4	Spray Booth Tasks 2, 3, 4 <input type="checkbox"/> Spray Equipment Tasks 2, 3(a), 3(c) <input type="checkbox"/> LEV System Task 2 <input type="checkbox"/> PPE Tasks 2, 3 <input type="checkbox"/> Breathing Air Quality Task 1 <input type="checkbox"/>	Spray Booth Task 5 <input type="checkbox"/> Spray Equipment Task 1 <input type="checkbox"/> LEV System Task 2 <input type="checkbox"/> Breathing Air Quality Tasks 1, 2 <input type="checkbox"/>	Spray Booth Task 1 <input type="checkbox"/> Spray Equipment Tasks 1, 2(a) <input type="checkbox"/>
Signature			

TABLE 13 DECEMBER

	DECEMBER		
	Inspection	Testing	Maintenance
Week 1	Spray Booth Task 2 <input type="checkbox"/> Spray Equipment Tasks 2, 3(a), 3(c) <input type="checkbox"/> LEV System Task 2 <input type="checkbox"/> PPE Tasks 2, 3 <input type="checkbox"/> Breathing Air Quality Task 1 <input type="checkbox"/>	Spray Booth Task 1 (wet back) <input type="checkbox"/> Spray Equipment Task 1 <input type="checkbox"/>	Spray Booth Task 1 <input type="checkbox"/> Spray Equipment Tasks 1, 2(a) <input type="checkbox"/>
Week 2	Spray Booth Task 2 <input type="checkbox"/> Spray Equipment Tasks 2, 3(a), 3(c) <input type="checkbox"/> LEV System Task 2 <input type="checkbox"/> PPE Tasks 2, 3 <input type="checkbox"/> Breathing Air Quality Task 1 <input type="checkbox"/>	Spray Equipment Task 1 <input type="checkbox"/>	Spray Booth Task 1 <input type="checkbox"/> Spray Equipment Tasks 1, 2(a) <input type="checkbox"/>
Week 3	Spray Booth Task 2 <input type="checkbox"/> Spray Equipment Tasks 2, 3(a), 3(c) <input type="checkbox"/> LEV System Task 2 <input type="checkbox"/> PPE Tasks 2, 3 <input type="checkbox"/> Breathing Air Quality Task 1 <input type="checkbox"/>	Spray Equipment Task 1 <input type="checkbox"/>	Spray Booth Task 1 <input type="checkbox"/> Spray Equipment Tasks 1, 2(a) <input type="checkbox"/>
Week 4	Spray Booth Tasks 2, 3, 4 <input type="checkbox"/> Spray Equipment Tasks 2, 3(a), 3(c) <input type="checkbox"/> LEV System Task 2 <input type="checkbox"/> PPE Tasks 2, 3 <input type="checkbox"/> Breathing Air Quality Task 1 <input type="checkbox"/>	Spray Booth Task 5 <input type="checkbox"/> Spray Equipment Task 1 <input type="checkbox"/> LEV System Task 2 <input type="checkbox"/> Breathing Air Quality Tasks 1, 2 <input type="checkbox"/>	Spray Booth Task 1 <input type="checkbox"/> Spray Equipment Tasks 1, 2(a) <input type="checkbox"/>
Signature			

EQUIPMENT INSPECTION, TESTING AND MAINTENANCE

13 The following paragraphs cover spray booths, spray equipment and local exhaust ventilation. Each equipment section deals with inspection, testing and maintenance. These in turn are further divided into; tasks, task schedule, and responsible persons who perform the tasks. At the end of each equipment section there are proforma forms for reporting the inspection, testing and maintenance tasks carried out.

14 This section provides instruction for the inspection testing and maintenance tasks that need to be carried out on a given piece of equipment. The 'schedule' table shows when the task(s) should be carried out. The 'responsible person' table shows who should carry out the task. Once the task(s) have been carried out, the person who carried out the task fills in the appropriate reporting form which is signed and dated. The Monthly Charts (Para 12) are used to show when the Supervisors tasks are due to be carried out. When the task is completed the Supervisor records the fact that the tasks have been carried out by ticking the appropriate box next to the task numbers. When all of the tasks have been completed for the month the signatory will sign off the 'Signature' portion provided at the bottom of the chart.

Spray booths

15 Open face cross draught, full enclosure and combination booths with dry (filter) or wet (water) over spray dust control are the various types of spray booths covered.

15.1 Spray booth inspection. Task List is given in Table 14 and an inspection schedule in Table 15. The staff responsible for these inspections is shown in Table 16.

TABLE 14 TASK LIST

Task No.	Inspection
1	Check technical data sheets are available for spray booth operation and paint and solvent materials.
2	Carry out weekly audit to ensure specified operating procedures are being adhered to. Have sprayers checked the following? Booth doors seal and open properly. Pressure differential gauges are working. Pressure differential gauge reading is between the established maximum and minimum limits for satisfactory booth performance. Water level in booth sump tank. Booth heater controls are operational. Paint containers in use are sealed. NOTE Sprayers should carry out the above checks on a shift basis and report to the supervisor.
3	Check fire extinguishers are in place, that they are the correct type of extinguisher.
4	Check escape routes are clear.

TABLE 15 INSPECTION SCHEDULE AND TASKS

Schedule	Booth Type		
	Dry Filter	Wet Back Filter	Combination
Weekly	2(a), 2(b), 2(c), 2(f)	2(a), 2(b), 2(c), 2(d), 2(f)	2(a), 2(b), 2(c), 2(e), 2(f)
Monthly	3, 4	3, 4	3, 4
6 Monthly	1	1	1

TABLE 16 RESPONSIBILITIES AND TASKS

Personnel	Inspections		
	Dry Filter	Wet Back Filter	Combination
Supervisor	1, 2, 3, 4	1, 2, 3, 4	1, 2, 3, 4

15.2 Spray booth testing. Table 17 provides the task list for the spray booth. The task inspection schedule in Table 18 and the staff responsible for the various inspections are detailed in Table 19.

TABLE 17 SPRAY BOOTH TASKS

Task No.	Tests
1	Test pH level in wet back sump, add denaturant if required until correct level is obtained (as recommended by manufacturer)
2	Test pressure differential gauge operating to maximum and minimum limits (as set by manufacturer)
3	Test interlocking system linking pressure differential gauge, exhaust fan and air compressor (as recommended by manufacturer)
4	Test booth thermostats and gas regulators (as recommended by manufacturer)
5	Test fire alarms
6	Test emissions to atmosphere (as required by process authorisation)

TABLE 18 TASK INSPECTION SCHEDULE

Schedule	Booth Type		
	Dry Filter	Wet Back Filter	Combination
Weekly		1	
Monthly	5	5	5
As required or recommended by manufacturer	2, 3,	2, 3,	2, 3, 4,
As specified by process authorisation	6	6	6

TABLE 19 STAFF RESPONSIBILITIES AND THEIR RESPECTIVE INSPECTIONS

Personnel	Inspections		
	Dry Filter	Wet Back Filter	Combination
Supervisor	Task 5	Tasks 1, 5	Task 5
Service Engineer	Tasks 2, 3	Tasks 2, 3	Tasks 2, 3, 4
External Expert	Task 6	Task 6	Task 6

15.3 Spray booth maintenance. Table 20 shows the task list for maintaining the spray booth. The maintenance schedules are in Table 21 and the staff responsible for the maintenance are in Table 22.

TABLE 20 TASK LIST FOR SPRAY BOOTH MAINTAINENCE

Task No.	Maintenance
1	Carry out audit to ensure that sprayers carry out the following maintenance: a) vacuum out booth b) strip off booth coating, clean out booth and recoat with peelable paint c) remove and replace floor filters (as recommended by booth manufacturer) d) remove and clean extract floor grid (as recommended by booth manufacturer) e) remove and replace ceiling filters (as recommended by booth manufacturer) f) change water, clean baffle plates and remove paint residue inside extract chamber (as recommended by booth manufacturer) g) remove and replace back-wall filters (as recommended by booth manufacturer)
2	Maintenance of the differential pressure gauge (as recommended by booth manufacturer). a) check function of gauges and fill liquid manometers with fluid. b) check that the interlocking system linking the internal gauge and exhaust. c) check fan to the compressor is operational.

TABLE 21 SPRAY BOOTH MAINTENANCE SCHEDULES

Schedule	Booth Type		
	Dry Filter	Wet Back Filter	Combination
Shift	Task 1(a)	Task 1(a)	Task 1(a)
Monthly		Task 1(f)	
As required or as specified by manufacturer	Tasks 1(b), 1(c), 1(d), 1(e), 2	Tasks 1(b), 1(e), 1(g), 2	Tasks 1(b), 1(c), 1(d), 1(e), 2

TABLE 22 STAFF RESPONSIBILITIES AND THEIR RESPECTIVE INSPECTIONS

Personnel	Inspections		
	Dry Filter	Wet Back Filter	Combination
Supervisor	Tasks 1(a), 1(b), 1(c), 1(d), 1(e)	Tasks 1(a), 1(b), 1(e), 1(f), 1(g)	Tasks 1(a), 1(b), 1(c), 1(d), 1(e)
Service Engineer	Task 2	Task 2	Task 2

15.4 Report forms for spray booths. Forms (in Tables 23-26) for recording and reporting the conditions of the spray booth are given below.

TABLE 23 FORM SB1 - SPRAY BOOTH DETAILS

Site Details (address, department etc)
Spray booth Inventory / Identification Number
Location of spray booth
Type of spray booth (see also section on sketch of plant layout)
Sketch of booth layout: label ventilation plant items and number release points and emission measurement positions (measurement positions should be in accordance with guidelines given in ISO 9096)

TABLE 24 FORM SB2 - SPRAY BOOTH INSPECTION (WEEKLY AUDIT)

Conditions at time of Inspection
Results of visual inspection Describe any defects found in any parts of the spray booth and state what remedial action is required.
Booth Doors
Pressure Gauges
Water Level
Heater Controls
Operating Procedures
Fire Extinguishers
Inspection made by
Name
Date

TABLE 25 FORM SB3 - SPRAY BOOTH TESTING

Conditions at time of Test			
Spray Booth Differential Pressure			
Actual reading Pa	Maximum reading Pa	Minimum reading Pa	Action no action increase flow change filter
Spray Booth pH of Wet Back Sump			
Actual reading pH	Maximum reading pH	Minimum reading pH	Action no action add denaturant change water
Spray Booth Thermostat			
Actual booth temperature °C	Thermostat setting °C	Action no action repair replace	
Interlock System operating not operating			
Testing carried out by Name Date			

TABLE 26 FORM SB4 - SPRAY BOOTH MAINTENANCE

<p>Maintenance carried out: Describe any parts of the spray booth repaired or replaced and state what remedial action is required</p> <p>Pressure Gauges</p> <p>Interlocking System</p> <p>Extract Floor Filters and Grid</p> <p>Ceiling Filters</p> <p>Water Wash System</p> <p>Back Wall Filters</p>
<p>Maintenance carried out by</p> <p>Name</p> <p>Date</p>

Spray equipment

16 Equipment covered includes: spray guns, gun cleaning equipment, pressure regulators, paint pressure pots, paint pumps condensation traps, paint and air hoses, and compressor.

16.1 Spray equipment inspections. The task list for spray equipment inspections is shown in Table 27 and their schedules in Table 28. Staff responsible for the inspection is given in Table 29.

TABLE 27 TASK LIST FOR SPRAY EQUIPMENT

Task No.	Inspection
1	Check technical data sheets available for : a) spray guns b) air compressor and filter regulator unit c) pressure feed systems d) automatic gun wash systems
2	Check operating procedures are being adhered to. - Have sprayers checked the following? a) spray gun tip for damage b) air lines/fluid hoses for damage and leaks
3	Check air compressor and filter regulator unit (as recommended by manufacturer). a) check level of oil in crankcase b) inspect electric motor c) check air intake filter for cleanliness, replace if saturated d) check compressor drive belt and adjust or replace as necessary

TABLE 28 INSPECTION SCHEDULES

Schedule	Inspection
Shift	Tasks 2, 3(a), 3(c)
Monthly	Tasks 3(b), 3(d)
6 Monthly	Task 1

TABLE 29 STAFF RESPONSIBILITIES AND THEIR RESPECTIVE INSPECTIONS

Personnel	Inspection
Supervisor	Tasks 1, 2, 3

16.2 Spray equipment tests. Table 30 details the tests required for the spray equipment, their schedules (Table 31) and the staff responsible for these tests (Table 32).

TABLE 30 SPRAY EQUIPMENT TESTS

Task No.	Tests
1	Check that the sprayers carry out the following tests : a) spray gun air inlet pressure and air cap pressure (as recommended by manufacturer) b) paint viscosity c) spray pattern and fan width d) Check fluid flow

TABLE 31 TEST SCHEDULE

Schedule	Tests
Stat of shift	Task 1

TABLE 32 STAFF RESPONSIBLE FOR THE TESTING

Personnel	Tests
Supervisor	Task 1

16.3 Spray equipment maintenance. The maintenance of spray equipment (Table 33), schedules (Table 34) and staff responsible (Table 35) are shown below.

TABLE 33 SPRAY EQUIPMENT MAINTENANCE

Task No.	Maintenance
1	Ensure sprayers clean spray guns, air caps and fluid tips (as recommended by manufacturer).
2	Maintenance of compressor and filter regulator unit (as recommended by manufacturer). a) drain accumulated water. b) service compressor and filter regulator unit.
3	Maintenance and service of pressure feed systems. Obtain certificate for pressure vessel. (as recommended by manufacturer).
4	Maintenance and service of gun wash system (as recommended by manufacturer).

TABLE 34 MAINTENANCE SCHEDULES OF SPRAY EQUIPMENT

Schedule	Maintenance
Shift	Tasks 1, 2(a)
As required or recommended by manufacturer	Tasks 2(b), 3, 4

TABLE 35 STAFF RESPONSIBLE FOR THE MAINTENANCE

Personnel	Maintenance
Supervisor	Tasks 1, 2(a)
External expert	Tasks 2(b), 3, 4

16.4 Reporting forms. Reporting Forms for Spray Equipment Inspection (Monthly) are given below in Tables 36-38.

TABLE 36 FORM SE1 - SPRAY EQUIPMENT INSPECTION

<p>Results of visual inspection Describe any defects found in any parts of the spray equipment and state what remedial action is required</p> <p>Spray Gun</p> <p>Pressure Feed System</p> <p>Gun Wash System</p> <p>Air Compressor</p> <ul style="list-style-type: none">Oil LevelElectric MotorAir Intake FilterDrive BeltFilter / Regulator UnitOperating Procedures
<p>Inspection made by</p> <p>Name</p> <p>Date</p>

TABLE 37 FORM SE2 - SPRAY EQUIPMENT TESTING

Spray Gun Pressure		
Required air inlet pressure	Measured air inlet pressure	Action
m.bar	m.bar	
psi	psi	
Required air cap pressure	Measure air cap pressure	
m.bar	m.bar	
psi	psi	
Testing carried out by		
Name		
Date		

TABLE 38 FORM SE3 - SPRAY EQUIPMENT MAINTENANCE

<p>Maintenance carried out: Describe any parts of the spray equipment repaired or replaced and state what remedial action is required</p>
<p>Spray Gun</p> <p style="margin-left: 20px;">Air Caps & Fluid Tips</p> <p style="margin-left: 20px;">Pressure Feed System</p>
<p>Gun Wash System</p>
<p>Compressor & Regulator Unit</p>
<p>Maintenance carried out by</p> <p>Name</p> <p>Date</p>

Local Exhaust Ventilation (LEV)

17 The Local Exhaust Ventilation (LEV) system covers work preparation, paint preparation, gun cleaning and drying areas.

17.1 LEV inspection. Tables 39, 40 and 41 respectively provide task list, inspection schedules and staff responsible for the inspections.

TABLE 39 TASK LIST FOR LEVS

Task No.	Inspection
1	Check technical data sheets are available for the local exhaust ventilation system
2	Inspect to ensure that the sprayers carry out the following checks: <ul style="list-style-type: none"> a) check for signs of wear, tear and damage to ductwork and filtration systems (where fitted) b) check for outward signs of malfunction or damage e.g. paint particle deposits, apparent loss of extraction c) thorough external and where appropriate internal inspection of all parts of the system (as recommended by manufacturer) d) check differential pressure gauges are operating and that the reading is between the established maximum and minimum limits. e) check there are no obstructions in front of air exhaust vents f) check grills of air exhaust vents are clean

TABLE 40 INSPECTION SCHEDULE FOR LEVS

Schedule	Inspection
Shift	Tasks 2(a), 2(b), 2(d), 2(e), 2(f)
6 Monthly	Task 1
As required or as recommended by the manufacturer	Task 2(c)

TABLE 41 STAFF RESPONSIBLE FOR THE INSPECTIONS

Personnel	Maintenance
Supervisor	Tasks 1, 2(a), 2(b), 2(d), 2(e), 2(f)
Independent expert	Task 2(c)

17.2 LEV tests. The LEV system tests are given in Table 42 with their schedules (Table 43) and the staff responsible for the testing (Table 44).

TABLE 42 LEV SYSTEM TESTS

Task No.	Tests
1	Carry out initial appraisal (only for new plant or existing plant which has subsequently been modified). a) check plant effectively captures emissions and meets specified performance. b) determine base level face velocities and static pressures
2	Assessment of control - use smoke test to determine if LEV system is extracting.
3	Measurement of plant performance. Parameters to be tested include: a) static pressure, b) face velocity (recommended minimum 0.7 m/s - ref 1) and c) fan and motor speeds.
4	If performance of LEV system is below specification: a) check air quality using colorimetric detection tubes b) if detection tubes indicate a possible problem a workplace monitoring survey should be carried out to determine occupational exposure levels
5	Measure duct velocity (should not exceed 9 m/s - ref 14)
6	Calculate discharge velocity (minimum 10 m/s - ref 15)

TABLE 43 TEST SCHEDULE FOR THE LEV SYSTEM TESTS

Schedule	Tests
Monthly	Task 2
On installation of a new LEV system, or modification of old plant	Task 1
Annually	Tasks 3, 5, 6
As required	Task 4

TABLE 44 STAFF RESPONSIBLE FOR THE TESTING

Personnel	Tests
Supervisor	Task 2
Independent expert	Tasks 1, 3, 4, 5, 6

17.3 LEV maintenance. Tables 45, 46 and 47 respectively list tasks, schedules and the staff responsible for the LEV System Maintenance.

TABLE 45 TASK LIST FOR LEV MAINTENANCE

Task No.	Maintenance
1	Replacement of worn or damaged parts.
2	Servicing of LEV system (as recommended by manufacturer)

TABLE 46 MAINTENANCE SCHEDULE FOR LEV SYSTEM

Schedule	Maintenance
As required or as recommended by manufacturer	Tasks 1, 2 (not more than 14 months)

TABLE 47 STAFF RESPONSIBLE FOR LEV MAINTENANCE

Personnel	Tests
Supervisor	Task 1
Independent expert	Tasks 1, 2

17.4 Reporting forms. Report forms are provided in Tables 49-51, for LEV System Performance (Annual Assessment).

TABLE 48 FORM LEV1 - LEV SYSTEM SPECIFICATION AND PERFORMANCE

Site Details (address, department, etc)
Plant inventory number
Location of plant
Hazardous substance controlled by plant
Type of plant (see also section on sketch of plant layout)

TABLE 49 FORM LEV1 - LEV SYSTEM SPECIFICATION AND PERFORMANCE

Fan specification (provided by the supplier)		
Fan details:	maker serial no.	
Fan type (e.g. guide vane, bifure, forwarded vane)		Max. design speed rpm
Axial Centrifugal		
Fan speed	rpm	Motor:maker speed rpm
Drive type direct v-belt other		Motor power kW
Duty : Volume flow rate	m ³ /s	Voltage phase
Static or total pressure	Pa	
Air power	kW	
Inlet diameter	mm	Full load current amp
Outlet dimensions	mm	
Primary air cleaner details: * (i.e filtration system)	Static pressure	Test
Maker	inlet	Pa
Serial no	outlet	Pa
Filter Area	across	Pa
Design volume flow	change at	Pa

* same will apply for second air cleaner

TABLE 50 FORM LEV1 - LEV SYSTEM SPECIFICATION AND PERFORMANCE

Identification and location of system
Sketch of plant layout : label ventilation plant items and number measurement positions

TABLE 51 FORM LEV1A INLET POINTS, SHOWING THE DESIGN VALUES FOR PERFORMANCE (SEE SKETCH)

Point No.	Type of inlet	Face dimensions (mm)	Duct dia (mm)	Area (m ²)	Face vel (m/s)	Duct vel (m/s)	Flow rate (m ³ /s)	Comments

TABLE 52 FORM LEV1 - LEV SYSTEM SPECIFICATION AND PERFORMANCE RESULTS OF ROUTINE VENTILATION MEASUREMENTS TEST VALUES FOR INLET POINTS

Point	Date	Static pressure (Pa)	Face velocity (m/s)	Duct velocity (m/s)	Volume flow (m ³ /s)	Instrument used	Comment
Conditions at time of test							
Results of visual inspection Describe any defects found in any parts of the ventilation system and state what remedial action is required							
Measurement and inspection made by							
Name							
Date							

PERSONAL HEALTH PROTECTION AND TRAINING

18 The personal health protection and training section covers care and maintenance of personal protective equipment, personal health checks, operator instruction and training.

19 For health surveillance there is a list of tasks, a task schedule and a list of responsible persons to carry out the tasks. Finally there is personal record which combines the employees training record, with their health surveillance record and the personal and respiratory protective equipment that they have been issued.

Personal Protective Equipment (PPE)

20 The equipment covered includes: respiratory protection masks, overalls, goggles, gloves, shoes, ear defenders.

20.1 Personal Protective Equipment (PPE) Inspection The inspection of PPE is given in Table 53, its schedule in Table 54 and the staff responsible in Table 55.

TABLE 53 PPE INSPECTION TASKS

Task Number	Inspection
1	Check technical data sheets are available and up to date
2	<p>Inspect to ensure that the sprayers check respiratory protective equipment (RPE) physical condition.</p> <p>a) Full face air fed masks:</p> <ul style="list-style-type: none"> i. ensure mask fits tightly around face ii. check visors for good visibility iii. check for wear or damage to straps, face-piece, filters and valves. iv. check compressed air hoses for wear or damage <p>b) Half face filter masks:</p> <ul style="list-style-type: none"> i. ensure mask fits tightly around face ii. check for wear or damage to straps, face-piece, filters and valves. iii. check filters appropriate for duty iv. check filters are within use by date v. change filters when saturated <p>NOTE All RPE should be kept in a sealed container or locker when not in use.</p>
3	<p>Inspect to ensure that the sprayers check their</p> <ul style="list-style-type: none"> a) overalls for wear and tear b) gloves for wear and tear c) boots for wear and tear d) ear defenders for wear and tear

TABLE 54 PPE INSPECTION SCHEDULE

Schedule	Inspection
Start of shift	Tasks 2, 3
6 Monthly	Task 1

TABLE 55 STAFF RESPONSIBLE FOR THE PPE INSPECTION

Personnel	Inspection
Supervisor	Tasks 1, 2, 3

20.2 Maintenance of Personal Protective Equipment (PPE). The maintenance of PPE task list is shown in Table 56, its schedule in Table 57 and the staff responsible for the inspections in Table 58.

TABLE 56 TASK LIST FOR PPE MAINTENANCE

Task No.	Maintenance
1	Replacement of worn or damaged protective and respiratory equipment
2	Servicing of air compressor and filter regulator unit

TABLE 57 MAINTENANCE SCHEDULE FOR PPE INSPECTION

Schedule	Maintenance
As required or as recommended by manufacturer	Tasks 1, 2

TABLE 58 STAFF RESPONSIBLE FOR PPE INSPECTION

Personnel	Inspection
Supervisor	Task 1
External Expert	Task 2

20.3 Reporting forms. PPE Reporting forms for PPE Inspection (Monthly) are provided in Tables 59 and 60.

TABLE 59 FORM FOR REPORTING PPE INSPECTION

<p>Results of visual inspection Describe any defects found in any parts of the PPE and state what remedial action is required</p> <p>Full Face Air Fed Masks</p> <p>Half Face Filter Masks</p> <p>Overalls</p> <p>Gloves</p> <p>Footwear</p> <p>Glasses / Goggles</p> <p>Ear Defenders</p>
<p>Inspection made by</p> <p>Name</p> <p>Date</p>

TABLE 60 FORM FOR REPORTING PPE MAINTENANCE

<p>Maintenance carried out: It is recommended that any protective and respiratory protective equipment which is found to be defective be replaced immediately.</p> <p>Full Face Air Fed Masks</p> <p>Half Face Filter Masks</p> <p>Overalls</p> <p>Gloves</p> <p>Footwear</p> <p>Glasses / Goggles</p> <p>Ear Defenders</p> <p>Air Compressor</p> <p>Filter / Regulator Unit</p>
<p>Maintenance carried out by</p> <p>Name</p> <p>Date</p>

20.4 Breathing air inspection. The inspection for the quality of breathing air (Statutory Requirement) is shown in Table 61, its inspection schedule in Table 62 and the staff responsible for the inspection in Table 63.

TABLE 61 TASK LIST FOR BREATHING AIR QUALITY INSPECTION

Task No.	Inspection
1	Inspect to ensure that sprayers check the following : a) compressed air hoses for wear or damage b) air hoses are routed safely and that they are not trapped c) hose clamps are secure d) air filter regulators units for wear or damage

TABLE 62 SCHEDULE FOR BREATHING AIR INSPECTION

Schedule	Inspection
Shift	Task 1

TABLE 63 STAFF RESPONSIBLE FOR INSPECTING BREATHING AIR QUALITY

Personnel	Inspection
Supervisor	Task 1

20.5 Breathing air quality tests. Table 64 lists the tests required for checking the quality of breathing air. The schedule for checking is shown in Table 65 and the staff responsible for these checks in Table 66.

TABLE 64 QUALITY OF BREATHING AIR

Task No.	Tests	Criteria
1	Volume flow of compressed air to mask	(see BS EN 529 and BS EN 12021)
2	Test quality of compressed air for: O ₂ CO CO ₂ oil mist odour/taste water liquid water vapour	(see BS EN 529 and BS EN 12021)

TABLE 65 BREATHING AIR QUALITY TEST SCHEDULE

Schedule	Tasks
Monthly	Tasks 1, 2

TABLE 66 STAFF RESPONSIBLE FOR CHECKING THE QUALITY OF BREATHING AIR

Personnel	Inspection
Trained personnel	Tasks 1, 2

20.6 Breathing air equipment maintenance. The maintenance for the equipment that supplies breathing air is given in Table 67, its schedule in Table 68 and the staff responsible in Table 69.

TABLE 67 TASK LIST FOR MAINTAINING THE BREATHING AIR EQUIPMENT

Task No.	Maintenance
1	RPE a) servicing of air compressor and filter regulator unit b) replacement of compressed air hoses for wear or damage c) replacement of air filter regulators units for wear or damage

TABLE 68 SCHEDULE FOR MAINTAINING THE BREATHING AIR EQUIPMENT

Schedule	Tasks
As required or as recommended by manufacturer	Task 1

TABLE 69 STAFF RESPONSIBLE FOR MAINTAINING BREATHING AIR EQUIPMENT

Personnel	Inspection
Supervisor	Tasks 1(a), 1(c)
Qualified Personnel	Task 1(b)

20.7 Reporting forms for breathing air. Report Forms for Breathing Air Quality are given in Tables 70-72.

TABLE 70 FORM BAQ1 - BREATHING AIR QUALITY INSPECTION

<p>Results of visual inspection Describe any defects found in any parts of the air breathing equipment and state what remedial action is required</p> <p>Compressed Air Hoses</p> <p>Hose Routing</p> <p>Hose Clamps</p> <p>Compressed Air Filter / Regulator Units</p>
<p>Inspection made by</p> <p>Name</p> <p>Date</p>

TABLE 71 FORM BAQ2 - BREATHING AIR QUALITY TESTING

No.	Substance	Measured Value	Criteria (BS EN 529 and BS EN 12021)
1	volume flow		150 litres/minute for each person
2	O ₂		20 - 23 % by volume
	CO		5 ppm
	CO ₂		500 ppm
	oil mist		5 mg/m ³
	odour/taste		no significant odour taste
	water liquid		no free liquid water
	water vapour		air at 40 bar pressure dew point sufficiently low to prevent condensation and freezing air at 40 - 200 bar water content < 50 mg/m ³ air above 200 bar water < 35 mg/m ³ .
Testing carried out by			
Name			
Date			

**TABLE 74 SCHEDULE FOR HEALTH SURVEILLANCE
(SCHEDULE AT DISCRETION OF MEDICAL ADVISOR)**

Schedule	Tasks
Daily	4
Weekly	5
6 Weeks	2
3 Monthly	2, 3(b)
6 Monthly	3(a)
Annually	2
As required	6
Before commencing work that gives rise to exposure to hazardous substance	1

TABLE 75 STAFF RESPONSIBLE FOR PERFORMING HEALTH SURVEILLANCE

Personnel	Inspection
Sprayer	Task 4
Supervisor	Task 5
Medical Expert	Tasks 1, 2, 3, 6

22 The Control of Substances Hazardous to Health Regulations, 1994 require employers to provide their employees with suitable information and training on the hazardous materials that they use. It has therefore been decided to combine the employees training record, with their health surveillance record and the PPE and RPE that they have been issued in one single personal record (Table 76). Training should be completed as part of an induction course before employee allowed to work on-site. Periodic refresher courses are appropriate for all personnel and must be carried out when new equipment or materials are introduced.

TABLE 76 PERSONAL RECORD

Name	Employee No.	Occupation	
Personal Protective Equipment		Date Issued	Date Returned
Half or full face respirators			
Half or full face air fed mask			
Coveralls			
Gloves			
Glasses or goggles			
Safety boots			
Health Surveillance		Date Completed	On Going
Pre-exposure examination			
6 weeks after work has started			
12 weeks after work has started			
Annual test while exposure continues			
Training		Date Completed	Re-training
Information on the health effects associated with hazardous substances in use. - attendance at HSE seminars - provision material safety data sheets			
Information on the role of health surveillance and health records			
How to use, and the purpose of local exhaust ventilation (LEV) systems.			
How to test the efficiency of LEV systems			
How to use and the purpose of RPE			
How to test the efficiency of RPE			
Maintenance and operation of spray guns			
Maintenance and operation of compressed air systems			
How to operate fire extinguishers			
External qualifications			

ENVIRONMENTAL RELEASES

23 The following paragraphs covers the measurement and recording of release to environment : emissions to atmosphere, waste water discharges and solid/liquid wastes.

24 Routinely inspect the site, at least once a week, and assess the potential for environmental damage or nuisance. The check list (Table 77) itemises those items which may indicate a housekeeping or plant operation problem that should be investigated and corrected.

TABLE 77 CHECK LIST FOR ROUTINE ENVIRONMENTAL INSPECTION

Item	Observed (tick)
Smell which may originate from your operations	
Dust or smoke originating from your plant	
Staining or deposits around chimneys and vents	
Leaks or spills of materials in storage or operating areas	
Plant noise	
Waste, materials or old plant stored on open ground	
Dust deposits which may have come from your plant	
Litter which may have come from your plant	
Drums or cans from your plant	
Discoloration of the ground or water courses	
Date	
Inspection carried out by:	

Solvent management plan

25 Maintenance of organic solvent use records are vital to assessing whether an establishment requires an authorisation under EPA 1990, as the qualification criteria is based on the quantity of organic solvent used. It is also an essential part of monitoring the process to assess compliance with authorisation conditions, particularly where the establishment elects to meet the emission limits for volatile organic compounds by using compliant coatings. It is likely that the keeping of such records will be a condition of the establishment's authorisation and the establishment should be able to demonstrate, through documentary evidence, that they are using compliant materials to the local authority. Knowledge of the quantities of materials and organic solvent used is also an essential part of effective materials management.

26 Solvent use is defined in the Prescribed Process and Substances Regulations as the sum of the mass of organic solvent contained in paints, thinners, degreasers and gun wash associated with the painting operation less the mass of solvent recovered or recycled.

27 Only organic solvents directly associated with painting operations should be included in the solvent use account. The account should also not include material used off-site for touch up purposes.

28 The core of the solvent use account is a list of all the materials used in the paint shop. Purchase / stock records should be used to identify the quantity (in litres) of material used over a period of a month. The amount used is multiplied by the organic solvent content to determine solvent use associated with each material.

29 The solvent content should be available on material data sheets or from the paint supplier. The solvent associated with for each material is summed to determine the total solvent input into the process.

30 The solvent account should include the quantity of solvent recovered and recycled (in-house or through a solvent recovery contractor) and that disposed as waste.

31 An example of a solvent account is presented in Table 78.

32 Accounts should be compiled monthly and a cumulative total solvent use over each rolling 12 month period up dated. For management purposes it is helpful to present monthly solvent use as a graph which includes monthly work throughput and waste disposals.

33 Solvent use accounts are to be submitted to the local authority at intervals specified in a process authorisation (usually every 6 or 12 months).

TABLE 78 SOLVENT USE ACCOUNT

Date: For period			
	Quantity used per month litres	Solvent content grams / litre	Quantity solvent kg
1. Primer (list all materials used)	A	B	$Q1 = A \times B / 1000$
2. Intermediate coats (list all materials used)			Q2
3. Topcoats (list all materials used)			Q3
4. Hardeners or activators (two pack systems) (list all materials used)			Q4
5. Thinners			Q5
6. Gun wash			Q6
7. Other e.g fillers, polishes, degreasing fluids. (list all materials used)			Q7
Total solvent input kg			$T = Q1 + Q2 + Q3 + Q4 + Q5 + Q6 + Q7$
Solvent recovered / recycled			R1
Total solvent used kg			T - R1
Waste solvent disposed (kg)			
Report prepared by:			
Report checked by:		Date:	
Filed date:			
Report made to Local Authority Date:			

Emission to atmosphere

34 **Testing requirement.** Where a process is authorised under the Environmental Protection Act 1990 the establishment's authorisation will specify the substances to be determined, the emission limit values applicable, the frequency of testing, and the reports to be prepared for the local authority. These requirements may vary between local authorities.

35 Normally, the emission limits and testing requirements specified in an authorisation will be those contained in the Secretary of States Guidance Notes for Re-spraying of Road Vehicles (PG6/34b). The applicable emission limit values from these guidance notes are summarised in Table 79.

TABLE 79 EMISSION LIMIT VALUES

Emission	PG 6/34b
Particulates (mg/m ³) - vehicle total enclosure and combination spray booth	10
Target emission all existing installations from 31/10/2007 Solvent use > 1 t/year	(1.0 tonne registration threshold). use compliant coatings
Designated Risk Phrase Materials with risk phrases R45, R46, R49, R61	Replace by less harmful substances is advisable.

Emission testing

36 The sources and substances to be monitored, the frequency of monitoring and test method are summarised in Table 80.

TABLE 80 EMISSION TESTING

Source	Substance	Frequency	Method
Spray booth	Particulate	As necessary	BS EN 13284
Blast booths or any other source of dust emission	Particulate	As necessary	BS EN 13284

37 Emission testing will also be required when new plant is commissioned (to confirm performance), when installing abatement equipment (to provide design data) or where there is a problem with dust emissions or odour.

38 Local authorities usually require notice of any emission testing and their approval of procedures to be used.

39 Testing should be carried out by a competent person using appropriately calibrated equipment and to accepted test methods. Tests conducted by the establishment are acceptable provided these conditions are met. However, independent testing by a Source Testing Association member will ensure the quality of test results. Each emission test should be described in a test report that details;

- 39.1 Date of test.
- 39.2 Plant tested.
- 39.3 Details of plant operation during test.
- 39.4 Methods of testing.
- 39.5 Test results.
- 39.6 Base data and calculations.

39.7 For an authorised process the results of emission tests in their entirety should be forwarded to the Local Authority within 8 weeks of conducting the test.

40 Test reports should be kept for a minimum of 4 years.

Waste

41 Industrial and commercial waste disposal is controlled under specific waste or environmental protection regulations. In addition to regulatory controls there are commercial benefits in minimising waste.

42 Legislation in place prohibits fly tipping of waste and imposes a "Duty of Care" on producers, carriers and disposers of waste. Waste storage and handling on-site, the transfer of waste and ultimate disposal of waste should be carried out to eliminate or minimise the possibility of pollution. Transfer and disposal of waste is subject to a consignment note procedure. The consignment note should correctly describe the material being disposed, state the quantity and identify any particular hazards associated with the waste.

43 Monthly review/inspection of waste arising should be carried out. This should include the tasks identified in check list in Table 81.

TABLE 81 CHECK LIST FOR RECORDING WASTE OUTPUT

Issue	Yes / No
Quantities of waste generated determined (see Table 82).	
Consignment note procedure followed. Waste correctly described.	
Waste segregated.	
Waste storage on site secure and in closed containers.	
No waste buried, burnt or dumped on-site.	
Actions to minimise arising identified.	

TABLE 82 WASTE ARISING

Waste Type	Source (plant or operation)	Quantity Generated per month (mass or volume)	Site Storage Location and Quantity	Disposal Contractor
Potentially Hazardous Waste				
Paint				
Booth filters				
Sludge Booth or solvent recovery plant residues				
Solvent				
Chemicals				
Over spray and preparation dusts				
General Industrial / Commercial Waste				
Paper & Plastic including Masking				
Scrap				
Packaging Cans / boxes / pallets				
Other (specify)				
Date:				
For period				

44 Waste can be hazardous either on its own or in combination with other waste. The Special Waste Regulations 1996 set out the criteria for classifying waste as special: each waste stream should be assessed. Any waste stream originating from a source with material inputs classified as toxic, explosive, flammable, oxidising, or corrosive should be regarded as potentially hazardous. The information supplied with the material should also provide guidance on waste disposal.

45 Potentially hazardous waste materials are subject to special transfer (prior notification of the Environment Agency) and disposal procedures. This waste also should be stored and handled with care, in particular:

- 45.1 The hazardous waste should be kept separate from general and from other types of hazardous wastes.
- 45.2 The hazardous waste should not be disposed to skips.
- 45.3 The hazardous waste should be kept in closed and labelled containers.

Waste process water

46 Release of process waste waters to sewer or to surface waters (streams) is generally prohibited without a permit or consent. Permits are issued on a plant by plant basis and restrict the waste water discharge by volume, composition, and temperature.

47 Limits are placed on substances specified in environmental or waste water legislation and typically these include the following:

- 47.1 Heavy metals (nickel, cadmium, mercury, lead, zinc in particular).
- 47.2 Biocides, pesticides and herbicides (which may be present in coatings or water treatment chemicals).
- 47.3 Organic solvents particularly chlorinated degreasing solvents.
- 47.4 Ammonia and nitrates.
- 47.5 Acidity and alkalinity.
- 47.6 Chemical oxygen demand.
- 47.7 Biological oxygen demand.

48 Discharge of substances other than those specifically mentioned in the permit is prohibited. Permits should be maintained in an environmental file.

49 Where a discharge is made to sewer or surface water the consent will usual specify the discharge limits and the frequency and type of monitoring required.

50 A monthly review / inspection should be carried out. This should comprise of:

- 50.1 Assessment of release sources: use the check list in Table 83 and a site inspection to identify sources of waste water on site.
- 50.2 These items represent a potential source of process waste water, the discharge of which is generally controlled. Either stop the discharge or obtain a consent.
- 50.3 Check water usage by recording water meter readings. The majority of water input into the site ends up as waste water and thus any abnormal or increased usage could indicate a waste water problem.

TABLE 83 CHECK LIST FOR PROCESS WASTE WATER SOURCES

Plant or operation	Quantity litres or m ³	Discharge	
		Sewer or Surface water	Waste Disposal Contractor
Pre-treatment process (e.g phosphating, chromating) and rinse tanks			
Cleaning (steam or high pressure water and aqueous degreasing bath)			
Spray booth water			
Cooling water (e.g vapour degreasing tank solvent recovery plant)			
Bunded storage areas and tanks (water collected in bund)			

CHAPTER 4
CLEANING, PREPARATION AND PRE-TREATMENTS

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- 2 Safety
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Paint removal (WARNING)
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- 9 Aluminium alloys
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Painting at unit level
- 14 Surface preparation and pre-treatments

INTRODUCTION

1 This chapter covers the preparation of various surfaces and/or components for repainting, and the degree of removal and replacement of paint finishes.

Safety

2 Materials and processes described in this publication carry health hazards. COSHH and Risk assessments are to be made prior to initial use, and afterwards, as required by the regulations made under the Health and Safety at Work Act, 1974. Advice on safety aspects is to be read in conjunction with those chapters covering processes or materials in this publication.

GENERAL

3 The indiscriminate removal of existing paint is not to be practised. Where the existing finish is in generally good condition, rubbing down with abrasive paper using either mechanical or manual technique, followed by removal of any dust will provide a satisfactory surface. Alternatively, abrasive cleaning may be lightly applied to matt the existing finish. Abrasive cleaning, can be used to remove poor quality paint or rust areas to give a matt finish that is ready for patch priming and topcoat

4 For small areas of damage, the paint film can be repaired by patch painting to give an even finish.

5 Spots of corrosion can be removed by the use of abrasive paper, or by the use of a rust converter.

6 For extensive rusting, complete de-rusting should be considered. De-rusting by abrasive or chemical methods may, however, remove any zinc, cadmium or galvanised coatings and these must be renewed before priming and repainting, or replaced by a suitable primer.

SOIL AND GREASE REMOVAL

7 Grease, soil and loosely adherent or degraded coats of paint may be removed by use of hot aqueous detergent e.g H1 7930-99-225-3993, applied by high pressure water lance, self-contained washing machine or in an agitated tank type cleaner followed by rinsing, if necessary, and drying. Alternatively, heavy soil and grease deposits may first be removed by the use of Compound Emulsion Concentrate, H1 7930-99-220-1173 diluted with 20 times its volume of Kerosene, followed by water rinsing and then hot detergent washing. Effluent treatment is necessary in this case.

PAINT REMOVAL**WARNING**

DUST. PAINT REMOVAL BY ABRASIVE METHODS CAUSES DUST. THIS PROCESS SHOULD BE CARRIED OUT IN A WELL VENTILATED AREA AND OPERATORS MUST WEAR DUST MASKS TO PREVENT INHALATION.

Ferrous materials**CAUTION**

EQUIPMENT DAMAGE. High strength steels and particularly armour steels are not phosphated, unless otherwise specified in which case the requirements of Def Stan 03-4 (pre-treatment and protection of steel items of specified maximum strength exceeding 1450 mpa) are to be met.

8 If necessary, paint may be removed from ferrous and non ferrous substrates, by abrasive methods as follows:

8.1 Manual or power assisted (H1 5130-99-571-2957 (77 mm) or 5130-99-460-2342 (150 mm)) use of abrasive papers, cloths or pads are the recommended methods for preparation for patch painting, for small items and for matting of gloss finishes before over coating. Flexible and resilient pads which follow the contours of the surface concerned will assist in patch painting of vehicles in particular.

Aluminium alloys

9 Unless otherwise specified, aluminium alloys, after the removal of old paint and if the substrate is exposed, are to be treated with etch primer to BS 2X 32 (H1 8010-99-126-0772). Paint removal may destroy the anodic coatings of anodised components and are particularly vulnerable when abrasive blast cleaning is employed. Anodised coatings, if damaged can also be repaired with etch primer to BS 2X 32 (H1 8010-99-126-0772).

Wood**WARNING**

LEAD BASED PAINTS. LEAD BASED PRIMERS ARE NOT TO BE USED DUE TO POSSIBLE HAZARDS TO APPLICATORS AND EQUIPMENT USERS.

10 Paint may be removed from wood by the following processes:

10.1 The application of paint remover H1 8010-99-220-2307 followed by scraping and wiping with white spirit.

10.2 Abrasive methods.

10.3 Burning off and scraping.

11 New wood will require to be treated with preservative in accordance with AESP 0200-A-232-013. Particular care should be taken that the correct solutions are used and that areas not to be painted are treated with a suitable preservative such as creosote, H1 6505 99 311 3295.

Canvas

12 Canvas articles are detergent washed only, using the detergent to Def Stan 80-218, rinsed thoroughly and allow to dry.

Glass Reinforced Plastics (GRP) and composites

13 Paint can be removed from GRP or composites by light abrasion, taking care not to remove the gel coat and expose the fibre reinforcement. This is followed by detergent wash, a thorough rinse and allow to dry prior to painting.

PAINTING AT UNIT LEVEL

Surface preparation and pre-treatments

14 The only process permitted at Unit Level is 'touch-up' painting to repair small damaged areas using the touch-up kits provided.

15 Complete re-spray is **only** authorised at approved facilities.

NOTES

(1) Masking of items or areas during painting is to be by use of paper adhesive tape, H4 7510-99-943-3238 with paper wrapping, H4 8135-99-943-2382, for large areas.

(2) Grease is not to be used for masking, since it leads to poor edge adhesion and contamination of prepared areas. This practice also leads to problems on windscreens and wipers.

CHAPTER 5
PAINTS FOR SERVICE USE

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INTRODUCTION

1 This chapter outlines the paint systems for service use, their applications and specific problems.

SAFETY

2 Materials and processes described in this AESP carry health hazards. COSHH and Risk assessments are to be made prior to initial use, and afterwards, as required by the regulations made under the Health and Safety at Work Act, 1974. Advice on safety aspects is to be read in conjunction with those chapters covering processes or materials.

Safety precautions

3 Solvents present in paints, paint thinners, paint removers and other surface preparation materials can present a health and safety hazard. Safety precautions must be observed in their use. Such hazards are dealt with in the manual of Health and Safety Management in ESO/REME and in Chap 2 while specific guidance for paint spraying is given in Chap 3 of this publication. General requirements are to avoid skin contact by use of protective clothing and skin protection creams, to prevent the inhalation of solvent vapours and paint droplets, and to prevent the accumulation of flammable vapours or liquids.

4 The following injunctions are listed:

4.1 Lead based paints are not to be applied by spraying, and are not approved for general use.

4.2 Paints and pre-treatment materials are to be applied, stoved or stored only in areas where the ventilation is adequate to maintain the vapours at an acceptably low level.

- 4.3 Face masks are to be provided and used where necessary. These are to be air fed with a supply of breathing quality air through special filtration, or fitted with suitable aerosol and/or vapour filters on the masks.
- 4.4 Paints with flash point below 32°C (90°F) are subject to the Highly Flammable Regulations 1972. The prescribed precautions must be observed in the storage, use and disposal of these materials. Spraying of such paints requires specialised conditions, precautions and equipment which are outlined in HSE Guidance Notes EH 9 and EH 16.
- 4.5 In all cases of paint application but especially when application is by spray, the ventilation and working situations must be designed and checked to ensure the concentration of solvents in the workshop atmosphere is maintained as low as practicable and at least below the appropriate control limit, typically 100 ppm. Occupational Exposure Limit (OEL), or in some cases Maximum Exposure Limit (MEL) must be observed.
- 4.6 When spraying of most in service paints, the mandatory air movement in the application zone must be maintained, at 0.7 m/s minimum, with the discharge to open air at a point where no hazard is presented to other personnel. If practicable, the preferred type of extraction system using filtration and washing of the extract air is to be used. For paints containing isocyanate curing systems, e.g polyurethane paints, the air movement is to be 0.9 m/s minimum.
- 4.7 More detailed safety precautions are given in Chaps 2 and 3 of this publication and in the Manual of Health and Safety Management in Equipment Support Organisation ESO/REME Units.

PAINTING POLICY

- 5 Maintenance painting of Army equipment is performed so that the removal of sound paint coatings is avoided but replaces paint coatings that does not perform the required functions. A full re-spray of Army equipment is only authorised at compliant facilities. Army Units without compliant facilities are only authorised to perform patch or repair of coatings.
- 6 Where the AESP or design authority for an equipment specifies a more stringent or special purpose painting requirement, the specified coatings can be applied, however these could be subject to confirmation that the normal in service scheme is not acceptable.

DEFINITIONS

Overpainting

- 7 The painting on top of a complete and sound existing paint system is permissible only to change colour or effect.

Patch or repair painting

- 8 Coating repair of only the areas of equipment from which paint is damaged or has been removed is performed with a coating system conforming to Def Stan 80-208.

GENERAL REQUIREMENTS

- 9 The prime function of the paint system is protection, by preventing substrate metal from corroding. The integrity of the coating, no matter how well applied, has a finite life, in general between three to five years, various factors combine to break down the paint system, e.g weather and the environment. The technical decision for maintenance painting should be based on the Painting Policy given at Para 8 and in Chap 1.

10 Military vehicles and equipments are to be painted with coatings that possess properties including Infra-Red Reflectance (IRR) and resistance to Chemical Agents. These coatings must also comply with the Environmental Protection Act (EPA), unless otherwise specified for technical reasons. IRR provides camouflage protection against near infra-red viewing and photography. A Chemical Agent Resistant Coating (CARC) produces a hard surface finish that is impervious to chemical agents thus aiding decontamination. Any addition of small quantities of other paints or pigments will destroy these properties. The addition of other paints to IRR and/or CARC compliant paints is therefore prohibited. The IRR paint system which is also CARC compliant is to Def Stan 80-208.

11 The coating conforming to Def Stan 80-208 is the standard coating to be adopted for the exterior of all vehicles (including armoured vehicles) and equipment. The coating is also suitable for vehicles subjected to frequent immersion in water (e.g Beach Recovery Vehicles). It will be applied in NATO green and is compliant with the EPA. Exceptions to this policy are detailed at Para 14 of Chap 1.

12 Other paints in general use are:

12.1 Paint pre-treatment (BS 2X 32) is a two part acid etching primer for use on aluminium and aluminium alloy substrates. The etch primer is applied to substrates where the surface has been exposed from the cleaning process.

12.2 High gloss finish, to Def Stan 80-209 is a standard coating for interior compartments of vehicles or for equipments or vehicles that require a high gloss finish with Chemical Agent Resistance. The finish is usually applied as a single coat which as a paint system is capable of retaining its colour, reflectivity and integrity for much longer service time and is not discoloured or removed by oils and most solvents.

12.3 All vehicles, in due course will have white polyurethane finish as an internal paint finish. There are, however, exceptions due to type and role of some armoured vehicles:

12.3.1 Aluminium armour vehicles, e.g CVR(T), are to be painted with the polyurethane system, white, Def Stan 80-209, on hull floor, including the gearbox, engine, battery and fuel compartments, and to a minimum of 10 cm up from the floor. The remaining interior surface is to be finished with either the aluminium finish (Para 12.4), or with the polyurethane system. If the Aluminium finish is used, it is not to be applied to areas that are subsequently covered with foam padding, because of poor adhesion.

12.3.2 Other light armoured vehicles: Internally Warrior AFVs have Dark Green, BS 381C No. 241, polyurethane finish, MRLS has an eau de nil, BS381C No. 216, epoxide finish, Saxon and BV206 are given the same finish as their exteriors. The required colour and finish, therefore, is to be checked with the specification, although the majority will be as given in Para 12.2.

12.4 A coating for interior surfaces is a leafing aluminium finish, air drying version to Def Stan 80-9. This coating is used where flame resistance is required and is easier to apply being single pack but lacks cohesion and causes smearing onto clothing and equipment. It does not allow adhesion, e.g in adhering foam padding, has a poor light reflectivity, cannot be easily wiped for cleaning and hygiene, and tends to hold dust, often of toxic nature from weapons firing.

12.5 Non-slip coatings; applied to the exterior top surface of all 'A' vehicles. The in-service material to Def Stan 80-213 has a grit additive and is compatible for application over the IRR Matt System.

PAINT SYSTEMS GENERAL INFORMATION

13 A single paint will rarely possess all the properties required for the anticipated service requirements. Therefore, the specified standard formulates a system which usually comprises a priming coat, with one or more intermediate coats, and finishing coats. Maximum protection and durability is generally provided by

a multicoat system of primer and finish.

13.1 The colours and types of paints to be employed in the finishing of vehicles, equipment and stores are listed at Annex A.

Etch primer

14 The etch primer gives a thin coating, in which the acidic component etches and passivates the metal surface. It is essential over non-ferrous metal to provide a key for subsequent coats. The pre-treatment or etch primer is applied to a metal surface to improve the performance of a priming paint. It is NOT a substitute for the appropriate primer, although it can be used in this respect where weight is important, i.e. for certain airportable stores. This primer consists of an acid component and a base component which, once mixed, has a pot-life of eight hours. The primer reacts with the surface of the metal to form an inactive surface. Approximately one hour after application this primer dries to a thin translucent coating and provides a very good bond for the normal primer. The primer coat is to be applied over the etch primer within 24 hours. For Army equipment, the etch primer is only applied over items that are grit blasted.

Primer

15 The priming coat as its name implies is the first coat of this system, it should wet the surface thoroughly, adhere well, and provide a good foundation for later coats. The choice of priming paint, which must be corrosion inhibitive, mainly depends upon the type of metal and its surface condition, e.g. a zinc rich primer provides electrolytic protection for aluminium, if corrosion does occur the zinc will corrode rather than the aluminium. It is important that the primer is compatible with the surface to be coated, for example a lead based primer is not to be used in contact with aluminium, otherwise corrosion may form due to the interaction of dissimilar metals in contact.

16 A primer coat is also used as a sealer coat to seal an old existing paint system.

Finish

17 The final or finish coat is formulated to provide durability, colour and the required degree of gloss Chemical Agent Resistance and IRR properties.

Fillers

18 Fillers are used to rectify accidentally damaged areas or minor depressions. They are not to be used over large areas or for altering the contour of the surface, and are usually supplied in the form of a thick paste for knifing into depressions. They are also frequently referred to as stoppers, putties and filling pastes. Some types of fillers also possess anti-corrosive properties.

19 The filler is to be compatible with the paint scheme being used, and is to be suitable for the conditions of use. The filler is to be applied locally by knife after cleaning and priming the area. Excess quantities of stopper are to be removed by manipulation of the knife, or suitable instrument, to leave an approximately level surface free from uneven patches and grooves. After drying for the specified time, the filler is to be rubbed smooth ensuring no damage to adjacent paintwork. Before applying further coats of paint appropriate to the scheme all residue of the rubbing down is to be removed, and any damage to the priming coats is repaired.

PAINT TYPES

Single pack materials

20 The single pack paint in its liquid form consists of a complete binder or resin material dissolved in a suitable solvent with a pigment or pigment mixture dispersed in it.

21 Single pack paints, which include most oil based materials, tend to form films of relatively low hardness and general durability. Drying or curing occurs by solvent evaporation followed by oxygen reacting with the binder to complete polymerization. It should be noted that drying in poor light may result in yellowing of some autoxidizing materials, although this will be neutralized on exposure to natural daylight. These may be air drying/curing or require heat (i.e stoving) to complete polymerization.

21.1 Care must be taken to avoid drying in confined spaces when cadmium or zinc surfaces are adjacent, as traces of organic acids evolved during the drying process may give rise to corrosion. These acids, e.g formic acid are given off in detectable amounts for at least 12 months.

21.2 Due to their nature, careful attention is needed when overcoating these paints. When very thick coatings are required they can be built up by the application of several coats of normal thickness, allowing adequate drying time for each coat since the dried film is no longer soluble in its original solvents.

21.3 Care should be taken that the cooling of the surface by solvent evaporation does not depress the temperature of the surface. The correct balance of solvents is therefore essential and the use of anti-chilling thinners in accordance with manufacturer's instructions may be necessary. Extremes of temperature affect the drying of lacquers less than some other types of coating, but may be more likely to cause spraying defects.

22 Water-based paints are available in two types. One type where the binder is dissolved in the water, and the other type where it is dispersed in water. A typical example of the former, is a distemper, and of the latter, an emulsion paint. The definition of what constitutes solubility tends to blur the distinction between them, but usually water-soluble media are perpetually re-soluble whereas dispersions are often insoluble in water after drying. The limitations of water solubility reduce the utility of distemper-like materials, except for temporary camouflage, and dispersions are much more likely to be encountered. However, stoving water-soluble media are available which, after heating, become insoluble. Dispersions, in general, dry by evaporation of water and subsequent coalescence of the dispersed phase. They may also be encountered as electropaints where the object to be painted is made an electrode on to which the dispersed particles are deposited and subsequently cured by stoving. If necessary, water-based paints may be thinned with tap water unless the manufacturer's instructions state otherwise. Some materials may be water borne but the binder oxidises in contact with air, similar to solvent borne paints.

22.1 Care must be taken to ensure adequate cleaning and drying of painting equipment after use, since in some cases rust staining may affect subsequent painting.

Stoving paints

23 When stoving versions of the in-service paint schemes are used, stoving is to be carried out at the temperature and for the time required in accordance with the relevant specification in an approved stoving oven. The critical factor is not the temperature of the oven but the actual temperature which the paint film acquires. Large and heavy components will require a longer time to reach the required temperature and it is essential that the correct time is allowed after the component has attained the approved stoving temperature.

23.1 Each coat of paint is to be allowed to flash-off in a dust-free atmosphere before stoving for the time recommended by the paint manufacturer. In order to avoid possible poor intercoat adhesion, with certain types of stoving materials it is advisable to only partially stove preliminary coats and complete the curing process of the system by full stoving of the final coat.

23.2 Waste gases from the heating system are to be excluded from the stoving oven. Ovens used for stoving paint materials are to be adequately ventilated. Before different paints are stoved in the same oven at the same time, it is advisable to ensure that different paint systems do not adversely effect each other.

23.3 Since the drying process involves the uptake of oxygen, the thickness of the film influences the drying and care shall be taken to ensure that excessively thick coatings are not applied. When very thick coatings are required they must be built up by the application of several coats of normal thickness, allowing adequate drying time for each coat. No attempt must be made to apply very thick coatings in one operation. The paint suppliers provide information regarding practical film thickness limits.

Multi pack materials

24 Multi-pack chemically cured paints are often more durable and afford better protection, but are more difficult to use. Before use, the various parts of a multi pack system, are mixed in the specified proportions, thoroughly stirred prior to their use. Drying occurs by a chemical reaction between the components, normally after mixing and therefore the material has a limited useful life known as 'Pot Life'. Multi pack materials are not to be used after the specified Pot Life. The particular solvent for the paint is normally to be used to clean equipment after use.

25 All parts of a paint system are normally compatible with each other. Compatibility of paints in different paint systems are to be checked before they are used, this can be checked with TES MIG. All component paints of a multi pack system are to be supplied by the same manufacturer.

SURFACE PREPARATION

26 Surfaces are cleaned to remove any extraneous or undesirable materials deposited during manufacture, storage or service. Correct preparation is essential to achieve good adhesion, corrosion resistance and maximum coating life. Def Stan 03-32 specifies the method of preparation for different metal surfaces, the technique of which is given in AESP 0200-A-209-013.

27 If overpainting is required, the existing paint is to be cleansed of all surface contaminants such as dirt, grease, fuel etc and smoothed down by an abrasive process to provide a suitable key for the overcoat of paint.

PAINT PREPARATION AND MIXING

28 The quality, sheen and colour of the paint coating will depend on the degree of mixing prior to application. The different constituents of a paint, over a period of time, settle to form layers and it is important that before use they are evenly mixed, i.e homogeneous, before application. Mixing procedures will vary between different types of paint, but regardless of the procedure, care must be taken to avoid the incorporation of excess air. Mixing is done by either manual or mechanical methods.

29 **Manual mixing.** This is less efficient than mechanical methods in terms of time, effort and results. It should be limited to containers no larger than 5 litres. The stirred paint must be completely blended with no evidence of variable coloured swirls at the top, nor is there to be evidence of any lumps indicating the presence of undispersed solids or foreign matter.

30 **Mechanical mixing.** This ensures maximum uniformity, and greatly reduces time and labour. The two commonly used types of mixers are those which vibrate or rotate the full sealed container, and those which utilize propellers inserted into the paint container. The choice of which to use is dependent on the type and quantity of containers in which the paint is supplied and availability of the equipment. It is important that units which have high usage rates of paint employ a means of mechanical mixing and ensure that operators are trained in its use.

PAINT APPLICATION METHODS

31 Paint application can be divided into three main categories, dipping, spraying and brushing. However, most service painting is by brush or spraying techniques.

32 **Brush painting.** The most versatile method of application, gives a smooth finish, clean and economical with materials. It is a slow process especially on large or textured surfaces and not suitable for fast drying paints over large areas.

33 In order to obtain the maximum protection from a paint system, the first priming coat is often applied by brush. Particular attention should be paid to bolt heads, welds, corners and crevices. The paint is to be applied as evenly as possible over peaks or projecting areas. It is good practice, and may be necessary, to apply more than one coat of primer to achieve this condition.

34 **Spray painting.** This is generally the most suitable method to use for maintenance painting of equipment. The principle of spraying is to atomize the paint into small droplets projecting them into the surface to be painted, they then coalesce and flow out to give a smooth finish. Atomization may be achieved by compressed air jets or by hydraulic pressure in the paint, with the paint supplied by suction or pressure feed, and electrostatic charging may be incorporated to give all round coverage.

34.1 **Conventional spraying (pneumatic).** Air and paint are supplied separately to the gun and are discharged from different orifices. The jet of paint is broken up into a circular cloud of droplets by the emerging air. Further air jets from the side wings flatten this circular pattern into an elongated pattern. This process is much faster than brushing and gives an appearance of high quality, however, there is more wastage of materials and solvents, which necessitate greater control by extraction, trapping and management procedures.

34.2 **High volume low pressure air spraying.** The design of spray guns that use low pressure air e.g 7 to 15 lb/in.², to both atomize and deliver the paint. These use higher volumes of air but at the lower pressure which results in lower overspray and a greater control of spray pattern and paint thickness. When combined with electrostatic, the lower particle speed assists wrap round of the paint.

34.3 **Air assisted spraying.** The paint is atomized by hydraulic pressure lower than that of airless spraying. Low pressure air is fed round the airless tip to give a fan control. This system has the advantage of the airless system clean environment and the fan control of the conventional system.

34.4 **Electrostatic spraying.** The metal surface to be sprayed is earthed and the paint droplets given a high electric charge as they leave the nozzle of the spray gun so that they are attracted to the equipment being coated. Uniform coatings are produced as deposition will only occur on conducting areas where an insulating thickness has not been attained. Small objects are coated by a wrap around effect, normal spraying skills must be applied to larger objects. This process is ideal for intricately shaped objects with the exception of crevices.

34.5 **Airless spraying (hydraulic).** Paint is supplied at high pressure up to 3500 lb/i.² to the gun and is forced through a narrow orifice at the tip where atomization takes place. It has the advantage over conventional spraying in that there is minimal bounce back or fog created when the paint hits the surface. This produces a much cleaner painting environment and reduces wastage by excessive overspray. The process is up to 30 times faster than brushing, but the high velocity jet does constitute a hazard. The paint may be heated to aid both spraying and curing and variations exist in which compressed air is used to modify the spray pattern.

Control of paint coating

35 The two methods for controlling the coating are based on control of wet-film thickness and determining dry-film thickness of the cured coating. Dry-film thickness is the final requirement but the measurement of wet-film thickness is often convenient as a quality control procedure. The coating supplier or manufacturer should provide data for the wet and dry-film thicknesses for the coating system to be used. Using wet-film-thickness measurement, it is possible to detect departures from specification requirements and to correct them during the application process.

36 Some of the common paint application defects and their causes are given in Table 1.

TABLE 1 PAINT APPLICATION DEFECTS AND CAUSES

Ser	Potential Defects	Determined by	Cause	Action	Comment	
(1)	(2)	(3)	(4)	(5)	(6)	
1	Over-thick areas, sagging, curtaining.	Visual and/or instrumental comparison.	Failure to brush out properly or too heavy spray application.	Scrape off excess, wipe off while still wet, or otherwise remove. Re-prime to give the correct thickness.	Particular attention is required to ensure that each primer is not applied too thickly. Loss of adhesion to subsequent coats may occur.	
2	'Dry spray'.	Visual or touch.	Incorrect spraying technique or incorrect mixing.	If noticed at time of application, brush surface with hard bristle brush and re-apply. If noticed at a later stage, re-blast and re-prime.		
3	Corrosion products.	Visual.	Too long storage in primed state.	(1) If rusting or rust spotting, re-blast and re-prime. (2) If zinc corrosion products show on a metallic zinc primer, especially in a sheltered situation, scrub with fresh water and dry.		
4	Colour change or soft paint near welds.	Visual or touch.	Non-removal of welding flux, residues have saponified the paint.	Remove all the affected paint, by most appropriate method, to bare metal. Scrub affected areas with water and mild detergent, rinse thoroughly and allow to dry. Re-prepare surfaces as specified and prime immediately.		
5	'Orange-peel' effect.	Visual.	Poor spraying techniques.	Correct all adjustments to spraying equipment and operator technique.		May be difficult to avoid with thick paint.
6	Lofting, wrinkling, etc.	Visual.	(1) Incompatibility of solvents with the state of the previous coat. (2) Wrong interval between coats. (3) Drying conditions too fast. (4) Surface contaminated. (5) Over thick coats.	) ) ) Reduce all affected paint by most suitable means to a firm sound substrate and replace all coats as necessary.)))))	

STORAGE

37 Paint is to be stored as laid down in Fire Prevention and Fire Fighting Regulations - Army Department (Army Code 60737) Section 4, see also Materiel Regulations Vol 9, Pam 1 and appropriate product safety data sheets. The store is to be designed to maintain the paints in the temperature range 10 to 15°C as advised by leading suppliers of paint to MOD specifications, and within the extreme range of 5 to 35°C under difficult conditions.

38 All paints of MOD issue are supplied ready for use (ie thinners are not required) other than mixing of multi pack products. Failure to mix paints properly can result in unevenness and variations in paint film performance. Long periods of storage can cause separation and settling; it is essential, therefore, that all paints are thoroughly mixed before use. Paint cans are to be inverted to offset settling, at approximately monthly intervals on a routine monitored schedule. The inversion of the paint containers may be omitted where storage times are short due to usage and where modern mechanical paint mixing equipment is available and in use. Thinning should only be performed in accordance with the manufacturer's instructions. If the paint is not suitable for application after this addition it is to be regarded as defective, and an Equipment Failure Report (EFR) should be submitted for possible investigation.

39 Paint is normally required to comply with its specification for at least one year but most paints can be stored for longer periods provided the storage conditions are maintained and regular product inspections are conducted. Units wishing to use paint that has exceeded its 'shelf-life' are to refer the matter to TES MIG.

COMPATIBILITY

40 Paints produced by different manufacturers are not compatible with one another. Paints shall be obtained as a system (e.g primer, undercoat, finish) from a single manufacturer in accordance with Def Stan 03-32, Part 1.

PAINTING REQUIREMENTS

- 41 The correct application of paint to equipment requires:
- 41.1 The correct paint system.
 - 41.2 The correct condition of the surfaces and environment.
 - 41.3 The necessary equipment for preparation and painting.
 - 41.4 The correct mixing of the paint before use
 - 41.5 Correct application of paint to the required dry film thickness.
 - 41.6 The correct drying times.
 - 41.7 Inspection before and throughout the paint application process.

PAINT SYSTEMS DETAILED INFORMATION

- 42 Unless otherwise specified, the exterior paint system will consist of:
- 42.1 One coat of primer to Def Stan 80-206 or Def Stan 80-207.
 - 42.2 One coat of finish or topcoat to Def Stan 80-208 or Def Stan 80-209.

Primers

Preparation of substrates

43 Surfaces to be painted are to have all loose paint removed by abrasive methods (see Para 8 Chap 4).

44 Where the existing paint film is not to be removed, it must be high pressure hot water/detergent washed and rinsed. All surfaces to be painted must be abraded by hand or mechanical methods. After abrading, all dust must be removed and any areas contaminated with oils etc, shall be degreased with a suitable cleaning compound (NSN ??).

45 Where areas of non slip walkway paint have been damaged, they must be repaired in accordance with Para 74.

Primer selection

46 Def Stan 80-206 zinc phosphate primer shall be prepared and applied in accordance with the manufacturer's instructions. The primer coat is applied to the following surfaces:

46.1 Prepared ferrous metal substrates.

46.2 Previously painted prepared substrates to seal the old existing paint scheme.

46.3 GRP and specified non-metallic surfaces (see Def Stan 03-32, Part 6).

47 Def Stan 80-207 zinc chromate primer shall be applied to non-ferrous metal substrates. Prepare the primer for application and apply the primer in accordance with the manufacturers' instructions.

Storage and handling of primed items

48 Primed items may be handled after 6 hours air drying under workshop conditions. Primer coatings to Def Stan 80-207 (zinc chromate) must be stored within the workshops. Items coated in primer to Def Stan 80-206 (zinc phosphate) may be stored externally after a minimum period of 12 hours air drying under workshop conditions. Outdoor storage shall not exceed 7 days. Primed items may be stored indefinitely under workshop conditions. However, they must be pre-prepared in accordance with Para 49 before overcoating. Further advice may be sought from TES MIG.

Overcoating aged primer

49 Primer coatings, which have aged beyond the manufacturer's recommendations, may be overcoated satisfactorily subject to the following conditions:

49.1 The primer surface is thoroughly cleaned and the primer surface is lightly abraded, or, alternatively:

49.2 The surface is thoroughly cleaned and then refreshed with a thin coat of Def Stan 80-206 or Def Stan 80-207 primer, as appropriate. However, the same overcoating times apply to the refreshed coat as the original primer coating.

Inspection of primer

50 Inspect the primer coating for appearance and defects. Primer must be removed from any unsatisfactory areas and the area recoated.

51 The primed equipment is then overcoated with an appropriate finish coat.

Finish coats (matt and gloss finishes)

WARNING (POLYURETHANE PAINTS)

PERSONAL INJURY. UNDER NO CIRCUMSTANCES MUST THE SPECIFIED QUANTITY OF ACTIVATOR BE EXCEEDED AS THIS WILL RELEASE FREE ISOCYANATES WHICH WILL INCREASE HEALTH AND SAFETY RISKS.

Finish coat selection

- 52 The gloss finish available in a range of colours is Chemical Agent Resistant. The matt finish also available in a range of colours is Chemical Agent Resistant and has appropriate IRR properties.
- 53 Surfaces to be painted must preferably have any loose existing paint removed by abrasive blasting or mechanical process to provide a key for painting. Surfaces painted to Def Stan 80-9 (Paint Aluminium Flame Resisting Air Drying Types: Brushing and Spraying) or Def Stan 80-11 (Paint, Aluminium, Flame Resisting: Stoving and Spraying) must not be overcoated.
- 54 Where the existing paint film is not to be removed, it must be high pressure hot water/detergent washed and rinsed. All surfaces to be painted must be abraded by hand or mechanical methods. After abrading, all dust must be removed and any areas contaminated with oils etc, shall be degreased with a suitable cleaning compound (see Chapter 4 and Para 44 above, of this AESP).
- 55 Where areas of non slip walkway paint have been damaged, they must be repaired in accordance with Para 74 of this Chapter.
- 56 A finish coat must be applied and allowed to dry in accordance with manufacturer's recommendations.

Application of additional coats of finish

- 57 Additional coats of finish (i.e an alternative colour) may be applied after the elapsed full drying time as detailed at Para 56 or may be applied wet on wet as follows:
- 58 A minimum of 30 minutes after application of the first coat of finish should be allowed prior to application of a disruptive pattern. The second coat of finish should be sufficiently applied to mask the first coat.

Overcoating aged finish coats

- 59 When the finish coat is required to be overcoated at a time period in excess of the maximum quoted at Para 56, then after cleaning down the existing finish coat, it must be abraded before application of subsequent coats to avoid loss of adhesion of the top coat. For further advice contact TES MIG.

Storage and handling of finish coated items

- 60 Whilst the coating is hard dry at 6 hours, it requires 48 hours to achieve maximum cure. During the intervening period, the coating must not be subjected to solvents, service fluids or outdoor weathering. The degree of handling will need to be determined locally (24 hours after force drying).

Application of low VOC non slip walkway paints

- 61 If the non slip walkway coating is required to be applied to the equipment it shall be applied over the finish to Defence Standard 80-208 as given below.

TYPES OF NON SLIP PRODUCTS

Coatings

62 In this type, abrasive particles are incorporated into the binding agent by the manufacturers. This type is in service as Walkway Compound, non slip, NATO Green to Def Stan 80-213, H1 8010-99-225-1558 (brushing grade) and H1 8010 99 466 3464 (spraying grade). Such materials may have binders or solvent blends that may not be compatible with existing finishes. The non-slip walkway paint is a compliant finish containing a suitable aggregate in a IRR, NATO Green finish. The preparation of the coating and its application must be in accordance with the manufacturer's instructions. Advice on forced drying conditions, if required, may be obtained from the paint supplier.

63 The non skid walkway paint scheme applied to suitably prepared and pre-treated substrates, including existing in-service vehicle paint scheme, consists of:

- 63.1 One coat primer to Defence Standard 80-206 or 80-207.
- 63.2 One coat finish to Defence Standard 80-208 NATO Green IRR.
- 63.3 One coat non skid walkway paint to Def Stan 80-213 NATO Green IRR.
- 63.4 One coat finish to Defence Standard 80-208 (alternative colour) in disruptive pattern if required.

Preparation of surfaces

64 Application to Def Stan 80-208 paint scheme. Provided the surface of the polyurethane finish (Def Stan 80-208) is clean and more than 16 hours, but no more than 72 hours, have elapsed from the application of the finish to Defence Standard 80-208, then the new non skid walkway paint may be applied.

65 Where more than 72 hours have elapsed from the application of the finish to Defence Standard 80-208, then the finish should be lightly abraded prior to application of the new non skid walkway paint.

66 Surfaces that are already coated with a compatible paint need only to be cleaned and, if with a gloss finish, lightly abraded to give a matt finish. Compatibility checks can be performed by the trialling the coating application on a small test area of the equipment to be coated. If the existing paint surface is not compatible with the non slip material, then the existing coating may have to be removed or the non slip material changed for a compatible one. TES MIG is to be consulted for advice on compatibility of the proposed non slip material.

67 Application to non compliant one pack paint scheme. Where the non skid walkway paint is required to be applied over the existing in-service one pack vehicle paint scheme, the surface shall be prepared and primed with one coat primer to Defence Standard 80-206 in accordance with Para 46. The original paint film must be at least 30 days old prior to overpainting.

Application

68 Spraying is the preferred method of application and shall be performed in compliant facilities and in accordance with the manufacturer's instructions.

69 At the end of painting, all equipment should be cleaned out as instructed by the paint manufacturer and performed in a controlled environment.

Application of additional coats of non slip finish

70 A coat of non-slip paint may be applied without further pre-treatment, provided that the overcoating

interval is greater than 16 hours, but less than 72 hours.

71 Where more than 72 hours have elapsed prior to application of the non slip walkway paint finish, then the surface should be cleaned, prior to application of a further coat of the new non slip paint.

72 After application of the final coat of the non slip finish, the item must remain in the spray booth with the extraction in for a minimum of 30 minutes.

Storage and handling of finish coated items

73 Whilst the coating is hard dry at 16 hours, it requires 48 hours to achieve maximum cure. During the intervening period, the coating should not be subject to solvents, service fluids or outdoor storage. The degree of handling that the coating will accept up to 48 hours after application will need to be determined locally (24 hours after force drying).

Maintenance of non slip coating

74 Severe use by tracked vehicles can result in small patches of the coating being worn or torn away. To repair such patches, the exposed substrate is to be cleansed and its edges feathered out by abrasion. If the base metal is exposed, the whole substrate paint system is to be restored followed by brush application of the non slip system. If only the substrate paint coating is exposed, then only the non slip system is required on the patch. Curing times, overcoating times and environmental conditions are to be maintained as for the original applications.

Adhesive pads or mats

75 Adhesive backed mats or rolls of fabric faced with a suitable rough finish, for example, 3M safety walk.

Metal sprayed spatter type

76 A metal sprayed coating is deliberately laid down with settings that give a rough spattered finish. Usually zinc or aluminium is used which also imparts corrosion resistance but other metals can be used. Also flame sprayed plastic coatings loaded with abrasive particles are available.

Broadcast type

77 The binding agent is applied to the surface, often over a buffer coating, and the abrasive material is broadcast over the wet binding agent. Suitable sets of materials are not in service but use of appropriate in service grits and paints is possible. The broadcast type systems may use one or two part binders but usually these are two part materials based on epoxy or polyurethane resins. This type does allow easy control of the distribution of the mineral particles and use of any desired grading or composition of particles.

78 Two part binding agents require careful proportioning of the components and thorough mixing. Preparation of the substrate and application under suitable environmental conditions are important to achieve good adhesion and curing.

Heavy traffic duty finishes

79 For heavy duty of long duration, a multi-coat system is applied as shown in Fig 1. In this, the grains of abrasive material that impart roughness to the surface are cushioned against crushing by a layer of buffer coat. This buffer coat is to be allowed to cure adequately before applying the second coat (bedding coat) to which the abrasive is added. After the bedding coat is cured, a third coat, sealing coat, is added to ensure the abrasive grains are completely sealed into the coating.

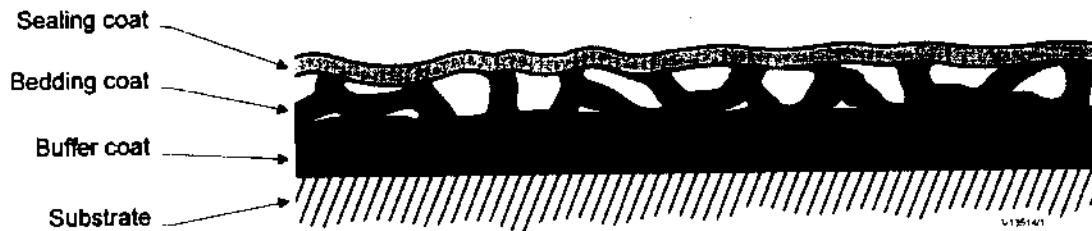


Fig 1 Section through heavy duty multi-layer finish

EXTERIOR GLOSS FINISHES

80 When a high gloss finish is required, the paint, if possible, is to be applied by spraying. For normal service vehicles requiring a high gloss finish, the system to Def Stan 80-209 is to be used.

STOVING EPOXIDE PAINT FOR SMALL ARMS

81 The cleaning, repainting and protection of small arms is detailed in AESP 1000-A-003-013, using the paint to Def Stan 80-56 (H1 8101-99-224-5187). A complete overhaul and repaint is only performed by a MOD Approved contractor at the contractor's facilities.

82 Minor damage to the paint coating may be repaired at Unit level, using Suncorite 259, Protective Coating, Ferrous Metal (H1 6850-99-224-8265). The use of this material is to be restricted to minor paint damage and it is not intended for use in place of the stoved epoxy finish to Def Stan 80-56.

UNDER-FLOOR PROTECTION FOR THIN SKINNED VEHICLES

83 The two types of material are listed below, however, additional details are given in Chap 6 of this AESP. This paint provides under-floor protection for ferrous and non-ferrous substrates where corrosion might follow damage from flying road spoil.

83.1 Water based material to Def Stan 80-168, H1 8030-99-220-3233, (25 litre).

83.2 PX 28 solvent based, corrosion preventative, POL 8030-99-657-7708, (25 litre).

84 When renewing damaged or worn under-floor protection apply coatings of water based material to Def Stan 80-168 to top of an existing system of solvent based material. The surface to which the protection is to be applied is to be clean and free from dirt, oil and grease etc and be in such a condition that no softening or lifting occurs.

85 The material can be applied by heavy brush or trowel to give a minimum dry thickness of 2.5 mm. It will take at least three days drying at workshop conditions before the equipment can be exposed to normal working conditions.

86 All joints between panels, crevices and any other details which could entrap moisture or be subject to road spoil thrown up from the vehicle wheels are to be protected by the coating.

87 Unless otherwise stated in equipment AESPs the protective coating is to be applied to the exposed surfaces of all metal less than 3 mm thick including:

87.1 Underside of floors including bases of storage boxes and lockers.

87.2 Floor framing and support brackets.

87.3 Underside of mud-wings or mud-guards.

- 87.4 Valances and wheel arches.
- 87.5 Fuel tanks (bottoms only).
- 87.6 Air reservoir (bottom only).
- 87.7 Axle casings and differential housings.
- 87.8 Chassis brackets and frame members.

88 Working parts or moving surfaces, e.g propeller shafts, springs, shackle pins, lubricating nipples, brake gear, flexible hoses, protective rubber boots, drive joint housing, battery leads, etc are to be fully masked to prevent the application of the protective coating. The masking is to be removed after the coating has dried. Under-floor protection must not be applied to rotating items or exhaust systems.

BATTERY COMPARTMENTS

89 The system to be applied is of one coat primer and one coat of finish paint to provide a protective finish for wood, metal, asbestos cement and plasterwork that may come into contact with battery electrolyte. The finishing paint may also be used as a quick drying single coat that is resistant to dilute acids.

90 Surfaces are to be cleaned and pre-treated as indicated in Chap 4 of this publication.

91 Interior and exterior surfaces are to be primed with one coat of H1 8010-99-943-6190 (paint, priming, plasticized chlorinated rubber based, semi-gloss, neutral grey), and allowed to dry at workshop conditions for twenty-four hours. After drying, paint with one full coat of either H1 8010-99-943-4481 (paint, finishing, chlorinated rubber based, brushing, gloss finish, black) or H1 8010-99-943-4483 (paint, finishing, chlorinated rubber based, brushing, gloss finish, signal red), as appropriate.

EXHAUST SYSTEMS AND HEAT RESISTING PAINTS

92 Exhaust manifolds, pipes, silencers and interiors of heat deflecting shields are to be grit blasted to remove all rust and mill scale to provide a good key for painting. Suitable paints may be obtained from manufacturers, such as Firwood Paints Ltd., Oakenbottom Road, Bolton BL2 6DP, Tel: 01204 525231. The paint is to be applied and cured in accordance with the manufacturer's instructions.

93 On equipment or parts such as Field Kitchens and where there is a need to withstand temperatures up to 200°C: H1 8010 99 943 4662 (paint, finishing, general service, heat resisting, brushing), can be used. For temperatures up to 600°C, use paints from Firwood Paints (see Para 92).

WORKSHOP TOOLS

94 Tools can be painted, after pre-treatment, with paints specified in Para 42, if heat resistance is needed, otherwise use H1 8010-99-910-7000 (Paint, Finishing, oleo or alkyd resin based, to air drying, brushing, black, gloss finish, 5 litres).

DISTINCTIVE COLOURS

95 This section specifies the colour of the finish paint to be applied as a distinctive finish, unless otherwise stated in an equipment AESP or drawings. The single pack paint finishes at Annex A are high gloss alkyd systems to Def Stan 80-54 specification. For example:

- 95.1 Bridge sign plates. Plates are to be painted with H1 8010-99-910-7023 (Paint, Finishing, GS, gloss, light grey, 5 litres).
- 95.2 Convoy plates. Plates are to be painted with H1 8010 99 9010 7037 (Paint, Finishing, white).

ENGINE COMPARTMENTS

96 Interiors of vehicle engine compartments are painted with high gloss finish to Def Stan 80-209. The colour chosen will be such that presents a contrast to that of the power unit, but which is not likely to compromise the camouflage of the vehicle under field maintenance or repair.

ROAD MARKING PAINT

97 For use in aerosol form, normally with road marking machine, the following are available:

97.1 H1 8010-99-225-2009, 31 oz aerosol, white.

97.2 H1 8010-99-225-2008, 31 oz aerosol, yellow.

OTHER PAINTS

98 Further advice and information on other in-service paints not dealt with in this Chapter may be obtained from TES MIG.

DISPOSAL OF MIXED PAINT

99 Water based paint. The mixed paint may remain liquid even after the specified pot life period has elapsed. It is to be disposed of as liquid waste, in accordance with local regulations.

100 Solvent based paint. The mixed paint will normally solidify after 16 hours if left in an open container in the spray booth or controlled area. The reaction by-product is gaseous and could force the lid off, if sealed. The solid residue may be disposed as non-toxic waste.

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CHAPTER 6

PROTECTION OF UNDERFLOOR AND INTERNAL CAVITY AREAS OF THIN SKINNED VEHICLES

CONTENTS

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- 5 Corroded surfaces
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- 21 Application (WARNING)
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- 24 Exterior surfaces
- 25 Interior surfaces
- 27 Return to service

INTRODUCTION

1 This chapter deals with the application of underfloor protection for ferrous and non-ferrous substrates of thin skinned vehicles to prevent corrosion occurring after damage to the normal underfloor paint finish by flying road debris or by other physical attack. It also covers the anti-corrosion treatment of the interiors of box sections and other internal cavities.

SAFETY

2 Materials and processes described in this AESP carry health hazards. COSHH and Risk Assessments are to be made and safe working procedures established prior to initial use, and revised afterwards, as required by the Regulations made under the Health and Safety at Work Act, 1974. Chaps 2 and 3 gives general advice on safety and paint spraying.

GENERAL

External surfaces

3 External underfloor surfaces of vehicles are protected by a coating of the selected material in addition to the paint scheme specified for the vehicles. The material available in service is a water based material to Def Stan 80-168. This is codified as sealing compound, H1 8030-99-220-3233.

Internal surfaces

4 Internal surfaces of hollow sections of vehicles e.g the inside of chassis box sections and doors, are to be protected by an anti-corrosion coating in addition to any paint coating applied during the manufacturing process. The in-service material for the corrosion protection of interior surfaces is

- 4.1 Corrosion Preventive Compound, Undersealing, PX 28, POL 8030-99-657-7708, 25 litres.

Corroded surfaces

5 The protective coatings provided by the materials in Paras 3 and 4 do not remove or deactivate existing corrosion, although they may slow down its progress by restricting the uptake of moisture by the existing corrosion. Corroded ferrous surfaces which cannot be de-rusted by chemical or physical means; particularly internal surfaces, may be treated with a corrosion convertible product, such as:

5.1 Vactan. From Paco Systems, 18 Broadridge Close, Newton Abbot, Devon TQ12 1YE.
Tel: 01626 207064,

5.2 Neutrarust. From Neutra Rust International Ltd, Griffins Court, 24-322 London Road, Newbury, Berkshire RG14 1JX. Tel: 08451 308 803 or 01784 455 454.

6 These materials may be brushed or sprayed or in to surfaces where due to wetting agents present they will spread to cover and infuse into the corroded areas. The materials are water based, allowing equipment to be cleaned with water and have minimal health and safety problems with no particularly toxic constituents which allows them to be sprayed in conditions unsuitable for solvent based paints. In addition to the neutralising action, these materials contain an air drying acrylic lacquer which seals the corroded surface and may be overcoated by the protective coating materials given in Para 3 and 4.

7 Alternatively, corroded surfaces may be treated with zinc phosphate primer to Def Stan 80-206. Full coverage of the primer is necessary onto oil, grease and soil free surfaces with a drying time of six hours minimum before further overcoating with the appropriate top-coat.

UNDERFLOOR AREAS**Preparation**

8 The surface to which the protection is to be applied is to be as clean, and free from oil or grease as far as practicable in order to prevent lifting or softening of the protective coating. This usually may be achieved by use of a high pressure lance using a aqueous detergent, e.g cleaning compound detergent, H1 7930-99-225-3993, 25 litres.

9 If the surfaces are corroded, the corrosion is to be removed by physical or chemical action given in Chap 4. or alternatively treated with a rust converter, as described in Para 6 to 8. Following the treatment, the appropriate paint scheme for the vehicle will be applied before application of the underbody protection.

10 With this water based material to Def Stan 80-168 (Para 4), it is not necessary to dry the surfaces after aqueous cleaning, and already wetted surfaces can be expected to promote ease of application and improved coating coverage and adhesion.

11 The repair or renewal of worn or damaged underfloor protection can be performed by application of water based material over existing coatings of either solvent based or water based material.

Application

12 The material (H1 8030-99-220-3233) can be applied by heavy brush or trowel, or, if available, by specialised spray equipment. The aim is to produce a coating that will result in a minimum dry thickness of 2.5 mm. Such a coating will take three days to dry in workshop conditions before being suitable for normal duty.

13 The joints between metal panels, crevices and other re-entrant details which could trap and collect moisture, road soil or other debris are to be sealed and the surfaces protected by applications of the coating.

14 Except when otherwise required or directed by the equipment AESPs or other governing documents, the protective coating is to be applied to the exposed underfloor surfaces of all metal less than 3 mm thick including:

14.1 Underside of floors including the bases of storage boxes and lockers.

- 14.2 Floor frames and support brackets.
- 14.3 Undersides of mudguards and mudwings.
- 14.4 Valances and wheel arches.
- 14.5 Lower halves of fuel tanks.
- 14.6 Bottoms of air reservoirs.
- 14.7 Axle casings and housings of differentials/final drives.
- 14.8 Chassis brackets and frame members.

15 The protective coating is to be applied to cover the edges of adjacent surfaces to avoid corrosion initiating at the edges of the surface being protected.

16 Moving surfaces or working components are to be masked or otherwise prevented from being coated. This will include propeller shafts, springs, shackles and pins, clevis pins, lubricating nipples, flexible hoses, brake gear, rubber or plastic boots or gaiters, drive joint housings and battery terminals.

17 Exhaust systems are not to be coated with protective finishes because of their poor temperature resistance and combustibility.

18 If the coating is not prevented from covering items described in Para 14, the coating is to be carefully removed, which in practice may be more easily carried out after the coating is dry.

INTERNAL SURFACES

WARNING

HEALTH PRECAUTIONS. THE USE OF COMPRESSED AIR OR HIGH PRESSURE WATER IN CLEANING OUT INTERNAL SPACES WILL RESULT IN DEBRIS BEING BLOWN FROM THE VEHICLE. PERSONNEL INVOLVED WILL WEAR SUITABLE PERSONAL PROTECTIVE EQUIPMENT (PPE) INCLUDING FACE PROTECTION, AND NON-PROTECTED PERSONNEL ARE TO BE EXILED FROM THE AREA WHILST THE CLEANING IS CARRIED OUT.

Preparation

19 The internal surfaces to be protected are to be as free from soils, grease or oil as is practicable. Loose debris in enclosed sections may be removed by use of a compressed air line, taking full care to protect all personnel in the area particularly against eye damage. Washing out of enclosed areas with hot water and detergent may be preferred to remove loose soil and greasy deposits and will also be effective on road salt contamination.

20 Corroded areas may be treated as in Paras 5 to 7 for optimum protection and dried by blowing warm dry air through the enclosed spaces

Application

WARNING

TOXIC FUMES. THE SOLVENT IN THE CORROSION PREVENTIVE MATERIAL, PX 28, IS TOXIC AND FLAMMABLE AND SUITABLE PRECAUTIONS ARE TO BE TAKEN AS RECOMMENDED BY HSE GUIDANCE NOTE EH9, SEE PARA 3.

21 The protective material may be applied by brush, for touch up purposes but will be normally applied by airless or air assisted, pressure fed, spray. The ambient temperature is to be above 15° C and relative humidity below 70%.

22 Evaporation of the solvent from the confined areas of vehicles may be assisted by blowing warm dry air through the cavities. Drying of the solvent from the protective film is to be carried out in a suitably extracted area with equipment suitable for use in the presence of flammable vapours.

23 Cleaning and removal may be accomplished by use of white spirit or kerosene. Care is to be taken to prevent the build up of solvent vapours to a dangerous level from used cloths, or treated vehicles left in a non-ventilated area.

HOT WORK

Exterior surfaces

24 When welding, brazing or similar hot processes are used on vehicle underbodies, the exterior protective coating and the base paint coating are to be removed from the areas to be exposed to heat. After the work is complete, the paint and underbody protection is to be replaced as described in Paras 8 to 11.

Interior surfaces

25 The interior protective coating cannot generally be removed and will decompose on application of welding temperatures to give off smoke and carbonaceous gases. To reduce the possibility of flash fire and to avoid operators breathing the breakdown products, extraction is to be used, possibly with the aid of blown or compressed air, to induce an air flow through the cavities that will keep the decomposition products and fumes at a low level in the cavities and in the work area.

26 Restoring the preservation to interior surfaces after damage by hot work is carried out by respraying the interiors of the hollow sections after removal of as much of the carbonised coating as is practicable.

RETURN TO SERVICE

27 Vehicles may be returned to service when the solvent has been evaporated from the protective film. Unless otherwise indicated by the manufacturer, the coating scheme normally requires 7 days curing time after application of the final coat.

CHAPTER 7

APPLICATION AND REMOVAL OF TEMPORARY CAMOUFLAGE COATINGS (TCC)

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21	Disposal of TCC and remover waste
22	Containment and collection of TCC waste products
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INTRODUCTION

1 This chapter covers the application and removal procedures for the alkali removable temporary camouflage coating that conforms to Def Stan 80-215. The coating is applied over existing polyurethane finishes that conform to either Def Stan 80-208 (matt finish) or Def Stan 80-209 (gloss finish) to offer temporary camouflage properties on service vehicles and equipment.

SAFETY

2 Materials and processes described in this publication carry health hazards. COSHH and Risk assessments are to be made prior to initial use, and afterwards, as required by the regulations made under the Health and Safety at Work Act, 1974. Advice on safety aspects is to be read in conjunction with those chapters covering processes or materials in this publication.

GENERAL

3 Application of TCC onto existing longer lasting polyurethane finishes allows the Units to transform the appearance of service vehicles from the original colour scheme into the required camouflage colours. The minimum useful life of this coating is around 6 months and after its useful life can be removed with a cleaning compound complying with Def Stan 80-218. Although the minimum service life of the TCC is around 6 months it is advisable that the maximum time in service is restricted to 12 months to facilitate the ease of removal.

Application and curing conditions

4 The conditions shall be above 5°C and a dry environment or in accordance with the manufacturer's instructions.

Soil and grease removal

5 Grease, soil and loosely adherent or degraded coats of paint may be removed by use of hot aqueous detergent e.g H1 7930-99-225-3993, applied by high pressure water lance, self-contained washing machine or in an agitated tank type cleaner followed by rinsing, if necessary, and drying.

TCC APPLICATION

6 Ensure the vehicle or equipment is thoroughly dry and allowed to reach the specified minimum temperature before paint application.

7 Allow the paint materials to reach the specified minimum temperatures.

8 Identify the areas for masking and mask these accordingly.

9 Thin and mix the paint in accordance with the manufacturer's instructions. Only mix the quantity required.

10 Apply the paint in accordance with the manufacturer's instructions to the wet film thickness recommended by the manufacturer to achieve satisfactory colour change of the equipment.

11 On completion of the painting, wash all equipment used, with water and subsequently with a suitable cleaner that is miscible with water.

DRYING

12 Where possible allow the TCC to dry under the conditions specified at Para 4.

13 Where there are facilities capable of force drying, then the conditions shown in Table 1 may be used as a guide. It is recommended that trials are carried out under the supervision of TES MIG before establishing force drying schedules for specific workshops/items.

TABLE 1 TCC DRYING TIMES - FORCED DRYING

Force drying Temperature (1)	Flash off period (2)	Force drying period at temperature (3)	Cooling down period prior to overcoating (4)	Maximum overcoating period (5)
40°C	15 minutes	20 minutes	45 minutes	48 hours
70°C	15 minutes	10 minutes	1 hour	48 hours

NOTE

Forced drying. The force drying figures quoted in this document are for guidance only and assume that the work-piece has attained the agreed time/temperature schedule not just that of the air temperature of the force drying booth. Experience has shown that heavy metal objects rarely reach the stated oven temperature, which will result in under-cured paint films. If these are overcoated, the result could be unacceptable paint softening/blistering.

WASTE DISPOSAL

13 Any unused paint should be allowed to dry in controlled area and then disposed off in accordance with local regulations.

REMOVAL OF TCC

14 The application of TCC remover (7930-99-474-5700 (Ardrox 6025)), requires the following application equipment

- 14.1 Compressed air supply.-
- 14.2 High Pressure cold water power wash - set to maximum pressure.
- 14.3 Steps or staging for high vehicle roof areas
- 14.4 Pressure application rig with extension lance for TCC remover application.

NOTE

The TCC remover can be brushed, rolled or sprayed, however, spraying is the preferred more efficient option. The use of TCC remover is recommended to be avoided at temperatures below 5°C.

14.5 A variety of gel/foam application equipment is available throughout the MOD. This is available from WSS IPT.

14.6 Similar types of gel/foam applicators are specified by the Royal Air Force reference AP119F-1928-123.

14.7 In addition a variety of cold water power washers are available, again, suitable equipment is available from WSS IPT.

Preparation

15 Mask the vehicle or equipment to prevent water ingress. Position the vehicle or equipment on the wash bay or dedicated area over a collecting drain. On no account allow the vehicle wash off residues to enter into surface or foul water drainage system.

16 Do not wet the vehicle prior to the application of the TCC remover, as removal of the TCC is more efficient when the TCC is dry prior to application. In addition do not dilute the TCC remover prior to use.

Procedure

17 The TCC remover is to be applied in a thick even coating, starting from the bottom of the vehicle, concentrating firstly on wheels, underside chassis and under-wing areas. Application should then progress side to side and upward at a spreading rate of approximately 1 litre per metre². Extra care should be given to application to any intricate areas such as seams, headlight mountings, door handle recesses, chassis rails and radiator grills to ensure adequate coverage.

18 Allow the TCC remover an adequate dwell time of approximately 5 - 10 minutes. Once the coating has reacted it will show signs of breakdown by dripping off the vehicle and will be evident by the TCC colour in the breakdown waste products. The TCC is now ready for removal by high pressure water jetting.

19 Using the high pressure water lance proceed to wash off the TCC starting at the roof and topside of the vehicle, working side to side and downward using copious amounts of water to avoid white residues when the vehicle has dried.

20 Where the TCC has been over applied in recessed areas, some TCC may remain after the first wash down. These areas are to be treated by localised TCC remover application followed by agitation by a nylon bristle brush. Repeat Para 19 above until all TCC has been removed.

DISPOSAL OF TCC AND REMOVER WASTE

21 The disposal of TCC and remover waste is to be in accordance with local unit regulations. However the nature of the waste product involved prevents immediate discharge into foul water sewerage systems. Disposal can be facilitated by the following guidelines at all or selected unit sites:

Containment and collection of TCC waste products

22 The TCC waste product to be collected by a temporary bunded enclosure or collective drain. The collected waste product is to be transferred to temporary or static bulk storage tanks that are capable of holding a volume of up to 50,000 litres. A registered waste carrier to be contracted by units to periodically remove the TCC waste product by tanker (~24,000 litres). This will ensure safe transportation and treatment of the waste product. Further details of the current registered waste carrier can be obtained from the MOD Technical Authority (TES MIG).

Alternative methods of treating TCC waste

23 Chemical treatment. The TCC waste can be processed chemically by a PRC DeSoto Ltd SPEED unit. The unit is self contained and is capable of the total process TCC application, removal and waste treatment, producing water (approx 1000 litres per hour) which can either be recycled or disposed of in the foul water sewerage system. The unit is capable of pH adjustment, dosing of calcium carbonate, coagulating agents, and polymer that leads to sedimentation, which can be pressed and stored for future transportation to land fill (subject to local authority regulations). Further details of this unit can be obtained from the MOD Technical Authority (TES MIG).

24 Mechanical treatment. The TCC waste can also be processed by a mechanical processing unit manufactured by Kirton Ltd. This unit is containerised and allows the waste product to be pumped from a 250 litre holding tank to a filter press to remove particulate. The filtered waste is then passed through a further 'multi media' filter prior to entering a membrane plant that will filter water (approx 1400 litres per hour) suitable for recycling or discharge into the foul water sewerage system. The filtered particulate can be pressed and stored for future transportation to land fill (subject to local authority regulations). Further details of this unit can be obtained from the MOD Technical Authority (TES MIG).

CHAPTER 8
POWDER COATING PROCESS

CONTENTS

Para

- 1 Introduction
- 2 Safety
- 3 General
- 4 Workshop conditions
- 5 Paint removal and cleaning of equipment
- 12 Paint removal and cleaning of small arms weapon
- 19 Powder coating application and curing
- 21 Waste disposal
- 22 Re-assembly

INTRODUCTION

1 This chapter describes the procedure for powder coating pre-treated ferrous and non-ferrous service equipment. Powder coating produces a durable protective finish for Army equipment.

SAFETY

2 Materials and processes described in this publication carry health hazards. COSHH and Risk assessments are to be made prior to initial use, and afterwards, as required by the regulations made under the Health and Safety at Work Act, 1974. Advice on safety aspects is to be read in conjunction with those chapters covering processes or materials in this publication.

GENERAL

3 Powder coating material is a finely divided form of dry coating that is suitable for application by electrostatic spraying technique. The powder is electrostatically charged and applied onto the item to be coated. The item is then placed in a pre-heated oven which melts the powder particles and allows the particles to fuse and form a continuous film.

Workshop conditions

4 The conditions shall be in accordance with the manufacturer's instructions or have a temperature range: 15-23°C and humidity of 30-75%.

PAINT REMOVAL AND CLEANING OF EQUIPMENT

5 The cleaning, repainting and protection of equipment that is to be powder coated is contained in the relevant AESP that deals with the equipment.

6 Disassemble the equipment and remove plastic or wooden parts and parts which are not to be coated.

7 Degrease and remove paint from the remaining equipment using wet abrasive blast cleaning. Dry abrasive blasting with virgin brown alumina (60-80 mesh) or virgin white alumina (60 mesh) can also be used for removing paint. Remove the paint to the substrate to a surface standard of Sa 2½ (BS 7079).

8 Thoroughly wash in clean water and immediately dry.

9 Ferrous items are given a phosphate coating to the weight of Class II, Def Stan 03-11 level by the tank process or by the concurrent wet blasting and phosphating process, as described in EMER Wksp G500 and AESP 100-A-003-013.

NOTE

Non-ferrous components are **NOT** to be phosphated.

10 Thoroughly wash phosphated components in clean water followed by soaking in clean water to allow residual chemicals to be leached out.

11 Dry the components and allow to cool.

NOTE

Light alloy items are not to be heated at temperatures above 100°C for more than 15 minutes.

PAINT REMOVAL AND CLEANING OF SMALL ARMS WEAPON

12 The cleaning, repainting and protection of small arms weapon is detailed in AESP 1000-A-003-013.

13 Disassemble the weapon and remove plastic or wooden parts and parts which are not to be coated.

14 Degrease and remove paint from the remaining weapon using wet abrasive blast cleaning. Dry abrasive blasting with virgin brown alumina (60-80 mesh) or virgin white alumina (60 mesh) can also be used for removing paint. Remove the paint to the substrate to a surface standard of Sa 2½ (BS 7079).

15 Thoroughly wash in clean water and immediately dry.

16 Ferrous items are given a phosphate coating to the weight of Class II, Def Stan 03-11 level by the tank process or by the concurrent wet blasting and phosphating process, as described in EMER Wksp G500 and AESP 100-A-003-013.

NOTE

Non-ferrous components are **NOT** to be phosphated.

17 Thoroughly wash phosphated components in clean water followed by soaking in clean water to allow residual chemicals to be leached out.

18 Dry the components and allow to cool.

NOTE

Light alloy items are not to be heated at temperatures above 100°C for more than 15 minutes.

POWDER COATING APPLICATION AND CURING

19 Powder coating is to be performed by trained operators only. Mask off those areas that are not to be coated.

19.1 Use a dedicated powder coating booth in accordance with the booth manufacturer's instructions.

19.2 Apply the powder to the item to be coated in accordance with the manufacturer's instructions

19.3 Remove the coated item from the booth.

19.4 Stove the coated item in accordance with the powder manufacturer's stoving schedule.

20 Determine the dry film thickness of the coating on randomly selected items and ensure the measurements are within the manufacturer's recommended values.

WASTE DISPOSAL

21 Any contaminated powder coating should be disposed off in accordance with local regulations.

RE-ASSEMBLY

22 On satisfactory completion of the work, re-assemble the equipment in accordance with the relevant equipment AESP.

CHAPTER 9

APPLICATION AND REMOVAL OF PEELABLE COATINGS

CONTENTS

Para

- 1 Introduction
- 2 Safety
- 3 General
- 4 Workshop conditions
- 5 Painting and Cleaning of Equipment
- 12 Waste disposal
- 13 Removal of peelable coating
- 14 Disposal of peeled coating

INTRODUCTION

1 This chapter describes the procedure for application and removal of peelable coatings. The coating conforming to Def Stan 80-220 is applied over existing polyurethane finishes that conform to either Def Stan 80-208 (matt finish) or Def Stan 80-209 (gloss finish) to offer temporary camouflage properties on Service vehicles and equipment. Additionally, the coating will absorb and retain chemical agents on contact.

SAFETY

2 Materials and processes described in this publication carry health hazards. COSHH and Risk assessments are to be made prior to initial use, and afterwards, as required by the regulations made under the Health and Safety at Work Act, 1974. Advice on safety aspects is to be read in conjunction with those chapters covering processes or materials in this publication.

GENERAL

3 The peelable coating (to Def Stan 80-220) allows units to provide a chemical agent absorption coating with Infrared Reflectance (IRR) and optional solar heat reflectance (SHR) properties which will enable units at short notice to alter the colour pattern or signature of military vehicles and ground support equipment, for rapid deployment and out - of - area operations. The original paint schemes conform either to Def Stan 80-208 or to Def Stan 80-209. The coating is suitable for spray application and small areas can be repaired by brush application. The cured film is expected to have a service life of 12 months. At any time during its service and especially if the coating is contaminated, it can be readily removed or peeled away from the original paint schemes.

WORKSHOP CONDITIONS

4 The application conditions shall be in accordance with the manufacturer's instructions or have a temperature and humidity range 15-23°C and humidity of 30-75%.

PAINTING AND CLEANING OF EQUIPMENT

5 The cleaning and protection of the equipment or vehicle that is to be painted with a peelable coating, is contained in the relevant AESP that deals with the equipment.

6 Prior to painting with peelable paint, thoroughly detergent - wash and rinse in clean water and allow to thoroughly dry.

7 Mask off vents, wheels, tail lights, headlamps, wiper blades and identification plates prior to painting. Due to the nature of the coating, windows of vehicles may be painted and, once dry, may be cut to shape with a sharp blade, allowing a 15 – 20 mm overlap onto the glass. The residual area of coating on glass can be peeled and removed.

8 Prior to peelable paint application in workshop conditions, ensure that the surface of the equipment to be painted has reached the workshop temperature, and that the skin temperature of the equipment is not less than 15 °C and relative humidity ≤ 70 %. The peelable paint is water based and supplied 'ready for use' and should not require the addition of water as thinners.

Apply the peelable coating to all areas of the equipment using the coating manufacturer's recommended procedure (usually a pressure pot or airless spray system with a 2.2 mm gun tip, applied by a single cross pass) to a wet film thickness of 200 ± 30 µm. The wet film thickness can be checked at the time of application using a wet film comb gauge. On vehicles spray painting should commence on top of the vehicle and be followed by application to the sides. Complex areas may require an additional pass in order to obtain an adequate wet film thickness around sharp edges.

Where anti-slip properties are required on upper surface areas a further application using the manufacturer's version of anti-slip coating (complying with Def Stan 80-220 Table 2) shall be used. The anti-slip coat to be applied before the initial coat has cured.

9 Allow the coating to air dry cure under the conditions specified by the manufacturer. However the coating may be cured by force drying. Examples of air drying and force drying schedules are detailed in Table 1.

Table 1 Drying Schedules for Peelable coatings

Schedule	Time	Temperature ° c	Comment
Force Drying	30 mins	70 ± 2	Allow 1 hour cool down at 23 ± 2 °C
Air Drying	4 – 6 hours	23 ± 2	Increased air flow will reduce the coating drying time

10 Clean the application equipment by immediately flushing with copious quantities of clean water on completion of operations.

11 De-mask all areas after the appropriate drying schedule. Any damaged areas can be over-coated and repaired by brush application.

WASTE DISPOSAL

12 Any unused wet paint should be contained and allowed to dry, then disposed of as commercial waste.

REMOVAL OF PEELABLE COATING

13 Once applied correctly and allowed to thoroughly dry, the coating can be manually peeled off the equipment by cutting an edge and lifting the coating at a 90° angle to the surface of the substrate. Large flat surface areas should be effectively removed with ease, whilst complex areas may experience coating break, allowing residues to remain. The approximate time of removal for an AFV totally painted in peelable paint would require one man hour to remove.

Slight residues of peelable coating which remain on complex areas can be effectively removed using hot detergent pressure washing.

DISPOSAL OF PEELED COATING

14 The dry paint residues should be contained and disposed of as commercial waste.

COMMENT(S) ON AESP*

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Sender's Reference	BIN Number	Date
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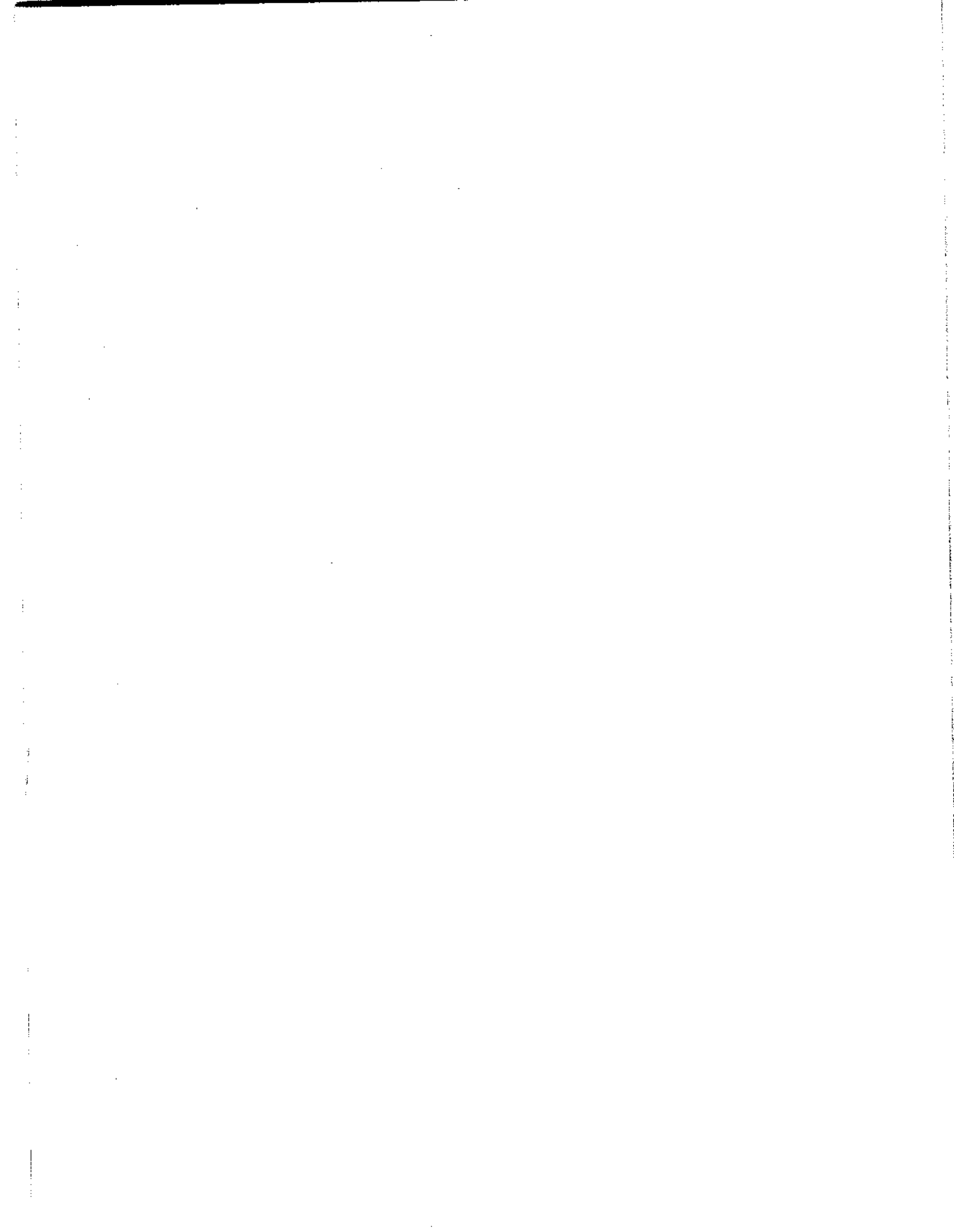
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* AESP or EMER





B VEHICLE CORROSION PREVENTION

This publication contains information covering the requirements of
Category 2 at information level 1 and category 5 at
information levels 2, 3 and 4

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2300-A-310-201

ARMY EQUIPMENT
SUPPORT PUBLICATION

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PREFACE

Sponsor: DG S and E
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INTRODUCTION

1 Any comments by service users on this publication should be forwarded through the channels prescribed in Army Equipment Support Publication (AESP) 0100-P-011-013. An AESP Form 10 is provided at the end of this publication; it should be photocopied and used for forwarding comments on this AESP.

2 AESPs are issued under UK MOD authority and where AESPs specify action is to be taken, the AESP will of itself be sufficient authority for such action and also for the demanding of the necessary stores, subject to the provisions of Para 3 below.

3 The subject matter of this publication may be affected by Defence Instructions and Notices (DINs), Standard Operating Procedures (SOPs) or by local regulations. When any such instruction, Order or Regulation contradicts any portion of this publication it is to be taken as the overriding authority.

RELATED AND ASSOCIATED PUBLICATIONS

Related publications

4 The Octad for the subject equipment consists of the publications shown opposite. All references are prefixed with the first eight digits of this publication. The availability of the publications can be checked by reference to the relevant Group Index (see AESP 0100-A-001-013).

Category/Sub-category		Information Level				
		1 User/Operator	2 Unit Maintenance	3 Field Maintenance	4 Base Maintenance	
1	0	Purpose and Planning Information	*	*	*	*
	1	Equipment Support Policy Directive	*	*	*	*
2	0	Operating Information	*	*	*	*
	1	Aide Memoiré	*	*	*	*
	2	Training Aids	*	*	*	*
3		Technical Description	*	*	*	*
4	1	Installation Instructions	*	*	*	*
	2	Préparation for Special Environments	*	*	*	*
5	1	Failure Diagnosis	*	*	*	*
	2	Maintenance Instructions	*	*	*	*
	3	Inspection Standards	*	*	*	*
	4	Calibration Procedures	*	*	*	*
6		Maintenance Schedules	*	*	*	*
7	1	Illustrated Parts Catalogues	*	*	*	*
	2	Commercial Parts Lists	*	*	*	*
	3	Complete Equipment Schedule, Production	*	*	*	*
	4	Complete Equipment Schedule, Service Edition (Simple Equipment)	*	*	*	*
	5	Complete Equipment Schedule, Service Edition (Complex Equipment)	*	*	*	*
8	1	Modification Instructions	*	*	*	*
	2	General Instructions, Special Technical Instructions and Servicing Instructions	*	*	*	*
	3	Service Engineered Modification Instructions (RAF only)	*	*	*	*

*Category/sub-category not published

Associated publications

5	<u>Reference</u>	<u>Title</u>
	JSP 375	MOD Health and Safety Handbook
	JSP 437	Personal Protective Equipment Catalogue
	JSP 515	Hazardous Stores Information System
	JSP 800	Defence Movements and Transportation Regulations Vol 5
	EMER T & M A 028 Chap 150	General Principles of Quality Assessment of Vehicles
	AESP 0200-A-100-013	Mandatory Equipment Inspection (MEI)
	Vehicle Inspectorate	Heavy Goods Vehicle Inspection Manual
	Vehicle Inspectorate	Public Service Vehicle Inspection Manual
	Vehicle Inspectorate	Car and Light Commercial Vehicle Testing Manual
	AESP Octad	For specific vehicle as necessary

WARNINGS AND CAUTIONS

6 WARNINGS

VEHICLE CORROSION PREVENTION PROCEDURES APPLICATION OF PX 28

- (1) **HEALTH HAZARD. PERSONNEL SPRAYING PX 28 ARE TO WEAR THE APPROPRIATE PROTECTIVE CLOTHING AND RESPIRATOR/BREATHING EQUIPMENT IN ACCORDANCE WITH MANUFACTURERS SAFETY DATA SHEETS AND/OR JSP 437.**
- (2) **HEALTH HAZARD. PERSONNEL ARE TO BE CONVERSANT WITH THE HEALTH HAZARDS AND SAFETY PRECAUTIONS CONTAINED ON THE SAFETY DATA SHEET PRIOR TO SPRAYING PX 28.**
- (3) **HEALTH HAZARD. APPLICATION OF PX 28 IS TO BE CARRIED OUT IN VEHICLE SPRAY BAYS/BOOTHES WITH BUILT IN EXTRACTION FACILITIES OR IN DESIGNATED AREAS AS APPROVED BY LOCAL HEALTH AND SAFETY MANAGEMENT, IN ACCORDANCE WITH REGULATIONS LAID DOWN UNDER THE H AND SW ACT 1974 AND LOCAL FIRE ORDERS.**
- (4) **FIRE HAZARD. AFTER SPRAYING PX 28 IN/ONTO A VEHICLE THE VEHICLE IS NOT TO BE USED/DRIVEN FOR AT LEAST FOUR HOURS. IDEALLY THE VEHICLE SHOULD BE LEFT INSIDE THE SPRAY BAY OVERNIGHT TO ALLOW THE PX 28 TO DRY OFF.**

7 CAUTIONS

- (1) **MASKING. Where necessary and before spraying, mask off any brake components, electrical wiring, plastic pipes/hoses and mechanical linkages etc.**

INTRODUCTION

1 This AESP details the corrosion prevention procedures to be carried out on green fleet B vehicles used in the Services as called for routinely in individual vehicle AESP Category 6 Maintenance Schedules or after any rectification work as necessary. Unit personnel carrying out either routine maintenance or rectification work are to ensure that any corrosion found is removed, using the appropriate equipment and complying with relevant safety precautions as necessary, before repainting or treating of affected areas. This AESP also gives details on the application of PX 28 to vehicles as a corrosion prevention measure. PX 28 is to be applied to vehicle types listed in this AESP by a specialist Painter and Finisher (P&F) MOD civilian or contract tradesmen in an authorised specialist vehicle spray bay/booth.

APPLICABILITY

2 This AESP applies to all green fleet B vehicles. Green fleet vehicles are those maintained in-house. Dual role vehicles, e.g. Ambulance Role Coaches, EOD vans etc, will remain an in-service responsibility. As a guideline, any vehicle with letters NB as part of the Equipment Asset Code shall be subject to in-service/contract corrosion prevention. In instances where cabs or bodies are manufactured from non-metallic materials, (fibre glass, plastic etc) whilst corrosion is not likely to effect these components, they should still be examined where they contribute to the overall strength of the vehicle. All metallic supporting framework, box sections and attachments should be treated as necessary.

STANDARD COMMERCIAL CARS SALOON, CARS UTILITY, COACHES AND VANS

Wax injection and underbody protection.

3 Modern vehicles have wax injection of hollow body sections and underbody protection applied during manufacture. The re-application of wax injection or underbody protection is not necessary for variants of cars saloon, cars utility, coaches small, ambulances and vans, unless specifically called for in the vehicle's AESP Category 6.

Manufacturer's bodywork anti-perforation/ corrosion warranties

4 Most light and medium vehicles are covered by a manufacturer's bodywork anti-perforation/corrosion warranty, usually for a period of six years. A condition of these warranties is that the bodywork must be examined annually for damage/ corrosion. For most Service vehicles, this examination can be carried out by a REME tradesman /MT Technician (RAF) or civilian equivalent. A bodywork warranty examination form has been compiled for recording these examinations and is reproduced at Annex A to this AESP. Rectification of any damage found on the paintwork/underbody protection, during the warranty period, is to be carried out by a manufacturer's recognised local dealer for the vehicle type. For vehicles located in remote areas overseas, where it is not feasible for it to be returned to a manufacturer's local agent, the warranty terms cannot be complied with and rectification necessary should be carried out by the unit. The warranties normally cover corrosion that perforates a panel from the inside as a result of defective materials or workmanship. They do not cover corrosion that has resulted from damage to exterior paintwork or underbody protection from exterior sources. Once a vehicle's bodywork warranty has expired, the annual examination of the body is still to be carried out. However, any rectification work is to be carried out at unit level where possible.

LARGE GOODS VEHICLES, COACHES AND SPECIALIST VEHICLES

Vehicle chassis and sub-chassis.

5 The vehicle chassis and sub-chassis is to be examined annually for surface corrosion. If corrosion is found, it is to be removed and the area repainted. Minor corrosion can be mechanically removed and the affected area repainted by the user/MT Mech/Tech (RAF) taking advice as necessary from REME tradesmen, (P&F) MOD civilian or contract tradesmen. Heavy chassis corrosion should be removed and the affected area treated then repainted by (P&F) MOD civilian or contract tradesmen or at 2nd or 3rd line as necessary.

Coach bodies.

6 Coach bodies are constructed with a steel or alloy frame, mounted onto the vehicle chassis or sub-chassis. The frames are covered with painted aluminium and fibre-glass exterior panels. The frame is normally wax-injected during vehicle manufacture and it is not necessary to re-apply during the life of the vehicle. Coach bodies and their frames are to be examined annually for corrosion. Any minor corrosion found is to be removed and the area repainted. Heavy corrosion is to be removed and the affected area treated then repainted by (P&F) MOD civilian or contract tradesmen or at 2nd or 3rd line as necessary.

Vehicle cabs.

7 All vehicle cabs are to have the following examination/corrosion prevention measures carried out:

7.1 The exterior of the cab, including the underside, is to be cleaned and examined annually for damage to the paintwork and for corrosion. Any damage to the paintwork is to be rectified immediately and any corrosion is to be removed and the area retreated/repainted. In instances where cabs or bodies are manufactured from non - metallic materials, fibre glass, plastic, etc whilst corrosion is not likely to effect these components, they should still be examined where they contribute to the overall strength of the vehicle. All metallic supporting framework, box sections and attachments should be treated as necessary.

7.2 At the 1st maintenance interval, as called for in the respective AESP Category 6 Maintenance Schedule, the cab is to be examined to ascertain that box sections and the underside of the floor pan have been sprayed with manufacturer's corrosion preventative compound (CPC). If the cab has been treated and the CPC is in good condition then record this fact in the Vehicle document FMT 1004 within the FMT1000 series for both Army and RAF. If the cab has not been sprayed with a CPC or the covering is found to be inadequate, then PX 28, NSN 8030-99-657-7708 is to be sprayed into all hollow box sections, inside doors and on the underside of the floor pan where no underbody protection exists. This application of PX 28 should be carried out by REME tradesmen or (P&F) MOD civilian or contract tradesmen or at 2nd or 3rd line as necessary, and recorded in the AB 562 (Army) or on STAMA and the vehicle record card (4870) (RAF). Information on applying PX 28 is at Paras 13 to 16.

Specialist vehicle bodies.

8 The following examination and corrosion prevention measures are to be carried out on the bodies of specialist vehicles:

8.1 Interior and exterior bodywork and any supporting framework is to be cleaned and examined annually for damage to paintwork and for corrosion. If any damage or corrosion is found it is to be rectified immediately.

8.2 At the 1st maintenance interval, as called for in the respective vehicle AESP Category 6 Maintenance Schedule, the bodywork is to be examined to ascertain that box sections and panels on the underside or in hidden/non-cosmetic areas have been sprayed with manufacturer's CPC. If the body has been treated and the compound is in good condition, then record this fact in the Vehicle document FMT 1004 within the FMT1000 series for both Army and RAF. If the body has not been sprayed with a CPC, or the covering is found to be inadequate, then PX 28 is to be sprayed into all hollow box sections and onto unprotected panels on the underside or in hidden/non-cosmetic areas of the body. This application of PX 28 should be carried out by REME tradesmen or (P&F) MOD civilian or contract tradesmen at 2nd or 3rd line as necessary, and recorded in the Vehicle document FMT 1004 within the FMT1000 series for both Army and RAF. Information on the application of PX 28 is given in this AESP.

Lifting equipment superstructures, booms, masts and jibs.

9 Superstructures, booms, masts and jibs of all lifting equipment are to be examined annually for damage to paintwork and for corrosion. Minor corrosion can be mechanically removed/repainted by the user/MT Mech/Tech (RAF), taking advice as necessary from REME tradesmen or (P&F) MOD civilian or contract tradesmen. Heavy corrosion should be removed, and the affected area treated then repainted by (P&F) MOD civilian or contract tradesmen or at 2nd or 3rd line as necessary.

TRAILERS

Trailer chassis.

10 Trailer chassis and sub-chassis are to be examined as per Para 0.

Trailer bodies.

11 The bodies of trailers are to be examined as follows:

11.1 Annually, bodywork and any supporting framework is to be examined for corrosion and damage to the paintwork. Any damage or corrosion found is to be rectified immediately.

11.2 The body is to be examined and treated with PX 28 if necessary as per Para 8.2

VARIATIONS IN EXAMINATION AND CORROSION PREVENTION PROCEDURES

12 Any variations to the procedures listed in this AESP, required to comply with manufacturer's warranty conditions, will be identified in individual vehicles manufacturer's literature or AESP

Category 6 Maintenance Schedules as applicable. When new panels or repaired sections of a vehicle cab/body are fitted, the internal surface of the panels/ box sections are to be sprayed with PX 28 prior to the vehicle being returned to use.

VEHICLE CORROSION PREVENTION PROCEDURES APPLICATION OF PX 28

WARNINGS

(5) **HEALTH HAZARD. PERSONNEL SPRAYING PX 28 ARE TO WEAR THE APPROPRIATE PROTECTIVE CLOTHING AND RESPIRATOR/BREATHING EQUIPMENT IN ACCORDANCE WITH MANUFACTURERS SAFETY DATA SHEETS AND/OR JSP 437**

(6) **HEALTH HAZARD. PERSONNEL ARE TO BE CONVERSANT WITH THE HEALTH HAZARDS AND SAFETY PRECAUTIONS CONTAINED ON THE SAFETY DATA SHEET PRIOR TO SPRAYING PX 28.**

(7) **HEALTH HAZARD. APPLICATION OF PX 28 IS TO BE CARRIED OUT IN VEHICLE SPRAY BAYS/BOOTHES WITH BUILT IN EXTRACTION FACILITIES OR IN DESIGNATED AREAS AS APPROVED BY LOCAL HEALTH AND SAFETY MANAGEMENT, IN ACCORDANCE WITH REGULATIONS LAID DOWN UNDER THE H AND SW ACT 1974 AND LOCAL FIRE ORDERS.**

(8) **FIRE HAZARD. AFTER SPRAYING PX 28 IN/ONTO A VEHICLE THE VEHICLE IS NOT TO BE USED/DRIVEN FOR AT LEAST FOUR HOURS. IDEALLY THE VEHICLE SHOULD BE LEFT INSIDE THE SPRAY BAY OVERNIGHT TO ALLOW THE PX 28 TO DRY OFF.**

CAUTION

(1) **MASKING. Where necessary and before spraying, mask off any brake components, electrical wiring, plastic pipes/hoses and mechanical linkages etc.**

Preparation.

13 Prior to the application of PX 28, the underside of the vehicle must be thoroughly power cleaned and dried. To enable PX 28 to be sprayed it must be warmed, by decanting a quantity into a container and placing the container in hot water. PX 28 should not normally be thinned. However, in cold climates or conditions where it is impossible to spray without dilution, it is permissible to thin the PX 28 with up to a maximum of 20% white spirit. The spray pattern/coverage from the spray gun/nozzles being used should be checked by spraying into a cardboard box prior to treating a vehicle.

Spraying equipment.

14 The following equipment is to be used to spray PX 28:

14.1 Enclosed box sections. A spray gun, with rigid and flexible nozzle extension lances should be used. These should be available at authorised vehicle spray booths/bays with kits consisting of:

14.1.1 Spray gun.

14.1.2 Long rigid extension lance 1100 x 8 mm (metal) giving 360 degrees spray at right angles from the lance.

14.1.3 Flexible nylon extension hose 1300 x 8 mm giving 360 degrees spray at right angles to the hose end.

14.1.4 Rigid hook nozzle 300 x 4 mm giving a forward spray. The air supply to this spray gun should be regulated to between 3 - 6 bar (40-80 lbf/in²).

14.2 Open panels. A high volume low pressure (HVLP) type spray gun must be used whenever PX 28 is sprayed onto open panels (in accordance with EC Volatile Organic Compound Regulations). HVLP spray guns are available under Section Ref numbers 4940-99-915-3666 and 4940-99-225-5425. These are only available to authorised vehicle spray booths/bays

Vehicle cabs.

15 The following procedures are to be followed:

15.1 Cab preparation. Before treatment, the cab interior trims and door trims should be removed as necessary by a REME tradesman or MT Mech/Tech (RAF) or civilian equivalent, to give access to any box sections. The instrument panel/dashboard headlining need not be removed. Remove any loose material/dust from inside the cab/panels as necessary using a vacuum cleaner. Most box sections will have manufacturer's holes to facilitate spraying. Any box sections that do not have suitable access are to have 10 mm diameter holes drilled by a REME tradesman or MT Mech/Tech (RAF) or civilian equivalent as follows:

15.1.1 On long vertical box sections, 2 holes should be drilled, one approximately a third of the way up and the other, two thirds.

15.1.2 On short vertical sections, a single hole should be drilled midway.

15.1.3 On horizontal or diagonal sections, holes should be drilled at approximately 900 mm intervals.

Any holes drilled in box sections should be in non-cosmetic areas, for example on the inside or underside of the cab or in areas that are normally covered by a trim panel. Bare metal created by the drilling of extra holes is to be painted prior to the application of PX 28. After application of the PX 28 these additional holes are to be plugged using grommets (NSN 6MT 5340-99-810-8172), or equivalent.

15.2 Application. The shaded areas marked on **Error! Reference source not found.** to Fig 4, give representative examples of the box sections of a vehicle cab to be treated with PX 28. When the rigid and flexible extension lances are used, they should be fully inserted into the box section/panel and then slowly withdrawn with the spray gun trigger fully applied. When using the hook nozzle, the nozzle end should be inserted into the panel/section and directed at the area to be treated with the spray gun trigger fully applied. The cab should be treated in separate areas as follows:

15.2.1 Cab front. Raise the cab front grille and identify all box sections to be treated. Remove plugs/grommets from box section access holes. Spray PX 28 into all box sections using a flexible nozzle extension or hook nozzle as necessary. Refit plugs/grommets.

15.2.2 Cab sides. Open the cab doors, locate box sections and remove any plastic plugs/grommets from existing manufacturer's holes. PX 28 should be sprayed into all the box sections using the rigid or flexible nozzle extension. Refit plastic plugs/grommets to holes as necessary.

15.2.3 Cab doors. Open cab doors and ensure the windows are raised. Spray PX 28 up into the box section window frames, using the rigid and flexible nozzle extensions as necessary. Using the hook nozzle extension, spray PX 28 inside the door cavity below the window frames, paying particular attention to all welded and folded joints and strengtheners in contact with the outer skin.

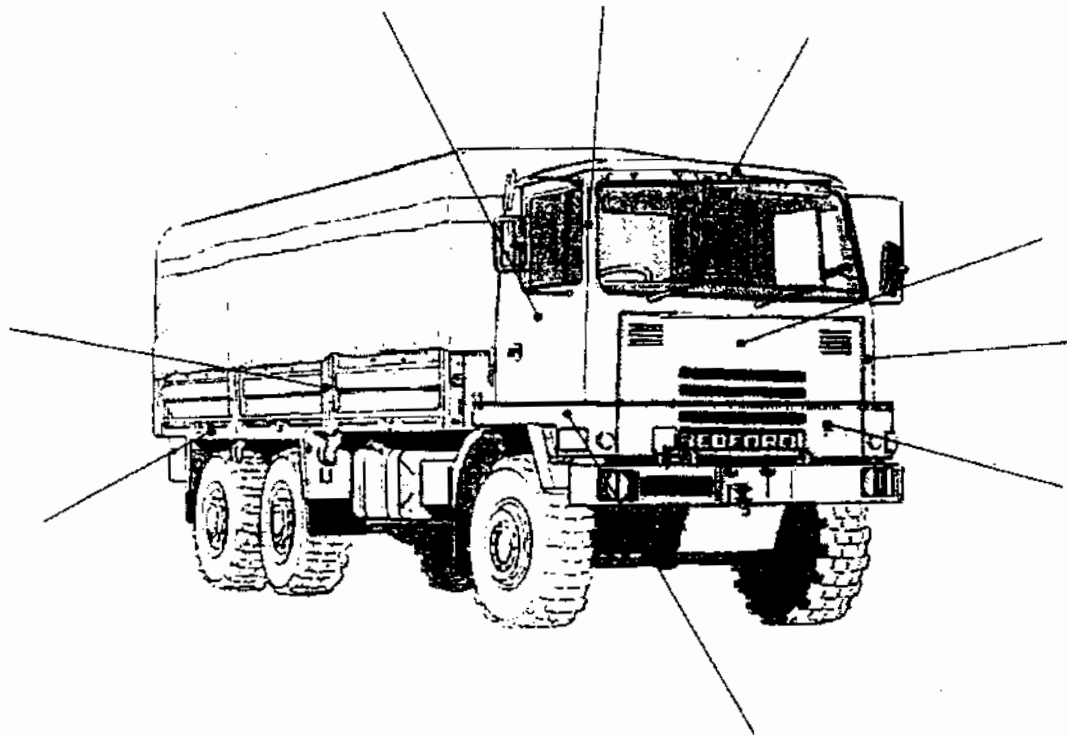


Fig 1 Examples of enclosed box sections to be found at the front and sides of a vehicle cab/body

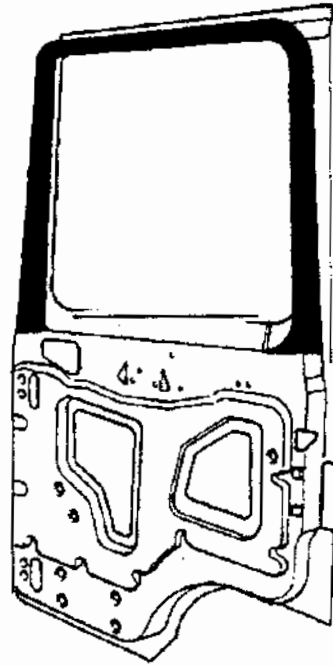


Fig 2 Examples of box sections to be found on a cab door

15.2.4 Cab rear. Identify all box sections on the cab rear and remove any plugs/grommets from access holes. Spray PX 28 into all box sections, using the rigid and flexible nozzle extensions as necessary through all available holes. Refit plugs/grommets.

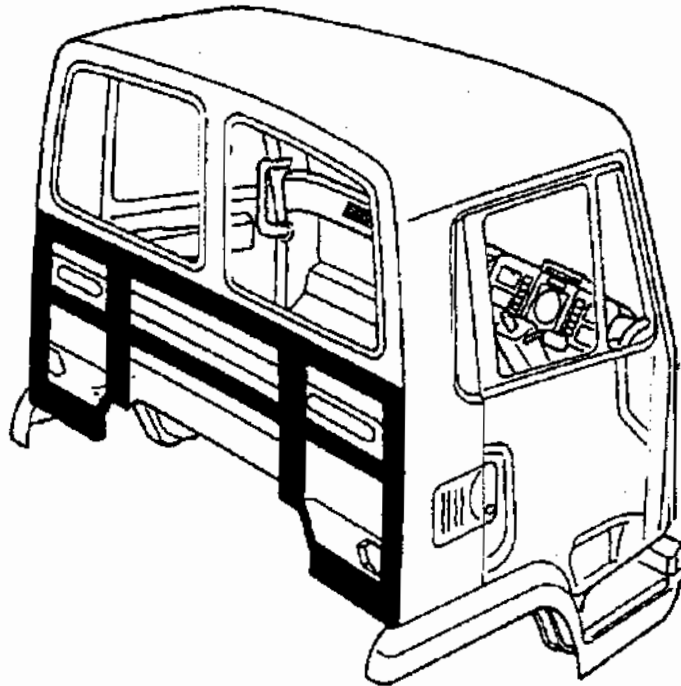


Fig 3 Examples of box sections to be found at the rear of a cab

15.2.5 Cab underside/floor Tilt the cab, identify all enclosed box sections on the cab floor and remove any plugs/grommets from access holes. Spray PX 28 into the box sections using the rigid and flexible nozzle extensions as necessary, through all access holes. Refit plugs/grommets. Spray any panels on the underside of the cab floor that are not coated with underbody sealant with PX 28, using a HVLP spray gun and lower the cab. From inside the cab, spray PX 28 into any box sections that have not been treated. After spraying PX 28, ensure that all manufacturer's drainage holes on the vehicle are clear.

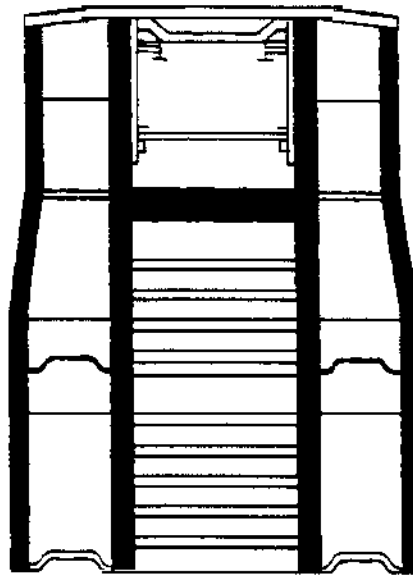


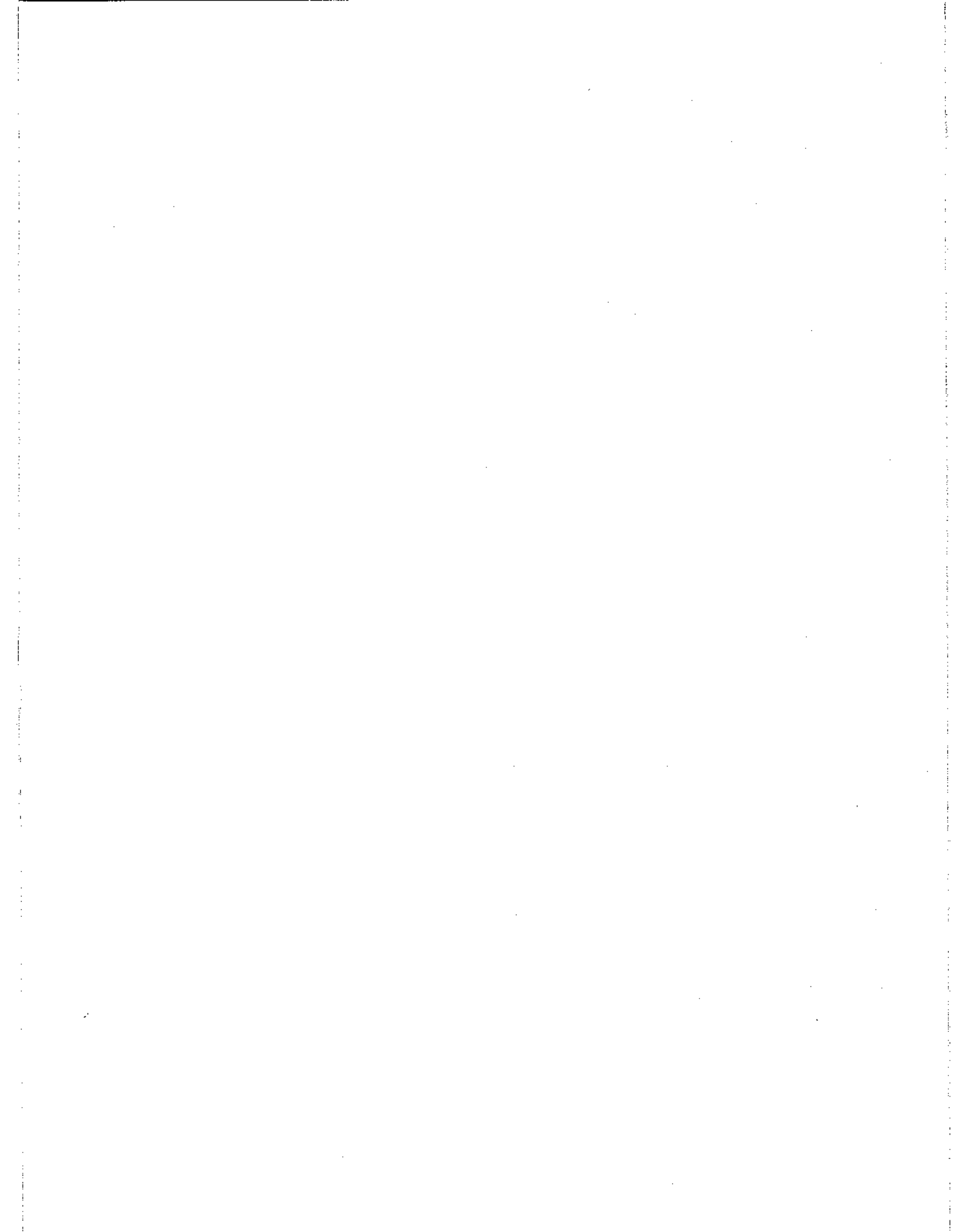
Fig 4 Examples of box sections to be found on the underside/floor of a vehicle cab

Specialist vehicles, trailers and bodies

16 The following procedures are to be followed when applying PX 28 to specialist vehicles, trailers and bodies:

16.1 Preparation. Any loose equipment should be removed and stowed away from the vehicle. If necessary, trim panels should be removed by a REME tradesman or MT Mech/Tech (RAF) or civilian equivalent to give access to areas that require spraying. Examine the body structure of the vehicle or trailer and note the position of any enclosed box sections and whether there are sufficient access holes. Any box sections that do not have sufficient access holes are to have 10 mm diameter holes drilled in accordance with Para 15. Note the position of any unprotected aluminium panels on the underside. If necessary, mask up electrical wiring, brake components, plastic pipes/hoses and mechanical linkages adjacent to open panels that are to be sprayed. of the vehicle and in hidden non-cosmetic areas, particularly where they are in contact with steel supporting frames/structures. Remove any loose material or dust with a vacuum cleaner.

16.2 Application. Remove any plugs/grommets and spray PX 28 into all steel enclosed box sections using a spray gun with rigid or flexible extension lance as necessary. The interior surfaces of door cavities are to be sprayed using the hook nozzle extension. The interior surfaces of any hidden/non-cosmetic steel sheet or aluminium sheet body panels and any unprotected aluminium or steel panels on the underside of the vehicle, are to be sprayed using a HVLP spray gun. Particular attention should be paid to all welded and folded joints and strengtheners supporting frames in contact with the outer skin. After spraying, ensure that any manufacturer's drainage holes are clear. Refit plugs/grommets.



ANNEX A

VEHICLE BODYWORK WARRANTY

EXAMINATION FORM

Fig		Page
1	Example of light/medium vehicle body.....	2
Table		Page
1	Record of bodywork defects	4

ANNEX A

VEHICLE BODYWORK WARRANTY EXAMINATION FORM

NOTES

- (9) This form is to be photocopied and used to record in-house vehicle bodywork warranty examinations on light/medium vehicles.
- (10) The Figure below shows a representative example of a light/medium vehicle body with panels to be examined.
- (11) Any damaged bodywork/paintwork found during the examination is to be recorded in Table 1, for example stone chips on the bonnet should be recorded with the words 'stone chips' against Serial 2. A dent on the front 1 .h. wing would be recorded with the word 'dent' against Serial 4.
- (12) If damaged bodywork/paintwork is found, arrangements to get the damage repaired should be initiated as soon as possible.
- (13) The completion of the bodywork examination should be documented on this form by using the unit stamp and signature by the MT WO/SNCO or MT TECH NCO.
- (14) The form is to be retained with the vehicles Vehicle document FMT 1004 within the FMT 1000 series/maintenance documents for the duration of the vehicle's bodywork warranty - normally six years from the date into service.

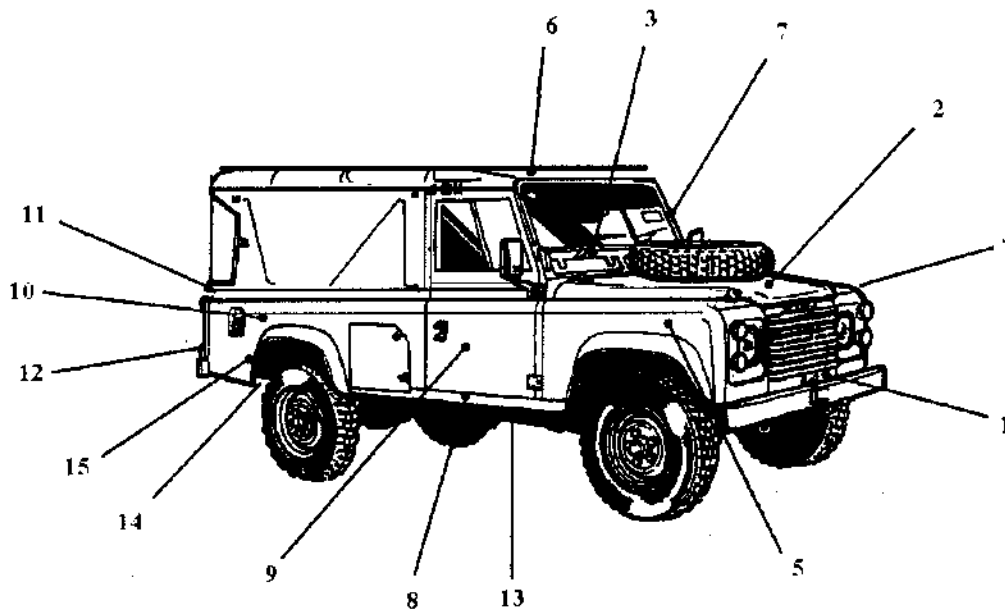


Fig 5 Example of light/medium vehicle body



TABLE 1 RECORD OF BODYWORK DEFECTS

Serial	Body Area	Comments
1	Front Panel/Valance	
2	Bonnet	
3	Windscreen Surround	
4	LH Front Wing	
5	RH Front Wing	
6	Roof	
7	LH Front Door	
8	Sills	
9	RH Front Door	
10	RH Rear Wing/Bodyside Panel	
11	Boot/Tailgate/Rear Door(s)	
12	Rear Panel/Valance	
13	Floor Pan	
14	Chassis Legs/Crossmembers	
15	Front and Rear Wheel Arches	
16	Miscellaneous Body Panels	
17		
18		
19		

EAC: _____	REGISTRATION NO: _____
VEHICLE TYPE _____	VEHICLE MILEAGE: _____
UNIT STAMP:	SIGNATURE:

If required this form should be adapted locally and used on Large Goods Vehicles, Coaches and Trailers.

COMMENT(S) ON AESP*

To: FRACAS BFPO 794

From:
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.....

Senders Reference	BIN Number	Date
AESP Title: B VEHICLE CORROSION PREVENTION - TECHNICAL DESCRIPTION		
Chapter(s)/Instruction	Page(s)/Paragraph(s)	
If you require more space please use the reverse of this form or a separate piece of paper. Comment(s):		

Signed: Telephone No.:

Name(Capitals): Rank/Grade: Date:

X

FOR AESP* SPONSOR USE ONLY

TO: FROM:
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Thank you for commenting on AESP*: 2300-A-310-201.....

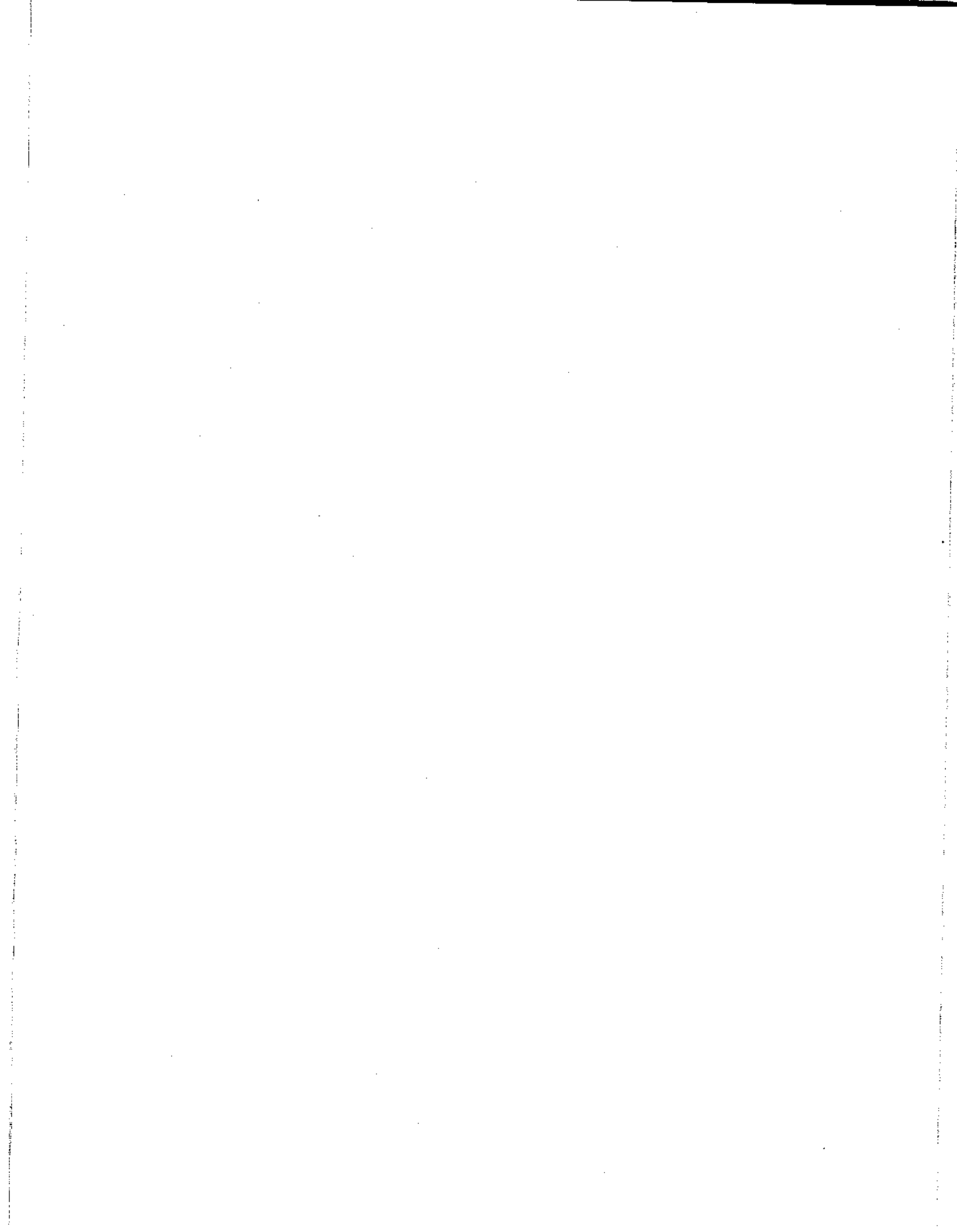
Your reference: Dated:

Action is being taken to:	Tick		Tick
Issue a revised/amended AESP*		Under investigation	
Incorporate comment(s) in future amendments		No action required	
Remarks			

Signed: Telephone No.:

Name(Capitals): Rank/Grade: Date:

* AESP or EMER



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MATERIEL QUALITY ASSESSMENT - PRINCIPLES AND PRACTICE IN REME

CALIBRATION OF TACHOGRAPHS

BY COMMAND OF THE DEFENCE COUNCIL

Ministry of Defence

Sponsor:

DGEME(A)

File ref: 0/DGEME/125/2/12 EME 7b(2)

Publications Authority:

Vehs & Wpns Br REME

Project No: 7b(2)1997(393)

File ref: 7b(2)1997/EEP

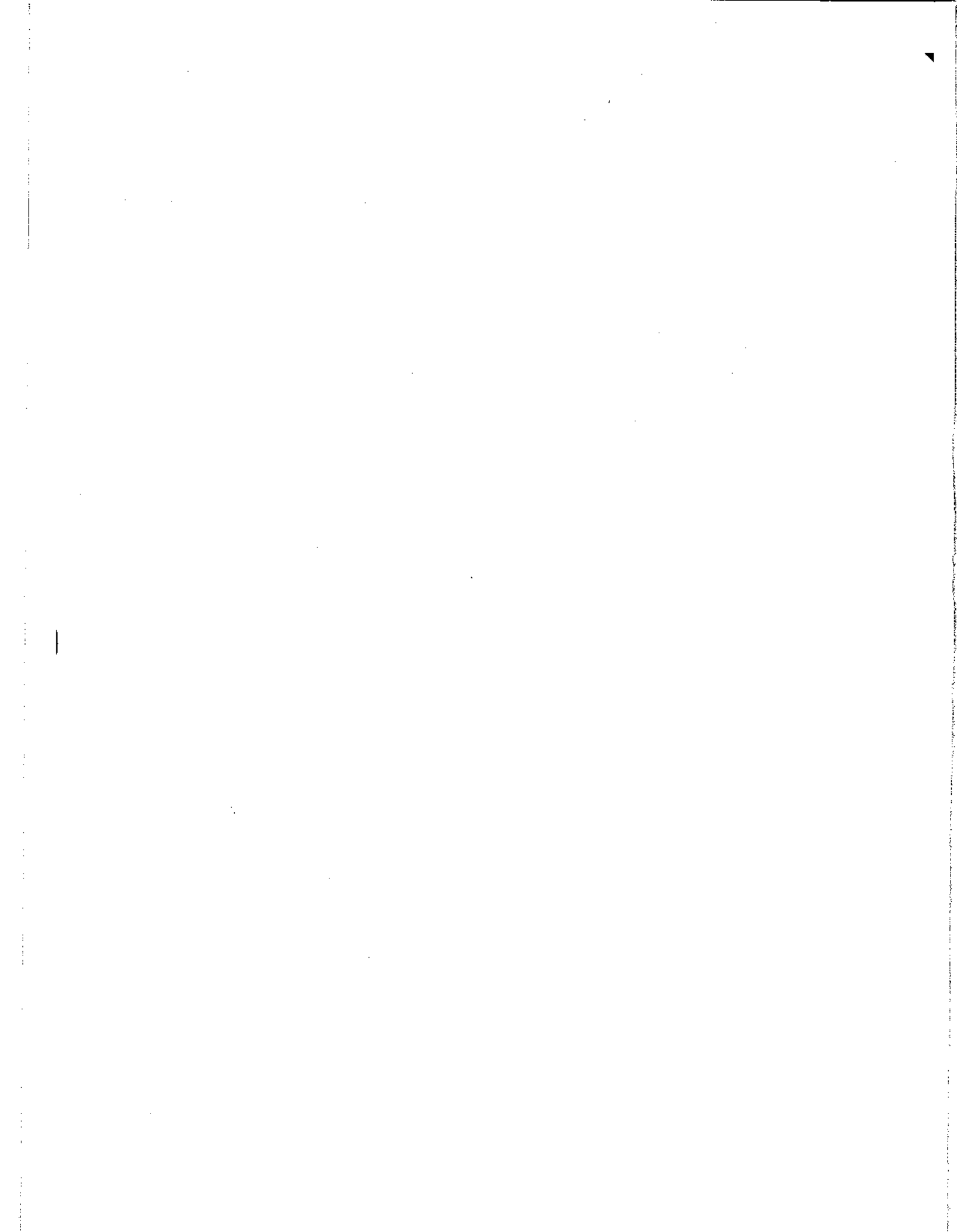
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AMENDMENT RECORD

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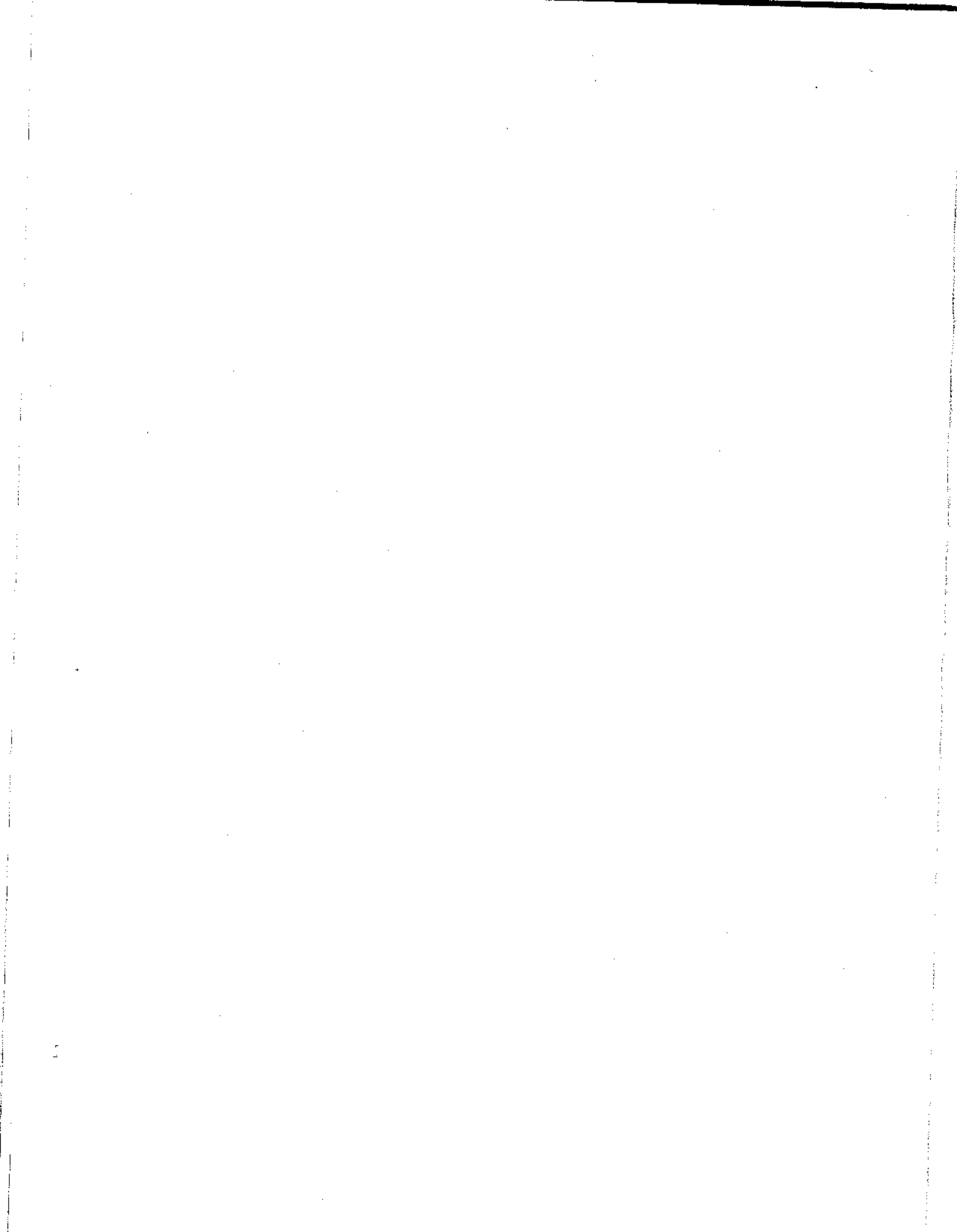
Frame Para

- 1 Introduction
- 2 Legal requirements
- 7 Approved tachograph centres

PREFACE

1 Amendments are identified by marginal side lining.

2 Comments on this publication are to be forwarded in accordance with AESP 0100-P-011-013 to Vehicles and Weapons Branch REME, Chobham Lane, Chertsey, Surrey KT16 0EE.



INTRODUCTION

1 This regulation specifies the procedure to be adopted with regard to the calibration of tachographs, where used.

LEGAL REQUIREMENTS

2 The following legislation requires that Tachographs are fitted to most vehicles over 3.5 tonnes to enable accurate and reliable recording of driver's hours (driving, duty and break period times).

2.1 EEC Regulation 3821/85.

2.2 Passenger and Goods Vehicles (Recording Equipment) Regulations 1979.

3 EEC Regulation 3821/85 also specifies the intervals at which Tachographs must be inspected and calibrated, Annex 1, (vi) refers.

4 Full calibration must be carried out at the following times:

4.1 On installation.

4.2 After a period of six years from the last Full Calibration.

4.3 If the vehicle has ANY tachograph seal broken.

5 Two yearly inspection is required at the following times:

5.1 After two years have elapsed since the last Full Calibration.

5.2 After two years have elapsed since the last two year inspection.

6 Installation, Calibration and Sealing may only be carried out at a Department of Transport "approved tachograph centre".

APPROVED TACHOGRAPH CENTRES

7 There are over 500 Department of Transport approved tachograph centres in the United Kingdom.

7.1 Access to the approved tachograph centre will be through Contract Repair Branch REME.

