[redacted]
DE&S Secretariat (Land Equipment)

Ministry of Defence

de&s

DESSEC-PolSecLE-JSC-WPNS@mod.uk

Defence Equipment & Support
Maple 0a # 2043
MOD Abbey Wood
Bristol BS34 8JH

[redacted]

Via:

[redacted]

September 13th 2017 Our Ref: FOI2017/07808

Dear [redacted],

Thank you for your email of 4th August 2017 requesting the following information:

SPRINGER
I have recently purchased one of the above ex military vehicle.
I have concerns about maintaining it and need to understand any modifications that may have been carried out. Basic information like correct tyre pressures, etc.
How do I get a copy of AESPs ?
Any assistance will be gratefully received.

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 information in scope of your request is held.

The information you have requested can be found below, but some of the information falls entirely within the scope of the qualified exemption provided for at section 26 (Defence) of the FOIA and has been redacted.

Section 26 is a qualified exemption and is 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 because it contains details which are operationally sensitive and would prejudice the capability and effectiveness of our armed forces. The documents contain information which would allow for the formation of tactics by potential enemies of UK forces to be used against the vehicles taking advantage of limitations inherent in each of the different systems. 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 that could put the physical safety of UK troops at risk 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”.

If you have any queries regarding the content of this letter, please contact this office in the first instance.

If you wish to complain about the handling of your request, or the content of this response, you can request 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 should be made within 40 working days of the date of this response.

If you remain dissatisfied following an internal review, you may raise your complaint directly to the Information Commissioner under the provisions of Section 50 of the Freedom of Information Act. Please note that the Information Commissioner will not normally investigate your case until the MOD internal review process has been completed. The Information Commissioner can be contacted at: Information Commissioner's Office, Wycliffe House, Water Lane, Wilmslow, Cheshire, SK9 5AF. Further details of the role and powers of the Information Commissioner can be found on the Commissioner's website at https://ico.org.uk/.

Yours sincerely,

[redacted]

[redacted]
DES SEC Pol Sec Land Equipment

SPRINGER
ASSET CODE (NB1201-8100)

2320 99 908 7565

PURPOSE AND PLANNING INFORMATION

Sponsored for use in the
UNITED KINGDOM MINISTRY OF DEFENCE
AND ARMED FORCES
by

GSV IPT
U05V9

Publication Authority:
TECHNICAL ENABLING SERVICES TECHNICAL INFORMATION GROUP
KCZM6

CONDITIONS OF RELEASE

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~~This information must be afforded the same degree of protection as that afforded to information of an equivalent classification originated by the recipient Government or as required by the recipient Government's National Security regulations.~~

~~This information may be disclosed only within the Defence Department of the recipient Government, except as otherwise authorized by the Ministry of Defence (Army).~~

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~~THIS DOCUMENT IS THE PROPERTY OF HER BRITANNIC MAJESTY'S GOVERNMENT, and is issued for the information of such persons only as need to know its contents in the course of their official duties. Any person finding this document should hand it in to a British forces unit or to a police station for its safe return to the Ministry of Defence, (DDef Sy), Main Building, Whitehall London, SW1A 2HB, with particulars of how and where found. THE UNAUTHORIZED RETENTION OR DESTRUCTION OF THIS DOCUMENT IS AN OFFENCE UNDER THE OFFICIAL SECRETS ACTS OF 1911-1989. (When released to persons outside Government service, this document is issued on a personal basis. The recipient to whom it is entrusted in confidence, within the provisions of the Official Secrets Acts 1911-1989, is personally responsible for its safe custody and for seeing that its contents are disclosed only to authorized persons.)~~

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PURPOSE AND PLANNING INFORMATION

Para

1 Equipment Identity
2 Role/Purpose
3 Brief Description
5 Physical Data
6 Performance Data
7 Environmental Data
8 Transportation Data

Tables

1. Physical Data
2. Performance Data

PREFACE

Sponsor:	GSV IPT
Project Number:	UOR A01393
File Ref:	SUV C1/0204
Publication Authority:	GSV IPT

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 contracts 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	101	101	101	101
	1	Equipment Support Policy Directive	111	111	111	111
2	0	Operating Information	201	201	201	201
	1	Aide Memoiré	*	*	*	*
	2	Training Aids	*	*	*	*
3		Technical Description	*	*	*	*
4	1	Installation Instructions	*	*	*	*
	2	Preparation for Special Environments	*	*	*	*
5	1	Failure Diagnosis	*	*	*	*
	2	Maintenance Instructions	522	522	522	522
	3	Inspection Standards	*	*	*	*
	4	Calibration Procedures	*	*	*	*
6		Maintenance Schedules	601	601	601	601
7	1	Illustrated Parts Catalogues	*	*	*	*
	2	Commercial Parts Lists	721	721	721	721
	3	Complete Equipment Schedule, Production	*	*	*	*
	4	Complete Equipment Schedule. Service Edition (Simple Equipment)	741	741	741	741
	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 Reference Title

AESP 0100-P-007-013	Demand and Distribution of Army Equipment Support Publications
AESP 0100-P-090-013	Specification for Army Equipment Support Publications
AESP 0200-A-062-013	Management and Control of Equipment Support Units, Casting Procedures for all Equipments
AESP 0200-A-093-913	Land Equipment User Maintenance Standards
AESP 0200-A-100-013	Equipment Care Inspection and Mandatory Equipment Inspection
AESP 0200-A-400-013	Technical Instructions for Storage of Equipment under Controlled Humidity Environments
AESP 2300-A-041-013	Short Term Storage, All Vehicles
AESP 2300-A-050-013	'B' Vehicle Test, Inspection and Certification
DES STAN 05-07	Configuration Management of Defence Materiel
JSP 886, Vol 12, Part 1	The Defence Supply Chain Manual, Supply Chain Instructions for the Land Environment, Supply
JSP 886, Vol 12, Part 2	The Defence Supply Chain Manual, Supply Chain Instructions for the Land Environment, Equipment Support
JSP 800	Joint Services Road Transport Regulations

ABBREVIATIONS

6 The following abbreviations are listed and included at the discretion of the publication authority:

Abbreviation	Description
AESP	Army Equipment Support Publication
ATV	All Terrain Vehicle
CES	Complete Equipment Schedule
DA	Design Authority
DE&S	Defence Equipment and Support
DINs	Defence Instructions and Notices
FLC	Front Line Command
IPT	Integrated Project Team
JSP	Joint Service Publication
kg	kilogramme
mm	millimetre
OEM	Original Equipment Manufacturer
Para	Paragraph
PDS	Post Design Services
SF	Special Forces
SOP	Standard Operating Procedures
SUV	Specialist and Utility Vehicles
VM	Vehicle Mechanic

PURPOSE AND PLANNING INFORMATION

EQUIPMENT IDENTITY

1. This is the Purpose and Planning Information for the equipment detailed below:

1.1 Designation	Springer
1.2 Asset Code	NB1201-8100
1.3 NATO Stock Number	2320-99-908-7565
1.4 Domestic Management Code (DMC)	7TMC

ROLE/PURPOSE

2. The Springer is used by Infantry units worldwide to

2.1 Facilitate the rapid clearance of a designated Drop Zone of stores and munitions, effectively reducing the effort and load bearing requirement for the individual infantryman.

2.2 Assist in the rapid extraction/transportation of causalities to either a safe area or an extraction point.

BRIEF DESCRIPTION

3. The Springer is a self propelled, seated operator, 4 wheeled machine for operation on unimproved natural terrain and disturbed terrain. The Springer is rear wheel drive vehicle based on a Tom Car TM57D BMV (British Military Variant). It is a purpose designed, purpose built load carrying vehicle optimised for off road use. The cross-country mobility is achieved through good power to weight ratio and the vehicles unique geometry giving a very low Centre of Gravity (C of G) whilst maintaining high ground clearance. The overall design of the Springer provides a simple robust and easy to maintain platform for both operator and maintainer, without loss of performance or utility.

4. Operator protection is achieved by a Roll Over Protection Structure (ROPS), [redacted]

PHYSICAL DATA

5. The physical data applicable to this equipment is detailed in Table 1.

TABLE 1 PHYSICAL DATA

Serial (1)	Detail (2)	Data (3)
1	Vehicle Length	3416mm
2	Vehicle Width	1780mm
3	Vehicle Height	1686mm
4	Unladen Weight	[redacted]
5	Laden Weight	[redacted]
6	Tyre Size - Front	25x8.00x12 NHS
7	Tyre Size - Rear	25x12.00x12 NHS

PERFORMANCE DATA

6. The performance data applicable to this equipment is detailed in Table 2.

TABLE 2 PERFORMANCE DATA

Serial (1)	Detail (2)	Data (3)
1	Payload	[redacted]
2	Fuel Tank Capacity	2 X 27 Litres
3	Range (without refuelling)	300 Miles
4	Max Speed On Road Unladen	40 mph
	Max Speed On Road Laden	30 mph
	Max Speed Off Road Unladen	30 mph
	Max Speed Off Road Laden	20 mph
	Max Speed Suspended Tow (Recovery)	10 mph
5	Fording Depth	400mm
6	Turning Circle	[redacted]
7	Approach Angle	[redacted]
8	Departure Angle	[redacted]
9	Ground Clearance	378mm

ENVIRONMENTAL DATA

7. The equipment is capable of being operated at temperatures between within the environmental conditions covered by Climatic Categories A1 to C1 of DEFSTAN 00-35.

TRANSPORTATION DATA

8. Preparation of the vehicle for transportation should be in accordance with JSP 800.

9. Springer is road legal and therefore is movement by road is not specifically restricted, however in the event that [redacted] road movement is prohibited.

10. All Units and personnel must use Joint Air Transport Evaluation Unit (JATEU) Aircraft Data Sheets when planning the movement of equipment by Air.

11. Springer is fully Air Transportable in C17, C130, CH47 and EH101, a full JATEU evaluation has been carried out prior to the platforms in Service date.

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: .....

✂.....

FOR AESP* SPONSOR USE ONLY

To: .....
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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 EM

SPRINGER
ASSET CODE (NB1201-8100)
2320 99 908 7565

EQUIPMENT SUPPORT POLICY DIRECTIVE (ESPD)

Sponsored for use in the
UNITED KINGDOM MINISTRY OF DEFENCE
AND ARMED FORCES
by

GSV IPT
U05V9

Publication Authority:
TECHNICAL ENABLING SERVICES TECHNICAL INFORMATION GROUP
KCZM6

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EQUIPMENT SUPPORT POLICY DIRECTIVE (ESPD)

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1 Introduction
2 Management information
3 Technical Description
4 Physical Data
5 Maintenance
6 Repair
8 Supply
9 Specialist Tool & Test Equipment
10 Publications
11 Training
12 Reliability/warranty
13 Configuration management
14 Storage
15 Disposal
16 Safety Case

Annex

A. Specialist Tools & Test Equipment
B. Warranty documentation and distribution
C. Warranty procedure flow chart

PREFACE

Sponsor: GSV IPT
Project Number: **UOR A01393**
File Ref: SUV C1/0204

Publication Authority: GSV IPT

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.

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4	1	Installation Instructions	*	*	*	*
	2	Preparation for Special Environments	*	*	*	*
5	1	Failure Diagnosis	*	*	*	*
	2	Maintenance Instructions	*	*	*	*
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6		Maintenance Schedules	601	601	601	601
7	1	Illustrated Parts Catalogues	*	*	*	*
	2	Commercial Parts Lists	721	721	721	721
	3	Complete Equipment Schedule, Production	*	*	*	*
	4	Complete Equipment Schedule. Service Edition (Simple Equipment)	741	741	741	741
	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

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JSP 886, Vol 12, Part 1	The Defence Supply Chain Manual, Supply Chain Instructions for the Land Environment, Supply
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FLC	Front Line Command
GSV	General Support Vehicles
IPT	Integrated Project Team
JSP	Joint Service Publication
kg	kilogramme
mm	millimetre
OEM	Original Equipment Manufacturer
Para	Paragraph
PDS	Post Design Services
SF	Special Forces
SOP	Standard Operating Procedures
SUV	Specialist and Utility Vehicles
VM	Vehicle Mechanic

EQUIPMENT SUPPORT POLICY DIRECTIVE

INTRODUCTION

1 This Equipment Support Policy Directive (ESPD) is concerned with:

1.1 Vehicle designation: Springer.

1.2 Asset code: NB 1201-8101.

MANAGEMENT INFORMATION

2 The management information relating to this equipment is as follows:

2.1 Equipment Sponsor: DEC GM

2.2 Equipment Support Manager (ESM):

[redacted]

Civ Tel: [redacted]

Mil Tel: [redacted]

Civ Fax: [redacted]

Mil Fax: [redacted]

2.3 Main Contractor & Design Authority (DA):

EPS (UK) Ltd
Unit 1, Machine House,
Newfields, Moira
Derbyshire
DE12 6EG

UIN: CC587C

2.4 Requisition Quantity: 78 Platforms

2.5 Contract Number: SUV C1/0204

2.6 In Service Date: IOC 31 May 2009, FOC 31 Aug 09.

2.7 Engineering Support:

[redacted]

Email: [redacted]

Mobile: [redacted]

Civ Tel: [redacted]

Mil Tel: [redacted]

Civ Fax: [redacted]

Mil Fax: [redacted]

2.8 Supply Manager:

DE&S Supply Manager

Email: [redacted]

Civ Tel: [redacted]

Mil Tel: [redacted]

Civ Fax: [redacted]

Mil Fax: [redacted]

2.9 Deployment: Worldwide [redacted]

2.10 Planned Life: UOR A01393 – 1 year.

TECHNICAL DESCRIPTION

3

Capacities: Engine Oil – 2.4 Litres, Coolant 6 Litres.

Engine: The Springer is fitted with a four cylinder 1400cc Lombardini diesel engine.

Tyres:

3.3.1 Front: Size 25X8.00-12 NHS

3.3.2 Rear: Size 26X12.00-12 NHS

3.4 Braking system: The Springer is fitted with servo assisted hydraulic brakes, this system utilises callipers and discs at all four wheel stations.

3.5 Transmission: The Springer has a proprietary Gearbox with forward, high, low and reverse gears. It is a Constant Velocity Transmission driven by a Kevlar re-enforced belt.

PHYSICAL DATA

4 The following is the physical data for this equipment:

4.1 Dimensions:

4.1.1. Height: 1686mm

4.1.2. Width: 1780mm

4.1.3. Length: 3416mm

4.2 Weights:

4.2.1 Laden Weight: [redacted]

4.2.2 Unladen Weight [redacted]

4.2.3 Payload: [redacted]

MAINTENANCE

5 The maintenance policy for this equipment is detailed below:

5.1 All maintenance is to be carried out in accordance with AESP 0200-A-093-013, Land Equipment User Maintenance Standards.

5.2 The timing and scope of scheduled maintenance is detailed in the Cat 601 of AESP suite.

REPAIR

6 The following table outlines repair procedures:

Repair Level	Detail
1	Maintenance and day to day preparation. It may include such operations as functional testing, replenishment, role changing, minor modifications, fault diagnosis and corrective maintenance by replacement, adjustment or minor repair. The Active Corrective Maintenance Time (ACMT) for unscheduled tasks using the equipment CES tools shall not exceed 1 hour.
2	Maintenance by replacement, adjustment or minor repair including fault diagnosis and minor authorised modification, within times detailed within Local Technical Instructions or by operational constraints, using generally provisioned resources. The mean ACMT for unscheduled tasks should not exceed 4 hours. No single task should exceed 6 hours.
3	Maintenance in greater depth than Level 2. It includes such operations as repair, partial reconditioning and modification requiring special skills or special equipment; but which is short of a complete strip, reconditioning and reassembly. This will normally be carried out by CLS.
4.	Maintenance that is full reconditioning, major conversions or major repairs. This will normally be carried out by CLS.

7. Oils and Lubricants. All vehicles will be received filled with “factory filled “ oils and Lubricants. The following list of “In service “ oils and lubricants are to be used as “top-up” and re-fill oils

Serial	Component	Specification	In service Equivalent
1	Engine Oil	SAE 15W-40	**OMD-90**
2	Engine Oil	SAE 5W-30	**OMD 55(below -15C)**
3	Engine Coolant	Regular Blue Coolant	**AL 39/Water (50/50)**
4	Transmission Oil	SAE 80W-90	**OEP 220**
5	Brake Fluid	DOT 4	**OX-8**
6	Final Drive	SAE 80W-90	**OEP 220**
7	Battery Terminals	Soft Petrolatum	**PX7**
8	General Greasing	Multipurpose Grease	**XG279**

SUPPLY

8 The Springer is supported by the supply system. Initial spares have been provided through Manufactures Spares Packs supplied alongside the equipment for deployment to Theatre. Replenishment of the MSPs and all other spares are available under NSNs. The majority of items have been codified prior to the In Service Date, however should an item be required that is not yet codified, it can be demanded using the manufacturers part number in the usual way.

SPECIAL TOOLS AND TEST EQUIPMENT

9 The list of Special Tools and Test Equipment to support Springer is detailed at Annex A. The initial issue of Specialist Tool & Test Equipment has been procured and deployed as per the fielding plan issued by HQ LF, it has also been scaled and any future demand should be against the appropriate scaling.

PUBLICATIONS

10 The equipment is supported by the following publications:

10.1 Purpose and Planning Information (AESP Cat 101).

10.2 Equipment Support Policy Directive (AESP Cat 111).

10.3 Operators Manual (AESP Cat 201).

10.4 Maintenance Instructions (AESP Cat 522).

10.5 Maintenance Schedules (AESP Cat 601)

10.6 Commercial Parts List (AESP Cat 721)

10.7 Complete Equipment Schedule (AESP Cat 741)

TRAINING

11 Springer training is provided as detailed below:

11.1 User Training. Operator training supplied by DST for this platform.

11.2 Maintainer Training. This is conducted as part of ‘career training’.

RELIABILITY/WARRANTY

12 The vehicles have been purchased with 12 months warranty. Vehicles were delivered direct to depot, the warranty will commence from the date of signing the MOD Form 640 with the exception of a few vehicle nominated as ‘Attrition Reserves’, the warranty for these few specified vehicles will commence from date of issue. SUV IPT can verify details as required. All warranty claims are to be routed through SUV IPT. EFR Action should be taken as appropriate for all identified trends/serious premature failures.

Warranty procedure:

12.1 Procedure in UK: In the event of a failure, which is covered by warranty the owning units are to contact SUV IPT by phone, followed by a faxed F/INS/777 to SUV IPT. SUV IPT will liase with EPS (UK) for authority to use their nominated agent, DSG or in-house facilities.

12.2 Procedure overseas: When a vehicle fails on deployment overseas owning units are to contact SUV IPT by phone where practical, followed by a faxed F/INS/777. SUV IPT will liase with EPS (UK) Ltd for authority to use their nominated agent, DSG or in-house facilities. If there is no nominated agent repairs are to be done in-house with parts and labour reclaimed as in paragraph 12.6

12.3 Operational necessity: If the vehicles are in the process of deploying or are on deployment overseas the OC of the unit or Commander ES will authorise repairs to be carried out. SUV IPT is to be informed of any repairs. Documentation is to be completed and sent as soon as possible.

12.4 Distribution for documentation relating to warranty is at Annex B.

12.5 A flow chart indicating the warranty procedure is at Annex C.

12.6 Warranty repairs undertaken in house: For repairs carried out in-house, SUV IPT require a copy of the F/INS/777, an AF G1084A (job card), hard copy or FEMIS/STAMA print out, this is to have printed in red on the top 'WARRANTY FOR REPAYMENT'.

12.6.1 The job card, whether hard copy or print out, must detail work carried out and repair times, spares used including NSN and/or manufacturers part numbers. Components replaced using in-house stock are to be retained for 90 days before disposal, unless instructions to the contrary are received from SUV IPT.

12.7 SUV IPT Helpline: SUV IPT (SV Team) has a dedicated Technical Support Officer who will advise and assist in resolving any warranty problems or disputes. Contact [redacted] or Abbey Wood Mil [redacted] Fax Number [redacted](or refer to Para 2.7).

CONFIGURATION MANAGEMENT

13 Configuration Management (CM) for this equipment is to be in accordance with Def Stan 05-57, Configuration Management of Defence Materiel. Configuration 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.

13.1 Modifications: Modifications must only be carried out when approved and authorised by SUV IPT.

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

STORAGE

14 The following procedures are to be applied:

14.1 The equipment is to be stored under cover where possible.

14.2 Short term storage of the equipment is to be conducted in accordance with AESP 2300-A-041-013, Short Term Storage, All Vehicles.

14.3 Storage in Controlled Humidity Environments (CHE) is to be conducted in accordance with AESP 0200-A-400-013, Technical Instructions for Storage of Equipment under Controlled Humidity Environments.

DISPOSAL

15 Equipment casting is to be in accordance with AESP 0200-A-062-013, Management and Control of Equipment Support Unit Casting Procedures for all Equipments. The equipment falls within the Special Casting Range outlined in Chapter 1, Annex E and may only be cast with the Equipment Support Manager's authority. Disposal instructions will be issued by the ESM and may include either:

15.1 Dispose of as scrap.

15.2 For sale through the Disposal Sales Agency (DSA).

SAFETY CASE

16 The Safety Case for this equipment is held by the Safety Officer in SUV IPT. User unit SOPs for this vehicle also contain advice on the hazards.

ANNEX A

SPECIAL TOOLS & TEST EQUIPMENT

Item No	Part No	NATO Stock Number	Item Name	Qty
1	TM50175	5120-99-551-6740	Extractor	1
2	TM50170	5120-99-667-2854	Driver Flange Extractor & CVT	1
3	TM50130	5120-99-507-3255	CVT Tension Tool	1
4	TM50123	5120-99-847-0534	CVT Tension Tool	1
5	TM50131	5120-99-373-6351	CVT Tension Meter	1
6	TM50165	5120-99-701-2639	Extractor CVT for Engine	1
7	TM50192	5120-99-776-1990	C Wrench for final drive	1
8	TM50198	5120-99-290-6652	C + C Wrench for Shock Absorber 38*18	1
9	7107-1460-051		Flywheel/Ring Gear Locking Tool	1
10	7107-1460-049		Timing Belt Tension Tool	1
11	TM50410		Hub Alignment Tool	1
12	TM50400		Lower A-Arm Positioning Tool	1
13			Digital Protractor	1

ANNEX B

WARRANTY DOCUMENTATION AND DISTRIBUTION

DOCUMENTATION

1 The following forms should be completed and distributed as follows:

1.1	F/Ins/777 (Warranty claim form)	3 copies
1.2	AF G1084A (Job Card)	2 copies
1.3	EFR	3 copies

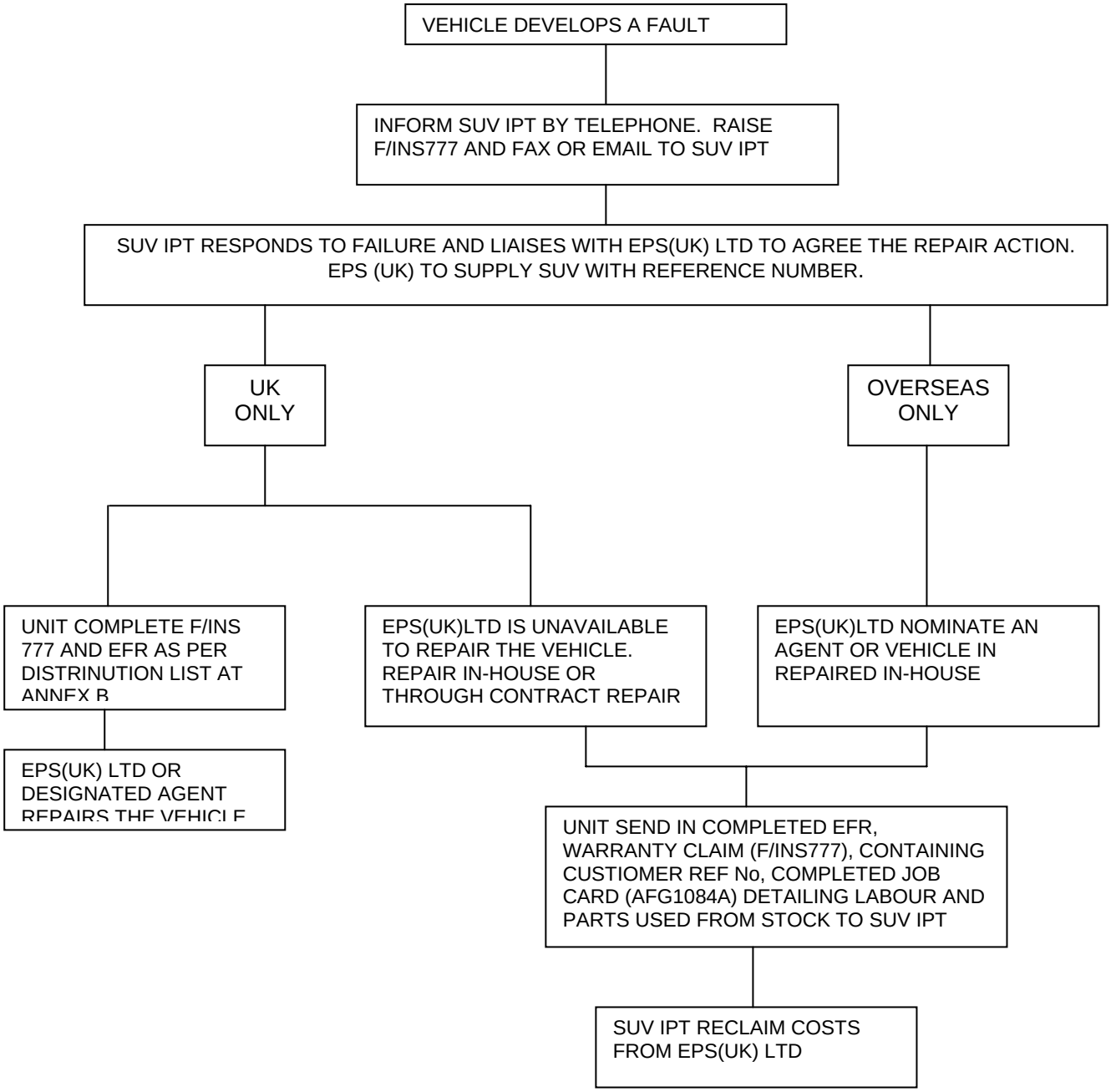
DISTRIBUTION

2 Distribution of the above forms should be as follows:

2.1	GSV Spec Vehicles GSV PT #1315 Spruce 3c DE&S Abbeywood Bristol BS34 8JH	1 copy F/Ins/777 1 copy of AF G1084A 1 copy of EFR
2.2	Unit to retain:	1 copy of F/Ins/777 1 copy of AF G1084A 1 copy of EFR
2.3	FRACAS	1 copy of EFR
2.4	Accompanies vehicle to the nominated agent, if required	1 copy F/Ins/777

ANNEX C

WARRANTY PROCEDURE FLOW CHART



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: .....

✂.....

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 EM

CONDITIONS OF RELEASE

1 ~~This information is released by the UK Government for Defence purposes only.~~

2 ~~This information must be afforded the same degree of protection as that afforded to information of an equivalent security marking originated by the recipient Government or as required by the recipient Government's security regulations.~~

3 ~~This information may be disclosed only within the Defence Department of the recipient Government, except as otherwise authorised by the Ministry of Defence (Army).~~

4 This information may be subject to privately owned rights.

SPRINGER VEHICLE

OPERATING INFORMATION

BY COMMAND OF THE DEFENCE COUNCIL

Ministry of Defence
Issued by
GSV SV IPT
U05V9

AMENDMENT RECORD

Amdt No.	Incorporated by (Signature)	Date
1		
2		
3		
4		
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OPERATING INFORMATION

Chapter

1 General technical description
2 Controls, instruments and indicators
3 Operating instructions
4 Maintenance
5 Recovering a disabled machine
6 Transportation and storage
7 Data summary

PREFACE

Sponsor: GSV IPT
Project No.: UOR A01393
File Ref: SUV C1/0204

Publication Authority: GSV IPT

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 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.

4 In this publication the terms 'left' and right' will mean the left and right sides of the vehicle respectively, as viewed by the operator when seated correctly in the driver's seat.

RELATED AND ASSOCIATED PUBLICATIONS

Related publications

5 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 Maint-enance**	**3 Field Maint-enance**	**4 Base Maint-enance**
1	0	Purpose and Planning Information	101	101	*	*
	1	Equipment Support Policy Directive	111	111	*	*
2	0	Operating Information	201	201	*	*
	1	Aide-Memoiré	*	*	*	*
	2	Training Aids	*	*	*	*
3		Technical Description	201	*	*	*
4	1	Installation Instructions	*	*	*	*
	2	Preparation for Special Environments	*	*	*	*
5	1	Failure Diagnosis	*	522	*	*
	2	Maintenance Instructions	201	522	*	*
	3	Inspection Standards	*	*	*	*
	4	Calibration Procedures	*	*	*	*
6		Maintenance Schedules	601	*	*	*
7	1	Illustrated Parts Catalogues	*	*	*	*
	2	Commercial Parts Lists	721	721	*	*
	3	Complete Equipment Schedule, Production	*	*	*	*
	4	Complete Equipment Schedule, Service Edition (Simple Equipment)	741	*	*	*
	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

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

Reference	Title
AESP 0200-A-306-211	The REME Recovery Manual
AESP 0200-A-307-013	All Arms Equipment Recovery Manual
AESP 0200-A-602-013	Management and control of Equipment Support, Casting.
AESP 2300-A-050-013	Inspection and Certification of 'B' Vehicles.
AESP 2300-A-310-201	B Vehicle Corrosion Protection.
EMER T&M A028 Chap 157	Inspection and recovery equipment including hand operated winches, winches fitted to A, B and C vehicles, winch ropes, tow ropes, strops and round slings.
EMER T&M A028 Chap 650	Inspection and Testing of Lifting Equipment.
JSP 375 Vol 2	MOD Health and Safety Manual.
JSP 800 Vol 5	Defence Transport Regulations.
JSP 800 Vol 7	Joint Service Diagrams for Vehicle and Equipment Transportation.
JSP 866	Material Regulations for the Army.
	LOLER 98 Lifting Operations and Lifting Equipment Regulations 1998
LSOPs	Local System Operating Procedures.

WARNINGS

7 The following WARNINGS and CAUTIONS are general observations applicable to this equipment and have been grouped for clarity of understanding. The list is not exhaustive and care is required at all times. The equipment must ONLY be operated by trained and competent personnel who have undertaken the relevant training package and the vehicle must ONLY be utilised within its design parameters.

Personal injury warnings:

(1) THE VEHICLE IS EQUIPPED WITH A 4-POINT HARNESS WHICH MUST BE WORN BY DRIVER AND PASSENGER WHEN USING THE VEHICLE.

(2) FAILURE TO EXERCISE CARE WHEN OPERATING ON SLIPPERY SURFACES CAN RESULT IN LOSS OF TRACTION, SUBSEQUENT LOSS OF CONTROL, ACCIDENT, SERIOUS INJURY OR DEATH.

(3) OPERATING THE VEHICLE ON HILLSIDES CAN BE DANGEROUS IF PROPER PRECAUTIONS ARE NOT TAKEN. OPERATE IN LOW RATIO ON HILLSIDES. REMAIN VIGILANT OF THE DIFFERING HANDLING CHARACTERISTICS DEPENDANT ON LOAD AND ANGLE OF TRAVERSE.

(4) IT IS THE OPERATORS RESPONSIBILITY TO ENSURE THAT LOADS ARE CARRIED SAFELY. LOADS WHICH ARE TOO HEAVY, UNBALANCED OR INSECURE CAN BE HAZARDOUS.

(5) ALWAYS ENSURE STRETCHERS ARE FULLY SECURE PRIOR TO MOVEMENT.

Maintenance warnings:

(1) OILS AND LUBRICANTS CAN BE CARCINOGENIC – AVOID DIRECT CONTACT WITH SKIN AND EYES. ALWAYS COMPLY WITH PRODUCT SAFETY AND MEDICAL CARE DATA AND PRACTICE GOOD HYGIENE.

(2) ALWAYS CHOCK THE VEHICLE PRIOR TO JACK LIFTING OPERATIONS AND NEVER WORK UNDER A VEHICLE THAT IS JUST SUPPORTED ON A JACK.

(3) ALWAYS ISOLATE AT THE MASTER SWITCH ON COMPLETION OF TASK AND PRIOR TO COMMENCING WORK UPON THE VEHICLE SYSTEMS.

(4) REMAIN VIGILANT OF HOT PARTS (EXHAUST, COOLANT ETC) WHEN UNDERTAKING MAINTENANCE.

(5) TYRES AND WHEELS ARE CRITICAL TO SAFETY, ALWAYS ENSURE CORRECT PRESSURES, WEAR LIMITS AND TORQUE SPECIFICATIONS ARE ADHERED TO.

(6) BATTERIES ARE AN EXPLOSIVE HAZARD AND CONTAIN ACID. EXTREME CAUTION IS TO BE EXERCISED ATALL TIMES.

(7) THE COMPRESSOR WILL BECOME VERY HOT DURING USE. DO NOT UTILISE WITHOUT PROPER PROTECTION.

Winch warnings:

(1) DO NOT ATTEMPT TO EXCEED THE MAXIMUM PULL RATING AND AVOID 'SHOCK LOADS'.

(2) DO NOT PERMIT THE 'RED' LEAD ROPE LENGTH TO LEAVE THE CAPSTAN OF THE WINCH.

(3) DO NOT ATTEMPT TO UTILISE THE WINCH FOR PURPOSES OTHER THAN THOSE UNDERTAKEN DURING TRAINING.

(4) KEEP ALL PERSONNEL AT A SAFE DISTANCE DURING WINCHING OPERATIONS.

(5) DO NOT STEP ON THE WINCH ROPE AT ANY TIME.

(6) ENSURE ALL WINCHING EQUIPMENT IS CHECKED FOR SERVICEABILITY AND SECURITY PRIOR TO COMMENCING WINCHING.

(7) WHEN PERFORMING WINCHING THAT REQUIRES THE ROPE TO GO THROUGH THE CAB AREA, THE WINCH MUST ONLY BE OPERATED REMOTELY FROM OUTSIDE THE CAB.

CAUTIONS

8 The following CAUTIONS are applicable to this equipment.

(1) EQUIPMENT DAMAGE. Incorrect use of the vehicle with the differential lock engaged can cause rollover. While the differential lock is engaged do not operate the vehicle at speeds greater than 17 kph (10 mph).

(2) EQUIPMENT DAMAGE. Do not operate the starter continuously for more than five seconds or the starter will overheat and the battery power will drop temporarily. Wait at least five seconds between each operation of the starter to allow it to cool and to allow battery power recovery.

(3) EQUIPMENT DAMAGE. Do not turn the ignition switch to the START position while the engine is running. Damage to the starter can result.

(4) EQUIPMENT DAMAGE. The booster (slave) supply must not be higher than that of the machine. Using a higher voltage supply will damage your machine's electrical system. Do not attempt to jump-start the engine without being sure of the voltage of the booster (slave) supply.

(5) EQUIPMENT DAMAGE. Do not attempt to change gear while the vehicle is moving or damage to the transmission could result. Always change gear when the vehicle is stationary and the engine is at idle. Make sure the lever is in the proper gear position.

(6) EQUIPMENT DAMAGE. Electric winches are designed and made for intermittent use and should not be used in constant duty applications.

(7) EQUIPMENT DAMAGE. Towing a vehicle too far or too fast can damage the transmission. Do not tow the vehicle further than one mile. Use a trailer for greater distances. When towing do not travel faster than 25 kph (15 mph).

(8) EQUIPMENT DAMAGE. The towing vehicle(s) must have enough pulling and braking power to move and stop the vehicle.

(9) EQUIPMENT DAMAGE. Always check and change the air filters at the intervals outlined in Cat 601.

(10) EQUIPMENT DAMAGE. Service the air filters more frequently if the vehicle is operated in wet or dusty conditions or at high throttle openings for extended periods.

(11) EQUIPMENT DAMAGE. Do not use pressurised air or solvents to clean filter. Pressurised air and solvents may damage filter.

(12) EQUIPMENT DAMAGE. Always replace fuses with ones of correct ampere rating to avoid electrical system damage.

(13) EQUIPMENT DAMAGE. Prior to transportation by air release the air pressure from all suspension units - front and rear shock absorbers, and rear load compensators.

(14) EQUIPMENT DAMAGE. Do not submerge compressor in water.

ABBREVIATIONS

9 The following abbreviations are used in this publication:

AESP	Army Equipment Support Publication
A	Ampere
BFPO	British Forces Post Office
C	Celsius
Cat	Category
Chap	Chapter
CI	Compression Ignition
deg	degree
DINs	Defence Instructions and Notices
DOR	Direction of Rotation
EMER	Electrical and Mechanical Engineering Regulations
ESS	Engineer Systems Support
EVP	Engineer Vehicle & Plant
F	Fahrenheit
Fig	Figure
FRACAS	Failure Reporting Analysis and Corrective Action System
ft	feet
gal	gallon
hp	horse power
in.	inch
IPT	Integrated Project Team
IR	Infra Red
JSP	Joint Services Publication
kg	kilogram
km	kilometre
kph	kilometre per hour
l	litre
lb	pound
lb/in.^{2}	pounds per square inch
lbf ft	pound force feet
LED	Light Emitting Diode
LH	Left Hand
LOLER	Lifting Operations and Lifting Equipment Regulations
Max	Maximum
mph	mile per hour
Min	Minimum

mm	millimetre
N	Neutral
NATO	North Atlantic Treaty Organisation
Nm	Newton metre
Para	Paragraph
PPE	Personal Protective Equipment
psi	pounds per square inch
R	Reverse
REME	Royal Electrical and Mechanical Engineers
RH	Right Hand
rev/min	revolutions per minute
ROPS	Roll Over Protection Structure
SOPs	Standard Operating Procedures
SWL	Safe Working Load
TES-TIG	Technical Enabling Service Technical Information Group
V	Volt

Springer Vehicle 3/4 Front View

Springer Vehicle 3/4 Rear View

CHAPTER 1

GENERAL TECHNICAL DESCRIPTION

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Description
2 Springer Vehicle
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7 Lubrication system
9 Fuel system
13 Cooling system
15 Inlet and exhaust system
Transmission
17 Drive train
Brakes
21 Service Brakes
22 Parking brake
23 Steering
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33 Firefighting Equipment
34 Stowage
39 Decals
40 Vehicle Identification Number (VIN)
42 Military Vehicle Identification Plate
43 Payload Information Plate

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INTRODUCTION

1 This chapter details a general technical description of the Springer Vehicle.

DESCRIPTION

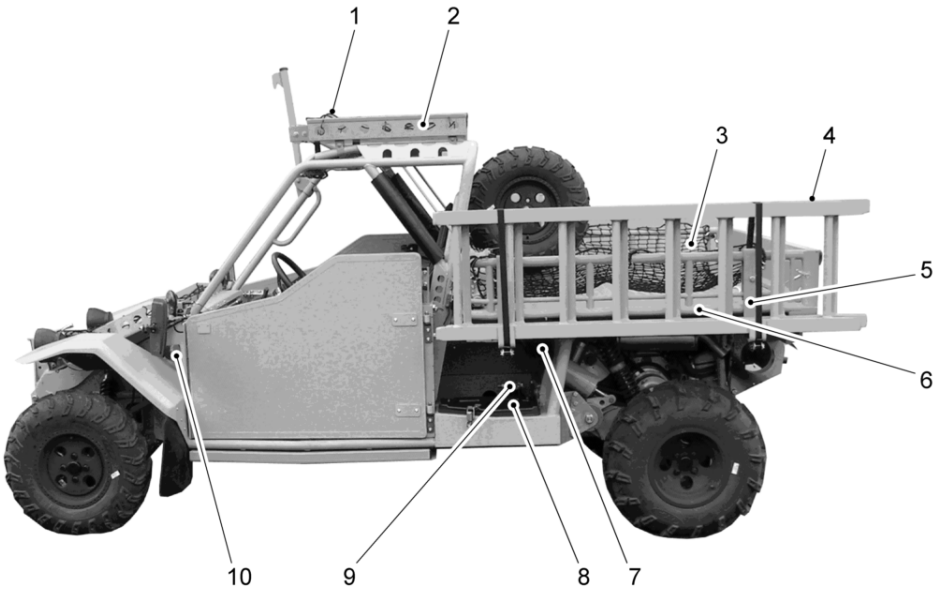
Springer Vehicle

2 The Springer Vehicle is a self-propelled, seated operator, 4-wheeled machine for operation on unimproved natural terrain and disturbed terrain. Cargo platforms are mounted on the front and rear of the vehicle. An electric winch is fitted to enable loads to be winched onto the rear cargo bay, and to enable the vehicle to self-recover from difficult terrain.

3 Operator protection is achieved by a fitted Roll Over Protection Structure (ROPS) and full 4-point safety harness.

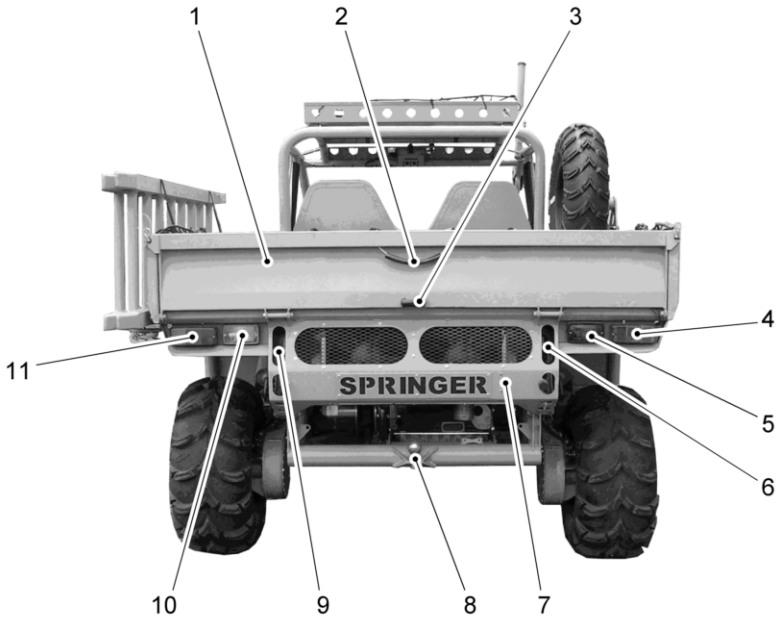
4 Tools, a spare wheel and loading ramps are provided and stowed on the vehicle. The vehicle is equipped with towing facilities front and rear.

5 The main components of the Springer Vehicle and their locations are shown in Figs 1 - 4



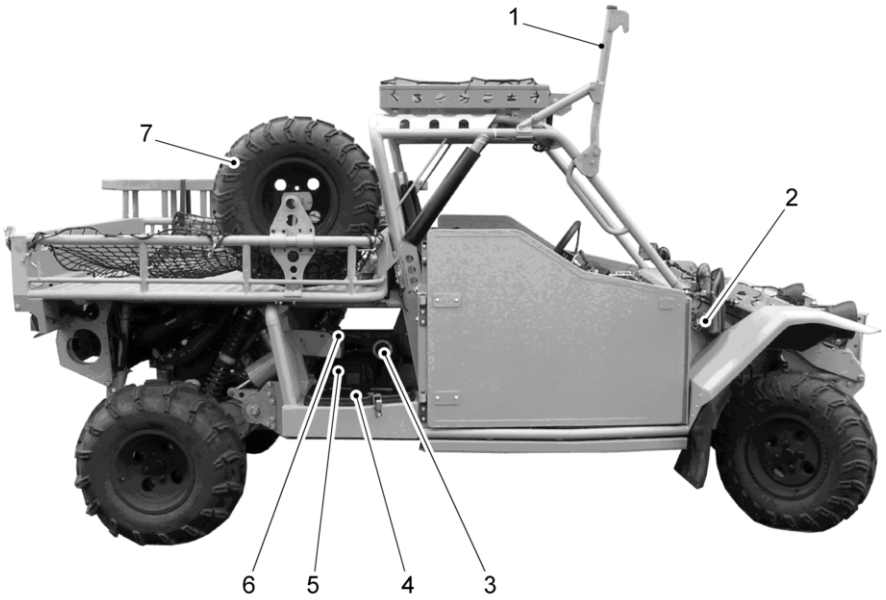
1	Cargo net, top	6	Pallet pull bar
2	Top cargo bay	7	High lift jack
3	Cargo net, rear	8	Toolbox
4	Loading ramps	9	Compressor
5	Ramp carrier	10	Slave socket

Fig 1 Main component location (Left)



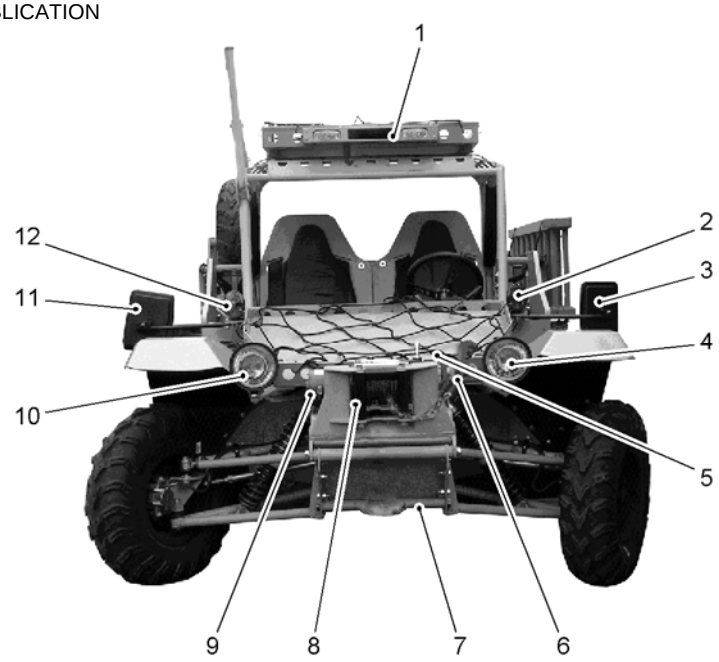
1	Rear cargo bay gate	7	Rear IR light
2	Wire handle	8	Tow hitch
3	Number plate light	9	Rear IR light
4	Rear light cluster	10	Reversing light
5	Rear fog light	11	Rear light cluster
6	Rear IR light		

Fig 2 Main component location (Rear)



1	Wire cutter	5	Battery box
2	Fire extinguisher	6	High lift jack
3	Battery isolator switch	7	Spare wheel
4	Toolbox		

Fig 3 Main component location (Right)

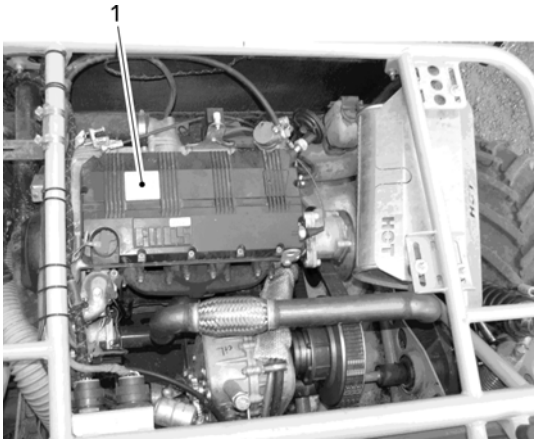


1	IR Light bar	7	Winch pull bar
2	Direction indicator	8	Winch fairlead
3	Mirror	9	Winch
4	Headlight	10	Headlight
5	Cargo net, front	11	Mirror
6	Front cargo bay	12	Direction indicator

Fig 4 Main component location (Front)

Engine

6 The engine is a 4-cylinder, naturally-aspirated diesel engine in which the fuel is ignited by Compression Ignition (CI). The engine operates on a four-stroke cycle and is rated at 35.2 HP. The engine data plate (Fig 5 (1)) is located as shown.



1 Engine data plate

Fig 5 Engine data plate location

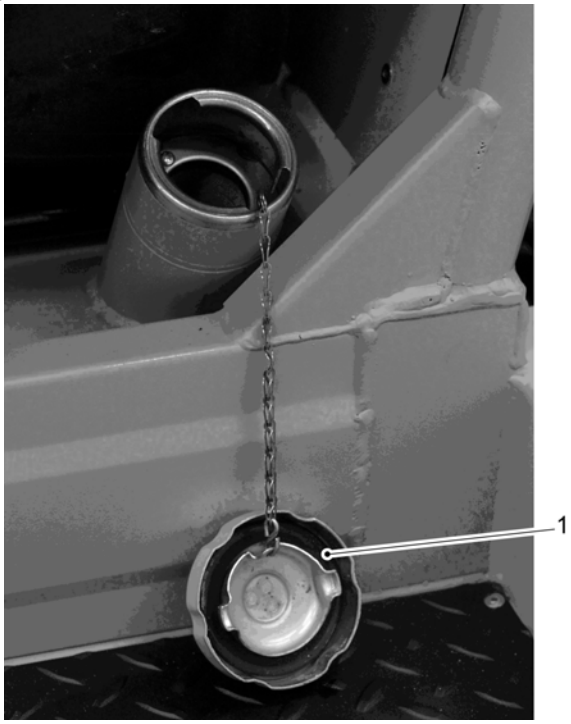
Lubrication System

7 An integral oil pump supplies oil for the engine lubrication system. A screw-on canister-type oil filter provides filtration of the engine oil system.

8 The oil system has a capacity of 3.2 litres (0.7 gal) at the full mark as measured on the oil dipstick. (Refer to Cat 601 for details of oil types used on this machine).

Fuel system

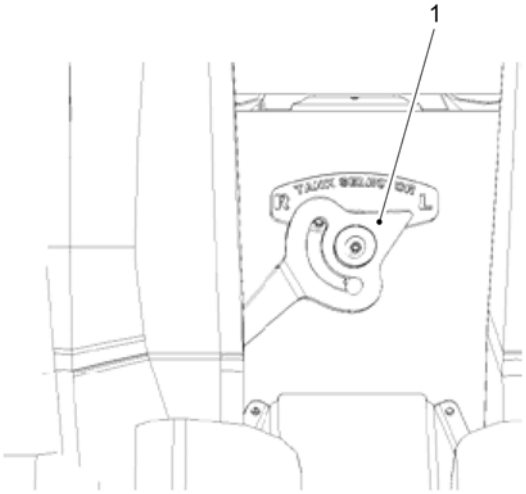
9 The engine is supplied from two fuel tanks located under the seats, each fitted with a filler cap (Fig 6 (1)).



1 Filler cap

Fig 6 Fuel tank filler cap (LH)

10 A fuel tank selector valve (Fig 7 (1)) is located in the middle of the rear fire wall between the seats.



1 Selector Valve

Fig 7 Fuel tank selector valve

11 A fuel pump draws fuel from the tank through a fuel filter. Filtered and decontaminated fuel is essential to prevent irreversible damage occurring to the fuel injectors.

12 The fuel injectors inject atomised fuel into the combustion chambers for ignition.

Cooling system

13 The antifreeze fluid used in the coolant mixture contains a corrosion inhibitor, which makes it suitable to leave in the cooling system all the year round, provided that the strength of the mixture is checked regularly and according to the schedules detailed in Cat 601.

14 A system radiator allows air to cool the circulating coolant as it passes around the system. An expansion bottle provides a head of additional coolant and also gives a space for expanding fluid. When hot, the system is pressurised to aid efficient operation.

Inlet and exhaust system

15 The inlet system ensures that the required volume of air enters the engine to provide efficient fuel combustion.

16 Exhaust gases from the exhaust manifold pass through the exhaust system and out to atmosphere.

Transmission

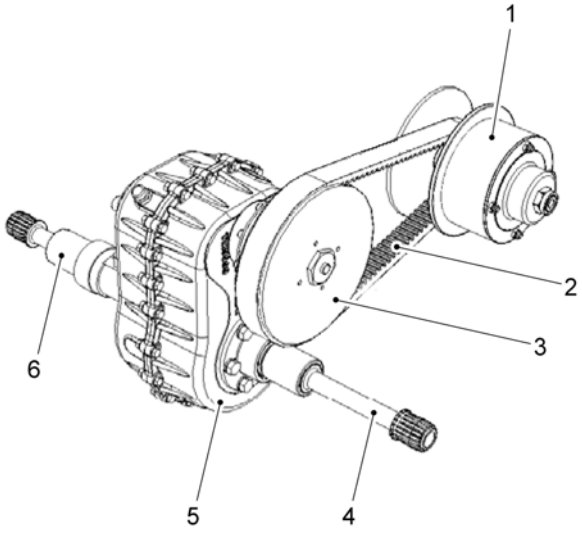
Drive train

17 Power is transferred from the engine to the gearbox via an 'automatic' Continuously-Variable Transmission system (CVT). The system comprises of a heavy-duty drivebelt running between two variable pulleys (one attached to the engine, the other to the gearbox input shaft). The pulley-walls (sheaves) move apart or together, depending on engine speed.

18 The engine mounted pulley or 'driver clutch assembly' is driven by the engine crankshaft. Varying centrifugal force causes rollers within the unit to move outward or inward. This causes a varying separation of the pulley-walls. Accordingly, the gearbox mounted pulley or 'driven clutch' also varies due to the belt and its in-built clutch spring. As the effective 'diameter' of the driver clutch pulley increases, the driven pulley becomes smaller. The transmission drive ratio therefore varies.

19 The gearbox operates in Neutral, Forward High or Low ratios, or Reverse, depending on the position of the gear selector. When a Forward ratio or Reverse is selected, power from the gearbox is transferred to the rear wheels via oil-bathed fully-enclosed double drive chains.

20 The gearbox incorporates a differential lock which is operated by a lever.



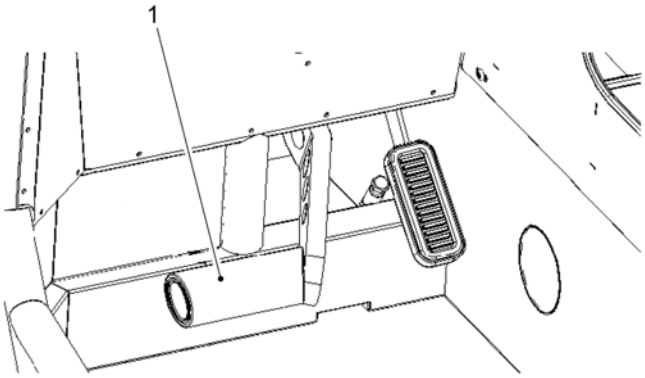
1	Engine CVT pulley	4	Driveshaft (LHS)
2	Belt	5	Transmission
3	Transmission CVT pulley	6	Driveshaft (RHS)

Fig 8 Transmission

Brakes

Service Brakes

21 The brakes are hydraulically operated, power assisted, with discs and calipers fitted to all four wheels. The brakes are activated by the brake pedal (Fig 9 (1)).

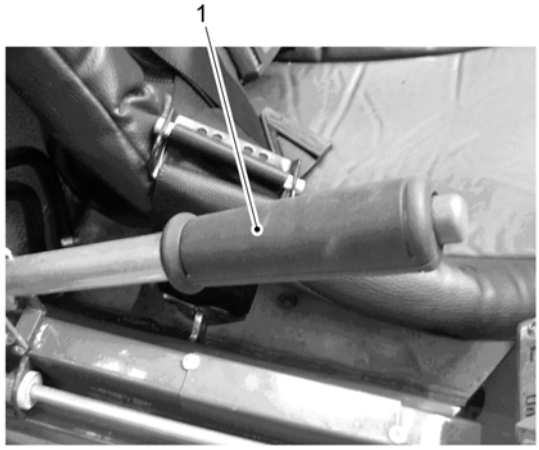


1 Brake pedal

Fig 9 Brake pedal

Parking Brake

22 The parking brake operates by cables and is applied to both rear wheels using a hand-operated lever (Fig 10 (1)).



1 Parking brake lever

Fig 10 Parking brake lever

Steering

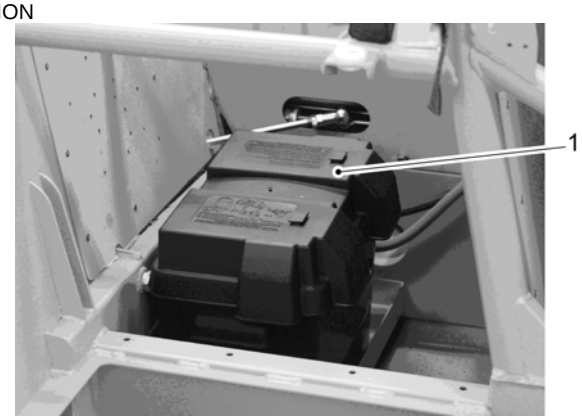
23 The main components of the steering system are the steering wheel, steering rack and steering tie-rods.

Electrical system

24 The electrical circuit is a 12V negative-earth system with initial power being provided by a heavy-duty battery.

25 The 12V battery supplies all the electrical power required to run the systems and start the vehicle. When the engine is running, a belt drives a 40-70A nominal-output alternator, generating direct current through a rectifier which takes over the running of the electrical systems. It also trickle-charges the battery to replace the power used during the start cycle.

26 The heavy-duty battery is located under the rear cargo bay on the right hand side of the chassis in a protective box and is classed as maintenance free.

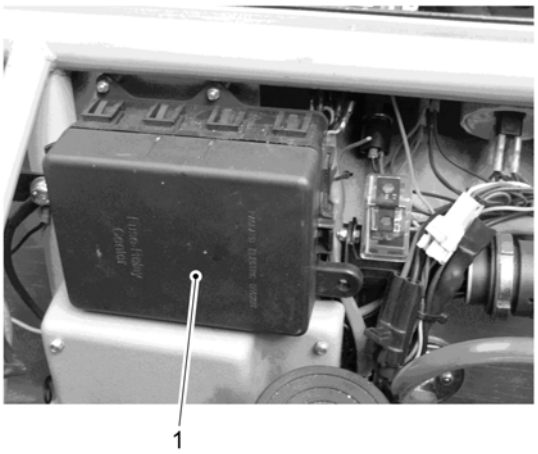


1 Battery box

Fig 11 Battery box

27 The electrical systems are protected by fuses. The fuses are located in a protective box under the front cargo bay.

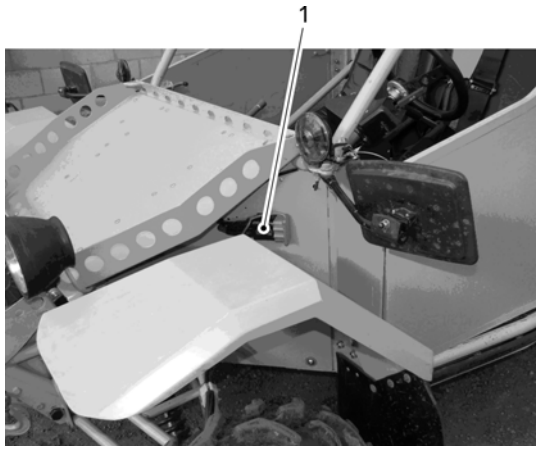
28 The relays are located alongside the fuses inside the protective box under the front cargo bay.



1 Fuse box

Fig 12 Fuse box

29 A slave socket is located on the front left of the vehicle to enable jump starting in the event of battery failure.



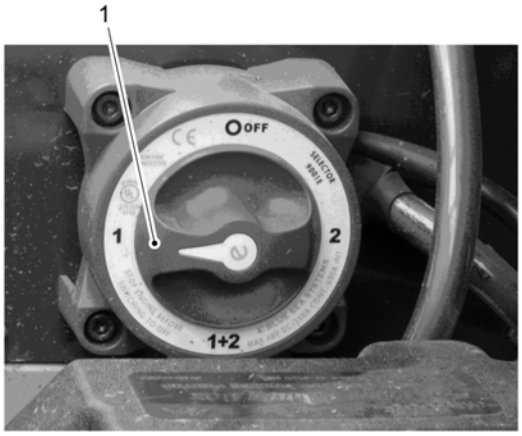
1 Slave socket

Fig 13 Slave socket

30 A master isolator switch (Fig 14 (1)) is located below the cargo bay next to the battery. The switch is used to select between batteries (if two are fitted), and to isolate the whole electrical system of the vehicle during transportation or storage. It should also be used when maintenance is being performed, to prevent the vehicle being started.

31 The master isolator switch has multiple positions; the only ones utilised on this platform are position 0 (battery disconnected) and position 1 (battery connected). Only one battery is fitted to this vehicle, so positions 2 and 1+2 are not utilised.

32 To isolate the electrical system, turn the switch to the 0 (off) position. This will disconnect the battery from the whole electrical system of the vehicle.

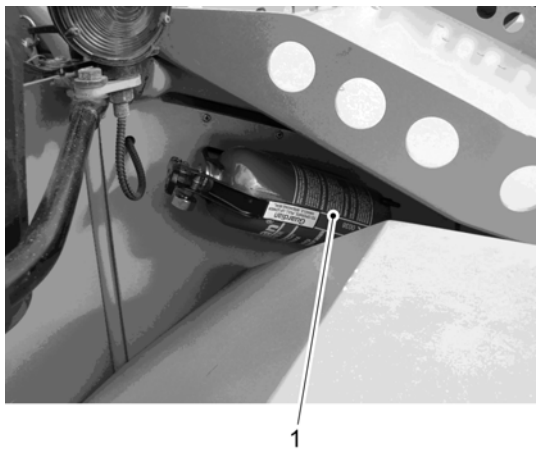


1 Master isolator switch

Fig 14 Master isolator switch

Fire fighting equipment

33 A fire extinguisher (Fig 15 (1)) is mounted on the front right side of the vehicle.

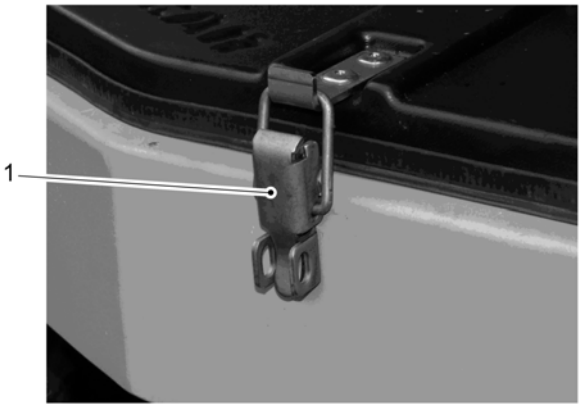


1 Fire extinguisher

Fig 15 Fire extinguisher

Stowage

34 Two toolboxes (Fig 1 (8)) and (Fig 3 (3)) are constructed within the chassis behind the seats. They are fitted with lids, secured by latches (Fig 16 (1)).



1 Latch

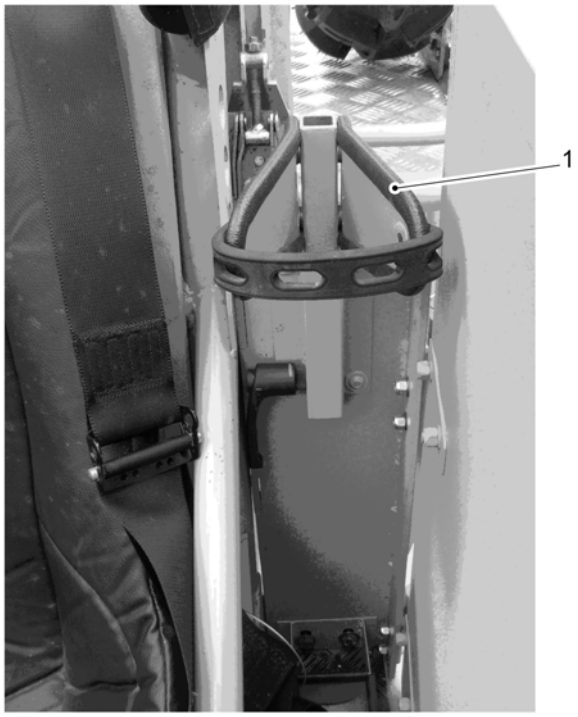
Fig 16 Toolbox lid latch

35 Storage for small loose items is provided in the centre console and the glove box.

36 Personal kit may be stowed on the front cargo bay.

37 Additional stowage is provided under the front cargo bay, and behind the seats below the rear cargo bay.

38 A weapon rack (Fig 17 (1)) is positioned at the side of each seat.



1 Weapon rack

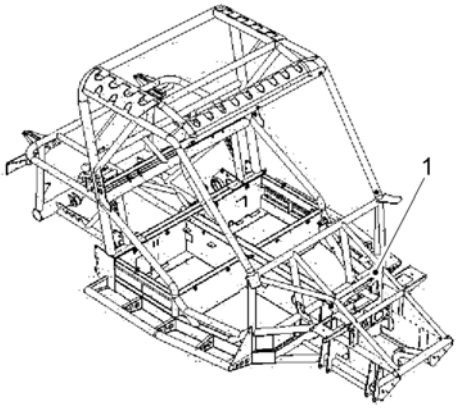
Fig 17 Weapon rack

Decals

39 No decals are fitted to the vehicle.

Vehicle Identification Number (VIN)

40 The VIN is located under the front cargo bay on the middle frame bar (Fig 18 (1)).



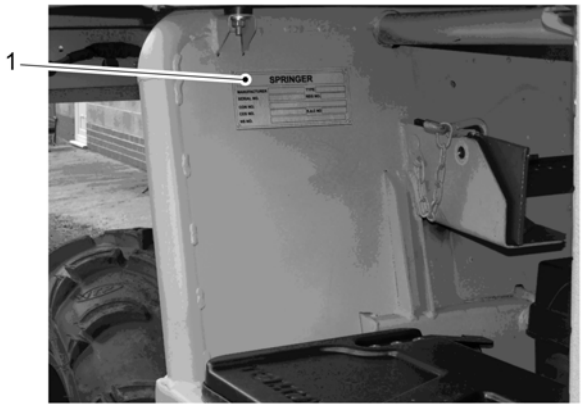
1 VIN

Fig 18 Vehicle Identification Number (VIN) location

41 For security purposes the VIN is also marked within the central tunnel (not visible without disassembly).

Military Vehicle Identification Plate

42 The military vehicle identification plate is located on the bulkhead below the front right corner of the rear cargo bay (Fig 19 (1)).

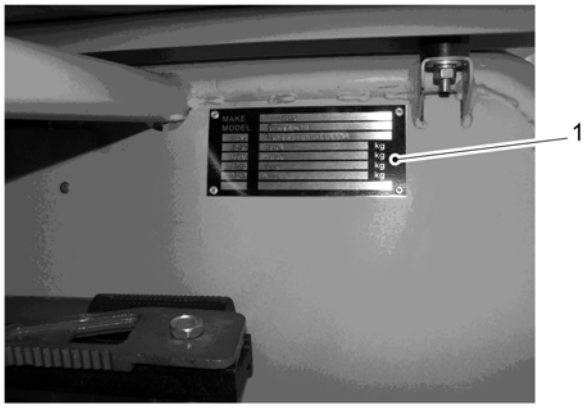


1 Military vehicle identification plate

Fig 19 Military vehicle identification plate location

Payload Information Plate

43 The payload information plate is located on the bulkhead below the front left corner of the rear cargo bay (Fig 20 (1)).



1 Payload information plate

Fig 20 Payload information plate location

CHAPTER 2

CONTROLS AND INSTRUMENTS

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9 Accelerator Pedal
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21 Seat Adjustment
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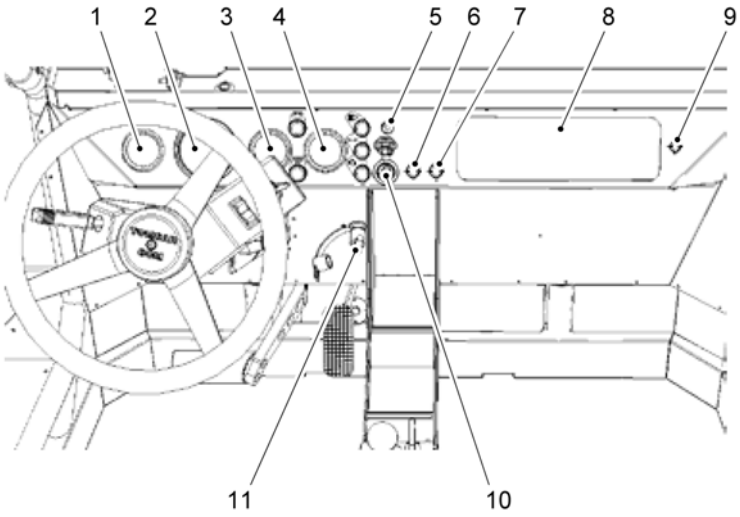
INTRODUCTION

1 This chapter gives the controls and instruments used on the Springer Vehicle.

CAB LAYOUT

Console



1	Fuel gauge	7	Rear fog light switch
2	Speedometer/Odometer	8	Glove box
3	Charge /volt meter	9	Winch remote control socket
4	Coolant temperature	10	12V receptacle
5	Map light (if fitted)	11	Slave Isolator switch
6	Hazard warning light switch		

Fig 1 Console

2 The 12V dc receptacle (10) is a standard automotive 12V accessory socket.

3 The 12V dc receptacle allows appropriate electrical items to be powered from the machine's electrical power circuit. Only items which are in the receptacle's power rating, and which are fitted with the correct plug, are to be connected.

4 The receptacle cap is to be closed when the receptacle is not in use.

5 The slave isolator switch (11) will isolate the slave socket (located on the front LH wing) from the rest of the electrical system.

6 Slave isolator switch operation:

6.1 The “L” shaped key points left for jump start operation.

NOTE

The master battery switch must be in the ON position (position 1) for slave socket operation. Refer to Chap 1.

6.2 In order to isolate the slave socket, turn the key counter clockwise to a vertical position.

6.3 The “L” shaped key can be removed from its holding base in either position.

Warning Lights

7 The warning lights on the console display are as follows:

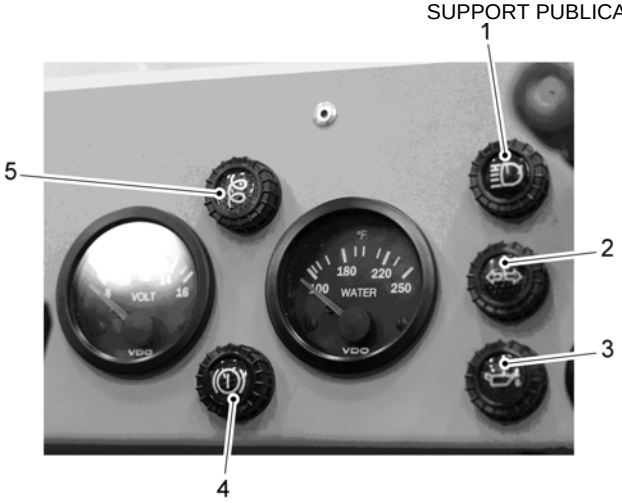
7.1 Main Beam ON (Fig 2 (1)): Illuminates when the headlight main beams are set to ON. Set the main beams OFF for oncoming vehicles.

7.2 Direction Indicators ON (2): Flashes when the left or right direction indictors are switched on.

7.3 Low Oil Pressure / High Temperature (3): Illuminates if the oil pressure falls, or the coolant temperature rises above the safe operating range while the engine is running. The will illuminate when the ignition switch is set to the ON position. The light should extinguish a few seconds after the engine is started.

7.4 Parking Brake (4): Illuminates if the parking brake is engaged.

7.5 Glow Plugs (5): Illuminates when the ignition switch is set to the ON position to indicate that the glow plugs are heating. When the light extinguishes the engine may be started.



1	Blue	High beam
2	Green	Direction Indicator lights
3	Red	Low oil pressure and/or High temperature
4	Red	Parking brake engaged
5	Amber	Glow plugs

Fig 2 Warning lights

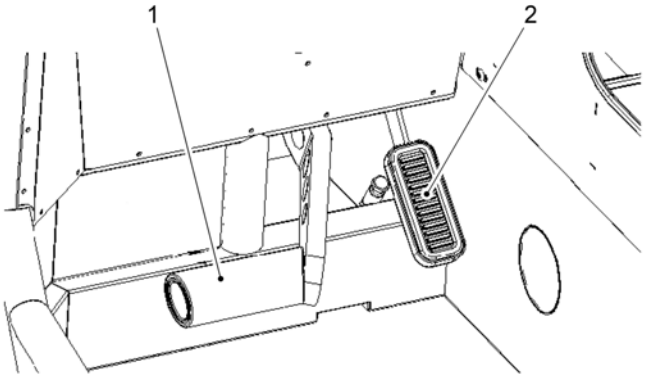
Drive Controls

Brake Pedal (Fig 3 (1))

8 Depress the brake pedal to slow or stop the vehicle. The pedal should always return to the rest position when released. Always check that the brake pedal returns normally before starting the engine.

Accelerator Pedal (2)

9 Push the pedal down to increase engine speed. Spring pressure returns the pedal to the rest position when released. Always check that the accelerator pedal returns normally before starting the engine.



1 Brake pedal
2 Accelerator pedal

Fig 3 Pedals

Gear Selection

CAUTION

EQUIPMENT DAMAGE. Do not attempt to change gear while the vehicle is moving or damage to the transmission could result. Always select the gear when the vehicle is stationary and the engine is at idle. Make sure the lever is in proper gear position.

NOTE

High is the primary driving range for the Springer Vehicle. Low is intended for use where maximum power is required e.g. when heavily loaded, towing, or crossing adverse terrain.

10 To change gears, always stop the vehicle. With the engine idling, press the brake pedal and move the lever (Fig 4 (1)) to the desired gear.

11 Always stop the engine, remove the ignition key and engage the parking brake whenever the vehicle is left unattended.

12 Maintaining gear selector linkage adjustment is important for proper transmission function. Refer the vehicle to REME maintenance personnel if you experience any gear selection problems.

Differential Lock

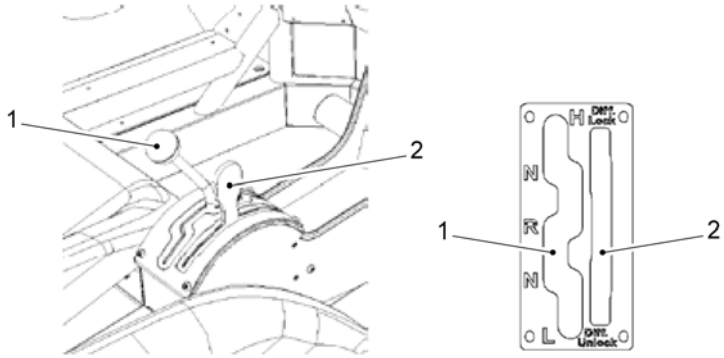
13 The rear axle is equipped with a lockable differential that allows the driver to choose between a locked differential or an unlocked differential. It is beneficial to lock the differential in low traction situations. To lock the differential, while driving slowly, push the differential lever (2) until it goes all the way forward into locked position. Disengagement is simply the reversal of the engagement procedure.

14 Slight changes in direction of travel while operating the lever may assist in the engagement and disengagement of the differential lock.

15 Damage to the differential can occur the differential lock is engaged while the vehicle is travelling at high speeds or while the rear wheels are spinning without traction. To unlock the differential; while moving slowly forward, pull differential lever all the way back into the unlocked position. If the differential lock is hard to engage or disengage; while moving slowly forward, turn the steering wheel slightly from side to side.

CAUTION

EQUIPMENT DAMAGE. Incorrect use of the vehicle with the differential lock engaged can cause rollover. While the differential lock is engaged do not operate the vehicle at speeds greater than 17 kph (10 mph).

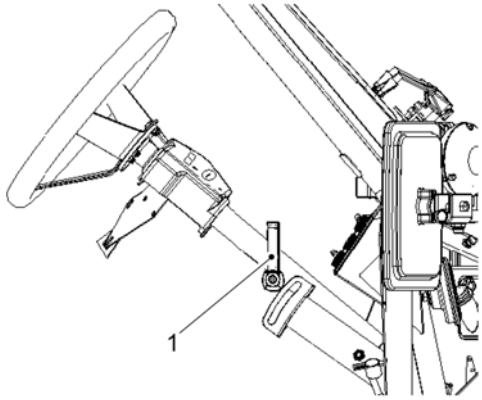


1 Gear selector
2 Differential lock

Fig 4 Transmission controls

Steering Wheel Adjustment

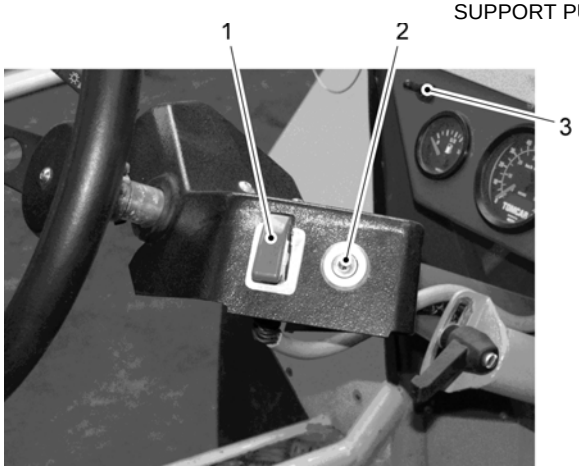
16 Turn the adjusting handle (Fig 5 (1)) counter-clockwise to loosen the adjuster. Adjust the steering wheel position as required. Lock the steering wheel in position by turning the adjusting handle clockwise.



1 Adjusting handle

Fig 5 Steering wheel adjustment

Switches



1 Blackout switch
2 Ignition switch
3 Fuel gauge tank switch

Fig 6 Switches

17 Blackout switch (Fig 6 (1))

17.1 Lift the cover and operate the switch. This switch enables all visible lights to be switched off when running under blackout conditions.

NOTE

When running under blackout conditions, the instrument cover (Fig 7 (1)) should be fixed in place using four press studs.

1 Instrument blackout cover

Fig 7 Instrument blackout cover

18 Ignition switch (Fig 6 (2))

18.1 The ignition switch is a four-position, key-operated switch. The key can be removed from the switch when it is in the OFF position.

18.2 The normal off position is OFF (Para 18.2.2).

18.2.1 **ACCESSORIES** – Engine is off. All electrical circuits are on. Cooling fan runs.

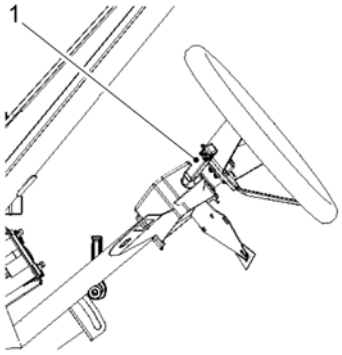
18.2.2 **OFF** – Engine is off. All electrical circuits are off except 12V socket on console.

18.2.3 **ON** – Engine circuits are on. All electrical accessories can be used.

18.2.4 **START** – Electric starter is engaged by pushing key inwards and holding ignition switch key in this position. Upon release, the key will return to the ON position.

19 Fuel gauge tank switch (3)

19.1 This switch determines which tank level (L or R) the gauge displays.



1 Multifunctional switch

Fig 8 Signal / Lights / Horn Control

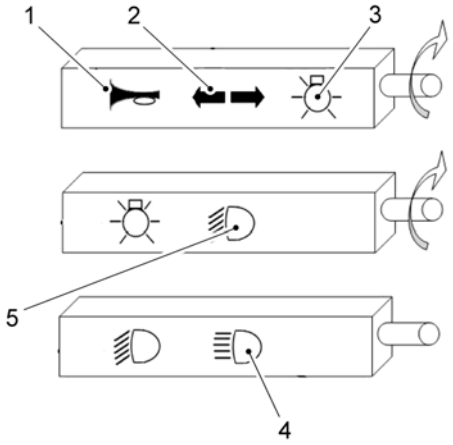


Fig 9 Signal / Lights / Horn Control

20 Multifunctional switch controls the following:

20.1 Move handle up, right direction indicator blinks. (Fig 9 (2))

20.2 Move handle down, left direction indicator blinks. (2)

20.3 Turn handle forward once to switch on parking lights. (3)

20.4 Turn handle forward twice to switch on head lights. (5)

20.5 Pull handle backwards to toggle high beam. (4)

20.6 Push handle towards steering wheel activates horn. (1)

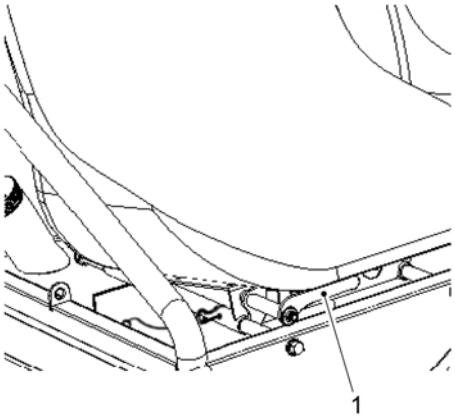
NOTES

(1) The ignition switch key must be in the ON position to operate the headlights.

(2) The multifunctional switch will not return automatically to its original position on low turning angle of the vehicle.

Seat Adjustment

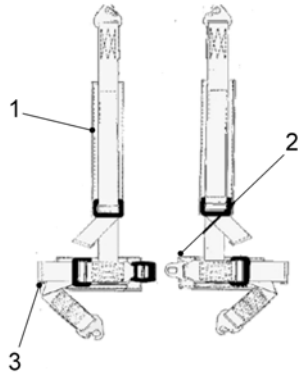
21 To adjust the seat, locate the lever (Fig 10 (1)) underneath the seat. Pull up on the lever and slide the seat to the desired position. Once the desired position is reached try to slide the seat forward and backward to make sure the lever is locked in place.



1 Lever

Fig 10 Seat adjustment

4-Point Harness Adjustment



1 Shoulder straps
2 Latch plate
3 Lap straps

Fig 11 4-Point harness

WARNING

PERSONAL INJURY. THE VEHICLE IS EQUIPPED WITH 4-POINT HARNESSES WHICH MUST BE WORN BY DRIVER AND PASSENGER WHEN USING THE VEHICLE.

22 Fasten 4-point harness in this order:

22.1 Loosen shoulder straps (Fig 11 (1)).

22.2 Place arms through the shoulder straps. (1)

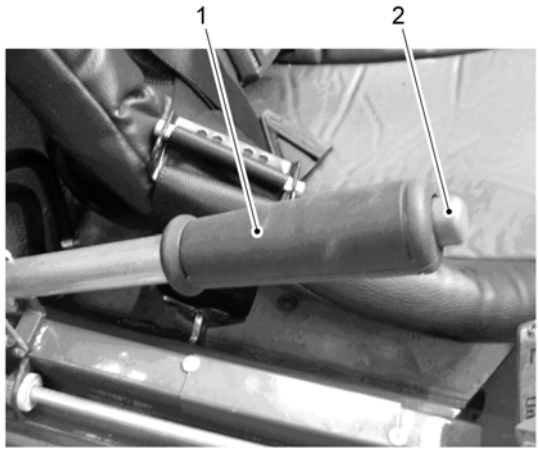
22.3 Insert the latch plate into the buckle until it clicks. (2)

22.4 Tighten lower straps (3) followed by shoulder straps (1).

22.5 Make sure the harness is tightened securely.

23 To unfasten, press the square red button in the buckle's center.

Parking Brake Lever



1 Parking brake lever
2 Parking brake release button

Fig 12 Parking brake

24 The parking brake lever (Fig 12 (1)) is located between driver and passenger seats and operates on the rear wheels by means of cable.

25 Parking brake engagement:

25.1 Engage the parking brake when parking the vehicle to prevent the vehicle from rolling. To apply the parking brake, push in the thumb button (2) and pull up the lever (1) with your hand releasing the thumb button to lock position.

26 Parking brake release:

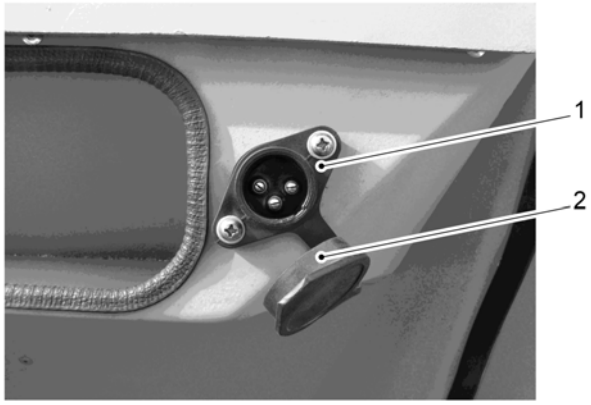
26.1 To release the parking brake, pull the lever (1) to allow operation of the thumb button (2) and while holding in the thumb button lower the lever to the

lower position. Make sure the parking brake lever is functioning properly before each operation.

Winch Controls

27 The winch is supplied with a remote control handset (Fig 14).

28 The remote control for the winch plugs into a socket (Fig 13 (1)) to the right of the glove box.



1 Socket
2 Cover

Fig 13 Winch remote control socket

29 The cover (Fig 13 (2)) is to be closed when the socket (1) is not in use.

30 An overload cut-out switch is fitted to the winch. This is reset by pressing the pushbutton located on the front right wing in front of the fire extinguisher.

Fig 14 Winch remote control

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INTRODUCTION

1 This chapter gives the operating instructions for the Springer Vehicle.

PREPARING THE VEHICLE

2 Make sure the vehicle is on a firm level surface.

3 Make sure the parking brake is engaged (locked).

4 Make sure the gear lever is in neutral.

5 Make sure the ignition key is in the off position.

PRE-USE CHECKS

6 Do the following checks before the vehicle is used. The operator is also advised to stop the vehicle occasionally during long work sessions and do the checks again.

7 All of the checks are applicable to the serviceability of the vehicle and operator safety. Faults must be checked and corrected by suitably qualified personnel.

7.1 Check the vehicle for cleanliness.

7.1.1 Clean the light lenses.

7.1.2 Remove dirt and debris, especially from around the suspension, steering pivots, pedals, engine and transmission belt, brake linkages, radiator and fans.

7.2 Check the vehicle for damage.

7.3 Do a walkround inspection of the vehicle. Check the vehicle for loose or missing nuts, bolts, screws etc. Replace or tighten these components where necessary.

7.4 Make sure that the fuel filler caps are tightly closed. Examine the frame hardware for damage including the ROPS.

7.5 Examine the vehicle for signs of damaged or missing parts.

7.6 Check below the vehicle for oil, fuel, brake fluid or coolant leakages. Check for large oil leaks from the engine, the transmission box and final drive. Slight oil moisture is not problematic.

WARNING

PERSONAL INJURY. TYRES AND WHEELS ARE CRITICAL TO SAFETY, ALWAYS ENSURE CORRECT PRESSURES, WEAR LIMITS AND TORQUE SPECIFICATIONS ARE ADHERED TO.

7.7 Check the tyres.

7.7.1 Make sure the tyres are correctly inflated. For the correct tyre pressures and for the safe procedure for inflating the tyres. Refer to Chap 4.

7.7.2 Check the tyres for wear, cuts and penetration by sharp objects. Refer to Chap 4. Do not use a vehicle with damaged tyres.

7.8 Check the wheel lug nuts for tightness. Refer to Cat 601 for correct wheel nut torque figure.

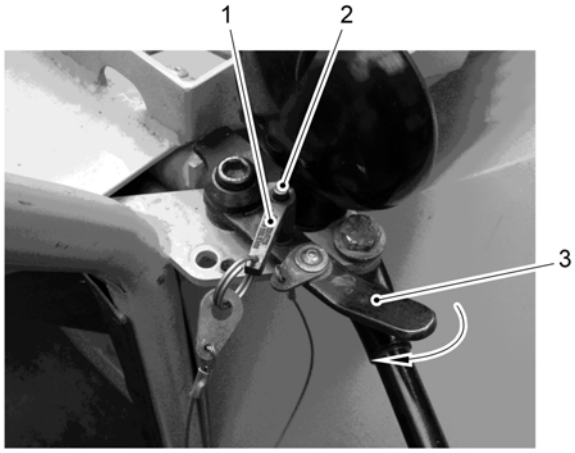
7.9 Check each wheel for free play by grabbing the top of the tyre firmly and pulling it back and forth.

7.10 Check that all the brake fluid hoses coming from the brake pump to the wheels are undamaged and in order (No leaks).

7.11 Check the steering system components for signs of damage or loose fasteners. Replace or tighten these components where necessary. Check for free play by turning the steering wheel left and right.

7.12 Check suspension air pressure. Refer to Chap 4. Check shock absorbers by pressing them hard downwards. The vehicle should spring back slowly and symmetrically. Check all fasteners are in place and tight. Check front suspension for free play and adjust ball joint when necessary.

7.13 Lift the front cargo bay as follows:



1 Locking pin
2 Release button
3 Retaining lever

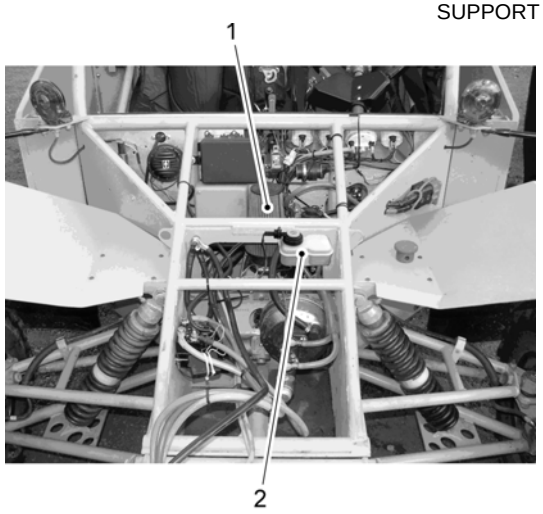
Fig 1 Front cargo bay retainer (RH)

7.13.1 Press and hold release button (Fig 1 (2)). Withdraw locking pin (1).

7.13.2 Release the front cargo bay by pushing the lever (3) towards the rear of the vehicle as shown.

7.13.3 Repeat on the other side of the vehicle.

7.14 Do the following checks:



1 Air filter
2 Brake fluid reservoir

Fig 2 Front checks

7.14.1 Check the front air filter (Fig 2 (1)). Refer to Chap 4. Check all air filter hoses are connected properly.

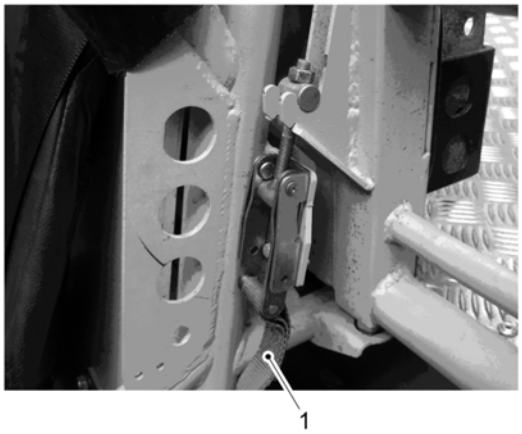
7.14.2 Brake fluid level (2). Refer to Chap 4. Check the completeness of the reservoir canister and that the cap is tightened. Verify that the clear tubes coming from the canister to the servo are not damaged in any way.

7.14.3 Make sure that there are no loose objects under the front cargo bay that might damage or interfere with the pedals or steering.

7.15 Close the front cargo bay. Makes sure that the retaining levers (3) on both sides of the vehicle are fully secured and both locking pins (1) are securely in place.

7.16 The rear cargo bay is secured by retainers fitted behind the seats on each side of the vehicle.

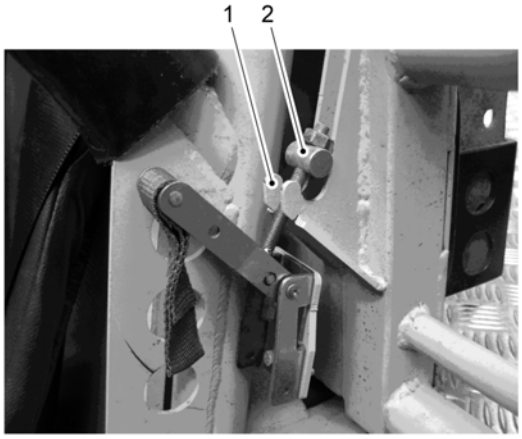
7.17 Lift the rear cargo bay as follows:



1 Strap

Fig 3 Rear cargo bay retainer (LH)

7.17.1 Lift the strap (Fig 3 (1)) to release the retainer.



1 Cargo bay
2 Retainer

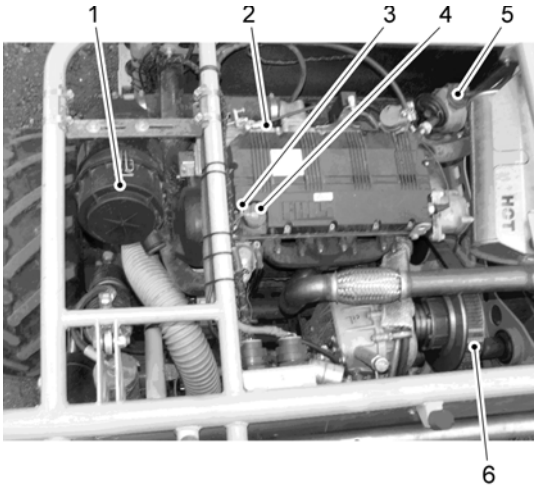
Fig 4 Rear cargo bay retainer (LH)

7.17.2 Lift the strap (Fig 3 (1)) sufficiently high to enable the retainer (Fig 4 (2)) to be lifted clear of the cargo bay (1). (Fig 5).

Fig 5 Rear cargo bay retainer (LH)

7.17.3 Ensure the retainer is stowed clear of the cargo bay to prevent damage when the bay is lowered. Repeat on the other side of the vehicle.

7.18 Do the following checks:



1	Air filter	4	Oil filler cap
2	Fuel Filter	5	Coolant level
3	Dipstick	6	CVT Belt

Fig 6 Rear checks

7.18.1 Check the rear air filter (Fig 6 (1)). Refer to Chap 4. Check all air filter hoses are connected properly.

7.18.2 Check that the fuel filter (2) and hoses are not leaking and are secured correctly.

7.18.3 Check engine oil level (3). Refer to Chap 4.

7.18.4 Make sure that the engine oil filler cap (4) is securely fitted.

7.18.5 Check coolant level (5). Refer to Chap 4. Make sure that the radiator cap is tightly closed.

7.18.6 Check that the battery connections are secure. Check that the battery is securely retained. Refer to Chap 4.

7.18.7 Check the CVT belt (6) for signs of damage, cracks or cuts. Check the CVT belt for correct tension. Refer to Chap 4.

7.18.8 Check the CVT operation as follows:

7.18.8.1 Check that the transmission is in neutral and the parking brake is engaged.

7.18.8.2 With assistance, start the engine and slowly rev several times while watching both CVTs.

7.18.8.3 Both CVTs should open and close in a smooth continuous motion, from (Fig 7 (1)) to (2).

7.18.8.4 If there is any hesitation or they do not reach full travel, there is a problem in one or both of the CVTs. Refer vehicle to REME maintenance personnel.

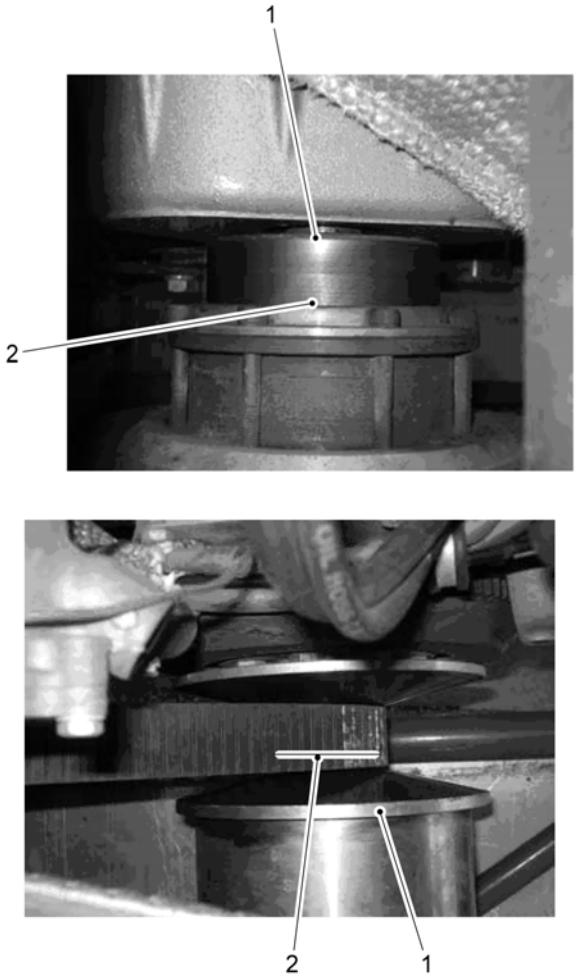


Fig 7 Checking CVT Operation

7.19 Ensure both cargo bay retainers (Fig 4, (2)) are clear of the cargo bay area and carefully select a suitable hand grip to prevent entrapment.

7.20 Close the rear cargo bay. Make sure that both cargo bay retainers (Fig 4 (2)) are fully engaged with the cargo bay (1), and both straps (Fig 3 (1)) are pulled fully down to secure the retainers.

7.21 Make sure the cargo bay is secured fully down

7.22 Make sure all cargo is safely stowed to prevent it moving around or being shaken out while the vehicle is in motion.

7.23 Check that all ancillary equipment is securely stowed e.g. spare wheel, jack, ramps, tools etc.

7.24 Check that the 4-point harnesses are secured correctly and in good condition.

7.25 Check that the vehicle does not roll with the parking brake engaged.

Load Compensators

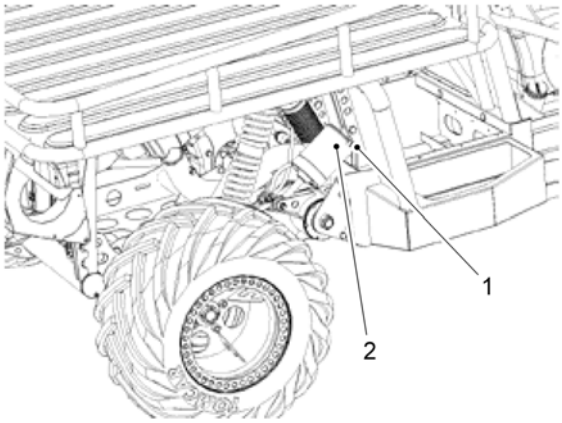
8 The Load Compensators are located between the rear trailing arm and the vehicle frame, one on each side (Fig 8).

9 Before loading cargo over 158 kg (350 lb) onto the rear cargo bay, inflate both load compensators to 75 psi as follows:

9.1 Remove the valve cap from the air valve (Fig 8 (1)).

9.2 Attach the air chuck to the air valve and inflate the load compensator to the required pressure. Refit the valve cap.

9.3 Repeat on the other side of the vehicle.



1 Air valve
2 Load compensator

Fig 8 Load Compensator (RH)

Winch

10 Inspect the rope and equipment before each use. A frayed or damaged rope should be replaced immediately. Use only the authorised replacement rope.

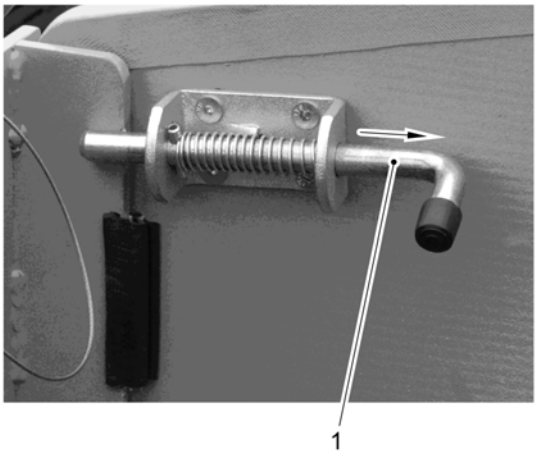
11 Inspect the winch installation and bolts to ensure that all the bolts are tight before each operation.

12 A winch that appears to be damaged in any way, is found to be worn, or operates abnormally should be removed from service until repaired. Refer unit to suitably qualified maintenance personnel or replace unit.

ENTERING AND EXITING THE VEHICLE

13 The doors are held closed by spring-loaded pins (Fig 9 (1)).

14 To open the door, pull the spring-loaded pin towards the rear of the vehicle as shown.



1 Spring-loaded pin

Fig 9 Door handle (RH)

15 Make sure that the spring-loaded pin is fully home when fastening the door.

BEFORE STARTING THE ENGINE

Pre-Start Safety Checks

16 Make sure the parking brake is engaged.

17 Remove dirt and rubbish from the vehicle, especially around the pedals and control levers and below the seats.

18 Remove oil, grease and mud from the pedals, control levers and the steering wheel.

19 Make sure that your hands and shoes are clean and dry.

20 Remove or secure all loose articles.

21 Check that these items are serviceable: Lights, Horn, Switches and Direction Indicators. Check warning lights on the dashboard (yellow/blue/red).

22 Check the brake pedal for excessive travel or a spongy feel.

23 Check that the accelerator pedal has full movement and springs back when released.

Adjusting the seat.

24 Sit in the drivers seat and adjust it as necessary. Refer to Chap 2

Adjusting the steering wheel.

25 Adjust the steering wheel. Refer to Chap 2.

Fastening the 4-point harness

WARNING

PERSONAL INJURY. THE VEHICLE IS EQUIPPED WITH 4-POINT HARNESSES WHICH MUST BE WORN BY DRIVER AND PASSENGER WHEN USING THE VEHICLE.

26 Fasten the 4-point harness in this order:

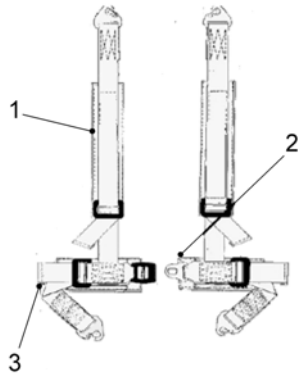
26.1 Loosen shoulder straps (Fig 10 (1)).

26.2 Place arms through the shoulder straps (1).

26.3 Insert the latch plate into the buckle until it clicks (2).

26.4 Tighten lower straps (3) followed by shoulder straps (1).

26.5 Make sure the harness is tightened securely.



1 Shoulder straps
2 Latch plate
3 Lap straps

Fig 10 4-Point Harness

STARTING THE ENGINE

NOTE

It is not possible to tow-start or push-start the vehicle due to the design of the transmission.

Starting the Engine in Normal Conditions

27 In order to start the engine, perform the following steps:

27.1 Place the transmission in neutral.

27.2 Sit in the driver's seat and fasten the harness. (Make sure the passenger is harnessed as well.)

CAUTIONS

(1) EQUIPMENT DAMAGE. Do not operate the starter continuously for more than five seconds or the starter will overheat and the battery power will drop temporarily. Wait at least five seconds between each operation of the starter to allow it to cool and to allow battery power recovery.

(2) EQUIPMENT DAMAGE. Do not turn the ignition switch to the START position while the engine is running. Damage to the starter can result.

27.3 Turn the ignition key to the 'ON' position, the amber glow plug indicator light on the dash board will illuminate indicating that the glow plug timer circuit is activated. As soon as the glow plug indicator light has extinguished, turn the key to the 'START' position while pressing the brake pedal. When the engine starts, release the key, which will return to the ‘ON’ position.

27.4 If engine does not start within 5 seconds, repeat the process.

NOTES

(1) Make sure that all the warning lights (apart from the park brake light) are OFF when the engine is running. If a warning light stays on, stop the engine immediately and find the cause of the problem.

(2) Do not press the accelerator pedal while starting the engine.

(3) Operating the vehicle immediately after starting could cause engine damage. Allow the engine to warm up for at least 10 seconds before operating the vehicle and run for 2 minutes before using full power.

(4) Never press accelerator pedal all the way when in neutral, it may cause severe damage to the transmission.

Jump Starting

CAUTION

EQUIPMENT DAMAGE. The booster (slave) supply must not be higher than that of the machine. Using a higher voltage supply will damage your machine's electrical system. Do not attempt to jump-start the engine without being sure of the voltage of the booster (slave) supply.

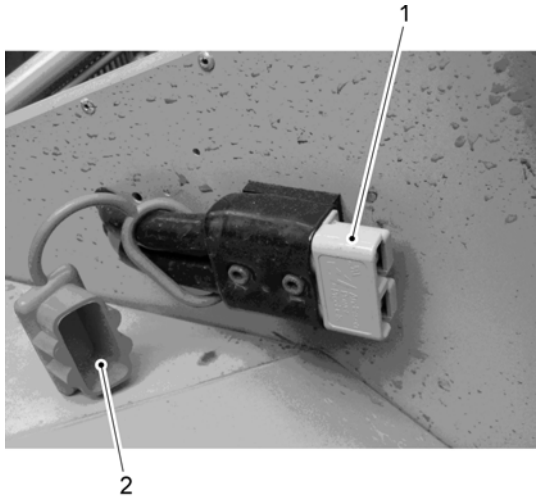
28 Make sure the park brake is engaged and the transmission is in neutral.

29 Set all the switches in the cab to OFF.

30 A slave socket is located on the front left of the vehicle. Refer to Chap 1.

31 Remove the rubber cover (Fig 11 (2)).

32 Connect the slave lead to the slave vehicle.



1 Slave socket
2 Rubber cover

Fig 11 Slave socket

33 Connect the slave lead to the socket (1). Make sure that all connections are secure.

34 Make sure that the master isolator switch is set to position 1. Refer to Chap 1.

35 Make sure that the slave isolator switch is turned to the left. Refer to Chap 2.

36 Do the Pre-Start Safety Checks. Refer to Para 16.

37 Start the engine. Refer to Para 27.

38 Disconnect the slave lead from the slave socket (1).

39 Disconnect the slave lead from the slave vehicle.

40 Isolate the slave socket by turning the slave isolator switch to the vertical position.

SAFETY OPERATING PROCEDURES

41 When you move the vehicle, keep it under control at all times. Stay alert for obstructions and possible hazards.

42 Use the brake pedal when you move down a slope, to prevent overspeeding of either the vehicle or the engine.

43 Do not use the brake pedal as a foot-rest.

44 Avoid water where possible, if the drive belt becomes wet, slippage occurs and the vehicle will lose power.

45 Do not cross a body of water where the depth is unknown. As a guideline, deep water is considered to be more than 220 mm (8 in.) in depth. Note that the tyres can tend to `float', making it difficult to control the vehicle.

46 Do not drive the vehicle with the cargo bay raised. You will have no rearward visibility and the vehicle will be unstable.

47 Make sure that your harness is fastened correctly.

48 Make sure that your passenger (if you are carrying one) is correctly seated, with their harness correctly fastened.

OPERATING PROCEDURES

Driving Procedures

49 Sit in the driver's seat and fasten the harness (as described earlier).

50 After starting the engine and allowing it to warm up to normal operating temperature, press the brake pedal and place the transmission into gear.

NOTES

(1) The high/low transmission enables the driver to better control the vehicle on different terrains and applications.

(2) High is the primary driving range for the Springer Vehicle. Low is intended for use where maximum power is required, such as when driving with heavy loads and/or adverse terrain.

CAUTION

EQUIPMENT DAMAGE. Do not attempt to change gear with the engine speed above idle or while the vehicle is moving. Damage to the transmission could result. Always select the gear when the vehicle is stationary and the engine is at idle. Make sure the lever is in proper gear position.

51 To change gears, always stop the vehicle. With the engine idling, press the brake pedal and move the lever to the desired gear. Do not attempt to change gears with engine speed above idle or while the vehicle is moving.

52 Maintaining gear selector linkage adjustment is important for proper transmission function. If you experience any gear selection problems refer to REME maintenance personnel.

53 Check your surroundings and determine your path of travel.

54 Disengage the parking brake.

55 Keeping both hands on the steering wheel, with thumbs on the outside, take your foot off the brake pedal and slowly press the accelerator with your right foot and begin driving. Vehicle speed is controlled by the amount the pedal is pressed.

56 While the vehicle is moving slowly, check the steering and brakes. Do not move the vehicle unless the steering and brakes are working correctly. If you are not sure, assume they are faulty and stop the vehicle.

CAUTION

EQUIPMENT DAMAGE. Incorrect use of the vehicle with the differential lock engaged can cause rollover. Steering becomes difficult. While the differential lock is engaged do not operate the vehicle at speeds greater than 17 kph (10 mph).

56.1 Set the Differential Lock lever to suit the ground conditions.

57 The rear axle is equipped with a lockable differential that allows the driver to choose between a locked differential or unlocked differential. It is beneficial to lock the differential in low traction situations. To lock the differential, while driving slowly, push the differential lever until it goes all the way forward into locked position. Disengagement is the reversal of the engagement procedure.

58 Slight changes in direction of travel while operating the lever may assist in the engagement and disengagement of the differential lock.

59 Damage to the differential can occur the differential lock is engaged while the vehicle is traveling at high speeds or while the rear wheels are spinning without traction. To unlock the differential; while moving slowly forward, pull differential lever all the way back into the unlocked position. If the differential lock is hard to engage or disengage; while moving slowly forward, turn the steering wheel slightly from side to side.

60 Practice manoeuvring and using the accelerator and brakes on level surfaces.

61 Never operate at speeds too fast for your skills or the conditions at hand.

62 Speed must be reduced when using the vehicle on rough roads, slopes and sharp turns. This is especially important when you transport heavy equipment in the cargo bay.

Driving on Slippery Surfaces

WARNING

PERSONNEL INJURY. FAILURE TO EXERCISE CARE WHEN OPERATING ON SLIPPERY SURFACES CAN RESULT IN LOSS OF TYRE TRACTION AND CAUSE LOSS OF CONTROL, ACCIDENT, AND SERIOUS INJURY OR DEATH.

63 When driving on slippery surfaces such as wet trails, loose gravel, or ice be alert for the possibility of skidding and sliding. Under these conditions, follow these precautions:

63.1 Slow down.

63.2 Read the terrain and avoid quick, sharp turns, which can cause skids. Keep alert at all times.

63.3 In the event of skidding, correct a skid by turning the steering wheel in the direction of the skid.

63.4 Never apply the brakes during a skid.

63.5 Do not operate on excessively slippery surfaces.

63.6 Always reduce speed and use additional caution when operating on slippery surfaces.

Driving Through Water

64 Avoid water where possible, if the drive belt becomes wet, slippage occurs and the vehicle will lose power.

65 Do not cross a body of water where the depth is unknown. Note that the tyres can tend to `float', making it difficult to control the vehicle.

66 Do not attempt to cross deep or fast-flowing water.

67 After leaving water and on a level surface, always dry the brakes by applying light pressure to the brake pedal repeatedly until braking action is normal.

68 The Springer Vehicle can operate through water up to a maximum fording depth of 400 mm (15.7 in.).

69 When driving through water cannot be avoided, follow these precautions:

69.1 Always determine water depths and current before entering.

69.2 Choose a crossing where both banks have inclines as gradual as possible.

69.3 Proceed slowly, avoiding rocks and any other obstacles that might be in your way.

NOTE:

After running your vehicle in water, it is critical that you perform the services outlined in Cat 601.

Give special attention to engine oil, transmission oil, final drive oil and all grease fittings.

Immersion can result in major damage if the vehicle is not serviced correctly and promptly. After immersion, always take the vehicle to REME maintenance personnel. Do not start the engine.

Driving Over Obstacles

70 Keep alert at all times when driving off-road. Look ahead to read the terrain and watch out for hazards such as rocks, holes and low hanging branches.

71 Severe injury or death can result if your vehicle suddenly comes in contact with a hidden obstacle. Not all obstacles are immediately visible.

72 Reduce speed and travel with caution in unfamiliar terrain.

Driving in Reverse

73 When driving in reverse, follow the guidelines outlined below:

73.1 Apply the brakes.

73.2 Put gear lever in reverse position.

73.3 Always look around you before reversing.

73.4 Slowly release brake pedal, and gently apply the accelerator pedal for movement.

73.5 Reverse slowly.

73.6 Apply the brakes lightly for stopping.

73.7 Avoid turning at sharp angles.

73.8 Always avoid backing downhill.

73.9 Never accelerate suddenly while in reverse.

Operating on Slopes

WARNING

PERSONAL INJURY. OPERATING THE VEHICLE ON HILLSIDES CAN BE DANGEROUS IF PROPER PRECAUTIONS ARE NOT TAKEN. OPERATE IN LOW RATIO ON HILLSIDES. REMAIN VIGILANT OF THE DIFFERENT HANDLING CHARACTERISTICS DEPENDANT ON LOAD AND ANGLE OF TRAVERSE.

Driving Uphill

74 When driving uphill, follow these precautions:

74.1 Always travel uphill in a straight line.

74.2 Avoid very steep hills (30 deg maximum).

74.3 Keep feet and hands within the cabin at all times.

74.4 Proceed at a constant speed.

Driving on side slopes

75 Avoid operating on very steep hills (30 deg maximum).

Driving Downhill

76 When driving down a hill, follow these precautions:

76.1 Test the brake pedal and parking brake before descent.

76.2 Keep in a straight line and proceed directly downhill.

76.3 Maintain a safe speed in accordance with the conditions.

76.4 Apply the brakes slightly and softly to aid in slowing.

76.5 Avoid descending a hill at an angle, which would cause the vehicle to lean sharply to one side. Travel straight downhill when possible.

Stopping and Parking the Vehicle

Braking

77 Release the accelerator pedal completely.

78 Press on the brake pedal evenly and firmly.

NOTE

Practice starting and stopping (using the brakes) until familiar with the controls.

Parking the Vehicle

79 When possible, stop the vehicle on dry and level ground.

79.1 Brake to a complete stop.

79.2 Engage the parking brake.

79.3 Place the gear lever in neutral position.

79.4 Turn the ignition switch to the ‘OFF’ position.

79.5 Remove the ignition switch key to prevent unauthorised use.

Parking on an Incline

80 If possible avoid parking on an incline. If it is unavoidable, block the downhill side of the wheels if leaving the vehicle on a hill, or park the vehicle in a side hill position instead.

WORKING WITH THE VEHICLE

Safety Practices

81 Adjust seat (refer to Chap 2) – make sure it’s locked. Sit all the way in; and make sure your back is straight, make sure your wrist touches the steering wheel.

82 Adjust steering wheel position (refer to Chap 2) – tighten lever.

83 Fasten safety harness.

84 Change gears only when vehicle is stationary and engine is at idle.

85 While driving, avoid applying the accelerator and brake pedals simultaneously.

86 Read and understand safety instructions.

87 Reverse operation can be dangerous, even at low speeds. Steering becomes difficult. To prevent flip over, avoid sharp turns.

88 The parking brake can be used in an emergency in case of primary brake system failure.

Clothing and Safety Equipment

89 Do not wear loose clothing or jewellery that can get caught on controls or moving parts. Wear suitable and approved Personal Protective Equipment (PPE) in accordance with LSOP. It is recommended that the minimum PPE includes eye protection, helmet, gloves and long sleeves.

Risk Assessment

90 The following considerations are intended as suggestions of some of the factors to be taken into account when making a risk assessment. Other factors may need to be considered.

General

91 Traffic routes should be of consolidated firm ground with no gradient more severe than the following:

91.1 Maximum up slope: [redacted]

91.2 Maximum down slope: [redacted]

91.3 Maximum lateral slope: [redacted]

Personnel

92 All personnel who are to take part in the operation should be adequately trained, experienced and competent. They are to be fit and adequately rested. A sick or tired operator is a dangerous operator.

93 If supervision is needed, the supervisor must be adequately trained and experienced.

94 In addition to the machine operator, assess if any assistants are required.

The machine

95 Ensure that:

95.1 The machine is in good working order.

95.2 All reported faults have been rectified.

95.3 All pre-use checks have been carried out.

95.4 Tyre pressures are correct and the tyres are in good condition and there is sufficient fuel in the tank to complete the task.

The load

96 Assess the load:

96.1 How heavy is it? Is it within the capabilities of the machine?

96.2 How bulky is it? The greater the surface area, the more affected it will be by wind speeds.

96.3 Is it an awkward shape? How is the weight distributed? Uneven loads are more difficult to handle.

96.4 Is there a possibility of the load shifting whilst being moved? If so, can it be secured?

Loading/unloading area

97 Assess the loading/unloading area:

97.1 Is it level? Any gradient should be carefully considered.

97.2 Is more than one direction of approach to the load possible? Approaching across the gradient should be avoided, if possible.

97.3 Is the ground firm? Will it support the weight of the machine when loaded?

97.4 How rough is the ground? Are there any sharp projections which could cause damage, particularly to the tyres?

97.5 Are there any obstacles or hazards in the vicinity, for example, debris, excavations, manhole covers or power lines?

97.6 Is the space adequate for safe manoeuvring?

97.7 Are any other vehicles or persons likely to be in or to enter the area whilst operations are in progress?

The route to be traversed

98 How firm is the ground, will it provide adequate traction and braking?

99 How steep are any gradients, up/down/across? Cross gradients are particularly hazardous, is it possible to detour to avoid them?

Weather

100 How windy is it? High wind will adversely affect the stability of a loaded machine, particularly if the load is bulky.

101 Is it raining or is rain likely? The ground that was firm and smooth when dry will become uneven and slippery when wet, and it will not offer the same conditions for traction, steering or braking.

Loading the Vehicle

WARNING

PERSONAL INJURY. IT IS THE OPERATORS RESPONSIBILITY TO ENSURE THAT HIS LOADS ARE CARRIED SAFELY. LOADS WHICH ARE TOO HEAVY, UNBALANCED OR INSECURE CAN BE HAZARDOUS.

102 The maximum load capacity for the front cargo bay is [redacted]

103 The maximum load capacity for the rear cargo bay of a fully equipped vehicle with two crew is [redacted]

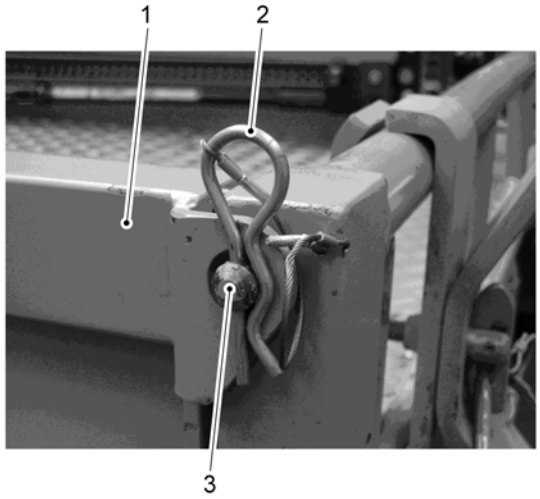
NOTE

When the vehicle is fully laden the vehicle must not exceed 32 kph (20 mph).

104 When loading the front or rear cargo bay, do not exceed the maximum load capacity.

105 To lower the rear cargo bay gate (Fig 12 (1)), proceed as follows:

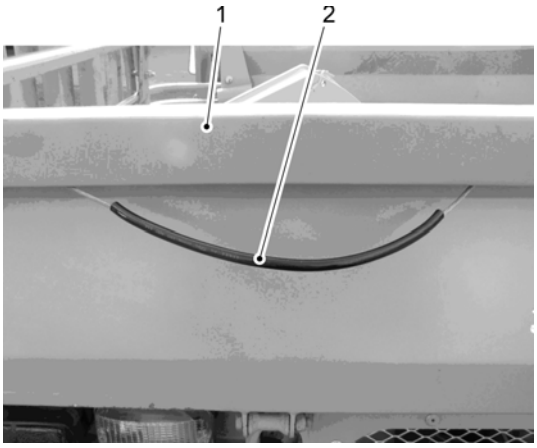
105.1 Remove the safety clip (2) from the post(3) at each side of the gate.



1 Rear cargo bay gate
2 Safety clip
3 Post

Fig 12 Rear cargo bay gate

105.2 Pull the release wire (Fig 13 (2)) firmly downwards to release the latches at each side of the gate (1).

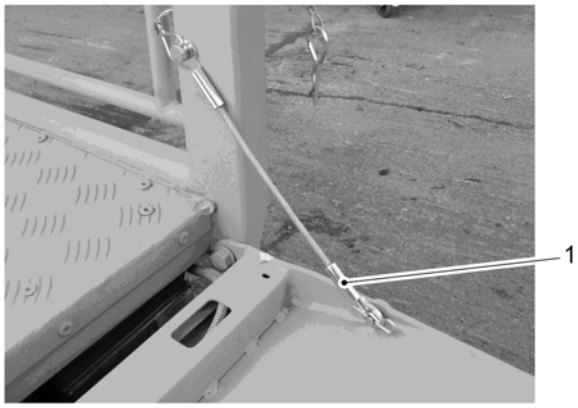


1 Rear cargo bay gate
2 Release wire

Fig 13 Rear cargo bay gate

105.3 Lower the gate.

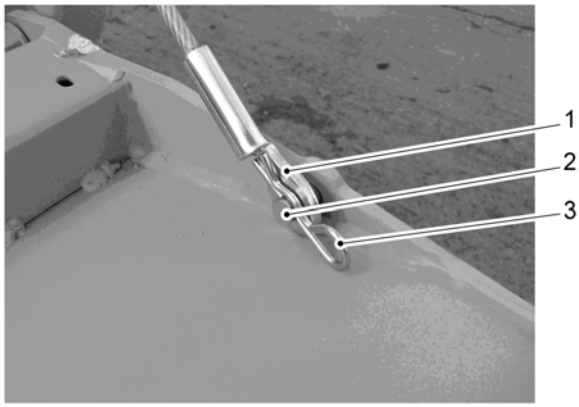
105.4 The gate is held in a horizontal position by two retaining straps (Fig 14 (1)), one at each side.



1 Retaining strap

Fig 14 Rear cargo bay gate retaining strap

105.5 To fully lower the gate, remove the safety clip (Fig 15 (3)), remove the strap (1) from the pin (2). Repeat for each side.



1 Retaining strap
2 Pin
3 Safety clip

Fig 15 Rear cargo bay gate retaining strap

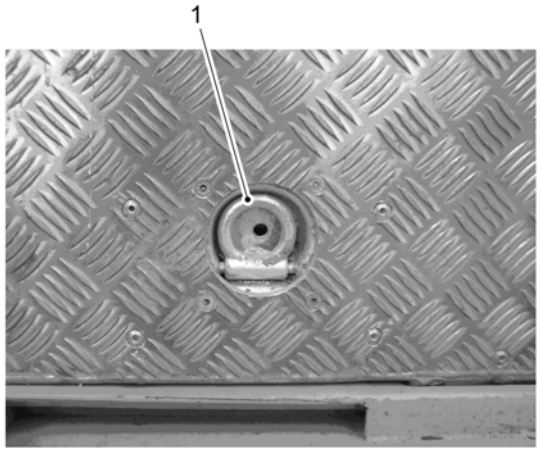
106 To secure the gate, raise to a horizontal position and install the retaining straps on each side. Make sure that the safety clips (3) are fully installed to the pins (2) on each side. Raise the gate fully and close firmly. Make sure that the latch at each side of the gate is fully engaged.

107 Install the safety clip(Fig 12 (2)) to the post(3) at each side of the gate..

108 Always place the load in the rear cargo bay as far forward as possible.

109 Load box-shaped objects longest side down to keep the centre of gravity low and to improve vehicle stability and safety.

110 Tie-down loops (Fig 16 (1)) are installed on the deck of the rear cargo bay. Use the tie-down loops to secure the cargo.



1 Tie-down loop

Fig 16 Tie-down loop

Carrying a Load

111 Drive more slowly when you transport loads. Do not make violent turns with the vehicle.

Winch Operation

WARNINGS

(1) DO NOT ATTEMPT TO EXCEED THE MAXIMUM PULL RATING AND AVOID 'SHOCK LOADS'.

(2) DO NOT PERMIT THE 'RED' LEAD ROPE LENGTH TO LEAVE THE CAPSTAN OF THE WINCH.

(3) DO NOT ATTEMPT TO UTILISE THE WINCH FOR PURPOSES OTHER THAN THOSE UNDERTAKEN DURING TRAINING.

(4) KEEP ALL PERSONNEL AT A SAFE DISTANCE DURING WINCHING OPERATIONS.

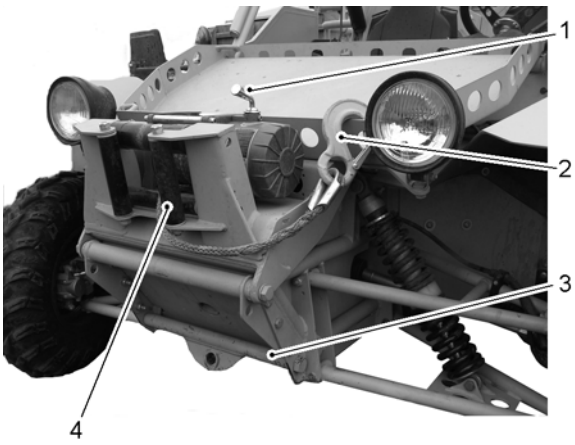
(5) DO NOT STEP ON THE WINCH ROPE AT ANY TIME.

(6) ENSURE ALL WINCHING EQUIPMENT IS CHECKED FOR SERVICEABILITY AND SECURITY PRIOR TO COMMENCING WINCHING.

(7) WHEN PERFORMING WINCHING THAT REQUIRES THE ROPE TO GO THROUGH THE CAB AREA, THE WINCH MUST ONLY BE OPERATED REMOTELY FROM OUTSIDE THE CAB.

CAUTION

EQUIPMENT DAMAGE. Electric winches are designed and made for intermittent use and should not be used in constant duty applications.



1 Free spool clutch lever
2 Handsaver hook
3 Pull bar
4 Fairlead

Fig 17 Winch

Component Description

112 Motor: The 4.6hp motor is powered by the 12V vehicle battery and provides power to the gear mechanism which turns the drum and winds the rope;

113 Winch Drum: The winch drum is the cylinder on which the rope is stored. It can feed or wind the rope depending on the remote winch switch.

114 Synthetic Rope: A 9.5mm x 14m (0.37 in. x 45.9 ft) synthetic rope designed specifically for load capacities of up to [redacted] The rope feeds onto the drum in the “under wind” position through the fairlead (Fig 17 (4)) and is looped at the end to accept the hook (2).

115 Roller Fairlead (4): When using the winch at an angle the roller fairlead acts to guide the rope onto the drum and minimizes damage to the rope from abrasion on the vehicle chassis.

116 Mechanical Gear System: The reduction gears convert the winch motor power into extreme pulling forces.

117 Braking System: Braking action is automatically applied to the winch drum when the winch motor is stopped and there is a load on the rope. The braking action is applied by a separate mechanical brake.

118 Free Spooling Clutch: The clutch lever (1) allows the operator to manually disengage (“Out”) the spooling drum from the gear train (free spool). Engaging the clutch (“In”) locks the winch into the gear system.

119 Solenoid: Power from the vehicle battery flows through the weather sealed switch before being directed to the winch motor.

120 Remote Switch: The Power switch lead has a dual switch for powering in or powering out your winch drum. The Power switch lead allows you to stand clear of the rope when the winch is under load. Refer to Chap 2.

121 Vehicle switch: Allows the operator to control the winch from the vehicle cab. Refer to Chap 2.

122 Pull Bar (3): The rope is attached to this bar when using a pulley/snatch block to double the line. Refer to Para 130.5.

General

123 The winch is rated at [redacted] capacity when spooling the first rope layer on the drum. Overloading can damage the winch, motor or rope.

124 The vehicle engine should be kept running during operation of the winch to minimize battery drain and maximize power and speed of the winch. If the winch is used for a considerable time with the engine off the battery may be drained and too weak to restart the engine

125 Practice using the winch to become familiar with rigging techniques, the sounds the winch makes under various loads, the way the cable spools on the drum, etc.

126 Inspect the rope and equipment before each use. A frayed or damaged rope should be replaced immediately. Use only the correct replacement rope.

127 Inspect the winch installation and bolts to ensure that all the bolts are tight before each operation.

128 Store the remote control inside the vehicle in a place that it will not be damaged.

129 Any winch that appears to be damaged in any way, is found to be worn, or operates abnormally should be removed from service until repaired. Refer unit to suitably qualified maintenance personnel or replace unit.

130 Use handsaver hook (2) when handling the hook for spooling or un-spooling the rope.

131 When re-spooling the rope, ensure that the rope spools in the under-wind position with the rope entering the drum from the bottom, not the top. To re-spool correctly, and while wearing gloves, keep a slight load on the rope while pushing the remote button to draw in the rope. Walk toward the winch without allowing the rope to slide through your hands. Turn off the winch and repeat the procedure until a few feet of rope is left. Disconnect the remote control and finish spooling by hand by rotating the drum by hand with the clutch disengaged. Stow the winch hook by attaching it to the front cargo bay as shown (Fig 17). An overload cut-out switch is fitted to the winch. This is reset by pressing the pushbutton located on the front right wing in front of the fire extinguisher.

Rigging Techniques

132 Self-Recovery:

132.1 Locate a suitable anchor such as a strong tree trunk or boulder. Always use a sling as an anchor point (Fig 18).

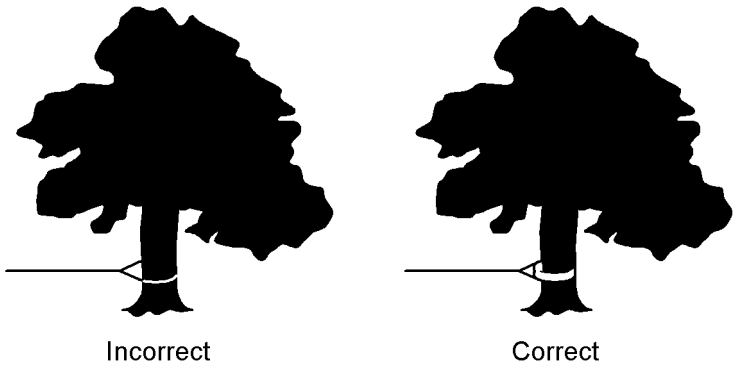


Fig 18 Using an anchor

132.2 Do not winch from an acute angle as the rope will pile up on one side of the drum causing damage to the rope and the winch (Fig 19).

132.3 Short pulls from an angle can be used to straighten the vehicle. Long pulls should be done with the rope at a 90° angle to the winch/vehicle.

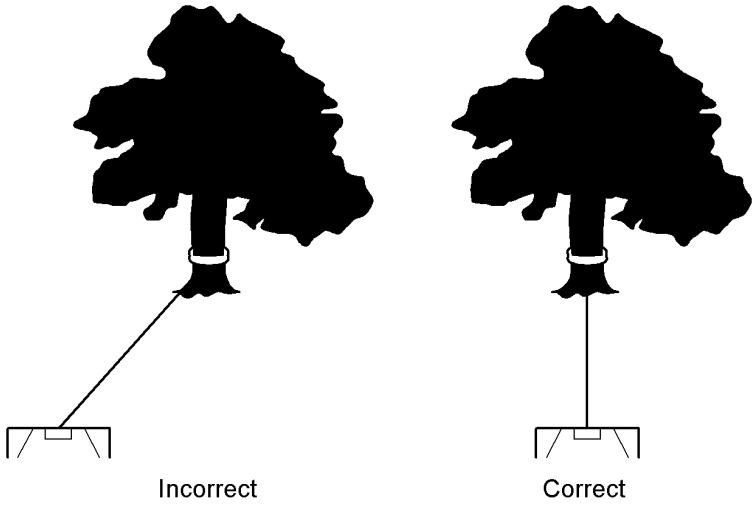


Fig 19 Pulling at an angle

132.4 When pulling a heavy load, place a blanket or jacket over the rope 1.5 to 1.8 m (5 to 6 ft) from the hook. In the event of a broken rope it will damp the snap back (Fig 20).

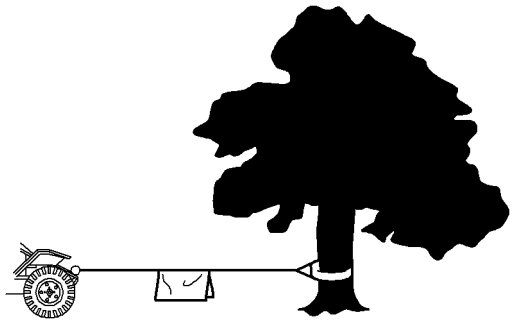


Fig 20 Protection

132.5 For loads over [redacted] a pulley/snatch block should be used to double the rope line (Fig 21). This will aid in two ways:

132.5.1 Reduce the number of rope layers on the drum.

132.5.2 Reduce the load on the rope by as much as 50%. When doubling the line back to the vehicle, attach it to the pull-bar (Fig 17 (2)).

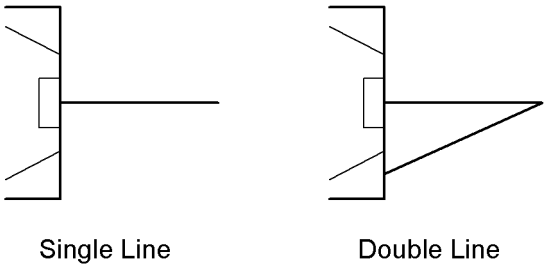


Fig 21 Using a double line

133 Take time to asses your situation and plan your pull.

134 Wear protective gloves.

135 Disengage the clutch to allow free-spooling and also save battery power.

136 Attach the hand saver hook to the shackle.

137 Pull out the rope to the desired anchor point using the hand saver hook.

138 Secure the shackle to the anchor point: Sling, chain or snatch block. Do not attach the hook back onto the rope.

139 Engage the clutch.

140 Start the vehicle engine to ensure the battery is being charged.

141 Winch in the rope, guiding the wire under tension to draw up the slack in the rope. Once the rope is under tension, stand well clear. Never step over the rope.

142 Double check the anchors and make sure all connections are secure.

143 Inspect the rope. Make sure there are at least five wraps of rope around the winch drum.

144 Drape a blanket or jacket over the rope approximately 1.5 to 1.8 m (5 to 6 ft) from the hook (Fig 20).

145 Clear the area. Make sure all spectators all well back and that no one is directly in front or behind the vehicle or anchor point.

146 Begin winching. Be sure that the rope is winding evenly and tightly around the drum. Avoid shock loads; keep the rope under tension.

147 The winch is meant for intermittent use. Under full load with a single line rig do not power in for more than a minute without letting the motor cool down for a few minutes and then resume the winching operation.

148 When the winching operation is complete, release the tension on the rope.

149 Disconnect the rope from the anchor.

150 Rewind the rope. Make sure that any rope already on the drum has spooled tightly and neatly. If not, draw out the rope and re-spool from the point where the rope is tight.

151 Keep hands and any loose clothing clear of the winch drum and fairlead as the rope is being drawn in.

152 Secure the hook (Fig 17).

Cargo Loading

153 To load a pallet onto the rear cargo bay using the winch, proceed as follows:

153.1 Manoeuvre the vehicle so that it is 2 - 3 m (7 - 10 ft) from the pallet and not at an angle to the pallet.

153.2 Make sure the transmission is in neutral and the parking brake is engaged.

153.3 Lower the rear cargo bay gate. Refer to Para 105.

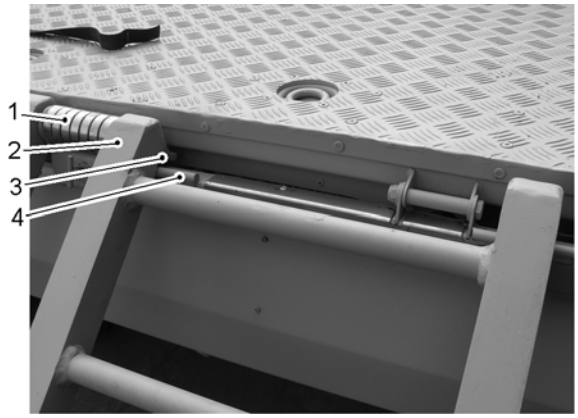
153.4 Place the roller (Fig 22 (1)) for the winch rope in the central position over the edge of the gate (2). Secure in place by tightening the locking screw (3).

1 Roller for winch rope
2 Cargo bay gate
3 Locking screw

Fig 22 Roller

153.5 Remove the ramps from the carriers. Refer to Para 177.

153.6 Place the ramps (Fig 23 (2)) into position on each side of the roller (1) as shown (Fig 23). Hook the tangs (3) on the ramps (2) into the gap between the rear cargo bay gate and the rear cargo bay deck. Ensure the ramps (2) are resting on the spacer bars (4).

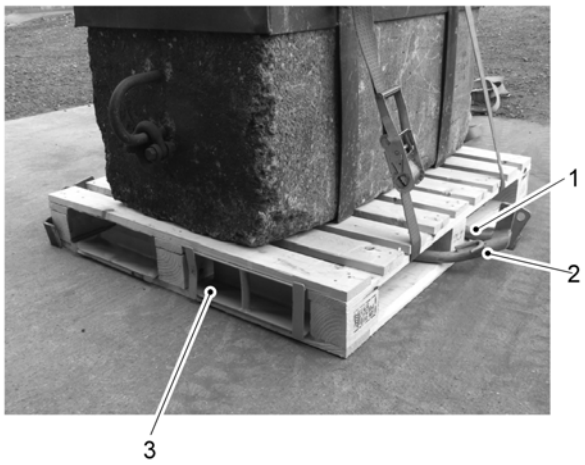


1 Roller
2 Ramp
3 Tang
4 Spacer bar

Fig 23 Loading ramps in position

153.7 Install the pallet pull bars (Fig 24 (1)) and (2) through the pallet (Fig 24).

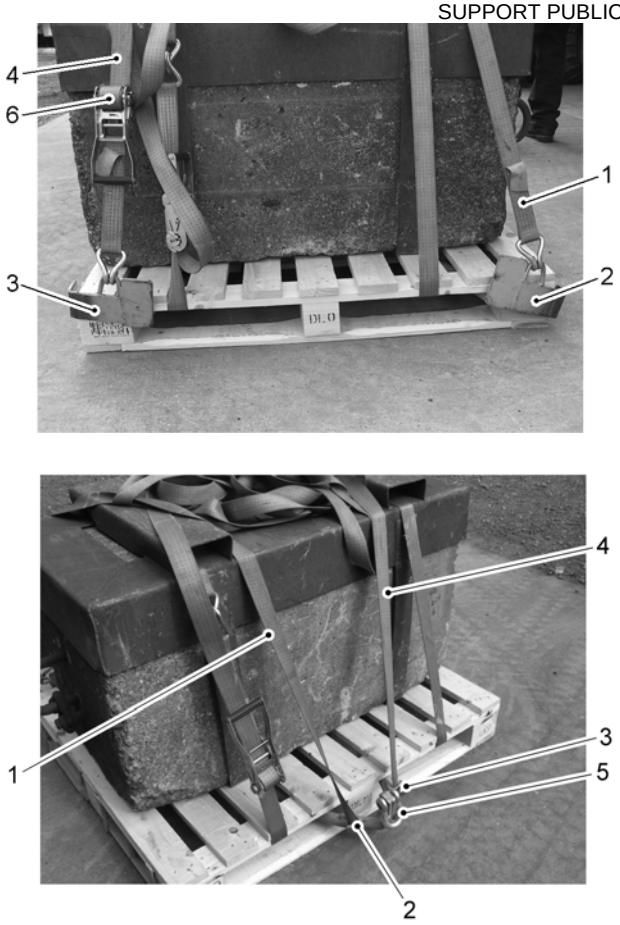
153.8 Fully install the two pallet packing pieces (3) (one not shown on other side) to the front of the pallet.



1 Pallet pull bar
2 Pallet pull bar
3 Packing piece

Fig 24 Pallet pull bars

153.9 Install a strop as shown (Fig 25). Attach the strop (1) to the pallet pull bar (2). Pass the strop over the load and under the hooks on the front of the pallet pull bars (2) and (3). Pass the strop (4) back over the load and attach it to the pallet pull bar (3). Tighten the strop using the ratchet (6). Install the shackle (5) through both pull bars (2) and (3).

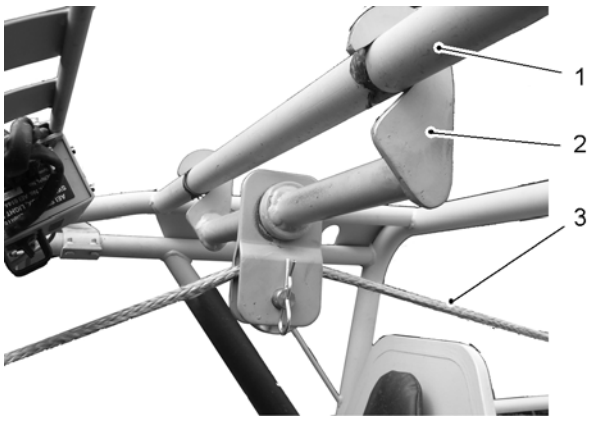


1	Strop	4	Strop
2	Pallet pull bar	5	Shackle
3	Pallet pull bar	6	Ratchet

Fig 25 Installing the strop

153.10 Release the free spooling clutch (refer to Para 118) and pull the winch rope from the drum, through the cab, over the rear cargo bay to the pallet.

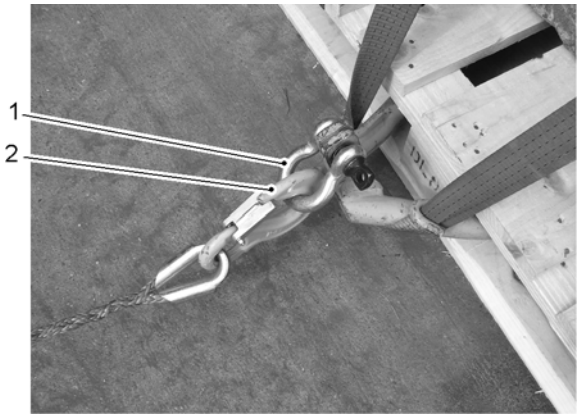
153.11 Install the rope guide (Fig 26 (2)) to the cab as shown (Fig 26).



1 ROPS structure
2 Rope guide
3 Winch rope

Fig 26 Rope guide

153.12 Attach the hook (Fig 27 (1)) to the shackle (2) shown (Fig 27).



1 Hook
2 Shackle

Fig 27 Attach the rope to the pallet

153.13 Ensure the transmission is in neutral and release the parking brake. This will allow the vehicle to roll back to the load as the winch is applied. With reference to the warnings, cautions and techniques listed under Winch Operation earlier in this chapter, operate the winch and pull the pallet up the ramps and onto the rear cargo bay (Fig 28).

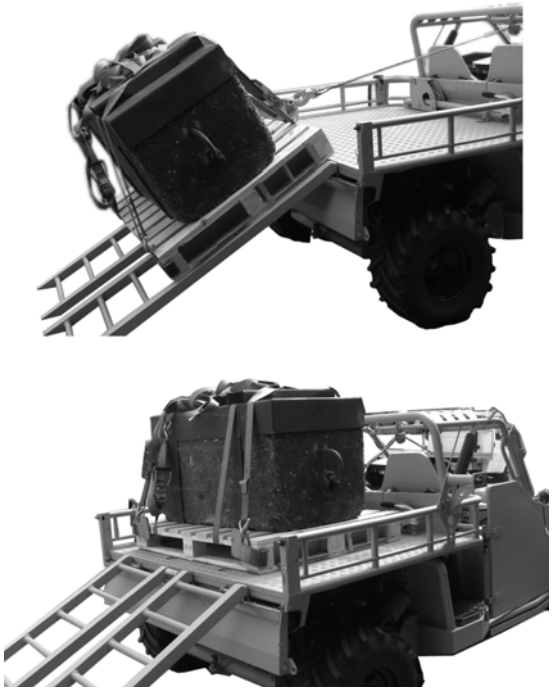


Fig 28 Loading the pallet

153.14 When the pallet is fully loaded, detach the hook from the shackle. Remove the strop, pallet pull bars and rope guide. It will be possible to retrieve the packing pieces when the pallet is unloaded.

153.15 Make sure that all loose items of equipment are cleaned as necessary, and securely stowed.

153.16 With reference to the warnings, cautions and techniques listed under Winch Operation earlier in this chapter, operate the winch and rewind the rope onto the winch drum. Secure the hook as shown (Fig 17).

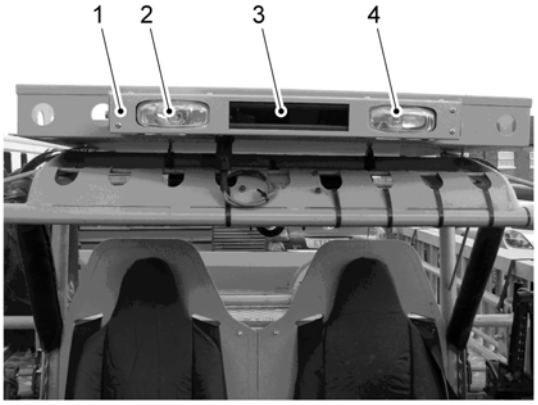
153.17 Secure the cargo.

153.18 Detach the ramps and securely stow in their carriers. Refer to Para 177.

153.19 Close and secure the rear cargo bay gate. Refer to Para 105.

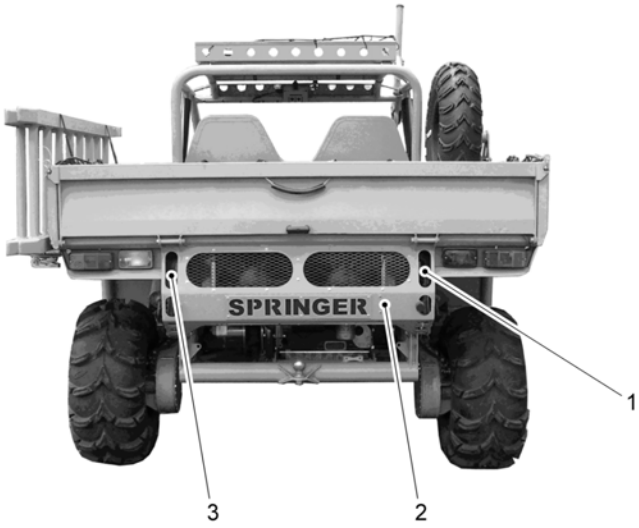
Infra Red (IR) Lighting Operation

154 Infra red lighting is fitted to the front (Fig 29) and rear (Fig 30) of the vehicle.



1	IR Lighting box	3	IR Lights
2	White light	4	White light

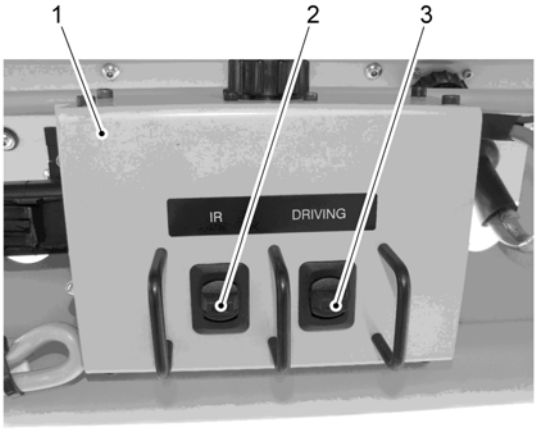
Fig 29 Front IR Lighting



1 IR Light
2 IR Light
3 IR Light

Fig 30 Rear IR lighting

155 The infra red lighting is controlled from switches mounted to the upper section of the ROPS at the front of the cab (Fig 31).



1 Switch box
2 IR Light switch
3 Driving (white) light switch

Fig 31 IR Lighting switches

156 A small red LED will illuminate in each switch when the switch is in the ON position.

Compressor Operation

WARNING

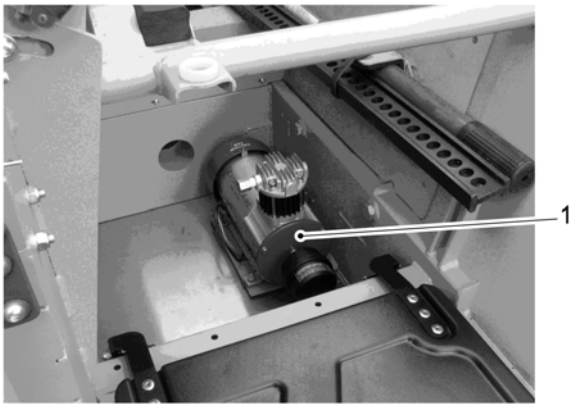
PERSONNEL INJURY. THE COMPRESSOR WILL BECOME VERY HOT DURING USE. DO NOT UTILISE WITHOUT PROPER PROTECTION.

CAUTION

EQUIPMENT DAMAGE. Do not submerge compressor in water.

157 The vehicle is fitted with a compressor that has a maximum working pressure of 150 psi.

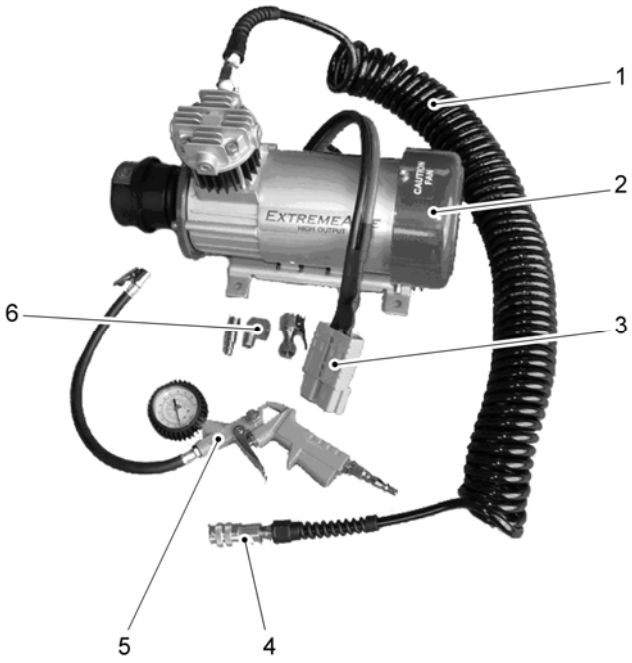
158 The compressor is mounted on the vehicle behind the driver's seat below the rear cargo bay (Fig 32).



1 Compressor

Fig 32 Compressor

159 The compressor is supplied with accessories (Fig 33).



1	Flexible hose	4	Quick release female coupling
2	Compressor	5	Inflator with pressure gauge and male quick release coupling
3	Power lead connector	6	Adaptors

Fig 33 Compressor with accessories

160 To operate the compressor, proceed as follows:

160.1 Remove the rubber cover from the slave socket is located on the front left of the vehicle (Fig 11 (2)).

160.2 Connect the slave lead to the slave socket (1).

160.3 Connect the slave lead to the compressor power lead connector (Fig 33 (3)). Make sure that all connections are secure.

160.4 Start the engine to ensure the battery is being charged. Refer to Para 27.

160.5 Operate the compressor by turning the slave isolator switch to the left. Refer to Chap 2.

NOTE

The compressor is protected from overheating by a thermal cutout switch. If the compressor stops operating, switch it off as detailed below and wait until it cools. The thermal switch will automatically reset.

A fuse is fitted to the compressor power lead. If the compressor does not restart after the thermal switch has reset, return the compressor power lead to REME personnel for testing.

160.6 After use, switch the compressor off by turning the slave isolator switch to the vertical position. This isolates the slave socket (Fig 11 (1)).

160.7 Disconnect the slave lead from the slave socket (1). Install the rubber cover (2).

160.8 Disconnect the slave lead from the compressor power lead compressor (Fig 33 (3)).

160.9 Make sure that all loose items of equipment are cleaned as necessary, and securely stowed.

OPERATING IN LOW AND HIGH TEMPERATURES

Low Temperatures

161 In low temperature conditions to prevent possible damage to the vehicle:

161.1 Use the correct viscosity engine lubricating oil. Refer to Cat 601.

161.2 If available use a low-temperature diesel fuel.

161.3 Use the correct coolant mixture. Refer to Cat 601.

161.4 Keep the battery at full charge.

161.5 Fill the fuel tanks at the end of each work period. This will help to prevent condensation forming on the tank walls.

161.6 Protect the vehicle when not in use. Park the vehicle inside a building or cover it with a tarpaulin.

161.7 Install a cold weather starting aid. In very low temperatures -18 deg C (0 deg F) and below, additional starting aids may be needed, for example, fuel, oil and coolant heaters.

High Temperatures

162 In high temperature situations to prevent possible damage to the vehicle:

162.1 Use the correct viscosity engine lubricating oil. Refer to Cat 601.

162.2 Use the correct coolant mixture. Refer to Cat 601.

162.3 Check the coolant system regularly. Keep the coolant at the correct level. Make sure there are no leaks.

162.4 Keep the radiator clean. Regularly remove dirt and debris from the radiator and the engine.

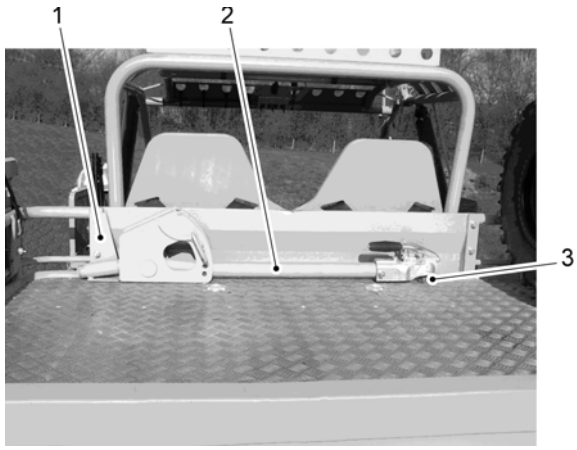
162.5 Check the alternator drive belt regularly.

162.6 Check the engine air filter regularly.

TOWING

Attaching the tow bar

163 A tow bar (Fig 34 (2)) is stowed at the front of the rear cargo bay. It is held in position by a bracket (1) and a ball hitch (3) mounted on the deck.

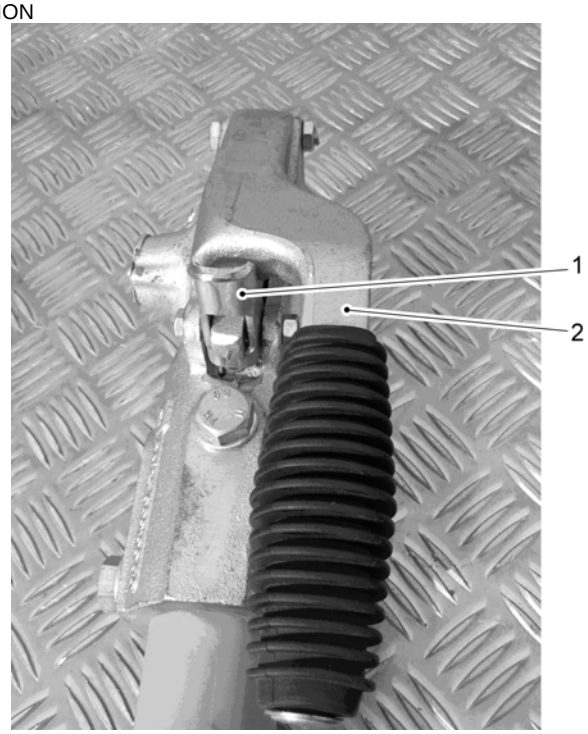


1 Bracket
2 Tow bar
3 Ball hitch

Fig 34 Tow bar (stowed)

164 To remove the tow bar from the rear cargo bay, proceed as follows:

164.1 Pull thumb lever (Fig 35 (1)) back whilst lifting handle (2).

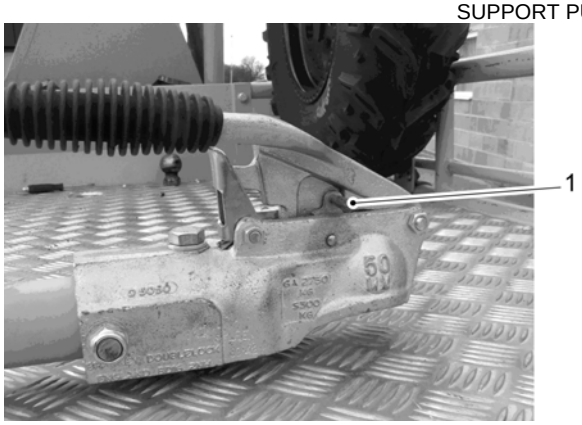


1 Thumb lever
2 Handle

Fig 35 Tow bar hitch

164.2 Lift the tow bar away from the ball hitch and remove from the bracket.

164.3 The tow bar hitch may be held in the unlocked position by moving the locking lever (Fig 36 (1)) towards the front of the tow bar.



1 Locking lever

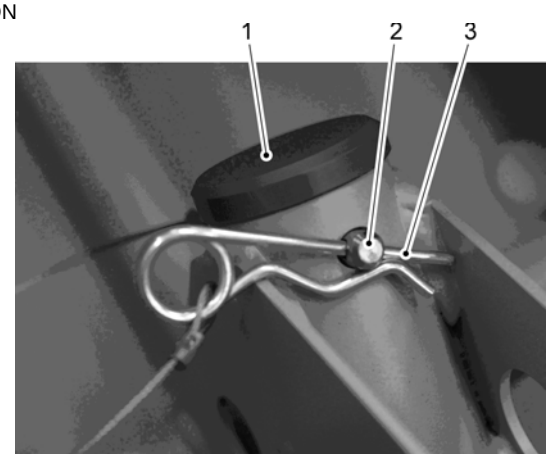
Fig 36 Tow bar hitch (locked)

164.4 The lock is released by moving the locking lever (1) towards the rear of the tow bar.

165 To attach the tow bar to the front of a Springer Vehicle, proceed as follows:

165.1 Lift the front cargo bay. Refer to Para 7.

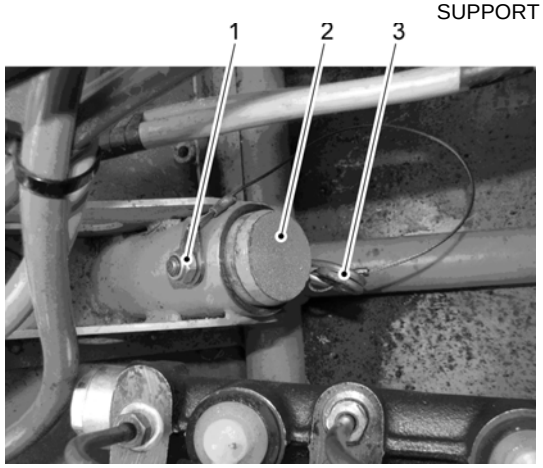
165.2 Remove the safety clip (Fig 37 (3)) from the retaining pin (2). Remove the retaining pin and remove the plastic bung (1).



1 Plastic bung
2 Retaining pin
3 Safety clip

Fig 37 Front tow hitch bung

165.3 Insert the tow bar (Fig 38 (2)) fully into the hole at the front of the vehicle. Secure the tow bar (2) with the retaining pin (1) and safety clip (3).



1 Retaining pin
2 Tow bar
3 Safety clip

Fig 38 Tow bar installed (front)

165.4 Close and secure the front cargo bay.

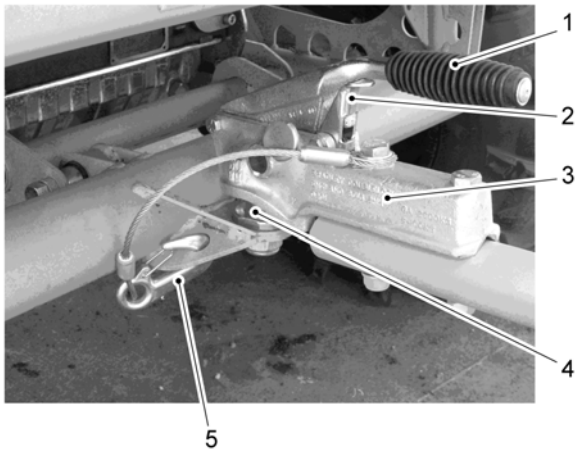
166 To attach the tow bar to the rear of a Springer Vehicle, proceed as follows:

166.1 Pull locking lever (Fig 39 (2)) back whilst lifting handle (1).

166.2 Press the tow bar (3) firmly down over the tow hitch (4) and release the handle (1).

166.3 Make sure that the tow bar is securely fitted to the tow hitch and that the handle is fully locked in the down position (Fig 39).

166.4 Attach the security cable (5) to the vehicle as shown (Fig 39).



1	Handle	4	Tow hitch
2	Locking lever	5	Security cable
3	Tow bar		

Fig 39 Tow bar installed (rear)

167 Make sure that you obey all the pertinent laws and regulations when you tow the vehicle on public roads.

Towing Procedures

CAUTIONS

(1) EQUIPMENT DAMAGE. Towing a vehicle too far or too fast can damage the transmission. Do not tow the vehicle further than one mile. Use a trailer for greater distances. When towing do not travel faster than 25 kph (15 mph).

(2) EQUIPMENT DAMAGE. The towing vehicle(s) must have enough pulling and braking power to move and stop the vehicle.

168 Always follow the precautions outlined below when towing:

168.1 Recommended maximum towing load is [redacted]

168.2 Make sure the vertical load on the tow hitch never exceeds 100 kg (220 lb).

168.3 Operate the vehicle slower than usual and take into consideration the terrain and the slope.

168.4 Do not tow more than the recommended weight for the vehicle.

1 Tow hitch

Fig 40 Tow hitch

168.5 Attach the tow bar to the tow hitch (Fig 40, (1)) only. Do not attach the tow bar to any other location or you may lose control of the vehicle.

168.6 Never tow on a grade steeper than 30 deg.

168.7 To get the maximum belt life when towing, use low gear for towing uphill.

168.8 Tow at a speed at which you can keep full control of the vehicle.

168.9 Only authorised modifications are to be made to the tow hitch (1).

169 Attach the tow bar as detailed above. Refer to Para 163.

170 Prepare the disabled vehicle for towing as follows:

170.1 Make sure that the gear selection lever is in the neutral position.

170.2 Set the differential lock lever to the disengaged position.

170.3 Release the parking brake.

171 If the front wheel(s) of the vehicle to be towed are disabled, it is possible to raise the front of the vehicle and attach the tow bar in such a way as to keep the front wheels raised while being towed.

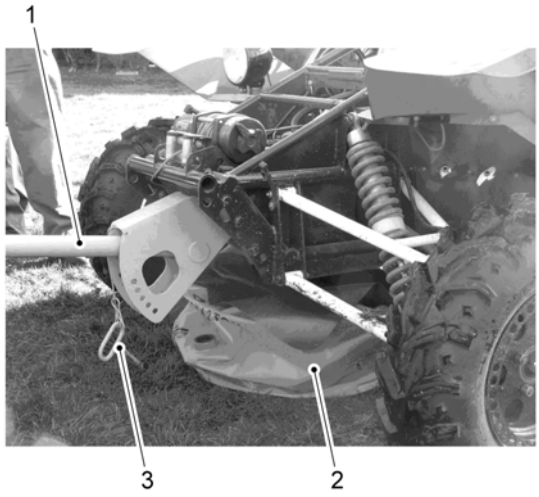
NOTE

The maximum speed for a suspended tow operation is 16 kph (10 mph).

172 To attach the tow bar to the front of a vehicle with raised front wheels, proceed as follows:

172.1 Attach the tow bar (Fig 41 (1)) to the front of the vehicle to be towed as detailed above. Refer to Para 163. Make sure the pin (3) is not installed.

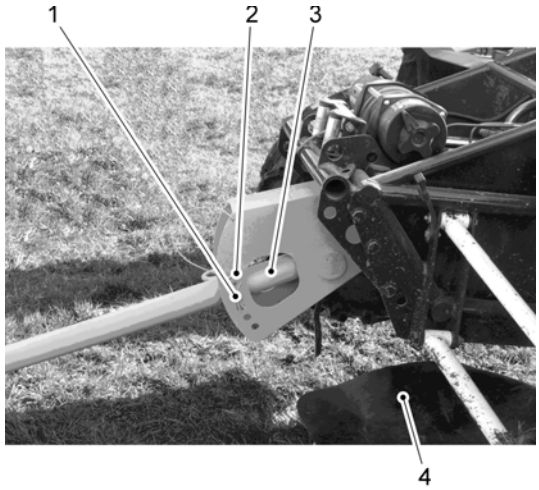
172.2 Using a suitable jack (2), in this example the air jack (refer to Para 185) and raise the front of the vehicle to lift the front wheels clear of the ground.



1 Tow bar
2 Air jack
3 Pin

Fig 41 Tow bar

172.3 When the vehicle is at the required height, insert the pin (Fig 42 (1)) and safety clip (2) to secure the tow bar (3). Remove the jack (4).



1 Pin
2 Safety clip
3 Tow bar
4 Air jack

Fig 42 Tow bar installed (front wheels raised)

173 If the vehicle cannot be towed, refer to Chap 5, Recovery of a Disabled Vehicle.

Coupling two operational Springer Vehicles together

174 It is possible to couple two fully operational Springer Vehicles together to provide extra drive when carrying heavy loads and/or crossing adverse terrain.

175 The two vehicles are coupled together using the tow bar as detailed above. Refer to Para 163.

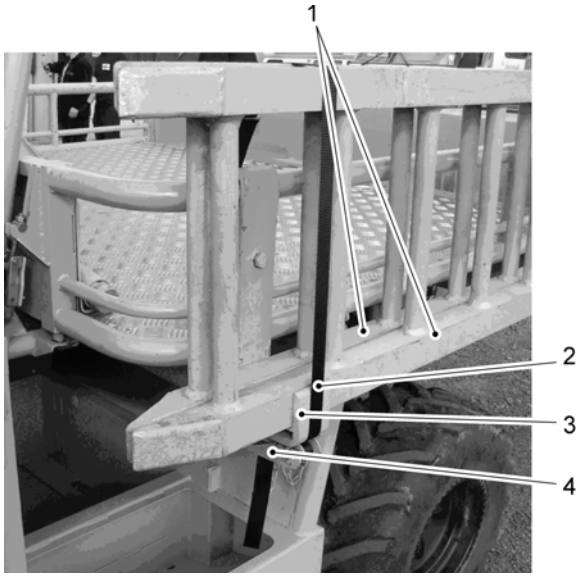
176 When coupled in this configuration, the two vehicles must not exceed 24 kph (15 mph) unladen, or 16 kph (10 mph) when fully loaded.

RAMPS

177 Two ramps are supplied with the vehicle, to be used when loading the cargo bay (refer to Para 153).

Stowage

178 The ramps are stowed on carriers mounted on the side of the rear cargo bay (Fig 43).



1 Ramps
2 Strap
3 Carrier
4 Ratchet

Fig 43 Ramps (Stowed)

179 To remove the ramps (Fig 43 (1)) from the carriers (3), proceed as follows:

179.1 Loosen the strap (2). Repeat for the second carrier.

179.2 Remove the ramps (1) from the carriers. Use assistance if required.

180 When stowing the ramps, make sure that they are both securely seated in the carriers, and that both straps are tightened using the ratchets (4).

WIRE CUTTER

181 The Springer vehicle is fitted with a wire cutter (Fig 44 (1)).

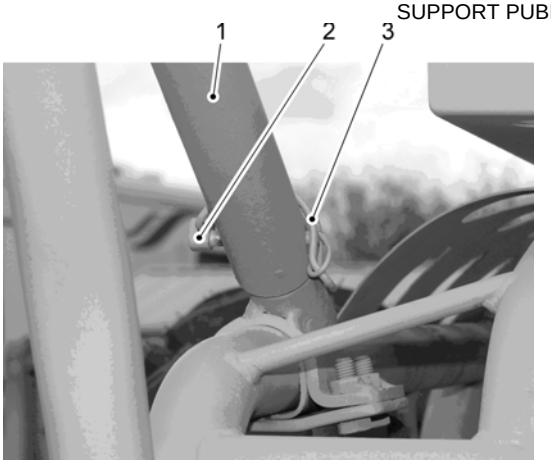
1 Wire cutter

Fig 44 Wire cutter

182 The wire cutter may be folded forwards to reduce the vehicle height as follows:

182.1 Remove safety clip (Fig 45 (3)).

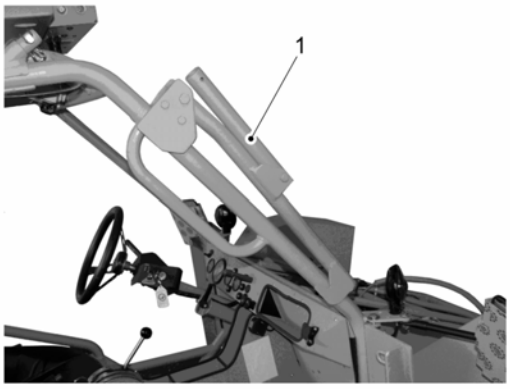
182.2 Remove pin (2).



1 Wire cutter
2 Pin
3 Safety clip

Fig 45 Wire cutter

182.3 Fold the wire cutter forwards (Fig 46).



1 Wire cutter

Fig 46 Wire cutter (folded)

STRETCHER CARRYING

WARNING

PERSONAL INJURY. ALWAYS ENSURE STRETCHERS ARE FULLY SECURE PRIOR TO MOVEMENT.

183 A stretcher may be attached across the rear cargo bay as shown (Fig 47).

Fig 47 Stretcher loaded

184 If there is a requirement to attach a second stretcher, the spare wheel and carrier must be removed. Refer to Chap 4.

JACKING

WARNING

PERSONAL INJURY. ALWAYS CHOCK THE VEHICLE PRIOR TO JACK LIFTING OPERATIONS AND NEVER WORK UNDER A VEHICLE THAT IS JUST SUPPORTED ON A JACK.

Air Jack

185 Make sure the ground below the lifting point is clear of sharp objects.

186 Place the air jack under the vehicle at a suitable lifting point, front, rear, or side.

NOTE

The side lifting point for the jack is under the vehicle frame below the door hinge post. This enables both wheels on that side of the vehicle to be lifted together.

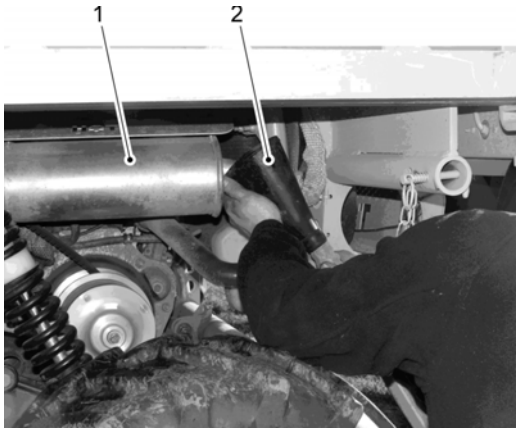
187 The hose is attached to the air jack (Fig 48 (2)) with a bayonet fitting (1).

1 Bayonet fitting
2 Air jack

Fig 48 Air jack

188 Make sure that the transmission is in neutral, and that the parking brake is engaged. Start the engine, and hold the hose inlet (Fig 49 (2)) over the exhaust where it exits the muffler (1).

189 The exhaust gases will inflate the air jack and raise the vehicle. When the vehicle has been raised to the required height, stop the engine.



1 Muffler
2 Hose inlet

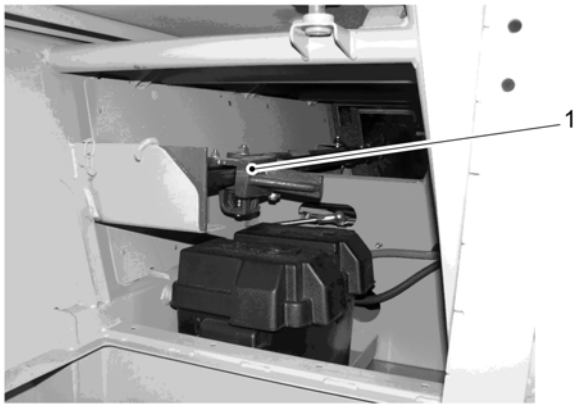
Fig 49 Hose inlet

190 To release the gases from the air jack, remove the hose at the bayonet fitting (Fig 48 (1)).

High Lift Jack

191 Make sure that the ground below the lifting point is firm and level.

192 The high lift jack (Fig 50 (1)) is stowed behind the seats below the rear cargo bay.



1 High lift jack

Fig 50 High lift jack (stowed)

193 Place the lever (Fig 51 (1)) in the down position. Place the jack under the vehicle at a suitable lifting point, front, rear, or side.

NOTE

The side lifting point for the jack is under the vehicle frame below the door hinge post. This enables both wheels on that side of the vehicle to be lifted together.

1 Lever

Fig 51 Jack lever (down)

194 Lift the jack (Fig 52 (1)) into position under the vehicle.

1 Jack

Fig 52 Lifting jack into position

195 Place the lever (Fig 53 (1)) in the up position.

1 Lever

Fig 53 Jack lever (up)

196 Operate the jack by pulling the handle (Fig 54 (1)) downwards to raise the lift upwards. Repeat until the vehicle has been raised to the required height (Fig 55).

NOTE

On soft ground it is normal for the jack to sink slightly as the ground compresses before the lift commences.

197 To lower the jack, place the lever (Fig 51 (1)) in the down position and pull the handle (Fig 54 (1)) downwards. Repeat until the vehicle is fully lowered. Remove the jack, clean as necessary and stow on the vehicle.

1 Operating lever

Fig 54 Operate the jack

Fig 55 Vehicle raised

CHAPTER 4

OPERATOR MAINTENANCE

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INTRODUCTION

1 This chapter contain the maintenance instructions for the Springer Vehicle and its systems.

2 Inspect, clean, lubricate, adjust and replace parts as necessary.

3 Maintenance intervals in the Service Schedule Cat 601 are based upon average driving conditions.

Severe Use Definition

4 Vehicles subjected to severe use must be inspected and serviced more frequently:

4.1 Frequent immersion in mud, water or sand.

4.2 Operating at high engine speeds.

4.3 Prolonged low speed, heavy load operation.

4.4 Extended idle.

4.5 Short trip cold weather operation.

4.6 Very hot and dusty, desert conditions

Lubrication Points

5 Perform regular lubrication at the lubrication points as detailed in Cat 601. Two pumps from a grease gun will be sufficient at each point.

ENGINE

Oil Level Check

WARNING

OILS AND LUBRICANTS CAN BE CARCINOGENIC – AVOID DIRECT CONTACT WITH SKIN AND EYES. ALWAYS COMPLY WITH PRODUCT SAFETY AND MEDICAL CARE DATA AND PRACTICE GOOD HYGIENE.

6 Refer to Cat 601 for correct oil specifications for this vehicle.

7 Position the vehicle on a firm level surface and engage the parking brake.

8 Remove the dipstick (Fig 1 (1)) and wipe it dry with a clean cloth. Install the dipstick completely. Remove the dipstick and ensure that the oil level is between the two marks (Max and Min).

9 Start the engine and let it idle for 20-30 seconds. Stop the engine and wait for 30 seconds.

10 Remove the dipstick (Fig 1 (1)) and wipe it dry with a clean cloth.

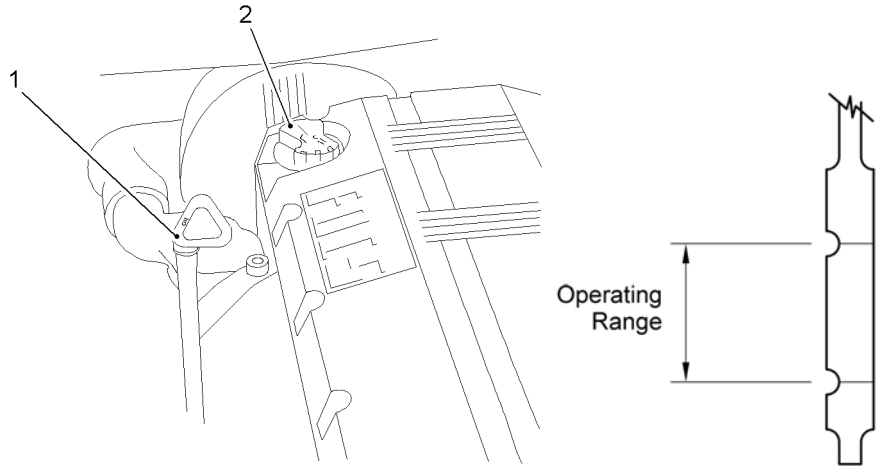
11 Install the dipstick completely.

12 Remove the dipstick and ensure that the oil level is between the two marks (Max and Min). Remove the oil filler cap (2) and add oil as required. Refit and securely fasten the oil filler cap (2)

NOTE

To raise the oil level from the minimum mark to the maximum, add 1 l (1.75 pints) of oil.

13 Do not overfill.



1 Dipstick
2 Oil filler cap

Fig 1 Engine oil level check

NOTES

(1) Pay special attention to the oil level. A rise in oil level during cold weather can indicate contaminants collecting in the oil sump or crankcase.

(2) Change oil immediately if the oil level begins to rise. Monitor the oil level, and if it continues to rise, discontinue use and refer to REME maintenance personnel.

Changing the Oil and Oil Filter

WARNINGS

(1) ALWAYS ISOLATE AT THE MASTER SWITCH ON COMPLETION OF TASK AND PRIOR TO COMMENCING WORK UPON THE VEHICLE SYSTEMS.

(2) OILS AND LUBRICANTS CAN BE CARCINOGENIC – AVOID DIRECT CONTACT WITH SKIN AND EYES. ALWAYS COMPLY WITH PRODUCT SAFETY AND MEDICAL CARE DATA AND PRACTICE GOOD HYGIENE.

(3) REMAIN VIGILANT OF HOT PARTS (EXHAUST, COOLANT ETC) WHEN UNDERTAKING MAINTENANCE.

14 Refer to Cat 601 for correct oil specifications and capacity.

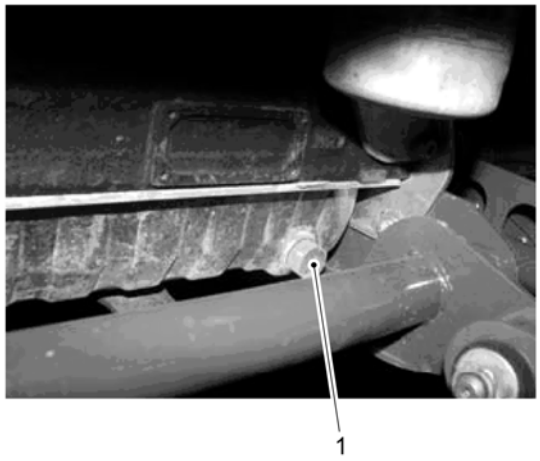
15 Position the vehicle on a firm level surface and engage the parking brake.

16 Place the gear selector in neutral and run the engine two to three minutes until warm.

17 Stop the engine, remove the ignition key and turn master isolator switch to off.

18 Clean the area around the drain plug (Fig 2 (1)) at the bottom of the engine.

19 Place a drain pan beneath the drain plug.



1 Drain plug

Fig 2 Engine oil drain plug

20 Open oil filler cap for better oil drainage.

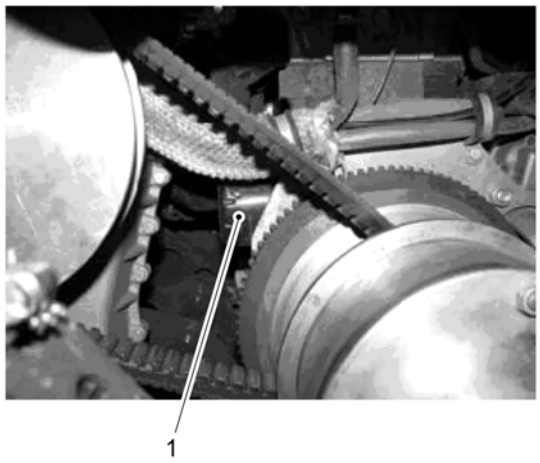
21 Remove the drain plug. Allow the oil to drain completely.

NOTE:

The sealing surfaces on the drain plug and oil tank should be clean and free of burrs, nicks or scratches.

22 Replace the copper seal and reinstall the drain plug. Torque tighten the drain plug to 40 Nm (29.5 lbf-ft).

23 Place a piece of cloth beneath the oil filter (Fig 3 (1)). Using an oil filter wrench, turn the filter anti-clockwise to remove.



1 Oil filter

Fig 3 Engine oil filter

24 Using a clean dry cloth, clean the filter sealing surface on the crankcase.

25 Lubricate the O-ring on the new filter with a film of clean engine oil.

26 Install the new filter and turn by hand until the filter seal contacts the sealing surface, then turn an additional 1/2 turn.

27 Fill with new oil through the oil cap opening. Bring level to the upper mark on the dipstick.

28 Refit and securely fasten the oil filler cap.

29 Start the engine. Wait until oil pressure indicator light turns off.

30 Stop engine, and wait for two minutes. Check for leaks.

31 Check oil level on the dipstick and add oil as necessary.

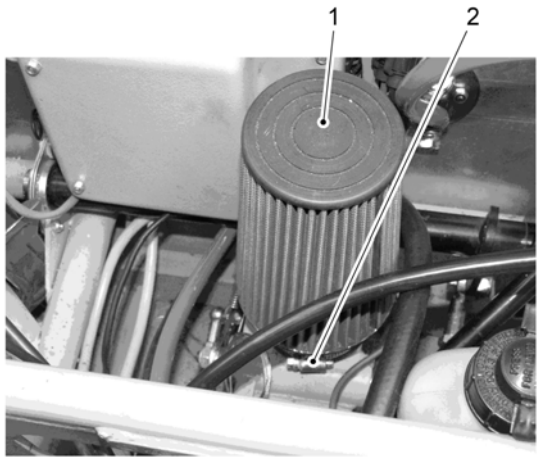
32 Dispose of used filter and oil in accordance with local procedures.

Air Filter Replacement

CAUTIONS

(1) EQUIPMENT DAMAGE. Always check and change the air filters at the intervals outlined in Cat 601.

(2) EQUIPMENT DAMAGE. Service the air filters more frequently if the vehicle is operated in wet or dusty conditions or at high throttle openings for extended periods.



1 Filter element
2 Hose clamp

Fig 4 Front air filter

33 Cleaning the front air filter.

33.1 Lift the front cargo bay (refer to Chap 3) to access the air filter.

33.2 Loosen the hose clamp (Fig 4 (2)). Remove filter element (1) and check its condition.

33.3 Wash with soapy water and drain.

33.4 Allow the filter element to dry completely.

33.5 Apply a light coat of oil spread evenly over the filter element. Applying too much oil can prevent air from passing through.

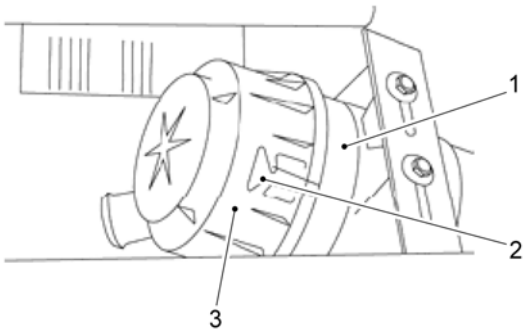
34 Reinstall filter element (1). Tighten hose clamp (2).

35 Inspect all air intake hoses for any visible damage.

36 Check that all hose clamps are tight and are positioned correctly.

37 Close and secure the front cargo bay. Refer to Chap 3.

Rear



1 Air filter housing
2 Clamps
3 Cover

Fig 5 Rear air filter

38 Lift the rear cargo bay (refer to Chap 3) and locate the air box on the right hand-side.

CAUTION

EQUIPMENT DAMAGE. Do not use pressurised air or solvents to clean filter. Pressurised air and solvents may damage filter.

39 Remove and inspect the filter element for debris. Check for tears or damage. Tap gently on clean area with the filter element. Look into the light through the filter element. If no light is visible, then the filter element is clogged. Replace as needed.

40 Reinstall the filter element with the arrow pointing toward the engine and secure the cover knob.

41 Reassemble all components.

42 Inspect all air intake hoses for any visible damage.

43 Check that all hose clamps are tight and are positioned correctly.

44 Close and secure the rear cargo bay.

FUEL SYSTEM

Refuelling

45 Do not allow the fuel tanks to become empty, or air will enter the fuel system.

46 Position the vehicle on a firm level surface and engage the parking brake.

47 Set the ignition switch to OFF before filling the tanks and remove the key.

48 Do not over fill the tanks. Do not fill the tank neck. If the neck is filled, heat may cause the fuel to expand and overflow from the tank vent or around the fuel cap.

49 At the end of each working day, fill the tanks with the correct type of fuel to prevent overnight condensation from forming in the fuel

50 Do not let dirt or debris enter the fuel system.

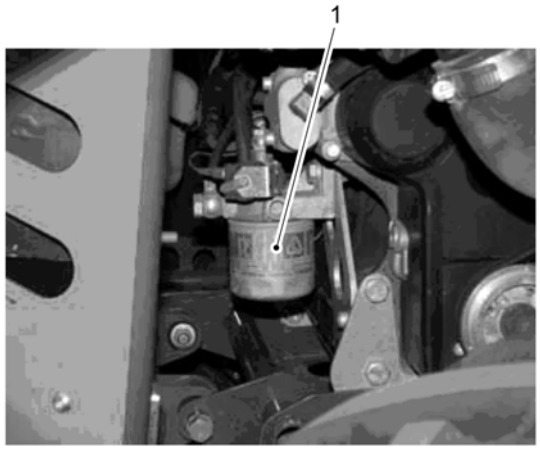
51 Clean all spillages.

Fuel Filter Replacement

52 Park the machine on a firm level surface and engage the parking brake.

53 Stop the engine and remove the ignition key.

54 The fuel filter (Fig 6 (1)) is found on the right rear side of the engine.



1 Filter

Fig 6 Fuel filter

55 Put a suitable container under the filter to catch any fuel.

56 Unscrew and remove the fuel filter.

57 Lubricate the seals on the new fuel filter.

58 Install the new fuel filter.

59 Bleed the air from the fuel filter as follows:

59.1 Loosen the banjo bolt (Fig 7 (1)) on the fuel filter housing to allow fuel to escape as pressure increases.

1 Filter

Fig 7 Fuel filter

59.2 Press the priming lever on the fuel pump (Fig 8) down several times until fuel begins to leak from the banjo bolt (Fig 7 (1)) on the fuel filter housing.

Fig 8 Priming lever

59.3 Tighten the banjo bolt (Fig 7 (1)) and check the fuel filter for leaks.

COOLING SYSTEM

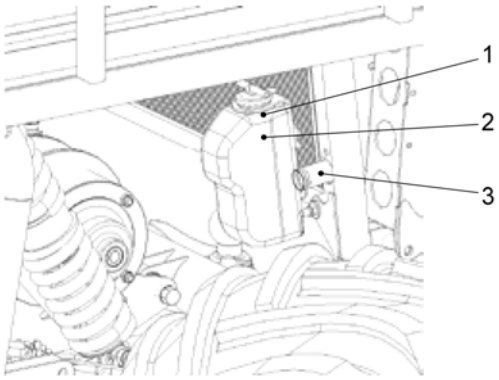
60 Always check and change the coolant at the intervals outlined in Cat 601.

61 Refer to Cat 601 for correct coolant mixture specification and capacity.

Coolant Level Check

62 Position the vehicle on a firm level surface and engage the parking brake.

63 Stop the engine and allow to cool.



1 Coolant overflow bottle
2 Full level mark
3 Radiator lower hose

Fig 9 Coolant overflow bottle

64 The overflow bottle (Fig 9(1)) is located behind left rear wheel attached to the radiator.

65 Maintain the coolant level to the full mark (2) of the container (when the fluid is cool).

66 View the coolant level in the overflow bottle.

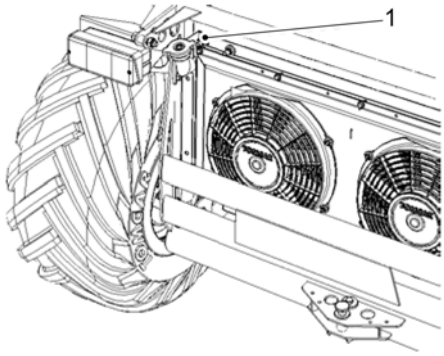
67 If the coolant level is below the safe operating range, lift the cargo bay and locate the overflow bottle lid. Remove the lid and use a funnel to add coolant through the filler opening. Reinstall the cap.

68 If the overflow bottle has run dry, the level in the radiator should also be inspected.

NOTE

If coolant must be added often, or if the overflow bottle runs completely dry, there may be a leak in the system. Have the cooling system inspected by suitably qualified maintenance personnel.

Adding/Replacing the Coolant



1 Radiator cap

Fig 10 Coolant filler

69 Park the machine on a firm level surface and engage the parking brake.

70 Stop the engine and remove the ignition key.

71 Let the engine cool.

72 Lift the cargo bay and slowly remove the radiator cap (Fig 10 (1)) to release excess pressure.

73 If the coolant is to be replaced, proceed as follows:

1 Hose clamp
2 Lower radiator hose

Fig 11 Lower radiator hose

73.1 Position a suitable container below the lower radiator hose (Fig 11 (2)).

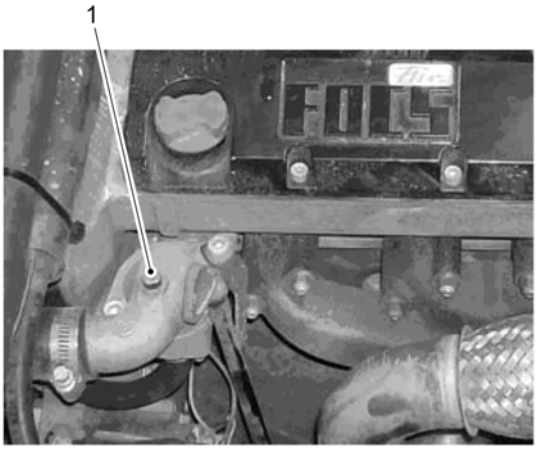
73.2 Loosen the hose clamp (1). Remove the lower radiator hose and let the coolant drain into the container.

73.3 Clean the area around the hose fitting. Install the lower radiator hose to the radiator. Tighten the hose clamp.

74 Remove the air bleed screw (Fig 12 (1)) for the cooling system.

75 Fill the system with coolant at the filler (Fig 10).

76 When coolant exits the air bleed, replace the air bleed screw (Fig 12 (1)).



1 Air bleed screw

Fig 12 Air bleed screw

77 Replace the radiator cap, make sure it is tight.

78 Run the engine until the coolant is at the working temperature and pressure.

79 Stop the engine and check the coolant level and for coolant leaks.

80 Examine the condition of the radiator hoses and clamps. Make sure that the connections are secure and show no indication of leakage.

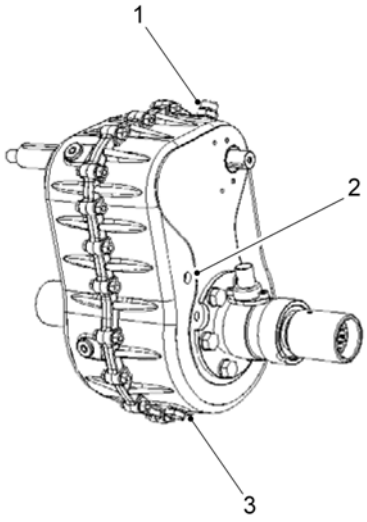
81 Dispose of used coolant in accordance with local procedures.

82 After a few hours of operation, when the engine is cold, check the coolant level.

TRANSMISSION

83 Always check and change the transmission oil at the intervals outlined in the Cat 601.

84 Refer to Cat 601 for correct oil specifications and capacity.



1 Oil filler plug
2 Oil level indicator bolt
3 Drain plug

Fig 13 Transmission

WARNINGS

(1) ALWAYS ISOLATE AT THE MASTER SWITCH ON COMPLETION OF TASK AND PRIOR TO COMMENCING WORK UPON THE VEHICLE SYSTEMS.

(2) OILS AND LUBRICANTS CAN BE CARCINOGENIC – AVOID DIRECT CONTACT WITH SKIN AND EYES. ALWAYS COMPLY WITH PRODUCT SAFETY AND MEDICAL CARE DATA AND PRACTICE GOOD HYGIENE.

Oil Level Check

85 Position the vehicle on a firm level surface and engage the parking brake.

86 Stop the engine, remove the ignition key and turn the master isolator switch to off.

87 The oil should be level with the bottom of the oil level indicator bolt (Fig 13 (2)) hole.

88 Remove the oil level indicator bolt (2) and the fill plug (1).

89 Add oil until the oil comes out of the opening (2). Allow the flow of oil from the opening to stop.

90 Reinstall the oil indicator bolt and fill plug.

Changing the Oil

91 Drive the vehicle for a short distance to warm the transmission oil.

92 Position the vehicle on a firm level surface and engage the parking brake.

93 Stop the engine, remove the ignition key and turn the master isolator switch to off.

94 Clean the area around the gearbox fill plug (1).

95 Remove the fill plug (1).

96 Clean the area around the gearbox drain plug (3).

97 Position a suitable container below the drain plug.

98 Remove the drain plug and drain the oil into a suitable container.

99 Wipe the magnetic end of the drain plug clean to remove accumulated metallic particles.

100 After the oil has drained completely, install a new sealing washer and reinstall the drain plug.

101 Add the recommended amount of correct oil. Refer to Cat 601.

102 Reinstall the fill plug (1).

103 Check for leaks.

104 Run the engine for one minute, then stop the engine and let the machine stand for two minutes.

105 Check the oil level.

CVT Belt Replacement

WARNINGS

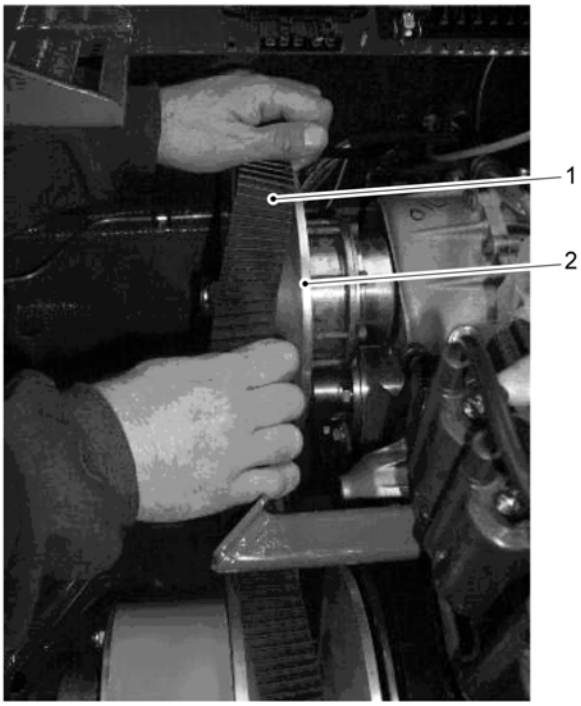
(1) ALWAYS ISOLATE AT THE MASTER SWITCH ON COMPLETION OF TASK AND PRIOR TO COMMENCING WORK UPON THE VEHICLE SYSTEMS.

(2) REMAIN VIGILANT OF HOT PARTS (EXHAUST, COOLANT ETC) WHEN UNDERTAKING MAINTENANCE.

Belt Removal

106 Lift the rear cargo bay.

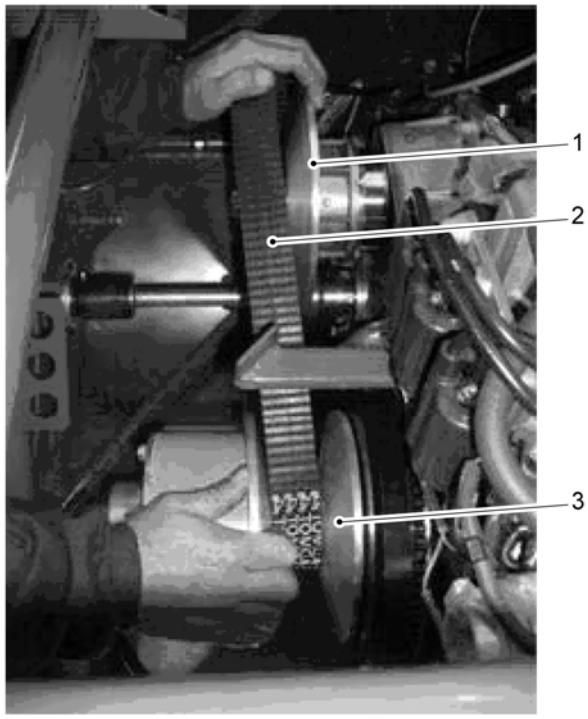
107 Pull CVT belt (Fig 14 (1)) up with right hand while sliding it over the rim of the Transmission CVT plate (2) with left hand.



1 CVT Belt
2 Transmission CVT

Fig 14 CVT Belt removal

108 Once belt is on the rim of the plate rotate the Engine CVT (Fig 15 (3)) (counter clockwise) with right hand and pull the belt (2) off the Transmission CVT (1).



1 Transmission CVT
2 CVT Belt
3 Engine CVT

Fig 15 CVT Belt removal

NOTE

If the belt is too tight to pull over the rim, push down in the center of the belt until the belt sinks deeper in between the CVT plates. This will give the belt more slack and make it easier to remove.

109 Remove the belt from the Engine CVT and remove from the vehicle.

Belt Inspection

110 Measure the belt width (Fig 16). The belt width should be between the following values:

110.1 Standard (new) - 35mm (1.36 in.)

110.2 Service limit - 33.5mm (1.30 in.)

111 If the belt width is less than the service limit replace the belt.

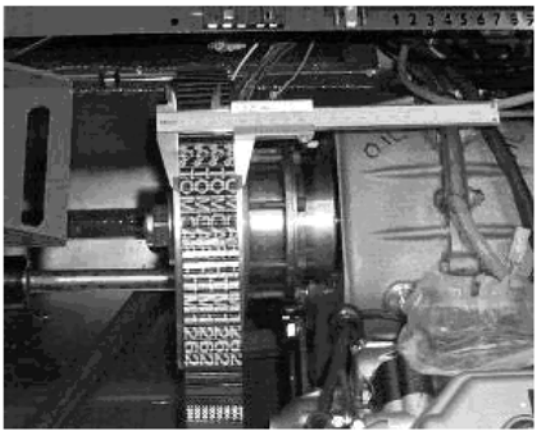


Fig 16 Check the CVT belt width

112 The belt should not be dry, cracked, or otherwise damaged (Fig 17).

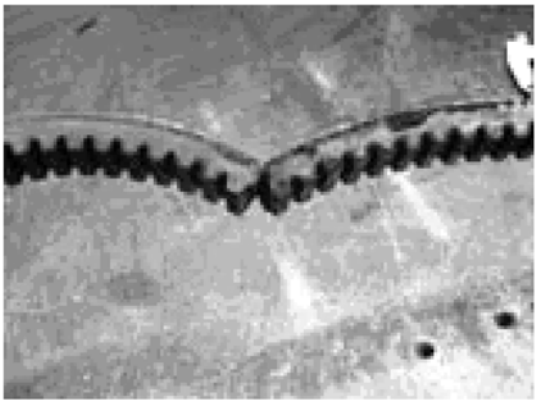


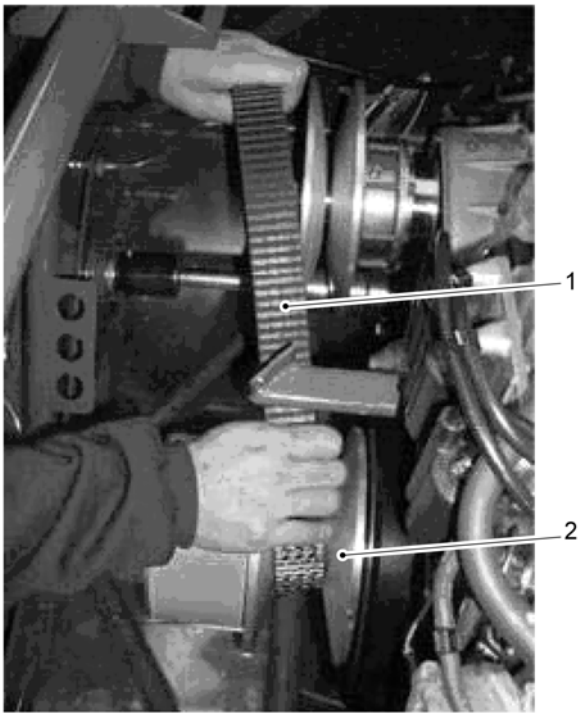
Fig 17 CVT Belt showing damage

Belt Installation

113 The belt has an operational direction. To ensure the right direction make sure that the writing is in a readable direction when being installed (Fig 18).

Fig 18 CVT Belt orientation

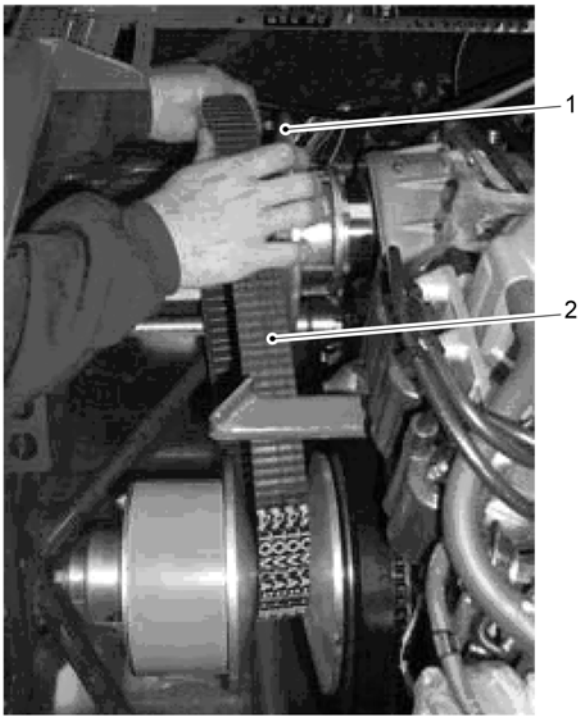
114 Install the belt (Fig 19 (1)) completely on the Engine CVT (2) first.



1 CVT Belt
2 Engine CVT

Fig 19 CVT Belt installation

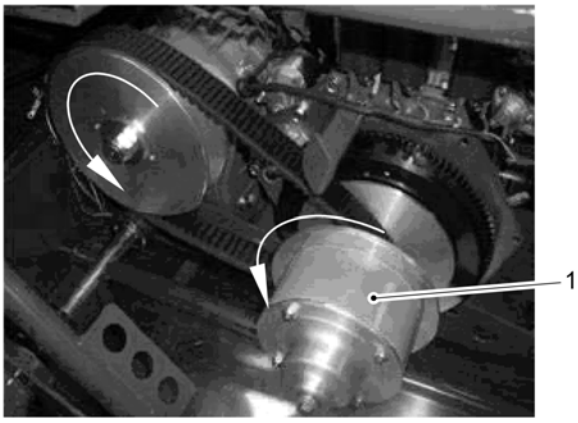
115 Install the belt (Fig 20 (2)) partially on the Transmission CVT (1) and hold in place with left hand.



1 Transmission CVT
2 CVT Belt

Fig 20 CVT Belt installation

116 Make sure the transmission is in neutral. Using right hand hold the Engine CVT (Fig 21 (1)) and turn anti-clockwise until belt is seated.



1 Engine CVT

Fig 21 CVT Belt installation

117 Check the CVT belt tension. Refer to Para 119. Run the engine for a short period to allow the CVT belt to 'run in'. Stop the engine and recheck the belt tension. Refer to Para 119.

118 Close and secure the rear cargo bay.

CVT Belt Tension

WARNING

ALWAYS ISOLATE AT THE MASTER SWITCH ON COMPLETION OF TASK AND PRIOR TO COMMENCING WORK UPON THE VEHICLE SYSTEMS.

119 Position the vehicle on a firm level surface and engage the parking brake.

120 Stop the engine, remove the ignition key and turn the master isolator switch to off.

121 The gap should be 5-7 cm (2.0-2.9in) measured at midpoint between the two CVT pulleys (Fig 22).

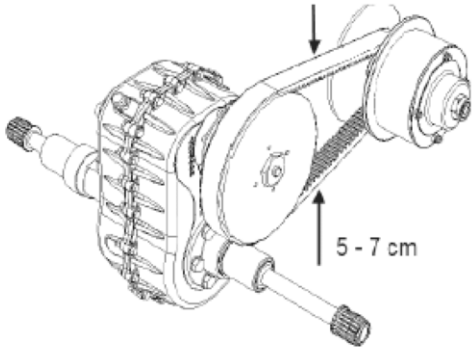


Fig 22 CVT Belt tension

122 If the belt tension needs to be adjusted, refer to REME maintenance personnel.

Final Drive

123 Always check and change the final drive oil at the intervals outlined in the Cat 601.

124 Refer to Cat 601 for correct oil specifications and capacity.

WARNINGS

(1) ALWAYS ISOLATE AT THE MASTER SWITCH ON COMPLETION OF TASK AND PRIOR TO COMMENCING WORK UPON THE VEHICLE SYSTEMS.

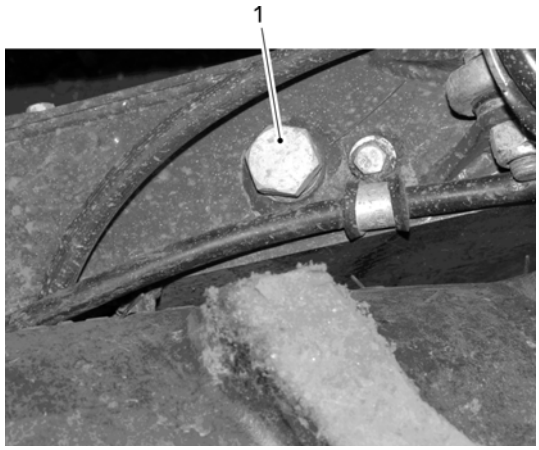
(2) OILS AND LUBRICANTS CAN BE CARCINOGENIC – AVOID DIRECT CONTACT WITH SKIN AND EYES. ALWAYS COMPLY WITH PRODUCT SAFETY AND MEDICAL CARE DATA AND PRACTICE GOOD HYGIENE.

125 Position the vehicle on a firm level surface and engage the parking brake.

126 Stop the engine, remove the ignition key and turn the master isolator switch to off.

127 Clean the area around the filler plug (Fig 23 (1)).

128 Remove the filler plug (1).

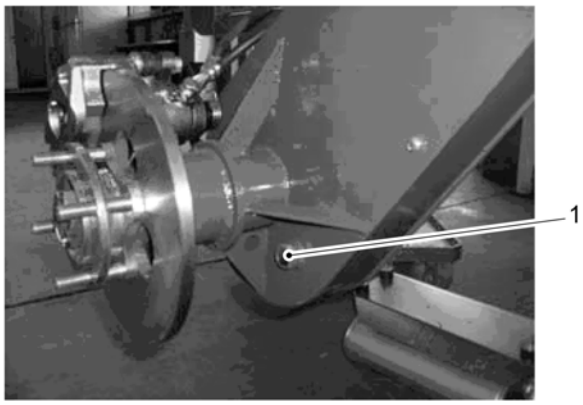


1 Filler plug

Fig 23 Final drive filler plug

129 Clean the area around the drain plug (Fig 24 (1)).

130 Remove the drain plug (1) and drain oil into a suitable container.



1 Drain plug

Fig 24 Final drive drain plug

131 Clean and install drain plug. Replace sealing washer if broken or worn.

132 Fill the final drive with recommended quantity of correct oil. Refer to Cat 601.

133 Install filler plug.

134 Check for leaks.

BRAKES AND WHEELS

Parking Brake Check and Adjustment

NOTE

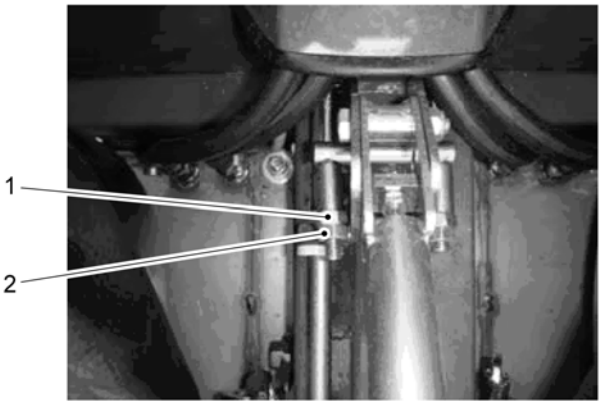
There are two parking brake cables fitted, one to each rear wheel.

135 Position the vehicle on a firm level surface.

136 Place the transmission in neutral.

137 Stop the engine, remove the ignition key and turn the master isolator switch to off.

138 Make sure parking brake is disengaged.



1 Locknut
2 Locknut

Fig 25 Parking brake cable adjusters

139 Loosen the lock nuts (Fig 25 (1) and (2)) and adjust the parking brake cable free play to 2 – 5 mm.

140 Repeat for the second cable.

141 Tighten all lock nuts and check that when the parking brake is applied the vehicle will not move.

Brake Fluid Level Check

142 Routine inspections are recommended to keep the brake system in good operating condition.

143 Change the brake fluid at the intervals outlined in Cat 601.

144 Refer to Cat 601 for the correct brake fluid specification.

145 The brake fluid should also be changed if it becomes contaminated, if the fluid level is below the minimum, or if the type and brand of the fluid in the reservoir are unknown.

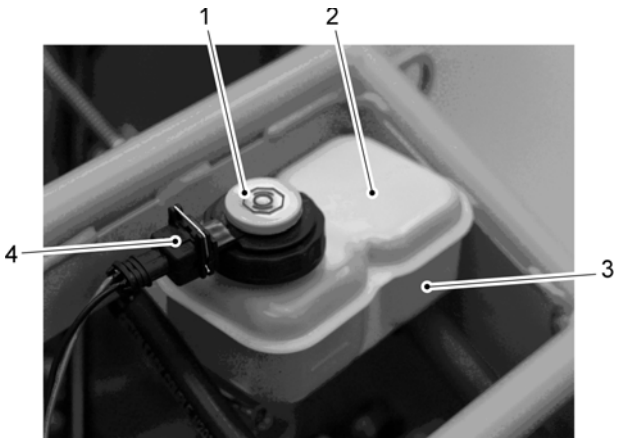
146 Position the vehicle on a firm level surface and engage the parking brake.

147 Stop the engine and remove the ignition key.

148 Lift the front cargo bay. Refer to Chap 3.

149 Disconnect the electrical connector (Fig 26 (4)). Clean the cap (1) and remove the cap (1) from the brake fluid reservoir (2).

150 Check that the fluid reaches the level mark on the reservoir body (3).



1 Cap
2 Reservoir
3 Level mark
4 Electrical connector

Fig 26 Brake fluid reservoir

151 If the fluid level is low check for leaks and replace the fluid to the required level. Use the specified brake fluid only. Refer to Cat 601.

152 Install the brake fluid reservoir cap (1) and fasten securely. Connect the electrical connector (4).

153 Apply the brake forcefully for a few seconds and check for fluid leakage around the fittings.

154 Close and secure the front cargo bay.

Tyre Tread Depth Check

WARNING

TYRES AND WHEELS ARE CRITICAL TO SAFETY, ALWAYS ENSURE CORRECT PRESSURES, WEAR LIMITS AND TORQUE SPECIFICATIONS ARE ADHERED TO.

155 Always replace tyres when tread depth is worn to 8 mm (0.31 in.) or less (Fig 27).

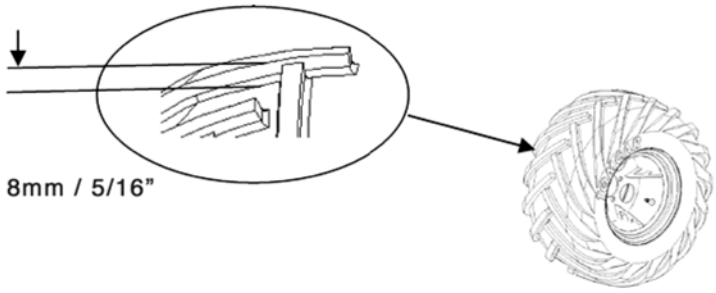


Fig 27 Tyre tread depth

Tyre Inflation

156 Refer to Cat 601 for the correct tyre pressures.

157 These instructions are for adding air to a tyre which is already inflated. If the tyre has lost all its air pressure, refer to REME maintenance personnel.

158 Prepare the wheel.

158.1 Before you add air to the tyre, make sure it is correctly fitted on the vehicle.

159 Prepare the equipment.

159.1 Use only an air supply system which includes a pressure regulator. Set the regulator no higher than 1.38 bar (20 psi) above the recommended tyre pressure. Refer to Cat 601 for recommended tyres and pressures.

159.2 Use an air hose fitted with a self-locking air chuck and remote shut-off valve.

160 Add the air.

160.1 Make sure that the air hose is correctly connected to the tyre valve. Clear other people from the area. Stand behind the tread of the tyre while adding the air.

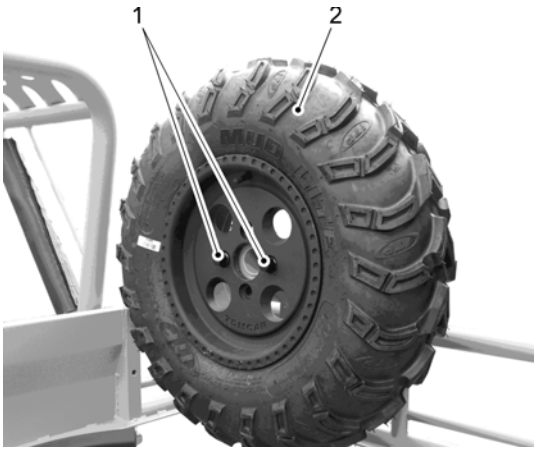
160.2 Inflate the tyre to the recommended pressure. Do not over-inflate.

Wheel Replacement

Spare Wheel Mounting

161 The spare wheel is secured to the carrier by two nuts (Fig 28 (1)). Remove the nuts to remove the spare wheel (3) from the carrier.

162 When installing the spare wheel to the carrier, make sure that the nuts are tightened securely.



1 Nuts
2 Spare wheel

Fig 28 Spare wheel

Removal

163 Position the vehicle on a firm level surface and engage the parking brake.

164 Stop the engine and remove the ignition key.

165 Loosen the wheel nuts slightly.

WARNINGS

(1) ALWAYS CHOCK THE VEHICLE PRIOR TO JACK LIFTING OPERATIONS AND NEVER WORK UNDER A VEHICLE THAT IS JUST SUPPORTED ON A JACK.

(2) ALWAYS ISOLATE AT THE MASTER SWITCH ON COMPLETION OF TASK AND PRIOR TO COMMENCING WORK UPON THE VEHICLE SYSTEMS.

166 Elevate the side of the vehicle by placing a suitable jack under the frame. Refer to Chap 3.

167 Remove the wheel nuts. Remove the wheel.

Installation

NOTES

(1) In an emergency, a rear wheel may be fitted to the front.

(2) In an emergency, a front wheel may be fitted to the rear by using the hub adaptor (Fig 29).

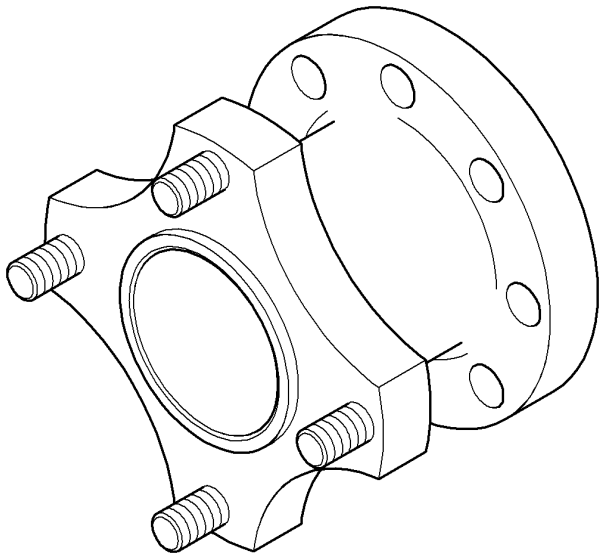


Fig 29 Hub adaptor

168 With the parking brake locked, place the wheel in the correct position on the wheel hub. Make sure the valve stem is toward the outside and rotation arrows on the tyre point toward forward rotation.

169 Attach the wheel nuts and tighten by hand.

170 Carefully lower the vehicle to the ground.

171 Tighten the wheel nuts firmly. Refer to Cat 601 for correct wheel nut torque figure.

Shock Absorber Air Pressure Adjustment

172 To fill the shock absorber air chamber, proceed as follows:

172.1 Place a suitable jack under the frame and raise the wheel off the ground. Refer to Chap 3.

172.2 Remove the valve cap from the shock absorber air valve (Fig 30 (1)) front, (Fig 31 (1)) rear.

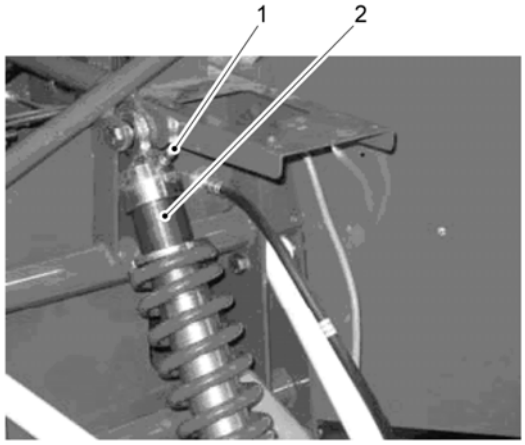
NOTE

The shock absorber air pressure can only be measured by using an inflator with an inline gauge. Do not attempt to check the pressure using a separate pressure gauge.

172.3 If the inflator has an inline gauge, attach the air chuck to the shock absorber air valve and inflate to 6.1 bar (90 psi).

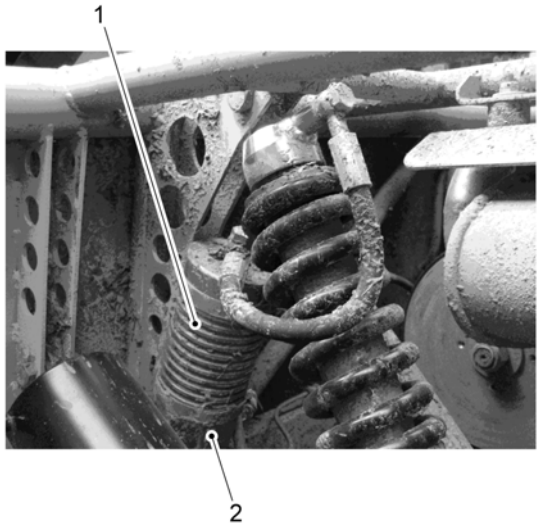
172.4 If the inflator does NOT have an inline gauge, attach the air chuck to the shock absorber air valve and hold in place for five seconds.

172.5 Refit the valve cap.



1 Air valve
2 Shock absorber body

Fig 30 Shock absorber air valve - Front



1 Air reservoir
2 Air valve

Fig 31 Shock absorber air valve - Rear

172.6 Spray the valve stem with water and look for bubbles indicating an air leak.

BODY AND FRAMEWORK

Cleaning the Vehicle

173 Park the machine on a firm level surface, engage the parking brake and set the transmission to neutral.

174 Stop the engine, remove the ignition key and turn the master isolator switch to off.

175 Use a low pressure water jet and brush with mild detergent to remove dirt. Rinse with clean water and dry with a cloth or chamois.

Checking for Damage

176 Examine the frame and ROPS for damage.

177 Examine the bodywork for damage. Record damaged paintwork for future repair.

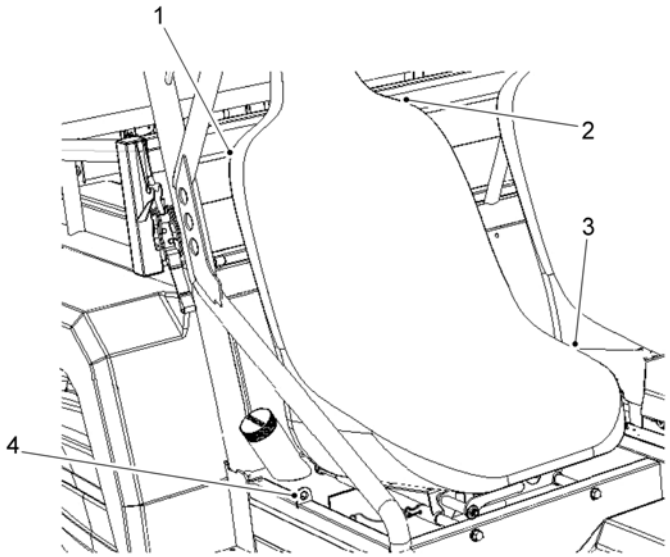
178 Check for broken or cracked mirrors. Replace damaged items.

179 Check all the lamp lenses for damage. Replace damaged items.

180 Examine the tyres for damage and penetration by sharp objects.

Harness Condition and Security

181 Check that the harness is attached firmly to the hooks on the frame (four locations) (Fig 32 (1), (2), (3) and (4)).



1-4 Harness mounting points

Fig 32 4-Point harness mounting points

182 Make sure that each clip is securely fastened to the hook on the frame as shown (Fig 33).

Fig 33 4-Point harness clip

183 To install the 4 point harness, secure the clips for the left and right lower straps of the harness to the seat belt brackets. Place the left and right shoulder harness over the seat. Cross the shoulder straps behind the seat and secure the clips to the shoulder harness brackets (Fig 34).

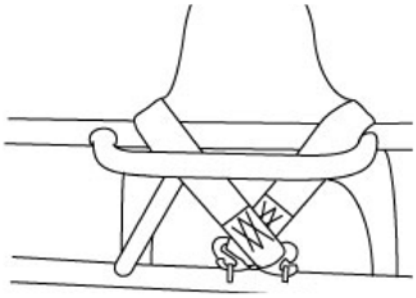


Fig 34 4-Point harness attachment

184 Check the belt webbing for wear, cuts or damage. If any irregularities are found, have the harness checked and/or replaced by suitable qualified personnel.

185 Push the latch plate into the buckle until it clicks. The latch plate must slide smoothly into the buckle. A click indicates that it is securely latched.

186 Push the red button in the middle of the buckle to make sure it releases freely.

ELECTRICAL SYSTEM

WARNINGS

(1) BATTERIES ARE AN EXPLOSIVE HAZARD AND CONTAIN ACID. EXTREME CAUTION IS TO BE EXERCISED ATALL TIMES.

(2) ALWAYS ISOLATE AT THE MASTER SWITCH ON COMPLETION OF TASK AND PRIOR TO COMMENCING WORK UPON THE VEHICLE SYSTEMS.

First Aid - Electrolyte

187 Do the following if electrolyte:

187.1 GETS INTO YOUR EYES

187.1.1 Immediately flush with water for 15 minutes, always get medical help.

187.2 IS SWALLOWED

187.2.1 Do not induce vomiting. Drink large quantities of water or milk. Then drink milk of magnesia, beaten egg or vegetable oil. Get medical help.

187.3 GETS ONTO YOUR SKIN

187.3.1 Flush with water, remove affected clothing. Cover burns with a sterile dressing then get medical help.

Battery Daily Check

188 It is necessary to keep the battery terminals and connections free of corrosion.

189 For cleaning, remove the corrosion with a stiff wire brush. Wash with hot water. Coat the terminals with dielectric grease or petroleum jelly.

Remove and Refit Battery

Battery Removal

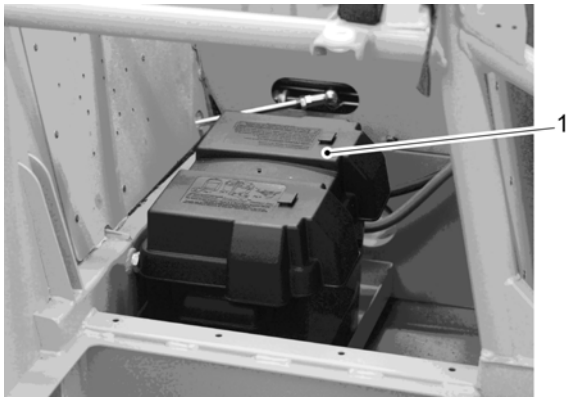
190 Park the vehicle on a firm level surface, engage the parking brake and set the transmission to neutral.

191 Stop the engine and remove the ignition key.

192 Set the Master Switch to OFF. Refer to Chap 1.

193 Lift the rear cargo bay. Refer to Chap 3.

194 Remove the lid (Fig 35 (1)) from the battery box.



1 Battery box lid

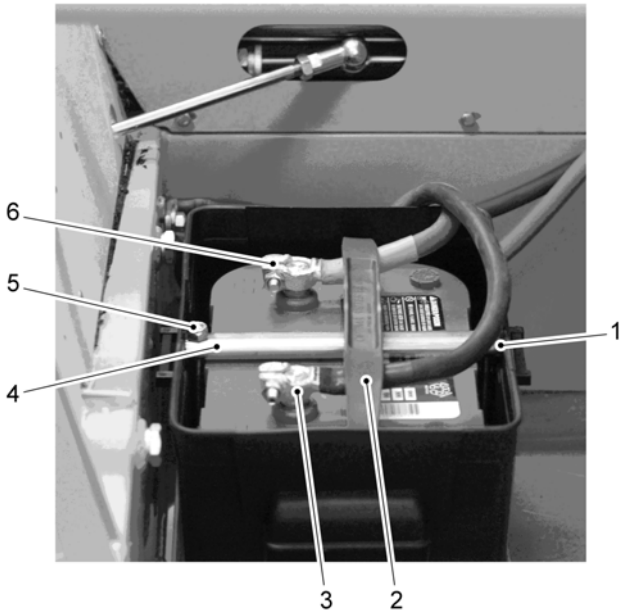
Fig 35 Battery box

195 Disconnect the black (negative) battery cable (Fig 36 (3)).

196 Disconnect the red (positive) battery cable (6).

197 Remove the nuts (1) and (5) from the retaining bar (1). Remove the retaining bar (1).

198 Using the handle (2), lift the battery out of the vehicle, being careful not to tip it sideways and spill any electrolyte. If electrolyte spills, immediately wash it off with water to prevent damage to the vehicle.



1	Nut	4	Retaining bar
2	Handle	5	Nut
3	Black (negative) cable	6	Red (positive) cable

Fig 36 Battery

Battery Installation

199 Using the handle (2), set the battery in its place.

200 It must be free from obstructions and securely installed.

201 Install the retaining bar (4) with nuts (1) and (5).

202 Connect and tighten the red (positive) cable (6).

203 Connect and tighten the black (negative) cable (3).

204 Verify that cables are properly routed.

205 Replace the battery box lid (Fig 35 (1)).

206 Close and secure the rear cargo bay.

Alternator Belt Tension

207 Park the vehicle on a firm level surface, engage the parking brake and set the transmission to neutral.

208 Stop the engine and remove the ignition key.

209 Set the Master Switch to OFF. Refer to Chap 1.

210 Lift the rear cargo bay. Refer to Chap 3.

211 The deflection at the center of the belt should be 10 mm (0.39 in.) (Fig 37).

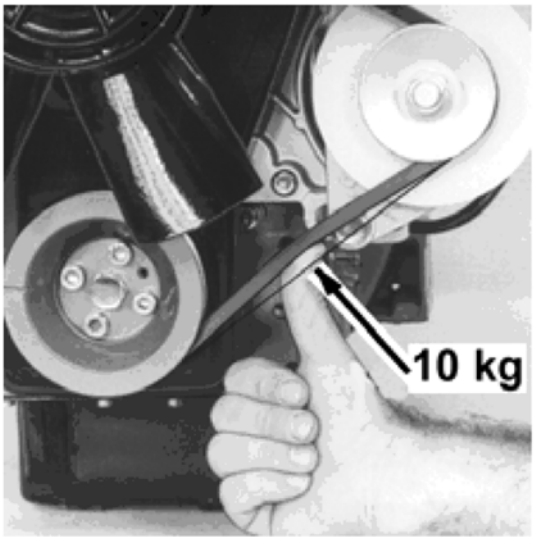


Fig 37 Alternator belt deflection

212 If adjustment is required, proceed as follows:

212.1 Loosen the two alternator fixing bolts (Fig 38).

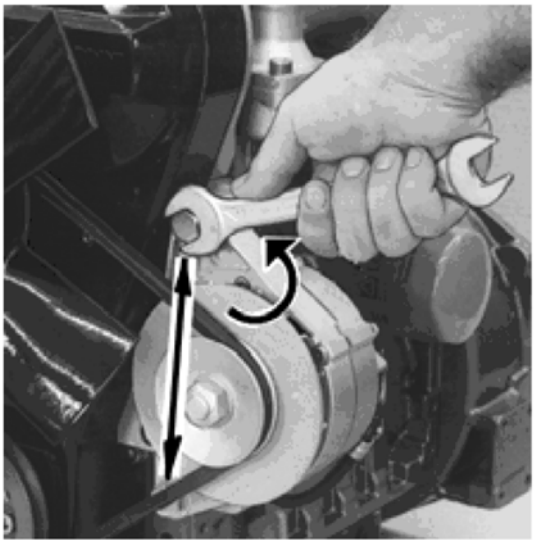


Fig 38 Alternator mounting bolts

212.2 Force the alternator outwards and temporarily tighten the bolts (Fig 39).

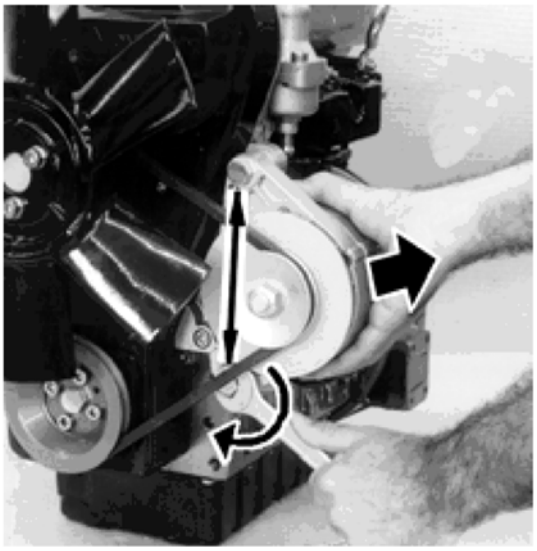


Fig 39 Tightening the alternator belt

212.3 Recheck the belt tension and adjust if necessary.

212.4 When the belt tension is correct torque tighten the alternator fixing bolts to 25 Nm (18.4 lbf-ft) and 40 Nm (29.5 lbf-ft) (Fig 40)

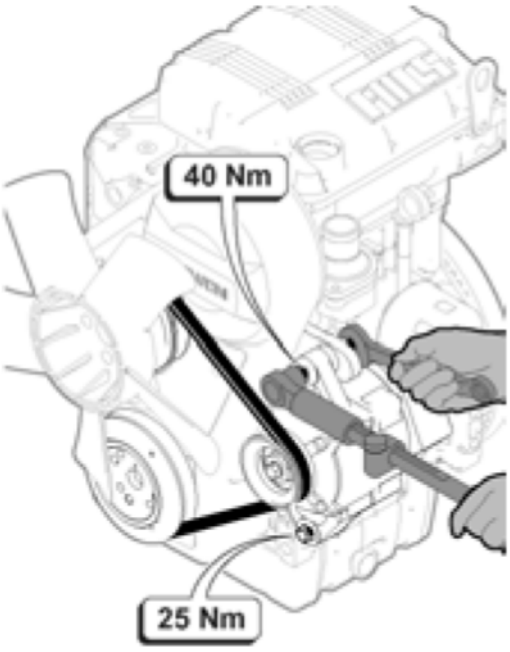


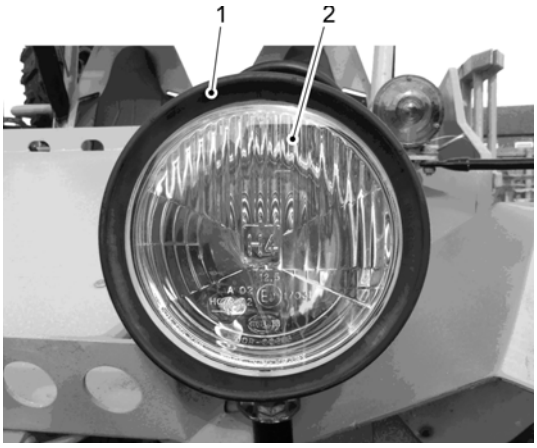
Fig 40 Alternator mounting bolts

213 Close and secure rear cargo bay.

Lighting – Bulb Replacement

214 Refer to Cat 721 for correct bulb types and specifications.

Headlight



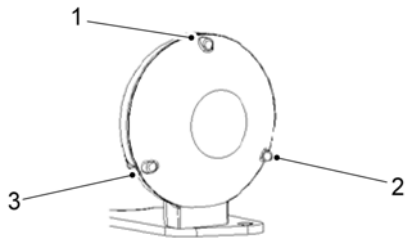
1 Rubber surround
2 Lens

Fig 41 Headlight

215 Peel back the rubber surround (Fig 41 (1)) from the lens (2).

216 Install the new bulb.

217 Refit the lens into the rubber surround.



1 Screw
2 Body
3 Lens

Fig 42 Direction indicator light

218 Remove 3 screws (Fig 42 (3)).

219 Remove the lens (1).

220 Install the new bulb.

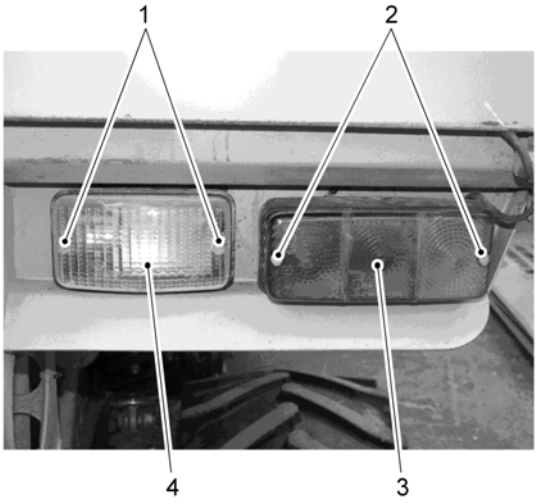
221 Install the lens (1).

222 Install the screws (3).

NOTE

Make sure the tab on the lamp locates properly in the housing.

Rear Light Cluster



1 Screws
2 Screws
3 Lens
4 Lens

Fig 43 Rear lights

223 Remove the screws (Fig 43 (1)) or (2) from the required lens.

224 Remove the lens (3) or (4).

225 Install the new bulb.

226 Install the lens.

227 Install the screws.

Fuse Replacement

CAUTION

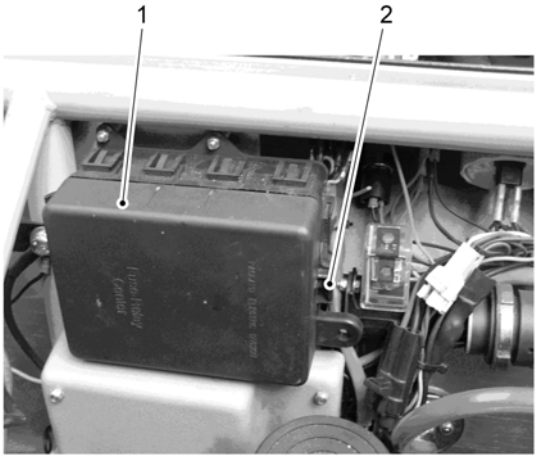
EQUIPMENT DAMAGE. Always replace fuses with ones of correct ampere rating to avoid electrical system damage.

228 Park the vehicle on a firm level surface, engage the parking brake and set the transmission to neutral.

229 Stop the engine and remove the ignition key.

230 Set the Master Switch to OFF. Refer to Chap 1.

231 Lift the front cargo bay. Refer to Chap 3.



1 Lid
2 Tab

Fig 44 Fuse box

232 Press two tabs (Fig 44 (2)) (one each side) in towards the fuse box to release the lid (1). Remove the lid (1).

233 Identify the correct fuse to be replaced (Fig 45).

234 Replace the fuse. Check all connections before reconnecting the power. If the fuse blows again, refer the machine to REME maintenance personnel for testing.

Relay Replacement

235 Remove the fuse box lid. Refer to Para 228.

236 Identify the correct relay to be replaced (Fig 45).

237 Remove the defective relay from the socket.

238 Install the new relay into the socket.

F1	IGN Switch	F14	Spare
F2	Lights	F15	Spare
F3	Right fan	F16	Open
F4	Left fan	F17	Open
F5	Relay R5 power	F18	Open
F6	Spare	F19	Open
F7	Spare	F20	Open
F8	Open	F21	Open
F9	Open	F22	Running lights
F10	Open	F23	Instrument lights
F11	Headlight low	F24	Headlight high
F12	Spare	F25	Spare/open
F13	Open	F26	Brake pressure switch

R1	Starter relay	R4	Lighting
R2	Open	R5	Switched IGN 12V
R3	Right fan	R6	Left fan

Fig 45 Fuse and Relay Identification

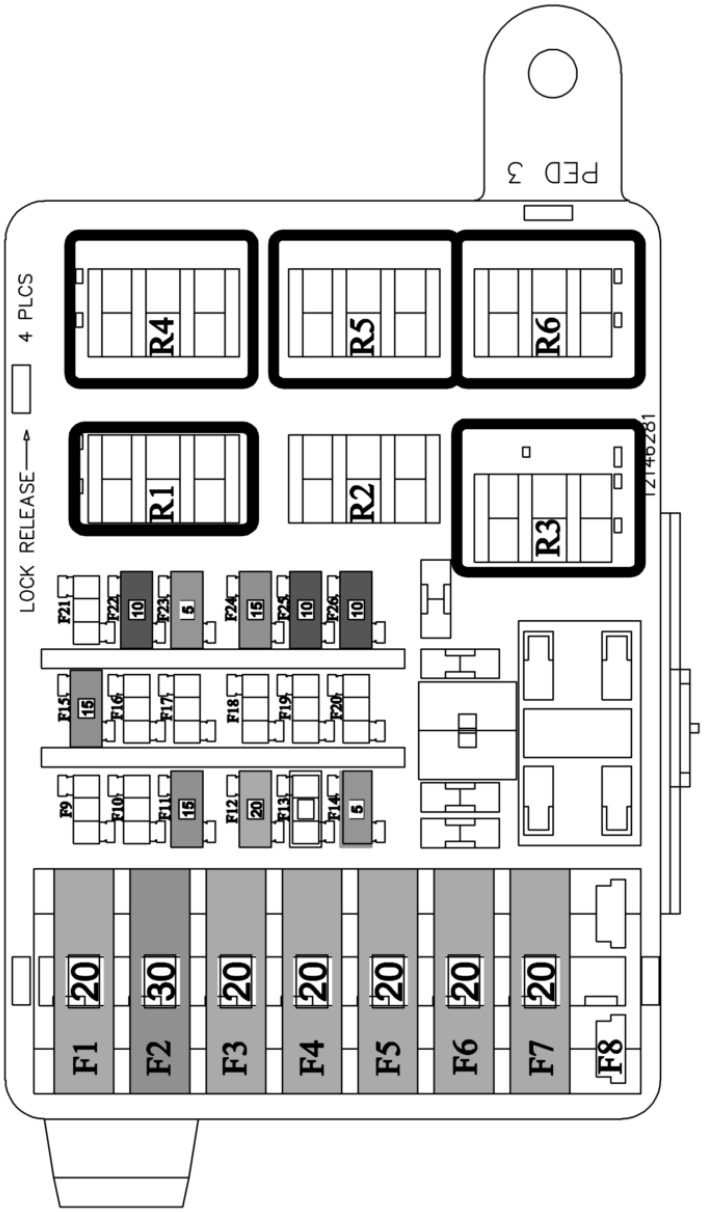


Fig 45 Fuse and Relay Identification

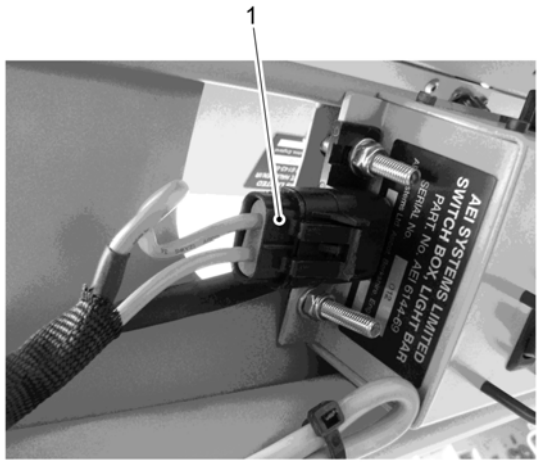
IR Switch Box Fuse Replacement

239 Park the vehicle on a firm level surface, engage the parking brake and set the transmission to neutral.

240 Stop the engine and remove the ignition key.

241 Set the Master Isolator Switch to OFF. Refer to Chap 1.

242 Remove the fuse holder (Fig 46 (1)) from the IR switch box.



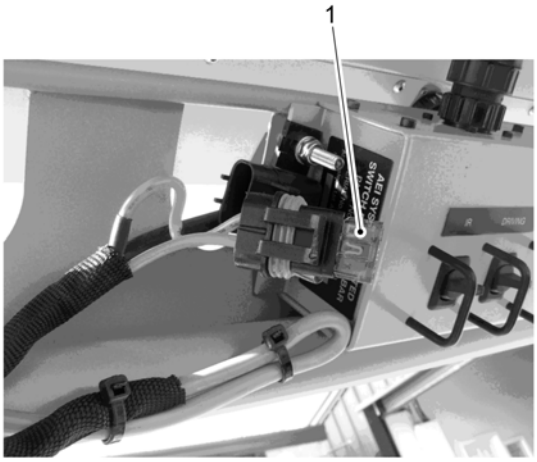
1 Fuse holder

Fig 46 IR Switch box fuse holder

CAUTION

EQUIPMENT DAMAGE. Always replace fuses with ones of correct ampere rating to avoid electrical system damage.

243 Fit a new fuse of 10 Amps rating (Fig 47 (1)).



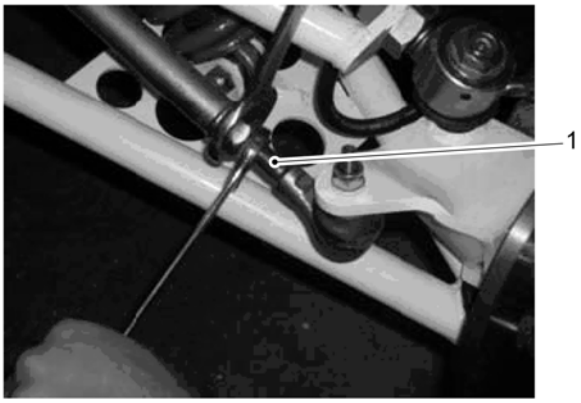
1 Fuse

Fig 47 IR Switch box fuse

STEERING TIE-ROD END REPLACEMENT

NOTE

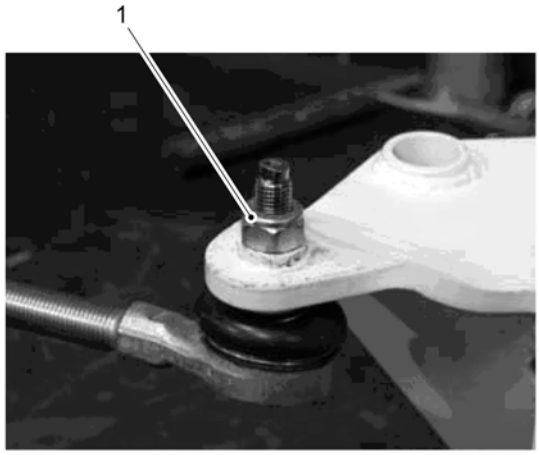
Before removing the steering tie-rod end, count the number of exposed threads (Fig 48 (1)). This will maintain proper wheel alignment during installation.



1 Exposed threads

Fig 48 Steering tie-rod end preparation

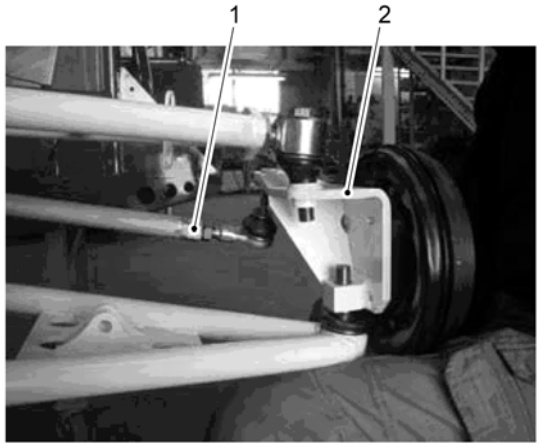
244 Remove the nut (Fig 49 (1)) to release the steering tie-rod end from the swivel hub.



1 Nut

Fig 49 Steering tie-rod end

245 Disconnect the steering tie-rod (Fig 50 (1)) from the swivel hub (2).



1 Steering tie-rod
2 Swivel hub

Fig 50 Disconnect the steering tie-rod

246 Loosen the lock nut (Fig 51 (1)) and then remove the steering tie-rod end.

247 Install the steering tie-rod end to the swivel hub and tighten nut (Fig 49 (1)).

NOTE

When installing new steering tie-rod end make sure the number of exposed threads matches the number previously counted when removed. If number is unknown, steering alignment will need to be performed, refer to REME maintenance personnel.

1 Locknut

Fig 51 Adjust the steering alignment

248 If ball joint spins and nut will not tighten, apply pressure from bottom side of the ball joint to lock ball joint in place (Fig 52).

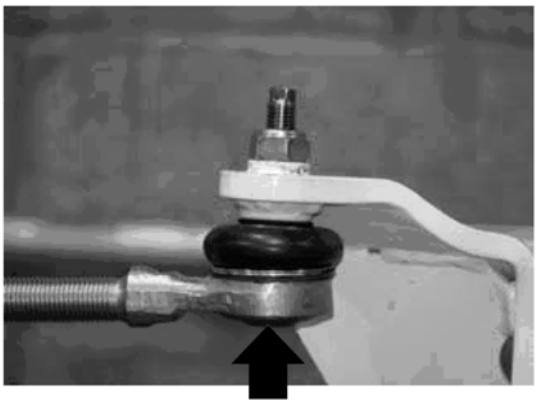


Fig 52 Ball joint

249 Check steering for smooth, proper operation.

COMPRESSOR AIR FILTER MAINTENANCE

250 The compressor is fitted with a paper air filter element, designed to trap and hold dirt, sand, dust and debris.

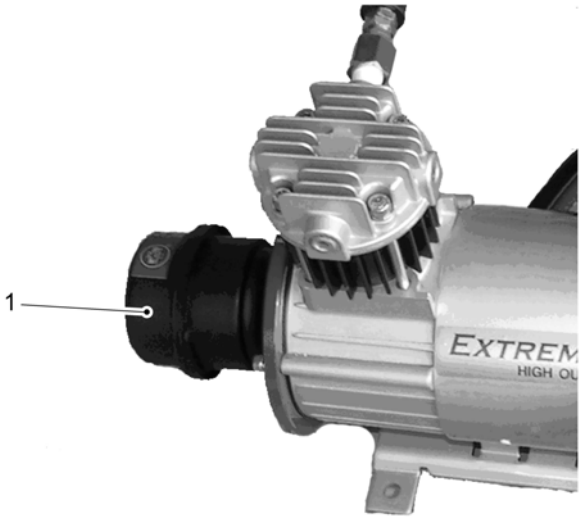
251 The filter should be cleaned, inspected and replaced according the schedule specified in Cat 601.

Cleaning and Inspection

CAUTION

EQUIPMENT DAMAGE. Do not use pressurised air or solvents to clean filter. Pressurised air and solvents may damage filter.

252 Unscrew and separate the air filter housing (Fig 53 (1)). Remove the filter element.



1 Air filter housing

Fig 53 Compressor air filter housing

253 Inspect the filter element for debris. Check for tears or damage. Tap gently on clean area with the filter element. Look into the light through the filter element. If no light is visible, then the filter element is clogged. Replace as needed.

254 Install the filter element to the housing. Connect and tighten the air filter housing.

[redacted]

CHAPTER 5

RECOVERING A DISABLED MACHINE

CONTENTS

Para

1 Introduction
2 Towing
3 Vehicle Recovery

INTRODUCTION

1 This chapter covers the detail required to recover a disabled Springer Vehicle.

2 Refer to AESP 0200-A-306-211 for REME recovery procedures.

3 Refer to All Arms Equipment Recovery Manual AESP 0200-A-307-013.

TOWING

4 Refer to Chap 3.

VEHICLE RECOVERY

5 If the disabled vehicle cannot be towed, it may be lifted by attaching suitable lifting equipment to the ROPS. Refer to LOLER 98.

CHAPTER 6

TRANSPORTATION AND STORAGE

CONTENTS

Para

Introduction
1 General
2 Transportation (CAUTION)
3 Storage

INTRODUCTION

General

1 This chapter covers the detail required to safely secure the Springer Vehicle for road transportation and storage.

TRANSPORTATION

CAUTION

EQUIPMENT DAMAGE. Prior to transportation by air, release the air pressure from all suspension units - front and rear shock absorbers, and rear load compensators.

2 For transportation and tie down procedures, refer to JSP 800.

STORAGE

3 If the Springer Vehicle is not going to be operated for an extended period of time, it is to be stored correctly as detailed in Cat 601.

CHAPTER 7

DATA SUMMARY

CONTENTS

Para

1 Introduction
Vehicle

Table Page

1 Vehicle Dimensions 2
2 Cargo Box Dimensions 2
3 Weight 2
4 Service Fill Capacities 3
5 Tyres and Pressures 3
6 Speeds and Loads 3
7 Technical Information 4

INTRODUCTION

1 This chapter contains the data summary for the Springer Vehicle.

VEHICLE

TABLE 1 VEHICLE DIMENSIONS

Length	3416 mm (135 in.)
Width	1780 mm (70 in.)
Height	1686 mm (67 in.)
Wheelbase	2562 mm (101 in.)
Wheel Track	Front - 1540 mm (60.6 in.) Rear - 1465 mm (57.7 in.)
Turning Circle	[redacted]
Ground Clearance	378 mm (15 in.)
Fording Depth	400 mm (15.7 in.)

TABLE 2 CARGO BOX DIMENSIONS

Rear Cargo Box (inside rails)	1684 mm x 1343 mm (66 in. x 53 in.)
Rear Cargo Box Capacity (for a fully equipped vehicle with two crew)	[redacted]
Front Cargo Box (inside rails at widest point)	950 mm x 600 mm (37.4 in. x 23.6 in.)
Front Cargo Box Capacity	[redacted]

TABLE 3 WEIGHT

Unladen (Dry) Weight	[redacted]
Laden Weight	[redacted]
Maximum Towing Weight	[redacted]
Maximum Weight on Tow Hitch	[redacted]
Maximum Total Weight	[redacted]

TABLE 4 SERVICE FILL CAPACITIES

Fuel Tank Capacity (per tank)	27 l (5.9 gal)
Engine Oil Sump and Filter	3.2 l (0.7 gal)
Transmission	2.4 l (0.5 gal)
Final Drive	0.95 l (0.2 gal)
Coolant	6 l (1.3 gal)

TABLE 5 TYRES AND PRESSURES

Front	Carlisle 25 X 8 – 12 NHS	1.7 Bar (24 psi)
Rear	Carlisle 26 X 12 – 12 NHS	1.7 Bar (24 psi)

TABLE 6 SPEEDS AND LOADS

Maximum Speeds:	
On road unladen	64 kph (40 mph)
On road laden	48 kph (30 mph)
Off road unladen	48 kph (30 mph)
Off road laden	32 kph (20 mph)
Suspended tow recovery	16 kph (10 mph)
The speeds listed are a maximum and the operator is expected to reduce speed as appropriate to the local conditions.	
Maximum Slope Angle	[redacted]
Approach Angle	[redacted]
Departure Angle	[redacted]
Payload (for a fully equipped vehicle with two crew)	[redacted]

TABLE 7 TECHNICAL INFORMATION

Engine	Diesel 1400cc, Naturally Aspirated, 4 Cylinder, Liquid Cooled
Transmission	Automatic V-Belt CVT Rear Wheel Drive Final Drive: Oil Bathed Double Chains High - Low - Reverse Transfer Case Differential lock
Suspension	4 Wheel Independent Suspension with up to 343 mm (13.5 in.) Travel Front: Heavy Duty Double Wishbone Rear: Heavy Duty Trailing Arm Adjustable Dual-Coil Over Gas-Hydraulic Shocks Pneumatic Load Compensators
Steering	Rack and Pinion. 1.6 Turn Lock to Lock.
Brakes	Power Assisted Hydraulic Brakes Mechanical Parking Brake.
Electrical	12V Battery 40-70A Alternator Horn 12V Power Socket Halogen Head Lights Tail, Turn and Brake Lights
Instrumentation	Speedometer with Odometer Voltmeter Fuel Gauge Temperature Gauge
Seating	Adjustable, Bucket Style with integral head rest 4 point Safety Harness

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SPRINGER VEHICLE

MAINTENANCE INSTRUCTIONS

BY COMMAND OF THE DEFENCE COUNCIL

Ministry of Defence
Issued by
GSV IPT
U05V9

AMENDMENT RECORD

Amdt No.	Incorporated by (Signature)	Date
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MAINTENANCE INSTRUCTIONS

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1 Engine
2 Electrical system
3 Brake system
4 Steering
5 Transmission
6 Suspension
7 Cooling system
8 Body and Framework

PREFACE

Sponsor: GSV IPT
Project No.: UOR A01393
File Ref: SUV C1/0204

Publication Authority: GSV IPT

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 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.

4 In this publication the terms 'left' and right' will mean the left and right sides of the vehicle respectively, as viewed by the operator when seated correctly in the driver's seat.

RELATED AND ASSOCIATED PUBLICATIONS

Related publications

5 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	101	101	*	*
	1	Equipment Support Policy Directive	111	111	*	*
2	**0**	Operating Information	201	201	*	*
	1	Aide Memoire	*	*	*	*
	2	Training Aids	*	*	*	*
3		Technical Description	201	*	*	
4	**1**	Installation Instructions	*	*	*	*
	2	Preparation for Special Environments	*	*	*	*
5	**1**	Failure Diagnosis	*	522	*	*
	2	Maintenance Instructions	201	522	*	*
	3	Inspection Standards	*	*	*	*
	4	Calibration Procedures	*	*	*	*
6		Maintenance Schedules	601	*	*	*
7	**1**	Illustrated Parts Catalogues	*	*	*	*
	2	Commercial Parts Lists	721	721	*	
	3	Complete Equipment Schedules, Production Edition	*	*	*	*
	4	Complete Equipment Schedules, Service Edition (Simple Equipment)	741	*	*	*
	5	Complete Equipment Schedules, Service Edition (Complex Equipment)	*	*	*	*
8	**1**	Modification Instructions	*	*	*	*
	2	General Instructions, Special Technical Instructions and Servicing Instructions	*	*	*	*
	3	Service Engineered Modification Instructions (RAF Only)	*	*	*	*

Associated publications

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

Reference	Title
AESP 0200-A-306-211	The REME Recovery Manual
AESP 0200-A-307-013	All Arms Equipment Recovery Manual
AESP 0200-A-602-013	Management and control of Equipment Support, Casting.
AESP 2300-A-050-013	Inspection and Certification of 'B' Vehicles.
AESP 2300-A-310-201	B Vehicle Corrosion Protection.
EMER T&M A028 Chap 157	Inspection and recovery equipment including hand operated winches, winches fitted to A, B and C vehicles, winch ropes, tow ropes, strops and round slings.
EMER T & M A028 Chap 158	Examination of Lighting Systems of Vehicles and Mobile Equipment
EMER T&M A028 Chap 650	Inspection and Testing of Lifting Equipment.
JSP 375 Vol 2	MOD Health and Safety Manual.
JSP 800 Vol 5	Defence Transport Regulations.
JSP 800 Vol 7	Joint Service Diagrams for Vehicle and Equipment Transportation.
JSP 866	Material Regulations for the Army.
LOLER 98	Lifting Operations and Lifting Equipment Regulations 1998
LSOPs	Local System Operating Procedures.

WARNINGS

7 The following WARNINGS are applicable to this equipment.

(1) PERSONNEL INJURY. ROTATING PARTS; THE ENGINE HAS EXPOSED ROTATING PARTS. DO NOT OPEN THE ENGINE COVER WHILE THE ENGINE IS RUNNING. DO NOT OPERATE THE MACHINE WITH THE COVER OPEN.

(2) PERSONNEL INJURY. CRUSH HAZARD; A MACHINE CAN SINK INTO SOFT GROUND. NEVER WORK UNDER AN UNSUPPORTED MACHINE ON SOFT GROUND.

(3) PERSONNEL INJURY. THE FOLLOWING PROCEDURE IS AN OPERATIONAL TEST WITH THE VALVE COVER REMOVED. EYE PROTECTION MUST BE WORN. TAKE CARE TO ENSURE THAT NO PARTS OF THE BODY OR LOOSE CLOTHING COME INTO CONTACT WITH ROTATING ENGINE COMPONENTS.

(4) TOXIC HAZARD. USED OIL IS CARCINOGENIC AND DIRECT SKIN CONTACT IS TO BE AVOIDED. DO NOT HANDLE USED OIL MORE THAN NECESSARY. ALWAYS USE BARRIER CREAM OR WEAR GLOVES TO PREVENT SKIN CONTACT. WASH SKIN CONTAMINATED WITH OIL THOROUGHLY IN WARM SOAPY WATER. DO NOT USE PETROL, DIESEL FUEL OR PARAFFIN TO CLEAN SKIN. IF OIL IS SWALLOWED, DO NOT INDUCE VOMITING, SEEK MEDICAL ADVICE.

(5) PERSONNEL INJURY. MACHINE LIMITS; OPERATING THE MACHINE BEYOND ITS DESIGN LIMITS CAN DAMAGE THE MACHINE, BE DANGEROUS AND CAUSE INJURIES. DO NOT OPERATE THE MACHINE OUTSIDE ITS LIMITS. DO NOT TRY TO UPGRADE THE MACHINE PERFORMANCE WITH UNAPPROVED MODIFICATIONS.

(6) FATAL INJURY. TOXIC GASES; INHALING THE MACHINE EXHAUST GASES CAN CAUSE SERIOUS INJURY OR KILL YOU. DO NOT OPERATE THE MACHINE IN ENCLOSED AREAS WITHOUT ENSURING THERE IS GOOD VENTILATION. IF POSSIBLE, FIT AN EXHAUST EXTENSION. IF YOU BEGIN TO FEEL DROWSY, STOP THE MACHINE AT ONCE. GET OUT OF THE CAB INTO FRESH AIR AND SEEK MEDICAL ADVICE IF NECESSARY.

(7) PERSONNEL INJURY. SCALDING HAZARD; DO NOT REMOVE THE ENGINE COOLANT FILLER CAP IF THE TEMPERATURE OF HEADER TANK IS ABOVE HAND HOT.

(8) PERSONNEL INJURY. EYE PROTECTION; ALWAYS WEAR SAFETY GLASSES WHEN DISMANTLING ASSEMBLIES CONTAINING COMPONENTS UNDER PRESSURE FROM SPRINGS.

(9) PERSONNEL INJURY. CRUSH HAZARD; UNLESS THE WHEELS HAVE BEEN CHOCKED A MACHINE CAN ROLL OFF A JACK. ALWAYS CHOCK THE WHEELS AT THE OPPOSITE END OF THE MACHINE THAT IS TO BE JACKED. DO NOT WORK UNDERNEATH A MACHINE SUPPORTED ONLY BY JACKS. ALWAYS SUPPORT A JACKED-UP MACHINE ON AXLE STANDS BEFORE WORKING UNDERNEATH IT.

(10) PERSONNEL INJURY. BURN HAZARD; ENSURE THAT THE ENGINE IS SAFE TO WORK ON. IF THE ENGINE HAS BEEN RUNNING, ENSURE THE ENGINE HAS COOLED SUFFICIENTLY BEFORE CARRYING OUT WORK.

(11) PERSONNEL INJURY. SET THE MASTER ISOLATOR SWITCH TO OFF (REFER TO CAT 201), TO PREVENT THE ENGINE BEING STARTED WHILE YOU ARE BENEATH THE MACHINE.

(12) PERSONNEL INJURY. CRUSH HAZARD; UNDER NO CIRCUMSTANCES MUST THE ENGINE BE RUN WITH DIFFERENTIAL LOCKED, THE TRANSMISSION IN GEAR AND ONLY ONE DRIVING WHEEL JACKED CLEAR OF THE GROUND, AS THE WHEEL ON THE GROUND WILL MOVE THE MACHINE.

(13) TOXIC HAZARD. DIESEL FUEL IS CARCINOGENIC AND DIRECT SKIN CONTACT IS TO BE AVOIDED. IF FUEL OIL COMES IN CONTACT WITH SKIN, WASH OFF WITH WATER. IF SPLASHED INTO EYES, WASH OUT THOROUGHLY WITH WATER AND SEEK MEDICAL ASSISTANCE.

(14) WEIGHT WARNING. HEAVY WEIGHT; IF THE WEIGHT OF AN ITEM EXCEEDS 15KG THERE IS A RISK OF INJURY DURING MANUAL HANDLING OPERATIONS. PRIOR TO INSTALLATION A RISK ASSESSMENT MUST BE CARRIED OUT LOCALLY TO ENSURE SAFE WORKING PRACTICES AND PROCEDURES. REFER TO DEF STAN 00-25 (PART 14) AND LOCAL INSTRUCTIONS.

(15) PERSONNEL INJURY. FIRE HAZARD; IF A FUEL LEAK IS SUSPECTED, STOP THE ENGINE IMMEDIATELY AND THOROUGHLY WIPE AWAY ANY SPILT FUEL.

(16) PERSONNEL INJURY. SET THE MASTER ISOLATOR SWITCH TO OFF (REFER TO CAT 201) BEFORE DISCONNECTING AND CONNECTING THE BATTERY. WHEN DISCONNECTING THE BATTERY, TAKE OFF THE EARTH (-) LEAD FIRST. WHEN RECONNECTING, FIT THE POSITIVE (+) LEAD FIRST.

(17) PERSONNEL INJURY. ELECTRICAL CIRCUITS; UNDERSTAND THE ELECTRICAL CIRCUIT BEFORE CONNECTING OR DISCONNECTING AN ELECTRICAL COMPONENT. A INCORRECT CONNECTION CAN CAUSE INJURY TO PERSONNEL OR DAMAGE TO THE EQUIPMENT.

(18) PERSONNEL INJURY. THE BRAKES GENERATE A HIGH TEMPERATURE WHEN OPERATING, THIS MEANS THAT THE DISC WILL BE HOT TO TOUCH, THIS CONDITION IS NORMAL.

(19) PERSONNEL INJURY. FLUID UNDER PRESSURE; FINE JETS OF HIGH PRESSURE FLUID CAN PENETRATE THE SKIN. KEEP FACE AND HANDS WELL CLEAR OF PRESSURISED FLUID. WEAR PROTECTIVE GLASSES. IF FLUID PENETRATES THE SKIN, SEEK MEDICAL AID IMMEDIATELY.

(20) PERSONNEL INJURY. CRUSH HAZARD; UNLESS THE WHEELS HAVE BEEN CHOCKED A MACHINE CAN ROLL OFF A JACK. ALWAYS CHOCK THE WHEELS AT THE OPPOSITE END OF THE MACHINE THAT IS TO BE JACKED. DO NOT WORK UNDERNEATH A MACHINE SUPPORTED ONLY BY JACKS. ALWAYS SUPPORT A JACKED-UP MACHINE ON AXLE STANDS BEFORE WORKING UNDERNEATH IT.

(21) PERSONNEL INJURY. TOXIC HAZARD; BRAKE FLUID CAN HARM YOUR SKIN. WEAR RUBBER GLOVES AND COVER CUTS OR GRAZES.

(22) PERSONNEL INJURY. FAULTY BRAKES CAN KILL. IF YOU HAVE TO TOP UP THE BRAKE RESERVOIR FREQUENTLY, GET THE BRAKE SYSTEM CHECKED BY THE REPAIR AGENCY. DO NOT USE THE MACHINE UNTIL THE FAULT HAS BEEN RECTIFIED.

(23) PERSONNEL INJURY. BEFORE PROCEEDING WITH THE BLEEDING PROCEDURE IT IS IMPORTANT TO ENSURE THAT THE PARKING BRAKE IS ENGAGED AND THAT ONE PAIR OF WHEELS IS BLOCKED ON BOTH SIDES.

(24) PERSONNEL INJURY. AFTER OPENING A BOTTLE OF BRAKE FLUID, ALWAYS DISCARD ANY UNUSED PORTION. NEVER STORE OR USE A PARTIAL BOTTLE OF BRAKE FLUID. BRAKE FLUID ABSORBS MOISTURE FROM THE AIR. THE MOISTURE MAY CAUSE BRAKE FADE OR FAILURE, AND THE POSSIBILITY OF ACCIDENT OR SEVERE INJURY. NEVER REUSE OLD BRAKE FLUID OR MIX DIFFERENT BRANDS.

CAUTIONS

8 The following CAUTIONS are applicable to this equipment.

(1) EQUIPMENT DAMAGE. Fuel System; do not allow dirt to enter the fuel system. Before disconnecting any part of the fuel system, thoroughly clean around the connection. When a fuel pipe has been disconnected always fit protective caps or plugs to prevent dirt ingress. Failure to follow these instructions will lead to dirt entering the fuel system, causing serious damage to the fuel injection equipment.

(2) ENVIRONMENTAL DAMAGE. Pollution; it is illegal to pollute drains, sewers or the ground. Used fluids and/or lubricants and contaminated materials must be disposed of in accordance with local regulations. Clean up all spilt fluids and/or lubricants.

(3) EQUIPMENT DAMAGE. Solvents; cleaning metal parts with incorrect solvents can cause corrosion. Use only recommended cleaning agents and solvents.

(4) EQUIPMENT DAMAGE. Badly fitted, damaged or rotted O-rings, seals and gaskets can cause leakages and possible accidents. O-rings, seals and gaskets are to be renewed whenever disturbed unless otherwise instructed.

(5) EQUIPMENT DAMAGE. Switching off the engine using the master isolator may result in damage to the electrical circuits. Except in an emergency, do not use the master isolator to switch off the engine.

(6) EQUIPMENT DAMAGE. DO NOT operate the starter motor for more than 10 seconds without the engine firing. If the engine fires but does not fully start, continue operating the starter motor but ensure that the cycle does not exceed 40 seconds. Let the starter motor cool for at least two minutes between starter operations.

(7) EQUIPMENT DAMAGE. The parking brake must not be used to slow the machine from travelling speed, except in an emergency; otherwise the efficiency of the brakes will be reduced. Whenever the parking brake has been used in an emergency, always renew both brake pads.

(8) EQUIPMENT DAMAGE. If the brake fluid is cloudy, then water or air has contaminated the system which may damage the components and reduce braking efficiency.

(9) EQUIPMENT DAMAGE. Brake fluid quickly ruins painted surfaces; should fluid spill wipe it up immediately.

(10) EQUIPMENT DAMAGE. Do not force the CVT on the shaft. If the CVT does not slide smoothly all the way on to the shaft, remove the key and check again. If CVT fits without the key check that the key is straight and the groove is clean and smooth.

(11) EQUIPMENT DAMAGE. Valve clearance checks and adjustments must be performed on a cold engine.

(12) EQUIPMENT DAMAGE. Only authorised replacement rope must be used.

(13) EQUIPMENT DAMAGE. The recommended radiator cap relief setting is 0.7 bar (10.1 psi). Do not operate the engine with a pressure cap of higher or lower setting installed.

ABBREVIATIONS

9 The following abbreviations are applicable to this publication:

A	Ampere
AESP	Army Equipment Support Publication
A/F	Across flats
AQL	Acceptable Quality Level
bdc	Bottom Dead Centre
bhp	Brake Horse Power
BTDC	Before Top Dead Centre
C	Celsius
Cat	Category
CB	Circuit Breaker
cm^3	cubic centimetres
Chap	Chapter
Cu	cubic
cyl	cylinder
dc	direct current
deg	degrees
DINs	Defence Instructions and Notices
DTI	Dial Test Indicator
EMER	Electrical and Mechanical Engineering Regulations
ESS	Engineer Systems Support
EVP	Engineer Vehicle & Plant
F	Fahrenheit
Fig	figure
FRACAS	Failure Reporting Analysis and Corrective Action System
ft	feet
gal/min	gallons per minute
HP	High Pressure
in.	inches
IP	International Protection
kg	kilogramme
lb	pound
lbf ft	pounds force feet
lb $in.^2$	pound per square inch
$in.^3$	cubic inch
IPT	Integrated Project Team
LH	Left Hand
l/min	litres per minute
LOLER	Lifting Operations and Lifting Equipment Regulations
m	metre
Max	maximum
Mm	micro metres
Min	minimum
mm	millimetre
Nm	Newton metre
No.	number
NSN	NATO Stock Number
Para	Paragraph
rev/min	revolutions per minute
RH	Right Hand
ROPS	Roll Over Protection Structure
SOPs	Standard Operating Procedures
STTE	Special Tools and Test Equipment
SWL	Safe Working Load
TDC	Top Dead Centre
V	Volt
W	Watt
TES-TIG	Technical Enabling Service Technical Information Group

Springer Vehicle 3/4 Front View

Springer Vehicle 3/4 Rear View

CHAPTER 1

ENGINE

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INTRODUCTION

1 This chapter covers failure diagnosis and repair instructions for the engine assembly fitted to the Springer Vehicle.

2 Make sure that the parking brake is engaged and/or the wheels are securely chocked and the transmission set to neutral (N), the engine switched OFF with the ignition key removed and the rear cargo bay lifted as detailed in Cat 201. These tasks are assumed to have been completed prior to commencing the relevant task.

3 Many of the tasks detailed in this chapter require the application of techniques and practices commonly employed in an engineering environment. These actions, together with associated checks to confirm serviceability of these items, are assumed to be within the scope of general engineering principles and not covered in depth.

Scope of repairs

4 The tasks that can be carried out at this level comprise the following:

4.1 Accelerator Cable Replacement.

4.2 Accelerator Cable Adjustment.

4.3 Exhaust Replacement.

4.4 Vacuum Pump Replacement.

4.5 Removal of the Engine.

4.6 Installation of the Engine.

4.7 Valve Clearance Adjustment.

4.8 Timing Belt Replacement.

4.9 Coolant Pump Replacement.

Special tools and test equipment

5 The Special Tools and Test Equipment (STTE) required to carry out the tasks detailed in this chapter are listed in Table 1.

TABLE 1 SPECIAL TOOLS AND TEST EQUIPMENT

Serial (1)	NSN/Part No. (2)	Designation (3)
1	7107-1460-051	Flywheel/Ring gear engine locking tool
2	7107-1460-049	Timing belt tension tool

Sealants, adhesives and lubricants

6 The sealants, adhesives and lubricants required to carry out the tasks detailed in this chapter are listed in Table 2.

TABLE 2 SEALANTS, ADHESIVES AND LUBRICANTS

Serial (1)	NSN/Part No. (2)	Designation (3)
1		RTV Silicon

FAILURE DIAGNOSIS

GENERAL

7 The following failure diagnosis tables are applicable to the engine.

TABLE 3 ENGINE WILL NOT START OR DIFFICULT TO START (NO EXHAUST SMOKE)

Serial (1)	Cause (2)	Remedy (3)
1	No fuel in the fuel tank	Check the fuel tank level using the fuel gauge. Refer to Cat 201. Replenish as required
2	Incorrect starting procedure	Check that correct starting procedure is being used. Refer to Cat 201
3	Fuel filter blocked with water or other contamination	Replace the fuel filter. Refer to Cat 201
4	Fuel is aerated	Check the fuel system for loose connections and possible leaks or any air ingress points. Rectify and bleed the fuel system. Refer to Cat 201
5	Air intake or exhaust system blocked	Check the air intake and exhaust system for any blockage or obstruction - remove as required
		Check the air filter elements for signs of blocking - replace as required. Refer to Cat 201
6	Fuel filter(s) blocked, fuel supply restricted	Check/replace the fuel filter(s). Refer to Cat 201
		Check fuel lines for restriction

TABLE 4 ENGINE WILL NOT START OR DIFFICULT TO START (EXHAUST SMOKE)

Serial (1)	Cause (2)	Remedy (3)
1	Incorrect starting procedure	Check that correct starting procedure is being used. Refer to Cat 201
2	Insufficient air intake	Check the air intake for any blockage or obstruction - remove as required
		Check the air filter elements for signs of blockage - replace as required. Refer to Cat 201
3	Fuel is aerated	Check the fuel system for loose connections and possible leaks or any air ingress points. Rectify any leaks and bleed the fuel system. Refer to Cat 201
4	Contaminated fuel or incorrect grade of fuel used	Refer to Cat 601 for recommended fuels. If the fuel is suspect verify by operating the engine using a temporary fuel tank and clean fuel
5	Fuel filter(s) blocked, fuel supply restricted	Check/replace the fuel filter(s). Refer to Cat 201
		Check fuel lines for restriction

TABLE 5 ENGINE WILL NOT CRANK OVER OR CRANKS SLOWLY

Serial (1)	Cause (2)	Remedy (3)
1	Starting electrical circuit connections loose or corroded	Clean and tighten connections. Refer to Chap 2
2	Battery charge low	Check battery voltage, charge the battery or replace as required. Ensure that the alternator is functioning correctly and charging the battery. Refer to Chap 2

TABLE 6 ENGINE STARTS AND THEN STOPS

Serial (1)	Cause (2)	Remedy (3)
1	No fuel in the fuel tank	Check the fuel gauge on the instrument panel. Refer to Cat 201. Replenish as required
2	Engine starting under load	Check for added loading from malfunctioning final drive units (refer to Chap 5), binding brakes (refer to Chap 3) or machine heavily loaded.
3	Air intake or exhaust blocked	Check the air intake for any blockage or obstruction - remove as required
		Check the air filter elements for signs of blockage - replace as required. Refer to Cat 201
		Check the exhaust for any blockage or obstruction - remove as required
4	Fuel is aerated	Check the fuel system for loose connections and possible leaks or any air ingress points. Rectify any leaks and bleed the fuel system. Refer to Cat 201
5	Fuel is waxing due to extremely cold weather	Inspect the fuel filter. Clean if required. Refer to Cat 601 for recommended fuel to use in cold weather
6	Contaminated fuel or incorrect grade of fuel used	Refer to Cat 601 for recommended fuels. If the fuel is suspect verify by operating the engine using a temporary fuel tank and clean fuel
7	Fuel filter blocked, fuel supply restricted	Check/replace the fuel filter. Refer to Cat 201
		Check fuel lines for restriction

TABLE 7 POOR RUNNING

Serial (1)	Cause (2)	Remedy (3)
1	Fuel is aerated	Check the fuel system for loose connections and possible leaks or any air ingress points. Rectify any leaks and bleed the fuel system. Refer to Cat 201
2	Fuel filter(s) blocked, fuel supply restricted	Check/replace the fuel filter(s). Refer to Cat 201
		Check fuel lines for restriction
3	Contaminated fuel or incorrect grade of fuel used	Refer to Cat 601 for recommended fuels. If the fuel is suspect verify by operating the engine using a temporary fuel tank and clean fuel

TABLE 8 EXCESSIVE ENGINE NOISE

Serial (1)	Cause (2)	Remedy (3)
1	Air intake or exhaust leaks	Refer to Table 13
2	Contaminated fuel or incorrect diesel fuel used	Refer to Cat 601 for recommended fuels. If the fuel is suspect verify by operating the engine using a temporary fuel tank and clean fuel

TABLE 9 EXCESSIVE ENGINE KNOCKING NOISE

Serial (1)	Cause (2)	Remedy (3)
1	Fuel is aerated	Check the fuel system for loose connections and possible leaks or any air ingress points. Rectify any leaks and bleed the fuel system. Refer to Cat 201
2	Contaminated fuel or incorrect grade of fuel used	Refer to Cat 601 for recommended fuels. If the fuel is suspect verify by operating the engine using a temporary fuel tank and clean fuel

TABLE 10 LOW POWER OUTPUT

Serial (1)	Cause (2)	Remedy (3)
1	No fuel in tank	Check fuel gauge on instrument panel. Refer to Cat 201. Replenish as required
2	Oil level incorrect	Check oil level. Refer to Cat 201
3	Engine overloaded	Check for binding brakes refer to Chap 3) or final drive units (refer to Chap 5).
		Check brakes. Refer to Chap 3
4	Throttle adjustment incorrectly set or binding	Inspect the throttle linkage for freedom of movement. Refer to Para 16
5	Contaminated fuel or incorrect grade of fuel used	Refer to Cat 601 for recommended fuels. If the fuel is suspect verify by operating the engine using a temporary fuel tank and clean fuel
6	Fuel filter(s) blocked, fuel supply restricted	Check/replace the fuel filter(s). Refer to Cat 201
		Check fuel lines for restriction.
7	Fuel is aerated	Check the fuel system for loose connections and possible leaks or any air ingress points. Rectify any leaks and bleed the fuel system. Refer to Cat 201
8	Air intake or exhaust blocked	Check the air intake for any blockage or obstruction - remove as required
		Check the air filter elements for signs of blockage - replace as required. Refer to Cat 201
		Check the exhaust for any blockage or obstruction - remove as required
9	Exhaust leak at manifold	Check for leaks from gaskets. Inspect manifold for cracks. Repair/replace as required.

TABLE 11 CANNOT REACH MAXIMUM REV/MIN

Serial (1)	Cause (2)	Remedy (3)
1	Engine overloaded	Check for binding brakes (refer to Chap 3) or final drive units (refer to Chap 5)
		Check brakes. Refer to Chap 3
2	Throttle adjustment incorrectly set or binding	Inspect the throttle linkage for freedom of movement. Refer to Para 16
3	Fuel is aerated	Check the fuel system for loose connections and possible leaks or any air ingress points. Rectify any leaks and bleed the fuel system. Refer to Cat 201
4	Contaminated fuel or incorrect grade of fuel used	Refer to Cat 601 for recommended fuels. If the fuel is suspect verify by operating the engine using a temporary fuel tank and clean fuel
5	Fuel filter(s) blocked, fuel supply restricted	Check/replace the fuel filter(s). Refer to Cat 201
		Check fuel lines for restriction

TABLE 12 SURGING REV/MIN

Serial (1)	Cause (2)	Remedy (3)
1	Low fuel in the fuel tank	Check the fuel gauge on the instrument panel. Refer to Cat 201. Replenish as required
2	Throttle adjustment incorrectly set or binding	Inspect the throttle linkage for freedom of movement. Refer to Para 16
3	Fuel tank cap vent / breather blocked	Inspect and rectify as required. Renew if necessary
4	Fuel filter blocked, fuel supply restricted	Check/replace the fuel filter. Refer to Cat 201
		Check fuel lines for restriction
5	Fuel is aerated	Check the fuel system for loose connections and possible leaks or any air ingress points. Rectify any leaks and bleed the fuel system. Refer to Cat 201

TABLE 13 EXCESSIVE VIBRATION

Serial (1)	Cause (2)	Remedy (3)
1	Engine misfiring	Refer to Table 6
2	Oil level overfull	Check oil level. Refer to Cat 201
2	Engine mountings damaged or loose	Check condition of the mountings.
4	Driveline components worn or unbalanced	Clean and inspect the driveline components such as driveshafts etc. If the problem persists, the component must be renewed. Refer to Chap 5

TABLE 14 EXCESSIVE EXHAUST SMOKE (BLACK)

Serial (1)	Cause (2)	Remedy (3)
1	Engine being overloaded	Use appropriate ratio for task. Refer to Cat 201
2	Air intake or exhaust blocked	Check the air intake for any blockage or obstruction - remove as required
		Check the air filter elements for signs of blockage - replace as required. Refer to Cat 201
		Check the exhaust for any blockage or obstruction - remove as required
3	Air leak at the intake manifold	Check for leaks from gaskets. Inspect manifold for cracks. Repair/replace as required.
4	Exhaust leak at manifold	Check for leaks from gaskets. Inspect manifold for cracks. Repair/replace as required.

TABLE 15 EXCESSIVE EXHAUST SMOKE (WHITE/BLUE)

Serial (1)	Cause (2)	Remedy (3)
1	Incorrect starting procedure	Check that the correct starting procedure is being used. Refer to Cat 201
2	Contaminated fuel or incorrect grade of fuel used	Refer to Cat 601 for recommended fuels. If the fuel is suspect verify by operating the engine using a temporary fuel tank and clean fuel
3	Oil level incorrect	Check oil level. Refer to Cat 201
4	Diesel fuel in sump	Check oil consistency. If oil contamination is suspected check drain, flush and fill with clean oil
5	Coolant temperature too low (over-cooling) - light blue or white smoke at high speed/light load	Refer to Chap 7

MAINTENANCE INSTRUCTIONS

WARNINGS

(1) PERSONAL INJURY. ROTATING PARTS; THE ENGINE HAS EXPOSED ROTATING PARTS. DO NOT OPEN THE ENGINE COVER WHILE THE ENGINE IS RUNNING. DO NOT OPERATE THE MACHINE WITH THE COVER OPEN.

(2) PERSONAL INJURY. CRUSH HAZARD; A MACHINE CAN SINK INTO SOFT GROUND. NEVER WORK UNDER AN UNSUPPORTED MACHINE ON SOFT GROUND.

(3) TOXIC HAZARD. USED OIL IS CARCINOGENIC AND DIRECT SKIN CONTACT IS TO BE AVOIDED. DO NOT HANDLE USED OIL MORE THAN NECESSARY. ALWAYS USE BARRIER CREAM OR WEAR GLOVES TO PREVENT SKIN CONTACT. WASH SKIN CONTAMINATED WITH OIL THOROUGHLY IN WARM SOAPY WATER. DO NOT USE PETROL, DIESEL FUEL OR PARAFFIN TO CLEAN YOUR SKIN. OIL IF SWALLOWED IS TOXIC. DO NOT INDUCE VOMITING, SEEK MEDICAL ADVICE.

(4) PERSONAL INJURY. MACHINE LIMITS; OPERATING THE MACHINE BEYOND ITS DESIGN LIMITS CAN DAMAGE THE MACHINE, BE DANGEROUS AND CAUSE INJURIES. DO NOT OPERATE THE MACHINE OUTSIDE ITS LIMITS. DO NOT TRY TO UPGRADE THE MACHINE PERFORMANCE WITH UNAPPROVED MODIFICATIONS.

(5) FATAL INJURY. TOXIC GASES; INHALING THE MACHINE EXHAUST GASES CAN CAUSE SERIOUS INJURY OR KILL YOU. DO NOT OPERATE THE MACHINE IN ENCLOSED AREAS WITHOUT ENSURING THERE IS GOOD VENTILATION. IF POSSIBLE, FIT AN EXHAUST EXTENSION. IF YOU BEGIN TO FEEL DROWSY, STOP THE MACHINE AT ONCE. GET OUT OF THE CAB INTO FRESH AIR AND SEEK MEDICAL ADVICE IF NECESSARY.

(6) PERSONAL INJURY. SCALDING HAZARD; DO NOT REMOVE THE ENGINE COOLANT FILLER CAP IF THE TEMPERATURE OF HEADER TANK IS ABOVE HAND HOT.

(7) PERSONAL INJURY. EYE PROTECTION; ALWAYS WEAR SAFETY GLASSES WHEN DISMANTLING ASSEMBLIES CONTAINING COMPONENTS UNDER PRESSURE FROM SPRINGS.

(8) PERSONAL INJURY. CRUSH HAZARD; UNLESS THE WHEELS HAVE BEEN CHOCKED A MACHINE CAN ROLL OFF A JACK. ALWAYS CHOCK THE WHEELS AT THE OPPOSITE END OF THE MACHINE THAT IS TO BE JACKED. DO NOT WORK UNDERNEATH A MACHINE SUPPORTED ONLY BY JACKS. ALWAYS SUPPORT A JACKED-UP MACHINE ON AXLE STANDS BEFORE WORKING UNDERNEATH IT.

(9) PERSONAL INJURY. BURN HAZARD; ENSURE THAT THE ENGINE IS SAFE TO WORK ON. IF THE ENGINE HAS BEEN RUNNING, ENSURE THE ENGINE HAS COOLED SUFFICIENTLY BEFORE CARRYING OUT WORK.

(10) PERSONNEL INJURY. SET THE MASTER ISOLATOR SWITCH TO OFF (REFER TO CAT 201), TO PREVENT THE ENGINE BEING STARTED WHILE YOU ARE BENEATH THE MACHINE.

(11) PERSONAL INJURY. CRUSH HAZARD; UNDER NO CIRCUMSTANCES MUST THE ENGINE BE RUN WITH DIFFERENTIAL LOCKED, THE TRANSMISSION IN GEAR AND ONLY ONE DRIVING WHEEL JACKED CLEAR OF THE GROUND, AS THE WHEEL ON THE GROUND WILL MOVE THE MACHINE.

(12) TOXIC HAZARD. DIESEL FUEL IS CARCINOGENIC AND DIRECT SKIN CONTACT IS TO BE AVOIDED. IF FUEL OIL COMES IN CONTACT WITH SKIN, WASH OFF WITH WATER. IF SPLASHED INTO EYES, WASH OUT THOROUGHLY WITH WATER AND SEEK MEDICAL ASSISTANCE.

(13) WEIGHT WARNING. HEAVY WEIGHT; IF THE WEIGHT OF AN ITEM EXCEEDS 15KG THERE IS A RISK OF INJURY DURING MANUAL HANDLING OPERATIONS. PRIOR TO INSTALLATION A RISK ASSESSMENT MUST BE CARRIED OUT LOCALLY TO ENSURE SAFE WORKING PRACTICES AND PROCEDURES. REFER TO DEF STAN 00-25 (PART 14) AND LOCAL INSTRUCTIONS.

(14) PERSONAL INJURY. FIRE HAZARD; IF A FUEL LEAK IS SUSPECTED, STOP THE ENGINE IMMEDIATELY AND THOROUGHLY WIPE AWAY ANY SPILT FUEL.

CAUTIONS

(1) EQUIPMENT DAMAGE. Fuel System; do not allow dirt to enter the fuel system. Before disconnecting any part of the fuel system, thoroughly clean around the connection. When a fuel pipe has been disconnected always fit protective caps or plugs to prevent dirt ingress. Failure to follow these instructions will lead to dirt entering the fuel system, causing serious damage to the fuel injection equipment.

(2) ENVIRONMENTAL DAMAGE. Pollution; it is illegal to pollute drains, sewers or the ground. Clean up all spilt fluids and/or lubricants. Used fluids and/or lubricants and contaminated materials must be disposed of in accordance with local regulations.

(3) EQUIPMENT DAMAGE. Solvents; cleaning metal parts with incorrect solvents can cause corrosion. Use only recommended cleaning agents and solvents.

(4) EQUIPMENT DAMAGE. Badly fitted, damaged or rotted O-rings, seals and gaskets can cause leakages and possible accidents. O-rings, seals and gaskets are to be renewed whenever disturbed unless otherwise instructed.

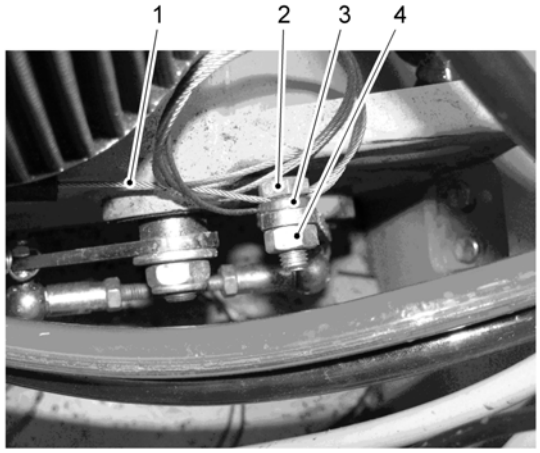
(5) EQUIPMENT DAMAGE. Switching off the engine using the master isolator may result in damage to the electrical circuits. Except in an emergency, do not use the master isolator to switch off the engine.

(6) EQUIPMENT DAMAGE. DO NOT operate the starter motor for more than 10 seconds without the engine firing. If the engine fires but does not fully start, continue operating the starter motor but ensure that the cycle does not exceed 40 seconds. Let the starter motor cool for at least two minutes between starter operations.

ACCELERATOR CABLE REPLACEMENT

Removal

8 Lift the front cargo bay (refer to Cat 201). The cable is attached to the pedal below and to the right of the air filter element.

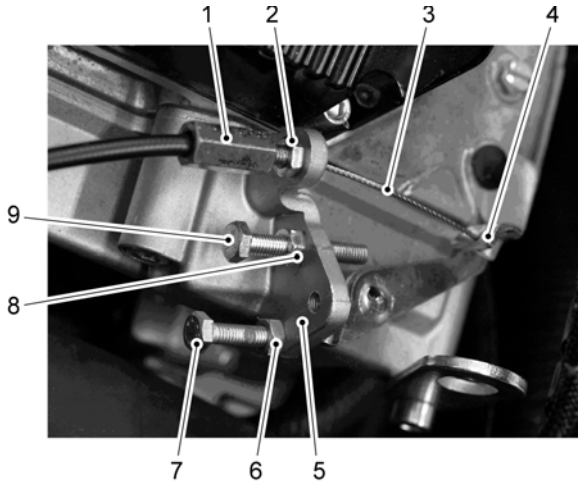


1 Accelerator cable inner
2 Bolt
3 Washer
4 Nut

Fig 1 Accelerator cable attachment (pedal)

9 Loosen nut (Fig 1 (4)). Withdraw the accelerator cable inner (1) from the bolt (2) and washer (3).

10 Withdraw the cable through the vehicle body. Note the routing of the cable for reference during replacement.



1	Cable adjuster	6	Locknut
2	Locknut	7	Stop bolt
3	Cable inner	8	Locknut
4	Throttle arm	9	Stop bolt
5	Bracket		

Fig 2 Accelerator cable attachment (engine)

11 Detach the cable inner (Fig 2 (3)) from the throttle arm (4).

12 Loosen the locknut (2) and remove the cable adjuster (1) from the bracket (5). Remove the accelerator cable from the machine.

Installation

13 Install the cable adjuster (1) to the bracket (5). Attach the cable inner (3) to the throttle arm (4).

14 Feed the accelerator cable through the vehicle body.

15 Insert the accelerator cable inner (Fig 1 (1)) through the bolt (2) and washer (3).

Adjustment

16 Adjust the accelerator cable using cable adjuster (Fig 2 (1)) to remove free play from the accelerator cable inner (3). Tighten locknut (2).

17 Pull the accelerator cable Inner (Fig 1 (1)) to remove free play and tighten nut (4).

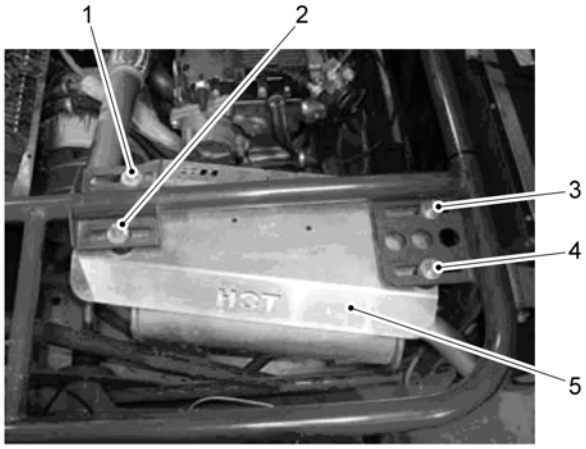
18 The engine idle speed may be adjusted by loosening locknut (Fig 2 (6)) and adjusting stop bolt (7). Make sure that locknut (6) is tightened after any adjustment.

19 The maximum throttle opening may be adjusted by loosening locknut (8) and adjusting stop bolt (9). Make sure that locknut (8) is tightened after any adjustment.

EXAUST REPLACEMENT

Removal

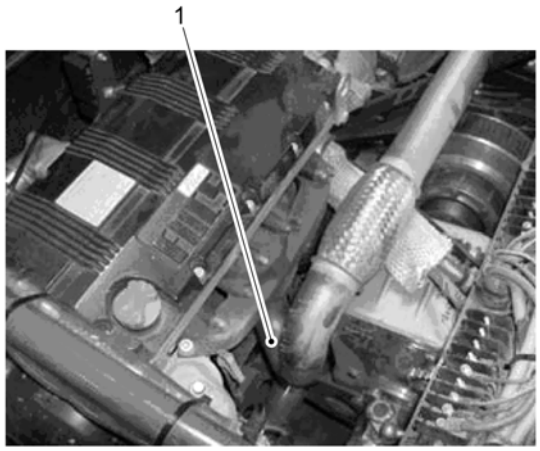
20 Loosen the four nuts (Fig 3 (1)) to (4) holding the exhaust assembly (2) to the vehicle frame. Remove three nuts, leaving one nut in place to temporarily hold the exhaust.



1 - 4 Nuts
2 Exhaust assembly

Fig 3 Exhaust assembly

21 The exhaust assembly is attached to the exhaust manifold. Remove two nuts (Fig 4 (1)) from the exhaust manifold.



1 Nuts

Fig 4 Exhaust assembly

22 Remove the remaining nut left in place during Para 20. Remove the exhaust assembly from the left side of the engine compartment (Fig 5).

Fig 5 Exhaust assembly

23 Remove the exhaust gasket from the exhaust manifold.

Installation

24 Install the exhaust assembly from the left side of the engine compartment (Fig 5).

25 Loosely install the exhaust assembly to the vehicle frame with one nut (Fig 3 (1)) to hold the exhaust in place.

26 Install a new exhaust gasket to the exhaust manifold.

27 Install the exhaust assembly to the exhaust manifold with two nuts (Fig 4 (1)). Tighten nuts securely.

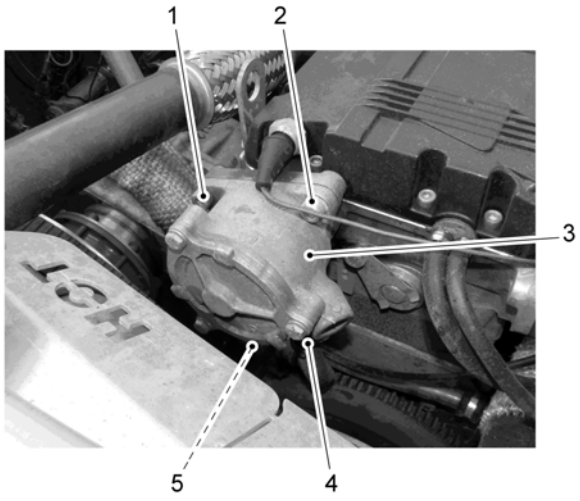
28 Install the remaining three nuts (Fig 3 (2)), (3) and (4). Tighten securely.

VACUUM PUMP REPLACEMENT

Removal

29 Disconnect the hose (Fig 6 (4)) from the vacuum pump (3).

30 Remove three allen screws (1), (2) and (5) from the vacuum pump (3).



1	Allen screw	4	Hose
2	Allen screw	5	Allen screw
3	Vacuum pump		

Fig 6 Vacuum pump

31 Remove the vacuum pump (3) from the engine.

Installation

32 Install the vacuum pump (3) to the engine with three allen screws (1), (2) and (5).

33 Connect the hose (4) to the vacuum pump (3) and tighten hose clip.

ENGINE REMOVAL

34 Remove the exhaust assembly. Refer to Para 20.

35 Remove the CVT belt. Refer to Cat 201.

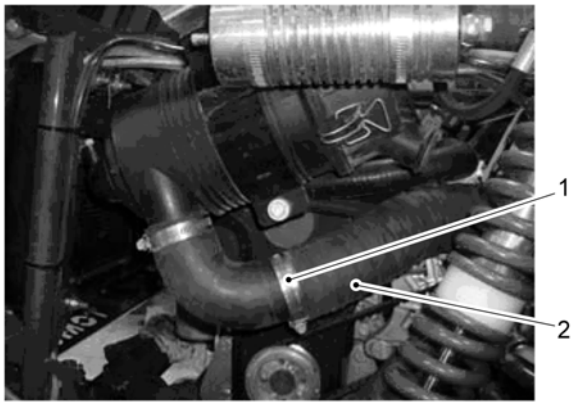
36 Loosen the hose clip (Fig 7 (1)). Disconnect the lower radiator hose (2) and drain the coolant into a suitable container. Use suitable caps and plugs to prevent the ingress of dirt into the coolant system.

1	Hose clip
2	Lower coolant hose

Fig 7 Lower coolant hose

37 Remove the engine CVT. Refer to Chap 5.

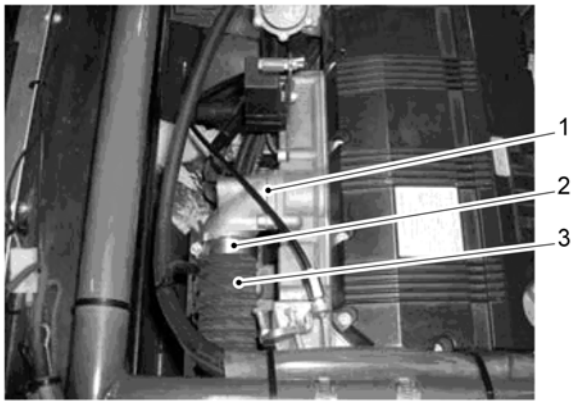
38 Loosen the hose clip (Fig 8 (1)) and disconnect the air inlet hose (2). Move the hose to one side.



1 Hose clip
2 Air inlet hose

Fig 8 Air inlet hose

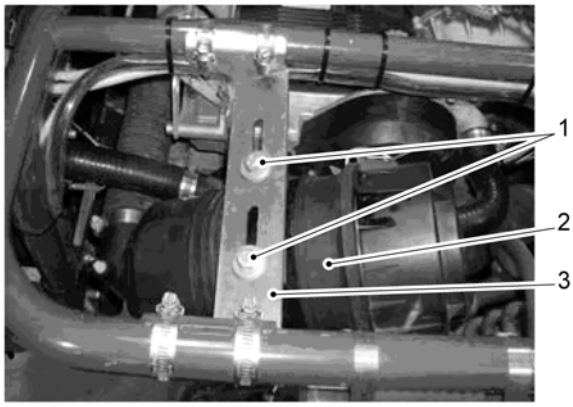
39 Loosen the hose clip (Fig 9 (2)) and disconnect the air inlet hose (3) from the engine intake manifold (1).



1 Engine intake manifold
2 Hose clip
3 Air inlet hose

Fig 9 Air inlet hose

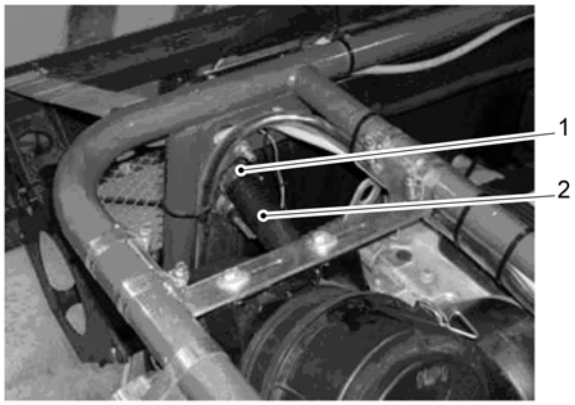
40 Remove two bolts (Fig 10 (1)) with washers and remove the air filter assembly(2) from the bracket (3).



1 Bolts
2 Air filter assembly
3 Bracket

Fig 10 Air filter assembly

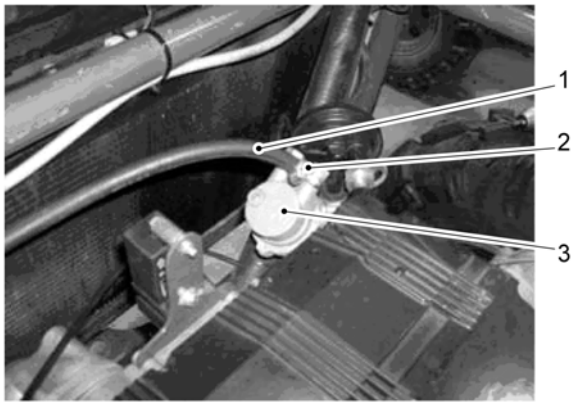
41 Loosen the hose clip (Fig 11 (1)) and disconnect the upper coolant hose (2) from the radiator. Use suitable caps and plugs to prevent the ingress of dirt into the coolant system.



1 Hose clip
2 Upper coolant hose

Fig 11 Upper coolant hose

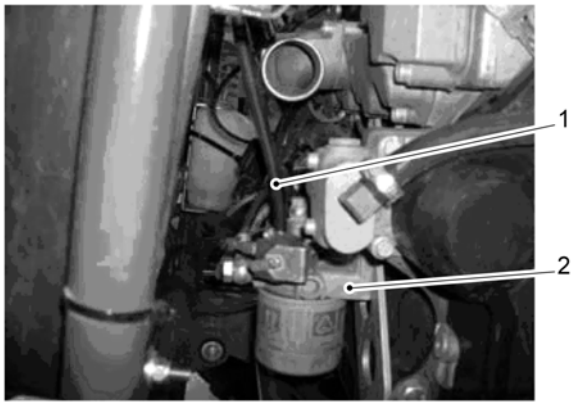
42 Loosen the hose clip (Fig 12 (2)) and disconnect the fuel supply line (1) from the engine mounted fuel pump (3). Use suitable caps and plugs to prevent the ingress of dirt into the fuel system.



1 Fuel supply line
2 Hose clip
3 Fuel pump

Fig 12 Fuel supply line

43 Loosen the hose clip and disconnect the fuel return line (Fig 13 (1)) from the engine mounted fuel filter block (2). Use suitable caps and plugs to prevent the ingress of dirt into the fuel system.



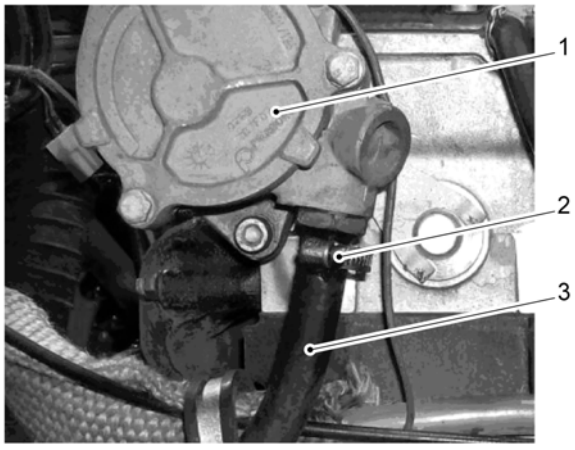
1 Fuel return line
2 Fuel filter block

Fig 13 Fuel return line

44 Label and disconnect all wires and battery cable from the rear of the engine (Fig 14).

Fig 14 Engine wiring (rear)

45 Loosen the hose clip (Fig 15 (2)) and disconnect the vacuum hose (3) from the vacuum pump body (1). Remove the P-clips securing the wires to the engine, and move the wires and vacuum hose to one side.



1 Vacuum pump body
2 Hose clip
3 Vacuum hose

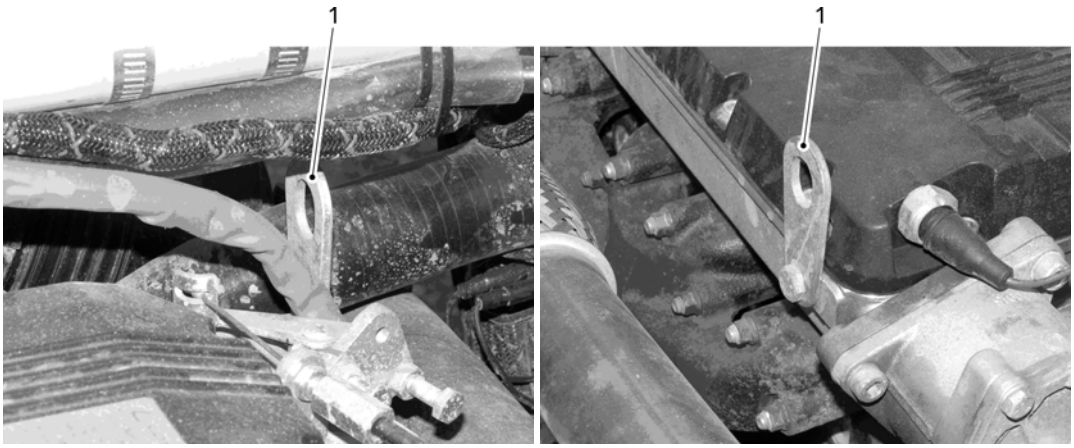
Fig 15 Vacuum hose

46 Label and disconnect all wires from the front of the engine (Fig 16).

Fig 16 Engine wiring (front)

47 Disconnect the accelerator cable. Refer to Cat 201.

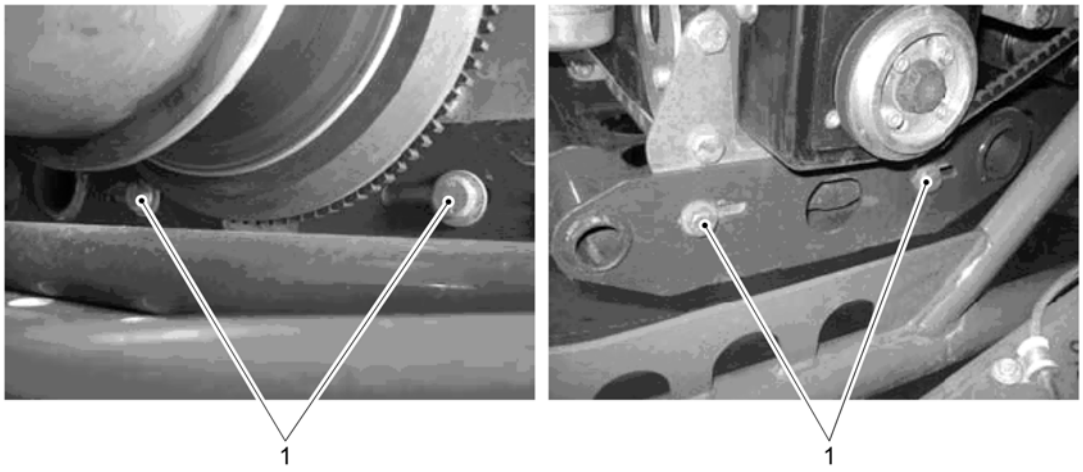
48 Attach suitable lifting equipment to the lifting eyes (Fig 17 (1)) on the engine and support the weight of the engine.



1 Lifting eyes

Fig 17 Engine lifting eyes

49 Remove four bolts (Fig 18 (1)) that secure the engine to the cradle.



1 Bolts

Fig 18 Engine mounting bolts

50 Make sure that all lines, wires and hoses are clear. With care, use suitable lifting equipment to lift the engine away from the cradle and out of the vehicle.

ENGINE INSTALLATION

51 Attach suitable lifting equipment to the lifting eyes (Fig 17 (1)) on the engine.

52 Make sure that all lines, wires and hoses are clear. With care, use suitable lifting equipment to lift the engine into position in the vehicle. Make sure the engine is fully seated in the cradle.

53 Secure the engine to the cradle with four bolts (Fig 18 (1)).

54 Connect the accelerator cable. Refer to Cat 201.

55 Connect all wires to the front of the engine (Fig 16) and remove the labels..

56 Move the wires and vacuum hose into place and secure to the engine using the P-clips. Connect the vacuum hose (Fig 15 (3)) from the vacuum pump body (1). Tighten the hose clip (2)

57 Connect all wires and battery cable to the rear of the engine (Fig 14) and remove the labels.

58 Remove all caps and plugs and connect the fuel return line (Fig 13 (1)) to the engine mounted fuel filter block (2). Tighten the hose clip.

59 Remove all caps and plugs and connect the fuel supply line (Fig 12 (1)) to the engine mounted fuel pump (3). Tighten the hose clip (2).

60 Remove all caps and plugs and connect the upper coolant hose (Fig 11 (2)) from the radiator. Tighten the hose clip (1).

61 Install the air filter assembly (Fig 10 (2)) to the bracket (3) with two bolts (1) with washers.

62 Connect the air inlet hose (Fig 9 (3)) from the engine intake manifold (1). Tighten the hose clip (2).

63 Connect the air inlet hose (Fig 8 (2)). Tighten the hose clip (1).

64 Install the engine CVT. Refer to Chap 5.

65 Remove all caps and plugs and connect the lower radiator hose (Fig 7 (2)). Tighten the hose clip (1).

66 Install the CVT belt and adjust the belt tension. Refer to Cat 201.

67 Install the exhaust assembly. Refer to Para 24.

68 Refill the coolant system. Refer to Cat 201.

69 Start the engine. Check for leaks and loose connections. Verify fluid levels before returning to service.

ENGINE TIMING REFERENCE MARKS

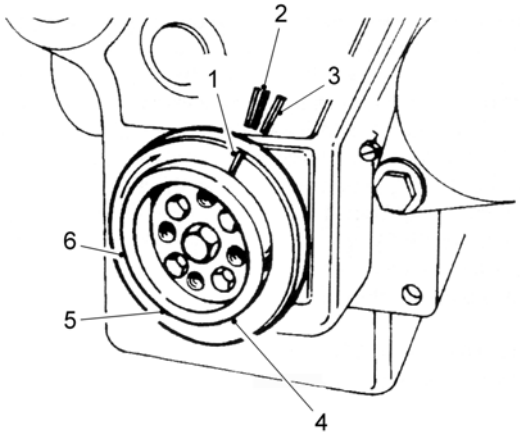


Fig 19 Engine timing reference marks

70 TDC may be determined via timing marks on the timing cover and crankshaft pulley.

71 Pulley mark (Fig 19 (1)) corresponds to the No. 1 piston (flywheel side piston). Timing cover mark (2) corresponds to approximately 11 to 13 deg BTDC. Timing cover mark (3) corresponds to TDC.

NOTE

Pulley marks (4) and (6) are not used and should be disregarded.

72 When (1) aligns with (3):

72.1 TDC No. 1 cyl. and No. 4 cyl.

73 When (5) aligns with (3):

73.1 TDC No. 2 cyl. and No. 3 cyl.

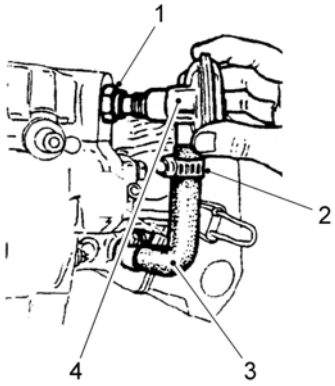
VALVE CLEARANCES

Checking and Adjustment

CAUTION

EQUIPMENT DAMAGE. Valve clearance checks and adjustments must be performed on a cold engine.

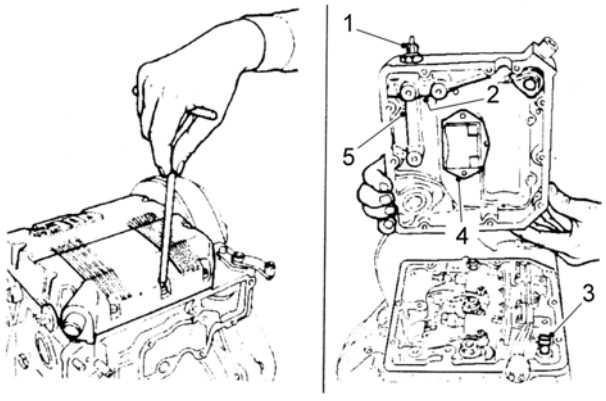
74 Loosen gland nut (Fig 20 (1)). Loosen hose clip (2) and disconnect hose (3). Remove the crankcase vacuum regulator valve (4).



1 Gland nut
2 Hose clip
3 Hose
4 Crankcase vacuum regulator valve

Fig 20 Crankcase vacuum regulator valve

75 Remove the retaining bolts and lift the valve / rocker cover assembly away from the engine (Fig 21).

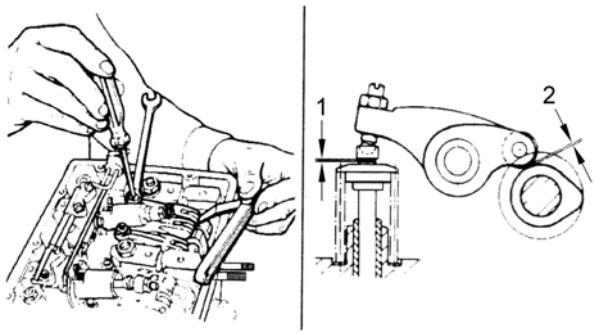


1 Oil pressure switch
2 Rocker arm lubrication port
3 Oil return tube to sump
4 Crankcase ventilation chamber
5 Camshaft lubrication port

Fig 21 Valve / rocker cover assembly

76 Rotate the engine to TDC on the compression stroke before adjusting the valves on each respective cylinder. Refer to Para 70.

77 Loosen the adjustment locknut (Fig 22) and adjust the clearance at measurement point A (1) to 0.20mm (0.008 in.), or 0.15mm (.006 in.) at measurement point B (2), for both intake and exhaust valves.



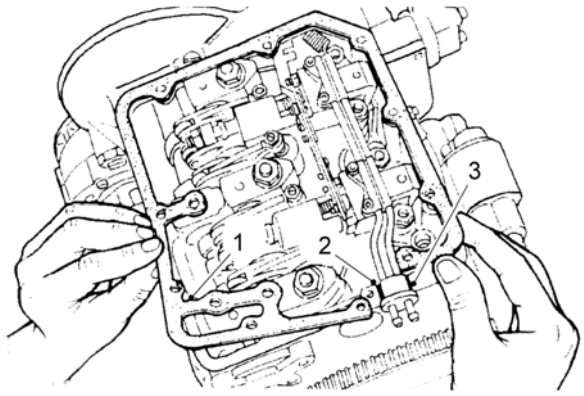
1 Measurement point A
2 Measurement point B

Fig 22 Valve clearance adjustment

78 While holding the adjustment screw with a suitable screwdriver, tighten the adjustment locknut.

79 Re-check the valve clearance and adjust as required.

80 Repeat the procedure for each cylinder.



1 Gasket
2 RTV position 1
3 RTV position 2

Fig 23 Valve / rocker cover gasket

81 After adjusting the valves, replace the valve / rocker cover using a new gasket (Fig 23 (1)) as follows:

81.1 Thoroughly clean all gasket material from the cylinder head and valve / rocker cover.

81.2 Place a small bead of RTV Silicone (Table 2, Serial 1) at positions (1) and (2).

81.3 Install the valve / rocker cover gently. Make sure that it is fully seated on the engine.

81.4 Install the valve / rocker cover bolts and torque tighten evenly to 9 Nm (6.6 lbf-ft).

81.5 Install the crankcase vacuum regulator valve (Fig 20 (4)) to the engine. Tighten gland nut (1). Connect hose (3) and tighten hose clip (2).

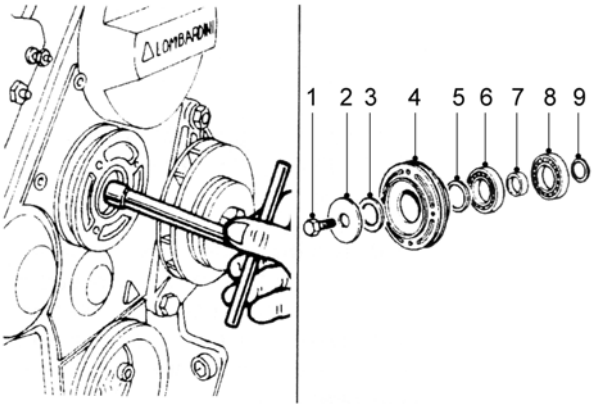
TIMING BELT REPLACEMENT

Removal

82 Remove the alternator belt. Refer to Chap 2.

83 Remove the upper pulley assembly as follows:

83.1 Remove the center bolt (Fig 24 (1)) and slide the upper pulley assembly from the engine.



1	Centre bolt	6	Bearing
2	Washer	7	Spacer
3	Spacer	8	Bearing
4	Pulley	9	Snap ring
5	Snap ring		

Fig 24 Upper pulley assembly

84 Align the crankshaft pulley timing mark (Fig 25 (2)) with the TDC mark on the crankcase (1).

85 Lock the engine to prevent rotation as follows:

85.1 Remove the starter. Refer to Chap 2.

85.2 Install the engine locking tool (Table 1, Serial 1).

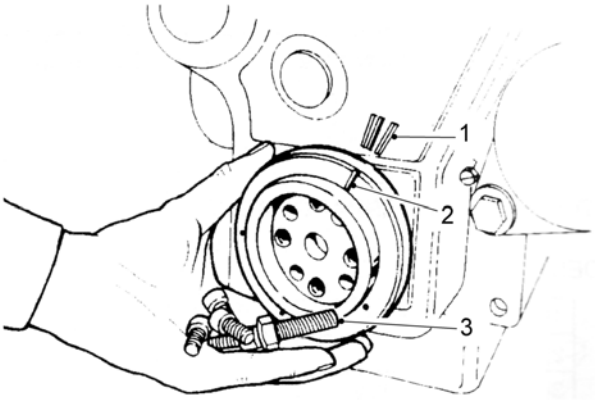
86 Remove the crankshaft pulley as follows:

86.1 Remove four outer bolts.

86.2 Remove the centre bolt (3).

NOTE

The centre bolt is left-handed.



1 TDC Mark
2 Timing mark
3 Centre bolt

Fig 25 Crankshaft pulley

86.3 Remove the crankshaft pulley from the engine.

87 Remove five allen screws securing the timing cover to the engine. Remove the timing cover from the engine (Fig 26) to gain access to the timing belt and timing pulley arrangement (Fig 27).

NOTE

The screws are of differing lengths. note the position of each screw as it is removed.

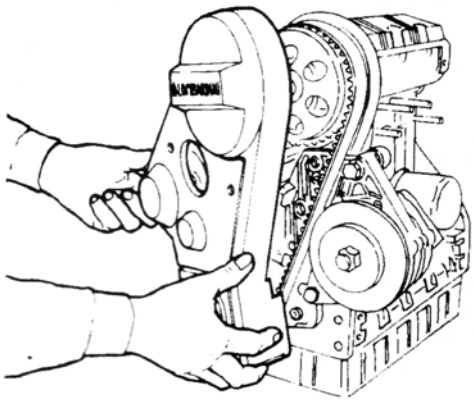
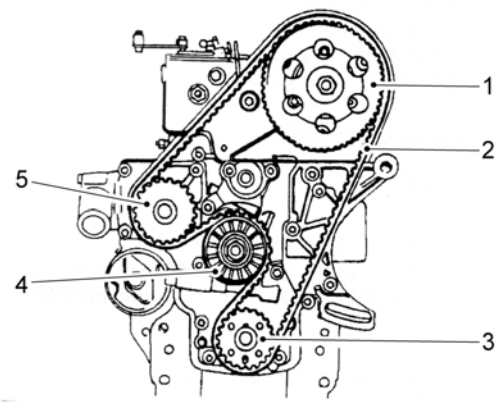


Fig 26 Timing cover



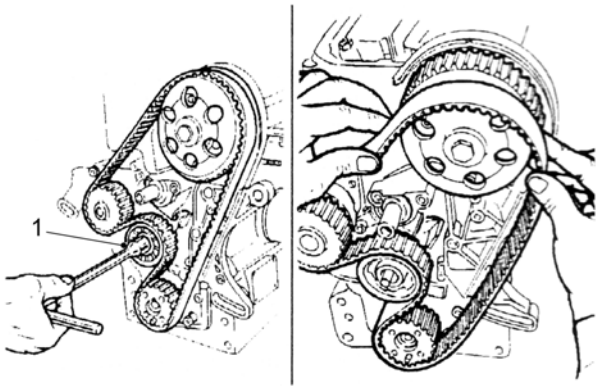
1	Camshaft pulley	4	Belt tensioner pulley
2	Timing belt	5	Coolant pump pulley
3	Crankshaft pulley		

Fig 27 Timing belt and pulley arrangement

88 Loosen nut (Fig 28 (1)). Slide the timing belt off the pulleys.

NOTE

Discard the timing belt after removal regardless of operational hours. A new belt must always be fitted after removal.

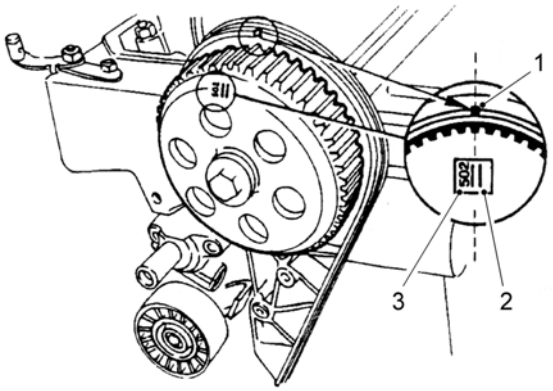


1 Nut

Fig 28 Timing belt removal

Installation

89 Align the camshaft pulley timing mark (Fig 29 (2)) with the cylinder head reference mark (1).



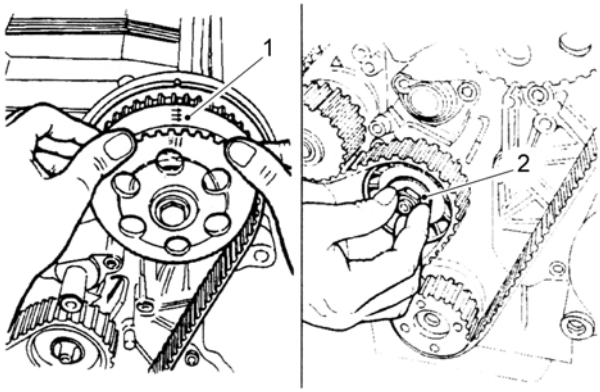
1 Cylinder head reference mark
2 Camshaft pulley timing mark
3 Not used - disregard

Fig 29 Timing pulley reference marks

90 Loosen the nut (Fig 30 (2)). Orient the new timing belt with the direction marks (1) as shown. Install the timing belt onto the engine routing the timing belt over the crankshaft pulley, over the camshaft pulley, over the coolant pump pulley and finally around the idler.

91 Push the timing belt against the back of the crankshaft pulley and align the timing belt on all other pulleys.

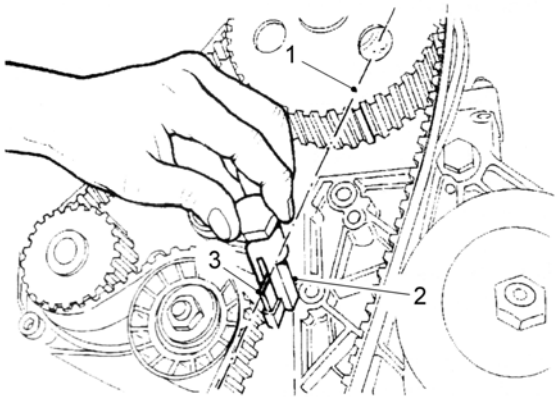
92 Pivot the timing belt tensioner pulley by hand and slightly tension the belt. Hand tighten the nut (2), then loosen the nut by 1/2 turn.



1 Timing belt directional marks
2 Nut

Fig 30 Fitting the timing belt

93 Position belt tension tool (Table 1, Serial 2) ((Fig 31 (2)) over the timing belt tensioner pulley adjustment tab (3). The tool should be oriented so that it is parallel with axis (1).

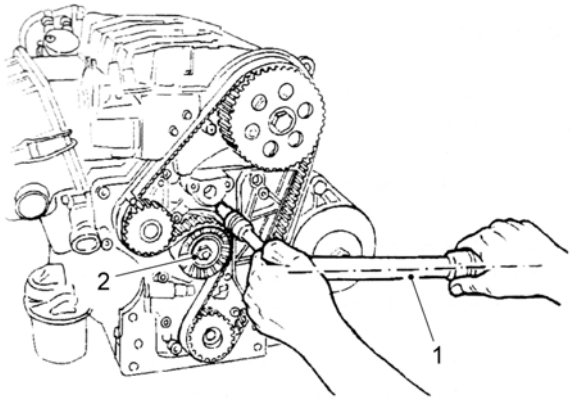


1 Axis
2 Timing belt tension tool
3 Tensioner pulley adjustment tab

Fig 31 Tensioning the timing belt

94 Position a torque wrench (Fig 32 (1)) as shown, engaging the tension tool. The torque wrench axis should be perpendicular to axis (Fig 31 (1)).

95 Tension the belt by applying a torque of 30 Nm (22.1 lbf-ft). While holding the torque at 20 Nm (14.7 lbf-ft), tighten the nut (Fig 32 (2)) securely. Torque tighten the nut (2) to 40 Nm (29.5 lbf-ft).



1 Torque wrench
2 Nut

Fig 32 Tensioning the timing belt

96 Rotate the engine in the normal direction of rotation (clockwise when viewed from timing belt end of engine) three complete revolutions to allow the timing belt to “seat” and to align perfectly.

97 Repeat Paras 95 and 96 two more times to ensure the timing belt is correctly tensioned.

98 Remove the belt tension tool (Table 1, Serial 2) ((Fig 31 (2)) from the timing belt tensioner pulley adjustment tab (3).

99 Install the timing cover to the engine with five allen screws. Torque tighten the screws to 10 Nm (7.4 lbf-ft).

NOTE

The screws are of differing lengths. replace each screw in the position noted during removal.

100 Align the pulley timing mark (Fig 25 (2)) with the timing mark on the engine (1). Install the crankshaft pulley to the engine with four outer bolts. Install the centre bolt (3) with threadlock. Torque tighten the centre bolts to 360 Nm (265.5 lbf-ft). Torque tighten the four outer bolts to 12 Nm (8.8 lbf-ft).

NOTE

The centre bolt is left-handed.

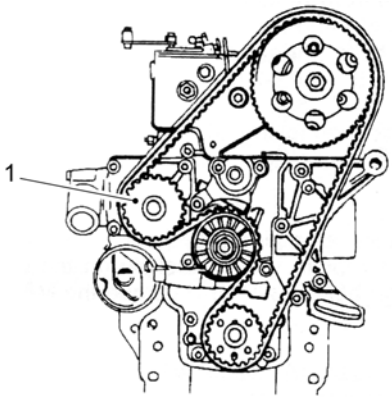
101 Install the upper pulley assembly (Fig 24) to the engine. Install the centre bolt (1) with threadlock. Torque tighten to 25 Nm (18.4 lbf-ft).

102 Install the alternator belt. Refer to Chap 2.

COOLANT PUMP REPLACEMENT

Removal

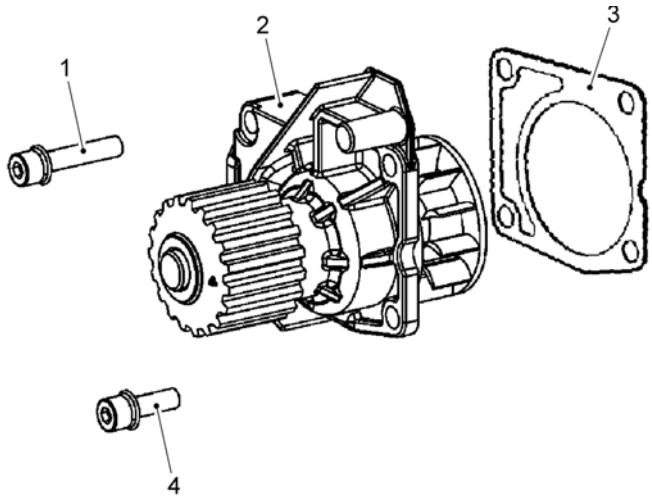
103 Remove the timing belt (refer to Para 82) in order to access the coolant pump (Fig 33 (1)).



1 Coolant pump

Fig 33 Coolant pump location

104 Remove two long screws (Fig 34 (1)) and two short screws (4). Remove the coolant pump (2) and gasket (3) from the engine.



1	Long screw	3	Gasket
2	Coolant pump	4	Short screw

Fig 34 Coolant pump

Installation

105 Install the coolant pump (2) to the engine with a new gasket (3), two short screws (4) and two long screws (1).

106 Install the timing belt. Refer to Para 89.

CHAPTER 2

ELECTRICAL SYSTEM

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7 Special tools and test equipment
8 Sealants, adhesives and lubricants
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12 Installation
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INTRODUCTION

General

1 This chapter covers the failure diagnosis and maintenance instructions for the electrical system of Springer Vehicle at level 2.

2 Before attempting any failure diagnosis or maintenance, it is essential to have a sound knowledge of the equipment, its components and how they operate. Operating information is contained in Cat 201.

3 To maintain product safety and reliability, failure diagnosis and maintenance must only be carried out by an authorised tradesman. Faults are to be reported in accordance with current service regulations.

4 Ensure the parking brake is engaged and/or the wheels are securely chocked and the transmission set to neutral (N), the engine switched OFF with the ignition key and the rear cargo bay lifted as detailed in Cat 201. Isolate the electrical system by turning the master switch to OFF. Refer to Cat 201. These tasks are assumed to have been completed prior to commencing the relevant task.

5 Many of the tasks detailed in this chapter require the application of techniques and practices commonly employed in an engineering environment. These actions, together with associated checks to confirm serviceability of these items, are assumed to be within the scope of general engineering principles and not covered in depth.

Scope of repairs

6 The tasks that can be carried out at this level comprise the following:

6.1 Alternator Belt Replacement.

6.2 Alternator Replacement.

6.3 Starter Motor Replacement.

6.4 Winch Replacement.

6.5 Light Unit Replacement.

6.6 Horn Replacement.

6.7 IR System Replacement.

Special tools and test equipment

7 There are no Special Tools and Test Equipment (STTE) required to carry out the tasks in this chapter.

Sealants, adhesives and lubricants

8 There are no sealants, adhesives or lubricants required to carry out the tasks in this chapter.

FAILURE DIAGNOSIS

9 The following failure diagnosis tables are applicable to the electrical system.

TABLE 1 SEVERAL OR ALL LIGHTS DO NOT ILLUMINATE

Serial (1)	Cause (2)	Remedy (3)
1	Discharged battery.	Check battery and charge, replace if necessary.
2	Loose or defective battery cable connection.	Inspect, clean and tighten.
3	Loose harness connection.	Check and connect securely.
4	Blown fuse or fuse link.	Inspect and replace as necessary. Refer to Cat 201. Check circuit before reconnecting power.
5	Faulty wiring.	Check lighting circuit wiring and repair or replace.
6	Defective light switch.	Check and replace.
7	Several light bulbs burnt out due to defective voltage regulation.	Check and replace voltage regulator (Alternator)

TABLE 2 INDIVIDUAL LIGHTS DO NOT ILLUMINATE

Serial (1)	Cause (2)	Remedy (3)
1	Burnt out bulb.	Replace. Refer to Cat 201
2	Defective or corroded bulb contact.	Inspect, clean or replace.
3	Blown fuse.	Inspect and replace as necessary. Refer to Cat 201. Check circuit before reconnecting power.
4	Loose or broken wires.	Inspect, secure, repair or replace wiring.
5	Poor earth.	Inspect, clean and tighten earth connection.

TABLE 3 LIGHTS BURN OUT REPEATEDLY

Serial (1)	Cause (2)	Remedy (3)
1	Faulty voltage regulator.	Check and replace voltage regulator (Alternator)

TABLE 4 INOPERATIVE OR ERRATIC METERS

Serial (1)	Cause (2)	Remedy (3)
1	Loose or broken wiring.	Inspect circuit, tighten connections or replace wiring.
2	Defective meters.	Inspect and replace.
3	Defective sensors.	Check and replace.
4	Defective voltage regulator.	Check and replace voltage regulator (Alternator).

TABLE 5 HORN DOES NOT OPERATE

Serial (1)	Cause (2)	Remedy (3)
1	Blown fuse.	Inspect and replace as necessary. Refer to Cat 201. Check circuit before reconnecting power.
2	Loose or broken wiring or connections.	Inspect circuit, tighten connections or replace wiring.
3	Defective horn switch.	Check and replace.
4	Defective horn.	Check and replace.

TABLE 6 ALL GLOW PLUGS DO NOT HEAT RED

Serial (1)	Cause (2)	Remedy (3)
1	Discharged battery.	Check battery and charge, replace if necessary.
2	Loose or defective battery cable connection.	Inspect, clean and tighten connection.
3	Loose wiring harness connection.	Check and connect securely.
4	Blown fuse.	Inspect and replace as necessary. Refer to Cat 201. Check circuit before reconnecting power.
5	Faulty wiring.	Check glow plug circuit wiring and repair or replace.
6	Defective main switch.	Check and replace.

TABLE 7 INDIVIDUAL GLOW PLUG DOES NOT GLOW

Serial (1)	Cause (2)	Remedy (3)
1	Defective glow plug.	Check and replace. Refer to Para 69
2	Defective or corroded glow plug contacts.	Inspect, clean or replace.
3	Loose or broken wires.	Inspect, secure, repair or replace wiring.

TABLE 8 GLOW PLUG MONITOR LIGHT DOES NOT ILLUMINATE

Serial (1)	Cause (2)	Remedy (3)
1	Defective glow timer.	Check and replace. Refer to Para 65
2	Defective warning light.	Check and replace.

TABLE 9 STARTER MOTOR DOES NOT SPIN

Serial (1)	Cause (2)	Remedy (3)
1	Discharged battery.	Check battery and charge, replace if necessary.
2	Defective starter switch.	Check and replace.
3	Loose starter motor or battery connection.	Check, clean and tighten connection.
4	Faulty starter motor.	Check and replace. Refer to Para 23.
5	Blown fuse.	Inspect and replace as necessary. Refer to Cat 201. Check circuit before reconnecting power.

TABLE 10 ENGINE CRANKS SLOWLY

Serial (1)	Cause (2)	Remedy (3)
1	Discharged battery.	Check battery and charge, replace if necessary.
2	Excessive resistance in starter circuit.	Check circuit connections and repair or replace faulty wiring.
3	Faulty starter motor.	Check and replace. Refer to Para 25.
4	Tight engine.	Check and repair.

TABLE 11 ENGINE CRANKS BUT FAILS TO START

Serial (1)	Cause (2)	Remedy (3)
1	Blown fuse	Inspect and replace as necessary. Refer to Cat 201. Check circuit before reconnecting power.

TABLE 12 BATTERY IS LOW IN CHARGE OR DISCHARGE

Serial (1)	Cause (2)	Remedy (3)
1	Loose or worn alternator drive belt.	Check, adjust tension (refer to Cat 201) or replace.
2	Defective battery: it will not accept or hold a charge. Electrolyte level Low.	Check condition of battery and replace if necessary.
3	Excessive resistance due to loose charging system connections.	Check, clean and tighten circuit connections.
4	Faulty alternator.	Check, and repair or replace. Refer to Para 14.
5	Blown fuse.	Inspect and replace. Check circuit before re-connecting power.

TABLE 13 BATTERY IS CHARGING AT A HIGH RATE (BATTERY OVERHEATING)

Serial (1)	Cause (2)	Remedy (3)
1	Defective battery.	Check condition of battery and replace if necessary.
2	Faulty alternator.	Check, and repair or replace. Refer to Para 14.

TABLE 14 NO OUTPUT FROM ALTERNATOR

Serial (1)	Cause (2)	Remedy (3)
1	Alternator drive belt is broken.	Replace and tension correctly. Refer to Para 10.
2	Loose connection or broken cable in charge system.	Inspect system, tighten connections and repair or replace faulty wiring.
3	Faulty voltage regulator.	Check and replace.
4	Faulty alternator.	Check, and repair or replace. Refer to Para 14.

TABLE 15 INTERMITTENT OR LOW ALTERNATOR OUTPUT

Serial (1)	Cause (2)	Remedy (3)
1	Faulty external charging circuit connections.	Inspect system, clean and tighten connections.
2	Defective monitor and warning light.	Check and replace.
3	Faulty rectifier.	Check and replace.

TABLE 16 CHARGE WARNING LIGHT DIM

Serial (1)	Cause (2)	Remedy (3)
1	Alternator drive belt slipping.	Check and adjust tension (refer to Cat 201) or replace.
2	Loose connection or broken cable in charge system.	Inspect system, tighten connections and repair or replace faulty wiring.
3	Faulty alternator.	Check, and repair or replace. Refer to Para 14.

TABLE 17 CHARGE WARNING LIGHT IS NORMAL BUT BATTERY IS DISCHARGED

Serial (1)	Cause (2)	Remedy (3)
1	Faulty voltage regulator.	Check and replace.
2	Faulty rectifier.	Check and replace.

TABLE 18 CHARGE WARNING LIGHT IS LIT DURING OPERATION

Serial (1)	Cause (2)	Remedy (3)
1	Loose or worn alternator drive belt.	Check and adjust tension Refer to Cat 201) or replace.
2	Faulty rectifier.	Check and replace.
3	Blown fuse.	Inspect and replace as necessary. Refer to Cat 201. Check circuit before reconnecting power.

TABLE 19 CHARGE WARNING LIGHT FLASHES INTERMITTENTLY

Serial (1)	Cause (2)	Remedy (3)
1	Faulty external charging circuit connections.	Inspect system, clean and tighten connections. Repair or replace faulty wiring if necessary.

TABLE 20 WINCH IS INOPERATIVE OR DOES NOT OPERATE CORRECTLY

Serial (1)	Symptom (2)	Possible Cause (3)	Remedy (4)
1	Motor does not turn on	Switch Assembly not connected properly	Insert Switch Assembly all the way into the connector.
		Loose battery cable connections	Tighten nuts on all cable connections.
		Defective Switch Assembly	Replace Switch Assembly.
		Defective motor	Check for voltage at armature port with Switch pressed. If voltage is present, replace unit.
		Water has entered motor	Allow to drain and dry. Run in short bursts without load until completely dry.
2	Motor runs but cable drum does not turn	Clutch not engaged	Turn clutch to the “In” position. If problem persists refer unit to REME maintenance personnel.
3	Motor runs slowly or without normal power	Insufficient current or voltage	-Battery weak, recharge.
			Run winch with vehicle motor running.
			Loose or corroded battery cable connections. Clean, tighten, or replace.
4	Motor overheating	Winch running time too long	Allow winch to cool down periodically
5	Motor runs in one direction only	Defective Switch Assembly	Loose or corroded battery cable or motor cable connections. Clean and tighten.
			Repair or replace switch assembly.

WARNINGS

(1) PERSONAL INJURY. ROTATING PARTS; THE ENGINE HAS EXPOSED ROTATING PARTS. DO NOT OPEN THE ENGINE COVER WHILE THE ENGINE IS RUNNING. DO NOT OPERATE THE MACHINE WITH THE COVER OPEN.

(2) PERSONAL INJURY. CRUSH HAZARD; A MACHINE CAN SINK INTO SOFT GROUND. NEVER WORK UNDER AN UNSUPPORTED MACHINE ON SOFT GROUND.

(3) PERSONAL INJURY. CRUSH HAZARD; UNLESS THE WHEELS HAVE BEEN CHOCKED A MACHINE CAN ROLL OFF A JACK. ALWAYS CHOCK THE WHEELS AT THE OPPOSITE END OF THE MACHINE THAT IS TO BE JACKED. DO NOT WORK UNDERNEATH A MACHINE SUPPORTED ONLY BY JACKS. ALWAYS SUPPORT A JACKED-UP MACHINE ON AXLE STANDS BEFORE WORKING UNDERNEATH IT.

(4) PERSONAL INJURY. BURN HAZARD; ENSURE THAT THE ENGINE IS SAFE TO WORK ON. IF THE ENGINE HAS BEEN RUNNING, ENSURE THE ENGINE HAS COOLED SUFFICIENTLY BEFORE CARRYING OUT WORK.

(5) PERSONAL INJURY. SET THE MASTER ISOLATOR SWITCH TO OFF (REFER TO CAT 201) BEFORE DISCONNECTING AND CONNECTING THE BATTERY. WHEN DISCONNECTING THE BATTERY, TAKE OFF THE EARTH (-) LEAD FIRST. WHEN RECONNECTING, FIT THE POSITIVE (+) LEAD FIRST.

(6) PERSONAL INJURY. ELECTRICAL CIRCUITS; UNDERSTAND THE ELECTRICAL CIRCUIT BEFORE CONNECTING OR DISCONNECTING AN ELECTRICAL COMPONENT. A INCORRECT CONNECTION CAN CAUSE INJURY TO PERSONNEL OR DAMAGE TO THE EQUIPMENT.

(7) WEIGHT WARNING. HEAVY WEIGHT; IF THE WEIGHT OF AN ITEM EXCEEDS 15KG THERE IS A RISK OF INJURY DURING MANUAL HANDLING OPERATIONS. PRIOR TO INSTALLATION A RISK ASSESSMENT MUST BE CARRIED OUT LOCALLY TO ENSURE SAFE WORKING PRACTICES AND PROCEDURES. REFER TO DEF STAN 00-25 (PART 14) AND LOCAL INSTRUCTIONS.

CAUTIONS

(1) EQUIPMENT DAMAGE. Solvents; cleaning metal parts with incorrect solvents can cause corrosion. Use only recommended cleaning agents and solvents.

ALTERNATOR BELT REPLACEMENT

Removal

10 Loosen the two alternator mounting bolts (Fig 1).

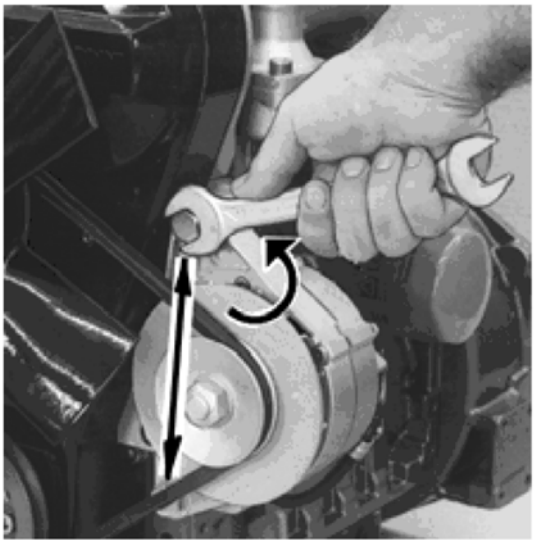


Fig 1 Alternator mounting bolts

11 Remove the alternator belt (Fig 2).

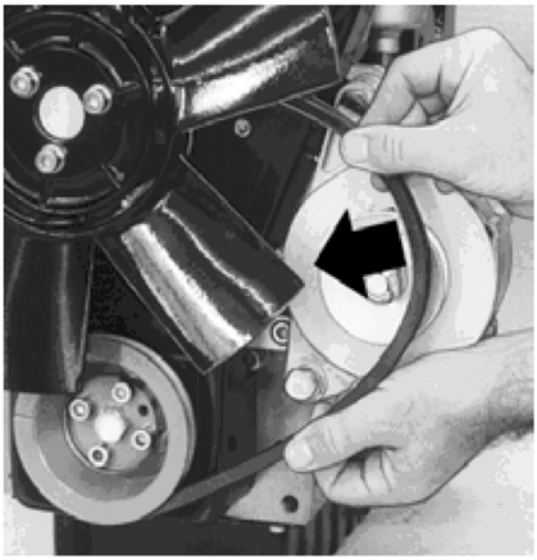


Fig 2 Alternator Belt

Installation

12 Install a new belt. Make sure the new belt is fully seated around the pulleys (Fig 2).

13 Tension the alternator belt. Refer to Cat 201.

ALTERNATOR REPLACEMENT

Removal

14 Loosen the two alternator mounting bolts (Fig 1).

15 Label and disconnect the electrical connectors (not shown) from the alternator.

16 Remove the alternator belt (Fig 2).

17 Remove the two alternator mounting bolts.

18 Remove the alternator from the engine.

Installation

19 Position the alternator on the engine.

20 Install the two alternator mounting bolts (Fig 1).

21 Connect the electrical connectors (not shown) to the alternator and remove the labels.

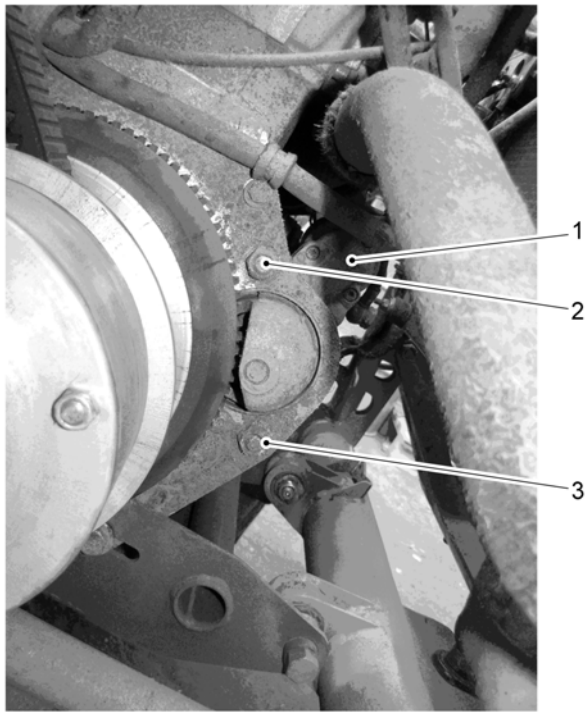
22 Inspect the belt for damage, and replace if necessary.

23 Install the belt. Make sure the belt is fully seated around the pulleys (Fig 2).

24 Tension the alternator belt. Refer to Cat 201.

STARTER MOTOR REPLACEMENT

Removal



1 Solenoid
2 Bolt
3 Bolt

Fig 3 Starter motor

25 Label and disconnect two electrical connectors (not shown) from the starter solenoid (Fig 3 (1)).

26 Remove two bolts (2) and (3). Remove the starter motor from the engine.

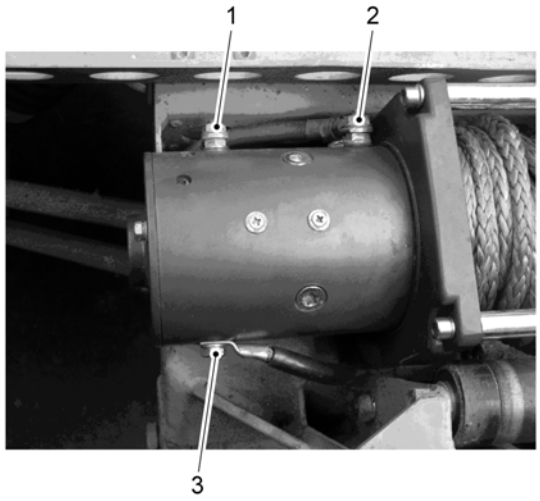
Installation

27 Install the starter motor to the engine with two bolts (2) and (3).

28 Connect two electrical connectors (not shown) to the starter solenoid (1) and remove the labels.

WINCH REPLACEMENT

Removal

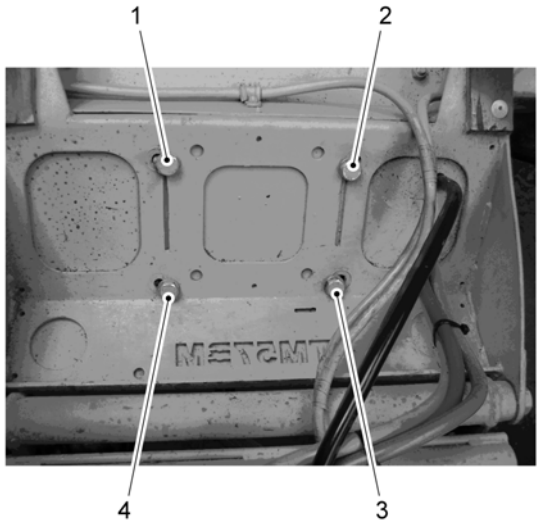


1 Electrical connector
2 Electrical connector
3 Electrical connector

Fig 4 Winch electrical connections

29 Label and disconnect three electrical connectors (Fig 4 (1)), (2) and (3) from the winch.

30 Lift the front cargo bay. Refer to Cat 201.



1 - 4 Mounting bolt

Fig 5 Winch mounting bolts

31 Support the winch using suitable equipment to prevent it falling when the bolts are removed.

32 Remove four bolts (Fig 5 (1)) to (4). Remove the winch from the vehicle.

Installation

33 Support the winch using suitable equipment.

34 Install the winch to the vehicle with four bolts (Fig 5 (1)) to (4).

35 Close and secure the front cargo bay. Refer to Cat 201.

36 Connect three electrical connectors (Fig 4 (1)), (2) and (3) to the winch and remove the labels.

Solenoid Replacement

37 Open the front cargo bay. Refer to Cat 201.

38 Label and disconnect all electrical connectors from the solenoid (Fig 6 (1)).

1 Solenoid

Fig 6 Winch solenoid

39 Remove the solenoid (1) from the vehicle.

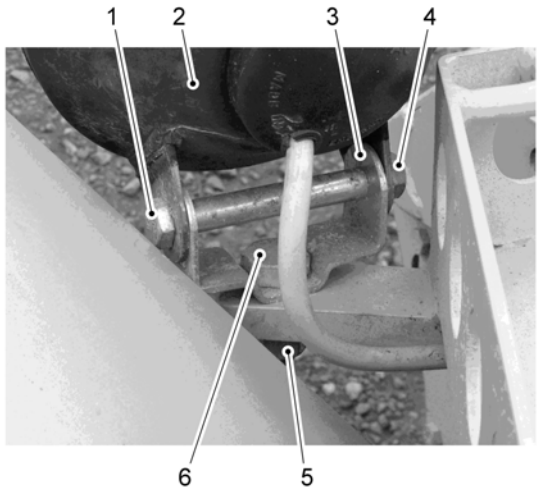
40 Install the replacement solenoid to the vehicle.

41 Connect the electrical connectors to the solenoid and remove the labels.

42 Close and secure the front cargo bay. Refer to Cat 201.

LIGHT UNIT REPLACEMENT

Headlight



1	Mounting bolt	4	Nut
2	Headlight unit	5	Nut
3	Bracket	6	Bolt

Fig 7 Headlight

Removal

43 Disconnect the cable.

44 Remove mounting bolt (Fig 7 (1)) and nut (4). Remove the headlight unit (2) from the bracket (3).

45 Remove bolt (6) and nut (5). Remove the bracket (3) from the vehicle.

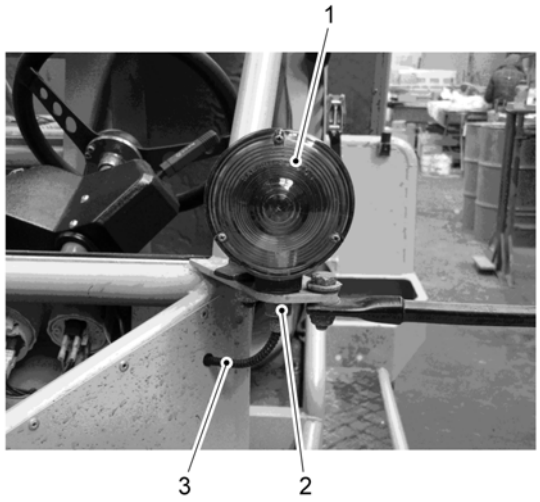
Installation

46 Install the bracket (3) to the vehicle with bolt (6) and nut (5).

47 Install the headlight unit (2) to the bracket (3) with mounting bolt (1) and nut (4).

48 Connect the cable.

Direction Indicator



1 Light unit
2 Nut
3 Cable

Fig 8 Direction indicator

Removal

49 Disconnect the cable (Fig 8 (3)).

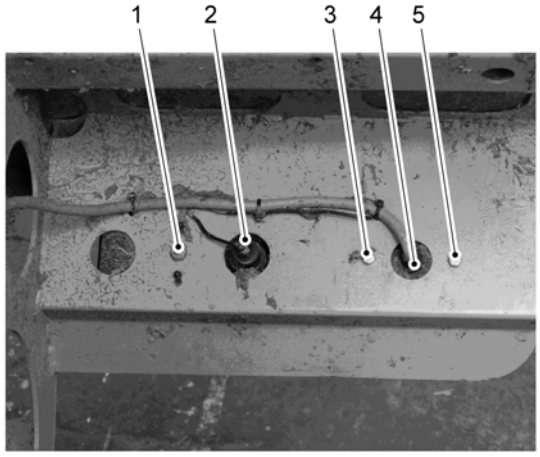
50 Remove the nut (2). Remove the light unit (1) from the vehicle.

Installation

51 Install the light unit (1) to the vehicle with nut (2).

52 Connect the cable (3).

Rear Lights



1	Nut	4	Electrical connector
2	Electrical connector	5	Bolt
3	Bolt		

Fig 9 Rear lights

Removal

53 Open the rear cargo bay. Refer to Cat 201.

54 To remove the single white light, proceed as follows:

54.1 Disconnect the electrical connector (Fig 9 (2)).

54.2 Remove the nut (1). Remove the light unit from the vehicle.

55 To remove the light cluster, proceed as follows:

55.1 Disconnect the electrical connector (4).

55.2 Remove two bolts (3) and (5). Remove the light cluster from the vehicle.

Installation

56 To install the single white light, proceed as follows:

56.1 Install the light unit to the vehicle with nut (1).

56.2 Connect the electrical connector (2).

57 To install the light cluster, proceed as follows:

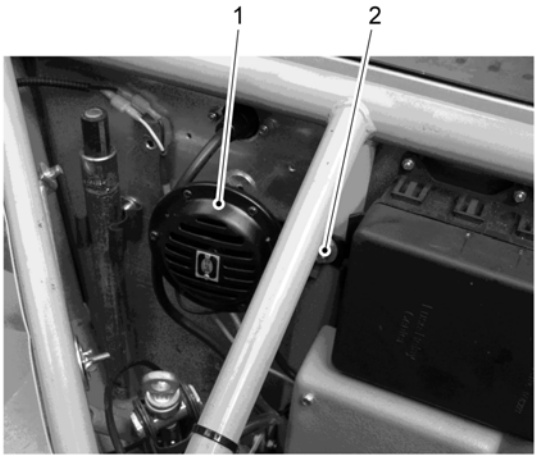
57.1 Install the light cluster to the vehicle with two bolts (3) and (5).

57.2 Connect the electrical connector (4).

58 Close and secure the rear cargo bay. Refer to Cat 201.

HORN REPLACEMENT

Removal



1 Horn
2 Bolt

Fig 10 Horn

59 Open the front cargo bay. Refer to Cat 201.

60 Remove bolt (Fig 10 (2)) and washer. Detach the horn (1) from the vehicle body.

61 Label and disconnect two electrical connections (not shown) from rear of horn (1).

Installation

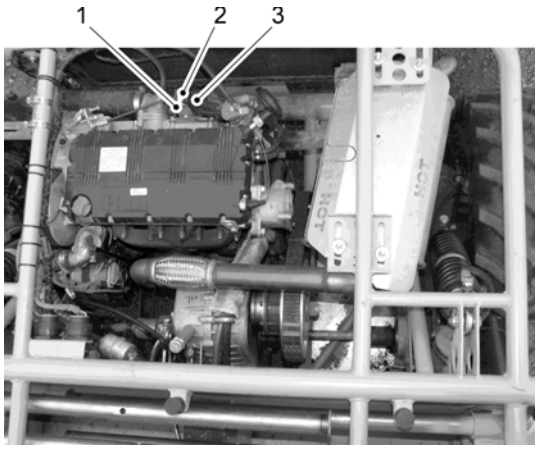
62 Connect two electrical connections (not shown) to rear of horn (1) and remove the labels.

63 Install the horn (1) to the vehicle body with bolt (2) and washer.

64 Close and secure the front cargo bay. Refer to Cat 201.

GLOWPLUG TIMER RELAY REPLACEMENT

Removal



1 Nut
2 Allen screw
3 Relay

Fig 11 Glowplug timer relay

65 Remove the nut (Fig 11 (1)) and allen screw (2) from the bracket.

66 Remove the relay (3) from the socket.

Installation

67 Install the relay (3) in the socket. Make sure the relay is fully seated in the socket.

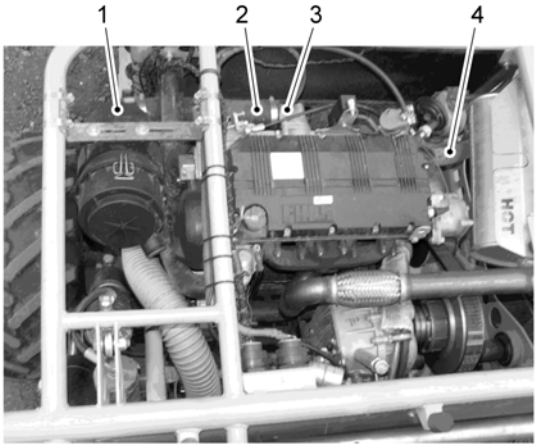
68 Secure the relay to the bracket with the allen screw (2) and nut (1). Tighten securely.

GLOWPLUG REPLACEMENT

Removal

69 The glowplugs are located in the engine block under the inlet manifold. There is one glowplug per cylinder.

70 To gain access to the glow plugs, proceed as follows:



1 Air filter
2 Air pipe
3 Inlet manifold
4 Coolant hose

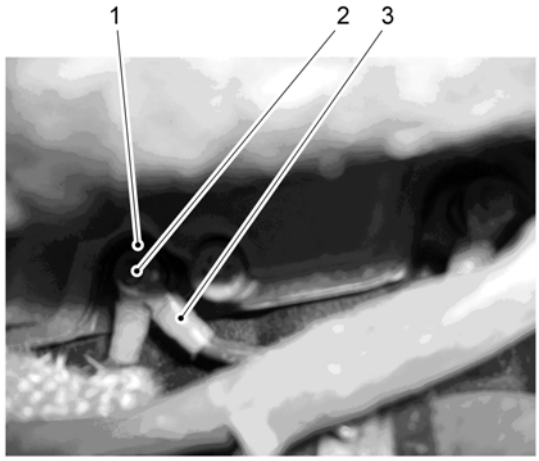
Fig 12 Glowplug removal

70.1 Remove the air pipe (Fig 12 (2)) from the inlet manifold (3) to the air filter (1).

70.2 Drain the coolant. Refer to Cat 201.

70.3 Remove the bottom water hose (4).

71 To remove the glowplugs, proceed as follows:



1 Glowplug
2 Nut
3 Wire

Fig 13 Glowplug

71.1 Remove the nut (Fig 13 (2)).

71.2 Remove the wire (3).

71.3 Remove the glowplug (1).

Installation

72 Install the glowplug (1) to the engine block. Torque tighten to 25 Nm (18.4 lbf-ft).

73 Install the wire (3) with nut (2). Torque tighten to 5 Nm (3.7 lbf-ft).

74 Install the bottom water hose (Fig 12 (4)).

75 Install the air pipe (2) from the inlet manifold (3) to the air filter (1).

76 Refill with fresh coolant. Refer to Cat 201.

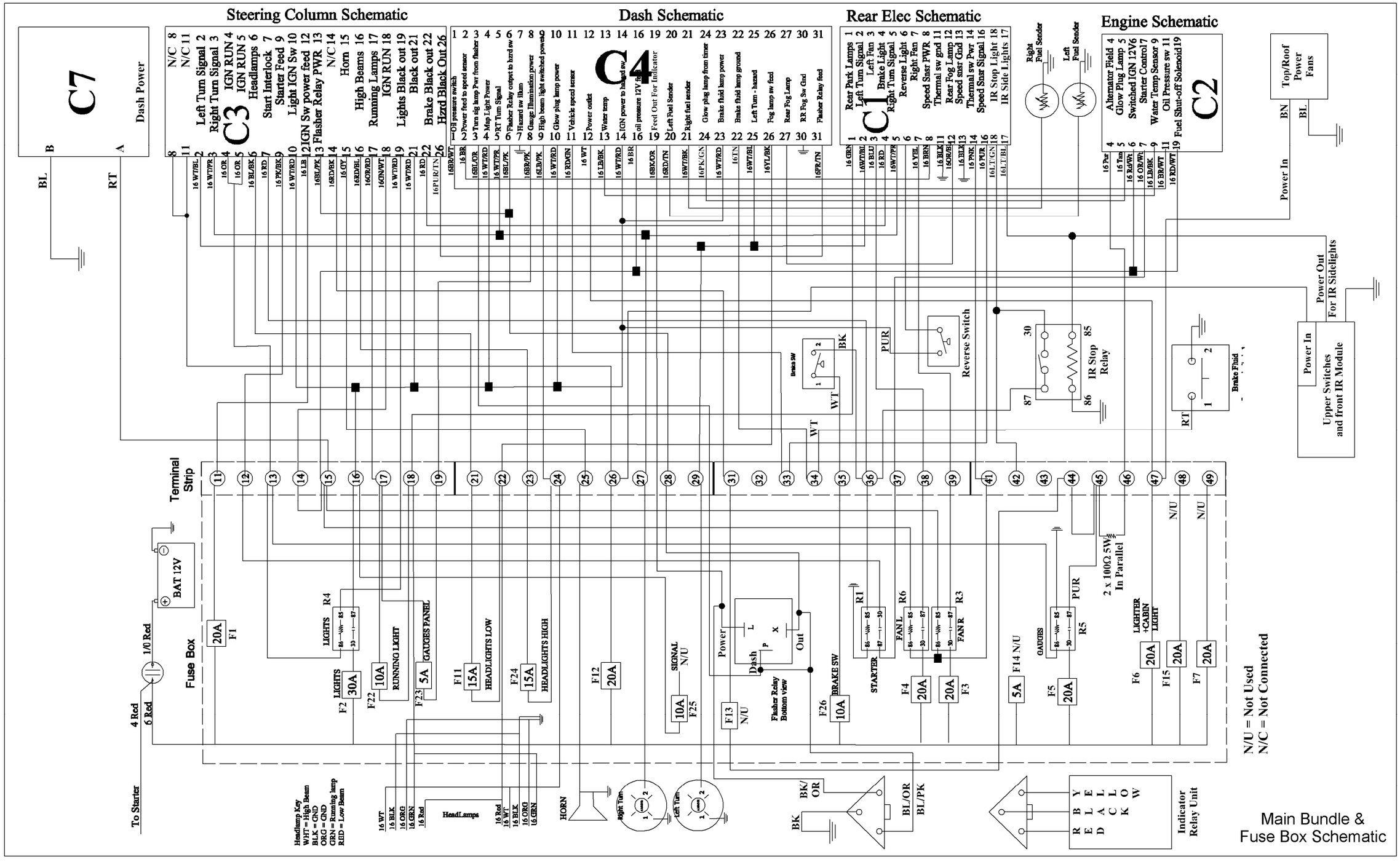


Fig 14 Main bundle and fuse box schematic

Steering Column Schematic

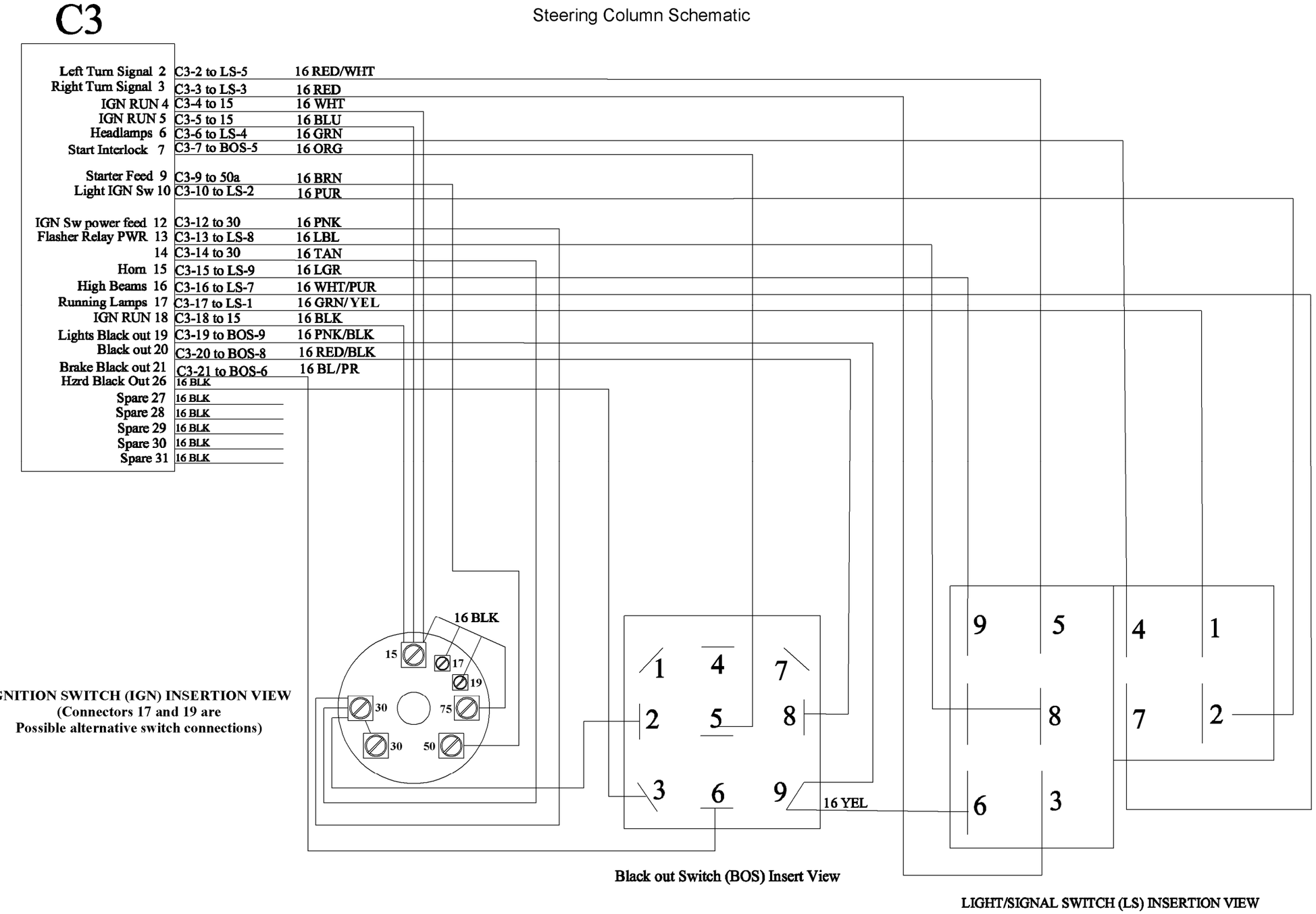


Fig 15 Steering column schematic

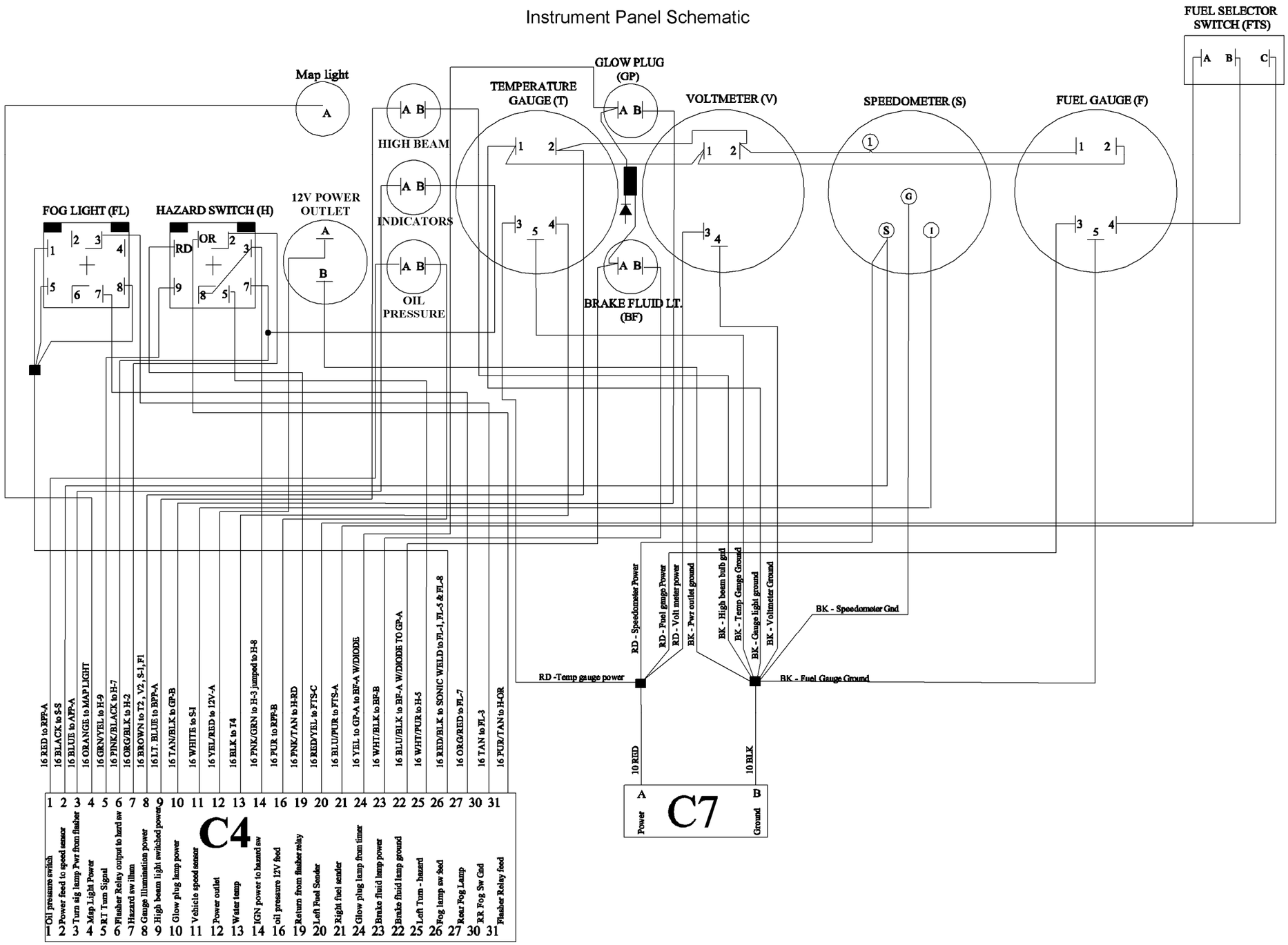


Fig 16 Instrument panel schematic

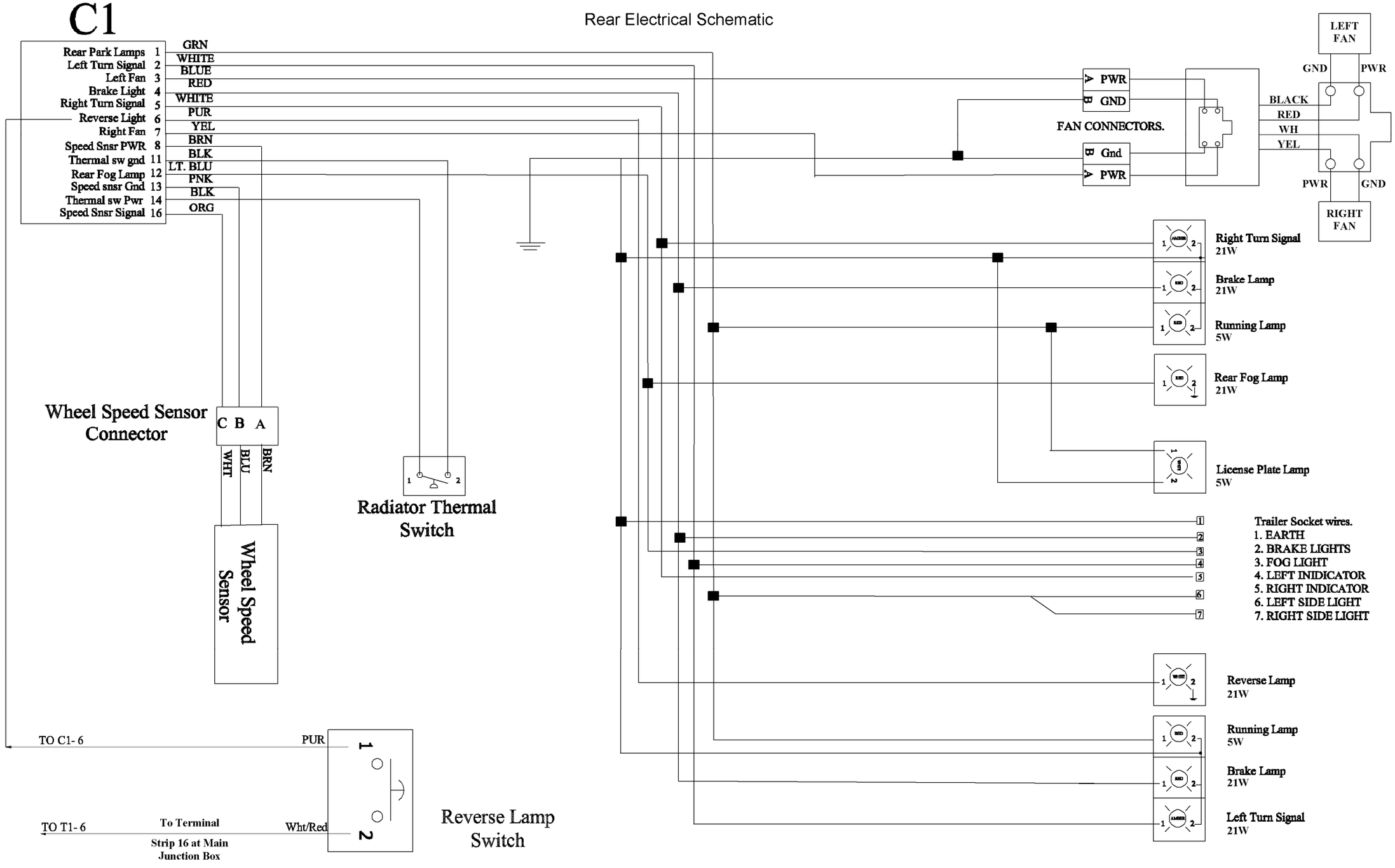


Fig 17 Rear electrical schematic

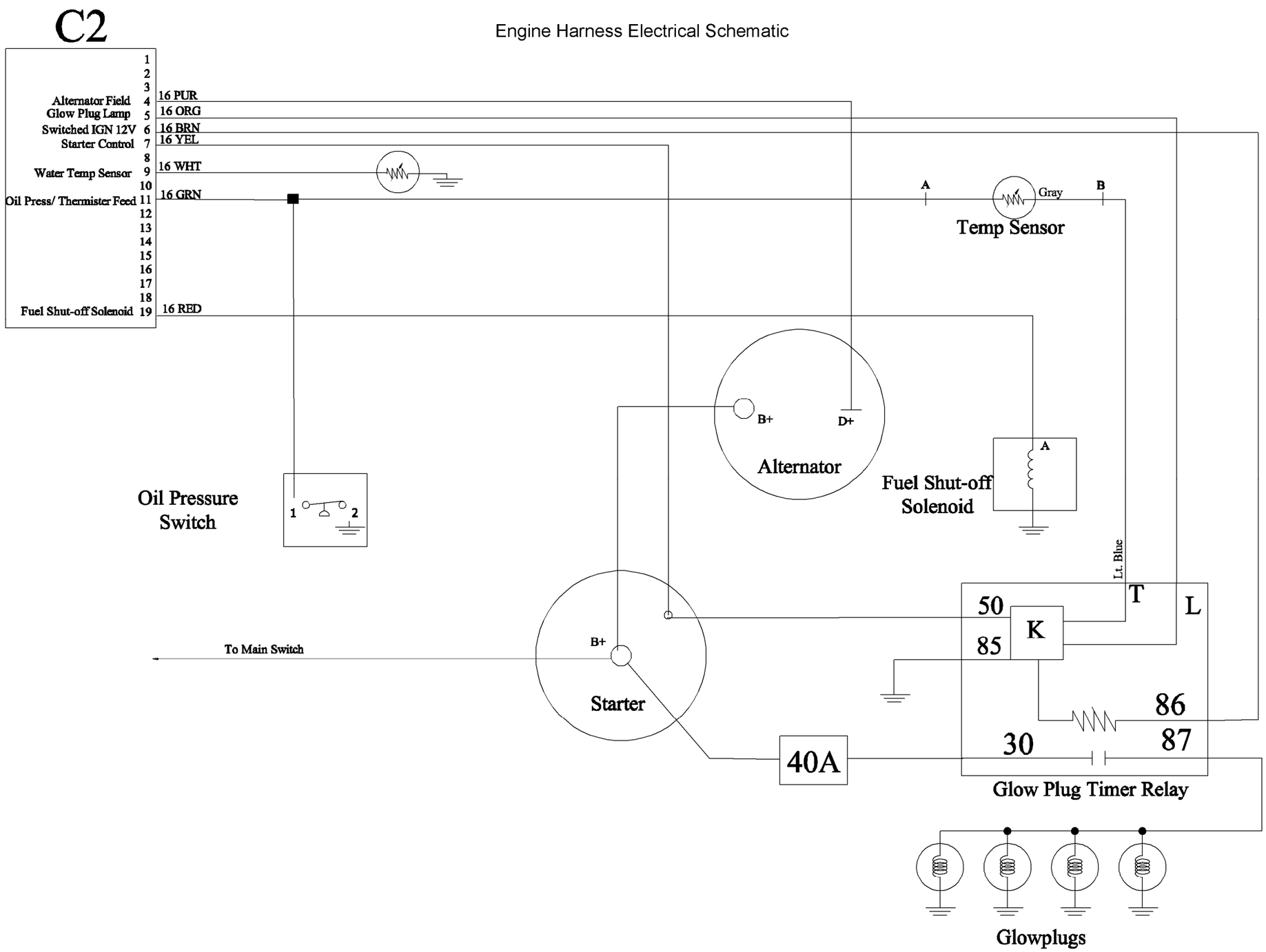


Fig 18 Engine harness electrical schematic

Main Power Supply

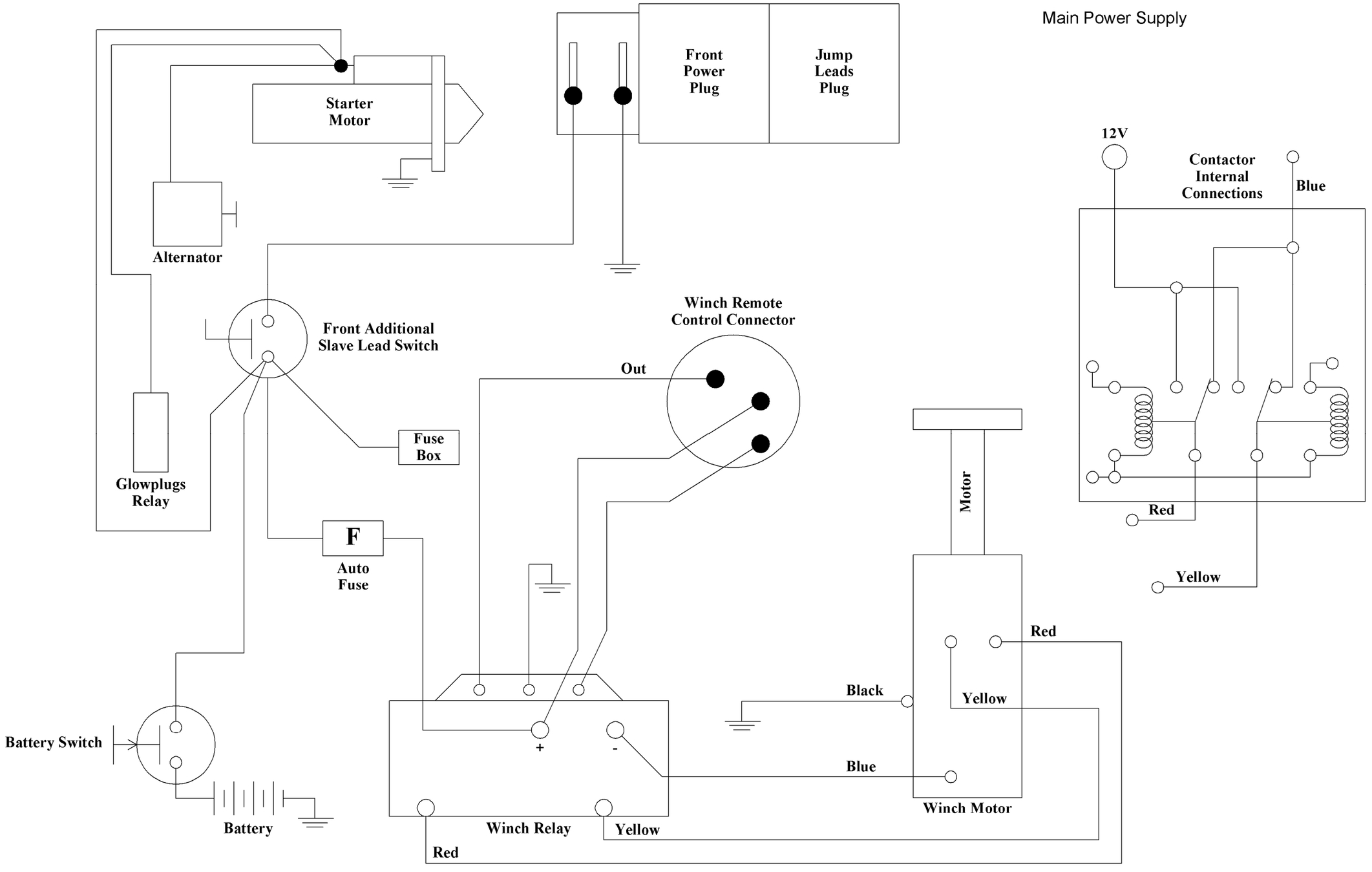


Fig 19 Main power supply schematic

Fuse Box Terminals

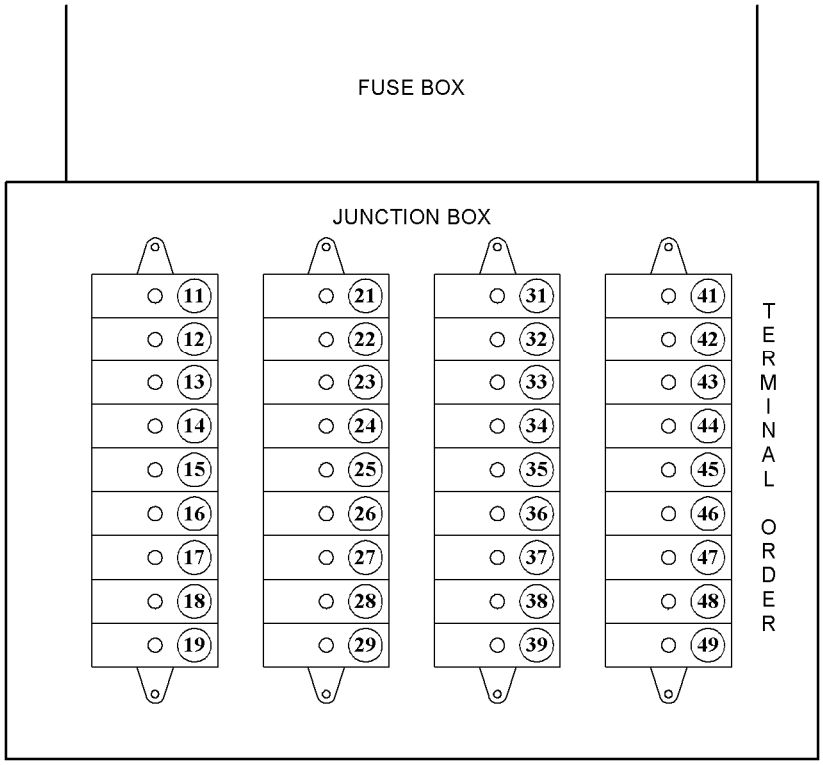


Fig 20 Junction box terminals

Fuse Box Label

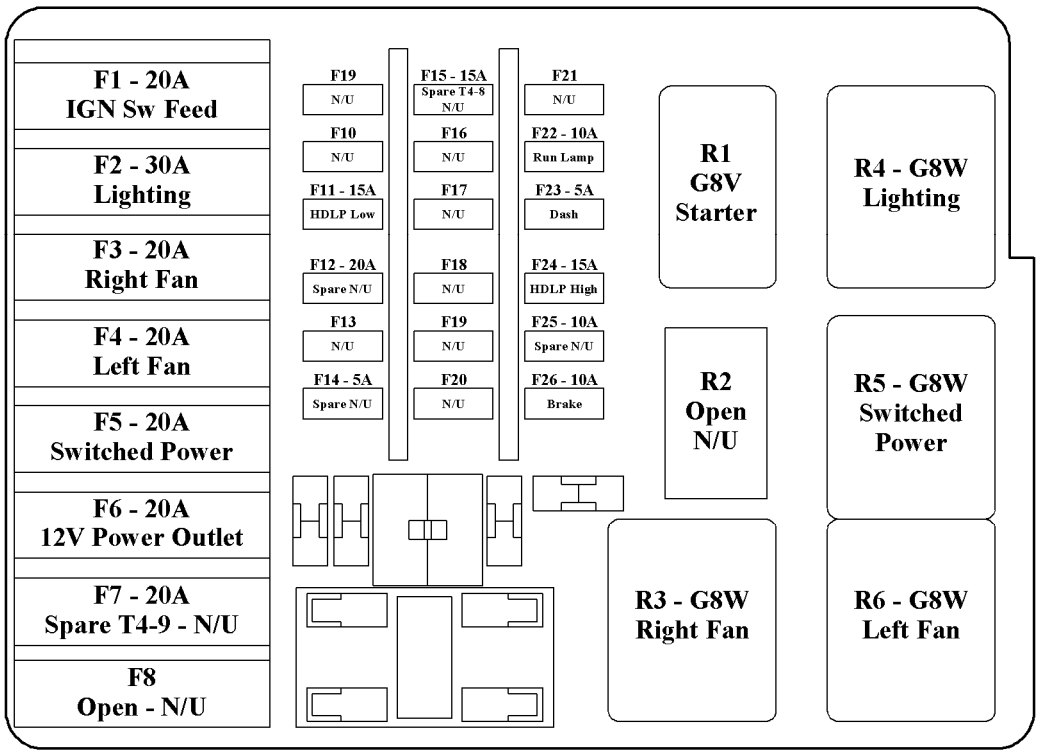


Fig 21 Fuse box

CHAPTER 3

BRAKE SYSTEM

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5 Special tools and test equipment
6 Sealants, adhesives and lubricants
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INTRODUCTION

1 This chapter covers failure diagnosis and maintenance instructions for the braking systems on the Springer Vehicle at Level 2.

2 Ensure the parking brake is engaged and/or the wheels are securely chocked and the transmission set to neutral (N), the engine switched OFF with the ignition key removed and the rear cargo bay lifted as detailed in Cat 201. These tasks are assumed to have been completed prior to commencing the relevant task.

3 Many of the tasks detailed in this chapter require the application of techniques and practices commonly employed in an engineering environment. These actions, together with associated checks to confirm serviceability of these items, are assumed to be within the scope of general engineering principles and not covered in depth.

Scope of repairs

4 The tasks that can be carried out at this level comprise the following:

4.1 Brake Pad Replacement.

4.2 Servo Replacement.

4.3 Master Cylinder Replacement.

4.4 Brake Pedal Adjustment.

4.5 Bleeding the Brakes.

4.6 Parking Brake Cable Replacement.

4.7 Brake Caliper Replacement.

4.8 Brake Disc Replacement.

Special tools and test equipment

5 There are no Special Tools and Test Equipment required to carry out the tasks detailed in this chapter.

Sealants, adhesives and lubricants

6 The sealants, adhesives and lubricants required to carry out the tasks detailed in this chapter are listed in Table 1.

TABLE 1 SEALANTS, ADHESIVES AND LUBRICANTS

Serial (1)	NSN/Part No. (2)	Designation (3)
1		Loctite 271
2		High temperature anti-seize grease

FAILURE DIAGNOSIS

GENERAL

7 The following failure diagnosis tables are applicable to the braking system.

WARNING

PERSONNEL INJURY. THE BRAKES GENERATE A HIGH TEMPERATURE WHEN OPERATING, THIS MEANS THAT THE DISC WILL BE HOT TO TOUCH, THIS CONDITION IS NORMAL.

NOTE

Whenever there is a brake problem go through the whole system for any other problems that might be developing.

TABLE 2. ONE OR MORE BRAKES DO NOT APPLY. (PEDAL TRAVEL NOT EXCESSIVE)

Serial (1)	Cause (2)	Remedy (3)
1	Master cylinder fault.	Replace master cylinder. Refer to Para 25.
2	Brake disc excessively worn (thickness less than 8.8 mm (0.35 in.)).	Renew brake discs as an axle set - both front discs or both rear discs. Refer to Para 60.

TABLE 3. PEDAL TRAVEL EXCESSIVE (BUT NOT TOUCHING FLOOR)

Serial (1)	Cause (2)	Remedy (3)
1	Air in hydraulic system.	Check fluid reservoir level. Refer to Cat 201. Check for fluid/air leaks, rectify as required. Bleed the brake system. Refer to Para 38.
2	Leak in hydraulic system.	Check for fluid loss at master cylinder and brake piston, all pipes and fittings for loose connections. Rectify as required. Top up brake reservoir and bleed the brake system. Refer to Para 38.
3	Brake disc excessively worn.	See Table 2, Item 2.
4	Brake pushrod needs adjusting.	Adjust brake pushrod. Refer to Para 28.

TABLE 4. PEDAL HARD TO OPERATE

Serial (1)	Cause (2)	Remedy (3)
1	Tightness at pedal pivot.	Inspect pedal pivot. Loosen/lubricate.
2	Fluid contamination/seal damage.	Replace the brake fluid and bleed the brake system. Refer to Para 38.
		Replace the brake calipers (refer to Para 58) and master cylinder (refer to Para 25).
3	Misaligned pushrod/pedal.	Check and rectify as required.
4	Kinked or crushed brake hoses.	Check and renew hoses as required.
5	Servo is malfunctioning.	Replace brake servo. Refer to Para 14.
6	No vacuum to servo.	Check and rectify as required.

TABLE 5. PEDAL TOUCHES FLOOR UNDER CONSTANT PRESSURE - NO FLUID LOSS

Serial (1)	Cause (2)	Remedy (3)
1	Master cylinder fault.	See Table 2, Item 1.
2	Brake disc excessively worn.	See Table 2, Item 2.
3	Air in hydraulic system.	See Table 3, Item 1.

TABLE 6. PEDAL TOUCHES FLOOR UNDER CONSTANT PRESSURE AND FLUID LOSS

Serial (1)	Cause (2)	Remedy (3)
1	External fluid leaks.	Visually check brake circuit for fluid loss, service as required. Top up brake reservoir and bleed the brake system. Refer to Para 38.

TABLE 7. POOR BRAKING

Serial (1)	Cause (2)	Remedy (3)
1	Brake pads distorted or worn beyond the wear indicator groove on the pads.	Renew brake pads as an axle set- both front sets or both rear sets. Refer to Para 8.
2	Master cylinder fault.	See Table 2, Item 1.
3	Brake caliper piston fault.	See Table 8, Item 5.

TABLE 8. BRAKES NOT RELEASING

Serial (1)	Cause (2)	Remedy (3)
1	Master cylinder fault (plunger stuck in bore).	See Table 2, Item 1.
2	Blocked hole in master cylinder reservoir cap.	Fit a new reservoir cap.
3	Brake pedal free travel incorrect.	Adjust pedal free travel. Refer to Para 32.
4	Fluid contamination/seal damage.	Replace the brake fluid and bleed the brake system. Refer to Para 38. Replace the brake calipers (refer to Para 58) and master cylinder (refer to Para 25).
5	Brake piston(s) binding in caliper.	Check that correct brake fluid has been used (incorrect fluid could swell the brake piston seals). Check if brake piston seals in good condition. Check that brake piston rotates freely in its housing with no seals fitted. Check that the brake piston seal retracts the piston approximately 0.5 mm (0.020 in). Replace the brake caliper (refer to Para 58)
6	Kinked or crushed brake pipes.	Check and renew pipes as required.
7	Brake pads not free on sliding pins.	Check brake pads for free movement, clean and lubricate sliding pins. Refer to Para 8.

TABLE 9. POOR BRAKING WHEN HOT

Serial (1)	Cause (2)	Remedy (3)
1	Moisture in system vaporising when caliper is hot.	Replace the brake calipers (refer to Para 58) and master cylinder (refer to Para 25). Replace the brake fluid and bleed the brake system. Refer to Para 38.

TABLE 10. EXCESSIVE BRAKE NOISE IN OPERATION

Serial (1)	Cause (2)	Remedy (3)
1	Brake pads worn beyond wear indicator grooves.	Renew brake pads as an axle set - both front sets or both rear sets. Refer to Para 8.
2	Brake pads in poor condition.	Check for distortion or surface pitting and/or roughness of pads.
3	Brake pads are new	Use the vehicle to ‘bed-in’ the brakes pads. Refer to Para 13.

TABLE 11. FLUID LOSS WHEN MACHINE STANDING FOR INSTANCE - OVERNIGHT

Serial (1)	Cause (2)	Remedy (3)
1	Severe damage or slight cut/nick in the brake piston seal.	Replace brake caliper. Refer to Para 58.
2	External leakage through brake pipe connections, etc.	Check for and repair leaking connections.
Confirm fault is as indicated by checking that the brake pedal does not touch the floor under constant pressure.		

TABLE 12. PARKING BRAKE DOES NOT HOLD VEHICLE WHEN ENGAGED

Serial (1)	Cause (2)	Remedy (3)
1	Parking brake cable is damaged.	Renew parking brake cable. Refer to Para 44.
2	Parking brake cable is not adjusted correctly.	Adjust parking brake cable. Refer to Cat 201.

MAINTENANCE INSTRUCTIONS

WARNINGS

(1) PERSONNEL INJURY. FLUID UNDER PRESSURE; FINE JETS OF HIGH PRESSURE FLUID CAN PENETRATE THE SKIN. KEEP FACE AND HANDS WELL CLEAR OF PRESSURISED FLUID. WEAR PROTECTIVE GLASSES. IF FLUID PENETRATES THE SKIN, SEEK MEDICAL AID IMMEDIATELY.

(2) PERSONNEL INJURY. CRUSH HAZARD; A MACHINE CAN SINK INTO SOFT GROUND. NEVER WORK UNDER AN UNSUPPORTED MACHINE ON SOFT GROUND.

(3) PERSONNEL INJURY. CRUSH HAZARD; UNLESS THE WHEELS HAVE BEEN CHOCKED A MACHINE CAN ROLL OFF A JACK. ALWAYS CHOCK THE WHEELS AT THE OPPOSITE END OF THE MACHINE THAT IS TO BE JACKED. DO NOT WORK UNDERNEATH A MACHINE SUPPORTED ONLY BY JACKS. ALWAYS SUPPORT A JACKED-UP MACHINE ON AXLE STANDS BEFORE WORKING UNDERNEATH IT.

(4) PERSONNEL INJURY. TOXIC HAZARD; BRAKE FLUID CAN HARM YOUR SKIN. WEAR RUBBER GLOVES AND COVER CUTS OR GRAZES.

(5) PERSONNEL INJURY. FAULTY BRAKES CAN KILL. IF YOU HAVE TO TOP UP THE BRAKE RESERVOIR FREQUENTLY, GET THE BRAKE SYSTEM CHECKED BY THE REPAIR AGENCY. DO NOT USE THE MACHINE UNTIL THE FAULT HAS BEEN RECTIFIED.

(6) PERSONNEL INJURY. AFTER OPENING A BOTTLE OF BRAKE FLUID, ALWAYS DISCARD ANY UNUSED PORTION. NEVER STORE OR USE A PARTIAL BOTTLE OF BRAKE FLUID. BRAKE FLUID ABSORBS MOISTURE FROM THE AIR. THE MOISTURE MAY CAUSE BRAKE FADE OR FAILURE, AND THE POSSIBILITY OF ACCIDENT OR SEVERE INJURY. NEVER REUSE OLD BRAKE FLUID OR MIX DIFFERENT BRANDS.

CAUTIONS

(1) ENVIRONMENTAL DAMAGE. Pollution; it is illegal to pollute drains, sewers or the ground. Used fluids and/or lubricants and contaminated materials must be disposed of in accordance with local regulations. Clean up all spilt fluids and/or lubricants.

(2) EQUIPMENT DAMAGE. Solvents; cleaning metal parts with incorrect solvents can cause corrosion. Use only recommended cleaning agents and solvents.

(3) EQUIPMENT DAMAGE. Badly fitted, damaged or rotted O-rings, seals and gaskets can cause leakages and possible accidents. O-rings, seals and gaskets are to be renewed whenever disturbed unless otherwise instructed.

(4) EQUIPMENT DAMAGE. Brake Fluid; use of the incorrect brake fluid will cause serious damage to the seals and lead to brake failure.

(5) EQUIPMENT DAMAGE. The parking brake must not be used to slow the machine from travelling speed, except in an emergency; otherwise the efficiency of the brakes will be reduced. Whenever the parking brake has been used in an emergency, always renew both brake pads.

(6) EQUIPMENT DAMAGE. If the brake fluid is cloudy, then water or air has contaminated the system which may damage the components and reduce the braking efficiency.

(7) EQUIPMENT DAMAGE. Brake fluid quickly ruins painted surfaces; should fluid spill wipe it up immediately.

BRAKE PAD REPLACEMENT

WARNING

PERSONNEL INJURY. SET THE MASTER ISOLATOR SWITCH TO OFF (REFER TO CAT 201), TO PREVENT THE ENGINE BEING STARTED WHILE YOU ARE BENEATH THE MACHINE.

NOTE

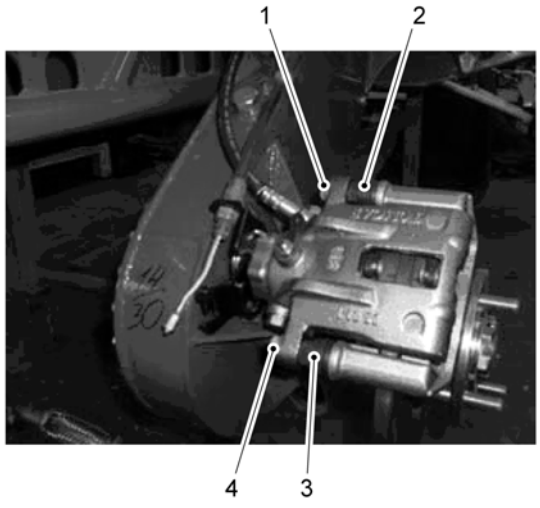
Brake pads must be renewed as an axle set ie. both sets of front pads, or both sets of rear pads.

8 Remove the wheel. Refer to Cat 201.

Rear

9 Replace the rear brake pads as follows:

9.1 Remove the rear caliper bolt (Fig 1 (4)). Inspect the rubber boot (3) for damage, renew if necessary.

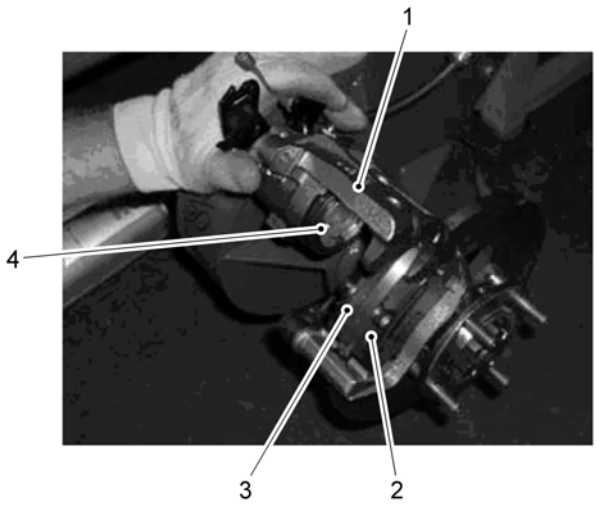


1 Front caliper bolt
2 Rubber boot
3 Rubber boot
4 Rear caliper bolt

Fig 1 Rear brake caliper (RH)

9.2 Raise the caliper (Fig 2 (1)) and remove brake pads (2) and (3). Clean the exposed piston surface (4).

9.3 Using a suitable tool, push piston back into caliper. Install new pads.



1 Caliper
2 Brake pad
3 Brake pad
4 Piston

Fig 2 Rear brake caliper (RH)

9.4 Apply a thin smear of suitable grease (Table 1, Serial 2) to the caliper bolt (Fig 1 (4)). Install the rear caliper bolt. Make sure that the rubber boot (3) is correctly seated to prevent the ingress of moisture and debris which will reduce the performance of the caliper.

9.5 Make sure that no grease comes into contact with the friction surface of the pads or the disc.

9.6 Tighten the caliper bolt securely.

9.7 Remove the front caliper bolt (Fig 1 (1)). Inspect the rubber boot (2) for damage, renew if necessary. Apply a thin smear of suitable grease to the caliper bolt.

9.8 Install the front caliper bolt. Make sure that the rubber boot is correctly seated to prevent the ingress of moisture and debris which will reduce the performance of the caliper.

9.9 Make sure that no grease comes into contact with the friction surface of the pads or the disc.

9.10 Tighten the caliper bolt securely.

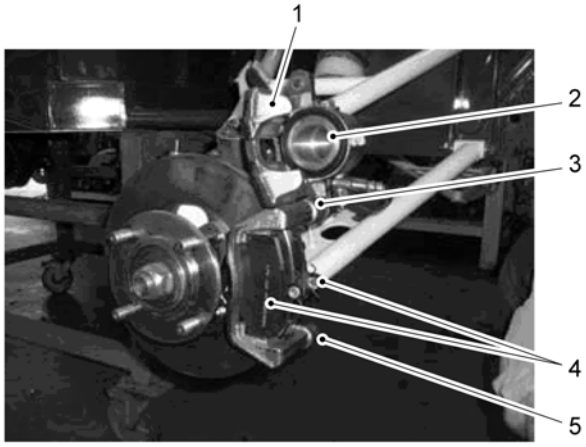
Front

10 Replace the front brake pads as follows:

10.1 Remove the lower caliper bolt (Fig 3 (5)). Inspect the rubber boot for damage renew if necessary.

10.2 Raise caliper (1) and remove brake pads (4). Clean the exposed piston surface (2).

10.3 Using a suitable tool, push piston back into caliper. Install new pads.



1 Caliper
2 Piston
3 Upper caliper bolt
4 Brake pads
5 Lower caliper bolt

Fig 3 Front brake caliper (RH)

10.4 Apply a thin smear of suitable grease to the caliper bolt (5). Install the caliper bolt. Make sure that the rubber boot is correctly seated to prevent the ingress of moisture and debris which will reduce the performance of the caliper.

10.5 Make sure that no grease comes into contact with the friction surface of the pads or the disc.

10.6 Tighten the caliper bolt securely.

10.7 Remove the upper caliper bolt (3). Inspect the rubber boot for damage, renew if necessary. Apply a thin smear of suitable grease to the caliper bolt.

10.8 Install the caliper bolt (3). Make sure that the rubber boot is correctly seated to prevent the ingress of moisture and debris which will reduce the performance of the caliper.

10.9 Make sure that no grease comes into contact with the friction surface of the pads or the disc.

10.10 Tighten the caliper bolt securely.

11 Install the wheel. Refer to Cat 201.

12 Pump the brake pedal to bring the pads into contact with the brake disc.

13 Bed in the new pads as follows:

13.1 Accelerate vehicle to 50 kph. (30 mph).

13.2 Apply brake using moderate pedal pressure, reduce speed to 5 kph (do not stop if possible)

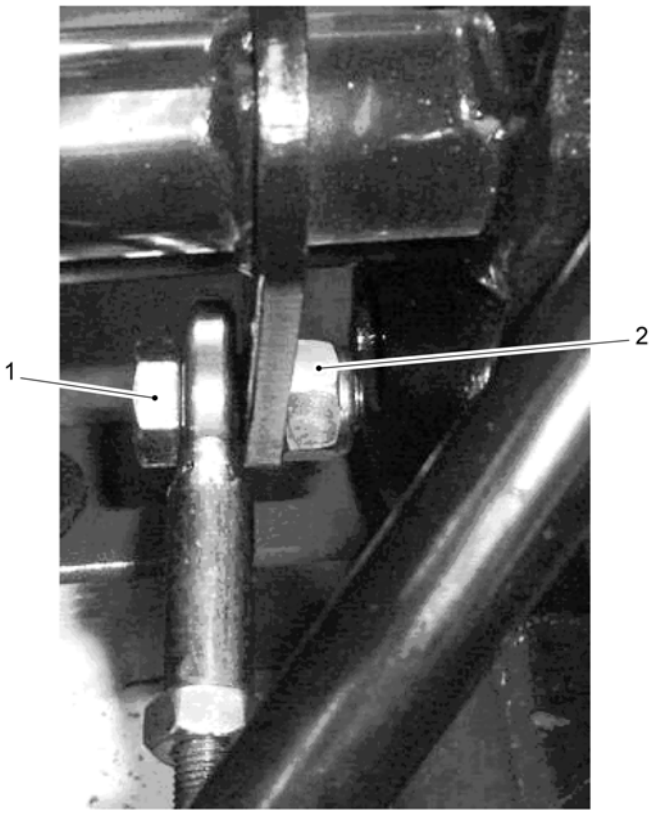
13.3 Repeat Paras 13.1 and 13.2 between 8 and 10 times allowing 0.3 to 0.6 km to cool the brakes between brake applications.

13.4 Accelerate the vehicle and apply hard braking, the wheels should just lock. If the wheels do not lock under hard braking, allow the brakes to cool and repeat Paras 13.1 to 13.4.

SERVO REPLACEMENT

14 Remove the master cylinder. Refer to Para 25.

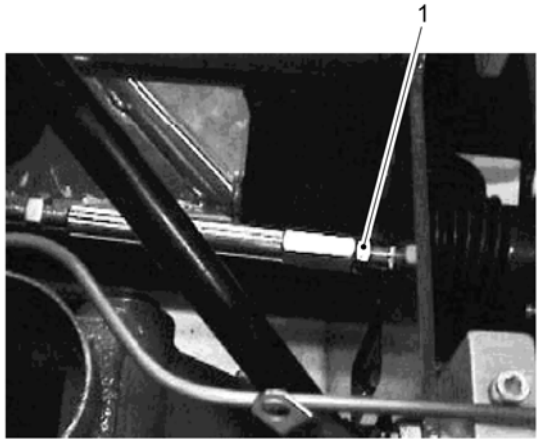
15 Remove the bolt (Fig 4 (1)) and nut (2) that locks the pedal shaft and the pushrod ball joint together. This is located under the front cargo bay, left of the air filter.



1 Bolt
2 Locknut

Fig 4 Brake pedal and pushrod

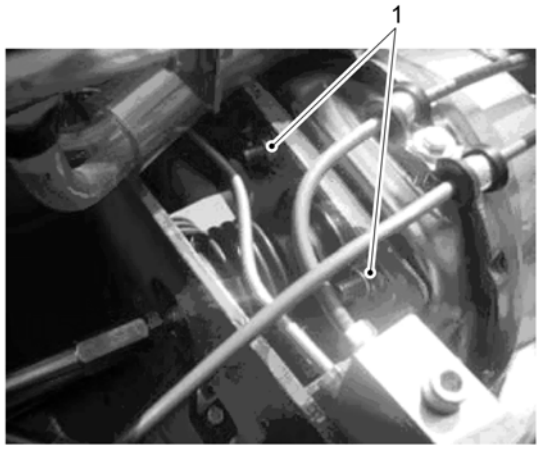
16 Loosen the lock nut (Fig 5 (1)). Disconnect the pushrod from the servo



1 Locknut

Fig 5 Brake pushrod

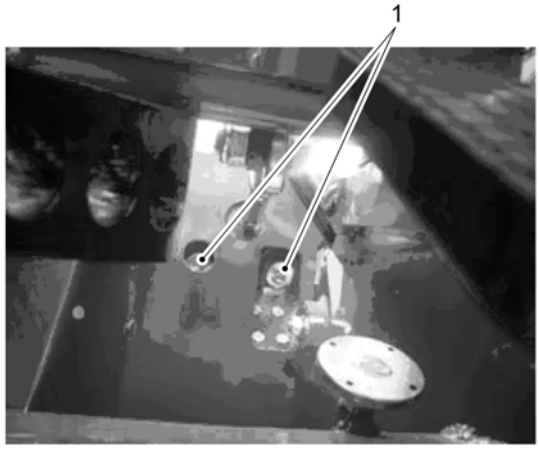
17 Remove the two upper nuts (Fig 6 (1)) and washers.



1 Nuts

Fig 6 Upper mounting nuts

18 Remove the two lower nuts (Fig 7 (1)) and washers through the access holes below the pushrod.



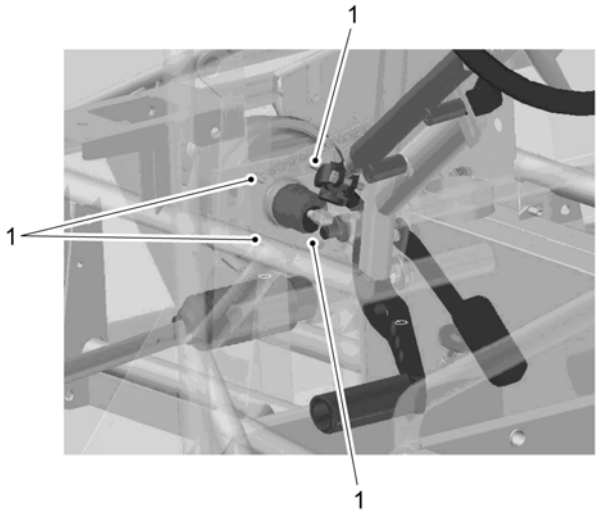
1 Nuts

Fig 7 Lower mounting nuts

19 Disconnect the vacuum pipe and remove the old servo from the machine.

20 Install the new servo, washers and tighten the 4 nuts (Fig 8 (1)).

21 Connect the vacuum pipe.



1 Nuts

Fig 8 Servo mounting nuts

22 Install the pushrod and lock nut (Fig 5 (1)).

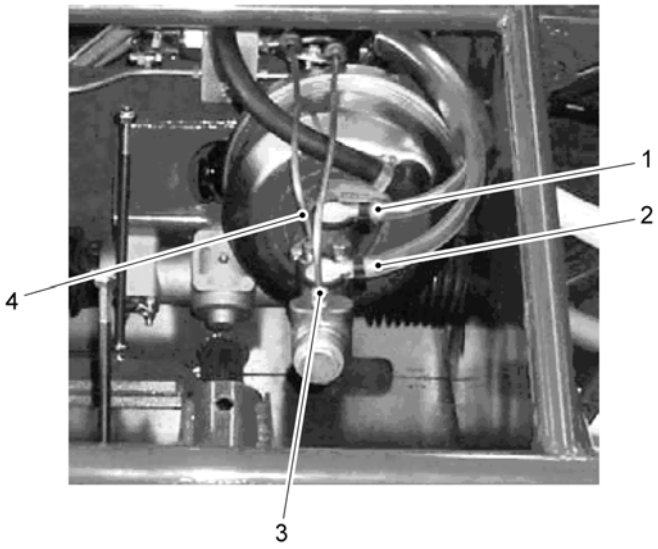
23 Install the bolt (Fig 4 (1)) and nut (2) that locks the pedal shaft and the pushrod ball joint together.

24 Install the master cylinder. Refer to Para 28

MASTER CYLINDER REPLACEMENT

25 Lift the front cargo bay. Refer to Cat 201.

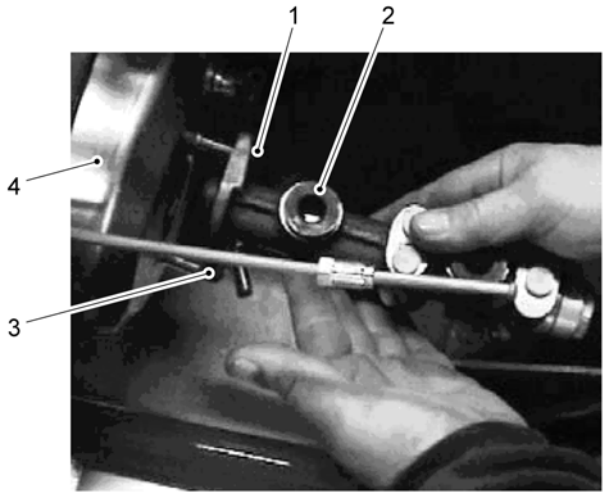
26 Disconnect the brake hoses (Fig 9 (1)) and (2) and copper lines (3) and (4) from the master cylinder. Cap and plug the open hoses and lines to prevent the ingress of debris.



1-2 Brake hose
3-4 Copper line

Fig 9 Master cylinder connections

27 Remove the nuts that hold the master cylinder in place on the two mounting studs (Fig 10 (1) and (3)). Remove the master cylinder (2) from the servo (4).

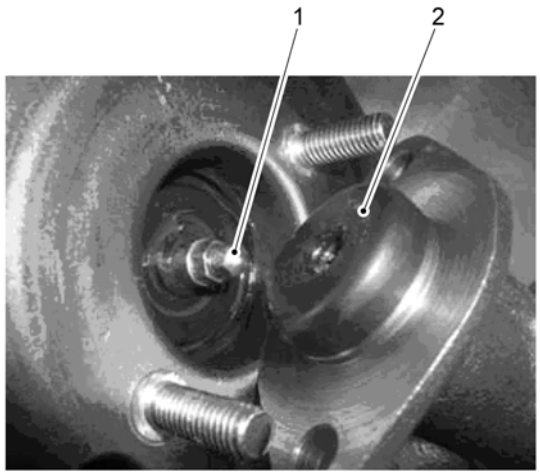


1 Mounting stud
2 Master cylinder
3 Mounting stud
4 Servo

Fig 10 Master cylinder removal

28 Replace the master cylinder.

28.1 When installing the master cylinder, there must be 1 to 2 mm (0.039 to 0.078 in.) of clearance between the master cylinder valve (Fig 11 (2)) and the servo pushrod (1). To achieve this clearance, make sure that the end of the pushrod is flush with the servo surface by checking with a straight edge.



1 Servo pushrod
2 Master cylinder valve

Fig 11 Master cylinder installation

28.2 If adjustment is needed loosen the lock nut (Fig 12 (1)) and adjust the pushrod until the pushrod is flush with the servo surface.

1 Locknut

Fig 12 Clearance adjustment

28.3 Position the master cylinder (Fig 10 (2)) in place on the two mounting studs (1) and (3). Install and tighten the nuts.

29 Examine the brake hoses (Fig 9 (1)) and (2) and copper lines (3) and (4) for signs of damage. Replace as necessary.

30 Remove all caps and plugs from the hoses and lines. Install the brake hoses and copper lines to the master cylinder.

31 Bleed the brakes. Refer to Para 38.

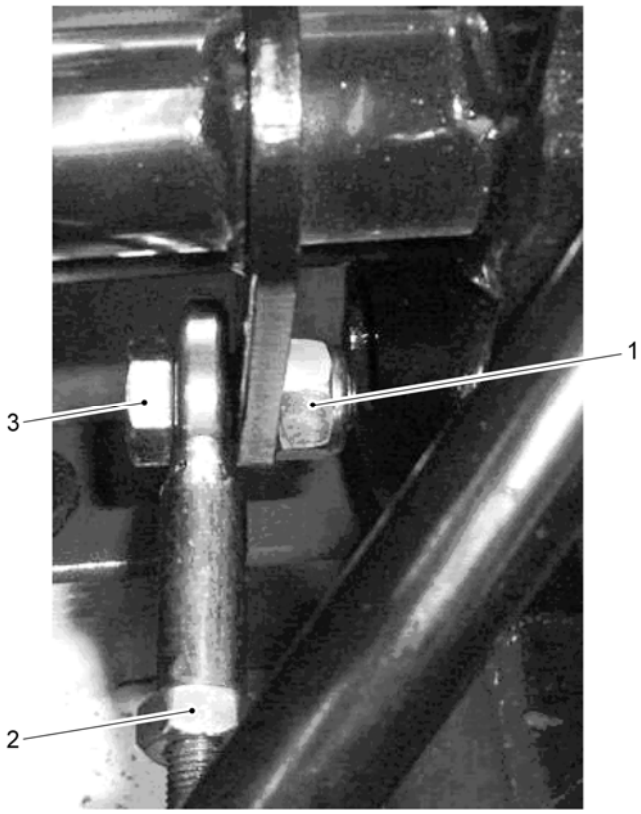
BRAKE PEDAL ADJUSTMENT

32 If the servo or pushrod have been removed the pedal pushrod length must be checked.

NOTE

A small amount of free play encountered when pushing on the brake pedal before the pressure starts to build up is acceptable. This should not be more than a 2 to 7mm (0.078 to 0.275 in.) movement at the pedal end.

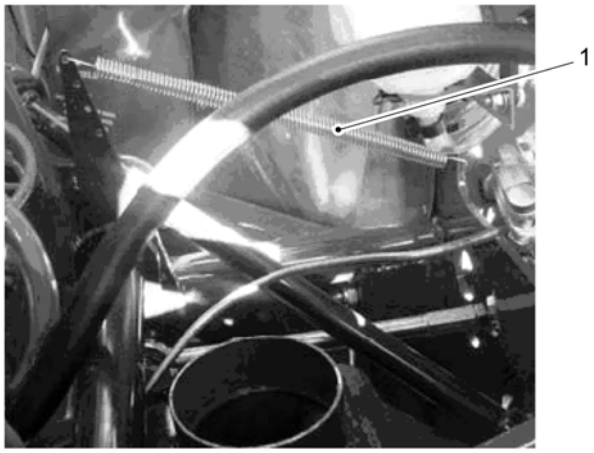
33 Loosen the ball joint lock nut (Fig 13 (1)). Remove the bolt (2) and nut (3) that hold the pushrod to the pedal. This is located under the front cargo bay, left of the air filter.



1 Locknut
2 Locknut
3 Bolt

Fig 13 Brake pedal and pushrod

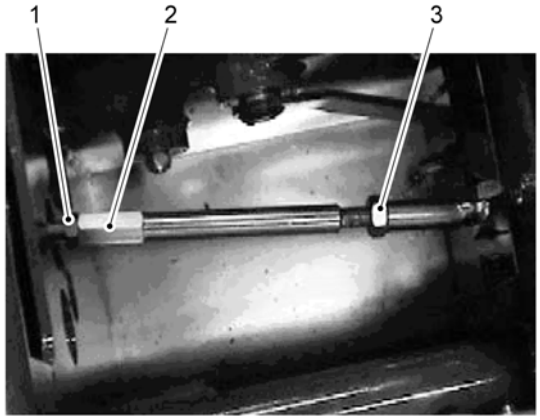
34 Make sure that the spring (Fig 14 (1)) that returns the brake pedal is connected.



1 Spring

Fig 14 Brake pedal return spring

35 Adjust the pushrod length by releasing (Fig 15 (1)) and (3) lock nuts on the brake pedal pushrod (2), and by turning the pushrod to achieve the required length.



1 Locknut
2 Pushrod
3 Locknut

Fig 15 Brake pedal pushrod adjustment

36 The correct length is reached when the hole in the pushrod ball joint is aligned with the hole in the brake pedal, and the bolt can be inserted freely into the holes. Lock the bolt with a new self-locking nut.

37 Retighten lock nut (Fig 13 (1)) when the pushrod distance is set. Make sure that the ball joint can pivot freely on the bolt.

BLEEDING THE BRAKES

WARNING

PERSONNEL INJURY. BEFORE PROCEEDING WITH THE BLEEDING PROCEDURE IT IS IMPORTANT TO ENSURE THAT THE PARKING BRAKE IS ENGAGED AND THAT ONE PAIR OF WHEELS IS BLOCKED ON BOTH SIDES.

CAUTION

EQUIPMENT DAMAGE. Use of incorrect fluid will cause serious damage to the seals which could in turn cause brake failure.

38 Fill the reservoir with correct fluid (OX-8) and ensure that throughout the bleeding procedure the level is not allowed to fall below the MINIMUM mark.

39 Bleed the brake system, in the appropriate sequence, as follows:

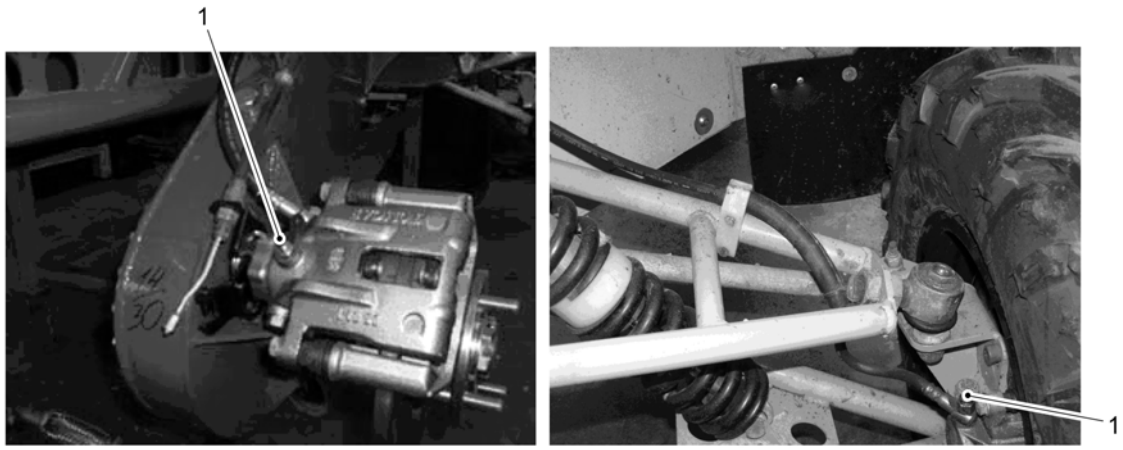
39.1 Rear right caliper.

39.2 Rear left caliper.

39.3 Front right caliper.

39.4 Front left caliper.

40 Attach a tube to the appropriate bleed screw (Fig 16 (1)), ensuring that the free end of the tube is immersed in fluid (OX-8) in a suitable container.



1 Bleed screw

Fig 16 Brake caliper bleed screw (rear / front)

41 Open the bleed screw and apply one rapid full stroke of the brake pedal followed by three rapid short strokes from the halfway pedal position. After the third short stroke, allow the pedal to return quickly to its stop.

42 Continue bleeding normally until all air is dispelled, closing the bleed screw with the pedal fully depressed. Torque tighten the bleed screw to 22 Nm (16 lbf-ft).

43 Top up reservoir to the full mark.

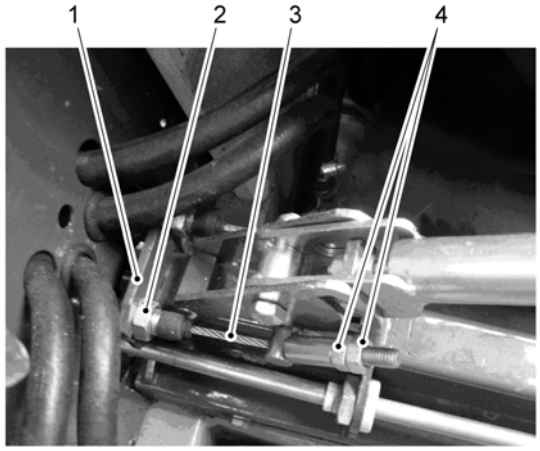
PARKING BRAKE CABLE REPLACEMENT

NOTE

There are two parking brake cables fitted, one to each rear wheel.

Removal

44 Ensure the wheels are securely chocked and release the parking brake.



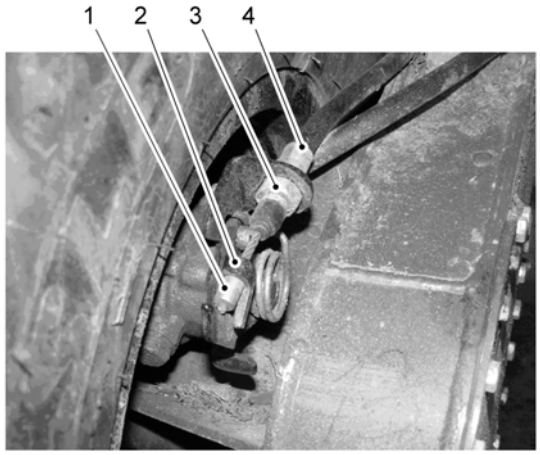
1	Bracket	3	Cable
2	Locknut	4	Locknuts

Fig 17 Parking brake cable (lever)

45 Loosen locknuts (Fig 17 (2)) and (4).

46 Remove cable (3) from bracket (1).

47 Feed the cable back through the vehicle body.



1	Cable inner	3	Locknut
2	Operating lever	4	Cable outer

Fig 18 Parking brake cable (wheel)

48 Loosen the locknut (Fig 18 (3)).

49 Remove the cable outer (4) from the bracket.

50 Detach the cable inner (1) from the operating lever (2).

51 Remove the cable from the vehicle.

Installation

52 Attach the cable inner (1) to the operating lever (2).

53 Install the cable outer (4) to the bracket. Tighten locknut (3).

54 Feed the cable through the vehicle body.

55 Install the cable (Fig 17 (3)) to bracket (1).

56 Install locknuts (2) and (4).

57 Adjust the cable free play as detailed in Cat 201.

BRAKE CALIPER REPLACEMENT

Rear

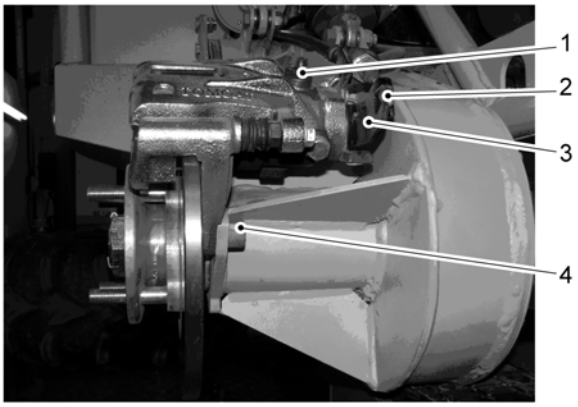
Removal

58 Remove the wheel. Refer to Cat 201.

59 Make sure that the wheels are blocked and release the parking brake.

60 Disconnect the parking brake cable (Fig 19 (2)) from the bracket (3). Refer to Para 48.

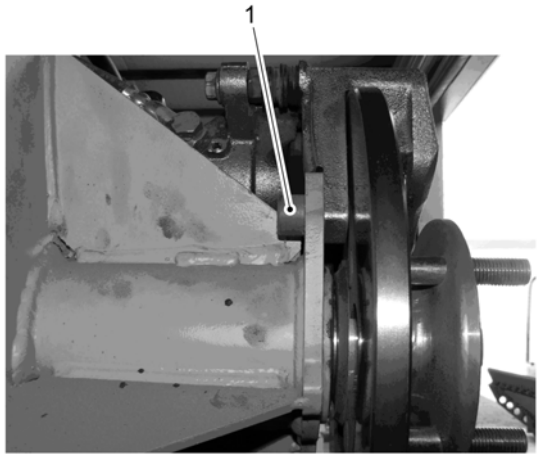
61 Remove the union bolt (1). Disconnect the brake hose from the brake caliper. Cap and plug the open hose and caliper to prevent the ingress of debris.



1	Union bolt	3	Bracket
2	Parking brake cable	4	Cap screw

Fig 19 Rear brake caliper

62 Remove two cap screws (Fig 19 (4)) and (Fig 20 (1)). Remove the rear brake caliper from the vehicle.



1 Cap screw

Fig 20 Rear brake caliper bolt

Installation

63 Apply loctite 271 (Table 1, Serial 1) to two cap screws (Fig 19 (4)) and (Fig 20 (1))

64 Install the rear brake caliper to the vehicle with two cap screws (Fig 19 (4)) and (Fig 20 (1)). Torque tighten the cap screws to 105 Nm (77.4 lbf-ft).

65 Examine the brake hose for signs of damage. Replace as necessary.

66 Remove all caps and plugs from the hose and caliper. Install the brake hose to the caliper with the union bolt. Torque tighten the union bolt to 22 Nm (16.2 lbf-ft).

67 Bleed the brakes. Refer to Para 38.

68 Install the wheel. Refer to Cat 201.

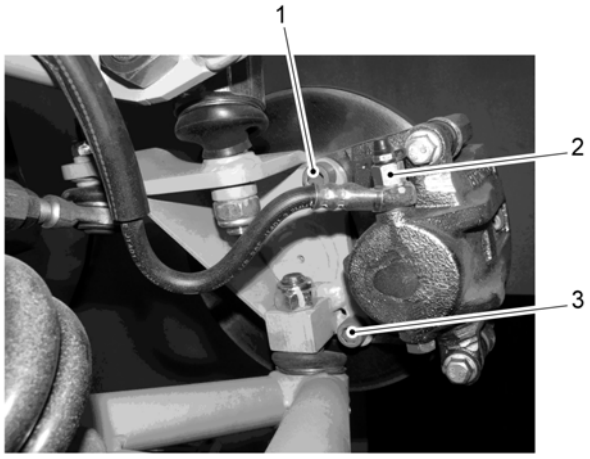
Front

Removal

69 Remove the wheel. Refer to Cat 201.

70 Remove the union bolt (Fig 21 (2)). Disconnect the brake hose from the brake caliper. Cap and plug the open hose and caliper to prevent the ingress of debris.

71 Remove two cap screws (1) and (3). Remove the front brake caliper from the vehicle.



1 Cap screw
2 Union bolt
3 Cap screw

Fig 21 Front brake caliper

Installation

72 Apply loctite 271 (Table 1, Serial 1) to two cap screws (1) and (3)

73 Install the front brake caliper to the vehicle with two cap screws (1) and (3). Torque tighten the cap screws to 105 Nm (77.4 lbf-ft).

74 Examine the brake hose for signs of damage. Replace as necessary.

75 Remove all caps and plugs from the hose and caliper. Install the brake hose to the caliper with the union bolt (2). Torque tighten the union bolt to 22 Nm (16.2 lbf-ft).

76 Bleed the brakes. Refer to Para 38.

77 Install the wheel. Refer to Cat 201.

BRAKE DISC REPLACEMENT

Rear

Removal

78 Remove the wheel. Refer to Cat 201.

79 Remove the safety pin (Fig 22 (1)). Engage the parking brake to lock the hub and loosen the hub nut (2).

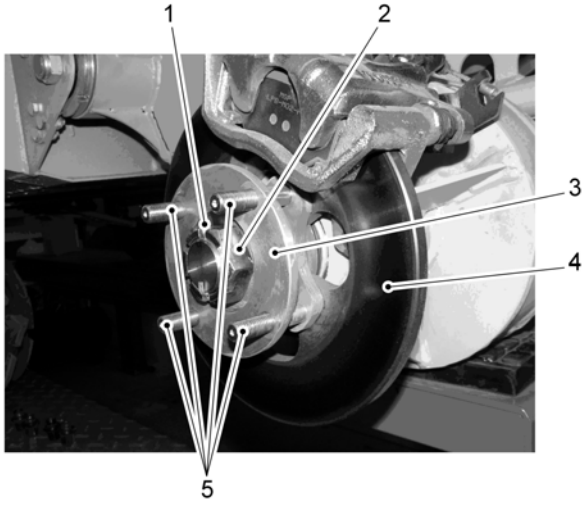
80 Make sure that the wheels are blocked and release the parking brake.

81 Remove two cap screws (Fig 19 (4)) and (Fig 20 (1)). Remove the rear brake caliper from the vehicle and move aside..

82 Remove the hub nut (Fig 22 (2)).

83 Draw the hub (3) and disc (4) off the final drive as one unit.

84 Using a suitable drift, and taking extreme care not to damage them, remove the four wheel studs (5). Separate the hub (3) and disc (4).



1	Safety pin	4	Disc
2	Hub nut	5	Wheel studs
3	Hub		

Fig 22 Rear hub

Installation

85 Install the disc (4) to the hub (3) with four wheel studs (5). Use spacers and the wheel nuts to draw the wheel studs through the disc and hub.

86 Install the disc and hub to the vehicle with the hub nut (2).

87 Apply loctite 271 (Table 1, Serial 1) to two cap screws (Fig 19 (4)) and (Fig 20 (1)).

88 Install the rear brake caliper to the vehicle with two cap screws (Fig 19 (4)) and (Fig 20 (1)). Torque tighten the cap screws to 105 Nm (77.4 lbf-ft).

89 Engage the parking brake to lock the hub and securely tighten the hub nut (Fig 22 (2)). Install the safety pin (1).

90 Install the wheel. Refer to Cat 201.

Front

Removal

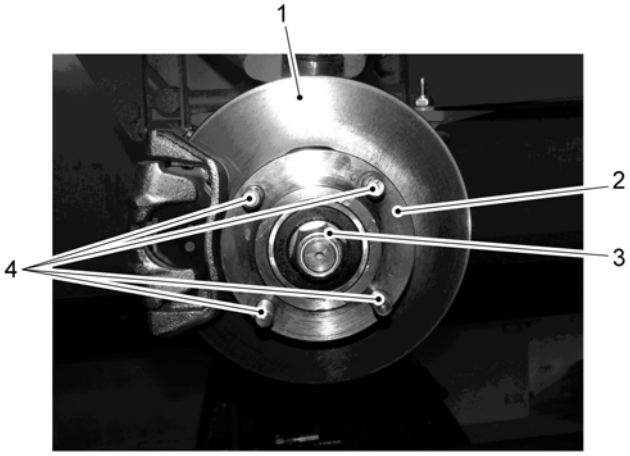
91 Remove the wheel. Refer to Cat 201.

92 Remove two cap screws (Fig 21 ((1)) and (3). Remove the front brake caliper from the vehicle and move aside.

93 Remove and discard the hub nut (Fig 23 (3)).

94 Draw the hub (2) and disc (1) off the swivel hub as one unit.

95 Using a suitable drift, and taking extreme care not to damage them, remove the four wheel studs (4). Separate the hub (2) and disc (1).



1	Disc	3	Hub nut
2	Hub	4	Wheel studs

Fig 23 Front hub

Installation

96 Install the disc (1) to the hub (2) with four wheel studs (4). Use spacers and the wheel nuts to draw the wheel studs through the disc and hub.

97 Install the disc and hub to the vehicle with a new locking hub nut (3).

98 Apply loctite 271 (Table 1, Serial 1) to two cap screws (Fig 21 (1)) and (3).

99 Install the front brake caliper to the vehicle with two cap screws (Fig 21 (1)) and (3). Torque tighten the cap screws to 105 Nm (77.4 lbf-ft).

100 Install the wheel. Refer to Cat 201.

CHAPTER 4

STEERING

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5 Special tools and test equipment
6 Sealants, adhesives and lubricants
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INTRODUCTION

General

1 This chapter covers failure diagnosis and maintenance instructions for the steering on the Springer Vehicle at Level 2.

2 Ensure the parking brake is engaged and/or the wheels are securely chocked and the transmission set to neutral (N), the engine switched OFF with the ignition key removed and the rear cargo bay lifted as detailed in Cat 201. These tasks are assumed to have been completed prior to commencing the relevant task.

3 Many of the tasks detailed in this chapter require the application of techniques and practices commonly employed in an engineering environment. These actions, together with associated checks to confirm serviceability of these items, are assumed to be within the scope of general engineering principles and not covered in depth.

Scope of repairs

4 The tasks that can be carried out at this level comprise the following:

4.1 Steering Alignment.

4.2 Steering Tie-Rod End Replacement.

4.3 Steering Tie-Rod Replacement.

4.4 Ball Joint Replacement.

4.5 A-Arm Replacement.

4.6 Steering Rack Replacement.

Special tools and test equipment

5 The Special Tools and Test Equipment (STTE) required to carry out the tasks detailed in this chapter are listed in Table 1.

TABLE 1 SPECIAL TOOLS AND TEST EQUIPMENT

Serial (1)	NSN/Part No. (2)	Designation (3)	QTY (4)	Remarks (5)
1	TM50410	Hub Alignment Tool	1	
2	TM50400	Lower A-Arm Positioning Tool	1	
3		Digital Protractor	1	

Sealants, adhesives and lubricants

6 The sealants, adhesives and lubricants required to carry out the tasks detailed in this chapter are listed in Table 2.

TABLE 2 SEALANTS, ADHESIVES AND LUBRICANTS

Serial (1)	NSN/Part No. (2)	Designation (3)
1		Antiseize grease

FAILURE DIAGNOSIS

GENERAL

7 The following failure diagnosis tables are applicable to the steering.

TABLE 3 STEERING WHEEL DIFFICULT TO TURN

Serial (1)	Cause (2)	Remedy (3)
1	Tyres not inflated to correct pressure	Inflate tyres to correct pressure. Refer to Cat 201
2	Mechanical failure	Check for damaged components, such as rack, tie-rods, A-arms and renew as applicable

TABLE 4 MACHINE WILL NOT TURN WHEN STEERING WHEEL TURNED

Serial (1)	Cause (2)	Remedy (3)
1	Mechanical failure	Check for damaged components, such as rack, tie-rods, A-arms and renew as applicable
2	Steer column shaft not fully engaged in upper steering rod.	Check shaft engagement

MAINTENANCE INSTRUCTIONS

WARNINGS

(1) PERSONAL INJURY. CRUSH HAZARD; A MACHINE CAN SINK INTO SOFT GROUND. NEVER WORK UNDER AN UNSUPPORTED MACHINE ON SOFT GROUND.

(2) PERSONAL INJURY. CRUSH HAZARD; UNLESS THE WHEELS HAVE BEEN CHOCKED A MACHINE CAN ROLL OFF A JACK. ALWAYS CHOCK THE WHEELS AT THE OPPOSITE END OF THE MACHINE THAT IS TO BE JACKED. DO NOT WORK UNDERNEATH A MACHINE SUPPORTED ONLY BY JACKS. ALWAYS SUPPORT A JACKED-UP MACHINE ON AXLE STANDS BEFORE WORKING UNDERNEATH IT.

(3) PERSONAL INJURY. SET THE MASTER ISOLATOR SWITCH TO OFF (REFER TO CAT 201), TO PREVENT THE ENGINE BEING STARTED WHILE YOU ARE BENEATH THE MACHINE.

(4) PERSONAL INJURY. CRUSH HAZARD; UNDER NO CIRCUMSTANCES MUST THE ENGINE BE RUN WITH THE DIFFERENTIAL LOCKED, THE TRANSMISSION IN GEAR AND ONLY ONE DRIVING WHEEL JACKED CLEAR OF THE GROUND, AS THE WHEEL ON THE GROUND WILL MOVE THE MACHINE.

(5) WEIGHT WARNING. HEAVY WEIGHT; IF THE WEIGHT OF AN ITEM EXCEEDS 15KG THERE IS A RISK OF INJURY DURING MANUAL HANDLING OPERATIONS. PRIOR TO INSTALLATION A RISK ASSESSMENT MUST BE CARRIED OUT LOCALLY TO ENSURE SAFE WORKING PRACTICES AND PROCEDURES. REFER TO DEF STAN 00-25 (PART 14) AND LOCAL INSTRUCTIONS.

CAUTIONS

(1) ENVIRONMENTAL DAMAGE. Pollution; it is illegal to pollute drains, sewers or the ground. Used fluids and/or lubricants and contaminated materials must be disposed of in accordance with local regulations. Clean up all spilt fluids and/or lubricants.

(2) EQUIPMENT DAMAGE. Solvents; cleaning metal parts with incorrect solvents can cause corrosion. Use only recommended cleaning agents and solvents.

(3) EQUIPMENT DAMAGE. Badly fitted, damaged or rotted O-rings, seals and gaskets can cause leakages and possible accidents. O-rings, seals and gaskets are to be renewed whenever disturbed unless otherwise instructed.

STEERING ALIGNMENT

Preparation

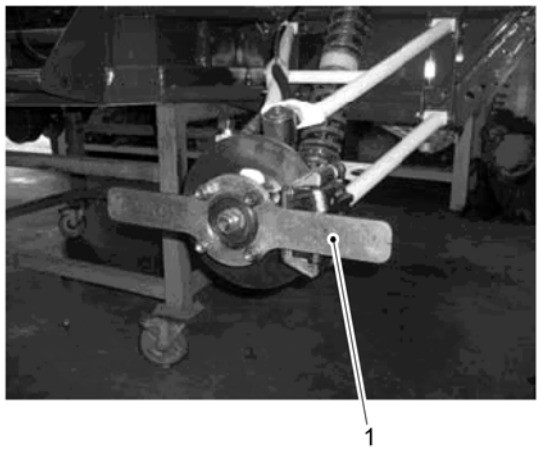
8 Raise and properly support the vehicle so that the frame is level.

NOTE

It is important to make sure that the vehicle frame is level both front to rear and left to right. Failure to level the vehicle as accurately as possible will affect the accuracy of the following procedure.

9 Remove the front wheels. Refer to Cat 201.

10 Attach special tool TM50410 (Fig 1 (1)) to the hub bolts.



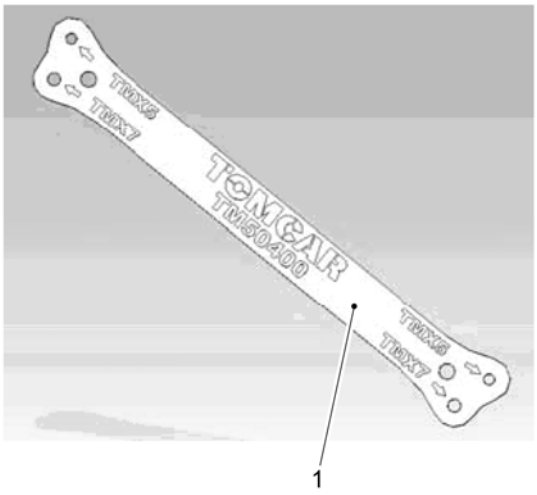
1 Special tool TM50410

Fig 1 Hub preparation

11 Remove the shock absorber (refer to Chap 6) and attach TM50400 lower A-arm positioning tool (Fig 2 (1)) in its place.

NOTE

Make sure that TM50400 lower A-arm positioning tool is installed according the model indications marked on it.



1 Special tool

Fig 2 Lower A-arm positioning tool

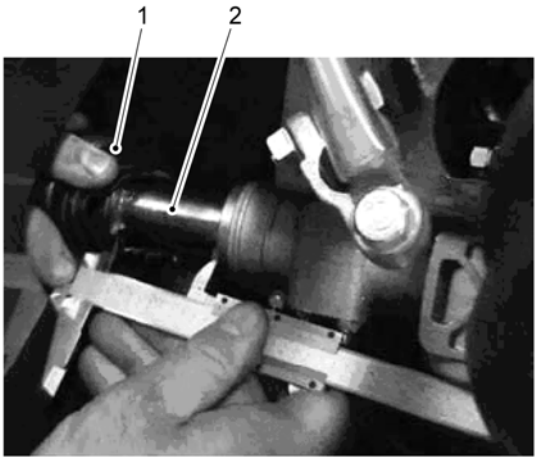
12 Remove the bands that hold the dust boots (Fig 3 (1)) in place on either side. Reveal the steering rack shaft (2).

13 Adjust the steering rack as follows:

13.1 Turn the steering wheel to full lock.

13.2 Measure the distance exposed.

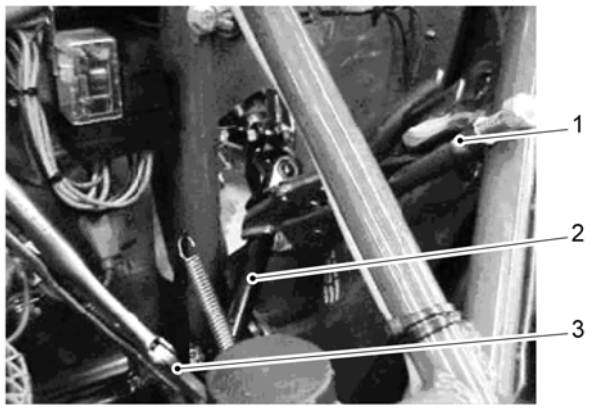
13.3 Adjust the steering rack shaft equally on both sides to half the distance measured in Para 13.2.



1 Dust boot
2 Steering rack shaft

Fig 3 Steering rack shaft preparation

14 Fix the steering main shaft (Fig 4 (2)) so that it will not be able to rotate. In this example, two vice grips (1) and (3) have been used to hold the steering main shaft (2) in place.

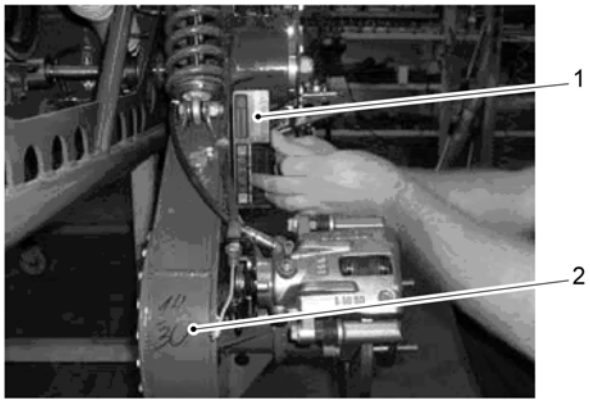


1 Vice grip
2 Steering main shaft
3 Vice grip

Fig 4 Lock the steering main shaft

Setting the Camber Angle

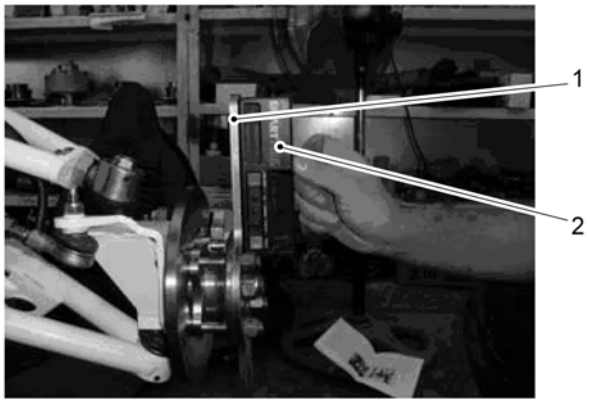
15 Zero the digital protractor (Fig 5 (1)) on the side of the final drive (2).



1 Digital protractor
2 Final drive (RHS)

Fig 5 Zero the digital protractor

16 Rotate the hub until TM50410 (Fig 6 (1)) is vertical using a level. Measure the angle of the hub using a digital protractor (2).



1 Special tool TM50410
2 Digital protractor

Fig 6 Measure the camber angle

17 The correct camber angle is 1.5 degrees from vertical, towards the inside of the vehicle (Fig 7).

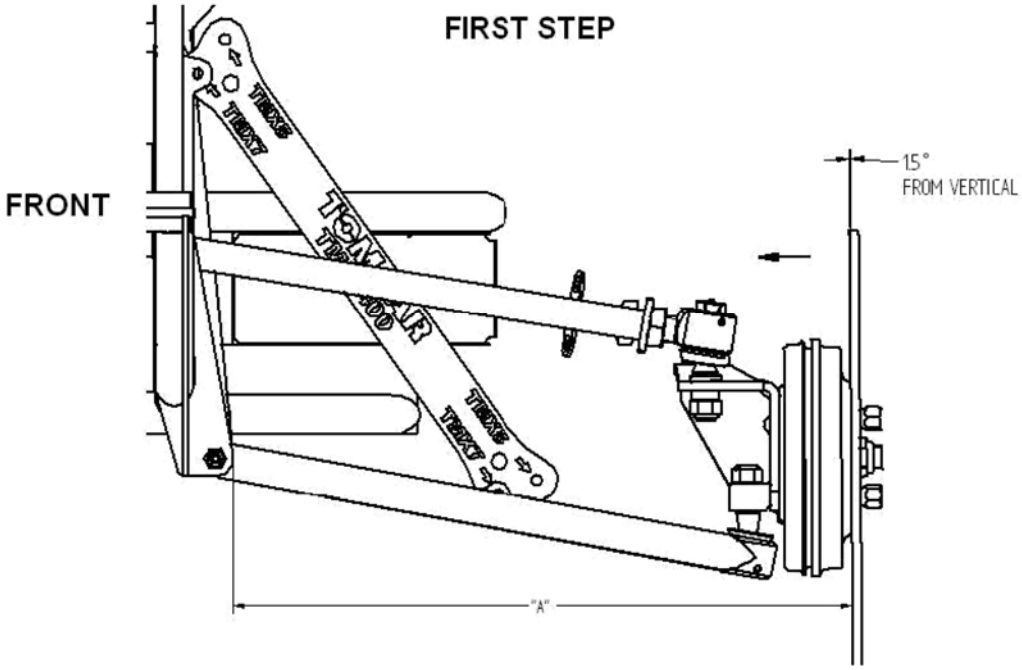
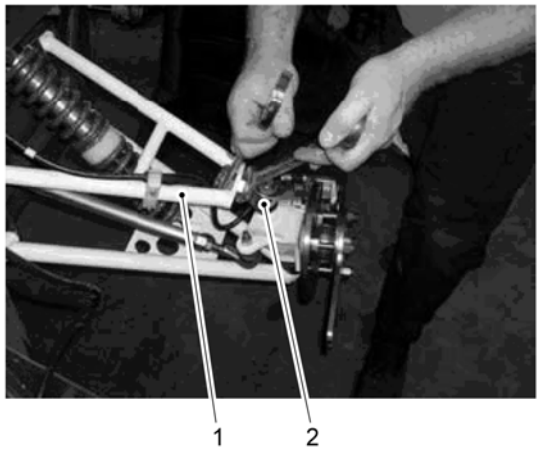


Fig 7 Correct camber angle

18 To adjust the camber angle, adjust the nuts to increase or decrease the distance between the upper ball joint (Fig 8 (2)) and the upper A-arm (1). When the correct camber angle is reached, tighten both nuts firmly and make sure that the ball joint is levelled.

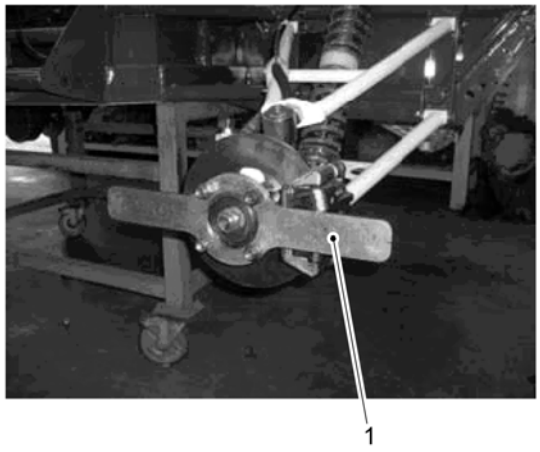


1 Upper A-arm
2 Upper ball joint

Fig 8 Adjust the camber angle

Setting the Toe-In

19 Rotate the hub until special tool TM50410 (Fig 9 (1)) is horizontal using a level.



1 Special tool TM50410

Fig 9 Hub preparation

20 Measure the distance from the frame to the front and rear of the hub level bar (Fig 10).

Fig 10 Measure the toe-in

21 Adjust the toe-in so the side of the level bar closest to the front of the vehicle is 2 mm (0.08 in.) closer to the frame then the rear side of the bar (Fig 11).

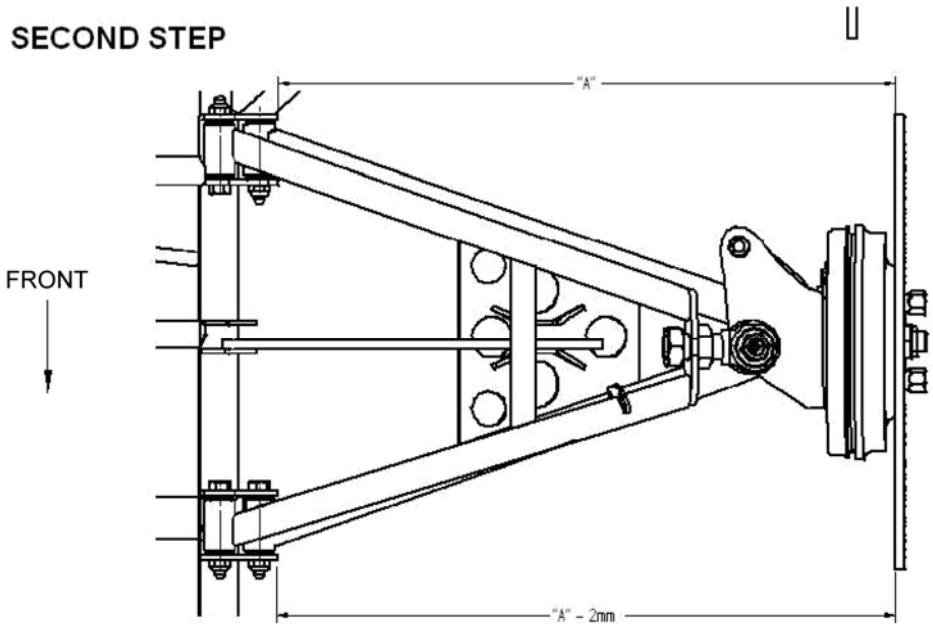
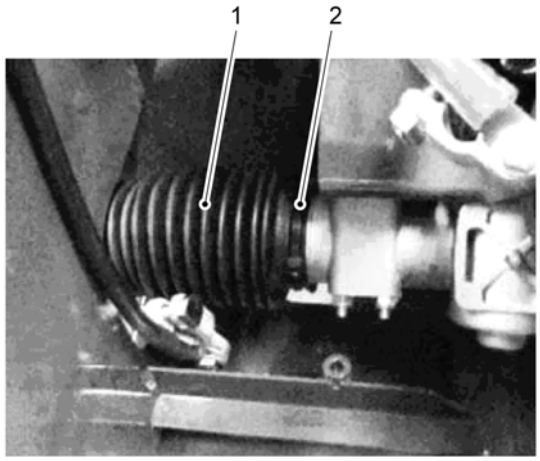


Fig 11 Correct toe-in

22 To adjust the toe-in, adjust the nuts on the steering tie-rod end (Fig 12). This will move the swivel hub. When the correct amount of toe-in is reached, tighten both nuts firmly.

Fig 12 Adjust the toe-in

23 Refit the steering rack dust boots (Fig 13 (1)) and replace the securing bands (2) on both sides.



1 Dust boot
2 Securing band

Fig 13 Refit the dust boot

24 If the steering wheel is not level (Fig 14), proceed as follows:

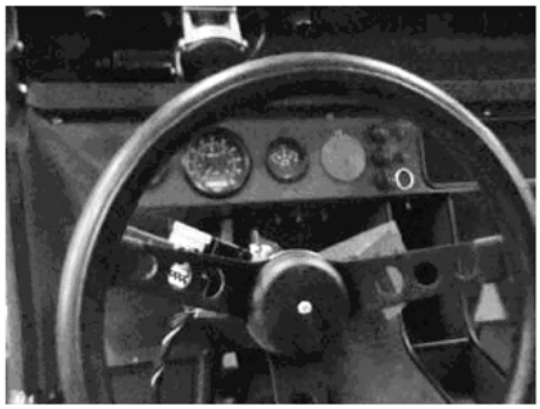
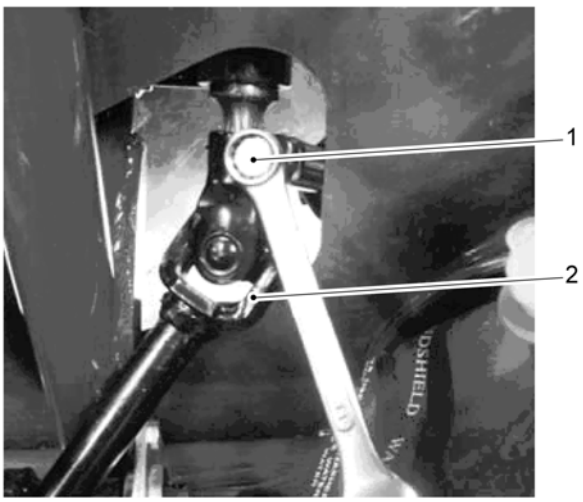


Fig 14 Steering wheel in correct position

24.1 Remove the bolt (Fig 15 (1)) from the upper steering rod universal joint (2).



1 Bolt
2 Upper steering rod universal joint

Fig 15 Loosen the steering column

24.2 Carefully pull the steering wheel up separating the steering column from the upper steering rod.

24.3 Align the steering wheel so that it is level and reattach the steering column to the upper steering shaft.

24.4 Install the bolt (1) to the upper steering rod universal joint (2). Tighten firmly.

25 Remove steering main shaft locking method (in this example vice grips) installed at Para 14 (Fig 4).

26 Check steering for smooth, proper operation.

27 Refit the wheels. Carefully lower the vehicle to the ground.

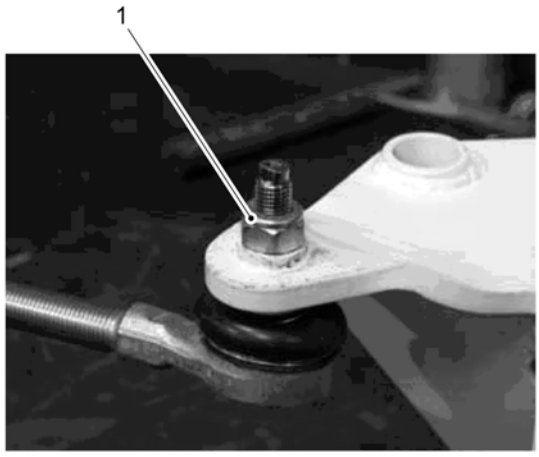
STEERING TIE-ROD END REPLACEMENT

28 Refer to Cat 201.

STEERING TIE-ROD REPLACEMENT

29 Raise and properly support the vehicle. Remove the front wheel. Refer to Cat 201.

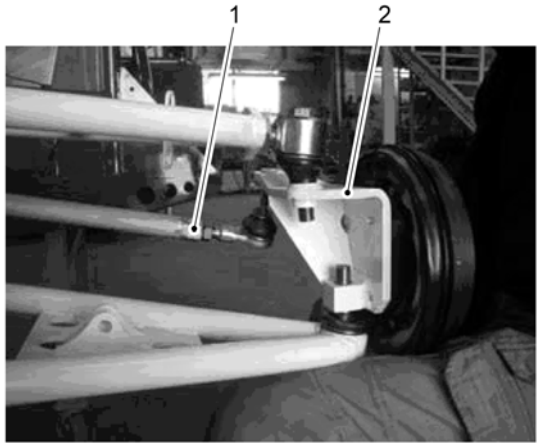
30 Remove the nut (Fig 16 (1)) to release the steering tie-rod end from the swivel hub.



1 Nut

Fig 16 Steering tie-rod end

31 Disconnect the steering tie-rod (Fig 17 (1)) from the swivel hub (2).



1 Steering tie-rod
2 Swivel hub

Fig 17 Disconnect the steering tie-rod

32 Remove the steering tie-rod from the steering rack (Fig 18).

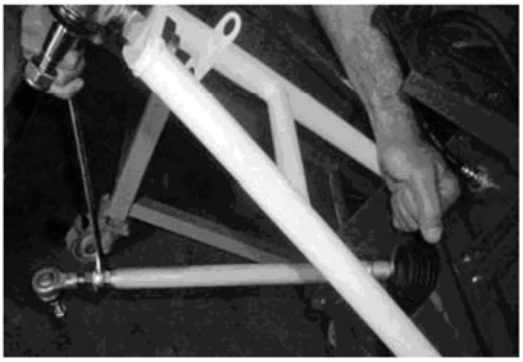


Fig 18 Remove the steering tie-rod

33 Install a new steering tie-rod to the steering rack.

34 Install a new steering tie rod end.

35 Install the steering tie-rod end to the swivel hub and tighten nut (Fig 16 (1)).

36 If ball joint spins and nut will not tighten, apply pressure from bottom side of the ball joint to lock ball joint in place (Fig 19).

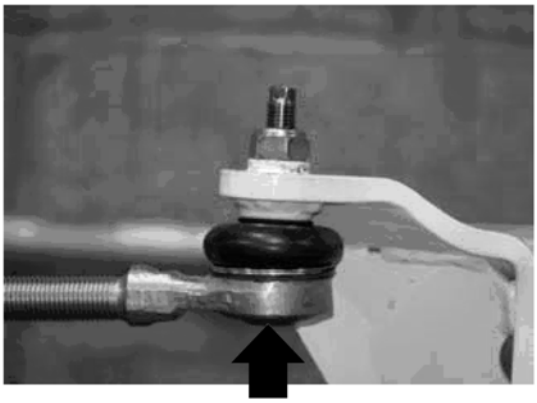


Fig 19 Ball joint

37 Perform steering alignment. Refer to Para 8.

BALL JOINT REPLACEMENT

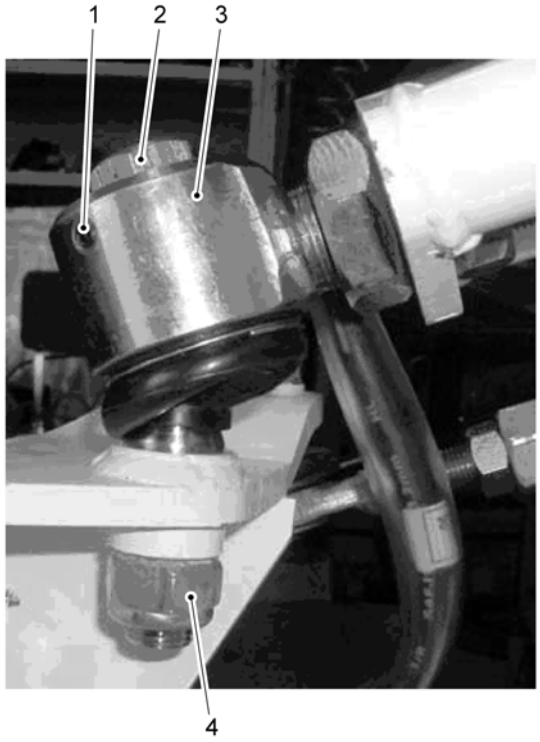
38 Raise and properly support the vehicle. Remove the front wheel. Refer to Cat 201.

Upper ball joint – removal, disassembly and inspection

39 Remove the ball joint nut (Fig 20 (4)).

40 Loosen the two Allen screws (1).

41 Unscrew the cap (2) from the ball joint housing (3).



1 Allen screw
2 Cap
3 Housing
4 Nut

Fig 20 Upper ball joint

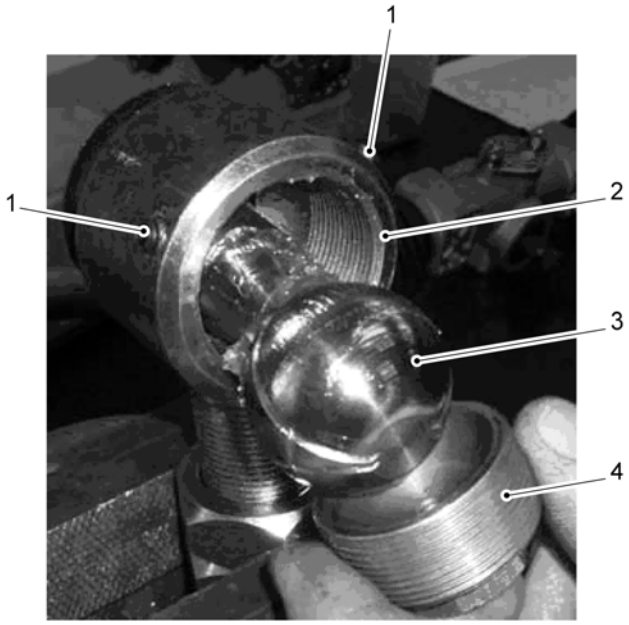
NOTES

If the ball joint spins while removing the nut (4) tighten the ball joint cap (2) to lock the ball joint in place.

To remove the ball joint from the swivel hub, loosely install the ball joint nut back on the ball joint. Hit the nut to remove the ball joint. This will protect the threads on the ball joint.

42 Inspect the ball joint (Fig 21 (3)), housing (2) and cap (4) for damage and/or wear.

43 Remove two Allen screws (1) and two copper washers.

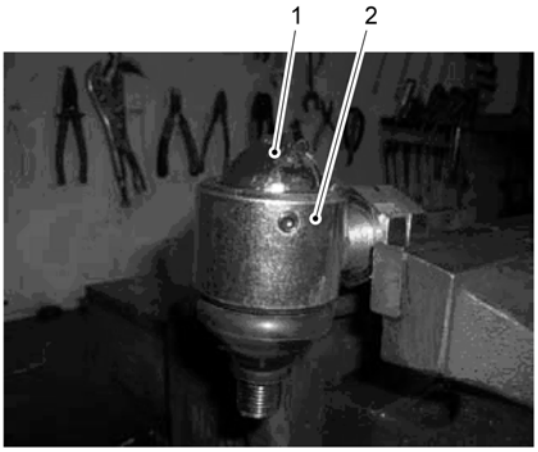


1 Allen screws
2 Housing
3 Ball joint
4 Cap

Fig 21 Inspect the ball joint for wear

Upper ball joint – reassembly and installation

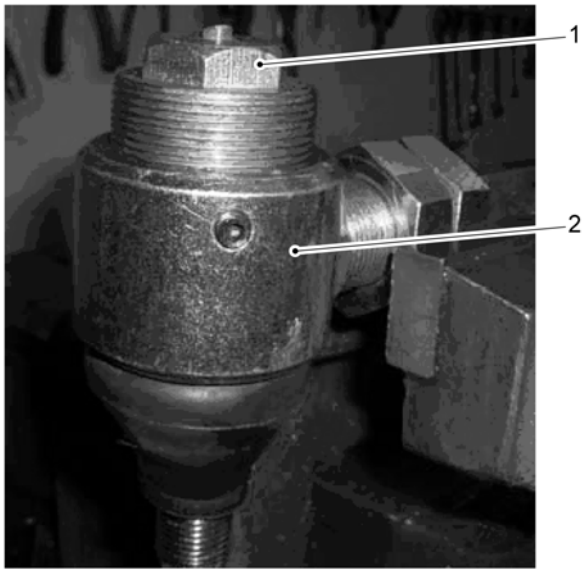
44 Grease the ball joint (Fig 22 (1)) and insert it into the housing (2).



1 Ball joint
2 Housing

Fig 22 Ball joint assembly

45 Put the cap (Fig 23 (1)) on the housing (2) and apply antiseize grease (Table 2, Serial 1) on the thread. Screw it in fully until it is tight. Unscrew the cap 1/8 turn. This is necessary to allow steering.

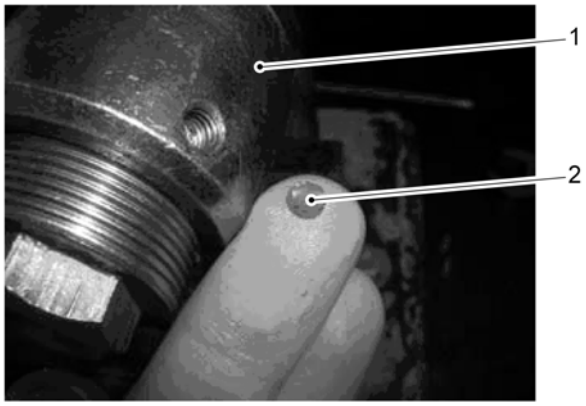


1 Cap
2 Housing

Fig 23 Ball joint assembly

46 Place two new copper washers (Fig 24 (2)) in the housing (1) (these lock the cap in place).

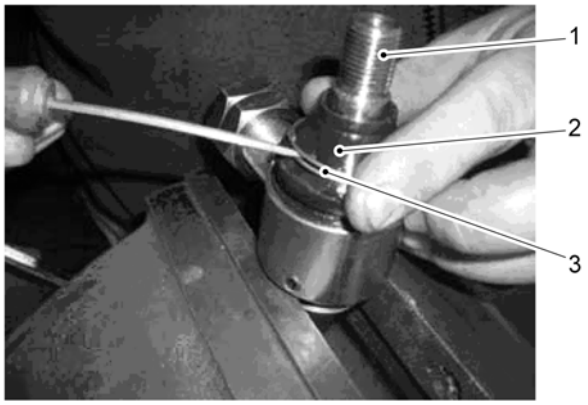
47 Install and tighten two Allen screws.



1 Housing
2 Copper washer

Fig 24 Ball joint assembly

48 Replace the rubber boot (Fig 25 (2)) on the spindle (1) and secure it with its snap ring (3). The rubber boot is important for keeping the grease in the ball joint and keeping the dirt out. Inspect it for signs of damage and replace it if it is cracked and/or torn.



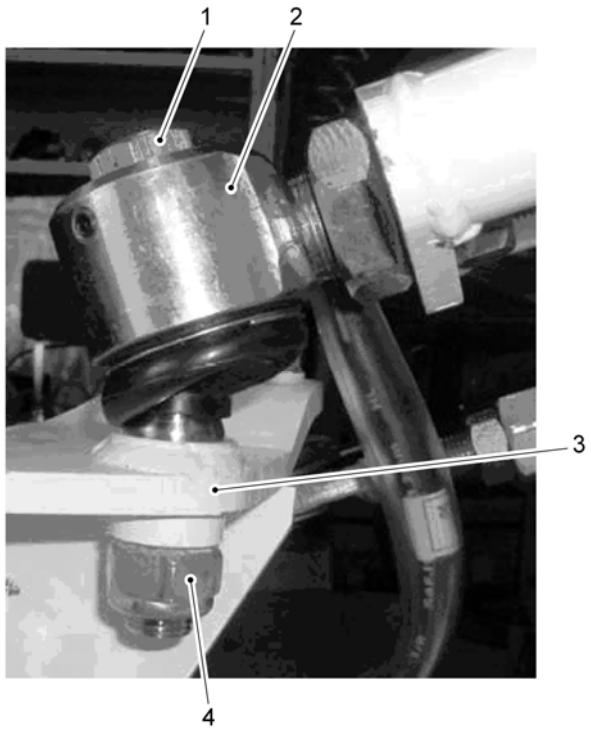
1 Spindle
2 Rubber boot
3 Snap ring

Fig 25 Ball joint assembly

49 Install the ball joint onto the swivel hub (Fig 26 (3)).

NOTE

If the ball joint spins while tightening the nut (4) tighten the ball joint cap (1) to lock the ball joint in place. Unscrew the cap 1/8 turn when the nut is tight.



1 Cap
2 Housing
3 Swivel hub
4 Nut

Fig 26 Install the upper ball joint

Lower ball joint

50 The lower ball joint removal, inspection and installation is exactly the same as the upper ball joint except that the housing is part of the lower A-arm. If there is any damage to the housing then replace the whole A-arm. Refer to Para 65.

51 Check steering for smooth, proper operation.

52 Refit the wheel. Carefully lower the vehicle to the ground.

A-ARM REPLACEMENT

53 Raise and properly support the vehicle. Remove the front wheel. Refer to Cat 201.

Upper A-Arm – Removal

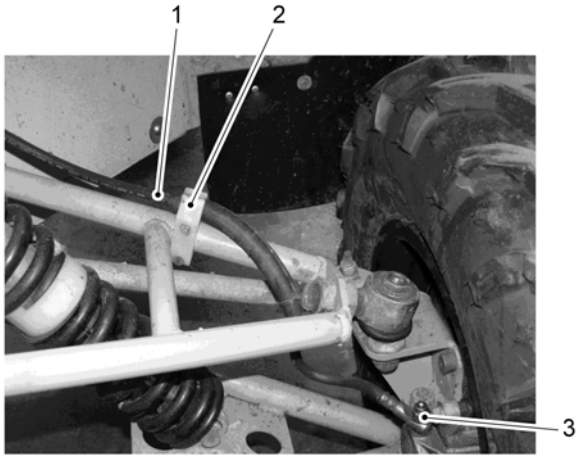
WARNING

PERSONNEL INJURY. TOXIC HAZARD; BRAKE FLUID CAN HARM YOUR SKIN. WEAR RUBBER GLOVES AND COVER CUTS OR GRAZES.

CAUTION

EQUIPMENT DAMAGE. Brake fluid quickly ruins painted surfaces; should fluid spill wipe it up immediately.

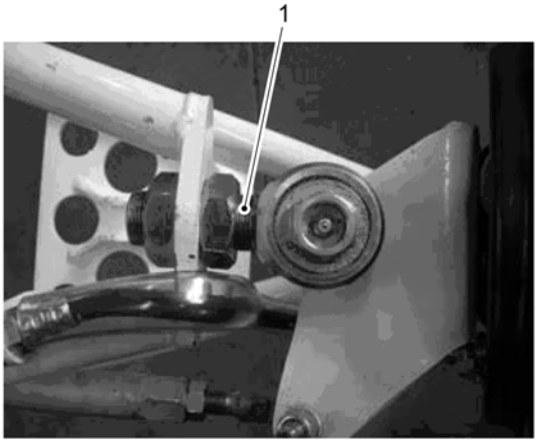
54 Loosen the clamp (Fig 27 (2)). Detach the clamp (2) and brake hose (1) from the A-arm. Remove the brake union bolt (3) and detach the brake hose from the caliper. Cap the open hose and caliper to prevent the ingress of debris.



1 Brake hose
2 Clamp
3 Brake union bolt

Fig 27 Disconnect the brake hose

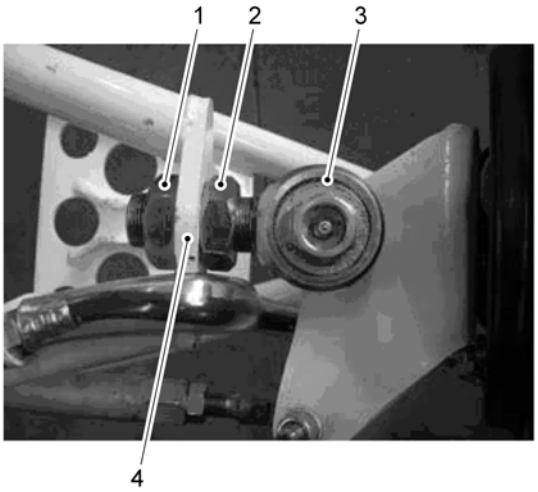
55 Count the number of exposed threads (Fig 28 (1)). Use this number when reinstalling to keep wheels aligned.



1 Exposed Threads

Fig 28 Upper A-Arm removal preparation

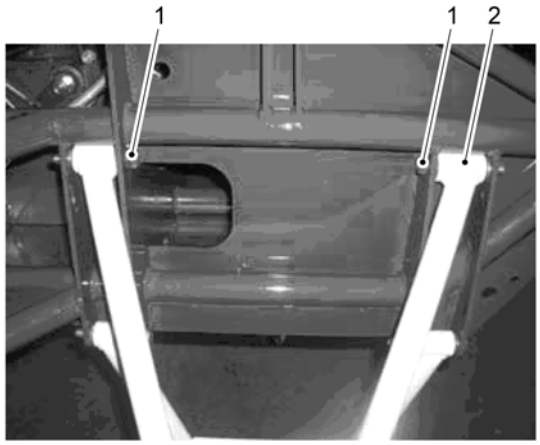
56 Unlock the nuts (Fig 29 (1)) and (2) that hold the upper ball joint (3) to the A-arm (4) and disconnect it from the spindle.



1 Locknut
2 Locknut
3 Upper ball joint
4 A-arm

Fig 29 Disconnect the upper A-arm from the ball joint

57 Remove the bolts (Fig 30 (1)) and remove the upper A-arm (2) from the vehicle.



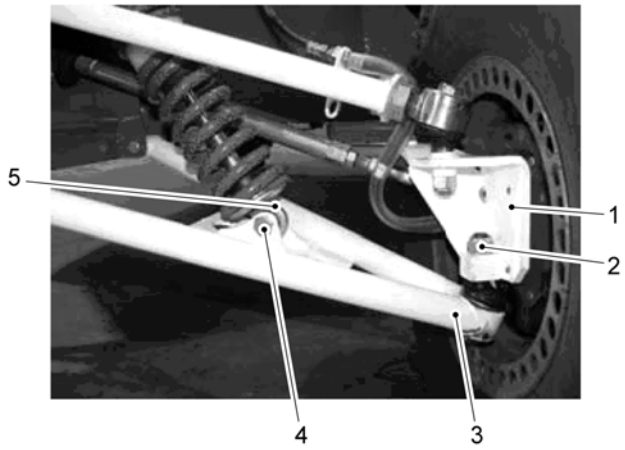
1 Bolts
2 Upper A-arm

Fig 30 Disconnect the upper A-arm from the chassis

Lower A-Arm – Removal

58 Remove the nut (Fig 31 (2)) to detach the ball joint from the swivel hub (1).

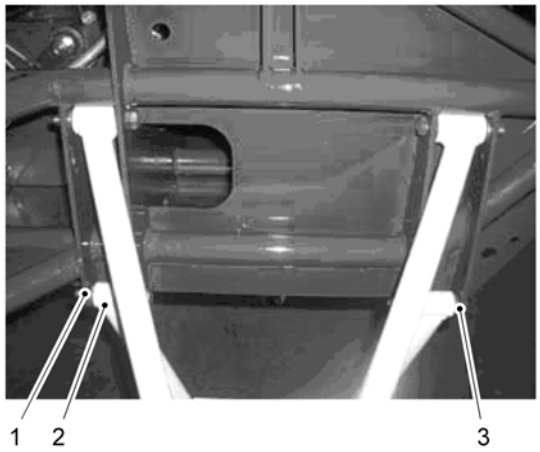
59 Remove the bolt(4) and detach the shock absorber (5) from the lower A-arm (3).



1 Swivel hub
2 Nut
3 Lower A-arm
4 Bolt
5 Shock Absorber

Fig 31 Disconnect the lower A-arm from the swivel hub

60 Remove the bolts (Fig 32 (1)) and (3) and remove the lower A-arm (2) from the vehicle.



1 Bolt
2 Lower A-arm
3 Bolt

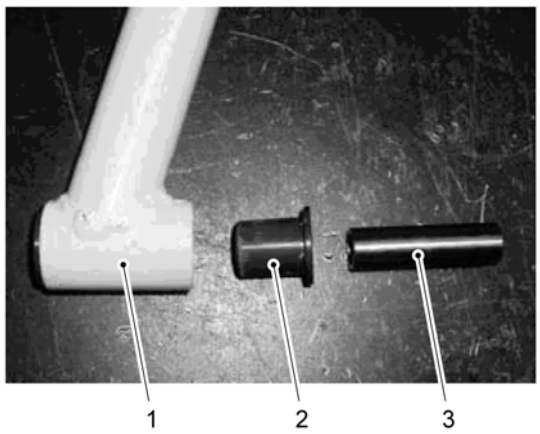
Fig 32 Disconnect the lower A-arm from the chassis

A-Arm – Installation to the Chassis, Upper and Lower

NOTE

It is possible to install the upper A-arm upside down. Check prior to installation that the A-arm is to be installed in the correct orientation. Failure to install the A-arm in the correct orientation may result in misalignment of the brake caliper, incorrect steering alignment, or an inability to set the steering alignment correctly.

61 Install new bushings in the A-arm (Fig 33 (1)). Install two plastic bushings (TM1730) (2) and one chrome bushing (TM1725) (3) in each mounting point.

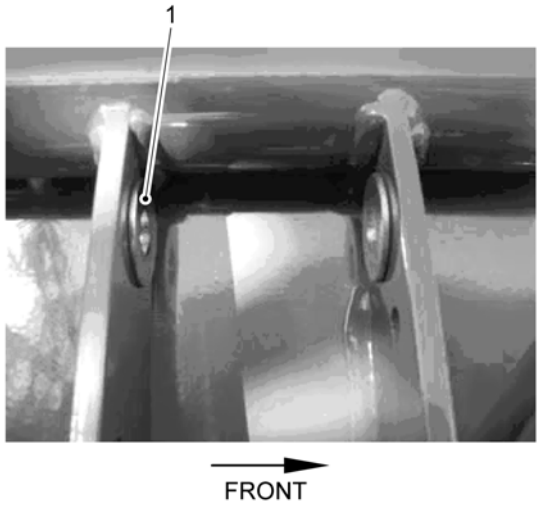


1 A-arm
2 Plastic bushing (TM1730)
3 Chrome bushing (TM1725)

Fig 33 A-Arm bushings

62 Replace the chassis bushings. There are two types of bushing used in the chassis, yellow bushings (TM1666) and silver bushings (TM1665).

63 The yellow bushings are used for the upper A-arm only. One is installed in each chassis mounting point (Fig 34 (1)) closest to the rear of the vehicle. Silver bushings are installed in all other chassis mounting points.



1 Yellow bushing (TM1666)

Fig 34 Yellow chassis bushing

64 Install the A-arm into the chassis using a soft-faced hammer (Fig 35).

Fig 35 Install the A-arm to the chassis

65 Insert the bolt, apply antiseize grease and fit a nut (Fig 36). Tighten securely.

NOTE

Insert the bolts from the front of the vehicle so that the nuts will be towards the rear. This will help protect the exposed threads from the bolt from getting damaged by rocks, and will be easier to remove next time.

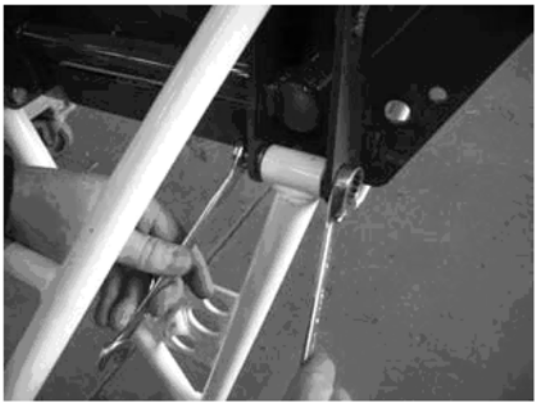


Fig 36 Tighten the bolts

Lower A-Arm – Installation

66 Install the shock absorber (Fig 31 (5)) to the lower A-arm (3) with bolt (4) and a nut. Tighten securely.

67 Install the ball joint to the swivel hub (1) with nut (2). Tighten securely.

Upper A-Arm – Installation

68 Install the A-arm to the upper ball joint. Make sure the number of exposed threads matches the number previously counted when removed in Para 55. If number is unknown steering alignment will need to be performed. Refer to Para 8. Tighten the nuts securing the A-arm to the spindle.

69 Remove all caps and plugs from the brake hose and caliper. Install the brake hose (Fig 27 (1)) on the caliper with the brake union bolt (3). Install the clamp (2) and brake hose (1) on the A-arm.

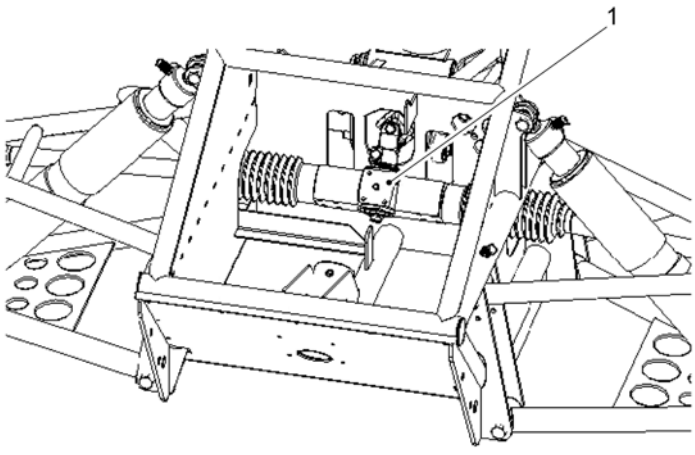
70 Bleed the brakes. Refer to Chap 3.

71 Check steering for smooth, proper operation.

72 Refit the wheel. Carefully lower the vehicle to the ground.

STEERING RACK REPLACEMENT

73 Raise and properly support the vehicle. Remove the front wheels. Refer to Cat 201.



1 Steering box

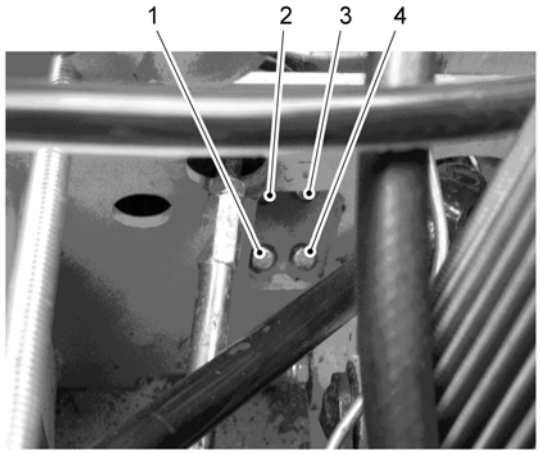
Fig 37 Steering box

74 The steering rack is mounted on the vehicle frame by four bolts each side of the steering box (Fig 37 (1)).

Removal

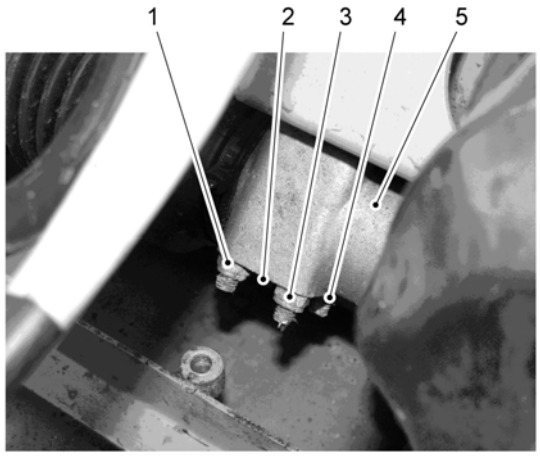
75 Disconnect both steering rod tie-ends from the A-arms. Refer to Para 29.

76 Disconnect the steering column from the upper steering rod. Refer to Para 24.



1 - 4 Bolts

Fig 38 Steering rack mountings



1 - 4 Nuts
5 Steering rack

Fig 39 Steering rack mountings

77 Remove four bolts (Fig 38 (1)) to (4) and four nuts (Fig 39 (1)) to (4) from each side of the steering box (Fig 37 (1)).

78 Remove the steering rack (Fig 39 (5)) from the vehicle.

Installation

79 Install the steering rack (5) to the vehicle with four nuts (1) to (4) and four bolts (Fig 38 (1)) to (4) on each side of the steering box (Fig 37 (1)).

80 Connect the upper steering rod to the steering column. Refer to Para 24.

81 Install both steering tie-rod ends to the A-arms. Refer to Para 33.

82 Perform steering alignment. Refer to Para 8.

83 Check steering for smooth, proper operation.

84 Refit the wheels. Carefully lower the vehicle to the ground.

CHAPTER 5

TRANSMISSION

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5 Special tools and test equipment
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INTRODUCTION

General

1 This chapter covers failure diagnosis and maintenance instructions for the transmission on the Springer Vehicle at Level 2.

2 Ensure the parking brake is engaged and/or the wheels are securely chocked and the transmission set to neutral (N), the engine switched OFF with the ignition key removed and the rear cargo bay lifted as detailed in Cat 201. These tasks are assumed to have been completed prior to commencing the relevant task.

3 Many of the tasks detailed in this chapter require the application of techniques and practices commonly employed in an engineering environment. These actions, together with associated checks to confirm serviceability of these items, are assumed to be within the scope of general engineering principles and not covered in depth.

Scope of repairs

4 The tasks that can be carried out at this level comprise the following:

4.1 Engine CVT Replacement.

4.2 Transmission CVT Replacement.

4.3 Final Drive Unit Replacement.

4.4 Driveshaft Replacement

4.5 Transmission Replacement.

4.6 Gear Lever Adjustment.

4.7 CVT Belt Tensioning

Special tools and test equipment

5 The Special Tools and Test Equipment (STTE) required to carry out the tasks detailed in this chapter are listed in Table 1.

TABLE 1 SPECIAL TOOLS AND TEST EQUIPMENT

Serial (1)	NSN/Part No. (2)	Designation (3)	QTY (4)	Remarks (5)
1	5120-99-551-6740	Puller	1	
2	5120-99-667-2854	Drive flange and CVT puller	1	
3	5120-99-507-3255	CVT Tension tool	1	
4	5120-99-847-0534	CVT Tension tool	1	
5	5120-99-373-6351	CVT Tension meter	1	
6	5120-99-701-2639	Engine CVT puller	1	
7	5120-99-776-1990	C-spanner for final drive	1	

Sealants, adhesives and lubricants

6 The sealants, adhesives and lubricants required to carry out the tasks detailed in this chapter are listed in Table 2.

TABLE 2 SEALANTS, ADHESIVES AND LUBRICANTS

Serial (1)	NSN/Part No. (2)	Designation (3)
1		Antiseize grease

FAILURE DIAGNOSIS

GENERAL

7 The following failure diagnosis tables are applicable to the transmission.

TABLE 3 UNUSUAL NOISE

Serial (1)	Cause (2)	Remedy (3)
1	Oil level insufficient	Check the oil level. Refer to Cat 201.

TABLE 4 NO FORWARD OR REVERSE DRIVE

Serial (1)	Cause (2)	Remedy (3)
1	Engine/transmission shafts worn	Replace shafts. Refer to Para 61.
2	Belt tension incorrect	Check belt tension. Refer to Cat 201.
3	Worn out or broken belt	Replace belt. Refer to Cat 201.

MAINTENANCE INSTRUCTIONS

WARNINGS

(1) PERSONAL INJURY. ROTATING PARTS; THE ENGINE HAS EXPOSED ROTATING PARTS. DO NOT OPEN THE ENGINE COVER WHILE THE ENGINE IS RUNNING. DO NOT OPERATE THE MACHINE WITH THE COVER OPEN.

(2) PERSONAL INJURY. CRUSH HAZARD; A MACHINE CAN SINK INTO SOFT GROUND. NEVER WORK UNDER AN UNSUPPORTED MACHINE ON SOFT GROUND.

(3) PERSONAL INJURY. BURN HAZARD; ENSURE THAT THE ENGINE IS SAFE TO WORK ON. IF THE ENGINE HAS BEEN RUNNING, ENSURE THE ENGINE HAS COOLED SUFFICIENTLY BEFORE CARRYING OUT WORK.

(4) PERSONAL INJURY. CRUSH HAZARD; DO NOT WORK UNDERNEATH THE MACHINE WITH THE ENGINE RUNNING. SWITCH OFF THE ENGINE AND ISOLATE THE MACHINE, APPLY THE PARKING BRAKE AND CHOCK BOTH SIDES OF ALL WHEELS BEFORE GOING UNDERNEATH THE MACHINE.

(5) PERSONNEL INJURY. SET THE MASTER ISOLATOR SWITCH TO OFF (REFER TO CAT 201), TO PREVENT THE ENGINE BEING STARTED WHILE YOU ARE BENEATH THE MACHINE.

(6) WEIGHT WARNING. HEAVY WEIGHT; IF THE WEIGHT OF AN ITEM EXCEEDS 15KG THERE IS A RISK OF INJURY DURING MANUAL HANDLING OPERATIONS. PRIOR TO INSTALLATION A RISK ASSESSMENT MUST BE CARRIED OUT LOCALLY TO ENSURE SAFE WORKING PRACTICES AND PROCEDURES. REFER TO DEF STAN 00-25 (PART 14) AND LOCAL INSTRUCTIONS.

CAUTIONS

(1) ENVIRONMENTAL DAMAGE. Pollution; it is illegal to pollute drains, sewers or the ground. Clean up all spilt fluids and/or lubricants. Used fluids and/or lubricants and contaminated materials must be disposed of in accordance with local regulations.

(2) EQUIPMENT DAMAGE. Solvents; cleaning metal parts with incorrect solvents can cause corrosion. Use only recommended cleaning agents and solvents.

(3) EQUIPMENT DAMAGE. Badly fitted, damaged or rotted O-rings, seals and gaskets can cause leakages and possible accidents. O-rings, seals and gaskets are to be renewed whenever disturbed unless otherwise instructed.

ENGINE CVT REPLACEMENT

Removal

8 Remove CVT belt. Refer to Cat 201

9 Remove CVT mount bolt (Fig 1).

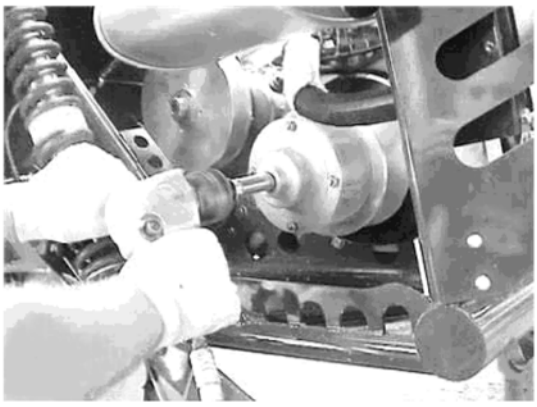
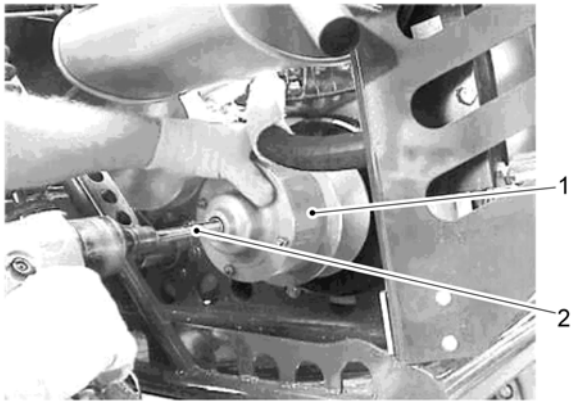


Fig 1 Engine CVT removal

10 Using the Engine CVT Puller (Table 1, Serial 6) (Fig 2 (2)), remove the CVT (1).

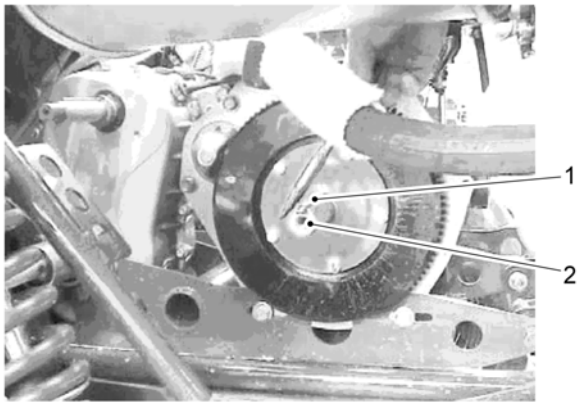


1 Engine CVT
2 Engine CVT puller

Fig 2 Engine CVT removal

NOTE

Do not lose the engine shaft key (Fig 3 (1)).



1 Key
2 Shaft

Fig 3 Engine CVT shaft

Inspection

11 Place the CVT on a firm surface and push down on the moving plate (Fig 4). It should move smoothly all the way up and down. Inspect the CVT for signs of damage. If the CVT does not move smoothly, or damage is evident, refer to REME maintenance personnel to service the CVT, or replace the unit.

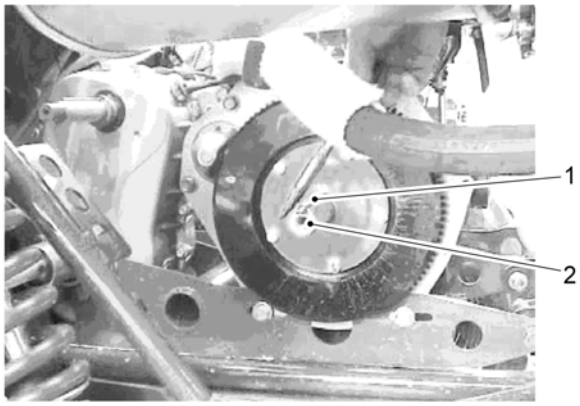
Fig 4 Engine CVT inspection

Installation

12 Thoroughly clean the engine shaft.

13 Make sure that the engine shaft key (Fig 5 (1)) is in place.

14 Apply antiseize grease (Table 2, Serial 1) to the shaft (2) and key (1).



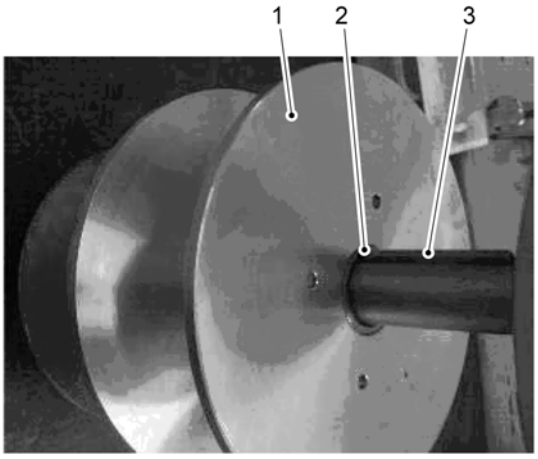
1 Key
2 Shaft

Fig 5 Engine CVT shaft

CAUTION

EQUIPMENT DAMAGE. Do not force the CVT on the shaft. If the CVT does not slide smoothly all the way on to the shaft, remove the key and check again. If CVT fits without the key check that the key is straight and the groove is clean and smooth.

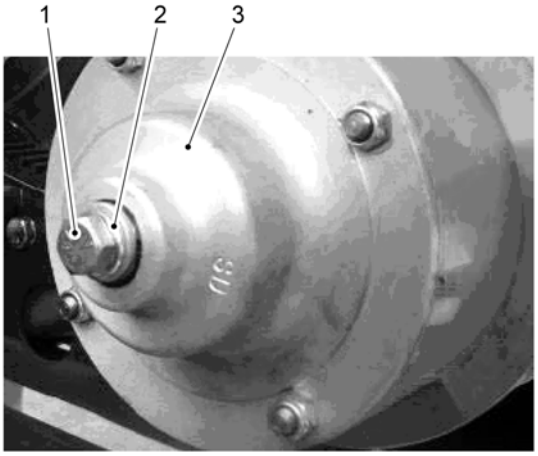
15 Align the groove (Fig 6 (2)) to the key (3) on the shaft and slide the engine CVT (1) into place.



1 Engine CVT
2 Groove
3 Key

Fig 6 Engine CVT installation

16 Secure the engine CVT (Fig 7 (3)) firmly in place with crankshaft washer (2) and bolt (1). Torque tighten to 67.7 Nm (50 lbf).



1 Bolt
2 Washer
3 Engine CVT

Fig 7 Engine CVT installation

17 Install CVT belt. Refer to Cat 201

18 Close and secure rear cargo bay. Refer to Cat 201.

TRANSMISSION CVT REPLACEMENT

Removal

19 Remove CVT belt. Refer to Cat 201

20 Remove the CVT nut (Fig 8).

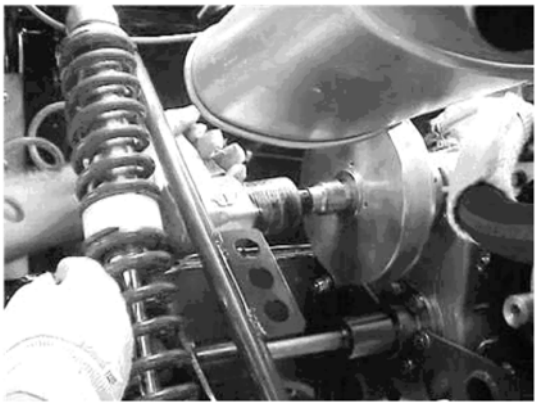
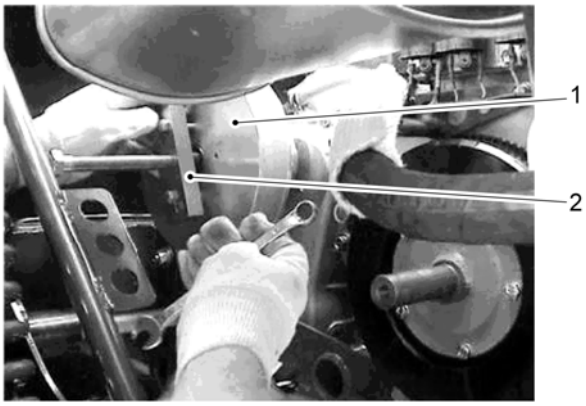


Fig 8 Transmission CVT removal

21 Using the Transmission CVT puller (Table 1, Serial 2) (Fig 9 (2)), remove the CVT (1)

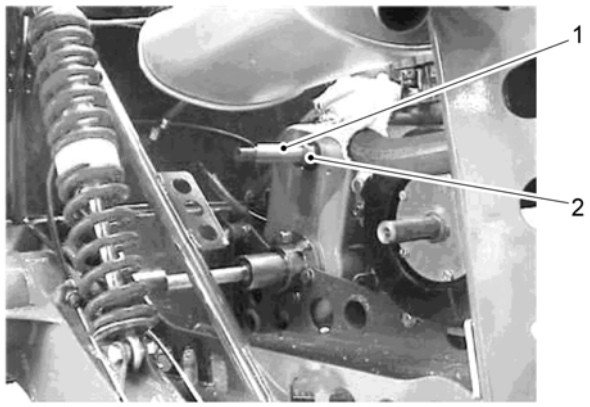


1 Transmission CVT
2 Transmission CVT puller

Fig 9 Transmission CVT removal

NOTE

Do not lose the spacer (Fig 10 (2)) and transmission shaft key (1).



1 Key
2 Spacer

Fig 10 Transmission CVT shaft

Installation

22 Thoroughly clean the transmission shaft.

23 Make sure the transmission CVT spacer (2) is installed on the transmission shaft.

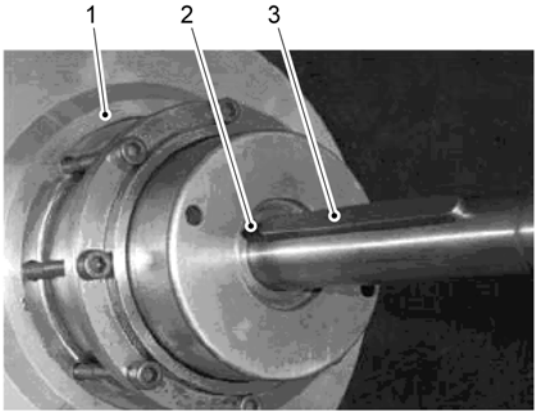
24 Make sure that the transmission shaft key (1) is in place.

25 Apply antiseize grease to the shaft and key.

CAUTION

EQUIPMENT DAMAGE. Do not force the CVT on the shaft. If the CVT does not slide smoothly all the way on to the shaft, remove the key and check again. If CVT fits without the key check that the key is straight and the groove is clean and smooth.

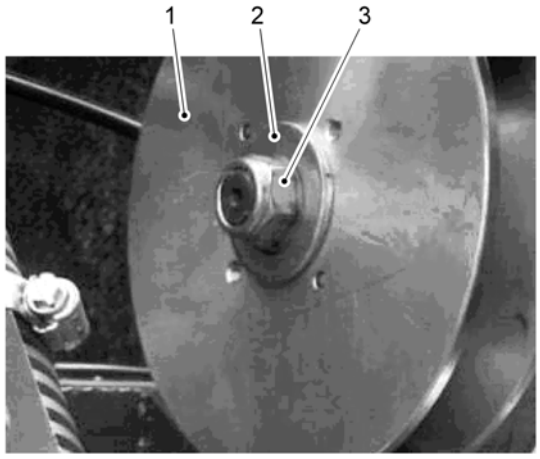
26 Align the groove (Fig 11 (2)) to the key (3) on the transmission shaft and slide the transmission CVT (1) into place.



1 Transmission CVT
2 Groove
3 Key

Fig 11 Transmission CVT installation

27 Secure the CVT (Fig 12 (1)) firmly in place with CVT shaft washer (2) and nut (3) Torque tighten to 425 Nm (313 lbf).



1 Transmission CVT
2 Washer
3 Nut

Fig 12 Transmission CVT installation

28 Install CVT belt. Refer to Cat 201

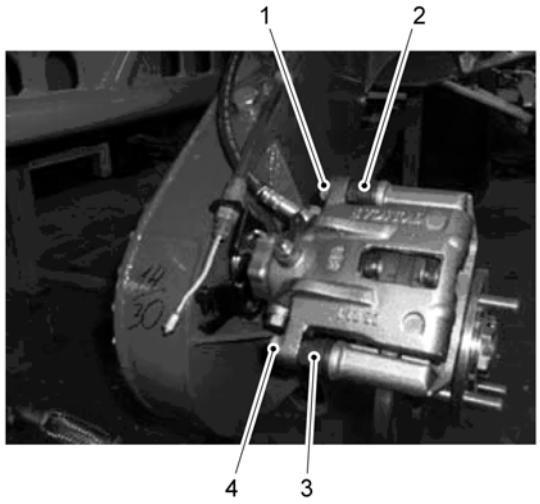
29 Close and secure rear cargo bay.

FINAL DRIVE UNIT REPLACEMENT

Removal

30 Raise the rear of the vehicle and secure on suitable stands. Remove the rear wheel. Refer to Cat 201.

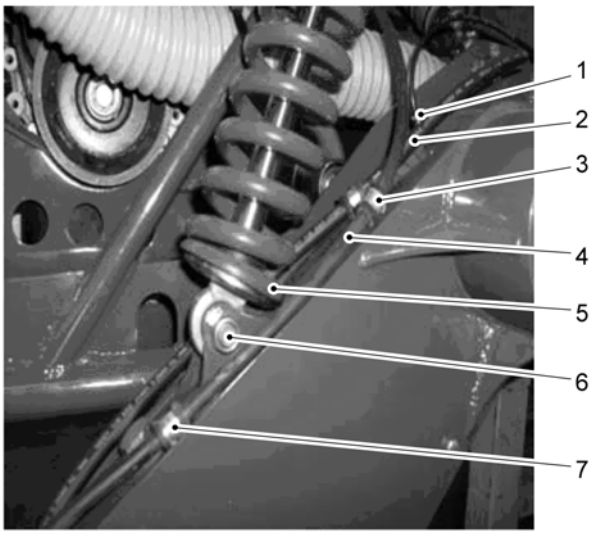
31 Detach the parking brake cable from the rear caliper. Refer to Chap 3.



1 Front caliper bolt
2 Rubber boot
3 Rubber boot
4 Rear caliper bolt

Fig 13 Rear brake caliper (RH)

32 Remove the front (Fig 13 (1)) and rear (4) caliper bolts. Detach the brake caliper from the final drive.



1 Hose
2 Brake hose
3 Hose clip
4 Parking brake cable
5 Shock absorber
6 Bolt
7 Hose clip

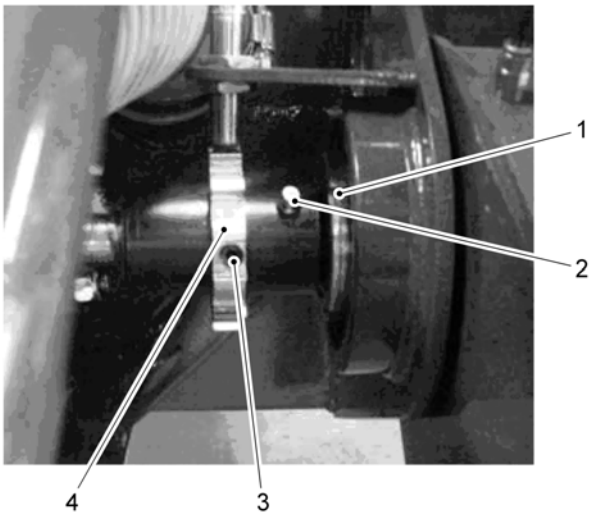
Fig 14 Final drive unit (RH)

33 Disconnect the hose (Fig 14 (1)) from the final drive.

34 Remove the hose clips (3) and (7) from the final drive.

35 Remove the bolt (6) and detach the shock absorber (5) from the final drive.

36 Secure the brake caliper, shock absorber, parking brake cable (4) and brake hose (2) to one side to allow access to the final drive.



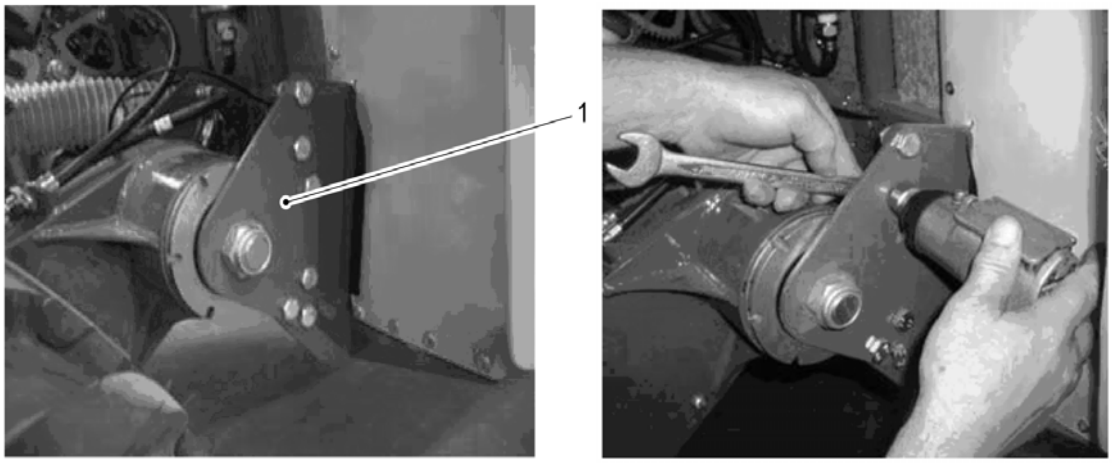
1 Final drive nut
2 Grease nipple
3 Allen set screw
4 Speedometer ring

Fig 15 Axle (RH)

37 Loosen the two allen set screws (Fig 15 (3)) and remove the speedometer ring (4) (RH side only).

38 Remove the grease nipple (2).

39 Remove the final drive nut (1) using C-spanner (Table 1, Serial 7).



1 Front caliper bolt

Fig 16 Final drive bracket (RH)

40 Remove the six bolts and nuts that secure the final drive bracket (Fig 16 (1)) to the vehicle.

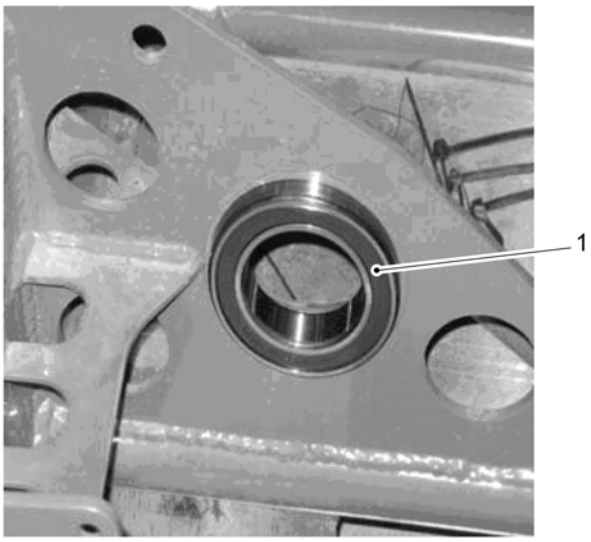
41 With care, withdraw the final drive unit from the vehicle.

1 Final drive nut

Fig 17 Final drive nut (RH)

42 After removal of the final drive unit, refit the final drive nut (Fig 17 (1)) to protect the threads on the housing.

Installation



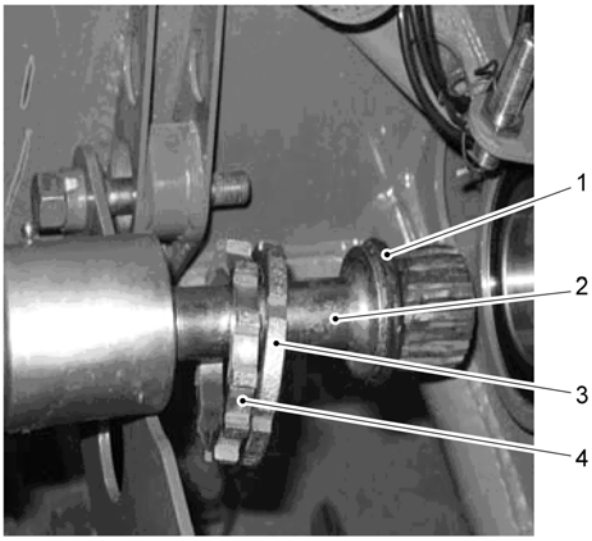
1 Bearing

Fig 18 Frame side bearing (RH)

43 Check the frame side bearing (Fig 18 (1)). Replace if necessary.

NOTE

Apply anti-seize before installing bearing.

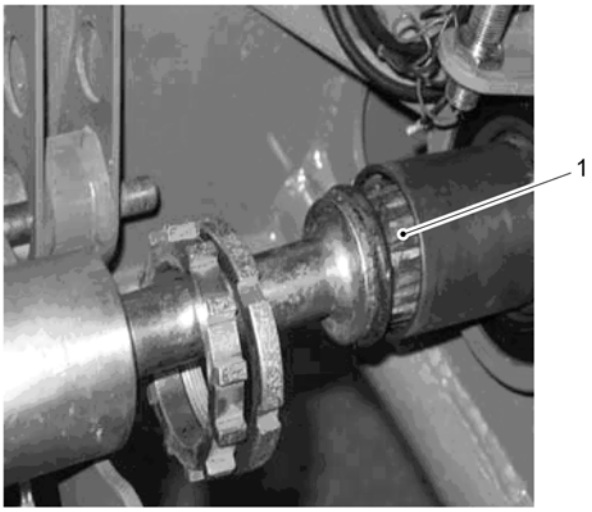


1 O-ring
2 Driveshaft
3 Final drive nut
4 Speedometer ring

Fig 19 Driveshaft (RH)

44 Before installing the final drive unit, make sure that the O-ring (Fig 19 (1)) is in place, and that the speedometer ring (4) (RH side only) and final drive nut (3) are placed over the driveshaft (2).

45 Place the final drive unit into position on the vehicle.



1 Splines

Fig 20 Driveshaft (RH)

46 While pressing the final drive unit into place, rotate the brake disc to align the driveshaft splines (Fig 20 (1)) with the upper final drive axle.

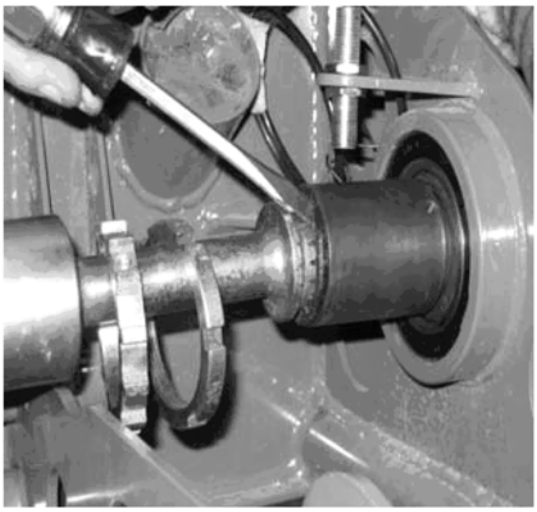


Fig 21 Driveshaft (RH)

47 Press the final drive unit into place until the O-ring contacts the upper final drive axle. Using a suitable tool, push the O-ring into the gap between the drive shaft and the final drive axle (Fig 21). Rotate the brake disc to turn the axle as the O-ring is worked into place. Make sure that the final drive unit is fully installed

48 Install the final drive bracket to the vehicle frame with six nuts and bolts (Fig 16). Torque tighten the bolts to 70 Nm (51.6 lbf-ft).

49 Install and tighten the final drive nut (Fig 15 (1)) using C-spanner (Table 1, Serial 7).

50 Install and tighten the grease nipple (2).

51 Install the speedometer ring (4) (RH side only) and tighten the two allen set screws (3).

52 Install the shock absorber (Fig 14 (5)) to the final drive unit with the bolt (6) and tighten.

53 Install the hose clips (3) and (7) to the final drive. Make sure that the parking brake cable (4) and brake hose (2) are routed correctly.

54 Connect the hose (1) to the final drive.

55 Inspect the rubber boots (Fig 13 (2)) and (3) for damage, renew if necessary. Apply a thin smear of suitable grease to the caliper bolts (1) and (4).

56 Install the brake caliper to the final drive unit with the front (Fig 13 (1)) and rear (4) caliper bolts. Make sure that the rubber boots (2) and (3) are correctly seated to prevent the ingress of moisture and debris which will reduce the performance of the caliper.

57 Make sure that no grease comes into contact with the friction surface of the pads or the disc.

58 Connect the parking brake cable to the caliper. Refer to Chap 3.

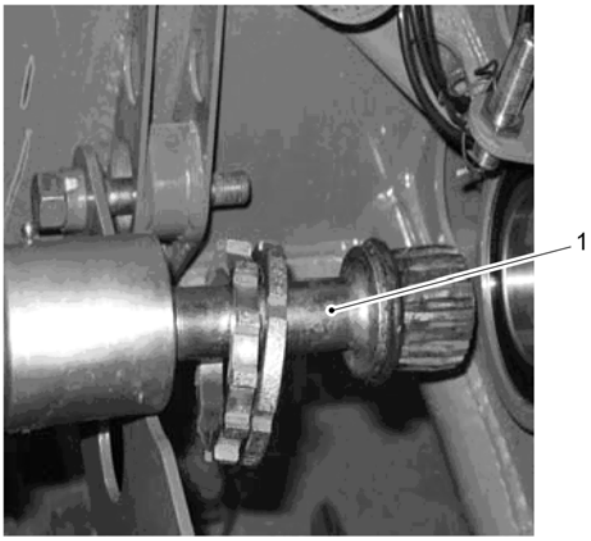
59 Install the rear wheel. Refer to Cat 201.

60 Carefully lower the vehicle to the ground.

DRIVESHAFT REPLACEMENT

Removal

61 Remove the final drive unit. Refer to Para 30.



1 Driveshaft

Fig 22 Driveshaft (RH)

62 Remove the speedometer ring (RH side only) and final drive nut.

63 Remove the driveshaft (Fig 22 (1)) from the transmission.

Installation

64 Install the driveshaft (1) to the transmission.

65 Install the final drive unit. Refer to Para 43.

TRANSMISSION REPLACEMENT

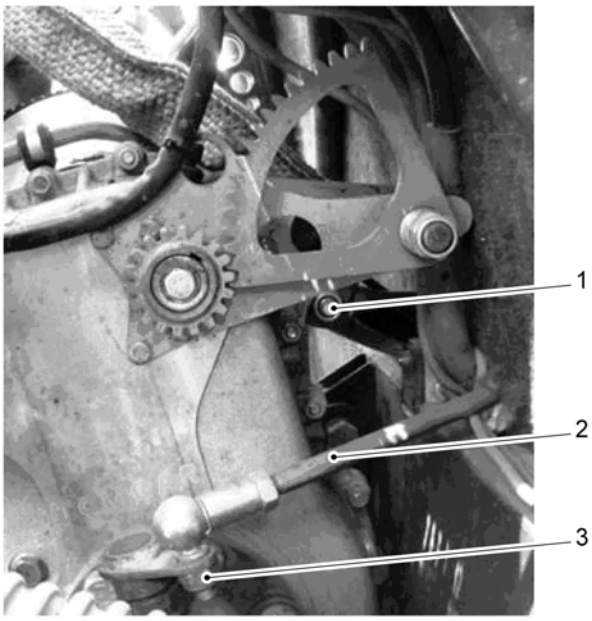
Removal

66 Raise the rear of the vehicle and secure on suitable stands. Remove both rear wheels. Refer to Cat 201.

67 Remove both final drive units. Refer to Para 30.

68 Remove the transmission CVT. Refer to Para 19.

69 Remove the exhaust system. Refer to Chap 1.

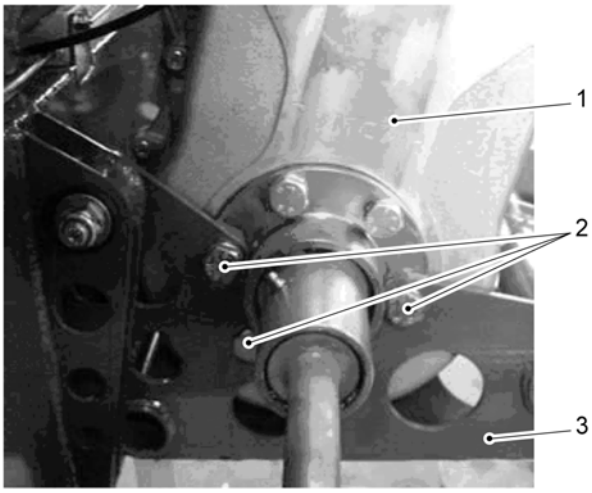


1 Nut
2 Differential lock operating arm
3 Nut

Fig 23 Transmission control connections

70 Remove the nut (Fig 23 (1)) and disconnect the gear lever connection from the transmission.

71 Remove the nut (3) and disconnect the differential lock operating arm (2) from the transmission.



1 Transmission
2 Bolts
3 Cradle

Fig 24 Transmission mountings (LH)

72 Remove six bolts (Fig 24 (2)) (three per side) and remove the transmission (1) from the cradle (3). Using suitable lifting equipment, lift the transmission clear of the vehicle.

73 Using suitable lifting equipment, position the transmission in the vehicle. Install the transmission (1) to the cradle (3) with six bolts (2) (three per side) and tighten securely.

74 Connect the differential lock operating arm (Fig 23 (2)) to the transmission with nut (3) and tighten securely.

75 Connect the gear lever connection to the transmission with nut (1) and tighten securely.

76 Install the exhaust system. Refer to Chap 1.

77 Install the transmission CVT. Refer to Para 22.

78 Install both final drive units. Refer to Para 43.

79 Install both rear wheels. Refer to Cat 201. Lower the vehicle carefully to the ground.

80 Check that the gear lever is adjusted correctly as detailed in Para 82.

GEAR LEVER ADJUSTMENT

81 Make sure that the gear lever is in neutral and start the engine. Refer to Cat 201.

82 With the engine idling slowly, move the gear lever from neutral towards high, but do not fully engage high.

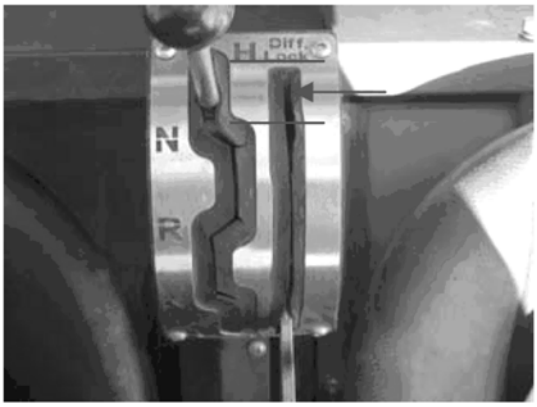


Fig 25 Position A

83 Pay close attention to the point when the gears just start to engage, and note where the lever is positioned on the gear selector plate (Fig 25). Do this several times if necessary.

84 With the engine idling slowly, move the gear lever from neutral towards low, but do not fully engage high.

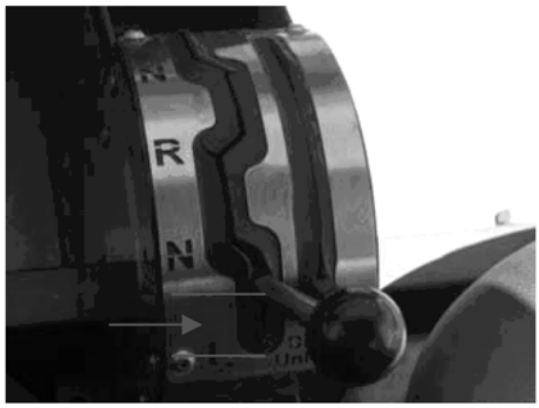
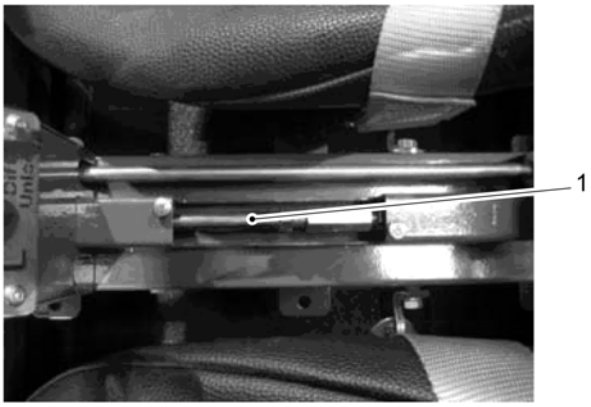


Fig 26 Position B

85 Pay close attention to the point when the gears just start to engage, and note where the lever is positioned on the gear selector plate (Fig 26). Do this several times if necessary.

86 The distances shown at position A and position B must be the same.



1 Connecting rod

Fig 27 Gear lever connecting rod

87 Access the connecting rod (Fig 27 (1)) between the seats and make adjustments as required until the gear engagement points are correct.

CVT BELT TENSION

WARNING

PERSONNEL INJURY. SET THE MASTER ISOLATOR SWITCH TO OFF (REFER TO CAT 201) TO PREVENT THE ENGINE BEING STARTED WHILE PERSONNEL ARE WORKING ON THE MACHINE.

88 Position the vehicle on a firm level surface and engage the parking brake.

89 Stop the engine, remove the ignition key and turn the master isolator switch to off.

90 The gap should be 5-7 cm (2.0-2.9in) measured at midpoint between the two CVT pulleys (Fig 28).

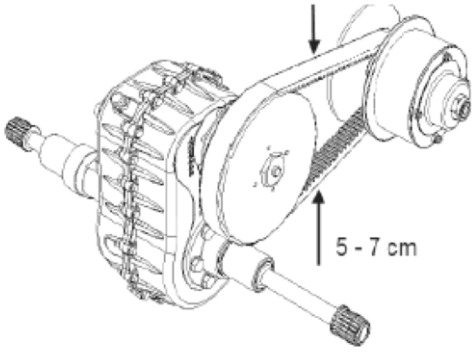
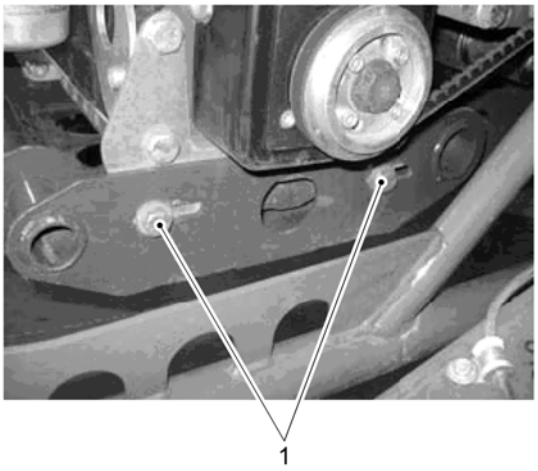


Fig 28 CVT Belt tension

91 If the belt tension needs to be adjusted, proceed as follows:

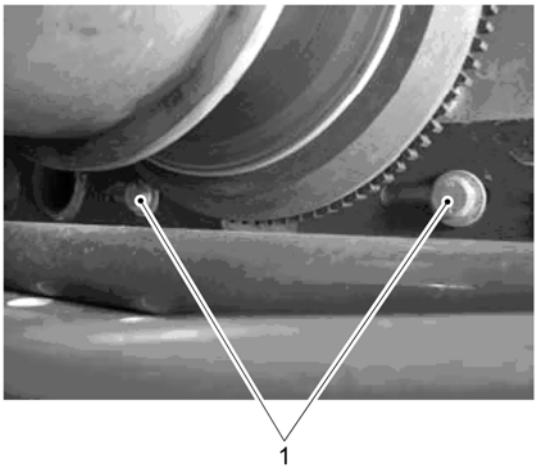
91.1 Loosen the two right side engine mount bolts (Fig 29 (1)).



1 Bolts

Fig 29 Engine mounting bolts (RH)

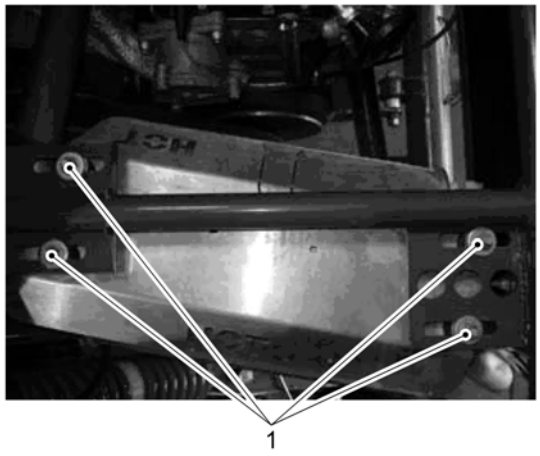
91.2 Loosen the two left side engine mount bolts (Fig 30 (1)).



1 Bolts

Fig 30 Engine mounting bolts (LH)

91.3 Loosen the four exhaust nuts (Fig 31 (1)).



1 Nuts

Fig 31 Exhaust nuts

91.4 Move engine forward or backwards until correct belt tension is reached.

91.5 Tighten all nuts and bolts

92 Run the engine for a short period to allow the CVT belt to 'run in'. Stop the engine and recheck the belt tension. Refer to Para 90.

CHAPTER 6

SUSPENSION

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30 Installation
33 Shock Absorber Preload Adjustment

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INTRODUCTION

1 This chapter covers failure diagnosis and maintenance instructions for the suspension on the Springer Vehicle at Level 2.

2 Ensure the parking brake is engaged and/or the wheels are securely chocked and the transmission set to neutral (N), the engine switched OFF with the ignition key removed and the rear cargo bay lifted as detailed in Cat 201. These tasks are assumed to have been completed prior to commencing the relevant task.

3 Many of the tasks detailed in this chapter require the application of techniques and practices commonly employed in an engineering environment. These actions, together with associated checks to confirm serviceability of these items, are assumed to be within the scope of general engineering principles and not covered in depth.

Scope of repairs

4 The tasks that can be carried out at this level comprise the following:

4.1 Shock Absorber Replacement

4.2 Load Compensator Replacement

4.3 Shock Absorber Preload Adjustment

Special tools and test equipment

5 The Special Tools and Test Equipment (STTE) required to carry out the tasks detailed in this chapter are listed in Table 1.

TABLE 1 SPECIAL TOOLS AND TEST EQUIPMENT

Serial (1)	NSN/Part No. (2)	Designation (3)
1	5120-99-290-6652	C-spanner for shock absorber

Sealants, adhesives and lubricants

6 There are no sealants, adhesives and lubricants required to carry out the tasks detailed in this chapter.

FAILURE DIAGNOSIS

GENERAL

7 The following failure diagnosis tables are applicable to the suspension.

TABLE 2 SHOCK ABSORBER

Serial (1)	Cause (2)	Remedy (3)
1	No damping	Replace the shock absorber
2	Oil leak visible	Replace the shock absorber

MAINTENANCE INSTRUCTIONS

WARNINGS

(1) PERSONAL INJURY. CRUSH HAZARD; A MACHINE CAN SINK INTO SOFT GROUND. NEVER WORK UNDER AN UNSUPPORTED MACHINE ON SOFT GROUND.

(2) PERSONAL INJURY. CRUSH HAZARD; UNLESS THE WHEELS HAVE BEEN CHOCKED A MACHINE CAN ROLL OFF A JACK. ALWAYS CHOCK THE WHEELS AT THE OPPOSITE END OF THE MACHINE THAT IS TO BE JACKED. DO NOT WORK UNDERNEATH A MACHINE SUPPORTED ONLY BY JACKS. ALWAYS SUPPORT A JACKED-UP MACHINE ON AXLE STANDS BEFORE WORKING UNDERNEATH IT.

(4) PERSONNEL INJURY. SET THE MASTER ISOLATOR SWITCH TO OFF (REFER TO CAT 201), TO PREVENT THE ENGINE BEING STARTED WHILE YOU ARE BENEATH THE MACHINE.

(3) WEIGHT WARNING. HEAVY WEIGHT; IF THE WEIGHT OF AN ITEM EXCEEDS 15KG THERE IS A RISK OF INJURY DURING MANUAL HANDLING OPERATIONS. PRIOR TO INSTALLATION A RISK ASSESSMENT MUST BE CARRIED OUT LOCALLY TO ENSURE SAFE WORKING PRACTICES AND PROCEDURES. REFER TO DEF STAN 00-25 (PART 14) AND LOCAL INSTRUCTIONS.

CAUTIONS

(1) ENVIRONMENTAL DAMAGE. Pollution; it is illegal to pollute drains, sewers or the ground. Clean up all spilt fluids and/or lubricants. Used fluids and/or lubricants and contaminated materials must be disposed of in accordance with local regulations.

(2) EQUIPMENT DAMAGE. Solvents; cleaning metal parts with incorrect solvents can cause corrosion. Use only recommended cleaning agents and solvents.

(3) EQUIPMENT DAMAGE. Badly fitted, damaged or rotted O-rings, seals and gaskets can cause leakages and possible accidents. O-rings, seals and gaskets are to be renewed whenever disturbed unless otherwise instructed.

SHOCK ABSORBER REPLACEMENT

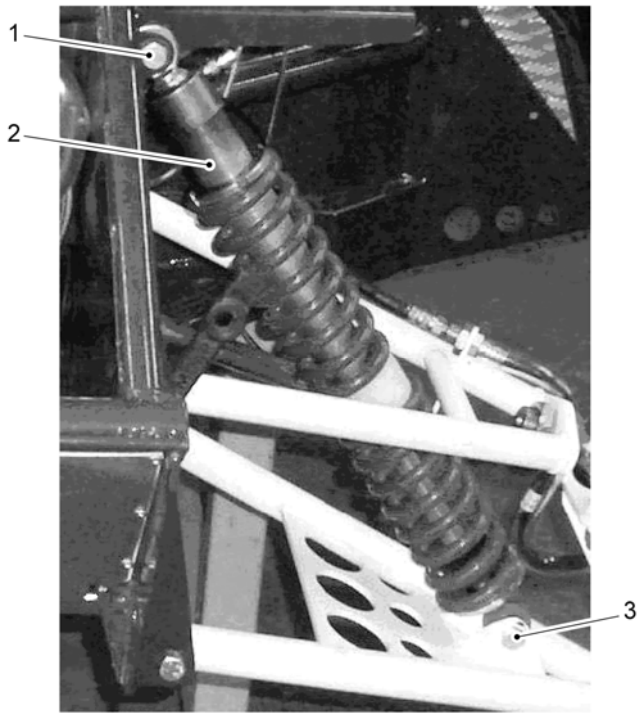
Front

Removal

8 Raise and properly support the vehicle. Remove the front wheel. Refer to Cat 201.

9 Remove the bolt (Fig 1 (1)) and nut at the top of the shock absorber (2).

10 Remove the bolt (3) and nut at the bottom of the shock absorber (2).



1 Bolt
2 Shock absorber
3 Bolt

Fig 1 Shock absorber - front

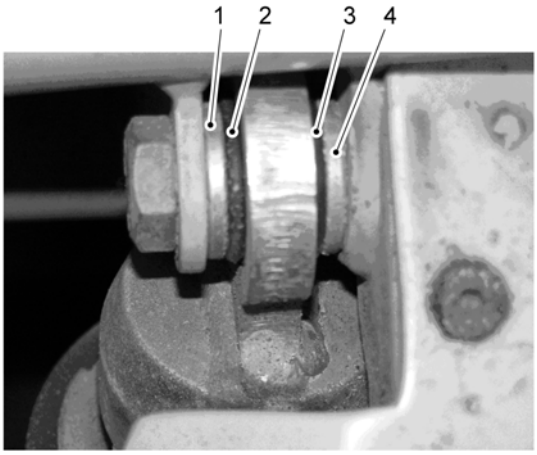
NOTE

If there is a problem removing the shock absorber out of the A-arm area; disconnect the lower A-arm from the lower ball-joint (refer to Chap 4), this will provide more clearance.

11 Remove the shock absorber from the vehicle.

NOTE

When removing a shock absorber remove the o-rings (Fig 2 (2)) and (3) and bushings (1) and (4) before removing the shock absorber.



1 Bushing
2 O-ring
3 O-ring
4 Bushing

Fig 2 O-rings and bushings

Installation

NOTE

When installing the shock absorber, install the bushings (1) and (4) and o-rings (2) and (3) just before you set the shock absorber into the mounts.

12 Install the shock absorber onto the vehicle.

13 If the lower A-arm has been disconnected, refit it. Refer to Chap 4.

14 Install the bolt (1) and nut at the top of the shock absorber (2).

15 Install the bolt (3) and nut at the bottom of the shock absorber (2).

16 Tighten securely.

17 Refit the wheel. Carefully lower the vehicle to the ground.

Rear

Removal

18 Raise and support the vehicle on suitable axle stands. Remove the rear wheel. Refer to Cat 201.

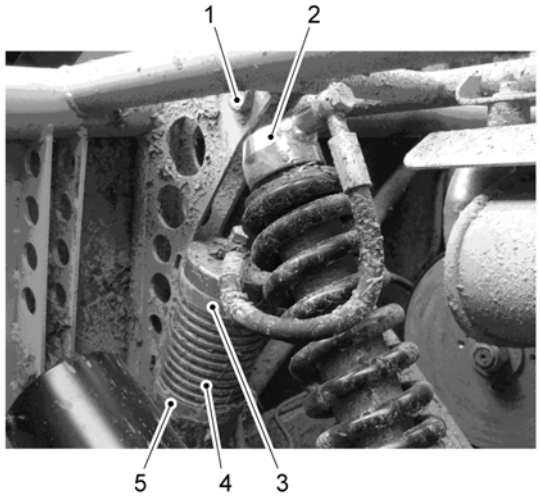
19 Remove the nut (Fig 3 (1)) and bolt (2) from the bottom end of the shock absorber.

1 Nut
2 Bolt

Fig 3 Shock absorber - rear

20 Undo clamps (Fig 4 (3)) and (5).

21 Remove bolt (1) and nut. Remove shock absorber (2) from vehicle together with air reservoir (4).



1 Bolt
2 Shock absorber
3 Clamp
4 Air reservoir
5 Clamp

Fig 4 Shock absorber - rear

Installation

22 Install shock absorber (2) to vehicle with bolt (1) and nut.

23 Install air reservoir (4) to vehicle with clamps (3) and (5).

24 Install the nut (Fig 3 (1)) and bolt (2) to the bottom end of the shock absorber.

25 Tighten top and bottom bolts securely.

26 Tighten the clamps (Fig 4 (3)) and (5).

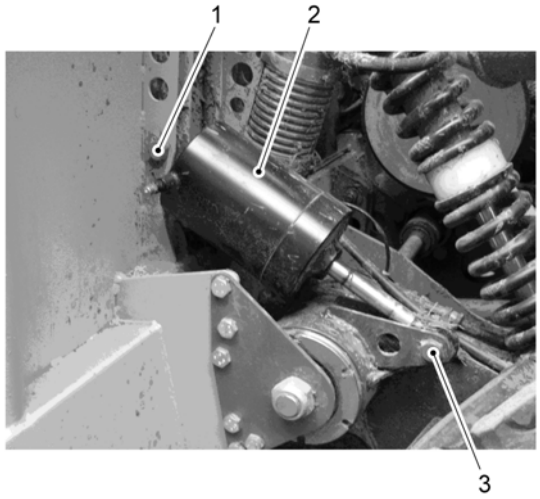
27 Refit the wheel. Carefully lower the vehicle to the ground.

LOAD COMPENSATOR REPLACEMENT

Removal

28 Raise and properly support the vehicle. Remove the rear wheel. Refer to Cat 201.

29 Remove bolts (Fig 5 (1)) and (3) with nuts. Remove the load compensator (2) from the vehicle.



1 Bolt
2 Load compensator
3 Bolt

Fig 5 Load compensator

Installation

30 Install the load compensator (2) to the vehicle with bolts (1) and (3) and nuts.

31 Tighten bolts securely.

32 Refit the wheel. Carefully lower the vehicle to the ground.

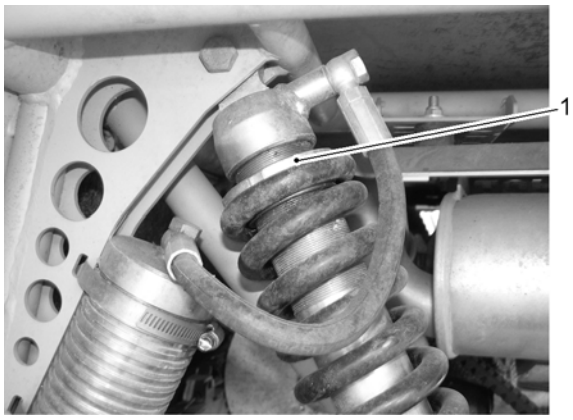
SHOCK ABSORBER PRELOAD ADJUSTMENT

33 The spring preload of each shock absorber may be adjusted by using the C-spanner (Table 1, Serial 1) to turn the adjuster ring (Fig 6 (1)) front, (Fig 7 (1)) rear, of the shock absorber.

34 Count the number of threads visible above the adjuster ring, and ensure that both front shock absorbers have an equal number of threads visible, and both rear shock absorbers have an equal number of threads visible.

1 Adjuster ring

Fig 6 Adjuster ring - front



1 Adjuster ring

Fig 7 Adjuster ring - rear

CHAPTER 7

COOLING SYSTEM

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INTRODUCTION

1 This chapter covers failure diagnosis and maintenance instructions for the cooling system on the Springer Vehicle at Level 2.

2 Ensure the parking brake is engaged and/or the wheels are securely chocked and the transmission set to neutral (N), the engine switched OFF with the ignition key removed and the rear cargo bay lifted as detailed in Cat 201. These tasks are assumed to have been completed prior to commencing the relevant task.

3 Many of the tasks detailed in this chapter require the application of techniques and practices commonly employed in an engineering environment. These actions, together with associated checks to confirm serviceability of these items, are assumed to be within the scope of general engineering principles and not covered in depth.

Scope of repairs

4 The tasks that can be carried out at this level comprise the following:

4.1 Radiator Replacement.

4.2 Radiator cap inspection.

4.3 Cooling system pressure test.

Special tools and test equipment

5 There are no Special Tools and Test Equipment (STTE) required to carry out the tasks detailed in this chapter.

Sealants, adhesives and lubricants

6 There are no sealants, adhesives and lubricants required to carry out the tasks detailed in this chapter.

FAILURE DIAGNOSIS

GENERAL

7 The following failure diagnosis tables are applicable to the cooling system.

TABLE 1 COOLING SYSTEM

Serial (1)	Cause (2)	Remedy (3)
1	Radiator clogged	Clean the radiator
2	Coolant leaking from the couplings	Check all couplings, replace if necessary, tighten the clamps, refill with coolant
3	Coolant level low	Check for reason, refill with coolant
4	Fan broken	Replace the fan

TABLE 2 COOLANT LEAKING

Serial (1)	Cause (2)	Remedy (3)
1	Perforated radiator	Replace the radiator
2	Perforated coupling	Replace the coupling
3	Due to overheating	Look for the cause as detailed above

TABLE 3 COOLANT LEAKING FROM OVERFLOW BOTTLE

Serial (1)	Cause (2)	Remedy (3)
1	Coolant overheating	Look for the cause as detailed above
2	Coolant level too high	Remove coolant to correct level

MAINTENANCE INSTRUCTIONS

WARNINGS

(1) PERSONAL INJURY. ROTATING PARTS; THE ENGINE HAS EXPOSED ROTATING PARTS. DO NOT OPEN THE ENGINE COVER WHILE THE ENGINE IS RUNNING. DO NOT OPERATE THE MACHINE WITH THE COVER OPEN.

(2) PERSONAL INJURY. CRUSH HAZARD; A MACHINE CAN SINK INTO SOFT GROUND. NEVER WORK UNDER AN UNSUPPORTED MACHINE ON SOFT GROUND.

(3) PERSONAL INJURY. SCALDING HAZARD; DO NOT REMOVE THE ENGINE COOLANT FILLER CAP IF THE TEMPERATURE OF HEADER TANK IS ABOVE HAND HOT.

(4) PERSONAL INJURY. CRUSH HAZARD; UNLESS THE WHEELS HAVE BEEN CHOCKED A MACHINE CAN ROLL OFF A JACK. ALWAYS CHOCK THE WHEELS AT THE OPPOSITE END OF THE MACHINE THAT IS TO BE JACKED. DO NOT WORK UNDERNEATH A MACHINE SUPPORTED ONLY BY JACKS. ALWAYS SUPPORT A JACKED-UP MACHINE ON AXLE STANDS BEFORE WORKING UNDERNEATH IT.

(5) PERSONAL INJURY. BURN HAZARD; ENSURE THAT THE ENGINE IS SAFE TO WORK ON. IF THE ENGINE HAS BEEN RUNNING, ENSURE THE ENGINE HAS COOLED SUFFICIENTLY BEFORE CARRYING OUT WORK.

(6) PERSONNEL INJURY. SET THE MASTER ISOLATOR SWITCH TO OFF (REFER TO CAT 201), TO PREVENT THE ENGINE BEING STARTED WHILE YOU ARE BENEATH THE MACHINE.

(7) PERSONAL INJURY. CRUSH HAZARD; UNDER NO CIRCUMSTANCES MUST THE ENGINE BE RUN WITH THE TRANSMISSION IN GEAR AND ONLY ONE DRIVING WHEEL JACKED CLEAR OF THE GROUND, AS THE WHEEL ON THE GROUND WILL MOVE THE MACHINE.

(8) WEIGHT WARNING. HEAVY WEIGHT; IF THE WEIGHT OF AN ITEM EXCEEDS 15KG THERE IS A RISK OF INJURY DURING MANUAL HANDLING OPERATIONS. PRIOR TO INSTALLATION A RISK ASSESSMENT MUST BE CARRIED OUT LOCALLY TO ENSURE SAFE WORKING PRACTICES AND PROCEDURES. REFER TO DEF STAN 00-25 (PART 14) AND LOCAL INSTRUCTIONS.

CAUTIONS

(1) ENVIRONMENTAL DAMAGE. Pollution; it is illegal to pollute drains, sewers or the ground. Clean up all spilt fluids and/or lubricants. Used fluids and/or lubricants and contaminated materials must be disposed of in accordance with local regulations.

(2) EQUIPMENT DAMAGE. Solvents; cleaning metal parts with incorrect solvents can cause corrosion. Use only recommended cleaning agents and solvents.

(3) EQUIPMENT DAMAGE. Badly fitted, damaged or rotted O-rings, seals and gaskets can cause leakages and possible accidents. O-rings, seals and gaskets are to be renewed whenever disturbed unless otherwise instructed.

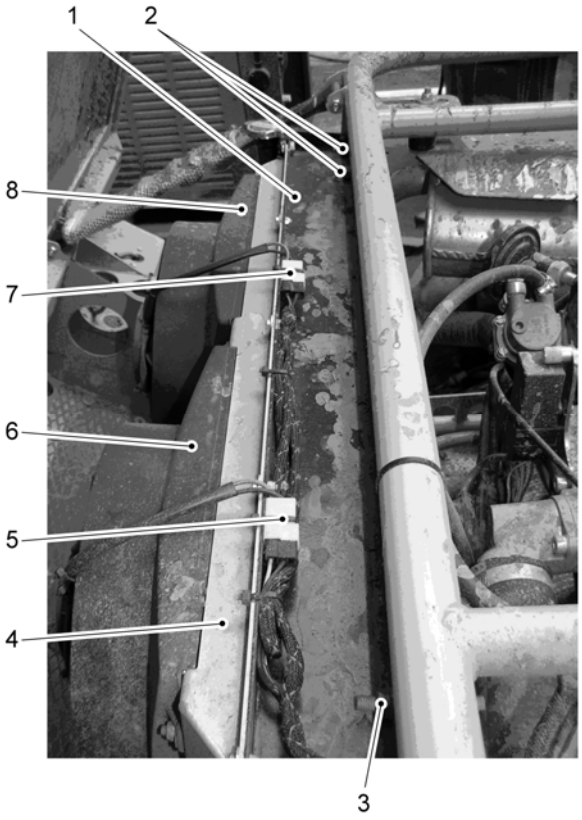
RADIATOR REPLACEMENT

Removal

8 Drain the coolant. Refer to Cat 201.

9 Remove and discard all cable ties from top of radiator (Fig 1 (1)). Label and disconnect electrical connectors (5) and (7). Move cables to one side.

10 Support the radiator from below. Remove four bolts (2) and (3) from the top corners of the radiator. Remove two bolts (not shown) from the bottom corners of the radiator. Lift the radiator away from the vehicle.



1	Radiator	5	Electrical connector
2	Bolts	6	Fan
3	Bolts	7	Electrical connector
4	Fan cowl	8	Fan

Fig 1 Radiator

11 Remove the fans (6) and (8) and fan cowl (4) from the radiator.

Installation

12 Install the fans (6) and (8) and fan cowl (4) to the radiator.

13 Position the radiator on the vehicle. Install the radiator to the vehicle with four bolts (2) and (3) at the top corners of the radiator and two bolts (not shown) at the bottom corners of the radiator.

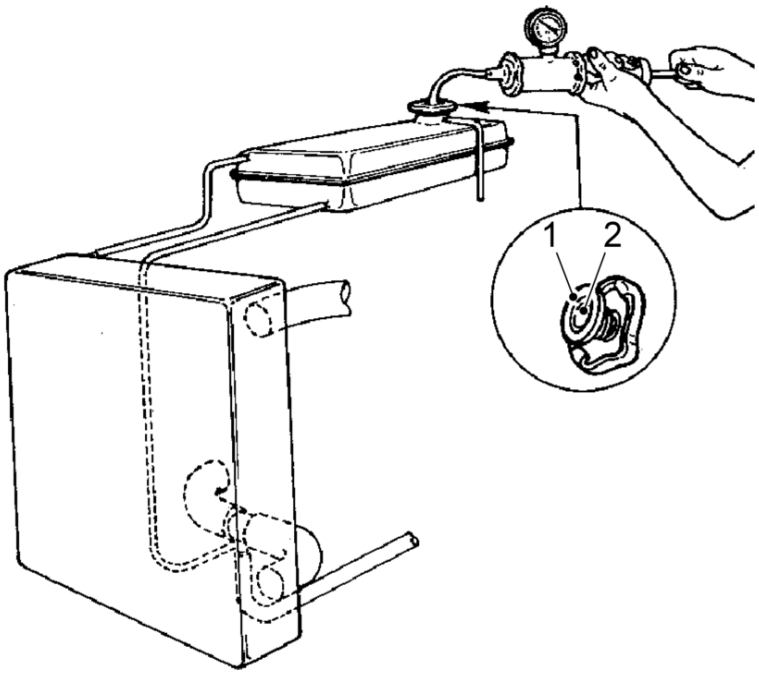
14 Remove labels and connect electrical connectors (5) and (7). Install new cable ties along the top of radiator (1).

15 Refill the cooling system with fresh coolant. Refer to Cat 201.

COOLING SYSTEM PRESSURE CHECK / RADIATOR CAP INSPECTION

16 Pressure checking the cooling system is the only reliable method of determining the source of coolant leaks and the condition of the radiator, hoses and coolant pump seals.

17 The radiator cap controls the cooling system operating pressure, and as such must be inspected regularly.



1 Vacuum valve
2 Relief valve

Fig 2 Radiator and expansion tank

Radiator cap

18 Replace the cap if any degradation is seen on the vacuum valve seal or the pressure relief seal, or if the cap is bent, deformed or damaged.

19 Inspect the vacuum valve (Fig 2 (1)) and relief valve (2). Fit the radiator cap onto a suitable radiator cap testing fixture.

CAUTION

EQUIPMENT DAMAGE. The recommended radiator cap relief setting is 0.7 bar (10.1 psi). Do not operate the engine with a pressure cap of higher or lower setting installed.

20 Pressurise to 0.7 bar (10.1 psi) to ensure that the radiator cap holds the rated pressure. Replace the cap if 0.7 bar (10.1 psi) cannot be reached before pressure relief.

Radiator cap seat

21 The sealing ability of the radiator cap depends on the condition of the radiator or expansion tank seat. Inspect and replace / repair as required.

Cooling system pressure test

22 Fill the cooling system completely with the correct coolant. Refer to Cat 601.

23 Fit a cooling system pressurising device to the cooling system filler. Pressurise the cooling system to 0.7 bar (10.1 psi). The pressure should hold steady. If the pressure does not hold at 0.7 bar (10.1 psi), inspect the cooling system for leaks at all joints, hoses and the coolant pump. Tighten, repair or replace as required.

CHAPTER 8

BODY AND FRAMEWORK

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5 Special tools and test equipment
6 Sealants, adhesives and lubricants
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7 General
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8 Mirror Replacement
9 Removal
11 Installation
14 Cargo Bay Tie-Down Replacement
15 Removal
18 Installation
20 Front Wing Replacement
21 Removal
24 Installation
25 Winch Rope Replacement (CAUTION)
Door
27 Replacement
31 Latch Replacement
32 Removal
34 Installation
Spare Wheel Carrier Replacement
35 Removal
37 Installation

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4 Cargo tie-down 5
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INTRODUCTION

1 This chapter covers failure diagnosis and maintenance instructions for the body and framework fitted to the Springer Vehicle at Level 2.

2 Ensure the parking brake is engaged and/or the wheels are securely chocked and the transmission set to neutral (N), the engine switched OFF with the ignition key removed. These tasks are assumed to have been completed prior to commencing the relevant task.

3 Many of the tasks detailed in this chapter require the application of techniques and practices commonly employed in an engineering environment. These actions, together with associated checks to confirm serviceability of these items, are assumed to be within the scope of general engineering principles and not covered in depth.

Scope of repairs

4 The tasks that can be carried out at this level comprise the following:

4.1 Mirror Replacement

4.2 Front Wing Replacement

4.3 Cargo Bay Tie-Down Replacement

4.4 Spare Wheel Carrier Replacement

Special tools and test equipment

5 There are no Special Tools and Test Equipment (STTE) required to carry out the tasks detailed in this chapter.

Sealants, adhesives and lubricants

6 There are no sealants, adhesives and lubricants required to carry out the tasks detailed in this chapter.

FAILURE DIAGNOSIS

GENERAL

7 There are no failure diagnosis procedures applicable to the body and framework.

MAINTENANCE INSTRUCTIONS

WARNINGS

(1) PERSONAL INJURY. ROTATING PARTS; THE ENGINE HAS EXPOSED ROTATING PARTS. DO NOT OPEN THE ENGINE COVER WHILE THE ENGINE IS RUNNING. DO NOT OPERATE THE MACHINE WITH THE COVER OPEN.

(2) PERSONAL INJURY. CRUSH HAZARD; A MACHINE CAN SINK INTO SOFT GROUND. NEVER WORK UNDER AN UNSUPPORTED MACHINE ON SOFT GROUND.

(3) PERSONAL INJURY. CRUSH HAZARD; UNLESS THE WHEELS HAVE BEEN CHOCKED A MACHINE CAN ROLL OFF A JACK. ALWAYS CHOCK THE WHEELS AT THE OPPOSITE END OF THE MACHINE THAT IS TO BE JACKED. DO NOT WORK UNDERNEATH A MACHINE SUPPORTED ONLY BY JACKS. ALWAYS SUPPORT A JACKED-UP MACHINE ON AXLE STANDS BEFORE WORKING UNDERNEATH IT.

(4) PERSONAL INJURY. BURN HAZARD; ENSURE THAT THE ENGINE IS SAFE TO WORK ON. IF THE ENGINE HAS BEEN RUNNING, ENSURE THE ENGINE HAS COOLED SUFFICIENTLY BEFORE CARRYING OUT WORK.

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(3) EQUIPMENT DAMAGE. Badly fitted, damaged or rotted O-rings, seals and gaskets can cause leakages and possible accidents. O-rings, seals and gaskets are to be renewed whenever disturbed unless otherwise instructed.

MIRROR REPLACEMENT

8 Both mirrors are removed and installed in the same way.

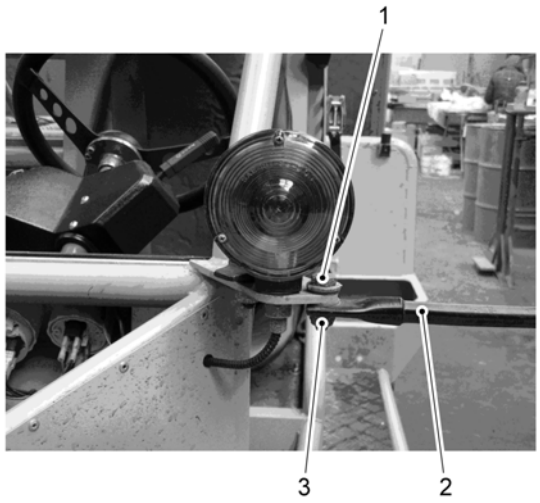
Removal

9 Loosen nut (Fig 1 (2)) to undo clamp (3) and remove mirror (4) from mirror arm (1).

1 Bolt
2 Mirror arm
3 Nut

Fig 1 Mirror (RH)

10 Remove bolt (Fig 2 (1)), nut (3) and washers. Remove mirror arm (2) from vehicle.



1 Bolt
2 Mirror arm
3 Nut

Fig 2 Mirror arm mount (LH)

Installation

11 Position mirror arm (2) on vehicle. Install mirror arm to vehicle with bolt (1), nut (3) and washers.

12 Install mirror (Fig 1 (4)) to mirror arm (1). Move to required position.

13 Tighten nut (2) to tighten clamp (3) and secure mirror (4) in position.

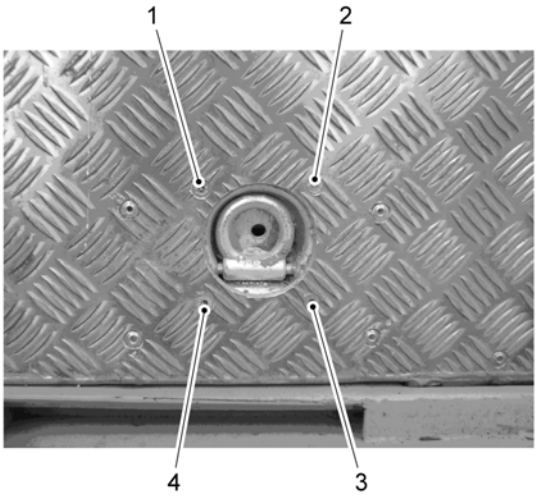
CARGO BAY TIE-DOWN REPLACEMENT

14 All cargo bay tie-downs are removed and installed in the same way.

Removal

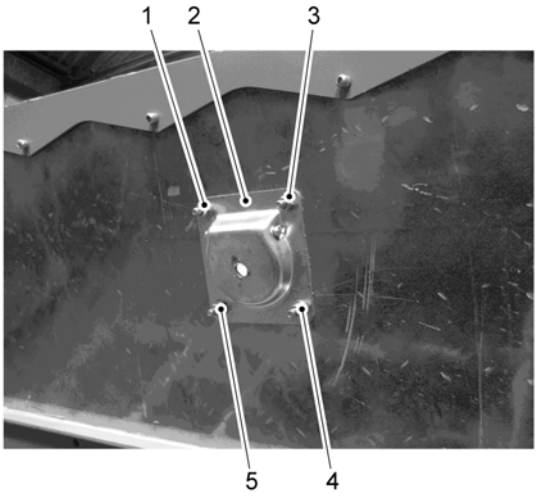
15 Raise the cargo bay. Refer to Cat 201.

16 Remove four allen screws (Fig 3 (1)) to (4) with four nuts (Fig 4 (1)), (3), (4) and (5).



1 - 4 Allen screws

Fig 3 Cargo tie-down



1	Nut	4	Nut
2	Cargo tie-down	5	Nut
3	Nut		

Fig 4 Cargo tie-down

17 Remove the cargo tie-down (Fig 4 (2)) from underside of cargo bay.

Installation

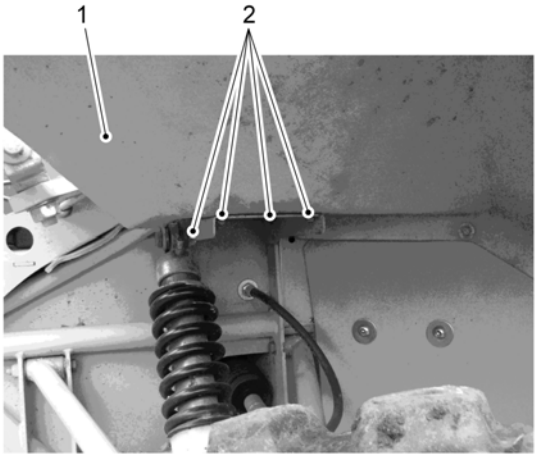
18 Install the cargo tie-down (2) to the underside of the cargo bay with four nuts (1), (3), (4) and (5) and four allen screws (Fig 3 (1)) to (4).

19 Close and secure the cargo bay. Refer to Cat 201.

FRONT WING REPLACEMENT

20 Both front wings are removed and installed in the same way.

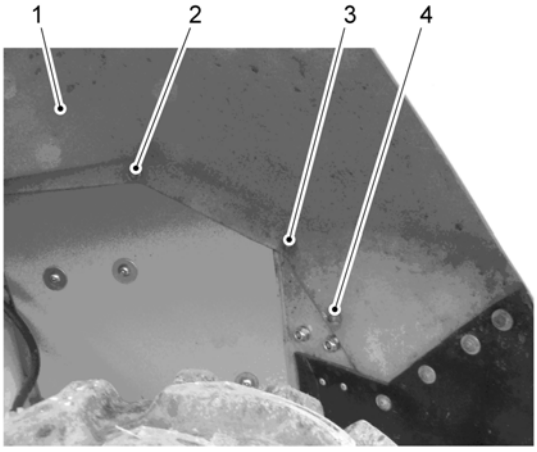
Removal



1 Wing
2 Nuts

Fig 5 Front wing mountings (LH)

21 Remove four nuts (Fig 5 (2)).



1 Wing
2 Bolt
3 Bolt
4 Bolt

Fig 6 Front wing mountings (LH)

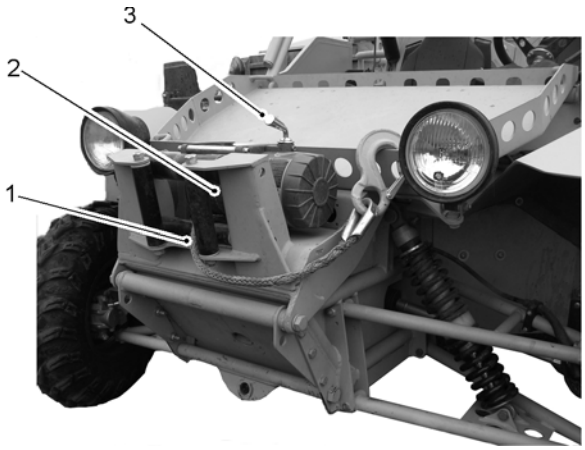
22 Remove three bolts (Fig 6 (2)), (3) and (4) and washers.

23 Lift the wing away from the vehicle.

Installation

24 Position the wing on the vehicle. Install the wing to the vehicle using three bolts (2), (3) and (4) with washers. Install four nuts (Fig 5 (2)). Tighten securely.

WINCH ROPE REPLACEMENT



1 Rope
2 Drum
3 Free spooling clutch lever

Fig 7 Winch

CAUTION

EQUIPMENT DAMAGE. Only authorised replacement rope must be used.

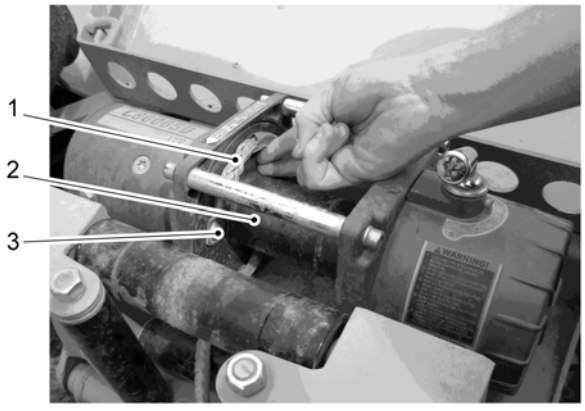
25 If the rope (Fig 7 (1)) has become worn or is beginning to show signs of strands breaking, it must be replaced before being used again.

26 To replace the rope, proceed as follows:

26.1 Manually disengage the spooling drum from the gear train by moving the free spooling clutch lever (3) to "Out". Remove the defective rope by hand.

26.2 Remove the bolt (Fig 8 (3)) from the drum (2) and release the rope (1).

26.3 Insert the end of the new rope (1) and install the bolt (3) tightly.



1 Rope
2 Drum
3 M6 x 10 mm bolt

Fig 8 Winch drum

26.4 Make sure that there is slack in the rope (Fig 8 (1)). Manually turn the drum (2) to add two turns of rope (Fig 9), keeping the slack in the rope as shown (Fig 8). Make sure that the rope is re-spooling in the "under wind" position.

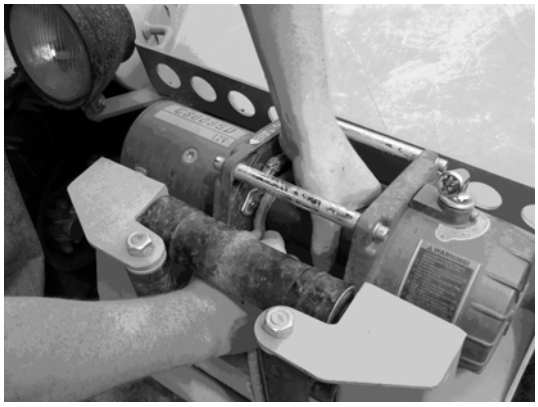


Fig 9 Manually turn the winch drum

26.5 Engage the clutch by moving the free spooling clutch lever (Fig 7 (3)) to "In". Keep slack rope at the anchor point (Fig 10 (1)) and pull the two turns of rope (2) tight on the drum.

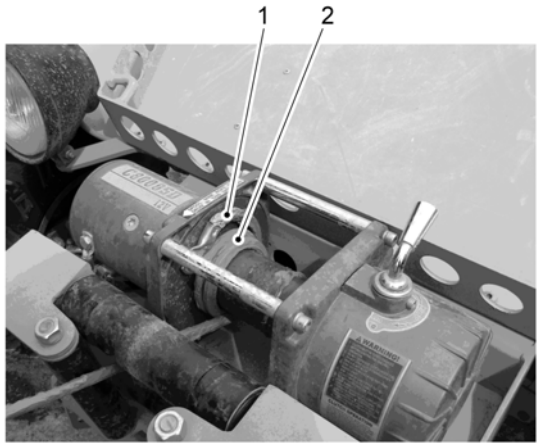


Fig 10 Pull the rope tight

26.6 Disengage the clutch by moving the free spooling clutch lever (Fig 7 (3)) to "Out" and manually turn the drum to add two more turns of rope.

26.7 Engage the clutch by moving the free spooling clutch lever (Fig 7 (3)) to "In". Keep slack rope at the anchor point (Fig 10 (1)) and pull the rope tight on the drum.

26.8 Disengage the clutch by moving the free spooling clutch lever (Fig 7 (3)) to "Out" and manually turn the drum to add two more turns of rope, making a total of six turns of rope on the drum.

26.9 Engage the clutch by moving the free spooling clutch lever (Fig 7 (3)) to "In". Keep slack rope at the anchor point (Fig 10 (1)) and pull the rope tight on the drum.

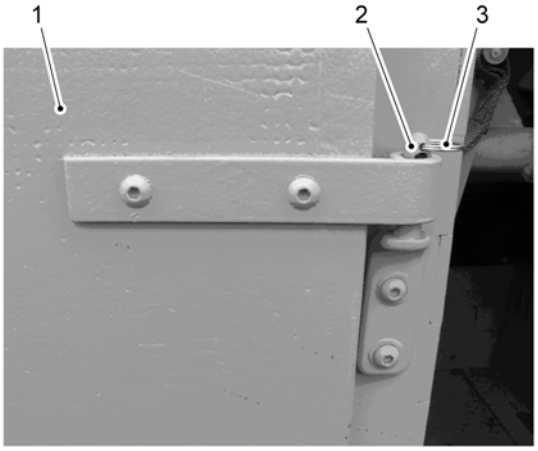
26.10 Operate the winch (refer to Cat 201) to re-spool the new rope on the drum, keeping tension on the rope as it spools.

DOOR

Replacement

27 Both doors are removed and installed in the same way.

28 Each door is secured to the vehicle by two hinge pins at the rear edge of the door (Fig 11).



1 Door
2 Hinge pin
3 Safety clip

Fig 11 Door hinge (LH)

29 To remove a door, proceed as follows:

29.1 Remove the safety clips (3) from top (2) and bottom (not shown) hinge pins.

29.2 Lift the door (1) off the hinge pins (2) and remove from the vehicle.

30 To install a door, proceed as follows:

30.1 With assistance, position the door on the vehicle. Make sure that the door sits securely over both hinge pins.

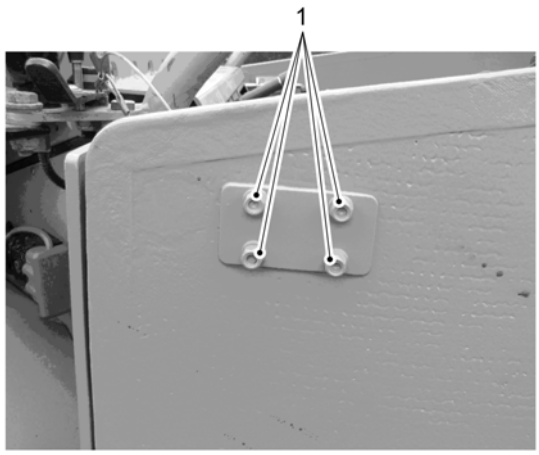
30.2 Fit safety clips to both hinge pins (Fig 11).

Latch Replacement

31 Both door latches are removed and installed in the same way.

Removal

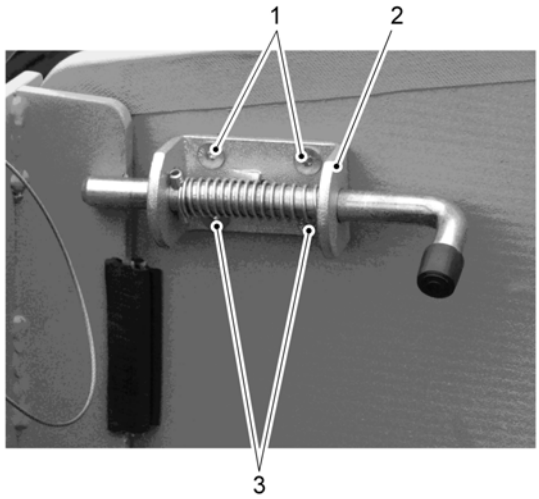
32 Remove four nuts (Fig 12 (1)) from the outside of the door.



1 Nuts

Fig 12 Door latch fixings (LH)

33 Remove four allen screws (Fig 13 (1)) and (3). Remove latch assembly (2) from door.



1 Allen screws
2 Latch assembly
3 Allen screws

Fig 13 Door latch (RH)

Installation

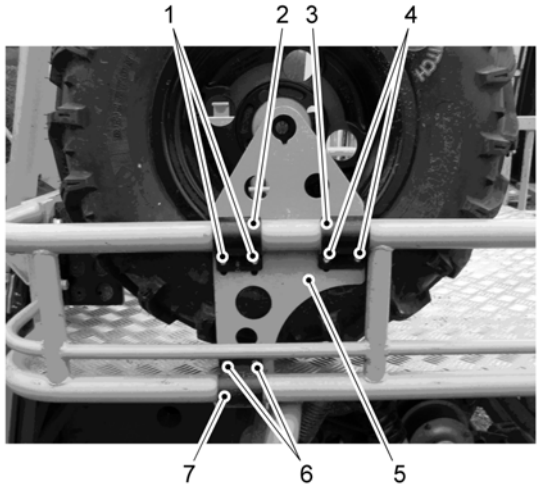
34 Install the door latch (2) to the door with four allen screws (1) and (3) and four nuts (Fig 12 (1)). Tighten securely.

SPARE WHEEL CARRIER REPLACEMENT

Removal

35 Remove the spare wheel. Refer to Cat 201.

36 Remove six bolts (Fig 14 (1)), (3) and (6) and remove three clamps (2), (4) and (7). Remove the spare wheel carrier (5) from the vehicle.



1	Bolts	5	Spare wheel carrier
2	Clamp	6	Bolts
3	Bolts	7	Clamp
4	Clamp		

Fig 14 Spare wheel carrier

Installation

37 The spare wheel carrier may be mounted to the rear cargo bay so that the spare wheel is carried 'inboard' or 'outboard' of the cargo bay.

38 Install the spare wheel carrier (5) to the cargo bay in the desired position with six bolts (1), (3) and (6) and three clamps (2), (4) and (7). Make sure that the clamps are secured fully around the cargo bay frame and tighten the bolts securely.

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AESP Form 10 (Issue 5.0 dated Dec 01)

SPRINGER VEHICLE

MAINTENANCE SCHEDULES

BY COMMAND OF THE DEFENCE COUNCIL

Ministry of Defence
Issued by
GSV IPT
U05V9

AMENDMENT RECORD

Amdt No.	Incorporated by (Signature)	Date
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MAINTENANCE SCHEDULE

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5 Definitions
6 Warnings, cautions and maintenance notes
7 Maintenance intervals and areas of responsibility

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PREFACE

Sponsor: GSV IPT
Project No.: UOR A01393
File Ref: SUV C1/0204

Publication Authority: GSV IPT

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.

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 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	101	101	*	*
	1	Equipment Support Policy Directive	111	111	*	*
2	0	Operating Information	201	*	*	*
	1	Aide-Memoiré	*	*	*	*
	2	Training Aids	*	*	*	*
3		Technical Description	201	*	*	*
4	1	Installation Instructions	*	*	*	*
	2	Preparation for Special Environments	*	*	*	*
5	1	Failure Diagnosis	*	522	*	*
	2	Maintenance Instructions	201	522	*	*
	3	Inspection Standards	*	*	*	*
	4	Calibration Procedures	*	*	*	*
6		Maintenance Schedules	601	*	*	*
7	1	Illustrated Parts Catalogues	*	*	*	*
	2	Commercial Parts Lists	721	721	*	*
	3	Complete Equipment Schedule, Production	*	*	*	*
	4	Complete Equipment Schedule, Service Edition (Simple Equipment)	741	*	*	*
	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 The following associated publications should be read in conjunction with this publication:

Reference	Title
AESP 0200-A-306-211	The REME Recovery Manual
AESP 0200-A-307-013	All Arms Equipment Recovery Manual
AESP 0200-A-602-013	Management and control of Equipment Support, Casting.
AESP 2300-A-050-013	Inspection and Certification of 'B' Vehicles.
AESP 2300-A-310-201	B Vehicle Corrosion Protection.
EMER T&M A028 Chap 157	Inspection and recovery equipment including hand operated winches, winches fitted to A, B and C vehicles, winch ropes, tow ropes, strops and round slings.
EMER T & M A028 Chap 158	Examination of Lighting Systems of Vehicles and Mobile Equipment
EMER T&M A028 Chap 650	Inspection and Testing of Lifting Equipment.
JSP 341	Road Transport Regulations
JSP 375 Vol 2	MOD Health and Safety Manual.
JSP 800 Vol 5	Defence Transport Regulations.
JSP 800 Vol 7	Joint Service Diagrams for Vehicle and Equipment Transportation.
JSP 866	Material Regulations for the Army.
LOLER 98	Lifting Operations and Lifting Equipment Regulations 1998
LSOPs	Local System Operating Procedures.

WARNINGS

6 The following WARNINGS and CAUTIONS are general observations applicable to this equipment and have been grouped for clarity of understanding. The list is not exhaustive and care is required at all times. The equipment must ONLY be operated by trained and competent personnel who have undertaken the relevant training package and the vehicle must ONLY be utilised within its design parameters.

Personal injury warnings:

(1) THE VEHICLE IS EQUIPPED WITH A 4-POINT HARNESS WHICH MUST BE WORN BY DRIVER AND PASSENGER WHEN USING THE VEHICLE.

(2) FAILURE TO EXERCISE CARE WHEN OPERATING ON SLIPPERY SURFACES CAN RESULT IN LOSS OF TRACTION, SUBSEQUENT LOSS OF CONTROL, ACCIDENT, SERIOUS INJURY OR DEATH.

(3) OPERATING THE VEHICLE ON HILLSIDES CAN BE DANGEROUS IF PROPER PRECAUTIONS ARE NOT TAKEN. OPERATE IN LOW RATIO ON HILLSIDES. REMAIN VIGILANT OF THE DIFFERING HANDLING CHARACTERISTICS DEPENDANT ON LOAD AND ANGLE OF TRAVERSE.

(4) IT IS THE OPERATORS RESPONSIBILITY TO ENSURE THAT LOADS ARE CARRIED SAFELY. LOADS WHICH ARE TOO HEAVY, UNBALANCED OR INSECURE CAN BE HAZARDOUS.

(5) ALWAYS ENSURE STRETCHERS ARE FULLY SECURE PRIOR TO MOVEMENT.

Maintenance warnings:

(1) OILS AND LUBRICANTS CAN BE CARCINOGENIC – AVOID DIRECT CONTACT WITH SKIN AND EYES. ALWAYS COMPLY WITH PRODUCT SAFETY AND MEDICAL CARE DATA AND PRACTICE GOOD HYGIENE.

(2) ALWAYS CHOCK THE VEHICLE PRIOR TO JACK LIFTING OPERATIONS AND NEVER WORK UNDER A VEHICLE THAT IS JUST SUPPORTED ON A JACK.

(3) ALWAYS ISOLATE AT THE MASTER SWITCH ON COMPLETION OF TASK AND PRIOR TO COMMENCING WORK UPON THE VEHICLE SYSTEMS.

(4) REMAIN VIGILANT OF HOT PARTS (EXHAUST, COOLANT ETC) WHEN UNDERTAKING MAINTENANCE.

(5) TYRES AND WHEELS ARE CRITICAL TO SAFETY, ALWAYS ENSURE CORRECT PRESSURES, WEAR LIMITS AND TORQUE SPECIFICATIONS ARE ADHERED TO.

(6) BATTERIES ARE AN EXPLOSIVE HAZARD AND CONTAIN ACID. EXTREME CAUTION IS TO BE EXERCISED ATALL TIMES.

(7) THE COMPRESSOR WILL BECOME VERY HOT DURING USE. DO NOT UTILISE WITHOUT PROPER PROTECTION.

Winch warnings:

(1) DO NOT ATTEMPT TO EXCEED THE MAXIMUM PULL RATING AND AVOID 'SHOCK LOADS'.

(2) DO NOT PERMIT THE 'RED' LEAD ROPE LENGTH TO LEAVE THE CAPSTAN OF THE WINCH.

(3) DO NOT ATTEMPT TO UTILISE THE WINCH FOR PURPOSES OTHER THAN THOSE UNDERTAKEN DURING TRAINING.

(4) KEEP ALL PERSONNEL AT A SAFE DISTANCE DURING WINCHING OPERATIONS.

(5) DO NOT STEP ON THE WINCH ROPE AT ANY TIME.

(6) ENSURE ALL WINCHING EQUIPMENT IS CHECKED FOR SERVICEABILITY AND SECURITY PRIOR TO COMMENCING WINCHING.

(7) WHEN PERFORMING WINCHING THAT REQUIRES THE ROPE TO GO THROUGH THE CAB AREA, THE WINCH MUST ONLY BE OPERATED REMOTELY FROM OUTSIDE THE CAB.

CAUTIONS

7 The following CAUTIONS are applicable to this equipment.

(1) EQUIPMENT DAMAGE. Incorrect use of the vehicle with the differential lock engaged can cause rollover. While the differential lock is engaged do not operate the vehicle at speeds greater than 17 kph (10 mph).

(2) EQUIPMENT DAMAGE. Do not operate the starter continuously for more than five seconds or the starter will overheat and the battery power will drop temporarily. Wait at least five seconds between each operation of the starter to allow it to cool and to allow battery power recovery.

(3) EQUIPMENT DAMAGE. Do not turn the ignition switch to the START position while the engine is running. Damage to the starter can result.

(4) EQUIPMENT DAMAGE. The booster (slave) supply must not be higher than that of the machine. Using a higher voltage supply will damage your machine's electrical system. Do not attempt to jump-start the engine without being sure of the voltage of the booster (slave) supply.

(5) EQUIPMENT DAMAGE. Do not attempt to change gear while the vehicle is moving or damage to the transmission could result. Always change gear when the vehicle is stationary and the engine is at idle. Make sure the lever is in the proper gear position.

(6) EQUIPMENT DAMAGE. Electric winches are designed and made for intermittent use and should not be used in constant duty applications.

(7) EQUIPMENT DAMAGE. Towing a vehicle too far or too fast can damage the transmission. Do not tow the vehicle further than one mile. Use a trailer for greater distances. When towing do not travel faster than 25 kph (15 mph).

(8) EQUIPMENT DAMAGE. The towing vehicle(s) must have enough pulling and braking power to move and stop the vehicle.

(9) EQUIPMENT DAMAGE. Always check and change the air filters at the intervals outlined in Cat 601.

(10) EQUIPMENT DAMAGE. Service the air filters more frequently if the vehicle is operated in wet or dusty conditions or at high throttle openings for extended periods.

(11) EQUIPMENT DAMAGE. Do not use pressurised air or solvents to clean filter. Pressurised air and solvents may damage filter.

(12) EQUIPMENT DAMAGE. Always replace fuses with ones of correct ampere rating to avoid electrical system damage.

(13) EQUIPMENT DAMAGE. Prior to transportation by air release the air pressure from all suspension units - front and rear shock absorbers, and rear load compensators.

(14) EQUIPMENT DAMAGE. Do not submerge compressor in water.

ABBREVIATIONS

8 The following abbreviations are applicable to this publication:

A	Ampere
AESP	Army Equipment Support Publication
A/R	As Required
DINs	Defence Instructions and Notices
SOPs	Standing Operating Procedures
C	Celsius
Cat	Category
CES	Complete Equipment Schedule
Cm	centimetre
db (A)	decibel (on the A scale)
eg	for example
EMER	Electrical and Mechanical Engineering Regulations
ESS	Engineer Systems Support
EVP	Engineer Vehicles and Plant
FRACAS	Failure Reporting Analysis and Corrective Action System
ft	feet
in.	inches
IPT	Integrated Project Team
JSP	Joint Service Publications
kgf	kilogramme force
kph	kilometres per hour
lb	pound
ldf-ft	pounds force feet
lbf/in.^{2}	pounds force per square inch
LOLER	Lifting Operations and Lifting Equipment Regulations
L_pA	Sound pressure level
L_wA	Sound power level
min	minimum
mm	millimetre
mph	miles per hour
m/s	metres per second
Nm	Newton metre
OEP	Oil Extreme Pressure
OM	Oil Mineral
OMD	Oil Mineral Detergent
Para	Paragraph
rev/min	revolutions per minute
T&M	Test and Measurement
TES-TIG	Technical Enabling Service Technical Information Group
ROPS	Roll Over Protection Structure
ST	Specialist Task

Springer Vehicle 3/4 Front View

Springer Vehicle 3/4 Rear View

MAINTENANCE SCHEDULE

INTRODUCTION

9 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.

10 The person in 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 this Maintenance Schedule are properly carried out. The operations are only 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.

11 Scheduled Maintenance is to be recorded in the appropriate format in accordance with local procedures.

12 Serial numbers left blank in the tables may be taken up by amendment action at a later date.

DEFINITIONS

13 As far as this document is concerned, the following definitions apply

13.1 Examine. Carry out a survey of the condition of an item without dismantling, **unless** specifically instructed to do so in the relevant task requirement. The condition of an item may be impaired by the following:

13.1.1 Insecurity of attachment.

13.1.2 Cracks or fractures.

13.1.3 Corrosion, contamination or deterioration.

13.1.4 Distortion.

13.1.5 Loose or missing fasteners.

13.1.6 Chafing, fraying, scoring or wear.

13.1.7 Faulty or broken locking devices.

13.1.8 Loose clips or packing, obstruction of, or leakage from pipelines.

13.1.9 Discoloration due to overheating or leakage of fluids.

13.1.10 Damage due to external sources.

13.2 Check. Make a comparison of measurement of time, pressure, temperature, resistance, dimension or other quantity, with a known figure.

13.3 Operate. As far as possible, ascertain that a component or system functions correctly without the use of test equipment or reference to measurement.

13.4 Replenish. Refill a container to a predetermined 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.

13.5 Replace. Remove an item and then fit a new or reconditioned item.

WARNINGS, CAUTIONS AND MAINTENANCE NOTES

14 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

NOTE

The following tables detail the maintenance intervals and areas of responsibility.

15 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, eg the recording of lifting equipment with the appropriate test authority, 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 appropriately trained personnel, as detailed in Para 2.

16 Table 5 - out of phase maintenance. The maintenance tasks detailed in Table 5.

17 Table 6 - driver/operator maintenance. The maintenance tasks detailed in Table 6. Maintenance Intervals A, B, and C are to be carried out by appropriately trained personnel, as detailed in Para 2, as follows:

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

17.2 B - Daily or after 10 hours use (after the equipment has been operated).

17.3 C - Weekly or after 50 hours use.

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

18.1 1st - After the vehicle (or new/overhauled assembly) has completed 500 km (300 miles).

18.2 A - Every 2500 km (1500 miles) or 3 months.

18.3 B - Every 5000 km (3000 miles) or 6 months.

18.4 C - Every 15000 km (9000 miles) or 18 months.

18.5 D - Every 30000 km (18000 miles) or 3 years.

19 Table 8 - out of use maintenance. The Out of Use Maintenance in Table 8 is to be carried out in accordance with single service regulations.

TABLE 1 EQUIPMENT APPLICABILITY

Serial (1)	Equipment Asset Code (2)	Designation (3)	Contract Numbers (4)
1	NB1201-8101	SPRINGER VEHICLE	SUV C1/0204

TABLE 2 FUELS, LUBRICANTS AND ASSOCIATED PRODUCTS

NOTES

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

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

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

Serial	Assembly	Product		Capacity	
		Above -15 deg C	Below -15 deg C	Litres	Pints
(1)	(2)	(3)	(4)	(5)	(6)
1	Engine	SAE 15W 40 (OMD-90)	SAE 5W 30 (OMD-55)	3.2	6.8
2	Transmission	SAE 80W-90 (OEP-220)	SAE 80W-90 (OEP-220)	2.4	5.1
3	Final drive (per side)	SAE 80W-90 (OEP-220)	SAE 80W-90 (OEP-220)	0.75	1.6
4	Cooling system	Water (50%) AL-39 (50%)	Water (50%) AL-39 (50%)	6	14.4
5	Brake system	DOT 4 (OX-8)	DOT 4 (OX-8)	0.5	1.1
6	Grease points (Figs 1 – 4)	Multipurpose (XG279)	Multipurpose (XG279)	A/R	A/R
7	Battery terminals	Soft Petrolatum (PX-7)	Soft Petrolatum (PX-7)	A/R	A/R
8	Fuel tank (single)	Diesel JP8	Avtur F34	27	57

TABLE 3 EQUIPMENT DATA

Serial (1)	Detail (2)	Data (3)
	DIMENSIONS	
1	Length	3416 mm (135 in.)
2	Width	1780 mm (70 in.)
3	Height	1686 mm (67 in.)
4	Wheelbase	2562 mm (101 in.)
5	Wheel Track	Front – 1540 mm (60.6 in.) Rear - 1465 mm (57.7 in.)
6	[redacted]	[redacted]
	6.1 Steering	1.6 Turns Lock to Lock
7	Ground Clearance	378 mm (15 in.)
8	Fording Depth	400 mm (15.7 in.)
	REAR CARGO BAY	
9	Cargo Bay (inside rails)	1684 mm x 1343 mm (66 in. x 53 in.)
10	Cargo Bay Capacity (for a fully equipped vehicle with two crew)	1200 kg (2645 lb)
	FRONT CARGO BAY	
11	Cargo Bay (inside rails at widest point)	950 mm x 600 mm (37.4 in. x 23.6 in.)
12	Cargo Bay Capacity	100 kg (220 lb)
	[redacted]	
13	[redacted]	[redacted]
14	[redacted]	[redacted]
15	[redacted]	[redacted]
16	[redacted]	[redacted]
17	[redacted]	[redacted]
	WHEELS AND TYRES	
18	Tyres	
	18.1 Front	Carlisle 25 X 8 – 12 NHS
	18.2 Rear	Carlisle 26 X 12 – 12 NHS
19	Tyre pressures	
	19.1 Front	1.7 Bar (24 psi)
	19.2 Rear	1.7 Bar (24 psi)
20	Wheel nut torque	155 Nm +/- 5 Nm (114 lb-ft +/- 3.7 lb-ft)
	SPEEDS AND LOADS	
21	Maximum Speeds	
	21.1 On road unladen	64 kph (40 mph)
	21.2 On road laden	48 kph (30 mph)
	21.3 Off road unladen	48 kph (30 mph)

(continued)

TABLE 3 EQUIPMENT DATA (continued)

Serial (1)	Detail (2)	Data (3)
	21.4 Off road laden	32 kph (20 mph)
	21.5 Suspended tow recovery	16 kph (10 mph)
	The speeds listed are a maximum and the operator is expected to reduce speed as appropriate to the local conditions.	
22	[redacted]	[redacted]
23	[redacted]	[redacted]
24	[redacted]	[redacted]
25	[redacted]	[redacted]
	ALTERNATOR	
26	Nominal Output	40-70 A

TABLE 4 ACTION ON RECEIPT

NOTES

(1) For the first 115 km (65 miles) do the following:

Before operating vehicle allow engine to reach normal operating temperature.

Do not operate engine above 70% of maximum power range.

Do not haul or carry any load in excess of 45.4 kg (100 lb).

Do not climb any grade above a 10% incline.

Serial (1)	Action (2)
1	Units are to ensure that a copy of the Operating Instructions (AESP Cat 201) are retained within the cab, and are read and fully understood before the machine is operated.
2	Refit any components removed to aid transit and remove preservation, sealing and packing where appropriate.
3	Complete all maintenance tasks as detailed in Table 6, maintenance interval A.

TABLE 5 OUT OF PHASE MAINTENANCE

Serial (1)	Action (2)	Interval (3)
1	Engine timing belt replacement	120000 km (72000 miles) or 5 years

TABLE 6 OPERATOR MAINTENANCE

The following WARNINGS and Maintenance Notes MUST be read and understood prior to commencing these maintenance tasks.

WARNINGS

(1) PERSONNEL INJURY. MAINTENANCE MUST BE DONE BY SUITABLY QUALIFIED PERSONNEL.

(2) PERSONNEL INJURY. BEFORE ATTEMPTING ANY MAINTENANCE WORK, MAKE SURE THE MACHINE IS SAFE.

MAINTENANCE NOTES

(1) Maintenance tasks are to be carried out in accordance with Cat 201.

(2) Daily Before Use maintenance tasks must be carried out once every 10 hours when the vehicle is in continuous use.

(3) Excessive grey, black or white smoke from the exhaust indicates an engine or fuelling problem. Report the fault to REME maintenance personnel for further investigation.

Serial (1)	Task (2)	Fig/ Item No. (3)	Product (4)	Maintenance Interval A (5)	B (6)	C (7)
1	Examine the vehicle generally for obvious signs of damage, leaks and wear			X	X	X
2	Engine oil: Check level, replenish as necessary (refer to Maintenance Note (1))			X	X	X
3	Coolant system: Check level in coolant reservoir, replenish as necessary (refer to Maintenance Note (1))			X	X	X
4	Coolant: Check correct antifreeze/water mix (refer to Table 2)					X
5	Tyres: Examine tyres for signs of damage and wear			X		
6	Tyres: Check pressures (refer to Table 3), adjust if necessary (refer to Maintenance Note (1))			X		
7	Roadwheels and wheelnuts: Examine visually before and after use			X	X	
8	Roadwheels and wheelnuts: Check wheelnut torque (refer to Table 3), adjust if necessary (refer to Maintenance Note (1))					X
9	Brake system: Check the brake fluid level. Replenish as necessary (refer to Maintenance Note (1))			X	X	X
10	Electrical cables/harnesses: Check for damage and correct routing					X
11	Bodywork and cab: Check for damage			X	X	X

(continued)

TABLE 6 OPERATOR MAINTENANCE (continued)

Serial (1)	Task (2)	Fig/ Item No. (3)	Product (4)	Maintenance Interval A (5)	B (6)	C (7)
12	Start engine (refer to Cat 201). Check neutral start operation			X		X
13	Warning lights: As far as practicable, ensure correct operation			X		X
14	Direction indicators, lights and horn: Examine. Ensure correct operation			X		X
15	Parking brake: Check operation (refer to Cat 201)			X	X	X
16	Transmission: Check operation in forward and reverse (refer to Cat 201)			X		X
17	Service brake: Check operation (refer to Cat 201)			X		X
18	Steering system: Check correct operation.			X	X	X
19	Engine exhaust emissions: Visually check exhaust emissions for excessive smoking (refer to Maintenance Note (3))					X
20	CVT Belt: Check for cracks or damage. Check for correct tension.			X	X	X
21	Suspension: Check for smooth operation and free play			X	X	X
22	Load compensators: Check and set pressure to 75 psi before use			X		
23	Engine Air Filters: Inspect and clean if necessary			X	X	X
24	Compressor Air Filter: Inspect and clean if necessary					X
25	Steel armour including belly plate: Visually inspect for material and weld damage and/or corrosion. Report any fault to REME maintenance personnel for further investigation.					X
26	Ceramic composite armour: Perform inspection and maintenance as detailed (refer to Maintenance Note (1))					X
	DOCUMENTATION					
27	Report all damage and faults: Make formal entries into the relevant reporting system in accordance with local procedures			X	X	X
28	Record maintenance actions in the relevant documentation in accordance with local procedures			X	X	X

TABLE 7 TIME/USAGE MAINTENANCE

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

WARNINGS

(1) PERSONNEL INJURY. MAINTENANCE MUST BE CARRIED OUT BY SUITABLY QUALIFIED PERSONNEL.

(2) PERSONNEL INJURY. BEFORE ATTEMPTING ANY MAINTENANCE WORK, MAKE SURE THE MACHINE IS SAFE.

MAINTENANCE NOTES

(1) Maintenance tasks are to be carried out in accordance with Cat 201.

(2) Maintenance tasks are to be carried out in accordance with Cat 522.

(3) Excessive grey, black or white smoke from the exhaust indicates an engine or fuelling problem. Report the fault for further investigation.

(4) Maintenance task to be carried out when: a fault is suspected; a qualified person deems it necessary, in accordance with Cat 522.

(5) Maintenance task bearing the trade task indicator (ST) (Specialist Task), must only be completed by an appropriately qualified person, as detailed in Para 2 Page 1.

(6) The vehicle must not be used on a rolling road. The brake test must be a functional or deceleration test, undertaken by an appropriately qualified person, as detailed in Para 2 Page 1.

Serial	Task	Fig/ Item No.	Product	Maintenance Interval				
				1st	A	B	C	D
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	GENERAL							
1	Examine the vehicle generally for obvious signs of damage, leaks and wear			X	X	X	X	X
	ENGINE							
2	Engine: Drain oil, replace oil filter and replenish (refer to Maintenance Note (1))			X	X	X	X	X
3	Air filter, front: Clean element and replace if necessary (refer to Maintenance Note (1))			X	X	X	X	X
4	Air filter, rear: Clean element and replace if necessary (refer to Maintenance Note (1))			X	X	X	X	X
5	Fuel system: Replace fuel filter (refer to Maintenance Note (1))				X	X	X	X

(continued)

TABLE 7 TIME/USAGE MAINTENANCE (continued)

Serial (1)	Task (2)	Fig/ Item No. (3)	Product (4)	Maintenance Interval 1st (5)	A (6)	B (7)	C (8)	D (9)
6	Coolant system: Check condition of coolant and that the coolant is level with the neck of the radiator expansion tube. Replenish as necessary (refer to Maintenance Note (1))			X	X	X	X	
7	Coolant: Drain and replenish with correct antifreeze/water mix (refer to Table 2)							X
8	Radiator: Clean radiator matrix			X	X	X	X	X
9	Hoses: Check all hoses for security, signs of damage and leaks			X	X	X	X	X
10	Alternator Belt: Check for damage and correct tension (refer to Maintenance Note (1))			X	X	X	X	X
11	Valve Adjustment (refer to Maintenance Note (2))						X	X
	TRANSMSISSION							
12	Transmission: Check oil level, replenish as necessary (refer to Maintenance Note (1))			X				
13	Transmission: Drain oil and replenish(refer to Maintenance Note (1))				X	X	X	X
14	Driveshafts: Examine for damage and signs of wear. Inspect the drive axles and make sure the o-ring is not exposed and/or torn. Grease the axle grease fittings, two at each axle (refer to Maintenance Note (2)) (Figs 3 and 4)			X	X	X	X	X
15	Change final drive oil (refer to Maintenance Note (2))				X	X	X	X
16	Grease transmission CVT (Fig 4) Thoroughly clean the inner collar hub (1). Grease the CVT. The grease fitting (2) is located on the inner collar.				X	X	X	X
17	Inspect the engine CVT (refer to Maintenance Note (2))				X	X	X	X
18	Check for excessive free play in final drives. A small amount of free play is acceptable				X	X	X	X

(continued)

TABLE 7 TIME/USAGE MAINTENANCE (CONTINUED)

Serial	Task	Fig/ Item No.	Product	Maintenance Interval				
				1st	A	B	C	D
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	WHEELS AND TYRES							
19	Check for excessive free play in wheel bearings. A small amount of free play is acceptable				X	X	X	X
20	Tyres: Examine tyres for signs of damage and wear			X	X	X	X	X
21	Tyres: Check pressures (refer to Table 3), adjust if necessary (refer to Maintenance Note (1))			X	X	X	X	X
22	Roadwheels and wheelnuts: Examine. Check wheelnut torque (refer to Table 3), adjust if necessary (refer to Maintenance Note (1))			X	X	X	X	X
	BRAKES							
23	Inspect brake discs & pads: Check for excessive or uneven wear or damage.				X	X	X	X
24	Service brake system fluid level: Check, replenish as necessary (refer to Maintenance Note (1))			X	X	X		
25	Service brake system fluid: Replace (refer to Maintenance Note (2))						X	X
26	Parking brake: Check correct operation. Adjust if necessary (refer to Maintenance Note (1))			X	X	X	X	X
	STEERING							
27	Check A-Arm bushings. There should be no free play			X	X	X	X	X
28	Adjust and grease ball joints (replace rubber boots as needed) (Fig 1)			X	X	X	X	X
29	Check steering tie-rod ends			X	X	X	X	X
30	Grease steering box (refer to Maintenance Note (2)) (Fig 2) and check steering system for excessive free play				X	X	X	X
	SUSPENSION							
31	Check shock mounts: Check front and rear for excessive free play			X	X	X	X	X
32	Check load compensators for damage or evidence of leaks			X	X	X	X	X

(continued)

TABLE 7 TIME/USAGE MAINTENANCE (CONTINUED)

Serial	Task	Fig/ Item No.	Product	Maintenance Interval				
				1st	A	B	C	D
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
33	Fill shock air chambers (maximum air pressure 200psi) (refer to Maintenance Note (1))				X	X	X	X
	ELECTRICS							
34	Battery: Check condition of terminal connections and security			X	X	X	X	X
35	Cables and harnesses: Examine for signs of damage/chaffing and check correct routing			X	X	X	X	X
36	Inspect fuses: Check for loose or blown fuse, signs of damage			X	X	X	X	X
	BODYWORK AND CAB							
37	Cab seats: Ensure correct operation of seats and seat belts (refer to Maintenance Note (1))			X	X	X	X	X
38	Front mudguards: Check for damage and security of attachment			X	X	X	X	X
39	Rear cargo bay: Check for damage and security of attachment			X	X	X	X	X
40	Paintwork: Check condition			X	X	X	X	X
	FUNCTIONAL TESTS							
41	Engine: Start engine (refer to Cat 201). Check neutral start operation. Check for excessive noise and vibration			X	X	X	X	X
42	Throttle system and control cable: Check and ensure correct operation (refer to Maintenance Note (3))			X	X	X	X	X
43	Engine exhaust emissions: Visually check exhaust emissions for excessive smoking (refer to Maintenance Note (5))			X	X	X	X	X
44	Exhaust system: Examine for damage and security of attachment			X	X	X	X	X
45	Air inlet system: Examine for damage and security of attachment			X	X	X	X	X
46	Transmission: Check operation in forward and reverse. (refer to Maintenance Note (1))			X	X	X	X	X

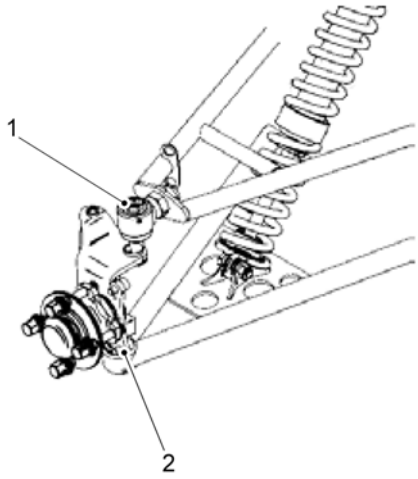
(continued)

TABLE 7 TIME/USAGE MAINTENANCE (CONTINUED)

Serial	Task	Fig/ Item No.	Product	Maintenance Interval				
				1st	A	B	C	D
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
47	Steering system: Check correct operation.			X	X	X	X	X
48	Service brake: Check operation (refer to Maintenance Note (6))			X	X	X	X	X
49	Parking brake: Check operation			X	X	X	X	X
50	Warning lights: As far as practicable, ensure correct operation			X	X	X	X	X
51	Direction indicators, lights and horn: Examine. Ensure correct operation			X	X	X	X	X
	COMPRESSOR							
52	Air filter: Check element and replace if necessary (refer to Maintenance Note (1))				X	X	X	X
	DOCUMENTATION							
53	Report all damage and faults: Make formal entries into the relevant reporting system			X	X	X	X	X
54	Record maintenance actions in the relevant documentation in accordance with local procedures.			X	X	X	X	X
	ANNUAL INSPECTION							
55	Perform vehicle inspection 932. Refer to AESP 2300-A-050-013. Refer to Maintenance Note (6)							

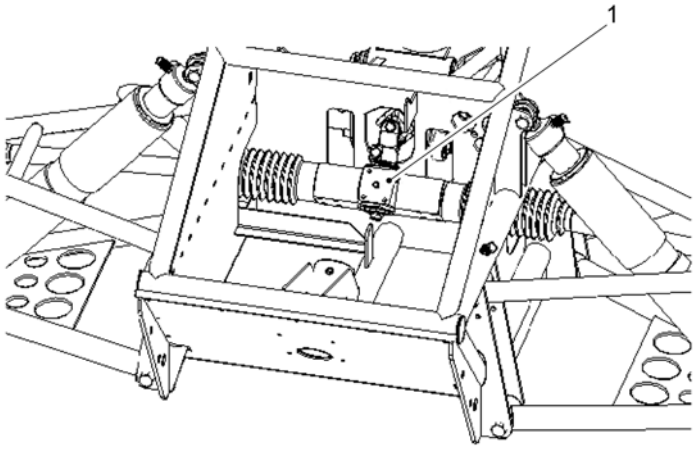
TABLE 8 OUT OF USE MAINTENANCE

Serial (1)	Operation (2)	Fig/ Item No. (3)	Product (4)
	Prior to vehicle entering storage:		
1	Complete maintenance as at Table 6, maintenance intervals A, B and C		
2	Carry out next maintenance due as at Table 7 if it falls during the out of use period		
3	Thoroughly clean the complete equipment, all ancillaries and Complete Equipment Schedule (CES)		
4	Check bodywork, chassis and components for rust; patch paint as required		
5	Fill fuel tanks		Diesel
6	Disconnect the vehicle's battery and grease all terminals and terminal clamps		
	3 Monthly whilst in storage:		
7	Clean battery terminals and terminal clamps, connect ready for operation		
8	Operate the engine until normal operating temperature is attained		
9	Drive the vehicle to exercise the transmission, steering, brakes and associated systems		
10	Carry out serials 1-6 as necessary for continued storage		
	Action necessary to return the vehicle into use:		
11	Carry out serials 7-9 to prepare for operation and exercise		
12	Carry out Table 7 maintenance intervals A and B		
	DOCUMENTATION		
13	Report all damage and faults: Make formal entries into the relevant reporting system		
14	Record maintenance actions in the relevant documentation in accordance with local procedures.		



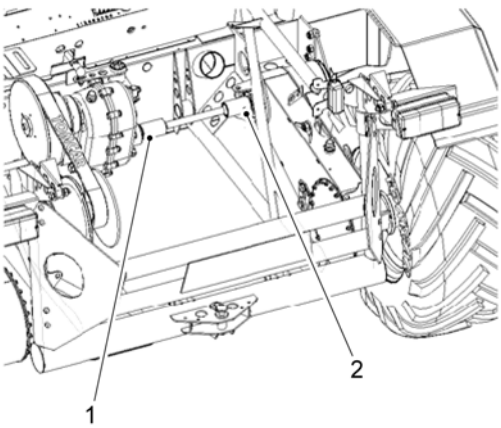
1 Upper ball joint
2 Lower ball joint

Fig 1 Front Ball Joint Grease Points (RH Shown)



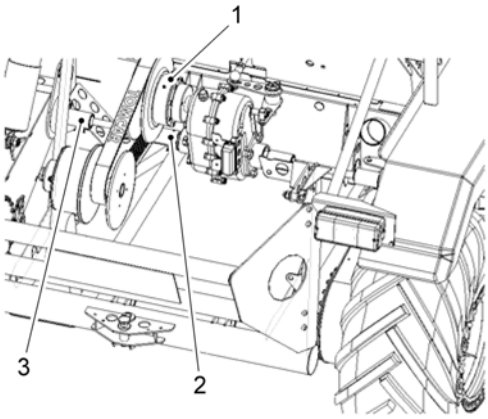
1 Steering box

Fig 2 Steering Box Grease Point



1 Grease point
2 Grease point

Fig 3 RH Driveshaft Grease Points (Engine Removed for Clarity)



1 Transmission CVT grease point
2 Driveshaft grease point
3 Driveshaft grease point

Fig 4 LH Driveshaft and Transmission CVT Grease Points (Engine Removed for Clarity)

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: .....

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Thank you for commenting on AESP*: .....

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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			

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AESP or EMER

AESP Form 10 (Issue 5.0 dated Dec 01)

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SPRINGER VEHICLE

ILLUSTRATED PARTS CATALOGUE

BY COMMAND OF THE DEFENCE COUNCIL

Ministry of Defence
Issued by
GSV IPT
U05V9

AMENDMENT RECORD

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PARTS LIST

Chapter

1 Index of main assemblies, drawing numbers and list of illustrations used throughout the IPC

2 Parts List

3 Index of NATO stock numbers

4 Index of makers part/drawing numbers

PREFACE

Sponsor: GSV IPT
Project No.: UOR A01393
File Ref: SUV C1/0204

Publication Authority: GSV IPT

INTRODUCTION

1 Service users should forward any comments on this publication through the channels prescribed in AESP0100-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.

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 AESP, Item number, Figure Reference and Item Name. Where a manufacturers number is known this should be quoted.

Quantities

5 The figure in the 'Number 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

6 When demanding Spare Parts the following particulars must be quoted:-

6.1 Management Code (Man Code).

6.2 NATO Stock Number.

6.3 Item Name.

6.4 Name of the Equipment for which the part is required.

6.5 Manufacturer's reference, if known.

NOTE

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

Modification State

7 When appropriate, a list at the front of each chapter or sub-chapter will indicate the modification numbers which have been incorporated in the IPC by amendment action, subsequent to initial issue.

Annotations

8 The following notations are used in this publication:-

8.1 A/R When appearing in the 'Number off' column indicates that the quantity is 'as required'.

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

8.3 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.

8.4 REF In the 'Number off' column indicates that the item is listed for reference purposes only.

8.5 LM This notation in the annotation column indicates local manufacture, ie a part that is to be manufactured from local resources.

Abbreviations

9 9 Abbreviations and symbols used in this IPC have been approved and are listed separately

Amendments

10 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.

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

Indentations

12 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

NOTES

(1) Attaching parts for the Main Assembly are listed at the end of the text of the Main Assembly.

(2) Catalogue numbers quoted in this catalogue will supersede any number that may have been allotted previously.

RELATED AND ASSOCIATED PUBLICATIONS

Related publications

13 The Octad for the subject equipment of the publications is 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 (see AESP 0100-A-001-013).

Associated publications

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

Reference Title

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	*	*
	1	Equipment Support Policy Directive	111	111	*	*
2	0	Operating Information	201	201	*	*
	1	Aide-Memoiré	*	*	*	*
	2	Training Aids	*	*	*	*
3		Technical Description	201	201	*	*
4	1	Installation Instructions	*	*	*	*
	2	Preparation for Special Environments	*	*	*	*
5	1	Failure Diagnosis	*	522	*	*
	2	Maintenance Instructions	201	522	*	*
	3	Inspection Standards	*	*	*	*
	4	Calibration Procedures	*	*	*	*
6		Maintenance Schedules	601	601	*	*
7	1	Illustrated Parts Catalogues	*	*	*	*
	2	Commercial Parts Lists	721	721	*	*
	3	Complete Equipment Schedule, Production	*	*	*	*
	4	Complete Equipment Schedule, Service Edition (Simple Equipment)	741	741	*	*
	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

WARNINGS

15 There are no WARNINGS applicable to this equipment.

CAUTIONS

16 There are no CAUTIONS applicable to this equipment.

ABBREVIATIONS

17 The following abbreviations are applicable to this publication:

AESP	Army Equipment Support Publication
DINs	Defence Instructions and Notices
EMER	Electrical and Mechanical Engineering Regulations
ESS	Engineer Systems Support
EVP	Engineer Vehicles and Plant
FRACAS	Failure Reporting Analysis and Corrective Action System
IPT	Integrated Project Team
Kg	kilogram
m	metre
mm	millimetre
SOPs	Standing Operating Procedures
TES-TIG	Technical Enabling Service Technical Information Group

Springer Vehicle 3/4 Front View

Springer Vehicle 3/4 Rear View

CHAPTER 1

INDEX OF MAIN ASSEMBLIES, DRAWING NUMBERS AND

LIST OF ILLUSTRATIONS USED THROUGHOUT THE IPC

INDEX OF MAIN ASSEMBLIES, DRAWING NUMBERS AND LIST OF ILLUSTRATIONS USED THROUGHOUT IPC

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A ARM - BOLT ADAPTER, 5.9 YELLOW	TM1666	2	13-4
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A ARM - BOLT M10 X 1.25 X 80 XZ	TM1735	2	14-5
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A ARM BUSH, METAL	TM1725	2	14-2
A ARM BUSH, POLYMER	TM1730	2	13-3
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AIR SUSPENSION UNITS	TM4570	2	12-1
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BOLT, HEX, M8 X 20	TM7310	2	26-2
BOLT, M16 X M12 LONG, ENGINE TRAY	TM1211	2	1-7
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BRAKE CALIPER, REAR, RHS	TM2064	2	18-8

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BRAKE RESERVOIR	TM2110	2	18-3
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BULB, HALOGEN,12 V 60/55 WFRONT HEADLAMP	L:LHA-83140101	2	29-3
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NUT, SELF-LOCK, M10 X 1.25 NY	TM7090	2	14-6
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Description	Drawing No.	Chapter	Fig-Item No.
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RUBBER SUPPORT M8 X 30 X 20	TM87300	2	7-3
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SEAT COVER	TM5730	2	26-3
SENSOR, SPEED	TMXXXX	2	30-17
SHOCK 38/18, BALL JOINT ADAPTOR 12	TM6530	2	12-4
SHOCK 38/18, BOLT M12 X 1.5 X 47	TM6480	2	12-5
SOLENOID, DC CONTACTOR, WINCH	WSDC	2	22-7
SPACER, ENGINE TRAY	TM1215	2	1-8

Description	Drawing No.	Chapter	Fig-Item No.
SPEEDOMETER	TM6170	2	28-1
SPRING CLIP, LOWER BALL JOINT	TM1749	2	14-12
SPRING, ACCELERATOR PEDAL	SP140	2	27-3
SPRING, BRAKE PEDAL	SP180	2	27-5
STARTER	LB100582119	2	4-1
SUPPRESSOR, COOLING FAN	MIRA	2	30-7
SUPPRESSOR, DIRECTION INDICATOR	MIRA	2	30-6
SWITCH ARM, INDICATOR/HEADLAMP/HORN	TMXXXX	2	30-9
SWITCH, BATTERY MASTER CUTOFF	MAR BSS9001E	2	30-8
SWITCH, BLACKOUT	TMXXXX	2	30-13
SWITCH, FOG LIGHT	TMXXXX	2	30-11
SWITCH, FUEL TANK SENDER	TMXXXX	2	30-12
SWITCH, HAZARD LIGHT	TMXXXX	2	30-10
SWITCH, IGNITION ASSEMBLY AND KEY	TSM01008	2	30-15
SWITCH, REVERSE LIGHT	TMZG32006	2	30-14
SWITCH, WINCH SAFETY CUT OFF	E.T.A. WSCB75	2	22-11
TAILGATE R-CLIPS/PINS	X	2	23-1
THERMO SWITCH M16 82-87	TM79160	2	6-6
THIN FLAT WASHER, M10	800004	2	22-5
TOP CARGO BOX	AEI-	2	24-1
TOP RADIATOR HOSE	LB0004220	2	6-9
TRACK ROD END	TM1778	2	19-8
TURN SIGNAL LAMP, FRONT	TM2838	2	29-5
TYRE, FRONT, 25 X 8-12 6 PLY	TM3305	2	17-3
TYRE, REAR, 26 X 12-12 10 PLY	TM3307	2	17-6
UNIVERSAL JOINT, STEERING	TM1791	2	19-5
UPPER BALL JOINT ASSEMBLY COMPLETE	TM1755	2	13-8
VACUUM PUMP	LB6601.112	2	1-4
VALVE COVER GASKET	4400-057	2	1-15
VOLTMETER	TM6172	2	28-3
WASHER 8 X 21 X 2	TM7077	2	2-6
WASHER 8 X 25 X 3	TM7078	2	2-5
WASHER 8 X 25 X 3	TM7078	2	3-3
WASHER 8 X 25 X 3	TM7078	2	6-3
WASHER 8 X 25 X 3	TM7078	2	7-4
WASHER, 12 X 27 X 3, ENGINE TRAY	TM7086	2	1-9
WASHER, 16 X 30 X 3, ENGINE TRAY	TM7088	2	1-10
WEAPON STOW BASE	AC:WH-2	2	21-4
WEAPON STOW TOP	AC:WH-1	2	21-3

Description	Drawing No.	Chapter	Fig-Item No.
WHEEL AND TYRE COMPLETE, FRONT	TM3380	2	17-1
WHEEL AND TYRE COMPLETE, REAR	TM3470	2	17-4
WHEEL NUT	TM1995	2	10-5
WHEEL NUT,	TM1995	2	15-5
WHEEL RIM (aLUM), FRONT	TM3250	2	17-2
WHEEL RIM (aLUM), REAR	TM3265	2	17-5
WHEEL STUD	TM1988	2	10-4
WHEEL STUD	TM1988	2	15-4
WHEEL, STEERING	TM1764	2	19-1
WINCH	WS8000SD	2	22-1
WIRE CUTTER	S.A.WC	2	20-5
WISHBONE LOWER	TM1783LST	2	14-1
WISHBONE UPPER	TM1723LST	2	13-1

CHAPTER 2

PARTS LIST

SPRINGER VEHICLE

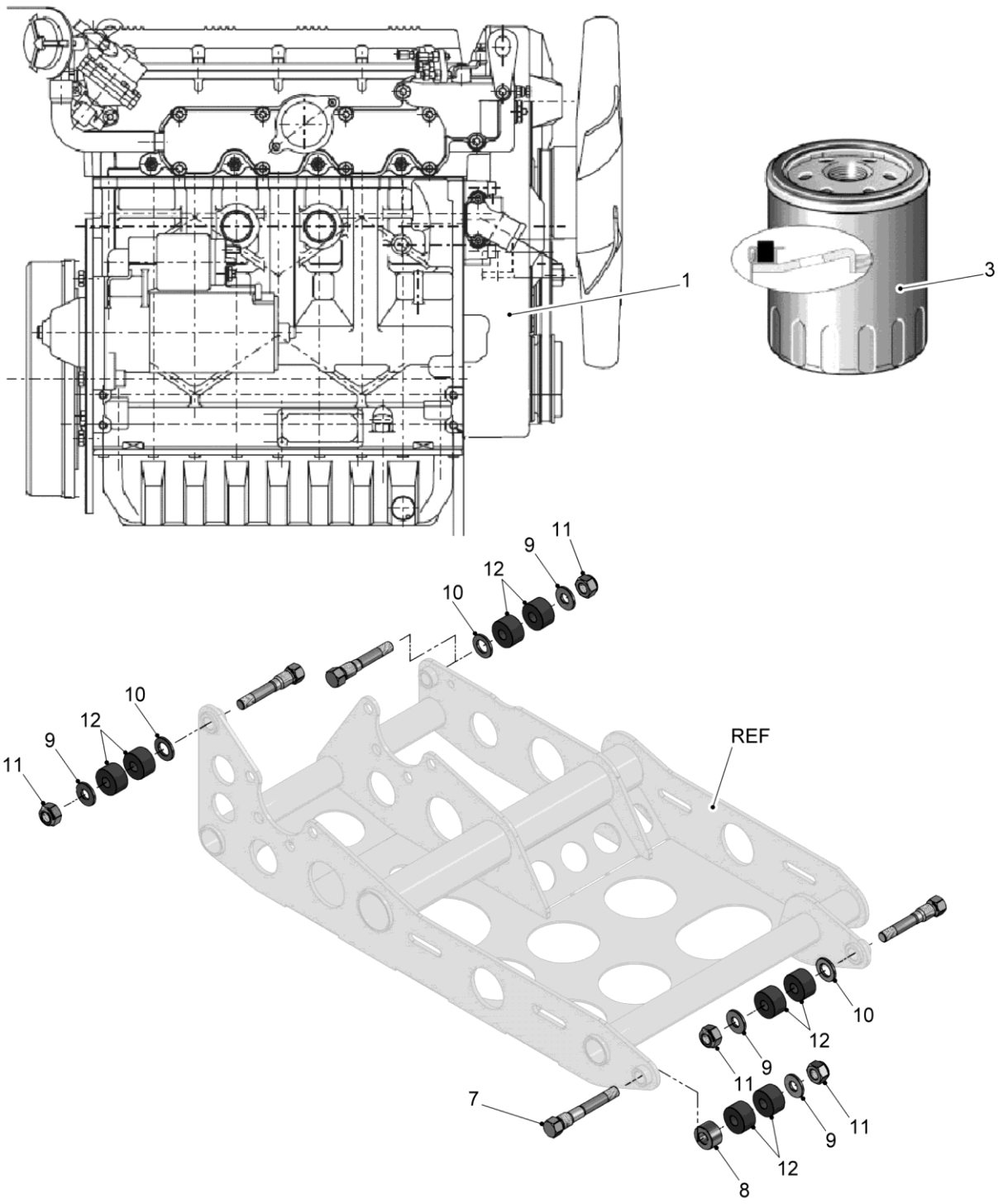

Fig 1 Engine 1404 Diesel

Fig./ Item	DMC Army	NATO Stock Number	Item name and Description	Part No./ Dwg No.	No Off	Annotation (NSCM)
1						
1		2815-15-180-2285	ENGINE 1404 DIESEL	LDW 1404	1 EA	
NI 2			1.1.1 . MANUAL, ENGINE 1404 DIESEL	MANUAL	1 EA	
3		2910-99-818-1797	. OIL FILTER, CROSLAND 2178	C2178	1 EA	
4		4310-99-994-2159	1.1.2 . VACUUM PUMP	LB6601.112	1 EA	
5			1.1.3 . FUEL PRIMER PUMP	LBXXX	1 EA	
6			. CABLE, THROTTLE	TM16533	1 EA	
7			1.1.4 . BOLT, M16 X M12 LONG, ENGINE TRAY	TM1211	1 EA	
8			1.1.5 . SPACER, ENGINE TRAY	TM1215	1 EA	
9			1.1.6 . WASHER, 12 X 27 X 3, ENGINE TRAY	TM7086	4 EA	
10			1.1.7 . WASHER, 16 X 30 X 3, ENGINE TRAY	TM7088	4 EA	
11			1.1.8 . NUT, M14 X 1.5, SELF-LOCK, ENGINE TRAY	TM7094	4 EA	
12			1.1.9 . RUBBER SUPPORT, 12 X 32 X 18, ENGINE TRAY	TM87512	8 EA	
NI 13			1.1.10 . PREHEATING GLOWPLUG, 12V	2100-089	4 EA	
NI 14			1.1.11 . ENGINE TIMING BELT	2440-338	1 EA	
NI 15			1.1.12 . VALVE COVER GASKET	4400-057	1 EA	
NI 16			1.1.13 . COOLANT PUMP ASSEMBLY	6584.439	1 EA	
NI 17			1.1.14 . COOLANT PUMP GASKET	4580.215	1 EA	
NI 18			1.1.15 . SCREW, M8 X 1.25 X 35	1770.178	2 EA	
NI 18			1.1.16 . SCREW, M8 X 1.25 X 16	1770.160	2 EA	
			1.1.17			
			1.1.18			
			1.1.19			
			1.1.20			
			1.1.21			
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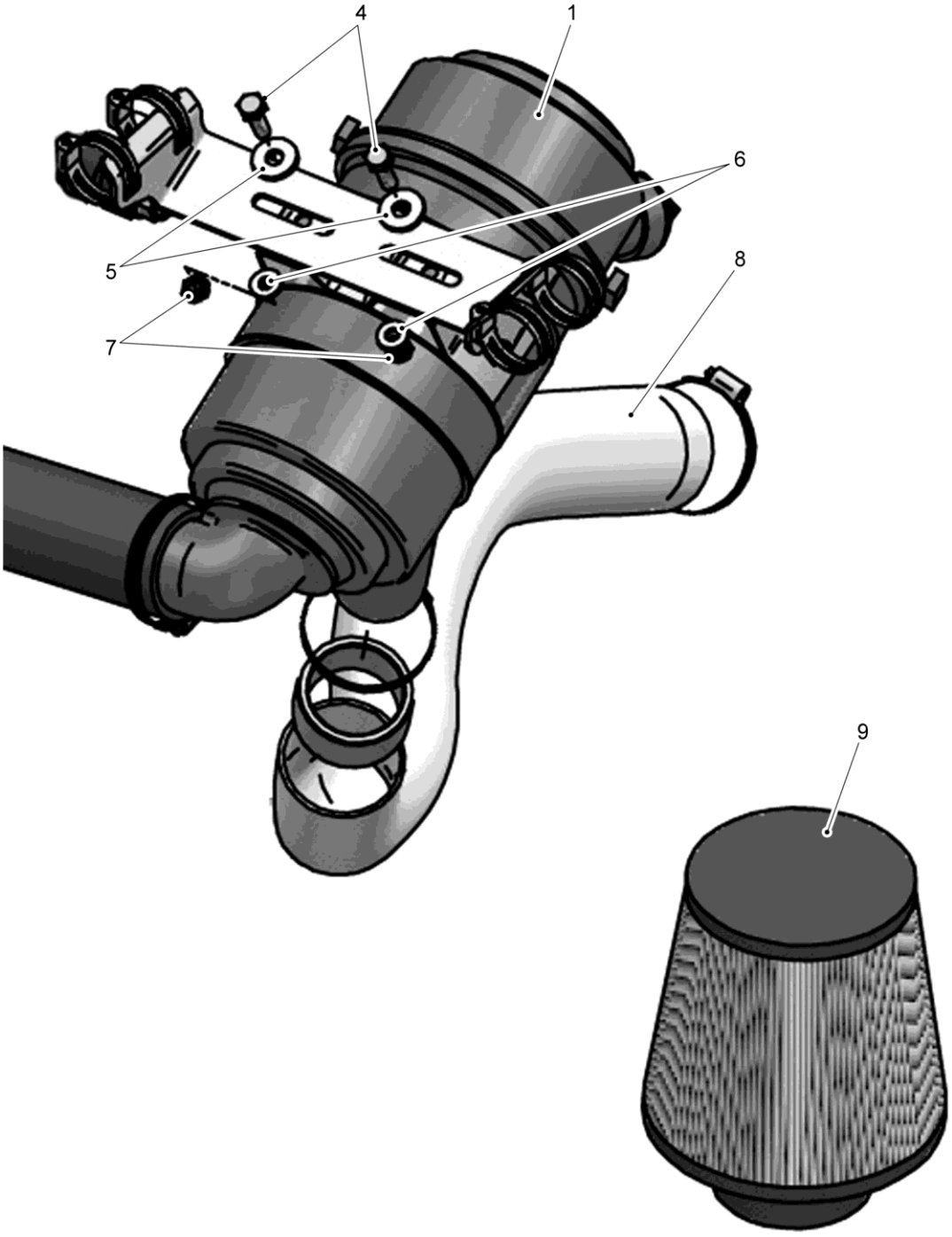

Fig 2 Air Filters

Fig./ Item	DMC Army	NATO Stock Number	Item name and Description	Part No./ Dwg No.	No Off	Annotation (NSCM)
2						
1		2940-99-667-2850	AIR FILTER, REAR, COMPLETE	TM84035	1 EA	
NI 2		4330-99-984-8167	. REAR AIR FILTER SET OUTER	TM84040	1 EA	
NI 3		4330-99-908-2353	1.1.31 . REAR AIR FILTER SET INNER	TM84050	1 EA	
4			. HEXAGON BOLT M8 X 25	TM7313	2 EA	
5			1.1.32 . WASHER 8 X 25 X 3	TM7078	2 EA	
6			1.1.33 . WASHER 8 X 21 X 2	TM7077	2 EA	
7			1.1.34 . NUT SELF-LOCK M8 STEEL	TM7042	2 EA	
8			1.1.35 HOSE, CHASSIS TO REAR AIR FILTER	TM3755	1 EA	
9		2910-99-297-8007	1.1.36 FRONT AIR FILTER	TM3802	1 EA	
			1.1.37			
			1.1.38			
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			1.1.64			

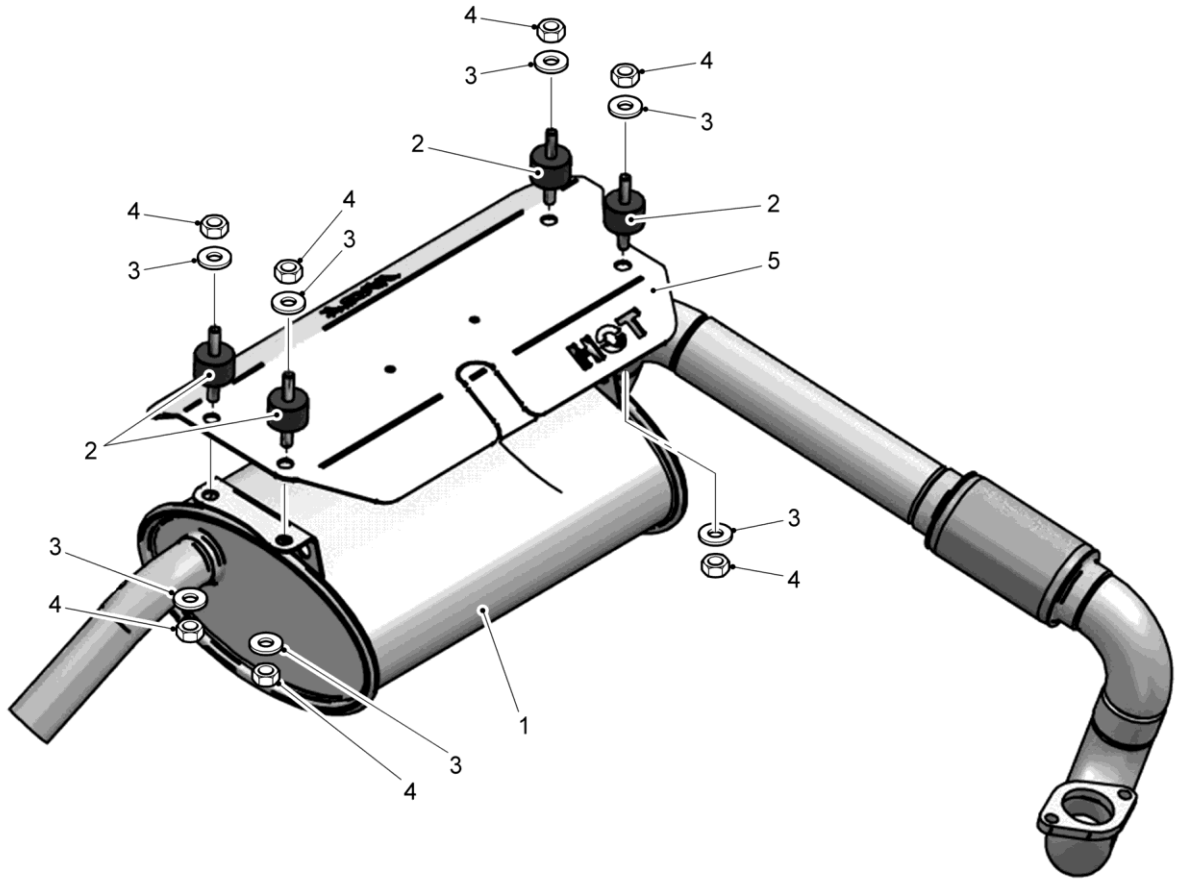

Fig 3 Muffler

Fig./ Item	DMC Army	NATO Stock Number	Item name and Description	Part No./ Dwg No.	No Off	Annotation (NSCM)
3						
1		2990-99-835-7548	MUFFLER	LB0002200	1 EA	
2			. RUBBER SUPPORT M8 X 30 X 20	TM87300	4 EA	
3			1.1.65 . WASHER 8 X 25 X 3	TM7078	8 EA	
4			1.1.66 . NUT SELF-LOCK M8 NY	TM7040	8 EA	
5			1.1.67 . HEATSHIELD, EXHAUST	TM82260	1 EA	
			1.1.68			
			1.1.69			
			1.1.70			
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			1.1.101			

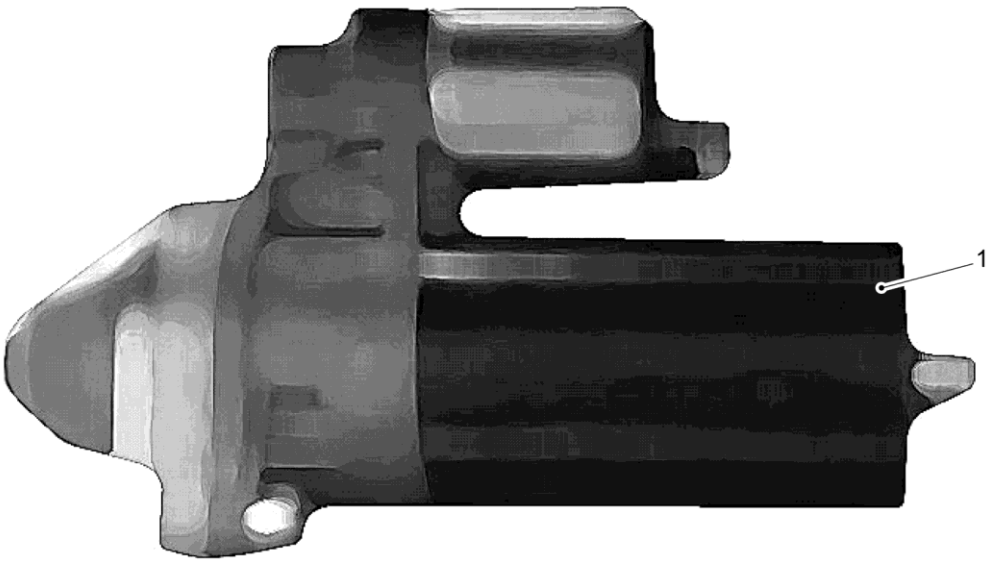

Fig 4 Starter

Fig./ Item	DMC Army	NATO Stock Number	Item name and Description	Part No./ Dwg No.	No Off	Annotation (NSCM)
4						
1		2920-99-423-1674	STARTER	LB100582119	1 EA	
			1.1.102			
			1.1.103			
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			1.1.140			

Fig 5 65A 12V Alternator

Fig./ Item	DMC Army	NATO Stock Number	Item name and Description	Part No./ Dwg No.	No Off	Annotation (NSCM)
5						
1		6115-99-861-0299	65 AMP 12V ALTERNATOR	LB1157.270	1 EA	
2		3030-01-023-2674	FAN BELT (ALTERNATOR BELT)	LB0003050	1 EA	
			1.1.141			
			1.1.142			
			1.1.143			
			1.1.144			
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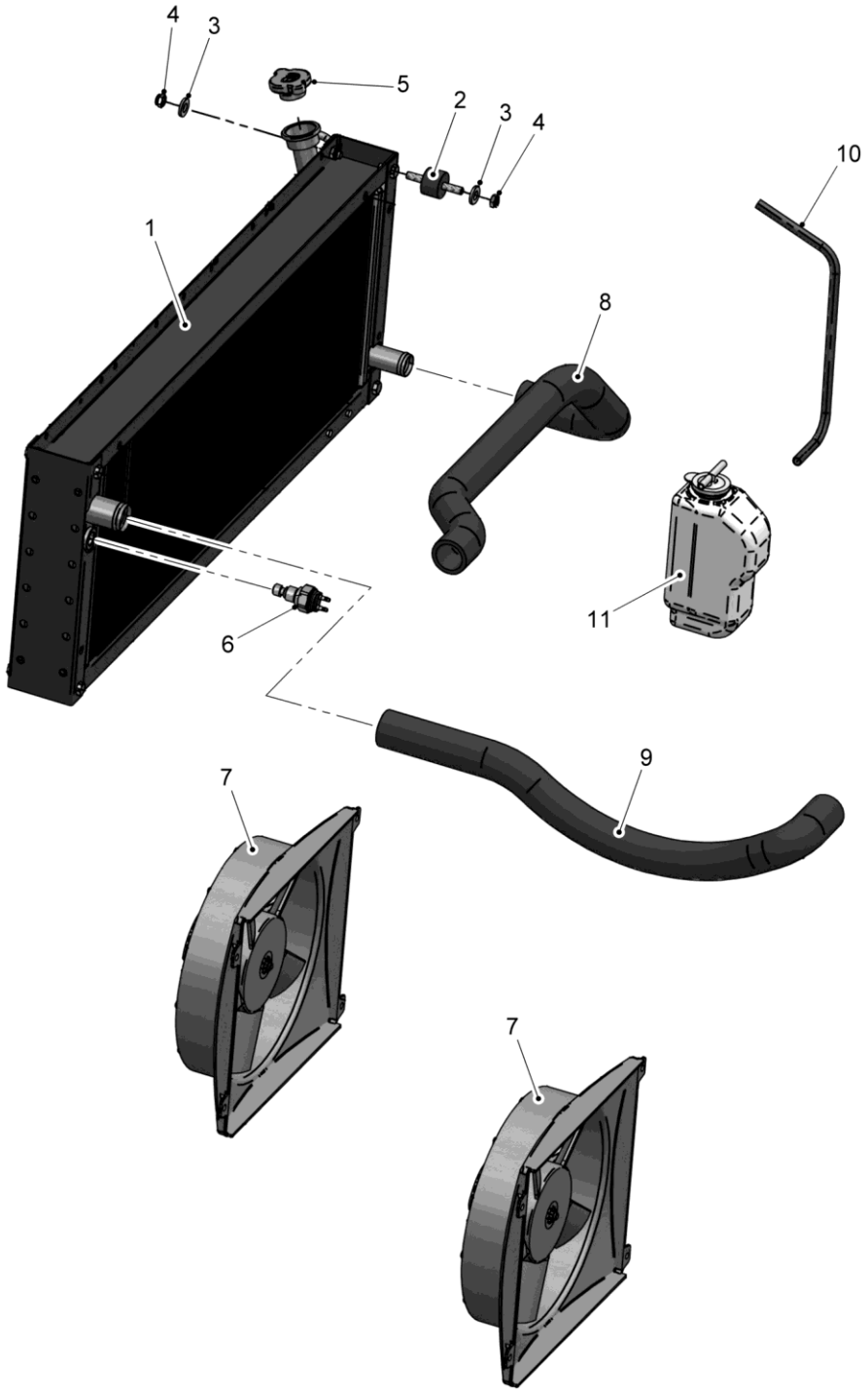

Fig 6 Cooling System

Fig./ Item	DMC Army	NATO Stock Number	Item name and Description	Part No./ Dwg No.	No Off	Annotation (NSCM)
6						
1		[redacted]	RADIATOR S3 25/25	TM79181	1 EA	
2			. RUBBER SUPPORT M8 X 30 X 20	TM87300	6 EA	
3			1.1.178 . WASHER 8 X 25 X 3	TM7078	12 EA	
4			1.1.179 . NUT SELF-LOCK M8 NY	TM7040	12 EA	
5		2930-99-596-9997	1.1.180 . RADIATOR CAP	TM79170	1 EA	
6		5930-99-667-2873	1.1.181 . THERMO SWITCH M16 82-87	TM79160	1 EA	
7			1.1.182 . COOLING FAN	TM79105	2 EA	
8			1.1.183 . LOWER RADIATOR HOSE	LB0004230	1 EA	
9			1.1.184 . TOP RADIATOR HOSE	LB0004220	1 EA	
10			1.1.185 . EXPANSION BOTTLE HOSE	TM79230	1 EA	
11			1.1.186 . EXPANSION BOTTLE	TM79240	1 EA	
NI 12			[redacted]	MIRA	1 EA	

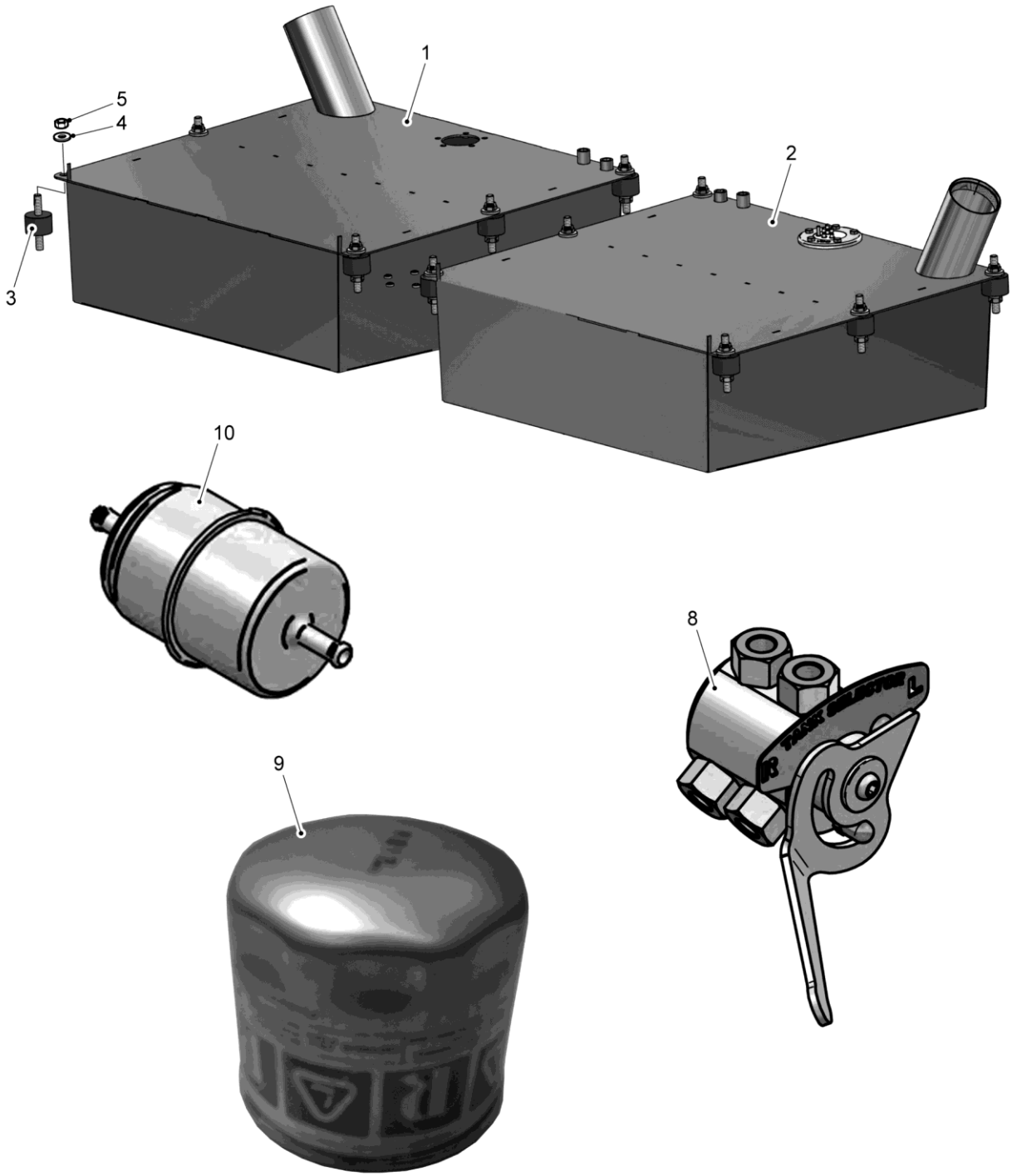

Fig 7 Fuel System

Fig./ Item	DMC Army	NATO Stock Number	Item name and Description	Part No./ Dwg No.	No Off	Annotation (NSCM)
7						
1		2910-99-725-4086	FUEL TANK AND RETURN R	TM2697	1 EA	
2		2910-99-359-4719	FUEL TANK AND RETURN L	TM2702	1 EA	
3			. RUBBER SUPPORT M8 X 30 X 20	TM87300	6 EA	
4			1.1.211 . WASHER 8 X 25 X 3	TM7078	12 EA	
5			1.1.212 . NUT SELF-LOCK M8 NY	TM7040	12 EA	
NI 6			1.1.213 . FUEL CAP	TMXXX	1 EA	
NI 7			1.1.214 . FILTER, FUEL NECK	TMXXX	1 EA	
8			FUEL SELECTOR	TM2620	1 EA	
9		2910-99-551-6839	FUEL FILTER, CARTRIDGE	LB1742175256	1 EA	
10		2910-99-393-4548	FUEL FILTER, INLINE	TM2640	1 EA	
			1.1.215			
			1.1.216			
			1.1.217			
			1.1.218			
			1.1.219			
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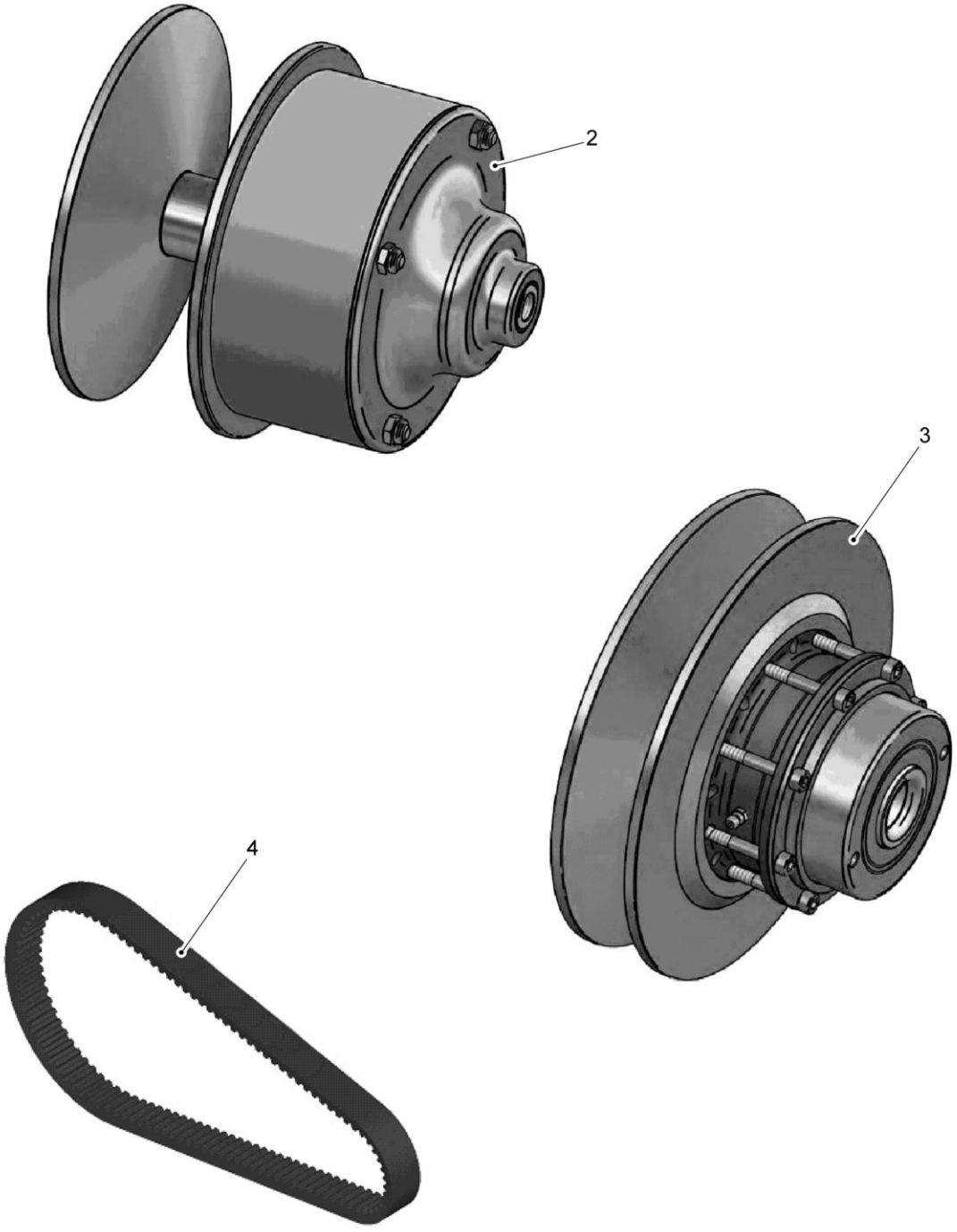

Fig 8 Transmission

Fig./ Item	DMC Army	NATO Stock Number	Item name and Description	Part No./ Dwg No.	No Off	Annotation (NSCM)
8						
NI 1			CVT COMPLETE		1 EA	
2		3010-99-812-8125	. CVT, ENGINE	TM1315	1 EA	
3		2520-99-148-1430	. CVT, GEARBOX	TM1370	1 EA	
4		3030-99-961-3766	CVT BELT	TM1262	1 EA	
			1.1.247			
			1.1.248			
			1.1.249			
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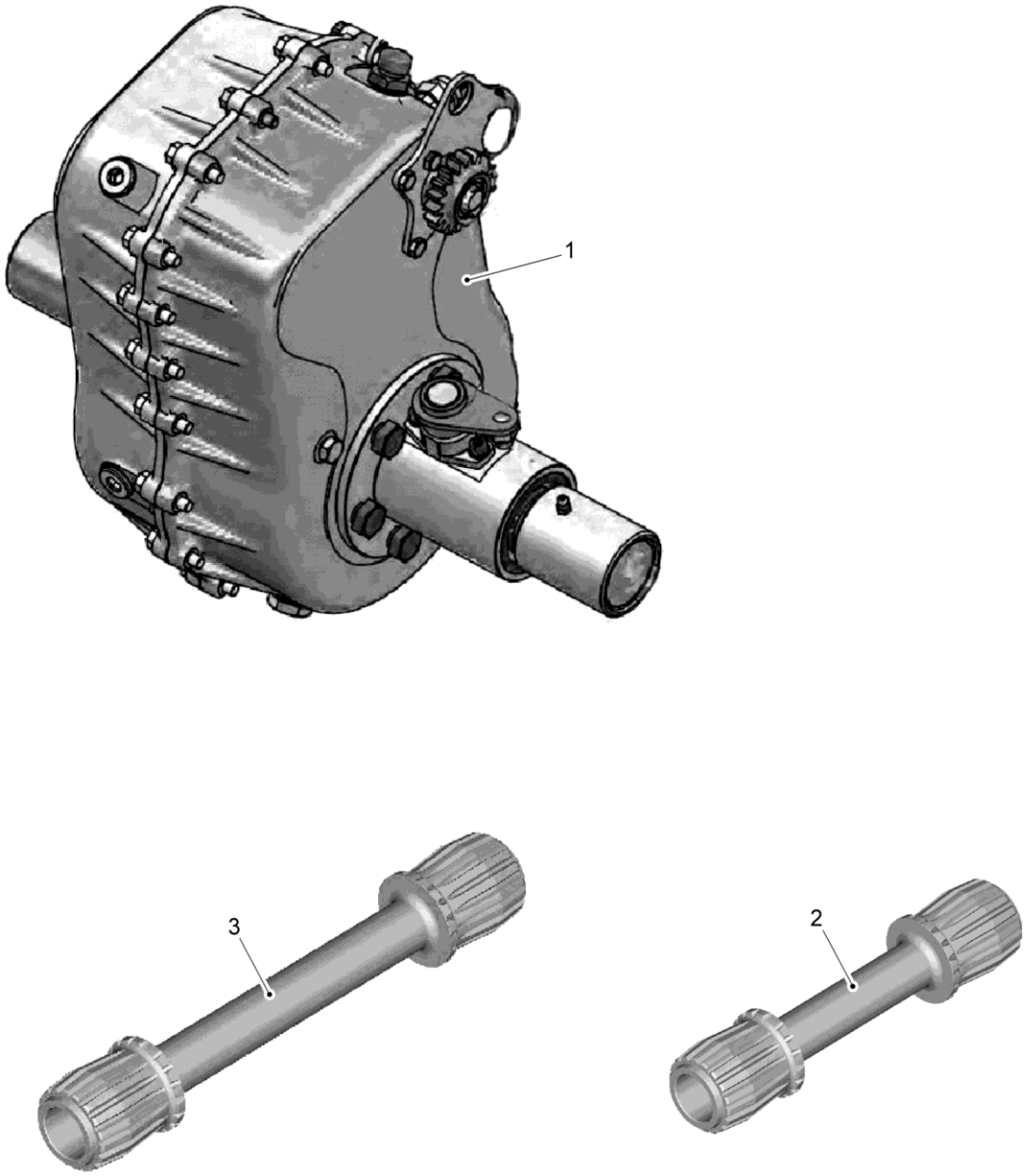

Fig 9 Gearbox - External Parts

Fig./ Item	DMC Army	NATO Stock Number	Item name and Description	Part No./ Dwg No.	No Off	Annotation (NSCM)
9						
1		2520-99-989-1266	GEARBOX	TM1530	1 EA	
2		3040-99-213-2667	. REAR DRIVE SHAFT RIGHT (SHORT)	TM1276	1 EA	
3		3040-99-746-9694	. REAR DRIVE SHAFT LEFT (LONG)	TM1277	1 EA	
NI 4			BALL JOINT, DIFFERENTIAL LOCK	TM406	2 EA	
			1.1.281			
			1.1.282			
			1.1.283			
			1.1.284			
			1.1.285			
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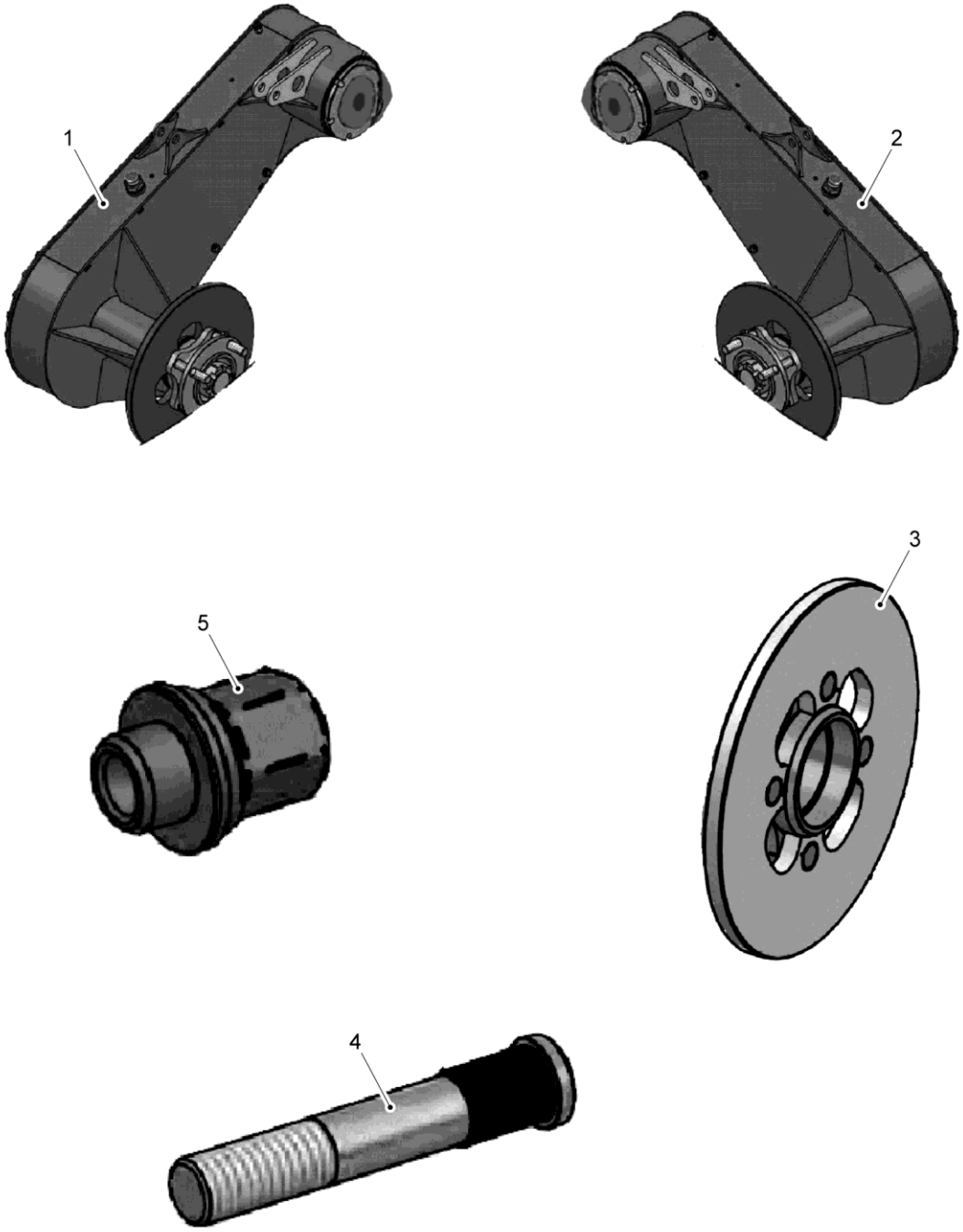

Fig 10 Final Drive Assemblies

Fig./ Item	DMC Army	NATO Stock Number	Item name and Description	Part No./ Dwg No.	No Off	Annotation (NSCM)
10						
1		2520-99-175-1574	FINAL DRIVE ASSEMBLY R/H	TM25850	1 EA	
2		2520-99-975-0655	FINAL DRIVE ASSEMBLY L/H	TM25851	1 EA	
3		2530-99-613-4047	. BRAKE DISC, REAR (INC HUB)	TM2056	1 EA	
4		5315-99-434-9307	. . WHEEL STUD	TM1988	4 EA	
5		5310-99-667-2900	. . . WHEEL NUT	TM1995	1 EA	
			1.1.315			
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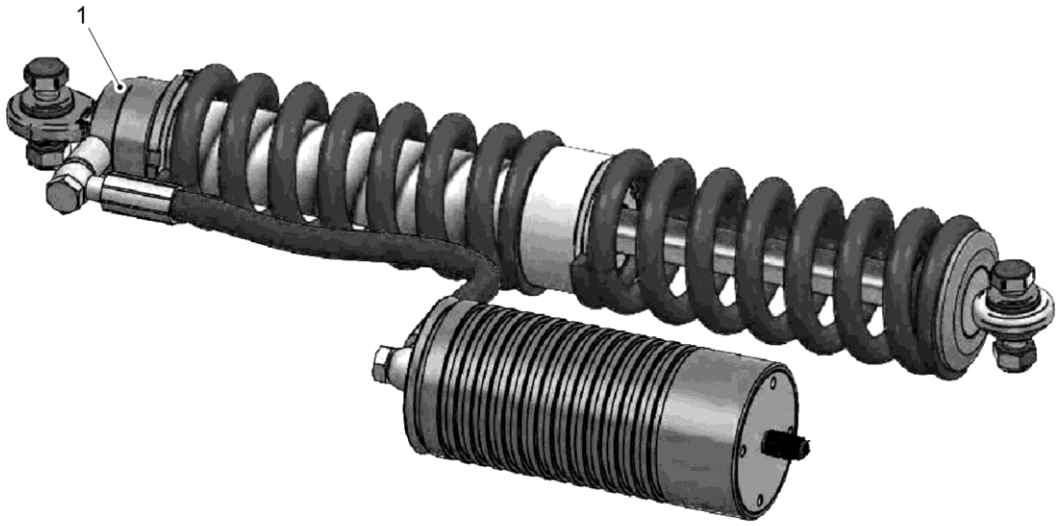

Fig 11 Rear Shock Absorbers

Fig./ Item	DMC Army	NATO Stock Number	Item name and Description	Part No./ Dwg No.	No Off	Annotation (NSCM)
11						
1		2510-99-148-1113	REAR SHOCK ABSORBERS (COMPLETE)	TM4404	2 EA	
			1.1.349			
			1.1.350			
			1.1.351			
			1.1.352			
			1.1.353			
			1.1.354			
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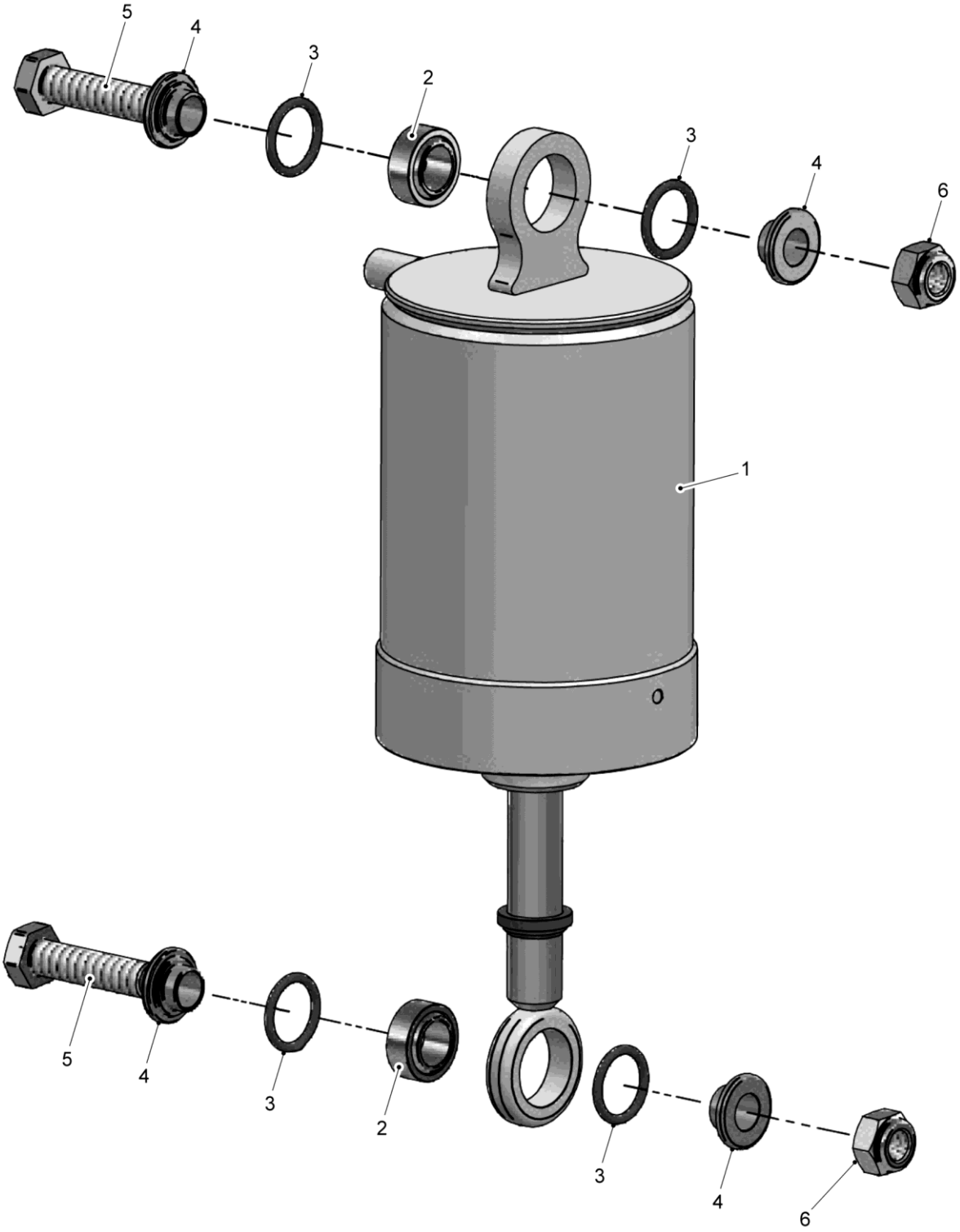

Fig 12 Air Suspension Units

Fig./ Item	DMC Army	NATO Stock Number	Item name and Description	Part No./ Dwg No.	No Off	Annotation (NSCM)
12						
1		2510-99-327-4484	AIR SUSPENSION UNITS	TM4570	2 EA	
2			. BALL JOINT DIA 15, CHROME/TEFLON	TJ15	2 EA	
3			. O-RING 3.53 X 19.00	OR210	4 EA	
4			. SHOCK 38/18, BALL JOINT ADAPTOR 12	TM6530	4 EA	
5			. SHOCK 38/18, BOLT M12 X 1.5 X 47	TM6480	2 EA	
6			1.1.385 . NUT, SELF-LOCK, M12 X 1.5 NY	TM7092	2 EA	
			1.1.386			
			1.1.387			
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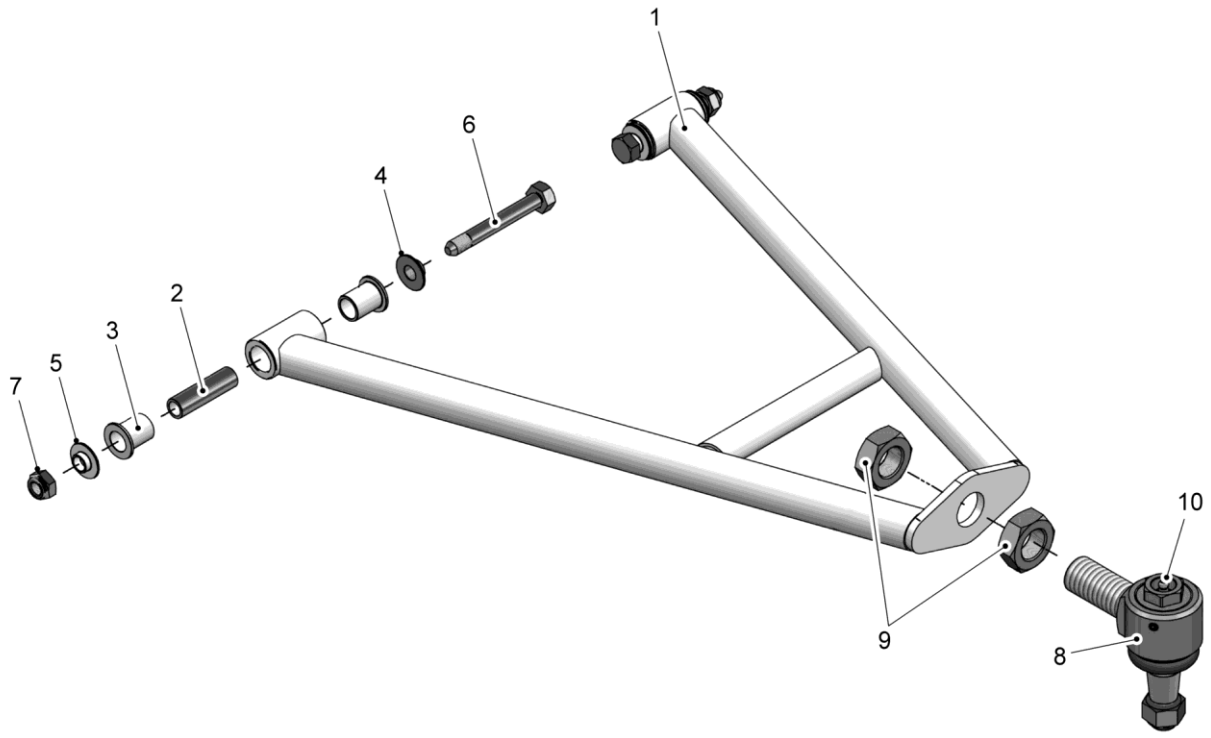

Fig 13 Front Suspension Arm Assembly, Upper

Fig./ Item	DMC Army	NATO Stock Number	Item name and Description	Part No./ Dwg No.	No Off	Annotation (NSCM)
13						
1		2530-99-667-3068	WISHBONE UPPER	TM1723LST	1 EA	
2			. A ARM BUSH, METAL	TM1725	2 EA	
3			. A ARM BUSH, POLYMER	TM1730	4 EA	
4			. A ARM - BOLT ADAPTER, 5.9 YELLOW	TM1666	2 EA	
5			. A ARM - BOLT ADAPTER, 4.7 WHITE	TM1665	2 EA	
6			. A ARM - BOLT M10 X 1.25 X 80 XZ	TM1735	2 EA	
7			1.1.417 . NUT, SELF-LOCK, M10 X 1.25 NY	TM7090	2 EA	
8			1.1.418 . UPPER BALL JOINT ASSEMBLY COMPLETE	TM1755	1 EA	
9			1.1.419 . . NUT, M24, UPPER BALL JOINT	TM1740	2 EA	
10			1.1.420 . . GREASE NIPPLE, UPPER BALL JOINT	TM7990	1 EA	
			1.1.421			
			1.1.422			
			1.1.423			
			1.1.424			
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			1.1.426			
			1.1.427			
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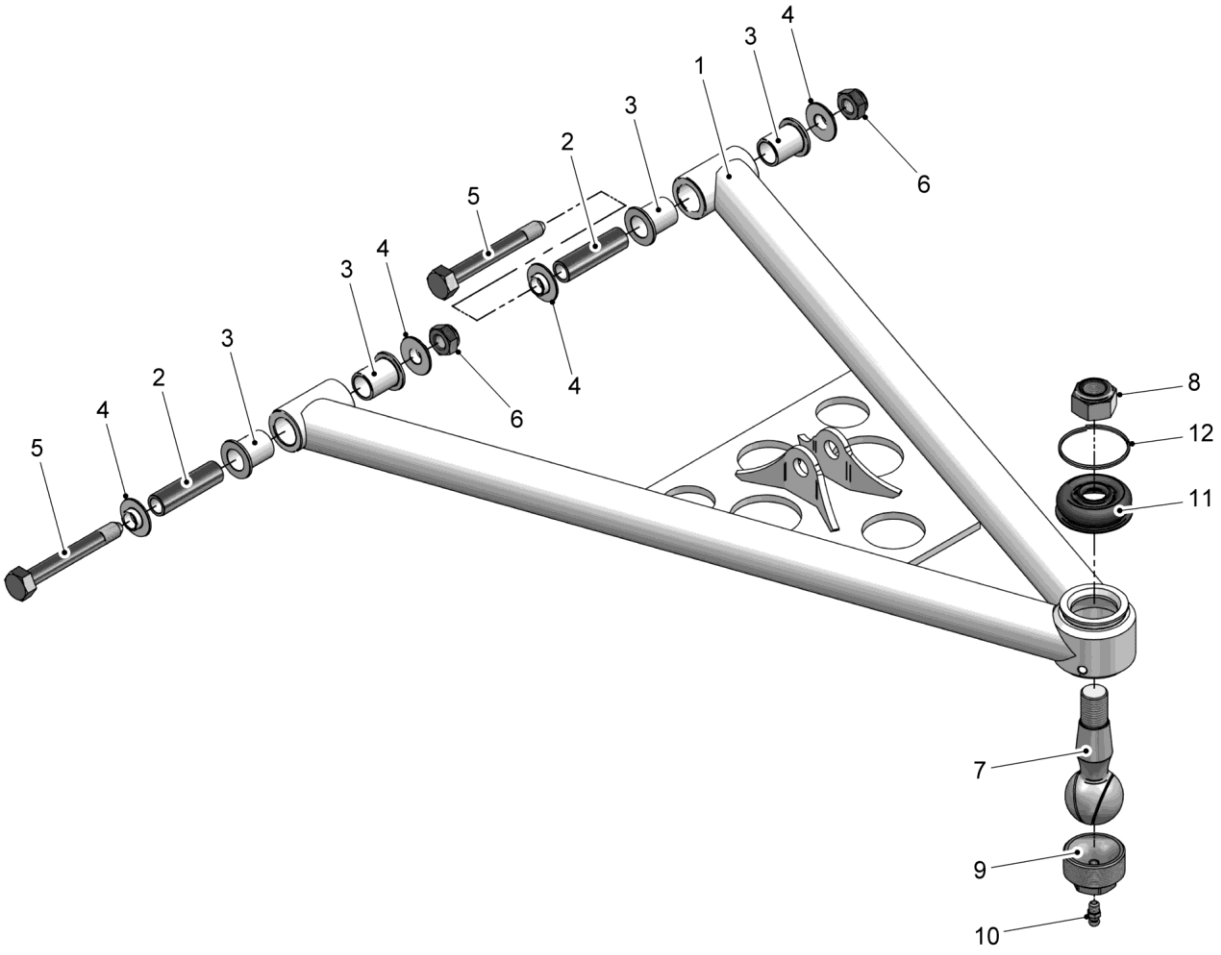

Fig 14 Front Suspension Arm Assembly, Lower

Fig./ Item	DMC Army	NATO Stock Number	Item name and Description	Part No./ Dwg No.	No Off	Annotation (NSCM)
14						
1		2530-99-148-1428	WISHBONE LOWER	TM1783LST	1 EA	
2			. A ARM BUSH, METAL	TM1725	2 EA	
3			. A ARM BUSH, POLYMER	TM1730	4 EA	
4			. A ARM - BOLT ADAPTER, 4.7 WHITE	TM1665	4 EA	
5			. A ARM - BOLT M10 X 1.25 X 80 XZ	TM1735	2 EA	
6			1.1.445 . NUT, SELF-LOCK, M10 X 1.25 NY	TM7090	2 EA	
7			1.1.446 . LOWER BALL JOINT	TM1747	1 EA	
8			1.1.447 . . NUT, LOWER BALL JOINT SELF-LOCK, M16 X 1.5	TM7095	1 EA	
9			1.1.448 . LOWER BALL JOINT CAP	TM1745	1 EA	
10			1.1.449 . . GREASE NIPPLE, LOWER BALL JOINT CAP	TM7990	1 EA	
11			1.1.450 . RUBBER GAITER LOWER BALL JOINT	TM1748	1 EA	
12			1.1.451 . . SPRING CLIP, LOWER BALL JOINT	TM1749	1 EA	
			1.1.452			
			1.1.453			
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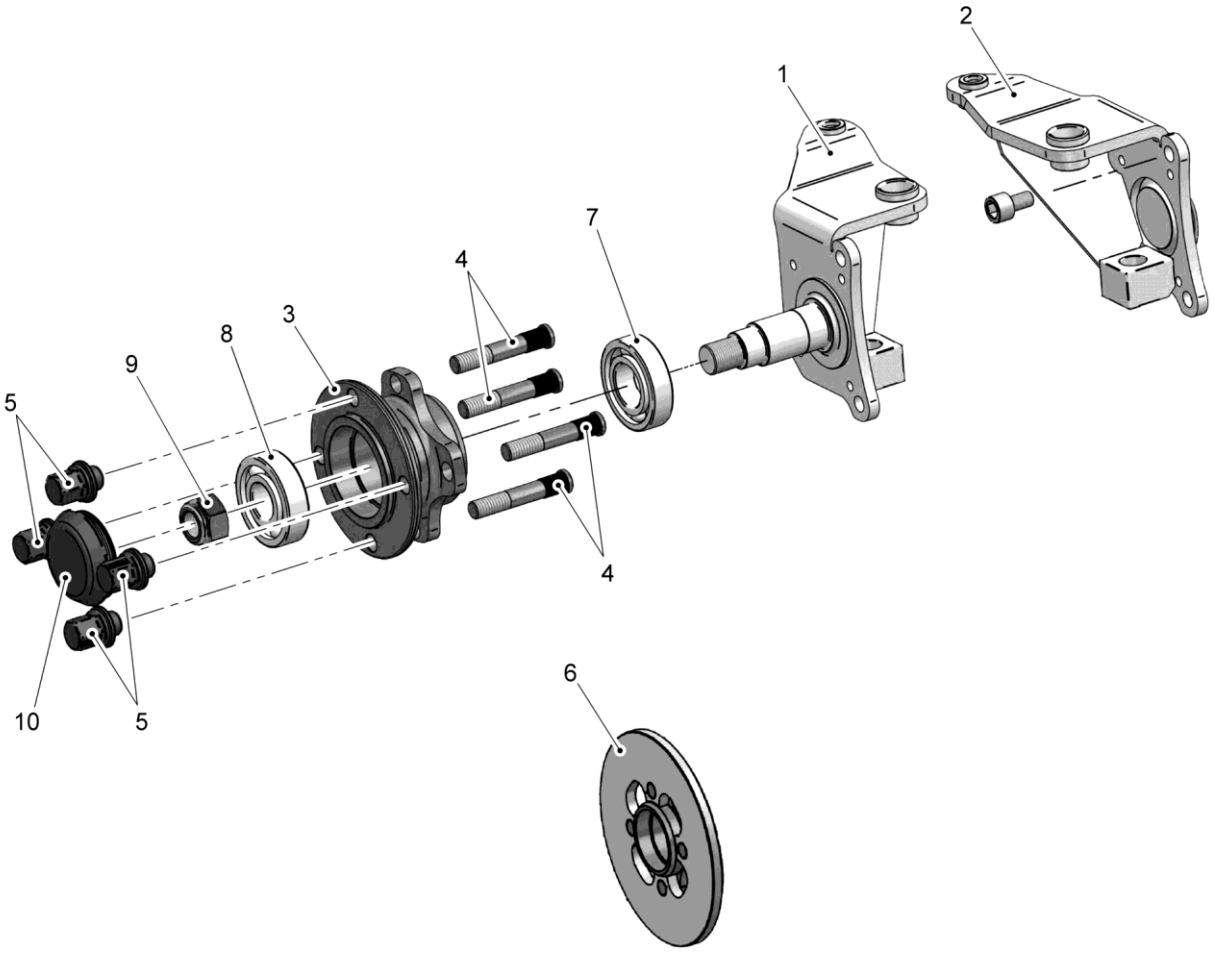

Fig 15 Front Kingpin and Hub Assembly

Fig./ Item	DMC Army	NATO Stock Number	Item name and Description	Part No./ Dwg No.	No Off	Annotation (NSCM)
15						
1			KINGPIN RHS	TM1707	1 EA	
2			KINGPIN LHS	TM1708	1 EA	
3		2530-99-667-2849	. HUB, FRONT WHEEL	TM1705	1 EA	
4			1.1.473 . . WHEEL STUD	TM1988	4 EA	
5			1.1.474 . . . WHEEL NUT,	TM1995	1 EA	
6		2530-99-438-2575	1.1.475 . . BRAKE DISC, FRONT	TM2055	1 EA	
7			. BEARING, INNER, FRONT HUB	TM88302	1 EA	
8			. BEARING, OUTER, FRONT HUB	TM88253	1 EA	
9			1.1.476 . . NUT, HUB, M20 X 1.5 NY	TM7097	1 EA	
10			1.1.477 . CUP, ALU RIMS	TM1998	1 EA	
			1.1.478			
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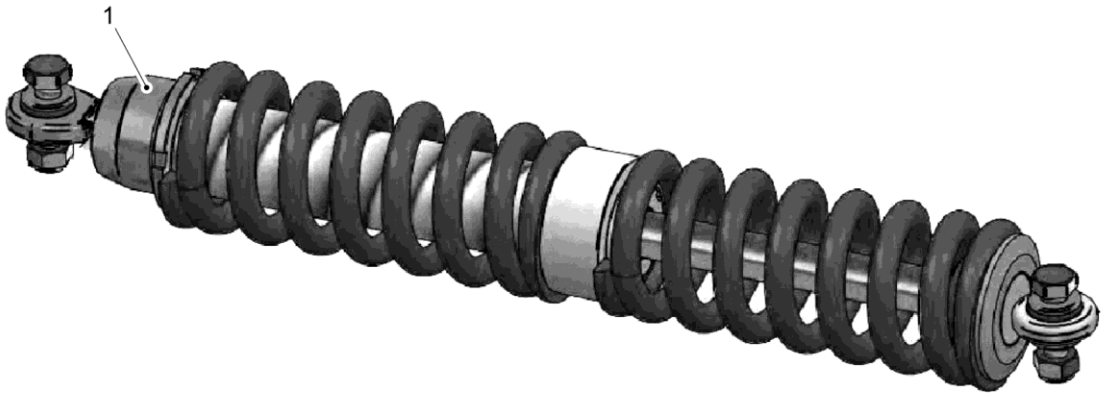

Fig 16 Front Shock Absorbers

Fig./ Item	DMC Army	NATO Stock Number	Item name and Description	Part No./ Dwg No.	No Off	Annotation (NSCM)
16						
1		2510-99-364-0864	FRONT SHOCK ABSORBERS (COMPLETE)	TM4380	2 EA	
			1.1.504			
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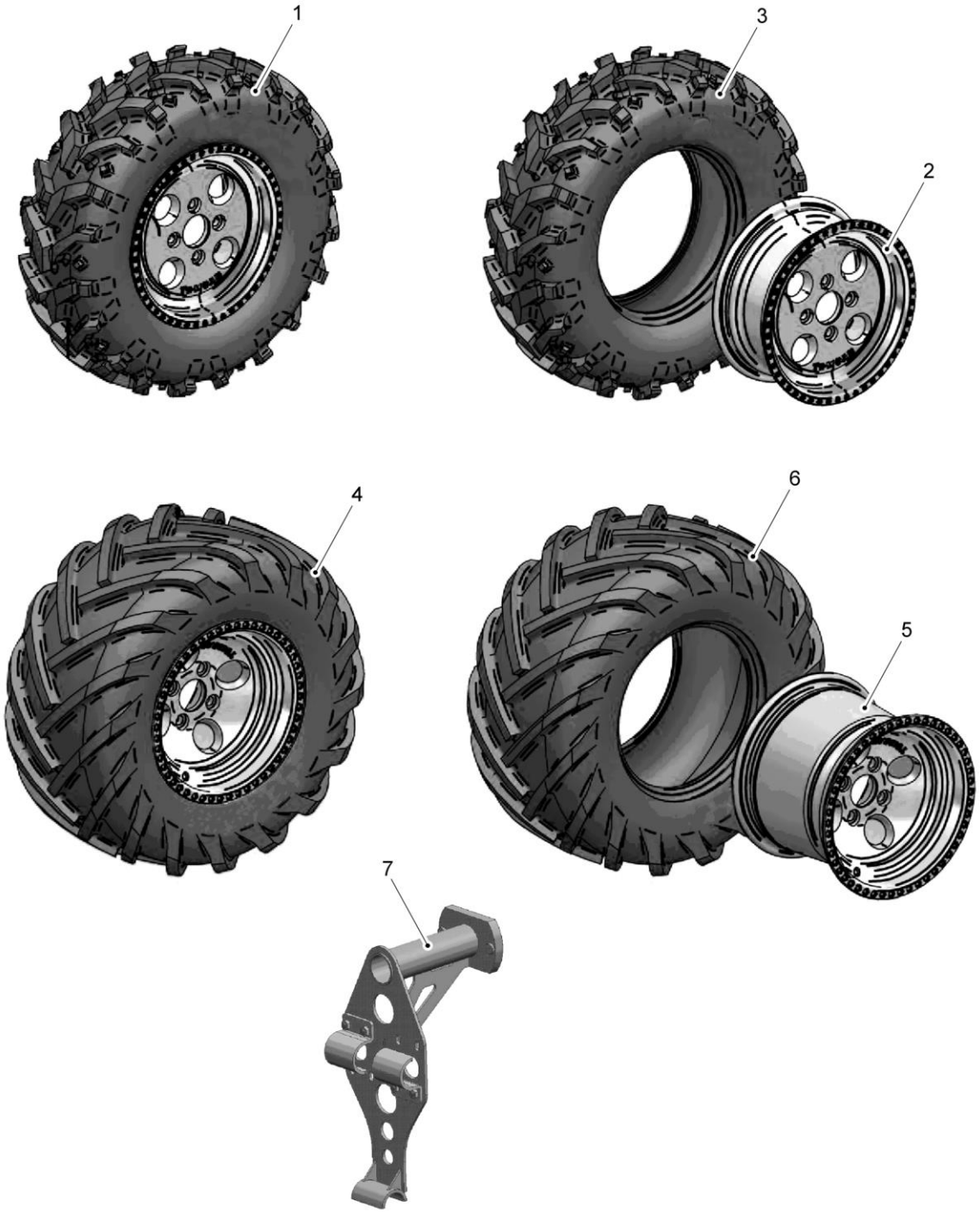

Fig 17 Wheels and Tyres

Fig./ Item	DMC Army	NATO Stock Number	Item name and Description	Part No./ Dwg No.	No Off	Annotation (NSCM)
17						
1		2530-99-921-2423	WHEEL AND TYRE COMPLETE, FRONT LEFT HAND	TM3385L	1 EA	
2		2530-99-994-2707	WHEEL AND TYRE COMPLETE, FRONT RIGHT HAND	TM3385R	1 EA	
3		2530-99-148-1085	. WHEEL RIM (ALUM), FRONT	TM3250	1 EA	
4		2610-99-985-0773	. TYRE, FRONT, 25 X 8-12 6 PLY	TM3305	1 EA	
5		2530-99-424-7151	WHEEL AND TYRE COMPLETE, REAR LEFT HAND	TM3470L	1 EA	
6		2530-99-411-7059	WHEEL AND TYRE COMPLETE, REAR LEFT HAND	TM3470R	1 EA	
7		2530-99-790-0112	. WHEEL RIM (ALUM), REAR	TM3267	1 EA	
8		2610-99-391-2381	. TYRE, REAR, 26 X 12-12 10 PLY	TM3307	1 EA	
9		2590-99-750-7089	MOUNTING BRACKET, SPARE WHEEL	TM6122	1 EA	
			1.1.540			
			1.1.541			
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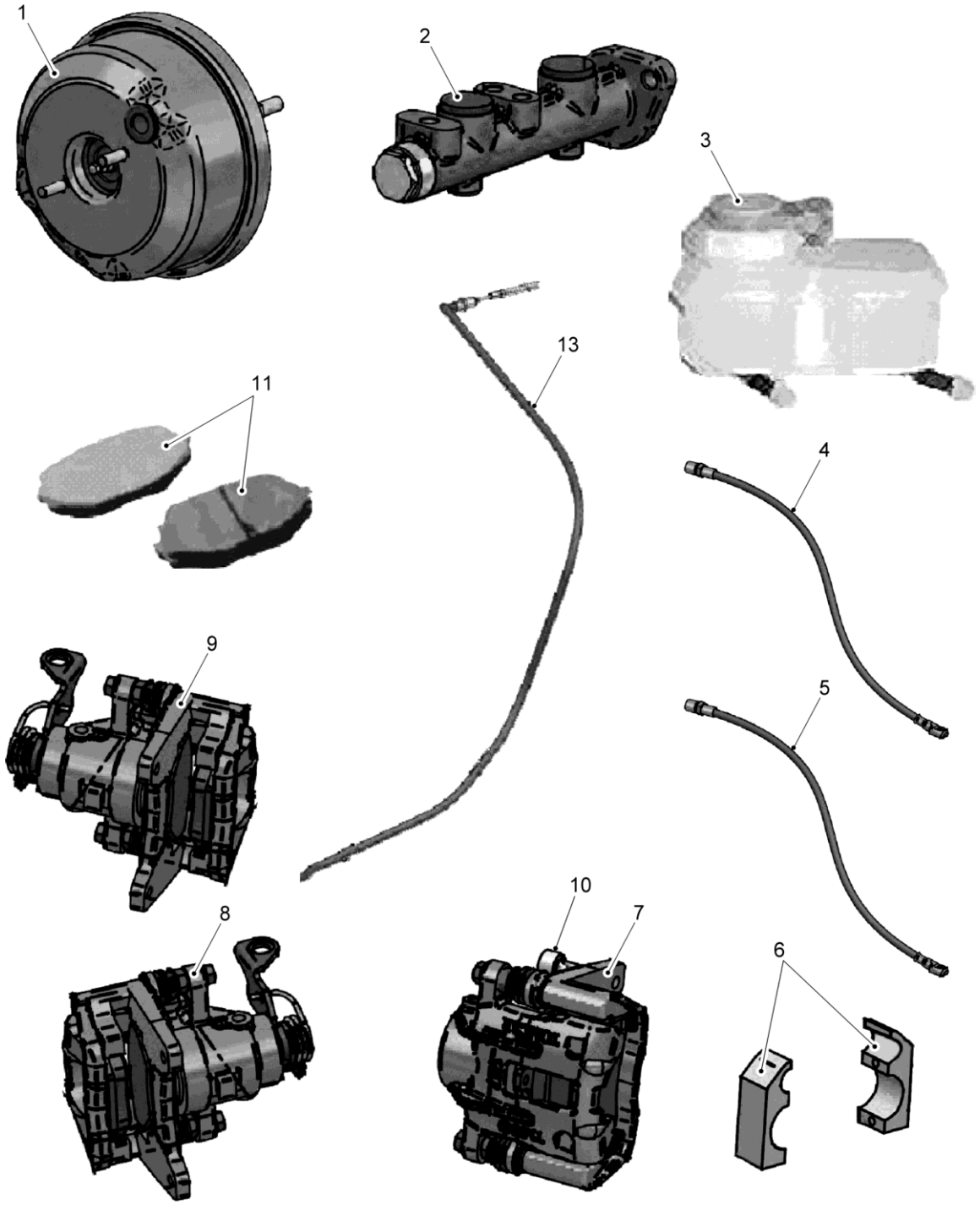

Fig 18 Brake System

Fig./ Item	DMC Army	NATO Stock Number	Item name and Description	Part No./ Dwg No.	No Off	Annotation (NSCM)
18						
1			BOOSTER	TM2182	1 EA	
2			MASTER CYLINDER	TM2100	1 EA	
3			BRAKE RESERVOIR	TM2110	1 EA	
4			BRAKE HOSE, FRONT	TM2076	2 EA	
5			BRAKE HOSE, REAR	TM2077	2 EA	
6			FLEXI PIPE HOLDER	TM2082	2 EA	
7			BRAKE CALIPER, FRONT	TM2060	2 EA	
8			BRAKE CALIPER, REAR, RHS	TM2064	1 EA	
9			BRAKE CALIPER, REAR, LHS	TM2065	1 EA	
10			. BOLT, HALEN M10 X 1.25 X 18	TM2079	2 EA	
11		2530-99-991-5137	. BRAKE PADS	TM2058	2 EA	
NI 12			LEVER, HANDBRAKE ASSEMBLY	TMXXXX	1 EA	
13			CABLE, HANDBRAKE	TM2264	2 EA	
			1.1.567			
			1.1.568			
			1.1.569			
			1.1.570			
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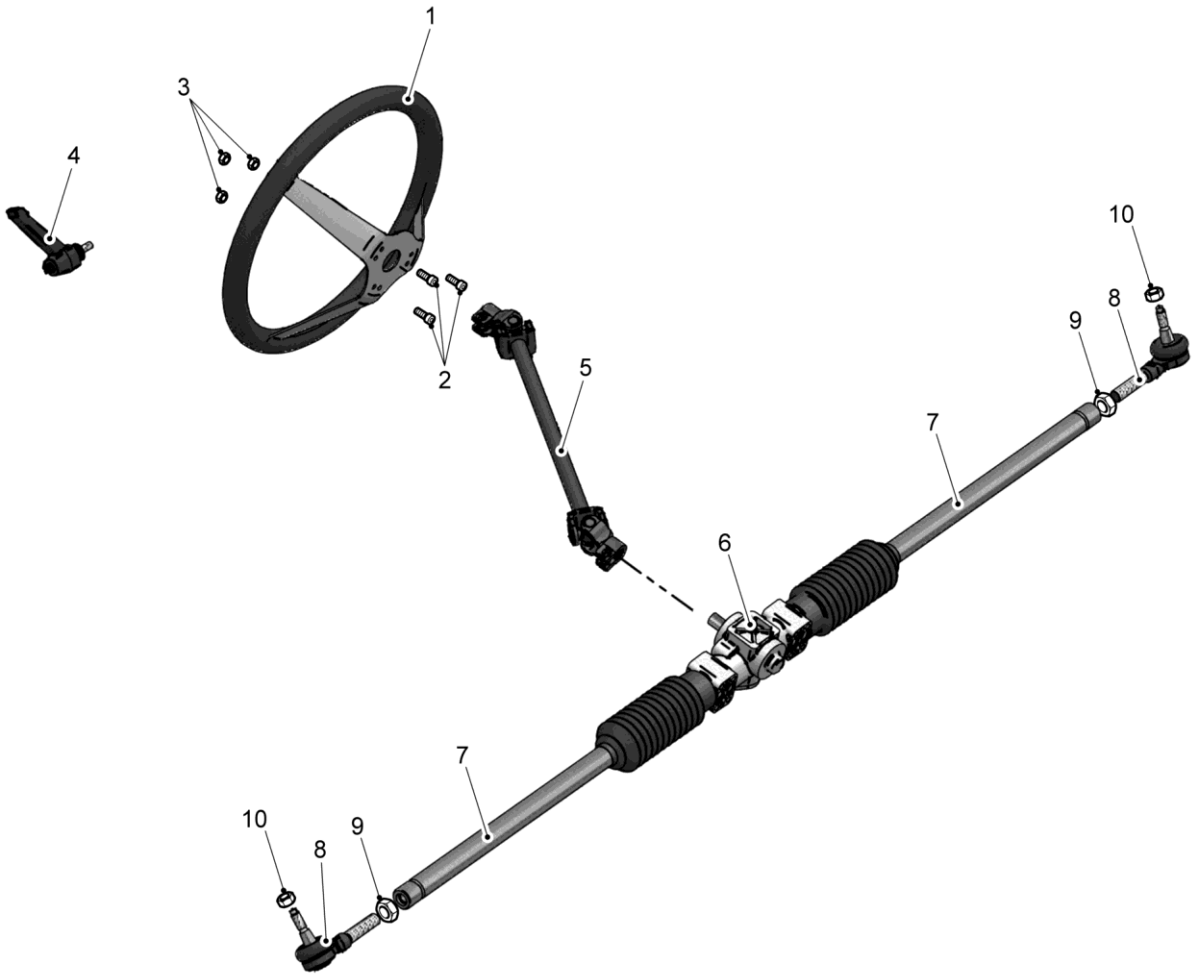

Fig 19 Steering System

Fig./ Item	DMC Army	NATO Stock Number	Item name and Description	Part No./ Dwg No.	No Off	Annotation (NSCM)
19						
1			WHEEL, STEERING	TM1764	1 EA	
2			. BOLT, HALEN H, M5 X 16	TM7157	3 EA	
3			. NUT, SELF-LOCK, M5	TM7030	3 EA	
4			LOCKING LEVER, STEERING COLUMN	TM1786	1 EA	
5			UNIVERSAL JOINT, STEERING	TM1791	1 EA	
6		2530-99-388-8263	BOX, STEERING (INC. RODS AND BALLS)	TM1799	1 EA	
7			. CONNECTION ROD ASSEMBLY, STEERING	TM1786	1 EA	
8		5340-99-287-2433	TRACK ROD END	TM1778	2 EA	
9			. NUT, LOCKING, M14 X 1.5	TM1773	1 EA	
10			. NUT, SELF-LOCK, M10 X 1.25	TM7070	1 EA	
			1.1.586			
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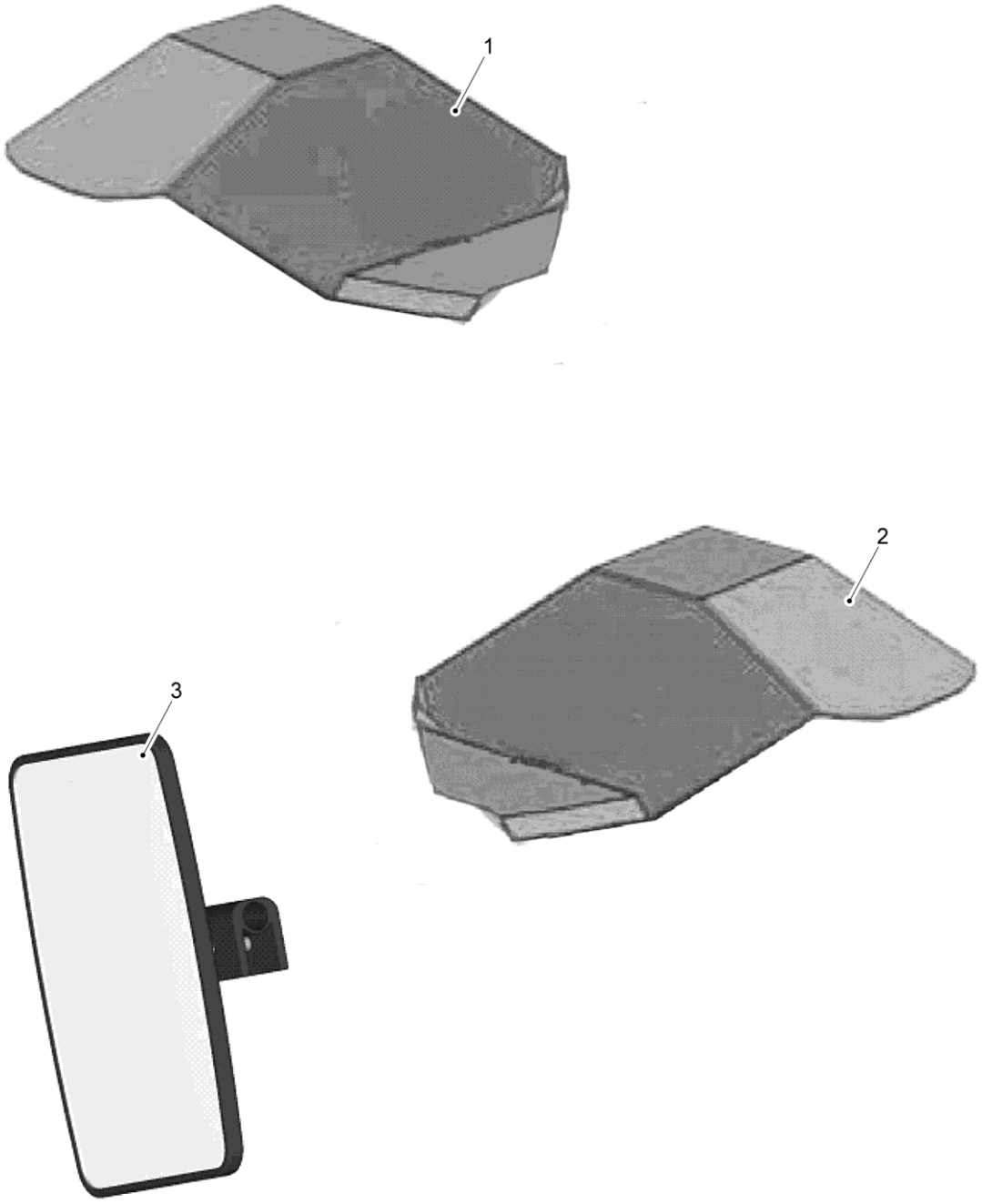

Fig 20 Body Exterior

Fig./ Item	DMC Army	NATO Stock Number	Item name and Description	Part No./ Dwg No.	No Off	Annotation (NSCM)
20						
1			FRONT WING/FENDER RH	TM1240	1 EA	
2			FRONT WING/FENDER LH	TM1241	2 EA	
3		2540-99-916-1037	MIRROR	TM1119	2 EA	
NI 4			. ARMS, MIRROR	TM1132	1 EA	
NI 5		2590-99-165-6230	WIRE CUTTER	S.A.WC	1 EA	
			1.1.600			
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			1.1.602			
			1.1.603			
			1.1.604			
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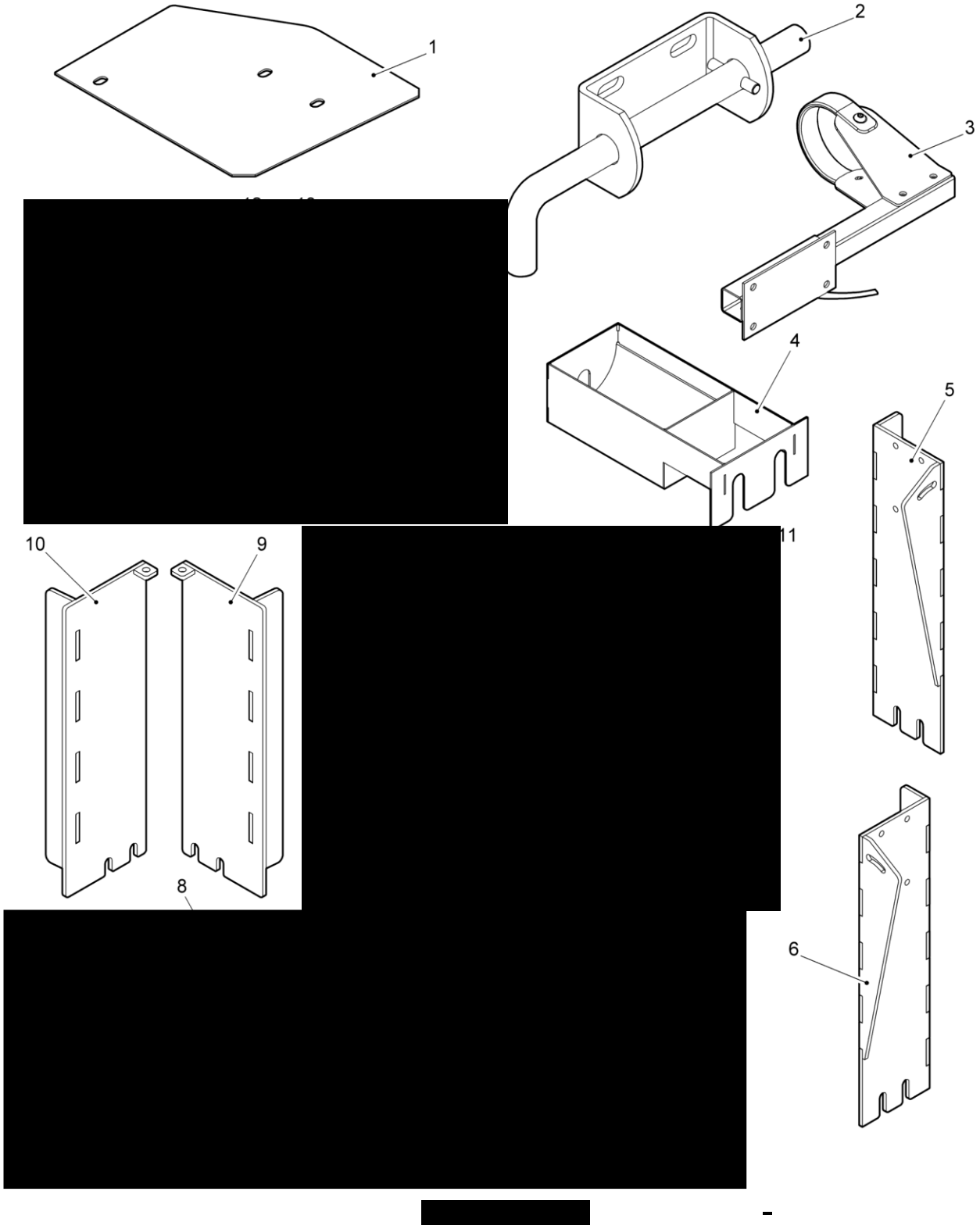
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Fig./ Item	DMC Army	NATO Stock Number	Item name and Description	Part No./ Dwg No.	No Off	Annotation (NSCM)
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Fig./ Item	DMC Army	NATO Stock Number	Item name and Description	Part No./ Dwg No.	No Off	Annotation (NSCM)
22						
1		2590-99-969-2299	WINCH	WS8000SD	1 EA	
NI 2			. MANUAL, WINCH	MANUAL	1 EA	
NI 3			. CAP SCREW, M10 X 35	800002	4 EA	
NI 4			. LOCK WASHER, M10	800003	4 EA	
NI 5			. THIN FLAT WASHER, M10	800004	4 EA	
NI 6			. HEX NUT, M10	800005	4 EA	
7		6110-99-448-7262	. SOLENOID, DC CONTACTOR, WINCH	WSDC	1 EA	
8		4020-99-253-6772	. LINE, PLASMA, 14 M	WSPLL	1 EA	
NI 9		2590-99-880-0353	2 INTO 1 UNDER WINCH BAR	S.A.UW	1 EA	
NI 10			FRONT CARGO LOCKING ARM, C/W SECURING PIN	TMXXXX	2 EA	
NI 11			SWITCH, WINCH SAFETY CUT OFF	E.T.A. WSCB75	1 EA	
			1.1.650			
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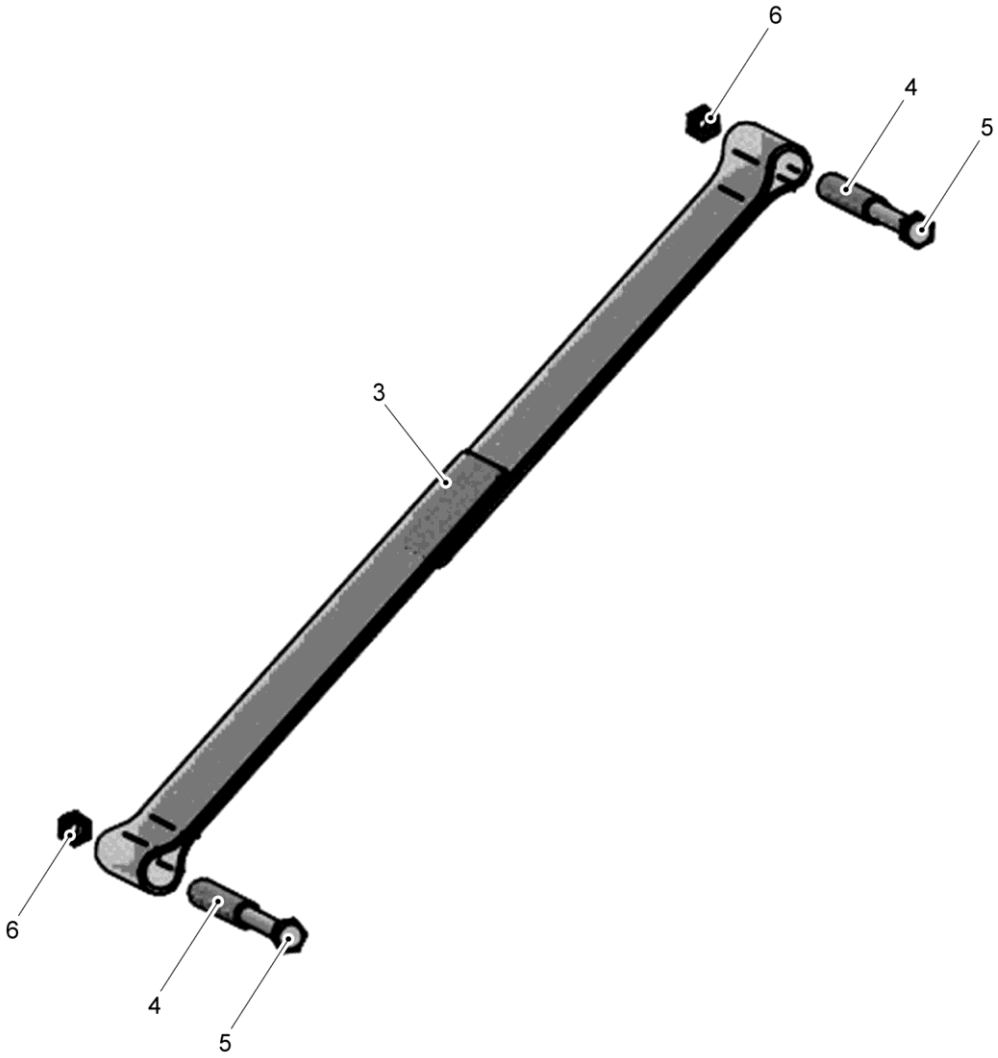

Fig 23 Rear Cargo Box Parts

Fig./ Item	DMC Army	NATO Stock Number	Item name and Description	Part No./ Dwg No.	No Off	Annotation (NSCM)
23						
NI 1			TAILGATE R-CLIPS/PINS	X	2 EA	
NI 2			RAMP BRACKETS	S.A.LRB	2 EA	
3			BELT, CARGO BOX	TM1235	2 EA	
4			. BUSHING, CARGO BOX BELT	TM1236	2 EA	
5			. BOLT, M8 X 80, CARGO BOX BELT	TM7333	2 EA	
6			. NUT, SELF-LOCK, M8, NY, CARGO BOX BELT	TM7040	2 EA	
NI 7			CLIP, STRETCHER	E.W. SS4	4 EA	
NI 8		3990-99-474-6717	REAR ROLLER CARGO LOADING		1 EA	
			1.1.670			
			1.1.671			
			1.1.672			
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			1.1.674			
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Fig./ Item	DMC Army	NATO Stock Number	Item name and Description	Part No./ Dwg No.	No Off	Annotation (NSCM)
24 NI 1			TOP CARGO BOX	AEI-	1 EA	
			1.1.692 1.1.693 1.1.694 1.1.695 1.1.696 1.1.697 1.1.698 1.1.699 1.1.700 1.1.701 1.1.702			
			1.1.703 1.1.704 1.1.705 1.1.706 1.1.707 1.1.708 1.1.709 1.1.710 1.1.711 1.1.712 1.1.713 1.1.714 1.1.715 1.1.716 1.1.717 1.1.718 1.1.719			

Fig 25 Compressor and accessories

Fig./ Item	DMC Army	NATO Stock Number	Item name and Description	Part No./ Dwg No.	No Off	Annotation (NSCM)
25						
1		4310-99-488-8208	COMPRESSOR, LWT, WITH ACCESSORIES	TM98010	1 EA	
			1.1.720			
			1.1.721			
			1.1.722			
			1.1.723			
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			1.1.731			
			1.1.732			
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			1.1.734			
			1.1.735			
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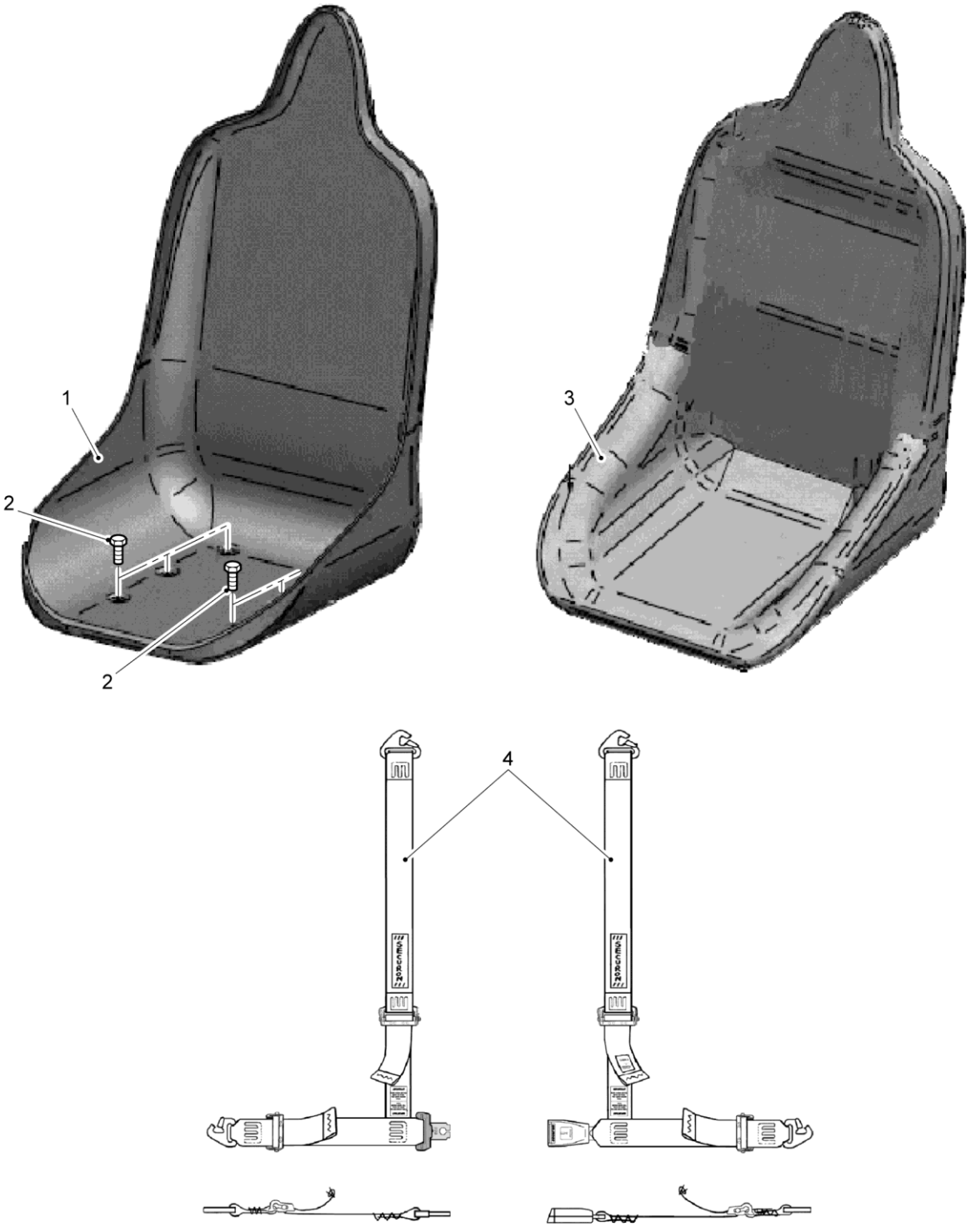

Fig 26 Seats

Fig./ Item	DMC Army	NATO Stock Number	Item name and Description	Part No./ Dwg No.	No Off	Annotation (NSCM)
26						
1			SEAT	TM5709	2 EA	
2			. BOLT, HEX, M8 X 20	TM7310	6 EA	
3			. SEAT COVER	TM5730	1 EA	
4		2540-99-219-7303	. SEAT BELT	PN715	1 EA	
			1.1.748			
			1.1.749			
			1.1.750			
			1.1.751			
			1.1.752			
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			1.1.767			
			1.1.768			
			1.1.769			
			1.1.770			
			1.1.771			
			1.1.772			
			1.1.773			

Fig 27 Pedals

Fig./ Item	DMC Army	NATO Stock Number	Item name and Description	Part No./ Dwg No.	No Off	Annotation (NSCM)
27						
NI 1			RUBBER MATTING	AC:	X EA	
2			PEDAL, ACCELERATOR	TM2333	1 EA	
3			. SPRING, ACCELERATOR PEDAL	SP140	1 EA	
4			PEDAL, BRAKE	TM2392	1 EA	
5			. SPRING, BRAKE PEDAL	SP180	1 EA	
6			BALL JOINT, THROTTLE	TM404	2 EA	
			1.1.774			
			1.1.775			
			1.1.776			
			1.1.777			
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			1.1.779			
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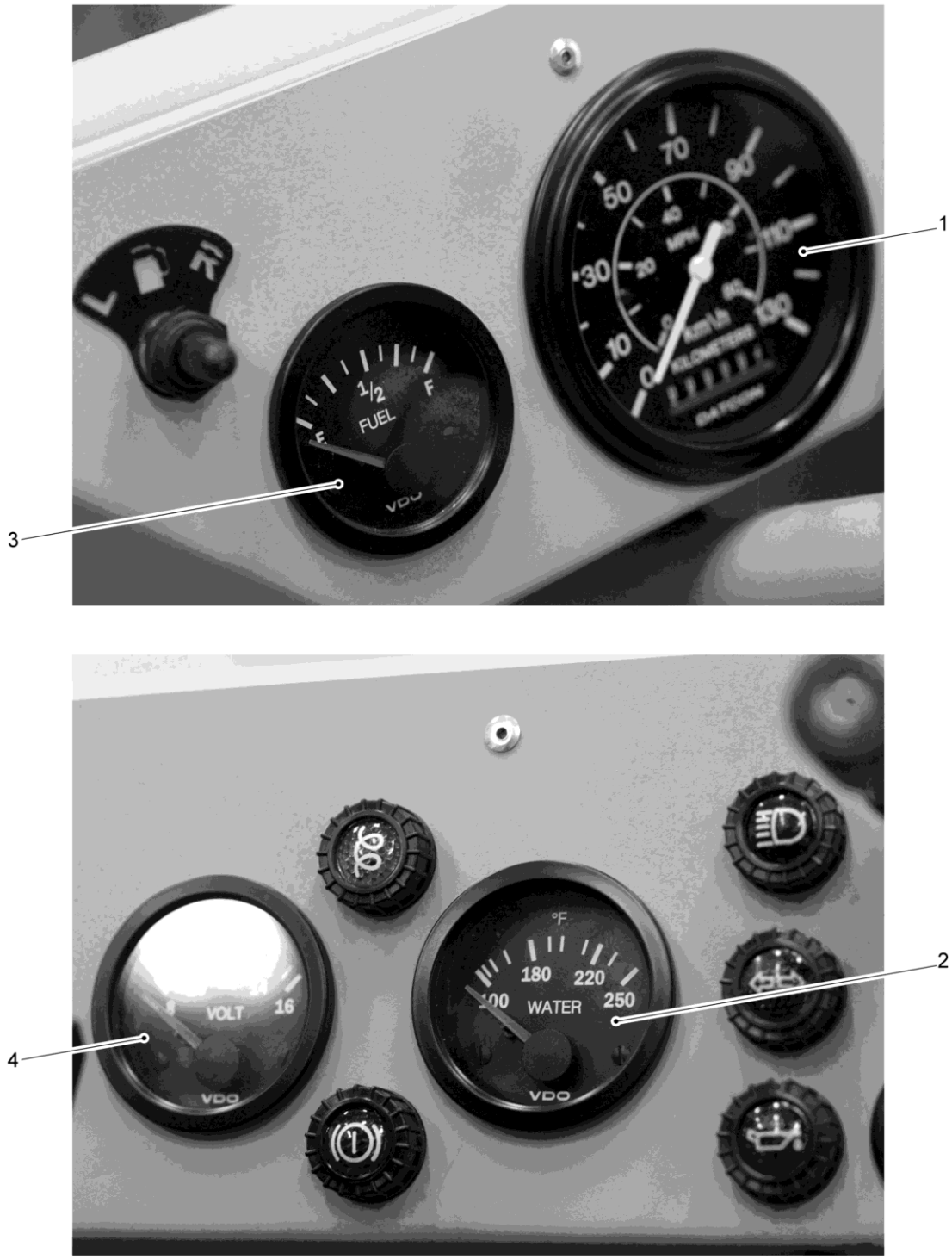

Fig 28 Instruments

Fig./ Item	DMC Army	NATO Stock Number	Item name and Description	Part No./ Dwg No.	No Off	Annotation (NSCM)
28						
1			SPEEDOMETER	TM6170	1 EA	
2			GAUGE, WATER TEMPERATURE	TM6171	1 EA	
3			VOLTMETER	TM6172	1 EA	
4			GAUGE, FUEL	TM6173	1 EA	
			1.1.795			
			1.1.796			
			1.1.797			
			1.1.798			
			1.1.799			
			1.1.800			
			1.1.801			
			1.1.802			
			1.1.803			
			1.1.804			
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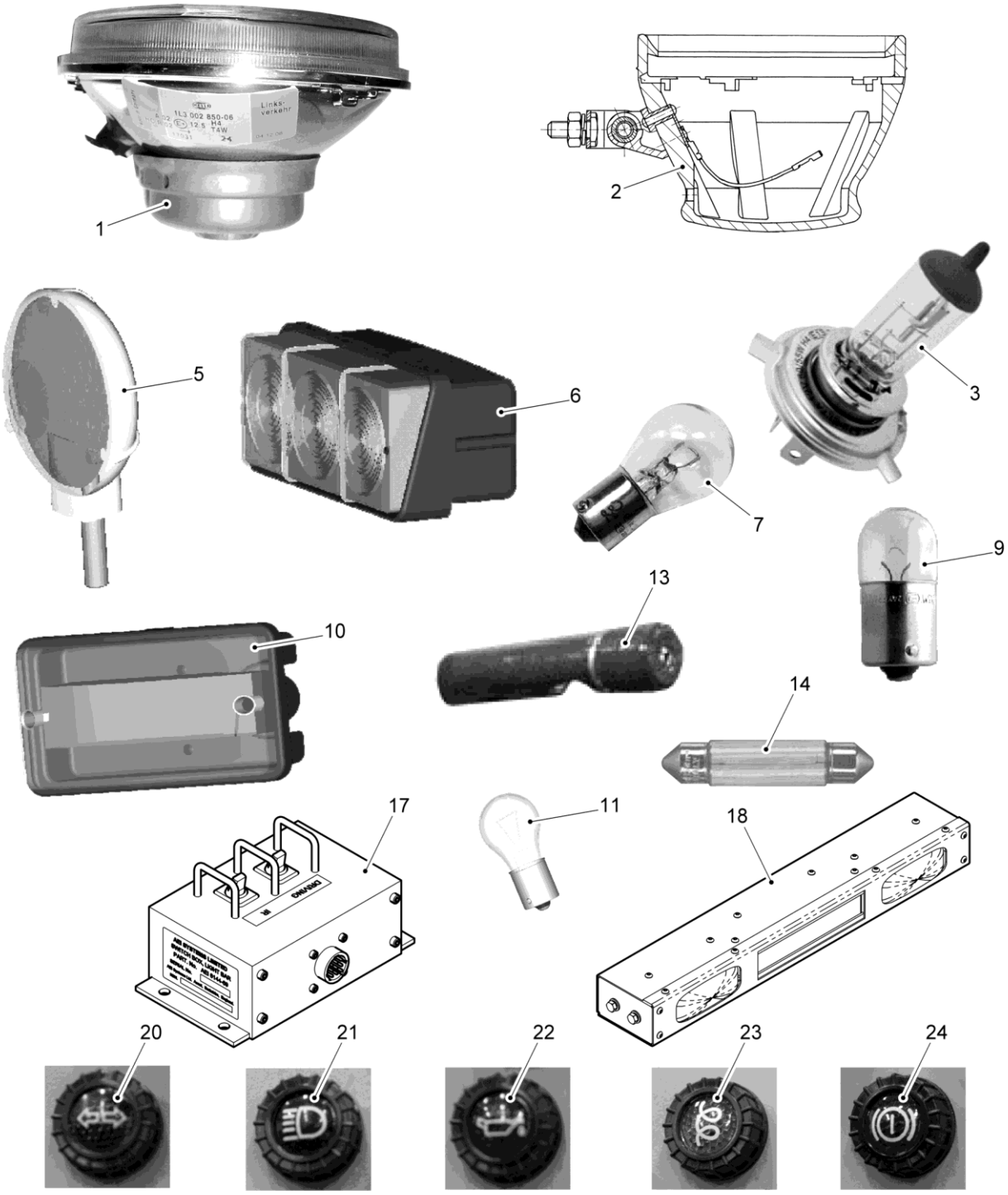

Fig 29 Lights

Fig./ Item	DMC Army	NATO Stock Number	Item name and Description	Part No./ Dwg No.	No Off	Annotation (NSCM)
29						
1			HEADLIGHT HOUSING, RUBBER	La:9BG 127 179-01	2 EA	
2		6220-12-348-3435	. HEADLAMP WITH SIDELIGHT	La:1L3 002 850-06	1 EA	
3			. . BULB, HALOGEN,12 V 60/55 W FRONT HEADLAMP	L:LHA-83140101	1 EA	
NI 4			. . BULB,12 V 4 W FRONT SIDELAMP	L:BA9S	1 EA	
5		2590-99-917-0157	TURN SIGNAL LAMP, FRONT	TM2838	2 EA	
6		6220-99-471-4639	BRAKE LIGHT HOUSING, REAR	TM2840	2 EA	
7			. BULB, 12 V 21 W, INDICATOR AND BRAKE, REAR	L:P21W	2 EA	
NI 8			REVERSING LAMP	TMXXXX	1 EA	
9			. BULB, 12 V 5 W, REAR LIGHT AND REVERSE	L:R5W	2 EA	
10			FOGLAMP, REAR	TM2855	1 EA	
11			. BULB, FOGLAMP, REAR	TM2802	1 EA	
NI 12			NO. PLATE LAMP	TMXXXX	1 EA	
13			MAP LAMP HOUSING	TM3055	1 EA	
NI 14			. BULB, 12 V 5 W, MAP/NO. PLATE LIGHT	L:C5W	2 EA	
NI 15		6240-99-497-2542	BULB PACK, COMPLETE (CONTAINS 1 OF EACH BULB TYPE LISTED ABOVE)	TME200	1 EA	
NI 16		2590-99-148-1516	LIGHT COVERS NVG	EPS	x EA	
17		6110-99-990-0446	IR LIGHT BAR CONTROL UNIT	AEI-6144-69	1 EA	
18		6220-99-378-9069	IR LIGHT BAR LIGHT CLUSTER	AEI-6143-69	1 EA	
NI 19			IR LIGHT BAR LIGHT CLUSTER, REAR	AEI-	1 EA	
20			LIGHT, DASH, INDICATOR	TM3052	1 EA	
21			LIGHT, DASH, MAIN BEAM	TM3140	1 EA	
22			LIGHT, DASH, OIL WARNING	TM3142	1 EA	
23			LIGHT, DASH, GLOW PLUG	TM3143	1 EA	
24			LIGHT, DASH, BRAKE WARNING	TM3144	1 EA	
25		8105-99-987-5906	CANVAS LIGHT COVERS		2 EA	

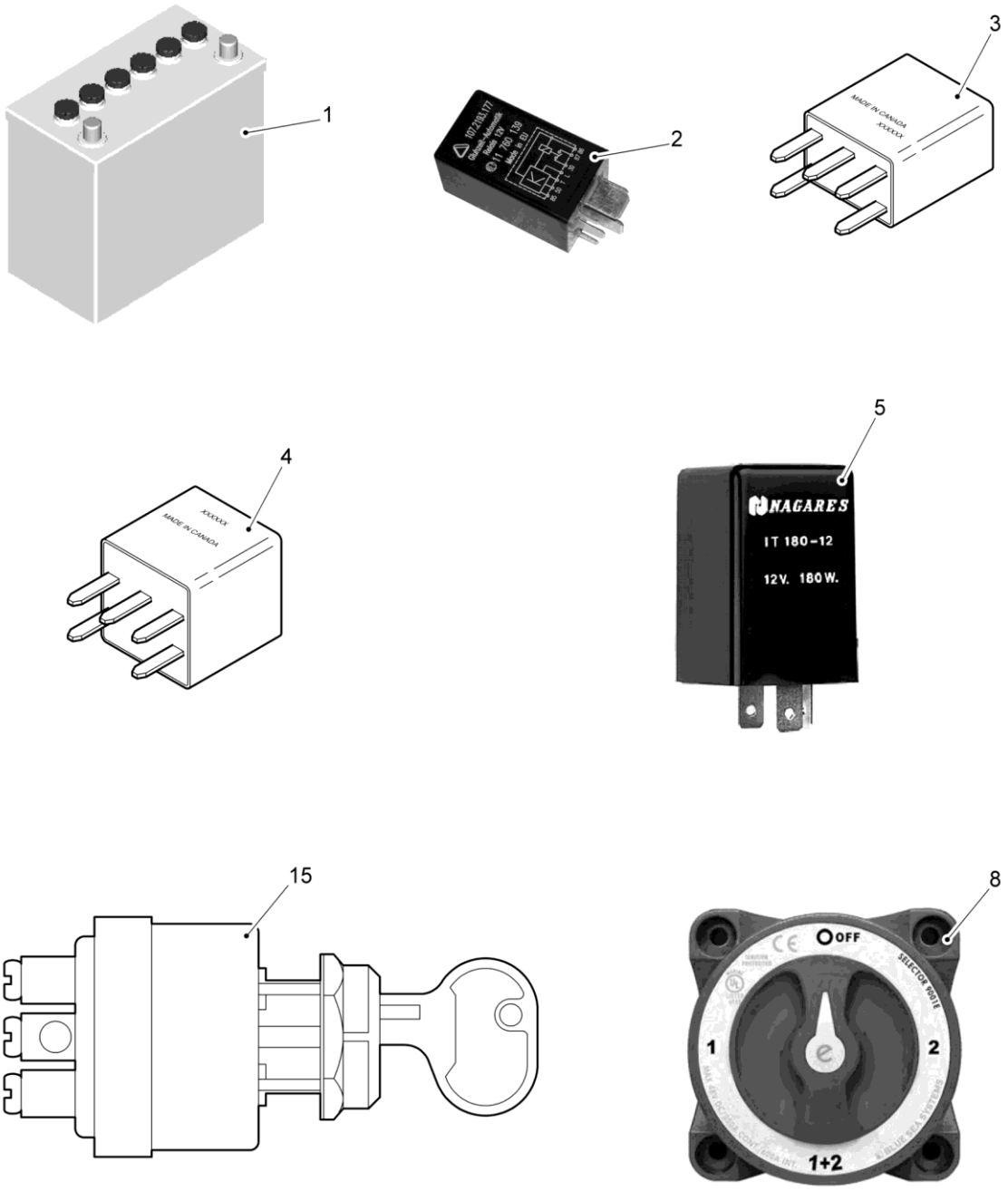

Fig 30 Electrical Components

Fig./ Item	DMC Army	NATO Stock Number	Item name and Description	Part No./ Dwg No.	No Off	Annotation (NSCM)
30						
1		6140-99-260-8873	BATTERY	TM3192	1 EA	
2			RELAY, HEATER PLUG	LB107.2193.177	1 EA	
3			RELAY, OMRON MICRO G8V	OMG8V	1 EA	
4			RELAY, OMRON MINI G8W	OMG8W	1 EA	
5			RELAY, FLASHER, 12 V, 180 W	NAGARES 1036	1 EA	
NI 6			SUPPRESSOR, DIRECTION INDICATOR	MIRA	1 EA	
NI 7			SUPPRESSOR, COOLING FAN	MIRA	1 EA	
8			SWITCH, BATTERY MASTER CUTOFF	MAR BSS9001E	1 EA	
NI 9			SWITCH ARM, INDICATOR/HEADLAMP/HORN	TMXXXX	1 EA	
NI 10			SWITCH, HAZARD LIGHT	TMXXXX	1 EA	
NI 11			SWITCH, FOG LIGHT	TMXXXX	1 EA	
NI 12			SWITCH, FUEL TANK SENDER	TMXXXX	1 EA	
NI 13			SWITCH, BLACKOUT	TMXXXX	1 EA	
NI 14			SWITCH, REVERSE LIGHT	TMZG32006	1 EA	
15			SWITCH, IGNITION ASSEMBLY AND KEY	TSM01008	1 EA	
NI 16			HORN	TMXXXX	1 EA	
NI 17			SENSOR, SPEED	TMXXXX	1 EA	
			1.1.814			
			1.1.815			
			1.1.816			
			1.1.817			
			1.1.818			
			1.1.819			
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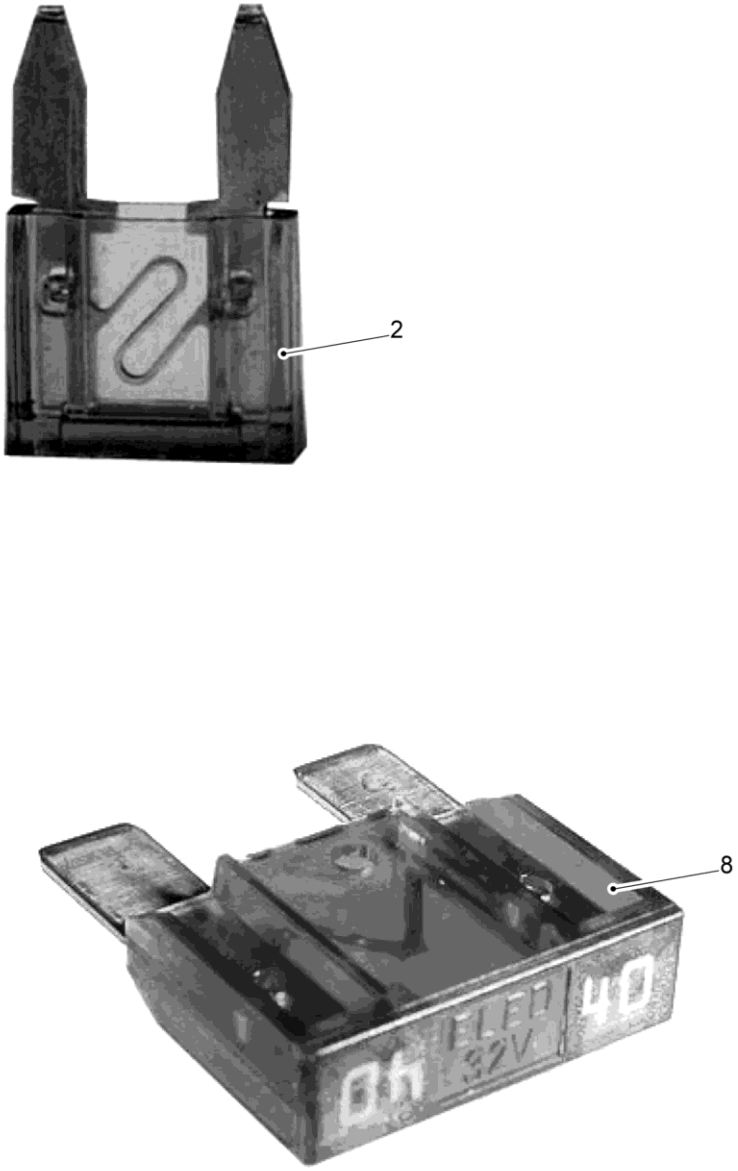

Fig 31 Fuses

Fig./ Item	DMC Army	NATO Stock Number	Item name and Description	Part No./ Dwg No.	No Off	Annotation (NSCM)
31						
NI 1		5920-99-479-6347	FUSE PACK, COMPLETE	TME100	1 EA	
2			. FUSE, MINI-BLADE 5 AMP	F:26-2404	1 EA	
NI 3			. FUSE, MINI-BLADE 10 AMP	F:26-2408	1 EA	
NI 4			. FUSE, MINI-BLADE 15 AMP	F:26-2450	1 EA	
NI 5			. FUSE, MINI-BLADE 20 AMP	F:26-2452	1 EA	
NI 6			. FUSE, MAXI-BLADE 20 AMP	F9020	1 EA	
NI 7			. FUSE, MAXI-BLADE 30 AMP	F9030	1 EA	
8			. FUSE, MAXI-BLADE 40 AMP	F9040	1 EA	
			1.1.825			
			1.1.826			
			1.1.827			
			1.1.828			
			1.1.829			
			1.1.830			
			1.1.831			
			1.1.832			
			1.1.833			
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			1.1.842			
			1.1.843			
			1.1.844			
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			1.1.846			
			1.1.847			
			1.1.848			

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Issue a revised/amended AESP*		Under investigation	
Incorporate comment(s) in future amendments		No action required	
Remarks			

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AESP Form 10 (Issue 5.0 dated Dec 01)

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SPRINGER VEHICLE

COMPLETE EQUIPMENT SCHEDULE
SERVICE EDITION

(SIMPLE EDITION)

BY COMMAND OF THE DEFENCE COUNCIL

Ministry of Defence
Issued by
GSV IPT
U05V9

AMENDMENT RECORD

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COMPLETE EQUIPMENT SCHEDULE (SERVICE)

Chapter

1 General information (Not Issued)
2 Springer Vehicle
3 Indexes

PREFACE

Sponsor: GSV IPT
Project No.: UOR A01393
File Ref: SUV C1/0204

Publication Authority: GSV IPT

INTRODUCTION

1 Service users should forward any comments on 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 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.

Instructions for use by units

4 Detailed instructions for use by Units are given in Materiel Regulations for the Army Vol 1 Para 1.

In lieu items

5 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

6 Certain items may be annotated as follows:

6.1 (E) - Expendable stores, consumable stores and material, 'NON LEDGER' spare parts of minor value.

6.2 (X) - ESSENTIAL ITEMS without which the RLC will not issue the equipment.

6.3 (*) - This asterisk indicated the accountability classification of the item.

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

6.5 (NIV) - (Not in Vocabulary) indicates that the item is not available within the stores system.

Amendments

7 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

8 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

9 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

10 This CES relates to the Springer Vehicle as detailed in Table 1.

TABLE 1 EQUIPMENT APPLICABILITY

Serial (1)	NSN (2)	Code (3)	Equipment Designation (4)	Contract (5)
1	2320-99-908-7565	NB1201-8101	Springer Vehicle	SUV C1/0204

RELATED AND ASSOCIATED PUBLICATIONS

Related publications

11 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	*	*
	1	Equipment Support Policy Directive	111	111	*	*
2	0	Operating Information	201	201	*	*
	1	Aide-Memoiré	*	*	*	*
	2	Training Aids	*	*	*	*
3		Technical Description	201	*	*	*
4	1	Installation Instructions	*	*	*	*
	2	Preparation for Special Environments	*	*	*	*
5	1	Failure Diagnosis	*	522	*	*
	2	Maintenance Instructions	201	522	*	*
	3	Inspection Standards	*	*	*	*
	4	Calibration Procedures	*	*	*	*
6		Maintenance Schedules	601	*	*	*
7	1	Illustrated Parts Catalogues	*	*	*	*
	2	Commercial Parts Lists	721	721	721	*
	3	Complete Equipment Schedule, Production	*	*	*	*
	4	Complete Equipment Schedule, Service Edition (Simple Equipment)	741	741	*	*
	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

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

Reference	Title
2320-B-130-201	Springer Vehicle Operating Information
JSP 336	Defence Supply Chain Manual

WARNINGS

13 There are no WARNINGS applicable to this equipment.

CAUTIONS

14 There are no CAUTIONS applicable to this equipment.

ABBREVIATIONS

15 The following abbreviations are used in this publication:

AESP	Army Equipment Support Publication
AC	Army Code
Amdt	Amendment
CES	Complete Equipment Schedule
Chap	Chapter
DINs	Defence Instructions and Notices
DLO	Defence Logistics Organisation
DMC	Domestic Management Code
D of Q	Denomination of Quantity
EA	Each
ESM	Equipment Support Manager
ESS	Engineer Systems Support
Fig	Figure
ft	Foot
FRACAS	Failure Reporting Analysis and Corrective Action System
in.	Inch
IPT	Integrated Project Team
JSP	Joint Service Publication
Lwt	Light Weight
mm	Millimetre
NI	Not Illustrated
NSN	NATO Stock Number
RLC	Royal Logistic Corps
SOPs	Standing Operating Procedures
SQ DR	Square Drive
SW	Switch
t	Tonne
TI	Technical Information

CHAPTER 2-0

COMPLETE EQUIPMENT SCHEDULES (SERVICE)

SIMPLE EQUIPMENT

SPRINGER VEHICLE

Chapter

2-1 Springer Vehicle

CES

Fig. No Item No	Army DMC NSCM	Army NSN Part Number	Item Description and Annotations	No Off D of Q	Quantity on Issue
NI 1		2320-99-908-7565	SPRINGER VEHICLE	1 EA	

CHAPTER 2-1

COMPLETE EQUIPMENT SCHEDULES (SERVICE)

SIMPLE EQUIPMENT

SPRINGER VEHICLE

Chapter

2-1-1 Not issued
2-1-2 Vehicle loose items
2-1-3 Literature

Springer Vehicle

CES

Fig. No Item No	Army DMC NSCM	Army NSN Part Number	Item Description and Annotations	No Off D of Q	Quantity on Issue
1					
0		2320-99-908-7565	SPRINGER VEHICLE	1 EA	
NI 1		NIV	. VEHICLE FITTED ITEMS (Not issued)	REF	
NI 2		NIV	. VEHICLE LOOSE ITEMS (Refer to Chap 2-1-2)	REF	
NI 3		NIV	. LITERATURE (Refer to Chap 2-1-3)	REF	

CHAPTER 2-1-2

COMPLETE EQUIPMENT SCHEDULES (SERVICE)

SIMPLE EQUIPMENT

VEHICLE LOOSE ITEMS

Fig 1 Vehicle loose 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	VEHICLE LOOSE ITEMS	REF	
1		5180-99-335-9720	. TOOL ROLL	1 EA	
2		5120-99-149-9574	. . SPANNER 19 mm COMBINATION	1 EA	
3		5120-99-587-3743	. . SPANNER , 17 mm COMBINATION	1 EA	
4		5120-99-138-6841	. . SPANNER , 14 mm COMBINATION	1 EA	
5		5120-99-138-6840	. . SPANNER, 13 mm COMBINATION	1 EA	
6		5120-99-138-6839	. . SPANNER, 12 mm COMBINATION	1 EA	
7		5120-99-139-3636	. . SPANNER, 10 mm COMBINATION	1 EA	
8		5120-99-138-6838	. . SPANNER, 9 mm COMBINATION	1 EA	
9		5120-99-977-2524	. . SPANNER, 8 mm COMBINATION	1 EA	
10		5120-99-974-2661	. . ALLEN KEY SET, METRIC	1 EA	
11		5120-99-910-5966	. . SPANNER, 300 mm ADJUSTABLE	1 EA	
12		5120-99-304-3111	. . LUMP HAMMER, 1 kg	1 EA	
13		5120-99-910-6635	. . WRENCH, STILSON	1 EA	
14		5120-99-585-8735	. . SCREWDRIVER, 200 mm, FLAT HEAD	1 EA	
15		5120-99-767-9458	. . SCREWDRIVER, 200 mm, CROSS POINT	1 EA	
16		5120-99-667-3107	. . PLIERS, 175 mm COMBINATION	1 EA	
NI 17		MDV941	. . SCREWDRIVER, 75 mm, PH1 CROSS POINT	1 EA	
NI 18		MDV922	. . SCREWDRIVER, 75 mm, FLAT HEAD 5.5 mm BLADE	1 EA	

Fig 2 Vehicle loose items

CES

Fig. No Item No	Army DMC NSCM	Army NSN Part Number	Item Description and Annotations	No Off D of Q	Quantity on Issue
2			VEHICLE LOOSE ITEMS - Contd		
1		3940-99-968-5688	. SPREADER BAR FOR WINCH	1 EA	
2		8105-99-840-2302	. BAG	1 EA	
3		3990-99-667-3072	. . STROP, 2 M 14 TONNE	1 EA	
4		8415-99-737-2509	. . GLOVES (PAIR), WINCH KIT	1 EA	
5		3940-99-292-4890	. . PULLEY, 2 TO 1, SMALL	1 EA	
6		3940-99-894-0534	. . PULLEY, 2 TO 1, LARGE	1 EA	
7		4030-99-414-4069	. . BOW SHACKLE 5/8 in., 3.25 TONNE	2 EA	
8		6150-99-812-8222	. . WIRED REMOTE CONTROL, WINCH	1 EA	
NI 9		5120-99-148-1472	. HANDLING BAR	1 EA	

Fig 3 Vehicle loose items

CES

Fig. No Item No	Army DMC NSCM	Army NSN Part Number	Item Description and Annotations	No Off D of Q	Quantity on Issue
3			VEHICLE LOOSE ITEMS - Contd		
1		5120-99-418-3281	. JACK, HIGH LIFT	1 EA	
2		5120-99-507-3264	. JACK, AIR	1 EA	
3		2530-99-455-5563	. ADAPTOR, SPARE WHEEL	1 EA	
4		2530-99-921-2423	. WHEEL AND TYRE COMPLETE	1 EA	
5		5120-99-396-1762	. WRENCH, WHEEL BRACE	1 EA	
6		5120-99-958-3293	. T BAR, WHEEL BRACE	1 EA	
NI 7		2540-99-702-1691	. CHOCK, VEHICULAR	2 EA	
NI 8		4910-99-051-7772	. TYRE INFLATOR	1 EA	

Fig 4 Vehicle loose items

CES

Fig. No Item No	Army DMC NSCM	Army NSN Part Number	Item Description and Annotations	No Off D of Q	Quantity on Issue
4			VEHICLE LOOSE ITEMS - Contd		
1		8305-99-148-1576	. COVER, CAB, WATERPROOF	1 EA	
2		8305-99-733-8901	. CARGO COVER, REAR, WATERPROOF	1 EA	
3		2530-99-551-6831	. GAITERS, SUSPENSION	4 EA	
NI 4		8305-99-836-4561	. CARGO NET, TOP	1 EA	
NI 5		8305-99-555-0578	. CARGO NET, REAR	1 EA	
NI 6		8305-99-613-4097	. CARGO NET, FRONT	1 EA	
NI 7		3990-99-798-5398	. TIEDOWN CARGO VEHICLE, RATCHET ASSEMBLY	4 EA	
NI 8		3990-99-798-5399	. TIEDOWN CARGO VEHICLE, LASHING ASSEMBLY	4 EA	

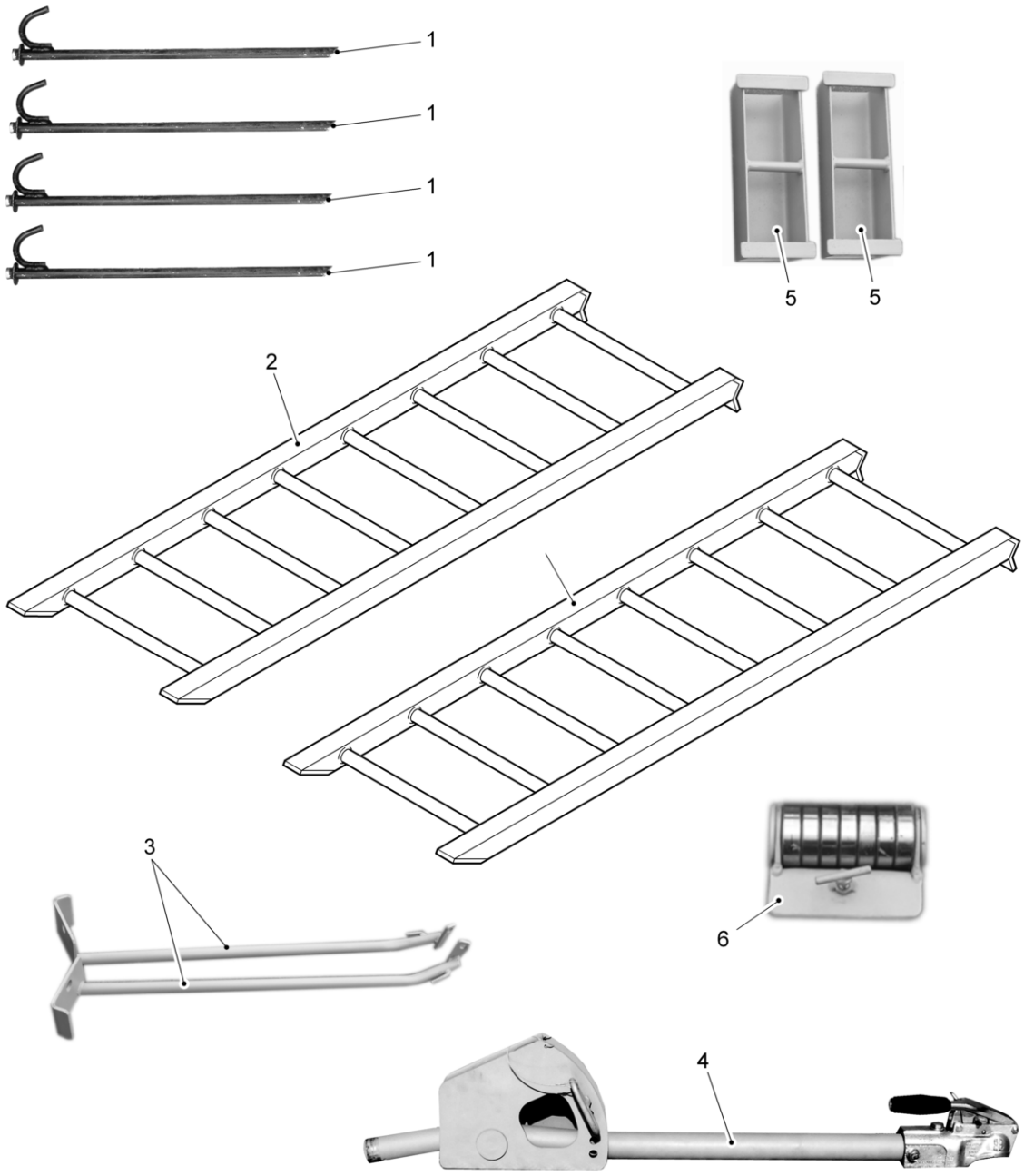

Fig 5 Vehicle loose items

CES

Fig. No Item No	Army DMC NSCM	Army NSN Part Number	Item Description and Annotations	No Off D of Q	Quantity on Issue
5			VEHICLE LOOSE ITEMS - Contd		
1		4030-99-245-4828	. STAKE, GROUNDING	4 EA	
2		3990-99-485-3472	. RAMP, GAP CROSSING	2 EA	
3		S.A.PLB2	. LOADING BAR, PALLET	2 EA	
4		2540-99-246-2622	. TOWBAR	1 EA	
5		S.A.PS2	. PALLET STRENGTHENER	2 EA	
6		S.A.PR	. LOADING ROLLER	1 EA	

Fig 6 Vehicle loose items

CES

Fig. No Item No	Army DMC NSCM	Army NSN Part Number	Item Description and Annotations	No Off D of Q	Quantity on Issue
6			VEHICLE LOOSE ITEMS - Contd		
1		5120-99-325-2376	. SHOVEL, EXPEDITION	1 EA	
2		6150-99-182-3062	. LEAD, SLAVE	1 EA	
3		4210-99-812-8220	. FIRE EXTINGUISHER c/w BRACKET	1 EA	

CHAPTER 2-1-3

COMPLETE EQUIPMENT SCHEDULES (SERVICE)

SIMPLE EQUIPMENT

LIERATURE

CES

Fig. No Item No	Army 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	NIV	NIV	. PURPOSE AND PLANNING INFORMATION	1 EA	
NI 2	NIV	NIV	. EQUIPMENT SUPPORT POLICY DIRECTIVE	1 EA	
NI 3	NIV	NIV	. OPERATING INFORMATION	1 EA	
NI 4	NIV	NIV	. MAINTENANCE INSTRUCTIONS	1 EA	
NI 5	NIV	NIV	. MAINTENANCE SCHEDULES	1 EA	
NI 6	NIV	NIV	. COMMERCIAL PARTS LIST	1 EA	
NI 7	NIV	NIV	. COMPLETE EQUIPMENT SCHEDULE	1 EA	

CHAPTER 3

INDEXES

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3-2 Index of Manufacturers Part/Drawing Numbers to Chapter, Figure and Item Numbers
3-3 Not issued
3-4 Not issued

INTRODUCTION

16 This chapter identifies the number of indexes provided in support to the CES List.

CHAPTER 3-1

INDEX OF NATO STOCK NUMBERS

TO

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2540-99-246-2622	1-2	5-4
2540-99-702-1691	1-2	3-7
3940-99-292-4890	1-2	2-5
3940-99-894-0534	1-2	2-6
3940-99-968-5688	1-2	2-1
3990-99-485-3472	1-2	5-2
3990-99-667-3072	1-2	2-3
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5120-99-910-6635	1-2	1-13
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NATO Stock Number	Chapter 2-Sub-chap	Fig & Item

NATO Stock Number	Chapter 2-Sub-chap	Fig & Item

CHAPTER 3-2

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CHAPTER, FIGURE AND ITEM NUMBERS

INDEX OF MANUFACTURERS' PART/DRAWING NUMBERS

TO CHAPTER, FIGURE AND ITEM NUMBERS

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XNP1	1-2	6-3

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AESP*	Title:

Chapter(s)/Instruction	Page(s)/Paragraph(s)

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* AESP or EMER

AESP Form 10 (Issue 5.0 dated Dec 01)

Ministry of Defence

SPRINGER

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:
SPECIALIST & LOGISTIC VEHICLE PROJECT TEAM

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PREFACE

Sponsor: SLV PT
Project Number: UOR A01393
File Ref: SUV C1/0204

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 AESP 0100-P-011-013. 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 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.

MODIFICATION INSTRUCTION INDEX

Priority (Pty) is shown as: Immediate: I Routine: R

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2	R	1-6		Replacement of Hazard Switch for Improved Sealed Switch	
3	R	1-6		Replacement of Fog Light for Improved Sealed Switch	
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SPRINGER

MODIFICATION INSTRUCTION No. 1

Sponsor: SLV L&SLV PT
Project No.: UOR 01393
File Ref: SUV C1/0204

Publication Authority: DES LE GSG SLV OutSp TechDocs

AMENDMENT RECORD

DP

Amdt No.	Incorporated By (Signature)	Date
1		
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SUBJECT: Introduction of a Gearbox Gate

INTRODUCTION

1

Limitations on use of equipment. Nil.

APPLICABILITY

2

2.1 Fitted to subject vehicles EAC 1201-8100, SPRINGER held by user units.

2.2 Unmodified stock, held at all levels of technical storage.

REASON FOR MODIFICATION

3

3.1 Code 3 - to improve reliability.

PRIORITY

4

4.1 ARMY: Immediate

ESTIMATED TIME REQUIRED

5

5.1 Dismantling: 0.2 man-hours.

5.2 Embodiment: 0.5 man-hours.

5.3 Assembling: 0.2 man-hours.

5.4 Testing: 0.1 man-hours.

MODIFICATION IMPLEMENTATION PLAN

6

6.1 This instruction is to be implemented by:

6.1.1 ARMY – Units authorized to carry out levels 1, 2, 3 or 4 maintenance.

6.2 Associated instructions. Nil.

6.3 Strike plate action: N/A.

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 or modification record plate to see if modification is embodied and where necessary Units with 1st Line REME Support demand the stores required.

7.1.3 ARMY - On receipt of stores, request REME to modify equipment.

7.1.4 ARMY - Record the AESP and instruction number in equipment documents.

7.1.5 Carry out action at 7.2.3

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 Record completion details of modification against appropriate entry in vehicle documents.

7.2.3 Send details of embodiment as detailed below:

VRN Date Embodied Embodied By

To:

SLV LLV ILSM
NB 1 Spruce 3c #1315
MOD Abbey Wood
Bristol
BS34 8JH

7.3 All recipients of this instruction. Add particulars to AESP 2320-B-130-811 Mod Instruction Index Stores, tools and equipment

8

8.1 Stores to be demanded – UK Training Fleets (OTEP/OSUP and DEPOT Stk).

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
	7TMC	2520-99-254-3242	Mod set comprising:	1
1	7TMC	TME900	Gearbox Lock Plate	(1)
2	7TMC	TMP1	Template	(1)

8.2 Stores to be demanded – Theatre Vehicles ONLY.

8.2.1 The following item(s)/set is to be demanded quoting this instruction as the authority. The have been issued direct to theatre and include the hole cutting tool. For further Information contact SLV LLV ILSM on [redacted]

8.2.2 Registration/Serial number of vehicle/engine/assembly for equipment held by user units.

Item No.	DMC	NSN/Part No.	Designation	Qty per eqpt
	7TMC	2520-99-616-8158	Mod set comprising:	(1)
1	7TMC	TME900	Gearbox Lock Plate	(1)
2	1F1	3455-99-137-4930	22mm Hole Cutter	(1)
3	1F1	3460-99-137-4927	Arbor	(1)

8.3 Special tools and test equipment required

1	1F1	3455-99-137-4930	22mm Hole Cutter	(1)
2	1F1	3460-99-137-4927	Arbor	(1)

Sequence of operations

NOTE

The item numbers of Para 8 are used as reference throughout this instruction.

9 Carry out this instruction as follows:

9.1 Unscrew the gear selector knob and the M6 bolts securing the gear selector plate. Remove the gear selector top plate from the housing (fig1)

9.2 Using the template supplied in the kit (fig2), secure the template to the drivers side of the housing (fig3) ensuring that the template is correctly fitted and orientated (fig4).

9.3 Mark the 3 X 8mm mounting holes, located the centre point and drill the holes.

9.4 Mark the 2 X 22mm mounting holes, locate the centre point and drill the pilot holes. Using the 22mm hole cutter and arbour listed in 8.3 cut the 2 X 22mm holes.

9.5 Fit the Lock plate and secure with the M8 Allen bolts and M8 Nyloc nuts (5mm Allen key and 13mm spanner required) (fig5).

9.6 Refit the gear selector plates using the M6 bolts and refit the gear selector knob.

TESTING AFTER EMBODIMENT

10. Once secure test the operation in all gears to ensure movement and that the lever locks in the vertical (reverse) position (fig6).

EFFECT ON WEIGHT

11 Negligible.

PUBLICATION AMENDMENTS

NOTE

Necessary amendments will be issued separately.

12 Nil.

Fig 1 Removal of Gear selector Plate

Fig 2 Template

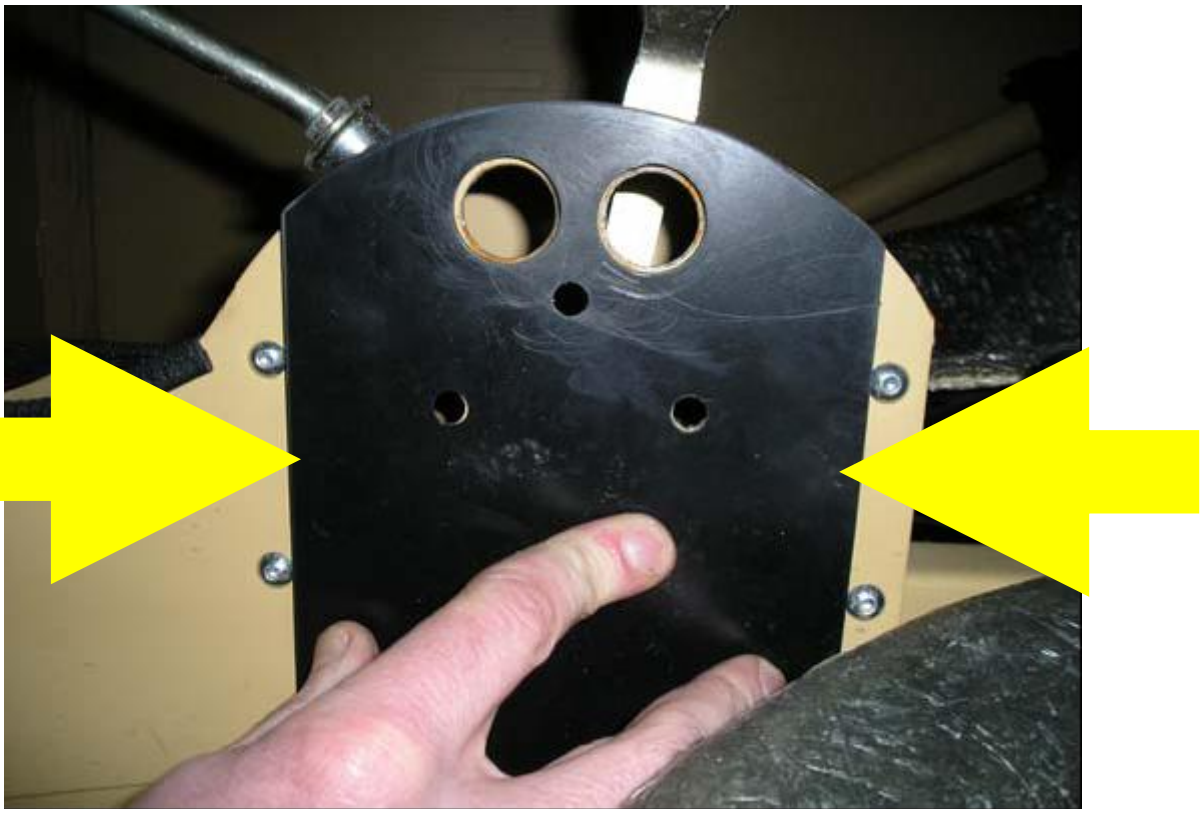

Fig 3 Fitting of Template – Ensure that the template is lined up between the M6 Bolt heads as shown

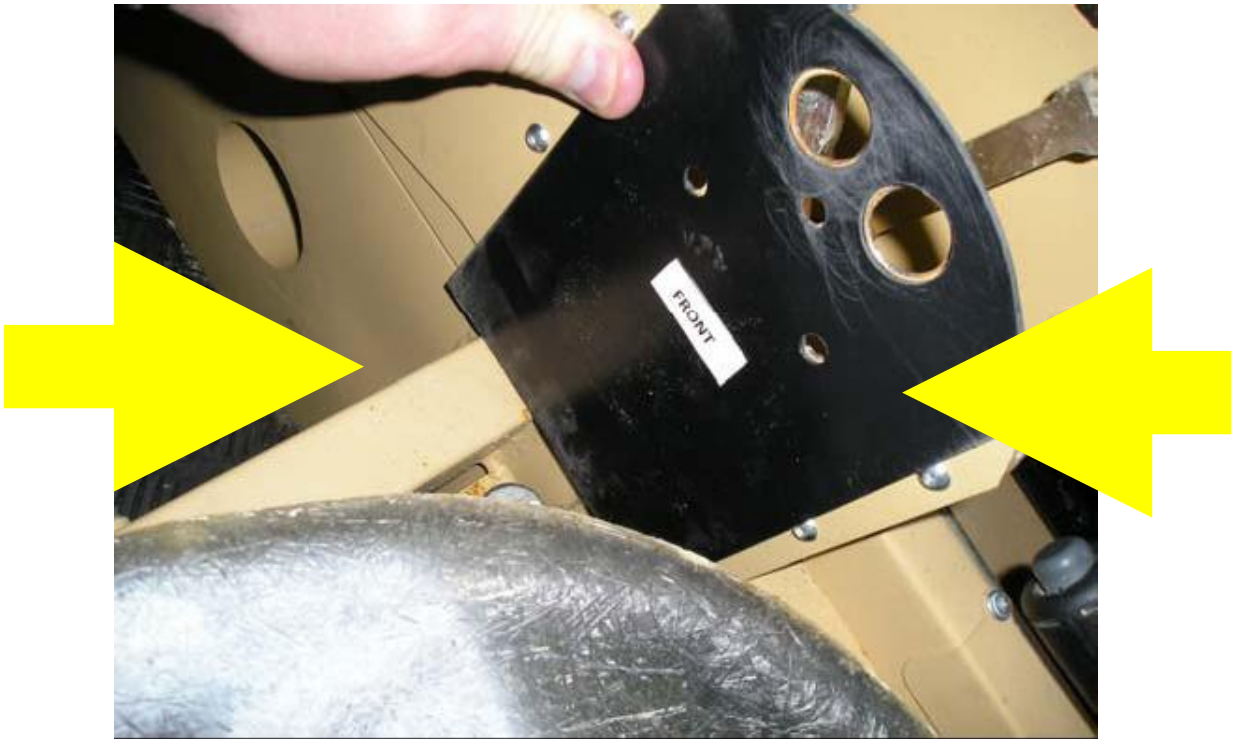

Fig 4 Fitting of Template – Ensure that base of template rests on the chassis as shown before marking the 22mm and 8mm holes

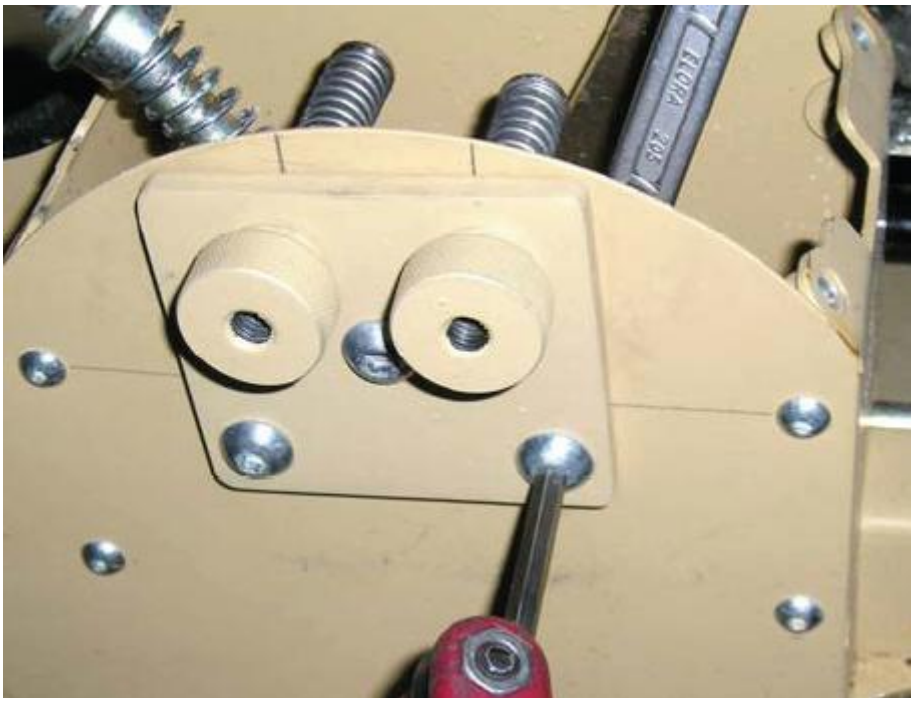

Fig 5 Secure the locking plate

Fig 6 Test in all positions

SPRINGER

MODIFICATION INSTRUCTION No. 2

Sponsor: SLV L&SLV PT
Project No.: UOR 01393
File Ref: SUV C1/0204

Publication Authority: DES LE GSG SLV OutSp TechDocs

AMENDMENT RECORD

DP

Amdt No.	Incorporated By (Signature)	Date
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SUBJECT: Replacement of Hazard Switch for Improved Sealed Switch

INTRODUCTION

1

1.1 Limitations on use of equipment. Nil.

APPLICABILITY

2

2.1 Fitted to subject vehicles EAC 1201-8100, SPRINGER held by user units.

2.2 Unmodified stock, held at all levels of technical storage.

REASON FOR MODIFICATION

3

3.1 Code 3 - to improve reliability.

PRIORITY

4

4.1 ARMY: Routine

ESTIMATED TIME REQUIRED

5

5.1 Dismantling: 0.2 man-hours.

5.2 Embodiment: 0.5 man-hours.

5.3 Assembling: 0.2 man-hours.

5.4 Testing: 0.1 man-hours.

MODIFICATION IMPLEMENTATION PLAN

6

6.1 This instruction is to be implemented by:

6.1.1 ARMY – Units authorized to carry out levels 1, 2, 3 or 4 maintenance.

6.2 Associated instructions. Nil.

6.3 Strike plate action: N/A.

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 or modification record plate to see if modification is embodied and where necessary Units with 1st Line REME Support demand the stores required.

7.1.3 ARMY - On receipt of stores, request REME to modify equipment.

7.1.4 ARMY - Record the AESP and instruction number in equipment documents.

7.1.5 Carry out action at 7.2.3

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 Record completion details of modification against appropriate entry in vehicle documents and on JAMES Land

7.3 All recipients of this instruction. Add particulars to AESP 2320-B-130-811 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
1	7TMC	5930-99-264-5684	Hazard Light Switch	(1)

8.3 Special tools and test equipment required.

Nil

Sequence of operations

NOTE

The item numbers of Para 8 are used as reference throughout this instruction.

9 Carry out this instruction as follows:

9.1 Switch off the Battery Isolator.

9.2 Remove the existing Hazard light switch.

9.3 Enlarge the existing switch hole to 21mm X 38mm (Fig 1).

9.4 Carefully rewire the new switch as illustrated (Fig 2).

NOTE: Remember to pass the wires through the dashboard before connecting them.

9.5 Refit the switch into the newly resized hole.

TESTING AFTER EMBODIMENT

10. Test the operation of the switch.

EFFECT ON WEIGHT

11 Negligible.

PUBLICATION AMENDMENTS

NOTE

Necessary amendments will be issued separately.

12 Nil.

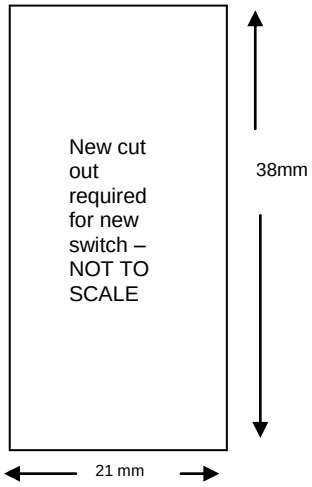

Fig 1 Hole dimensions

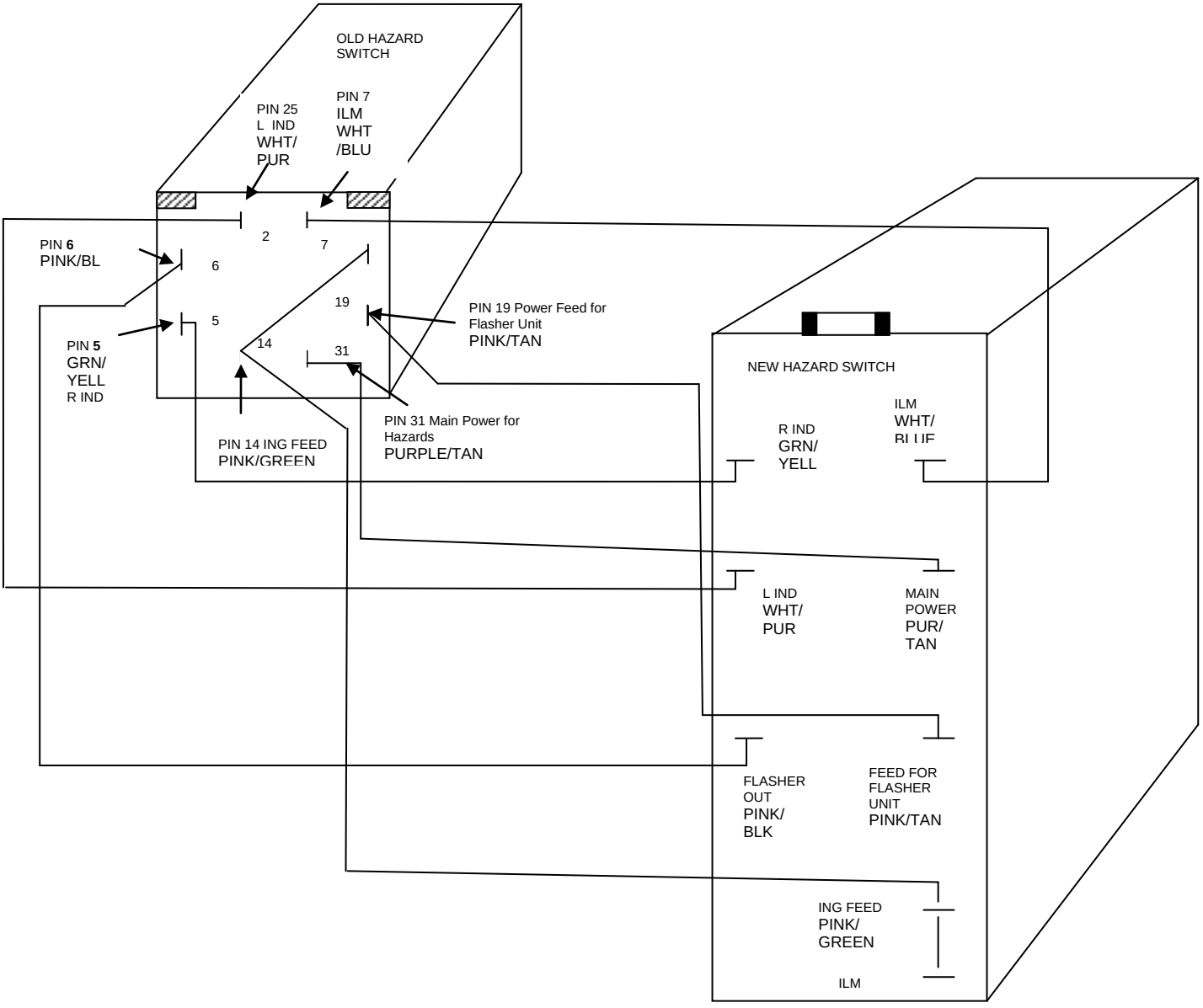

Fig 2 New Switch Wiring

SPRINGER

MODIFICATION INSTRUCTION No. 3

Sponsor: SLV L&SLV PT
Project No.: UOR 01393
File Ref: SUV C1/0204

Publication Authority: DES LE GSG SLV OutSp TechDocs

AMENDMENT RECORD

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SUBJECT: Replacement of Fog Light for Improved Sealed Switch

INTRODUCTION

1

1.1 Limitations on use of equipment. Nil.

APPLICABILITY

2

2.1 Fitted to subject vehicles EAC 1201-8100, SPRINGER held by user units.

2.2 Unmodified stock, held at all levels of technical storage.

REASON FOR MODIFICATION

3

3.1 Code 3 - to improve reliability.

PRIORITY

4

4.1 ARMY: Routine

ESTIMATED TIME REQUIRED

5

5.1 Dismantling: 0.2 man-hours.

5.2 Embodiment: 0.5 man-hours.

5.3 Assembling: 0.2 man-hours.

5.4 Testing: 0.1 man-hours.

MODIFICATION IMPLEMENTATION PLAN

6

6.1 This instruction is to be implemented by:

6.1.1 ARMY – Units authorized to carry out levels 1, 2, 3 or 4 maintenance.

6.2 Associated instructions. Nil.

6.3 Strike plate action: N/A.

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 or modification record plate to see if modification is embodied and where necessary Units with 1st Line REME Support demand the stores required.

7.1.3 ARMY - On receipt of stores, request REME to modify equipment.

7.1.4 ARMY - Record the AESP and instruction number in equipment documents.

7.1.5 Carry out action at 7.2.3

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 Record completion details of modification against appropriate entry in vehicle documents and on JAMES Land

7.3 All recipients of this instruction. Add particulars to AESP 2320-B-130-811 Mod/Gen Instr 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
1	7TMC	5930-99-269-3268	Fog Light Switch	(1)

8.3 Special tools and test equipment required.

Nil

Sequence of operations

NOTE

The item numbers of Para 8 are used as reference throughout this instruction.

9 Carry out this instruction as follows:

9.1 Switch off the Battery Isolator.

9.2 Remove the existing Fog light switch.

9.3 Enlarge the existing switch hole to 22mm X 43mm (Fig 1).

9.4 Carefully rewire the new switch as illustrated (Fig 2).

NOTE:

Remember to pass the wires through the dashboard before connecting them.

9.5 Refit the switch into the newly resized hole.

TESTING AFTER EMBODIMENT

10. Test the operation of the switch.

EFFECT ON WEIGHT

11 Negligible.

PUBLICATION AMENDMENTS

NOTE

Necessary amendments will be issued separately.

12 Nil.

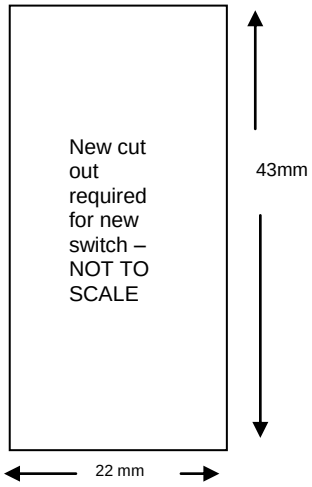

Fig 1 Hole dimensions

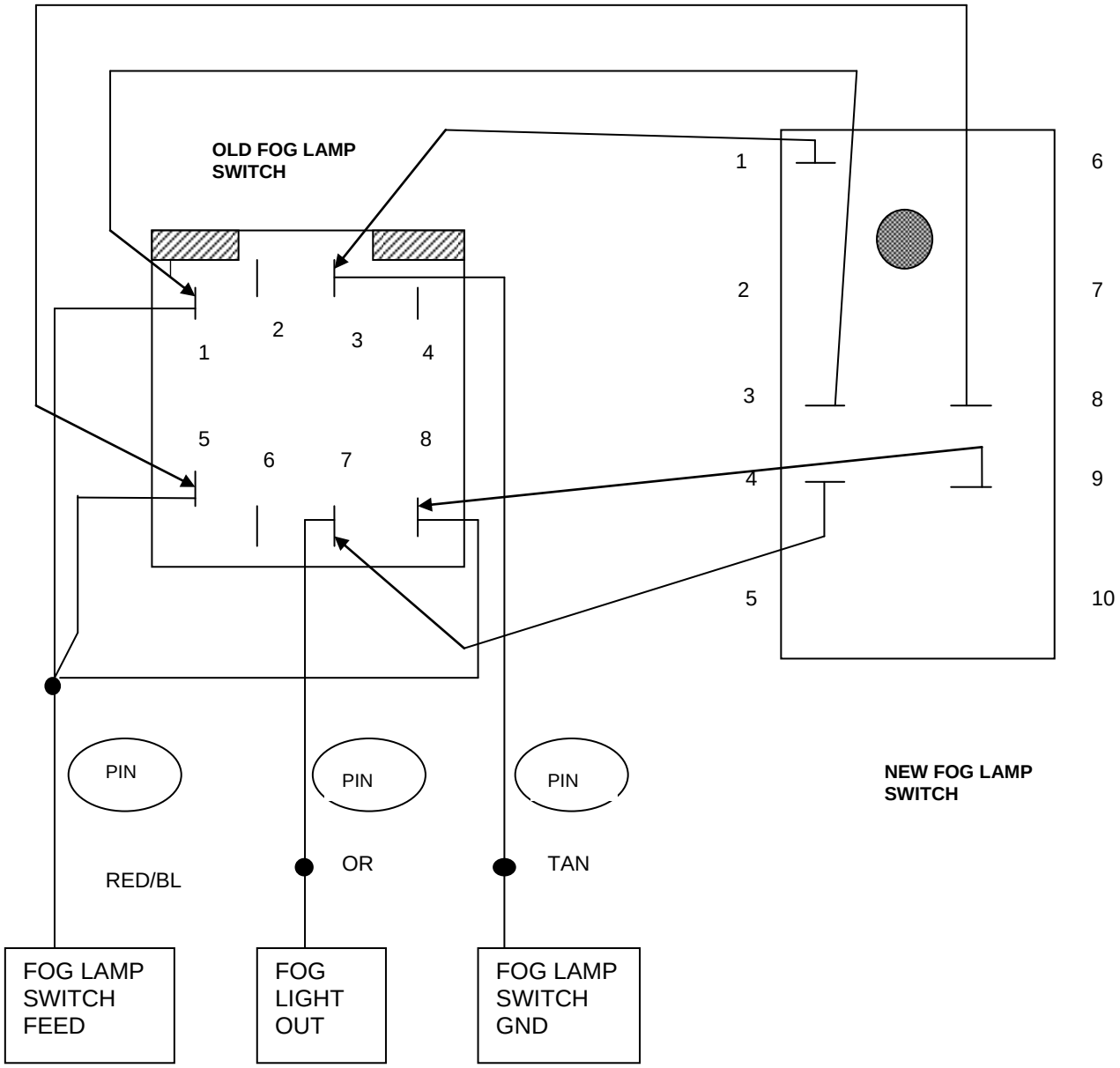

Fig 2 New Switch Wiring

SPRINGER

MODIFICATION INSTRUCTION No. 4

Sponsor: SLV L&SLV PT
Project No.: UOR 01393
File Ref: SUV C1/0204

Publication Authority: DES LE GSG SLV OutSp TechDocs

AMENDMENT RECORD

Amdt No.	Incorporated By (Signature)	Date
1	Martin New	Nov 10
2		
3		

Amdt No.	Incorporated By (Signature)	Date
4		
5		
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SUBJECT: Replacement of Starter Motor for Improved Sealed Unit

INTRODUCTION

1

1.1 Limitations on use of equipment. Nil.

APPLICABILITY

2

2.1 Fitted to subject vehicles EAC 1201-8100, SPRINGER held by user units.

2.2 Unmodified stock, held at all levels of technical storage.

REASON FOR MODIFICATION

3

3.1 Code 3 - to improve reliability.

PRIORITY

4

4.1 ARMY: Routine

ESTIMATED TIME REQUIRED

5

5.1 Dismantling: 0.5 man-hours.

5.2 Embodiment: 0.5 man-hours.

5.3 Assembling: 0.5 man-hours.

5.4 Testing: 0.1 man-hours.

MODIFICATION IMPLEMENTATION PLAN

6

6.1 This instruction is to be implemented by:

6.1.1 ARMY – Units authorized to carry out levels 1, 2, 3 or 4 maintenance.

6.2 Associated instructions. Nil.

6.3 Strike plate action: N/A.

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 or modification record plate to see if modification is embodied and where necessary Units with 1st Line REME Support demand the stores required.

7.1.3 ARMY - On receipt of stores, request REME to modify equipment.

7.1.4 ARMY - Record the AESP and instruction number in equipment documents.

7.1.5 Carry out action at 7.2.3

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 Record completion details of modification against appropriate entry in vehicle documents and on JAMES Land

7.3 All recipients of this instruction. Add particulars to AESP 2320-B-130-811 Mod/Gen Instr 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
1	7TMC	6110-99-219-8246	Starter Motor	(1)

8.3 Special tools and test equipment required.

8.3.1 Nil

Sequence of operations

NOTE

The item numbers of Para 8 are used as reference throughout this instruction.

9 Carry out this instruction as follows:

9.1 Switch off the Battery Isolator.

9.2 Remove the existing Starter Motor ant the Starter Motor Mounting Plate.

9.3 File out the holes as indicated in the illustration to allow the fuel filter housing to be moved over allowing the replacement motor to be fitted.(Fig 1).

9.4 Cut the plug of the existing solenoid wires fit the heat shrink over the wires and crimp the two new spade terminals onto the wire. (Fig 2)

9.5 Slide the heat shrink over the terminals and shrink with a heat gun.

TESTING AFTER EMBODIMENT

10. Test the operation of the new motor.

EFFECT ON WEIGHT

11 Negligible.

PUBLICATION AMENDMENTS

NOTE

Necessary amendments will be issued separately.

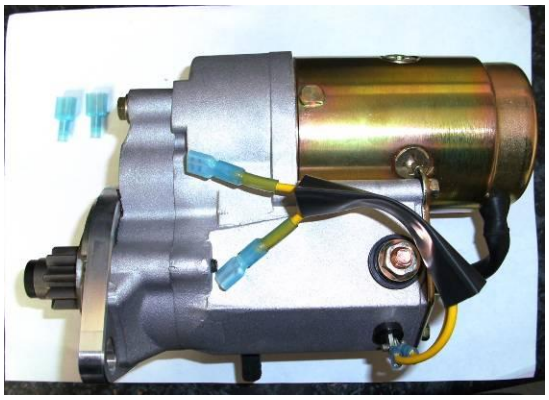
12 Nil.

File hole 5 mm to the right of each hole

allowing the fuel filter housing to move over 5mm.
(Picture with arrows mark holes to be changed)
This should give clearance for the Starter Motor to fit in.

(File Provided)

Fig 1 Starter Motor Mounting Holes



When fitting the starter motor you will need to cut the plug off the solenoid wires on the Springer then crimp the two new spade terminals onto the wire. The heat shrink then goes over terminals and shrunk accordingly with heat gun.

Fig 2 Starter Motor Connections

SPRINGER

MODIFICATION INSTRUCTION No. 5

Sponsor: SLV L&SLV PT
Project No.: UOR 01393
File Ref: SUV C1/0204

Publication Authority: DES LE GSG SLV OutSp TechDocs

AMENDMENT RECORD

DP

Amdt No.	Incorporated By (Signature)	Date
1	Martin New	Nov 10
2		
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Amdt No.	Incorporated By (Signature)	Date
4		
5		
6		

SUBJECT: Replacement of Ignition Switch for improved Unit

INTRODUCTION

1

1.1 Limitations on use of equipment. Nil.

APPLICABILITY

2

2.1 Fitted to subject vehicles EAC 1201-8100, SPRINGER held by user units.

2.2 Unmodified stock, held at all levels of technical storage.

REASON FOR MODIFICATION

3

3.1 Code 3 - to improve reliability.

PRIORITY

4

4.1 ARMY: Routine

ESTIMATED TIME REQUIRED

5

5.1 Dismantling: 0.5 man-hours.

5.2 Embodiment: 0.5 man-hours.

5.3 Assembling: 0.5 man-hours.

5.4 Testing: 0.1 man-hours.

MODIFICATION IMPLEMENTATION PLAN

6

6.1 This instruction is to be implemented by:

6.1.1 ARMY – Units authorized to carry out levels 1, 2, 3 or 4 maintenance.

6.2 Associated instructions. Nil.

6.3 Strike plate action: N/A.

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 or modification record plate to see if modification is embodied and where necessary Units with 1st Line REME Support demand the stores required.

7.1.3 ARMY - On receipt of stores, request REME to modify equipment.

7.1.4 ARMY - Record the AESP and instruction number in equipment documents.

7.1.5 Carry out action at 7.2.3

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 Record completion details of modification against appropriate entry in vehicle documents and on JAMES Land

7.3 All recipients of this instruction. Add particulars to AESP 2320-B-130-811 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
1	7TMC	2920-99-9584678	Ignition Switch and keys (UK)	(1)
2	7MC	2920-99-1517353	Ignition Switch and keys (Theatre only)	(1)

8.2 Special tools and test equipment required.

Ni

Sequence of operations

NOTE

The item numbers of Para 8 are used as reference throughout this instruction.

9 Carry out this instruction as follows:

9.1 Switch off the Battery Isolator.

9.2 Remove the Old Ignition Switch – DO NOT remove the cables at this time (Fig 1).

9.3 Drill out the fitting hole to 22mm and file a small side cut in hole edge of hole for locating pin on new switch to fit in. (Figs 2, 3 and 4).

NOTE

The switch must line up when fitted as shown in Fig 4, so care must be taken to file in correct place.

9.4 Using Red Crimp connectors supplied connect the wires to the new switch as per the diagram (Fig 5).

9.5 Make sure the vehicle is in Neutral and is safe to start.

TESTING AFTER EMBODIMENT

10. Test the operation of the new Ignition Switch – without power first then switch on Isolator and test the switch with power..

EFFECT ON WEIGHT

11 Negligible.

PUBLICATION AMENDMENTS

NOTE

Necessary amendments will be issued separately.

12 Nil.

Fig 1 Remove Old Ignition Switch

Fig 2 Drill out the fitting hole to 22mm

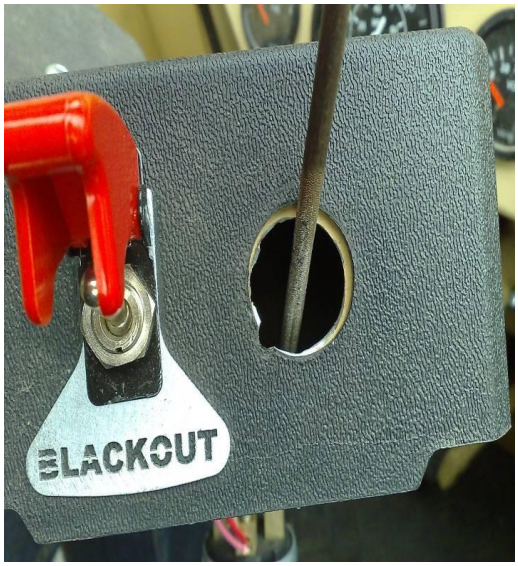

Fig 3 File a small side cut in hole edge of hole

Fig 4 The switch must line up as shown above

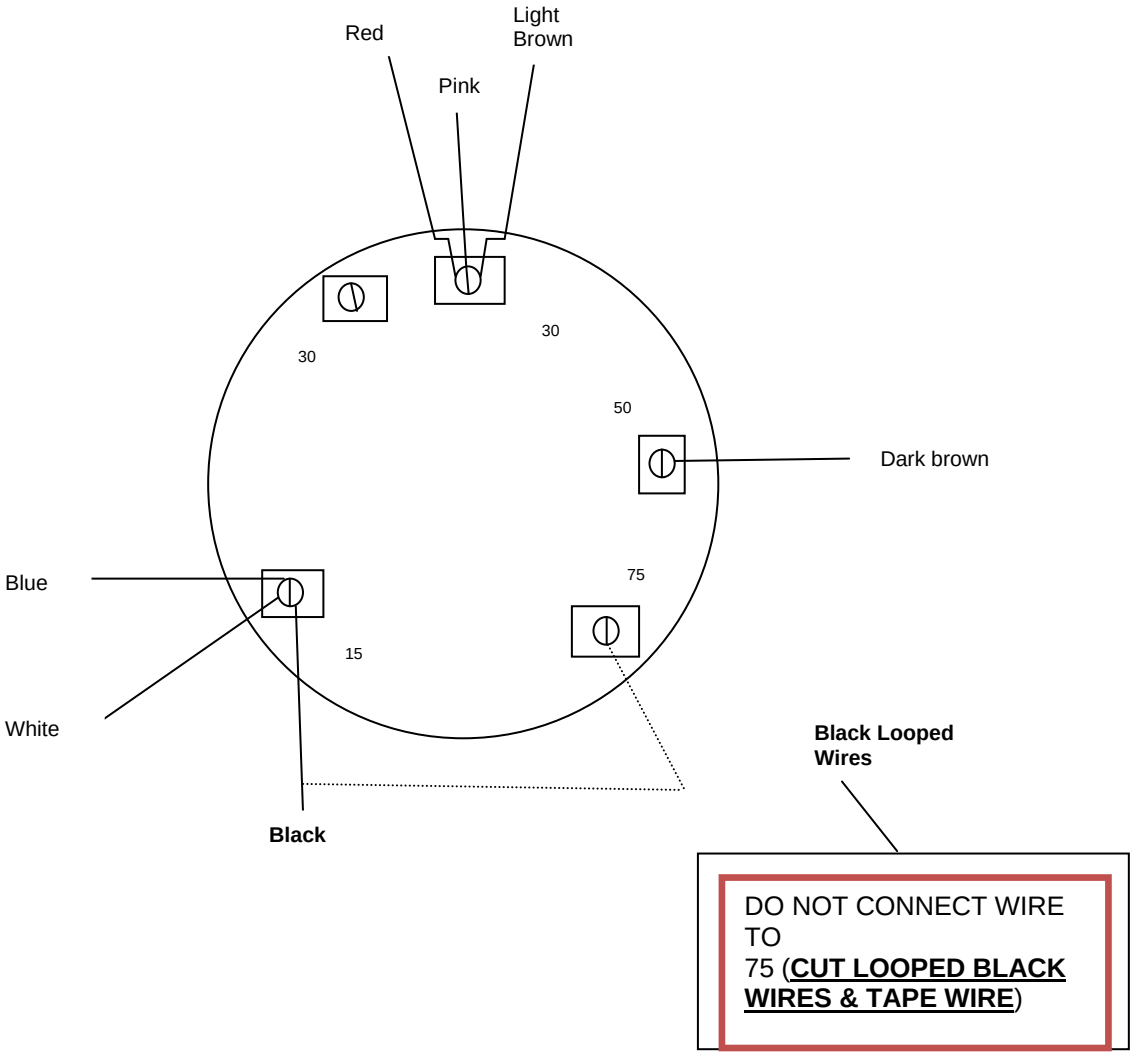

Fig 5 Wiring for Connections for New Ignition Switch

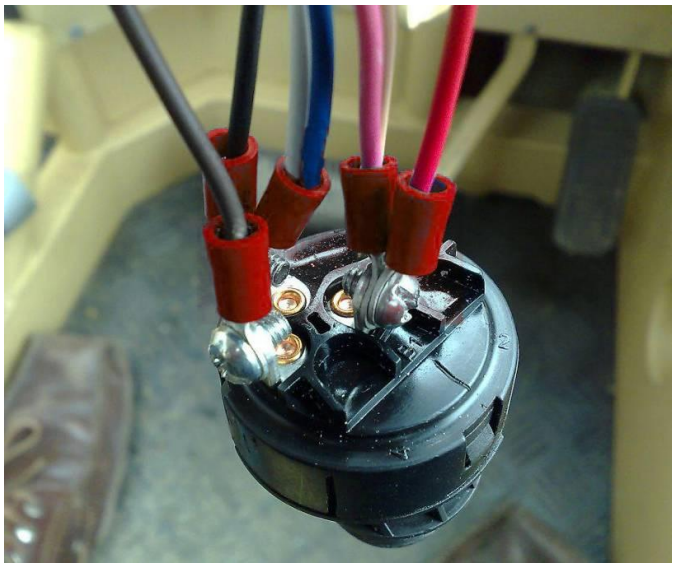

Fig 6 Wiring Connected to New Switch

COMMENT(S) ON AESP*

To: FRACAS
BFPO 794

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

Sender's Reference	**BIN Number**	**Date**
AESP* Title: SPRINGER MODIFICATION INSTRUCTIONS AND INDEX		
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: .....

✂.....

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

AESP Form 10 (Issue 5.0 dated Dec 01)