



Ministry  
of Defence



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DE&S Secretariat (Land Equipment)

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Bristol BS34 8JH



Via: ██████████

20 August 2020

Our Ref: FOI2020/07577

Dear ██████████,

Thank you for your email of 2 July 2020, logged under reference FOI2020/07577, requesting the following information:

*Please could you provide me with the following for the MAN HX60:*

*Operating Information manual & the Illustrated Parts Catalogue.*

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 at annexes A and B, but some of the information falls entirely within the scope of the absolute exemption provided for at section 40 (Personal Data), and qualified exemptions provided for at sections 26 (Defence) and 38 (Health and Safety) of the FOIA and has been redacted.

Section 40(2) has been applied to some of the information in order to protect personal information as governed by the Data Protection Act 2018. Section 40 is an absolute exemption and there is therefore no requirement to consider the public interest in making a decision to withhold the information.

Section 26 and 38 are qualified exemptions and are 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 which contribute to Counter-IED tactics and would prejudice the capability and effectiveness of our armed forces. The balance of public interest was found to be in favour of withholding the information given that, overall, the public interest is best served in not releasing any details that would prejudice the security of UK personnel serving in the UK or abroad and which would provide tactical advantage to our enemies. 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".

Section 38 has been applied because some of the information has the potential to adversely affect the physical and/or mental health of UK personnel as well as endanger the safety of an individual by exposing vulnerabilities in the levels of protection. The balance of the public interest test concluded that, whilst release would increase public understanding and confidence, the balance of the public interest lay in withholding this information you desire. I have considered it necessary to apply the higher 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.gov.uk](mailto:CIO-FOI-IR@mod.gov.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 signature]

[Redacted name]

DES SEC PolSec2 Asst Hd



**Ministry of Defence**

**Defence Technical Documentation**

# **SUPPORT VEHICLE (SV) - MAN TRUCKS (ALL VARIANTS)**

## **ILLUSTRATED PARTS CATALOGUE**

2320-W-100-711  
3<sup>rd</sup> Edition  
October 2018

Sponsored for use in the  
United Kingdom Ministry of Defence  
and Armed Forces by **OPERATIONAL SUPPORT VEHICLE PROGRAMME**

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### **Publication Authority: OSVP**

Defence Equipment and Support  
MoD Abbey Wood

Service users should send their comments through the channel prescribed for the purpose by the publication sponsor.

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**AMENDMENT RECORD**

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**CONTENTS**

**PRELIMINARY MATERIAL**

	Page
Front Cover (title page) .....	(i)
AMENDMENT RECORD .....	(iii)
CONTENTS (this page) .....	(v)
PREFACE .....	(vi)
Introduction .....	(vi)
Hazardous material .....	(vi)
Quantity .....	(vi)
Demands .....	(vi)
Modification state .....	(vii)
Annotations .....	(vii)
Abbreviations .....	(vii)
Amendments .....	(vii)
Modification records .....	(viii)
Indentations .....	(viii)
APPLICABILITY DETAILS .....	(viii)
RELATED AND ASSOCIATED PUBLICATIONS .....	(ix)
Related publications .....	(ix)
Associated publications .....	(x)
WARNINGS .....	(x)
INTRODUCTION .....	(x)
ACRONYMS AND ABBREVIATIONS .....	(xi)
Abbreviations .....	(xi)
Rear cover .....	(xiii)/(xiv)

**ILLUSTRATED PARTS LIST**

1	General Information
2	Driver fitted items – 6 Tonne (X60)
2-1	Driver fitted items – 9 Tonne (X58), 9 Tonne IMM (X44), and SVR
2-2	Driver fitted items – 15 Tonne (X77) and EPLS All Variants
2-3	Driver fitted items – Andover trailer AD DBT30
3	Indexes – <b>Not issued</b>
3-1	Index of NSNs to Chapter, figure and item number – <b>Not issued</b>
3-2	Index of part/ drawing number to Chapter, figure and item number – <b>Not issued</b>
3-3	Index of NSNs to item names and description – <b>Not issued</b>
3-4	Index of NATO supply codes for manufacturers to manufacturers' name - <b>Not issued</b>

## PREFACE

Sponsor: Operational Support Vehicle Programme

Project Number: GSV/3/03

Publication Authority: OSVP

File ref: As Required

## INTRODUCTION

1 Users should forward any comments on this publication in accordance with Army Equipment Support Publication (AESP) 0100-P-011-013. All comments are only to be submitted using the electronic and interactive Form 10 which can be accessed and downloaded from the Joint Asset Management and Engineering Solutions (JAMES) Portal (via Hot Topic – Forms) or from DR TDOL (F10).

2 AESPs are issued under Defence Council authority and when AESPs specify action to be taken, the AESP will be itself sufficient authority for such action and also for the demand of the necessary stores, subject to 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 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 The Illustrated Parts Catalogue (IPC) is designed as an aid to the identification of component parts or assemblies of the equipment, and to provide information necessary for demanding spares.

5 This IPC may list some or all of the parts comprising the equipment concerned, but only those parts assigned a NATO Stock Number, Service Catalogue or Reference 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 manufacturer's reference is known, this should also be quoted.

6 Information in this AESP is applicable to both the Enhanced Palletised Load System (EPLS) Mk 1 and Mk 2 variants, and to the EPLS Mk 3 variant. Where variant specific information is provided, such information is provided with appropriate designators: (EPLS Mk 1/Mk 2) or (EPLS Mk 3). Non-designated information is applicable to all variants.

### Hazardous material

7 This IPC may list some items which are hazardous materials within the terms of the HSW Act (1974) and current COSHH Regulations refer to Safety Data information published in JSP 515 Hazardous Stores Information System (HSIS) and information in JSP 886 Defence Logistics Support Chain Manual.

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

### Quantity

9 The figure in the 'Number of' column specifies the quantity for the unit (or assembly, sub-assembly etc.); it does not indicate the quantity to be demanded.

### Demands

10 When demanding spare parts the following particulars must be quoted:



- 10.1 Domestic Management Code (DMC).
- 10.2 NATO Stock Number (NSN).
- 10.3 Item name.
- 10.4 Name of equipment for which the part is required.
- 10.5 Manufacturer's reference (if known).

**NOTE**

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

**Modification state**

11 When appropriate, a list at the front of each chapter or sub-chapter will indicate the modification numbers.

**Annotations**

12 The following annotations may appear in the IPC:

- 12.1 A/R - When appearing in the 'Number of' column indicates that the quantity is 'as required'.
- 12.2 NI - The letters 'NI' against a number in the 'Fig Item' column indicates that the item is not illustrated.
- 12.3 NFD - When appearing in the 'ANNOTATION' column indicates that the part number/drawing number for the item is Not Fully Definitive.
- 12.4 \* (Obsolescent Stock) – an asterisk in the 'Part Number' column indicates a obsolescent item, no further purchase of which will be made but stocks are to be used until exhausted.
- 12.5 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.
- 12.6 (U0795) - When such a code appears in the 'annotation (NSCM)' column it will identify the manufacturer of any Non-Provisioned (NP) item(s) (an index of NSCM(s) is provided in Chapter 3-4 as applicable).
- 12.7 LM - Indicates local manufacture, i.e. a part that is to be manufactured by Service units from local resources.
- 12.8 REF - In the 'Number of' column indicates that the item is listed for reference purposes only.

**Abbreviations**

13 Abbreviations and symbols used in this IPC have been approved and are listed separately.

**Amendments**

14 Amendments to the catalogue will be published as and when necessary. They will be numbered consecutively, and the Amendment Record Sheet is to be completed for each Amendment List embodied.

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

**Modification records**

16 Modification numbers indicating Sub-Chapter details applicable to the IPC are listed on the 'RECORD OF MODIFICATION' page in Chapter 2. Further details are then identified on the 'RECORD OF MODIFICATION' page of the appropriate level Sub-Chapter.

**Indentations**

17 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-subassembly)
- . . . Attaching parts for third level
- . . . . FOURTH LEVEL OF BREAKDOWN (Sub-sub sub-sub-assembly or detail part of Sub-subassembly)
- . . . . Attaching parts for fourth 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.

**APPLICABILITY DETAILS**

18 This IPC relates to the following equipment:

18.1	<u>NSN</u>	<u>Vehicle Code</u>	<u>Contract</u>
			GSV/3/03

18.2 NSN and Vehicle codes can be found by referring to Table 2 Vehicle Designations within AESP 2320-W-100-111 Equipment Support Policy Directive.

**RELATED AND ASSOCIATED PUBLICATIONS**

**Related publications**

19 The AESP Octad for the subject equipment consists of publications shown below. All references are prefixed with the first eight digits of this publication. The availability of the publications can be checked by reference to the relevant Group Index (see AESP 0100-A013-013).

Category/Sub-category			Information Level			
			1 User/ Operator	2 Unit Maintenance	3 Field Maintenance	4 Base Maintenance
1	0	Purpose and Planning Information	*	*	*	*
	1	Equipment Support Policy Directive	111	111	111	111
2	0	Operating Information	201 <sup>1</sup>	201 <sup>1</sup>	201 <sup>1</sup>	201 <sup>1</sup>
	1	Aide Memoire	*	*	*	*
	2	Training Aids	221	*	*	*
3		Technical Description	*	*	*	*
4	1	Installation Instructions	*	*	*	*
	2	Preparation for Special Environments	421	421	*	*
5	1	Failure Diagnosis	512	512	*	*
	2	Repair Instructions	522	522	*	*
	3	Inspection Standards	532	532	532	*
	4	Calibration Procedures	*	*	*	*
6		Maintenance Schedules	601	601	601	601
7	1	Illustrated Parts Catalogues	711	711	711	711
	2	Commercial Parts Lists	*	*	*	*
	3	Complete Equipment Schedules, Production Edition	*	*	*	*
	4	Complete Equipment Schedules, Service Edition (Simple Equipment)	741	741	741	741
	5	Complete Equipment Schedules, Service Edition (Complex Equipment)	*	*	*	*
8	1	Modification Instructions	811	811	811	811
	2	General Instructions, Special Technical Instructions and Servicing Instructions	821	821	821	821
	3	Service Engineered Modification Instructions (RAF Only)	*	*	*	*

\* Category / Sub-category not published.

<sup>1</sup> Each individual variant has a type specific category 201.

**Associated publications**

20 The publications listed below are complimentary to this publication completing the Family Group for the above equipment.

<u>Reference</u>	<u>Title</u>
AESP 2320-W-101-201	Support Vehicle (SV) - MAN Trucks, All 6 Tonne MM Variants
AESP 2320-W-110-201	Support Vehicle (SV) - MAN Trucks, All 9 Tonne MM Variants
AESP 2320-W-120-201	Support Vehicle (SV) - MAN Trucks, All 15 Tonne MM Variants
AESP 2320-W-125-201	Support Vehicle -MAN - 15 Tonne Enhanced Palletised Load System (EPLS) All Variants
AESP 2320-W-130-201	Support Vehicle (SV) - MAN Trucks, All 9 Tonne IMM Variants
AESP 2320-W-134-201	Support Vehicle (SV) - MAN Trucks - Recovery Vehicle

**WARNINGS****INTRODUCTION**

21 Before using any hazardous substances or material, make sure that you know the safety and first aid instructions:

- 21.1 On the label of the container it was supplied in.
- 21.2 On the Material Safety Data Sheet (MSDS).
- 21.3 In local Safety Orders and Regulations.



## ACRONYMS AND ABBREVIATIONS

### ABBREVIATIONS

22 The following abbreviations are in accordance with the requirements of Defence Technical Documentation Guidance.

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

<u>Abbreviation</u>	<u>Nomenclature</u>
AESP	Army Equipment Support Publication
Amdt	Amendment
A/R	As Required
CES	Complete Equipment Schedule
Cont	Continued
COSHH	Control of Substances Hazardous to Health
DE&S (Abbey Wood)	Defence Equipment and Support (Abbey Wood)
DFI	Driver Fitted Items
Dia	Diameter
DIN	Defence Instructions and Notices
Dwg	Drawing
DMC	Defence Management Code
DR	Design Repository
EPLS	Enhanced Palletised Load System
ESM	Equipment Support Manager
Fig	Figure
GSV	General Support Vehicles
HSIS	Hazardous Stores Information System
HSW	Health and Safety at Work
IETP	Interactive Electronic Technical publication
IMM	Improved Medium Mobility
Incl.	Including
IPC	Illustrated Parts Catalogue
JAMES	Joint Asset Management Engineering Solutions
JSP	Joint Services Publication
L	Left
LED	Light Emitting Diode
LH	Left Hand
LM	Local Manufacturer
L/H/F	Left Hand Front
L/H/R	Left Hand Rear
MM	Millimetre
MM	Medium Mobility
MoD	Ministry of Defence
MSDS	Maintenance Safety Data Sheet

(continued)

**Acronyms and abbreviations (continued)**

<u>Abbreviation</u>	<u>Nomenclature</u>
N/A	Not Available/ Applicable
NATO	North Atlantic Treaty Organisation
N/S	Near Side
NFD	Not Fully Definitive
NI	Not Illustrated
No.	Number
NP	Not Provisioned
NSCM	NATO Supply Code for Manufacturers
NSN	NATO Stock Number
Para	Paragraph
PT	Project Team
PT No	Part number
O/S	Off Side
OSVP	Operational Support Vehicle Programme
RAF	Royal Air Force
Ref	Reference
RH	Right Hand
R/H/F	Right Hand Front
R/H/L	Right Hand Left
R/H/R	Right Hand Rear
SOP	Standard Operating Procedure
SV	Support Vehicle
SVR	Support Vehicle Recovery
T	Tonne
TDOL	Technical Documents On-Line
UK	United Kingdom
UST	Unit Support Tanker
v	Volt
W	Watt

**CHAPTER 1**

**DRIVER FITTED ITEMS  
(NON CES ITEMS)**

**MAN SUPPORT VEHICLE**

**GENERAL INFORMATION**

**CONTENTS**

Chapter

- 1 General Information.

Para

- 1 Introduction
- 4 Format
- 5 Maintainer
- 6 Publication authority
- 7 Materiel management

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## INTRODUCTION

1 This Illustrated Parts Catalogue has been developed by MAN Truck and Bus and the General Support Vehicle Project Team.

2 The content details the operator/driver range of spares (Driver Fitted Items) that user of the Support Vehicle can demand through the normal supply chain.

3 This Illustrated Parts Catalogue (IPC) is designed as an aid to the identification of parts or assemblies classified as level 1 Driver Fitted Items (DFI), and to provide the necessary information for demanding the required equipment. This IPC should not be used as a dismantling, maintenance, repair, storage or operation guide.

### Format

4 The publication has been produced as a standalone AESP parts catalogue for delivery within the support vehicle octad on Design Repository Technical Documentation on line (DR-TDOL) or printable hard copy. The format of a normal Illustrated Parts Catalogue (IPC) has been produced for ease of production and release to equipment users. However, not all aspects of this format have been reproduced in this edition.

- 4.1 As most of the items are singular assemblies the dot system of identification has not been used.
- 4.2 Chapter 3 Indexes are not issued.
- 4.3 No safety warnings are included in the catalogue.
- 4.4 Illustration of the item not provided.

### Maintainer

5 Maintainer tradesmen should refer to AESP 2320-W-100-901 repair and maintenance manual, which has been produced as an Interactive Electronic Technical Publication (IETP) hosted on the MAN CAT system vehicle analyser for other demandable repair items when maintaining the vehicle.

### Publication authority

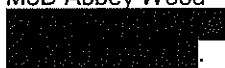
6 The contact details recorded in this paragraph should be used for any communication regarding the content of this publication:

- 6.1 Defence Equipment and Support  
MoD Abbey Wood

### **Materiel management**

7 Supply support information regarding spare part issues and returning of equipment is now in accordance with JSP 886 Defence Logistics Support Chain Manual Volumes 1-9. (Tri-Service) Further information can be obtained through the chain of command in conjunction with the ESM and the Materiel Management Teams in GSV PT at DE&S Abbey Wood, Bristol:

- 7.1 Defence Equipment and Support  
MoD Abbey Wood



**CHAPTER 2**

**DRIVER FITTED ITEMS  
(NON CES ITEMS)**

**MAN SUPPORT VEHICLE**

**6 TONNE (X60)**

**CONTENTS**

Chapter

- 2 Driver fitted items 6 Tonne (X60)
- 2-1 Driver fitted items 9 Tonne MM (X58), 9 Tonne IMM (X44), and SVR
- 2-2 Driver fitted items 15 Tonne MM (X77) and EPLS (All Variants)
- 2-3 Driver fitted items Andover Trailer AD DBT30

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PARTS LIST – DRIVER FITTED ITEMS

Fig Item	DMC Army	NATO stock number	Item name	Part No./ Dwg No.	No. off	Annotation MAN PT No.
			MAN 6 TONNE DFI (Non CES ITEMS)			
NI 1	7SV	2540-12-312-0980	WIPER BLADE COMPLETE		1	81.26440-6023
NI 2	7SV	2540-12-323-2883	WIPER ARM COMPLETE		1	81.26430-6052
NI 3	7SV	2540-12-187-6736	WASHER JETS		1	88.26482-6005
NI 4	7SV	2910-12-335-0361	OIL FILTER CAP		1	88.12210-0007
NI 5	7SV	2940-12-370-4246	AIR FILTER ELEMENT		1	81.08405-0022
NI 6	7SV	2930-12-352-8857	RADIATOR CAP		1	81.06111-0018
NI 7	7SV	4820-12-357-4789	RADIATOR COVER		1	81.06111-0020
NI 8	7SV	2540-01-616-3041	CURB MIRROR		1	82.63730-6056
NI 9	7SV	2540-99-851-4779	FRONT MIRROR		1	82.63730-6057
NI 10	7SV	2540-01-550-7876	REAR VIEW MIRROR L/H		1	82.63730-6051
NI 11	7SV	2540-01-631-2627	REAR VIEW MIRROR R/H		1	82.63730-6052
NI 12	7SV	2540-01-550-7874	WIDE VIEW MIRROR R/H L/H		1	82.63730-6055
NI 13	7SV	2540-01-550-7880	MIRROR ARM R/H		1	82.63731-6036
NI 14	7SV	2540-01-550-7882	MIRROR ARM L/H		1	82.63731-6041
NI 15	7SV	2610-12-370-9976	TYRES SV STANDARD (Continental 1400x20)		1	81.45642-0124
NI 16	7SV	2610-14-470-4414	TYRES SV ALTERNATIVE (Michelin 395/85 R20XZL)		1	N/A
NI 17	7SV	2530-99-779-6412	WHEEL NUT INDICATOR (Olive Green)		1	81.45945-0012
NI 18	7SV	3990-12-371-3927	SPARE WHEEL CLAMPING STRAP (Vertical)		1	81.96802-6022
NI 19	7SV	8315-12-371-4019	SPARE WHEEL RETAINER STRAP (Horizontal)		1	81.96802-0032
NI 20	7SV	6240-12-173-4827	FRONT FLASHER BULB (21w-24v)		1	81.25901-0075
NI 21	7SV	6240-12-151-9661	HEAD LAMP BULB (High Beam) (70w-24v)		1	81.25901-0019
NI 22	7SV	6240-12-194-0048	HEAD LAMP BULB (Parking) (5w-24v)		1	81.25901-0093
NI 23	7SV	6240-12-151-9661	HEADLAMP BULB (Low Beam) (70w-24v )		1	81.25901-0019
NI 24	7SV	6220-41-000-9212	OUTLINE HARD TOP ROOF (Node Lights)		1	81.25260-6122
NI 25	7SV	6220-12-374-0374	OUTLINE LIGHTS REAR (Node Lights)		1	81.25260-6123
NI 26	7SV	6220-12-355-0045	SIDE MARKER (Node Lights)		1	81.25260-6105
NI 27	7SV	6240-12-173-4827	INTERIOR LIGHT BULB (21w-24v)		1	81.25901-0075
NI 28	7SV	6240-12-173-4825	INTERIOR LIGHT BULB (10w-24v)		1	81.25901-0074
NI 29	7SV	6240-12-120-7952	REAR CONVOY LIGHT BULB (2w-24v)		1	81.25901-0062
NI 30	7SV	6220-12-371-3731	NUMBER PLATE LIGHT BULB (LED)		1	81.25240-6000
NI 31	7SV	6240-12-173-4827	REAR TAIL LIGHT BULB (21w-24v)		1	81.25901-0075

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**PARTS LIST – DRIVER FITTED ITEMS (Continued)**

Fig Item	DMC Army	NATO stock number	Item name	Part No./ Dwg No.	No. off	Annotation MAN PT No.
NI 32	7SV	6240-12-173-4824	REAR TAIL LIGHT BULB (5w-24v)		1	81.25901-0073
NI 33	7SV	6140-12-369-8589	BATTERY		1	07.97020-1010
NI 34	7SV	6350-12-370-8231	HORN		1	81.25301-6081
NI 35	7SV	6220-12-371-0083	FRONT FLASHER LENS		1	81.25320-6098
NI 36	7SV	5305-12-379-0978	FLASHER LENS SECURE FIXING SCREWS (2 x 38)		1	06.07156-3509
NI 37	7SV	5305-12-379-1028	FLASHER LENS SECURE FIXING SCREWS (2 x 50)		1	06.07156-3511
NI 38	7SV	5340-12-192-6462	FLASHER LENS SECURE CAPTIVE NUT		1	81.90685-0370
NI 39	7SV	6220-12-370-9916	FRONT HEADLAMP (High)		1	81.25101-6370
NI 40	7SV	6220-12-370-9814	FRONT HEADLAMP (Low)		1	81.25101-6391
NI 41	7SV	6220-12-356-2177	INTERIOR CAB LIGHTING UNIT		1	81.25201-6188
NI 42	7SV	6220-12-371-0110	REAR LAMP LENSES R/H		1	81.25225-6528
NI 43	7SV	6220-12-371-0092	REAR LAMP LENSES L/H		1	81.25228-6033
NI 44	7SV	2540-12-310-3475	BRAKE PEDAL RUBBER		1	81.48227-0006
NI 45	7SV	5340-12-171-2835	INNER DOOR HANDLE GRIP		1	81.97001-0233
NI 46	7SV	5305-12-355-5238	INNER DOOR HANDLE GRIP SECURING SCREWS		1	06.04201-4506
NI 47	7SV	5340-12-306-6147	DOOR STRAP		1	81.62680-0049
NI 48	7SV	4210-12-378-3673	CAB FIRE EXTINGUISHER MOUNT		1	81.66910-6029
NI 49	7SV	2540-12-374-0028	CAB FLOOR MAT L/H		1	81.62860-0814
NI 50	7SV	2540-12-374-0038	CAB FLOOR MAT R/H		1	81.62860-0815
NI 51	7SV	5325-12-333-6055	FRONT PANEL DEFLECTOR RETAINING WING NUT		1	06.43809-0109
NI 52	7SV	5310-12-323-4076	FRONT PANEL DEFLECTOR RETAINING WING NUT WASHER		1	06.43809-0178
NI 53	7SV	5342-12-374-4676	FRONT PANEL DEFLECTOR GAS STRUT		1	81.74821-0125
NI 54	7SV	2540-12-384-5260	LADDER ASSEMBLY		1	82.61511-6003
NI 55	7SV	2540-12-378-2239	ROLLER BLIND ASSEMBLY		1	82.63703-6005
NI 56	7SV	4030-12-378-1453	EYELET INNER CAB RETAINER TIE DOWN		1	81.62158-0031
NI 57	7SV	9905-12-380-2758	WARNING PLATE LH		1	81.66907-0017
NI 58	7SV	5325-12-379-3103	WARNING PLATE RH		1	81.66907-0016
NI 59	7SV	9905-12-139-8150	REAR REFLECTOR (Red)		1	81.42950-0050
NI 60	7SV	2510-12-372-3869	MUD GUARD BEHIND CAB R/H & L/H (Front)		1	82.61210-0116
NI 61	7SV	2540-99-438-1577	MUD GUARDS REAR WHEEL STATION L & R/H/R		1	81.66410-0519
NI 62	7SV	2540-99-133-8135	MUD GUARDS REAR WHEEL STATION L & R/H/L		1	81.66410-0520
NI 63	7SV	2540-12-376-6847	MUD FLAP REAR R/H & L/H		1	82.66440-6006
NI 64	7SV	6160-12-346-4141	BATTERY COVER BOX		1	81.41860-5221

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PARTS LIST – DRIVER FITTED ITEMS (Continued)

Fig Item	DMC Army	NATO stock number	Item name	Part No./ Dwg No.	No. off	Annotation MAN PT No.
NI 65	7SV	2510-12-380-5689	BATTERY COVER LATERAL PANEL		1	81.41660-0143
NI 66	7SV	2930-12-344-2910	FUEL CAP		1	81.12210-0055
NI 67	7SV	6680-12-374-0382	OIL DIP STICK		1	51.05805-5805

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**CHAPTER 2-1**

**DRIVER FITTED ITEMS  
(NON CES ITEMS)**

**MAN SUPPORT VEHICLE**

**9 TONNE MM (X58), 9 TONNE IMM (X44), AND SVR**

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PARTS LIST – DRIVER FITTED ITEMS

Fig Item	DMC Army	NATO stock number	Item name	Part No./ Dwg No.	No. off	Annotation MAN PT No.
			9 TONNE MM (X58), 9 TONNE IMM (X44), AND SVR (Non CES ITEMS)			
NI 1	7SV	2540-12-312-0980	WIPER BLADE COMPLETE		1	81.26440-6023
NI 2	7SV	2540-12-323-2883	WIPER ARM COMPLETE		1	81.26430-6052
NI 3	7SV	2540-12-187-6736	WASHER JETS		1	88.26482-6005
NI 4	7SV	2940-12-371-0272	OIL FILTER ELEMENT & SEAL		1	51.05504-0107
NI 5	7SV	2910-12-335-0361	OIL FILLER CAP		1	81.12210-0007
NI 6	7SV	2940-12-370-8272	AIR FILTER ELEMENT - OUTER		1	83.08405-0001
NI 7	7SV	2940-12-370-9116	AIR FILTER ELEMENT - INNER		1	81.08405-0017
NI 8	7SV	2930-12-352-8857	RADIATOR CAP (9T MM)		1	81.06111-0018
NI 9	7SV	4820-12-357-4789	RADIATOR COVER (9T MM)		1	81.06111-0020
NI 10	7SV	2930-12-392-4060	RADIATOR COVER 0.8 BAR (9T IMM and SVR)		1	81.06111-0027
NI 11	7SV	2930-12-392-4064	RADIATOR COVER 1.2 BAR (9T IMM and SVR)		1	81.06111-0028
NI 12	7SV	2540-01-616-3041	CURB MIRROR		1	82.63730-6056
NI 13	7SV	2540-99-851-4779	FRONT MIRROR		1	82.63730-6057
NI 14	7SV	2540-01-550-7876	REAR VIEW MIRROR L/H		1	82.63730-6051
NI 15	7SV	2540-01-631-2627	REAR VIEW MIRROR R/H		1	82.63730-6052
NI 16	7SV	2540-01-550-7874	WIDE VIEW MIRROR R/H L/H		1	82.63730-6055
NI 17	7SV	2540-01-550-7880	MIRROR ARM R/H		1	82.63731-6036
NI 18	7SV	2540-01-550-7882	MIRROR ARM L/H		1	82.63731-6041
NI 19	7SV	2610-12-370-9976	TYRES SV STANDARD (Continental 1400x20)		1	81.45642-0124
NI 20	7SV	2610-14-470-4414	TYRES SV ALTERNATIVE (Michelin 395/85 R20XZL)		1	N/A
NI 21	7SV	Awaiting coding	TYRES SV-RECOVERY STANDARD (Michelin 1600 R20XZL)		1	N/A
NI 22	7SV	2530-99-779-6412	WHEEL NUT INDICATOR (Olive Green)		1	81.45945-0012
NI 23	7SV	3990-12-371-3927	SPARE WHEEL CLAMPING STRAP (Vertical) (9T MM only)		1	81.96802-6022
NI 24	7SV	8315-12-371-4019	SPARE WHEEL RETAINER STRAP (Horizontal) (9T MM only)		1	81.96802-0032
NI 25	7SV	6240-12-173-4827	FRONT FLASHER BULB (21w-24v)		1	81.25901-0075
NI 26	7SV	6240-12-151-9661	HEAD LAMP BULB (High Beam) (70W-24v)		1	81.25901-0019
NI 27	7SV	6240-12-194-0048	HEAD LAMP BULB (Parking) (5W-24v)		1	81.25901-0093
NI 28	7SV	6240-12-151-9661	HEADLAMP BULB (Low Beam) (70w-24v )		1	81.25901-0019
NI 29	7SV	6220-41-000-9212	OUTLINE HARD TOP ROOF (Node Lights)		1	81.25260-6122
NI 30	7SV	6220-12-374-0374	OUTLINE LIGHTS REAR (Node Lights)		1	81.25260-6123

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**PARTS LIST – DRIVER FITTED ITEMS (Continued)**

Fig Item	DMC Army	NATO stock number	Item name	Part No./ Dwg No.	No. off	Annotation MAN PT No.
NI 31	7SV	6220-12-355-0045	SIDE MARKER (Node Lights)		1	81.25260-6105
NI 32	7SV	6240-12-173-4827	INTERIOR LIGHT BULB (21w-24v)		1	81.25901-0075
NI 33	7SV	6240-12-173-4825	INTERIOR LIGHT BULB (10w-24v)		1	81.25901-0074
NI 34	7SV	6240-12-120-7952	REAR CONVOY LIGHT BULB (2w-24v)		1	81.25901-0062
NI 35	7SV	6220-12-371-3731	NUMBER PLATE LIGHT BULB (LED)		1	81.25240-6000
NI 36	7SV	6240-12-173-4827	REAR TAIL LIGHT BULB (21w-24v)		1	81.25901-0075
NI 37	7SV	6240-12-173-4824	REAR TAIL LIGHT BULB (5w-24v)		1	81.25901-0073
NI 38	7SV	6140-12-369-8589	BATTERY		1	07.97020-1010
NI 39	7SV	6350-12-370-8231	HORN		1	81.25301-6081
NI 40	7SV	6220-12-371-0083	FRONT FLASHER LENS		1	81.25320-6098
NI 41	7SV	5305-12-379-0978	FLASHER LENS SECURE FIXING SCREWS (2 x 38)		1	06.07156-3509
NI 42	7SV	5305-12-379-1028	FLASHER LENS SECURE FIXING SCREWS (2 x 50)		1	06.07156-3511
NI 43	7SV	5340-12-192-6462	FLASHER LENS SECURE CAPTIVE NUT		1	81.90685-0370
NI 44	7SV	6220-12-370-9916	FRONT HEADLAMP (High)		1	81.25101-6370
NI 45	7SV	6220-12-370-9814	FRONT HEADLAMP (Low)		1	81.25101-6391
NI 46	7SV	6220-12-356-2177	INTERIOR CAB LIGHTING UNIT		1	81.25201-6188
NI 47	7SV	6220-12-371-0110	REAR LAMP LENSES R/H		1	81.25225-6528
NI 48	7SV	6220-12-371-0092	REAR LAMP LENSES L/H		1	81.25228-6033
NI 49	7SV	2540-12-310-3475	BRAKE PEDAL RUBBER		1	81.48227-0006
NI 50	7SV	5340-12-171-2835	INNER DOOR HANDLE GRIP		1	81.97001-0233
NI 51	7SV	5305-12-355-5238	INNER DOOR HANDLE GRIP SECURING SCREWS		1	06.04201-4506
NI 52	7SV	5340-12-306-6147	DOOR STRAP		1	81.62680-0049
NI 53	7SV	4210-12-378-3673	CAB FIRE EXTINGUISHER MOUNT		1	81.66910-6029
NI 58	7SV	2540-12-374-0028	CAB FLOOR MAT L/H		1	81.62860-0814
NI 59	7SV	2540-12-374-0038	CAB FLOOR MAT R/H		1	81.62860-0815
NI 60	7SV	5325-12-333-6055	FRONT PANEL DEFLECTOR RETAINING WING NUT		1	06.43809-0109
NI 61	7SV	5310-12-323-4076	FRONT PANEL DEFLECTOR RETAINING WING NUT WASHER		1	06.43809-0178
NI 62	7SV	5342-12-374-4676	FRONT PANEL DEFLECTOR GAS STRUT		1	81.74821-0125
NI 63	7SV	2540-12-384-5260	LADDER ASSEMBLY (9T MM)		1	82.61511-6003
NI 64	7SV	2540-12-382-0431	LADDER ASSEMBLY (9T IMM and SVR)			82.61511-6004
NI 65	7SV	2540-12-378-2239	ROLLER BLIND ASSEMBLY		1	82.63703-6005

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**PARTS LIST – DRIVER FITTED ITEMS (Continued)**

Fig Item	DMC Army	NATO stock number	Item name	Part No./ Dwg No.	No. off	Annotation MAN PT No.
NI 66	7SV	4030-12-378-1453	EYELET INNER CAB RETAINER TIE DOWN		1	81.62158-0031
NI 67	7SV	9905-12-380-2758	WARNING PLATE LH		1	81.66907-0017
NI 68	7SV	5325-12-379-3103	WARNING PLATE RH		1	81.66907-0016
NI 69	7SV	9905-12-380-2758	WARNING MARKERS & MARKER PLATES REFLECTOR (Mud flap) (left)		1	81.66907-0017
NI 70	7SV	9905-12-379-3103	WARNING MARKERS & MARKER PLATES REFLECTOR (Mud flap) (right)		1	81.66907-0016
NI 71	7SV	9905-12-139-8150	REAR REFLECTOR (Red)		1	81.42950-0050
NI 72	7SV	2540-12-371-7585	MUD GUARD BEHIND CAB R/H/F		1	82.61210-0066
NI 73	7SV	2540-12-371-7593	MUD GUARD BEHIND CAB L/H/F		1	82.61210-0067
NI 74	7SV	2510-12-347-7962	MUD GUARDS REAR WHEEL STATION L/H/F (UST only)		1	81.66410-5136
NI 75	7SV	2510-12-360-9270	MUD GUARDS REAR WHEEL STATION L/H/R (UST only)		1	82.66410-5069
NI 76	7SV	2510-12-346-6616	MUD GUARDS REAR WHEEL STATION R/H/F (UST only)		1	81.66410-5137
NI 77	7SV	2510-12-380-9273	MUD GUARDS REAR WHEEL STATION R/H/R (UST only)		1	82.66410-5070
NI 78	7SV	2540-12-376-6847	MUD FLAP REAR R/H & L/H		1	82.66440-6006
NI 79	7SV	2540-99-248-4915	MUD FLAP REAR (SVR only)		2	81.66440-0196
NI 80	7SV	6160-12-346-4141	BATTERY COVER BOX		1	81.41860-5221
NI 81	7SV	2510-12-380-5689	BATTERY COVER LATERAL PANEL		1	81.41660-0143
NI 82	7SV	2930-12-344-2910	FUEL CAP		1	81.12210-0055
NI 83	7SV	6680-12-371-4359	OIL DIP STICK (9T MM)		1	51.05805-5785
NI 84	7SV	6680-12-374-0379	OIL DIP STICK (9T IMM and SVR)		1	51.05805-5808

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**CHAPTER 2-2**

**DRIVER FITTED ITEMS  
(NON CES ITEMS)**

**MAN SUPPORT VEHICLE**

**15 TONNE MM (X77) AND EPLS (ALL VARIANTS)**

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**PARTS LIST – DRIVER FITTED ITEMS**

Fig Item	DMC Army	NATO stock number	Item name	Part No./ Dwg No.	No. off	Annotation MAN PT No.
			MAN 15T & EPLS (All Variants) (Non CES ITEMS)			
NI 1	7SV	2540-12-312-0980	WIPER BLADE COMPLETE		1	81.26440-6023
NI 2	7SV	2540-12-323-2883	WIPER ARM COMPLETE		1	81.26430-6052
NI 3	7SV	2540-12-187-6736	WASHER JETS		1	88.26482-6005
NI 4	7SV	2940-12-371-0272	OIL FILTER ELEMENT & SEAL		1	51.05504-0107
NI 5	7SV	2910-12-335-0361	OIL FILLER CAP		1	81.12210-0007
NI 6	7SV	2940-12-370-9116	AIR FILTER ELEMENT- OUTER		1	81.08405-0001
NI 7	7SV	2815-12-379-4533	AIR FILTER ELEMENT- INNER		1	81.08405-0017
NI 8	7SV	2930-12-352-8857	RADIATOR CAP		1	81.06111-0018
NI 9	7SV	4820-12-357-4789	RADIATOR COVER		1	81.06111-0020
NI 10	7SV	2540-01-616-3041	CURB MIRROR		1	82.63730-6056
NI 11	7SV	2540-99-851-4779	FRONT MIRROR		1	82.63730-6057
NI 12	7SV	2540-01-550-7876	REAR VIEW MIRROR L/H		1	82.63730-6051
NI 13	7SV	2540-01-631-2627	REAR VIEW MIRROR R/H		1	82.63730-6052
NI 14	7SV	2540-01-550-7874	WIDE VIEW MIRROR R/H L/H		1	82.63730-6055
NI 15	7SV	2540-01-550-7880	MIRROR ARM R/H		1	82.63731-6036
NI 16	7SV	2540-01-550-7882	MIRROR ARM L/H		1	82.63731-6041
NI 17	7SV	2610-14-470-4414	TYRES SV STANDARD (Continental 1400x20)		1	81.45642-0124
NI 18	7SV	Awaiting coding	TYRES SV ALTERNATIVE (Michelin 395/85 R20XZL)		1	
NI 19	7SV	3990-12-371-3927	WHEEL NUT INDICATOR (Olive Green)		1	81.45945-0012
NI 20	7SV	8315-12-371-4019	SPARE WHEEL CLAMPING STRAP (Vertical)		1	81.96802-6022
NI 21	7SV		SPARE WHEEL RETAINER STRAP (Horizontal)		1	81.96802-0032
NI 22	7SV	6240-12-173-4827	FRONT FLASHER BULB (21w-24v)		1	81.25901-0075
NI 23	7SV	6240-12-151-9661	HEAD LAMP BULB (High Beam) (70w-24v)		1	81.25901-0019
NI 24	7SV	6240-12-194-0048	HEAD LAMP BULB (Parking) (5w-24v)		1	81.25901-0093
NI 25	7SV	6240-12-151-9661	HEADLAMP BULB (Low Beam) (70w-24v )		1	81.25901-0019
NI 26	7SV	6220-41-000-9212	OUTLINE HARD TOP ROOF (Node Lights)		1	81.25260-6122
NI 27	7SV	6220-12-374-0374	OUTLINE LIGHTS REAR (Node Lights)		1	81.25260-6123
NI 28	7SV	6220-12-355-0045	SIDE MARKER (Node Lights)		1	81.25260-6105
NI 29	7SV	6240-12-173-4827	INTERIOR LIGHT BULB (21w-24v)		1	81.25901-0075
NI 30	7SV	6240-12-173-4825	INTERIOR LIGHT BULB (10w-24v)		1	81.25901-0074
NI 31	7SV	6240-12-120-7952	REAR CONVOY LIGHT BULB (2w-24v)		1	81.25901-0062
NI 32	7SV	6220-12-371-3731	NUMBER PLATE LIGHT BULB (LED)		1	81.25240-6000

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**PARTS LIST – DRIVER FITTED ITEMS (Continued)**

Fig Item	DMC Army	NATO stock number	Item name	Part No./ Dwg No.	No. off	Annotation MAN PT No.
NI 33	7SV	6240-12-173-4827	REAR TAIL LIGHT BULB (21w-24v)		1	81.25901-0075
NI 34	7SV	6240-12-173-4824	REAR TAIL LIGHT BULB (5w-24v)		1	81.25901-0073
NI 35	7SV	6140-12-369-8589	BATTERY		1	07.97020-1010
NI 36	7SV	6350-12-370-8231	HORN		1	81.25301-6081
NI 37	7SV	6220-12-371-0083	FRONT FLASHER LENS		1	81.25320-6098
NI 38	7SV	5305-12-379-0978	FLASHER LENS SECURE FIXING SCREWS (2 x 38)		1	06.07156-3509
NI 39	7SV	5305-12-379-1028	FLASHER LENS SECURE FIXING SCREWS (2 x 50)		1	06.07156-3511
NI 40	7SV	5340-12-192-6462	FLASHER LENS SECURE CAPTIVE NUT		1	81.90685-0370
NI 41	7SV	6220-12-370-9916	FRONT HEADLAMP (High)		1	81.25101-6370
NI 42	7SV	6220-12-370-9814	FRONT HEADLAMP (Low)		1	81.25101-6391
NI 43	7SV	6220-12-356-2177	INTERIOR CAB LIGHTING UNIT		1	81.25201-6188
NI 44	7SV	6220-12-371-0110	REAR LAMP LENSES R/H		1	81.25225-6528
NI 45	7SV	6220-12-371-0092	REAR LAMP LENSES L/H		1	81.25228-6033
NI 46	7SV	2540-12-310-3475	BRAKE PEDAL RUBBER		1	81.48227-0006
NI 47	7SV	5340-12-171-2835	INNER DOOR HANDLE GRIP		1	81.97001-0233
NI 48	7SV	5305-12-355-5238	INNER DOOR HANDLE GRIP SECURING SCREWS		1	06.04201-4506
NI 49	7SV	5340-12-306-6147	DOOR STRAP		1	81.62680-0049
NI 50	7SV	4210-12-378-3673	CAB FIRE EXTINGUISHER MOUNT		1	81.66910-6029
NI 51	7SV	2540-12-374-0028	CAB FLOOR MAT L/H		1	81.62860-0814
NI 52	7SV	2540-12-374-0038	CAB FLOOR MAT R/H		1	81.62860-0815
NI 53	7SV	5325-12-333-6055	FRONT PANEL DEFLECTOR RETAINING WING NUT		1	06.43809-0109
NI 54	7SV	5310-12-323-4076	FRONT PANEL DEFLECTOR RETAINING WING NUT WASHER		1	06.43809-0178
NI 55	7SV	5342-12-374-4676	FRONT PANEL DEFLECTOR GAS STRUT		1	81.74821-0125
NI 56	7SV	2540-12-378-2239	ROLLER BLIND ASSEMBLY		1	82.63703-6005
NI 57	7SV	4030-12-378-1453	EYELET INNER CAB RETAINER TIE DOWN		1	81.62158-0031
NI 58	7SV	9905-12-380-2758	WARNING PLATE LH		1	81.66907-0017
NI 59	7SV	5325-12-379-3103	WARNING PLATE RH		1	81.66907-0016
NI 60	7SV	9905-12-139-5180	REAR REFLECTOR (Red)		1	81.42950-0050
NI 61	7SV	2510-12-380-9246	SPLASH GUARD FRONT WHEEL STATION R/H/F		1	82.61210-0088
NI 62	7SV	2510-12-372-0116	CENTRAL SPLASH GUARD R/H/F WHEEL STATION		1	82.61210-0068
NI 63	7SV	2510-12-378-3215	SPLASH GUARD FRONT WHEEL STATION R/H/R		1	82.61210-0090
NI 64	7SV	2510-12-378-3213	SPLASH GUARD FRONT WHEEL STATION L/H/F			82.61210-0087

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**PARTS LIST – DRIVER FITTED ITEMS (Continued)**

Fig Item	DMC Army	NATO stock number	Item name	Part No./ Dwg No.	No. off	Annotation MAN PT No.
NI 65	7SV	2510-12-372-0116	CENTRAL SPLASH GUARD L/H/F WHEEL STATION		1	82.61210.0068
NI 66	7SV	2510-12-380-9267	SPLASH GUARD FRONT WHEEL STATION L/H/R		1	82.61210-0089
NI 67	7SV	2510-12-347-7962	MUD GUARDS REAR WHEEL STATION L/H/F		1	81.66410-5136
NI 68	7SV	2510-12-380-9270	MUD GUARDS REAR WHEEL STATION L/H/R		1	82.66410-5069
NI 69	7SV	2510-12-346-6616	MUD GUARDS REAR WHEEL STATION R/H/F		1	81.66410-5137
NI 70	7SV	2510-12-380-9273	MUD GUARDS REAR WHEEL STATION R/H/R		1	82.66410-5070
NI 71	7SV	2540-12-376-6847	REAR MUD FLAP X77		1	82.66440-6006
NI 72	7SV	2540-99-321-1265	MUDGUARDS ANGULAR FRONT (Excluding EPLS)		2	81.66410-0534
NI 73	7SV	2540-99-666-7752	MUDGUARDS REAR AXLE REAR (Excluding EPLS)		2	81.66410-0518
NI 74	7SV	2540-99-613-2718	MUDGUARDS REAR AXLE FRONT (Excluding EPLS)		2	81.66410-0517
NI 75	7SV	2510-12-380-9820	MUD GUARDS EPLS R/H/REAR EPLS SPECIFIC		1	82.66410-5086
NI 76	7SV	2150-12-380-5696	MUD GUARDS EPLS L/H/REAR EPLS SPECIFIC		1	82.66410-5085
NI 77	7SV	6160-12-346-4141	BATTERY COVER BOX		1	81.41860-5221
NI 78	7SV	2510-12-380-5689	BATTERY COVER LATERAL PANEL		1	81.41660-0143
NI 79	7SV	2930-12-344-2910	FUEL CAP		1	81.12210-0055
NI 80	7SV	6680-12-371-4359	OIL DIP STICK		1	51.05805-5785

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**CHAPTER 2-3**

**DRIVER FITTED ITEMS  
(NON CES ITEMS)**

**MAN SUPPORT VEHICLE**

**ANDOVER TRAILER AD DBT30**

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**PARTS LIST – DRIVER FITTED ITEMS**

Fig Item	DMC Army	NATO stock number	Item name	Part No./ Dwg No.	No. off	Annotation MAN PT No.
			ANDOVER TRAILER  (Non CES ITEMS) <b>RAMP PIVOT BAR ASSEMBLIES</b>	AD DBT30		
NI 1		2510-99-5516885	NYLACAST SEGMENT <b>SIDE EXTENSION ASSEMBLIES</b>		1	81.69110-0004
NI 2		2510-99-1348272	SWING UP PLATFORM ASSEMBLY - 2 LUG		1	81.69103-0001
NI 3		2510-99-4450381	PLATFORM SUPPORT ASSEMBLY		1	81.69103-0004
NI 4		2510-99-9742349	PLATFORM SUPPORT ASSEMBLY		1	81.69103-0005
NI 5		5315-99-8128252	14MM FULCRUM PIN		1	06.21569-0053
NI 6		5315-99-2999704	R-CLIP 2MM		1	81.91320-0105
NI 7		5340-12-3785489	51.6 DIA NEODYMIUM MAGNET		1	81.97107-0009
NI 8		5305-99-9900456	M4 X 80 LONG COUNTERSUNK BOLT FOR MAGNET		1	81.90490-0792
NI 9		5340-99-3912251	RUBBER BUFFER		1	82.96020-6001
NI 10		5340-99-6177708	SWING UP PLATFORM ASSEMBLY		1	82.65000-6033
NI 11		2510-99-4063379	PLATFORM SUPPORT ASSEMBLY		1	81.69103-0002
NI 12		2510-99-3321267	PLATFORM SUPPORT ASSEMBLY		1	81.69103-0003
NI 13		4010-99-3886468	DOOR RETAINER WIRE TYPE REPAIR		1	81.92610-6008
NI 14		2510-99-6168126	SWING UP PLATFORM ASSEMBLY		1	81.69103-0007
NI 15		2510-99-2132646	SWING UP PLATFORM ASSEMBLY		1	81.69103-0006
NI 16		5306-99-4746706	M14 X 150 BOLT BZP		1	81.90490-0789
NI 17		5365-99-1855388	C- BUSH		1	81.69110-0005
NI 18		5305-99-8425083	TOMMY SCREW		1	81.90490-0787
NI 19		5315-99-8813405	'R' CLIP 3MM		1	81.91320-0106
NI 20		5315-99-2169602	LYNCH PIN		1	81.91301-0200
NI 21		5315-99-6673195	COIL PACK BUSH PIN		1	81.69110-0000
NI 22		5310-99-3613034	M24 DRAB OLIVE BINX NUT		1	81.90685-0476
NI 23		5340-99-7430593	RAMP STAY O/S		1	81.69110-6000
NI 24		5120-99-6673474	RAMP STAY N/S		1	81.69110-6001
NI 25		5315-99-7256602	RAMP STAY BOLT		1	81.69110-0006
NI 26		4010-99-3886468	DOOR RETAINER WIRE TYPE REPAIR		1	81.92610-6008
NI 27		2590-99-8854527	CABLE LANYARD		1	81.92611-0189
NI 28		5315-99-4408313	PIPE LYNCH PIN		1	81.91301-0201

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**PARTS LIST – DRIVER FITTED ITEMS (Continued)**

Fig Item	DMC Army	NATO stock number	Item name	Part No./ Dwg No.	No. off	Annotation MAN PT No.
			<b>FRONT MARKER BOARD SOCKET ASSEMBLIES</b>			
NI 29		5305-99-8425083	TOMMY SCREW		1	81.90490-0787
NI 30		5315-99-8813405	'R' CLIP 3MM		1	81.91320-0106
			<b>SPARE WHEEL CARRIER ASSEMBLIES</b>			
NI 31		2590-99-1481461	SPARE WHEEL CARRIER		1	81.69105-6004
NI 32		2590-99-2536774	AFT BRACE FOR /01 CARRIER		1	81.69105-0000
NI 33		2590-99-1543088	CROSS BRACE		1	81.69105-0002
NI 34		2590-99-3406077	SPARE WHEEL CARRIER		1	81.69105-6006
NI 35		2590-99-5516861	AFT BRACE FOR /02 CARRIER		1	81.69105-0001
NI 36		2590-99-1543088	CROSS BRACE		1	81.69105-0002
			<b>TOOLBOX ASSEMBLIES</b>			
NI 37		2540-99-2132775	TOOLBOX & SUPPORT FRAME O/S		1	81.69105-6005
NI 38		5330-99-7334997	TOOL BOX SEAL REPAIR KIT, WITH 2 NEW SEALS AND GLUE		1	82.96501-6002
NI 39		2540-99-9859448	TOOLBOX & SUPPORT FRAME N/S		1	81.69105-6003
NI 40		3120-99-9939332	ANCHOR PIN - WITH ANTI CORROSION COATING		1	81.50230-0027
NI 41		3130-99-6673111	BEARING BRACKET WITH GREASE		1	81.50311-0004
NI 42		5310-99-5970013	SPINDLE NUT - RIGHT		1	81.90640-0062
NI 43		5310-99-6156229	SPINDLE NUT - LEFT		1	81.90640-0061
NI 44		5305-12-3597981	SPINDLE NUT LOCKING SCREW		1	06.01283-4911
NI 45		5325-99-3912435	CIRCLIP - CORROSION RESISTANT COATING		1	81.90820-0652
NI 46		5325-99-1751583	CIRCLIP - CORROSION RESISTANT COATING		1	81.90820-0653
NI 47		2590-99-3402939	WASHER CORROSION RESISTANT COATING		1	81.50610-0006
NI 48		5310-99-6674466	LOCK NUT CORROSION RESISTANT COATING		1	81.90685-0479
NI 49		5340-99-8365580	HOSE CLAMP		1	81.97440-0244
NI 50		5360-99-5858771	RETURN SPRING - CHAMBER		1	81.97610-0321
NI 51		2590-99-3886470	BRACKET AGS RIGHT		1	81.50324-0000
NI 52		2590-99-6673118	BRACKET AGS LEFT		1	81.50324-0001
NI 53		5310-99-4287327	SPIGOT WHEEL NUT		1	81.45503-0059
NI 54		2530-99-1907364	HUB CAP - 09237113		1	81.44312-0014
NI 55		53319-99-283442	HUB CAP O-RING		1	06.56930-4081
NI 56		2530-99-1481492	BRAKE DRUM DUST COVER KIT C/W ALL FASTENERS - 09317884		1	81.50101-6091
NI 57		5365-99-3402940	DISTANCE SLEEVE		1	81.43450-0001
NI 58		5365-99-1481493	RUBBER ROLLER		1	81.43450-0007
NI 59		5306-12-3768967	U BOLT - LENGTH 320MM		1	81.43450-0002

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**PARTS LIST – DRIVER FITTED ITEMS (Continued)**

Fig Item	DMC Army	NATO stock number	Item name	Part No./ Dwg No.	No. off	Annotation MAN PT No.
			<b>TOOLBOX ASSEMBLIES (Contd)</b>			
NI 60		5310-12-3742087	U BOLT NUT		1	81.90685-0478
NI 61		5365-99-3402940	DISTANCE SLEEVE		1	81.43450-0001
NI 62		5365-99-1481493	RUBBER ROLLER		1	81.43450-0007
NI 63		5340-99-1481496	BEARING CLAMP		1	81.43450-0000
NI 64		5306-12-3768967	U BOLT - LENGTH 320MM		1	81.43450-0002
NI 65		5310-12-3742087	U BOLT NUT		1	81.90685-0478
NI 66		4720-99-4953819	SUZIE		1	81.96340-6157
NI 67		4720-99-6953392	SUZIE		1	81.96340-6156
NI 68		2530-99-3231126	PALM COUPLING - RED		1	81.51220-6138
NI 69		2530-99-7263541	PALM COUPLING - YELLOW		1	81.51220-6139
NI 70		4820-99-8128258	DRAIN VALVE		1	81.51260-6069
NI 71		4010-99-4197480	DRAIN VALVE CABLE		1	81.96804-0008
NI 72		2510-99-3240200	MUD WING		1	81.69115-0000
NI 73		2510-99-1499575	MUD WING BRACKET		1	81.69115-0003
NI 74		5340-99-7485072	MUD WING BACKING PLATE		1	81.69115-0004
NI 75		2540-99-2557360	MUD FLAP 560 X 530 PLAIN		1	81.69115-0001
NI 76		2540-99-4714648	MUD FLAP 500 X 430 PLAIN		1	81.69115-0002
NI 77		9905-99-4796377	FRONT (WHITE) REFLECTOR		1	81.25925-0020
NI 78		6150-99-5007926	12 PIN NATO SUZZIE		1	81.25411-6060
NI 79		5999-99-5022863	2 PIN SOCKET CAP		1	81.25475-0310
NI 80		5935-99-7030686	2 PIN BULGIN PLUG CAP		1	81.25475-0309
NI 81		9905-99-2978027	RED TRIANGLE REFLECTORS		1	81.25925-0019
NI 82		9905-99-5516865	AMBER SIDE REFLECTORS - ADHESIVE		1	81.25925-0018
NI 83		6220-99-6019161	NATO CONVOY LIGHT COMPLETE WITH CABLE		1	81.25215-6008
NI 84		9905-99-9685698	MARKER BOARD - ECE 6/7		1	81.66907-0020
NI 85		5935-99-5073274	NATO 12 PIN SOCKET COVER		1	81.25431-0133
NI 86		5340-99-3801062	REAR TIMBER TRAP DOOR		1	81.69103-5002
NI 87		5340-99-8514675	MIDDLE TIMBER TRAP DOOR		1	81.69103-5001
NI 88		5340-99-7586673	FRONT TIMBER TRAP DOOR		1	81.69103-5000
NI 89		5306-12-1516157	M8 X 55 LONG COACH BOLTS		1	06.03071-0309
NI 90		5340-99-8364587	TIMBER CLAMP		1	81.69103-0012
NI 91		5340-99-2417026	TIMBER CLAMP (FABRICATED C/MEMBER)		1	81.69103-0011
NI 92		5340-99-8766971	TIMBER CLAMP (SPECIAL SHORT LENGTH)		1	81.69103-0010
NI 93		5310-99-0005460	BACK NUT		1	81.90685-0477
NI 94		5310-99-7786863	WHEEL NUT		1	81.45503-0060
NI 95		2510-99-4911400	CROSS BAR INCL. BOLT KIT		1	81.69111-6003
NI 96		5340-99-3594657	SPRING BALANCE KIT		1	81.69111-6002
NI 97		2530-99-6815818	WHEEL AND TYRE		1	82.42401-6018
NI 98		2640-99-6673120	VALVE EXTENSIONS		1	81.45905-0221
NI 99		4210-99-3981014	FIRE EXTINGUISHER BOX		1	81.66910-6040

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**PARTS LIST – DRIVER FITTED ITEMS (Continued)**

Fig Item	DMC Army	NATO stock number	Item name	Part No./ Dwg No.	No. off	Annotation MAN PT No.
			<b>TOOLBOX ASSEMBLIES (Contd)</b>			
NI100		5365-99-1480332	TWISTLOCK COLLAR ASSEMBLY		1	81.65750-0068
NI101		5310-99-8585718	TWISTLOCK HANDNUT		1	81.65750-0064
NI102		5340-99-7409352	TWISTLOCK HANDLE AND SLEEVE		1	82.97001-5004
NI103			<b>SNORKEL ASSEMBLY</b>		1	
NI104		4710-99-3134651	1.25" HYDRAULIC PIPE ASSEMBLY		1	81.51221-0007
NI105		4730-99-5819320	M16 STUD TO 8 PIPE		1	81.98130-6059
NI106		4730-99-3424184	M22 STUD TO 12 PIPE		1	81.98130-6062
NI107		2940-99-2389348	AIR CLEANER ASSEMBLY		1	81.51270-6109
NI108		4720-99-5144445	DRAIN TAP		1	81.51260-6070
NI109		5306-99-7254211	45MM U-BOLT CLAMP		1	81.92501-0033
NI110		2590-99-4832661	WHEEL NUT INDICATOR (NATO GREEN) – HIGH TEMPERATURE		1	81.45945-0014
NI111			<b>GRIP TAPE ASSEMBLY</b>		1	
NI112		7510-99-2429393	6" 3M SAFETY WALK TAPE 655 LONG		1	81.97812-2492
NI113		7510-99-2429393	6" 3M SAFETY WALK TAPE 790 LONG		1	81.97812-2492
NI114		7510-99-9764809	4" 3M SAFETY WALK TAPE 685 LONG		1	81.97812-2491
NI115		N/A	<b>LABEL &amp; GREASER CAP ASSEMBLY</b>		1	N/A
NI116		9905-99-2294961	PUSH TO SHUNT LABEL		1	82.97801-0637
NI117		9905-99-6673209	8.3 BAR TYRE PRESSURE LABEL		1	82.97801-0638
NI118		9905-99-8364731	ENSURE HANDS ARE CLEAR LABEL		1	82.97801-0639
NI119		9905-99-1907365	PULL TO PARK LABEL		1	82.97801-0640
NI120		5340-99-6673809	RED GREASER PROTECTION CAP		1	81.96410-0691
NI121		5315-99-7333675	SPRING LOADED SWORD PIN (125mm)		1	82.91301-0013
			<b>SPARE WHEEL CARRIER DOOR</b>			
NI122		5340-99-7013566	BUFFER MOUNTING PLATE		1	81.69105-0004
NI123		5340-99-2133566	RUBBER BUFFER		1	81.96020-0446

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# SUPPORT VEHICLE (SV) - MAN TRUCKS, ALL 6 TONNE MM VARIANTS

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UNITED KINGDOM MINISTRY OF DEFENCE  
AND ARMED FORCES

By

DEFENCE EQUIPMENT AND SUPPORT

OPERATIONAL SUPPORT VEHICLE PROGRAMME (UO5V9)



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**AMENDMENT RECORD**

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## CONTENTS

### PRELIMINARY PAGES

Front cover (title page) .....	(i)
Conditions of release .....	(ii)
Amendment record .....	(iii)/(iv)
Contents (this list) .....	(v)
Preface .....	(vi)
Introduction .....	(vi)
Related and associated publications .....	(vi)
Related publications .....	(vi)
Associated publications .....	(viii)
Acronyms and Abbreviations .....	(ix)
Warnings .....	(xi)
Cautions .....	(xx)
Rear cover .....	(xxv)/(xxvi)

### OPERATING INFORMATION

#### Chapter

1-0	Vehicle
1-1	Technical data
1-2	Driver's controls
1-3	Heating, ventilation and air-conditioning
1-4	Braking systems
1-5	Vehicle operation
1-6	Driver's inspections
1-7	Electrical sockets
2-0	Body
2-1	Flat platform
2-2	Falcon variant
2-3	Technical data - cargo
2-4	General description - cargo
2-5	Operating instructions - cargo
3-0	Winch
3-1	Technical data
3-2	Operating precautions
3-3	General description
3-4	Operating instructions
3-5	Operator inspections
4-0	Crane
4-1	Technical data
4-2	Operating precautions
4-3	General description
4-4	Operating instructions
5-0	Tail Lift
5-1	Technical data
5-2	General description
5-3	Operating instructions
6-0	Denial of equipment

## PREFACE

Sponsor: Operational Support Vehicle Programme  
Delivery Team

Project No.: GSV/3/03

Publication Authority: OSVP DT

## INTRODUCTION

- 1 This publication details the location, function and safety aspects of the vehicle controls, switches and equipment.
- 2 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; the form should be photocopied and used for forwarding comments on this AESP.
- 3 AESPs are issued under Defence Council Authority and where AESPs specify action to be taken, the AESP will of itself be sufficient authority for such action and also for the demanding of the necessary stores, subject to the provisions of Para 4 below.
- 4 The subject matter of this publication may be affected by Defence Council Instructions (DCIs), Standard Operating Procedures (SOPs) or by local regulations. When any such instruction, order or regulation contradicts any portion of this publication it is to be taken as the overriding authority.

## RELATED AND ASSOCIATED PUBLICATIONS

### Related publications

- 5 The categories for the Support Vehicle consists of the publications in the table on page (vii). All references are prefixed with the first eight digits of this publication. The availability of the publications can be checked by reference to the group index, see AESP 0100-A-013-013.

Category/Sub-category			Information Level			
			1 User/ Operator	2 Unit Maintenance	3 Field Maintenance	4 Base Maintenance
1	0	Purpose and Planning Information	*	*	*	*
	1	Equipment Support Policy Directive	*	*	*	*
2	0	Operating Information	201	201	201	*
	1	Aide Memoire	*	*	*	*
	2	Training Aids	*	*	*	*
3		Technical Description	*	*	*	*
4	1	Installation Instructions	*	*	*	*
	2	Preparation for Special Environments	*	*	*	*
5	1	Failure Diagnosis	*	*	*	*
	2	Repair Instructions	*	*	*	*
	3	Inspection Standards	*	*	*	*
	4	Calibration Procedures	*	*	*	*
6		Maintenance Schedules	*	*	*	*
7	1	Illustrated Parts Catalogues	*	*	*	*
	2	Commercial Parts Lists	*	*	*	*
	3	Complete Equipment Schedules, Production Edition	*	*	*	*
	4	Complete Equipment Schedules, Service Edition (Simple Equipment)	*	*	*	*
	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)	*	*	*	*

\* Category / Sub-category not published.

**Associated publications**

6 The associated publications are listed below.

<b>Reference</b>	<b>Title</b>
AESP 0200-A-093-013	Land Equipment User Maintenance Standards
AESP 0200-A-307-013	All Arms Recovery Manual
AESP 0200-A-400-013	Storage under Controlled Humidity Environments
AESP 2300-A-401-013	Short Term Storage of all Vehicles
AESP 2320-A-100-522	Degassing, Cleaning and Repair of Refuelling Equipment
AESP 2320-W-100-111	Equipment Support Policy Directive
[REDACTED]	[REDACTED]
AESP 2320-W-100-421	Preparation for Special Environments Instructions and Index
AESP 2320-W-100-522	Support Vehicle MAN All Variants Maintenance Information
AESP 2320-W-100-532	Support Vehicle MAN All Variants Inspection Standards
AESP 2320-W-100-601	Support Vehicle, MAN Trucks, All Variants, Maintenance Schedule
AESP 2320-W-100-741	Support Vehicle MAN All Variants Complete Equipment Schedule
AESP 2590-E-100-013	Management of Lifting and Recovery Equipment in the Land Environment
AESP 2610-A-001-013	Tyres and Tubes
AESP 2610-A-409-521	Pneumatic Tyres and Tubes Associated Road Wheels Repair Instructions
JSP 71	Loading Instructions
JSP 317	Handling and Storage of Fuel and Lubricants
JSP 375	MOD Health and Safety Manual
JSP 445	Transport of Dangerous Goods by Road, Rail and Sea
JSP 800	Defence Movements and Transportation Regulations

**ACRONYMS AND ABBREVIATIONS**

7 The abbreviations are listed below:

<u>Abbreviation</u>	<u>Nomenclature</u>
A	Amps
ABS	Anti-lock Brake System
ABW	Abbey Wood
AC	Alternating Current
AESP	Army Equipment Support Publication
Ah	Ampere hour
bhp	Brake horse power
BUMK	Bowman Radio Kit
°C	Degrees Celsius
CES	Complete Equipment Schedule
Chap	Chapter
cm	Centimetre
DC	Direct Current
DCI	Defence Council Instruction
Deg	Degree(s)
DINs	Defence Instructions and Notices
DT	Delivery Team
EBS	Electronic Brake System
ECU	Electronic Control Unit
EDC	Electronic Diesel Control
EGR	Exhaust Gas Recirculation
ES	Equipment Support
ETD	Electronic Technical Documentation
EVB	Exhaust Valve Brake
FFR	Vehicle Management Computer
Fig	Figure
FSII	Fuel System Icing Inhibitor
GS	General Service
GSV	General Support Vehicle
GTW	Gross Train Weight
GVW	Gross Vehicle Weight
HQ	Headquarters
lb/in <sup>2</sup>	Pounds Per Square Inch
IETP	Interactive Electronic Technical Publication
ILS	Integrated Logistic Support
ISO	International Standards Organisation
IVC	Inter Vehicle Connection
J	Joules
Kg	Kilogramme
Km	Kilometres
KPH	Kilometres Per Hour
Km/h	Kilometres per hour
KSM	Customer Specified Model
kW	Kilowatt
LED	Light Emitting Diode
LSAR	Logistic Support Analysis Record
M	Metre
Maint	Maintenance
MAX	Maximum
MIN	Minimum
mm	Millimetre
MM	Medium Mobility

(continued)

**ACRONYMS AND ABBREVIATIONS (continued)**

<u>Abbreviation</u>	<u>Nomenclature</u>
Mohm	Mega-ohm
mP	mega-Pascals
MPH	Miles Per Hour
MT	Motor Transport
Nm	Newton-metre
NSPs	Normal Safety Precautions
OSP	Operational Support Programme
OSVP	Operational Support Vehicle Programme
Para	Paragraph
PTO	Power Take Off
QT	Qualified Tradesman
RAF	Royal Air Force
RCU	Remote Control Unit
REME	Royal Electrical and Mechanical Engineers
RHD	Right Hand Drive
RPM	Revolutions Per Minute
RSG	Road Speed Governor (Cruise Control)
RSL	Road Speed Limiter
Ser	Serial
SL	System Level
SML	Side Marker Lamp
SNS	Standard Numbering System
SOPs	Standard Operating Procedures
SV	Support Vehicle
UOC	Usable On Code
V	Volt
VIN	Vehicle Identification Number
VM	Vehicle Mechanic
VRN	Vehicle Registration Number
W	Watts
Wi/Wa	Winterised/Waterproofed
ZBR	Central On-Board Computer



**WARNINGS**

- (1) 'A' VEHICLES FIRE HAZARD. ONLY SLAVE THE AUXILIARY POWER UNIT.
- (2) DRIVING SAFETY. REMEDY ABS FAULTS IMMEDIATELY. CONTACT YOUR UNIT FOR ASSISTANCE.
- (3) AIR PRESSURE LOSS. THE REAR WHEELS CAN LOCK UP IF THERE IS A RAPID OR SUDDEN PRESSURE LOSS. THIS MIGHT CAUSE THE VEHICLE TO SKID. STOP THE VEHICLE IMMEDIATELY TAKING ACCOUNT OF THE TRAFFIC SITUATION.
- (4) DRIVING SAFETY. THE BLACK ICE WARNING MAY NOT APPEAR WHEN CONDITIONS ARE ICY AS THE OUTSIDE TEMPERATURE SENSOR CANNOT DETECT BLACK ICE. DRIVING STYLE MUST BE ADAPTED TO SUIT WEATHER CONDITIONS.
- (5) BRAKE FAILURE. WATER IN THE AIR RESERVOIRS CAN CAUSE THE BRAKE SYSTEM TO FAIL.
- (6) BRAKE FUNCTION. CHECK OPERATION OF THE SERVICE AND PARKING BRAKES BEFORE DRIVING THE VEHICLE.
- (7) BRAKE FUNCTION. THE VEHICLE MUST NOT BE SET IN MOTION UNTIL THE STOP MESSAGE ON THE DRIVER'S DISPLAY HAS GONE OFF.
- (8) DRIVING SAFETY. PERFORM A BRAKE TEST (SERVICE AND PARKING BRAKES) ON A DRY ROAD SURFACE AS SOON AS POSSIBLE AFTER MOVING OFF.
- (9) DANGER OF ACCIDENTS. ALWAYS APPLY THE PARKING BRAKE WHEN PARKING THE VEHICLE, USE WHEEL CHOCKS IF NECESSARY.
- (10) DANGER OF ACCIDENTS. ONLY TOW WITH A DRIVER, WHO STEERS AND BRAKES, IN THE VEHICLE TO BE TOWED.
- (11) DANGER OF ACCIDENTS. THE VEHICLE'S OPERATING PERMIT IS INVALIDATED IF THERE IS A MALFUNCTION OF THE EXTERIOR LIGHTING, DO NOT CONTINUE TO DRIVE.
- (12) DANGER OF FIRE. THE BRAKE LININGS COULD CATCH FIRE IF THE RESERVOIR PRESSURE IS BELOW 6 BAR AND THE BRAKE LININGS CONTACT THE DRUM.
- (13) PERSONAL INJURY. THE ROOF COVER CAN MOVE FREELY. MAKE SURE THE ACTUATOR LEVER IS LOCKED IN PLACE WHEN THE VEHICLE IS IN MOTION WITH THE ROOF HATCH OPEN OR CLOSED.
- (14) DANGER OF PERSONAL INJURY. MAKE SURE THAT THE LOAD IS CORRECTLY SECURED.
- (15) DANGER OF SCALDING. WEAR SUITABLE HAND PROTECTION. DO NOT OPEN FILLER PIPE SCREW CAP UNLESS THE ENGINE HAS COOLED DOWN. OPEN THE SCREW CAP SLOWLY TO ALLOW THE EXCESS PRESSURE TO ESCAPE. DO NOT OPEN FULLY UNTIL THE PRESSURE HAS COMPLETELY DISSIPATED.
- (16) DRIVING SAFETY. THE EBS IS UNABLE TO SURPASS THE PHYSICAL LIMITS OF THE BRAKE SYSTEM. ALWAYS ADAPT YOUR DRIVING TO SUIT THE ROAD AND TRAFFIC CONDITIONS.
- (17) DANGER TO LIFE AND LIMB. DUE CONSIDERATION SHOULD BE GIVEN TO THE HIGHLY FLAMMABLE NATURE OF GASOLINE AND ITS VAPOUR. CARELESSNESS IN ITS USE MAY RESULT IN PAINFUL BURNS.
- (18) DANGER TO LIFE AND LIMB. FIRING ARTILLERY AT RANGES OF 500 YARDS OR LESS AND FIRING GRENADES OR ANTI-TANK ROCKETS SHOULD BE FROM COVER.

- (19) DANGER TO PERSONNEL. ALWAYS TILT THE CAB FORWARDS TO ITS FINAL POSITION.
- (20) DANGER TO PERSONNEL. DANGER OF CRUSHING BETWEEN CAB AND BUMPER. KEEP THE TILTING AREA IN FRONT OF THE CAB CLEAR.
- (21) DANGER TO PERSONNEL. NEVER LEAN ON THE VEHICLE WHILST THE CAB IS BEING TILTED.
- (22) DANGER TO PERSONNEL. NEVER LEAN ON THE VEHICLE WHILST THE CAB IS BEING LOWERED.
- (23) DANGER TO PERSONNEL. STAY OUT OF THE AREA BETWEEN THE CAB AND THE CHASSIS WHILST THE CAB IS BEING TILTED.
- (24) DANGER TO PERSONNEL. STAY OUT OF THE AREA BETWEEN THE CAB AND THE CHASSIS WHILST THE CAB IS BEING LOWERED.
- (25) DANGER TO PERSONNEL. THE CAB DROPS QUICKLY INTO THE CAB LOCK OVER THE LAST 10CM TO 15CM.
- (26) DANGER TO PERSONNEL. THE CAB MUST BE SUPPORTED BY THE SUPPORT ROD WHEN TILTED. THE CAB COULD FALL BACK IF UNSUPPORTED.
- (27) DRIVING SAFETY. DRIVE WITH DUE CARE IF ANY ABS WARNING LIGHT COMES ON.
- (28) DRIVING ERRORS. DRIVING ERRORS CANNOT BE COMPENSATED FOR BY ABS. DO NOT ASSUME THAT THE BRAKING DISTANCE WILL BE SHORTENED.
- (29) DRIVING SAFETY. ALWAYS TAKE GREAT CARE WHEN ACTUATING OR ACTIVATING THE EVB ON WET, DIRTY OR ICY ROADS. DEACTIVATE THE EVB OR BRAKEMATIC IF NECESSARY.
- (30) DRIVING SAFETY. DO NOT ATTEMPT TO USE THE EVB AS A PARKING BRAKE. ALWAYS APPLY THE PARKING BRAKE BEFORE LEAVING THE VEHICLE.
- (31) DRIVING SAFETY. IF A RED MESSAGE APPEARS ON THE DRIVER'S DISPLAY, CONTACT YOUR UNIT FOR ASSISTANCE.
- (32) DRIVING SAFETY. IF THE STOP MESSAGE APPEARS ON THE DRIVER'S DISPLAY, STOP THE VEHICLE SAFELY AS SOON AS POSSIBLE, APPLY THE PARKING BRAKE AND STOP THE ENGINE. CONTACT YOUR UNIT FOR ASSISTANCE.
- (33) DRIVING SAFETY. THE EVB ONLY PROVIDES LOW BRAKING POWER AT LOW ENGINE SPEEDS. SHIFT TO A LOWER GEAR OR APPLY THE SERVICE BRAKES IF NECESSARY.
- (34) DRIVING SAFETY. SAFETY MAY BE IMPAIRED IF A NUMBER CODE APPEARS ON THE DISPLAY INSTEAD OF A TEXT MESSAGE. STOP THE VEHICLE.
- (35) DRIVING SAFETY. THE EVB IS AUTOMATICALLY DEACTIVATED WHEN ABS IS ACTIVATED. USE THE SERVICE BRAKES TO CONTINUE SLOWING THE VEHICLE.
- (36) DRIVING SAFETY. VEHICLES ARE NOT TO BE OPERATED WITH MIXED TYRES ACROSS AXLES. SHOULD OPERATIONAL USAGE NECESSITATE THE USE OF MIXED TYRES, AUTHORISATION MUST BE OBTAINED FROM HQ 'IN-THEATRE' ES BRANCH. AT THE EARLIEST POSSIBLE OPPORTUNITY, VEHICLES ARE TO REVERT BACK TO 'NON' MIXED TYRES.
- (37) DRIVING SAFETY. IF THE EBS OR ABS FAILS, THE VEHICLE WHEELS COULD LOCK DURING BRAKING. LESS BRAKING POWER WILL BE AVAILABLE.

- (38) **DRIVING SAFETY. IN THE EVENT OF AN EBS OR ABS MALFUNCTION, THE BRAKING AND DRIVING CHARACTERISTICS OF THE VEHICLE ALTER. THE BRAKE LAMP MAY NOT ACTIVATE.**
- (39) **DRIVING SAFETY. WHEN THE VEHICLE IS BEING DRIVEN, ONLY OPERATE THE PARKING BRAKE IN AN EMERGENCY, FOR EXAMPLE IF THE SERVICE BRAKES HAVE FAILED. THE REAR AXLE CAN LOCK UP.**
- (40) **DRIVING SAFETY. IN THE EVENT OF AN EBS OR ABS MALFUNCTION, THE BRAKING AND DRIVING CHARACTERISTICS OF THE VEHICLE ALTER.**
- (41) **FIRE HAZARD. DO NOT SHORT OUT CIRCUIT BREAKERS/FUSES. DO NOT INSTALL CIRCUIT BREAKERS/FUSES OF A HIGHER RATING.**
- (42) **FIRE HAZARD. ONLY FIT CIRCUIT BREAKERS/FUSES IN THE SPECIFIED POSITION. ONLY FIT CIRCUIT BREAKERS/FUSES WHEN THE IGNITION AND ANY CORRESPONDING LOADS ARE OFF.**
- (43) **FIRE HAZARD. ONLY BATTERIES OF THE SAME RATED VOLTAGE AND AMPERAGE OR LESSER AMPERAGE CAN BE SLAVE STARTED.**
- (44) **HIGH TEMPERATURES. ALWAYS MAKE SURE THAT THE COOKING VESSEL COVER IS PROPERLY CLOSED AND LATCHED BEFORE OPERATING OR AT ANY TIME THAT THE HOST VEHICLE IS MOBILE. FAILURE TO SECURE THE COVER CAN RESULT IN THE ACCIDENTAL SPILLAGE OF HEATED WATER AND EXPOSURE TO SERIOUS BURNS.**
- (45) **HIGH TEMPERATURES. NORMAL OPERATING TEMPERATURES WITHIN THE COOKING VESSEL ARE UP TO 88°C AND CAN REACH HIGHER TEMPERATURES UNDER ABNORMAL CONDITIONS. THEREFORE, ALWAYS WEAR GLOVES OR OTHER HAND PROTECTION TO AVOID SERIOUS BURNS TO THE SKIN.**
- (46) **DRIVING SAFETY. ABS DOES NOT OPERATE AT LOW SPEEDS.**
- (47) **DRIVING SAFETY. THE FUNCTION OF THE ABS IS LIMITED WHEN THE INTERAXLE DIFFERENTIAL LOCK, FRONT AXLE TRANSVERSE DIFFERENTIAL LOCK AND FRONT-WHEEL DRIVE ARE ENGAGED.**
- (48) **LIVE TERMINAL. ONLY AUTHORISED PERSONNEL SHOULD REMOVE THE EXTERNAL COVER TO GAIN ACCESS INTO THE BUMK TERMINALS.**
- (49) **LOSS OF CONTROL. DO NOT ACTUATE THE EMERGENCY OFF SWITCH WHEN THE VEHICLE IS MOVING. ONLY ACTUATE THE EMERGENCY OFF SWITCH IN THE EVENT OF DANGER AND WHEN THE VEHICLE IS STOPPED.**
- (50) **LOSS OF CONTROL. INCREASED EFFORT IS REQUIRED TO STEER THE VEHICLE IF THE POWER STEERING FAILS.**
- (51) **LOSS OF CONTROL. ONLY ACTUATE THE DRIVE RANGE SWITCH WHEN THE VEHICLE IS STATIONARY AND THE ENGINE IS IDLING. NEVER TURN THE DRIVE RANGE SWITCH WHILST DRIVING.**
- (52) **LOSS OF CONTROL. TAKE CARE WHEN DRIVING DOWNHILL, THE VEHICLE MAY SUDDENLY ACCELERATE, THEREFORE BE READY TO USE THE SERVICE BRAKES OR THE EXHAUST VALVE BRAKE.**
- (53) **LOSS OF CONTROL. THERE IS NO ENGINE BRAKE EFFECT WHEN THE DRIVE RANGE SWITCH IS IN THE NEUTRAL POSITION N OR WHEN THE GEARBOX IS CHANGING GEAR.**
- (54) **LOSS OF CONTROL. WHILE THE GEARBOX ECU IS SHIFTING UP TO THE NEXT GEAR, THERE IS NO ENGINE BRAKING.**

- (55) DRIVING SAFETY. IF THE BRAKE PRESSURE FALLS BELOW APPROX. 6.0 BAR, DO NOT MOVE OFF UNTIL THE WARNING LIGHTS HAVE GONE OFF AND THE DISPLAY MESSAGE HAS DISAPPEARED.
- (56) DRIVING SAFETY. ALWAYS APPLY THE BRAKE WHEN THE VEHICLE IS PARKED. IF NECESSARY, USE CHOCKS AS WELL TO PREVENT THE VEHICLE FROM ROLLING AWAY. ALWAYS CHECK THAT THE LEVER HAS ENGAGED COMPLETELY.
- (57) PERSONAL INJURY. ONLY OPERATE THE MENU ON THE DRIVER'S DISPLAY WHEN THE VEHICLE IS STATIONARY.
- (58) PERSONAL INJURY. ALWAYS EXTEND OR RETRACT THE HANDRAIL WITH THE LADDER RESTING ON THE GROUND IN A HORIZONTAL POSITION. NEVER EXTEND OR RETRACT THE HANDRAIL IN THE VERTICAL POSITION.
- (59) PERSONAL INJURY. ALWAYS KEEP SEAT BELTS CLEAN AND DRY.
- (60) PERSONAL INJURY. ALWAYS PROTECT YOUR EYES AND HANDS WHEN ACTUATING THE WATER DRAIN VALVE.
- (61) PERSONAL INJURY. AN OPEN TRAILER PINTLE COULD CLOSE WITH A SNAP WHEN RAISING/LOWERING. CLOSE THE TRAILER PINTLE.
- (62) PERSONAL INJURY. AVOID TRAPPING FINGERS UNDER THE SECURING CLIP AND THE ACTUATING LEVER AS THE TRAILER PINTLE SPRINGS BACK INTO THE CLOSED POSITION.
- (63) PERSONAL INJURY. BATTERIES MUST ALWAYS BE DISCONNECTED, OR THE BATTERY MASTER SWITCH TURNED OFF, BEFORE WORKING ON THE ELECTRICAL SYSTEM.
- (64) PERSONAL INJURY. BE CAREFUL WHEN REMOVING THE WHEEL NUTS, MAKE SURE THAT THE WHEEL DOES NOT FALL.
- (65) PERSONAL INJURY. CARE MUST BE TAKEN TO AVOID FINGER TRAPS WHEN USING THE SPANNER AND LOCKING LUGS.
- (66) PERSONAL INJURY. COMPLY WITH REGULATIONS WHEN HITCHING AND UNHITCHING THE TRAILER.
- (67) PERSONAL INJURY. DO NOT ADJUST THE SEATS UNLESS THE VEHICLE IS STATIONARY, AND MAKE SURE YOU HEAR THE SEAT LOCKING DEVICE ENGAGE.
- (68) PERSONAL INJURY. DO NOT ADJUST THE STEERING WHEEL UNLESS THE VEHICLE IS STATIONARY AND THE PARKING BRAKE IS APPLIED.
- (69) PERSONAL INJURY. DO NOT ATTEMPT TO ADJUST THE INSTRUMENT LIGHTING UNLESS TRAFFIC CONDITIONS ALLOW.
- (70) PERSONAL INJURY. DO NOT ATTEMPT TO ADJUST THE SEAT UNLESS IT IS UNDER LOAD AND THE RESERVOIR PRESSURE IN THE COMPRESSED AIR SYSTEM IS AT LEAST 7 BAR.
- (71) PERSONAL INJURY. DO NOT DRIVE UNLESS THE DOORS ARE PROPERLY CLOSED.
- (72) PERSONAL INJURY. DO NOT FOLD DOWN THE CENTRE SEAT UNLESS THE VEHICLE IS STATIONARY.
- (73) PERSONAL INJURY. DO NOT MOVE THE SEAT TO POSITIONS IN WHICH IT IS IMPOSSIBLE TO HAVE THE SEAT BELT FIT YOU CORRECTLY.

- (74) PERSONAL INJURY. DO NOT PLACE THE SEAT BELT OVER HARD OR FRAGILE OBJECTS IN YOUR POCKETS, FOR EXAMPLE, PENS, GLASSES ETC.
- (75) PERSONAL INJURY. DO NOT PUT FINGERS INTO THE RANGE OF THE SUN BLIND WHEN ROLLING UP.
- (76) PERSONAL INJURY. DO NOT STEP ONTO THE COVER OF THE AIR-CONDITIONING SYSTEM.
- (77) PERSONAL INJURY. DO NOT THROW OBJECTS OUT OF THE WINDOW. THIS ENDANGERS THE TRAFFIC BEHIND.
- (78) PERSONAL INJURY. DO NOT USE A DAMAGED A-FRAME.
- (79) PERSONAL INJURY. DO NOT USE THE LADDER WHEN DROPSIDES ARE FITTED TO THE VEHICLE.
- (80) PERSONAL INJURY. FASTEN YOUR SEAT BELT BEFORE EVERY TRIP.
- (81) PERSONAL INJURY. FASTEN YOUR SEAT BELT BEFORE MOVING OFF.
- (82) PERSONAL INJURY. FOR SAFETY REASONS THIS OPERATION REQUIRES TWO PEOPLE.
- (83) PERSONAL INJURY. LAMP BREAKING. USE A CLEAN CLOTH WHEN HANDLING THE LAMP.
- (84) PERSONAL INJURY. MAKE SURE THAT ALL PERSONNEL ARE CLEAR OF THE AREA DURING LOADING AND UNLOADING OPERATIONS.
- (85) PERSONAL INJURY. MAKE SURE THAT ALL PERSONNEL HAVE MOVED CLEAR OF THE VEHICLE, AND THE TRAILER, WHEN REVERSING UP TO THE TRAILER.
- (86) PERSONAL INJURY. MAKE SURE THAT THE LADDER IS LOCKED IN POSITION BEFORE ACCESSING THE CAB ROOF.
- (87) PERSONAL INJURY. MAKE SURE THAT THE SEAT BELT IS FULLY RETRACTED BEFORE EXITING THE VEHICLE.
- (88) PERSONAL INJURY. MAKE SURE THAT THE SEAT LOCKING DEVICE IS ENGAGED.
- (89) PERSONAL INJURY. ONLY CHECK THE GEARBOX OIL WHEN IT IS COLD.
- (90) PERSONAL INJURY. ONLY CHECK THE TRANSFER CASE OIL WHEN IT IS COLD.
- (91) PERSONAL INJURY. ONLY ONE PERSON IS ALLOWED TO BE SECURED WITH ONE SEAT BELT.
- (92) PERSONAL INJURY. ONLY OPERATE THE MENU ON THE DRIVER'S DISPLAY WHEN THE VEHICLE IS STATIONARY.
- (93) PERSONAL INJURY. ONLY SET THE TIME WHEN THE VEHICLE IS STATIONARY.
- (94) PERSONAL INJURY. PREVENT THE TRAILER FROM ROLLING AWAY BY APPLYING THE PARKING BRAKE AND/OR USING CHOCKS ON THE REAR WHEELS.
- (95) PERSONAL INJURY. REGULARLY CHECK THE CONDITION AND FUNCTION OF THE BELTS AFTER FASTENING AND WHILST DRIVING. RE-TENSION IF NECESSARY.
- (96) PERSONAL INJURY. SAFETY GLOVES MUST BE WORN WHEN OPERATING THE ISO TWISTLOCKS.

- (97) PERSONAL INJURY. SEAT BELTS ONLY PROVIDE OPTIMUM PROTECTION WHEN THE BACKREST IS IN AN ALMOST VERTICAL POSITION.
- (98) PERSONAL INJURY. SIT WITH YOUR BACK AGAINST THE BACKREST WITH THE SEAT BELT FITTING SNUGLY IN THE AREA BETWEEN YOUR NECK AND SHOULDER.
- (99) PERSONAL INJURY. STAY OUT OF THE AREA BETWEEN THE SPARE WHEEL AND THE VEHICLE DURING LOWERING.
- (100) PERSONAL INJURY. STAY OUT OF THE AREA BETWEEN THE SPARE WHEEL AND THE VEHICLE DURING RAISING.
- (101) PERSONAL INJURY. THE ACCESS LADDER MUST ALWAYS BE USED WITH THE HANDRAIL EXTENDED AND LOCKED IN POSITION.
- (102) PERSONAL INJURY. THE ACCESS LADDER MUST ONLY BE USED WHEN ATTACHED TO THE FLATBED IN THE DESIGNATED SLOTS.
- (103) PERSONAL INJURY. THE LAP PART OF THE BELT MUST ALWAYS SIT SNUGLY AND RUN ACROSS YOUR BODY AS LOW DOWN YOUR ABDOMEN AS POSSIBLE, NOT ACROSS YOUR STOMACH.
- (104) PERSONAL INJURY. THE SEAT BELT MUST NOT BE TWISTED. MAKE SURE YOUR SEAT BELT FITS SNUGLY AGAINST YOUR BODY.
- (105) PERSONAL INJURY. THE SHOULDER PART OF THE BELT MUST RUN APPROXIMATELY ACROSS THE MIDDLE OF YOUR SHOULDER, NEVER ACROSS YOUR THROAT.
- (106) PERSONAL INJURY. THE SPARE WHEEL SWINGS, KEEP THE AREA CLEAR.
- (107) PERSONAL INJURY. THE TRAILER PINTLE IS HEAVY. PUSH AND HOLD THE TRAILER PINTLE UPWARDS WHEN PULLING OUT THE FASTENING PINS.
- (108) PERSONAL INJURY. THE WHEEL COULD FALL. HOLD THE WHEEL UNTIL TWO OF THE WHEEL NUTS ARE FITTED.
- (109) PERSONAL INJURY. THE WHEELS CARRY A WEIGHT OF (197KG). CAUTION AND ASSISTANCE SHOULD BE USED WHEN REMOVING OR HANDLING.
- (110) PERSONAL INJURY. TO PREVENT INJURY DO NOT CLEAN THE WINDSCREEN FROM THE OUTSIDE WHEN THE WINDSCREEN WIPERS ARE SWITCHED ON. SWITCH OFF THE WINDSCREEN WIPERS.
- (111) PERSONAL INJURY. TWO PERSONS ARE REQUIRED TO ATTACH THE A-FRAME.
- (112) PERSONAL INJURY. WEAR PROTECTIVE GLOVES AND PROTECTIVE GLASSES. HALOGEN LAMPS ARE PRESSURISED AND CAN EXPLODE WHEN CHANGING THEM.
- (113) PERSONAL INJURY. WEAR PROTECTIVE GLOVES AND PROTECTIVE GLASSES. HALOGEN LAMPS ARE PRESSURISED AND CAN EXPLODE WHEN CHANGING THEM.
- (114) PERSONAL INJURY. WHEELS MUST ONLY BE CHANGED WHEN THE VEHICLE IS PARKED ON HARD, FLAT GROUND.
- (115) PERSONAL INJURY. WHEN CLIMBING ON/OFF THE FLATBED MAKE SURE THAT A THREE POINT CONTACT IS MAINTAINED AT ALL TIMES. I.E. HOLD RAIL/BODY WITH BOTH HANDS AND ONE FOOT ON STEP.
- (116) PERSONNEL INJURY. VEHICLE MALFUNCTION. DO NOT ATTEMPT TO CONNECT OR TOW A TRAILER WHILST THE TRAILER REAR PINTLE IS IN THE RAISED 30° STOWAGE POSITION.

(117) PERSONNEL INJURY. ENTRAPMENT HAZARD. IAW JSP 800, VOL 5, PT 3, CHAPTERS 1 AND 2. PERSONNEL MUST NOT MOUNT OR DISMOUNT VIA THE VEHICLE TAILBOARD WHILST THE TRAILER IS STILL CONNECTED. PRIOR TO THE MOUNTING OR DISMOUNTING OF PERSONNEL, THE TRAILER MUST BE DISCONNECTED AND MOVED TO AVOID ANY POSSIBLE ENTRAPMENT OF LIMBS.

(118) REDUCED BRAKING EFFICIENCY. AFTER DRIVING THROUGH MUD OR DEEP WATER, THE BRAKE DRUMS AND BRAKE SHOES COULD BE CONTAMINATED.

(119) DRIVING SAFETY. ALWAYS KEEP THE DRIVER'S FOOTWELL FREE OF OBJECTS.

(120) RISK OF ACCIDENTS. ALWAYS CHECK THE LOCKS AFTER THE CAB HAS BEEN LOWERED.

(121) RISK OF ACCIDENTS. ALWAYS HAVE THE KEY IN THE DRIVING POSITION II (IGNITION ON) WHEN BEING TOWED.

(122) RISK OF ACCIDENTS. DO NOT DRIVE THE VEHICLE IF THE CAB LOCKS ARE DEFECTIVE.

(123) RISK OF ACCIDENTS. DO NOT DRIVE THE VEHICLE IF THE WARNING LIGHTS DO NOT GO OFF.

(124) RISK OF ACCIDENTS. DO NOT STOP THE ENGINE WHILE THE VEHICLE IS MOVING.

(125) RISK OF ACCIDENTS. DO NOT USE DAMAGED TOWING BARS.

(126) RISK OF ACCIDENTS. HEADLIGHTS THAT ARE INCORRECTLY SET CAN DAZZLE ONCOMING TRAFFIC.

(127) RISK OF ACCIDENTS. IF THE BRAKE SYSTEM RESERVOIR PRESSURE HAS FAILED AND THE SPRING BRAKE CHAMBERS ARE RELEASED MECHANICALLY, THE VEHICLE HAS NO BRAKING.

(128) RISK OF ACCIDENTS. IF THE LEFT OR THE CENTRE PASSENGER SEAT IS OCCUPIED, THE DRIVER CANNOT SEE CLEARLY IN THE KERB MIRROR.

(129) RISK OF ACCIDENTS. NEVER LOCK THE STEERING WHEN THE VEHICLE IS MOVING.

(130) RISK OF ACCIDENTS. NEVER SWITCH OFF THE IGNITION WHILST THE VEHICLE IS MOVING. ALWAYS LEAVE THE KEY IN THE DRIVING POSITION II (IGNITION ON).

(131) RISK OF ACCIDENTS. PRIOR TO MOVING OFF, THE ACCESS LADDER (FITTED BENEATH THE FLATBED) MUST BE CORRECTLY STOWED AND ITS RETAINING PIN ENGAGED INTO POSITION AND MADE SECURE. THIS IS TO PREVENT THE DETACHMENT OF THE LADDER WHILE THE VEHICLE IS BEING DRIVEN ON PUBLIC ROADS.

(132) RISK OF ACCIDENTS. THERE ARE TWO DIFFERENT POSITIONS FOR THE 7-PIN SOCKET AND THE 12-PIN SOCKET. MAKE SURE THAT THE CORRECT TRAILER SOCKET IS CONNECTED, THERE MAY BE NO POWER SUPPLY FOR THE LIGHTS.

(133) RISK OF BURNS. ALWAYS SWITCH OFF THE LIGHT BEFORE YOU REPLACE A LAMP.

(134) RISK OF BURNS. LAMPS AND LAMP CAPS MAY BE HOT, WHICH CAN CAUSE BURNS IF TOUCHED.

(135) RISK OF EXPLOSION. DO NOT OPERATE THE AUXILIARY HEATER AT FUEL STATIONS OR ENCLOSED AREAS WITHOUT VENTILATION.

(136) RISK OF EXPLOSION. EXPLOSIVE GAS MAY FORM IN ENCLOSED BATTERY BOXES. ALWAYS VENT CLOSED BATTERY BOXES THOROUGHLY BEFORE DISCONNECTING THE BATTERIES. IF NECESSARY, BLOW COMPRESSED AIR THROUGH THE BOX.

(137) RISK OF EXPLOSION. EXPLOSIVE GAS MAY FORM IN ENCLOSED BATTERY BOXES.

(138) RISK OF EXPLOSION. SWITCH OFF AUXILIARY HEATERS IN AREAS WHERE INFLAMMABLE VAPOURS OR DUST COLLECT, E.G. CLOSE TO FUEL, COAL, WOOD DUST OR GRAIN STORES, OR SIMILAR SUBSTANCES.

(139) RISK OF EXPLOSION. SWITCH OFF THE AUXILIARY HEATER BEFORE TILTING THE CAB.

(140) RISK OF EXPLOSION. THE AUXILIARY HEATER MUST BE SWITCHED OFF IN HAZARD CHEMICAL (HAZCHEM) VEHICLES DURING LOADING AND UNLOADING.

(141) RISK OF FIRE AND EXPLOSION. DO NOT SMOKE OR ALLOW NAKED FLAMES IN THE VICINITY OF THE FUEL TANK WHEN REFUELLING. FUEL COULD IGNITE OR EXPLODE.

(142) RISK OF FUMES. MAKE SURE THE VEHICLE IS WELL VENTILATED, DO NOT OBSTRUCT THE VENTILATOR NOZZLES ON THE VEHICLE.

(143) RISK OF INJURY. DO NOT THROW WASTE, INCLUDING GLOWING CIGARETTES, FROM THE MOVING VEHICLE.

(144) RISK OF INJURY. SOME TASKS INVOLVE WORKING AT HEIGHT. THERE IS A RISK OF FALLING.

(145) RISK OF INJURY. WHEN TRAVELLING IN THE CAB OR IN VEHICLES FITTED WITH TROOP CARRYING VEHICLE ENHANCED SEATING KITS (TCVES) FOR CONTINUOUS AND EXTENDED PERIODS OF OPERATION, THERE IS A RISK FROM VIBRATION. FURTHER INFORMATION AND GUIDANCE IS INCLUDED IN THE EQUIPMENT SUPPORT POLICY DOCUMENT (AESP 2320-W-100-111).

(146) RISK OF INJURY. AVOID CONTACT WITH BATTERY ELECTROLYTE. THERE IS A DANGER OF SKIN OR EYE INJURY.

(147) RISK OF INJURY. AVOID CONTACT WITH CLEANING AGENTS. CLEANING AGENTS ARE A HAZARD IF INHALED, SWALLOWED, OR CONTACT THE SKIN.

(148) RISK OF INJURY. AVOID CONTACT WITH FUEL. FUEL CONTAINS CARCINOGENS AND IS A HAZARD IF INHALED, SWALLOWED, OR CONTACTS THE SKIN.

(149) RISK OF INJURY. AVOID CONTACT WITH REFRIGERANT FLUID OR VAPOUR. THERE IS A DANGER OF SKIN OR EYE INJURY, OR SUFFOCATION.

(150) RISK OF INJURY. AVOID CONTACT WITH USED ENGINE OIL. USED ENGINE OIL CONTAINS CARCINOGENS AND CAN CAUSE DRY SKIN, IRRITATION AND INFLAMMATION.

(151) RISK OF INJURY. BEWARE OF THE FLOOR RECESSES CONTAINING THE CARGO TIE DOWN RINGS AS THEY ARE A POTENTIAL TRIP HAZARD.

(152) RISK OF INJURY. DO NOT TOUCH THE HOT EXHAUST SYSTEM.

(153) RISK OF INJURY. IF THE HEADLIGHTS ARE NOT ADJUSTED WHEN DRIVING IN LEFT-HAND OR RIGHT-HAND TRAFFIC ACCIDENTS CAN BE CAUSED. DRIVERS OF APPROACHING VEHICLES MAY BE BLINDED AND THE ROAD AHEAD IS NOT ILLUMINATED PROPERLY. MAKE SURE THAT THE HEADLIGHT LOW BEAM IS ADJUSTED TO LEFT-HAND OR RIGHT-HAND TRAFFIC BEFORE SETTING OFF.



(154) RISK OF INJURY. TWISTLOCKS MUST ALWAYS BE POSITIONED SO THAT THEY DO NOT PROTRUDE ABOVE THE FLAT PLATFORM WHEN THEY ARE NOT IN USE TO PREVENT A TRIP HAZARD.

(155) DRIVING SAFETY. THE BRAKING CHARACTERISTICS OF THE VEHICLE MAY ALTER IF AN ABS WARNING IS INDICATED. THE VEHICLE IS BRAKED IN AN UNREGULATED MANNER IF THE ABS CONTROL FAILS.

(156) PERSONAL INJURY. VEHICLE MALFUNCTION. MAKE SURE ALL PERSONAL EQUIPMENT IS CORRECTLY STOWED IN DESIGNATED STOWAGE AREAS WITHIN THE VEHICLE CAB TO AVOID INADVERTANT APPLICATION OF THE HILL HOLD SWITCH.

(157) PERSONAL INJURY. VEHICLE MALFUNCTION. DO NOT ATTEMPT TO CONNECT OR TOW A TRAILER WHILST THE TRAILER REAR PINTLE IS IN THE RAISED 30° STOWAGE POSITION.

(158) PERSONAL INJURY. ALWAYS REMOVE THE COUPLING HEADS IN THE CORRECT SEQUENCE. OTHERWISE, THE TRAILER BRAKE WILL BE RELEASED AND THE UNBRAKED TRAILER COULD ROLL AWAY.

(159) TRAILER MOVEMENT. PREVENT THE TRAILER FROM ROLLING AWAY BY APPLYING THE PARKING BRAKE AND/OR USING CHOCKS ON THE REAR WHEELS.

(160) TRAILER MOVEMENT. THE BRAKES ON THE FRONT AXLE OF A TRAILER WITH FIFTH WHEEL STEERING MUST BE RELEASED SO THAT IT CAN TURN. USE WHEEL CHOCKS ON THE REAR WHEELS TO PREVENT THE TRAILER FROM ROLLING AWAY.

(161) DRIVING SAFETY. THE WHEELS OF THE TRAILER MAY LOCK UP DURING BRAKING.

(162) DRIVING SAFETY. ALWAYS APPLY THE SERVICE BRAKES OR PARKING BRAKE WHENEVER THE VEHICLE IS STATIONARY.

(163) DRIVING SAFETY. IF THIS TEST REVEALS THAT THE SPRING-BRAKE CHAMBERS ARE NOT CAPABLE OF HOLDING THE VEHICLE, USE WHEEL CHOCKS TO STOP THE VEHICLE FROM ROLLING AWAY.

(164) VEHICLE MOVEMENT. THE VEHICLE-TRAILER/VEHICLE MAY MOVE DURING THIS TEST.

(165) VEHICLE SAFETY. INCORRECT TYRE PRESSURES WILL ADVERSELY AFFECT VEHICLE HANDLING. CHECK THE TYRE PRESSURES BEFORE OPERATING THE VEHICLE.

(166) DRIVING SAFETY. ALWAYS USE CHOCKS IF YOU ARE PARKING THE VEHICLE OR THE VEHICLE-TRAILER UNIT ON A SLOPE AND THE VEHICLE BRAKES ARE HOT FROM DRIVING.

(167) WHEEL NUT SECURITY. AFTER CHANGING A WHEEL, ENSURE THE WHEEL NUTS ARE TIGHTENED DIAGONALLY USING THE WHEEL BRACE SUPPLIED. AFTER 50KM, RETIGHTEN WHEEL NUTS. AS SOON AS POSSIBLE, HAVE THE WHEEL NUTS TORQUED TO 575NM AND RE-TORQUED AFTER 50KM. CONTACT YOUR UNIT FOR ASSISTANCE.

(168) WHEEL SECURITY. INCORRECTLY TIGHTENED WHEEL NUTS MAY COME LOOSE.

(169) DRIVING SAFETY. WHEN REMOVING PERSONAL EQUIPMENT FROM THE CAB MAKE SURE THAT STRAPPING DOES NOT ACCIDENTALLY RELEASE THE PARKING BRAKE.

(170) WORKING AT HEIGHTS. PERSONNEL MUST EXERCISE EXTREME CAUTION WHEN WORKING ON HIGH, EXPOSED SURFACES.

**CAUTIONS**

- (1) **AIR FILTER ELEMENT DAMAGE.** Do not force the filter cover closed.
- (2) **AXLE DAMAGE.** Driving round bends or corners with the transverse differential locks engaged causes axle damage.
- (3) **COMPONENT DAMAGE.** Using a non-authorized SML can damage the central on board computer.
- (4) **COOLANT LOSS.** The cooling system is designed to permit driving at elevated temperatures for brief periods until the system can be checked and the problem rectified. In the case of severe or continuous coolant loss, stop the engine immediately.
- (5) **DAMAGE TO EQUIPMENT.** Do not operate the hydraulic equipment if the fluid level is not visible in the bottom sight glass.
- (6) **DAMAGE TO EQUIPMENT.** Make sure that the ladder is locked in the closed position before moving the vehicle.
- (7) **DAMAGE TO FRAME OR AXLE.** Unload the vehicle before raising from the front or rear.
- (8) **DAMAGE TO STEERING SYSTEM.** The vehicle must not be steered when it is stationary if the hydraulic power steering has failed.
- (9) **DANGER OF DAMAGE.** Do not cover the radiator as the engine will overheat.
- (10) **DANGER OF DAMAGE.** Do not use snow chains on vehicles with restricted clearance between the tyres and the mudguards or bodywork.
- (11) **DANGER OF ENGINE DAMAGE.** Do not blow out the filter housing with compressed air.
- (12) **DANGER OF ENGINE DAMAGE.** Do not fit a new air filter element unless the engine is stopped.
- (13) **DANGER OF ENGINE DAMAGE.** Do not over-fill the engine with oil. Do not fill with oil so that the level exceeds the MAX mark on the driver's display.
- (14) **DANGER OF ENGINE DAMAGE.** Do not over-tighten the clamps on the intake system connections.
- (15) **DANGER OF ENGINE DAMAGE.** Do not run the engine at high speed or under load until the minimum oil pressure is reached.
- (16) **DANGER OF ENGINE DAMAGE.** Make sure that the work area is clean when replacing the air filter element.
- (17) **DANGER OF ENGINE DAMAGE.** Unfiltered air can enter the engine if the air filter element is not installed correctly.
- (18) **DANGER OF ENGINE DAMAGE.** Unfiltered air can enter the engine if the filter cover is not installed correctly.
- (19) **ENGINE DAMAGE.** Check the display as soon as the engine starts.
- (20) **ENGINE DAMAGE.** Correct the oil level immediately if not between the MIN and MAX marks. The engine can be damaged if the oil level is incorrect.
- (21) **ENGINE DAMAGE.** Do not exceed the permitted engine speed range.

- (22) **ENGINE DAMAGE.** Do not press the accelerator when starting the engine.
- (23) **ENGINE DAMAGE.** Do not run the starter motor for more than 10 seconds.
- (24) **ENGINE DAMAGE.** Do not switch off the electrical battery master switch whilst the combustion air blower and the circulating pump of the auxiliary heaters are still running.
- (25) **ENGINE DAMAGE.** If a large quantity of coolant is lost, causing the system to overheat, do not top up with cold coolant.
- (26) **ENGINE DAMAGE.** If the engine has been running under a high load, the coolant temperature will be high (above 95°C). Do not stop the engine immediately. Let the engine idle for between 1 and 2 minutes before stopping.
- (27) **ENGINE DAMAGE.** Stop the engine immediately if no oil pressure or inadequate oil pressure is signalled on the display and the "oil pressure" check lamp (1) comes on in conjunction with the central warning light (2) and investigate the fault immediately.
- (28) **ENGINE DAMAGE.** Stop the engine immediately if the driver's display indicates 'OIL PRESSURE TOO HIGH' or 'OIL PRESSURE TOO LOW', the oil pressure check lamp (1) comes on and the central warning light (2) starts flashing.
- (29) **ENGINE DAMAGE.** Stop the vehicle as soon as possible and switch off the engine if the 'OIL PRESSURE TOO LOW' or 'OIL PRESSURE TOO HIGH' message appears on the driver's display.
- (30) **ENGINE DAMAGE.** The engine can be damaged if the oil level is incorrect.
- (31) **ENGINE DAMAGE.** The needle must not move into the red zone (4) on the scale.
- (32) **ENVIRONMENTAL PROTECTION.** Dispose of used antifreeze in accordance with local procedures.
- (33) **EQUIPMENT DAMAGE.** Do not leave the link cable unconnected at any time.
- (34) **EQUIPMENT DAMAGE.** Do not use a 24V socket to power equipment with a total power consumption of more than 300W. Excessively high power consumption can cause to damage to the components.
- (35) **EQUIPMENT DAMAGE.** Do not use an unsuitable plug to connect to the 24V power socket. An unsuitable plug can cause damage to the socket. Use a plug that contacts the centre of the socket using the central contact. The contact must not be on the bimetallic spring arms of a plug.
- (36) **EQUIPMENT DAMAGE.** When slaving vehicles, make sure that the inter-vehicle connection cable is left attached to the casualty vehicle for 15 to 20 minutes after power up. This is to prevent damage to the alternator of the casualty vehicle.
- (37) **EQUIPMENT DAMAGE.** Trailer disconnection. Do not attempt to connect or tow a trailer whilst the trailer rear pintle is in the raised 30° stowage position.
- (38) **EQUIPMENT DAMAGE.** Tailboard distortion. IAW JSP 800, Vol 5, Pt 3, Chapters 1 and 2. Personnel must not mount or dismount via the vehicle tailboard whilst the trailer is still connected. Prior to the mounting or dismounting of personnel, the trailer must be disconnected and moved to avoid any damage to the trailer and/or tailboard.
- (39) **EQUIPMENT DAMAGE.** Battery failure. If the vehicle is not to be used for an extended period the battery master isolator switch must be switched off.
- (40) **EQUIPMENT DAMAGE.** Battery failure. Personnel are to ensure that all battery slave starting pre-conditions are adhered to. This will maintain the operating life of the battery.

- (41) **GEARBOX DAMAGE.** Always disengage the PTO before parking the vehicle for long periods.
- (42) **GEARBOX DAMAGE.** Changing gear off-road places high loads on the gearbox.
- (43) **GEARBOX DAMAGE.** Do not let the engine speed fall below 800 rpm when the PTO is engaged and under load.
- (44) **GEARBOX DAMAGE.** Do not operate the drive range switch and the accelerator at the same time.
- (45) **GEARBOX DAMAGE.** Manoeuvring places an increased load on the clutch. Only use manoeuvring mode for short periods.
- (46) **LAMP DAMAGE.** Hold the lamp by its plug tabs or by its base. Do not touch the glass.
- (47) **OVERHEATING.** If the engine is overheating, stop the vehicle. Keep the engine running. This allows the fan to continue cooling the engine. If the fan is not rotating, stop the engine immediately.
- (48) **REGULAR OPERATION OF THE AIR CONDITIONING.** Operate the system for about 10 minutes once every month during seasons when no air-conditioning is required. This prevents leaking of seals.
- (49) **RISK OF ENGINE DAMAGE.** Do not use fuels of unsuitable quality.
- (50) **TRANSFER CASE DAMAGE.** Do not select off-road range while the vehicle is moving.
- (51) **TRANSFER CASE DAMAGE.** Do not select on-road range while the vehicle is moving.
- (52) **TRANSFER CASE DAMAGE.** If the check lamp does not come on, the teeth have failed to mesh. Driving will cause transfer case damage.
- (53) **TRANSMISSION DAMAGE.** Only engage all-wheel drive if there is insufficient traction.
- (54) **VEHICLE DAMAGE.** Before opening the front service flap make sure that the windscreen wipers are switched off and the arms are in the parked position.
- (55) **VEHICLE DAMAGE.** Before opening the front service flap, make sure that the windscreen wiper arms are in the parked position.
- (56) **VEHICLE DAMAGE.** Before opening the front service flap, make sure that the windscreen wipers are in the parked position.
- (57) **VEHICLE DAMAGE.** Do not engage reverse gear while the PTO is operating. If the vehicle is put into reverse gear while the PTO is operating, the hydraulic pump may be damaged.
- (58) **VEHICLE DAMAGE.** Do not let the vehicle roll against the direction of travel as the clutch will be damaged.
- (59) **VEHICLE DAMAGE.** Do not switch off the electrical battery master switch for 2 - 5 minutes after the heater has been switched off. A cooling period is necessary to prevent the heater overheating.
- (60) **VEHICLE DAMAGE.** Do not use high-pressure cleaners.
- (61) **VEHICLE DAMAGE.** Make sure that all tools and equipment are removed from beneath the cab.

- (62) **VEHICLE DAMAGE.** Make sure that the breather is installed correctly.
- (63) **VEHICLE DAMAGE.** Make sure that the drawbar does not miss the trailer pintle and strike the vehicle.
- (64) **VEHICLE DAMAGE.** Make sure that the front service flap is open before tilting the cab.
- (65) **VEHICLE DAMAGE.** Make sure that the trailer drawbar and height adjuster function correctly.
- (66) **VEHICLE DAMAGE.** Never loosen or disconnect the battery or pole terminals while the engine is running.
- (67) **VEHICLE DAMAGE.** The IVC must only be used for emergency starting.
- (68) **VEHICLE DAMAGE.** To allow the auxiliary heater to cool down, do not switch off the electrical battery master switch whilst the combustion air blower and auxiliary heater circulating pump are running.
- (69) **VEHICLE DAMAGE.** When not towing a trailer, close the trailer pintle to protect the lower socket against dirt.
- (70) **EQUIPMENT DAMAGE. STOP SIGN.** After starting the engine, do not move off until the stop sign on the driver's display has gone out.

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**CHAPTER 1-0**

**VEHICLE**

**CONTENTS**

Chapter

- 1-1 Technical data
- 1-2 Driver's controls
- 1-3 Heating, ventilation and air-conditioning
- 1-4 Braking systems
- 1-5 Vehicle operation
- 1-6 Driver's inspections
- 1-7 Electrical sockets

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CHAPTER 1-1

TECHNICAL DATA

CONTENTS

Para

- Physical data
- Engine
  - Engine fill quantities
  - Cooling system
  - Air filter
  - Fuel system
- Fuel
- Automatic transmission
- Transfer case
- Front axle
- Rear axle
- Wheels and tyres
  - Ground tyre pressure run-flat and non run-flat tyres
- Central hydraulic system
- Steering
- Electrical system
- Lamps
- Brake system
- Plates (all vehicles)
  - 1 Model plate
  - 2 VIN (chassis number)
  - 3 Vehicle type (model code index number)
  - 4 Vehicle number
  - 6 Engine number
  - 7 Asset plate

Fig

Page

1	Model plate .....	7
2	VIN (chassis number) .....	8
3	Asset plate .....	9

**PHYSICAL DATA**

Configuration.....	4x4
Gross vehicle weight (GVW) .....	(see note 3)
Front axle plated weight.....	(see note 3)
Rear axle plated weight .....	(see note 3)
Gross train weight (GTW).....	(see note 3)
Wheelbase 1st to 2nd axle .....	4500mm
Overall length (including trailer pintle) .....	7970mm
Front overhang.....	1480mm
Rear overhang .....	1295mm
Height to top of cab, unladen (see notes 1 and 2).....	3110mm / 2934mm / 2650mm
Height to top of cab, laden (see notes 1 and 2).....	3080mm / 2894mm / 2610mm
Overall width .....	2550mm
Ground clearance front .....	424mm
Ground clearance rear.....	427mm

[REDACTED]	
[REDACTED]	
[REDACTED]	
Fording depth.....	750mm (without preparation), 1500mm (with preparation)
Air transportable (unladen) .....	C130/A400M aircraft

Note 1: Includes driver, tools, spare wheel and trailer coupling.  
 Note 2: Includes aluminium hard top, fibre glass hard top, without hard top for transport by rail or air.  
 Note 3: GVW, GTW and Gross Axle Weight data can be found within AESP 2320-W-100-111, Equipment Support Policy Directive and on the model plate.

**ENGINE**

Type .....	MAN D0836 LFG50
Exhaust emission standard .....	EURO 4
Mode of operation .....	4-stroke diesel, turbocharged, intercooled
Number of cylinders .....	6 in-line
Number of valves per cylinder .....	4
Bore .....	108mm
Stroke .....	125mm
Capacity .....	6.87 litres
Rated power .....	240kW (326 bhp) at 2400 rpm
Maximum torque .....	1250Nm at 1200 rpm to 1800 rpm
Idling speed .....	600 rpm
Governed maximum speed .....	2400 rpm
Cylinder 1 location .....	Opposite power output end
Oil pressure at idle speed .....	1.2 bar to 1.5 bar
Oil pressure at rated speed .....	4.0 bar to 5.0 bar
Operating limit at idling speed .....	1.0 bar
Injection system .....	Common rail, EDC7

**Engine fill quantities**

Oil quantity .....	27.5 litres
Oil quantity between MAX and MIN .....	4 litres

**Cooling system**

Cooling system (including heater) .....	40 litres
Coolant temperature .....	90°C steady state (105°C intermittent)

**Air filter**

Filter type .....	Dry, replaceable element
-------------------	--------------------------

**Fuel system**

Pre-filter type .....	Pre-cleaner with cartridge
Main filter type .....	Micro filter
Injection system .....	Common rail, EDC7
Fuel tank capacity .....	300 litres

**FUEL**

Type .....	F54 DIESO, AVTUR FSII, F35 AVTUR, F44 AVCAT FSII, F45 AVCAT, F63 DIESO MT, F76 Marine DIESO, Low sulphur diesel
------------	---

**AUTOMATIC TRANSMISSION**

Type ..... ZF AS 1210 MAN TipMatic  
 Oil quantity ..... 6.5 litres

**TRANSFER CASE**

Type ..... VG 103, 172, 173  
 Oil quantity ..... 5.5 litres

**FRONT AXLE**

Type ..... VP - 09  
 Axle drive oil quantity ..... 6.3 litres  
 Planetary reduction gear oil quantity ..... 2 x 1.5 litres  
 Steering knuckles oil quantity ..... 2 x 0.05 litres  
 Total oil quantity ..... 9.4 litres

**REAR AXLE**

Type ..... HP-1333-E  
 Total oil quantity ..... 11.5 litres  
 Planetary drive oil quantity ..... 2 x 1.5 litres  
 Total oil quantity ..... 16.2 litres

**WHEELS AND TYRES**

Tyres ..... 14.00 R20 Continental HCS 166/160 G  
 or Michelin 395/85 R20 XZL 168 G

Maximum pressure 14.00 R20 front ..... 7.30 bar (105 lb/in<sup>2</sup>)  
 Maximum pressure 14.00 R20 rear ..... 7.70 bar (111 lb/in<sup>2</sup>)  
 Pressure Michelin 395/85 R20 XZL 168 G front ..... 6.2 bar / 7.6 bar (90 lb/in<sup>2</sup> / 110 lb/in<sup>2</sup>)  
 Pressure Michelin 395/85 R20 XZL 168 G rear ..... 5.52 bar / 7.60 bar (80 lb/in<sup>2</sup> / 110 lb/in<sup>2</sup>)  
 Wheel type ..... 10.00W - 20 disc type, quantity 5

[REDACTED]			
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

**CENTRAL HYDRAULIC SYSTEM**

Oil quantity (dependant additional equipment e.g. crane) .....80 litres

**STEERING**

Type .....ZF 8098 Servocom recirculating ball steering box

Oil quantity .....6.5 litres

**ELECTRICAL SYSTEM**

Rated voltage .....24V

Operating voltage .....28V

Alternator .....28V/120A/3420W

Batteries .....12V/100Ah NATO EMC/NEMP protection, quantity 4

**LAMPS**

Headlight low beam .....	Halogen bulb H1 70W
Parking light .....	LED 5W
Headlight high beam .....	Halogen bulb H1 70W
Turn indicator front .....	Spherical bulb 21W
Rear fog lamp .....	Spherical bulb 21W
Rear lamp .....	Spherical bulb 5W
Brake lamp .....	Spherical bulb 21W
Turn indicator rear .....	Spherical bulb 21W
Reversing lamp .....	Spherical bulb 21W
Licence plate lamp .....	LED 5W
Side marker lamp .....	LED 3W
Clearance lamp .....	LED 5W
Interior light .....	Spherical bulb 21W
Reading light .....	Spherical bulb 10W
Recovery beacon .....	Halogen bulb H1 70W
Interior light .....	Spherical bulb 21W
Convoy light .....	Spherical bulb 2W

**BRAKE SYSTEM**

Type .....	Electronically controlled, dual circuit, compressed air operated
Cut-in pressure .....	Minimum 10.0 bar
Cut-out pressure .....	12.5 bar $\pm$ 0.2 bar
Operating range .....	1.3 bar $\pm$ 0.7 bar
Service brake system pressure .....	6.9 bar - 0.3 bar
Parking brake system pressure .....	7.0 bar - 0 bar / -1.3 bar
Trailer brake system pressure .....	8.5 bar + 0 bar / -1.3 bar
Sustained action brake system .....	Electro-pneumatic exhaust gas throttle
Air dryer .....	Single chamber with integrated pressure regulator (12.5 bar), four circuit protection valve

## PLATES (ALL VEHICLES)

### Model plate

1 Refer to Fig 1. The model plate is located on the left-hand side of the vehicle instrument panel. The model plate contains the following data:

- 1.1 Vehicle Identification Number (VIN) = chassis number.
- 1.2 Vehicle type (model).
- 1.3 Vehicle number.
- 1.4 Operating permit number.
- 1.5 K value (exhaust opacimeter reading/particulate emissions value).
- 1.6 Weight, axle loads.

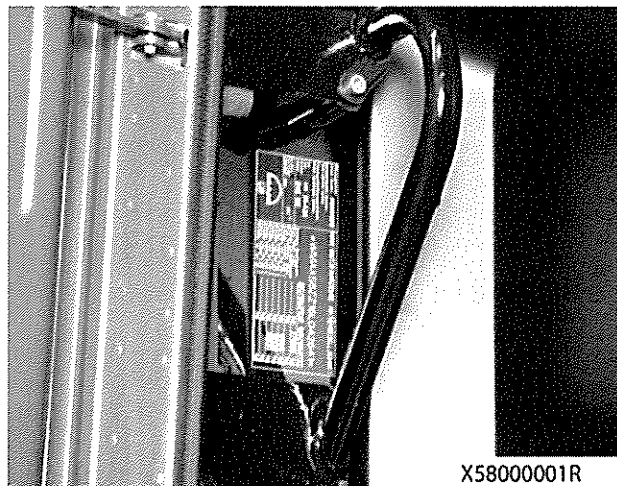


Fig 1 Model plate

### VIN (chassis number)

- 2 Refer to Fig 2. The VIN can be found at the following points on the vehicle:
- 2.1 On the model plate.
  - 2.2 On the front right longitudinal member over the axle.
  - 2.3 On the driver's display in the 'Configuration' menu, refer to Chapter 1-2.



Fig 2 VIN (chassis number)

### Vehicle type (model code index number)

3 The model code index number contains information on the model series and the technical identification of the chassis. The model number can be found at the following points on the vehicle:

- 3.1 In the vehicle documents.
- 3.2 On the model plate.
- 3.3 In the VIN as digits four to six.
- 3.4 In the vehicle number.

### Vehicle number

4 The vehicle number indicates the vehicle technical equipment and can be specified instead of the VIN whenever there is a technical query regarding bodies and conversions. The first three digits of the vehicle number contain the MAN model number (e.g. X58). This is followed by a four-digit serial number (e.g. 0008).

- 5 The vehicle number can be found at the following points on the vehicle:
- 5.1 On the front right longitudinal member ahead of the front axle.
  - 5.2 In the vehicle documents.

### Engine number

6 The engine number can be found at the following points on the vehicle:

- 6.1 On the Data Card, in an inside pocket of the Maintenance Record.
- 6.2 On the driver's display in the 'Configuration' menu, refer to Chapter 1-2.



**Asset plate**

- 7 The asset plate describes the technical military equipment details of the vehicle.
- 8 Refer to Fig 3. The asset plate can be found beneath the passenger's seat on the left-hand side.

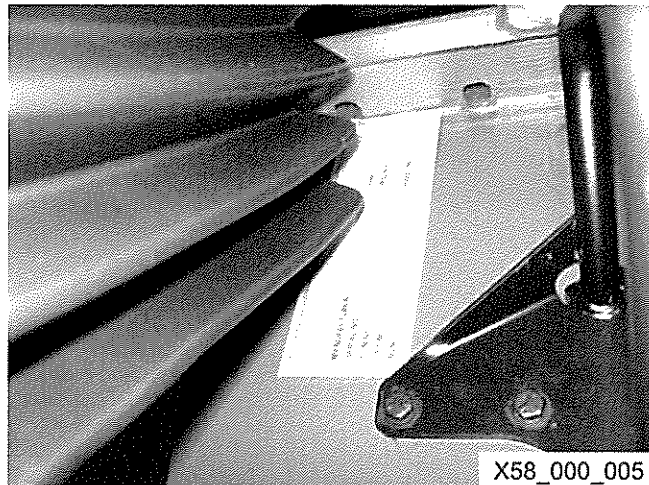


Fig 3 Asset plate

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CHAPTER 1-2

DRIVER'S CONTROLS

CONTENTS

Para

	Door operation (WARNING)
1	Door operation from outside
4	Door operation from inside
7	Seats (WARNINGS)
7	Driver's and co-driver's seat
8	Setting the driver's and co-driver's seat height (WARNING)
9	Centre seat/platform (WARNINGS)
	Automatic seat belts (WARNINGS)
10	General
13	Fastening the seat belt
15	Releasing the seat belt
16	Fresnel lens
17	Sliding windows (WARNING)
	Mirrors
18	Mirror adjustment (WARNING)
21	Mirror heaters
26	Adjusting the steering wheel (WARNING)
29	Sun blind (windscreen) (WARNING)
32	Protective window covers
34	Summary of controls (all vehicles)
35	Instrument panel - summary of controls
36	Check lamps and warning lights
37	Driver's display and panel of check lamps (WARNING)
42	Stop message (WARNING)
43	Red message (WARNING)
44	Yellow message (WARNING)
48	Functional message (function)
50	Menu structure on the driver's display (WARNING)
53	Activating the menu
56	Exiting the menu
58	Menu structure (vehicle stationary – engine stopped)
	Oil health monitoring programme
60	Menu structure (vehicle stationary – engine running)
61	Menu structure (vehicle in motion)
62	Lamp test on panel of check lamps (WARNING)
67	Lamp test with the ignition key
70	Lamp test using the vehicle menu on the driver's display
	Check lamps and warning lights
73	Red lamps and lights
74	Yellow lamps and lights
75	Rocker switches and buttons
76	Time and outside temperature display
78	Displaying time or outside temperature
79	Black ice warning (WARNING)
82	Setting the time display (WARNING)
83	Speedometer display
87	Combination switch
	Windscreen washers and wipers

(continued)

**CONTENTS (continued)**

## Para

88	Washing the windscreen (WARNING)
90	Operating the windscreen wipers
91	Intermittent wipe
94	Setting the intermittent wipe time (infinitely variable)
98	Vehicle horn
100	Turn indicators
102	Symbols on the driver's display
103	Turn indicator test
114	Lighting (WARNING)
114	Exterior lighting test
122	Light switch
125	Headlight high beam
128	Headlight flash
129	Rear fog lamps, general
131	Rear fog lamps
135	Hazard warning lights
139	Headlight beam regulator
143	Interior lighting
144	Reading light
145	Adjusting the instrument lighting (WARNING)
148	Storing weapons
152	Reversing signal

## Table

## Page

1	Check lamps and warning lights .....	17
2	Indications on the driver's display and panel of check lamps .....	23
3	Menu structure (vehicle stationary – engine stopped) .....	47
4	Menu structure (vehicle stationary – engine running) .....	48
5	Menu structure (engine running and vehicle driving) .....	49
6	Icons and button functions – driver's display menu .....	50
7	Red check lamps and warning lights .....	53
8	Yellow check lamps and warning lights .....	54
9	Rocker switches and buttons .....	54

## Fig

## Page

1	Operating the door (outside) .....	4
2	Operating the door (inside) .....	5
3	Control elements on the seat .....	6
4	Folding the centre seat .....	7
5	Fastening the seat belt .....	9
6	Fresnel lens .....	10
7	Operating the windows .....	10
8	Adjusting the rear view and kerb mirrors .....	11
9	Front mirror position .....	11
10	Mirror heaters .....	12
11	Adjusting the steering wheel .....	13
12	Steering wheel positions .....	13
13	Operating the sun blind .....	14
14	Protective window covers .....	14
15	Cab controls .....	15
16	Instrument panel .....	16
17	Display and check lamps .....	18

(continued)

CONTENTS (continued)

Fig		Page
18	STOP message .....	19
19	RED message .....	20
20	YELLOW message .....	21
21	OK button .....	21
22	Functional message (function) .....	22
23	Vehicle menu button .....	45
24	Arrow buttons .....	46
25	Ok button .....	46
26	Oil health monitoring programme .....	48
27	Check lamp test with the ignition key .....	51
28	Dashboard warning lamps .....	52
29	Dashboard menu button .....	52
30	Red check lamps and warning lights .....	53
31	Yellow check lamps and warning lights .....	53
32	Displaying time or outside temperature .....	55
33	Black ice warning .....	55
34	Central warning light .....	56
35	Setting the time display .....	56
36	Speedometer display .....	57
37	Km/mph/ok button .....	57
38	Combination switch .....	58
39	Washing the windscreen .....	59
40	Operating the windscreen wipers .....	60
41	Operating the intermittent wipe .....	60
42	Setting the intermittent wipe time .....	61
43	Intermittent wipe time reset .....	61
44	Vehicle horn .....	62
45	Turn indicators .....	62
46	Indication symbols .....	63
47	Lighting learning routine rocker switch .....	64
48	Headlight flash .....	64
49	Lighting learning routine rocker switch .....	65
50	Light switch .....	66
51	Headlight high beam .....	67
52	High beam check lamp .....	67
53	Headlight flash .....	68
54	Vehicle rear fog lamp rocker switch .....	68
55	Rear fog lamp check lamp .....	69
56	Hazard warning lights rocker switch .....	69
57	Headlight beam regulator rocker switch .....	70
58	Interior lighting .....	70
59	Adjusting the instrument lighting .....	71
60	Display lighting .....	72
61	Storing weapons .....	72
62	Reversing signal switch .....	73

**DOOR OPERATION****WARNING**

**PERSONAL INJURY. DO NOT DRIVE UNLESS THE DOORS ARE PROPERLY CLOSED.**

**Door operation from outside**

- 1 The key only unlocks one door at a time, the other door remains locked.
- 2 Refer to Fig 1. To unlock and open the door, proceed as follows:
  - 2.1 Insert the key into the lock (1), then turn the key in direction A to unlock the door.
  - 2.2 Press in the button to open the door.
- 3 To close and lock the door, proceed as follows:
  - 3.1 Swing the door closed with moderate force.
  - 3.2 Insert the key into the lock (1), then turn the key in direction B to lock the door.

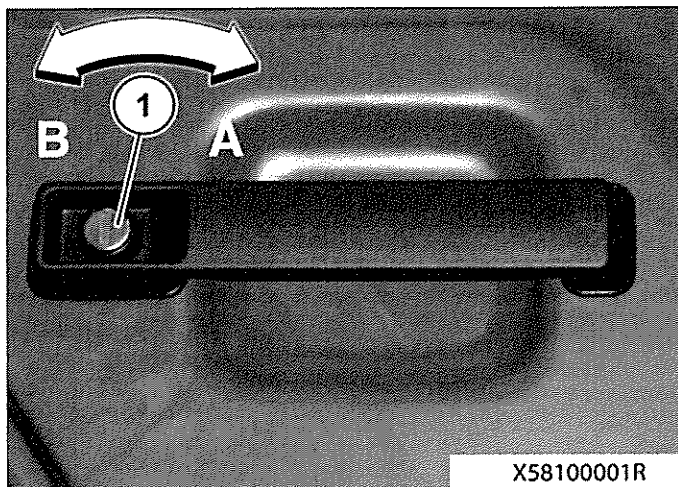


Fig 1 Operating the door (outside)

**Door operation from inside**

- 4 The lever operation will only lock that particular door.
- 5 Refer to Fig 2. To unlock and open a door, proceed as follows:
  - 5.1 Pull the lever upwards beyond the pressure point A to unlock the door.
  - 5.2 Pull the lever upwards to position B to open the door.
- 6 To close and lock the door, proceed as follows:
  - 6.1 Swing the door closed with moderate force.
  - 6.2 Push the lever downwards to lock the door.

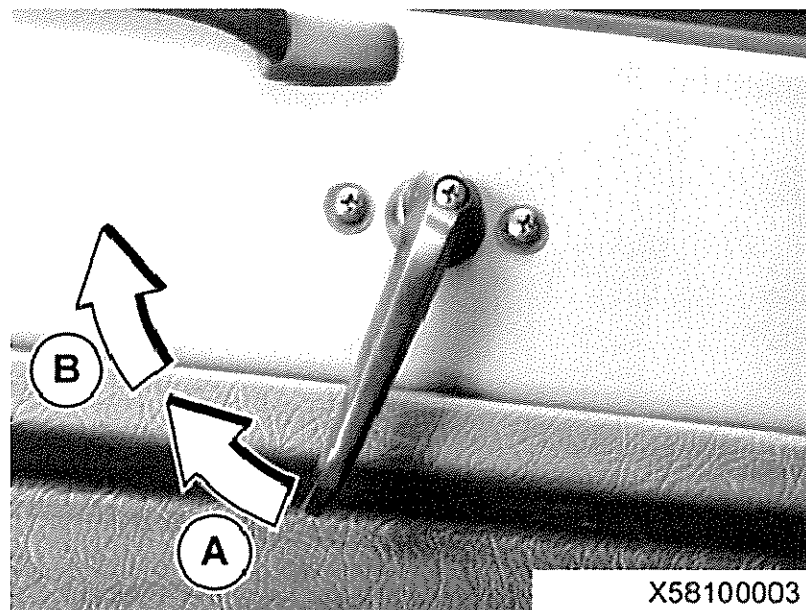


Fig 2 Operating the door (inside)

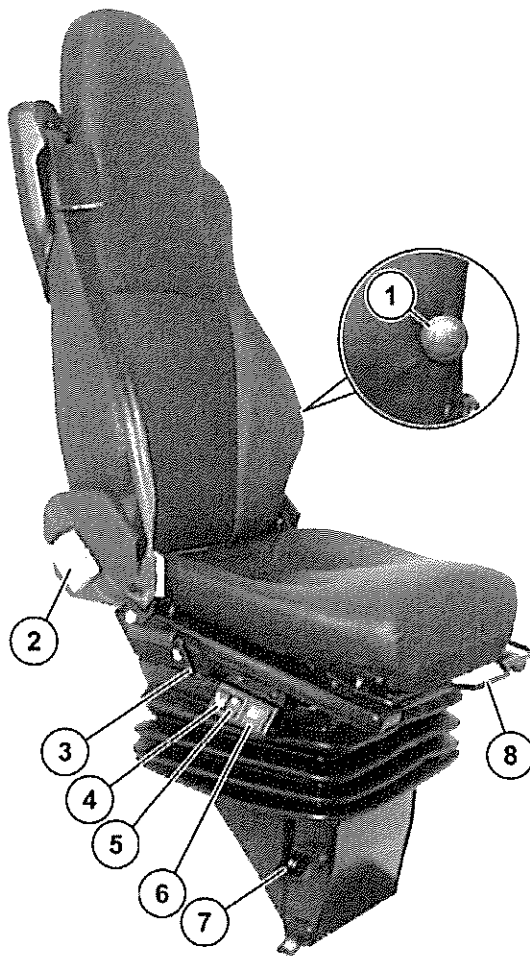
**SEATS**

**WARNINGS**

- (1) **PERSONAL INJURY. FASTEN YOUR SEAT BELT BEFORE EVERY TRIP.**
- (2) **PERSONAL INJURY. DO NOT ADJUST THE SEATS UNLESS THE VEHICLE IS STATIONARY, AND MAKE SURE YOU HEAR THE SEAT LOCKING DEVICE ENGAGE.**

**Driver's and co-driver's seat**

7 Refer to Fig 3. The driver's and co-driver's seat are similar. The seat controls are listed in the legend below.



X58110001

- |                          |  |
|--------------------------|--|
| 1 – Lumbar support (LWS) | 5 – Manual weight setting (adjustment not possible if seat is blocked) |
| 2 – Backrest adjustment  | 6 – Blocking of swinging system  |
| 3 – Height adjustment    | 7 – Damper setting   |
| 4 – Angle adjustment     | 8 – Horizontal setting   |

Fig 3 Control elements on the seat



### Setting the driver's and co-driver's seat height

#### WARNING

**PERSONAL INJURY. DO NOT ATTEMPT TO ADJUST THE SEAT UNLESS IT IS UNDER LOAD AND THE RESERVOIR PRESSURE IN THE COMPRESSED AIR SYSTEM IS AT LEAST 7 BAR.**

8 Refer to Fig 3. To set the seat height, proceed as follows:

8.1 Move the manual weight setting (5) to the central position.

#### NOTE

Adjustment is not possible if the seat is blocked.

8.2 Block the swinging system of the seat by pressing the bottom of the switch (6).

8.3 Pull the lever (3) upwards to set the seat to the required height.

8.4 Release the block of the swinging system by pressing the top of the switch (6).

### Centre seat/platform

#### WARNINGS

(1) **PERSONAL INJURY. DO NOT FOLD DOWN THE CENTRE SEAT UNLESS THE VEHICLE IS STATIONARY.**

(2) **PERSONAL INJURY. MAKE SURE THAT THE SEAT LOCKING DEVICE IS ENGAGED.**

9 Refer to Fig 4. To fold the centre seat forward to the platform position, pull the backrest adjustment lever (1) upwards and fold down the backrest until the seat locking device is heard to engage.

9.1 To move the centre seat back to the seat position, pull the backrest adjustment lever (1) upwards and move the backrest to the rear until the lock is heard to engage.

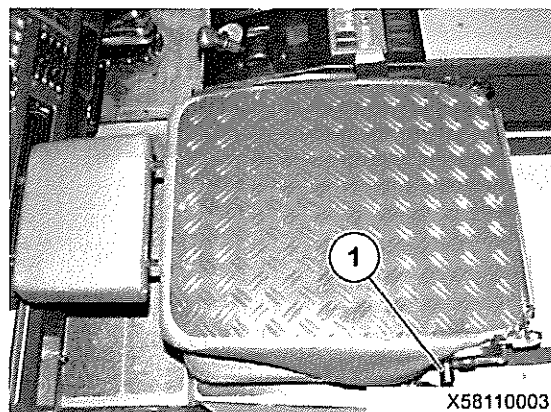


Fig 4 Folding the centre seat

**AUTOMATIC SEAT BELTS****WARNINGS**

- (1) **PERSONAL INJURY. FASTEN YOUR SEAT BELT BEFORE MOVING OFF.**
- (2) **PERSONAL INJURY. ONLY ONE PERSON IS ALLOWED TO BE SECURED WITH ONE SEAT BELT.**
- (3) **PERSONAL INJURY. THE SEAT BELT MUST NOT BE TWISTED. MAKE SURE YOUR SEAT BELT FITS SNUGLY AGAINST YOUR BODY.**
- (4) **PERSONAL INJURY. SEAT BELTS ONLY PROVIDE OPTIMUM PROTECTION WHEN THE BACKREST IS IN AN ALMOST VERTICAL POSITION.**
- (5) **PERSONAL INJURY. SIT WITH YOUR BACK AGAINST THE BACKREST WITH THE SEAT BELT FITTING SNUGLY IN THE AREA BETWEEN YOUR NECK AND SHOULDER.**
- (6) **PERSONAL INJURY. THE SHOULDER PART OF THE BELT MUST RUN APPROXIMATELY ACROSS THE MIDDLE OF YOUR SHOULDER, NEVER ACROSS YOUR THROAT.**
- (7) **PERSONAL INJURY. THE LAP PART OF THE BELT MUST ALWAYS SIT SNUGLY AND RUN ACROSS YOUR BODY AS LOW DOWN YOUR ABDOMEN AS POSSIBLE, NOT ACROSS YOUR STOMACH.**
- (8) **PERSONAL INJURY. DO NOT MOVE THE SEAT TO POSITIONS IN WHICH IT IS IMPOSSIBLE TO HAVE THE SEAT BELT FIT YOU CORRECTLY.**
- (9) **PERSONAL INJURY. DO NOT PLACE THE SEAT BELT OVER HARD OR FRAGILE OBJECTS IN YOUR POCKETS, FOR EXAMPLE, PENS, GLASSES, ETC.**
- (10) **PERSONAL INJURY. ALWAYS KEEP SEAT BELTS CLEAN AND DRY.**
- (11) **PERSONAL INJURY. REGULARLY CHECK THE CONDITION AND FUNCTION OF THE BELTS AFTER FASTENING AND WHILST DRIVING. RE-TENSION IF NECESSARY.**
- (12) **PERSONAL INJURY. MAKE SURE THAT THE SEAT BELT IS FULLY RETRACTED BEFORE EXITING THE VEHICLE.**

**General**

- 10 Where seat belts have been damaged or strained in an accident, contact your Unit for assistance.
- 11 Do not modify the seat belts.
- 12 The height of the seat belt is not adjustable.

### Fastening the seat belt

- 13 Refer to Fig 5. To fasten the seat belt, proceed as follows:
  - 13.1 Grasp the buckle latch, then pull the seat belt over the shoulder and lap.
  - 13.2 Press the buckle latch into the seat belt catch until the buckle latch engages.
  - 13.3 Make sure the seat belt fits snugly across the upper body and lap.
  - 13.4 Give the belt a sharp tug to check that the belt reel locks.
- 14 When driving, re-tension the seat belt if necessary.

### NOTE

The centre seats have a lap belt.

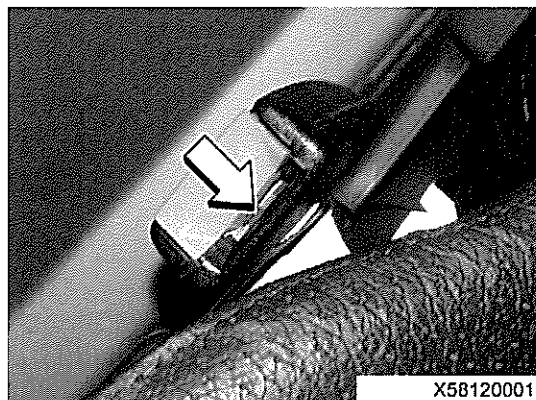


Fig 5 Fastening the seat belt

### Releasing the seat belt

- 15 To release the seat belt, proceed as follows:
  - 15.1 Press the red button on the seat belt catch.
  - 15.2 Keep hold of the buckle latch until the seat belt has retracted.

**FRESNEL LENS**

- 16 Refer to Fig 6. Fresnel lens (1) is fitted to the left side sliding window.
  - 16.1 Look through the Fresnel lens (1) to view and judge how close objects are to the vehicle.
  - 16.2 Use the Fresnel lens (1) when turning or manoeuvring the vehicle.



Fig 6 Fresnel lens

**SLIDING WINDOWS**

**WARNING**

**PERSONAL INJURY. DO NOT THROW OBJECTS OUT OF THE WINDOW. THIS ENDANGERS THE TRAFFIC BEHIND.**

- 17 Refer to Fig 7. To open the sliding window, proceed as follows:
  - 17.1 Press the button on the lock (1).
  - 17.2 Move the window to the required position.
  - 17.3 To close the sliding window, move the window to the closed position until the hook of the lock (1) engages.

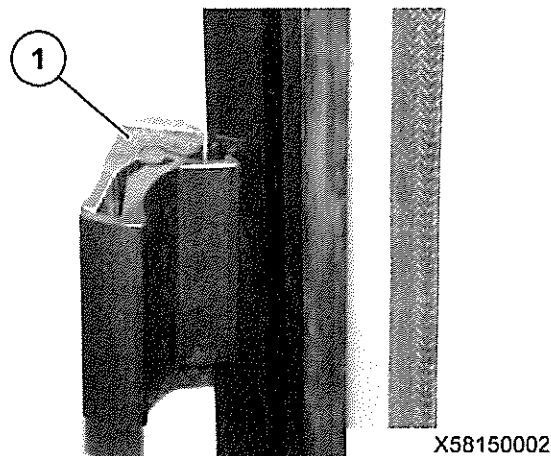


Fig 7 Operating the windows

## MIRRORS

### Mirror adjustment

#### WARNING

**RISK OF ACCIDENTS. IF THE LEFT OR THE CENTRE PASSENGER SEAT IS OCCUPIED, THE DRIVER CANNOT SEE CLEARLY IN THE KERB MIRROR.**

- 18 Refer to Fig 8. To adjust the rear view mirrors, proceed as follows:
  - 18.1 Make sure that the driver's seat is in the correct position, refer to Para 8.
  - 18.2 Make sure that the mirrors arms are locked in position.
  - 18.3 Clean the mirrors if necessary.
  - 18.4 Swivel the rear view mirror upwards or downwards, left or right to the required position.
- 19 Swivel the kerb mirror upwards or downwards, left or right to the required position.

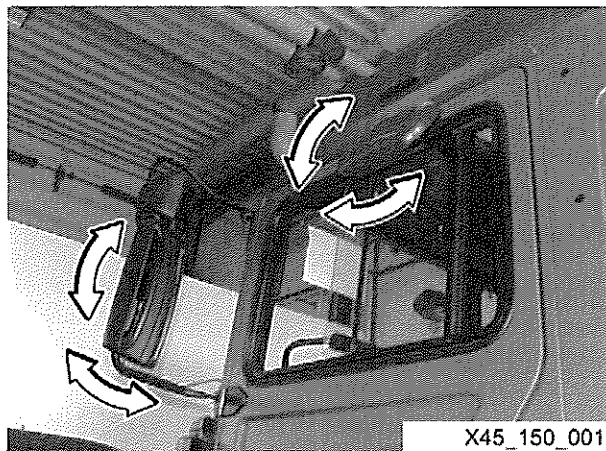


Fig 8 Adjusting the rear view and kerb mirrors

- 20 Refer to Fig 9. The front mirror is in a set position above the windscreen, it cannot be adjusted.

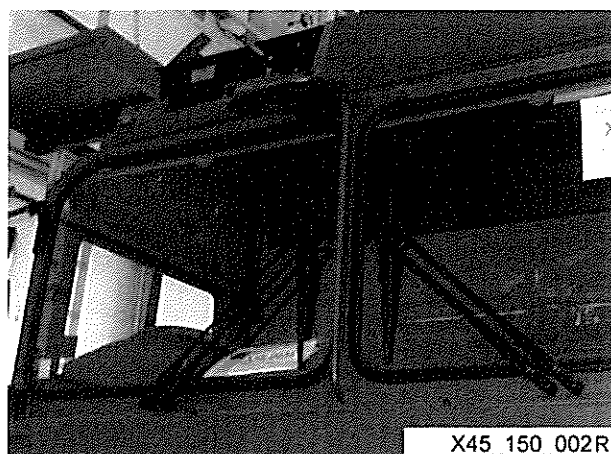


Fig 9 Front mirror position

**Mirror heaters**

- 21 The mirror heaters do not function unless the ignition is switched on.
- 22 The mirror heaters should be switched on if the mirrors are misted over or icy.
- 23 Refer to Fig 10. To switch on the mirror heaters, proceed as follows:
  - 23.1 Switch on the ignition.
  - 23.2 Press the bottom of the heated mirror switch located in the gearbox console.
- 24 To switch off the mirror heaters, press the top of the heated mirror switch.
- 25 The mirror heaters are switched off when the ignition is switched off.

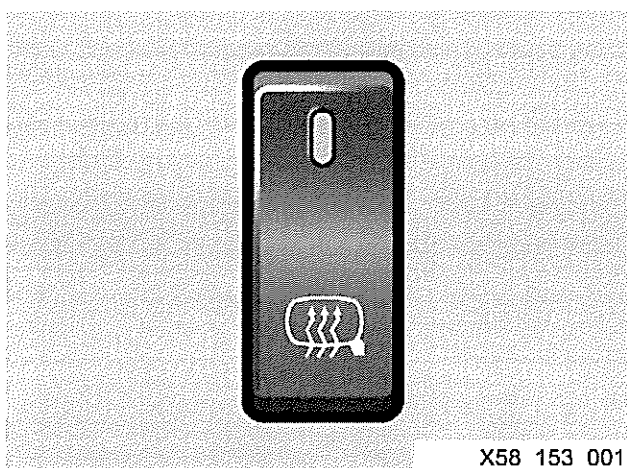


Fig 10 Mirror heaters

## ADJUSTING THE STEERING WHEEL

### WARNING

**PERSONAL INJURY. DO NOT ADJUST THE STEERING WHEEL UNLESS THE VEHICLE IS STATIONARY AND THE PARKING BRAKE IS APPLIED.**

26 There must be sufficient air pressure in the compressed air system in order to adjust the steering wheel.

27 Before adjusting the steering wheel, make sure that the seat is in the correct position, refer to Para 8.

28 Refer to Fig 11. To adjust the steering wheel, proceed as follows:

28.1 Use your heel to press and hold the push button (1) on the driver's seat console.

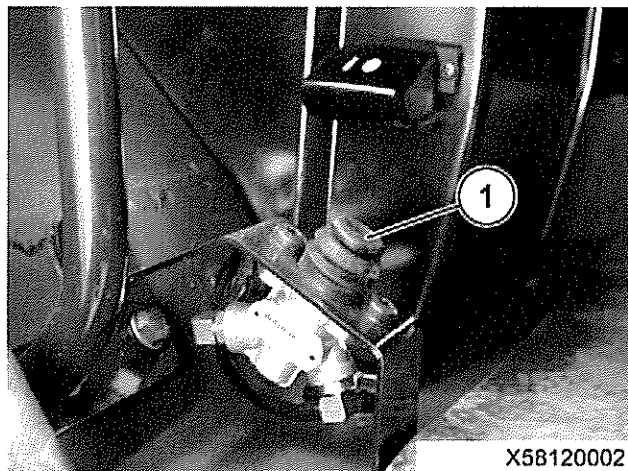


Fig 11 Adjusting the steering wheel

28.2 Refer to Fig 12. Adjust the height and reach of the steering wheel.

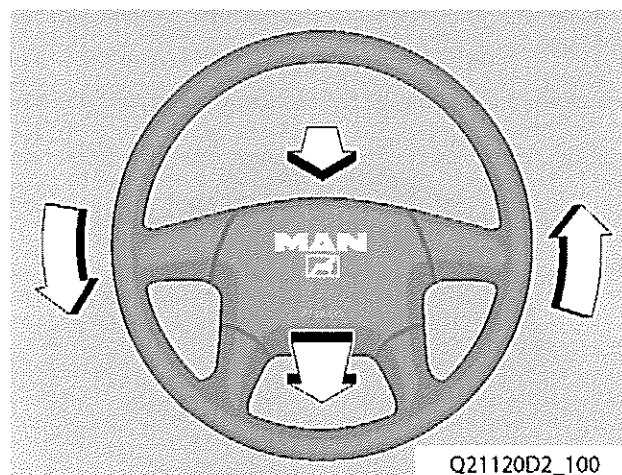


Fig 12 Steering wheel positions

28.3 Refer to Fig 11. Release the push button (1).

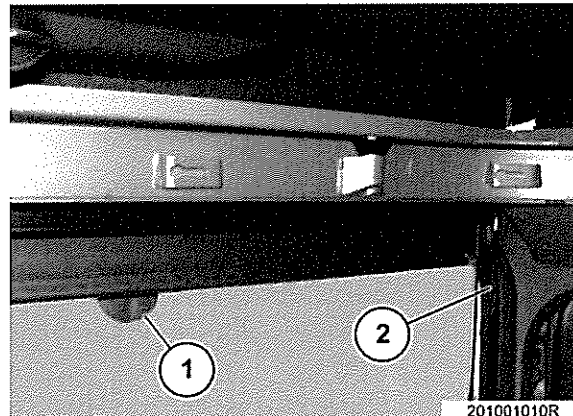
28.4 The steering wheel is locked in position.

**SUN BLIND (WINDSCREEN)**

29 The height setting of the windscreen sun blind can be adjusted as required.

30 Refer to Fig 13. To operate the sun blind, proceed as follows:

30.1 To roll the sun blind down, hold the draw handle (1) and pull the sun blind down to the required position.



1 – Draw handle

2 – Release mechanism

Fig 13 Operating the sun blind

**WARNING**

**PERSONAL INJURY. DO NOT PUT FINGERS INTO THE RANGE OF THE SUN BLIND WHEN ROLLING UP.**

31 To roll the sun blind up, pull the release mechanism (2) downwards. The sun blind is automatically rolled up.

**PROTECTIVE WINDOW COVERS**

32 Refer to Fig 14. Protective window covers (3) are supplied. These can be used for camouflage concealment and/or frost protection.

33 To attach the window covers to the cab, use the magnetic strips that are sewn into the edge of the covers.

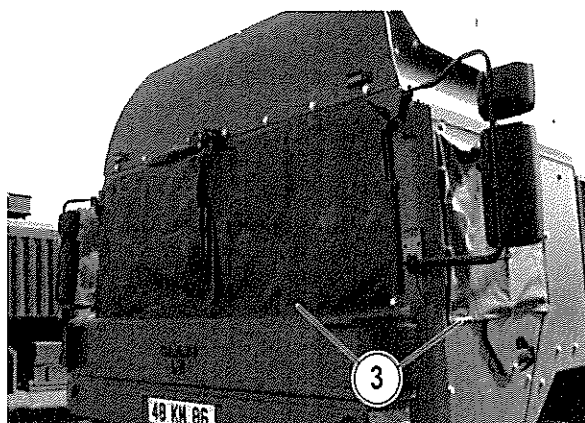
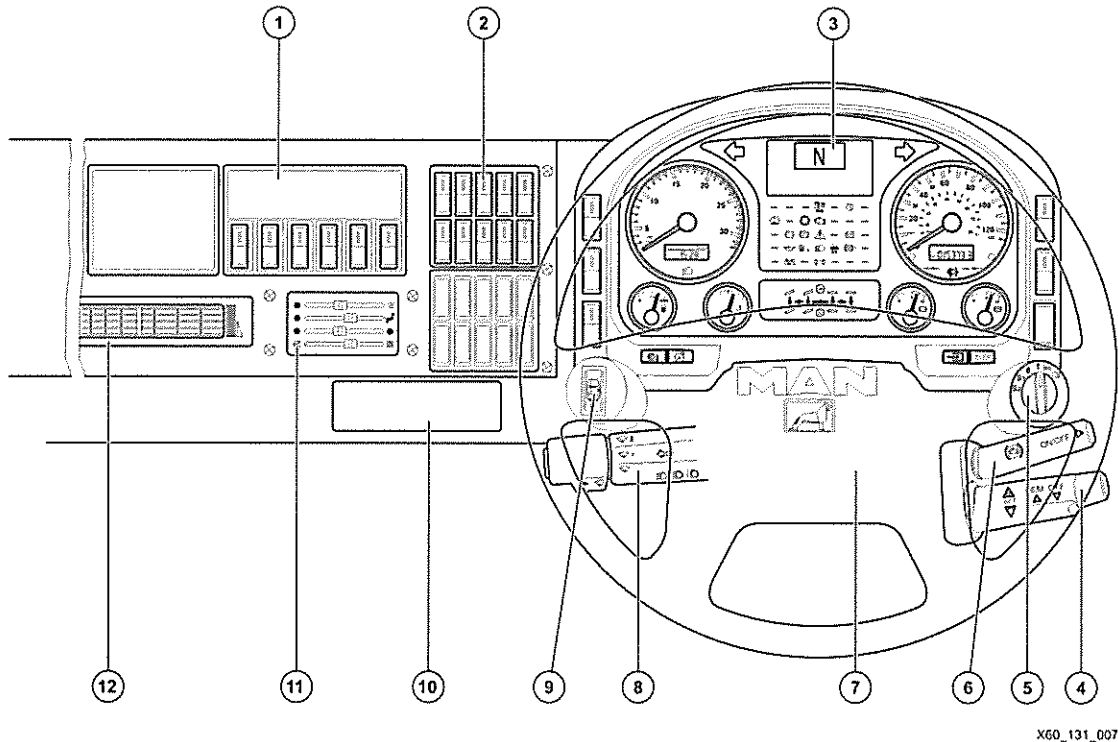


Fig 14 Protective window covers



**SUMMARY OF CONTROLS (ALL VEHICLES)**

34 Refer to Fig 15. The controls are listed in the legend below.



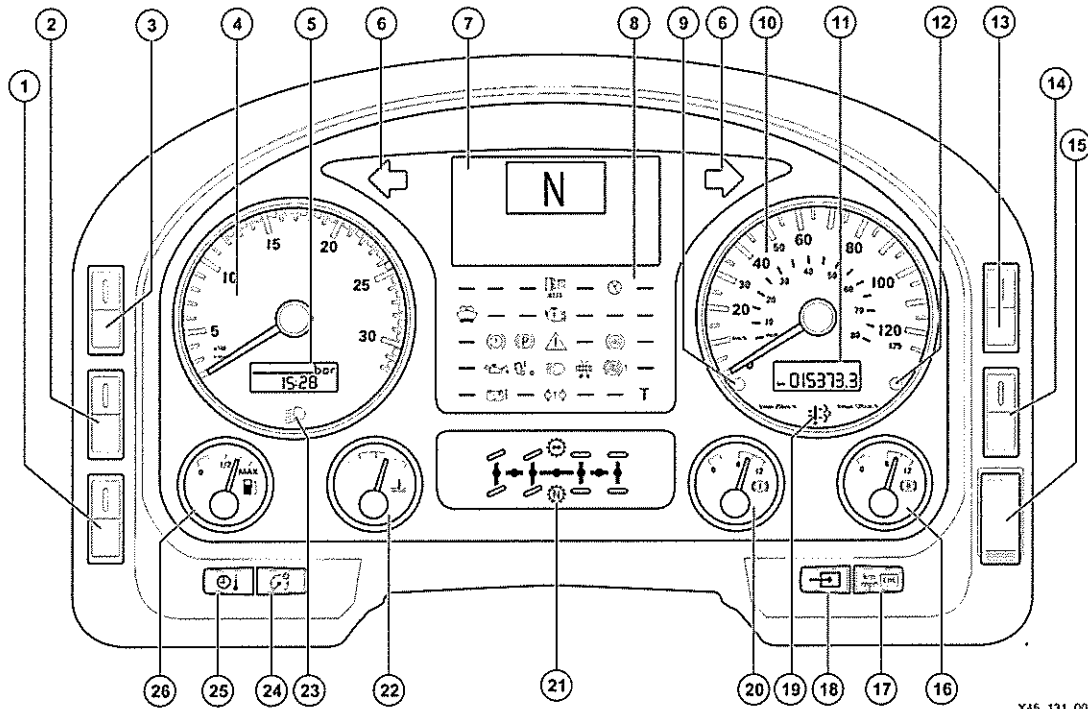
X60\_131\_007

- |   |   |
|---|---|
| 1 – Panel of rocker switches and buttons, refer to Table 9  | 7 – Ignition lock, refer to Chapter 1-5   |
| 2 – Panel of rocker switches and buttons refer to Table 9   | 8 – Combination switch for horn, headlight high beam, turn indicators, windscreen wipers and washers, refer to Paras 87 to 101. |
| 3 – Instrument panel, refer to Para 35  | 9 – Rotary switch for headlight beam regulator, refer to Para 139   |
| 4 – Steering column stalk for cruise control, road speed limiter and idling speed, refer to Chapter 1-5 | 10 – Not used.  |
| 5 – Rotary switch for parking lights, driving lights and camouflage light, refer to Para 123.           | 11 – Control panel for heating and ventilation, refer to Chapter 1-3  |
| 6 – Sustained-action brake lever (engine brake), refer to Chapter 1-4                                   | 12 – Air vent   |

Fig 15 Cab controls

**INSTRUMENT PANEL - SUMMARY OF CONTROLS**

35 Refer to Fig 16. The controls are listed in the legend below.



x45\_131\_005
























- |   |  |
|---|--|
| 1 – Cruise control/Road Speed Limiter changeover switch, refer to Chapter 1-5   | 14 – Hazard warning lights rocker switch   |
| 2 – Cruise control/retarder automatic rocker switch, refer to Chapter 1-4   | 15 – Emergency-off switch  |
| 3 – Light test rocker switch, refer to Para 119   | 16 – Pressure gauge, reservoir pressure, brake circuit II, Refer to Chapter 1-4          |
| 4 – Rev counter, refer to Chapter 1-5   | 17 – Button for vehicle menu, yellow messages on driver's display, and km or mph display |
| 5 – Multifunction display for time and outside temperature, boost pressure and instrument lighting, refer to Paras 76 to 78 | 18 – Button for vehicle menu on driver's display   |
| 6 – Turn indicators, vehicle refer to Para 100  | 19 – Emissions warning light   |
| 7 – Driver's display, refer to Table 7  | 20 – Pressure gauge, reservoir pressure, brake circuit I, refer to Chapter 1-4           |
| 8 – Panel of check lamps, refer to Paras 73 to 74   | 21 – Differential locks display, refer to Chapter 1-5                                    |
| 9 – Sensor for automatic brightness control for interior lighting   | 22 – Coolant temperature gauge   |
| 10 – Speedometer  | 23 – Headlight low beam (driving lights) display, refer to Para 123                      |
| 11 – Multifunction display (for mileage counter, trip counter, speed in mph/km/h), refer to Para 83                         | 24 – Instrument lighting button, refer to Para 145                                       |
| 12 – Road speed limiter check lamp  | 25 – Time and outside temperature button, refer to Para 76                               |
| 13 – Rear fog lamp rocker switch  | 26 – Fuel gauge  |

Fig 16 Instrument panel

**CHECK LAMPS AND WARNING LIGHTS**

36 The check lamps and warning lights are shown in Table 1.

**TABLE 1 CHECK LAMPS AND WARNING LIGHTS**

Symbol	Description	Symbol	Description	Symbol	Description
	Central warning light		Engine oil pressure		Turn indicators in trailer
	Fuel filter heater		Tail lift (if fitted)		Off road range
	Windscreen washers		Cab lock		Gearbox neutral position
	Engine		Headlight low beam (driving lights)		Gearbox
	Brake system		Headlight high beam		Battery charge monitor
	Parking brake		Air filter		Hydraulic system
	Anti-lock Brake System (ABS)		Emergency off fault		Control light, position of crane and supports (if fitted)
	ABS information in trailer		Turn indicators in vehicle tractive unit	<b>T</b>	Tacho simulation lamp

**DRIVER'S DISPLAY AND PANEL OF CHECK LAMPS****WARNING**

**DRIVING SAFETY. SAFETY MAY BE IMPAIRED IF A NUMBER CODE APPEARS ON THE DISPLAY INSTEAD OF A TEXT MESSAGE. STOP THE VEHICLE.**

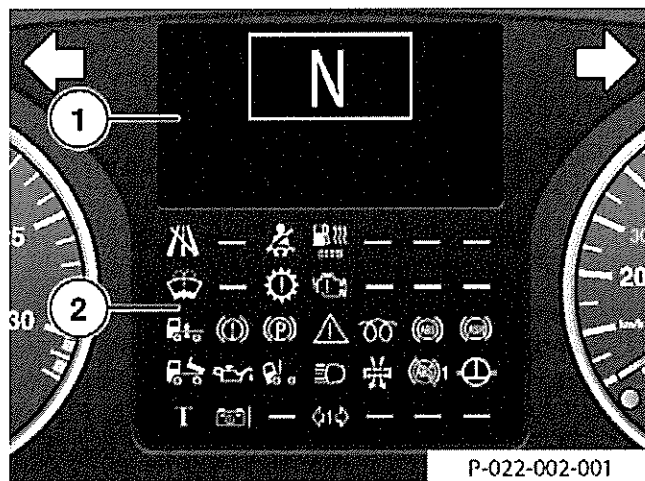
37 Refer to Fig 17. The driver's display (1) and panel of check lamps (2) inform the driver about the status of the vehicle.

38 If there is not enough space on the driver's display, all active messages are automatically displayed alternately.

39 If there are more than 20 messages a plus symbol is indicated on the driver's display.

40 The panel of check lamps (2) contains the check lamps and warning lights. The colours are red, yellow, blue or green and can show a steady or flashing light.

41 The check lamps and warning lights must be checked regularly to ensure that they function correctly, refer to Para 62.



1 – Display

2 – Check lamps

Fig 17 Display and check lamps

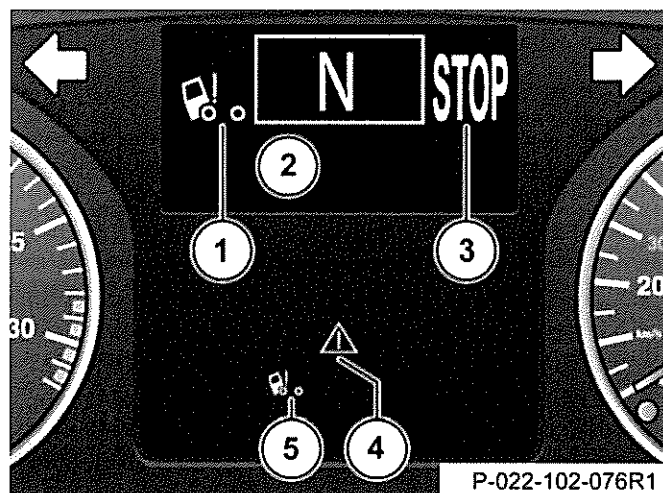
**STOP message**

**WARNING**

**DRIVING SAFETY. IF THE STOP MESSAGE APPEARS ON THE DRIVER'S DISPLAY, STOP THE VEHICLE SAFELY AS SOON AS POSSIBLE, APPLY THE PARKING BRAKE AND STOP THE ENGINE. CONTACT YOUR UNIT FOR ASSISTANCE.**

42 Refer to Fig 18. The STOP message indicates that driving safety is impaired or there is a risk of vehicle damage. Indications are as follows:

- 42.1 The central warning light (4) flashes red on the panel of check lamps.
- 42.2 The STOP symbol (3) is shown on the right of the display.
- 42.3 The symbol of the system (1) sending the message is shown on the left of the display.
- 42.4 A text message, or number code is shown on the display (2).
- 42.5 The corresponding warning light (5) on the panel of check lamps may light up red.
- 42.6 An audible warning signal sounds.



- 1 – Symbol
- 2 – Text message or number code
- 3 – STOP symbol
- 4 – Central warning light
- 5 – Corresponding warning light

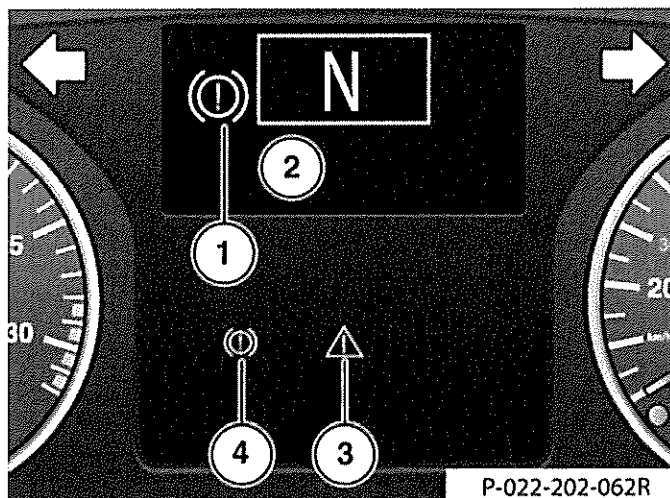
Fig 18 STOP message

**RED message****WARNING**

**DRIVING SAFETY. IF A RED MESSAGE APPEARS ON THE DRIVER'S DISPLAY, CONTACT YOUR UNIT FOR ASSISTANCE.**

43 Refer to Fig 19. The RED message indicates that the vehicle must be taken to a workshop immediately. Driving safety may be impaired. Indications are as follows:

- 43.1 The central warning light (3) lights up red on the panel of check lamps.
- 43.2 The symbol (1) of the system sending the message is shown on the left of the display.
- 43.3 A text message, or number code is shown on the display (2).
- 43.4 A corresponding warning light (4) may light up red on the panel of check lamps.
- 43.5 A brief audible warning signal sounds.



1 – Symbol

2 – Text message or number code

3 – Central warning light

4 – Corresponding warning light

Fig 19 RED message

**YELLOW message**

44 Refer to Fig 20. A YELLOW message indicates information and recommended action before starting to drive and whilst driving.

**WARNING**

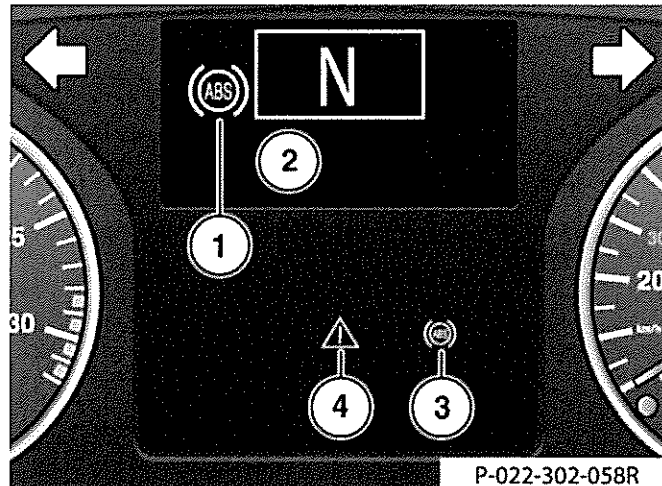
**DRIVING SAFETY. REMEDY ABS FAULTS IMMEDIATELY. CONTACT YOUR UNIT FOR ASSISTANCE.**

45 Driving safety is not impaired if a YELLOW message appears, with the exception of ABS and lighting system faults, which must be remedied immediately.

46 Indications are as follows:

- 46.1 The central warning light (4) lights up yellow on the panel of check lamps.

- 46.2 The symbol (1) of the system sending the message is shown on the left of the display.
- 46.3 A text message, or number code is shown on the display (2).
- 46.4 The corresponding warning light (3) may light up yellow on the panel of check lamps.
- 46.5 A brief audible warning sounds.

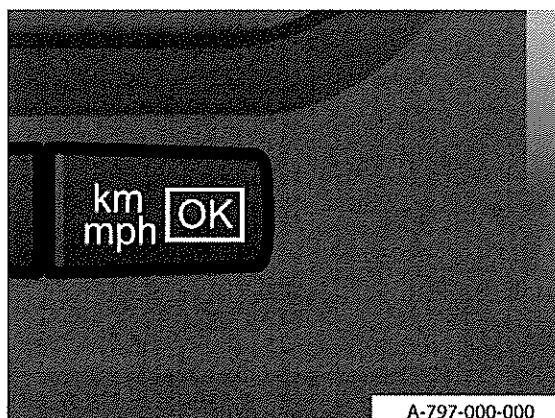


P-022-302-058R

- 1 – Symbol
- 2 – Text message or number code
- 3 – Symbol of affected system
- 4 – Central warning light

Fig 20 YELLOW message

47 Refer to Fig 21. Press the OK button briefly to confirm and temporarily clear the yellow message if required. The message will only be shown again when the ignition is switched on.



A-797-000-000

Fig 21 OK button

**Functional message (function)**

48 Refer to Fig 22. A functional message indicates correct functioning or a recommended action to be taken. Indications are as follows:

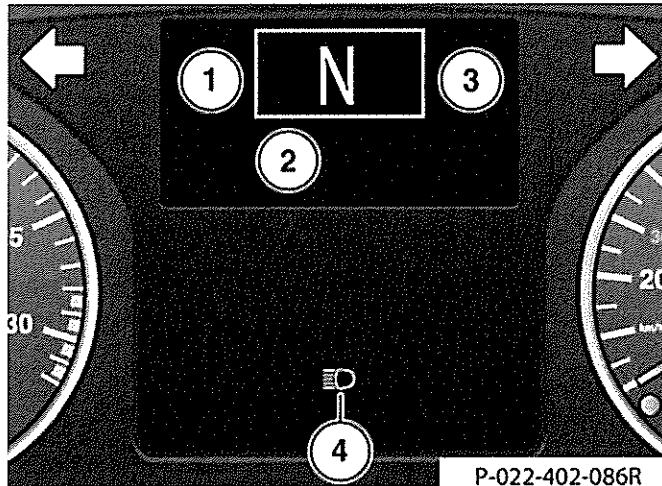
48.1 The symbol of the system sending the message is shown on the right of the display (3).

**OR**

48.2 The symbol of the system sending the message is shown on the left of the display (1) with a text message (2).

**OR**

48.3 The corresponding check lamp (4) lights up red, yellow, green, or blue on the panel of check lamps.



P-022-402-086R

1 – Symbol

2 – Text message

3 – Symbol of affected system







4 – Corresponding check lamp

Fig 22 Functional message (function)

49 For information on the meaning of functional messages, refer to Table 2.















TABLE 2 INDICATIONS ON THE DRIVER'S DISPLAY AND PANEL OF CHECK LAMPS

Display		Panel of check lamps	Audible signal	Meaning	Remarks/further procedure
Left	Text message				
	PSC 01087-09 Diagnosis	 Red	Yes	Example of a stop message with a number code instead of a text message.	Safety may be impaired. Stop the vehicle as soon as it is safe. Stop the engine. Contact your Unit for assistance.
	EBS 03204-31 Diagnosis	 Red	Yes	Example of a red message with a number code instead of a text message.	A malfunction has occurred in a system. Contact your Unit for assistance.
ZBR	ZBR 03301-05 Diagnosis	---	Yes	Example of a yellow message with a number code instead of a text message.	A malfunction has occurred in a system. Contact your Unit for assistance.
	LOCK CAB	 Red	Yes	Safety – Cab lock: Cab not fully locked. At least one of the cab lock switching contacts is open.	Lock the cab correctly, refer to Chapter 1-6.







(continued)

TABLE 2 INDICATIONS ON THE DRIVER'S DISPLAY AND PANEL OF CHECK LAMPS (continued)

Display		Panel of check lamps	Audible signal	Meaning	Remarks/further procedure
Left	Right				
	AIR PRESSURE TOO LOW	 Red  Flashes red	Yes	Safety – Service brake: Insufficient air pressure in one of the brake circuits, or an auxiliary consumer.	Stop the vehicle as soon as it is safe. Leave the engine running at increased revs until pressure is reached (the message disappears).
	CIRC. 1 PRESSURE TOO LOW	 Red  Flashes red	Yes	Safety – Service brake: Insufficient air pressure in brake circuit 1.	If the pressure is not reached, do not set the vehicle in motion. Contact your Unit for assistance.
	CIRC. 2 PRESSURE TOO LOW	 Red  Flashes red	Yes	Safety – Service brake: Insufficient air pressure in brake circuit 2.	
	CIRC. 3 PRESSURE TOO LOW	 Red  Flashes red	Yes	Safety – Service brake: Insufficient air pressure in brake circuit 3 (parking brake and trailer).	






(continued)

TABLE 2 INDICATIONS ON THE DRIVER'S DISPLAY AND PANEL OF CHECK LAMPS (continued)

Display		Panel of check lamps	Audible signal	Meaning	Remarks/further procedure
Left	Text message				
	CIRC. 3 PRESSURE TOO LOW	 Red   Flashes red	Yes	Workshop – Service brake without trailer.  Insufficient air pressure in brake circuit 3 (parking brake and trailer).	Leave the engine running at increased revs until pressure is reached (the message disappears).  If the pressure falls below 6 bar, stop the vehicle as soon as it is safe and leave the engine running at increased revs until pressure is reached (the message disappears).  If the pressure is not reached, do not set the vehicle in motion. Contact your Unit for assistance.
	EBS EMERGENCY PROG	 Red   Red	Yes	Workshop – Service brake: ASR and ESP on trailer has failed.	Drive slowly and carefully.  Note the different braking characteristics.  Greater tendency for wheels to lock.  Contact your Unit for assistance.

(continued)

TABLE 2 INDICATIONS ON THE DRIVER'S DISPLAY AND PANEL OF CHECK LAMPS (continued)

Display		Panel of check lamps	Audible signal	Meaning	Remarks/further procedure
Left	Right				
	TRAILER BRAKE	 Red	Yes	Workshop – Service brake: Trailer brake system has failed.	Drive slowly and carefully. Note the different braking characteristics. Contact your Unit for assistance.
	UNIT ABS	 Yellow	Yes	Information – ABS: Restricted vehicle ABS functioning.	Drive slowly and carefully. Greater tendency for wheels to lock. Brake gradually. Contact your Unit for assistance.
	---	 Flashes yellow	---	Function – ABS off-road: ABS off-road function is active.  ABS function is not available, or is restricted.	The ABS off-road function reacts according to the speed: – Up to 15 km/h, ABS is switched off; the wheels may lock. – From 15 km/h to 40 km/h, the spin threshold is increased to approx. 10 km/h. The wheels may lock for longer than in standard ABS mode. (Loose road material is pushed into a wedge in front of the wheel, improving the braking effect.) Above 40 km/h, standard ABS mode.

(continued)

TABLE 2 INDICATIONS ON THE DRIVER'S DISPLAY AND PANEL OF CHECK LAMPS (continued)




















Display		Audible signal	Meaning	Remarks/further procedure
Left	Right			
 1	TRAILER ABS	---	 Red  Yellow	Information – ABS: Trailer ABS function has failed. Drive slowly and carefully. Greater tendency for wheels to lock. Brake gradually.
 1	TRAILER ABS FAILURE	---	 Red  Yellow	Information – ABS: Trailer ABS function has failed. Check the vehicle to trailer plug connection, clean if necessary and fully insert plug. Check the vehicle to trailer cable, renew if necessary. Contact your Unit for assistance.
---	---	---	 1 Yellow	Function – ABS information: No trailer ABS.
	PARKING BRAKE DISPLAY DEFECT	---	---	Workshop – Parking brake: Functioning of the parking brake cannot be displayed. Contact your Unit for assistance.
---	---	---	 Red	Function – Parking brake: Parking brake applied, spring actuator depressurised. (continued)

TABLE 2 INDICATIONS ON THE DRIVER'S DISPLAY AND PANEL OF CHECK LAMPS (continued)

Display		Panel of check lamps	Audible signal	Meaning	Remarks/further procedure
Left	Right				
	BRAKE LINING/ PAD WEAR	--	Yes	Information – Brake wear: Brake linings worn, or uneven wear.	Contact your Unit for assistance.
	ENGINE BRAKE FAILURE	 Red	Yes	Workshop – Engine brake: Engine brake has failed.	Contact your Unit for assistance.
	CAN INTERCONNECT FAILURE	 Red  Yellow	Yes	Safety – Instrument panel: Connection between instrument panel and central electrical system has failed.	Stop the vehicle as soon as it is safe. Check the circuit breaker. Contact your Unit for assistance.
<b>ZBR</b>	ZBR FAILURE	--	Yes	Safety – Central on-board computer (ZBR): Central on-board computer has failed.	Stop the vehicle as soon as it is safe. Check the circuit breaker. Contact your Unit for assistance.











(continued)

TABLE 2 INDICATIONS ON THE DRIVER'S DISPLAY AND PANEL OF CHECK LAMPS (continued)

Display		Panel of check lamps	Audible signal	Meaning	Remarks/further procedure
Left	Right				
ZBR	CAN INTERCONNECT FAILURE	---	Yes	Workshop – Electrical connection to driveline: ECU interruption.	Check the circuit breaker. Contact your Unit for assistance.
FFR	FFR FAILURE	---	Yes	Safety – Vehicle management computer (FFR): Vehicle management computer failure.	Stop the vehicle as soon as it is safe. Check the circuit breaker. Contact your Unit for assistance.
	BATTERY UNDERVOLTAGE	---	Yes	Information – Battery voltage: Battery undervoltage, for example, after being out of use for too long.	Run the engine at increased speed until the message disappears. Check the battery electrolyte level.
	ALTERNATOR DISPL. DEFECTIVE	---	Yes	Workshop – Charge check: Charge check not functioning.	Contact your Unit for assistance.
	ALTERNATOR FAILURE	---	Yes	Workshop – Charge check: Alternator has failed.	If electrical battery master switch is fitted, refer to Chapter 1-5. Contact your Unit for assistance.
	CHARGE VOLTAGE TOO LOW	---	Yes	Information – Charge check: Charge voltage permanently too low when engine running.	Switch off current consumers that are not needed. Contact your Unit for assistance.

(continued)







TABLE 2 INDICATIONS ON THE DRIVER'S DISPLAY AND PANEL OF CHECK LAMPS (continued)

Display		Panel of check lamps		Audible signal	Meaning	Remarks/further procedure
Left	Text message	Right				
	CHARGE VOLTAGE TOO HIGH	---	 Yellow	Yes	Information – Charge check: Charge voltage is too high when engine is running at rated speed.	Contact your Unit for assistance.
	EDC FAILURE	STOP	 Flashes red	Yes	Safety – EDC: EDC has failed.	Stop the vehicle as soon as it is safe. Check the circuit breaker. Contact your Unit for assistance.
	BOOST PRESSURE SENSOR DEFECTIVE	---	 Yellow	Yes	Information – Charge air pressure (engine): Charge air pressure cannot be measured correctly.	Contact your Unit for assistance.
	OIL PRESSURE TOO LOW	STOP	 Flashes red	Yes	Safety – Engine oil pressure: Engine oil pressure too low.	Check engine oil level, top up oil if necessary, refer to Chapter 1-6, or contact your Unit for assistance.
	OIL PRESSURE TOO HIGH	STOP	 Flashes red	Yes	Safety – Engine oil pressure: Engine oil pressure too high.	Check engine oil level, drain oil if necessary, refer to Chapter 1-6. Contact your Unit for assistance.

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









TABLE 2 INDICATIONS ON THE DRIVER'S DISPLAY AND PANEL OF CHECK LAMPS (continued)

Display		Panel of check lamps	Audible signal	Meaning	Remarks/further procedure
Left	Right				
	ENGINE OIL TEMP. TOO HIGH	 Red	Yes	Workshop – Engine: Engine oil temperature too high.	Shift to a lower gear to improve cooling. Stop the vehicle as soon as it is safe, and leave the engine running at increased revs. Once the oil temperature has fallen (the message disappears): - Stop the engine and let it cool down. - Check the engine oil and coolant level, refer to Chapter 1-6. Contact your Unit for assistance.
	CHECK ENGINE OIL LEVEL	 Yellow	Yes	Information – Engine oil level: Oil level too low/too high or above/below the permitted maximum/minimum value.	Check engine oil level, refer to Chapter 1-6. If the vehicle is on a slope with the ignition ON, the display opposite may appear even though the oil level is actually OK. Display also appears when the oil level cannot be measured electrically or in the event of an electronic evaluator/wiring fault. Contact your Unit for assistance.
	COOLING SYSTEM STOP ENGINE	 Red	Yes	Safety – Engine: Engine cooling has failed.	Stop the vehicle as soon as it is safe. Contact your Unit for assistance.





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TABLE 2 INDICATIONS ON THE DRIVER'S DISPLAY AND PANEL OF CHECK LAMPS (continued)

Display		Audible signal	Meaning	Remarks/further procedure
Left	Right			
	COOLING SYSTEM <b>STOP</b>	 Red  Flashes red	Safety – Engine: Coolant temperature too high.	Shift to a lower gear to improve cooling. Stop the vehicle as soon as it is safe, and leave the engine running at increased revs. Once the coolant temperature has fallen (message disappears, thermometer in the green zone): – Stop the engine and let it cool down. – Check the coolant level, refer to Chapter 1-6. Contact your Unit for assistance.
	COOLANT TEMP. TOO HIGH	 Red	Workshop – Engine: Coolant temperature too high.	Shift to a lower gear to improve engine cooling. Check the coolant level, refer to Chapter 1-6.
	COOLANT LEVEL TOO LOW	 Yellow	Information – Engine: Not enough coolant in the cooling system.	Add coolant, refer to Chapter 1-6. Contact your Unit for assistance.
	ENGINE SPEED TOO HIGH	 Red	Function – Engine: Engine speed too high.	Shift into a higher gear, or reduce road speed.



(continued)

TABLE 2 INDICATIONS ON THE DRIVER'S DISPLAY AND PANEL OF CHECK LAMPS (continued)

Display		Audible signal	Meaning	Remarks/further procedure
Left	Right			
	CHANGE AIR FILTER	---	Information – Air filter: Air filter blocked.	Change air filter, refer to Chapter 1-6. Contact your Unit for assistance.
---	---	---	Function – Fuel: Fuel filter heater active. (Check lamp goes off approx. 5 seconds after engine start).	If the check lamp does not go off 5 seconds after engine start: – Check the fuel filter. – Check the circuit breaker in the engine compartment. Contact your Unit for assistance.
	REFUEL	Yes	Information – Fuel: Indication of fuel reserve.	Approximately 60 litres remains in the fuel tank. Top up fuel, refer to Chapter 1-6.
	TANK SENSOR FAILURE	Yes	Workshop – Fuel: Fuel reservoir monitor has failed.	Check circuit breaker. Contact your Unit for assistance.
	AIR PRESSURE DO NOT SHIFT	Yes	Workshop – Gearbox: No air pressure on automatic gearbox; no gear changes possible.	Contact your Unit for assistance.








(continued)

TABLE 2 INDICATIONS ON THE DRIVER'S DISPLAY AND PANEL OF CHECK LAMPS (continued)

Left	Display		Audible signal	Meaning	Remarks/further procedure
	Text message	Right			
	TCU FAILURE	STOP	Yes	Safety – Gearbox: Gearbox control unit has failed; no gear changes possible.	Stop the vehicle as soon as it is safe. Check the circuit breaker. Contact your Unit for assistance.
	NO ACCELERATION	--	Yes	Function – Automatic gearbox: Prompt to take foot off accelerator after ignition is switched ON.	Release accelerator. Gearbox cannot change gear due to excessive engine speed.
<b>i</b>	SHIFT TO NEUTRAL	--	Yes	Function – Gearbox: Shift the gearbox to neutral when the engine is stopped.	This indication only appears when the ignition is switched on. Shift the gearbox to neutral (N), refer to Chapter 1-5.
<b>i</b>	APPLY PARKING BRAKE	--	Yes	Function – Parking brake: Prompt to apply the parking brake.	Apply the parking brake, refer to Chapter 1-5.
<b>i</b>	SERVICE DUE	--	Yes	Information – Service: Prompt to call up the maintenance system.	Call up the maintenance system. Contact your Unit for assistance.







(continued)

TABLE 2 INDICATIONS ON THE DRIVER'S DISPLAY AND PANEL OF CHECK LAMPS (continued)

Display		Panel of check lamps	Audible signal	Meaning	Remarks/further procedure
Left	Right				
	STEER OIL PRESS. TOO LOW	---  Red	Yes	Workshop – Power steering: – Not enough oil in the power steering. – Changeover valve has failed. – Electrical short-circuit.	Contact your Unit for assistance.
	STEER OIL PRESS. TOO LOW	---  Red	Yes	Workshop – Power steering: – Not enough oil in the power steering. – Changeover valve has failed. – Electrical short-circuit.	Contact your Unit for assistance.
	STEER OIL LEVEL FAULT	---  Yellow	Yes	Workshop – Power steering: – Not enough oil in the power steering. – Electrical short-circuit.	Contact your Unit for assistance.
---	---	 Red	---	Function – Hydraulic oil level: – Fluid level in hydraulic tank too low. – Electrical connection of hydraulic switching contact is defective.	Check oil level in the hydraulic system, top up oil if necessary, refer to Chapter 1-6. Contact your Unit for assistance.





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TABLE 2 INDICATIONS ON THE DRIVER'S DISPLAY AND PANEL OF CHECK LAMPS (continued)

Display		Panel of check lamps	Audible signal	Meaning	Remarks/further procedure
Left	Right				
---	---	 Yellow	Yes	Function – Windscreen washer water: Fluid level in windscreen washer tank too low.	Top up with fluid, refer to Chapter 1-6.
---		---	---	Function – Power take-off is active.	---
	DEFFECTIVE SWITCH HAZ. WARN. LIGHTS	---	Yes	Workshop – Lighting: – Electrical connection to hazard warning light switch defective. – Hazard warning light function cannot be switched on.	Contact your Unit for assistance.
	LH HEADL. HEIGHT AUTOM. FAILURE	---	Yes	Information – Lighting: Left/right-hand headlight beam regulator has failed.	Contact your Unit for assistance.
	RH HEADL. HEIGHT AUTOM. FAILURE	 Yellow	Yes		








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TABLE 2 INDICATIONS ON THE DRIVER'S DISPLAY AND PANEL OF CHECK LAMPS (continued)

Left	Display		Panel of check lamps	Audible signal	Meaning	Remarks/further procedure
	Text message	Right				
↻↻	LH UNIT INDIC. FAILURE	---	---  Yellow	Yes	Information – Vehicle indicators: Failure of a left-/right-hand vehicle indicator. Lamp test out of tolerance.	TRAC text messages refer to prime mover. Change bulb immediately, refer to Chapter 1-6. Check the circuit breaker. Perform indicator test refer to Paras 103 to 112. Contact your Unit for assistance.
↻↻	RH UNIT INDIC. FAILURE	---	---  Yellow	Yes	Workshop – Switch defective: Electrical connection to left-/right-hand indicator switch defective.	Contact your Unit for assistance.
↻↻	DEFECTIVE SWITCH LH TURN INDIC.	---	---  Red	Yes		Contact your Unit for assistance.
↻↻	DEFECTIVE SWITCH RH TURN INDIC.	---	---  Red	Yes		Contact your Unit for assistance.

(continued)













TABLE 2 INDICATIONS ON THE DRIVER'S DISPLAY AND PANEL OF CHECK LAMPS (continued)

Display		Panel of check lamps	Audible signal	Meaning	Remarks/further procedure
Left	Right				
	LH TRAIL INDIC. FAILURE	---	Yes	Information – Trailer indicator 1: Failure of a left-/right-hand trailer indicator. Lamp test out of tolerance.	Change bulb immediately, refer to Chapter 1-6. Check circuit breaker.
	RH TRAIL INDIC. FAILURE	---	Yes		Perform indicator test, refer to Para 103. Contact your Unit for assistance.
	ERROR LH SIDE MARKER	---	Yes	Information – Lighting: Failure of at least one of the left/right-hand side marker lights on the vehicle.	Change LED block immediately. Also refer to Chapter 1-6. Check circuit breaker. Contact your Unit for assistance.
	ERROR RH SIDE MARKER	---	Yes		Change bulb immediately. Check circuit breaker. Contact your Unit for assistance.
	LH HIGH BEAM FAILURE	---	Yes	Information – Lighting: Left-/right-hand high beam or winter service lamp has failed.	Change bulb immediately. Check circuit breaker. Contact your Unit for assistance.
	RH HIGH BEAM FAILURE	---	Yes		Change bulb immediately. Check circuit breaker. Contact your Unit for assistance.
	RH FOG LAMP BEAM FAILURE	---	Yes		

(continued)










TABLE 2 INDICATIONS ON THE DRIVER'S DISPLAY AND PANEL OF CHECK LAMPS (continued)

Display		Panel of check lamps	Audible signal	Meaning	Remarks/further procedure
Left	Right				
	LH FOG LAMP FAILURE	---  Yellow	Yes	Information – Lighting: Left-/right-hand fog lamp bulb has failed.	Change bulb immediately. Check circuit breaker. Contact your Unit for assistance.
	UNIT R. FOG LAMP FAILURE	---  Yellow	Yes	Information – Lighting: Vehicle/trailer rear fog lamp has failed.	Change bulb immediately. Check circuit breaker. Contact your Unit for assistance.
	TRAI. R. FOG LAMP FAILURE	---  Red	Yes		
	DEFECTIVE SWITCH LOW BEAM	---  Red	Yes	Workshop – Lighting: Electrical connection to headlight low beam switch defective.	Contact your Unit for assistance.
	DEFECTIVE SWITCH HIGH BEAM	---  Red	Yes	Workshop – Lighting: Electrical connection to headlight high beam switch defective.	Contact your Unit for assistance.
	DEFECTIVE SWITCH HEADLIGHT FLASH	---  Red	Yes	Workshop – Lighting: Electrical connection to headlight flash switch defective.	Contact your Unit for assistance.









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TABLE 2 INDICATIONS ON THE DRIVER'S DISPLAY AND PANEL OF CHECK LAMPS (continued)

Left	Display		Panel of check lamps	Audible signal	Meaning	Remarks/further procedure
	Text message	Right				
	DEFECTIVE SWITCH FOG LAMP	---	---	Yes	Workshop – Lighting: Electrical connection to fog lamp switch defective.	Contact your Unit for assistance.
	DEFECTIVE SWITCH PARK LT. ON	---	---	Yes	Workshop – Lighting: Electrical connection to high parking lights switch defective.	Contact your Unit for assistance.
	LH UNIT PARK LT. FAILURE	---	---	Yes	Information – Lighting: Left-/right-hand vehicle parking light or winter service lamp has failed.	Change bulb immediately. Check circuit breaker. Contact your Unit for assistance.
	RH UNIT PARK LT. FAILURE	---	---	Yes		
	PARKING LIGHTS FAILURE	---	---	Yes	Information – Lighting: Parking lights defective.	Check circuit breaker. Contact your Unit for assistance.
	LH AUX. HIGH BEAM FAILURE	---	---	Yes	Information – Lighting: Left-/right-hand auxiliary high beam (if fog lamp fitted) has failed.	Change bulb immediately. Check circuit breaker. Contact your Unit for assistance.
	RH AUX. HIGH BEAM FAILURE	---	---	Yes		








(continued)

TABLE 2 INDICATIONS ON THE DRIVER'S DISPLAY AND PANEL OF CHECK LAMPS (continued)

Display		Panel of check lamps	Audible signal	Meaning	Remarks/further procedure
Left	Right				
	LH LOW BEAM FAILURE	---  Yellow	Yes	Information – Lighting: Left-/right-hand low beam or winter service lamp has failed.	Change bulb immediately. Check circuit breaker. Contact your Unit for assistance.
	RH LOW BEAM FAILURE	---  Yellow	Yes	---	---
---	---	 Green	Indicator	Function – Indicator on trailer: Indicator on trailer flashing.	---
---	---	 Green	---	Function – Headlight low beam: Headlight low beam on.	Check lamp is located in rev counter.
---	---	 Blue	---	Function – Headlight high beam: Headlight high beam on.	---
---		---	---	Function – Rear fog lamp: Rear fog lamp on.	For information, refer to Paras 130 and 133.








(continued)

TABLE 2 INDICATIONS ON THE DRIVER'S DISPLAY AND PANEL OF CHECK LAMPS (continued)

Left	Display		Panel of check lamps	Audible signal	Meaning	Remarks/further procedure
	Text message	Right				
	UNIT BRAKE LAMP FAILURE	---	---	Yes	Workshop – Brake lamp: Vehicle/trailer brake lamp has failed.	Change bulb immediately. Check circuit breaker. Contact your Unit for assistance if necessary.
	TRAIL BRAKE LAMP FAILURE	---	---	Yes		
	END LIGHT TEST	---	---	---	Function – Lighting learning routine: Turn indicator test is complete or lighting values have been successfully learned.	Refer to Paras 113 to 120.
	LIGHT TEST	---	---	---	Function – Lighting learning routine: Lighting learning routine (turn indicator test) can be started.	Refer to Paras 113 to 120.
	LIGHT TEST ABORT	---	---	---	Function – Lighting learning routine: Lighting learning routine (turn indicator test) has been cancelled.	---
	DANGER! BLACK ICE	---	---	Yes	Information – Black ice: Indication of low outside temperature (risk of black ice).	Adapt driving style to suit the weather conditions, refer to Paras 79 to 81
	TCO FAILURE	---	---	Yes	Workshop – Tachograph: Tachograph has failed.	If Tachograph is fitted, check circuit breaker. Contact your Unit for assistance.






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TABLE 2 INDICATIONS ON THE DRIVER'S DISPLAY AND PANEL OF CHECK LAMPS (continued)

Display		Panel of check lamps	Audible signal	Meaning	Remarks/further procedure
Left	Right				
	CHECK TCO	---  Red	Yes	Workshop – Tachograph: Tachograph not OK.	If Tachograph is fitted, check circuit breaker. Contact your Unit for assistance.
<b>KSM</b>	KSM FAILURE	---  Red	Yes	Workshop – For 9 tonne MM vehicle and 15 tonnes MM vehicle, customer-specified module (KSM): Control unit for external data exchange has failed.	Contact your Unit for assistance.
---	---	 Red	Yes	Function – Emergency off: Activate emergency off.	For more information, refer to Chapter 1-5.
	MAX XXX	---	---	Function – Driving speed limiting: Driving speed limiting is activated. XXX stands for the set speed.	The driving speed limiting symbol, the MAX display and the set speed limit appear on the display.
	MEMO XXX	---	---	Function – Driving speed limiting: Driving speed limiting is deactivated. XXX stands for the set speed.	The driving speed limiting symbol, the MEMO display and the last set speed limit appear on the display.
	SET XXX	---	---	Function – Cruise control: Cruise control is activated. XXX stands for the set speed.	The cruise control symbol, the SET display and the set speed appear on the display.

(continued)

TABLE 2 INDICATIONS ON THE DRIVER'S DISPLAY AND PANEL OF CHECK LAMPS (continued)

Display		Audible signal	Meaning	Remarks/further procedure
Left	Right			
	MEMO XXX	---	Function – Cruise control: Cruise control is deactivated. XXX stands for the set speed.	The cruise control symbol, the MEMO display and the last set speed appear on the display.
	SET XXX	---	Function – Cruise control function: Cruise control function is activated. XXX stands for the set speed.	The cruise control symbol, the SET display and the set speed appear on the display.
	MEMO XXX	---	Function – Cruise control function: Cruise control function is deactivated. XXX stands for the set speed.	The MEMO display and the last set speed appear on the display.
---	---	---	Crane operation.	Crane variants only.
	CRANE OPERATION	---	Crane operation.	Crane variants only.
<b>T</b>	TCO SIM FAILURE	Yes	Tachograph simulator has failed.	If Tachograph simulator is fitted, check circuit breaker. If the Tachograph simulation battery has a total loss of power, the unit must be reprogrammed. Contact the unit maintenance advisor for assistance.
		Yellow		

## MENU STRUCTURE ON THE DRIVER'S DISPLAY

### WARNING

**PERSONAL INJURY. ONLY OPERATE THE MENU ON THE DRIVER'S DISPLAY WHEN THE VEHICLE IS STATIONARY.**

50 Refer to Fig 23. Different levels of the menu can be accessed depending on the status of the vehicle. The majority of the menus are available when the ignition is switched on and the engine is stopped.

51 The content of the menu depends on the equipment installed and the status of the vehicle.

52 There are three types of status as follows:

52.1 Engine stopped and vehicle stationary.

52.2 Engine running and vehicle stationary.

52.3 Engine running and vehicle moving.

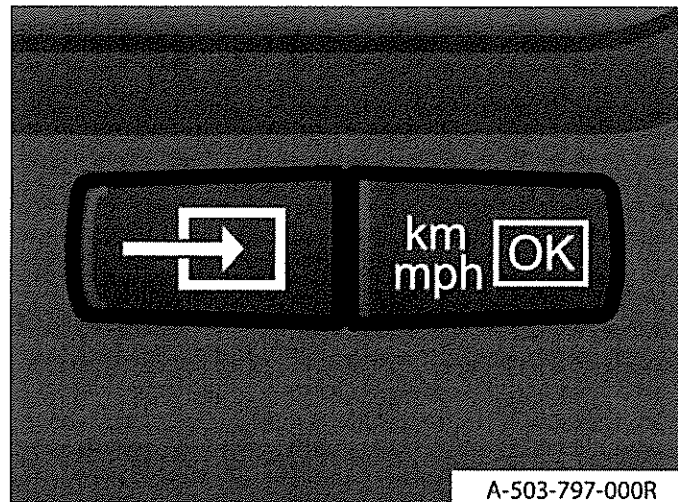


Fig 23 Vehicle menu button

### Activating the menu

53 Refer to Fig 23. The menu on the driver's display is controlled using two buttons; an arrow button and an OK button. There are two ways of using the buttons: **PRESSING** and **TOUCHING**:

53.1 **PRESSING** = Press and hold to call up the menu.

53.2 **TOUCHING** = Briefly press to scroll through the menu.

54 Refer to Fig 24. The functions performed by the arrow button are indicated by the left-hand icon on the driver's display, while those performed by the OK button are indicated by the right-hand icon, refer to Table 6.

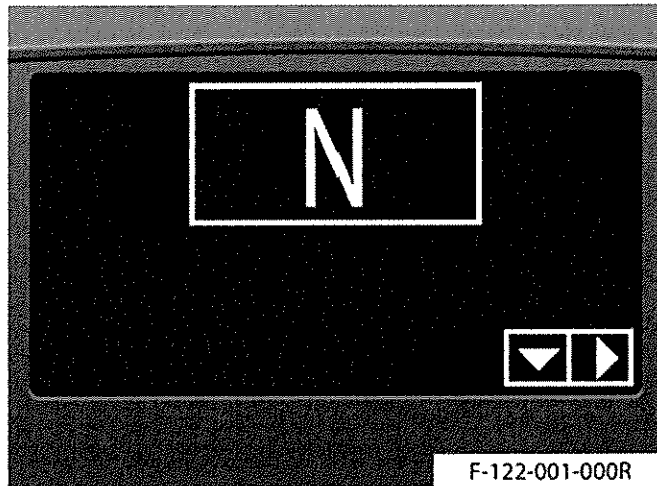


Fig 24 Arrow buttons

55 With the exception of continuous displays, the menu on the driver's display is automatically closed after 30 seconds if no button is pressed.

#### Exiting the menu

56 Refer to Fig 25. To exit the menu, press the OK button.

57 Pressing the OK button will close a continuously monitoring display.

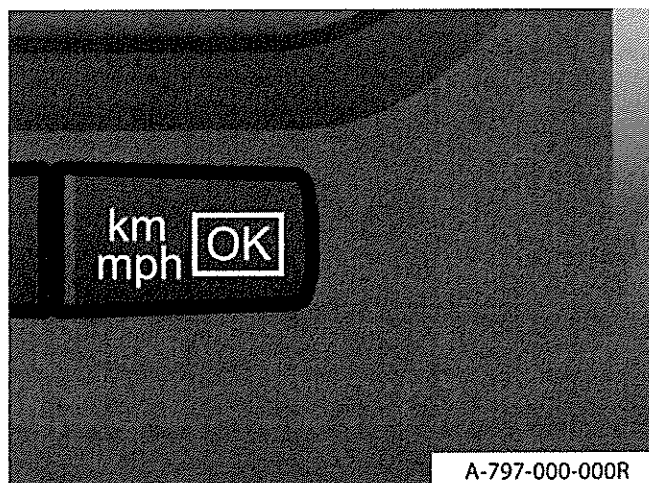


Fig 25 Ok button



**Menu structure (vehicle stationary – engine stopped)**

58 Refer to Table 3. The menu structure on the driver's display with the vehicle stationary and the engine stopped is shown below. The menu structure includes possible special equipment.

**TABLE 3 MENU STRUCTURE (VEHICLE STATIONARY – ENGINE STOPPED)**

Ser (a)	Driving Data (b)	Monitoring Data (c)	Settings (d)	Maint (e)	Diagnosis (f)	Language (g)
1	Display OFF	Oil level (M)	Warning speed		Control unit (U)	English
2	Position	Oil temperature (M)	Warning signal		Check lamp test	Deutsch
3	Current consumption (M)	Battery voltage (M)	Consumption		Vehicle data	
4	Average consumption (M)	Reservoir pressure (M)				
5	Trip consumption (M)	Crankshaft revs				
6	Total consumption					
7	Driving time (M)					
8	Trip time					
9	Average speed (M)					
10	Reset trip data					

(M) = Monitoring (selected function is permanently displayed on the driver's display)

**Oil health monitoring programme**

**NOTE**

The programme monitors oil condition with engine oil replacement at 4 years or 10,000 litres of fuel consumed, whichever comes first.

59 Refer Fig 26. To access the total 'Fuel Consumed' menu with engine stopped, proceed as follows:

59.1 From the drivers display menu, select 'Tractor Vehicle'.

59.2 From 'Tractor Vehicle' tab down to 'Driving Data'.

59.3 From 'Driving Data' tab down to 'Total Consumption'.



Fig 26 Oil health monitoring programme

**Menu structure (vehicle stationary – engine running)**

60 Refer to Table 4. The menu structure on the driver's display with the vehicle stationary and the engine running is shown below. The menu structure includes possible special equipment.

**TABLE 4 MENU STRUCTURE (VEHICLE STATIONARY – ENGINE RUNNING)**

Ser (a)	Driving Data (b)	Monitoring Data (c)	Settings (d)	Maint (e)	Language (f)
1	Display OFF	Oil level (M)	Warning speed		English
2	Position	Oil temperature (M)	Warning signal		Deutsch
3	Current consumption (M)	Battery voltage (M)	Consumption		
4	Average consumption (M)	Reservoir pressure (M)			
5	Trip consumption (M)	Crankshaft revs			
6	Total consumption				
7	Driving time (M)				
8	Trip time				
9	Average speed (M)				
10	Reset trip data				

(M) = Monitoring (selected function is permanently displayed on the driver's display)

**Menu structure (vehicle in motion)**
























61 Refer to Table 5. The menu structure on the driver's display with the vehicle in motion is shown below. The menu structure includes possible special equipment.

**TABLE 5 MENU STRUCTURE (ENGINE RUNNING AND VEHICLE DRIVING)**

<b>Ser (a)</b>	<b>Driving Data (b)</b>	<b>Monitoring Data (c)</b>	<b>Settings (d)</b>	<b>Language (e)</b>
1	Display OFF	Oil level (M)	Warning speed	English
2	Position	Oil temperature (M)	Warning signal	Deutsch
3	Current consumption (M)	Battery voltage (M)	Consumption	
4	Average consumption (M)	Reservoir pressure (M)		
5	Trip consumption (M)			
6	Total consumption			
7	Driving time (M)			
8	Trip time			
9	Average speed (M)			
10	Reset trip data			

(M) = Monitoring (selected function is permanently displayed on the driver's display)

TABLE 6 ICONS AND BUTTON FUNCTIONS – DRIVER'S DISPLAY MENU

Display symbol for button		Button actions		Button functions	
		Button	Action		
			Touch	Scroll through the menu	
			Press	Go back one level in the menu	
	OK		Touch	Change to selected level in the menu	
			Press	Change values in direction of arrow, e.g. set a higher warning speed or increase volume NOTE: You can reverse the direction arrows by releasing the button	
			Touch	Exit the selected level in the menu, or save values	
			Press	Completely exit vehicle menu and save values	
	OK		Touch	Scroll through the menu	
			Press	Change values in direction of arrow, e.g. set a higher warning speed or increase volume NOTE: You can reverse the direction arrows by releasing the button	
			Touch	Exit the selected level in the menu or save values	
			Press	Completely exit vehicle menu and save values	
			---	No function	
			Touch	Change to selected menu	
			Press	Completely exit vehicle menu and save values	
	OK		---	No function	
				Touch	Exit the selected level in the menu or save values
				Press	Completely exit vehicle menu and save values
	OK		Press	Call up continuous display	
				Touch	Exit the selected level in the menu or save values
				Press	Completely exit vehicle menu and save values
	OK		Touch	Switch through consumption units, or select additional features (e.g. trip time or operating hours)	
			Press	Call up continuous display	
			Touch	Exit the selected level in the menu or save values	
			Press	Completely exit vehicle menu and save values	

## LAMP TEST ON PANEL OF CHECK LAMPS

### WARNING

**PERSONAL INJURY. ONLY OPERATE THE MENU ON THE DRIVER'S DISPLAY WHEN THE VEHICLE IS STATIONARY.**

62 The lamp test can be performed to check that all the check lamps and warning lights on the panel of check lamps are functioning correctly. Several of the check lamps and warning lights must come on both red and yellow during this test (for example, the central warning light), or can also come on in a colour not used in normal operation (for example, fuel filter heater). Contact your Unit for assistance immediately if any of the check lamps or warning lights are defective.

63 For reasons of road safety, the lamp test must only be performed when the vehicle is stationary.

64 The lamp test can be performed with the ignition key, or using the vehicle menu structure on the driver's display.

65 Some of the check lamps or warning lights on the panel of check lamps may not be used, depending on the level of vehicle equipment. If check lamps or warning lights are not used, 'bars' come on in their place when the lamp test is performed. All yellow check lamps and warning lights, as well as the blue lamp for headlight high beam and the green lamp for the trailer turn indicators, must come on in the same way.

66 The lamp test is cancelled if the engine is started during the lamp test.

### Lamp test with the ignition key

67 Refer to Fig 27. The lamp test runs automatically (before the engine is started) and lasts a total of approximately 6 seconds. Proceed as follows:

- 67.1 Apply the parking brake.
- 67.2 Turn the ignition key to the ignition on position (I).
- 67.3 Turn the ignition key to the driving position (II).

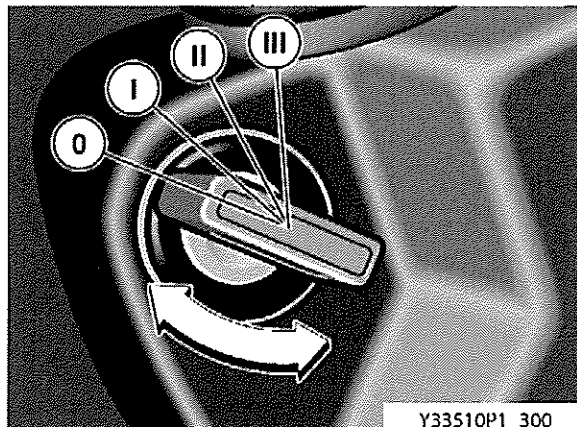


Fig 27 Check lamp test with the ignition key

68 All the check lamps and 'bars' in the instrument panel come on.

69 Refer to Fig 28. The check lamps come on alternately red and yellow for approximately 3 seconds. Refer to Para 73 and Para 74 for details of the red lamps and yellow lamps.

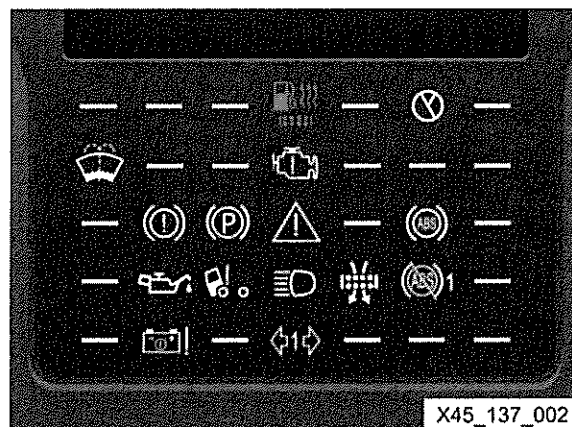


Fig 28 Dashboard warning lamps

### Lamp test using the vehicle menu on the driver's display

70 The lamp test can be performed using the menu structure. Refer to Para 58 for a description of the menu structure on the driver's display.

71 Refer to Fig 27. To perform the lamp test using the menu structure on the driver's display, proceed as follows:

71.1 Apply the parking brake.

71.2 Turn the ignition key to the ignition on position (I).

71.3 Turn the ignition key to the driving position (II).

71.4 Refer to Fig 29. Call up vehicle menu on the driver's display, select Diagnosis and Check lamp test. The Dual LED red menu option appears.

71.5 Touch the right button to start the check lamp test for the red lamps. All red lamps and 'bars' should come on. Refer to Para 73 for a list of the lamps.

71.6 Use the left button to call up the Dual LED yellow menu option. Touch the right button to start the check lamp test for the yellow lamps. All yellow lamps and 'bars' should come on. Refer to Para 74 for a list of the lamps.

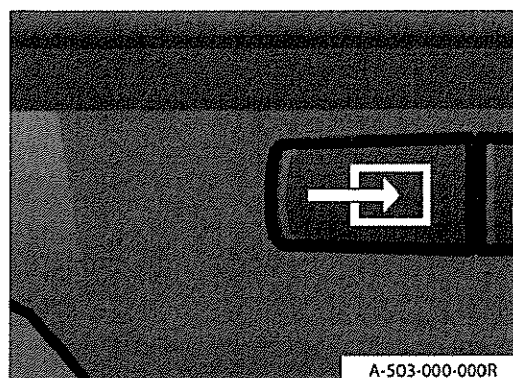


Fig 29 Dashboard menu button

72 The vehicle menu closes if no button is pressed within 30 seconds.

**CHECK LAMPS AND WARNING LIGHTS**

**Red lamps and lights**

73 Refer to Fig 30 and Table 7 for the check lamps and warning lights that come on red.

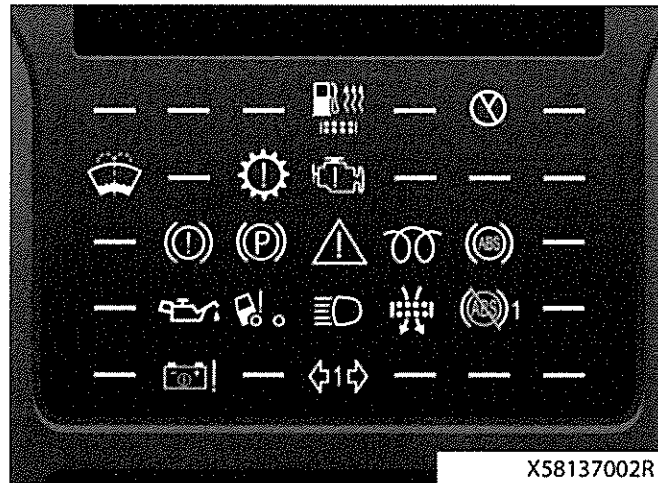


Fig 30 Red check lamps and warning lights

**TABLE 7 RED CHECK LAMPS AND WARNING LIGHTS**

Symbol	Description	Symbol	Description
	Hydraulic system		Central warning light
	Engine		Engine oil pressure
	Brake system		Cab lock
	Parking brake		Emergency off fault

**Yellow lamps and lights**

74 Refer to Fig 31 and Table 8 for the check lamps and warning lights that come on yellow are as follows:

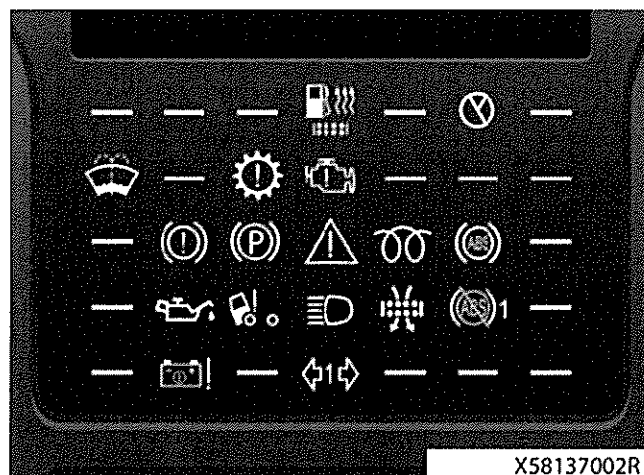












Fig 31 Yellow check lamps and warning lights






























TABLE 8 YELLOW CHECK LAMPS AND WARNING LIGHTS

Symbol	Description	Symbol	Description
	Fuel filter heater		Anti-lock Brake System (ABS)
	Hydraulic system		Headlight high beam
	Windscreen washers		Air filter
	Engine		ABS information in trailer
	Central warning light		Turn indicators in trailer

## ROCKER SWITCHES AND BUTTONS

75 The rocker switches and buttons are shown in Table 9.

TABLE 9 ROCKER SWITCHES AND BUTTONS

Symbol	Description	Symbol	Description	Symbol	Description
	Hazard warning lights.		Mirror heaters.		Transverse differential lock (rear axle).
	Rear fog lamp.		Instrument lighting.		Transverse differential lock (front axle).
	Light test.		Hill start switch.		All-wheel drive.
	Using vehicle menu on display.		<ul style="list-style-type: none"> <li>– Confirm yellow message.</li> <li>– Changing between kilometre and mph display on the speedometer.</li> <li>– Using vehicle menu on display.</li> </ul>		Turn off reversing alarm signal.
	Electrical battery master switch.		Windscreen heating (armoured variants only).		Hydraulic system of the winch (if fitted).
	Time / outside temperature.		Off-road range.		Interaxle differential lock (If fitted).
	Auxiliary heater.		12-pole trailer socket.		Recovery beacon (if fitted).
	Ventilation.		ABS off-road logic.		Working spotlight (If fitted).
	BrakeMatic function.		Changing over from road speed limiter (RSL) to cruise control (RSG) and vice versa.		Reversing camera (if fitted).
	Emergency off switch.				Tail lift (if fitted).



### TIME AND OUTSIDE TEMPERATURE DISPLAY

76 The time is displayed in the 24-hour format and the outside temperature is displayed in °C.

77 Refer to Fig 32. The displayed outside temperature may be slightly higher than the actual outside temperature. The difference is due to the heat from the engine and the heater if the vehicle is stationary or travelling at very low speed.

#### Displaying time or outside temperature

78 Refer to Fig 32. Briefly press the time/outside temperature button (1) to switch the display between the time and the outside temperature. The illustration shows an example outside temperature (2).

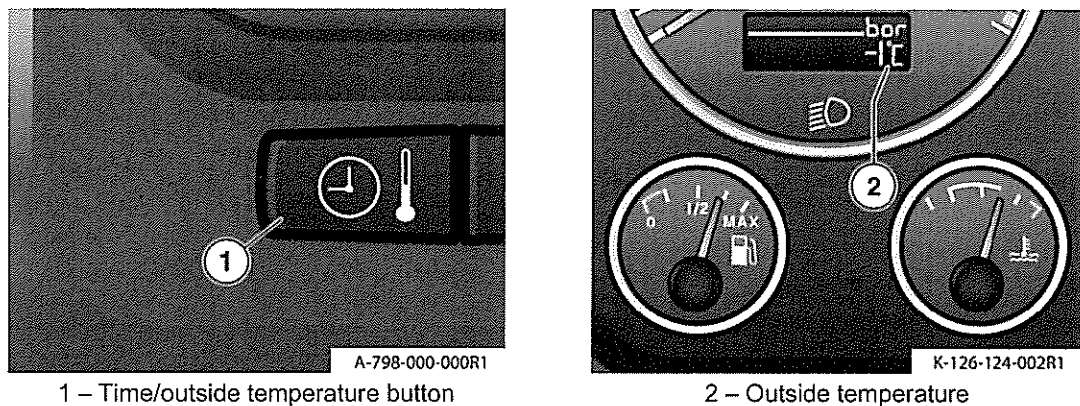


Fig 32 Displaying time or outside temperature

#### Black ice warning

##### WARNING

**DRIVING SAFETY. THE BLACK ICE WARNING MAY NOT APPEAR WHEN CONDITIONS ARE ICY AS THE OUTSIDE TEMPERATURE SENSOR CANNOT DETECT BLACK ICE. DRIVING STYLE MUST BE ADAPTED TO SUIT WEATHER CONDITIONS.**

79 Refer to Fig 33 .The black ice warning appears when the vehicle is travelling faster than 10 km/h and one of the temperature conditions is present as follows:

- 79.1 The outside temperature is between -5°C and +8°C and is rising.
- 79.2 The outside temperature is between +3°C and -10°C and is falling.

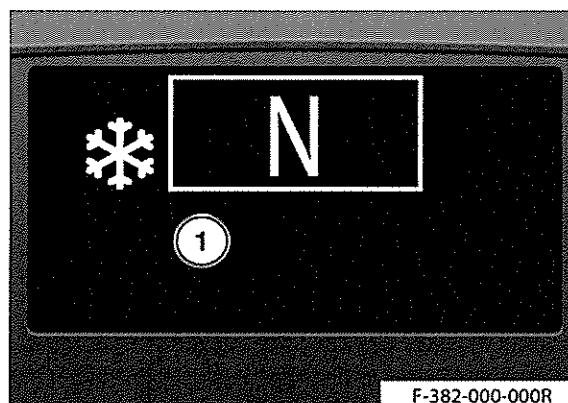


Fig 33 Black ice warning

80 Refer to Fig 33. When the conditions for black ice are detected, the driver's display shows the black ice symbol and the text 'DANGER! BLACK ICE' (1). Refer to Fig 34. The central warning light comes on yellow and an audible warning sounds.



Fig 34 Central warning light

81 The text 'DANGER! BLACK ICE' and the time and outside temperature appear alternately on the driver's display.

#### Setting the time display

#### WARNING

**PERSONAL INJURY. ONLY SET THE TIME WHEN THE VEHICLE IS STATIONARY.**

82 Refer to Fig 35. To set the time display, proceed as follows:

- 82.1 Make sure the vehicle is stationary and the parking brake applied.
- 82.2 Switch on the ignition.
- 82.3 Switch to the time display, refer to Para 76.
- 82.4 Press and hold the time/outside temperature button until the required time appears in the display (1), then release the time/outside temperature button.

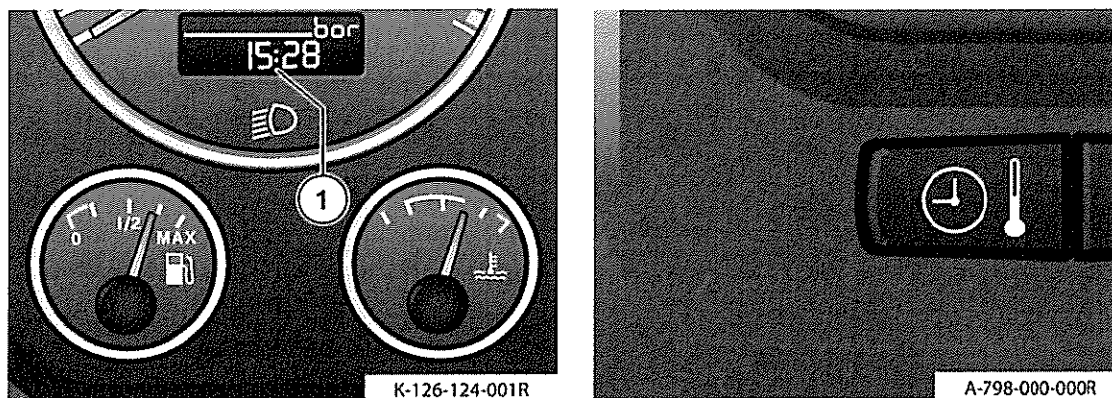


Fig 35 Setting the time display

### SPEEDOMETER DISPLAY

83 The speedometer display can indicate one of the following:

- 83.1 Trip counter in km.
- 83.2 Digital driving speed display in mph.
- 83.3 Total kilometres.

84 Refer to Fig 36. In the illustration, total kilometres are displayed in the window.



Fig 36 Speedometer display

85 Refer to Fig 37. To change the speedometer display, briefly press the km/mph/ok button.

86 To zero the trip counter, press and hold the km/mph/ok button.

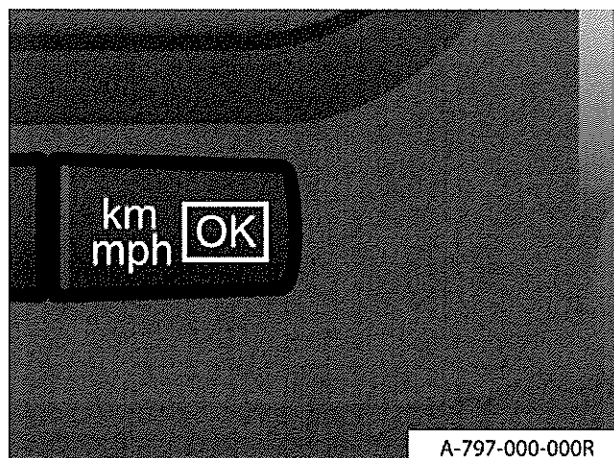
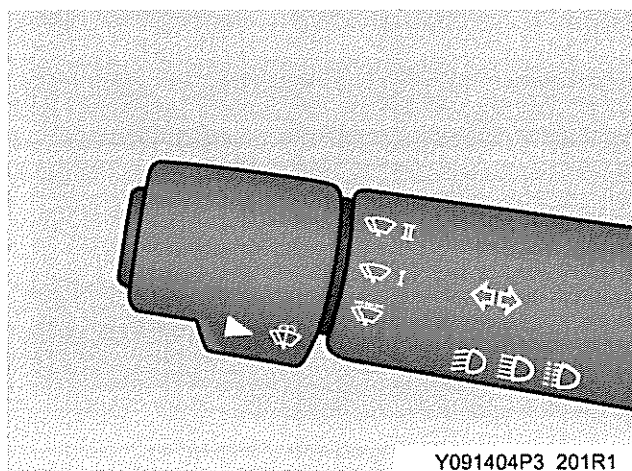


Fig 37 Km/mph/ok button

**COMBINATION SWITCH**

87 Refer to Fig 38. The combination switch is attached to the left side of the steering column and is used to operate the following functions:

- 87.1 Windscreen washers and wipers. Refer to Para 88.
- 87.2 Horn. Refer to Para 98.
- 87.3 Headlights. Refer to Para 126.
- 87.4 Indicators. Refer to Para 100.



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Fig 38 Combination switch

## WINDSCREEN WASHERS AND WIPERS

### Washing the windscreen

#### WARNING

**PERSONAL INJURY. TO PREVENT INJURY DO NOT CLEAN THE WINDSCREEN FROM THE OUTSIDE WHEN THE WINDSCREEN WIPERS ARE SWITCHED ON. SWITCH OFF THE WINDSCREEN WIPERS.**

88 Refer to Fig 39. For a single wash and wipe, briefly press the handle (1) to the stop.

89 For a prolonged wash and wipe, press the handle (1) to the stop. When the handle is released, a further three wipe cycles follow.

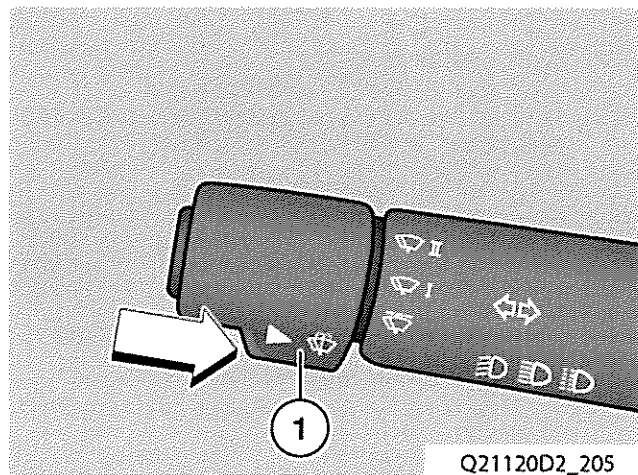


Fig 39 Washing the windscreen

### Operating the windscreen wipers

90 Refer to Fig 40. The windscreen wipers are operated by turning the handle (1) of the steering column stalk to select the desired position.

- 90.1 Position 0 - Off (rest position of the windscreen wipers).
- 90.2 Position A - Intermittent wipe.
- 90.3 Position B - Slow wipe.
- 90.4 Position C - Fast wipe.

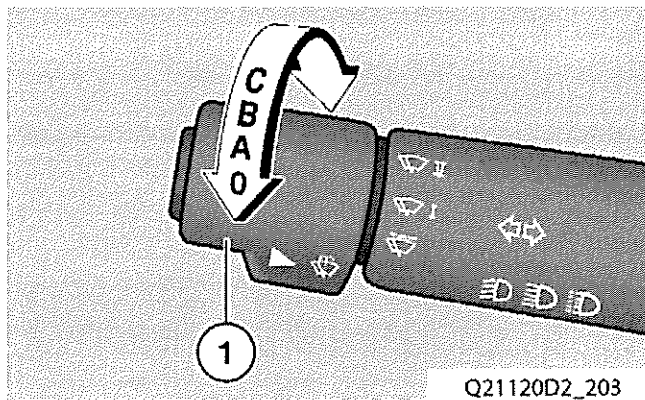


Fig 40 Operating the windscreen wipers

### Intermittent wipe

91 The default intermittent wipe setting is programmed to approximately 10 seconds. The interval is variable between approximately 2.5 secs and 60 seconds. Refer to Para 94.

92 Refer to Fig 41. To switch on the intermittent wipe, turn the handle (2) of the steering column stalk to position A.

93 The intermittent wipe can be switched off by turning the handle (2) of the steering column stalk to position 0.

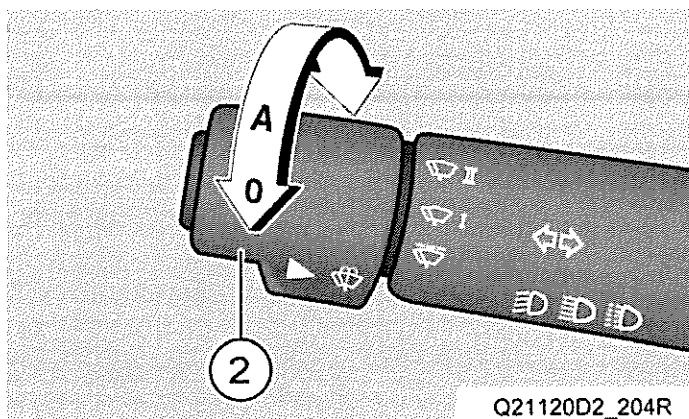


Fig 41 Operating the intermittent wipe



**VEHICLE HORN**

98 Refer to Fig 44. The vehicle is equipped with an electric horn.

99 To operate the electric horn, press the push-button (1) in the steering column stalk in the direction of arrow A.

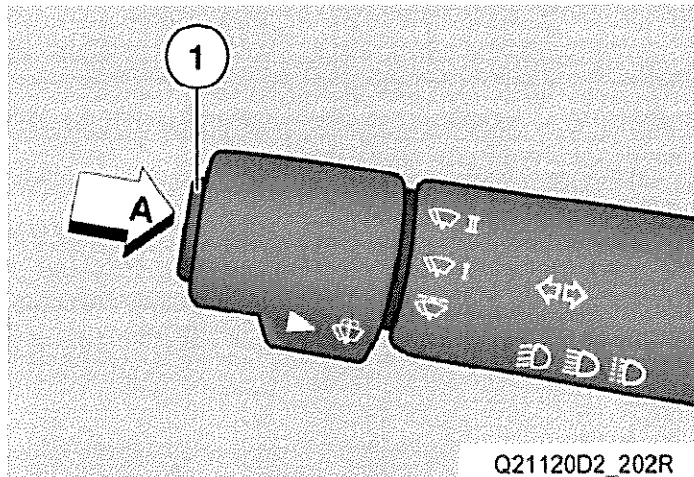


Fig 44 Vehicle horn

**TURN INDICATORS**

100 Refer to Fig 45. To operate the turn indicator switch, proceed as follows:

100.1 To indicate a left turn, press the column stalk down past the pressure point C to position D.

100.2 To indicate a right turn, press the column stalk up past the pressure point A to position B.

100.3 The indicators switch off when the steering wheel has returned to the straight ahead position and the column stalk has sprung back to the 0 position.

100.4 The column stalk can be manually returned to the 0 position.

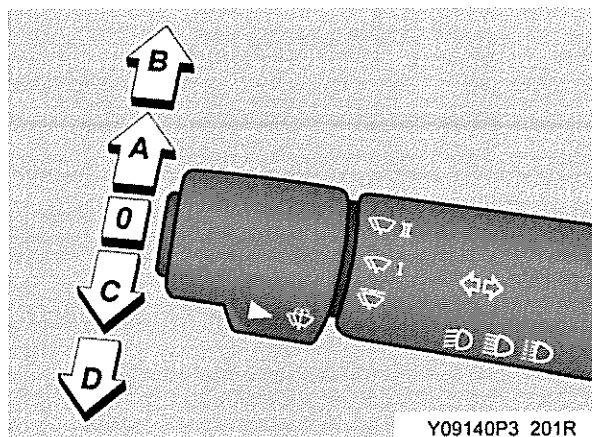


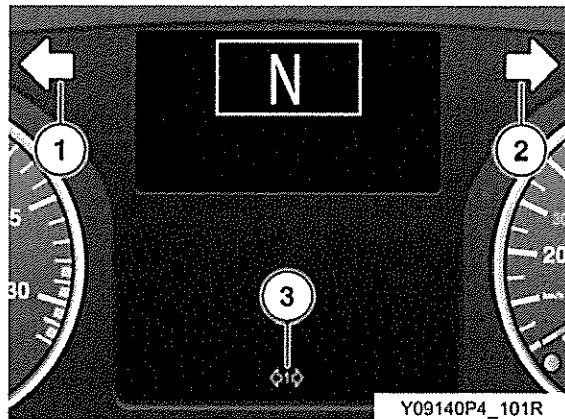
Fig 45 Turn indicators

101 For brief indications, press the column stalk to the C position for a left turn or to the A position for a right turn.



### Symbols on the driver's display

102 Refer to Fig 46. The symbols are listed in the legend below.



1 – Indicating left  
2 – Indicating right

3 – Indicating when towing a trailer

Fig 46 Indication symbols

### Turn indicator test

103 The turn indicator test checks the function of the turn indicators on the vehicle and trailer when a trailer is hitched up. The turn indicator test should be carried out when the vehicle is first received, after a bulb has been changed or whenever a trailer is hitched up. This turn indicator test lasts 2 minutes and involves all the turn indicators on the vehicle and trailer being switched on and off at intervals of approximately 1.5 seconds.

104 The test can only be carried out with the parking brake applied.

105 A turn indicator defect is indicated on the driver's display, refer to Para 37.

106 The central on-board computer performs the trailer turn indicator test automatically whenever the trailer is changed.

107 The minimum lamp load is:

107.1 Vehicle: 2x21 W per side.

107.2 Trailer: 1x18/21 W per side.

108 If the lamp load is any lower, the test is cancelled.

109 The maximum lamp load is:

109.1 Vehicle: 4x21 W per side.

109.2 Trailer: 4x21 W per side.

110 To perform the turn indicator test, proceed as follows:

111 Apply the parking brake and switch on the ignition.

111.1 Refer to Fig 47. Press the bottom of the rocker switch for the lighting learning routine. The check lamp in the rocker switch comes on.

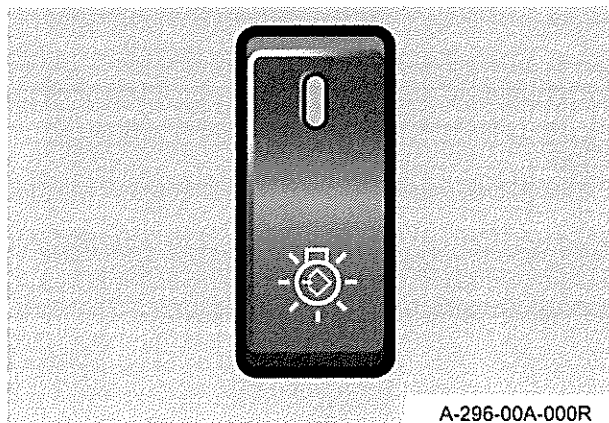


Fig 47 Lighting learning routine rocker switch

111.2 Switch off the ignition and remove the ignition key.

111.3 Within 2 minutes carry out the following:

111.3.1 Refer to Fig 48. Operate the headlight flash for approximately 1 second, the lighting learning routine begins.

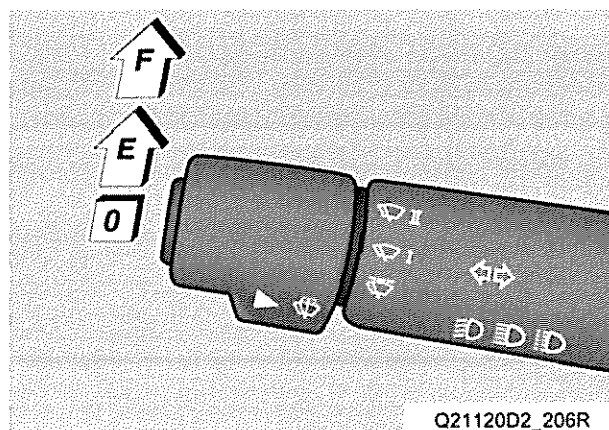


Fig 48 Headlight flash

111.3.2 Refer to Fig 45. Check that the turn indicators are functioning correctly.

111.3.3 Refer to Fig 48. Operate the headlight flash for approximately 1 second. The turn indicator test has now been concluded and the system has learned the lamp load.

112 The light test is cancelled if the headlight flash is not operated within 2 minutes during the light test. The function of the turn indicators has not been checked.

113 If the ignition is turned off when the engine is running, the engine is stopped and the indicator test is cancelled.

## LIGHTING

### WARNING

**DANGER OF ACCIDENTS. THE VEHICLE'S OPERATING PERMIT IS INVALIDATED IF THERE IS A MALFUNCTION OF THE EXTERIOR LIGHTING, DO NOT CONTINUE TO DRIVE.**

#### Exterior lighting test

- 114 The test can only be carried out with the parking brake applied.
- 115 The test can be carried out with the engine running or stopped.
- 116 The ignition must be switched on before turning on electrical components.
- 117 The exterior lighting test checks the function of the exterior lighting on the vehicle and trailer.
- 118 The exterior lighting test should be carried out after a bulb has been changed or when a trailer is hitched or unhitched.
- 119 This light test takes approximately 2 minutes and involves all the exterior lights on the vehicle and trailer being switched on and off at intervals of about 1.5 seconds.
- 120 To perform the exterior lighting test, proceed as follows:
  - 120.1 Apply the parking brake and switch on the ignition.
  - 120.2 Switch off the exterior lighting.
  - 120.3 Refer to Fig 49. Press the bottom of the light test switch.

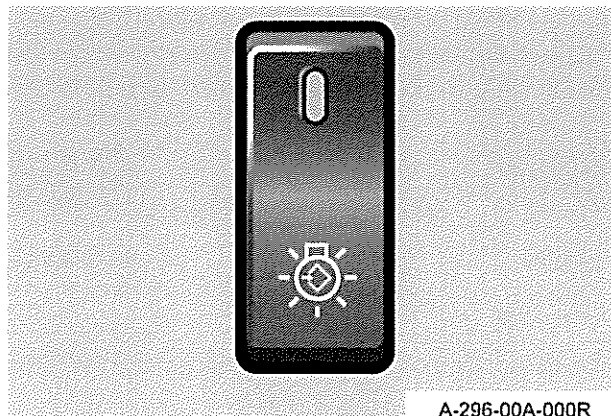


Fig 49 Lighting learning routine rocker switch

- 120.4 Switch off the ignition.
- 120.5 The exterior lighting test starts and the text message 'LIGHT TEST' appears on the driver's display.
- 120.6 Check the function of the exterior lights.
- 120.7 The message 'END LIGHT TEST' is shown on the display if the update was successful.

121 To cancel the exterior lighting test, proceed as follows:

121.1 Press the top of the light test switch.

121.2 The text message 'LIGHT TEST ABORT' appears on the drivers display.

### Light switch

122 The ignition must be switched on for the light switch to function.

123 Refer to Fig 50. The switch positions are as follows:

123.1 T - instrument panel illumination.

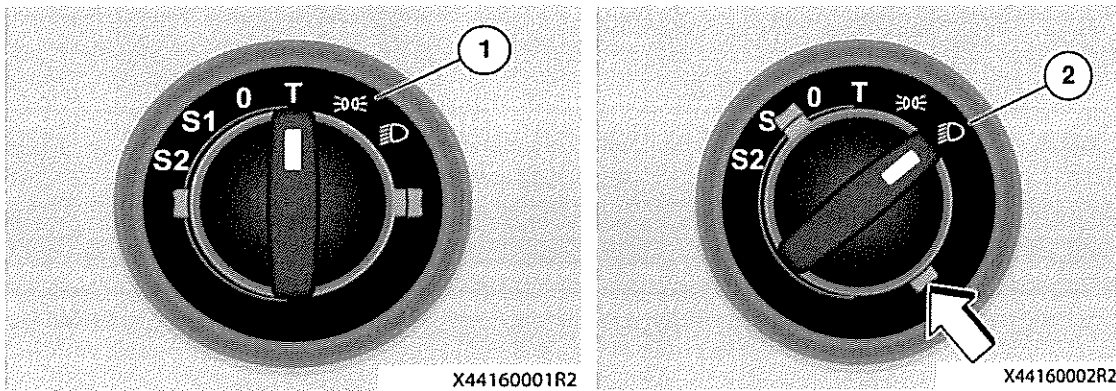
123.2 Parking lights (1).

123.3 Headlight low beam (2).

123.4 0 - all lights off.

123.5 S1 - convoy light.

123.6 S2 - convoy light and front parking lights.



1 – Parking lights

2 – Headlight low beam

Fig 50 Light switch

124 To switch off all the lights except for the instrument lighting, proceed as follows:

124.1 Push the bar (arrowed) to the right.

124.2 Press, then turn the switch to position 0.

**OR**

124.3 Press, then turn the switch to position T.

124.4 Switch on the ignition.

### Headlight high beam

125 If the headlight high beam is defective, the check lamp appears on the driver's display.

126 To operate the headlight high beam, proceed as follows:

126.1 Refer Fig 51. Pull the stalk beyond pressure point E to position F.

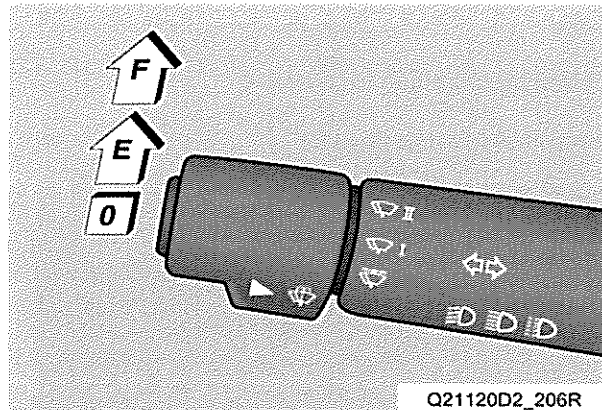


Fig 51 Headlight high beam

126.2 Release the stalk. The stalk will automatically return to position 0.

126.3 Refer to Fig 52. The blue high beam check lamp appears on the driver's display.

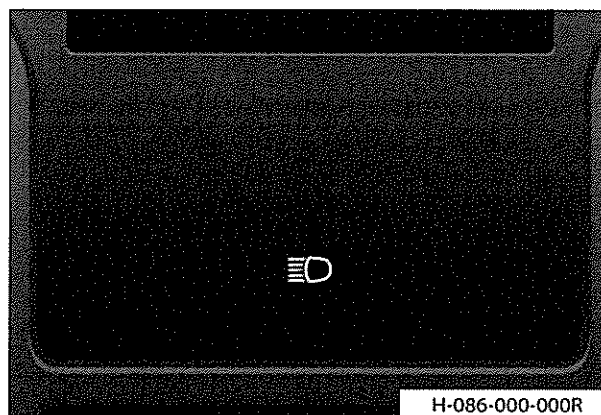


Fig 52 High beam check lamp

127 To switch off the headlight high beam, proceed as follows:

127.1 Pull the stalk beyond pressure point E to position F.

127.2 Release the stalk. The stalk will automatically return to position 0.

127.3 The blue high beam check lamp goes off on the driver's display.

**Headlight flash**

128 Refer to Fig 53. To operate the headlight flash, proceed as follows:

- 128.1 Push and hold the stalk to pressure point E.
- 128.2 The blue high beam check lamp comes on.
- 128.3 Release the stalk.
- 128.4 The stalk will automatically return to position 0.
- 128.5 The blue high beam check lamp goes off.

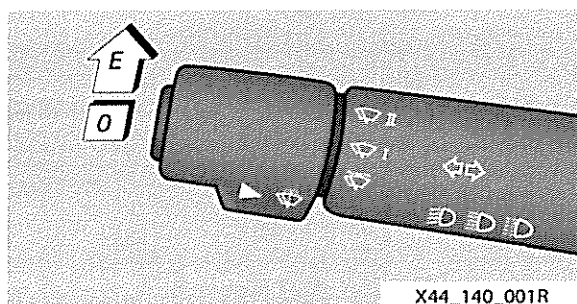


Fig 53 Headlight flash

**Rear fog lamps, general**

129 The vehicle rear fog lamps are deactivated when a trailer is being towed.

130 A warning light appears on the driver's display if the rear fog lamps are defective.

**Rear fog lamps**

131 Refer to Fig 54. To switch on the rear fog lamp, proceed as follows:

- 131.1 Switch on headlight low beam.
- 131.2 Press the bottom of the rocker switch. The check lamp in the switch comes on.
- 131.3 The rear fog lamp check lamp comes on.
- 131.4 The rear fog lamp comes on.

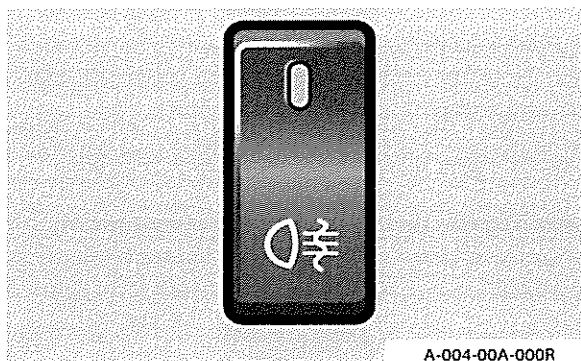


Fig 54 Vehicle rear fog lamp rocker switch

132 Refer to Fig 55. The rear fog lamp goes off automatically if the headlight low beam and parking lights are switched off.

133 The rear fog lamp remains switched off if the headlight low beam is switched on again.

134 To switch off the rear fog lamp, proceed as follows:

134.1 Press the bottom of the rocker switch. The check lamp in the switch goes off.

134.2 The rear fog lamp check lamp goes off.

134.3 The rear fog lamp goes off.

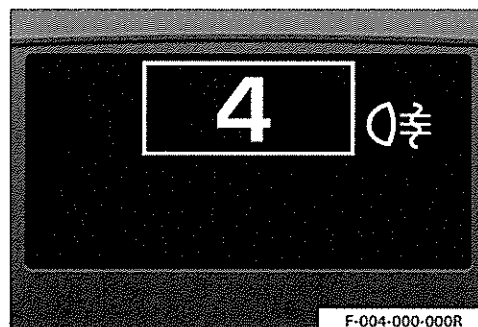


Fig 55 Rear fog lamp check lamp

#### Hazard warning lights

135 The hazard warning lights are activated if the ignition is switched off and the hazard warning light switch is defective.

136 An indicator appears on the driver's display if either the hazard warning light switch or the indicator light are defective.

137 Refer to Fig 56. To switch on the hazard warning lights, proceed as follows:

137.1 Switch on the electrical battery master switch if necessary.

137.2 Press the bottom of the rocker switch. The red check lamp in the switch comes on.

137.3 The green check lamps for the turn indicators (vehicle/ trailer) and all the turn indicators flash intermittently.

138 To switch off the hazard warning lights, press the top of the rocker switch. The check lamp in the switch goes off.

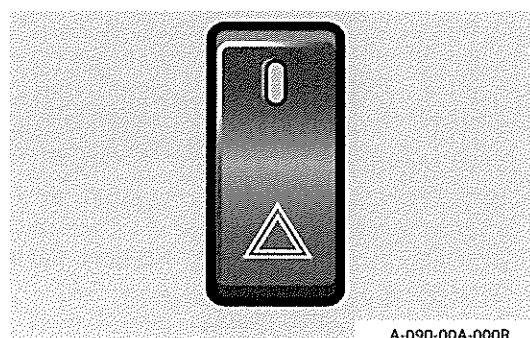


Fig 56 Hazard warning lights rocker switch

**Headlight beam regulator**

139 Refer to Fig 57. The headlight beam regulator (1) adjusts the range of the headlight beam to avoid dazzling oncoming traffic when the vehicle is unevenly laden.

140 If the vehicle is unladen, set the headlight beam regulator (1) to position 0.

141 To reduce the range of the headlight beam turn the headlight beam regulator (1) downwards.

142 To increase the range of the headlight beam turn the headlight beam regulator (1) upwards.

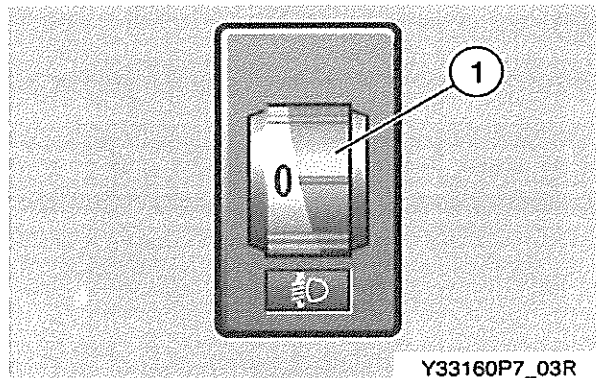


Fig 57 Headlight beam regulator rocker switch

**NOTE**

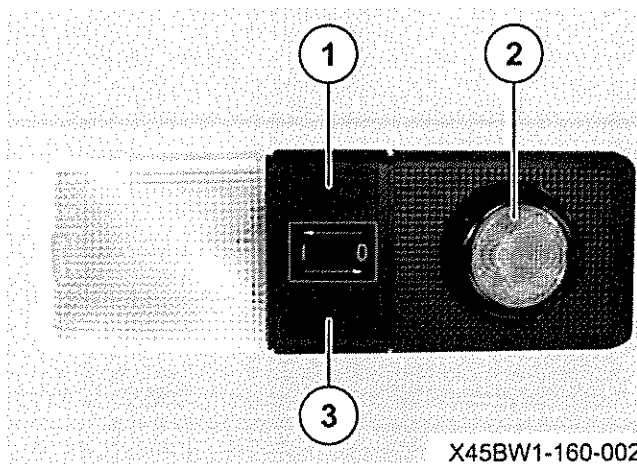
When switching on the lights at twilight or when driving into a tunnel, etc. with a laden vehicle, set the headlight beam regulator (1) to minimum (III) to avoid dazzling oncoming traffic.

**Interior lighting**

143 Refer to Fig 58. To operate the interior lighting, proceed as follows:

143.1 Press the rocker switch (1) to the left or the middle position, the interior lighting comes on.

143.2 Press the rocker switch (1) to the right position, the interior lighting goes off.



1 – Rocker switch

2 – Reading light housing

3 – Rocker switch

Fig 58 Interior lighting



### Reading light

144 Refer to Fig 58. To operate the reading light, proceed as follows:

- 144.1 Press the rocker switch (3) to the left, the reading light comes on.
- 144.2 Adjust the reading light housing (2) to the desired position.
- 144.3 Press the rocker switch (3) to the right, the reading light goes off.

### Adjusting the instrument lighting

#### WARNING

**PERSONAL INJURY. DO NOT ATTEMPT TO ADJUST THE INSTRUMENT LIGHTING UNLESS TRAFFIC CONDITIONS ALLOW.**

145 Refer to Fig 59. To adjust the lighting for the instruments, driver's display and heating controls, proceed as follows:

- 145.1 Switch on the ignition.
- 145.2 Press the button until the lighting bar appears.
- 145.3 Adjust the brightness as required.

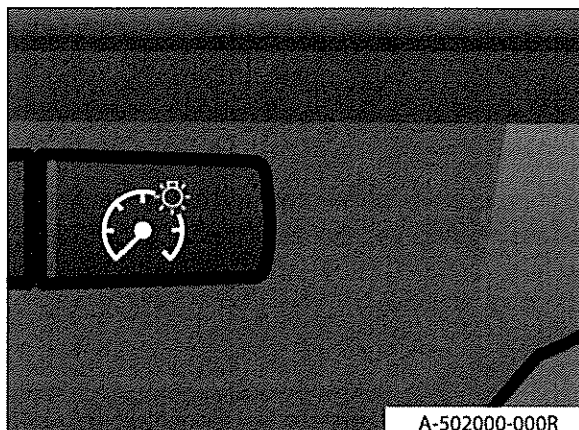


Fig 59 Adjusting the instrument lighting

146 The brightness is infinitely variable while the right button remains pressed. The brightness automatically varies from dark to bright and back to dark until the button is released.

147 Refer to Fig 60. To adjust the display lighting, proceed as follows:

- 147.1 Switch on the ignition.
- 147.2 Briefly touch the button (for less than 2 seconds).
- 147.3 The background and all the information on the driver's display changes from bright to dark or from dark to bright.

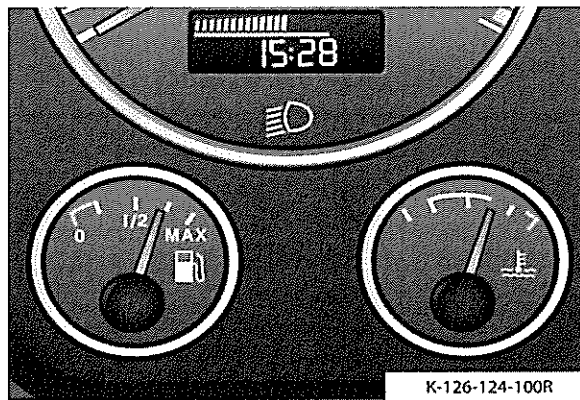


Fig 60 Display lighting

**STORING WEAPONS**

148 Refer to Fig 61. Weapons can be stored in the bracket located in the doors.

149 To store the weapons, proceed as follows:

149.1 Place the weapon in the support (2) and fit it into the bracket (1).

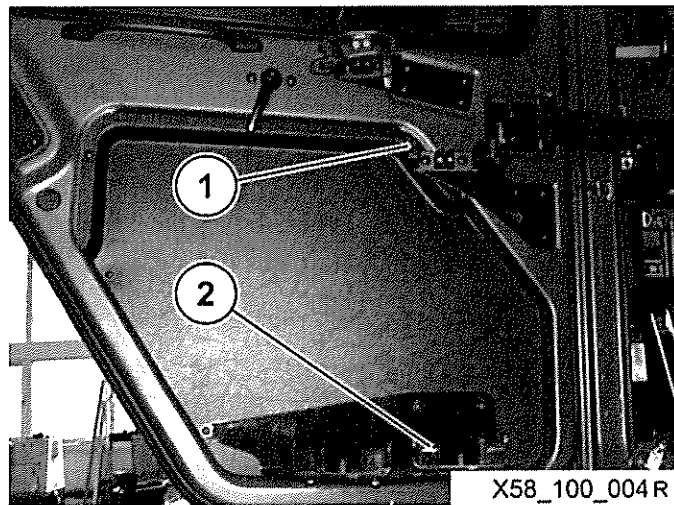
149.2 Close the bracket (1).

150 149 To remove the weapons, proceed as follows:

150.1 Open the bracket (1).

150.2 Remove the weapon from the bracket (1) and from the support (2).

151 Close the bracket (1).



1 – Bracket

2 – Weapon support

Fig 61 Storing weapons

### REVERSING SIGNAL

152 A warning signal sounds when reversing. The warning signal can be switched off if necessary.

153 Always switch off the warning signal at least 2 seconds before engaging reverse gear.

154 Refer to Fig 62. To switch off the reversing signal, press the bottom of the rocker switch (1). The check lamp in the switch comes on.

155 To switch on the reversing signal, press the bottom of the rocker switch (1). The check lamp in the switch goes off.

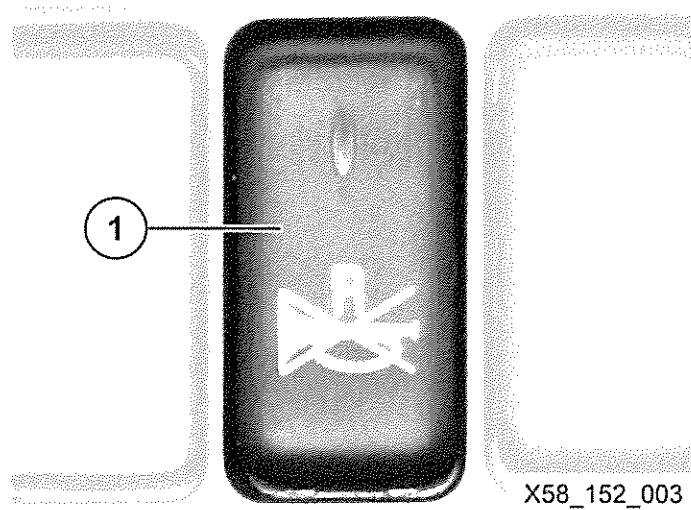


Fig 62 Reversing signal switch

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CHAPTER 1-3

HEATING, VENTILATION AND AIR-CONDITIONING

CONTENTS

Para

- 1 Introduction (CAUTION)
- Heating and ventilation controls
  - 4 Side levers
  - 5 Windscreen ventilation
  - 6 Footwell ventilation
  - 7 Heating/ventilation
  - 8 Fresh air/recirculated air
  - 10 Blower
  - 13 Central air nozzles
  - 14 Side air nozzle
  - 15 Front air nozzles for ventilator or defroster
- Heating/ventilation operation
  - 16 Defroster
  - 18 Maximum heating
  - 20 Maximum ventilation
  - 22 Recirculated air
  - 24 Air-conditioning system
  - 25 Switching on the air-conditioning
  - 26 Switching off the air-conditioning
- Roof hatch (WARNING)
  - 27 Opening the roof hatch
  - 28 Closing the roof hatch
- Auxiliary heaters (WARNINGS)
  - 29 General (CAUTION)
  - 35 Auxiliary air heater (winterised version only)
  - 37 Auxiliary coolant pre-heater 5kW
  - 41 Auxiliary coolant pre-heater (winterised version 10kW)
- Auxiliary air heater (winterised version)
  - 45 General
  - 50 Setting the temperature
  - 51 Using the timer
  - 53 Vehicles transporting hazardous substances
  - 54 Switching on immediate heating
  - 57 Switching off immediate heating
  - 58 Setting the timer
  - 61 Setting the time/day
  - 64 Setting the programmed time/day
  - 66 Checking/activating the programming
  - 67 Switching off the programming control
  - 70 Switching on the heater manually
  - 71 Setting the default operating time
  - 72 Switching off the heater manually
  - 73 Displaying the fault memory
  - 76 Resetting the fault memory
  - 79 Fault code display

(continued)

**CONTENTS (continued)**

Fig		Page
1	Slide levers.....	3
2	Blower switch .....	4
3	Central air nozzles .....	5
4	Side air nozzle .....	5
5	Front air nozzles .....	6
6	Heating/ventilation operation defroster .....	6
7	Maximum heating.....	7
8	Maximum ventilation .....	8
9	Recirculated air .....	8
10	Air conditioning system buttons .....	9
11	Opening the roof hatch .....	10
12	Closing the roof hatch.....	11
13	Auxiliary air heater controls.....	13
14	Resetting the fault memory .....	17

**INTRODUCTION**

**CAUTION**

**REGULAR OPERATION OF THE AIR CONDITIONING.** Operate the system for about 10 minutes once every month during seasons when no air-conditioning is required. This prevents leaking of seals.

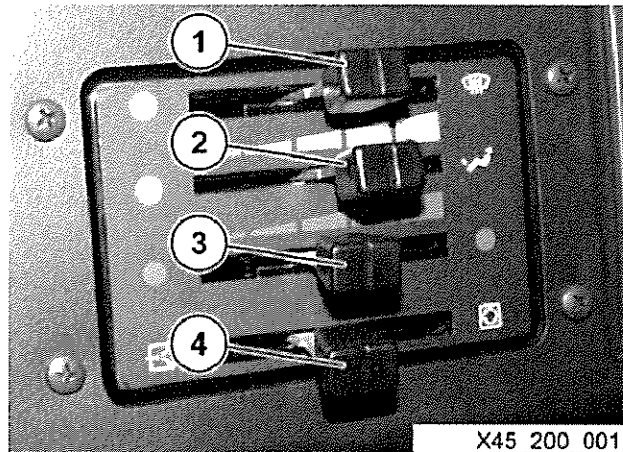
- 1 The heating/air-conditioning system ensures that the temperature in the cab remains constant.
- 2 The air-conditioning system can be used to achieve the desired temperature in the cab. In warm weather, this temperature should be around 6°C to 8°C lower than the outside temperature.
- 3 The air-conditioning system can only be operated when the engine is running.

## HEATING AND VENTILATION CONTROLS

### Slide levers

4 Refer to Fig 1. The slide levers for the heating, ventilation and air-conditioning are as follows:

- 4.1 Windscreen ventilation lever (1).
- 4.2 Footwell ventilation lever (2).
- 4.3 Heating/ventilation lever (3).
- 4.4 Fresh air/recirculated air lever (4).



1 – Windscreen ventilation lever  
2 – Footwell ventilation lever

3 – Heating/ventilation lever  
4 – Fresh air/recirculated air lever

Fig 1 Slide levers

### Windscreen ventilation

5 Refer to Fig 1. The windscreen ventilation lever (1) varies the airflow to the windscreen as follows:

- 5.1 Right - ventilation open.
- 5.2 Left - ventilation closed.

### Footwell ventilation

6 Refer to Fig 1. The footwell ventilation lever (2) varies the airflow to the footwell as follows:

- 6.1 Right - ventilation open.
- 6.2 Left - ventilation closed.

### Heating/ventilation

7 Refer to Fig 1. The heating/ventilation lever (3) varies the air temperature as follows:

- 7.1 Right - warm air (red).
- 7.2 Left - cold air (blue).

**Fresh air/recirculated air**

8 Refer to Fig 1. The fresh air/recirculated air lever (4) operates as follows:

8.1 Right - recirculated air.

8.2 Left - fresh air.

9 The fresh air/recirculated air lever (4) should only be set to recirculated air for a short period of time as follows:

9.1 When the air quality outside the vehicle is poor.

9.2 When water obstacles are forded.

**Blower**

10 Refer to Fig 2. The blower switch (1) operates as follows:

10.1 0 - Off.

10.2 1 - Slow.

10.3 2 - Medium.

10.4 3 - Fast.

11 The four-stage blower switch (1) can be used to increase the air flow to all nozzles.

12 When the auxiliary cab heater is in use, the blower switch should be set to position 1, 2 or 3.

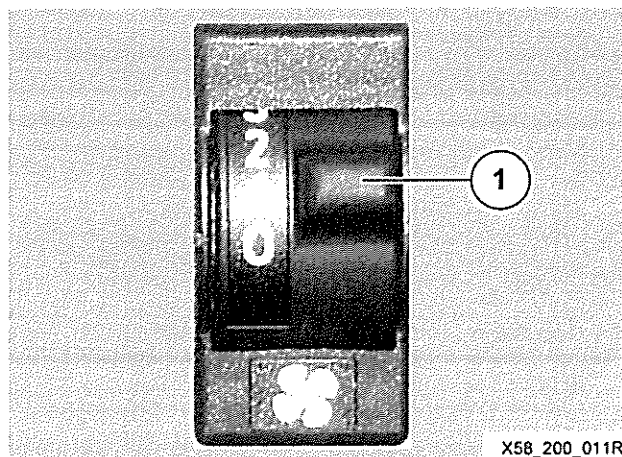


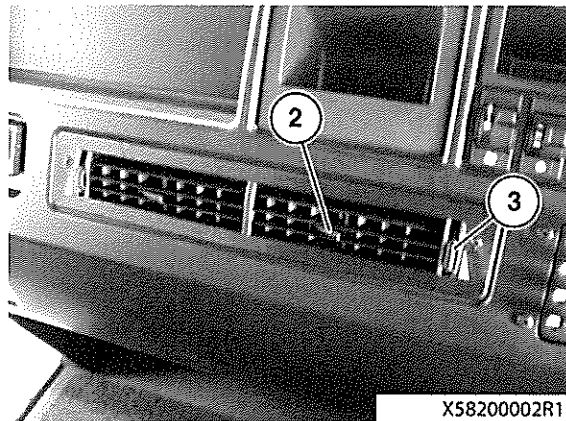
Fig 2 Blower switch



### Central air nozzles

13 Refer to Fig 3. The central air nozzles controls the flow of fresh air or heated air as follows:

- 13.1 Knurled wheel (3) down - open.
- 13.2 Knurled wheel (3) up - close.
- 13.3 Adjustable grill (2) left or right - airflow directed.



2 – Adjustable grill

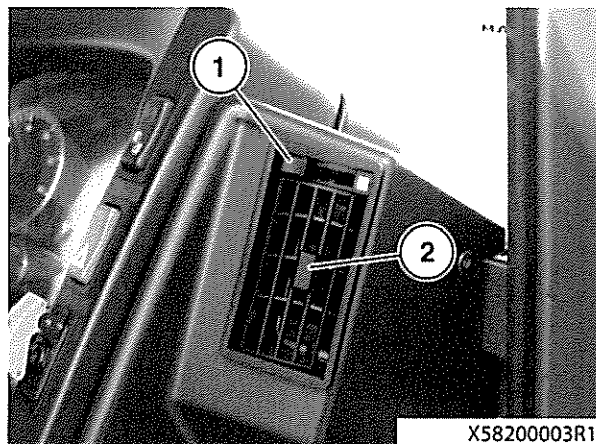
3 – Knurled wheel

Fig 3 Central air nozzles

### Side air nozzle

14 Refer to Fig 4. The side air nozzle controls the flow of fresh air or heated air as follows:

- 14.1 Lever (1) at right - ventilation open.
- 14.2 Lever (1) at left - ventilation closed.
- 14.3 Adjustable grill (2) left or right - airflow directed.



1 – Lever

2 – Adjustable grill

Fig 4 Side air nozzle

**Front air nozzles for ventilator or defroster**

15 Refer to Fig 5. Push the windscreen ventilation lever to the right to allow fresh air or heated air to the front air nozzles (3).

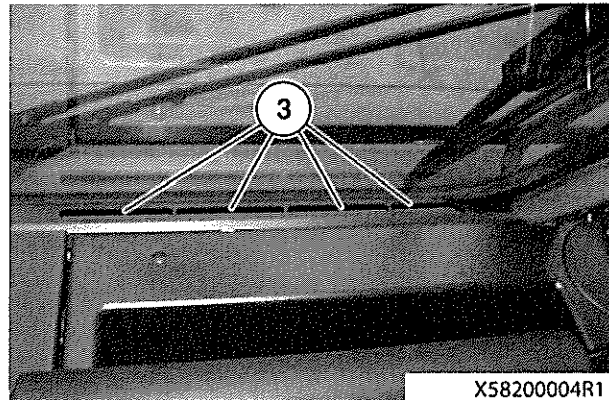


Fig 5 Front air nozzles

**HEATING/VENTILATION OPERATION****Defroster**

- 16 The defroster setting is used when the windows are misted or iced.
- 17 Refer to Fig 6. To defrost or demist the windows, proceed as follows:
- 17.1 Slide the windscreen ventilation lever to the right to supply air to the windscreen.
  - 17.2 Slide the footwell ventilation lever to the left to stop airflow to the footwell.
  - 17.3 Slide the heating/ventilation lever to the right to select warm air.
  - 17.4 Slide the fresh air/recirculated air lever to the left to select fresh air.
  - 17.5 Slide the side air nozzle lever to the right to supply fresh air or warm air.
  - 17.6 Turn the knurled wheel upwards to close the central air nozzles.
  - 17.7 Set the blower switch to position 3.
  - 17.8 Switch on the auxiliary heater if fitted.

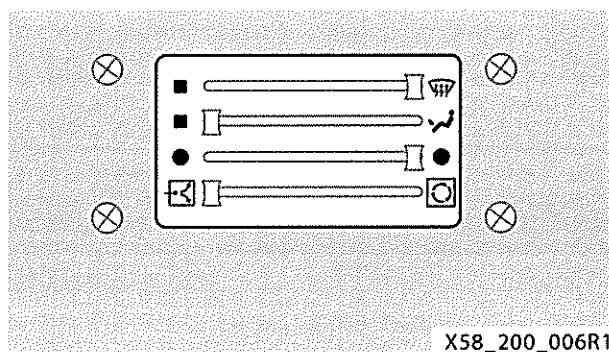


Fig 6 Heating/ventilation operation defroster

### Maximum heating

- 18 The maximum heat setting is used to heat the cab rapidly.
- 19 Refer to Fig 7. To obtain maximum heating, proceed as follows:
  - 19.1 Slide the windscreen ventilation lever to the right to supply air to the windscreen.
  - 19.2 Slide the footwell ventilation lever to the right to supply air to the footwell.
  - 19.3 Slide the heating/ventilation lever to the right to select warm air.
  - 19.4 Slide the fresh air/recirculated air lever to the left to select fresh air.
  - 19.5 Slide the side air nozzle lever to the right to supply fresh air or warm air.
  - 19.6 Turn the knurled wheel upwards to close the central air nozzles.
  - 19.7 Set the blower switch to position 3.
  - 19.8 Switch on the auxiliary heater.

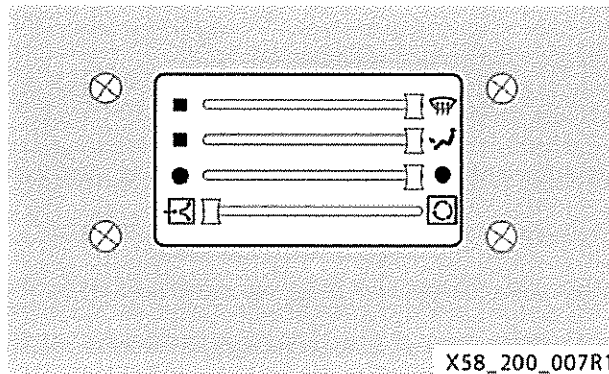


Fig 7 Maximum heating

### Maximum ventilation

- 20 Refer to Fig 8. The maximum ventilation setting is used to ventilate the cab rapidly, i.e. in hot weather.
- 21 To obtain maximum ventilation, proceeds as follows:
  - 21.1 Slide the windscreen ventilation lever to the right to supply air to the windscreen.
  - 21.2 Slide the footwell ventilation lever to the right to supply air to the footwell.
  - 21.3 Slide the heating/ventilation lever to the left to select cold air.
  - 21.4 Slide the fresh air/recirculated air lever to the left to select fresh air.
  - 21.5 Slide the side air nozzle lever to the right to supply fresh air.
  - 21.6 Turn the knurled wheel downwards to open the central air nozzles.
  - 21.7 Open the roof hatch.
  - 21.8 Set the blower switch to position 3.

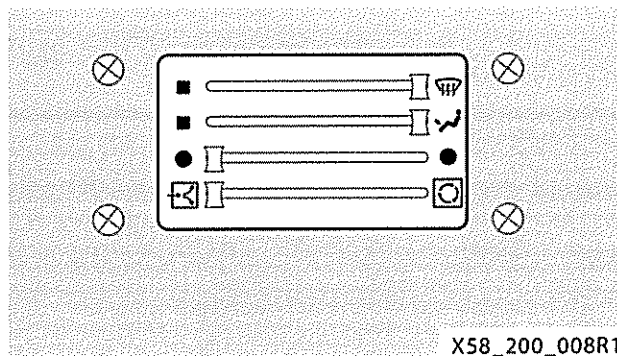


Fig 8 Maximum ventilation

**Recirculated air**

- 22 The recirculated air setting can be used for the following:
- 22.1 Short periods when the air quality outside the vehicle is poor.
  - 22.2 Heating the cab.
  - 22.3 When fording deep water, refer to Chapter 1-5.
- 23 Refer to Fig 9. To recirculate the air, proceed as follows:
- 23.1 Slide the windscreen ventilation lever left or right to stop or supply air.
  - 23.2 Slide the footwell ventilation lever left or right to stop or supply air.
  - 23.3 Slide the heating/ventilation lever left or right to select cold or warm air.
  - 23.4 Slide the fresh air/recirculated air lever to the right to select recirculated air.
  - 23.5 Slide the side air nozzle lever to the right to supply recirculated air.
  - 23.6 Turn the knurled wheel downwards to open the central air nozzles.

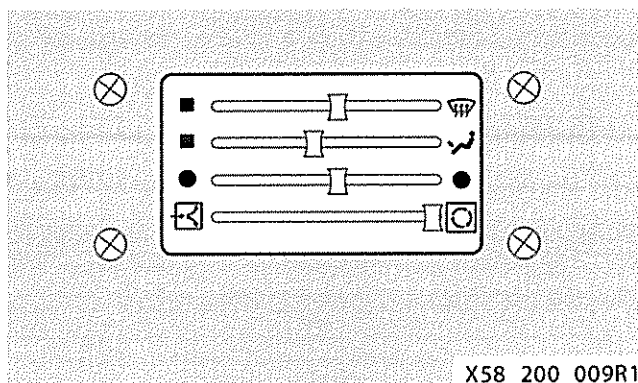


Fig 9 Recirculated air

## AIR-CONDITIONING SYSTEM

24 The doors, windows and roof hatch must be closed before switching on the air conditioning system.

### Switching on the air-conditioning

25 Refer to Fig 10. To switch on the air-conditioning system, proceed as follows:

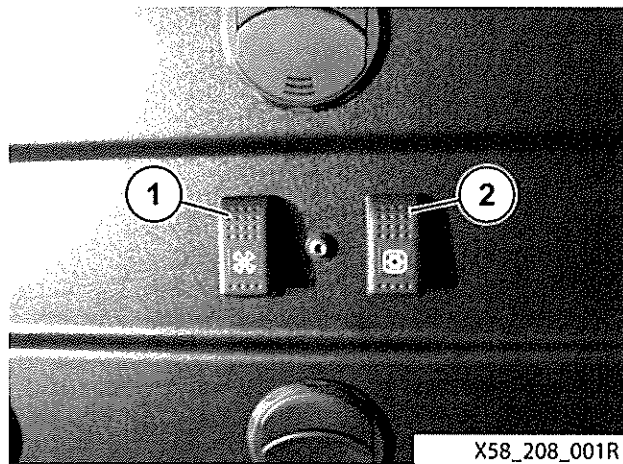
25.1 Press the top of the switch (2).

25.2 Press the switch (1) to operate the blower. The blower will run at the speed selected on the switch.

25.3 Open the ventilation nozzles as required.

### Switching off the air-conditioning

26 Refer to Fig 10. To switch off the air-conditioning system, press the bottom of switch (2).



1 – Fan speed switch

2 – On/Off switch

Fig 10 Air conditioning system buttons

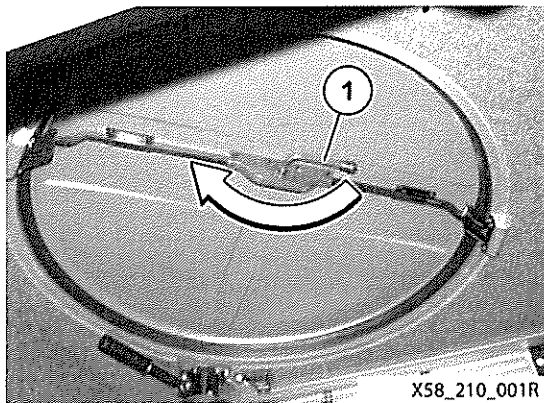
**ROOF HATCH****WARNING**

**PERSONAL INJURY. THE ROOF COVER CAN MOVE FREELY. MAKE SURE THE ACTUATOR LEVER IS LOCKED IN PLACE WHEN THE VEHICLE IS IN MOTION WITH THE ROOF HATCH OPEN OR CLOSED.**

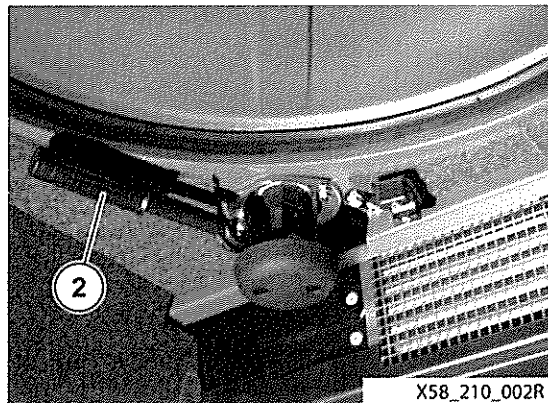
**Opening the roof hatch**

27 Refer to Fig 11. To open the roof hatch, proceed as follows:

- 27.1 Turn the closing lever (1) clockwise 180 degrees to release the roof hatch lock.
- 27.2 Pull the actuator lever (2) out of the locking device and pull down to lift the roof hatch.
- 27.3 Turn the actuator lever (2) clockwise up to the stop.
- 27.4 Push the actuator lever upward and clip into the holder (1). The roof hatch is open and locked.



1 – Closing lever



2 – Actuator lever

Fig 11 Opening the roof hatch

### Closing the roof hatch

28 Refer to Fig 12. To close the roof hatch, proceed as follows:

28.1 Pull the actuator lever out of the holder (1).

28.2 Turn the actuator lever anticlockwise.

28.3 Push the actuator lever up and into the locking device. This will lower the cover of the roof hatch.

28.4 Turn the closing lever anticlockwise 180 degrees. The roof hatch is now locked.

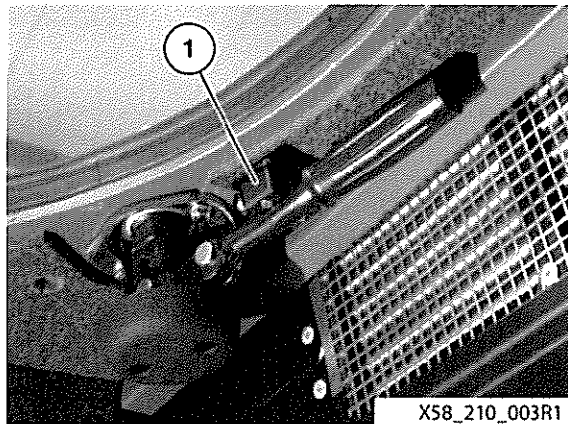


Fig 12 Closing the roof hatch

### AUXILIARY HEATERS

#### WARNINGS

(1) RISK OF EXPLOSION. DO NOT OPERATE THE AUXILIARY HEATER AT FUEL STATIONS OR ENCLOSED AREAS WITHOUT VENTILATION.

(2) RISK OF EXPLOSION. SWITCH OFF AUXILIARY HEATERS IN AREAS WHERE INFLAMMABLE VAPOURS OR DUST COLLECT, E.G. CLOSE TO FUEL, COAL, WOOD DUST OR GRAIN STORES, OR SIMILAR SUBSTANCES.

(3) RISK OF EXPLOSION. THE AUXILIARY HEATER MUST BE SWITCHED OFF IN HAZARD CHEMICAL (HAZCHEM) VEHICLES DURING LOADING AND UNLOADING.

(4) RISK OF FUMES. MAKE SURE THE VEHICLE IS WELL VENTILATED, DO NOT OBSTRUCT THE VENTILATOR NOZZLES ON THE VEHICLE.

(5) RISK OF EXPLOSION. SWITCH OFF THE AUXILIARY HEATER BEFORE TILTING THE CAB.

#### General

29 The auxiliary heater can be used with the vehicle in motion or stationary with the engine switched off or running.

30 The fuel for the auxiliary heater is drawn from the main fuel tank.

31 If the refuelling indicator lights up on the driver's display, the vehicle has a minimum amount of fuel. Refuel the vehicle.

32 The auxiliary heater consumes electrical power. Over-use of the auxiliary heater with the engine switched off will discharge the battery.

#### **CAUTION**

**VEHICLE DAMAGE.** Do not switch off the electrical battery master switch for 2 to 5 minutes after the heater has been switched off. A cooling period is necessary to prevent the heater overheating.

33 The auxiliary heater will operate for between 2 to 5 minutes after the heater has been switched off. This is to prevent damage to the auxiliary heater caused by overheating.

34 There are two versions of auxiliary heater in the vehicles:

34.1 Air heater; the timer is located on the centre console.

34.2 Engine coolant pre-heater. Fitted as standard on all variants. The control on/off switch is located on the central console.

#### **Auxiliary air heater (winterised version only)**

35 The air heater is used to warm the cab interior and can be operated (timer) with the engine running or switched off.

36 The air heater consumes less electrical power than the coolant pre-heater, therefore, the air heater is preferable to use for extended periods with the engine switched off.

#### **Auxiliary coolant pre-heater 5kW**

37 The 5kW coolant pre-heater is primarily used to pre-heat the engine coolant with ambient air temperatures down to -32°C (warm start).

38 The coolant pre-heater can also be used to defrost the windows and for warming the cab whilst the vehicle is stationary with the engine switched off.

39 To use the coolant pre-heater to defrost the windows, proceed as follows:

39.1 Switch on the ignition and set the heater controls, refer to Para 16.

40 To use the coolant pre-heater to warm the cab, proceed as follows:

40.1 Switch on the ignition and set the heater controls, refer to Para 19.

#### **Auxiliary coolant pre-heater (winterised version 10kW)**

41 The 10 kW coolant pre-heater is used to start vehicles at ambient temperatures between -32°C to -46°C. This heater differs from the 5kW version in that it also heats up the engine oil.

42 The coolant pre-heater can also be used to defrost the windows and for warming the cab whilst the vehicle is stationary with the engine switched off.

43 To use the coolant pre-heater to defrost the windows, proceed as follows:

43.1 Switch on the ignition and set the heater controls, refer to Para 16.

44 To use the coolant pre-heater to warm the cab, proceed as follows:

44.1 Switch on the ignition and set the heater controls, refer to Para 19.



## AUXILIARY AIR HEATER (WINTERISED VERSION)

### General

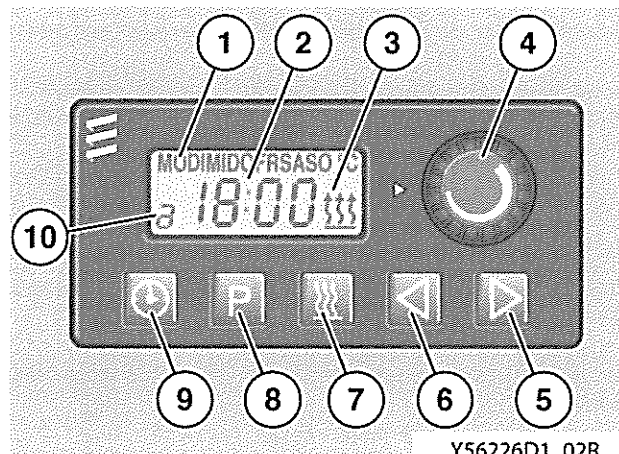
45 The auxiliary air heater is controlled from a timer switch with a seven day programme and temperature selection. The timer allows three switch-on times to be programmed in any 24 hour period. A switch-on time up to 7 days in advance can be programmed; in this case, only one switch on is permitted. The current time and day are continuously displayed.

46 The auxiliary heater can be switched on and off manually or automatically. On automatic, a start time must be programmed.

47 The heating period is 120 minutes (factory setting), however, the heating period can be altered.

48 The display of the heater time shows a fault code if an error occurs. The heater symbol (3) flashes within 15 seconds of a malfunction. Refer to Para 79 for the fault code.

49 Refer to Fig 13 for a list of auxiliary heater controls.



- |                                  |                       |
|----------------------------------|-----------------------|
| 1 – Day of the week              | 6 – Backwards         |
| 2 – Continuous display           | 7 – Immediate heating |
| 3 – Operational status indicator | 8 – Program selection |
| 4 – Rotary switch                | 9 – Clock time        |
| 5 – Forwards                     | 10 – Memory number    |

Fig 13 Auxiliary air heater controls

### Setting the temperature

50 Refer to Fig 13. To set the required temperature, turn the temperature selection rotary switch (4) as desired.

### Using the timer

51 The auxiliary air heater switches off when the optimum temperature has been reached. The auxiliary air heater will come back on once the temperature has fallen below the set temperature.

52 The air nozzles must be kept clear at all times.

**Vehicles transporting hazardous substances**

53 Refer to Fig 13. For vehicles transporting hazardous substances, no programming is permitted. Switch the auxiliary air heater on and off by pressing the immediate heating switch (7). Other features are as follows:

- 53.1 The time display can be set.
- 53.2 The current time and day of the week will be displayed.

**Switching on immediate heating**

54 Refer to Fig 13. To switch on immediate heating, proceed as follows:

- 54.1 Press the immediate heating button (7). The operational status indicator (3) will confirm the heater is operational.
- 54.2 With the ignition switched off, the set heating period will be displayed.
- 54.3 With the ignition switched, on the time and day of the week will be displayed.

55 The heater will continue to operate for as long as the ignition is switched on, then continue to operate for 15 minutes after the ignition has been switched off. This time can be extended to a maximum of 120 minutes.

56 To vary the time of operation of the heater after the ignition has been switched off, proceed as follows:

- 56.1 To increase the time, push the forwards button (5) until the desired time is displayed. The maximum time is 120 minutes.
- 56.2 To reduce the time, press the backwards button (6) until the desired time is displayed. The minimum time is 1 minute.

**Switching off immediate heating**

57 Refer to Fig 13. To switch off the heater press the immediate heating button (7). The display and button lighting go out.

**Setting the timer**

58 Refer to Fig 13. To change the settings, proceed as follows:

- 58.1 Press the forwards button (5) or backwards button (6) within 5 seconds of the symbols flashing. To make a symbol flash, press the appropriate button briefly. If there is no adjustment within this time, the time displayed will be stored.
- 58.2 Press the forwards button (5) or backwards button (6) for longer than 2 seconds to allow the numbers to change quickly.

59 The display will go blank approximately 10 seconds after the ignition has been switched off.

60 The operational status indicator (3) indicates the heater is operating.

### **Setting the time/day**

61 Refer to Fig 13. To change the time or date, proceed as follows:

61.1 Press the clock time button (9) until the time continuous display (2) flashes.

61.2 Press the forwards button (5) or the or backwards button (6) to set the time.

61.3 The day of the week will now flash.

61.4 Press the forwards button (5) or the or backwards button (6) to set the day. The setting is now complete.

62 To limit the flashing of the display after setting the day of the week, press the clock time button (9).

63 To change the time display only, press the clock time button (9) twice once the time has been changed. This will permit the change of day routine to be bypassed.

### **Setting the programmed time/day**

64 Refer to Fig 13. Press the program selection button (8) a number of times to change between the memory numbers and the time mode.

65 To set the program for the time and day, proceed as follows:

65.1 Press the program selection button (8) to select the desired memory number (10).

65.2 Press the forward button (5) or backward button (6) briefly until the continuous display (2) flashes.

65.3 Press the forward button (5) or the backward button (6) to set the programmed time on the continuous display (2).

65.4 The programmed time will be stored if no other button is pressed, and the programmed day of the week (1) flashes.

65.5 Press the forward button (5) or the backward button (6) to set the programmed day of the week (1).

65.6 The programmed day of the week (1) will be stored if no other button is pressed. The setting is complete.

### **Checking/activating the programming**

66 Refer to Fig 13. To check or activate the program to set the time or day, proceed as follows:

66.1 Press the program selection button (8) to select the desired memory number (10).

66.2 Memory numbers 1, 2 or 3 can be selected.

### **Switching off the programming control**

67 Refer to Fig 13. To switch off the program, press the program selection button (8) until no memory number (10) appears and the time is displayed.

68 All programs will be reset to the manufacturer's settings if the electrical supply is disconnected, i.e. during repairs or the battery is disconnected.

69 Always set the time using the setting mode first after the electrical supply has been disconnected. Refer to Para 61.

#### **Switching on the heater manually**

70 Refer to Fig 13. To switch on the heater, proceed as follows:

70.1 Press the immediate heating button (7) until the continuous display (2) flashes.

70.2 Press the forwards (5) or backwards (6) button to set the desired operating time.

#### **Setting the default operating time**

71 Refer to Fig 13. To set the default operating time, proceed as follows:

71.1 The heater must be switched off.

71.2 Press the backwards button (6) for 3 seconds, the operating time will flash.

71.3 Press the forwards button (5) or backwards button (6) to set the required operating time between 10 - 120 minutes.

#### **Switching off the heater manually**

72 Refer to Fig 13. To switch off the heater press the immediate heating button (7); the operating status indicator (3) will go off. The heater blower will continue to operate until the heater has cooled down.

#### **Displaying the fault memory**

73 Refer to Fig 13. The fault memory in the control unit can store up to five faults, which can be displayed by using the modular timer as follows:

73.1 Press the immediate heating button (7) to switch on the heater.

73.2 Press and hold the clock time button (9) while pressing the program selection button (8) within 2 seconds to activate the diagnosis mode and display the last fault code, e.g. F 64.

73.3 Press the forwards button (5) or the backwards button (6) to display the other faults.

74 In vehicles that transport hazchem, the timer will automatically switch off the heater after 5 seconds if there is a malfunction or in case of danger.

75 The control unit interlock will be activated if the heater overheats (fault display F 15) or as a result of too many switch-on attempts.

#### **Resetting the fault memory**

76 One of two types of control unit may be fitted, variant 1 or variant 2.

77 Refer to Fig 14. To reset the control unit variant 1, proceed as follows:

77.1 Remove the timer switch.

77.2 Disconnect the plug connection X 683/1 (cable no. 30006).

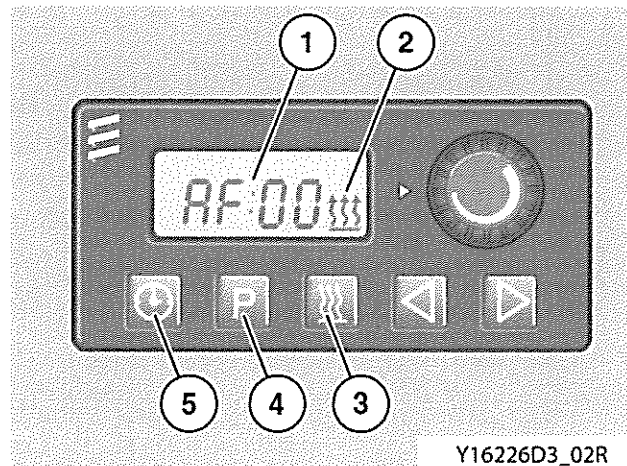
77.3 Press the immediate heating button (3) (The current fault F 15 or F 50 is displayed).

- 77.4 Press the clock time button (5) and the program selection button (4) simultaneously for 2 seconds.
- 77.5 Reconnect the plug connection X 683/1 (cable no. 30006). The lock-out is cancelled.
- 77.6 Reconnect the timer switch.
- 78 To reset the control unit variant 2, proceed as follows:
- 78.1 Switch on the ignition.
- 78.2 Press the immediate heating button (3) (The current fault F 15 or F 50 is displayed).
- 78.3 Press the clock time button (5) while pressing the program selection button (4) within 2 seconds to display the most recent fault.
- 78.4 Switch off the ignition.
- 78.5 Press the clock time button (5) and the program selection button (4) simultaneously and switch on the ignition.

NOTE

The lock-out cannot be cancelled unless the ignition is switched on.

- 78.6 The continuous display (1) will flash and the operational status indicator (2) will come on. The control unit is reset after 3 seconds and the heater will switch on. The continuous display (1) will show AF:00.



- |                        |                              |
|------------------------|------------------------------|
| 1 – Continuous display | 4 – Program selection button |
| 2 – Status indicator   | 5 – Clock time button        |
| 3 – Immediate heating  |                              |

Fig 14 Resetting the fault memory

**Fault code display**

79 Refer to Fig 14. Fault codes that may appear in the continuous display (1) are as follows:

79.1 00 - No fault.

79.2 12 - Overheating.

79.3 15 - Overheated too frequently.

79.4 50 - Too many switch-on attempts.

80 For any other fault codes contact your Unit for assistance.

CHAPTER 1-4

BRAKING SYSTEMS

CONTENTS

Para

	Electronic Brake System (EBS) (WARNINGS)
1	Sub-functions
5	EBS function check
6	EBS malfunction display (WARNINGS)
9	Electro-Pneumatic Brake (EPB) system/pedal brake (WARNINGS)
16	Anti-lock Brake System (ABS) (WARNINGS)
17	ABS function check
20	Braking controlled by ABS
21	Towing a trailer with ABS
24	Towing a trailer without ABS (WARNING)
25	ABS malfunction display (WARNINGS)
29	ABS off-road logic
31	Activating ABS off-road logic
32	Deactivating ABS off-road logic
34	Hill start brake
	Parking brake (hand brake)
37	Functional description and safety (WARNINGS)
38	Applying the parking brake
39	Releasing the parking brake
40	Partial braking
42	Parking brake malfunction (WARNINGS)
50	Using the parking brake to stop the vehicle
51	Parking brake test position (WARNINGS)
	Exhaust Valve Brake (EVB) and BrakeMatic (WARNINGS)
53	Functions of EVB
57	Activating the EVB
58	Deactivating the EVB
60	Functions of BrakeMatic
63	Activating BrakeMatic
65	Adaptive braking with the brake pedal
66	BrakeMatic and cruise control (RSG)
67	Deactivating BrakeMatic

Fig

Page

1	EBS malfunction display.....	3
2	Electro-Pneumatic Brake (EPB) system/pedal brake.....	4
3	ABS function check .....	5
4	ABS malfunction display.....	6
5	ABS off-road logic switch.....	7
6	Deactivating ABS off-road logic.....	7
7	Hill start brake.....	8
8	Applying the parking brake.....	9
9	Releasing the parking brake.....	10
10	Parking check lamp .....	10
11	Parking brake malfunction.....	11
12	Parking brake test position .....	12
13	Activating the EVB.....	14
14	Deactivating BrakeMatic.....	15

**ELECTRONIC BRAKE SYSTEM (EBS)****WARNINGS**

(1) **DRIVING SAFETY. THE EBS IS UNABLE TO SURPASS THE PHYSICAL LIMITS OF THE BRAKE SYSTEM. ALWAYS ADAPT YOUR DRIVING TO SUIT THE ROAD AND TRAFFIC CONDITIONS.**

(2) **DRIVING SAFETY. IF THE EBS OR ABS FAILS, THE VEHICLE WHEELS COULD LOCK DURING BRAKING. LESS BRAKING POWER WILL BE AVAILABLE.**

(3) **DRIVING SAFETY. ALWAYS KEEP THE DRIVER'S FOOTWELL FREE OF OBJECTS.**

**Sub-functions**

1 The following functions are integrated in the Electronic Brake System (EBS):

1.1 Electro-Pneumatic Brake (EPB).

1.2 Anti-lock Brake System (ABS).

2 The EBS incorporates the EPB and ABS functions. The EBS Electronic Control Unit (ECU) receives data for these functions as well as additional measured variables provided by sensors.

3 The EBS ECU collates all the data it receives to ensure optimum control of the brake system. As a result, the EBS helps to improve management of critical driving situations and to shorten braking distances. The EBS optimises the braking effectiveness on all wheels.

4 When ABS is activated, the Exhaust Valve Brake (EVB) is automatically deactivated and the engine brake symbol on the driver's display goes off.



**EBS function check**

5 The EBS and the ABS sub-function are automatically activated when the ignition is switched on.

**EBS malfunction display**

**WARNINGS**

(1) **DRIVING SAFETY. IN THE EVENT OF AN EBS OR ABS MALFUNCTION, THE BRAKING AND DRIVING CHARACTERISTICS OF THE VEHICLE ALTER. THE BRAKE LAMP MAY NOT ACTIVATE.**

(2) **DRIVING SAFETY. IF THE EBS OR ABS FAILS, THE VEHICLE WHEELS COULD LOCK DURING BRAKING. LESS BRAKING POWER WILL BE AVAILABLE.**

6 Refer to Fig 1. In the event of an EBS malfunction, a brake system symbol (1) will be displayed and a text message will appear in area (2) on the driver's display.

7 The corresponding check lamps on the panel come on and a warning buzzer sounds, refer to Chapter 1-2.

8 In the event of a malfunction, contact your Unit for assistance.

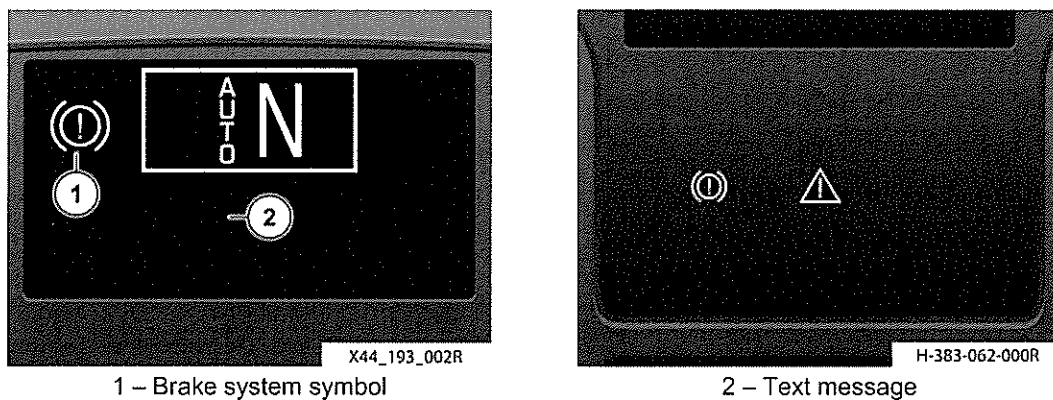


Fig 1 EBS malfunction display

**Electro-Pneumatic Brake (EPB) system/pedal brake**

**WARNINGS**

(1) **DRIVING SAFETY. IF THE BRAKE PRESSURE FALLS BELOW APPROX. 6.0 BAR, DO NOT MOVE OFF UNTIL THE WARNING LIGHTS HAVE GONE OFF AND THE DISPLAY MESSAGE HAS DISAPPEARED.**

(2) **DRIVING SAFETY. PERFORM A BRAKE TEST (SERVICE AND PARKING BRAKES) ON A DRY ROAD SURFACE AS SOON AS POSSIBLE AFTER MOVING OFF.**

(3) **DRIVING SAFETY. IN THE EVENT OF AN EBS OR ABS MALFUNCTION, THE BRAKING AND DRIVING CHARACTERISTICS OF THE VEHICLE ALTER.**

9 The pneumatic brake pressure is increased and decreased in response to electrical brake pressure signals from the EBS control unit. As a result, all axles can be braked more rapidly and simultaneously and the brakes are released swiftly.

10 The braking and driving characteristics of the vehicle alter in the event of an EPB malfunction. Drive with due care in this case.

11 The pedal brake acts on all load-bearing wheels of the vehicle by means of two independent circuits.

12 Refer to Fig 2. Pressure gauges for the front axle brake circuit (1) and rear axle brake circuit (2) indicate the reservoir pressure in the respective brake circuits.

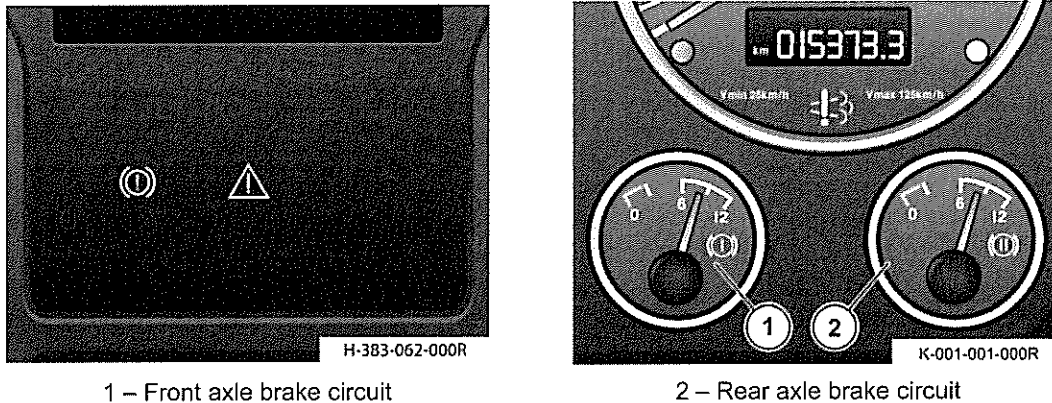


Fig 2 Electro-pneumatic brake (EPB) system/pedal brake

13 The pressure gauges indicate as follows:

13.1 Red or colourless zone: reservoir pressure too low. Below approximately 6.0 bar, warning lights come on and the driver's display shows the text 'AIR PRESSURE TOO LOW'.

14 If one of the service brake system circuits should fail, the other circuit, the parking brake system, the sustained-action brake system and the auxiliary consumers remain functional.

15 If the service brake system is depressurised, the parking brake spring actuators remain in the driving position until the parking brake is next applied.

### Anti-lock Brake System (ABS)

#### WARNINGS

- (1) **DRIVING SAFETY. ABS DOES NOT OPERATE AT LOW SPEEDS.**
- (2) **DRIVING ERRORS. DRIVING ERRORS CANNOT BE COMPENSATED FOR BY ABS. DO NOT ASSUME THAT THE BRAKING DISTANCE WILL BE SHORTENED.**
- (3) **DRIVING SAFETY. THE FUNCTION OF THE ABS IS LIMITED WHEN THE INTERAXLE DIFFERENTIAL LOCK, FRONT AXLE TRANSVERSE DIFFERENTIAL LOCK AND FRONT-WHEEL DRIVE ARE ENGAGED.**

16 ABS prevents the wheels from locking during braking. The steering function and directional stability are maintained even during hard braking. The brake pedal must be pressed fully down, regardless of road conditions, in order to obtain the shortest possible braking distance.

### ABS function check

17 ABS is activated automatically when the ignition is switched on, refer also to Paras 20 and 24.

18 Refer to Fig 3. The check lamp (1) remains lit when the ABS is not ready for operation. A message is also shown on the driver's display. The text on the display indicates whether the vehicle ABS or trailer ABS is affected; refer to Chapter 1-2.

19 The check lamp (2) remains lit if a trailer without ABS is being towed.

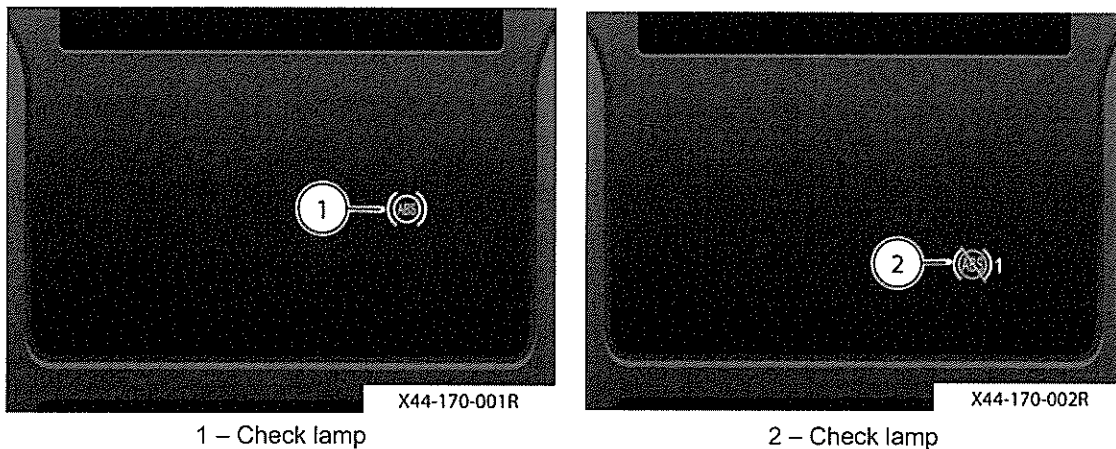


Fig 3 ABS function check

### Braking controlled by ABS

20 When braking is controlled by ABS, the following occurs:

- 20.1 The control valves blow off.
- 20.2 The engine brake symbol on the driver's display goes off.

### Towing a trailer with ABS

21 Refer to Fig 3. The ABS is activated automatically when the ignition is switched on. The check lamps (1) and (2) come on, and the text 'TRAILER ABS' is shown on the driver's display.

22 The check lamp goes off once the vehicle has moved off and reached approximately 10 km/h, providing no faults are detected.

23 The point at which the check lamp and the display message go off depends on the type of trailer ABS.

### Towing a trailer without ABS

#### WARNING

**DRIVING SAFETY. THE WHEELS OF THE TRAILER MAY LOCK UP DURING BRAKING.**

24 Refer to Fig 3. The ABS is activated automatically when the ignition is switched on. The yellow check lamp (2) stays on when the trailer has no ABS.

**ABS malfunction display****WARNINGS**

(1) **DRIVING SAFETY. THE BRAKING CHARACTERISTICS OF THE VEHICLE MAY ALTER IF AN ABS WARNING IS INDICATED. THE VEHICLE IS BRAKED IN AN UNREGULATED MANNER IF THE ABS CONTROL FAILS.**

(2) **DRIVING SAFETY. DRIVE WITH DUE CARE IF ANY ABS WARNING LIGHT COMES ON.**

25 Refer to Fig 4. In the event of an ABS defect, an ABS check lamp and a text message are shown on the driver's display.

26 The corresponding check lamps come on and a warning buzzer sounds, refer to Chapter 1-2.

27 If the text 'TRAILER ABS FAILURE' is shown on the driver's display, there is a problem in the power supply to the trailer ABS.

28 In the event of a malfunction, contact your Unit for assistance.

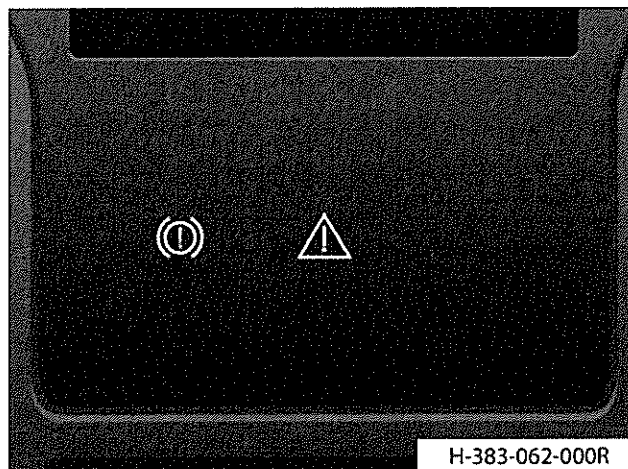


Fig 4 ABS malfunction display

**ABS off-road logic**

29 Only select off-road logic if driving on loose, soft surfaces such as gravel, sand, mud, earth, deep slush or boggy ground.

30 The ABS then operates as a function of the vehicle speed as follows:

30.1 Below 15 km/h there is no ABS and a tendency for the wheels to lock.

30.2 Between 15 km/h and 40 km/h there is reduced ABS function and increased wheel slip is possible.

30.3 Above 40 km/h there is normal ABS function.

### Activating ABS off-road logic

31 The ABS off road logic is activated as follows:

31.1 Refer to Fig 5. Press the bottom of the ABS off-road logic switch.



Fig 5 ABS off-road logic switch

31.2 Refer to Fig 6. The vehicle yellow ABS warning light (1) starts flashing.

### Deactivating ABS off-road logic

32 Refer to Fig 6. The ABS off road logic is deactivated as follows:

32.1 Press the bottom of the ABS off-road logic switch.

32.2 The warning light (1) goes off.

33 ABS functions normally at a speed of approximately 6 km/h or more.

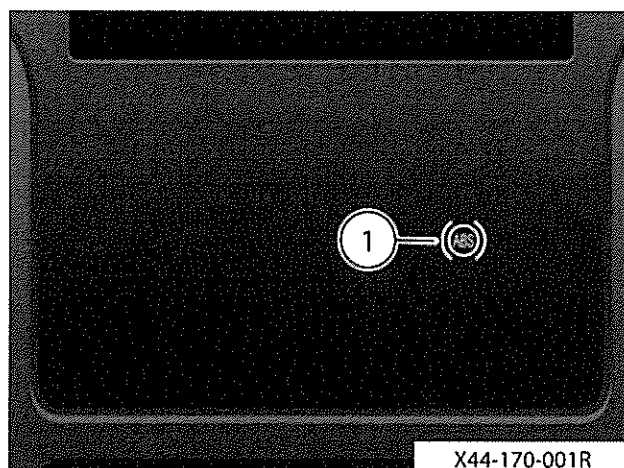


Fig 6 Deactivating ABS off-road logic

**Hill start brake**

34 Refer to Fig 7. The hill start brake can make moving off easier, especially on uphill gradients. If the hill start brake is activated whilst the brake pedal is pressed, the brake pressure will be retained in all the brake cylinders after the brake pedal has been released. The engine speed can be increased even if the vehicle is still braked.

35 The hill start brake does not provide a gradual braking effect and may only be activated when the vehicle is stationary.

36 To move off, proceed as follows:

- 36.1 Keep the brake pedal pressed down.
- 36.2 Select a suitable engine speed.
- 36.3 Press and hold the hill start switch.
- 36.4 Release the brake pedal.
- 36.5 Increase engine speed.
- 36.6 Release the hill start switch.
- 36.7 The vehicle will move off.



Fig 7 Hill start brake

## PARKING BRAKE (HAND BRAKE)

### Functional description and safety

#### WARNINGS

(1) DRIVING SAFETY. ALWAYS APPLY THE BRAKE WHEN THE VEHICLE IS PARKED. IF NECESSARY, USE CHOCKS AS WELL TO PREVENT THE VEHICLE FROM ROLLING AWAY. ALWAYS CHECK THAT THE LEVER HAS ENGAGED COMPLETELY.

(2) DRIVING SAFETY. WHEN THE VEHICLE IS BEING DRIVEN, ONLY OPERATE THE PARKING BRAKE IN AN EMERGENCY, FOR EXAMPLE IF THE SERVICE BRAKES HAVE FAILED. THE REAR AXLE CAN LOCK UP.

(3) DRIVING SAFETY. ALWAYS USE CHOCKS IF YOU ARE PARKING THE VEHICLE OR THE VEHICLE-TRAILER UNIT ON A SLOPE AND THE VEHICLE BRAKES ARE HOT FROM DRIVING.

(4) DRIVING SAFETY. WHEN REMOVING PERSONAL EQUIPMENT FROM THE CAB MAKE SURE THAT STRAPPING DOES NOT ACCIDENTALLY RELEASE THE PARKING BRAKE.

37 The parking brake acts on the wheels of the rear axle(s).

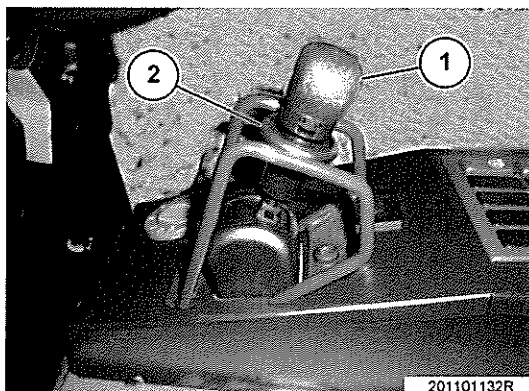
#### Applying the parking brake

38 Refer to Fig 8. To apply the parking brake, proceed as follows:

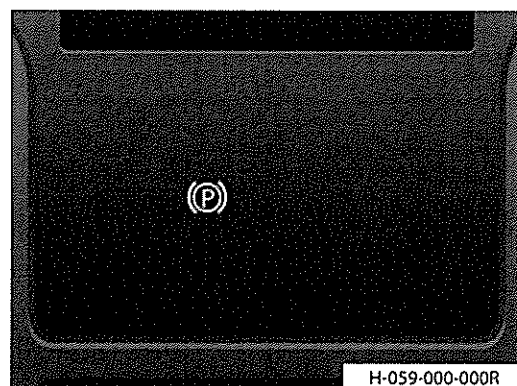
38.1 Push the lever (1) backwards until it engages.

38.2 The check lamp comes on.

38.3 Push the lever (1) forwards without pulling the lever collar (2) to check that the lever is engaged. The lever should not move forwards.



1 – Lever



2 – Lever collar

Fig 8 Applying the parking brake

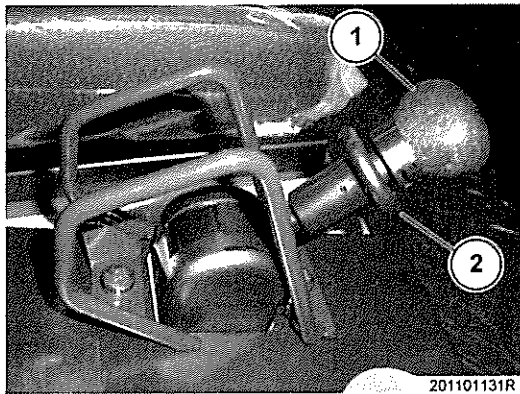
**Releasing the parking brake**

39 Refer to Fig 9. To release the parking brake, proceed as follows:

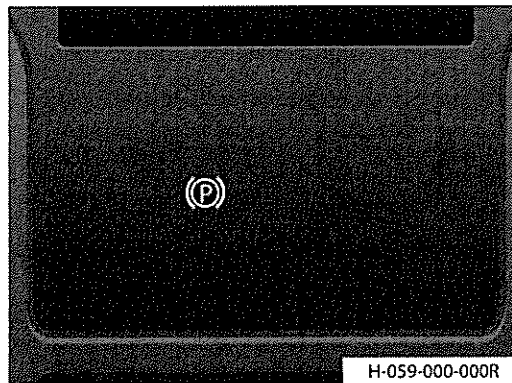
39.1 Pull up the lever collar (2).

39.2 The lever (1) automatically moves forwards into the released position.

39.3 The check lamp goes off.



1 – Lever



2 – Lever collar

Fig 9 Releasing the parking brake

**Partial braking**

40 Refer to Fig 9. Gradually pull the lever (1) back as far as the pressure point and hold in the desired position, otherwise the lever will return to the released position.

41 Refer to Fig 10. The check lamp comes on.

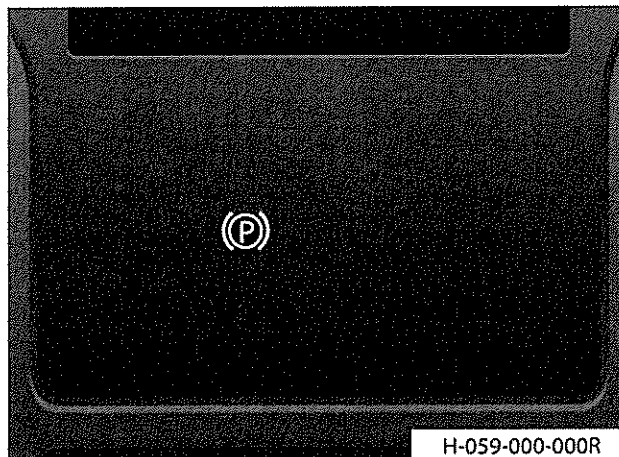


Fig 10 Parking check lamp



## Parking brake malfunction

### WARNINGS

(1) **AIR PRESSURE LOSS. THE REAR WHEELS CAN LOCK UP IF THERE IS A RAPID OR SUDDEN PRESSURE LOSS. THIS MIGHT CAUSE THE VEHICLE TO SKID. STOP THE VEHICLE IMMEDIATELY TAKING ACCOUNT OF THE TRAFFIC SITUATION.**

(2) **DANGER OF FIRE. THE BRAKE LININGS COULD CATCH FIRE IF THE RESERVOIR PRESSURE IS BELOW 6 BAR AND THE BRAKE LININGS CONTACT THE DRUM.**

42 Refer to Fig 11. The reservoir pressure in brake circuit III (parking brake) must be at least 6 bar to enable the parking brake to release properly.

43 The STOP symbol and a text message are shown on the driver's display if the reservoir pressure in circuit III is below 6 bar. The central warning light and check lamps flash at the same time and a warning buzzer sounds.

44 The parking brake check lamp will remain lit with the parking brake not applied if the reservoir pressure in circuit III is too low.

45 The rear wheels might be braked if the reservoir pressure in circuit III is too low.

46 The brake linings come into contact with the drums if there is a slow pressure loss or if the reservoir pressure is slightly below 6 bar.

47 In the event of reservoir pressure below 6 bar, run the engine at increased revs until the pressure is reached.

48 If one circuit of the brake system fails, the other circuits continue to function. Safe operation is no longer possible if circuit III fails.

49 In the event of a malfunction, contact your Unit for assistance.



Fig 11 Parking brake malfunction

**Using the parking brake to stop the vehicle**

- 50 Refer to Fig 9. If the service brake system has failed, proceed as follows:
- 50.1 Pull the lever collar (2) upwards and hold it in position.
  - 50.2 Pull the lever (1) backwards in stages depending on the braking effect required.
  - 50.3 Hold the lever (1) in the braking position.
  - 50.4 Release the lever collar (2) after the vehicle has come to a standstill.
  - 50.5 Refer to Fig 10. The parking brake check lamp comes on.

**Parking brake test position****WARNINGS**

- (1) **DRIVING SAFETY. THE VEHICLE-TRAILER/VEHICLE MAY MOVE DURING THE PARKING BRAKE TEST.**
- (2) **DRIVING SAFETY. IF THIS TEST REVEALS THAT THE SPRING-BRAKE CHAMBERS ARE NOT CAPABLE OF HOLDING THE VEHICLE, USE WHEEL CHOCKS TO STOP THE VEHICLE FROM ROLLING AWAY.**

51 In the test position, the vehicle or vehicle and trailer must be able to hold a stationary position on uphill or downhill gradients up to 12% when loaded.

52 Refer to Fig 12. Before leaving the vehicle, check the braking power of the spring-brake chambers when the vehicle is parked without chocks as follows:

- 52.1 Apply the parking brake.
- 52.2 Push down the parking brake lever (1) and pull back past the park position and hold.
- 52.3 This releases the trailer brakes, meaning that the vehicle trailer combination is now only held by the vehicle spring-brake chambers.
- 52.4 Release the parking brake lever (1), which automatically returns to the parking brake position. The trailer is braked again.

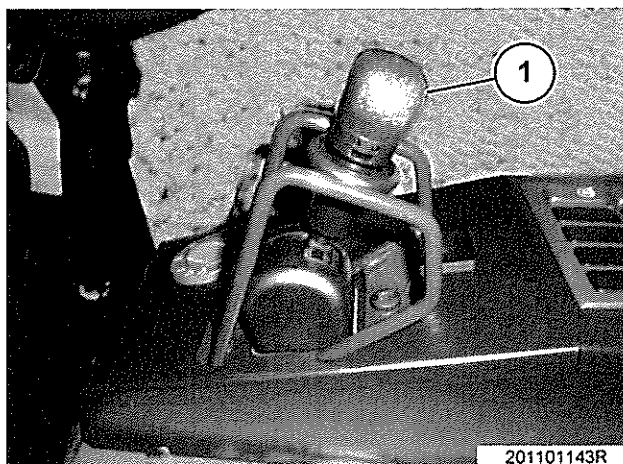


Fig 12 Parking brake test position

## **EXHAUST VALVE BRAKE (EVB) AND BRAKEMATIC**

### **WARNINGS**

- (1) DRIVING SAFETY. ALWAYS TAKE GREAT CARE WHEN ACTUATING OR ACTIVATING THE EVB ON WET, DIRTY OR ICY ROADS. DEACTIVATE THE EVB OR BRAKEMATIC IF NECESSARY.**
- (2) DRIVING SAFETY. THE EVB IS AUTOMATICALLY DEACTIVATED WHEN ABS IS ACTIVATED. USE THE SERVICE BRAKES TO CONTINUE SLOWING THE VEHICLE.**
- (3) DRIVING SAFETY. THE EVB ONLY PROVIDES LOW BRAKING POWER AT LOW ENGINE SPEEDS. SHIFT TO A LOWER GEAR OR APPLY THE SERVICE BRAKES IF NECESSARY.**
- (4) DRIVING SAFETY. DO NOT ATTEMPT TO USE THE EVB AS A PARKING BRAKE. ALWAYS APPLY THE PARKING BRAKE BEFORE LEAVING THE VEHICLE.**

### **Functions of EVB**

53 The EVB can be activated in any gear when descending long hills or for slowing the vehicle when travelling at high speed. This reduces wear on the service brakes and retains their full braking effect for emergency braking.

54 Do not use the EVB (BrakeMatic) only to brake the vehicle. If the service brakes are not used, then the brake linings will become hard or 'glazed' over time, leading to a reduction in service brake power.

55 The effectiveness of the EVB (BrakeMatic) depends on the engine speed (high engine speed = high level of engine brake effectiveness). The optimum braking effect is indicated on the rev counter, see Chapter 1-5.

56 The effect of the EVB is automatically cancelled if the engine speed is below 850rpm to prevent stalling of the engine. Shift down to a lower gear to continue braking, or use the service brakes.

**Activating the EVB**

- 57 Refer to Fig 13. To activate the EVB, proceed as follows:
- 57.1 Press the ON/OFF button (2) on the sustained-action brake lever (1).
  - 57.2 The EVB brakes the vehicle with maximum braking power (level 6).
  - 57.3 The engine brake symbol is shown on the driver's display.
  - 57.4 Optimum braking effect is shown on the rev counter when the needle is in the green zone.

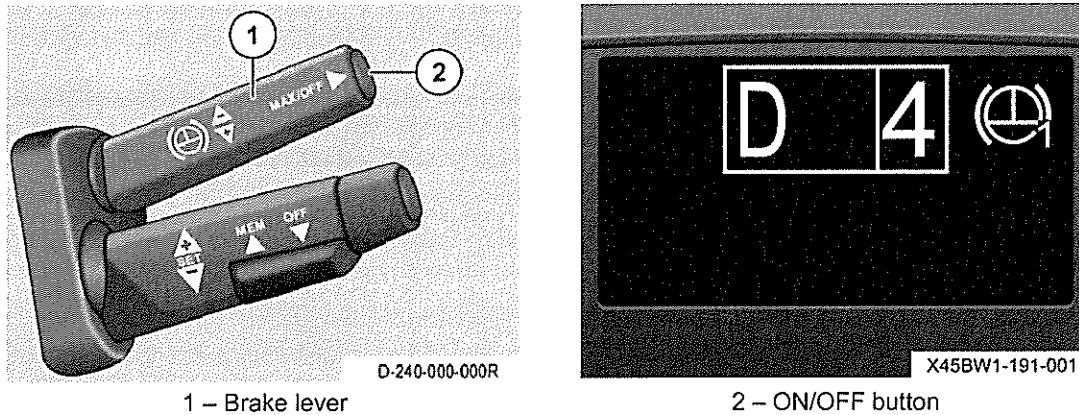


Fig 13 Activating the EVB

**Deactivating the EVB**

- 58 Refer to Fig 13. To deactivate the EVB, proceed as follows:
- 58.1 Depress the accelerator pedal or press the ON/OFF button (2) on the sustained-action brake lever (1).
- 59 The engine brake symbol on the driver's display goes off.

**Functions of BrakeMatic**

- 60 When BrakeMatic is activated, the EVB is activated automatically when the accelerator pedal is no longer pressed. Braking depends on the loading status of the vehicle and the engine revs.
- 61 The functions of BrakeMatic are as follows:
- 61.1 Activating the EVB when braking with the service brakes.
  - 61.2 Adaptive braking with the brake pedal.
  - 61.3 Active cruise control (RSG), refer to Chapter 1-5.
  - 61.4 Active driving speed limiting (RSL), refer to Chapter 1-5.
- 62 The activated EVB reduces the load on the service brakes and reduces brake lining wear.

### Activating BrakeMatic

63 The factory default setting for BrakeMatic is "On".

64 The EVB can be used for braking with or without the BrakeMatic function.

### Adaptive braking with the brake pedal

65 To activate adaptive braking, proceed as follows:

65.1 Press the brake pedal until the desired speed is reached.

65.2 The cruise control (RSG) and BrakeMatic are deactivated.

### BrakeMatic and cruise control (RSG)

66 If the programmed speed of the cruise control is exceeded, BrakeMatic automatically brakes the vehicle with the EVB.

### Deactivating BrakeMatic

67 Refer to Fig 14. To deactivate BrakeMatic, proceed as follows:

67.1 Press the bottom of the rocker switch.

67.2 The two brake pads around the symbol (1) of the cruise control go out.

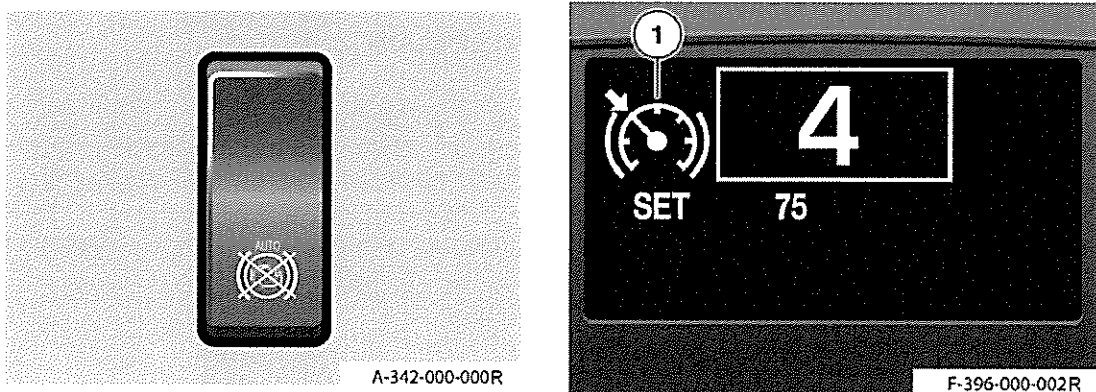


Fig 14 Deactivating BrakeMatic

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CHAPTER 1-5

VEHICLE OPERATION

CONTENTS

Para

- Safe working with the vehicle
- 1 General (WARNINGS)
- 3 Safety equipment and tools
- 4 Air conditioning system (WARNING)
- 5 Used engine oil (WARNING)
- 6 Cleaning agents and fuel (WARNINGS)
- 7 Exhaust system (WARNING)
- 8 Other driver maintenance
- 9 Taking out of operation or placing in storage
- 10 Attachments, body components and conversions
- 12 Mobile phones and radios
- 13 Accessories and parts
- Environmental protection
- 14 Disposing of used oil
- 15 Disposing of filters and cartridges
- 16 Disposing of engine coolant
- 17 Disposing of batteries
- 18 Running-in (WARNING)
- Economical driving
- 20 General
- 21 Economical vehicle operation
- 22 Loading the vehicle (WARNING)
- 23 Basic loading and unloading
- Cold weather operation
- 24 General (CAUTIONS)
- Before starting the engine
- 25 Battery master isolator switch (Not currently fitted, potential modification) (CAUTION)
- 29 Electrical battery master switch (CAUTIONS)
- 32 Ignition key position (WARNING)
- 34 Unlocking the steering (WARNING)
- 35 Switching on the ignition
- 36 Starting the engine from cold (CAUTIONS)
- 37 Starting the engine at temperatures down to -20°C
- 38 Starting the engine at temperatures between -20°C to -32°C (CAUTIONS)
- 39 Starting the engine at temperatures between -32°C to -46°C (winterised variants)
- 40 If the engine does not start (at very low temperatures)
- 41 Starting the engine from warm (CAUTIONS)
- 42 Stopping the engine (WARNING) (CAUTIONS)
- 43 Locking the steering (WARNINGS)
- 44 Stopping the engine in an emergency (vehicle moving)
- Stopping the engine in an emergency (vehicle stopped)
- 45 Emergency off switches
- 48 Disconnecting electrical power (WARNING)
- 49 Connecting electrical power
- 51 Auxiliary battery box
- 53 Rev counter (CAUTION)
- 54 Variable eco-zone

(continued)

**CONTENTS (continued)**

## Para

55	Brakematic operation – deceleration
58	Automated gearbox (WARNINGS)
63	Drive range switch (CAUTION)
64	Steering column stalk
65	Gear indications on the driver's display
67	Check lamps and display messages
69	Starting the engine
72	Protecting the clutch (CAUTION)
74	Moving off forwards
78	Moving off in reverse
81	Driving in automatic mode (WARNINGS)
82	Manual gearshifts in automatic mode
86	Kickdown
88	Driving in manual mode (CAUTION)
89	Gearshifts in manual mode
93	Off-road driving (CAUTION)
95	Manoeuvring (CAUTION)
99	Stopping and parking the vehicle (WARNING)
102	Tow starting and towing away
	Cruise control (road speed governor) and road speed limiter
103	Steering column stalk
105	Cruise control (RSG)/road speed limiter switch
106	Display with cruise control (RSG) or road speed limiter not activated
108	Display with road speed limiter set
109	Display with cruise control (RSG) set
111	Change of symbols on the display
	Cruise control (RSG)
113	Range of action
116	Activating the cruise control (RSG)
117	Increasing the speed
119	Reducing the speed
121	Storing the speed
125	Deactivating the cruise control (RSG)
126	Recalling the last stored speed
	Road speed limiter
130	Range of action
132	Activating the road speed limiter
134	Reducing the limited road speed
135	Storing the speed
138	Deactivating the road speed limiter
140	Recalling the last stored speed
	Idling speed
142	Changing the idling speed permanently
145	Changing the idling speed temporarily
149	Driver's display
150	Stop sign on the driver's display (CAUTION)
153	Operating temperature (CAUTIONS)
158	Coolant temperature too high
161	Coolant level too low
	Transfer case
163	Engaging off-road range (CAUTIONS)
164	Changing to neutral
166	Engaging on-road range (CAUTION)
167	Engaging all-wheel drive (CAUTION)

(continued)



**CONTENTS (continued)**

Para	
169	Disengaging all-wheel drive
171	Differential locks (CAUTION)
174	Engaging transverse lock(s) of the front axle(s)
176	Disengaging transverse lock(s) of the front axle(s)
178	Engaging transverse locks of the rear axles
180	Disengaging transverse locks of the rear axles
182	Engaging the interaxle differential lock
185	Disengaging the interaxle differential lock
	Off-road driving
189	After off-road driving or fording
190	Power take-off (PTO)
194	Steering column stalk (in vehicles without multifunctional steering wheel)
195	PTO operation (CAUTION)
196	Setting the working speed (emergency only) (CAUTION)
198	Disengaging the PTO
199	Parking the vehicle (CAUTION)
201	General instructions for trailer operation (WARNINGS) (CAUTIONS)
204	Rear tow hitch adjustment
205	Lowering the trailer pintle from the stowage position (WARNINGS)
206	Raising the trailer pintle to the stowage position (WARNINGS)
207	Opening the trailer pintle
208	Hitching up a trailer (WARNINGS) (CAUTIONS)
210	Manually close the trailer pintle (WARNING)
211	Vehicle trailer connections (WARNING)
212	Connecting the 12-pin trailer connection (WARNING) (CAUTION)
215	Connecting the brake air lines
216	Disconnecting the brake air lines (WARNING)
217	Disconnecting the trailer connections (CAUTION)
218	Unhitching a trailer (WARNING) (CAUTION)
219	Additional current consumer
	Spare wheel
222	Removing the spare wheel (WARNINGS)
223	Stowing the spare wheel (WARNINGS)
	Changing a wheel
226	Removing the wheel (WARNINGS)
227	Fitting the wheel (WARNINGS)
230	Towing and recovery
232	Conditions for a towing bar
233	General (WARNING) (CAUTION)
234	Preparation for towing
235	Disconnecting the propshafts
236	Towing clear
239	Towing using an A-frame (WARNINGS)
241	Attaching a towing bar (WARNINGS)
244	Hydraulic power steering failure (WARNING) (CAUTION)
246	Cab access ladder (WARNING) (CAUTION)
250	Winch remote socket (if fitted with winch)
	Slave starting
254	Vehicle slave starting pre-conditions (CAUTION)
255	Connecting the inter-vehicle connection cable and starting (WARNINGS) (CAUTION)
256	Disconnecting the inter-vehicle connection cable after starting

(continued)

## CONTENTS (continued)

Table	Page
1 Loading the vehicle .....	11
2 Conditions for towing and recovery .....	75
Fig	Page
1 Battery master isolator switch location (HX variant) .....	13
2 Electrical battery master switch .....	13
3 Ignition key .....	15
4 Check lamps .....	16
5 Starting the engine at temperatures between -20°C to -32°C .....	17
6 Ignition key .....	18
7 Starting the engine from warm .....	18
8 Ignition key .....	19
9 Locking the steering .....	20
10 Emergency off switch .....	21
11 Disconnecting electrical power .....	21
12 Auxiliary battery box .....	22
13 Rev counter .....	22
14 BrakeMatic operation – deceleration .....	23
15 Drive range switch .....	24
16 Steering column stalk .....	25
17 Gear indicator .....	25
18 Gearbox fault display .....	26
19 Steering column stalk .....	28
20 Steering column stalk .....	30
21 Off-road driving .....	30
22 Steering column stalk .....	32
23 Cruise control (RSG)/road speed limiter switch .....	32
24 RSL symbol (not activated) .....	33
25 RSL symbol (set) .....	33
26 RSG symbol (set) .....	34
27 Change of symbols on the display .....	35
28 Steering column stalk .....	35
29 RSG/RSL rocker switch .....	36
30 RSG – increasing the speed .....	36
31 Cruise control symbol .....	37
32 MEM/OFF switch .....	38
33 Cruise control (RSG) symbol .....	38
34 Road Speed Limiter (RSL) rocker switch .....	39
35 RSG/RSL steering column stalk .....	39
36 RSL symbol .....	40
37 Deactivating the Road Speed Limiter (RSL) .....	41
38 Changing the idling speed permanently .....	42
39 Changing the idling speed temporarily .....	42
40 Driver's display .....	43
41 Coolant temperature .....	44
42 Coolant temperature too high .....	45
43 Coolant level too low .....	46
44 Engaging off-road range .....	47
45 Changing to neutral .....	47
46 Engaging on-road range .....	48
47 Engaging all wheel drive .....	49
48 Engaging transverse lock(s) of the front axle(s) .....	50
49 Disengaging transverse lock(s) of the front axle(s) .....	50

(continued)

**CONTENTS (continued)**

Fig		Page
50	Engaging transverse lock(s) of the rear axle(s) .....	51
51	Engaging the interaxle differential lock.....	52
52	Power Take Off (PTO).....	54
53	PTO operation .....	55
54	Setting the working speed (emergency only) .....	56
55	Disengaging the PTO .....	57
56	Lowering the trailer pintle .....	59
57	Fastening pins .....	60
58	Opening the trailer pintle .....	60
59	Hitching up a trailer.....	62
60	Manually close the trailer pintle.....	62
61	Vehicle trailer connections .....	63
62	Connecting the 12-pin trailer connection (version 1).....	64
63	Connecting the 12-pin trailer connection (version 2).....	65
64	Connecting the brake air lines .....	65
65	Disconnecting the brake air lines .....	66
66	Additional current consumer.....	67
67	Removing the spare wheel.....	68
68	Release the spare wheel.....	69
69	Stowing the spare wheel .....	69
70	Securing the spare wheel.....	70
71	Removing the wheel.....	71
72	Jacking point and protection sleeves .....	71
73	Lever the wheel .....	72
74	Push the wheel onto the hub.....	73
75	Wheel nut indicators .....	73
76	Disconnecting the propshafts .....	75
77	Towing using an A-frame.....	76
78	Attaching a towing bar .....	77
79	Hydraulic power steering failure .....	78
80	Cab access ladder.....	79
81	Winch remote socket and rocker switch.....	80

**SAFE WORKING WITH THE VEHICLE****General**

- 1 Observe the points that follow:

**WARNINGS**

(1) **RISK OF INJURY. DO NOT THROW WASTE, INCLUDING GLOWING CIGARETTES, FROM THE MOVING VEHICLE.**

(2) **RISK OF INJURY. WHEN TRAVELLING IN THE CAB OR IN VEHICLES FITTED WITH TROOP CARRYING VEHICLE ENHANCED SEATING KITS (TCVES) FOR CONTINUOUS AND EXTENDED PERIODS OF OPERATION, THERE IS A RISK FROM VIBRATION. FURTHER INFORMATION AND GUIDANCE IS INCLUDED IN THE EQUIPMENT SUPPORT POLICY DOCUMENT (AESP 2320-W-100-111).**

1.1 Do not throw waste from the vehicle. Waste pollutes the environment and can be a danger to other road users, specifically motorcyclists and drivers of open top vehicles.

1.2 Glowing cigarettes that are thrown from the vehicle can initiate forest fires, and fires in following vehicles if the cigarette is drawn into the air filter.

1.3 Do not operate mobile phones or radios with their aerials inside the cab. The electronic systems of the vehicle could malfunction.

1.4 Remove outside aerials before loading the vehicle onto a trailer or ship, or driving inside a low building.

**WARNING**

**RISK OF INJURY. SOME TASKS INVOLVE WORKING AT HEIGHT. THERE IS A RISK OF FALLING.**

1.5 Avoid working at height if possible. Use suitable equipment or other measures to prevent falls. Use suitable equipment or other measures to minimise the distances and consequences of a fall.

**WARNING**

**PERSONNEL INJURY. VEHICLE MALFUNCTION. MAKE SURE ALL PERSONAL EQUIPMENT IS CORRECTLY STOWED IN DESIGNATED STOWAGE AREAS WITHIN THE VEHICLE CAB TO AVOID INADVERTANT APPLICATION OF THE HILL HOLD SWITCH.**

- 2 The driver and commander of the vehicle must ensure all personal equipment is stowed correctly within the vehicle cab to avoid loose equipment falling forward and contacting the hill hold switch.

### **Safety equipment and tools**

3 Check the accessibility, completeness and serviceability of the safety equipment and tools as follows:

- 3.1 Warning triangle.
- 3.2 Warning light.
- 3.3 First aid kit.
- 3.4 Fire extinguisher.
- 3.5 Wheel chock.
- 3.6 Jack.
- 3.7 Jacking block.
- 3.8 Tool kit. Refer to the vehicle CES.

### **Air conditioning system**

#### **WARNING**

**RISK OF INJURY. AVOID CONTACT WITH REFRIGERANT FLUID OR VAPOUR. THERE IS A DANGER OF SKIN OR EYE INJURY, OR SUFFOCATION.**

- 4 Refrigerant fluids and vapours are a health hazard. Observe the points that follow:
  - 4.1 Avoid contact with any leaking refrigerant fluid or vapour. Obtain immediate medical assistance from a doctor if refrigerant contacts the skin or eyes.
  - 4.2 Ventilate enclosed areas that contain refrigerant vapour.
  - 4.3 Do not use a steam cleaner to clean the parts of the air conditioning system.
  - 4.4 For work to be carried out on the air conditioning system, contact your Unit for assistance.

### **Used engine oil**

#### **WARNING**

**RISK OF INJURY. AVOID CONTACT WITH USED ENGINE OIL. USED ENGINE OIL CONTAINS CARCINOGENS AND CAN CAUSE DRY SKIN, IRRITATION AND INFLAMMATION.**

- 5 Engine oil is a health hazard. Observe the hygiene points that follow:
  - 5.1 Wear suitable gloves or skin protection.
  - 5.2 Avoid lengthy or repeated contact with used engine oil. Engine oil removes the natural grease from the skin.
  - 5.3 Clean areas of skin that contact engine oil as follows:
    - 5.3.1 Wash the area thoroughly with soap and water, or a suitable cleaning agent. Do not use petrol, diesel, gas oil, thinners or solvents.

- 5.3.2 Use a nail brush if necessary.
- 5.3.3 Apply a greasy skin cream after cleaning.
- 5.4 Change oil-soaked clothing or footwear.
- 5.5 Do not place oil-soaked rags into the pockets of clothing.

### Cleaning agents and fuel

#### WARNINGS

**(1) RISK OF INJURY. AVOID CONTACT WITH CLEANING AGENTS. CLEANING AGENTS ARE A HAZARD IF INHALED, SWALLOWED, OR CONTACT THE SKIN.**

**(2) RISK OF INJURY. AVOID CONTACT WITH FUEL. FUEL CONTAINS CARCINOGENS AND IS A HAZARD IF INHALED, SWALLOWED, OR CONTACTS THE SKIN.**

- 6 When using or handling cleaning agents or fuel, observe the points that follow:
  - 6.1 Avoid lengthy exposure to cleaning agents or fuel.
  - 6.2 Keep out of the reach of children.
  - 6.3 Keep away from sources of ignition. Do not smoke in the vicinity. Fuel is highly inflammable.
  - 6.4 Remove immediately any clothing that comes into contact with cleaning agents or fuel.
  - 6.5 Do not allow cleaning agents or fuel to flow down a drain.

### Exhaust system

#### WARNING

**RISK OF INJURY. DO NOT TOUCH THE HOT EXHAUST SYSTEM.**

- 7 Observe the points that follow:
  - 7.1 Do not touch the exhaust system and the associated heat shields, their temperatures can reach 200°C.
  - 7.2 Do not remove the heat shields.
  - 7.3 Prevent readily combustible materials, e.g. camouflage nets, hay, leaves and grass, from coming into contact with the hot exhaust system.

### Other driver maintenance

- 8 For safe working involving other driver maintenance tasks, see the appropriate paragraph or chapter as follows:
  - 8.1 Towing and recovery, refer to Para 230.
  - 8.2 Changing a wheel, refer to Para 226.
  - 8.3 Electrical system, refer to Chapter 1-6.

### **Taking out of operation or placing in storage**

9 Any equipment taken out of use for periods exceeding four months is to be put into storage in accordance with the requirements of AESP 2300-A-401-013 (Short Term Storage of All Vehicles) or AESP 0200-A-400-013 (Storage under Controlled Humidity Environments).

### **Attachments, body components and conversions**

10 Attachments, body components and conversions must be installed/performed in accordance with approved guidelines for installing bodies. The guidelines for installing bodies can be obtained from the Operational Support Vehicle Programme Delivery Team (DT) at:

Operational Support Vehicle Programme Delivery Team



11 The express written approval of OSVP DT is required for any deviations from the guidelines for installing bodies and for the installing of additional equipment such as air-conditioning units, tail-lifts, cranes, retarders, etc.

### **Mobile phones and radios**

12 Mobile phones and radios must be installed in accordance with MAN guidelines for installing bodies, refer to Para 10.

### **Accessories and parts**

13 Refer to the authority, OSVP DT.

## **ENVIRONMENTAL PROTECTION**

### **Disposing of used oil**

14 Used oil can adversely affect the quality of ground water. When disposing of used oil, observe the points that follow:

- 14.1 Do not pour used oil onto the ground, into water, or down a drain.
- 14.2 Collect and dispose of used oil in accordance with local procedures.
- 14.3 Contact an oil supplier or local authority for information about disposal depots.

### **Disposing of filters and cartridges**

15 Filter elements, filter cartridges and desiccant cartridges are hazardous waste. Dispose of these items in accordance with local procedures.

### **Disposing of engine coolant**

16 Undiluted engine coolant is hazardous waste. Collect and dispose of engine coolant in accordance with local procedures.

### **Disposing of batteries**

17 Vehicle batteries contain hazardous waste. When disposing of vehicle batteries, observe the points that follow:

- 17.1 Do not dispose of vehicle batteries in domestic refuse.
- 17.2 Dispose of vehicle batteries in accordance with local procedures.

**RUNNING-IN****WARNING**

**WHEEL NUT SECURITY. AFTER CHANGING A WHEEL, ENSURE THE WHEEL NUTS ARE TIGHTENED DIAGONALLY USING THE WHEEL BRACE SUPPLIED. AFTER 50KM, RETIGHTEN WHEEL NUTS. AS SOON AS POSSIBLE, HAVE THE WHEEL NUTS TORQUED TO 575NM AND RE-TORQUED AFTER 50KM. CONTACT YOUR UNIT FOR ASSISTANCE.**

18 For the durability, reliability and economy of the vehicle, run-in the engine and the other assemblies carefully during the initial driving period as follows:

19 After 2000km, increase the road speed gradually until the maximum permitted road speed or the maximum engine speed limit is reached.

**ECONOMICAL DRIVING****General**

20 Make sure that the following conditions are observed:

- 20.1 The air filter is clean.
- 20.2 Tyre pressures are set correctly.

**Economical vehicle operation**

21 Make sure that the following conditions are observed:

- 21.1 Do not depress the accelerator when starting the engine.
- 21.2 Do not allow the engine to warm up at idle, warm the engine and transmission at medium load.
- 21.3 Stop the engine when the vehicle is at a standstill for long periods.
- 21.4 If required, use the auxiliary heater to heat the cab, refer to Chapter 1-3 (winterised waterproof variants only).
- 21.5 Do not accelerate prior to stopping the engine.
- 21.6 Keep the needle of the rev counter in the green zone during normal driving.
- 21.7 Accelerate to the engine rated speed when driving uphill, overtaking, or adjusting to the speed of other traffic.
- 21.8 Select the D range.
- 21.9 Avoid using the kickdown or driving in the low, restricted drive ranges. Shift up into the next drive range in good time.
- 21.10 Modify your driving to avoid unnecessary use of the brakes.
- 21.11 Only use the cruise control if traffic conditions allow, refer to Para 113.
- 21.12 Do not use the cruise control when going downhill.



**LOADING THE VEHICLE**

**WARNING**

**DANGER OF PERSONAL INJURY. MAKE SURE THAT THE LOAD IS CORRECTLY SECURED.**

22 Make sure that the vehicle is correctly loaded, and that the load is correctly positioned and secured, refer to Table 1.

**TABLE 1 LOADING THE VEHICLE**

Ser (a)	Condition (b)	Effect (c)
1	One sided loading.	The tyres or springs can be overloaded on one side.
2	One sided loading or high centre of gravity.	Risk of the vehicle becoming unstable when turning.
3	Load not restrained securely.	Load shifting, damage to the vehicle and risk of the vehicle becoming unstable when braking or turning.
4	Loading against the sides of the vehicle.	Damage to the vehicle and risk of the vehicle becoming unstable when braking or turning.

**Basic loading and unloading**

23 The following conditions must be observed:

23.1 Do not exceed the permitted axle load rating or the Gross Vehicle Weight (GVW).

23.2 Load in accordance with the Load Interface Scheme for specific loads. If a Load Interface Scheme does not exist, refer to the Safe Loaders Guide.

23.3 Make sure that the load is distributed evenly.

23.4 Make sure that the centre of gravity of the load is in the middle of the load bed to prevent front axle overload.

23.5 Secure the load.

23.6 Note the tyre sizes, load index and tyre inflation pressure. Do not exceed the tyre rating. The load must not exceed the axle weights. Refer to Chapter 1-1.

23.7 When unloading the vehicle from the rear, note there is a risk of overloading the front axle(s) if the remaining load is not distributed evenly.

23.8 During braking, the load is transferred towards the front of the vehicle, the front axle load increases and the rear axle load reduces.

**COLD WEATHER OPERATION****General**

- 24 Make sure that the vehicle is properly winterised as follows:
- 24.1 Perform normal maintenance work in conjunction with the winter service, contact your Unit for assistance.
  - 24.2 If manufacturer's coating has been damaged or removed re-apply a wax-based preserving agent to the cab, the underside of the vehicle, the body and the chassis.
  - 24.3 Re-apply the preserving agent at specified intervals.
  - 24.4 Frequently wash the vehicle.
  - 24.5 Make sure that the correct grade of oil is used.
  - 24.6 Drain the water from the fuel tank at specified intervals.
  - 24.7 Use diesel fuel with cold temperature properties (winter-grade fuel).
  - 24.8 Make sure the fuel tank is empty before changing from summer-grade fuel to winter-grade fuel.
  - 24.9 Before the onset of cold weather, check the auxiliary heater, refer to Chapter 1-3 (winterised/waterproof variants only).
  - 24.10 Check the condition of outside electrical plug connections.
  - 24.11 Clean plug connections with contact cleaner.
  - 24.12 After cleaning plug connections, use suitable grease for corrosion protection.
  - 24.13 Check battery terminals for signs of corrosion, and make sure that they are properly greased.

**CAUTION**

**DANGER OF DAMAGE. Do not cover the radiator as the engine will overheat.**

- 24.14 Never use a radiator cover.
- 24.15 Check that all of the tyres are suitable for winter use, change to winter tyres if necessary.

**CAUTION**

**DANGER OF DAMAGE. Do not use snow chains on vehicles with restricted clearance between the tyres and the mudguards or bodywork.**

- 24.16 Check the clearance of the tyres before fitting snow chains.
- 24.17 Fit snow chains on the wheels before driving on roads with a heavy covering of snow, or roads with a tightly packed snow surface.
- 24.18 Do not fit the tyre chains too tightly.

**BEFORE STARTING THE ENGINE**

**Battery master isolator switch (NOT CURRENTLY FITTED, POTENTIAL MODIFICATION)**

**CAUTION**

**EQUIPMENT DAMAGE. Battery failure. If the vehicle is not to be used for an extended period the battery master isolator switch must be switched off.**

25 As part of the MoD preventative maintenance policy all SV variants have been fitted with a secondary battery master isolator switch.

26 Refer to Fig 1. The secondary battery master isolator switch has been located in the following position:

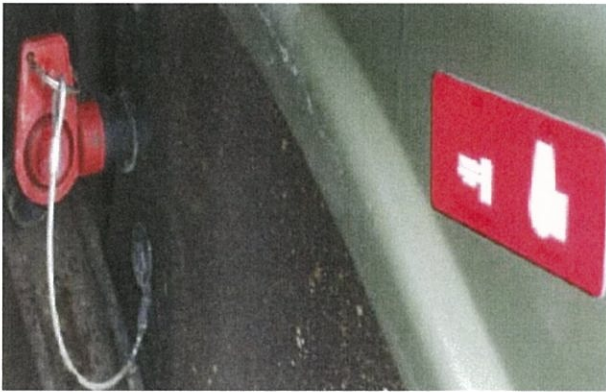


Fig 1 Battery master isolator switch location (HX variant)

26.1 The HX variant, battery master isolator switch is located on the front of the battery box on the LH side of the vehicle.

27 Refer to Fig 2. To prolong battery life avoid unnecessary engine starts (e.g. manoeuvring only); up to 2Ah of current are consumed each time the engine is started.

28 Before starting the engine, check that the electrical battery master switch is switched on.



Fig 2 Electrical battery master switch

**Electrical battery master switch****CAUTIONS**

(1) **VEHICLE DAMAGE.** Never loosen or disconnect the battery or pole terminals while the engine is running.

(2) **VEHICLE DAMAGE.** To allow the auxiliary heater to cool down, do not switch off the electrical battery master switch whilst the combustion air blower and auxiliary heater circulating pump are running.

29 Refer Fig 2. The electrical battery master switch should be switched off when the vehicle is parked up for long periods, or when work is being performed on the electrical system.

30 The electrical battery master switch automatically breaks the connection between the battery and the electrical system approximately 35 seconds after switch-off.

31 To operate the electrical battery master switch, proceed as follows:

31.1 To switch off the electrical battery master switch, press the top of the switch. All consumers are isolated from the vehicle electrical system.

31.2 To switch the electrical battery master switch to neutral, move the switch from the off position to the centre position.

31.3 To switch on the electrical battery master switch, press the bottom of the switch until the stop is reached. The switch springs back to the centre position.

**Ignition key position****WARNING**

**RISK OF ACCIDENTS. NEVER SWITCH OFF THE IGNITION WHILST THE VEHICLE IS MOVING. ALWAYS LEAVE THE KEY IN THE DRIVING POSITION II (IGNITION ON).**

32 Refer to Fig 3. The ignition key positions are as follows:

32.1 0 Inserting or removing the ignition key.

32.2 I Auxiliary on.

32.3 II Driving.

32.4 III Start.

33 Release the ignition key after the engine has started. The key springs back to the driving position II.

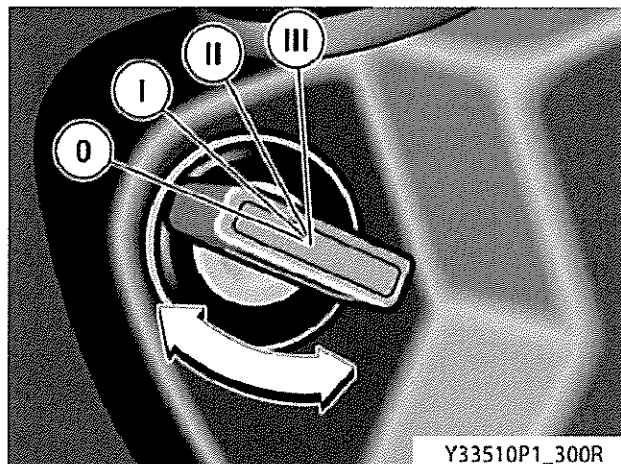


Fig 3 Ignition key

#### Unlocking the steering

#### WARNING

**RISK OF ACCIDENTS. NEVER LOCK THE STEERING WHEN THE VEHICLE IS MOVING.**

34 Refer to Fig 3. To unlock the steering, insert the ignition key in the steering/starter lock (position 0) and move the steering wheel back and forth whilst turning the ignition key toward position I.

#### Switching on the ignition

35 To switch on the ignition, turn the ignition key to position II. The check lamps and warning lamps come on. Refer to Chapter 1-2.

#### STARTING THE ENGINE FROM COLD

#### CAUTION

**ENGINE DAMAGE. Do not press the accelerator when starting the engine.**

36 Refer to Fig 3. To start the engine from cold, proceed as follows:

36.1 Make sure the parking brake is applied and the gearbox is in neutral N. The engine cannot be started with a gear selected.

36.2 If necessary, switch on the electrical battery master switch.

36.3 Turn the ignition key to driving position II.

36.4 The engine is ready to start when the text 'START ENGINE' appears on the driver's display. This message appears for approximately 15 seconds.

#### CAUTION

**ENGINE DAMAGE. Do not run the starter motor for more than 10 seconds.**

36.5 Turn the ignition key to start position III (as far as the stop) and start the engine.

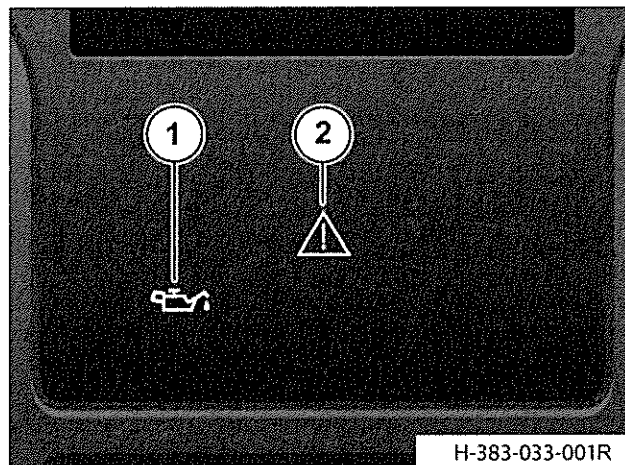
36.6 Release the ignition key immediately after the engine starts. The ignition key will return to the driving position II.

**CAUTION**

**ENGINE DAMAGE.** Stop the engine immediately if the driver's display indicates 'OIL PRESSURE TOO HIGH' or 'OIL PRESSURE TOO LOW', the oil pressure check lamp (1) comes on and the central warning light (2) starts flashing.

36.7 Refer to Fig 4. The check lamps and warning lamps go out when their check or warning functions have been completed, refer to Chapter 1-2.

36.8 Do not move off until the STOP symbol on the driver's display has gone out, refer to Chapter 1-2.



1 – Oil pressure check lamp

2 – Central warning light

Fig 4 Check lamps

#### Starting the engine at temperatures down to -20°C

37 To start the engine at temperatures down to -20°C, refer to Para 36.

#### Starting the engine at temperatures between -20°C to -32°C

38 Refer to Fig 5. To start the engine at temperatures between -20°C to -32°C proceed as follows:

- 38.1 Check the air intake duct of the coolant pre-heater for icing, and clean it if necessary.
- 38.2 Check air filter intake and elements for ice, replace, if necessary.
- 38.3 Check separator valve of the air filter housing for ice, empty, if necessary.
- 38.4 Set the transmission to neutral N.
- 38.5 Switch on the auxiliary coolant pre-heater and run for 60 minutes.
- 38.6 Regularly check if the yellow check lamp in the pre-heater switch lights.
- 38.7 After the auxiliary coolant pre-heater has been run for the requested time period shown in Para 38.5 the engine can be started.

### CAUTIONS

- (1) **ENGINE DAMAGE.** Check the display as soon as the engine starts.
- (2) **ENGINE DAMAGE.** Stop the engine immediately if no oil pressure or inadequate oil pressure is signalled on the display and the "oil pressure" check lamp (1) comes on in conjunction with the central warning light (2) and investigate the fault immediately.

38.8 Turn the ignition key to position III (start position) and hold it in that position for no more than 50 seconds.

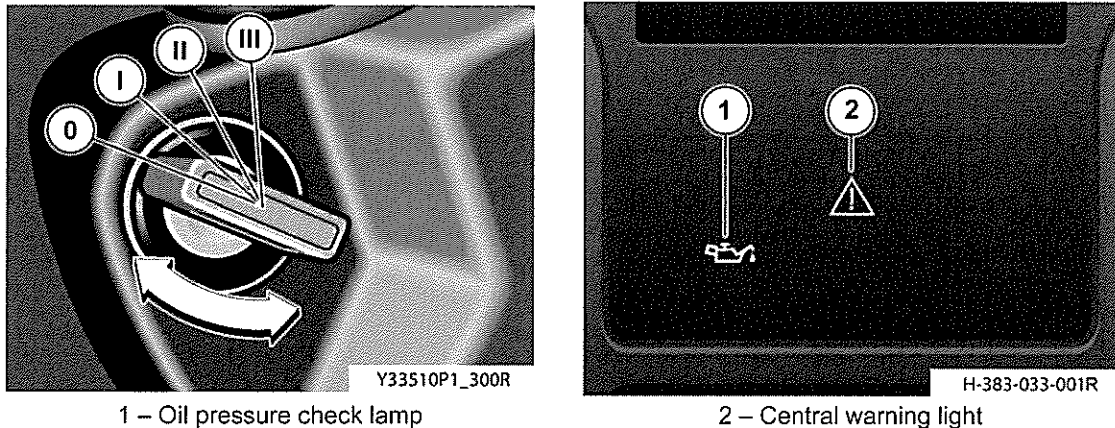


Fig 5 Starting the engine at temperatures between -20°C to -32°C

38.9 Do not press the accelerator pedal.

38.10 Release the ignition key if the engine is running or the time to actuate the starter motor has elapsed (50 seconds max). Wait at least 10 minutes before trying to start the engine again.

38.11 Let the engine warm up at idling speed for 5 minutes, do not turn the steering wheel during this period.

38.12 Increase the engine speed to approximately 1,500 rpm, and keep the engine running for 10 minutes (warming-up phase of the gearbox), do not turn the steering wheel during this period.

38.13 The vehicle is now ready for operation.

### Starting the engine at temperatures between -32°C to -46°C (winterised variants)

39 To start the engine at temperatures between -32°C to -46°C carry out the same procedure as described at Para 38, with one exception, Para 38.5, the auxiliary coolant pre-heater should be run for 90 minutes.

### If the engine does not start (at very low temperatures)

40 Refer to Fig 6. If the engine does not start at very low temperatures, proceed as follows:

40.1 Turn the ignition key back to position 0 (switched off) and wait approximately 10 minutes to allow the batteries to recover.

40.2 Repeat starting the engine from cold, refer to Para 36.

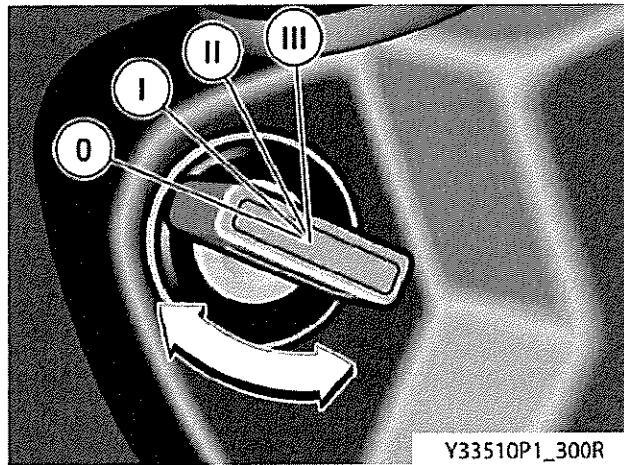


Fig 6 Ignition key

**STARTING THE ENGINE FROM WARM**

**CAUTIONS**

(1) **ENGINE DAMAGE.** Stop the engine immediately if the driver's display indicates 'OIL PRESSURE TOO HIGH' or 'OIL PRESSURE TOO LOW', the oil pressure check lamp (1) comes on and the central warning lamp (2) starts flashing.

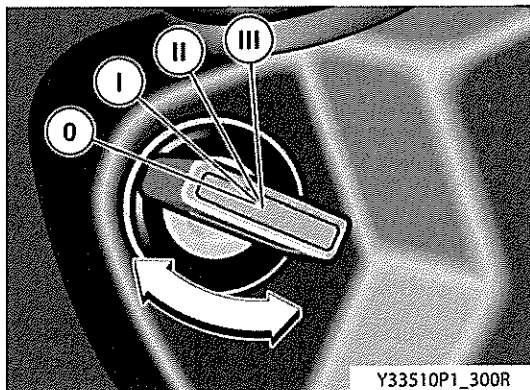
(2) **ENGINE DAMAGE.** Do not press the accelerator when starting the engine.

41 Refer to Fig 7. To start the engine from warm, (outside temperature above approximately +10°C), proceed as follows:

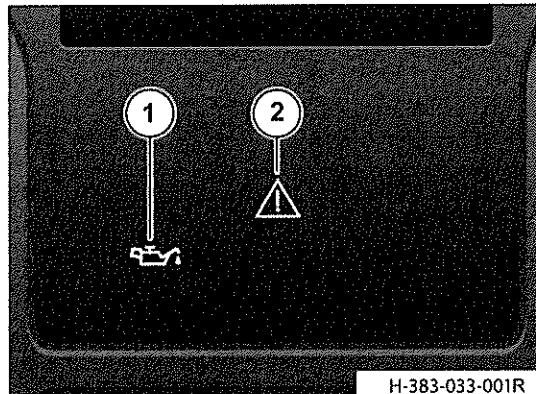
41.1 Make sure that the parking brake is applied and the gearbox is in neutral N. The engine cannot be started with a gear selected.

41.2 If necessary, switch on the electrical battery master switch.

41.3 Turn the ignition key to driving position II.



1 – Oil pressure check lamp



2 – Central warning light

Fig 7 Starting the engine from warm



### CAUTION

**ENGINE DAMAGE.** Do not run the starter motor for more than 10 seconds.

41.4 Turn the ignition key to start position III (as far as the stop) and start the engine.

41.5 Release the ignition key immediately after the engine starts. The ignition key will return to the driving position II.

41.6 The check lamps and warning lamps go out when their check or warning functions have been completed, refer to Chapter 1-2.

41.7 Do not move off until the STOP symbol on the driver's display has gone out, refer to Chapter 1-2.

### STOPPING THE ENGINE

#### WARNING

**RISK OF ACCIDENTS. DO NOT STOP THE ENGINE WHILE THE VEHICLE IS MOVING.**

#### CAUTIONS

(1) **ENGINE DAMAGE.** If the engine has been running under a high load, the coolant temperature will be high (above 95°C). Do not stop the engine immediately. Let the engine idle for between 1 and 2 minutes before stopping.

(2) **ENGINE DAMAGE.** Do not switch off the electrical battery master switch whilst the combustion air blower and the circulating pump of the auxiliary heaters are still running.

42 Refer to Fig 8. To stop the engine, proceed as follows:

42.1 Stop the vehicle.

42.2 Apply the parking brake.

42.3 Shift the gearbox to neutral N.

42.4 Turn the ignition key to position 0 (ignition off).

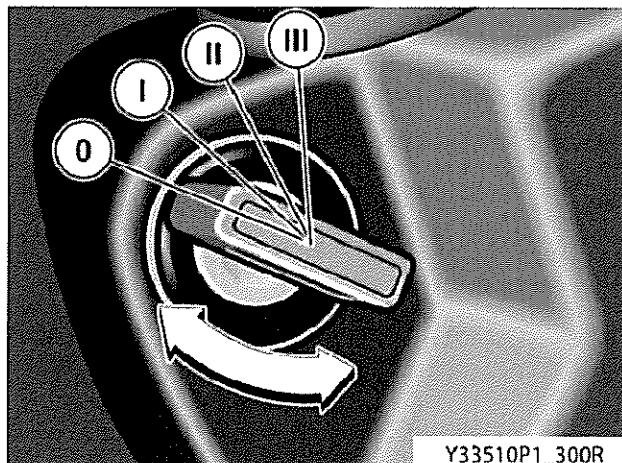


Fig 8 Ignition key

**Locking the steering****WARNINGS**

- (1) **RISK OF ACCIDENTS. NEVER LOCK THE STEERING WHILE THE VEHICLE IS MOVING.**
- (2) **RISK OF ACCIDENTS. ALWAYS HAVE THE KEY IN THE DRIVING POSITION II (IGNITION ON) WHEN BEING TOWED.**

43 Refer to Fig 9. To lock the steering, proceed as follows:

- 43.1 Turn the ignition key to position 0 (ignition off), and pull the key out.
- 43.2 Turn the steering wheel until the steering lock can be heard to engage.

**NOTES**

- (1) The steering wheel can no longer be turned.
- (2) The electrical battery master switch will switch off automatically.

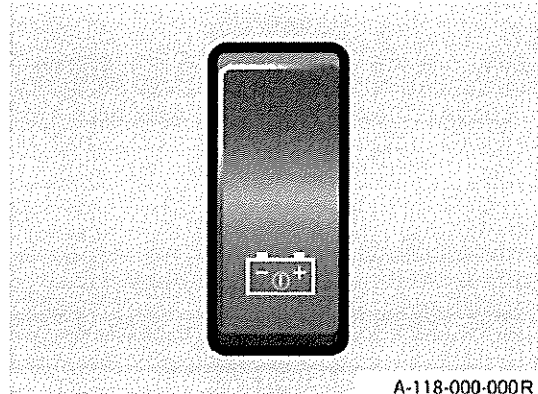
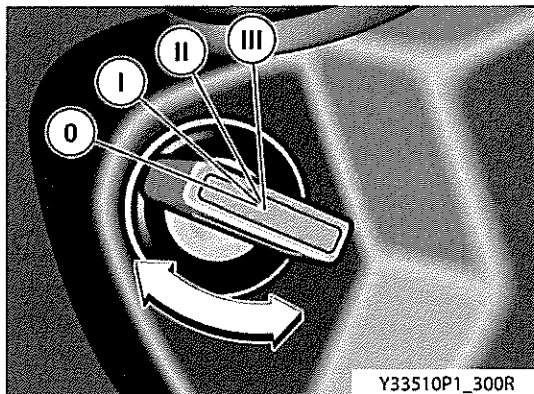


Fig 9 Locking the steering

**STOPPING THE ENGINE IN AN EMERGENCY (VEHICLE MOVING)**

44 Use the brakes immediately if the engine power or speed increases unintentionally. If the engine speed does not decrease, stop the vehicle immediately, then turn the ignition key to position 0 (ignition off). Stall the engine if necessary.

**STOPPING THE ENGINE IN AN EMERGENCY (VEHICLE STOPPED)****Emergency off switches**

45 Refer to Fig 10. The emergency off switches (1) are located on the instrument panel and on the driver's side of the vehicle.

46 The emergency off switch breaks the connection between the battery and the vehicle electrical system. Vehicle battery and auxiliary battery power is turned off by the emergency off switch (1).

47 The engine stops when the emergency off switch is actuated. The power steering, lighting, ABS, gearbox, retarder, etc. all cease to function.

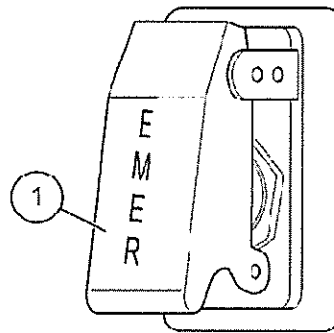


Fig 10 Emergency off switch

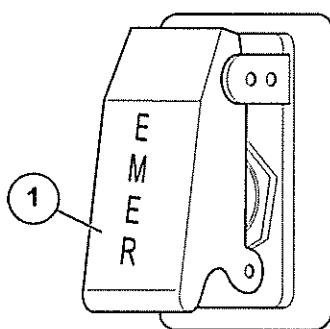
**Disconnecting electrical power**

**WARNING**

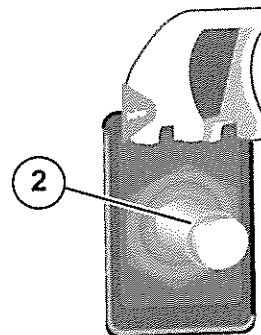
**LOSS OF CONTROL. DO NOT ACTUATE THE EMERGENCY OFF SWITCH WHEN THE VEHICLE IS MOVING. ONLY ACTUATE THE EMERGENCY OFF SWITCH IN THE EVENT OF DANGER AND WHEN THE VEHICLE IS STOPPED.**

48 Refer to Fig 11. To disconnect electrical power, proceed as follows:

- 48.1 Stop the vehicle.
- 48.2 Apply the parking brake.
- 48.3 Lift the red security flap (1) upwards to open.
- 48.4 Set the emergency off switch (2) to the up position.



1 – Red security flap



2 – Emergency off switch

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Fig 11 Disconnecting electrical power

**Connecting electrical power**

49 Refer to Fig 11. To connect electrical power, press the red security flap (1) down. Make sure that the security flap is heard to clip shut.

50 If the emergency off switch is used, the electrical battery master switch will need to be switched on. Refer to Para 31.

**AUXILIARY BATTERY BOX**

51 The vehicle is equipped with an additional emergency-off switch located in the auxiliary battery box on the left-hand side of the vehicle.

52 Refer to Fig 12. If radio power is required when the vehicle is shut down, the auxiliary battery emergency switch (1) must be set to on.

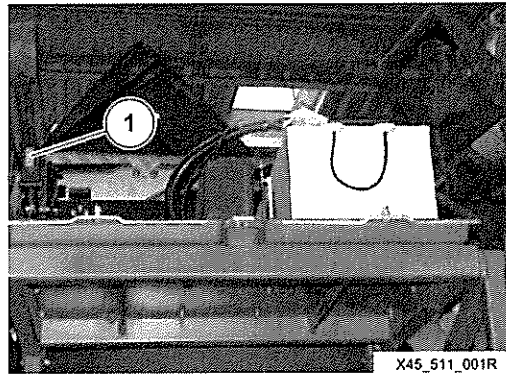


Fig 12 Auxiliary battery box

**REV COUNTER**

**CAUTION**

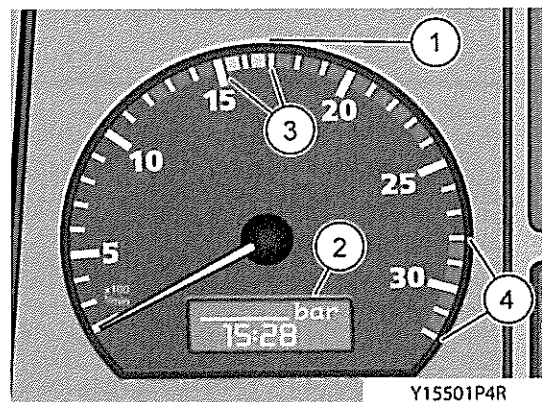
**ENGINE DAMAGE.** The needle must not move into the red zone (4) on the scale.

53 Refer to Fig 13. The rev counter displays the following:

53.1 Variable eco-zone (1).

53.2 Display (2) for time, outside temperature, charge pressure and dimmer setting for instrument and switch lighting.

53.3 Warning zone (4), coloured red to indicate the maximum permitted engine speed.



- |                       |                  |
|-----------------------|------------------|
| 1 – Variable eco-zone | 3 – LED          |
| 2 – Display           | 4 – Warning zone |

Fig 13 Rev counter

### Variable eco-zone

54 Refer to Fig 13. The variable eco-zone (1) displays the following:

- 54.1 Green is the economy range.
- 54.2 Light green is the optimum economy range.
- 54.3 LED (3) to indicate the optimum economy range.

### BrakeMatic operation – deceleration

55 Refer to Fig 14. The zone for optimum engine brake effectiveness is indicated by two LEDs (5) (light green).

56 The effectiveness of the engine brake depends on the engine speed; a high engine speed equals a high level of engine brake effectiveness. Refer to Chapter 1-4 for operation of the engine brake.

57 Shift down to a lower gear or drive range in good time before negotiating a downhill gradient. Operate the engine brake so that the maximum permitted engine speed is not exceeded and enough braking effect is available.

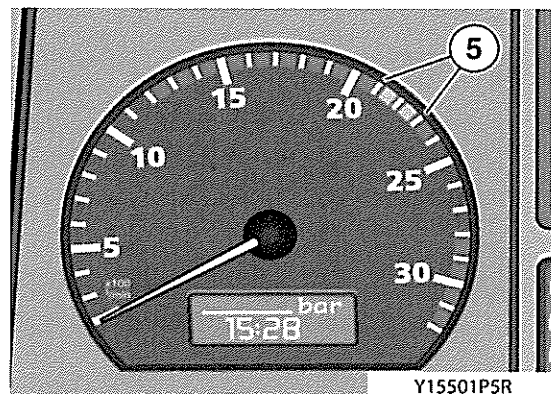


Fig 14 BrakeMatic operation – deceleration

## AUTOMATED GEARBOX

### WARNINGS

- (1) **VEHICLE MOVEMENT. ALWAYS APPLY THE SERVICE BRAKES OR PARKING BRAKE WHENEVER THE VEHICLE IS STATIONARY.**
- (2) **LOSS OF CONTROL. THERE IS NO ENGINE BRAKE EFFECT WHEN THE DRIVE RANGE SWITCH IS IN THE NEUTRAL POSITION N OR WHEN THE GEARBOX IS CHANGING GEAR.**
- (3) **LOSS OF CONTROL. ONLY ACTUATE THE DRIVE RANGE SWITCH WHEN THE VEHICLE IS STATIONARY AND THE ENGINE IS IDLING. NEVER TURN THE DRIVE RANGE SWITCH WHILST DRIVING.**

58 The vehicle has an automated gearbox with 12 forward speeds and two reverse speeds. The automated gearbox has an electronic/pneumatic gearshift and an automated dry clutch. The automated clutch (no clutch pedal) means that the driver does not operate the clutch.

59 The automated gearbox is operated using the drive range switch and the steering column stalk. The driver can select automatic drive mode or manual mode.

60 The neutral position N can be selected from any drive range switch setting. The engine can only be started when the switch is in the N position.

61 Any gear can be engaged from the N position at any time, except for reverse gear R. The automated gearbox automatically selects a gear suitable for the road speed.

62 The gear that is engaged is shown on the driver's display.

### Drive range switch

#### CAUTION

**GEARBOX DAMAGE.** Do not operate the drive range switch and the accelerator at the same time.

63 Refer to Fig 15. The drive range switch positions are as follows:

63.1 D Drive forward.

63.2 D<sup>X</sup> Cross-country.

63.3 D<sup>M</sup> Manoeuvre forward.

63.4 N Neutral.

63.5 R<sup>1</sup> Reverse.

63.6 R<sup>M</sup> Manoeuvre reverse.

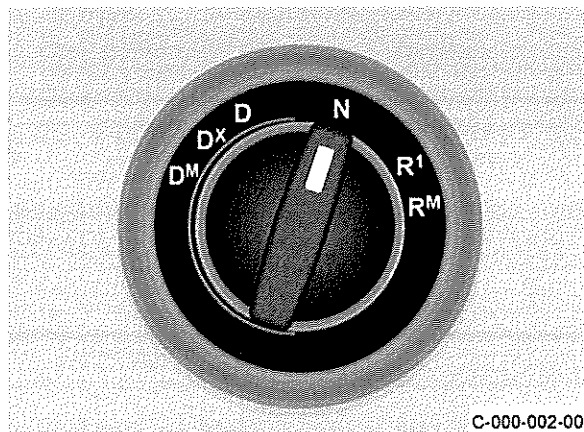
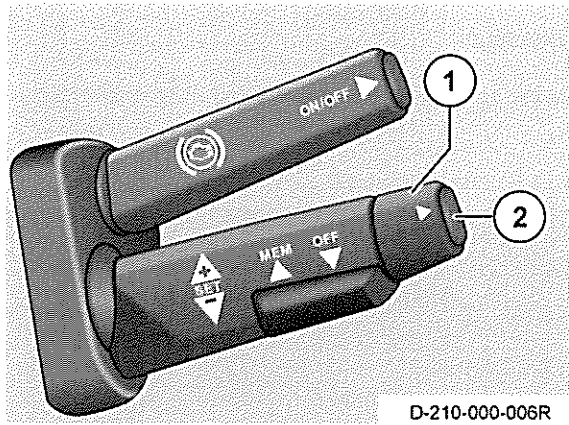


Fig 15 Drive range switch

### Steering column stalk

64 Refer to Fig 16. The steering column stalk (1) is used for changing gear and the button (2) is used to switch between automatic and manual mode.



1 – Steering column stalk

2 – Button

Fig 16 Steering column stalk

### Gear indications on the driver's display

65 Refer to Fig 17. When the gearbox is in automatic mode, the gear indicator (1) on the driver's display shows the following:

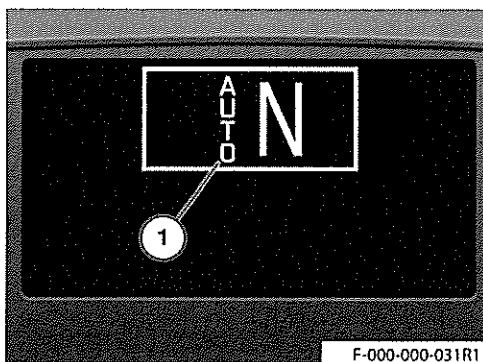
- 65.1 The text 'AUTO'.
- 65.2 The number of the gear engaged.

#### NOTE

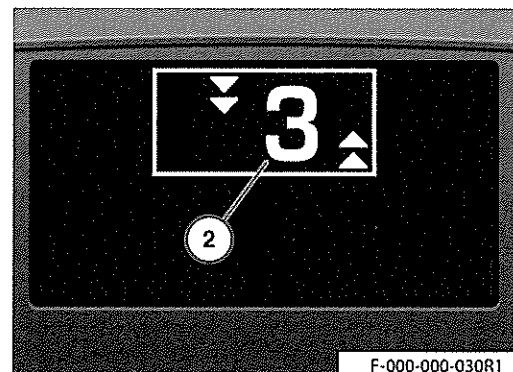
N = neutral and R = reverse gear.

66 When the gearbox is in manual mode, the gear indicator (2) on the driver's display shows the following:

- 66.1 The number of the gear engaged.
- 66.2 The triangles, which show the number of gears that are available to shift up or down at the current speed.



1 – Automatic gear indicator



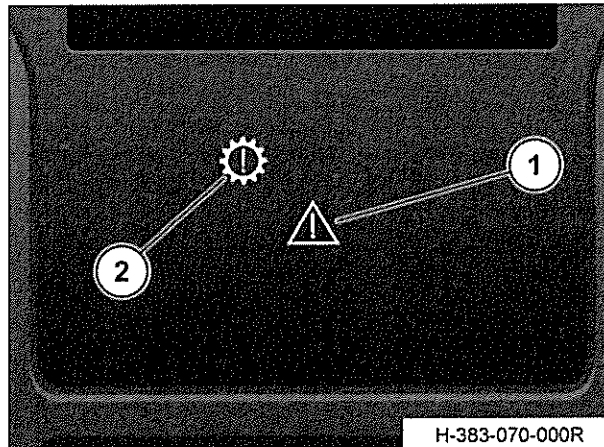
2 – Manual gear indicator

Fig 17 Gear indicator

**Check lamps and display messages**

67 Refer to Fig 18. A message appears on the display together with a symbol (2) if the gearbox is not operating.

68 The central warning light (1) comes on and a warning signal sounds, refer to Chapter 1-2.



1 – Central warning light

2 – Symbol

Fig 18 Gearbox fault display

**Starting the engine**

69 The engine cannot be started unless the drive range switch is set to N.

70 The neutral N is shown on the drivers display. Automatic mode is active.

71 To start the vehicle, proceed as follows:

71.1 Make sure that the parking brake is applied.

71.2 Switch on the ignition.

71.3 Wait for the system to perform a self-check.

71.4 Start the engine.



### Protecting the clutch

#### CAUTION

**VEHICLE DAMAGE.** Do not let the vehicle roll against the direction of travel as the clutch will be damaged.

72 To protect the clutch from overload, proceed as follows:

- 72.1 Start off in a low gear, shifting down to a lower gear if necessary.
- 72.2 Do not accelerate until the clutch is engaged.
- 72.3 Do not operate the clutch several times in quick succession.
- 72.4 Do not manoeuvre the vehicle for too long.
- 72.5 Always turn the drive range switch to N when stationary for more than 2 minutes.

73 If the clutch is overloaded, the text 'CLUTCH OVERLOAD SHIFT DOWN' is shown on the driver's display. The next moving off is always performed in 1st gear, refer to Chapter 1-2.

### Moving off forwards

74 To move off forwards, proceed as follows:

- 74.1 Move the drive range switch from N to D or D<sup>X</sup>. The selected gear is shown on the driver's display.
- 74.2 Wait for approximately 2 seconds.
- 74.3 Press the accelerator pedal and release the parking brake. The vehicle will move off.

75 If the vehicle is heavily loaded, or the vehicle is parked on a steep slope, select D. D<sup>M</sup> is for manoeuvring.

76 The gearbox Electronic Control Unit (ECU) automatically selects the optimum gear after initially moving off.

77 To select another gear, nudge the steering column stalk upwards or downwards, refer to Para 79.

### Moving off in reverse

78 There are two reverse gears available. The lowest gear is preselected using the drive range switch. The gearbox does not engage reverse 2nd gear automatically. RM is for manoeuvring.

79 To move off in reverse, proceed as follows:

- 79.1 Switch the drive range switch to the R1 position.
- 79.2 Reverse gear is indicated on the driver's display and a warning buzzer sounds.
- 79.3 Wait for two seconds.
- 79.4 Press the accelerator pedal and release the parking brake.
- 79.5 The vehicle moves off in reverse.

80 Nudging the steering column stalk upwards engages the 2nd reverse gear.

### Driving in automatic mode

#### WARNINGS

- (1) **LOSS OF CONTROL. WHILE THE GEARBOX ECU IS SHIFTING UP TO THE NEXT GEAR, THERE IS NO ENGINE BRAKING.**
- (2) **LOSS OF CONTROL. TAKE CARE WHEN DRIVING DOWNHILL, THE VEHICLE MAY SUDDENLY ACCELERATE, THEREFORE BE READY TO USE THE SERVICE BRAKES OR THE EXHAUST VALVE BRAKE.**

81 The gearbox ECU selects the necessary gear when moving off in the automatic mode. The gearbox shifts gear whenever the engine is no longer in the optimum speed range. The gear is shown on the driver's display.

### Manual gearshifts in automatic mode

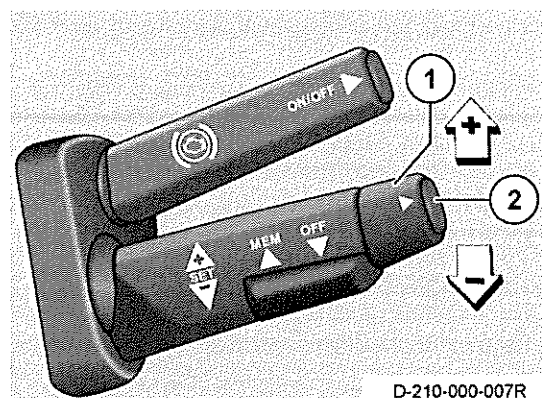
82 Refer to Fig 19. To manually shift gear in automatic mode, operate the steering column stalk (1) as follows:

- 82.1 To shift up a gear, briefly pull.
- 82.2 To shift up several gears, pull several times, or pull and hold.
- 82.3 To shift down a gear, briefly push.
- 82.4 To shift down several gears, push several times, or push and hold.
- 82.5 The steering column stalk automatically springs back to the centre position when released.

83 When manual mode is activated, the selected gear is shown on the driver's display.

84 Automatic mode is reactivated after approximately 10 seconds. The gearbox ECU once again selects the necessary gear automatically from this point on.

85 A gearshift command from the steering column stalk is not performed if the selected gear would result in the engine exceeding the maximum speed or running slower than the minimum speed.



1 – Steering column stalk

2 – SET+/-

Fig 19 Steering column stalk

### **Kickdown**

86 The kickdown position provides maximum acceleration and pulling power. To shift down to a lower gear, for example when accelerating or ascending a hill, depress the accelerator fully (kickdown position).

87 The kickdown position causes the gearbox to shift down to a suitable gear at the earliest possible moment. Fuel consumption will increase.

### **Driving in manual mode**

#### **CAUTION**

**ENGINE DAMAGE. Do not exceed the permitted engine speed range.**

88 The driver selects the appropriate gear when moving off in manual mode. The gearbox does not shift even when the engine speed moves out of the optimum range. The gear is shown on the driver's display.

### **Gearshifts in manual mode**

89 Refer to Fig 20. To manually shift gear, operate the steering column stalk (1) as follows:

89.1 Press button (2) to switch to manual mode.

89.2 To shift up a gear, briefly pull.

89.3 To shift up several gears, pull several times, or pull and hold.

89.4 To shift down a gear, briefly push.

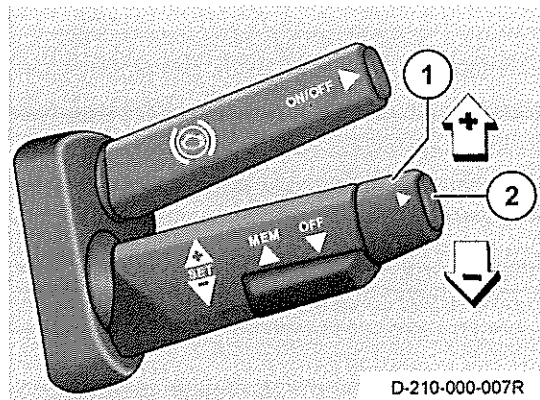
89.5 To shift down several gears, push several times, or push and hold.

89.6 The steering column stalk (1) automatically springs back to the centre position when released.

90 To switch to automatic mode, press button (2) again.

91 A gearshift command from the steering column stalk (1) is not performed if the selected gear would result in the engine exceeding the maximum speed or running slower than the minimum speed.

92 If the engine speed drops below the minimum speed, the clutch is disengaged to prevent the engine from stalling.



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1 – Steering column stalk

2 – SET+/-

Fig 20 Steering column stalk

**Off-road driving**

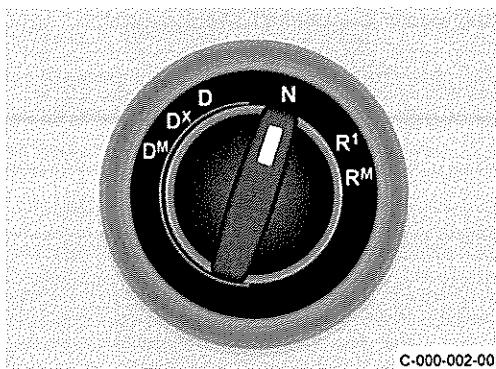
**CAUTION**

**GEARBOX DAMAGE.** Changing gear off-road places high loads on the gearbox.

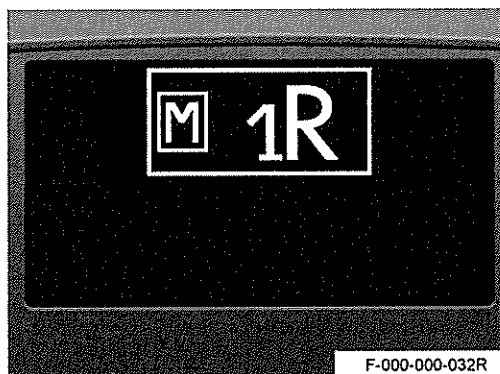
93 Refer to Fig 21. When driving off-road, proceed as follows:

- 93.1 Before driving off-road, set the drive neutral reverse switch to D for at least 2 seconds and then to D<sup>x</sup>.
- 93.2 Always drive in manual mode.
- 93.3 Keep gear changes to a minimum.
- 93.4 Do not change gear when driving on rough terrain.

94 The running resistance can change rapidly during off-road driving. The gearbox ECU may react too slowly when changing gear. This can lead to “crunching” of the gears, which results in increased gearbox wear.



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Fig 21 Off-road driving

## Manoeuvring

### CAUTION

**GEARBOX DAMAGE.** Manoeuvring places an increased load on the clutch. Only use manoeuvring mode for short periods.

- 95 The selected manoeuvring mode is shown on the driver's display.
- 96 To use the manoeuvring mode, proceed as follows:
- 96.1 Apply the parking brake.
  - 96.2 Turn the drive range switch to the manoeuvre forwards position D<sup>M</sup> or the manoeuvre reverse position R<sup>M</sup>.
  - 96.3 First gear is engaged.
  - 96.4 Wait for approximately two seconds.
  - 96.5 Press the accelerator pedal and release the parking brake. The vehicle will move off.
- 97 To change gear using the steering column stalk, refer to Para 82.
- 98 The modes for manoeuvring, D<sup>M</sup> and R<sup>M</sup>, are intended for very slow driving. The engine speed is limited.

## Stopping and parking the vehicle

### WARNING

**DANGER OF ACCIDENTS. ALWAYS APPLY THE PARKING BRAKE WHEN PARKING THE VEHICLE, USE WHEEL CHOCKS IF NECESSARY.**

- 99 For brief stops, for example at traffic lights, leave the selected drive range engaged.
- 100 For longer stops or parking the vehicle, turn the drive range switch to N to disengage the clutch.
- 101 The most suitable start gear is selected in automatic mode. In manual mode, the start gear preselected using the drive range switch is engaged.

## Tow starting and towing away

- 102 The engine cannot be tow started. Refer to Para 231.

**CRUISE CONTROL (ROAD SPEED GOVERNOR) AND ROAD SPEED LIMITER****Steering column stalk**

103 Refer to Fig 22. The cruise control (Road Speed Governor (RSG))/Road Speed Limiter (RSL) steering column stalk (1) operates as follows:

103.1 SET+: increases road speed.

103.2 SET-: reduces road speed.

104 The MEM/OFF switch operates as follows:

104.1 MEM: resumes the last programmed road speed.

104.2 OFF: deactivates the cruise control (RSG) or RSL.

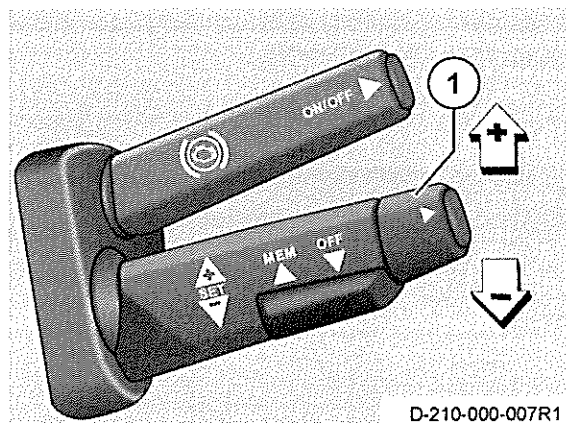


Fig 22 Steering column stalk

**ot mount or dismount via the vehicle tailboard** Refer to Fig 23. The cruise control (RSG)/RSL switch

105 Refer to Fig 23. The cruise control (RSG)/RSL switch operates as follows:

105.1 To activate the RSL, press the bottom of the switch.

105.2 To activate the cruise control (RSG), press the top of the switch.



Fig 23 Cruise control (RSG)/road speed limiter switch

**Display with cruise control (RSG) or Road Speed Limiter not activated**

106 Refer to Fig 24. When the cruise control (RSG) or RSL have not been activated since the ignition was switched on, the display shows the following:

- 106.1 The RSL symbol (1) or the cruise control (RSG) symbol.
- 106.2 The text 'MEMO ---'.

107 If the RSL symbol (1) is shown, the RSL can be activated using the cruise control (RSG)/RSL steering column stalk. If the cruise control (RSG) symbol is shown, the cruise control can be activated using the steering column stalk.

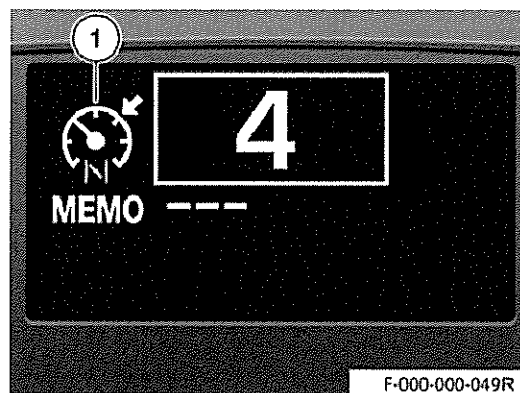


Fig 24 RSL symbol (not activated)

**Display with road speed limiter set**

108 Refer to Fig 25. When the RSL is set, the display shows the following:

- 108.1 The RSL symbol (1).
- 108.2 The text 'MAX'.
- 108.3 The value for the selected speed (the speed is shown here as 55 km/h). This is the speed at which the engine power is reduced.

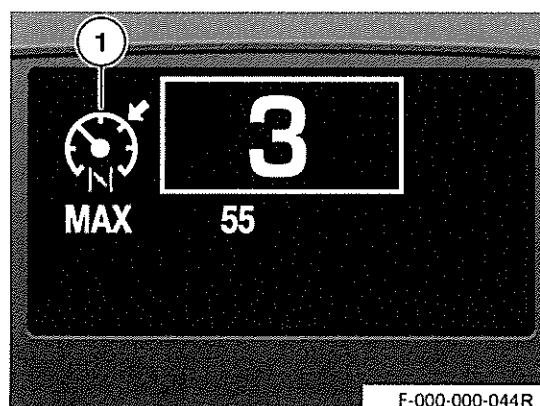


Fig 25 RSL symbol (set)

**Display with cruise control (RSG) set**

109 Refer to Fig 26. When the cruise control (RSG) is set, the display shows the following:

- 109.1 The cruise control (RSG) symbol (1).
- 109.2 The text 'SET'.
- 109.3 The value for the selected speed (shown here as 75 km/h).

110 The vehicle will keep to the set speed automatically, without the driver keeping the accelerator pedal pressed.

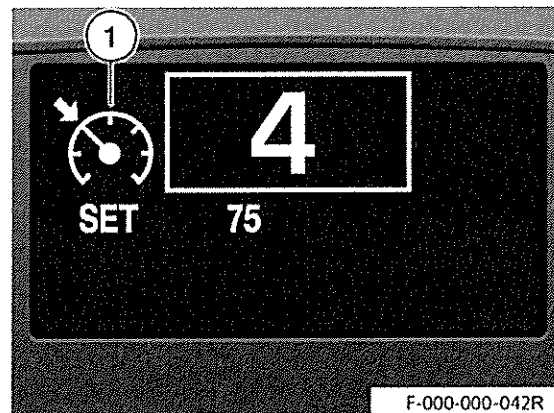


Fig 26 RSG symbol (set)

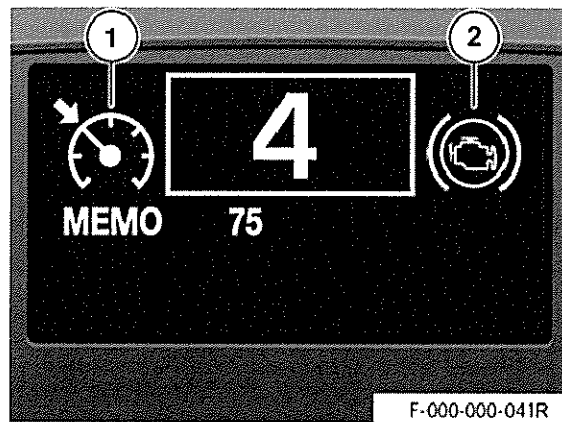
**Change of symbols on the display**

111 Refer to Fig 27. If there is other information to be displayed about the vehicle at the same time as the cruise control or RSL information, the display will alternate at intervals of approximately 10 seconds.

112 When the Exhaust Valve Brake (EVB) (BrakeMatic) activates, the display changes as follows:

- 112.1 The cruise control (RSG) symbol (1) remains.
- 112.2 MEMO and the value of the last selected speed is shown.
- 112.3 The engine brake symbol (2) is shown.





1 – RSG symbol

2 – Engine brake symbol

Fig 27 Change of symbols on the display

### CRUISE CONTROL (RSG)

#### Range of action

113 Refer to Fig 28. Any constant speed can be set using the cruise control (RSG)/RSL steering column stalk (1) at road speeds above 25 km/h.

114 Using the cruise control incorrectly leads to increased fuel consumption.

115 If the limit set for the cruise control (RSG) is exceeded by 2 km/h, the EVB (BrakeMatic) activates. Refer to Chapter 1-4.

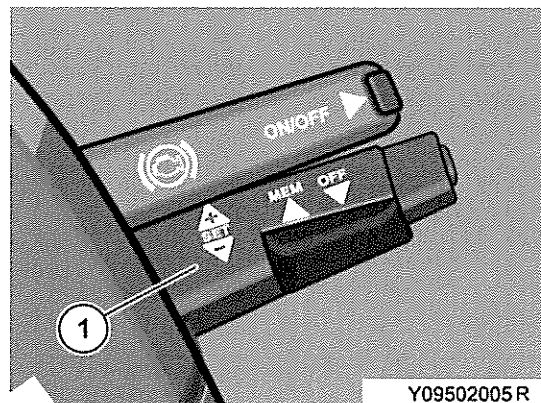
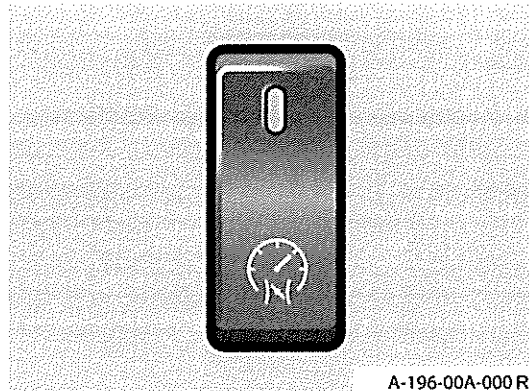


Fig 28 Steering column stalk

#### Activating the cruise control (RSG)

116 Refer to Fig 29. To activate the cruise control (RSG), proceed as follows:

- 116.1 Press the top of the (RSG)/RSL switch.
- 116.2 The check lamp in the (RSG)/RSL switch goes off.
- 116.3 The RSL function is deactivated.



A-196-00A-000 R

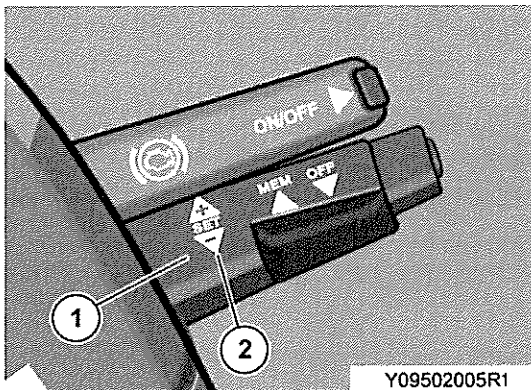
Fig 29 RSG/RSL rocker switch

**Increasing the speed**

117 Refer to Fig 30. To increase the road speed set on the cruise control (RSG), proceed as follows:

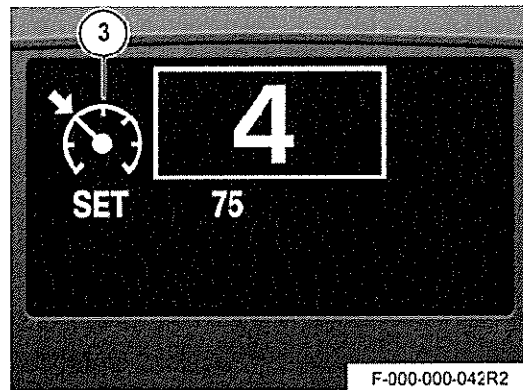
- 117.1 Move the cruise control (RSG)/RSL steering column stalk (1) up towards SET+ (2).
- 117.2 The road speed set on the cruise control (RSG) is increased.

118 The display shows the cruise control (RSG) symbol (3), the text 'SET' and the value for the increased speed (shown here as 75 km/h).



Y09502005R1

1 – RSG/RSL steering stalk



F-000-000-042R2

2 – SET +/-

3 – RSG symbol

Fig 30 RSG – increasing the speed

**Reducing the speed**

119 Refer to Fig 30. To reduce the road speed set on the cruise control (RSG), proceed as follows:

- 119.1 Move the cruise control (RSG)/RSL steering column stalk (1) down towards SET- (2).
- 119.2 The road speed set on the cruise control (RSG) is decreased.

120 The display shows the cruise control (RSG) symbol (3), the text 'SET' and the value for the reduced speed (shown here as 75 km/h).

### Storing the speed

121 To store the increased or reduced cruise control road speed shown on the display, proceed as follows:

121.1 Release the cruise control (RSG)/RSL steering column stalk.

121.2 The increased or reduced cruise control road speed is stored.

122 Refer to Fig 31. The display shows the following:

122.1 The cruise control symbol (1).

122.2 The text 'SET'.

122.3 The value for the set cruise control road speed (shown here as 75 km/h).

123 Providing the engine can supply sufficient power, the road speed is maintained at the speed set on the cruise control (RSG) without the need for the accelerator pedal to be pressed.

124 Brief acceleration or kickdown, for example when overtaking, does not cause the cruise control (RSG) to be deactivated.

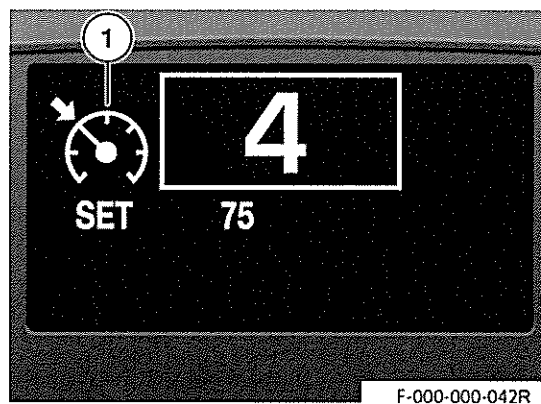


Fig 31 Cruise control symbol

**Deactivating the cruise control (RSG)**

125 Refer to Fig 32. The cruise control (RSG) can be deactivated as follows:

- 125.1 Press the MEM/OFF switch (1) towards OFF.
- 125.2 Operate the service brakes or the EVB (BrakeMatic).

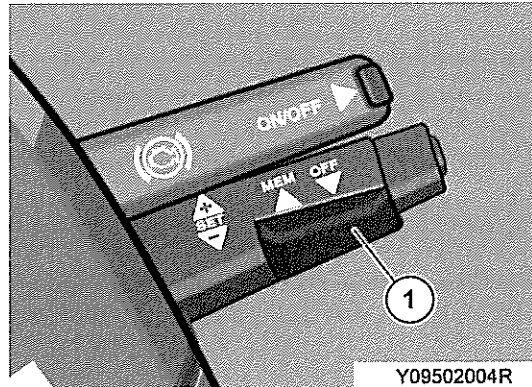


Fig 32 MEM/OFF switch

**Recalling the last stored speed**

126 To recall the last stored cruise control road speed, press the MEM/OFF switch (1) towards MEM.

127 The last stored cruise control road speed is set and maintained.

128 Refer to Fig 33. The display shows the following:

- 128.1 The cruise control (RSG) symbol (2).
- 128.2 The text 'SET'.
- 128.3 The last set cruise control stored value (shown here as 75 km/h).

129 The road speed stored in the cruise control is reset when the ignition is switched off.

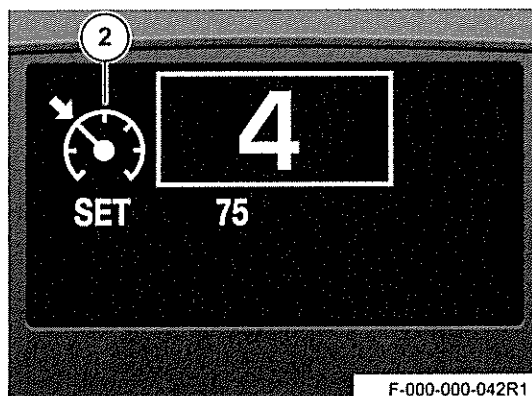


Fig 33 Cruise control (RSG) symbol

## ROAD SPEED LIMITER

### Range of action

130 Refer to Fig 34. The Road Speed Limiter (RSL) enables the driver to set any desired maximum speed between approximately 25 km/h and the statutory speed limit.

131 If the limit set for the RSL is exceeded by 2 km/h, the EVB (BrakeMatic) activates. Refer to Chapter 1-4.

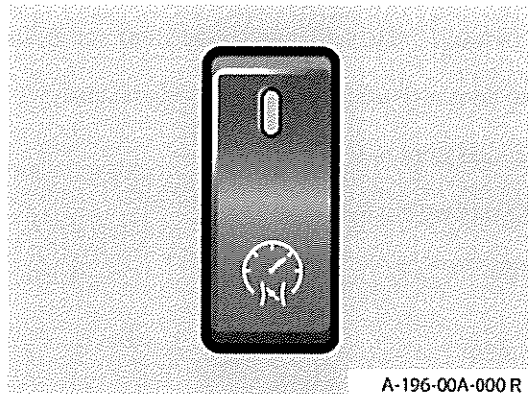


Fig 34 Road Speed Limiter (RSL) rocker switch

### Activating the road speed limiter

132 Refer to Fig 34. To activate the RSL, proceed as follows:

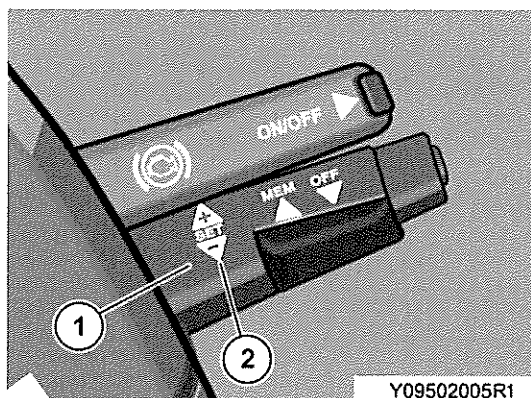
132.1 Press the bottom of the (RSG)/RSL switch.

132.2 The check lamp in the (RSG)/RSL switch comes on. Increasing the limited road speed

133 Refer to Fig 35. To increase the limited road speed, proceed as follows:

133.1 Move the cruise control Road Speed Governor (RSG)/RSL steering column stalk (1) up towards SET+ (2).

133.2 The limited road speed is increased.



1 – RSG/RSL steering column stalk

2 – SET +/-

Fig 35 RSG/RSL steering column stalk

**Reducing the limited road speed**

134 Refer to Fig 35. To reduce the limited road speed, proceed as follows:

134.1 Move the cruise control (RSG)/RSL steering column stalk (1) down towards SET- (2).

134.2 The limited road speed is decreased.

**Storing the speed**

135 To store the increased or reduced the limited road speed shown on the display, proceed as follows:

135.1 Release the cruise control (RSG)/RSL steering column stalk (1).

135.2 The limited road speed is stored.

136 Refer to Fig 36. The display shows the following:

136.1 The RSL symbol (3).

136.2 The text 'MAX'.

136.3 The set speed (shown here as 55 km/h).

137 The set speed is the road speed at which the engine power is limited.

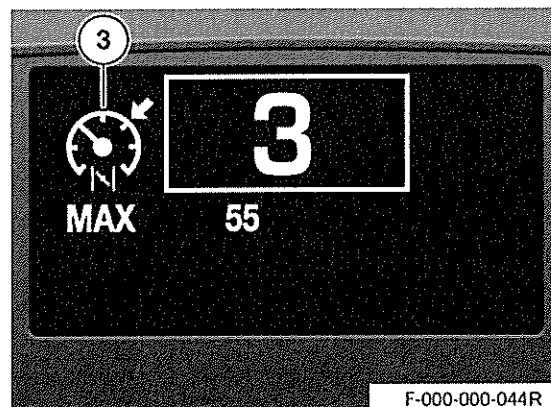


Fig 36 RSL symbol

**Deactivating the road speed limiter**

138 Refer to Fig 37. To deactivate the RSL, proceed as follows:

138.1 Press the MEM/OFF switch (1) towards OFF, or press the accelerator pedal to the kickdown position.

139 The display shows the following:

139.1 The RSL symbol (2).

139.2 The text 'MEMO'.

139.3 The last stored speed (shown here as 55 km/h).

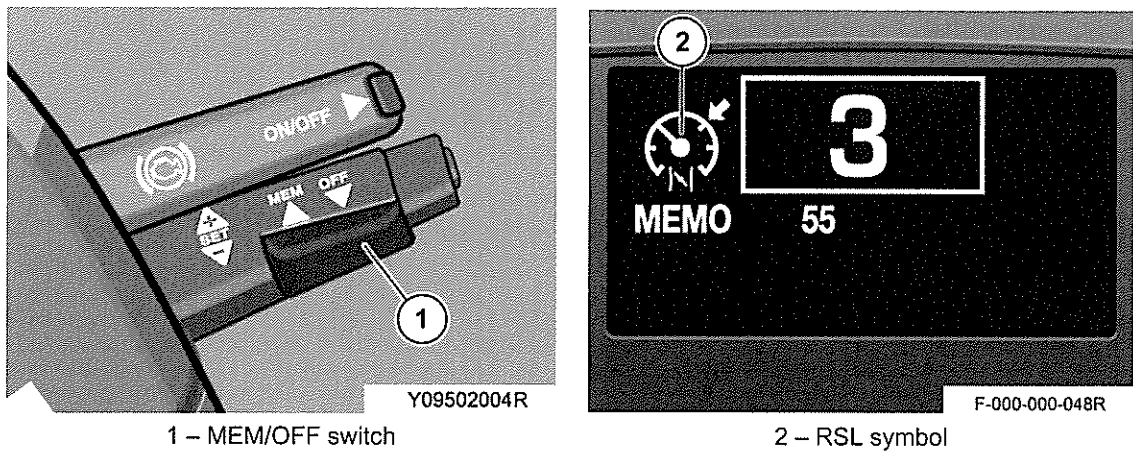


Fig 37 Deactivating the Road Speed Limiter (RSL)

### Recalling the last stored speed

140 Refer to Fig 37. To recall the last limited road speed, proceed as follows:

140.1 Press the MEM/OFF switch (1) towards MEM, or release the accelerator pedal from the kickdown position and decelerate to slower than the last stored speed.

140.2 The last stored speed is set again.

141 The limited road speed stored in the system is reset when the ignition is switched off.

### IDLING SPEED

#### Changing the idling speed permanently

142 If the engine is warm (above 30°C) and the vehicle is stationary, the driver can increase the idling speed from about 600 rpm to 800 rpm.

143 Refer to Fig 38. To change the idling speed permanently, proceed as follows:

143.1 Stop the vehicle.

143.2 Apply the parking brake.

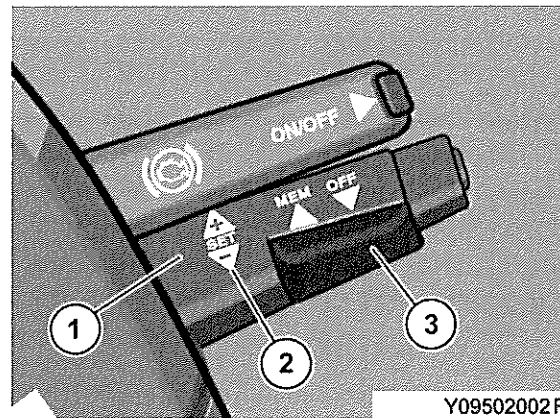
143.3 Press the MEM/OFF switch (3) for five seconds. The engine speed drops to the lower idling setting.

143.4 Push the steering column stalk (1) towards SET+ (2) and hold there until the desired idling speed is reached.

143.5 Press the MEM/OFF switch (3) again for five seconds. The increased idling speed is stored.

143.6 Release the parking brake.

144 The idling speed setting remains stored after the ignition is switched off.



1 – Steering column stalk

2 – SET +/-

3 – MEM/OFF

Fig 38 Changing the idling speed permanently

**Changing the idling speed temporarily**

145 Do not operate the service brake or the exhaust valve brake during the setting procedure.

146 When the vehicle is stationary, the engine speed can be set at any level up to the rated speed.

147 Refer to Fig 39. To activate the temporary idle, proceed as follows:

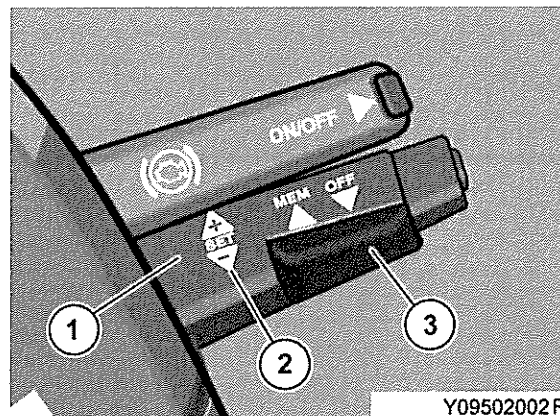
147.1 Push the steering column stalk (1) towards SET+ (2), or pull the steering column stalk (1) towards SET- (2).

147.2 Hold the steering column stalk until the desired idling speed is reached.

148 To deactivate the temporary idle, perform one of the following:

148.1 Press the MEM/OFF switch (3) towards OFF.

148.2 Shift the gearbox out of the neutral position and operate the service brakes or the exhaust valve brake.



1 – Steering column stalk

2 – SET +/-

3 – MEM/OFF

Fig 39 Changing the idling speed temporarily



## DRIVER'S DISPLAY

149 Observe the driver's display when starting the engine and when driving. Refer to Chapter 1-2.

### STOP sign on the driver's display

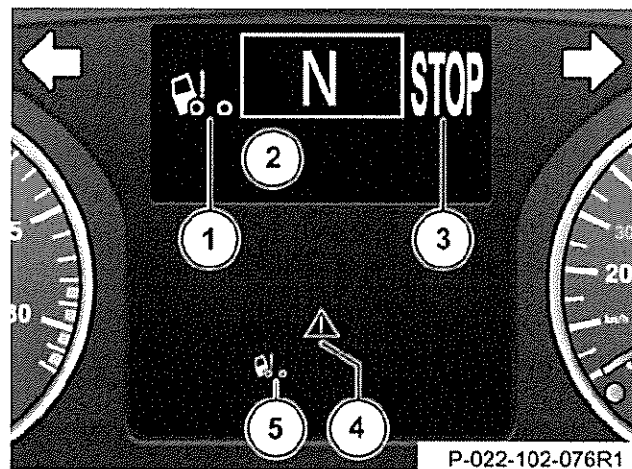
#### CAUTION

**EQUIPMENT DAMAGE. STOP SIGN.** After starting the engine, do not move off until the stop sign on the driver's display has gone out.

150 Refer to Fig 40. The STOP sign (3) comes on in conjunction with a message on the display (2), the associated check lamps (1 and 5) and the warning light (4).

151 The STOP sign indicates a fault when starting the engine, or when driving. In this eventuality, the safety or functional capability of the vehicle is compromised. Refer to Chapter 1-2.

152 If the STOP sign appears on the driver's display while the vehicle is being driven, stop the vehicle at the earliest possible opportunity, determine and correct the cause of the problem. If necessary, contact your Unit for assistance.



- |                |                   |
|----------------|-------------------|
| 1 – Check lamp | 4 – Warning light |
| 2 – Display    | 5 – Check lamp    |
| 3 – STOP sign  |                   |

Fig 40 Driver's display

**OPERATING TEMPERATURE****CAUTIONS**

(1) **OVERHEATING.** If the engine is overheating, stop the vehicle. Keep the engine running. This allows the fan to continue cooling the engine. If the fan is not rotating, stop the engine immediately.

(2) **COOLANT LOSS.** The cooling system is designed to permit driving at elevated temperatures for brief periods until the system can be checked and the problem rectified. In the case of severe or continuous coolant loss, stop the engine immediately.

153 After a cold start, let the engine coolant warm up to a temperature of 80°C by driving in low gears at medium engine speeds before running the engine at full power.

154 Depending on operating conditions and the ambient temperature, the coolant temperature may be between 80°C to 95°C.

155 A thermostat in the coolant circuit and a viscous coupling fan, running at a temperature-controlled speed, initially help to accelerate the rate at which the coolant heats up, then maintain the operating temperature as constant as possible.

156 Refer to Fig 41. Check the coolant temperature shown on the temperature gauge (1).

157 Switch off the heater to increase the coolant heating rate.

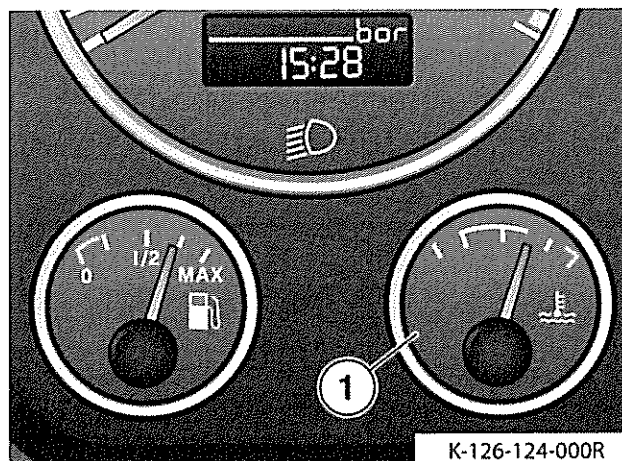


Fig 41 Coolant temperature

### Coolant temperature too high

158 Refer to Fig 42. If the coolant temperature is too high, the STOP sign comes on in conjunction with a message on the driver's display (1), the cooling system check lamp and the engine check lamp. At the same time, the red central warning light comes on and an alarm buzzer sounds. Refer to Chapter 1-2.

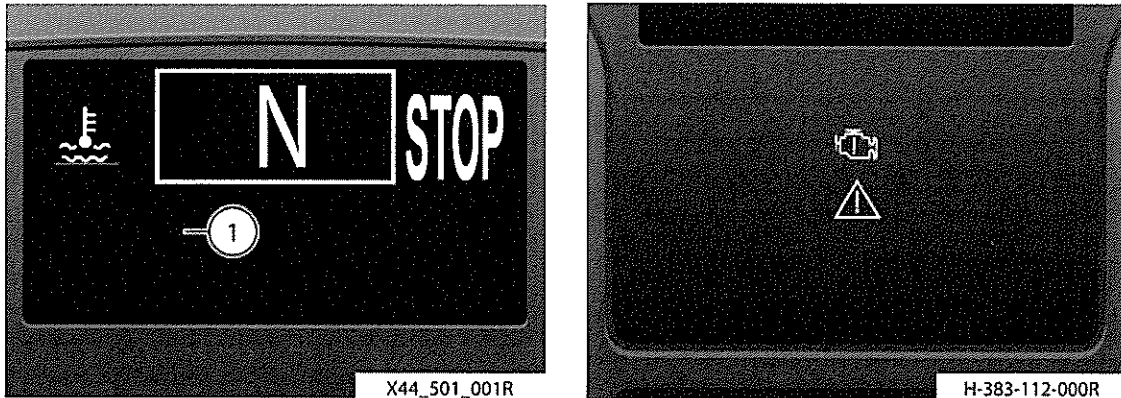


Fig 42 Coolant temperature too high

159 Possible causes for too high a coolant temperature may be:

- 159.1 Excessive coolant temperature and/or insufficient coolant in the cooling system.
- 159.2 Dirty radiator fins or insect screen.
- 159.3 Defective thermostats or obstructions in the cooling circuit.
- 159.4 Engine oil temperature too high because the engine oil level is too low.

160 If the coolant temperature is too high, proceed as follows:

- 160.1 Check the coolant level in the reservoir, refer to Chapter 1-6. Top up with coolant if required.
- 160.2 Check the cooling system for leaks and rectify if necessary.
- 160.3 Check if the radiator fins and insect screen are dirty and clean if necessary.
- 160.4 Check the engine oil level and top up the oil if necessary.
- 160.5 Check the oil level in the gearbox and top up the oil if necessary. Contact your Unit for assistance.

**Coolant level too low**

161 Refer to Fig 43. If there is not enough coolant in the cooling system, a message (1) appears and the coolant level check lamp comes on. At the same time, the yellow central warning light comes on and an alarm buzzer sounds. Refer to Chapter 1-2.

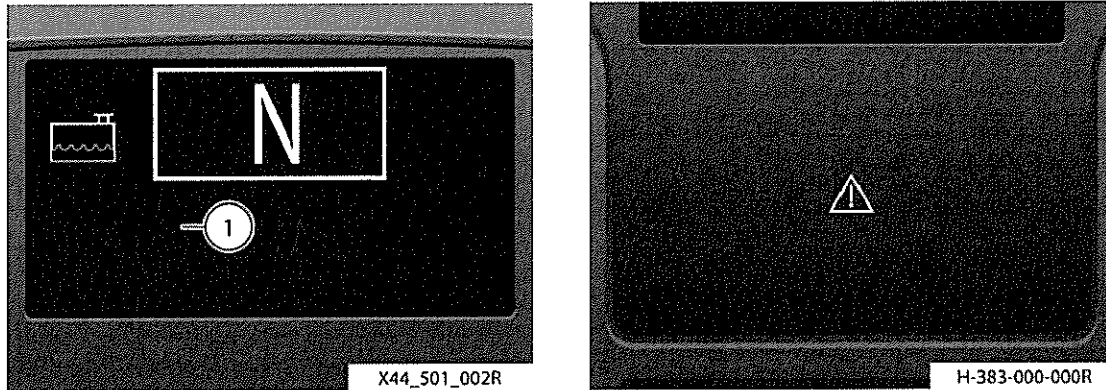


Fig 43 Coolant level too low

162 If the coolant level is too low, proceed as follows:

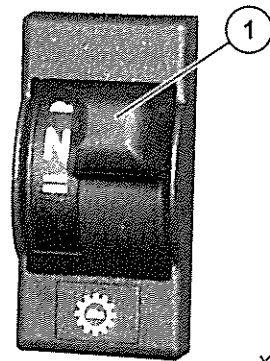
- 162.1 Check the coolant level, refer to Chapter 1-6.
- 162.2 Check the cooling system for leaks and rectify as necessary. Contact your Unit for assistance.
- 162.3 Add coolant, refer to Chapter 1-6.

**TRANSFER CASE****Engaging off-road range****CAUTIONS**

- (1) **TRANSFER CASE DAMAGE.** Do not select off-road range while the vehicle is moving.
- (2) **TRANSFER CASE DAMAGE.** If the check lamp does not come on, the teeth have failed to mesh. Driving will cause transfer case damage.

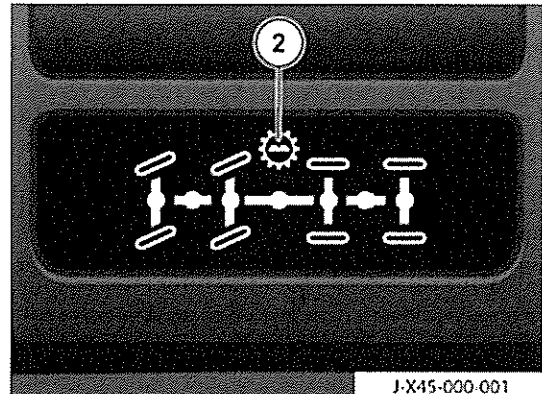
163 Refer to Fig 44. To select off-road range, proceed as follows:

- 163.1 Stop the vehicle.
- 163.2 Press N mode switch (1).
- 163.3 Move the switch (1) to the bottom position. The check lamp (2) for off-road range comes on. Press D mode switch.
- 163.4 If the check lamp (2) does not come on, press the N mode switch for approximately 2 seconds and then press the D mode switch.
- 163.5 Accelerate and slowly move off.



X45\_541\_004

1 – Switch



J-X45-000-001

2 – Check lamp

Fig 44 Engaging off-road range

### Changing to neutral

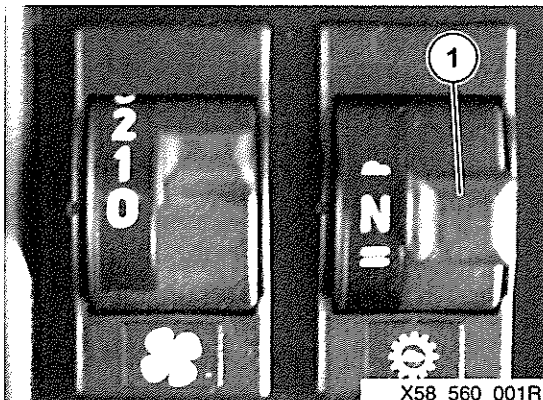
164 Only use neutral for towing the vehicle.

165 Refer to Fig 45. To select neutral, proceed as follows:

165.1 Stop the vehicle.

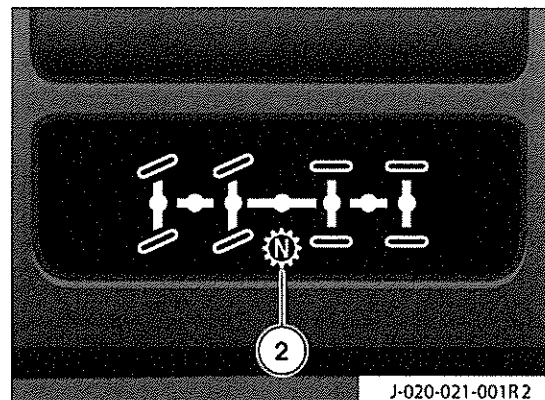
165.2 Set the drive range switch to N.

165.3 Then move the switch (1) to the central neutral position N. The check lamp (2) for neutral comes on.



X58\_560\_001R

1 – Switch



J-020-021-001R 2

2 – Check lamp

Fig 45 Changing to neutral

**Engaging on-road range****CAUTION**

**TRANSFER CASE DAMAGE. Do not select on-road range while the vehicle is moving.**

166 Refer to Fig 46. To select on-road range, proceed as follows:

166.1 Stop the vehicle.

166.2 Press the N mode switch (1).

166.3 Move the N mode switch (1) to the top position. The check lamp (2) goes out. Press the D mode switch.

166.4 If the check lamp (2) does not go out, press the N mode switch for approximately 2 seconds and then press the D mode switch.

166.5 Accelerate and slowly drive away.

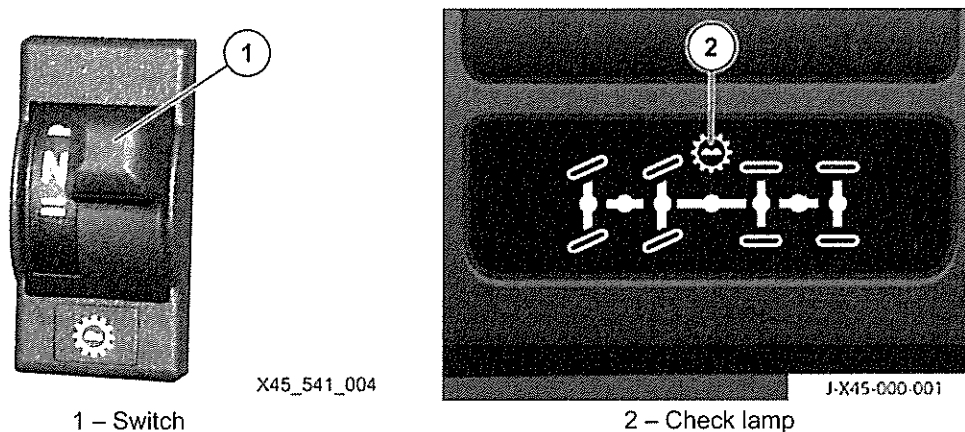


Fig 46 Engaging on-road range

**Engaging all-wheel drive**

167 The transfer case is a part-time all-wheel drive type and has no differential, therefore, all-wheel drive should only be engaged if there is insufficient traction.

**CAUTION**

**TRANSMISSION DAMAGE. Only engage all-wheel drive if there is insufficient traction.**

168 Refer to Fig 47. To engage all-wheel drive, proceed as follows:

168.1 Stop the vehicle.

168.2 Press the bottom of the switch. The indicator (1) and the check lamp in the switch come on.

168.3 Accelerate and carefully drive away.

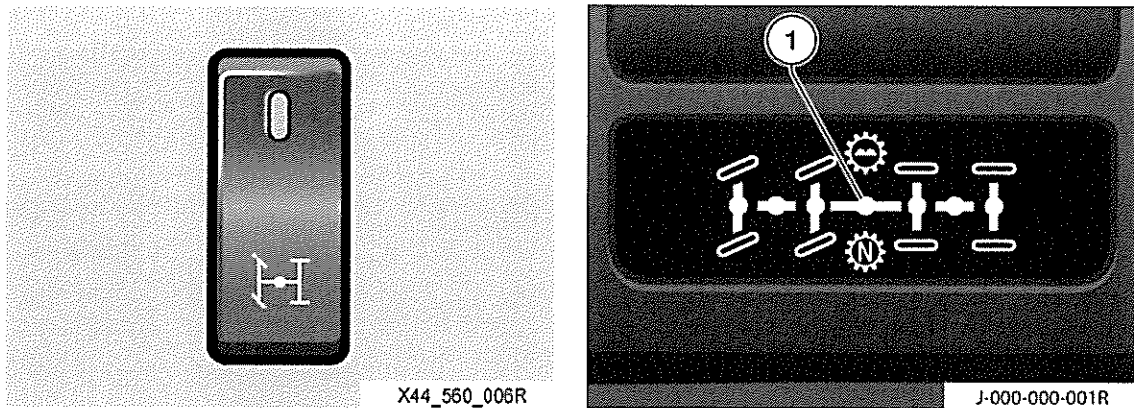


Fig 47 Engaging all wheel drive

### Disengaging all-wheel drive

169 Refer to Fig 47. To disengage all-wheel drive, proceed as follows:

169.1 Stop the vehicle.

169.2 Press the top of the switch. The indicator (1) and the check lamp in the switch go off.

170 Make minor steering correction movements to the left and right if the indicator (1) does not go out immediately.

### DIFFERENTIAL LOCKS

171 The transverse differential locks and interaxle differential lock can be engaged individually or in unison shortly before reaching unfavourable surfaces (sand, water or mud).

172 The vehicle must be at a standstill to prevent the wheels from slipping on engagement.

173 The transverse differential locks must be engaged if the wheels on the front and/or rear axle(s) are spinning on the left hand or right hand sides.

### CAUTION

**AXLE DAMAGE.** Driving round bends or corners with the transverse differential locks engaged causes axle damage.

### Engaging transverse lock(s) of the front axle(s)

174 Refer to Fig 48. To engage the front transverse differential lock(s), proceed as follows:

174.1 Stop the vehicle.

174.2 Activate the all-wheel drive, refer to Para 167.

174.3 Press the bottom of the switch. The indicators (1) and the check lamp in the switch come on.

175 If the indicators (1) do not come on, proceed as follows:

175.1 Slowly drive forwards and backwards until the indicators (1) come on.

175.2 Accelerate and slowly drive away.

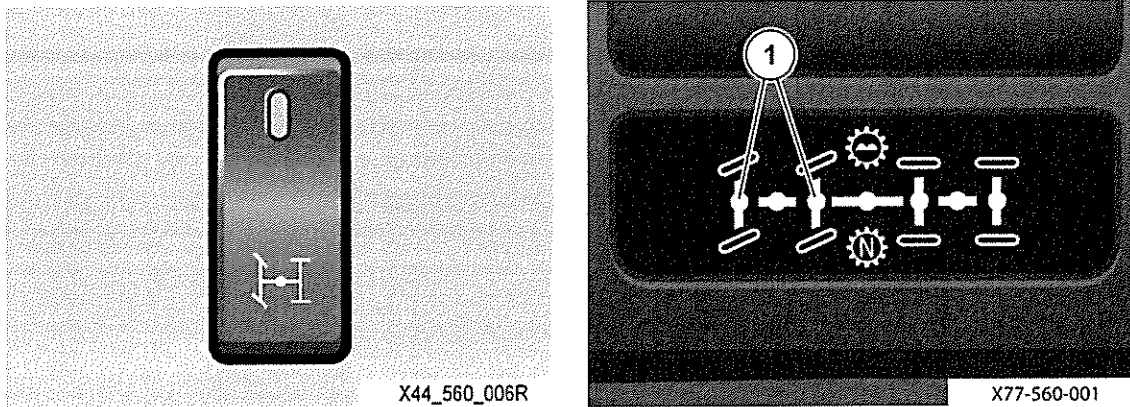


Fig 48 Engaging transverse lock(s) of the front axle(s)

**Disengaging transverse lock(s) of the front axle(s)**

176 Refer Fig 49. To disengage the front transverse differential lock(s), proceed as follows:

176.1 Slow the vehicle to 5 mph.

176.2 Press the top of the switch. The indicators (1) and the check lamp in the switch go out.

177 Make minor steering correction movements to the left and right if the indicators (1) do not go out immediately.

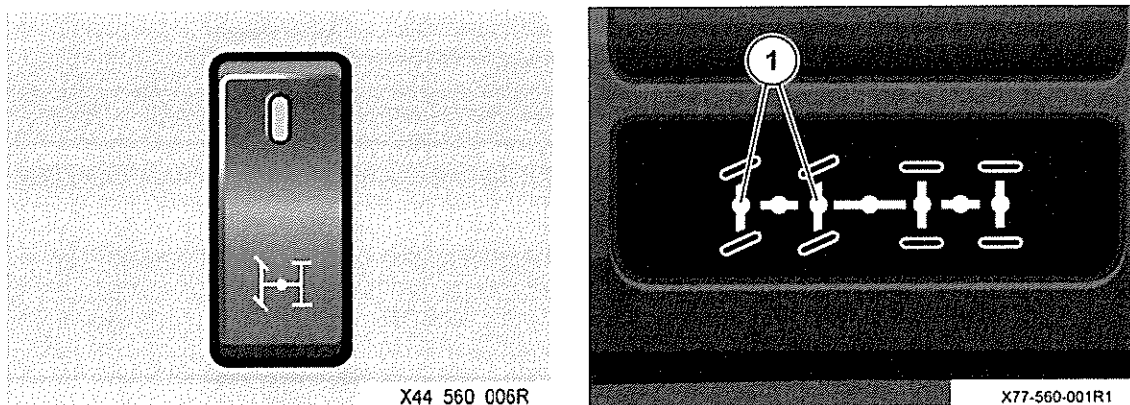


Fig 49 Disengaging transverse lock(s) of the front axle(s)



### Engaging transverse locks of the rear axles

178 Refer to Fig 50. To engage the rear transverse differential locks, proceed as follows:

178.1 Stop the vehicle.

178.2 Press the bottom of the switch. The indicators (1) and the check lamp in the switch come on.

179 If the indicators (1) do not come on, proceed as follows:

179.1 Slowly drive forwards and backwards until the indicators (1) come on.

179.2 Accelerate and slowly drive away.

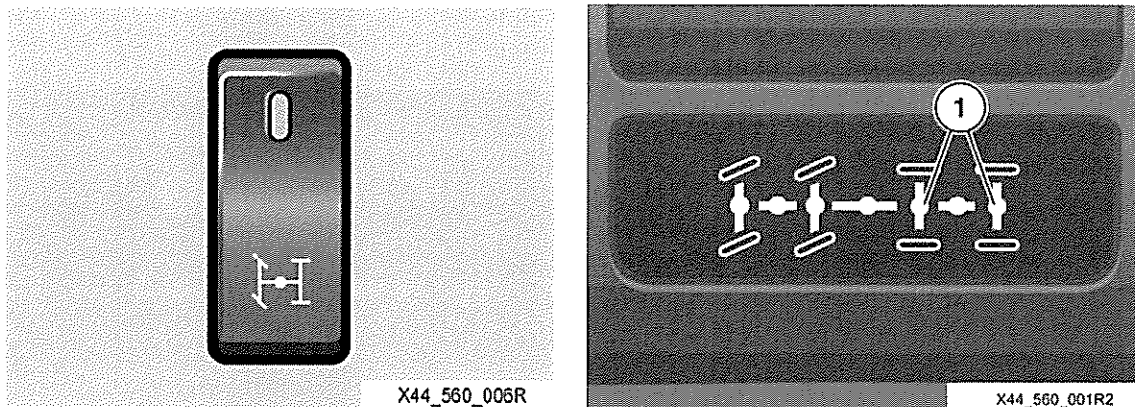


Fig 50 Engaging transverse lock(s) of the rear axle(s)

### Disengaging transverse locks of the rear axles

180 Refer to Fig 50. To disengage the rear transverse differential lock, proceed as follows:

180.1 Slow the vehicle to 5 mph.

180.2 Press the top of the switch. The indicators (1) and the check lamp in the switch go out.

181 Make minor steering correction movements to the left and right if the indicators (1) do not go out immediately.

### Engaging the interaxle differential lock

182 Refer to Fig 51. The interaxle differential lock must be engaged when the wheel slip on both rear axles is not the same.

183 To engage the interaxle differential lock, proceed as follows:

183.1 Stop the vehicle.

183.2 Press the bottom of the switch. The indicator (1) and the check lamp in the switch come on.

184 If the indicator (1) does not come on, proceed as follows:

184.1 Slowly drive forwards and backwards until the indicator (1) comes on.

184.2 Accelerate and slowly drive away.

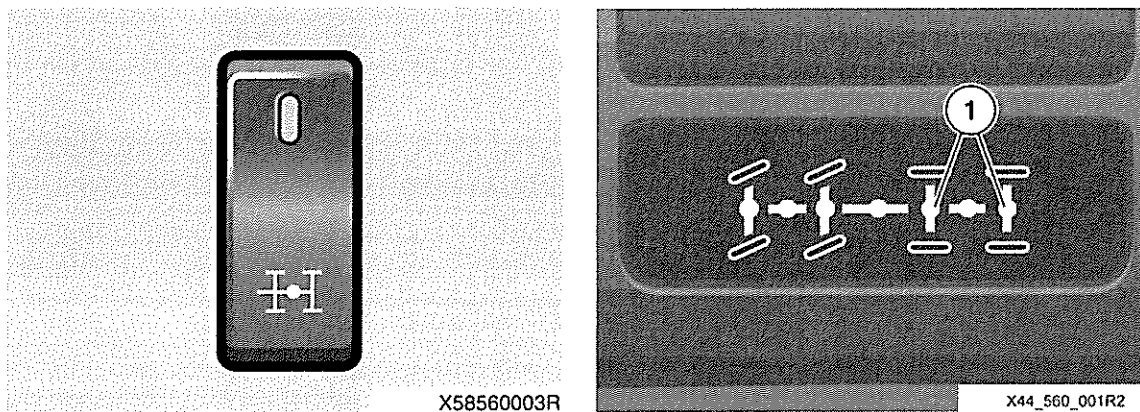


Fig 51 Engaging the interaxle differential lock

### Disengaging the interaxle differential lock

185 Refer to Fig 51. To disengage the interaxle differential lock, proceed as follows:

185.1 Slow the vehicle to 5 mph.

185.2 Press the top of the switch. The indicator (1) and the check lamp in the switch go out.

186 Make minor steering correction movements to the left and right if the indicator (1) does not go out immediately.

## OFF-ROAD DRIVING

### NOTE

For best cross country performance and vibration absorption, the friction on the seat damping system should be increased to reduce bounce and prevent the seat from bottoming out, refer to Chapter 1-2 'Setting the driver's seat' for instructions. This may require an element of trial and error by the driver or passenger due to the weight of the driver and the ground conditions.

187 When driving off-road:

187.1 If required, adjust the tyre pressures to the ground condition.

187.2 Install snow chains if necessary.

187.3 When fording, set the fresh air/recirculated air lever to the right (recirculated air position).

187.4 Select ABS off road logic, refer to Chapter 1-4.

187.5 Engage a suitable mode/gear prior to negotiating a steep uphill or downhill gradient.

187.6 Engage first gear prior to negotiating a steep downhill gradient to obtain maximum engine braking.

187.7 Operate the transfer case and the differential locks correctly, refer to Para 163 and 171.

187.8 Engage the transverse lock if the road surface differs from one wheel track to the other, refer to Para 171.

187.9 If there is no passenger on the passenger seat, adjust the seat as follows prior to driving:

187.9.1 Move the seat to the rearmost position.

187.9.2 Lower the air spring as much as possible.

187.9.3 Move the mechanical height adjustment to the lowest position until the bumpers touch the cab floor.

187.10 Drive over a bump with the wheels of one side of the vehicle to prevent damage to the vehicle.

187.11 When driving over a step, allow the front wheels to slowly contact the step, then accelerate over the step.

187.12 Carry out the tasks for 'After off-road driving or fording', refer to Para 189.

188 Do not exceed the maximum fording depth, refer to Chapter 1-1.

### After off-road driving or fording

189 After off-road driving or fording, proceed as follows:

189.1 Check the condition of the tyres (damage, uneven wear, depth of tread), and remove any stones from the tyre treads.

189.2 Check that the wheel nuts are still fully tightened.

189.3 Remove most of the dirt from the vehicle.

- 189.4 Check the trailer socket for contamination and clean it if necessary.
- 189.5 Check that the tyre inflation pressure is correct for on-road driving, refer to Chapter 1-6.
- 189.6 Dry the storage lockers after fording (once a day).
- 189.7 Check the condition of low-slung lines, steering linkage and axle mountings.
- 189.8 Check the brakes after fording deep water.
- 189.9 Clean the brake drums if necessary, refer to Chapter 1-6.
- 189.10 Clean all mirrors, lights and reflectors.

### POWER TAKE-OFF (PTO)

190 The input shaft of the PTO is directly connected to the input shaft of the transfer case. Power is transmitted via a mechanical dog clutch in the transfer case.

191 The PTO is pneumatically engaged and driven by the transmission. The pneumatic engagement requires a minimum air pressure of 6.2 bar in reservoir circuit 4 to operate.

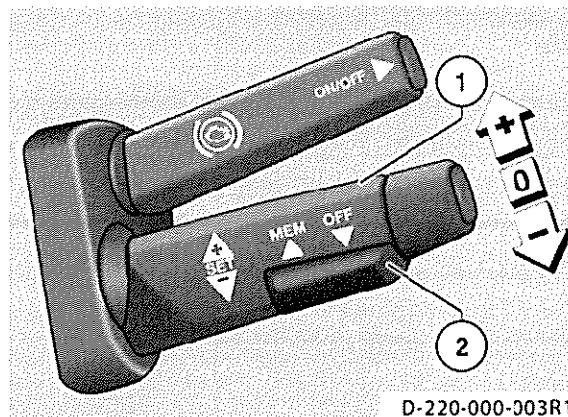
192 The PTO can only be engaged when the vehicle is stationary, with the engine running and the transmission in neutral.

193 The PTO is linked to a transmission interlock, which prevents a gear being selected when the PTO is engaged. The transmission remains in neutral. The engine-dependent power take-off is suitable for sustained operation.

### Steering column stalk (in vehicles without multifunctional steering wheel)

194 Refer to Fig 52. The PTO steering column stalk (1) is used for increasing or reducing the working speed.

- 194.1 The MEM/OFF switch (2) is used for switching the working speed on and off.



1 – PTO steering column stalk

2 – MEM/OFF switch

Fig 52 Power Take Off (PTO)

## PTO operation

### CAUTION

**VEHICLE DAMAGE.** Do not engage reverse gear while the PTO is operating. If the vehicle is put into reverse gear while the PTO is operating, the hydraulic pump may be damaged.

195 Refer to Fig 53. To engage the PTO, proceed as follows:

- 195.1 Make sure that the vehicle is stationary.
- 195.2 Apply the parking brake.
- 195.3 Run the engine at idle speed.
- 195.4 Press the N switch.
- 195.5 Set the transfer case to neutral (N).
- 195.6 Wait for approximately 5 seconds to allow the countershaft to stop.
- 195.7 Press the bottom of the PTO switch, the check lamp in the switch comes on.
- 195.8 Select D from the mode switches, the drivers display shows 5 instead of N.
- 195.9 The PTO symbol (1) is shown on the driver's display.
- 195.10 The engine speed increases to the minimum PTO speed.

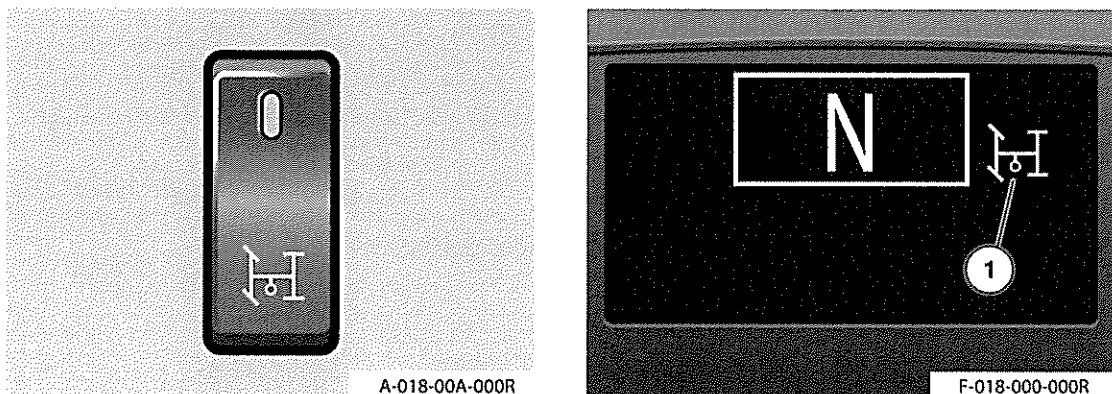


Fig 53 PTO operation

**Setting the working speed (emergency only)****CAUTION**

**GEARBOX DAMAGE.** Do not let the engine speed fall below 800 rpm when the PTO is engaged and under load.

196 The working speed for the PTO can be set and is infinitely variable.

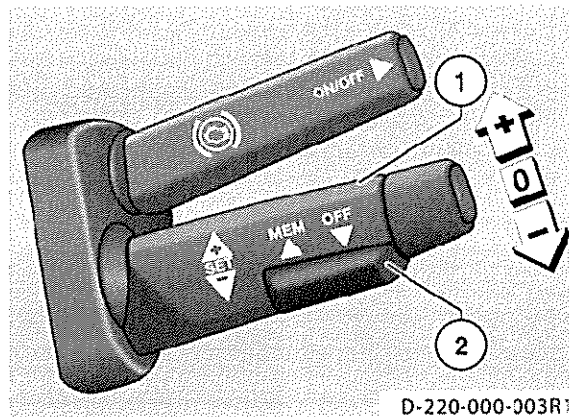
197 Refer to Fig 54. To set the working speed, proceed as follows:

197.1 Press the MEM/OFF switch (2) towards MEM.

197.2 To increase the working speed, push the steering column stalk (1) forwards to SET+, or press the accelerator.

197.3 To reduce the working speed, pull the steering column stalk (1) backwards to SET-, or release the accelerator.

197.4 Press the MEM/OFF switch (2) towards OFF to switch off the working speed.



1 – PTO steering column stalk

2 – MEM/OFF switch

Fig 54 Setting the working speed (emergency only)

**Disengaging the PTO**

198 Refer to Fig 55. To disengage the PTO, proceed as follows:

198.1 Press the top of the PTO switch, the check lamp goes off.

198.2 The PTO symbol (1) on the driver's display goes off.

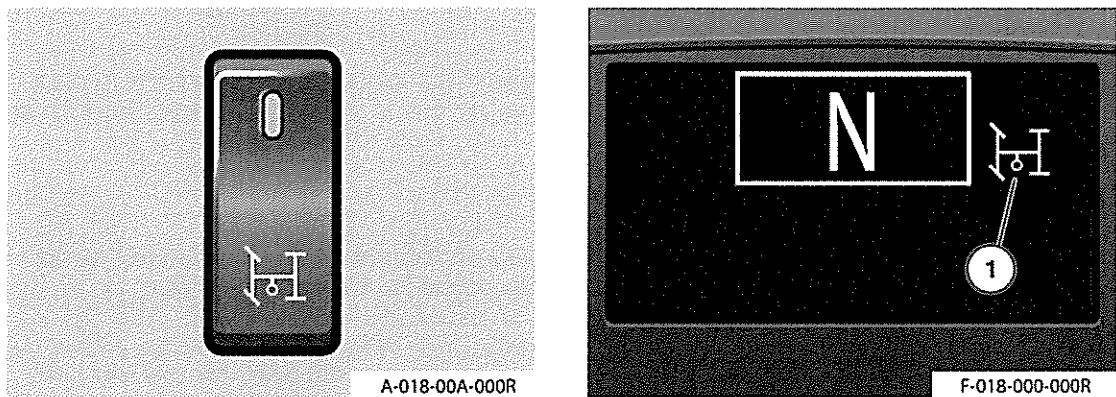


Fig 55 Disengaging the PTO

### Parking the vehicle

#### CAUTION

**GEARBOX DAMAGE.** Always disengage the PTO before parking the vehicle for long periods.

199 The PTO disengages when the pressure drops. The reservoir pressure in the air system will drop if the vehicle is parked for long periods.

200 When the engine is restarted the PTO will re-engage automatically as the pressure builds up and gearbox damage will occur.

#### GENERAL INSTRUCTIONS FOR TRAILER OPERATION

#### WARNING

**PERSONAL INJURY. COMPLY WITH REGULATIONS WHEN HITCHING AND UNHITCHING THE TRAILER.**

201 An EC dual line brake system is fitted to the vehicle. The brakes on the vehicle and trailer unit must always be balanced for trailer operation or whenever the trailer is changed. Brake balancing prevents unnecessary brake lining wear on the vehicle and trailer unit.

202 If a vehicle is driven without a container or interchangeable body, the vehicle must have guards or mudflaps covering the wheels.

203 Perform the following checks:

203.1 Check the trailer drawbar and the drawbar eye for damage.

203.2 Check that the trailer drawbar jockey wheel functions correctly (if fitted).

203.3 Regularly check the rubber seals on the compressed air coupling heads and the brake air lines for damage. Install new seals as necessary.

203.4 Regularly check that the trailer pintle mounting bolts on the rear crossmember are firmly seated.

**WARNING**

**PERSONNEL INJURY. VEHICLE MALFUNCTION. DO NOT ATTEMPT TO CONNECT OR TOW A TRAILER WHILST THE TRAILER REAR PINTLE IS IN THE RAISED 30° STOWAGE POSITION.**

**CAUTION**

**EQUIPMENT DAMAGE. Trailer disconnection. Do not attempt to connect or tow a trailer whilst the trailer rear pintle is in the raised 30° stowage position.**

203.5 The rear tow pintle can be stowed in a 30° raised position to improve the vehicle rear departure angle when not towing a trailer. No trailer is to be coupled when the rear tow pintle is stowed in the 30° raised position as the pintle jaws may not close, leading to the inadvertent trailer disconnection.

203.6 A check should be made to ensure that the rear tow pintle is correctly closed before operating any vehicle and trailer combination. If the jaws are found to be open, the trailer must not be towed.

**WARNING**

**PERSONNEL INJURY. ENTRAPMENT HAZARD. IAW JSP 800, VOL5, PT 3, CHAPTERS 1 AND 2. PERSONNEL MUST NOT MOUNT OR DISMOUNT VIA THE VEHICLE TAILBOARD WHILST THE TRAILER IS STILL CONNECTED. PRIOR TO THE MOUNTING OR DISMOUNTING OF PERSONNEL, THE TRAILER MUST BE DISCONNECTED AND MOVED TO AVOID ANY POSSIBLE ENTRAPMENT OF LIMBS.**

203.7 The vehicle tailboard must not be lowered whilst the trailer is still connected to the vehicle. Personnel must mount the vehicle before the trailer has been attached or dismount after the trailer has been detached.

**CAUTION**

**EQUIPMENT DAMAGE. Tailboard distortion. IAW JSP 800, Vol 5, Pt 3, Chapters 1 and 2. Personnel must not mount or dismount via the vehicle tailboard whilst the trailer is still connected. Prior to the mounting or dismounting of personnel, the trailer must be disconnected and moved to avoid any damage to the trailer and/or tailboard.**

203.8 The vehicle tailboard must not be lowered whilst the trailer is still connected to the vehicle to prevent any damage occurring.

**REAR TOW HITCH ADJUSTMENT**

204 The rear tow hitch can be adjusted between the Def Stan height and the standard height to enable the attachment and towing of approved in-service trailers as documented within the endorsed GSV tie down scheme register hosted on the DSEA's website [www.gov.uk/government/policy-advisory-groups/defence=safety-and-environment-authority](http://www.gov.uk/government/policy-advisory-groups/defence=safety-and-environment-authority) . Any requirement for adjustment must be referred to and conducted by a qualified maintainer. Refer to AESP 2320-W-100-522 for the adjustment procedure.

**Lowering the trailer pintle from the stowage position****WARNING**

**PERSONAL INJURY. AN OPEN TRAILER PINTLE COULD CLOSE WITH A SNAP WHEN RAISING/LOWERING. CLOSE THE TRAILER PINTLE.**

205 Refer to Fig 56. To lower the trailer pintle from the stowage position, proceed as follows:



205.1 Pull the cotter pins (3) out of the fastening pins (2 and 4).

205.2 Push and hold up the trailer pintle (1).

**WARNING**

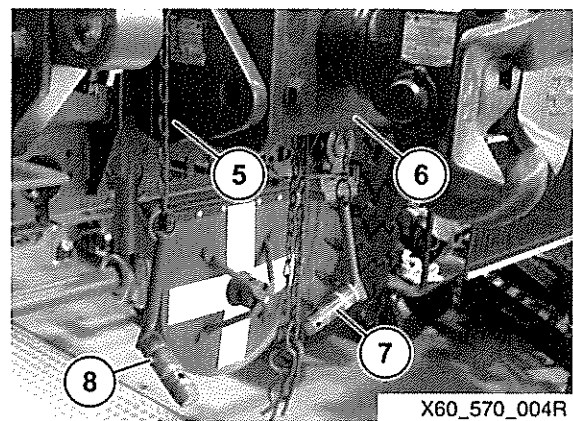
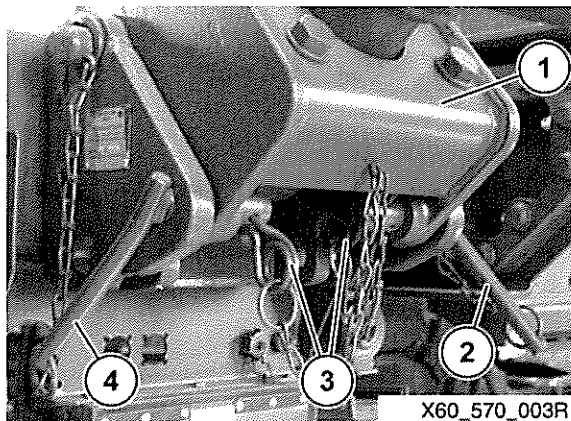
**PERSONAL INJURY. THE TRAILER PINTLE IS HEAVY. PUSH AND HOLD THE TRAILER PINTLE UPWARDS WHEN PULLING OUT THE FASTENING PINS.**

205.3 Pull out the fastening pins (2 and 4).

205.4 Lower the trailer pintle (6) slowly until it is heard to engage.

205.5 Install the fastening pins (7 and 8) in the rear holes (5).

205.6 Install the cotter pins in the fastening pins (1 and 2). The trailer pintle is locked in the lowered position.



- 1 – Trailer pintle
- 2 – Fastening pins
- 3 – Cotter pins
- 4 – Fastening pins

- 5 – Rear holes
- 6 – Trailer pintle
- 7 – Fastening pins
- 8 – Fastening pins

Fig 56 Lowering the trailer pintle

**Raising the trailer pintle to the stowage position**

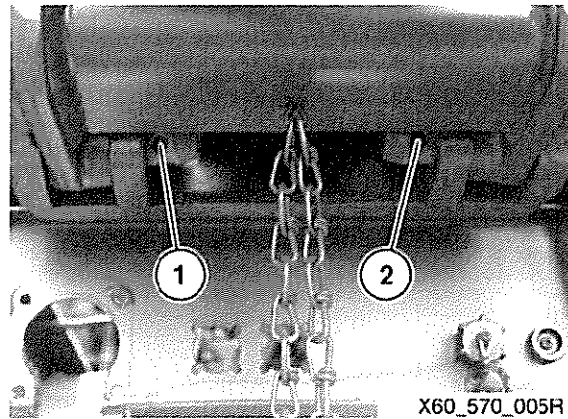
**WARNINGS**

(1) **PERSONAL INJURY. AN OPEN TRAILER PINTLE COULD CLOSE WITH A SNAP WHEN RAISING/LOWERING. CLOSE THE TRAILER PINTLE.**

(2) **PERSONAL INJURY. THE TRAILER PINTLE IS HEAVY. PUSH AND HOLD THE TRAILER PINTLE UPWARDS WHEN PULLING OUT THE FASTENING PINS.**

206 Refer to Fig 57. To raise the trailer pintle to the stowage position, proceed as follows:

206.1 Pull the cotter pins out of the fastening pins (1 and 2).



1 – Fastening pin

X60\_570\_005R

2 – Fastening pin

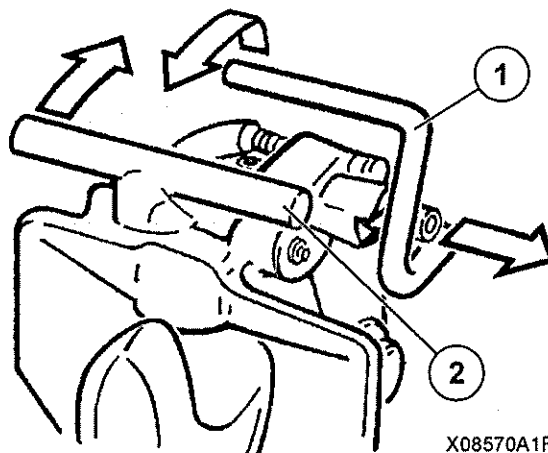
Fig 57 Fastening pins

- 206.2 Pull out the fastening pins (1 and 2).
- 206.3 Push and hold up the trailer pintle as far as the stop.
- 206.4 Install the fastening pins (1 and 2) in the front holes of the trailer pintle.
- 206.5 Install the cotter pins in the fastening pins (1 and 2). The trailer pintle is locked in the raised position.

**Opening the trailer pintle**

207 Refer to Fig 58. To open the trailer pintle, proceed as follows:

- 207.1 Pull the securing clip (1) outwards and twist it towards the pintle jaw.
- 207.2 Push the actuating lever (2) forwards.



1 – Securing clip

X08570A1R

2 – Actuating lever

Fig 58 Opening the trailer pintle

## Hitching up a trailer

### WARNINGS

(1) **PERSONAL INJURY. PREVENT THE TRAILER FROM ROLLING AWAY BY APPLYING THE PARKING BRAKE AND/OR USING CHOCKS ON THE REAR WHEELS.**

(2) **TRAILER MOVEMENT. THE BRAKES ON THE FRONT AXLE OF A TRAILER WITH FIFTH WHEEL STEERING MUST BE RELEASED SO THAT IT CAN TURN. USE WHEEL CHOCKS ON THE REAR WHEELS TO PREVENT THE TRAILER FROM ROLLING AWAY.**

208 The trailer pintle must be set to the lowered position in order to tow a trailer.

209 Refer to Fig 59. To hitch up a trailer to the vehicle, proceed as follows:

209.1 Make sure that the front axle of the trailer is able to turn.

209.2 Make sure that the trailer pintle is set to the lowered position, refer to Para 205.

### CAUTION

**VEHICLE DAMAGE. Make sure that the trailer drawbar and height adjuster function correctly.**

209.3 Set the trailer drawbar to the correct height of the trailer pintle, using the trailer drawbar height adjuster.

209.4 Open the trailer pintle. Refer to Para 207.

### WARNING

**PERSONAL INJURY. MAKE SURE THAT ALL PERSONNEL HAVE MOVED CLEAR OF THE VEHICLE, AND THE TRAILER, WHEN REVERSING UP TO THE TRAILER.**

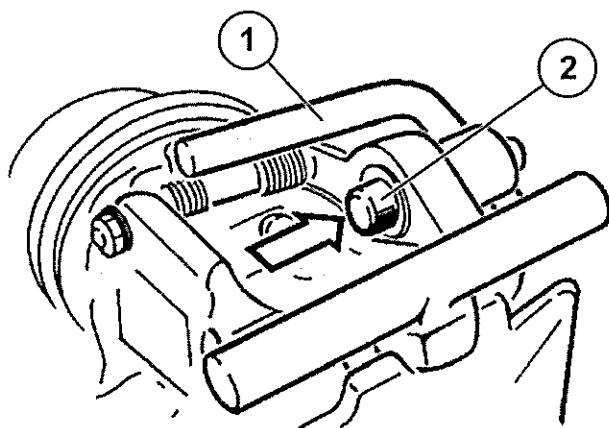
### CAUTION

**VEHICLE DAMAGE. Make sure that the drawbar does not miss the trailer pintle and strike the vehicle.**

209.5 Reverse the vehicle, the trailer pintle closes and locks automatically.

209.6 Check that the securing clip (1) is fully engaged.

209.7 Check visually or manually that the locating pin (2) has pushed out.



1 – Securing clip

X08570A2R  
2 – Locating pin

Fig 59 Hitching up a trailer

**Manually close the trailer pintle**

210 Refer to Fig 60. To manually close the trailer pintle, proceed as follows:

210.1 Position the trailer drawbar eye in the middle of the jaw and above the hook of the open trailer pintle.

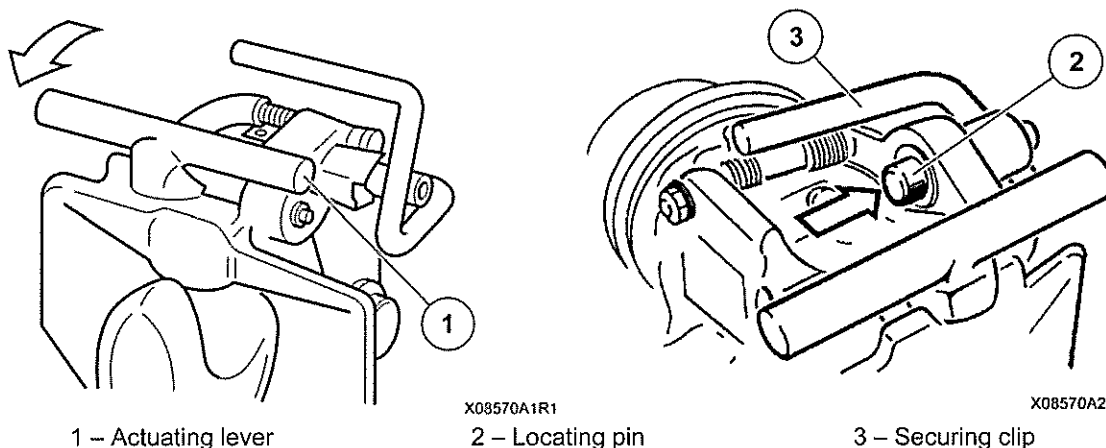
**WARNING**

**PERSONAL INJURY. AVOID TRAPPING FINGERS UNDER THE SECURING CLIP AND THE ACTUATING LEVER AS THE TRAILER PINTLE SPRINGS BACK INTO THE CLOSED POSITION.**

210.2 Pull the actuating lever (1) rearwards to close the trailer pintle.

210.3 Make sure the securing clip (3) is fully engaged.

210.4 Check visually that the locating pin (2) has pushed out.



1 – Actuating lever

X08570A1R1  
2 – Locating pin

X08570A2R1  
3 – Securing clip

Fig 60 Manually close the trailer pintle

## Vehicle trailer connections

### WARNING

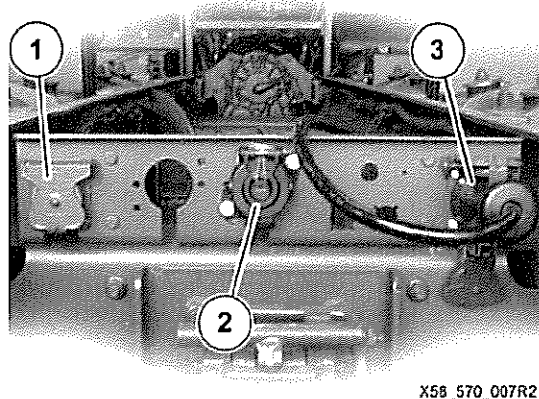
**RISK OF ACCIDENTS. THERE ARE TWO DIFFERENT POSITIONS FOR THE 7-PIN SOCKET AND THE 12-PIN SOCKET. MAKE SURE THAT THE CORRECT TRAILER SOCKET IS CONNECTED, THERE MAY BE NO POWER SUPPLY FOR THE LIGHTS.**

211 There are two different versions for the positions of the 7-pin and 12-pin electrical sockets for the connection of a trailer.

211.1 Refer to Fig 61. Version 1, the positions of the electrical sockets are as follows:

211.1.1 The 7-pin electrical socket is the centre socket (2).

211.1.2 The 12-pin electrical sockets are the left socket (1) and the right socket (3).



1 – Left socket

2 – Centre socket

3 – Right socket

Fig 61 Vehicle trailer connections

## Connecting the 12-pin trailer connection

### WARNING

**RISK OF ACCIDENTS. THERE ARE TWO DIFFERENT POSITIONS FOR THE 7-PIN SOCKET AND THE 12-PIN SOCKET. MAKE SURE THAT THE CORRECT TRAILER SOCKET IS CONNECTED, THERE MAY BE NO POWER SUPPLY FOR THE LIGHTS.**

### CAUTION

**EQUIPMENT DAMAGE. Do not leave the link cable unconnected at any time.**

212 Check the lights and update the central on-board computer every time the trailer is changed. Carry out a visual check.

213 Refer to Fig 62. Version 1, refer to Para 211.1 and proceed as follows:

213.1 For trailers with ABS and EBS, connect the lead to the 7-pin socket (4).

213.2 To connect a 12-pin Def Stan older UK trailer:

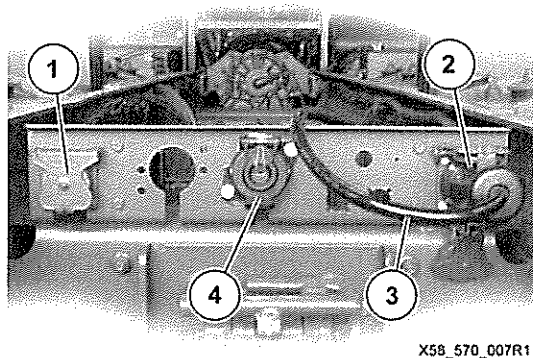
213.2.1 Connect the link cable (3) to the right socket (2).

213.3 Connect the 12-pin Def Stan trailer connector to the left socket (1).

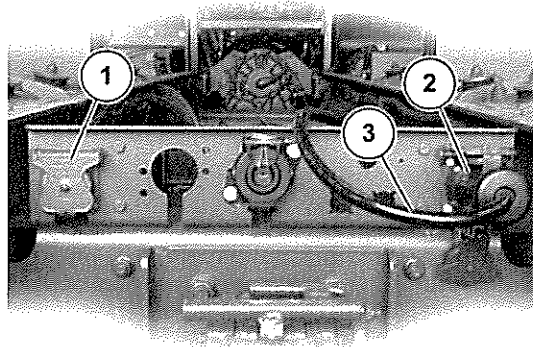
213.4 To connect a 12-pin NATO STANAG trailer:

213.4.1 Connect the link cable (3) to the left socket (1).

213.4.2 Connect the 12-pin NATO STANAG trailer connector to the right socket (2).



X58\_570\_007R1



X58\_570\_004R1

1 – Left socket

2 – Right socket

3 – Link cable

4 – 7-pin socket

Fig 62 Connecting the 12-pin trailer connection (version 1)

214 Refer to Fig 63. Version 2, refer to Para 211.1 and proceed as follows:

214.1 For trailers with ABS and EBS, connect the lead to the 7-pin socket (4).

214.2 To connect a 12-pin Def Stan older UK trailer:

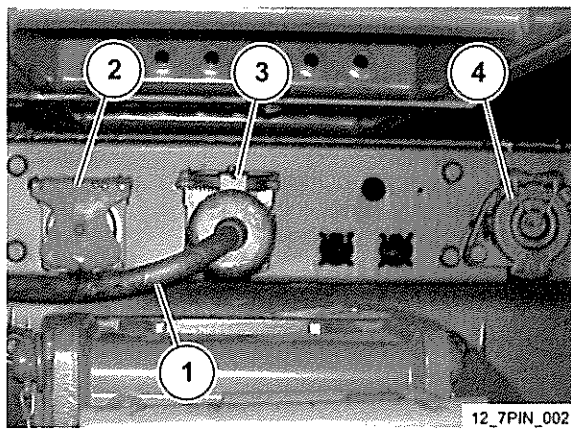
214.2.1 Connect the link cable (1) to the left socket (2).

214.2.2 Connect the UK trailer connector to the centre socket (3).

214.3 To connect a 12-pin NATO STANAG trailer:

214.3.1 Connect the link cable (1) to the centre socket (3).

214.3.2 Connect the NATO STANAG trailer connector to the left socket (2).



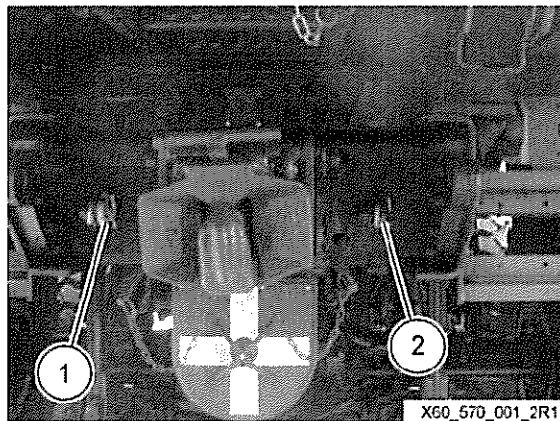
- |                 |                   |
|-----------------|-------------------|
| 1 – Link cable  | 3 – Centre socket |
| 2 – Left socket | 4 – 7 pin socket  |

Fig 63 Connecting the 12-pin trailer connection (version 2)

### Connecting the brake air lines

215 Refer to Fig 64. Connect the brake air lines in the sequence below:

- 215.1 Connect the service line to the yellow coupling head (1).
- 215.2 Connect the reservoir line to the red coupling head (2).



- |                          |                       |
|--------------------------|-----------------------|
| 1 – Yellow coupling head | 2 – Red coupling head |
|--------------------------|-----------------------|

Fig 64 Connecting the brake air lines

**Disconnecting the brake air lines****WARNING**

**TRAILER MOVEMENT. ALWAYS REMOVE THE COUPLING HEADS IN THE CORRECT SEQUENCE. OTHERWISE, THE TRAILER BRAKE WILL BE RELEASED AND THE UNBRAKED TRAILER COULD ROLL AWAY.**

216 Refer to Fig 64. Disconnect the brake air lines in the sequence below:

216.1 Disconnect the reservoir line from the red coupling head (2).

216.2 Disconnect the service line from the yellow coupling head (1).

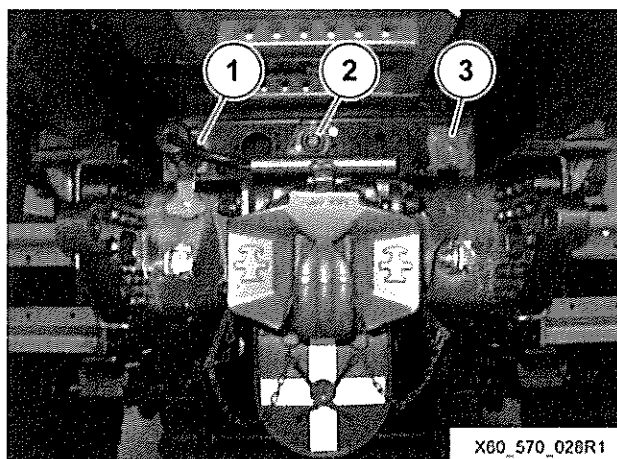
**Disconnecting the trailer connections****CAUTION**

**EQUIPMENT DAMAGE. Do not leave the link cable unconnected at any time.**

217 Refer to Fig 65. To disconnect the electrical leads, proceed as follows:

217.1 For trailers with ABS and EBS, disconnect the lead from the centre socket (2) or the right socket (3).

217.2 For trailers with a 12-pin connection, disconnect the trailer connector from the left socket (1), the centre socket (2) or the right socket (3).



1 – Left socket

2 – Centre socket

3 – Right socket

Fig 65 Disconnecting the brake air lines



### Unhitching a trailer

218 To unhitch a trailer from the vehicle, proceed as follows:

#### WARNING

**PERSONAL INJURY. PREVENT THE TRAILER FROM ROLLING AWAY BY APPLYING THE PARKING BRAKE AND/OR USING CHOCKS ON THE REAR WHEELS.**

218.1 Apply the trailer parking brake. Use wheel chocks, if necessary, to prevent the trailer from rolling away.

218.2 Open the trailer pintle, refer to Para 207.

218.3 Use the trailer drawbar height adjuster to raise the trailer from the trailer pintle.

218.4 Slowly move the vehicle forward, away from the trailer.

#### CAUTION

**VEHICLE DAMAGE. When not towing a trailer, close the trailer pintle to protect the lower socket against dirt.**

218.5 Close the trailer pintle.

### Additional current consumer

219 The 12 pole trailer socket (terminal K) allows an additional current consumer on the trailer to be powered.

220 Refer to Fig 66. To supply electrical power to the current consumer, proceed as follows:

220.1 Switch on the ignition.

220.2 Press the bottom of the rocker switch. The check lamp in the switch comes on.

221 To switch off electrical power to the current consumer, press the top of the rocker switch. The check lamp goes off.



Fig 66 Additional current consumer

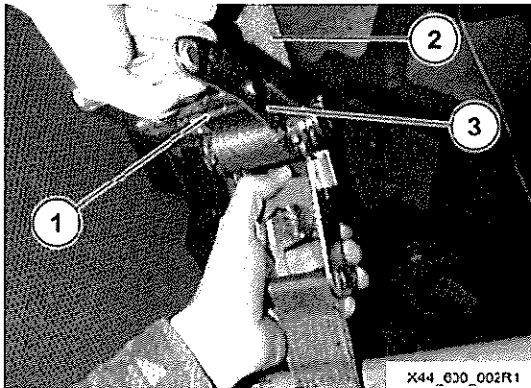
**SPARE WHEEL****Removing the spare wheel**

222 Refer to Fig 67. To remove the spare wheel, proceed as follows:

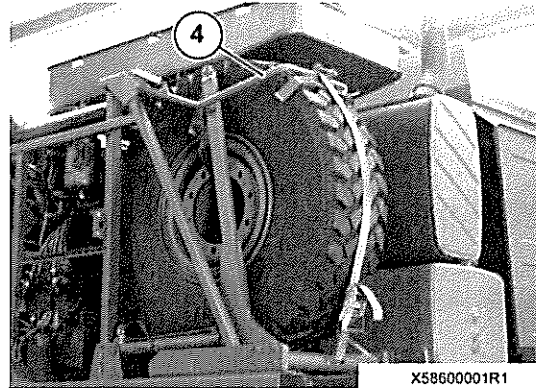
222.1 Pull the locking piece (1) towards the handle of the clamping lever (3) and push the clamping lever upwards until it is fully open and locked.

222.2 Pull the ratchet strap downwards and at the same time remove the securing strap (2) from the ratchet pulley.

222.3 Tip up the relay (4).



1 – Locking piece  
2 – Securing strap



3 – Clamping lever  
4 – Relay

Fig 67 Removing the spare wheel

222.4 Refer to Fig 68. Move the lever (2) of the changeover valve downwards until the lever reaches the stop.

**WARNINGS**

- (1) **PERSONAL INJURY. THE SPARE WHEEL SWINGS, KEEP THE AREA CLEAR.**
- (2) **PERSONAL INJURY. STAY OUT OF THE AREA BETWEEN THE SPARE WHEEL AND THE VEHICLE DURING LOWERING.**

222.5 Put the wheel nut socket and bar on the hexagon profile (1) and operate the pump until the spare wheel makes contact with the ground.

222.6 Release and remove the strap (3).

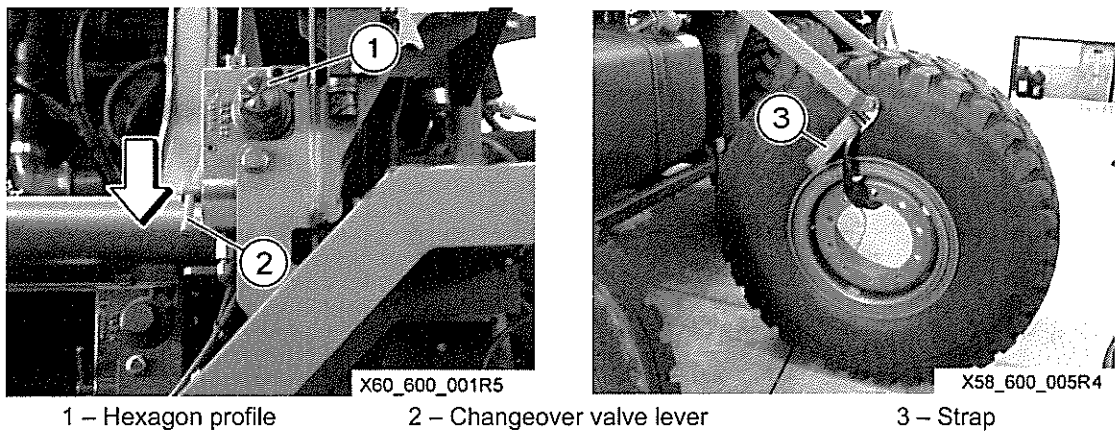


Fig 68 Release the spare wheel

### Stowing the spare wheel

223 Refer to Fig 69. To stow the spare wheel, proceed as follows:

223.1 Refit and secure the strap (3).

223.2 Move the lever (2) of the changeover valve upwards until it reaches the stop.

### WARNINGS

(1) **PERSONAL INJURY. THE SPARE WHEEL SWINGS, KEEP THE AREA CLEAR.**

(2) **PERSONAL INJURY. STAY OUT OF THE AREA BETWEEN THE SPARE WHEEL AND THE VEHICLE DURING RAISING.**

223.3 Put the wheel nut socket and bar on the hexagon profile (1), and operate the pump until the spare wheel returns to the carrier.

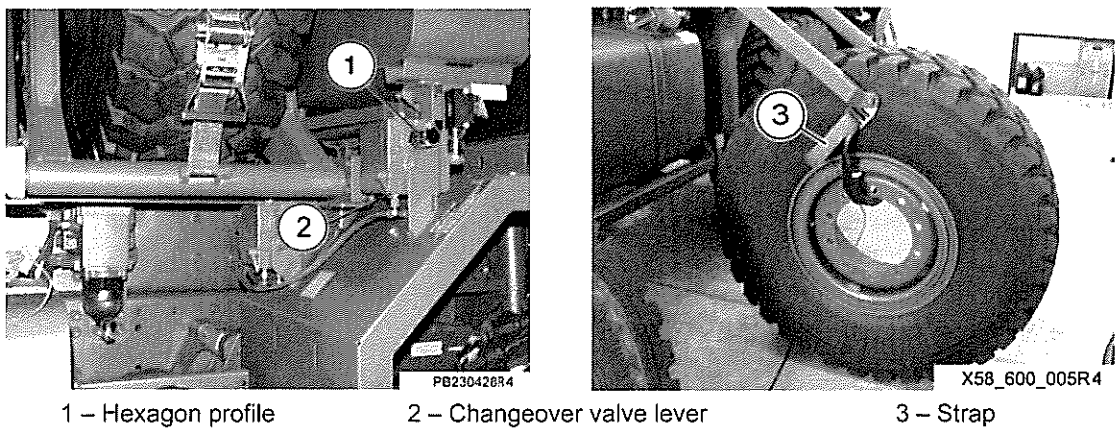
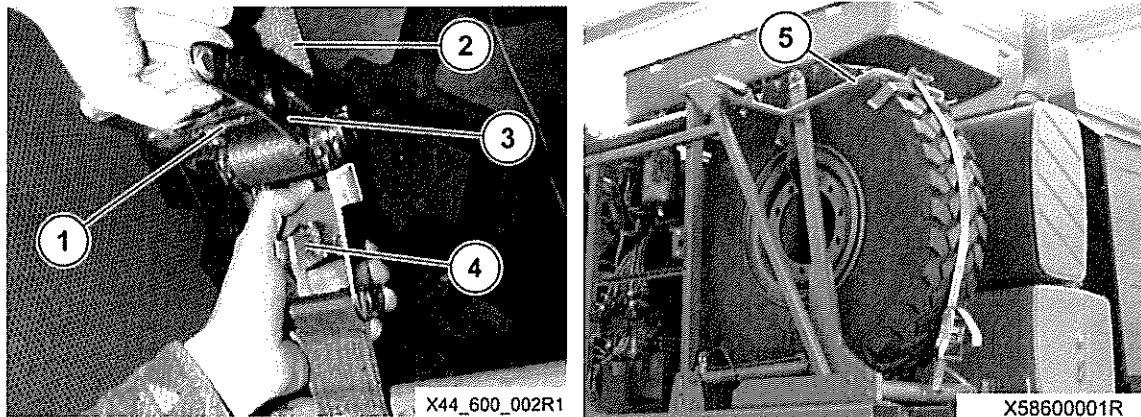


Fig 69 Stowing the spare wheel

223.4 Refer to Fig 70. Fold down the relay (5).

224 Push the securing strap (2) through the tensioning pulley.

225 Ratchet the clamping lever (3) to tighten the strap (2), securing the wheel in the stowage position. lock the clamping lever (3) into the main assembly and engage the locking piece (1) to engage into the lug (4).



- 1 – Locking piece  
2 – Strap  
3 – Clamping lever

- 4 – Lug  
5 – Relay

Fig 70 Securing the spare wheel

## CHANGING A WHEEL

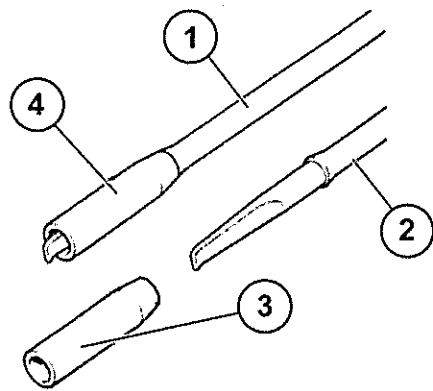
### Removing the wheel

#### WARNINGS

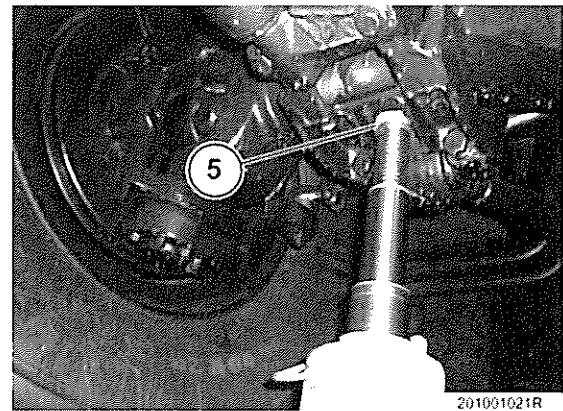
- (1) **PERSONAL INJURY. WHEELS MUST ONLY BE CHANGED WHEN THE VEHICLE IS PARKED ON HARD, FLAT GROUND.**
- (2) **PERSONAL INJURY. FOR SAFETY REASONS THIS OPERATION REQUIRES TWO PEOPLE.**
- (3) **DRIVING SAFETY. VEHICLES ARE NOT TO BE OPERATED WITH MIXED TYRES ACROSS AXLES. SHOULD OPERATIONAL USAGE NECESSITATE THE USE OF MIXED TYRES, AUTHORISATION MUST BE OBTAINED FROM HQ 'IN-THEATRE' ES BRANCH. AT THE EARLIEST POSSIBLE OPPORTUNITY, VEHICLES ARE TO REVERT BACK TO 'NON' MIXED TYRES.**

226 Refer to Fig 71. To remove a wheel, proceed as follows:

- 226.1 Apply the parking brake
- 226.2 Place chocks in front of and behind a wheel to prevent the vehicle from rolling away.
- 226.3 Loosen all the wheel nuts.
- 226.4 From the driver's tool roll, fit the wheel mounting sleeves (3 and 4) fully onto the end of the tyre levers (1 and 2) turning the wheel mounting sleeves (3 and 4) to securely fix them in place.
- 226.5 If the wheel to be changed is located on a front axle, position the jack so that the jack cannot slip, then locate the jack in the jacking point (5).



- 1 – Tyre lever
- 2 – Tyre lever
- 3 – Wheel mounting sleeve



- 4 – Wheel mounting sleeve
- 5 – Jacking point

Fig 71 Removing the wheel

226.6 Refer to Fig 72. If the wheel to be changed is located on a rear axle, position the jack so the jack cannot slip, then locate the jack in the jacking point (1).

226.7 Operate the jack until the wheel is clear of the ground.

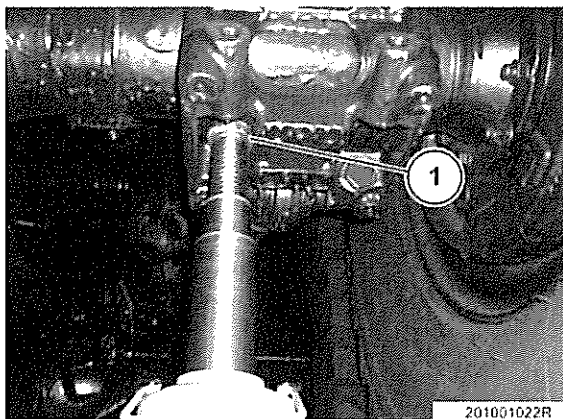
**WARNING**

**PERSONAL INJURY. BE CAREFUL WHEN REMOVING THE WHEEL NUTS, MAKE SURE THAT THE WHEEL DOES NOT FALL.**

226.8 Remove two horizontally opposite wheel nuts.

226.9 Fit wheel stud protection sleeves (2 and 3) to the horizontally exposed wheel studs.

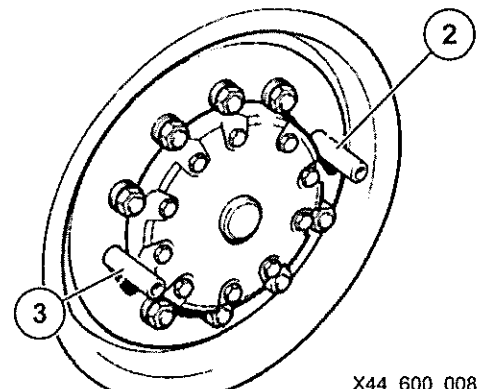
226.10 Remove the remaining wheel nuts. (Leaving wheel nuts positioned at 12 and 6 o'clock).



- 1 – Jacking point

- 2 – Stud protection sleeve

- 3 – Stud protection sleeve



X44\_600\_008R

Fig 72 Jacking point and protection sleeves

**WARNING**

**PERSONAL INJURY. THE WHEELS CARRY A WEIGHT OF (197KG). CAUTION AND ASSISTANCE SHOULD BE USED WHEN REMOVING OR HANDLING.**

226.11 Refer to Fig 73. Locate the exposed curved ends of the tyre levers that protrude through the wheel mounting sleeves (2 and 3) pointing downwards into the wheel stud protection sleeves (1 and 4), and remove the remaining wheel nuts.

226.12 Using the tyre levers (2 and 3) for support and with the aid of an assistant, remove the wheel and lower to the ground when clear of the studs.

226.13 Remove wheel stud protection sleeves (1 and 4) and retain for the re-fitting procedure.

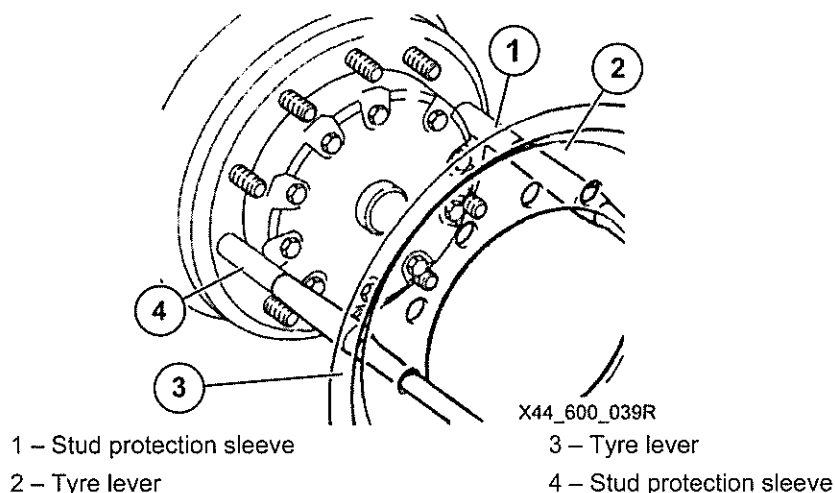


Fig 73 Lever the wheel

**Fitting the wheel**

227 Check the condition of all wheel studs and replace if damaged. Clean any rust and dirt off the brake drum, wheel studs and rim if necessary. Make sure all wheel studs are correctly located before re-fitting the wheel.

228 Refer to Fig 73. To fit the wheel, proceed as follows:

- 228.1 Remove the spare wheel if necessary. Refer to Para 222.
- 228.2 Make sure that all tyre inflating valve extensions have been removed prior to wheel fitment.
- 228.3 Fit the wheel stud protection sleeves (1 and 4) onto two horizontally opposite wheel studs.
- 228.4 With assistance, put the spare wheel in position.
- 228.5 Pass the tyre levers and the wheel mounting sleeves through the appropriate holes in the wheel rim.
- 228.6 Insert the assembled tyre levers and wheel mounting sleeves (2 and 3) into the open end of the wheel stud protection sleeves (1 and 4) ensuring the point is downwards to ensure it does not slip.
- 228.7 With the tyre levers (2 and 3) and with the aid of an assistant, raise the wheel up allowing the wheel to slide over the wheel stud protection sleeves onto the wheel studs (1 and 4).

228.8 Refer to Fig 74. With assistance, use a foot (against the base of the wheel) to help push the wheel fully onto the hub.

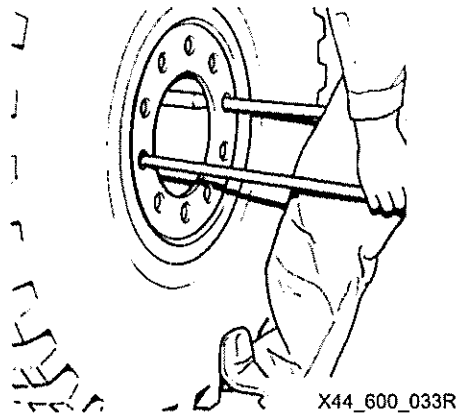


Fig 74 Push the wheel onto the hub

**WARNING**

**PERSONAL INJURY. THE WHEEL COULD FALL. HOLD THE WHEEL UNTIL TWO OF THE WHEEL NUTS ARE FITTED.**

228.9 With assistance, hold the wheel securely and fit two wheel nuts (6 and 12 o'clock) to the wheel.

228.10 Remove the two wheel stud protection sleeves from the wheel studs.

228.11 Fit all the wheel nuts and then tighten slightly.

228.12 Lower the jack, then using the wheel brace supplied, and working diagonally, tighten all the wheel nuts in stages.

228.13 Refer to Fig 75. Refit the wheel nut indicators (1).

228.14 Stow the jack, chocks and tool roll.



Fig 75 Wheel nut indicators

**WARNING****WHEEL SECURITY. INCORRECTLY TIGHTENED WHEEL NUTS MAY COME LOOSE.**

229 After 50km retighten the wheel nuts (if the nuts show signs of loosening continue frequent checks until back at Unit). Once back at Unit, wheel nuts should be torque tightened to 575Nm. Recheck torque after a further 50km. Contact your unit for assistance.

**TOWING AND RECOVERY**

230 Towing and recovery must be carried out in accordance with Standing Orders and Local Procedures.

231 Do not tow-start the vehicle to start the engine. Use the Inter-Vehicle Connection (IVC) cable, refer to Chapter 1-6.

**Conditions for a towing bar**

232 When towing with a towing bar, observe the following:

232.1 Run the engine, if possible, to supply the brake system with compressed air and to provide power steering. If the engine is not running or the power steering has failed, greater effort will be required to steer the vehicle; tow the vehicle slowly.

232.2 Make sure that the wheels are able to turn and there is no axle damage.

**General****WARNING****RISK OF ACCIDENTS. IF THE BRAKE SYSTEM RESERVOIR PRESSURE HAS FAILED AND THE SPRING BRAKE CHAMBERS ARE RELEASED MECHANICALLY, THE VEHICLE HAS NO BRAKING.**

233 When towing generally, observe the following:

233.1 Connect the two coupling heads in the front bumper to the compressed air system of the recovering vehicle when towing. The immobilised vehicle will now be braked like a trailer.

233.2 Raise the vehicle at the front if the braking system is not operating correctly, or the steering system is damaged. Alternatively, load the vehicle onto another vehicle.

**CAUTION****DAMAGE TO FRAME OR AXLE. Unload the vehicle before raising from the front or rear.**

233.3 Unload the vehicle before raising the vehicle at the front or rear.

233.4 Disengage any interaxle and/or transverse differential locks that may be engaged. Refer to Para 171.

233.5 Only use a towing A-frame or towing bar; do not tow with a cable. Alternatively, lift the vehicle at the front.

233.6 Set the ignition key to position II to switch on the ignition; operate the electrical battery master switch if necessary.

233.7 Remove the propshafts to interrupt the driveline if the engine, gearbox or transfer case is



damaged. Refer to Para 235.

233.8 If the vehicle is stuck, do not pull the vehicle free in jolts or at an angle, especially sideways.

**Preparation for towing**

234 The conditions for towing recovery are listed in Table 2.

**TABLE 2 CONDITIONS FOR TOWING AND RECOVERY**

Ser (a)	Vehicle condition (b)	Procedure (c)
1	Damaged engine and a towing distance of up to 100 km.	Shift the gearbox and transfer box into neutral. Do not exceed a towing speed of 30 km/h.
2	Damaged engine or gearbox, or a towing distance of more than 100 km.	Disconnect the propshafts.
3	Damaged transfer case.	Disconnect the propshafts.
4	Damaged front axle.	Use a special recovery vehicle, or raise the rear of the vehicle.
5	Damaged rear axle.	Use a special recovery vehicle, or raise the rear of the vehicle.

**Disconnecting the propshafts**

235 Refer to Fig 76. To remove the front or rear propshaft, proceed as follows:

235.1 Support the propshaft between the transfer case and the appropriate axle.

235.2 Unscrew the mounting bolts from the propshaft at the axle.

235.3 Unscrew the mounting bolts (1) from the propshaft at the transfer case, then remove the propshaft.

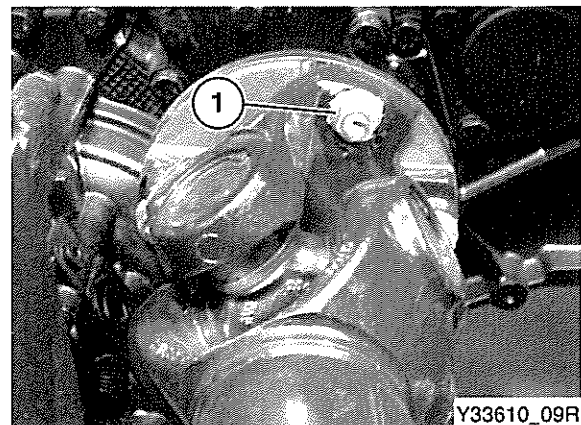
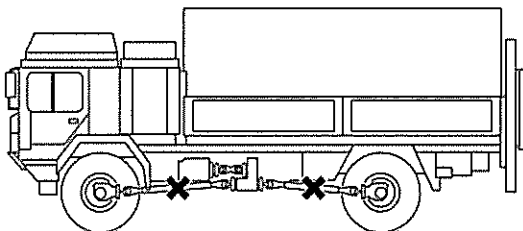


Fig 76 Disconnecting the propshafts

**Towing clear**

236 The vehicle must be towed clear if stuck, e.g. in soft ground.

237 Do not pull the vehicle free in jolts or at an angle, especially sideways, if the vehicle is stuck.

238 Only use the recovery lugs for towing clear and recovery work.

#### Towing using an A-frame

239 Refer to Fig 77. To attach an A-frame to the vehicle, proceed as follows:

#### WARNINGS

(1) **PERSONAL INJURY. TWO PERSONS ARE REQUIRED TO ATTACH THE A-FRAME.**

(2) **PERSONAL INJURY. DO NOT USE A DAMAGED A-FRAME.**

239.1 Attach the A-frame to the recovery eyes (1).

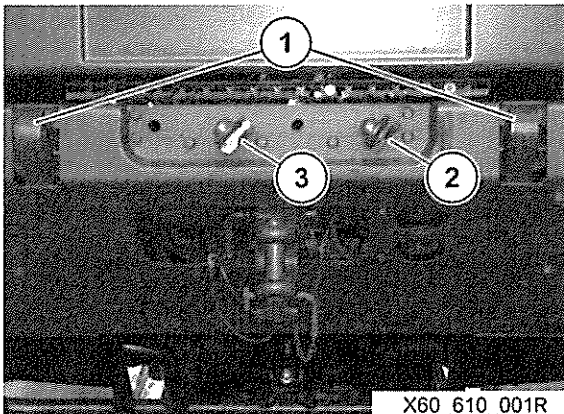
239.2 Align both ends of the A-frame half with the drawbar eye.

239.3 Insert a socket pin (4) to attach both ends to the drawbar eye, then secure using the spring cotter pin (5).

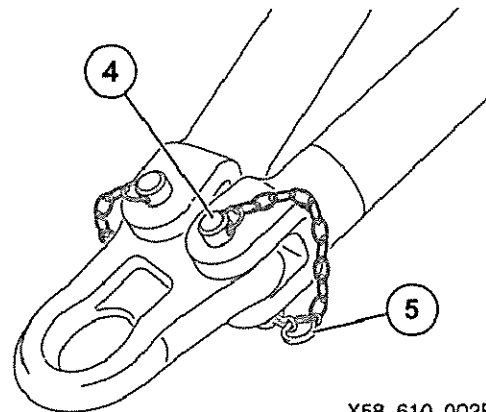
239.4 Connect the red coupling head reservoir line (2).

239.5 Connect the yellow coupling head control line (3).

240 Attach the vehicle to be towed to the recovery vehicle in the same manner as hitching up a trailer. Refer to Para 209.



- 1 – Recovery eyes
- 2 – Head reservoir line
- 3 – Head control line



- 4 – Socket pin
- 5 – Spring cotter pin

Fig 77 Towing using an A-frame

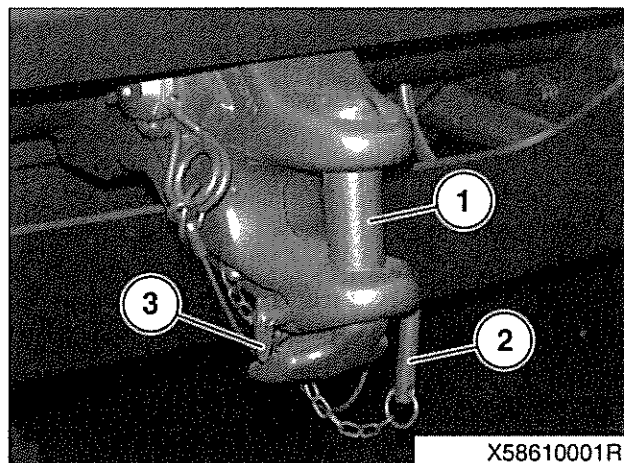
### Attaching a towing bar

#### WARNING

**RISK OF ACCIDENTS. DO NOT USE DAMAGED TOWING BARS.**

241 Refer to Fig 78. To attach a towing bar, proceed as follows:

- 241.1 Insert the eye of the towing bar into the open tow hook.
- 241.2 Insert the pintle pin (1) from below and hold in position.
- 241.3 Insert the fastening pin (2).
- 241.4 Fold the locking wing (3) down.



1 – Coupling pin

2 – Fastening pin

3 – Locking wing

Fig 78 Attaching a towing bar

#### WARNING

**DANGER OF ACCIDENTS. ONLY TOW WITH A DRIVER, WHO STEERS AND BRAKES, IN THE VEHICLE TO BE TOWED.**

242 To tow the vehicle after attaching the towing bar, proceed as follows:

- 242.1 Attach the vehicle to be towed to the recovery vehicle in the same manner as hitching up a trailer. Refer to Para 209.
- 242.2 Make sure that the drive range switch is in the N position.
- 242.3 Start the engine.
- 242.4 Charge the compressed air system up to the shut-off pressure.
- 242.5 Tow the vehicle slowly. Do not exceed the maximum towing speed of 60 km/h.

243 After towing the vehicle, proceed as follows:

- 243.1 Stop the engine.
- 243.2 Apply the parking brake and use chocks to prevent the vehicle from rolling away.

**HYDRAULIC POWER STEERING FAILURE****WARNING**

**LOSS OF CONTROL. INCREASED EFFORT IS REQUIRED TO STEER THE VEHICLE IF THE POWER STEERING FAILS.**

**CAUTION**

**DAMAGE TO STEERING SYSTEM. The vehicle must not be steered when it is stationary if the hydraulic power steering has failed.**

244 In the event of hydraulic power steering failure, the vehicle can be steered if still moving. Drive to your nearest Unit at a reduced speed.

245 Refer to Fig 79. If there is a loss of power steering fluid, the indications are as follows:

- 245.1 A text message (1) appears.
- 245.2 The power steering oil check lamp appears on the left of the display.
- 245.3 The central warning light flashes red on the panel of check lamps.
- 245.4 The audible warning signal sounds.

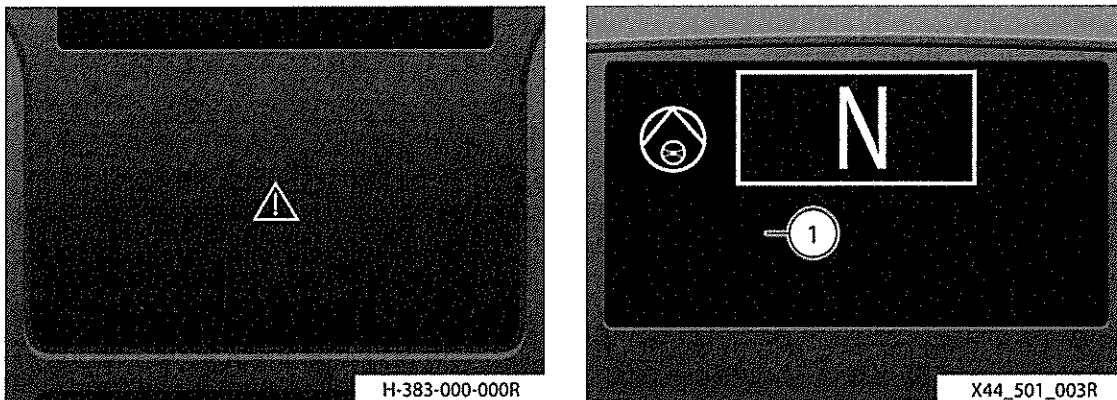


Fig 79 Hydraulic power steering failure

### CAB ACCESS LADDER

246 The ladder is fitted on the right side of the vehicle behind the driver's door. The ladder provides a secondary means of access to the cab roof. The primary means of access is through the cupola. The ladder is not to be used for any purpose (specifically loading) other than to gain access to the cab roof.

#### WARNING

**PERSONAL INJURY. MAKE SURE THAT THE LADDER IS LOCKED IN POSITION BEFORE ACCESSING THE CAB ROOF.**

#### CAUTION

**DAMAGE TO EQUIPMENT. Make sure that the ladder is locked in the closed position before moving the vehicle.**

247 Refer to Fig 80. To set up the ladder, proceed as follows:

247.1 Release the retaining strap (3).

247.2 Lift the ladder so that the top step is higher than the recess (2) and pull it out of the retaining bracket (1).

247.3 Move the ladder 90° anti-clockwise and secure it into the recess (2).

248 A grab handle (4) is fitted to the cab roof.

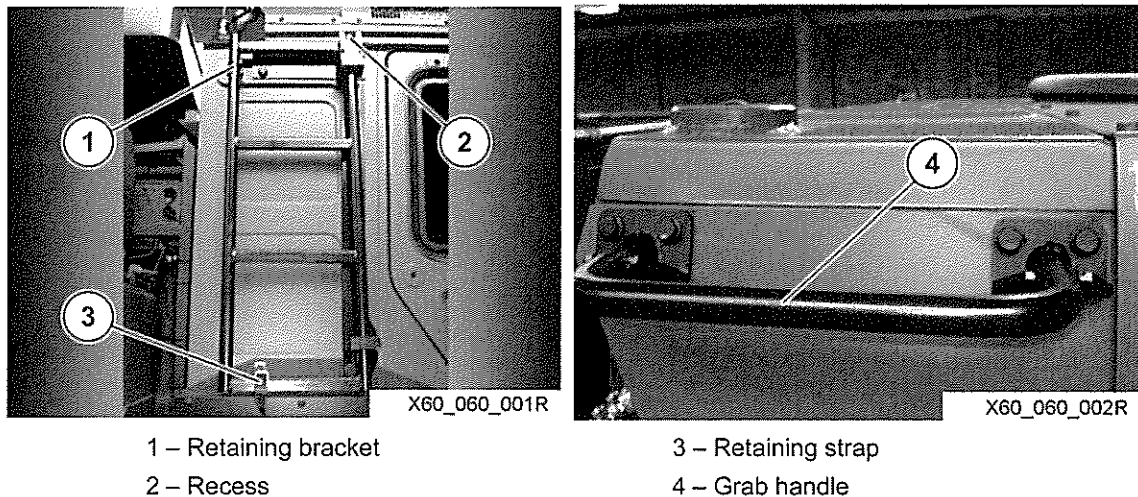


Fig 80 Cab access ladder

249 To stow the ladder, proceed as follows:

249.1 Lift the ladder out of the recess (2).

249.2 Move the ladder clockwise until it reaches the retaining bracket (1).

249.3 Push the ladder into the retaining bracket (1).

249.4 Slide the ladder downwards carefully to the stop.

249.5 Secure the ladder in position using the retaining strap (3).

249.6 The access ladder can be mounted to the opposite side of the vehicle cab, however this requires the ladder section to be dismantled and reassembled by fully authorised and competent personnel.

#### WINCH REMOTE SOCKET (IF FITTED WITH WINCH)

250 Refer to Fig 81. The socket (1) for the remote control of the cable winch is located on the right side of the battery box.

251 The socket has to be switched on before the remote control can be plugged in.

252 To switch on the winch remote socket, proceed as follows:

252.1 Press the bottom of the rocker switch.

252.2 The check lamp in the switch comes on.

253 The remote control for the winch can now be plugged in.

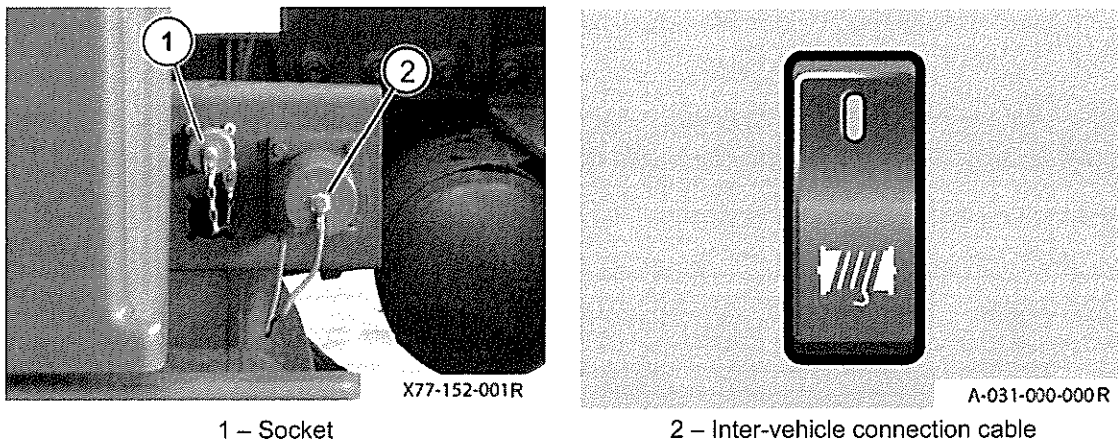


Fig 81 Winch remote socket and rocker switch

#### SLAVE STARTING

##### Vehicle slave starting pre-conditions

#### CAUTION

**EQUIPMENT DAMAGE. Battery failure. Personnel are to ensure that all battery slave starting pre-conditions are adhered to. This will maintain the operating life of the battery.**

254 To preserve the operating life of the vehicle battery, ensure the following situations are adhered to:

254.1 If a vehicle is intending to be unused for more than 28 days the batteries must be disconnected.

254.2 When slave starting a vehicle with flat batteries, the slave lead is to remain connected to both vehicles for a minimum of 20 minutes to allow the sulphation barrier on the slaved vehicles batteries to disseminate, allowing the batteries to recharge and prevent the alternator diode from overheating.

NOTE

After power-up the inter-vehicle connection cable should be left attached for a further 15 – 20 minutes.

254.3 Where possible units are to check the voltage of each battery prior to slave starting, to ensure that they are holding at least 10.5 volts charge.

**Connecting the inter-vehicle connection cable and starting**

**WARNING**

**'A' VEHICLES FIRE HAZARD. ONLY SLAVE THE AUXILIARY POWER UNIT.**

255 Refer to Fig 81. To connect the Inter-Vehicle Connection (IVC) (2) cable for starting assistance, proceed as follows:

255.1 Make sure that the parking brakes are applied on both vehicles.

255.2 Switch off the ignition of both vehicles.

**WARNING**

**FIRE HAZARD. ONLY BATTERIES OF THE SAME RATED VOLTAGE AND AMPERAGE OR LESSER AMPERAGE CAN BE SLAVE STARTED.**

**CAUTION**

**EQUIPMENT DAMAGE.** When slaving vehicles, make sure that the inter-vehicle connection cable is left attached to the casualty vehicle for 15-20 minutes after power up. This is to prevent damage to the alternator of the casualty vehicle.

255.3 Unscrew the cover from the IVC on both vehicles.

255.4 Connect the IVC cable to both vehicles.

255.5 Start the engine of the vehicle providing the slave start.

255.6 Start the engine of the vehicle receiving the slave start.

**Disconnecting the inter-vehicle connection cable after starting**

256 Refer to Fig 81. To disconnect the IVC (2) cable after starting, proceed as follows:

256.1 Stop the engine of the vehicle providing the jump start.

256.2 Disconnect the IVC cable from the vehicle receiving the jump start. Refit the cover.

257 Disconnect the IVC cable from the vehicle providing the jump start. Refit the cover.

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CHAPTER 1-6

DRIVER'S INSPECTIONS

CONTENTS

Para	
1	Introduction to driver inspections
	Front service flap (CAUTIONS)
4	Opening the front service flap
5	Closing the front service flap
	Cab tilt mechanism
6	Preparation for tilting (CAUTION)
7	[REDACTED]
	[REDACTED]
8	Tilting the cab (WARNINGS) (CAUTION)
10	Supporting the cab (WARNING)
11	Lowering the cab (CAUTION)
12	Checking the cab lock (WARNINGS)
15	Checking windscreen washers and wipers (CAUTION)
	Electrical system
19	General (WARNINGS)
27	Cleaning the vehicle
30	Central electrical system (WARNINGS)
36	Handling batteries (WARNINGS)
38	Battery checks
40	Removing and installing the batteries
	Lamp replacement
42	General (WARNING)
47	Replacing a low beam lamp (WARNINGS) (CAUTION)
49	Replacing a parking light lamp
50	Replacing a high beam lamp (WARNINGS) (CAUTION)
52	Checking the low-beam headlight setting (WARNING)
57	Replacing a front turn indicator lamp (WARNINGS)
58	Replacing a clearance LED on the cab
59	Replacing a side marker lamp (CAUTION)
60	Rear lamp unit (WARNINGS)
62	Replacing a licence plate lamp
63	Replacing a convoy lamp
64	Replacing lamps inside the cab (WARNINGS)
65	Cooling and heating system (WARNING) (CAUTION)
66	Screen and radiator fins (CAUTION)
67	Draining the coolant system
68	Filling with coolant
70	Checking the coolant (CAUTION)
72	Pressure relief valve
73	Coolant mixing ratio
78	Checking and draining the air filter
80	Replacing the air filter element (CAUTIONS)
81	Checking the cab tilt oil level
82	Checking the spare wheel tilt oil level
83	Checking the central hydraulic system fluid level (CAUTION)
	Fuel system
87	Checking and inspecting the fuel system

(continued)

**CONTENTS (continued)**

## Para

88	Draining off primary fuel filter (separator)
90	Checking the fuel level
91	Refilling the fuel tank (CAUTION) (WARNING)
	Tyre inflation pressure and condition (WARNING)
94	Checking tyre inflation pressure and condition
96	Inflating tyres
	Engine oil level
97	Oil level check with dipstick (CAUTION)
104	Oil level check electronic (CAUTION)
106	Checking the engine oil level with the vehicle menu (engine cold)
107	Checking the engine oil level with the vehicle menu (engine hot)
109	Exiting the menu
110	Topping up the engine oil (CAUTIONS)
111	Engine oil pressure (CAUTION)
114	Check the engine for leaks
	Engine oil and oil filter
117	Changing the engine oil and oil filter (CAUTIONS)
	Automated gearbox ZF 12AS1210
129	Checking the automated gearbox oil level (WARNING)
	Transfer case
130	Checking the transfer case oil level (WARNING)
131	Changing the transfer case oil
	Front axle foremost differential
132	Checking the differential oil level
133	Replacing the differential oil
	Rear axle differential
134	Checking the differential oil level
135	Replacing the differential oil
136	Replacing the breather (CAUTION)
138	Checking the planetary hub oil level
139	Replacing the planetary hub oil
140	Brake system (WARNINGS)
142	Checking the air reservoirs (WARNINGS)
147	Cleaning the brakes (WARNING)
148	Trailer pintle
149	Headlight adjustment (WARNING)
150	Setting the headlight
151	LED licence plate light
	Air-conditioning
154	Cleaning the drain hole and the gutter (WARNINGS)
156	Cleaning the drain tubes
158	Propshafts

## Table

## Page

1	Waiting time for corresponding oil temperatures .....	43
---	---	----

## Fig

## Page

1	Opening the front service flap .....	5
2	Preparation for tilting .....	6
3	Remove the centre front armour .....	7
4	Remove the jointed steering shaft armour .....	8
5	Tilting the cab .....	9

(continued)

CONTENTS (continued)

Fig		Page
6	Supporting the cab .....	10
7	Engaging the support rod .....	10
8	Lowering the cab .....	11
9	Driver's display .....	12
10	Checking windscreen washers and wipers .....	13
11	Remove the fuse box cover .....	15
12	Circuit breaker reset button .....	15
13	Electrical battery master switch .....	17
14	Replacing a low beam lamp .....	18
15	Replacing a light lamp .....	19
16	Replacing a high beam lamp .....	20
17	Checking the low-beam headlight setting .....	21
18	Replacing a front turn indicator lamp .....	22
19	Replacing a clearance LED on the cab .....	22
20	Replacing a Side Marker Lamp .....	23
21	Rear lamp unit .....	24
22	Rear unit lamp replacement .....	25
23	Replacing a licence plate lamp .....	25
24	Replacing the convoy light .....	26
25	Fitting the convoy light .....	26
26	Replacing lamps inside the cab .....	27
27	Clean the dirty radiator fins .....	28
28	Open the relief valve .....	29
29	Drain the coolant system .....	29
30	Remove the filler cap .....	30
31	Check and drain the separator valve .....	32
32	Replacing the air filter element .....	33
33	Install the air filter element .....	33
34	Install the filter cover .....	34
35	Checking the cab tilt oil level .....	35
36	Checking the spare wheel tilt oil level .....	35
37	Checking the central hydraulic system fluid level .....	36
38	Draining off primary fuel filter (separator) .....	37
39	Checking the fuel level .....	38
40	Refilling the fuel tank .....	39
41	Inflating tyres .....	40
42	Fit the inflating hose .....	40
43	Engine oil dipstick .....	41
44	Engine oil dipstick MIN/MAX level marks .....	42
45	Check the engine oil level .....	43
46	Topping up the engine oil .....	44
47	Engine oil pressure .....	45
48	Drain the engine oil .....	46
49	Replacing oil filter .....	47
50	Top up the engine oil .....	47
51	Oil pressure check lamp .....	48
52	Checking the automated gearbox oil level .....	49
53	Checking the transfer case oil level .....	49
54	Changing the transfer case oil .....	50
55	Checking/replacing the front axle differential oil level .....	51
56	Checking/replacing the rear axle differential oil level .....	52
57	Replacing the breather .....	53
58	Checking the planetary hub oil level .....	54
59	Replacing the planetary hub oil level .....	54

(continued)

**CONTENTS (continued).**

Fig		Page
60	Brake system pressure gauges .....	55
61	Driver's display indicators .....	56
62	Checking the air reservoirs .....	56
63	Cleaning the brakes .....	57
64	Lubricate the trailer pintle.....	58
65	Setting the headlight.....	59
66	Replacing the LED licence plate.....	60
67	Cleaning the drain hole and the gutter.....	61
68	Cleaning the drain tubes.....	62
69	Check and lubricate the propshafts .....	63

**INTRODUCTION TO DRIVER INSPECTIONS**

1 This Driver Inspection chapter has been completely revised and now only provides vehicle specific support maintenance instructions. All variant Support Vehicle scheduled maintenance tables are provided in AESP 2320-W-100-601.

2 The Unit Commander (Army) or Motor Transport (MT) Officer (RAF) is responsible for ensuring that the operations contained in AESP 2320-W-100-601 Maintenance Schedules and the maintenance support activities contained in this chapter are properly carried out by appropriately trained personnel or, where annotated, a Qualified Tradesman (QT) (Army only). These are defined as:

2.1 A REME Vehicle Mechanic (VM) or RAF equivalent.

2.2 Any person who has been formally trained as a Driver/Operator Mechanic on the subject equipment type (Army only).

2.3 Any person who has been taught how to carry out that task during a formal trade training course.

2.4 A civilian equivalent of the above.

3 The Unit Commander (Army) or MT Officer (RAF) may order any operation to be carried out more frequently than is specified if the conditions under which the equipment operates render it necessary. For Army equipment the Senior Maintenance Advisor should be consulted.

## FRONT SERVICE FLAP

### CAUTIONS

- (1) **VEHICLE DAMAGE.** Before opening the front service flap, make sure that the windscreen wiper arms are in the parked position.
- (2) **VEHICLE DAMAGE.** Make sure that the front service flap is open before tilting the cab.

### Opening the front service flap

- 4 Refer to Fig 1. To open the front service flap, proceed as follows:
  - 4.1 Tip up the bayonet catch (1), and then turn the catch counterclockwise to the horizontal position.
  - 4.2 Lift the front service flap (2) upwards. Two gas springs (3) assist in opening, then holding the flap fully open.

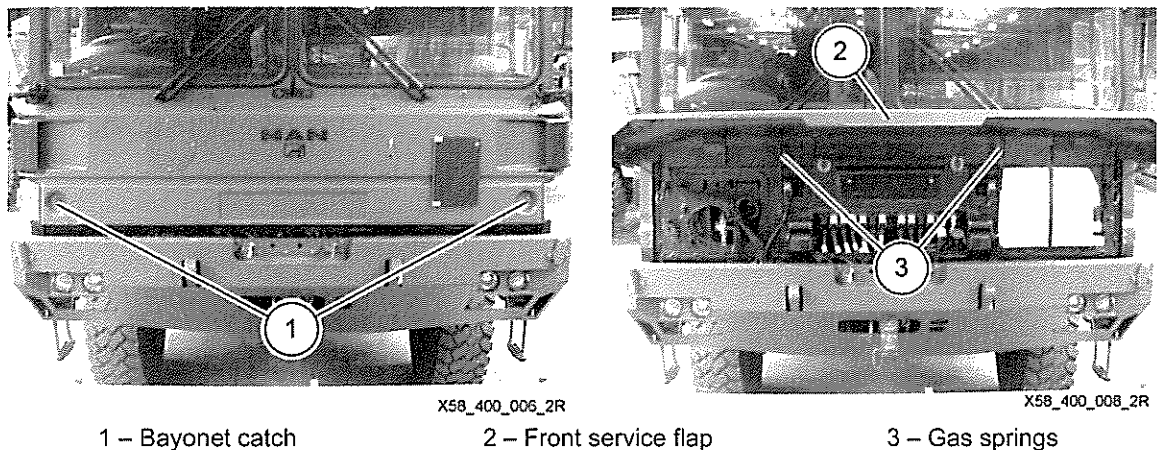


Fig 1 Opening the front service flap

### Closing the front service flap

- 5 Refer to Fig 1. To close the front service flap, proceed as follows:
  - 5.1 Pull the front service flap (2) downwards.
  - 5.2 Make sure that the bayonet catch (1) is horizontal and is heard to engage. Turn the bayonet catch (1) clockwise to the vertical position, then push the catch flat.

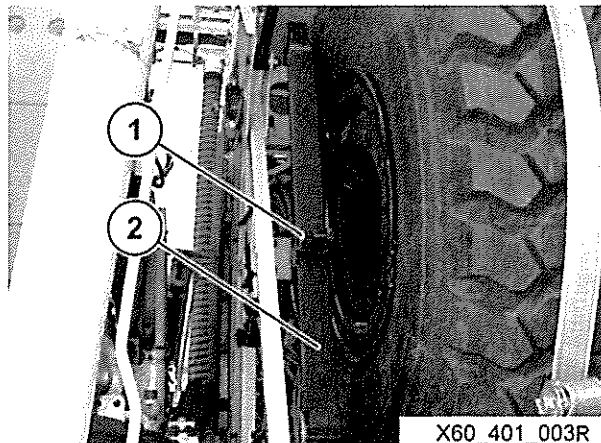
**CAB TILT MECHANISM****Preparation for tilting**

- 6 Refer to Fig 2. Before tilting the cab, proceed as follows:
  - 6.1 Apply the parking brake, use wheel chocks if necessary.
  - 6.2 Set the drive range switch to N.

**CAUTION**

**VEHICLE DAMAGE.** Before opening the front service flap, make sure that the windscreen wipers are in the parked position.

- 6.3 Switch off the ignition.
- 6.4 Secure or remove any loose objects in the cab.
- 6.5 Switch off the auxiliary heater.
- 6.6 Close the doors.
- 6.7 Open the fastener (1) and remove the support rod (2).
- 6.8 Assemble the support rod (2).



1 – Fastener

2 – Support rod

Fig 2 Preparation for tilting

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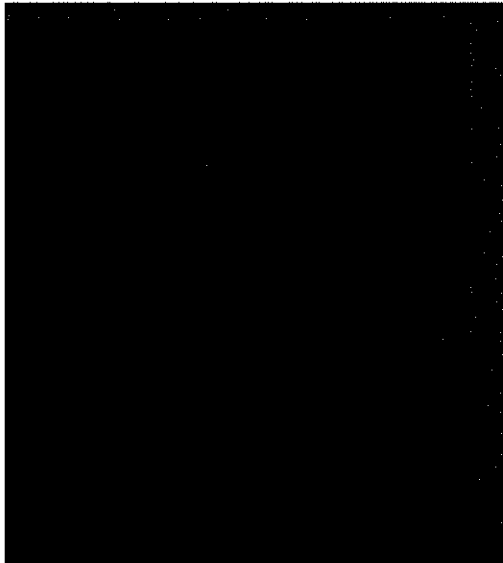
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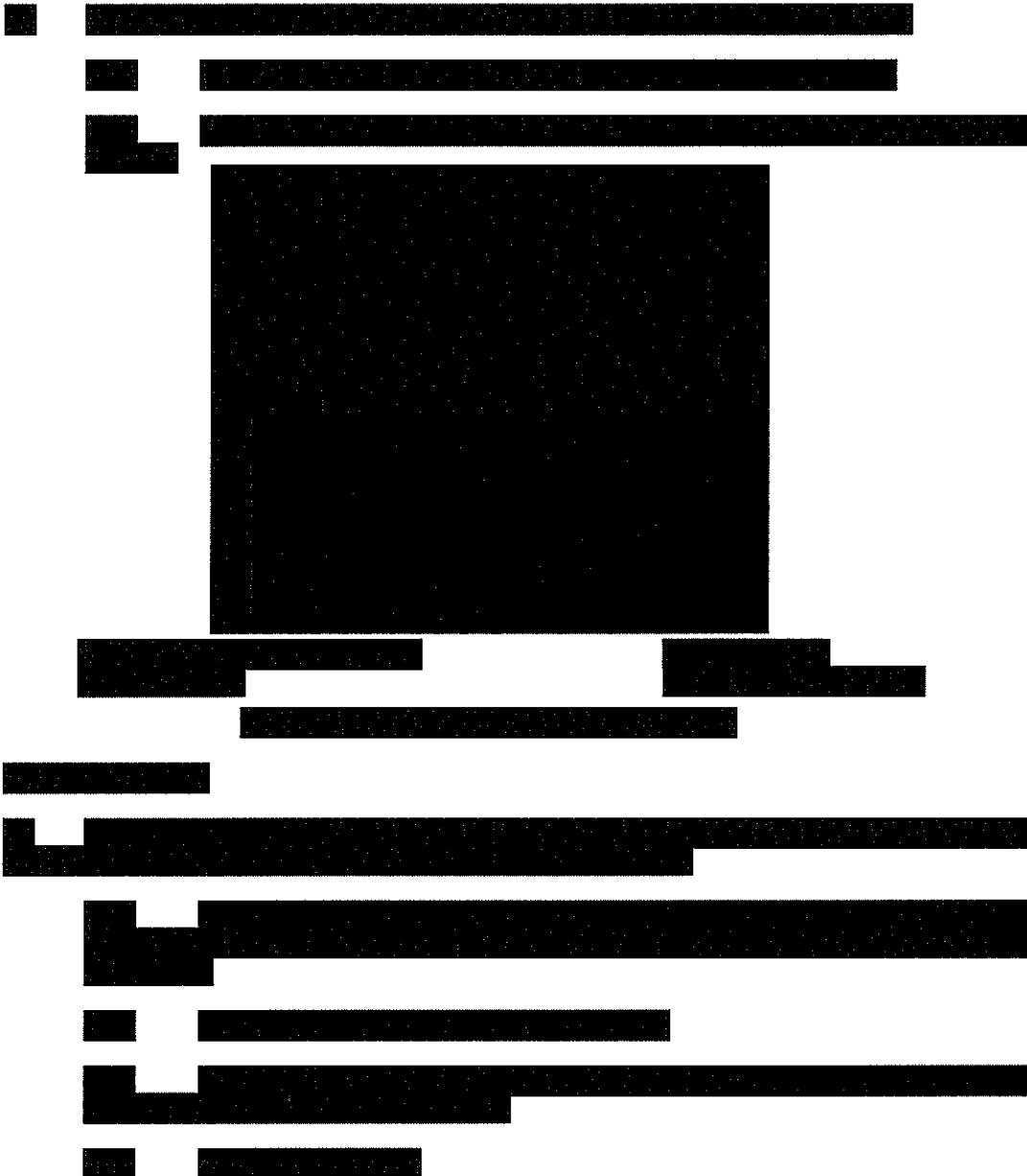
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[REDACTED]



**Tilting the cab**

8 Before tilting the cab, ensure that the following warnings are complied with.

**WARNINGS**

- (1) **DANGER TO PERSONNEL. DANGER OF CRUSHING BETWEEN CAB AND BUMPER. KEEP THE TILTING AREA IN FRONT OF THE CAB CLEAR.**
- (2) **DANGER TO PERSONNEL. STAY OUT OF THE AREA BETWEEN THE CAB AND THE CHASSIS WHILST THE CAB IS BEING TILTED.**
- (3) **DANGER TO PERSONNEL. NEVER LEAN ON THE VEHICLE WHILST THE CAB IS BEING TILTED.**



(4) **DANGER TO PERSONNEL. ALWAYS TILT THE CAB FORWARDS TO ITS FINAL POSITION.**

9 Refer to Fig 5. To tilt the cab, proceed as follows:

9.1 Make sure that there is sufficient space in front of the vehicle to tilt the cab.

**CAUTION**

**VEHICLE DAMAGE.** Before opening the front service flap, make sure that the windscreen wipers are in the parked position.

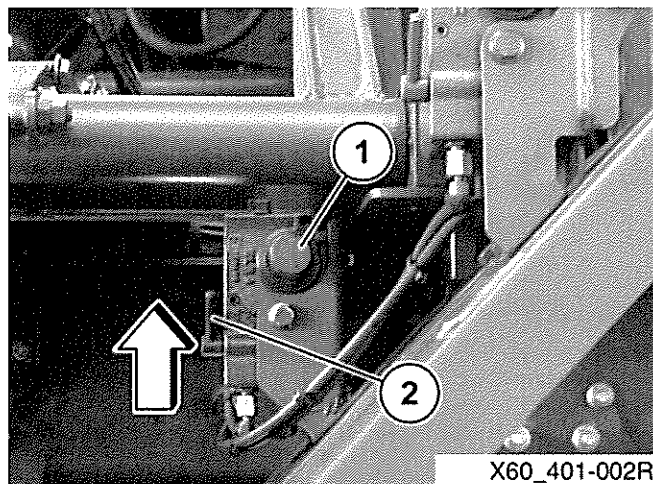
9.2 Open the front service flap, refer to Para 4.

9.3 Move the lever (2) of the change over valve upwards until the lever reaches the stop.

9.4 Put the wheel nut socket and bar onto the hexagon profile (1) and operate the pump.

9.5 The cab is unlocked and starts tilting forward.

9.6 Continue pumping until the cab is fully tilted.



1 – Hexagon profile

2 – Lever

Fig 5 Titriling the cab

Amdt 1 Feb 15

**Supporting the cab****WARNING**

**DANGER TO PERSONNEL. THE CAB MUST BE SUPPORTED BY THE SUPPORT ROD WHEN TILTED. THE CAB COULD FALL BACK IF UNSUPPORTED.**

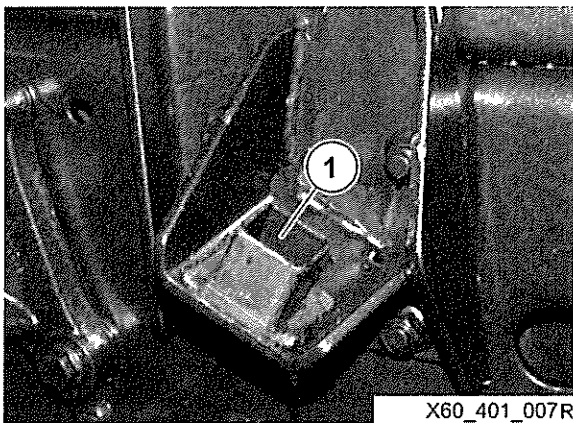
10 To support the cab, proceed as follows:

10.1 Refer to Fig 6. Insert the lower end of the support rod into the bracket (1) on the chassis.

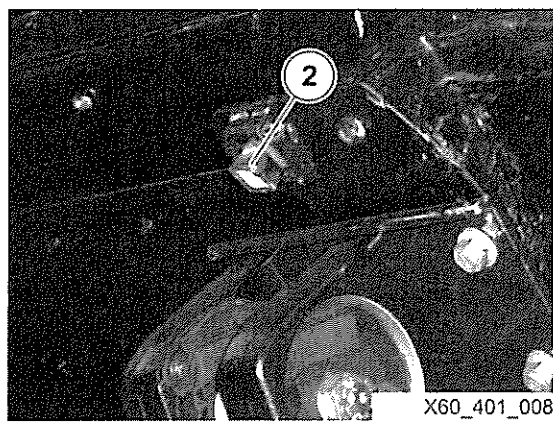
10.2 Insert the top end of the support rod into the bracket (2) on the cab.

10.3 Refer to Fig 5. Move the lever (2) of the change over valve downwards until the lever reaches the stop.

10.4 Put the wheel nut socket and bar onto the hexagon profile (1) and operate the pump until the cab is fully tilted.



1 – Chassis support bracket



2 – Cab support bracket

Fig 6 Supporting the cab

10.5 Refer to Fig 7. Lower the cab until the bracket on the cab engages with the top end of the support rod (3).

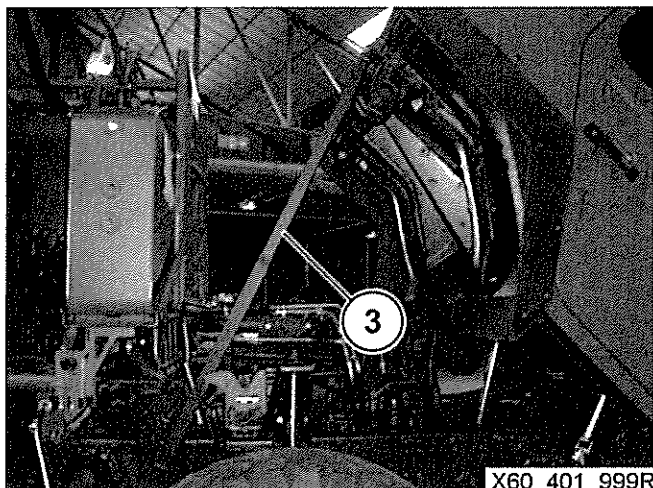


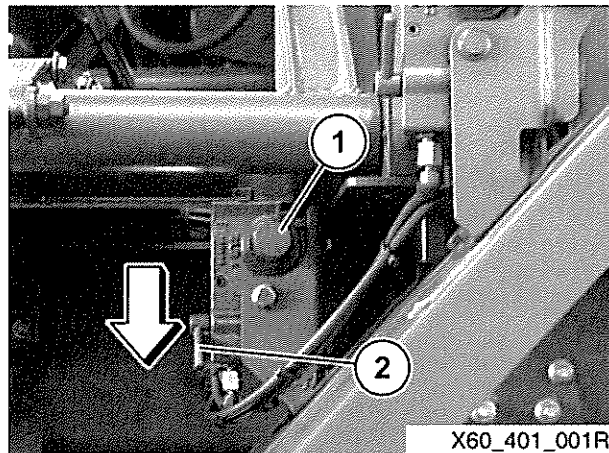
Fig 7 Engaging the support rod

### Lowering the cab

11 To lower the cab, proceed as follows:

11.1 Refer to Fig 8. Move the lever (2) of the change over valve upwards until the lever reaches the stop.

11.2 Put the wheel nut socket and bar onto the hexagon profile (1) and operate the pump until the cab is fully tilted.



1 – Hexagon profile

2 – Lever

Fig 8 Lowering the cab

11.3 Refer to Fig 7. Remove the support rod (3).

11.4 Make sure that the cab locks are clear before lowering the cab.

### WARNINGS

(1) **DANGER TO PERSONNEL. STAY OUT OF THE AREA BETWEEN THE CAB AND THE CHASSIS WHILST THE CAB IS BEING LOWERED.**

(2) **DANGER TO PERSONNEL. NEVER LEAN ON THE VEHICLE WHILST THE CAB IS BEING LOWERED.**

(3) **DANGER TO PERSONNEL. THE CAB DROPS QUICKLY INTO THE CAB LOCK OVER THE LAST 10CM TO 15CM.**

### CAUTION

**VEHICLE DAMAGE.** Make sure that all tools and equipment are removed from beneath the cab.

11.5 Refer to Fig 8. Move the lever (2) of the change over valve downwards until the lever reaches the stop.

11.6 Operate the pump. The cab starts lowering.

11.7 Continue pumping until the cab locks are properly engaged.

11.8 Remove the wheel nut socket and bar from the hexagon profile (1).

11.9 Close the front service flap, refer to Para 5.

11.10 Disassemble and stow the support rod.

### Checking the cab lock

#### WARNINGS

- (1) **RISK OF ACCIDENTS. ALWAYS CHECK THE LOCKS AFTER THE CAB HAS BEEN LOWERED.**
- (2) **RISK OF ACCIDENTS. DO NOT DRIVE THE VEHICLE IF THE CAB LOCKS ARE DEFECTIVE.**
- (3) **RISK OF ACCIDENTS. DO NOT DRIVE THE VEHICLE IF THE WARNING LIGHTS DO NOT GO OFF.**

12 The cab can tilt forward during sharp braking if the cab is not completely locked. Always check:

- 12.1 The cab locks after lowering the cab.
- 12.2 The change over lever is in the down position.

13 Refer to Fig 9. To check the cab is locked, turn the ignition key to position II. The following displays must go off:

- 13.1 Symbol (1).
- 13.2 Error message at position (2).
- 13.3 The STOP symbol (3).
- 13.4 The central warning light (4).
- 13.5 The cab lock check lamp (5).

14 If the items in the drivers display do not go off and a warning tone sounds, check the cab is fully lowered and the cab locks are engaged. In the event of defective cab locks, contact your Unit for assistance.

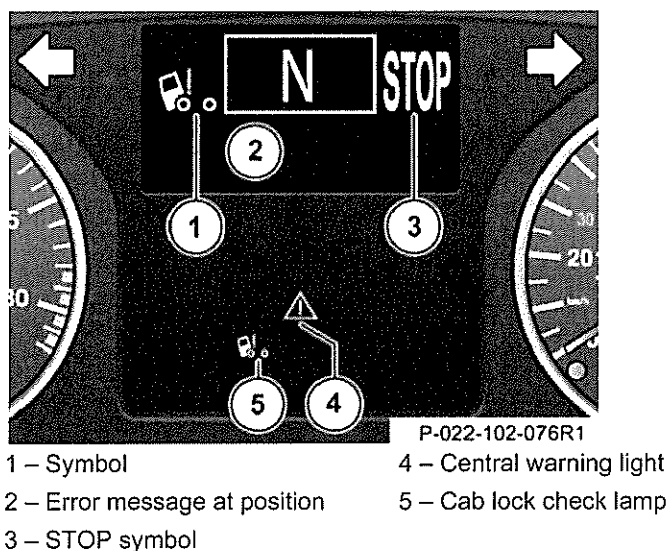


Fig 9 Driver's display

### CHECKING WINDSCREEN WASHERS AND WIPERS

- 15 Regularly check the wiper blades for dirt build-up and damage. Fit new ones if necessary.
- 16 Before setting off in cold weather, check that the wiper blades are not frozen to the windscreen.
- 17 Refer Fig 10. Before starting the engine, check the windscreen washer system as follows:

#### CAUTION

**VEHICLE DAMAGE.** Before opening the front service flap make sure that the windscreen wipers are switched off and the arms are in the parked position.

- 17.1 Open the front service flap, refer to Para 4.
- 17.2 Check the fluid level in the tank (1). Top up with fluid if necessary.

#### NOTE

Add antifreeze to the screen wash liquid before the onset of cold weather; refer to Chapter 1-2.

- 17.3 Close the front service flap, refer to Para 5.
- 18 Operate the windscreen washers and wipers; refer to Chapter 1-2.

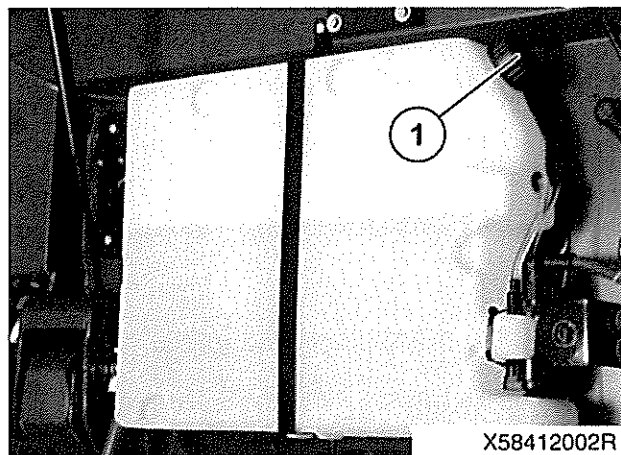


Fig 10 Checking windscreen washers and wipers

**ELECTRICAL SYSTEM****General****WARNINGS**

**(1) PERSONAL INJURY. BATTERIES MUST ALWAYS BE DISCONNECTED, OR THE BATTERY MASTER SWITCH TURNED OFF, BEFORE WORKING ON THE ELECTRICAL SYSTEM.**

**(2) RISK OF EXPLOSION. EXPLOSIVE GAS MAY FORM IN ENCLOSED BATTERY BOXES. ALWAYS VENT CLOSED BATTERY BOXES THOROUGHLY BEFORE DISCONNECTING THE BATTERIES. IF NECESSARY, BLOW COMPRESSED AIR THROUGH THE BOX.**

- 19 Do not start the engine unless the batteries are securely connected.
- 20 Do not disconnect the batteries whilst the engine is running.
- 21 Do not use a boost-charger to jump start the vehicle.
- 22 Always disconnect the positive and negative leads before boost-charging the batteries.
- 23 When disconnecting the batteries, always disconnect the negative terminals before the positive terminals. When connecting the batteries, always connect the positive terminals before the negative terminals.
- 24 The batteries must be charged every 4 weeks if the vehicle is not in use.
- 25 Measure voltage only using suitable measuring equipment. The input resistance of the measuring device must be at least 10Mohm.
- 26 Replace sockets or plugs that show signs of corrosion or have visible damage.

**Cleaning the vehicle**

- 27 Switch off the ignition and the lights before cleaning the vehicle.
- 28 Protect the sockets, starter and alternator from moisture (splash water) when washing the vehicle.
- 29 Use compressed air, at between approximately 6 to 8 bar, for cleaning sockets on the vehicle or trailer. Never use water or mechanical objects.

**Central electrical system****WARNINGS**

**(1) FIRE HAZARD. DO NOT SHORT OUT CIRCUIT BREAKERS/FUSES. DO NOT INSTALL CIRCUIT BREAKERS/FUSES OF A HIGHER RATING.**

**(2) FIRE HAZARD. ONLY FIT CIRCUIT BREAKERS/FUSES IN THE SPECIFIED POSITION. ONLY FIT CIRCUIT BREAKERS/FUSES WHEN THE IGNITION AND ANY CORRESPONDING LOADS ARE OFF.**

- 30 The central electrical system is located behind a cover on the co-driver's side of the dashboard.

31 Refer to Fig 11. To remove the fuse box cover, turn the closures (1) anticlockwise a quarter of a turn.

32 The central electrical system contains the following components:

32.1 Automatic circuit breakers.

32.2 Fuses.

32.3 Control units.

32.4 Relays.

32.5 Diodes.

NOTE

For the position of circuit breakers/fuses, refer to the label on the inside of the storage compartment cover.

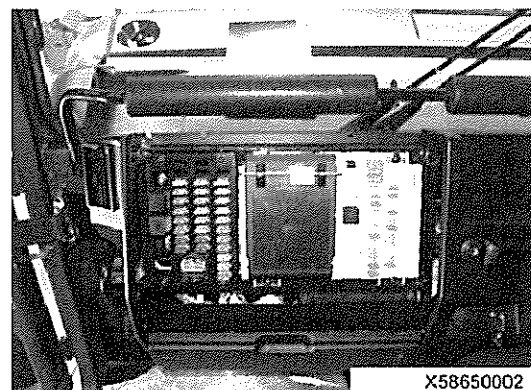
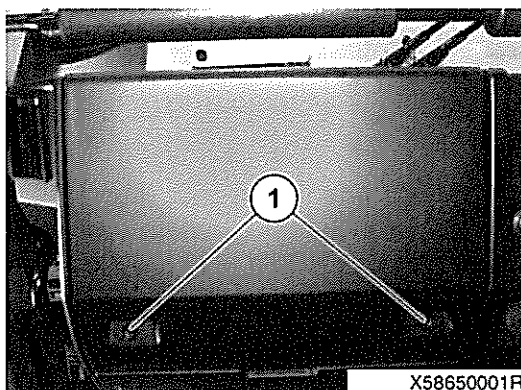


Fig 11 Remove the fuse box cover

33 Identify the cause of the short-circuit before resetting a circuit breaker or replacing a blown fuse. Switch off the ignition and the load.

34 Refer to Fig 12. To reset an automatic circuit breaker, press the reset button (2) on the top of the circuit breaker.

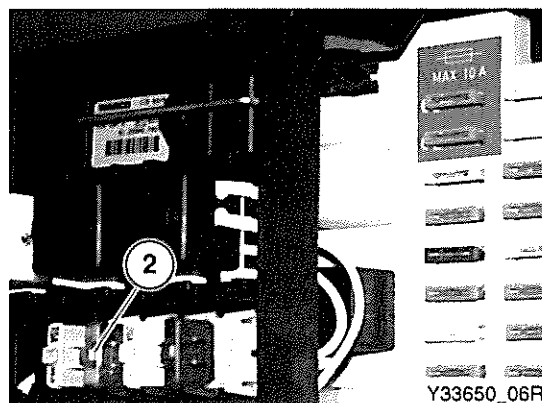


Fig 12 Circuit breaker reset button

35 Refer to Fig 11. Install the fuse box cover and turn the closures (1) clockwise a quarter of a turn.

**HANDLING BATTERIES****WARNINGS**

(1) **RISK OF EXPLOSION. EXPLOSIVE GAS MAY FORM IN ENCLOSED BATTERY BOXES.**

(2) **RISK OF INJURY. AVOID CONTACT WITH BATTERY ELECTROLYTE. THERE IS A DANGER OF SKIN OR EYE INJURY.**

36 When handling batteries, observe the safety points that follow:

36.1 Vent closed battery boxes thoroughly before disconnecting the batteries. Blow compressed air through the battery box if necessary.

36.2 Do not generate sparks when connecting or disconnecting electrical consumers, or test equipment to the battery terminals.

36.3 Wear suitable protective clothing and glasses, including acid-proof gloves.

36.4 Do not tilt a battery. The electrolyte can leak from the breather in the battery.

37 If contaminated by battery electrolyte, proceed as follows:

37.1 If the eyes are contaminated, rinse the eyes with water and seek medical assistance immediately.

37.2 If swallowed, rinse the mouth with water and seek medical assistance immediately.

37.3 If the skin is contaminated, wash the area thoroughly with soap and water.

37.4 Change splashed clothing.

**Battery checks**

38 Clean and grease the battery terminals.

39 Check the battery cables for condition and security.

**Removing and installing the batteries**

40 To remove the batteries, proceed as follows:

40.1 Refer to Fig 13. Press the top of the electrical battery master switch to isolate all the electrical consumers.

40.2 Remove the battery access cover.

40.3 Disconnect the batteries as follows:

40.3.1 Disconnect the vehicle negative terminal (earth) from the appropriate battery.

40.3.2 Disconnect the vehicle positive terminal from the appropriate battery.

40.3.3 Disconnect the interconnecting cables from the batteries.

40.4 Record the installation positions of the batteries.

40.5 Remove the battery clamps.



- 40.6 Remove the batteries.

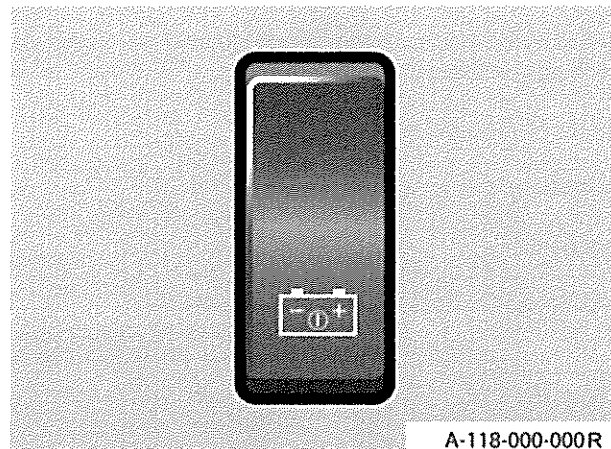


Fig 13 Electrical battery master switch

- 41 To install the batteries, proceed as follows:
- 41.1 Install the batteries as recorded during removal.
  - 41.2 Install the battery clamps.
  - 41.3 Connect the batteries as follows:
    - 41.3.1 Connect the interconnecting cables to the batteries.
    - 41.3.2 Connect the vehicle positive terminal to the appropriate battery.
    - 41.3.3 Connect the vehicle negative terminal (earth) to the appropriate battery.
  - 41.4 Install the battery access cover.
  - 41.5 Refer to Fig 13. Press the bottom of the electrical battery master switch to restore power to all the electrical consumers.

## LAMP REPLACEMENT

### General

### WARNING

**RISK OF BURNS. ALWAYS SWITCH OFF THE LIGHT BEFORE YOU REPLACE A LAMP.**

- 42 A new lamp must be the correct type, refer to Chapter 1-1.
- 43 Error messages may appear on the driver's display if the lamp load is incorrect.
- 44 Do not allow the lamp glass to come into contact with bare skin.
- 45 Only touch the lamp by the connection lug or the lamp cap. If this is not possible, use a clean cloth before touching the lamp glass.
- 46 Check that the lamp is working correctly after changing any of the external lamps. If a lamp is changed in the high or low-beam headlight, check the headlight setting and have the headlights adjusted. If necessary, contact your Unit for assistance.

**Replacing a low beam lamp**

47 Refer to Fig 14. The lamps for the low beam headlight and the high beam headlight are of the same design. Use the other lamp if a spare is not available.

48 To replace a low beam lamp, proceed as follows:

48.1 Switch off the ignition.

48.2 Switch off the lights.

48.3 Remove the cover cap (1) from the rear of the headlight.

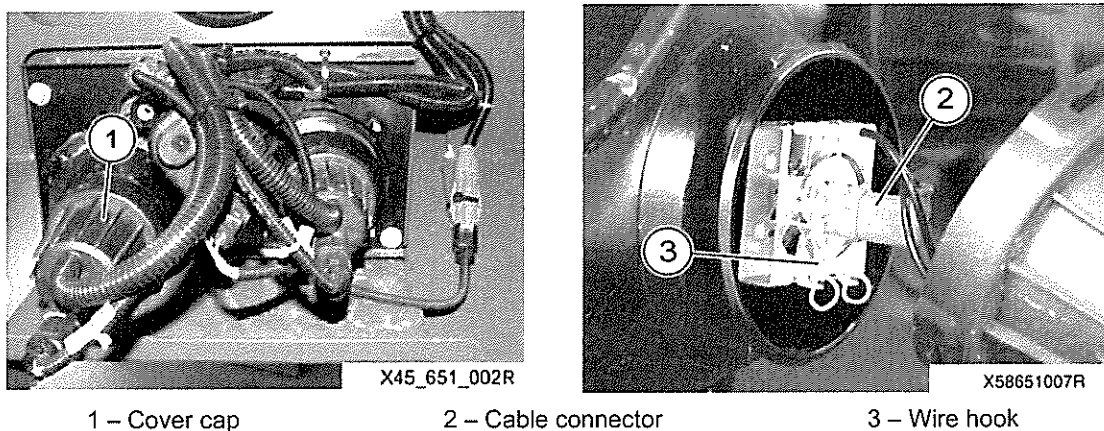


Fig 14 Replacing a low beam lamp

**WARNING**

**RISK OF BURNS. LAMPS AND LAMP CAPS MAY BE HOT, WHICH CAN CAUSE BURNS IF TOUCHED.**

48.4 Pull the cable connector (2) off the lamp cap.

48.5 Unclip the wire hook (3) of the lamp holder outwards.

**WARNING**

**PERSONAL INJURY. WEAR PROTECTIVE GLOVES AND PROTECTIVE GLASSES. HALOGEN LAMPS ARE PRESSURISED AND CAN EXPLODE WHEN CHANGING THEM.**

**CAUTION**

**LAMP DAMAGE. Hold the lamp by its plug tabs or by its base. Do not touch the glass.**

48.6 Pull the lamp out of the lamp socket.

48.7 Insert the new lamp into the recesses in the reflector with the projection on the holder uppermost.

48.8 Fold the wire hook down over the lamp cap, then locate the wire hook into the locking lugs.

48.9 Plug the cable connector onto the lamp cap.

48.10 Install the cover cap on the rear of the headlight.

48.11 Update the on board central computer, refer to Chapter 1-2.

48.12 Check the headlight setting, refer to Para 52.

### Replacing a parking light lamp

#### NOTE

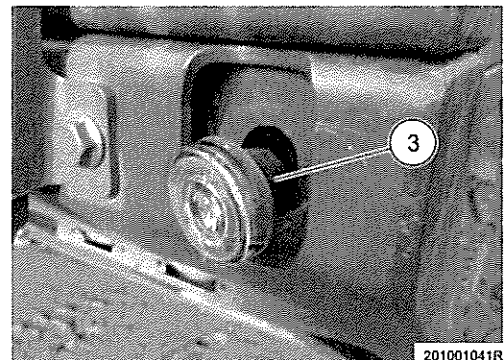
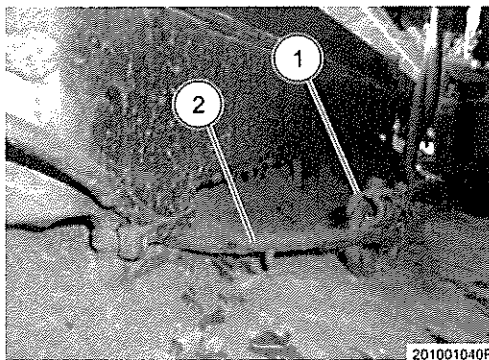
LED parking lights are located at the RH and LH areas of the front bumper panel.

49 Refer to Fig 15. To replace the LED parking lights, proceed as follows:

49.1 Switch off the ignition.

49.2 Switch off the lights.

49.3 Disconnect the harness block terminal (1) and wiring harness (2) at the rear of the bumper panel.



1 – Harness block terminal

2 – Wiring harness

3 – Lamp unit

Fig 15 Replacing a light lamp

49.4 The LEDs are installed as an interference fit into the front bumper. To remove the LEDs, prise out the complete lamp unit (3) from the bumper aperture.

49.5 Install the new complete lamp unit (3) into the bumper aperture.

49.6 Connect the harness block terminal (1) and wiring harness (2) at the rear of the bumper panel.

49.7 Update the on board central computer, refer to Chapter 1-2.

### Replacing a high beam lamp

50 Refer to Fig 16. The lamps for the high beam headlight and the low beam headlight are of the same design. Use the other lamp if a spare is not available.

51 To replace a high beam lamp, proceed as follows:

51.1 Switch off the ignition.

51.2 Switch off the lights.

51.3 Remove the cover cap (1) from the rear of the headlight.

**WARNING**

**RISK OF BURNS. LAMPS AND LAMP CAPS MAY BE HOT, WHICH CAN CAUSE BURNS IF TOUCHED.**

51.4 Pull the cable connector (2) off the lamp cap.

51.5 Unclip the wire hook (3) of the lamp holder outwards.

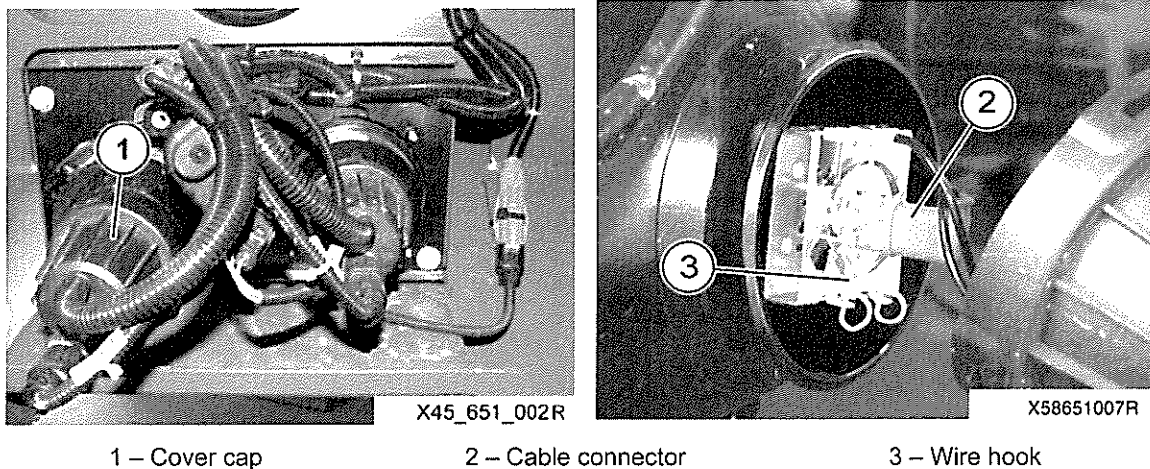


Fig 16 Replacing a high beam lamp

**WARNING**

**PERSONAL INJURY. WEAR PROTECTIVE GLOVES AND PROTECTIVE GLASSES. HALOGEN LAMPS ARE PRESSURISED AND CAN EXPLODE WHEN CHANGING THEM.**

**CAUTION**

**LAMP DAMAGE. Hold the lamp by its plug tabs or by its base. Do not touch the glass.**

51.6 Pull the lamp out of the lamp socket.

51.7 Insert the new lamp into the recesses in the reflector with the projection on the holder uppermost.

51.8 Fold the wire hook down over the lamp cap, then locate the wire hook into the locking lugs.

51.9 Plug the cable connector onto the lamp cap.

51.10 Install the cover cap on the rear of the headlight.

51.11 Update the on board central computer, refer to Chapter 1-2.

51.12 Check the headlight setting, refer to Para 52.

### Checking the low-beam headlight setting

#### WARNING

**RISK OF ACCIDENTS. HEADLIGHTS THAT ARE INCORRECTLY SET CAN DAZZLE ONCOMING TRAFFIC.**

- 52 Refer to Fig 17. The headlight beam range can be adjusted by the driver using the dial (1).
- 53 On vehicles that are evenly laden or unladen, set the headlight beam regulator (1) to position 0.
- 54 On vehicles that are fully laden set the headlight beam regulator to position III.
- 55 On vehicles that are not fully laden or unevenly laden, select the headlight beam regulator between position 0 and III.
- 56 The headlight beam regulator position must be altered if there are changes to the vehicle load.

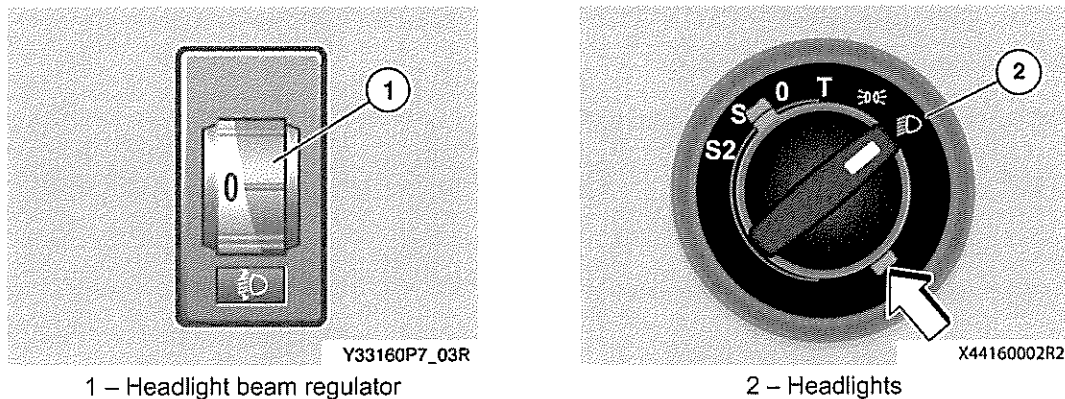


Fig 17 Checking the low-beam headlight setting

### Replacing a front turn indicator lamp

- 57 Refer to Fig 18. To replace a front turn indicator lamp, proceed as follows:
  - 57.1 Switch off the ignition.
  - 57.2 Switch off the lights.
  - 57.3 Remove the mounting bolts (1) and remove the front turn indicator lens and seal.

#### WARNINGS

(1) **RISK OF BURNS. LAMPS AND LAMP CAPS MAY BE HOT, WHICH CAN CAUSE BURNS IF TOUCHED.**

(2) **PERSONAL INJURY. LAMP BREAKING. USE A CLEAN CLOTH WHEN HANDLING THE LAMP.**

- 57.4 Push and turn the lamp (2) anti-clockwise, and remove the lamp from the socket.
- 57.5 Insert the new lamp (2) into the socket, then push and turn the lamp clockwise.
- 57.6 Fit the front turn indicator glass and seal onto the cab, then install and tighten the mounting bolts (1).

57.7 Check the operation of the indicators.

57.8 Update the on board central computer, refer to Chapter 1-2.

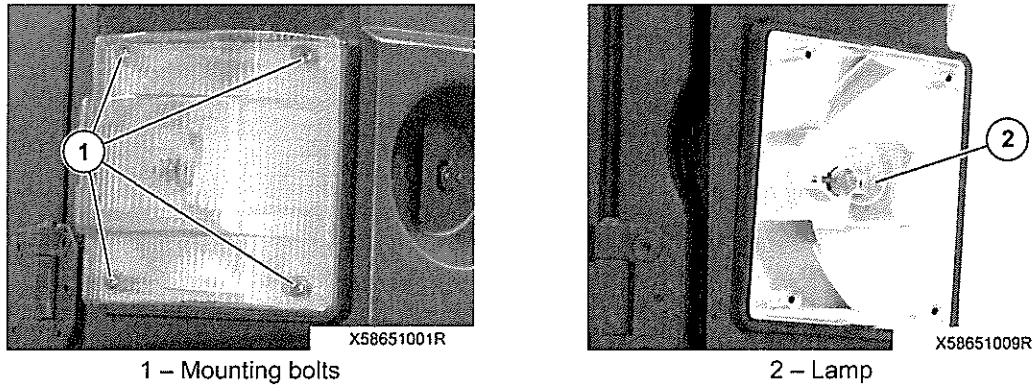


Fig 18 Replacing a front turn indicator lamp

#### Replacing a clearance LED on the cab

58 To replace the clearance LED, proceed as follows:

58.1 Switch off the ignition.

58.2 Switch off the lights.

58.3 Open the front service flap, refer to Para 4.

58.4 Tilt the cab, refer to Paras 6 to 9.

58.5 Refer to Fig 19. Loosen the mounting screws (1) and remove the cover frame for the clearance LED.

58.6 Pull the LED out of the LED socket and disconnect harness.

58.7 Connect harness and insert the new LED into the LED socket.

58.8 Fit the cover frame for the clearance LED and tighten the securing screws (1).

58.9 Lower the cab, refer to Paras 7.4 and 11.

58.10 Close the front service flap, refer to Para 5.

58.11 Update the on-board central computer, refer to Chapter 1-2.

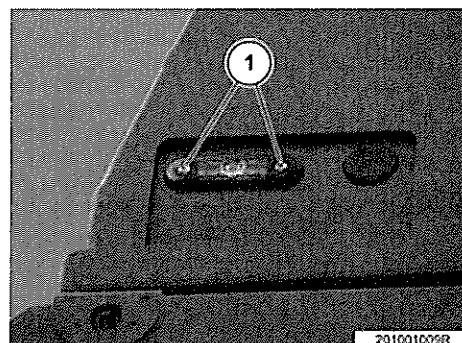


Fig 19 Replacing a clearance LED on the cab

### Replacing a side marker lamp

59 Refer to Fig 20. To replace a Side Marker Lamp (SML), proceed as follows:

- 59.1 Mark the routing of the SML cable and the position of the plastic cable ties.
- 59.2 Remove the attachment discs (1) of the SML.
- 59.3 Press the plug projection (3) forwards and pull off the plug (2).
- 59.4 Remove all plastic ties from the SML and the cable.

#### CAUTION

**COMPONENT DAMAGE.** Using a non-authorized SML can damage the central on board computer.

- 59.5 Fit the new SML, using new attachment discs (1).
- 59.6 Route the SML cable according to the marking, then attach the SML cable using plastic cable ties.
- 59.7 Connect the plug (2) of the SML cable.
- 59.8 Check the operation of the SML.
- 59.9 Update the on board central computer, refer to Chapter 1-2.

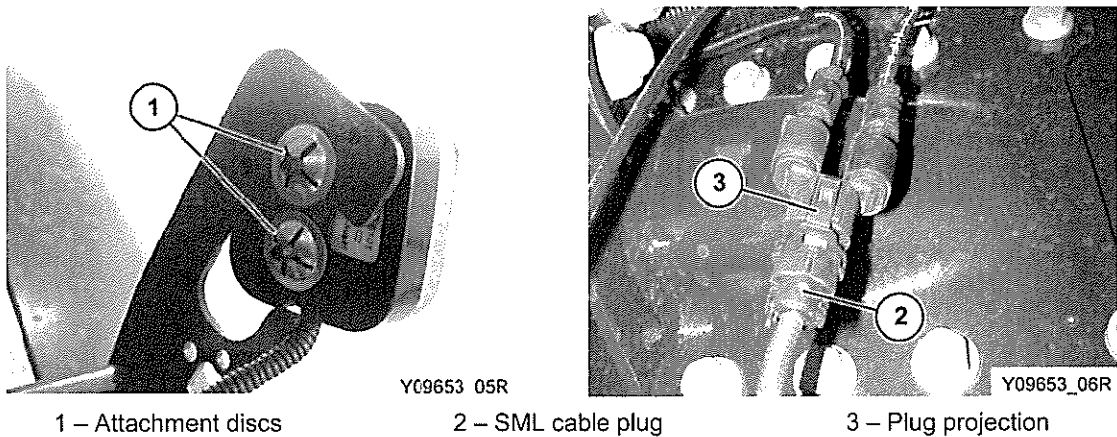


Fig 20 Replacing a Side Marker Lamp (SML)

**Rear lamp unit**

60 Refer to Fig 21. The lamps in the rear lamp unit are listed in the legend below. The illustration shows the left lamp unit viewed from the rear of the vehicle.

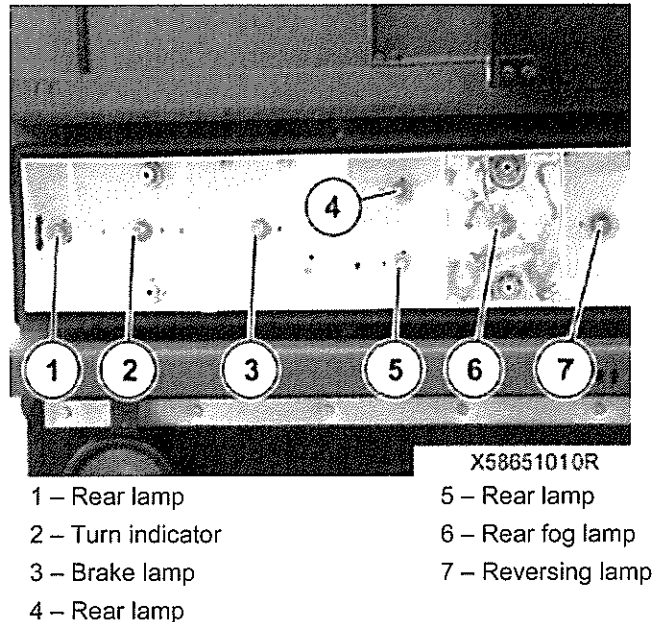


Fig 21 Rear lamp unit

61 Refer to Fig 22. To replace a lamp in the rear lamp unit, proceed as follows:

- 61.1 Switch off the ignition.
- 61.2 Switch off the lights.
- 61.3 Remove the mounting bolts (1) and remove the lens for the rear lamp unit.

**WARNINGS**

(1) **RISK OF BURNS. LAMPS AND LAMP CAPS MAY BE HOT, WHICH CAN CAUSE BURNS IF TOUCHED.**

(2) **PERSONAL INJURY. LAMP BREAKING. USE A CLEAN CLOTH WHEN HANDLING THE LAMP.**

- 61.4 Push and turn the lamp anti-clockwise to remove the lamp from the lamp socket in the rear lamp unit.
- 61.5 Insert the new lamp into the lamp socket, then turn the lamp clockwise.
- 61.6 Check the function of the lamp.
- 61.7 Fit the lens on the rear lamp unit, then install and tighten the mounting bolts (1).
- 61.8 Update the on board central computer, refer to Chapter 1-2.



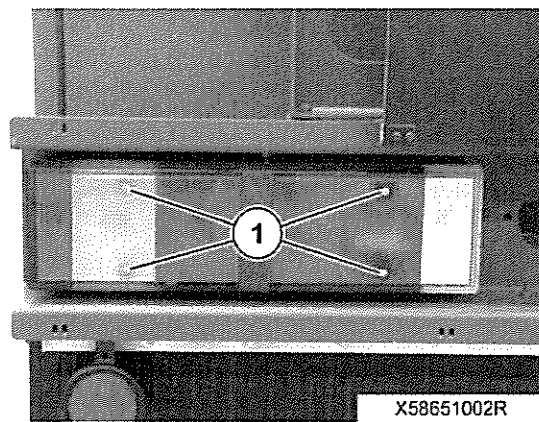


Fig 22 Rear unit lamp replacement

### Replacing a licence plate lamp

62 Refer to Fig 23. The licence plate lamp (1) is an LED type.

62.1 If the licence plate lamp (1) is faulty, check the connections or contact your Unit for assistance.

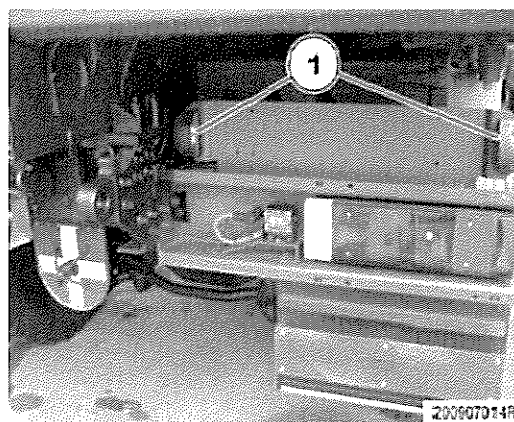


Fig 23 Replacing a licence plate lamp

**Replacing a convoy lamp**

63 To replace a convoy lamp, proceed as follows:

63.1 Refer to Fig 24. Remove the mounting bolts (1) and remove the metal cross (2).

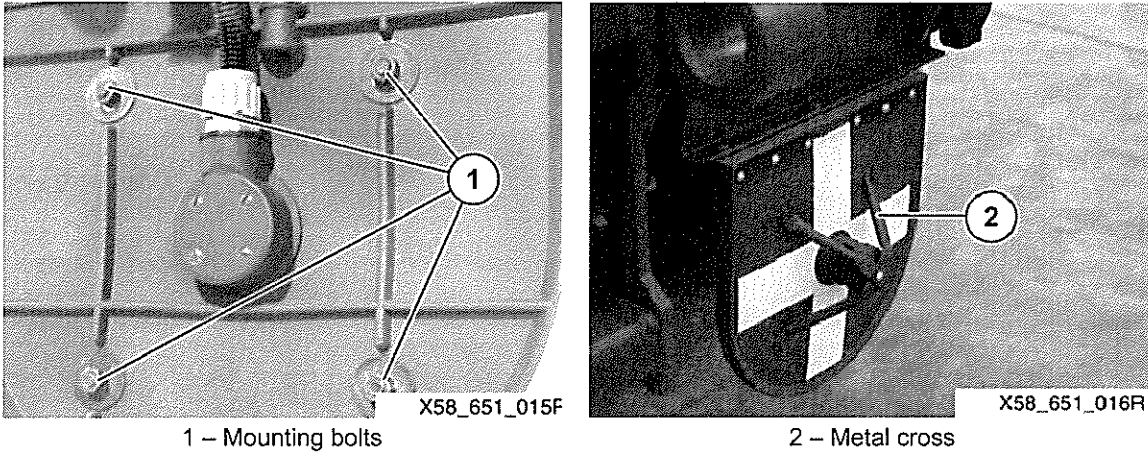


Fig 24 Replacing the convoy light

63.2 Refer to Fig 25. Remove the mounting bolts (1) and remove the lamp housing.

63.3 Push and turn the lamp anti-clockwise to remove the lamp from the lamp unit.

63.4 Insert the new lamp into the lamp unit, then turn the lamp clockwise.

63.5 Check the function of the lamp.

63.6 Fit the lamp housing and tighten the mounting bolts (1).

63.7 Fit the metal cross and tighten the mounting bolts.

63.8 Update the on board central computer, refer to Chapter 1-2.

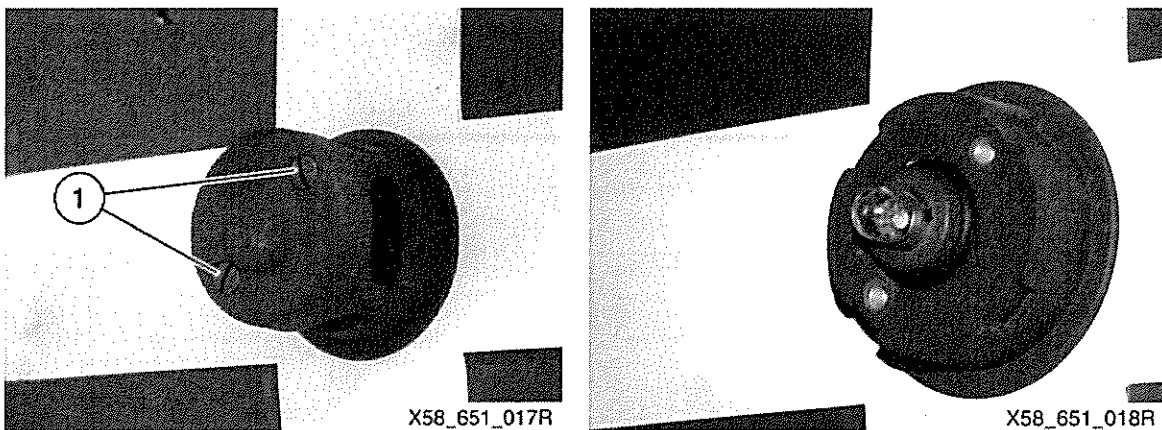


Fig 25 Fitting the convoy light

### Replacing lamps inside the cab

64 Refer to Fig 26. To replace the interior lamp/reading lamp, proceed as follows:

64.1 Using a screwdriver press the side (left or right) of the lamp housing of the interior lamps down slightly, then remove the cover.

#### WARNINGS

(1) **RISK OF BURNS. LAMPS AND LAMP CAPS MAY BE HOT, WHICH CAN CAUSE BURNS IF TOUCHED.**

(2) **PERSONAL INJURY. LAMP BREAKING. USE A CLEAN CLOTH WHEN HANDLING THE LAMP.**

64.2 Push and turn the interior lamp (1), or reading lamp (2), anti-clockwise to remove the lamp from the lamp socket.

64.3 Insert the new lamp into the lamp socket, then turn the lamp clockwise.

64.4 Fit the cover of the interior lamp/reading lamp.

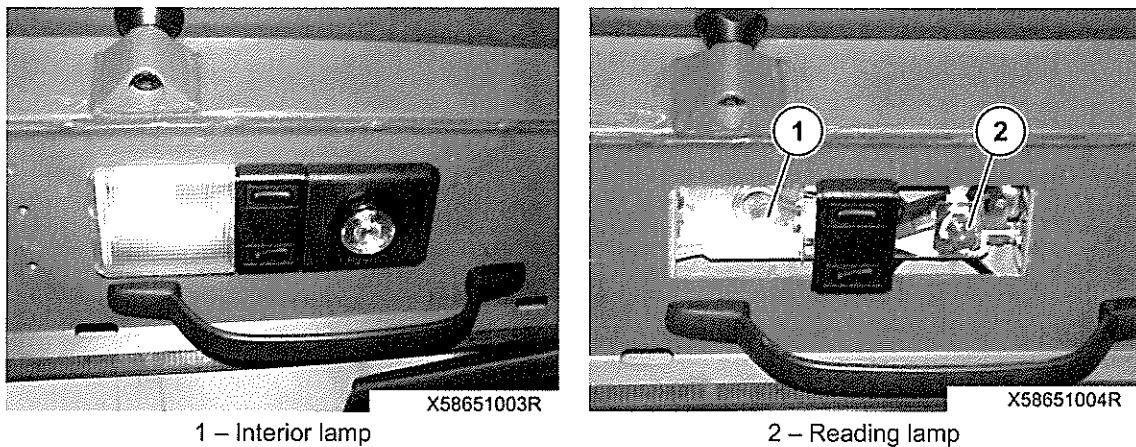


Fig 26 Replacing lamps inside the cab

### COOLING AND HEATING SYSTEM

#### WARNING

**DANGER OF SCALDING. WEAR SUITABLE HAND PROTECTION. DO NOT OPEN FILLER PIPE SCREW CAP UNLESS THE ENGINE HAS COOLED DOWN. OPEN THE SCREW CAP SLOWLY TO ALLOW THE EXCESS PRESSURE TO ESCAPE. DO NOT OPEN FULLY UNTIL THE PRESSURE HAS COMPLETELY DISSIPATED.**

#### CAUTION

**ENVIRONMENTAL PROTECTION. Dispose of used antifreeze in accordance with local procedures.**

65 Check the radiator, intercooler and coolant lines for leaks, security and condition.

**Screen and radiator fins****CAUTION**

**VEHICLE DAMAGE. Do not use high-pressure cleaners.**

66 To clean the radiator, intercooler and air conditioning condenser, proceed as follows:

66.1 Stop the engine.

66.2 Clean the radiator screen.

66.3 Refer to Fig 27. Clean the dirty fins on the radiator (arrowed), intercooler and oil cooler. Remove the radiator screen if necessary, contact your Unit for assistance.

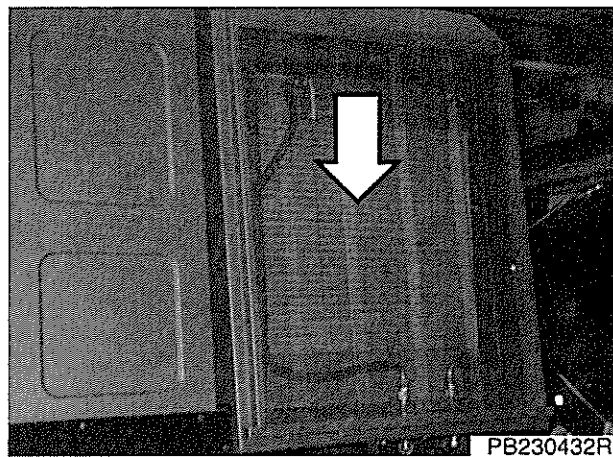


Fig 27 Clean the dirty radiator fins

66.4 Use a solution of water and cleaning additive, mixed 1:1.

66.5 Use a spray gun to spray the cleaning fluid straight at the fins and make the spray jet as concentrated as possible.

66.6 Wait for about 5 minutes.

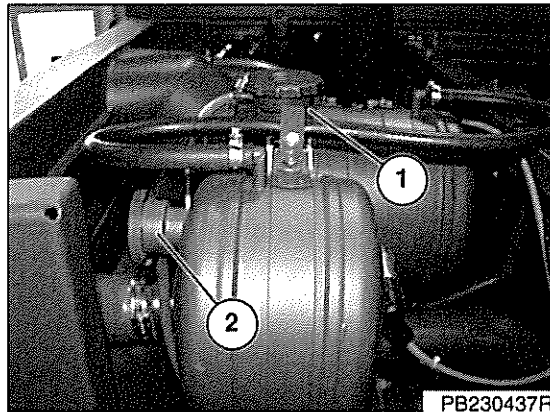
66.7 Flush out with a jet of clean water.

66.8 Repeat the procedure if the fins are very dirty.

### Draining the coolant system

67 To drain the coolant system, proceed as follows:

- 67.1 Stop the engine and allow the engine to cool.
- 67.2 Refer to Fig 28. Carefully open the relief valve (2) to allow the excess pressure to escape.
- 67.3 Remove the cap (1) from the filler neck.

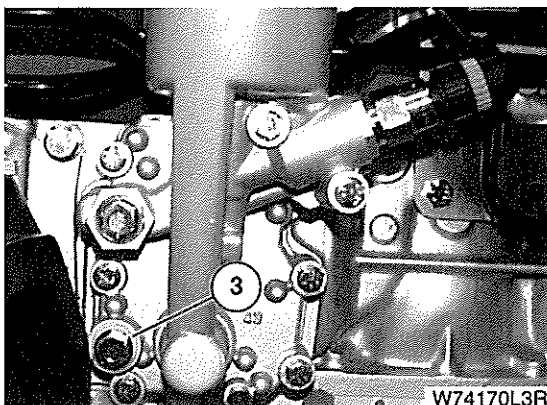


1 – Cap

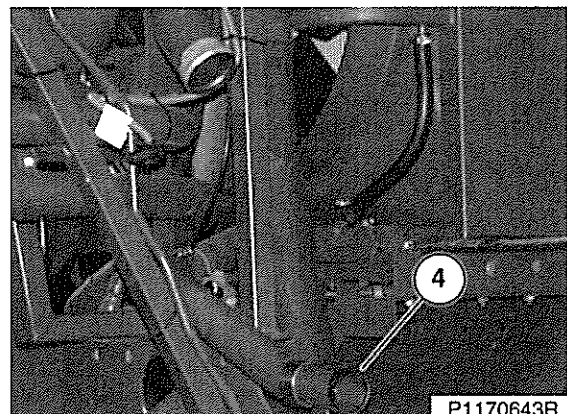
2 – Relief valve

Fig 28 Open the relief valve

- 67.4 Refer to Fig 29. Place a suitable container below the engine drain plug (3) and the hose connection (4).
- 67.5 Remove the engine drain plug (3) and release the hose connection (4) at the lowest point.
- 67.6 Set the vehicle heating to maximum temperature; refer to Chapter 1-3.
- 67.7 Drain the coolant.
- 67.8 Install then tighten the engine drain plug (3).
- 67.9 Reconnect the hose (4).



3 – Drain plug

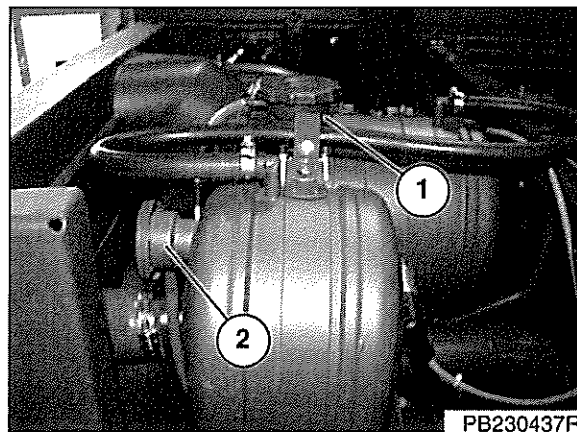


4 – Hose

Fig 29 Drain the coolant system

**Filling with coolant**

- 68 Make sure the coolant is of the correct concentration; refer to AESP 2320-W-100-601.
- 69 Refer to Fig 30. To fill the coolant system, proceed as follows:
- 69.1 Slowly pour in the coolant through the filler neck until the coolant overflows.
  - 69.2 Install the filler cap.
  - 69.3 Start the engine and let the engine run at idling speed for about 5 minutes.
  - 69.4 Check the cooling system for leaks.
  - 69.5 Stop the engine.
  - 69.6 Remove the filler cap (1).
  - 69.7 Check the coolant level at the filler neck, Para 71.



1 – Cap

2 – Relief valve

Fig 30 Remove the filler cap

**Checking the coolant**

- 70 The vehicle must be standing on a flat, level surface when the coolant level is measured.
- 71 To check the engine cooling system level, proceed as follows:
- 71.1 When the engine is cold, check that the coolant level reaches the bottom edge of the filler neck.
  - 71.2 Check the antifreeze concentration before correcting the coolant level and before the onset of cold weather.

**CAUTION**

**ENGINE DAMAGE.** If a large quantity of coolant is lost, causing the system to overheat, do not top up with cold coolant.

- 71.3 If necessary, top up the coolant through the filler neck.

**Pressure relief valve**

72 Refer to Fig 30. To replace the pressure relief valve (2), proceed as follows:

- 72.1 Stop the engine.
- 72.2 Carefully open the pressure relief valve to allow excess pressure to escape.
- 72.3 Remove and discard the pressure relief valve.
- 72.4 Install a new pressure relief valve.

**Coolant mixing ratio**

73 The coolant is a mixture of water and antifreeze with corrosion protection.

74 The concentration of the coolant must be checked before the onset of cold weather and increased if necessary.

75 To check the coolant ratio, proceed as follows:

- 75.1 Warm up the engine.
- 75.2 Stop the engine.
- 75.3 Remove the filler cap (1).
- 75.4 Use a hydrometer to take a sample of coolant and read off the coolant density indicated by the float.

76 The antifreeze must protect the coolant system down to at least  $-27^{\circ}\text{C}$ .

77 If the anti-freeze check reveals less effective protection than  $-27^{\circ}\text{C}$ , proceed as follows:

- 77.1 Drain off some coolant.
- 77.2 Top up the system with undiluted anti-freeze as indicated in AESP 2320 W-100-601.
- 77.3 Install the filler cap.
- 77.4 Run the engine until the engine reaches the operating temperature, i.e. the thermostat is fully opened.
- 77.5 Allow the engine to cool.
- 77.6 Use a hydrometer to recheck the coolant density and correct if necessary.

### CHECKING AND DRAINING THE AIR FILTER

78 Dust and water are expelled into the outside air through the separator valve (1), which is fitted to the dust collector of the air filter.

79 Refer to Fig 31. To check and drain the separator valve (1), proceed as follows:

79.1 Stop the engine.

79.2 Make sure that the separator valve is not stuck.

79.3 Squeeze the separator valve by hand, so that the dust and water can escape through the open lip.

79.4 Check the separator valve for free passage.

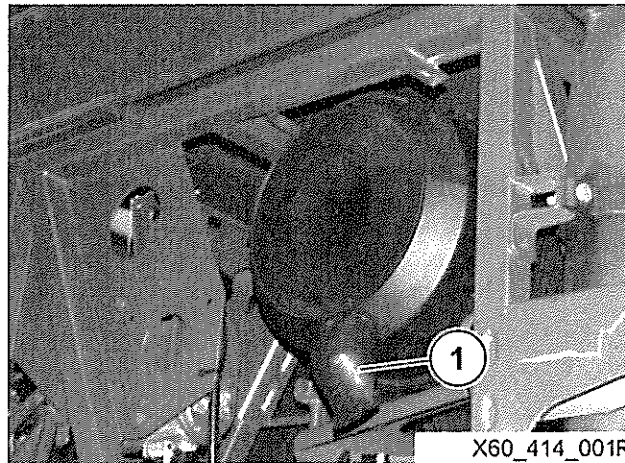


Fig 31 Check and drain the separator valve

### REPLACING THE AIR FILTER ELEMENT

#### CAUTION

**DANGER OF ENGINE DAMAGE.** Make sure that the work area is clean when replacing the air filter element.

80 To replace the air filter element, proceed as follows:

#### CAUTION

**DANGER OF ENGINE DAMAGE.** Do not fit a new air filter element unless the engine is stopped.

80.1 Stop the engine.

80.2 Refer to Fig 32. Release the four clips (2) on the filter housing, then remove the filter cover (1).

80.3 Pull the air filter element from the filter housing.

80.4 Check the separator valve (3) in the filter cover for free passage. Clean the separator valve if necessary.



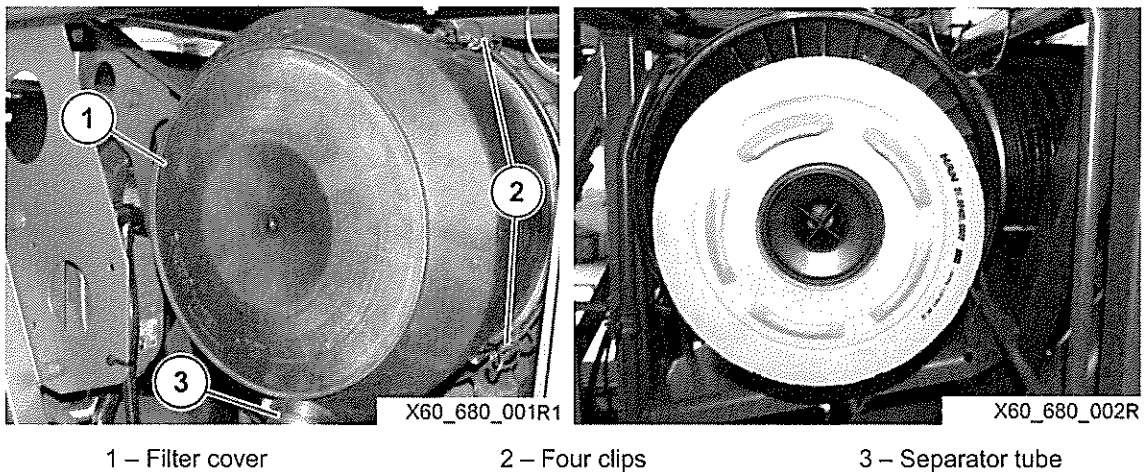


Fig 32 Replacing the air filter element

**CAUTION**

**DANGER OF ENGINE DAMAGE.** Do not blow out the filter housing with compressed air.

80.5 Clean the air filter housing and the filter cover.

**CAUTION**

**DANGER OF ENGINE DAMAGE.** Unfiltered air can enter the engine if the air filter element is not installed correctly.

80.6 Refer to Fig 33. Install the air filter element in the centre of the filter housing from the left side of the vehicle.

**NOTE**

The air filter element must be positioned against the contact surface (1) of the clean air pipe, to form a radial airtight seal.

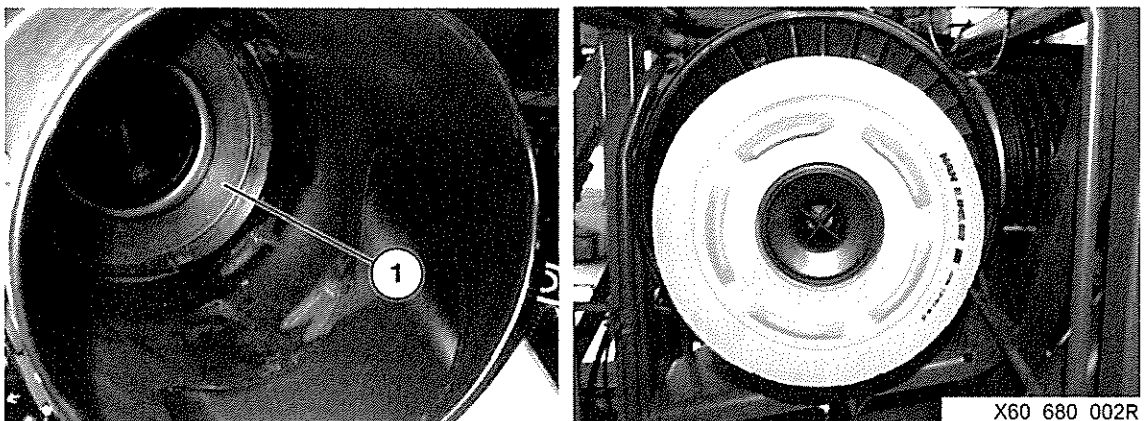


Fig 33 Install the air filter element

80.7 Make sure of the following:

80.7.1 The air filter element is not tilted.

80.7.2 The air filter element is pushed fully into the end of the filter housing.

80.7.3 The seal on the end of the element is seated over the clean air pipe.

#### CAUTIONS

(1) **AIR FILTER ELEMENT DAMAGE.** Do not force the filter cover closed.

(2) **DANGER OF ENGINE DAMAGE.** Unfiltered air can enter the engine if the filter cover is not installed correctly.

80.8 Refer to Fig 34. Install the filter cover (1) and fasten the four clips (2), working diagonally across.

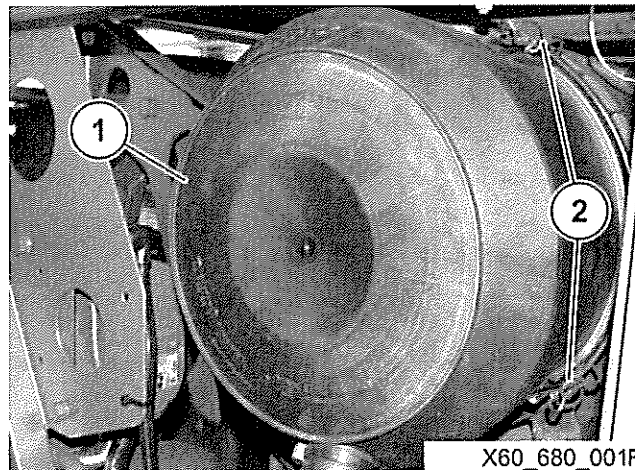
#### NOTE

If the filter cover cannot be closed, make sure the air filter element is correctly seated.

#### CAUTION

**DANGER OF ENGINE DAMAGE.** Do not over-tighten the clamps on the intake system connections.

80.9 Check that all connections on the intake system are sealed. Tighten the clamps if necessary.



1 – Filter cover

X60\_680\_001R

2 – Four clips

Fig 34 Install the filter cover

#### CHECKING THE CAB TILT OIL LEVEL

81 Refer to Fig 35. To check the oil level, proceed as follows:

81.1 Park the vehicle and switch off the ignition.

81.2 Remove the filler plug (1).

- 81.3 The oil must reach the top edge of the housing.
- 81.4 Top up if necessary.
- 81.5 Install the filler plug (1).

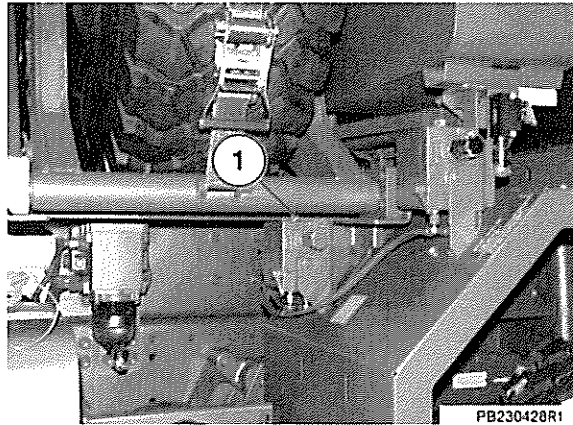


Fig 35 Checking the cab tilt oil level

#### CHECKING THE SPARE WHEEL TILT OIL LEVEL

- 82 Refer to Fig 36. To check the oil level, proceed as follows:
  - 82.1 Park the vehicle and switch off the ignition.
  - 82.2 Remove the filler plug (1).
  - 82.3 The oil must reach the top edge of the housing.
  - 82.4 Top up if necessary.
  - 82.5 Install the filler plug (1).

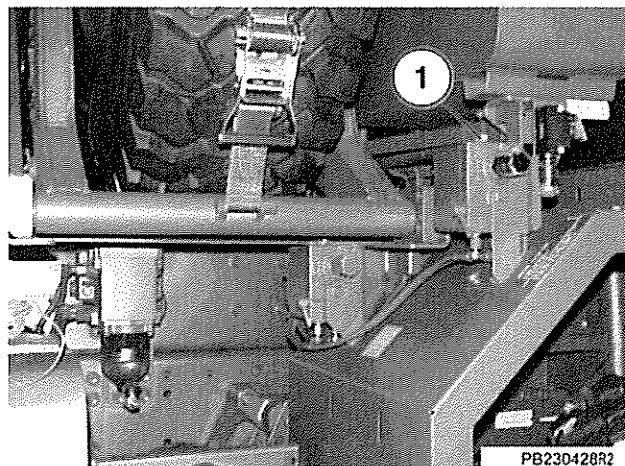


Fig 36 Checking the spare wheel tilt oil level

**CHECKING THE CENTRAL HYDRAULIC SYSTEM FLUID LEVEL****CAUTION**

**DAMAGE TO EQUIPMENT.** Do not operate the hydraulic equipment if the fluid level is not visible in the bottom sight glass.

83 Refer to Fig 37. The level of the hydraulic fluid depends on which additional equipment is fitted to the vehicle.

84 To check the central hydraulic system fluid level, proceed as follows:

84.1 Park the vehicle on a flat, level surface.

84.2 Switch off the engine.

84.3 Make sure that all hydraulic equipment is in the stowed position.

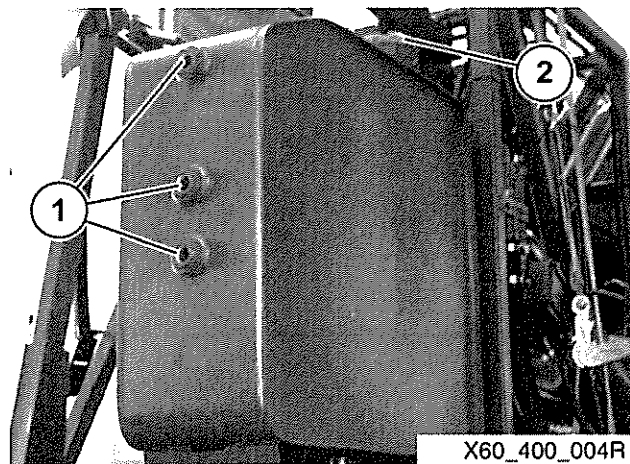
84.4 Check the fluid level.

85 The level in the sight glass (1) is as follows:

85.1 The level should be visible in the lower sight glass (1) for vehicles without hydraulic equipment.

85.2 The level should be visible in the middle sight glass (1) for vehicles fitted with a crane or a winch etc.

86 Top up the hydraulic oil through the filler (2). If the fluid level is not visible, contact your Unit for assistance.



1 – Sight glasses

2 – Filler

Fig 37 Checking the central hydraulic system fluid level

**FUEL SYSTEM****Checking and inspecting the fuel system**

87 Check and inspect the fuel system as follows:

87.1 Visually inspect the condition of the fuel system for damage and corrosion.

87.2 Visually check the fuel system lines and ports for leaks, particularly near components that reach high temperatures during operation, e.g. injection pump, injection nozzle, auxiliary heater, exhaust.

87.3 If there are any leaks or defective parts, contact your Unit for assistance.

#### Draining off primary fuel filter (Separator)

88 Refer to Fig 38. Check the primary fuel filter separator (1) for condensation or impurities.

#### NOTE

Drain water from the condensation separator once a day when running on poor quality fuel or at temperatures below -30°C. The fuel tank must be at least half full of fuel to drain the condensation.

89 To drain the primary fuel filter of condensation and impurities, proceed as follows:

89.1 Stop the engine.

89.2 Take the drain hose and clip from the vehicle tool kit and attach it to the hose port (3).

89.3 Put a suitable container to catch the fluid.

89.4 Unscrew the bleed screw (2).

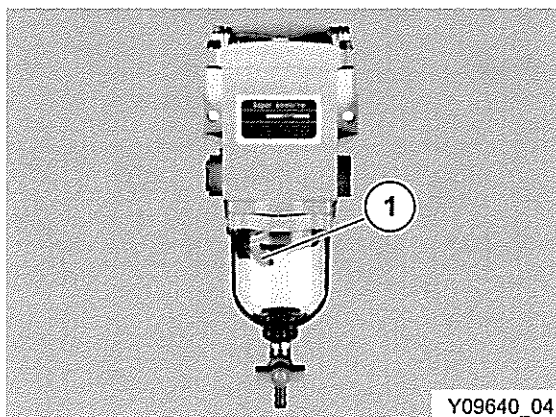
89.5 Open the stopcock (4).

89.6 Let the condensation and impurities drain out and dispose of them in accordance with local instructions.

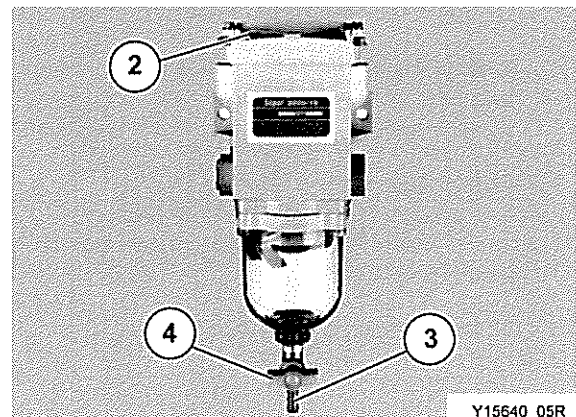
89.7 Close the stopcock (4).

89.8 Tighten the bleed screw (2) to 9Nm.

89.9 Remove the collecting container and the drain hose.



1 – Primary fuel filter separator  
2 – Bleed screw



3 – Hose port  
4 – Stopcock

Fig 38 Draining off primary fuel filter (separator)

### Checking the fuel level

90 Refer to Fig 39. To check the fuel level, switch on the ignition, then note the indication on the fuel gauge. Refill if necessary.

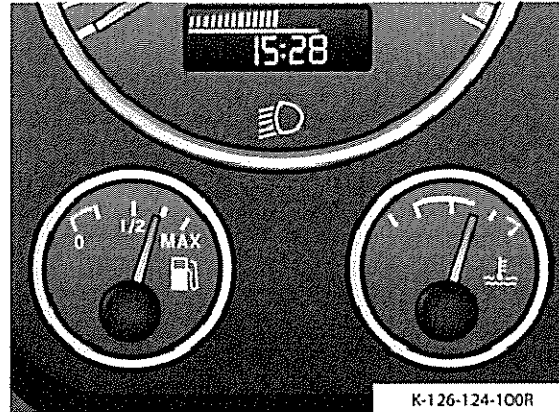


Fig 39 Checking the fuel level

### Refilling the fuel tank

#### CAUTION

**RISK OF ENGINE DAMAGE.** Do not use fuels of unsuitable quality.

- 91 Only use approved fuel types, refer to Chapter 1-1.
- 92 Check the cold resistance properties of the fuel before the onset of cold weather.

#### WARNING

**RISK OF FIRE AND EXPLOSION. DO NOT SMOKE OR ALLOW NAKED FLAMES IN THE VICINITY OF THE FUEL TANK WHEN REFUELLING. FUEL COULD IGNITE OR EXPLODE.**

- 93 Refer to Fig 40. To refill the fuel tank, proceed as follows:
  - 93.1 Switch off the engine and the auxiliary heater.
  - 93.2 Remove the filler cap (1).
  - 93.3 Refill the fuel tank. Do not overfill the tank; thermal expansion could cause the fuel to overflow from the tank.
  - 93.4 Install the filler cap (1).

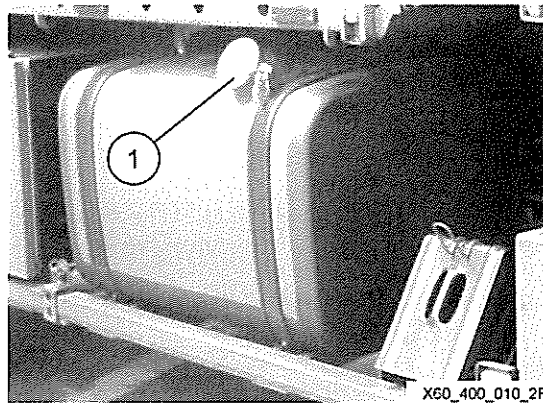


Fig 40 Refilling the fuel tank

## TYRE INFLATION PRESSURE AND CONDITION

### WARNING

**VEHICLE SAFETY. INCORRECT TYRE PRESSURES WILL ADVERSELY AFFECT VEHICLE HANDLING. CHECK THE TYRE PRESSURES BEFORE OPERATING THE VEHICLE.**

### Checking tyre inflation pressure and condition

94 To check the tyre inflation pressures and condition, proceed as follows:

94.1 Check that the tyres, including the spare tyre, are inflated to the correct pressure when the tyres are cold, refer to Chapter 1-1.

94.2 Check the condition of the tyres and have faults rectified as necessary. Make sure that the tread wear and depth of tread comply with the statutory requirements.

94.3 Check the tyres for any embedded objects or damage and have faults rectified as necessary.

95 Tyre inflation pressure may rise when the tyres are warm, for example after driving at speed. Tyre inflation pressure may fall in cold weather.

**Inflating tyres**

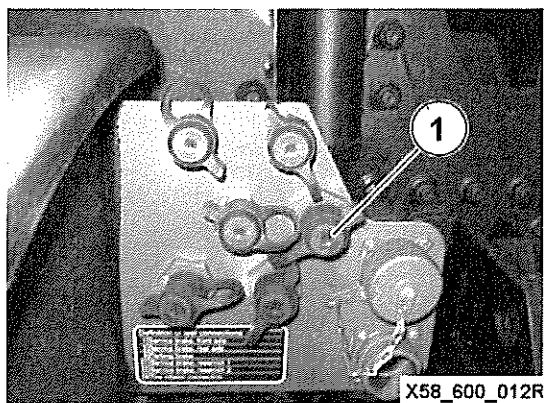
96 Refer to Fig 41. To inflate a tyre, proceed as follows:

**NOTE**

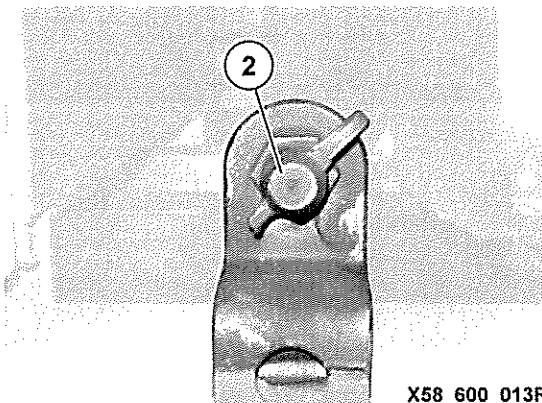
The tyre inflating union 24 is located on the left side of the vehicle. An alternative tyre inflating union is located on the right side of the vehicle to the left of the fuel tank.

96.1 Remove the protective cap from the tyre inflating union 24 (1) or from the alternative tyre inflating union (2).

96.2 Connect the tyre inflating hose to the tyre inflating union (1) or (2).



1 – Tyre inflating union



2 – Alternative tyre inflating union

Fig 41 Inflating tyres

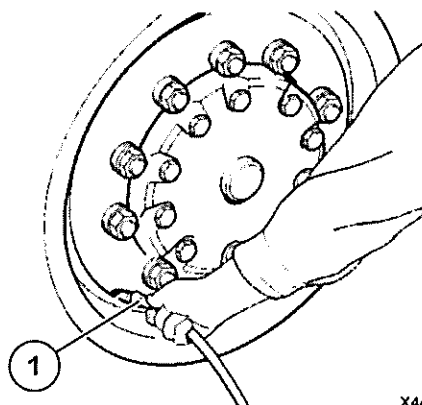
96.3 Start the engine and run at idling speed.

96.4 Refer to Fig 42. Attach the tyre inflating hose to the tyre valve (1).

96.5 Check the tyre inflation pressure during the inflation procedure, and adjust as necessary, refer to Chapter 1-1.

96.6 Disconnect the tyre inflating hose from the tyre inflating union and from the tyre valve (1).

96.7 Fit the protective caps to the tyre inflating union and the tyre valve (1).



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Fig 42 Fit the inflating hose



## ENGINE OIL LEVEL

### Oil level check with dipstick

#### CAUTION

**ENGINE DAMAGE.** Correct the oil level immediately if not between the MIN and MAX marks. The engine can be damaged if the oil level is incorrect.

#### NOTES

- (1) The only way to ensure a correct result in the check is to park the vehicle on a flat, level surface and ensure the engine is cold.
  - (2) It is not permitted for the oil level to exceed the MAX mark. This promotes oil consumption, is uneconomical and pollutes the environment.
- 97 Tilt the cab, refer to Paras 6 to 9.
- 98 Refer to Fig 43. Pull the dipstick (4) out of the guide tube, wipe the dipstick clean using a lint free cloth.
- 99 Push the dipstick (4) back into the guide tube as far as it will go and then pull the dipstick out again.

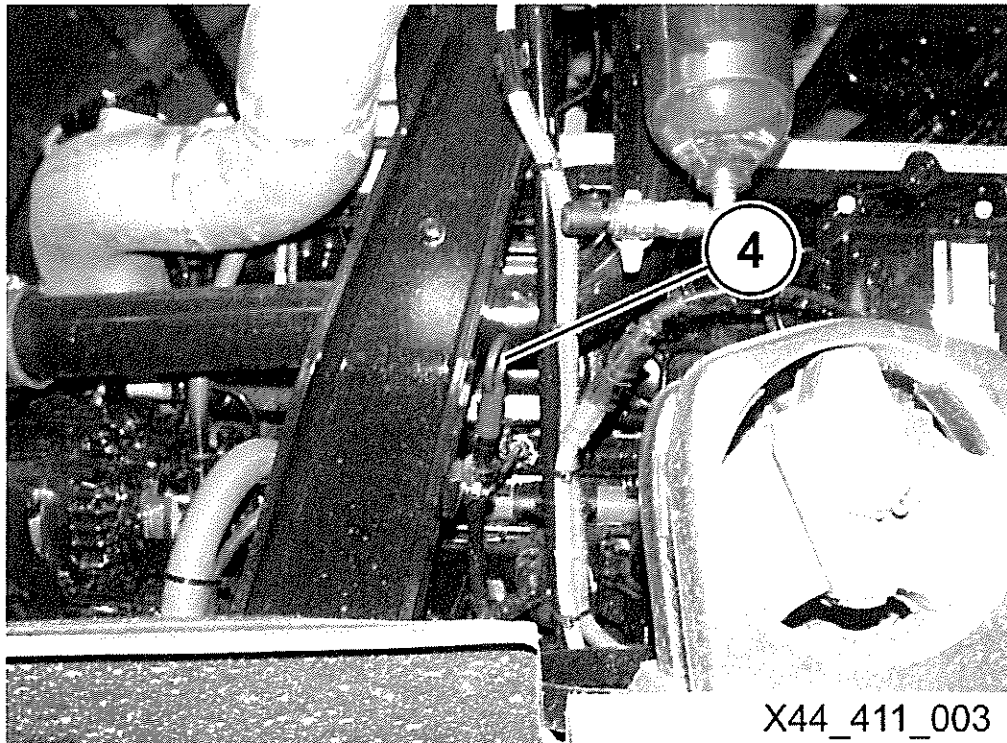


Fig 43 Engine oil dipstick

- 100 Read off the level.

101 Refer to Fig 44. The oil level must be between MIN mark (3) and the MAX mark (2).

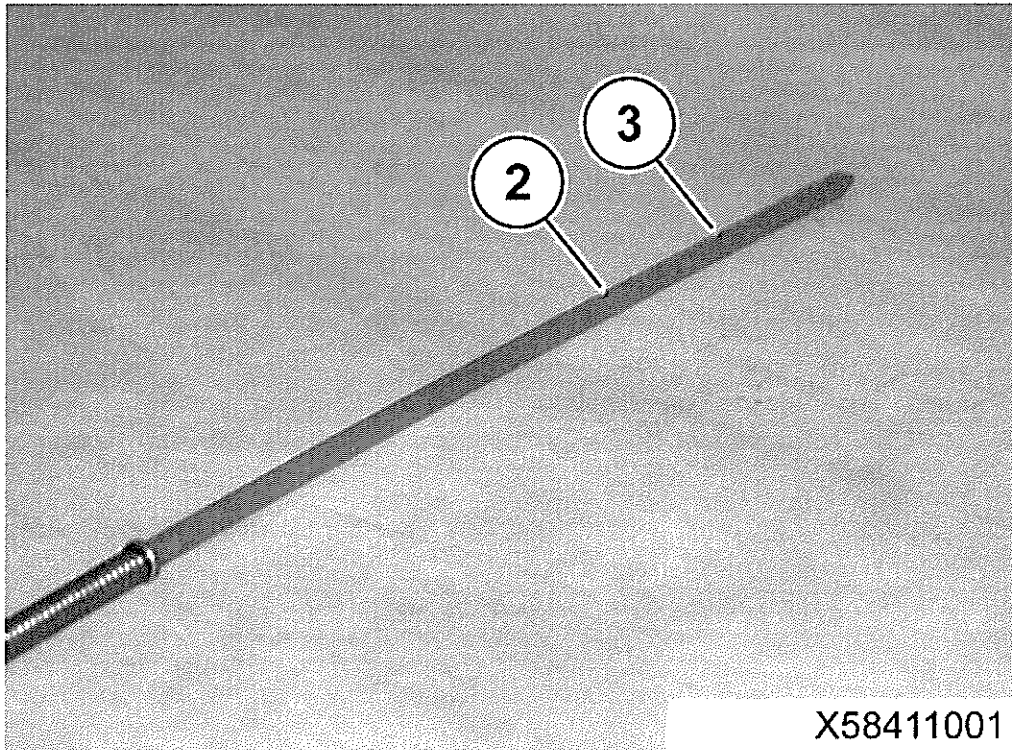


Fig 44 Engine oil dipstick MIN/MAX level marks

102 Correct the oil level by draining off or topping up as required.

103 Lower the cab, refer to Paras 7.4 and 11.

#### Oil level check electronic

#### CAUTION

**ENGINE DAMAGE.** Correct the oil level immediately if not between the MIN and MAX marks. The engine can be damaged if the oil level is incorrect.

#### NOTES

- (1) The engine oil level cannot be measured while the engine is running.
- (2) The vehicle must be standing on a flat, level surface when the engine oil level is being measured.

104 When the ignition is switched on, the oil level is automatically measured every 10 seconds. The measured value is stored and can be called up on the driver's display.

105 If possible, check the engine oil level when the engine is cold. If the engine is hot, the oil will expand and too much engine oil could be indicated on the display (up to 2 litres). If the engine is started and stopped, there is a delay to allow the engine oil to flow back into the oil sump. The length of the delay before the correct oil level can be ascertained depends on the engine oil temperature after stopping the engine, refer to Table 1.

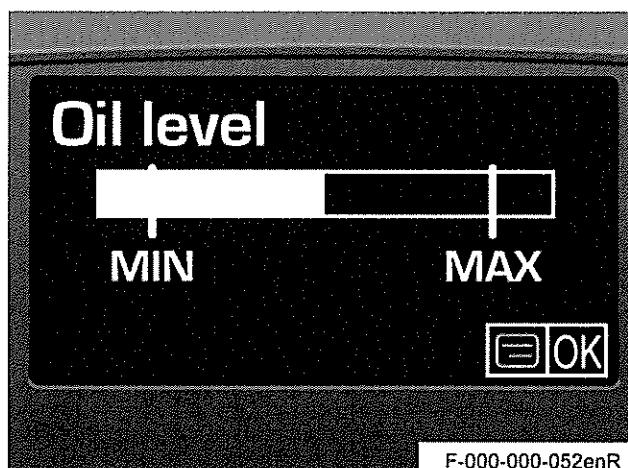
**TABLE 1 WAITING TIME FOR CORRESPONDING OIL TEMPERATURES**

Ser (a)	Oil Temperature (b)	Waiting Time (c)
1	-40°C	180 min
2	0°C	90 min
3	+20°C	45 min
4	+50°C	5 min
5	+80°C	4 min
6	+110°C	3 min

**Checking the engine oil level with the vehicle menu (engine cold)**

106 Refer to Fig 45. To check the engine oil level with the vehicle menu, proceed as follows:

- 106.1 Park the vehicle on a flat, level surface.
- 106.2 Switch on the ignition.
- 106.3 Call up and check the engine oil level on the driver's display using the 'Tractor Vehicle, Monitoring Data/'Oil level' refer to Chapter 1-2.
- 106.4 Top up if necessary, refer to Para 110.



F-000-000-052enR

Fig 45 Check the engine oil level

**Checking the engine oil level with the vehicle menu (engine hot)**

107 To check the engine oil level with the engine hot, proceed as follows:

- 107.1 Stop the engine.
  - 107.2 Call up and check the engine oil temperature on the driver's display using the 'Tractor Vehicle, Monitoring Data/'Oil temperature' refer to Chapter 1-2.
  - 107.3 Refer to Table 1 to ascertain the required delay for all the oil to collect in the oil sump.
- 108 Top up if necessary, refer to Para 110.

**Exiting the menu****NOTE**

The menu closes automatically in approximately 30 seconds if no button is pressed.

109 To exit the menu, refer to Chapter 1-2.

**Topping up the engine oil**

110 Refer to Fig 46. To top up the engine oil, proceed as follows:

110.1 Switch off the ignition.

**CAUTION**

**VEHICLE DAMAGE.** Before opening the front service flap, make sure that the windscreen wipers are in the parked position.

110.2 Open the front service flap, refer to Para 4.

**CAUTION**

**ENGINE DAMAGE.** The engine can be damaged if the oil level is incorrect.

110.3 Remove the red cap (1), then top up the oil through the filler pipe.

110.4 Check the engine oil level on the display; refer to Para 106 (engine cold) or Para 107 (engine hot).

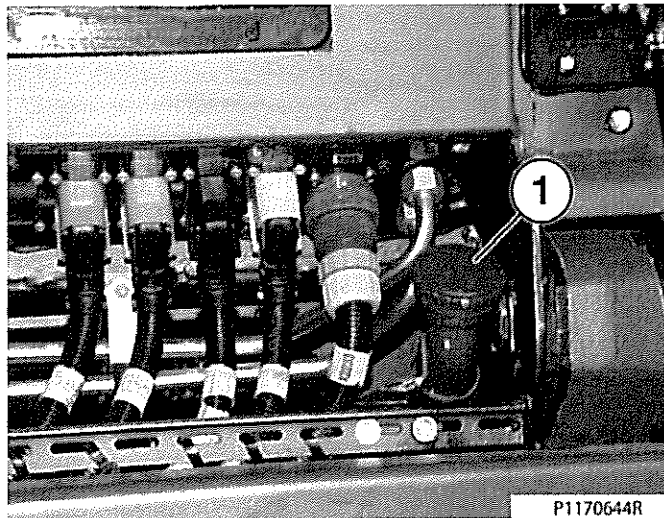


Fig 46 Topping up the engine oil

## ENGINE OIL PRESSURE

### CAUTION

**ENGINE DAMAGE.** Stop the vehicle as soon as possible and switch off the engine if the 'OIL PRESSURE TOO LOW' or 'OIL PRESSURE TOO HIGH' message appears on the driver's display.

111 Refer to Fig 47. When the engine is started from cold, make sure that the driver's display shows none of the following:

- 111.1 Oil pressure check lamp (1).
- 111.2 Central warning light (2).
- 111.3 'OIL PRESSURE TOO LOW' or 'OIL PRESSURE TOO HIGH' message (3).
- 111.4 STOP symbol.

### NOTE

The alarm buzzer must not sound.

112 If any of the above appear, refer to Chapter 1-2.

113 Call up the oil pressure on the driver's display, refer to Chapter 1-2. The oil pressure must be at least 3.0 bar at rated speed once the oil has heated up. The oil pressure may drop to 1.0 bar at idling speed without potentially damaging the engine. If the oil pressure is too low or too high, check the oil level and correct if necessary, refer to Para 106. Contact your unit for assistance.

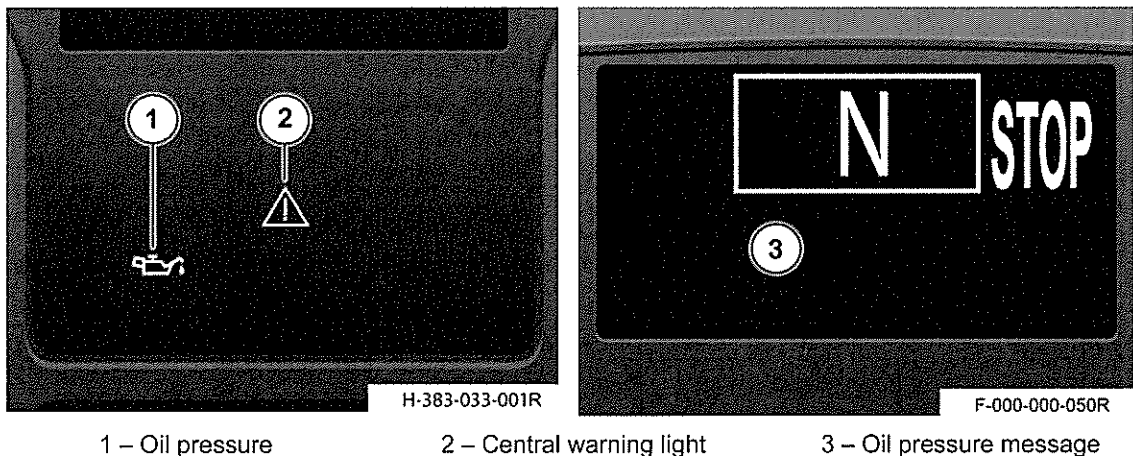


Fig 47 Engine oil pressure

### CHECK THE ENGINE FOR LEAKS

- 114 Check the engine for leaks as per the Maintenance schedule.
- 115 Check the condition and security of all components.
- 116 If any faults are found, contact your Unit for assistance.

**ENGINE OIL AND OIL FILTER****Changing the engine oil and oil filter**

117 Park the vehicle on a flat, level surface and switch off the ignition.

118 Tilt the cab, refer to Paras 6 to 9.

119 Refer to Fig 48. To drain the engine oil with the engine at operating temperature, proceed as follows:

119.1 Place a suitable container beneath the sump.

119.2 Remove the drain plug (1) from the sump.

**NOTE**

Dispose of the oil in accordance with local instructions.

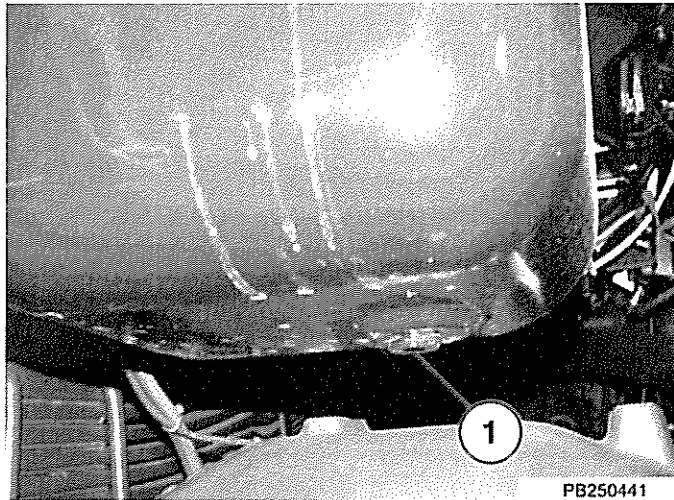


Fig 48 Drain the engine oil

120 Refer to Fig 49. To change the oil filter, proceed as follows:

**NOTE**

A new oil filter must be installed each time the engine oil is changed.

120.1 Remove the cover (2) and the oil filter (3) from the oil module (4) using the oil filter wrench (1). Make sure that all oil has drained from the filter bowl.

120.2 Remove the O-ring (8) from the cover (7).

120.3 Remove the O-rings (5 and 6) from the guide (9).

120.4 Install a new O-ring (8) in the cover (7).

120.5 Install new O-rings (5 and 6) onto the guide (9).

120.6 Install the cover (2) and oil filter (3) in the oil module (4). Tighten the cover to 25Nm using the oil filter wrench (1).

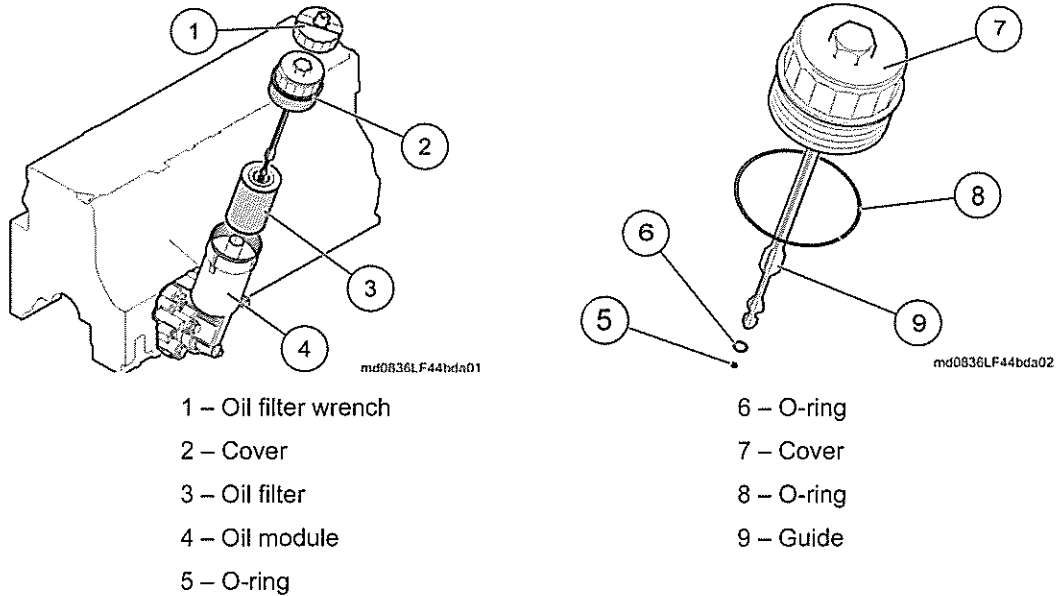


Fig 49 Replacing oil filter

121 Install the drain plug and a new sealing ring in the sump. Tighten the drain plug to 25Nm.

122 Lower the cab, refer to Paras 7.4 and 11.

**CAUTION**

**DANGER OF ENGINE DAMAGE. Do not over-fill the engine with oil. Do not fill with oil so that the level exceeds the MAX mark on the driver's display.**

123 Refer to Fig 50. Replenish the engine with the required quantity and specification of oil, using the oil filler (1) behind the front service flap.

124 Switch on the ignition, and check the oil level on the driver's display. Top up if the oil level is below MIN. The volume of oil between the MIN and MAX levels is 5.0 litres.

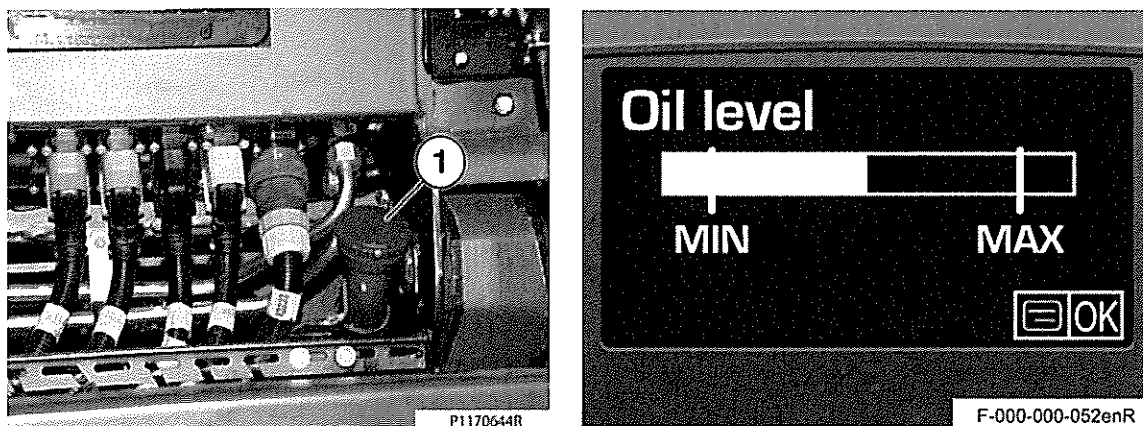


Fig 50 Top up the engine oil

**CAUTION**

**DANGER OF ENGINE DAMAGE. Do not run the engine at high speed or under load until the minimum oil pressure is reached.**

125 Refer to Fig 51. Start and run the engine at idling speed until the oil pressure check lamp (1) goes off, then stop the engine.

126 Check the engine and the oil filter housing for leaks.

127 Wait for a period of time as shown in Table 1, then switch on the ignition and check the oil level on the driver's display. Top-up the engine oil if necessary.

**NOTE**

The correct oil level must only be measured when all the oil in the engine block has flowed into the sump. This delay depends on the temperature and quantity of the engine oil. There will be up to between 2 and 5 litres of engine oil in the engine block after the engine has been running.

128 Switch off the ignition and close the front service flap.

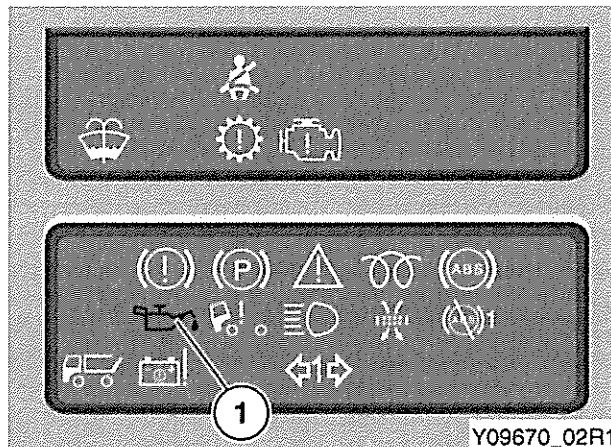


Fig 51 Oil pressure check lamp

**AUTOMATED GEARBOX ZF 12AS1210****Checking the automated gearbox oil level****WARNING**

**PERSONAL INJURY. ONLY CHECK THE GEARBOX OIL WHEN IT IS COLD.**

129 Refer to Fig 52. To check the oil level, proceed as follows:

129.1 Park the vehicle on a flat, level surface.

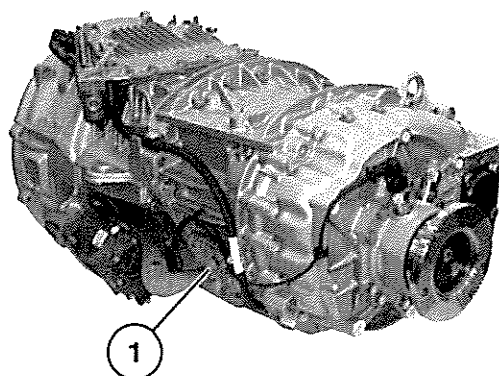
129.2 Stop the engine.

129.3 Remove the checking/filler plug (1).

129.4 Make sure that the oil level is at the bottom edge of the checking/filler hole.

129.5 Top up, if necessary, until the oil overflows. Install the checking/filler plug (1) and a new sealing ring. Tighten the checking/filler plug to 60Nm.





W75\_2\_233-06R1

Fig 52 Checking the automated gearbox oil level

## TRANSFER CASE

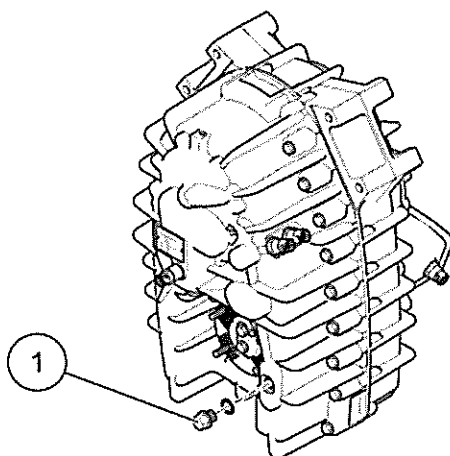
### Checking the transfer case oil level

#### WARNING

**PERSONAL INJURY. ONLY CHECK THE TRANSFER CASE OIL WHEN IT IS COLD.**

130 Refer to Fig 53. To check the oil level, proceed as follows:

- 130.1 Park the vehicle on a flat, level surface.
- 130.2 Stop the engine.
- 130.3 Remove the checking/filler plug (1).
- 130.4 The oil must reach the bottom edge of the checking/filler hole.
- 130.5 Top up, if necessary, until the oil overflows.
- 130.6 Install the checking/filler plug (1) and a new sealing ring. Tighten the checking/filler plug to 80Nm.



WAN6027501R

Fig 53 Checking the transfer case oil level

**Changing the transfer case oil**

131 Refer to Fig 54. To drain the oil, proceed as follows:

- 131.1 Make sure the oil is at operating temperature.
- 131.2 Park the vehicle on a flat, level surface.
- 131.3 Place a suitable container beneath the transfer case.
- 131.4 Remove the drain plug (2).

**NOTE**

Dispose of used oil in accordance with local procedures.

- 131.5 Clean any debris from the magnetic element on the drain plug (2).
- 131.6 Install the drain plug (2) and a new sealing ring. Tighten the drain plug to 80Nm.
- 131.7 Remove the checking/filler plug (1).
- 131.8 Fill the transfer case with the required quantity and specification of oil until the oil reaches the bottom of the checking/filler hole.
- 131.9 Install the checking/filler plug (1) and a new sealing ring. Tighten the checking/filler plug to 80Nm.

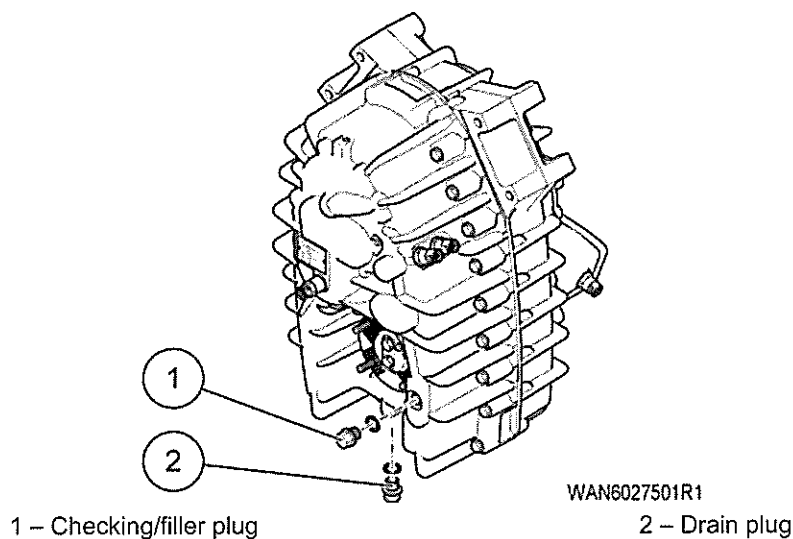


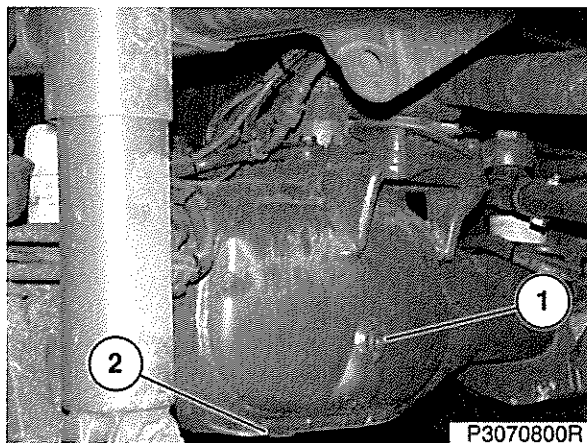
Fig 54 Changing the transfer case oil

## FRONT AXLE FOREMOST DIFFERENTIAL

### Checking the differential oil level

132 Refer to Fig 55. To check the oil level, proceed as follows:

- 132.1 Park the vehicle on a flat, level surface.
- 132.2 Remove the checking/filler plug (1).
- 132.3 The oil must reach the bottom edge of the checking/filler hole.
- 132.4 Top up, if necessary, until the oil overflows.
- 132.5 Install then tighten the checking/filler plug (1) to 100Nm.



1 – Checking/filler plug

2 – Drain plug

Fig 55 Checking/replacing the front axle differential oil level

### Replacing the differential oil

133 To drain the oil, proceed as follows:

- 133.1 Park the vehicle on a flat, level surface.
- 133.2 Place a suitable container beneath the axle.
- 133.3 Remove the drain plug (2).

#### NOTE

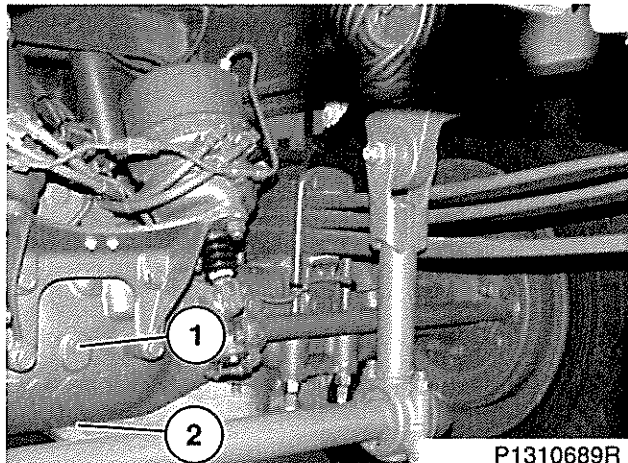
Dispose of used oil in accordance with local procedures.

- 133.4 Clean any debris from the drain plug (2).
- 133.5 Install then tighten the drain plug (2) to 100Nm.
- 133.6 Remove the checking/filler plug (1).
- 133.7 Pour oil through the checking/filler hole until the oil just overflows.
- 133.8 Install then tighten the checking/filler plug (1) to 100Nm.

**REAR AXLE DIFFERENTIAL****Checking the differential oil level**

134 Refer to Fig 56. To check the oil level, proceed as follows:

- 134.1 Park the vehicle on a flat, level surface.
- 134.2 Remove the checking/filler plug (1).
- 134.3 The oil must reach the bottom edge of the checking/filler hole.
- 134.4 Top up, if necessary, until the oil overflows.
- 134.5 Install then tighten the checking/filler plug (1) to 100Nm.



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1 – Checking/filler plug

2 – Drain plug

Fig 56 Checking/replacing the rear axle differential oil level

**Replacing the differential oil**

135 Refer to Fig 56. To drain the oil, proceed as follows:

- 135.1 Park the vehicle on a flat, level surface.
- 135.2 Place a suitable container beneath the axle.
- 135.3 Remove the drain plug (2).

**NOTE**

Dispose of used oil in accordance with local procedures.

- 135.4 Clean any debris from the drain plug (2).
- 135.5 Install then tighten the drain plug (2) to 100Nm.
- 135.6 Remove the checking/filler plug (1).
- 135.7 Pour oil through the checking/filler hole until the oil just overflows.
- 135.8 Install then tighten the checking/filler plug (1) to 100Nm.

### REPLACING THE BREATHER

136 Refer to Fig 57. To remove the breather, proceed as follows:

136.1 Remove the mounting bolts (1) from the breather (2).

136.2 Remove the breather (2) from the connection system.

137 To install the breather, proceed as follows:

137.1 Clean the connection system.

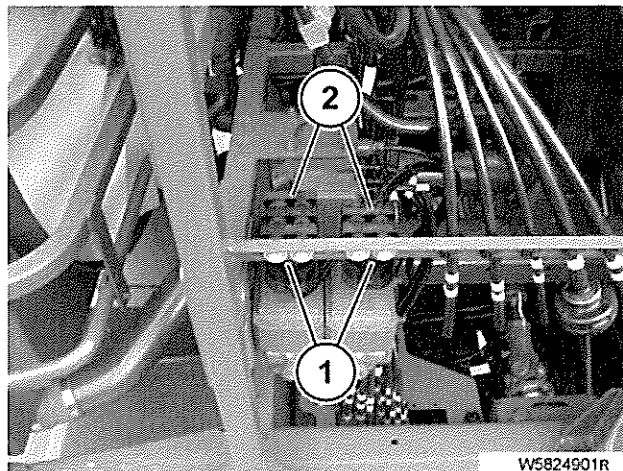
#### CAUTION

**VEHICLE DAMAGE. Make sure that the breather is installed correctly.**

137.2 Install the breather (2) onto the connection system.

137.3 Install the four mounting bolts (1).

137.4 Tighten the four mounting bolts to 22Nm.



1 – Four mounting bolts

2 – Breather

Fig 57 Replacing the breather

### CHECKING THE PLANETARY HUB OIL LEVEL

138 Refer to Fig 58. To check the oil level of the planetary hub drive, proceed as follows:

138.1 Park the vehicle on a flat, level surface and align one of the checking/filler plugs (1) approximately 7 degrees lower than the horizontal centre line.

138.2 Unscrew the lower checking/filler plug (1).

138.3 Make sure that the oil level is at the bottom edge of the checking/filler hole.

138.4 Top-up, if necessary, until the oil overflows.

138.5 Install then tighten the checking/filler plug (1) to 100Nm.

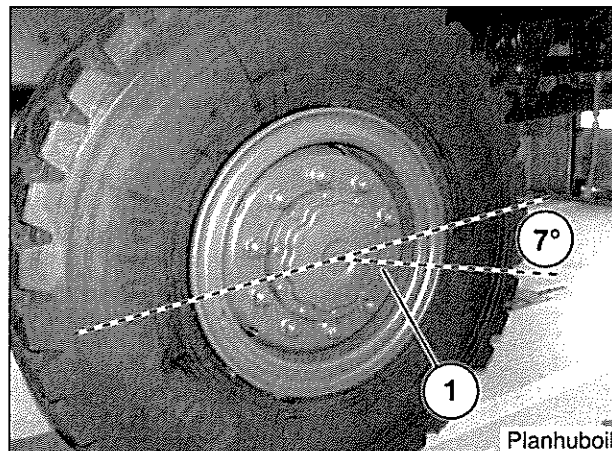


Fig 58 Checking the planetary hub oil level

**REPLACING THE PLANETARY HUB OIL**

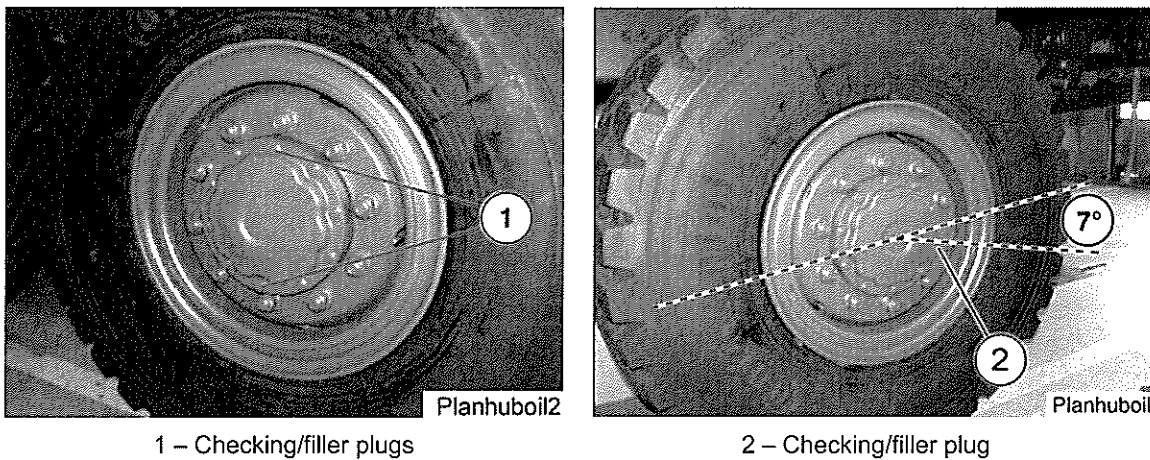
139 Refer to Fig 59. To replace the oil, proceed as follows:

- 139.1 Drain the oil.
- 139.2 Park the vehicle on a flat, level surface and align the checking/filler plugs (1) vertically.
- 139.3 Unscrew both of the checking/filler plugs (1), and clean any debris from the threads.

**NOTE**

Dispose of used oil in accordance with local procedures.

- 139.4 Install then tighten the lower checking/filler plug to 100Nm.



1 – Checking/filler plugs

2 – Checking/filler plug

Fig 59 Replacing the planetary hub oil level

- 139.5 Park the vehicle on a flat, level surface and align one of the checking/filler plugs (2) approximately 7 degrees lower than the horizontal centre line.
- 139.6 Fill with oil through the filler hole using a universal handpump until the oil just overflows.
- 139.7 Install then tighten checking/filler plug to 100Nm.

## BRAKE SYSTEM

### WARNINGS

- (1) BRAKE FUNCTION. THE VEHICLE MUST NOT BE SET IN MOTION UNTIL THE STOP MESSAGE ON THE DRIVER'S DISPLAY HAS GONE OFF.
- (2) BRAKE FUNCTION. CHECK OPERATION OF THE SERVICE AND PARKING BRAKES BEFORE DRIVING THE VEHICLE.

140 Refer to Fig 60. To check the brake system, proceed as follows:

- 140.1 Switch on the ignition, the pointers of the two pressure gauges must not be in the red zone.
- 140.2 If necessary, let the engine run and charge the compressed air system to at least 6.0 bar.
- 140.3 Listen for the pressure regulator blowing off.

### NOTE

The vehicle cannot be braked if the compressed air system is not adequately charged.

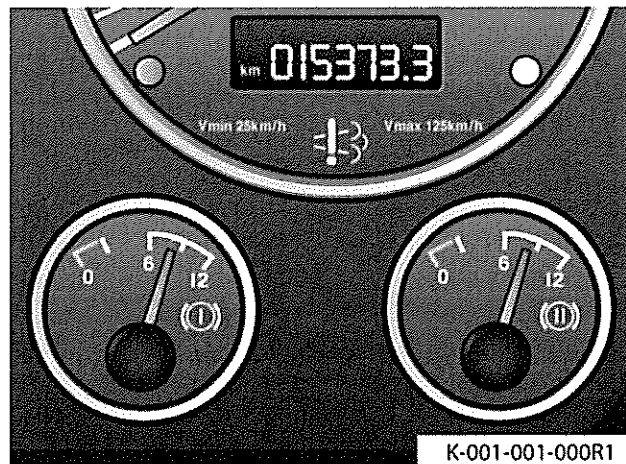


Fig 60 Brake system pressure gauges

141 Refer to Fig 61. When the engine is started the following must not appear on the driver's display:

- 141.1 STOP symbol.
- 141.2 Text message (1).
- 141.3 Brake check lamp (2).
- 141.4 Parking brake check lamp (3).
- 141.5 Central warning light (4).
- 141.6 The alarm buzzer must not sound.

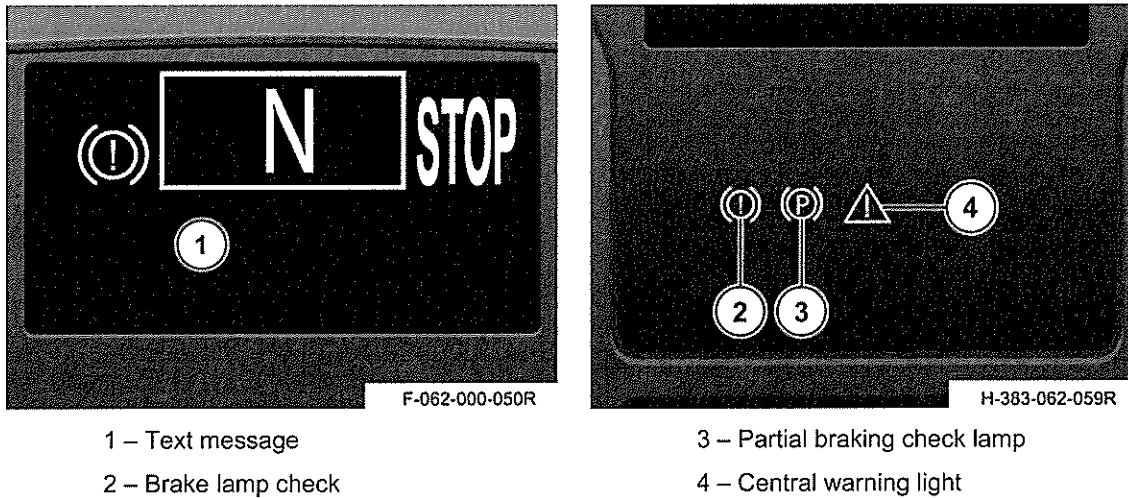


Fig 61 Driver's display indicators

**Checking the air reservoirs****WARNING**

**BRAKE FAILURE. WATER IN THE AIR RESERVOIRS CAN CAUSE THE BRAKE SYSTEM TO FAIL.**

142 Refer to Fig 62. The air reservoirs must be checked for the presence of water.

143 The compressed air system must be charged for the check.

144 Apply the parking brake and switch off the engine.

**WARNING**

**PERSONAL INJURY. ALWAYS PROTECT YOUR EYES AND HANDS WHEN ACTUATING THE WATER DRAIN VALVE.**

145 Actuate the water drain valves, indicated by the arrows.

146 If water emerges, drain all of the reservoirs and contact your Unit for assistance.

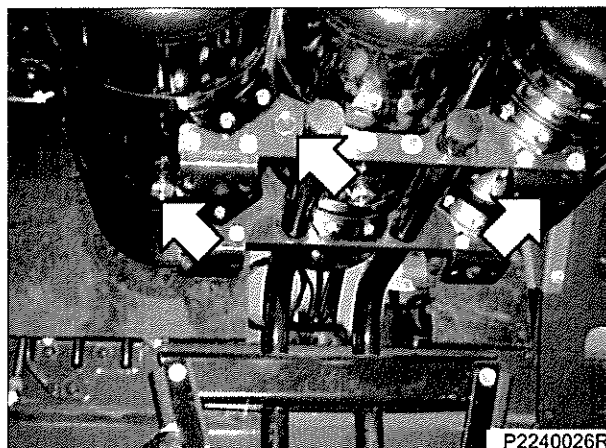


Fig 62 Checking the air reservoirs



### Cleaning the brakes

#### WARNING

**REDUCED BRAKING EFFICIENCY. AFTER DRIVING THROUGH MUD OR DEEP WATER, THE BRAKE DRUMS AND BRAKE SHOES COULD BE CONTAMINATED.**

147 Refer to Fig 63. To clean the internal parts of the brake system, proceed as follows:

147.1 Loosen the fixing bolts (3).

147.2 Remove the upper cover plate (1).

147.3 Remove the lower cover plate (2).

147.4 Wash the dirt out from the brake shoes and drums using a powerful water jet.

147.5 Dry the brake shoes and drums using compressed air.

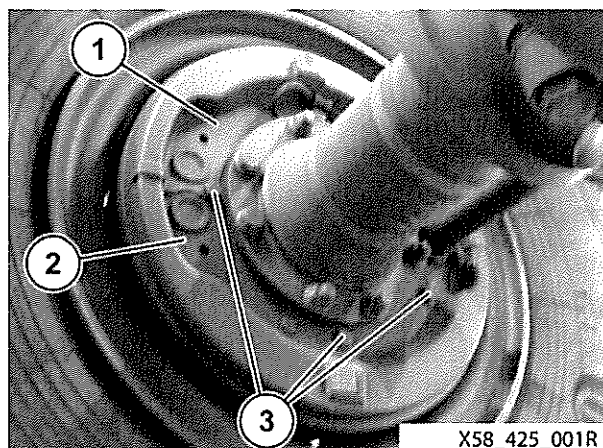
147.6 Carefully apply the brakes to dry them fully.

147.7 Dry the brakes again using compressed air.

147.8 Fit the upper cover plate (1).

147.9 Fit the lower cover plate (2).

147.10 Tighten the fixing bolts (3). Make sure that the brake shafts and slack adjusters are properly lubricated.



1 – Upper cover plate

2 – Lower cover plate

3 – Fixing bolts

Fig 63 Cleaning the brakes

**TRAILER PINTLE**

148 Refer to Fig 64. Lubricate the trailer pintle through the grease nipples (1 and 2).

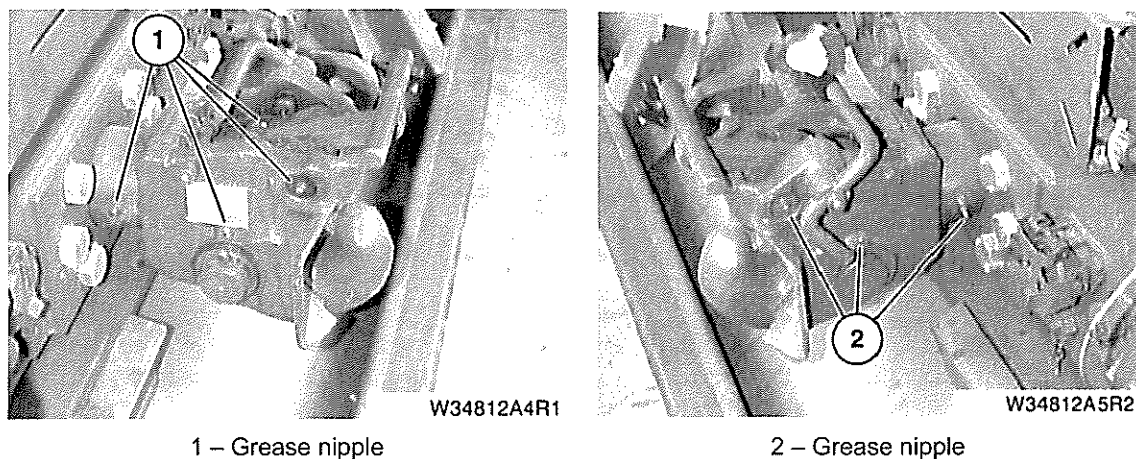


Fig 64 Lubricate the trailer pintle

**HEADLIGHT ADJUSTMENT****WARNING**

**RISK OF INJURY. IF THE HEADLIGHTS ARE NOT ADJUSTED WHEN DRIVING IN LEFT-HAND OR RIGHT-HAND TRAFFIC ACCIDENTS CAN BE CAUSED. DRIVERS OF APPROACHING VEHICLES MAY BE BLINDED AND THE ROAD AHEAD IS NOT ILLUMINATED PROPERLY. MAKE SURE THAT THE HEADLIGHT LOW BEAM IS ADJUSTED TO LEFT-HAND OR RIGHT-HAND TRAFFIC BEFORE SETTING OFF.**

149 Depending on the country in which the vehicle is used, the headlight low beam has to be set to driving in left-hand or right-hand traffic.

### Setting the headlight

150 Refer to Fig 65. To set the headlight low beam, proceed as follows:

150.1 Loosen the four screws, the two screws (1) on the left side of the frame are shown.

150.2 Remove the screws (2) from the headlight beam regulator.

150.3 Remove the screws (3) from the headlight low beam.

150.4 Note position and remove the light assembly from the frame.

150.4.1 For driving on the right side of the road, turn the headlight (low beam) clockwise until the next hole (LV) lines up.

150.4.2 For driving on the left side of the road, turn the headlight (low beam) anticlockwise until the next hole (RV) lines up.

150.5 Install the screws (2 and 3) into the mounting holes and tighten.

150.6 Mount the light assembly back onto the frame and secure using the four screws (1).

150.7 Repeat the procedure for the other headlight.

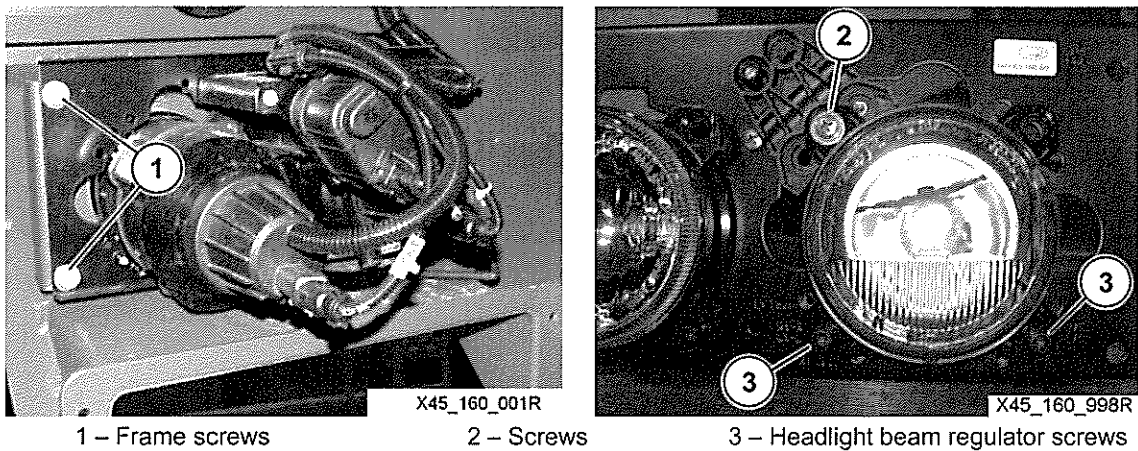


Fig 65 Setting the headlight

**LED LICENCE PLATE LIGHT**

151 Refer to Fig 66. The LED licence plate lights can only be replaced as a complete assembly.

152 To remove the LED licence plate light, proceed as follows:

152.1 Push the plug protection (1) forwards and disconnect the plug (2).

152.2 Remove the cable ties from the cable.

152.3 Remove the mounting nuts (3).

152.4 Remove the LED casing (5) and cable (4).

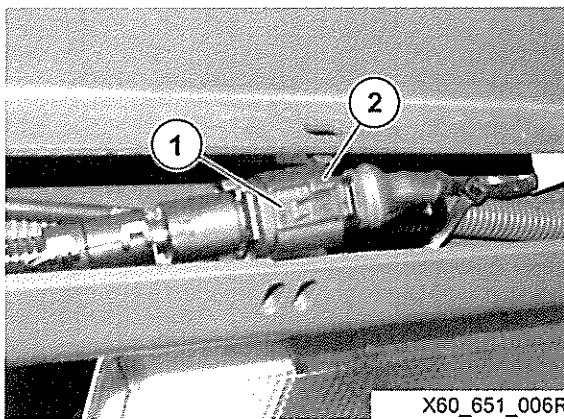
153 To install the LED licence plate light, proceed as follows:

153.1 Guide the cable (4) through the hole in the licence plate carrier and install the LED casing (5).

153.2 Install and tighten the mounting nuts (3).

153.3 Connect the plug (2) to the plug protection (1).

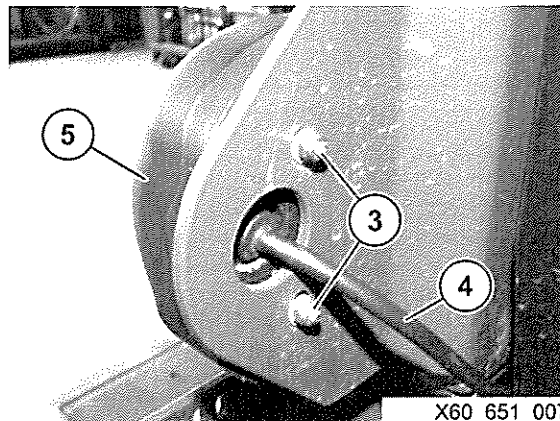
153.4 Secure the cable using cable ties.



X60\_651\_006R

1 – Plug protection

2 – Plug



X60\_651\_007

3 – Mounting nuts

4 – Cable

5 – LED casing

Fig 66 Replacing the LED licence plate

## AIR-CONDITIONING

### Cleaning the drain hole and the gutter

154 Bad weather, dirt and falling leaves can block the drain hole for the condensation of the air-conditioning system.

155 Refer to Fig 67. To clean the drain hole and the gutter from the outside, proceed as follows:

155.1 Open the roof hatch; refer to Chapter 1-3.

#### WARNINGS

(1) **WORKING AT HEIGHTS. PERSONNEL MUST EXERCISE EXTREME CAUTION WHEN WORKING ON HIGH, EXPOSED SURFACES.**

(2) **PERSONAL INJURY. DO NOT STEP ONTO THE COVER OF THE AIR-CONDITIONING SYSTEM.**

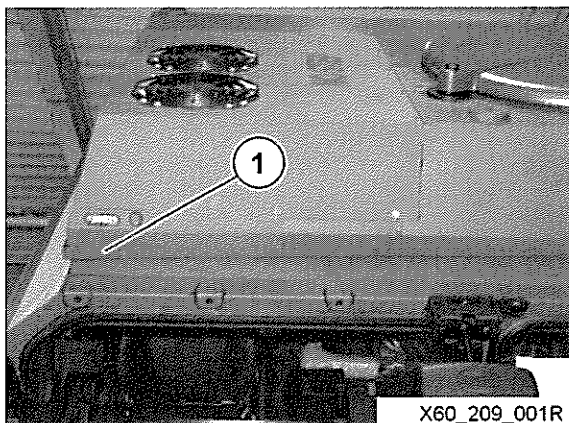
155.2 Climb out of the cab onto the roof.

155.3 Clear the gutter (1) of leaves and dirt using a suitable tool.

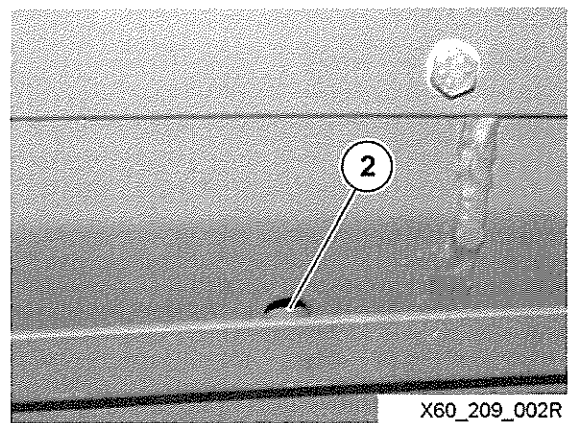
155.4 Clear the drain hole (2) located in the middle of the front gutter using a suitable tool.

155.5 Climb back into the cab.

155.6 Close the roof hatch; refer to Chapter 1-3.



1 – Gutter



2 – Drain hole

Fig 67 Cleaning the drain hole and the gutter

### Cleaning the drain tubes

156 If the drain hole is too blocked to be cleaned from outside the vehicle, it may be necessary to clean the tubes that carry the condensation to the drain hole.

157 Refer to Fig 68. To clean the drain tubes, proceed as follows:

- 157.1 Remove the screws (1).
- 157.2 Pull the cover plate down and to the left.
- 157.3 Remove the cover plate.
- 157.4 Loosen the clamps that attach the tubes to the drain pipes (2 and 3).
- 157.5 Remove the drain tubes.
- 157.6 Clean the drain tubes.
- 157.7 Install the drain tubes onto the drain pipes (2 and 3).
- 157.8 Tighten the clamps.
- 157.9 Install the cover plate.
- 157.10 Install and tighten the screws (1).

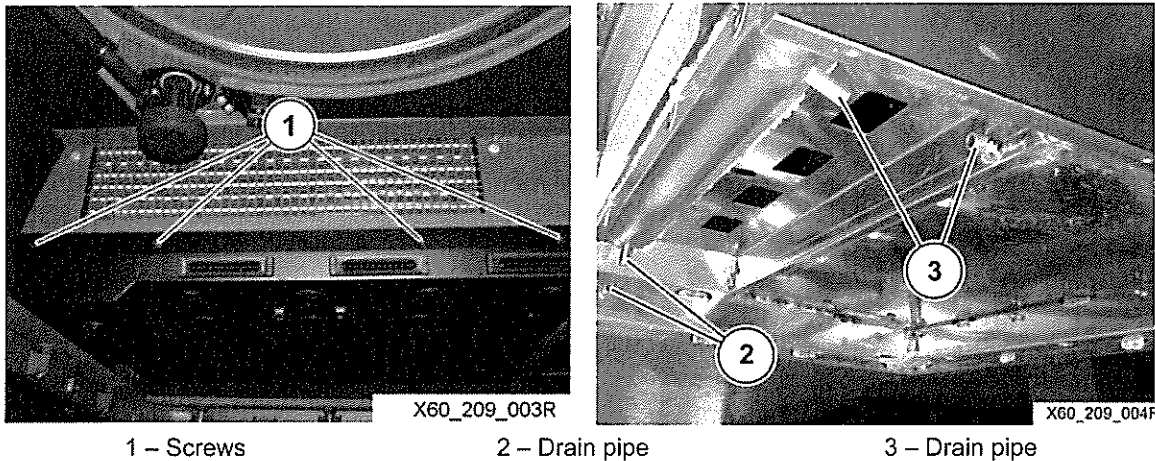
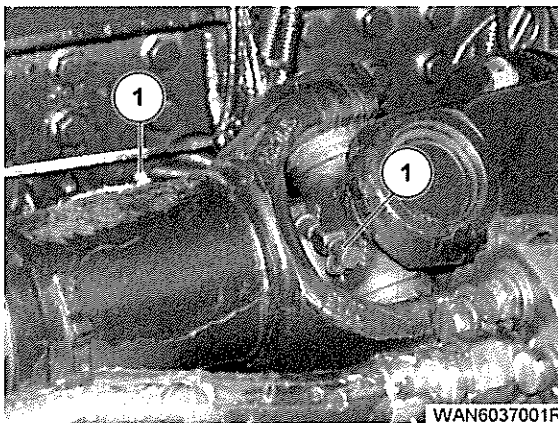


Fig 68 Cleaning the drain tubes

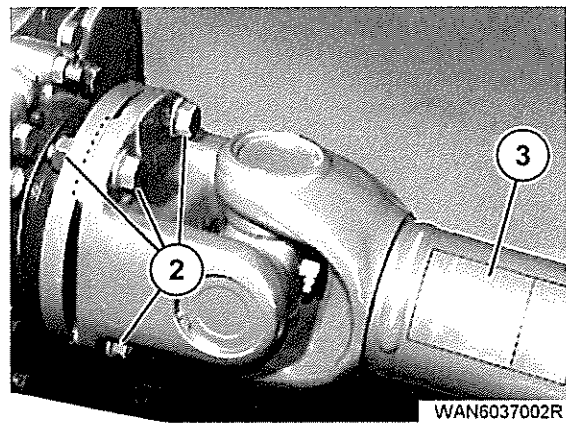
## PROPSHAFTS

158 Refer to 69. To check and lubricate the propshafts, proceed as follows:

- 158.1 Grease the nipples (1) of the universal joints and sliding joints.
- 158.2 Check that all propshaft bolts (2) are tight and flanges are properly seated.
- 158.3 Check that balancing plates (3) are in position and secure.
- 158.4 Check universal joints and sliding joints for any free play.
- 158.5 Check all universal joints retaining clips are in place.
- 158.6 Check the universal joint trunnion caps for signs of overheating.



1 – Grease nipples



2 – Bolts

3 – Balancing plate

Fig 69 Check and lubricate the propshafts

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**CHAPTER 1-7**

**ELECTRICAL SOCKETS**

**CONTENTS**

Para

- 1 Introduction  
Electrical sockets
- 2 24V sockets (CAUTIONS)
- 5 Cooking vessel (WARNINGS)
- 7 Radio connection (WARNING)
- 8 Inter-vehicle connection socket (CAUTION)

Fig

Page

1	Electrical sockets.....	2
2	Cooking vessel.....	3
3	Radio connection.....	3
4	Inter-vehicle connection socket.....	4

**INTRODUCTION**

1 This chapter provides details on the electrical sockets installed in the vehicle cab and on the chassis.

**ELECTRICAL SOCKETS****24V sockets****CAUTION**

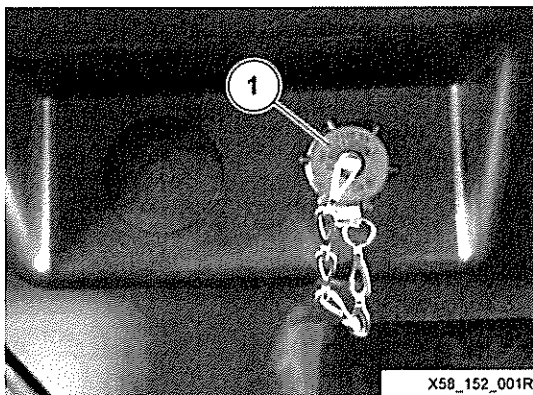
**EQUIPMENT DAMAGE.** Do not use a 24V socket to power equipment with a total power consumption of more than 300W. Excessively high power consumption can cause damage to the components.

- 2 Refer to Fig 1. The 24V sockets provide power for hand lamps or service tools.
- 3 The 24V 300W socket (2-pole) (1) is located in the cab. A map reading light can be fitted to this socket.

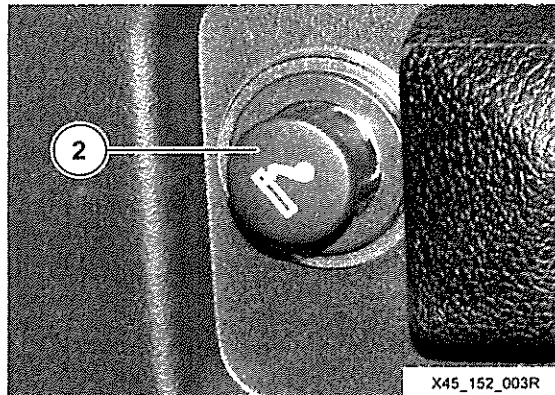
**CAUTION**

**EQUIPMENT DAMAGE.** Do not use an unsuitable plug to connect to the 24V power socket. An unsuitable plug can cause damage to the socket. Use a plug that contacts the centre of the socket using the central contact. The contact must not be on the bimetallic spring arms of a plug.

- 4 A power socket (2) is located in the cab.



1 – 24V 300W socket (2-pole)



2 – Power socket

Fig 1 Electrical sockets

**Cooking vessel**

- 5 Refer to Fig 2. The cooking vessel provides a potable water and pre-packaged rations heating facility for the crew of any military vehicle which has a 22V DC-28V DC (24V DC nominal) electrical system. Operation is possible at any time (including full battle conditions) in any climate while stationary or mobile.

**WARNINGS**

(1) **HIGH TEMPERATURES. NORMAL OPERATING TEMPERATURES WITHIN THE COOKING VESSEL ARE UP TO 88°C AND CAN REACH HIGHER TEMPERATURES UNDER ABNORMAL CONDITIONS. THEREFORE, ALWAYS WEAR GLOVES OR OTHER HAND PROTECTION TO AVOID SERIOUS BURNS TO THE SKIN.**

(2) HIGH TEMPERATURES. ALWAYS MAKE SURE THAT THE COOKING VESSEL COVER IS PROPERLY CLOSED AND LATCHED BEFORE OPERATING OR AT ANY TIME THAT THE HOST VEHICLE IS MOBILE. FAILURE TO SECURE THE COVER CAN RESULT IN THE ACCIDENTAL SPILLAGE OF HEATED WATER AND EXPOSURE TO SERIOUS BURNS.

6 A 3-pole socket (1) is located in the cab. The socket is used to provide power to a cooking vessel (2).

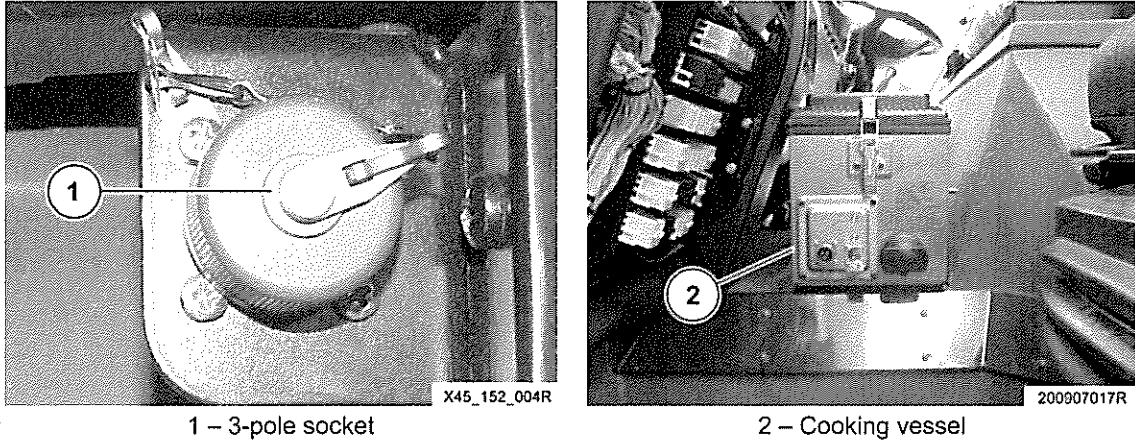


Fig 2 Cooking vessel

#### Radio connection

#### WARNING

LIVE TERMINAL. ONLY AUTHORISED PERSONNEL SHOULD REMOVE THE EXTERNAL COVER TO GAIN ACCESS INTO THE BUMK TERMINALS.

7 Refer to Fig 3. A distribution box (1) for the connection of radio equipment is located in the cab.

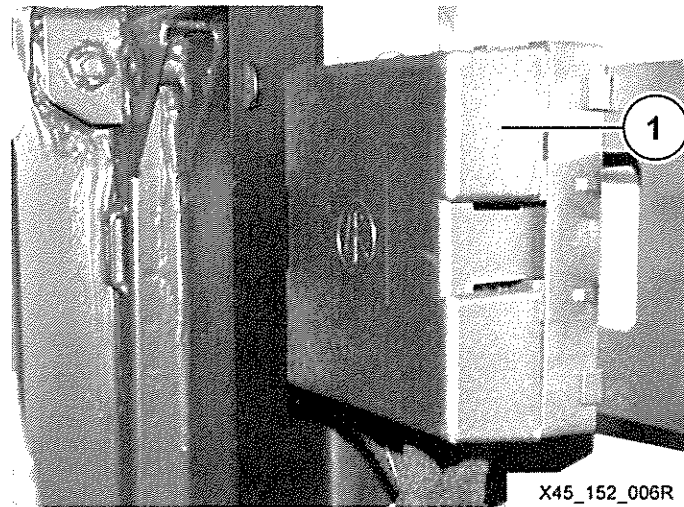


Fig 3 Radio connection

**Inter-vehicle connection socket**

8 Refer to Fig 4. The Inter-Vehicle Connection (IVC) socket (1) is located on the chassis.

**CAUTION**

**VEHICLE DAMAGE.** The IVC must only be used for emergency starting.

9 To use the IVC for emergency starting, refer to Chapter 1-5.

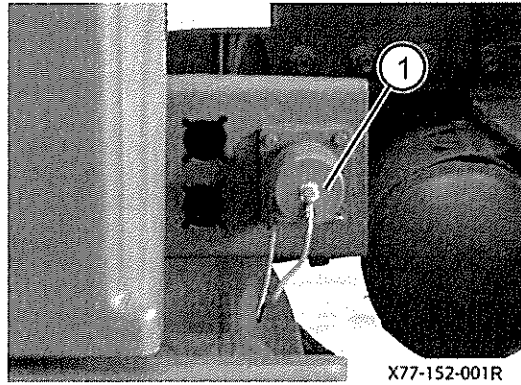


Fig 4 Inter-vehicle connection socket

**CHAPTER 2-0**

**BODY**

**CONTENTS**

Chap

- 2-1 Flat platform
- 2-2 FALCON variant
- 2-3 Technical data - cargo
- 2-4 General description - cargo
- 2-5 Operating instructions - cargo

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CHAPTER 2-1

FLAT PLATFORM

CONTENTS

Para

- 1 Introduction (WARNING)
- 4 ISO twistlocks (WARNINGS)
- 4 Preparing the flat platform for an ISO container
- 5 Locking an ISO container in position
- 6 Unlocking an ISO container
- 7 Stowing the ISO twistlocks
- 8 Flatbed floor access ladder (WARNINGS)

Fig

Page

1	ISO twistlocks and floor shackles .....	2
2	Preparing the flat platform for an ISO container.....	3
3	Lift the container guide block.....	3
4	Locking an ISO container .....	4
5	Stowing the ISO twistlocks .....	5
6	Install the access ladder .....	6
7	Stow the access ladder .....	7
8	Secure the ladder .....	7

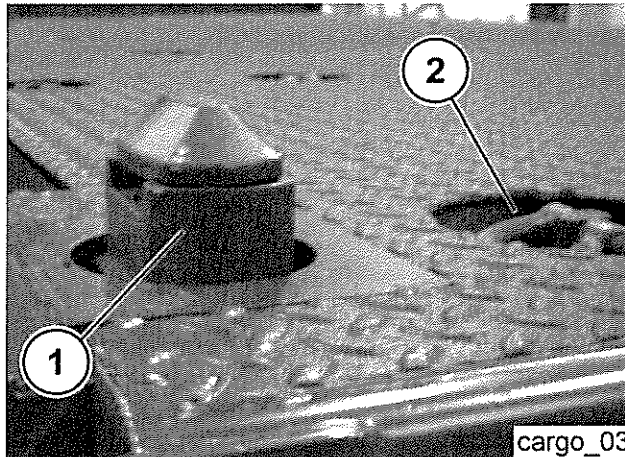
**INTRODUCTION**

1 Refer to Fig 1. This chapter provides the operating instructions for the flat platform.

**WARNING**

**PERSONAL INJURY. MAKE SURE THAT ALL PERSONNEL ARE CLEAR OF THE AREA DURING LOADING AND UNLOADING OPERATIONS.**

- 2 ISO twistlocks (1) allow ISO containers to be carried securely.
- 3 Floor shackles (2) are located on the flatbed floor for securing loads.



1 – ISO twistlocks

2 – Floor shackles

Fig 1 ISO twistlocks and floor shackles

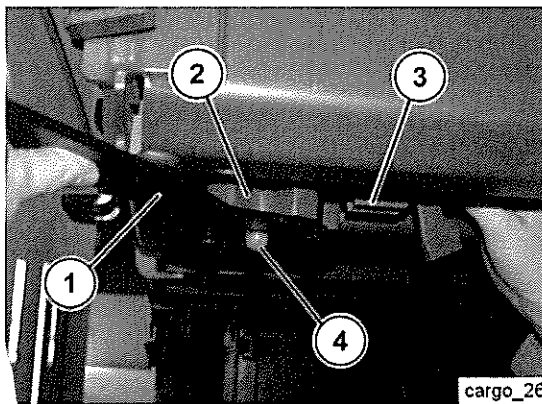
**ISO TWISTLOCKS****WARNINGS**

- (1) **RISK OF INJURY. BEWARE OF THE FLOOR RECESSES CONTAINING THE CARGO TIE DOWN RINGS AS THEY ARE A POTENTIAL TRIP HAZARD.**
- (2) **RISK OF INJURY. TWISTLOCKS MUST ALWAYS BE POSITIONED SO THAT THEY DO NOT PROTRUDE ABOVE THE FLAT PLATFORM WHEN THEY ARE NOT IN USE TO PREVENT A TRIP HAZARD.**
- (3) **PERSONAL INJURY. SAFETY GLOVES MUST BE WORN WHEN OPERATING THE ISO TWISTLOCKS.**
- (4) **PERSONAL INJURY. CARE MUST BE TAKEN TO AVOID FINGER TRAPS WHEN USING THE SPANNER AND LOCKING LUGS.**

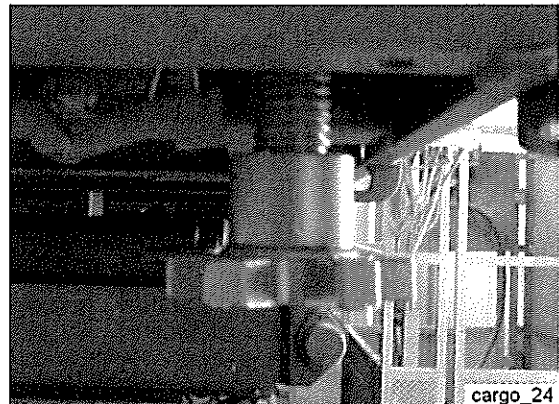


**Preparing the flat platform for an ISO container**

- 4 Refer to Fig 2. To prepare the flat platform for an ISO container, proceed as follows:
  - 4.1 Lift the locking lug (3) to disengage it from the locknut (2).
  - 4.2 Loosen the locknut using the locknut spanner (1).
  - 4.3 Remove the locknut spanner and unscrew the locknut fully by hand.
  - 4.4 When the locknut has been fully unscrewed the orange lock indicator (4) will be hidden from view inside the locknut.



1 – Locknut spanner  
2 – Locknut



3 – Locknut spanner  
4 – Orange lock indicator

Fig 2 Preparing the flat platform for an ISO container

- 4.5 Refer to Fig 3. Rotate the locknut anticlockwise and lift the container guide block (1) and turn through 90° until the guide block is correctly aligned.
- 4.6 Release the guide block to lock in position.
- 4.7 Repeat the procedure for all the ISO twistlocks being used to secure the ISO container to flat platform.

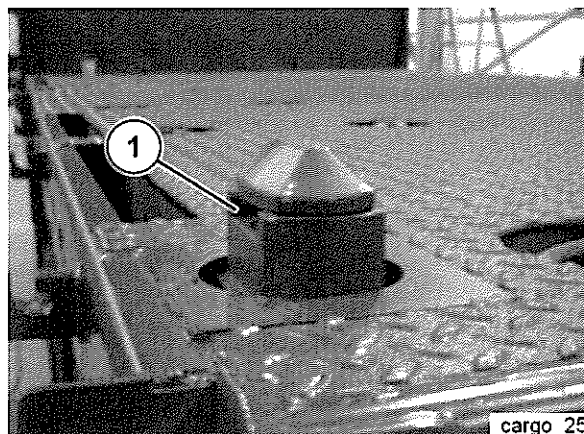
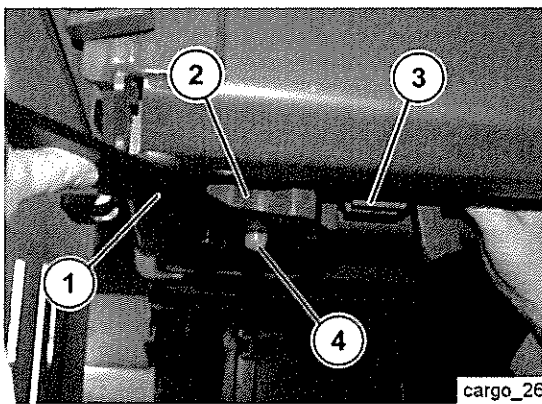


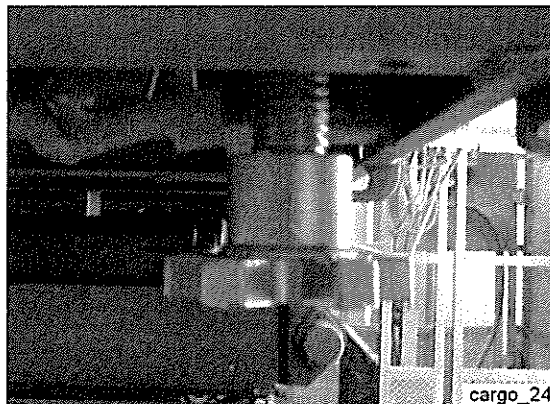
Fig 3 Lift the container guide block

**Locking an ISO container in position**

- 5 Refer to Fig 4. To lock the ISO container in position, proceed as follows:
  - 5.1 Load the ISO container.
  - 5.2 Rotate the locknut through 90° to lock the ISO container in position.
  - 5.3 Lift the locking lug (3) and hold clear of the locknut (2).
  - 5.4 Tighten the locknut by hand as much as possible.
  - 5.5 Fully tighten the locknut using the locknut spanner (1).
  - 5.6 Position the locking lug in the recessed part of the locknut. Make sure that the locking lug is properly engaged.
  - 5.7 Check that the orange indicator (4) visibly protrudes below the locknut to confirm the ISO container is securely locked to the flat platform.
  - 5.8 Repeat the procedure for all the ISO twistlocks being used to secure the ISO container to flat platform.



1 – Locknut spanner  
2 – Locknut



3 – Locknut spanner  
4 – Orange block indicator

Fig 4 Locking an ISO container

**Unlocking an ISO container**

- 6 Refer to Fig 4. To unlock an ISO container, proceed as follows:
  - 6.1 Lift the locking lug (3) to disengage it from the locknut (2).
  - 6.2 Loosen the locknut using the locknut spanner (1).
  - 6.3 Remove the locknut spanner and unscrew the locknut fully by hand.
  - 6.4 When the locknut has been fully unscrewed the orange lock indicator (4) will be hidden from view inside the locknut.
  - 6.5 Rotate the locknut through 90° to unlock the ISO container.
  - 6.6 Repeat the procedure for all the ISO twistlocks that were used to secure the ISO container to flat platform.

- 6.7 Unload the ISO container.

### Stowing the ISO twistlocks

- 7 Refer to Fig 5. To stow the ISO twistlocks, proceeds as follows:

- 7.1 Lift the guide block (1) and turn through 90° and rotate the locknut clockwise.
- 7.2 Lower the guide block into the stowed position.
- 7.3 Tighten the locknut by hand as much as possible.
- 7.4 Fully tighten the locknut using the locknut spanner.
- 7.5 Position the locking lug in the recessed part of the locknut.
- 7.6 Repeat the procedure for all the ISO twistlocks that were used to secure the ISO container to flat platform.
- 7.7 Make sure that the ISO twistlocks are positioned so that they do not protrude above the flat platform.

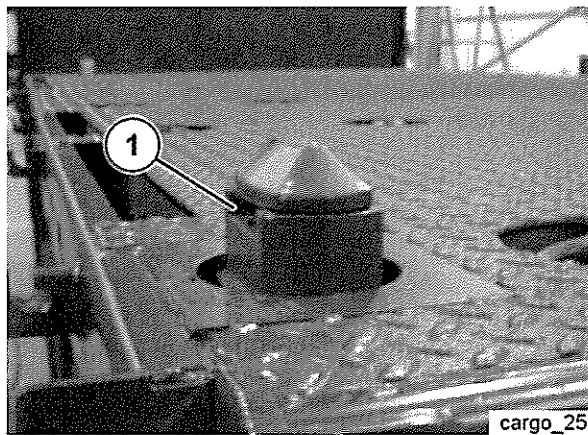


Fig 5 Stowing the ISO twistlocks

### FLATBED FLOOR ACCESS LADDER

#### WARNINGS

- (1) **PERSONAL INJURY. WHEN CLIMBING ON/OFF THE FLATBED MAKE SURE THAT A THREE POINT CONTACT IS MAINTAINED AT ALL TIMES. I.E. HOLD RAIL/BODY WITH BOTH HANDS AND ONE FOOT ON STEP.**
- (2) **PERSONAL INJURY. ALWAYS EXTEND OR RETRACT THE HANDRAIL WITH THE LADDER RESTING ON THE GROUND IN A HORIZONTAL POSITION. NEVER EXTEND OR RETRACT THE HANDRAIL IN THE VERTICAL POSITION.**
- (3) **PERSONAL INJURY. THE ACCESS LADDER MUST ALWAYS BE USED WITH THE HANDRAIL EXTENDED AND LOCKED IN POSITION.**
- (4) **PERSONAL INJURY. THE ACCESS LADDER MUST ONLY BE USED WHEN ATTACHED TO THE FLATBED IN THE DESIGNATED SLOTS.**
- (5) **PERSONAL INJURY. DO NOT USE THE LADDER WHEN DROPSIDES ARE FITTED TO THE VEHICLE.**

(6) **RISK OF ACCIDENTS. PRIOR TO MOVING OFF, THE ACCESS LADDER (FITTED BENEATH THE FLATBED) MUST BE CORRECTLY STOWED AND ITS RETAINING PIN ENGAGED INTO POSITION AND MADE SECURE. THIS IS TO PREVENT THE DETACHMENT OF THE LADDER WHILE THE VEHICLE IS BEING DRIVEN ON PUBLIC ROADS.**

8 Refer to Fig 6. To install the access ladder, proceed as follows:

NOTE

If the seating system is fitted, the ladder cannot be used and should be stored at the Quarter Master's stores.

8.1 Remove the securing pin and slide the access ladder from its stowage beneath the flatbed at the rear of the vehicle.

8.2 Place the ladder on the ground in the horizontal position.

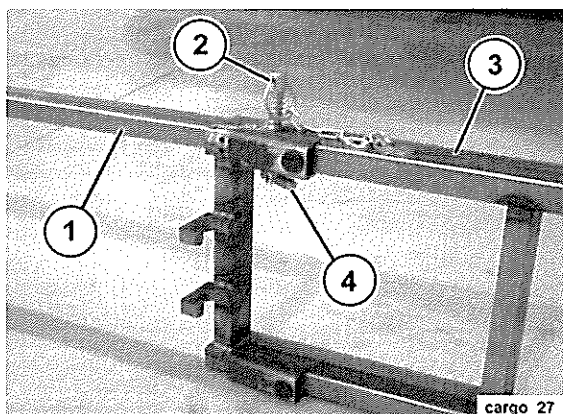
8.3 Remove the handrail retaining pin (2) from the ladder frame (3).

8.4 Extend the handrail (1) until the holes in the ladder frame (3) and the handrail (1) are aligned.

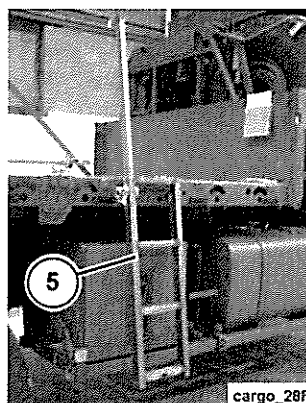
8.5 Insert the handrail retaining pin (2) and rotate the swivel part (4) to lock the pin in position.

8.6 Lift the ladder (5) into position at a convenient place over the flatbed side.

8.7 Make sure that the ladder (5) is securely located in the slots on the top edge of the flatbed side channel before use.



- 1 – Handrail
- 2 – Handrail retaining pin
- 3 – Ladder frame
- 4 – Swivel part

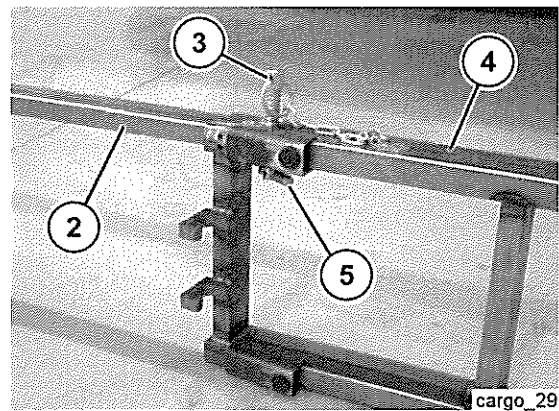
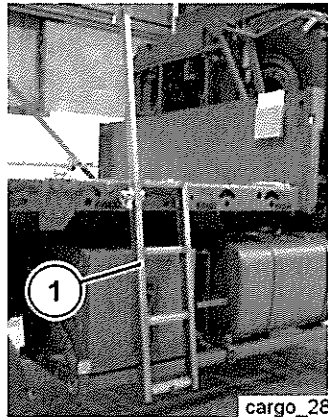


- 5 – Ladder

Fig 6 Install the access ladder

9 Refer to Fig 7. To stow the access ladder, proceed as follows:

- 9.1 Lift the ladder (1) vertically and clear of the vehicle flatbed.
- 9.2 Place the ladder on the ground.
- 9.3 Remove the handrail retaining pin (3) from the ladder frame (4).
- 9.4 Retract the handrail (2) until the holes in the ladder frame and the handrail are aligned.
- 9.5 Insert the retaining pin and rotate the swivel part (5) to lock the pin in position.



- 1 – Ladder
- 2 – Handrail
- 3 – Handrail retaining pin

- 4 – Ladder frame
- 5 – Swivel part

Fig 7 Stow the access ladder

9.6 Slide the access ladder into its stowage beneath the flatbed.

9.7 Refer to Fig 8. Make sure that the ladder is securely stowed by engaging and securing the retaining pin (6).

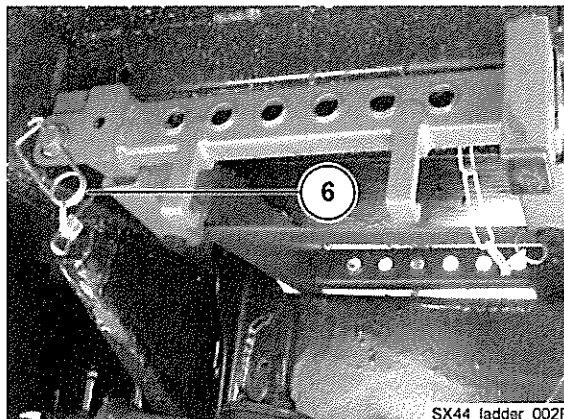


Fig 8 Secure the ladder

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CHAPTER 2-2

FALCON VARIANT

CONTENTS

Para

- 1 Introduction
- 2 Falcon generator operation
- 3 Prepare the hydraulic generator
- 4 Operate the power take-off

Fig

Page

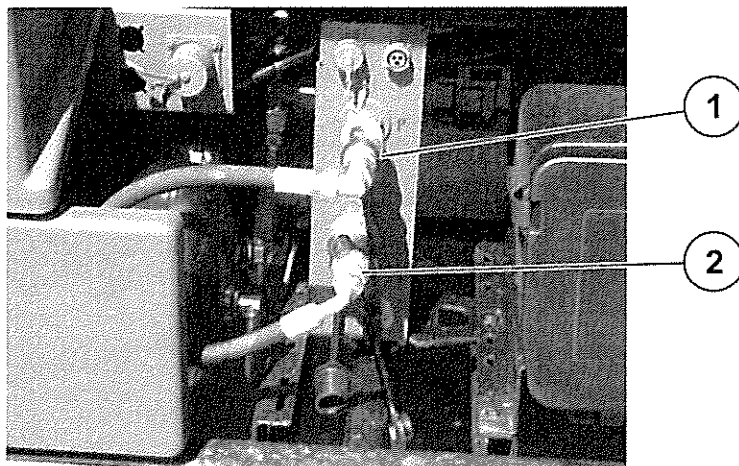
1	Hydraulic coupling connections on the interface panel .....	2
2	Bypass valve in the closed position.....	2
3	PTO switch .....	3

**INTRODUCTION**

1 This chapter provides the operating instructions for the hydraulically powered generator as fitted to the FALCON variant of the HX60 6 Tonne MM Flat platform.

**FALCON generator operation**

2 Refer to Fig 1. The FALCON variant is powered by a hydraulic generator supplied with pressurized fluid from the PTO system of the truck, connected through the hydraulic connection interface panel.



1 – Supply hose

2 – Return hose

1398A011

Fig 1 Hydraulic coupling connections on the interface panel

**Prepare the hydraulic generator**

3 Refer to Fig 2. If operating for the first time, activate the hydraulic generator; proceed as follows:

- 3.1 Locate the bypass valve on the left-hand side of the vehicle.
- 3.2 Rotate the bypass valve lever (1) through 90 degrees to the closed position (3 o'clock position).

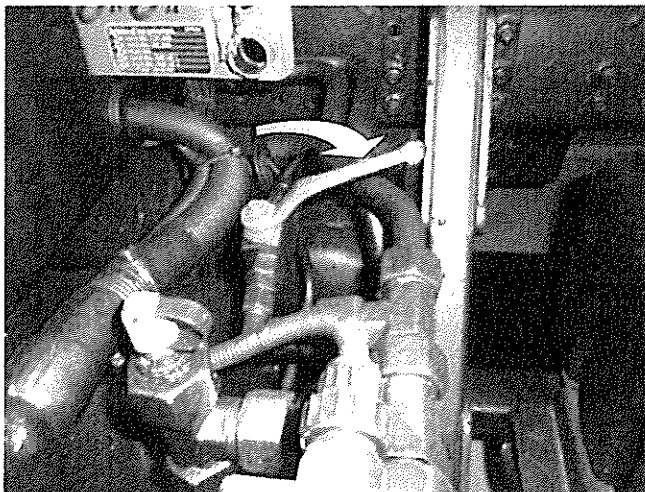


Fig 2 Bypass valve in the closed position

1398A012



**Operate the power take-off**

4 Refer to Fig 3. To engage the Power Take-Off (PTO), proceed as follows:

**NOTE**

The vehicle cannot be put into gear when the PTO is engaged.

- 4.1 Make sure that the vehicle is stationary and the parking brake is applied.
  - 4.2 Run the engine at idle speed.
  - 4.3 Make sure that the gear switch is in N.
  - 4.4 Press the bottom of the PTO switch. The check lamp in the switch comes on.
- 5 To disengage the PTO, press the top of the switch. The check lamp in the switch goes off.

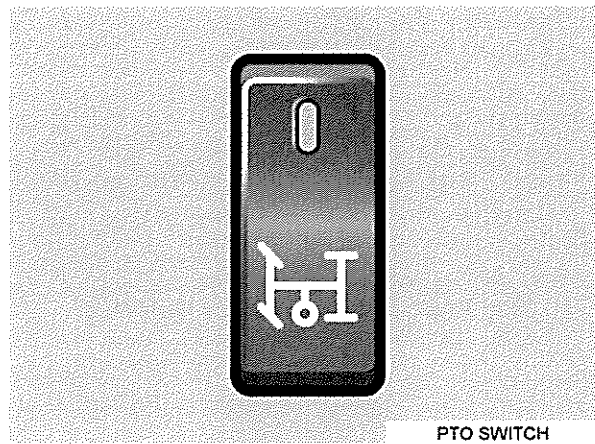


Fig 3 PTO switch

6 If disconnection of the hydraulic generator is required, the supply and return hoses must be disconnected and the bypass hose, stored in the CES locker, must be fitted to the hydraulic connection interface panel.

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**CHAPTER 2-3**

**TECHNICAL DATA - CARGO**

**CONTENTS**

Para

- 1 Introduction
- 2 Specification cargo body
- 2 Physical data

**INTRODUCTION**

- 1 This chapter provides technical data for the cargo body.

**SPECIFICATION CARGO BODY**

**Physical data**

2 This section details the physical data for the cargo body.

Height to top of cargo canopy unladen .....	3560mm
Height to top of cargo canopy laden .....	3475mm
Useable length .....	5900mm
Useable width .....	2450mm

CHAPTER 2-4

GENERAL DESCRIPTION – CARGO

CONTENTS

Para

- 1 Introduction
- 2 Configuration

Fig

Page

1	Cargo body configuration (1).....	2
2	Cargo body configuration (2).....	2

**INTRODUCTION**

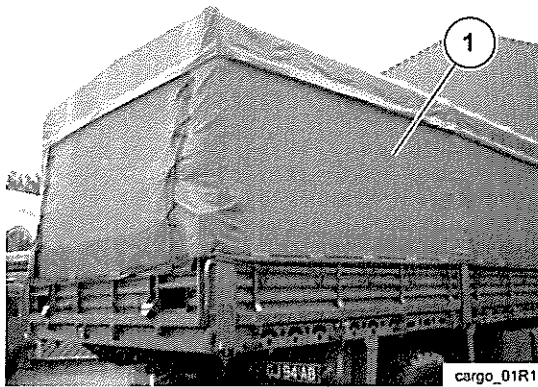
1 This chapter provides a general description of the cargo body.

**CONFIGURATION**

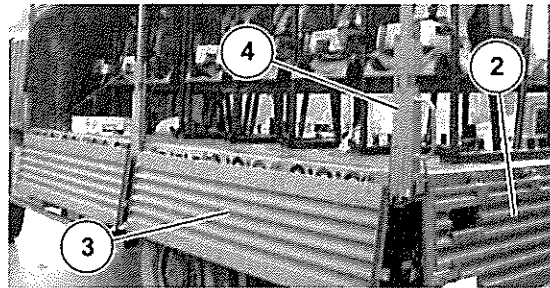
2 Refer to Fig 1. The cargo body is fitted with a removable canvas tilt (1).

3 The tailboard (2) and dropside panels (3) fold down for loading.

4 The tailboard, dropside panels and posts (4) are removable to allow the cargo body to be turned into a flatbed loading area.



1 – Removable canvas tilt  
2 – Tailboard



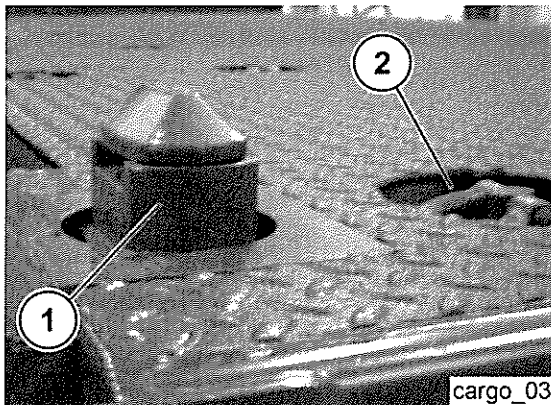
3 – Dropside panels  
4 – Posts

Fig 1 Cargo body configuration (1)

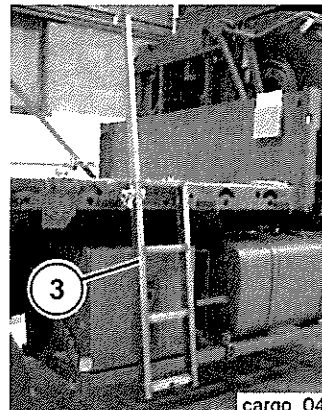
5 Refer to Fig 2. ISO twistlocks (1) allow ISO containers to be carried securely.

6 Floor shackles (2) are located on the flatbed floor for securing loads.

7 A ladder (3) is provided for access to the flatbed floor.



1 – ISO twistlocks  
2 – Floor shackles



3 – Ladder

Fig 2 Cargo body configuration (2)

CHAPTER 2-5

OPERATING INSTRUCTIONS – CARGO AND TAIL LIFT

CONTENTS

Para

- 1 Introduction (WARNINGS)
- 2 Tilt cover sidesheets (WARNING)
- 4 Tailboard (WARNINGS) (CAUTION)
- 6 Dropside panels (WARNINGS)
- 8 Removing the tilt (WARNINGS) (CAUTION)
  - 8 Removing the front and rear curtains and sidesheets
  - 9 Removing the tilt canopy (WARNINGS)
  - 10 Removing the tilt frame (WARNINGS)
  - 11 Removing the tailboard (WARNINGS)
  - 12 Removing the dropside panels (WARNINGS)
  - 13 Removing the posts (WARNINGS)
- 15 Installing the tilt (WARNINGS) (CAUTION)
  - 15 Installing the posts (WARNINGS)
  - 16 Installing the dropside panels (WARNINGS)
  - 17 Installing the tailboard (WARNINGS)
  - 18 Installing the tilt frame (WARNING)
  - 19 Installing the tilt canopy (WARNINGS)
  - 20 Installing the front and rear curtains and sidesheets
- 21 ISO twistlocks (WARNINGS)
  - 21 Preparing the flatbed floor for an ISO container
  - 22 Locking an ISO container in position
  - 23 Unlocking an ISO container
  - 24 Stowing the ISO twistlocks
- 25 Flatbed floor access ladder (WARNINGS)

Fig

Page

1	Tilt cover sidesheets.....	2
2	Lower/raise the tailboard.....	4
3	Lower/raise the dropside panels.....	5
4	Removing the front and rear curtains and sidesheets.....	6
5	Removing the tilt canopy.....	7
6	Removing the cords and straps.....	8
7	Remove the straps and cross rails.....	9
8	Removing the tailboard.....	10
9	Removing the dropside panels.....	11
10	Removing the posts.....	13
11	Installing the dropside panels.....	14
12	Installing the dropside panels.....	15
13	Fit the pillars and connection rails.....	16
14	Securing the pillars and cross rails.....	16
15	Installing the tilt canopy.....	17
16	Installing the front and rear curtains and sidesheets.....	18
17	Preparing the flatbed floor for an ISO container.....	19
18	Container guide block.....	19
19	Preparing the flatbed floor for an ISO container.....	20
20	Unlocking an ISO container.....	21
21	Stowing the ISO twistlocks.....	22
22	Flatbed floor access ladder.....	23
23	Stowing the access ladder.....	24
24	Ladder retaining pin.....	24

**INTRODUCTION**

1 This chapter provides the operating instructions for the cargo body.

**WARNINGS**

(1) **PERSONAL INJURY. MAKE SURE THAT ALL PERSONNEL ARE CLEAR OF THE AREA DURING LOADING AND UNLOADING OPERATIONS.**

(2) **RISK OF INJURY. TO PREVENT A TRIP HAZARD DURING REMOVAL AND INSTALLATION OF EQUIPMENT MAKE SURE THAT ALL ITEMS ARE REMOVED FROM THE FLATBED AND STORED CLEAR OF OPERATIONS.**

**TILT COVER SIDESHEETS****WARNING**

**RISK OF INJURY. MAKE SURE THAT THE TAILBOARD AND DROPSIDE PANELS ARE RAISED TO AVOID FALLING FROM VEHICLE CHASSIS WHILE WORKING AT HEIGHT.**

2 Refer to Fig 1. To roll up the tilt cover sidesheets, proceed as follows:

2.1 Unhook the ropes (1) from the chassis, dropside panels and tailboard cleats.

2.2 Unhook the sidesheets (3) from the front and rear curtains (2).

2.3 Release the straps (4) securing the sidesheets to the pillars.

2.4 Roll up the sidesheets and rear curtain to the roof canopy and secure with the straps (5).

3 To roll down the tilt cover sidesheets, proceed as follows:

3.1 Release the straps (5) and roll down the sidesheets (3) and rear curtain (2).

3.2 Secure the sidesheets to the pillars using the straps (4).

3.3 Secure the sidesheets to the front and rear curtains.

3.4 Secure the ropes (1) to the chassis, dropside panels and tailboard cleats.

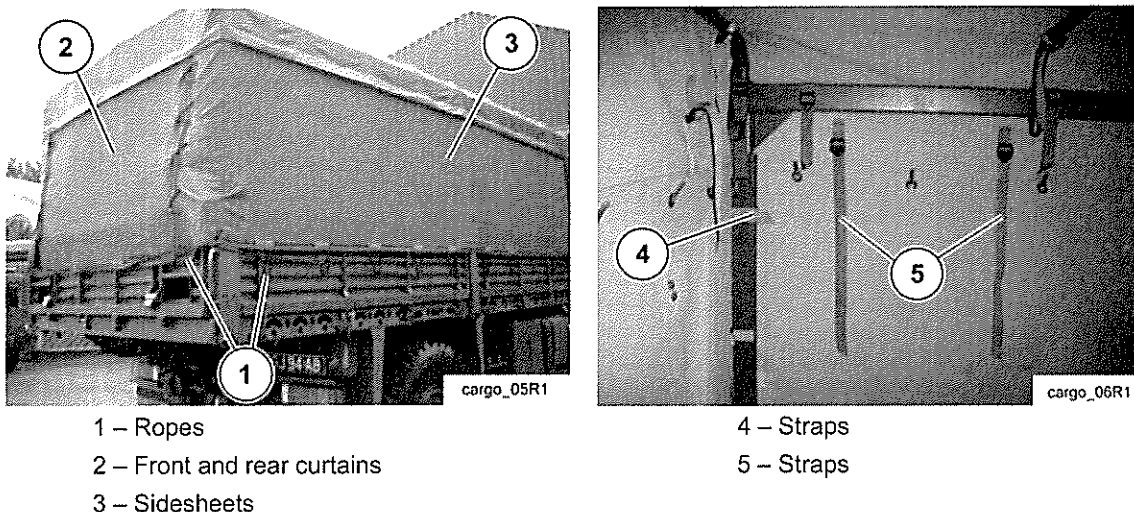


Fig 1 Tilt cover sidesheets



## TAILBOARD

### WARNINGS

- (1) RISK OF INJURY. DO NOT MOVE THE CANTILEVER HANDLES PAST THE CENTRE POSITION.
- (2) RISK OF INJURY. DO NOT LEAVE THE CANTILEVER HANDLES IN THE CENTRE POSITION.
- (3) PERSONAL INJURY. WEAR PROTECTIVE GLOVES.

### CAUTION

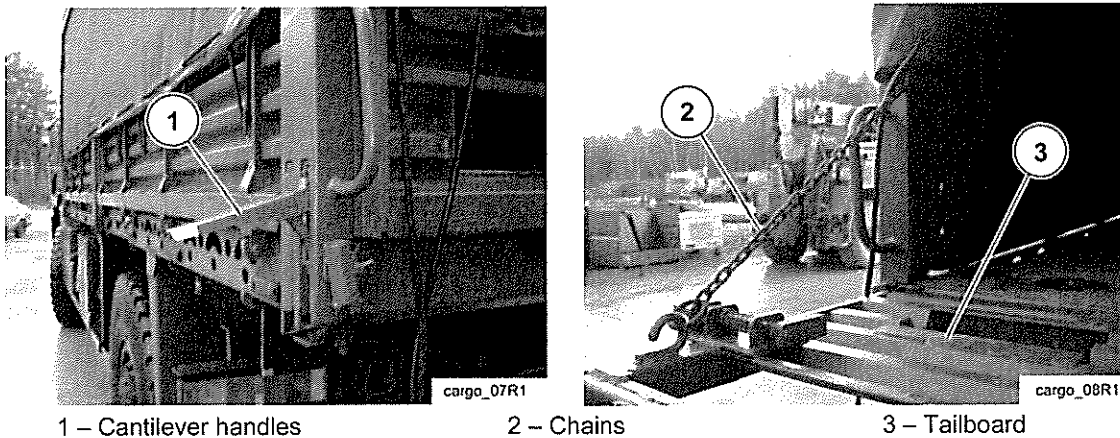
**DAMAGE TO EQUIPMENT.** Do not use the tailboard as a ramp.

- 4 Refer to Fig 2. To lower the tailboard, proceed as follows:
  - 4.1 Unhook the rear curtain rope from the tailboard cleats.
  - 4.2 Unhook the rear curtain from the sidesheets.
  - 4.3 Using two persons, hold the tailboard and move the cantilever handles (1) on the rear posts up to the centre position.
  - 4.4 Lower and the tailboard (3) to the horizontal position.
  - 4.5 Lower the cantilever handles so that they are flush with the posts.
  - 4.6 Raise the tailboard to just above the horizontal position.
  - 4.7 Release the chains (2) from the tailboard attachments and store in the storage pockets on the posts.
  - 4.8 Carefully lower the tailboard.

### WARNING

**PERSONNEL INJURY. FALL HAZARD. PERSONNEL MUST NOT RELEASE THE LOCKING HANDLES FOR THE TAILBOARD FROM INSIDE THE TROOP COMPARTMENT. ATTEMPTING TO LOWER THE TAILBOARD FROM INSIDE THE VEHICLE IS A DANGEROUS PRACTICE.**

- 4.9 The tailboard must be fully lowered to enable mounting, dismounting and loading of the cargo bed.
- 5 To raise the tailboard, proceed as follows:
  - 5.1 Using two persons, lift up the tailboard (3) to above the horizontal position.
  - 5.2 Remove the chains (2) from the chain stowage pockets in the posts.
  - 5.3 Attach the free end of the chain to the hook on the tailboard.
  - 5.4 Move the cantilever handles (1) on the rear posts up to the centre position.
  - 5.5 Raise the tailboard and lower the cantilever handles so they are flush with the posts.
  - 5.6 Make sure that the tailboard is securely locked in position.



1 – Cantilever handles

2 – Chains

3 – Tailboard

Fig 2 Lower/raise the tailboard

**DROPSIDE PANELS****WARNINGS**

(1) **RISK OF INJURY. DO NOT MOVE THE CANTILEVER HANDLES PAST THE CENTRE POSITION.**

(2) **RISK OF INJURY. DO NOT LEAVE THE CANTILEVER HANDLES IN THE CENTRE POSITION.**

(3) **PERSONAL INJURY. WEAR PROTECTIVE GLOVES.**

6 Refer to Fig 3. To lower the dropside panels, proceed as follows:

6.1 Unhook the sidesheet rope from the dropside panel cleats, refer to Para 2.1.

6.2 Unhook the sidesheets from the front and rear curtains, refer to Para 2.2.

6.3 Using two persons, hold the dropside panel and move the cantilever handles (1) on the posts up to the centre position.

6.4 Lower the dropside panel (2) to the horizontal position.

6.5 Lower the cantilever handles so that they are flush with the posts.

6.6 Raise the dropside panel to just above the horizontal position.

6.7 Release the chains (3) from the dropside panel attachments and store in the storage pockets on the posts.

6.8 Carefully lower the dropside panel.

7 To raise the dropside panels, proceed as follows:

7.1 Using two persons, lift up the dropside panel (2) to above the horizontal position.

7.2 Remove the chains (3) from the chain stowage pockets in the posts.

7.3 Attach the free end of the chain to the hook on the dropside panel.

7.4 Move the cantilever handles (1) on the posts up to the centre position.

- 7.5 Raise the dropside panel and lower the cantilever handles so they are flush with the posts.
- 7.6 Make sure that the dropside panel is securely locked in position.

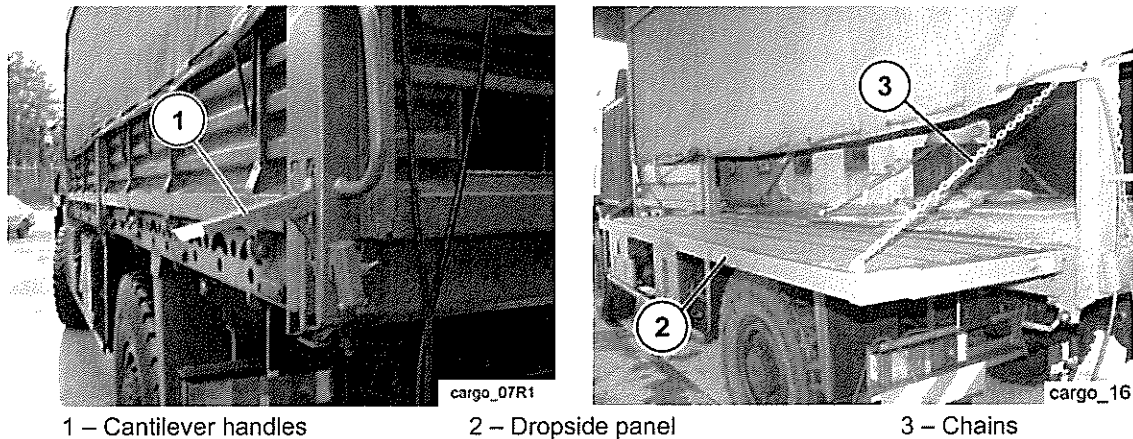


Fig 3 Lower/raise the dropside panels

## REMOVING THE TILT

### WARNINGS

- (1) **RISK OF INJURY. REMOVAL OF THE CARGO BODY MUST BE CARRIED OUT BY A MINIMUM OF TWO TRAINED PERSONS.**
- (2) **RISK OF INJURY. WEAR A HARD HAT, SAFETY GOGGLES, PROTECTIVE GLOVES AND SUITABLE FOOTWEAR.**
- (3) **RISK OF INJURY. THE CARGO BODY MUST NOT BE LEFT OR USED IN THE PARTIALLY ASSEMBLED CONDITION.**
- (4) **RISK OF INJURY. REMOVAL OF THE TILT COVER MUST BE CARRIED OUT WITH EXTREME CAUTION DURING ADVERSE WEATHER CONDITIONS.**

### CAUTION

**DAMAGE TO EQUIPMENT.** Make sure that the left and right rail box sections are free from damage, burring and sharp edges that would cause damage to the tilt cover.

### Removing the front and rear curtains and sidesheets

- 8 Refer to Fig 4. To remove the front and rear curtains and sidesheets, proceed as follows:

### NOTE

Release the canvas panels from their hooks and velcro fixings, working from the front towards the rear.

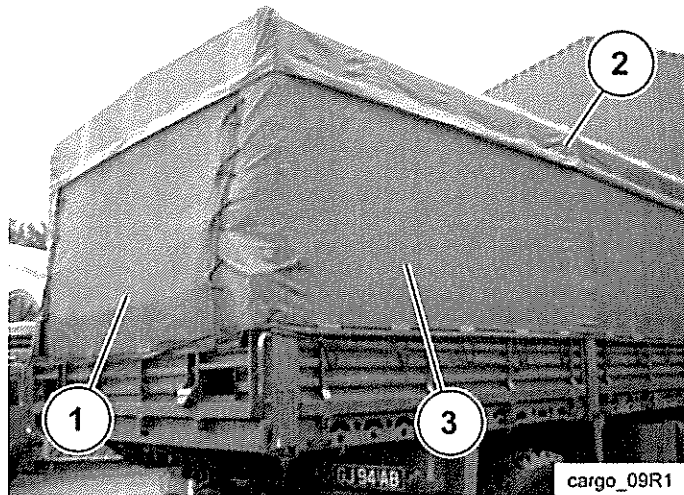
- 8.1 Unhook the ropes from the chassis, dropside panels and tailboard cleats.
- 8.2 Release the straps from the staples which attach the front curtain to the bulkhead.
- 8.3 Unhook the sidesheets (3) from the front and rear curtains (1).
- 8.4 Release the straps securing the sidesheets to the pillars.

8.5 Unhook the front and rear curtains from the tilt canopy (2).

8.6 Fold and store the front and rear curtains so that the identifier and weight information on the curtains remains visible.

8.7 Unhook the sidesheets from the tilt canopy.

8.8 Fold and store the sidesheets so that the identifier and weight information on the sidesheets remains visible.



1 – Front and rear curtains

2 – Tilt canopy

3 – Sidesheets

Fig 4 Removing the front and rear curtains and sidesheets

### Removing the tilt canopy

#### WARNINGS

(1) RISK OF INJURY. WHEN REMOVING THE TILT CANOPY BE AWARE OF THE SIDE AND REAR EDGES OF THE FLATBED TO AVOID FALLING WHEN LOOKING UP TO ROLL BACK THE CANOPY.

(2) RISK OF INJURY. WHEN REMOVING THE TILT CANOPY FROM THE VEHICLE MAKE SURE THERE ARE SUFFICIENT PERSONNEL TO LOWER THE CANOPY TO THE GROUND.

9 Refer to Fig 5. To remove the tilt canopy, proceed as follows:

- 9.1 Release all the straps (1) securing the tilt canopy to the cross rails.
- 9.2 Fold both side flaps up on top of the roof canopy.
- 9.3 Roll back the tilt canopy, working from the rear towards the front.
- 9.4 Carefully slide the tilt canopy off the tilt frame onto the flatbed floor.
- 9.5 Remove the tilt canopy from the flatbed floor.

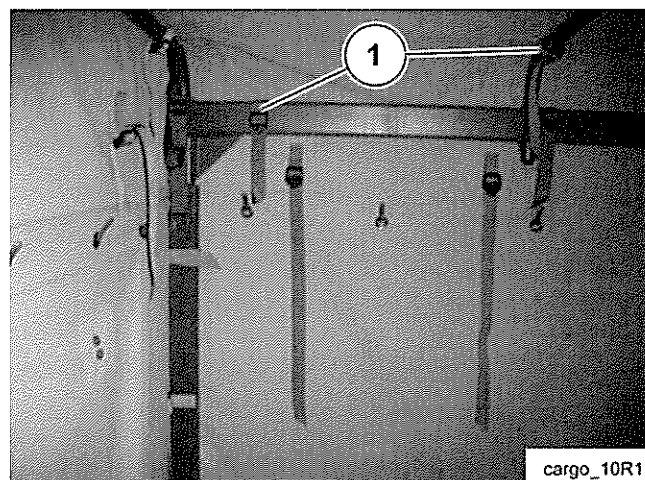


Fig 5 Removing the tilt canopy

**Removing the tilt frame****WARNINGS**

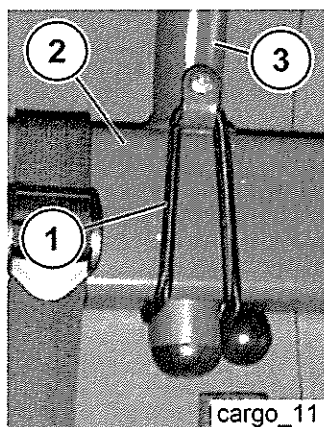
(1) **PERSONAL INJURY. THE CROSS RAIL ASSEMBLIES MUST BE CAREFULLY AND EVENLY REMOVED FROM THE CONNECTION RAILS BY TWO PERSONS, ONE ON EITHER END OF THE CROSS RAIL ASSEMBLY.**

(2) **PERSONAL INJURY. WHEN REMOVING THE TILT FRAME MAKE SURE THE DROPSIDE PANELS ARE RAISED TO AVOID FALLING OFF THE FLATBED.**

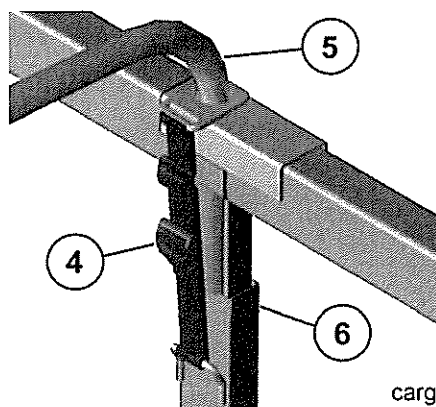
10 Refer to Fig 6. To remove the tilt frame, proceed as follows:

10.1 Undo the retaining cords (1) from the connection rails (2) and the cross rails (3).

10.2 Release the straps (4) that secure the pillar (6) to the cross rails (5).



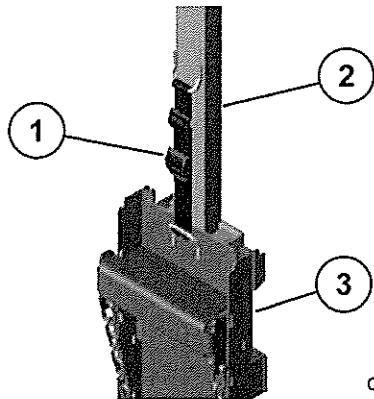
- 1 – Retaining cords
- 2 – Connection rails
- 3 – Cross rails



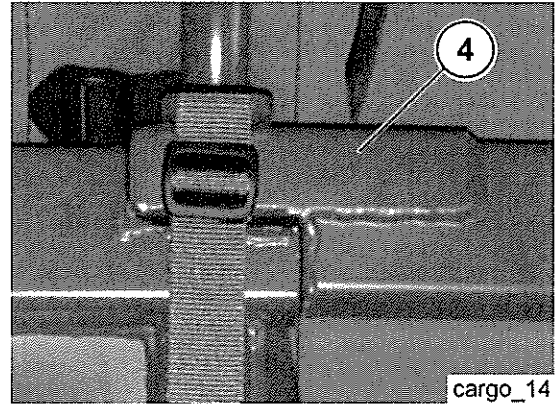
- 4 – Straps
- 5 – Cross rails
- 6 – Pillar

Fig 6 Removing the cords and straps

- 10.3 Refer to Fig 7. Release the straps (1) that secure the pillar (2) to the post (3).
- 10.4 Remove the intermediate cross rails from the connection rails.
- 10.5 Remove the front, centre and rear cross rails from the connection rails.
- 10.6 Remove the connection rails from the pillars. The connection rails with the overlapping sleeve (4) must be removed first.
- 10.7 Remove the pillars from the posts.



1 – Straps  
2 – Pillar



3 – Post  
4 – Overlapping sleeve

Fig 7 Remove the straps and cross rails

### Removing the tailboard

11 Refer to Fig 8. To remove the tailboard, proceed as follows:

11.1 Make sure that the tailboard is in the lowered position with the chains released and stowed, refer to Para 4.

11.2 Push the pin (2) against the spring pressure and rotate the swivel part (1) to align axially with the pin shaft.

11.3 Remove the pin.

#### WARNINGS

(1) **PERSONAL INJURY. THE TAILBOARD IS HEAVY AND IS A MANDATORY TWO PERSON LIFT WHEN REMOVING.**

(2) **PERSONAL INJURY. WEAR PROTECTIVE GLOVES.**

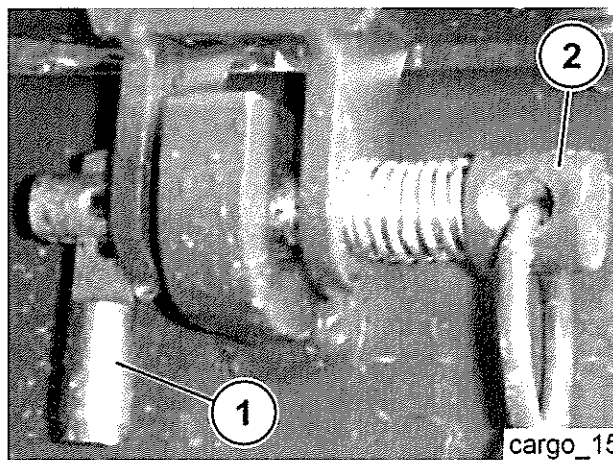
(3) **PERSONAL INJURY. DO NOT PLACE FINGERS BETWEEN THE TAILBOARD HINGES AND THE FLATBED.**

(4) **PERSONAL INJURY. LIFT OFF BOTH ENDS OF THE TAILBOARD AT THE SAME TIME.**

11.4 With one person at each end of the tailboard, lift the tailboard off the hinges.

11.5 Check the pin for damage and clean if necessary.

11.6 Insert the pin through the mounting hinge on the tailboard.



1 – Swivel part

2 – Pin

Fig 8 Removing the tailboard



### Removing the dropside panels

12 Refer to Fig 9. To remove the dropside panels, proceed as follows:

12.1 Make sure that the dropside panel is in the lowered position with the chains released and stowed, refer to Para 6.

12.2 Push the pin (2) against the spring pressure and rotate the swivel part (1) to align axially with the pin shaft.

12.3 Remove the pin.

#### WARNINGS

(1) **PERSONAL INJURY. THE DROPSIDE PANEL IS HEAVY AND IS A MANDATORY TWO PERSON LIFT WHEN REMOVING.**

(2) **PERSONAL INJURY. WEAR PROTECTIVE GLOVES.**

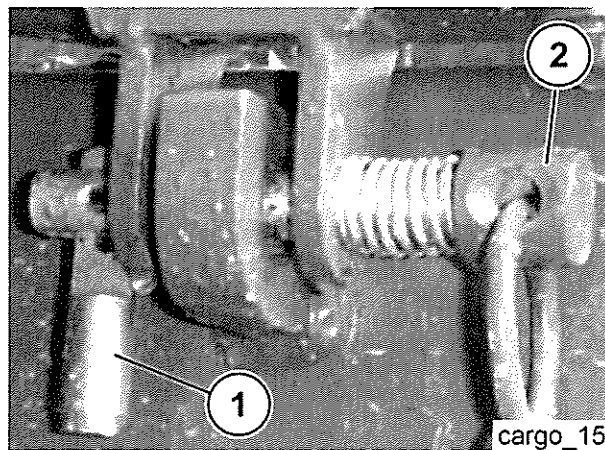
(3) **PERSONAL INJURY. DO NOT PLACE FINGERS BETWEEN THE DROPSIDE PANEL HINGES AND THE FLATBED.**

(4) **PERSONAL INJURY. LIFT OFF BOTH ENDS OF THE DROPSIDE PANEL AT THE SAME TIME.**

12.4 With one person at each end of the dropside panel, lift the dropside panel off the hinges.

12.5 Check the pin for damage and clean if necessary.

12.6 Insert the pin through the mounting hinge on the dropside panel.



1 – Swivel part

2 – Pin

Fig 9 Removing the dropside panels

**Removing the posts**

- 13 The posts attached to the front bulkhead are not removable.
- 14 Refer to Fig 10. To remove the remaining posts, proceed as follows:

**WARNING**

**PERSONAL INJURY. THE POSTS MUST ALWAYS BE SUPPORTED ONCE THE LEVER HAS BEEN PUSHED TO THE POST RELEASE POSITION.**

- 14.1 Support the post and move the two cantilever handles (1) upwards to the fully raised position.

**WARNINGS**

- (1) **PERSONAL INJURY. THE POSTS WEIGH IN EXCESS OF 10KG.**
- (2) **RISK OF INJURY. WHEN REMOVING THE POSTS HOLD THE CHAINS IN A SECURE POSITION TO AVOID THEM SWINGING OUT OF CONTROL.**

- 14.2 Hold the post and the chain firmly, allow the post to lean out away from the flatbed and lift the post out of the housing.

- 14.3 Carefully lower the post to the ground.

- 14.4 Lower the cantilever handles so they are flush with the posts.

**INSTALLING THE TILT****WARNINGS**

- (1) **RISK OF INJURY. INSTALLATION OF THE CARGO BODY MUST BE CARRIED OUT BY A MINIMUM OF TWO TRAINED PERSONS.**
- (2) **RISK OF INJURY. WEAR A HARD HAT, SAFETY GOGGLES, PROTECTIVE GLOVES AND SUITABLE FOOTWEAR.**
- (3) **RISK OF INJURY. THE CARGO BODY MUST NOT BE LEFT OR USED IN THE PARTIALLY INSTALLED POSITION.**
- (4) **RISK OF INJURY. INSTALLATION OF THE TILT COVER MUST BE CARRIED OUT WITH EXTREME CAUTION DURING ADVERSE WEATHER CONDITIONS.**

**CAUTION**

**DAMAGE TO EQUIPMENT.** When installing the rail box sections to the left and right sides of the tilt frame, make sure that the box rail sections are always fitted over the centre pillars from the outside of the tilt frame envelope. This will provide a smooth surface along the whole length of the rail box section for the tilt canvas to rest against.

### Installing the posts

#### WARNINGS

- (1) **PERSONAL INJURY. THE POSTS WEIGH IN EXCESS OF 10KG.**
- (2) **RISK OF INJURY. WHEN INSTALLING THE POSTS HOLD THE CHAINS IN A SECURE POSITION TO AVOID THEM SWINGING OUT OF CONTROL.**
- (3) **RISK OF INJURY. DO NOT LEAVE THE CANTILEVER HANDLES IN THE CENTRE POSITION.**

15 Refer to Fig 10. To install the posts, proceed as follows:

- 15.1 Move the two cantilever handles (1) on the post upwards to the fully raised position.
- 15.2 Holding the post and the chain firmly, slot the lug at the base of the post into the mating slot of the bracket on the flatbed.
- 15.3 Make sure that the two square lugs that protrude from the flatbed fit fully into the socket of the post.
- 15.4 Lower the cantilever handles so they are flush with the posts.
- 15.5 Make sure that the post is securely held in position.

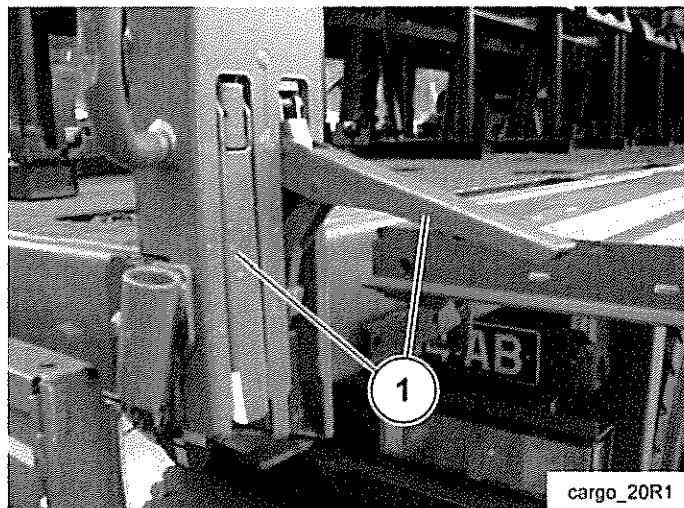
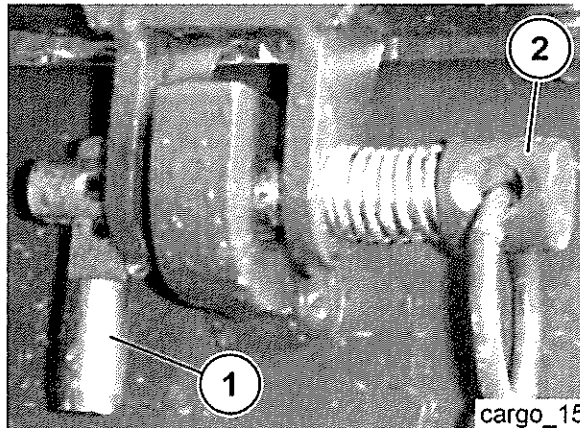


Fig 10 Removing the posts

**Installing the dropside panels****WARNINGS**

- (1) **PERSONAL INJURY. WEAR PROTECTIVE GLOVES.**
- (2) **PERSONAL INJURY. THE DROPSIDE PANEL IS HEAVY AND IS A MANDATORY TWO PERSON LIFT WHEN INSTALLING.**
- (3) **PERSONAL INJURY. DO NOT PLACE FINGERS BETWEEN THE DROPSIDE PANEL HINGES AND THE FLATBED.**
- (4) **PERSONAL INJURY. INSTALL BOTH ENDS OF THE DROPSIDE PANEL AT THE SAME TIME.**

- 16 Refer to Fig 11. To install the dropside panels, proceed as follows:
- 16.1 Remove the pin (2) from the mounting hinge on the dropside panel.
  - 16.2 With one person at each end of the dropside panel, lift the dropside panel onto the hinges.
  - 16.3 Insert the pin through the mounting hinge on the dropside panel and rotate the swivel part (1) to lock the pin in position.
  - 16.4 Raise the dropside panels, refer to Para 7.



1 – Swivel part

2 – Pin

Fig 11 Installing the dropside panels

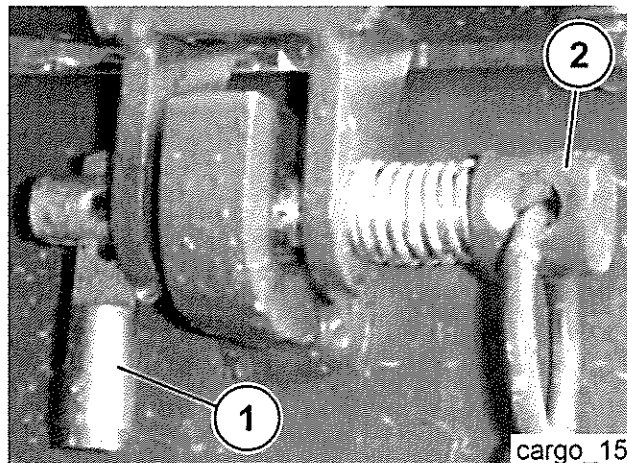
### Installing the tailboard

#### WARNINGS

- (1) **PERSONAL INJURY. WEAR PROTECTIVE GLOVES.**
- (2) **PERSONAL INJURY. THE TAILBOARD IS HEAVY AND IS A MANDATORY TWO PERSON LIFT WHEN REMOVING.**
- (3) **PERSONAL INJURY. DO NOT PLACE FINGERS BETWEEN THE TAILBOARD HINGES AND THE FLATBED.**
- (4) **PERSONAL INJURY. INSTALL BOTH ENDS OF THE TAILBOARD AT THE SAME TIME.**

17 Refer to Fig 12. To install the tailboard, proceed as follows:

- 17.1 Remove the pin (2) from the mounting hinge on the tailboard.
- 17.2 With one person at each end of the tailboard, lift the tailboard onto the hinges.
- 17.3 Insert the pin through the mounting hinge on the tailboard and rotate the swivel part (1) to lock the pin in position.
- 17.4 Raise the tailboard, refer to Para 5.



1 – Swivel part

2 – Pin

Fig 12 Installing the dropside panels

### Installing the tilt frame

#### WARNING

**PERSONAL INJURY. WHEN INSTALLING THE TILT FRAME MAKE SURE THE DROPSIDE PANELS ARE RAISED TO AVOID FALLING OFF THE FLATBED.**

18 Refer to Fig 13. To install the tilt frame, proceed as follows:

- 18.1 Insert the pillars (2) into the posts (3).
- 18.2 Secure the pillars (2) to the posts (3) using the straps (1).

18.3 Insert the connection rails into the pillars. The connection rails with the overlapping sleeve (4) must not be installed over the plain rails.

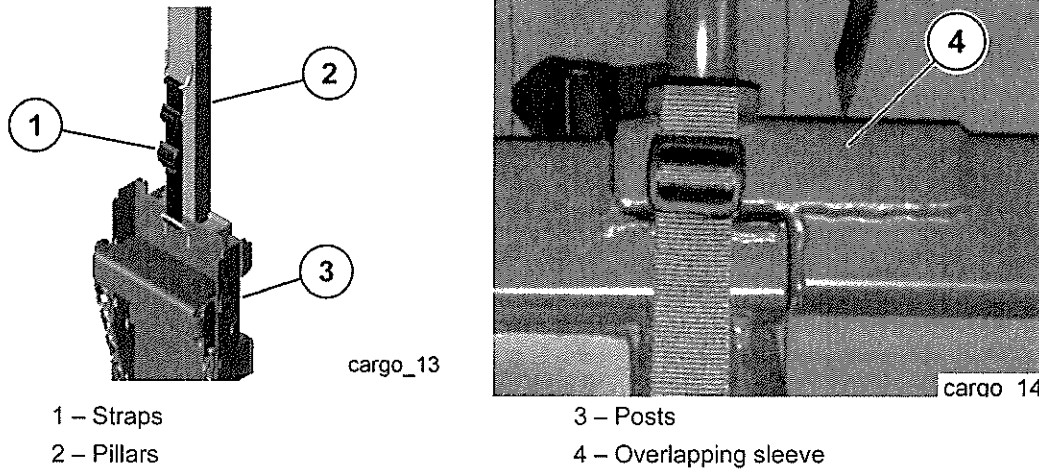


Fig 13 Fit the pillars and connection rails

18.4 Refer to Fig 14. Install the front, centre and rear cross rails to the connection rails.

18.5 Secure the pillars (3) to the cross rails (2) using the straps (1).

18.6 Install the intermediate cross rails to the connection rails.

18.7 Secure the connection rails (5) to the cross rails (6) using the retaining cords (4).

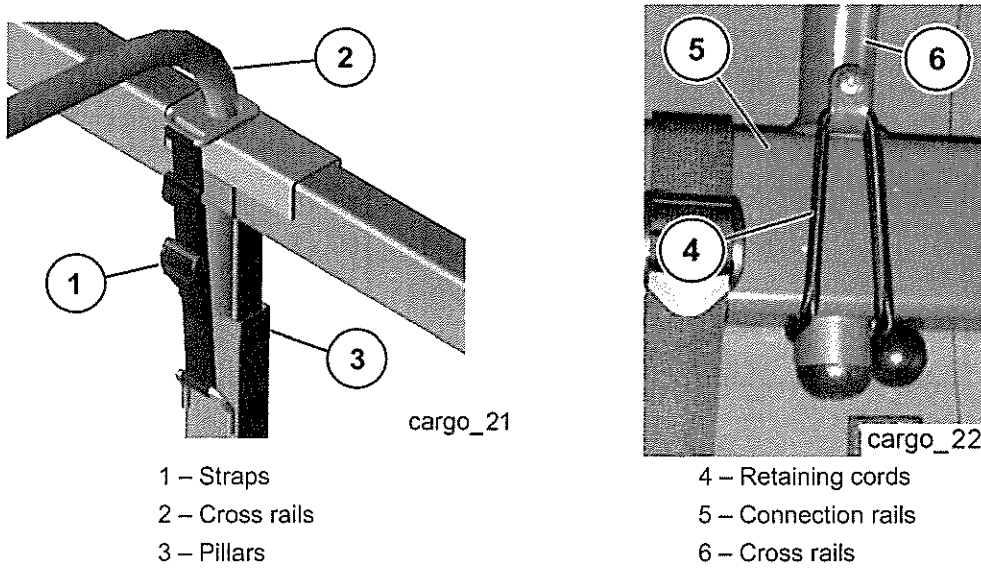


Fig 14 Securing the pillars and cross rails

### Installing the tilt canopy

#### WARNINGS

(1) RISK OF INJURY. WHEN INSTALLING THE TILT CANOPY BE AWARE OF THE SIDE AND REAR EDGES OF THE FLATBED TO AVOID FALLING WHEN LOOKING UP TO ROLL OUT THE CANOPY.

(2) RISK OF INJURY. WHEN INSTALLING THE TILT CANOPY FROM THE VEHICLE MAKE SURE THERE ARE SUFFICIENT PERSONNEL TO LIFT THE CANOPY ON TO THE CARGO BODY.

19 Refer to Fig 15. To install the tilt canopy, proceed as follows:

19.1 With one person at each end of the tilt canopy, lift the tilt canopy onto the flatbed floor.

19.2 Unroll the tilt canopy so that it will span at least three of cross rails.

19.3 Carefully lift the tilt canopy onto the tilt frame at the rear of the cargo body.

19.4 Unroll the tilt canopy, working from the rear towards the front. Make sure that there is an even overhang at the front and rear.

19.5 Fold down both side flaps from on top of the roof canopy. Make sure that there is an even overhang on both sides.

19.6 Secure the tilt canopy to the cross rails using the straps (1).

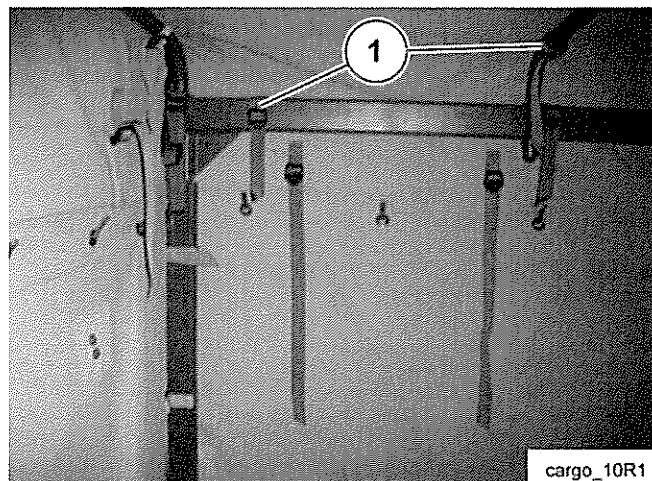


Fig 15 Installing the tilt canopy

### Installing the front and rear curtains and sidesheets

20 Refer to Fig 16. To install the front and rear curtains and sidesheets, proceed as follows:

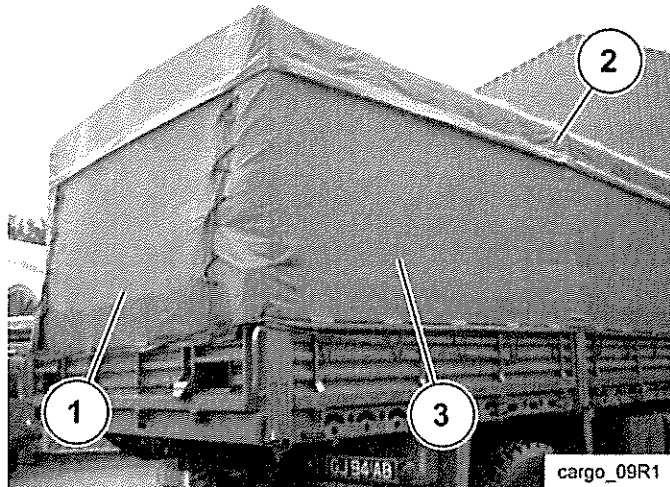
#### NOTE

Attach the canvas panels to their hooks and Velcro fixings, working from the rear towards the front.

20.1 Attach the front and rear curtains (1) to the tilt canopy (2).

20.2 Attach the sidesheets (3) to the tilt canopy (2).

- 20.3 Secure the sidesheets to the pillars using the straps, refer to Para 3.2.
- 20.4 Secure the straps to the staples which attach the front curtain to the bulkhead.
- 20.5 Secure the sidesheets to the front and rear curtains, refer to Para 3.3.
- 20.6 Secure the ropes to the chassis, dropside panels and tailboard cleats, refer to Para 3.4.



1 – Front and rear curtains

2 – Tilt canopy

3 – Sidesheets

Fig 16 Installing the front and rear curtains and sidesheets

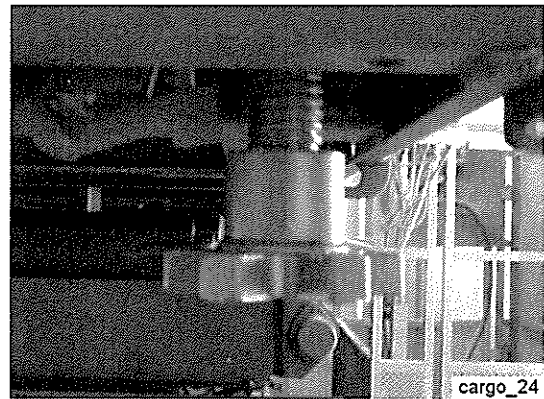
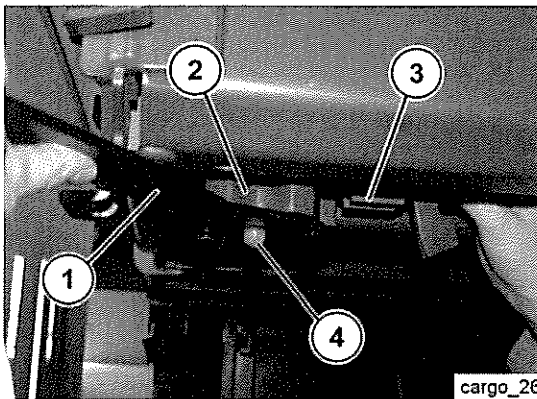
**ISO TWISTLOCKS****WARNINGS**

- (1) **RISK OF INJURY. BEWARE OF THE FLOOR RECESSES CONTAINING THE CARGO TIE DOWN RINGS AS THEY ARE A POTENTIAL TRIP HAZARD.**
- (2) **RISK OF INJURY. TWISTLOCKS MUST ALWAYS BE POSITIONED SO THAT THEY DO NOT PROTRUDE ABOVE THE FLATBED FLOOR WHEN THEY ARE NOT IN USE TO PREVENT A TRIP HAZARD.**
- (3) **PERSONAL INJURY. SAFETY GLOVES MUST BE WORN WHEN OPERATING THE ISO TWISTLOCKS.**
- (4) **PERSONAL INJURY. CARE MUST BE TAKEN TO AVOID FINGER TRAPS WHEN USING THE SPANNER AND LOCKING LUGS.**



**Preparing the flatbed floor for an ISO container**

- 21 Refer to Fig 17. To prepare the flatbed floor for an ISO container, proceed as follows:
- 21.1 Lift the locking lug (3) to disengage it from the locknut (2).
  - 21.2 Loosen the locknut using the locknut spanner (1).
  - 21.3 Remove the locknut spanner and unscrew the locknut fully by hand.
  - 21.4 When the locknut has been fully unscrewed the orange lock indicator (4) will be hidden from view inside the locknut.



1 – Locknut spanner  
2 – Locknut

3 – Locking lug  
4 – Orange lock indicator

Fig 17 Preparing the flatbed floor for an ISO container

- 21.5 Refer to Fig 18. Rotate the locknut anticlockwise and lift the container guide block (1) and turn through 90° until the guide block is correctly aligned.
- 21.6 Release the guide block to lock in position.
- 21.7 Repeat the procedure for all the ISO twistlocks being used to secure the ISO container to flatbed floor.

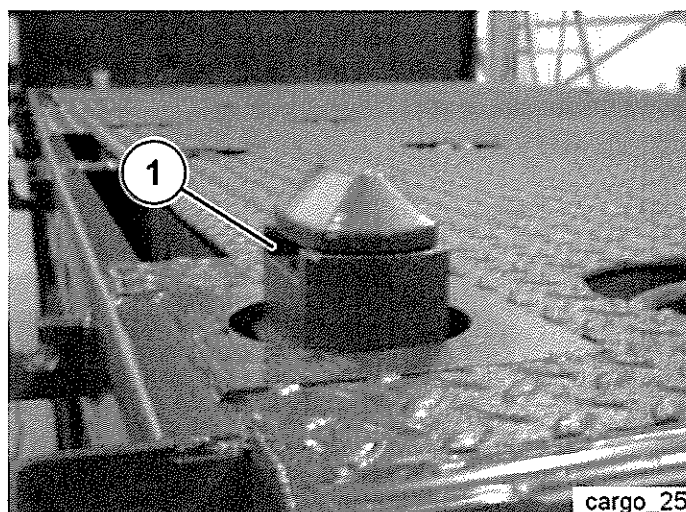
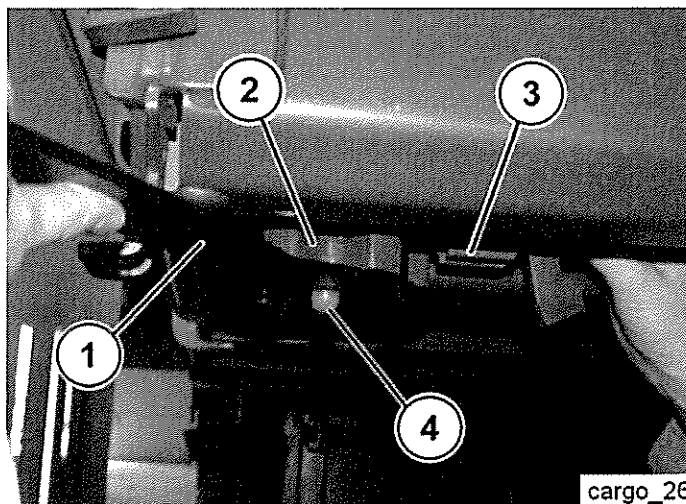


Fig 18 Container guide block

**Locking an ISO container in position**

- 22 Refer to Fig 19. To lock the ISO container in position, proceed as follows:
- 22.1 Load the ISO container.
  - 22.2 Rotate the locknut through 90° to lock the ISO container in position.
  - 22.3 Lift the locking lug (3) and hold clear of the locknut (2).
  - 22.4 Tighten the locknut by hand as much as possible.
  - 22.5 Fully tighten the locknut using the locknut spanner (1).
  - 22.6 Position the locking lug in the recessed part of the locknut. Make sure that the locking lug is properly engaged.
  - 22.7 Check that the orange indicator (4) visibly protrudes below the locknut to confirm the ISO container is securely locked to the flatbed floor.
  - 22.8 Repeat the procedure for all the ISO twistlocks being used to secure the ISO container to flatbed floor.



1 – Locknut spanner

2 – Locknut

3 – Locking lug

4 – Orange lock indicator

Fig 19 Preparing the flatbed floor for an ISO container

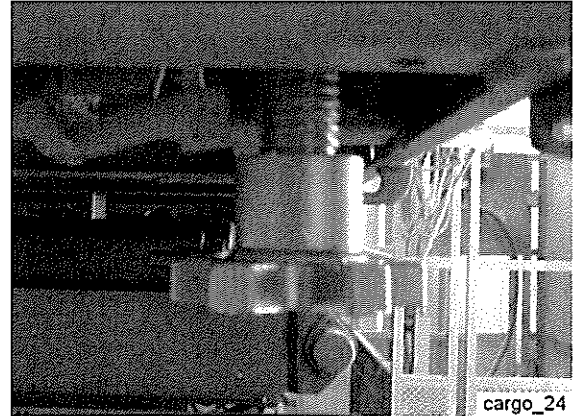
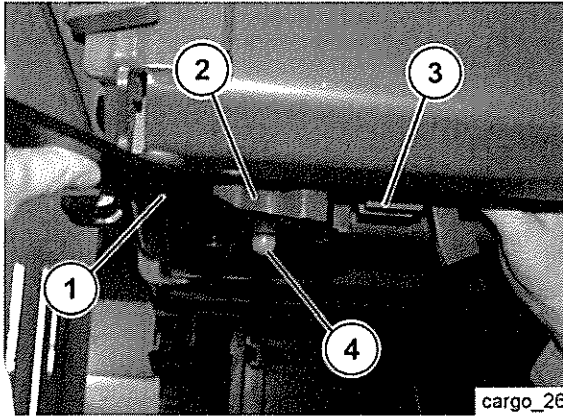
**Unlocking an ISO container**

- 23 Refer to Fig 20. To unlock an ISO container, proceed as follows:
- 23.1 Lift the locking lug (3) to disengage it from the locknut (2).
  - 23.2 Loosen the locknut using the locknut spanner (1).
  - 23.3 Remove the locknut spanner and unscrew the locknut fully by hand.
  - 23.4 When the locknut has been fully unscrewed the orange lock indicator (4) will be hidden from view inside the locknut.

23.5 Rotate the locknut through 90° to unlock the ISO container.

23.6 Repeat the procedure for all the ISO twistlocks that were used to secure the ISO container to flatbed floor.

23.7 Unload the ISO container.



1 – Locknut spanner  
2 – Locknut

3 – Locking lug  
4 – Orange lock indicator

Fig 20 Unlocking an ISO container

**Stowing the ISO twistlocks**

- 24 Refer to Fig 21. To stow the ISO twistlocks, proceeds as follows:
- 24.1 Lift the guide block (1) and turn through 90° and rotate the locknut clockwise.
  - 24.2 Lower the guide block into the stowed position.
  - 24.3 Tighten the locknut by hand as much as possible.
  - 24.4 Fully tighten the locknut using the locknut spanner.
  - 24.5 Position the locking lug in the recessed part of the locknut.
  - 24.6 Repeat the procedure for all the ISO twistlocks that were used to secure the ISO container to flatbed floor.
  - 24.7 Make sure that the ISO twistlocks are positioned so that they do not protrude above the floor of the flatbed.

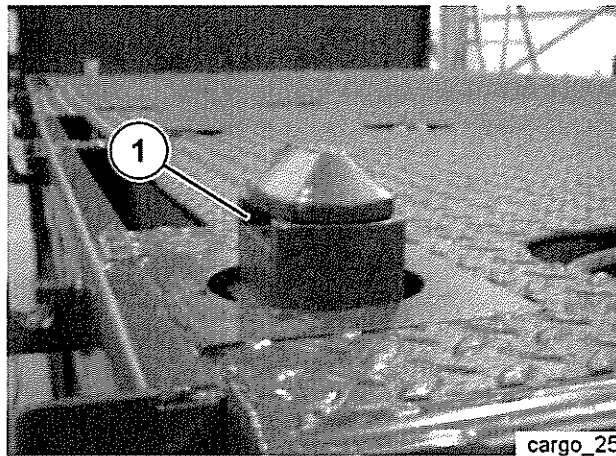


Fig 21 Stowing the ISO twistlocks

**FLATBED FLOOR ACCESS LADDER****WARNINGS**

- (1) **PERSONAL INJURY. WHEN CLIMBING ON/OFF THE FLATBED MAKE SURE THAT A THREE POINT CONTACT IS MAINTAINED AT ALL TIMES. I.E. HOLD RAIL/BODY WITH BOTH HANDS AND ONE FOOT ON STEP.**
- (2) **PERSONAL INJURY. ALWAYS EXTEND OR RETRACT THE HANDRAIL WITH THE LADDER RESTING ON THE GROUND IN A HORIZONTAL POSITION. NEVER EXTEND OR RETRACT THE HANDRAIL IN THE VERTICAL POSITION.**
- (3) **PERSONAL INJURY. THE ACCESS LADDER MUST ALWAYS BE USED WITH THE HANDRAIL EXTENDED AND LOCKED IN POSITION.**
- (4) **PERSONAL INJURY. THE ACCESS LADDER MUST ONLY BE USED WHEN ATTACHED TO THE FLATBED IN THE DESIGNATED SLOTS.**
- (5) **PERSONAL INJURY. DO NOT USE THE LADDER WHEN DROPSIDES ARE FITTED TO THE VEHICLE.**

**(6) RISK OF ACCIDENTS. PRIOR TO MOVING OFF, THE ACCESS LADDER (FITTED BENEATH THE FLATBED) MUST BE CORRECTLY STOWED AND ITS RETAINING PIN ENGAGED INTO POSITION AND MADE SECURE. THIS IS TO PREVENT THE DETACHMENT OF THE LADDER WHILE THE VEHICLE IS BEING DRIVEN ON PUBLIC ROADS.**

25 Refer to Fig 22. To install the access ladder, proceed as follows:

**NOTE**

If the seating system is fitted, the ladder cannot be used and should be stored at the Quarter Master's stores.

25.1 Remove the securing pin and slide the access ladder from its stowage beneath the flatbed at the rear of the vehicle.

25.2 Place the ladder on the ground in the horizontal position.

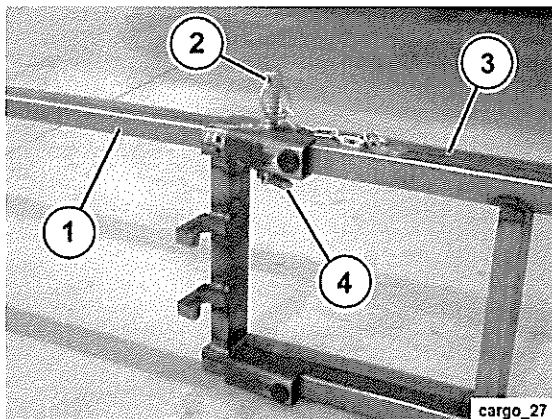
25.3 Remove the handrail retaining pin (2) from the ladder frame (3).

25.4 Extend the handrail (1) until the holes in the ladder frame (3) and the handrail (1) are aligned.

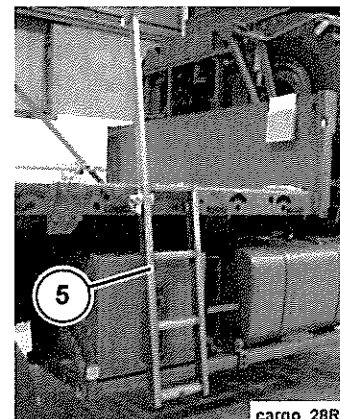
25.5 Insert the handrail retaining pin (2) and rotate the swivel part (4) to lock the pin in position.

25.6 Lift the ladder (5) into position at a convenient place over the flatbed side.

25.7 Make sure that the ladder (5) is securely located in the slots on the top edge of the flatbed side channel before use.



- 1 – Handrail
- 2 – Handrail retaining pin
- 3 – Ladder frame



- 4 – Swivel part
- 5 – Ladder

Fig 22 Flatbed floor access ladder

26 Refer to Fig 23. To stow the access ladder, proceed as follows:

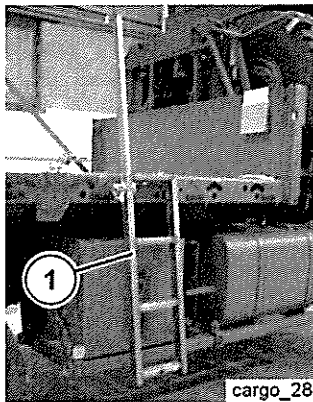
26.1 Lift the ladder (1) vertically and clear of the vehicle flatbed.

26.2 Place the ladder on the ground.

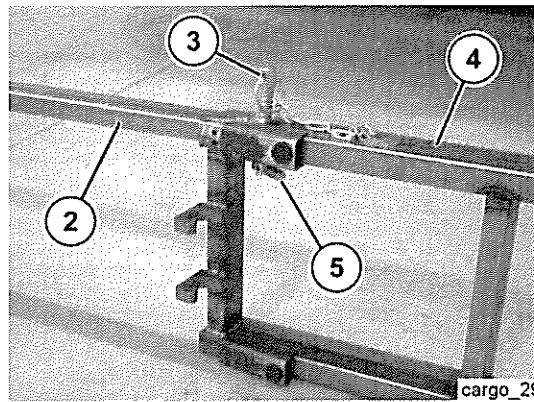
26.3 Remove the handrail retaining pin (3) from the ladder frame (4).

26.4 Retract the handrail (2) until the holes in the ladder frame and the handrail are aligned.

26.5 Insert the retaining pin and rotate the swivel part (5) to lock the pin in position.



- 1 – Ladder
- 2 – Handrail
- 3 – Handrail retaining pin



- 4 – Ladder frame
- 5 – Swivel part

Fig 23 Stowing the access ladder

26.6 Refer to Fig 24. Slide the access ladder into its stowage beneath the flatbed.

26.7 Make sure that the ladder is securely stowed by engaging and securing the retaining pin (6).

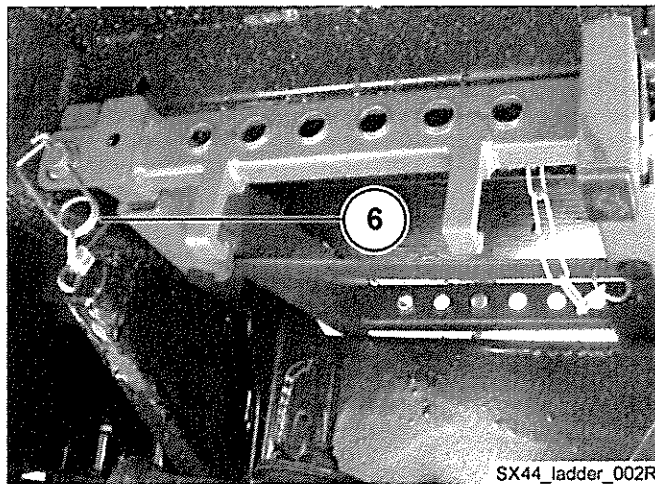


Fig 24 Ladder retaining pin

**CHAPTER 3-0**

**WINCH**

**CONTENTS**

Chapter

- 3-1 Technical data
- 3-2 Operating precautions
- 3-3 General description
- 3-4 Operating instructions
- 3-5 Operator inspections

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CHAPTER 3-1

TECHNICAL DATA

CONTENTS

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## CHAPTER 3-2

### OPERATING PRECAUTIONS

#### CONTENTS

Para

- 1 Introduction
- 2 General (WARNING)  
During operation
- 3 Safety points (WARNINGS)
- 4 Operating points (WARNINGS) (CAUTIONS)
- 5 After operation

#### INTRODUCTION

1 This chapter lists the warnings and cautions, and describes the precautions to be observed when operating the winch.

#### GENERAL

2 General points are as follows:

- 2.1 The winch must only be operated by an authorised and trained operator. The operator must have read and understood the winch operating instructions.
- 2.2 The winch is only to be used for self-recovery purposes. Do not use the winch for towing, or pulling personnel.
- 2.3 Do not use a swivel-type hook with the winch.
- 2.4 Do not use the winch as a hoist.
- 2.5 Replace a damaged rope immediately.
- 2.6 Do not clean the rope with a steam cleaner or high pressure washer.
- 2.7 Do not remove or paint over labels that are fixed on the winch.
- 2.8 Do not paint the working surfaces of ropes, pulleys, operating units, sensors, indicators or ventilation apertures.

#### NOTE

Colouring the rope to identify the safety margin is permissible.

2.9 The winch must not be modified without the appropriate authorisation.

#### WARNING

**DANGER TO PERSONNEL. THE ROPE END SENSOR MUST NOT BE REMOVED OR ADJUSTED.**

2.10 Do not remove or adjust the rope end sensor.

- 2.11 Make sure that the remote control unit is connected before carrying out any maintenance.

## DURING OPERATION

### Safety points

- 3 During operation of the winch, observe the safety points that follow:
- 3.1 Wear safety gloves.
- 3.2 Make sure that there is an uninterrupted view of the load and the hazard area. If the view is unclear, obtain the assistance of another person to signal information concerning the load. Make sure that the operator and the person assisting understand these signals.
- 3.3 Make sure of the safety of any person providing signal information concerning the load.

### WARNING

**DANGER TO PERSONNEL. STANDING IN THE IMMEDIATE VICINITY OF ANY PARTS UNDER LOAD IS HAZARDOUS. USE EXTREME CAUTION.**

- 3.4 Do not walk or stand in the hazard area.
- 3.5 Stop operations if someone enters the hazard area.
- 3.6 Stop operations if someone enters the hazard area.
- 3.7 Do not guide the rope by hand while the rope is under tension.

### WARNING

**DANGER TO PERSONNEL. NEVER EXCEED THE MAXIMUM PERMISSIBLE PULLING ANGLE OF 25 DEGREES AT THE ROPE OUTLET DURING THE SELF RECOVERY.**

- 3.8 Do not exceed the maximum permissible pulling angle at the rope outlet.
- 3.9 Do not allow the rope to run across sharp edges or obstacles.

### WARNING

**DANGER TO PERSONNEL. THE ROPE MUST NOT BE PAYED OUT COMPLETELY FROM THE WINCH DRUM. STOP PAYING OUT THE ROPE AS SOON AS THE ROPE END SAFETY COLOURING APPEARS.**

- 3.10 Do not allow the rope to run out beyond the safety margin.

### Operating points

- 4 During operation of the winch, observe the operating points that follow:

### WARNINGS

**(1) DANGER TO PERSONNEL. ONLY USE THE WINCH FOR A SHORT TIME IN THE EMERGENCY MODE. THE SAFETY SENSORS DO NOT OPERATE.**

**(2) DANGER TO PERSONNEL. THE OPERATOR MUST BE CLEAR OF THE PROHIBITED HAZARD AREAS.**

- 4.1 Operating in emergency mode is only intended for a short period of time. Authorised personnel must rectify the fault immediately.

**CAUTION**

**WINCH DAMAGE.** Do not allow rope connections or splices to run through the winch parts.

- 4.2 Do not run rope connections or splices through the rope outlet, fairlead, pulleys or winch drum.

**CAUTION**

**WINCH DAMAGE.** The dog clutch must not be operated when the rope is under load.

- 4.3 Do not operate the dog clutch when the rope is under load.

**AFTER OPERATION**

- 5 After operation of the winch, observe the points that follow:

- 5.1 Check the rope for damage.
- 5.2 Check that the rope end safety colouring is legible.

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CHAPTER 3-3

GENERAL DESCRIPTION

CONTENTS

Para

1	Introduction
	Components
2	General
4	Winch drum brakes
5	Clutch control
6	Pressure roller
7	Emergency operation (WARNING)
11	Remote Control Unit (RCU)
	Functions of controls
16	Clutch lever
19	On/off switch
20	Emergency stop switch
22	Rocker switch with proportional speed control
	System description
23	Power flow

Fig

Page

1	HZ051 winch.....	2
2	HZ051 winch control.....	2
3	Clutch control.....	3
4	Pressure roller.....	3
5	Winch emergency control.....	4
6	Operating the winch in emergency mode.....	4
7	Remote Control Unit (RCU).....	5
8	Clutch lever functions.....	6
9	Remote Control Unit (RCU) buttons.....	6

**INTRODUCTION**

1 This chapter provides a general description of the self recovery winch.

**COMPONENTS**

**General**

2 Refer to Fig 1. The parts of the HZ051 winch are listed in the legend below.

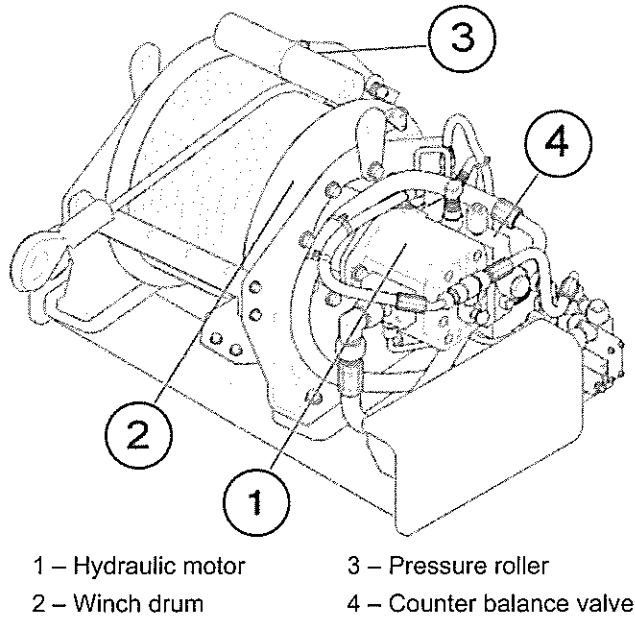


Fig 1 HZ051 winch

3 Refer to Fig 2. The electrical parts are listed in the legend below.

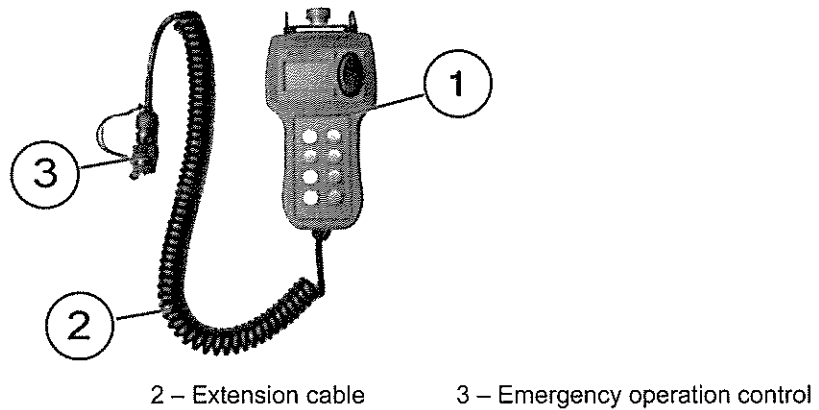


Fig 2 HZ051 winch control

**Winch drum brakes**

4 The HZ051 winch is fitted with an end disc brake.



**Clutch control**

5 Refer to Fig 3. The clutch lever (1) is used for disengaging the clutch which interrupts the drive to the winch.

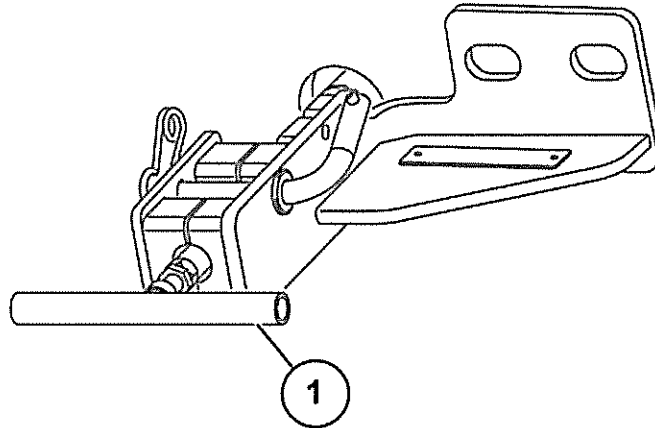


Fig 3 Clutch control

**Pressure roller**

6 Refer to Fig 4. A spring-loaded pressure roller (1) maintains a constant pressure on the wound rope, so that the rope spools correctly onto the drum.

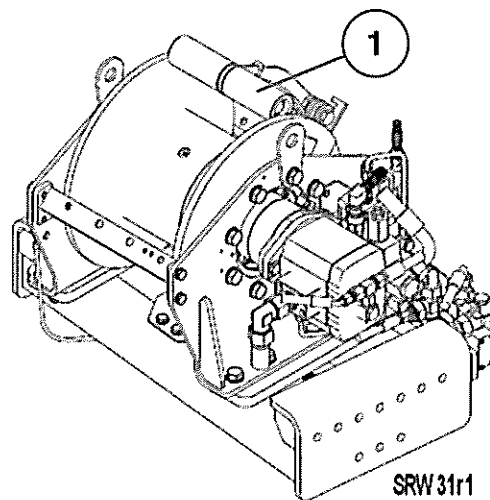


Fig 4 Pressure roller

**Emergency operation**

**WARNING**

**PERSONAL INJURY. CONTROL OF THE WINCH IN EMERGENCY MODE IS EITHER 'ON' OR 'OFF' WITH NO PROPORTIONAL SPEED CONTROL FUNCTION.**

- 7 Refer to Fig 5. An emergency control is provided for emergency operation of the winch.
- 8 The emergency control is located at the end of the cable which is attached to the Remote Control Unit (RCU).
- 9 Emergency operation of the winch system is via the built-in emergency control in the RCU lead.

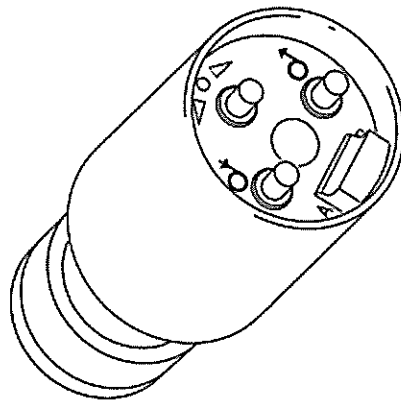
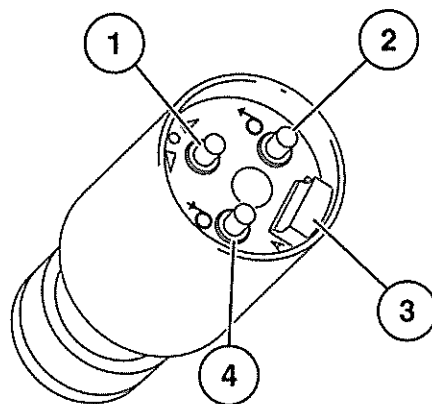


Fig 5 Winch emergency control

- 10 Refer to Fig 6. When using the winch in emergency mode, none of the safety sensor switches or any other safety devices are operational. The operator must use extra vigilance.

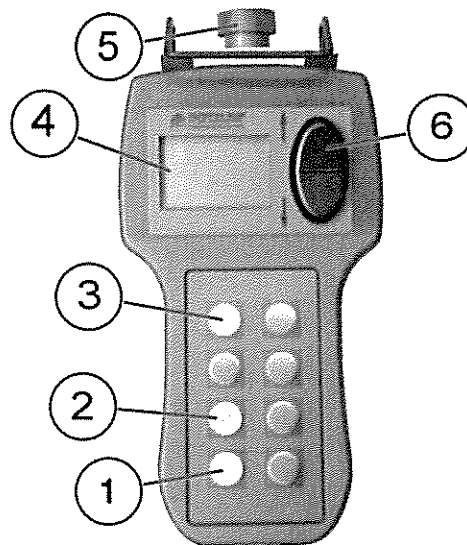


- 1 – Activating button
- 2 – Rope out
- 3 – Configuration switch (Default setting is position 'A' - do not adjust)
- 4 – Rope in

Fig 6 Operating the winch in emergency mode

### REMOTE CONTROL UNIT (RCU)

- 11 Refer to Fig 7. The on/off switch (1) operates as follows:
  - 11.1 Press the switch (1) once, the RCU comes on.
  - 11.2 The background lighting for the keypad and display (4) comes on.
  - 11.3 Press the switch (1) again, the RCU goes off.
  - 11.4 The background lighting goes off.
- 12 The Menu navigation key (2) is used for accessing and configuring the RCU settings.
- 13 When the Help button (3) is pressed during winch operation the display will show the icons of the available functions.
- 14 The emergency stop switch (5) operates as follows:
  - 14.1 Press the switch (5) to stop the winch, the RCU is isolated from the system.
  - 14.2 To re-activate the RCU, turn the emergency stop button clockwise to release the button, then switch the RCU off and on again.
  - 14.3 The rocker switch (6) is used to 'Rope out' and 'Rope in'. The top of the switch is 'Rope out', the bottom of the switch is 'Rope in'. The harder the switch is pressed the faster the winch rope moves out or in.
- 15 The rocker switch (6) is used to 'Rope out' and 'Rope in'. The top of the switch is 'Rope out', the bottom of the switch is 'Rope in'. The harder the switch is pressed the faster the winch rope moves out or in.



- |                         |                           |
|-------------------------|---------------------------|
| 1 – Power switch        | 4 – Display               |
| 2 – Menu navigation key | 5 – Emergency stop switch |
| 3 – Help button         | 6 – Rocker switch         |

Fig 7 Remote Control Unit (RCU)

**FUNCTIONS OF CONTROLS**

**Clutch lever**

16 Refer to Fig 8. The clutch lever (4) is used to manually engage and disengage the dog clutch.

17 The symbols on the winch are as follows:

- 17.1 Clutch engaged (1).
- 17.2 Do not operate clutch under load (2).
- 17.3 Clutch disengaged (3).

18 The clutch lever (4) is locked by means of a locking pin (6) and a safety clip (5).

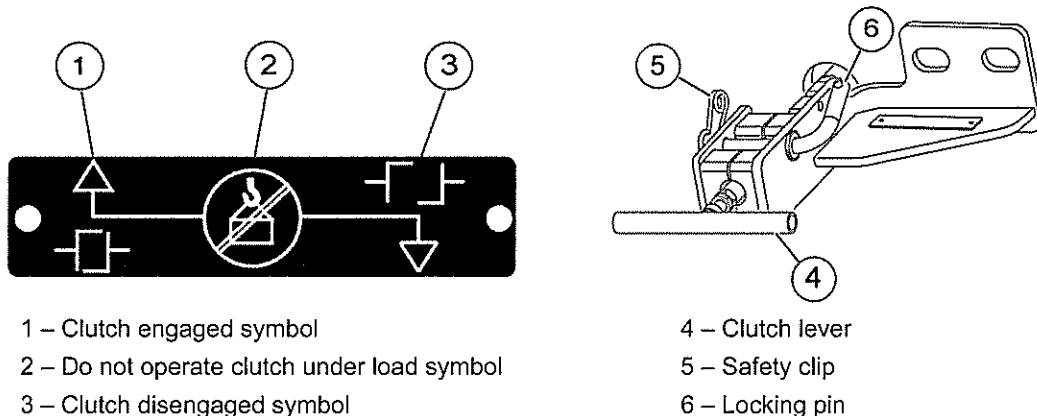
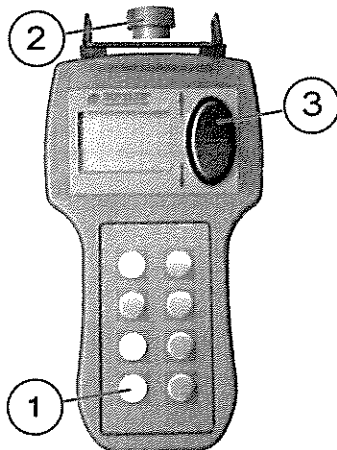


Fig 8 Clutch lever functions

**ON/OFF SWITCH**

19 Refer to Fig 9. The on/off switch (1) is used to activate the winch. An integral lamp comes on when the winch is active, and goes off when the winch is deactivated.



- 1 – On/Off switch
- 2 – Emergency stop switch
- 3 – Rocker switch

Fig 9 Remote Control Unit (RCU) buttons

**Emergency stop switch**

20 Refer to Fig 9. The emergency stop switch (2) is provided to stop the winch in an emergency.

21 The system must be reset to continue winch operations.

**Rocker switch with proportional speed control**

22 Refer to Fig 9. The rocker switch (3) is used to spool the rope on and off the drum.

**SYSTEM DESCRIPTION**

**Power flow**

23 Hydraulic oil is delivered to the hydraulic control block. Hydraulic oil is delivered through a counter balance valve to the winch motor. The holding brake is released hydraulically, and the winch motor drives the drum through a series of planetary gears and the dog clutch.

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CHAPTER 3-4

OPERATING INSTRUCTIONS

CONTENTS

Para

1	Introduction
2	Preparing for self recovery (WARNING)
3	Configure for front or rear self recovery (CAUTIONS) (WARNING)
	Starting self recovery
8	General
9	Attaching the rope (WARNING) (CAUTION)
10	Low temperature operation
11	Hazard area
15	Self recovery (WARNING)
17	Releasing the rope
19	Emergency stop
	After operation
21	Cleaning the rope
22	Spooling on the rope
23	Disconnecting the remote control unit
25	Visual check
28	Emergency operation (WARNINGS)
30	Clutch fails to engage or disengage (CAUTION)

Table

Page

1	Fault diagnosis .....	10
---	-----------------------	----

Fig

Page

1	Configure for front or rear self recovery .....	2
2	Feed the rope to the front of the vehicle (1) .....	3
3	Feed the rope to the front of the vehicle (2) .....	4
4	Attaching the rope .....	5
5	Hazard area .....	6
6	Self recovery .....	7
7	Press the rocker switch .....	7
8	Emergency stop .....	8
9	Emergency operation .....	9

## INTRODUCTION

1 This chapter provides the operating instructions for the self recovery winch.

## PREPARING FOR SELF RECOVERY

2 To prepare for a self recovery operation, proceed as follows:

### WARNING

**DANGER TO PERSONNEL. NEVER EXCEED THE MAXIMUM PERMISSIBLE PULLING ANGLE OF 25° AT THE ROPE OUTLET DURING THE SELF RECOVERY.**

2.1 Select a suitable fixed point for anchoring. Make sure that the maximum pulling angle of 25° at the rope outlet is not exceeded.

2.2 Make sure that the accessories for the recovery operation (rope, shackles, etc.) will not be overloaded by the pulling force.

2.3 Make sure that there is a direct view of the recovery path.

2.4 Check that the rope is configured for the required recovery direction.

### Configure for front or rear self recovery

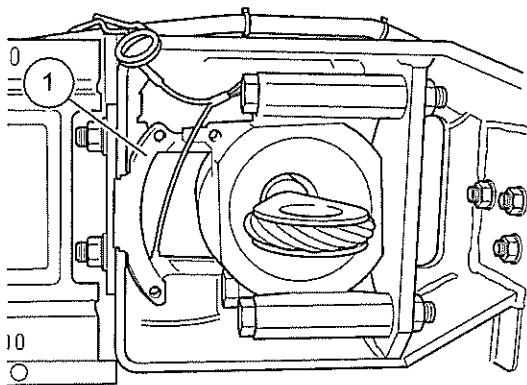
3 Refer to Fig 1. To remove the rope from the rear of the vehicle, proceed as follows:

3.1 Remove the locking clip from the U bracket (1).

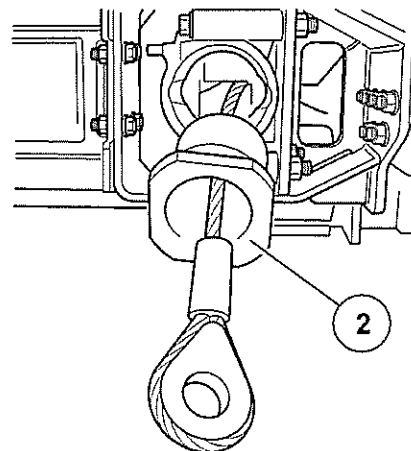
3.2 Remove the U bracket (1) from the cones.

3.3 Remove the cones (2).

3.4 Remove the rope from the rear of the vehicle.



1 – U bracket



2 – Cones

Fig 1 Configure for front or rear self recovery



4 Refer to Fig 2. To feed the rope to the front of the vehicle, proceed as follows:

4.1 Pass the rope through the guide brackets.

**CAUTION**

**EQUIPMENT DAMAGE. Make sure that the rope is seated correctly in the pulley.**

4.2 Divert the rope from the deflector, pass the rope over the pulley (1) towards the front of the vehicle.

**WARNING**

**PERSONAL INJURY. BE CAREFUL WHEN WORKING CLOSE TO THE EXHAUST SYSTEM.**

4.3 Pass the rope behind the battery box, the coolant pipe and the exhaust downpipe (2).

4.4 Pass the rope behind the cab mounting bracket and the shock absorber mounting bracket.

4.5 Feed the rope over the top of the front pulley.

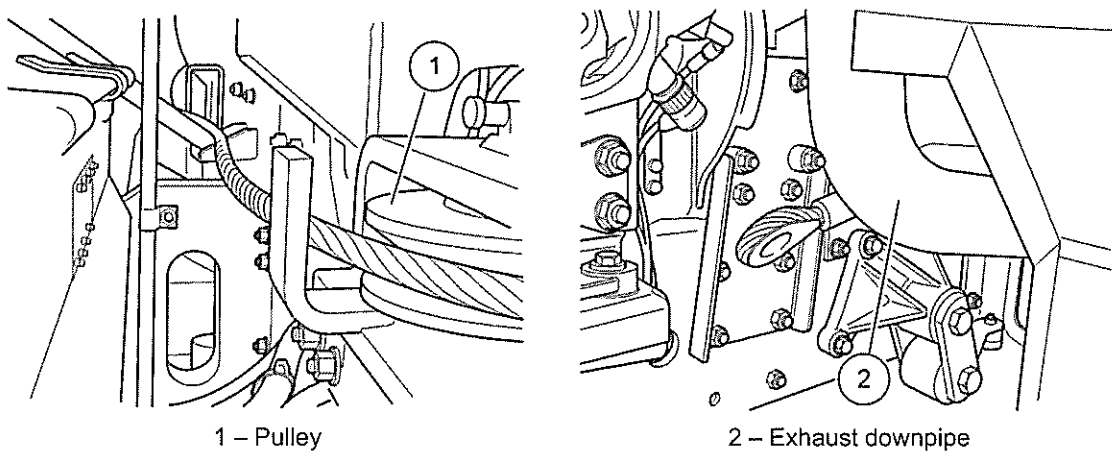


Fig 2 Feed the rope to the front of the vehicle (1)

4.6 Refer to Fig 3. Turn the fairlead release lever (1) a quarter turn anticlockwise to unlock.

4.7 Feed the rope end through the fairlead.

4.8 Turn the fairlead release lever (1) a quarter turn clockwise to lock in position.

5 Check that the rope is properly routed and passes through all the channels and guide brackets.

**CAUTION**

**EQUIPMENT DAMAGE. Make sure that the rope is not too tight in the fairlead aperture.**

6 Press the 'Rope in' to withdraw the rope end (2) to the correct stowed position.

7 To configure the winch rope from front to back, follow the instructions in reverse order.

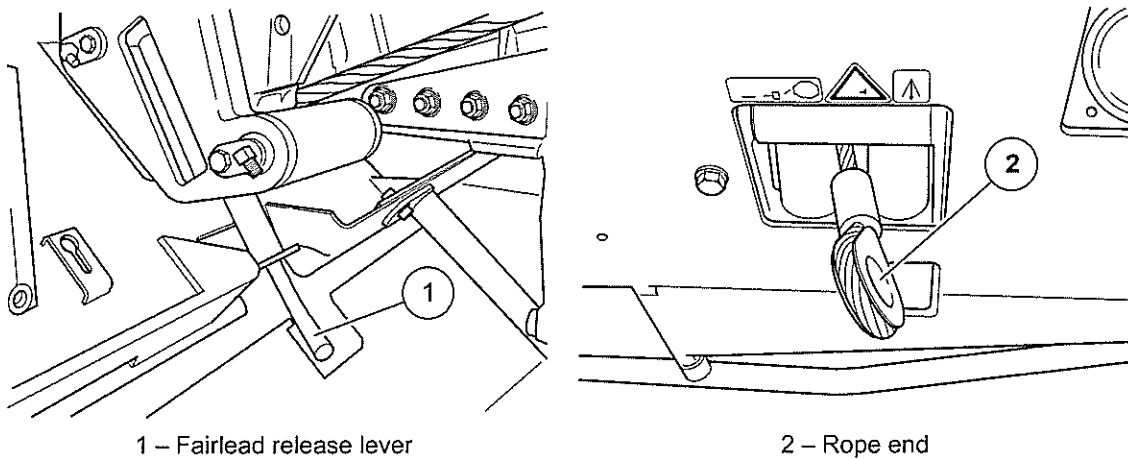


Fig 3 Feed the rope to the front of the vehicle (2)

**STARTING SELF RECOVERY****General**

8 To start the self recovery operation, proceed as follows:

- 8.1 Position the swivel fairleads so that the rope is running over one of the larger rollers (1).
- 8.2 Connect the remote control unit.

**Attaching the rope**

9 Refer to Fig 4. To attach the rope to the fixing point, proceed as follows:

- 9.1 Disengage the clutch.
  - 9.1.1 Remove the safety clip (2) and the locking pin (3).
  - 9.1.2 Move the clutch lever (4) to the disengaged position.
  - 9.1.3 Fit the locking pin (3) and the safety clip (2).

**WARNING**

**DANGER TO PERSONNEL. THE ROPE MUST NOT BE PAYED OUT COMPLETELY FROM THE WINCH DRUM. STOP PAYING OUT THE ROPE AS SOON AS THE ROPE END SAFETY COLOURING APPEARS.**

- 9.2 Pay out the rope by hand to the required length.

**CAUTION**

**EQUIPMENT DAMAGE. Do not sling the rope around the fixing point.**

- 9.3 Secure the rope to the fixing point using suitable fixing devices.

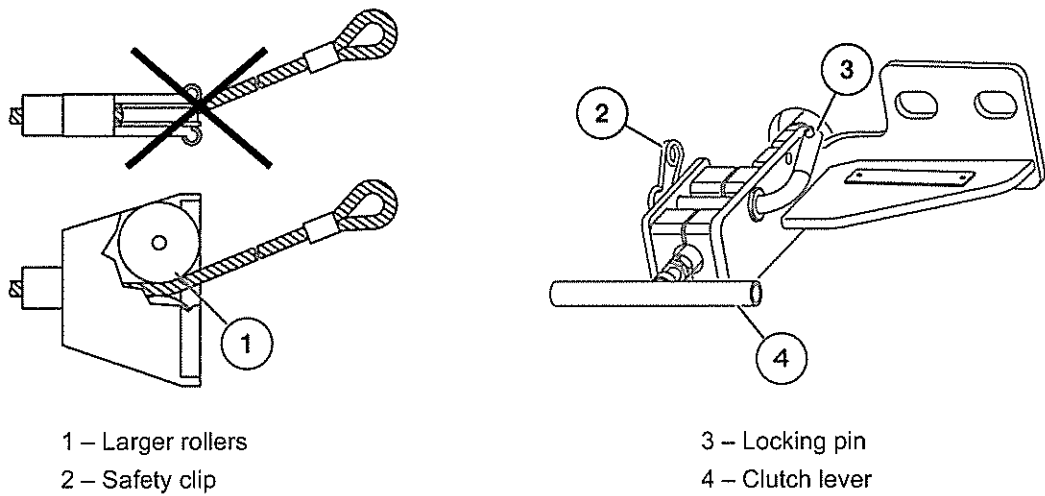


Fig 4 Attaching the rope

#### Low temperature operation

10 To start the winch at low temperatures, warm the winch as follows:

10.1 Between  $-18^{\circ}\text{C}$  to  $-30^{\circ}\text{C}$ , pay out half of the rope (approximately 30m), then spool the rope back on at reduced velocity.

10.2 Below  $-30^{\circ}\text{C}$ , pay out the rope by hand until the rope end safety colouring appears, then spool the rope back on at reduced velocity.

#### HAZARD AREA

11 Refer to Fig 5. The operator must observe the entire hazard area during the recovery.

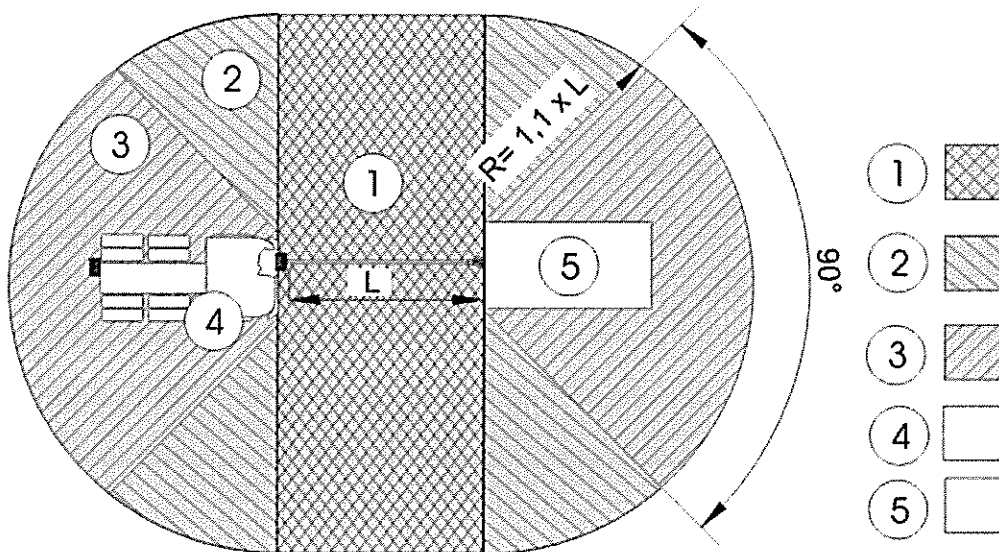
12 The minimum radius of the hazard zone is the same as the length of rope that is payed out. This distance applies to all directions, including under and on the vehicle.

13 If the view is obscured, additional personnel with effective communication must be used.

14 Refer to Fig 5 for the hazard area. The legend is listed below:

14.1 L Length of rope.

14.2 R Radius.



- |                              |                  |
|------------------------------|------------------|
| 1 – Prohibited area          | 4 – Vehicle      |
| 2 – Extended prohibited area | 5 – Fixing point |
| 3 – Operating zone           |                  |

Fig 5 Hazard area

**SELF RECOVERY****WARNING**

**DANGER TO PERSONNEL. STANDING IN THE IMMEDIATE VICINITY OF ANY PARTS UNDER LOAD IS HAZARDOUS; USE EXTREME CAUTION.**

- 15 Refer to Fig 6. Observe the movement of the rope and the entire hazard area during the recovery.
- 16 To recover the vehicle, proceed as follows:
  - 16.1 Engage the clutch.
    - 16.1.1 Remove the safety clip (1) and the locking pin (2).
    - 16.1.2 Move the clutch lever (3) to the engaged position.
    - 16.1.3 Fit the locking pin (2) and the safety clip (1).
  - 16.2 Engage the PTO by pressing the switch in the cab.
  - 16.3 Press the on/off switch (4). The lamp in the switch comes on. If the lamp in the switch does not come on, reset the winch system, refer to Para 15.
  - 16.4 Press the rocker switch (5) in the 'Rope in' direction.
  - 16.5 Release the rocker switch (5) when the vehicle is recovered.

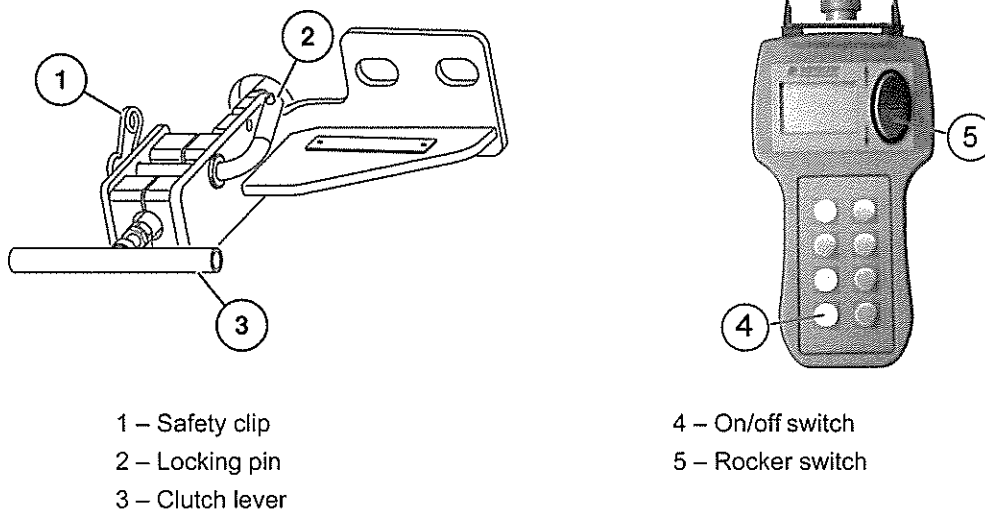


Fig 6 Self recovery

### Releasing the rope

17 Refer to Fig 7. To release the rope, proceed as follows:

17.1 Secure the vehicle.

17.2 If the rope is still under tension, press the rocker switch (1) in the 'Rope out' direction to release the tension.

17.3 Release the rope from the fixing point.

17.4 Press the rocker switch (1) in the rope in direction until the rope is stowed correctly.

18 If the vehicle is equipped with a rope window or a rope trumpet, fasten the rope end to the nominated location point.

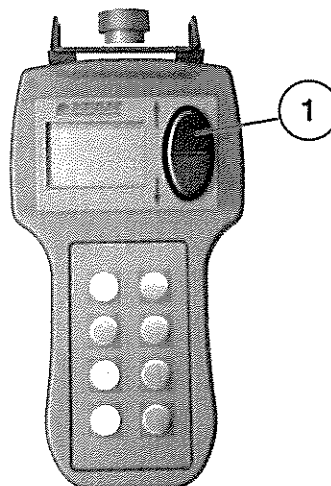
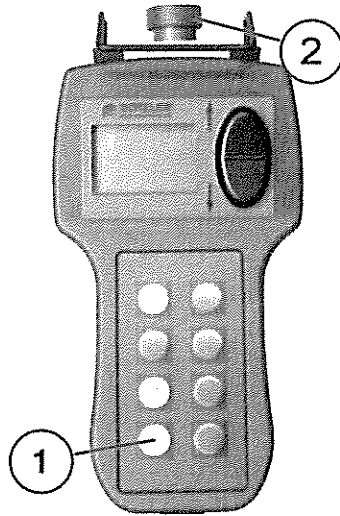


Fig 7 Press the rocker switch

**EMERGENCY STOP**

- 19 Refer to Fig 8. Press the emergency stop switch (2) on the remote control to stop the winch.
- 20 The emergency stop system must be reset after being operated. Reset the system as follows:
  - 20.1 Turn the emergency stop switch (2) clockwise.
  - 20.2 Press the on/off switch (1) twice.



1 – On/off switch

2 – Emergency stop switch

Fig 8 Emergency stop

**AFTER OPERATION****Cleaning the rope**

- 21 The rope must be cleaned every time the rope is used. Refer to Chap 3-5.

**Spooling on the rope**

- 22 To spool the rope onto the winch drum, engage the clutch and operate the winch in the 'Rope in' direction.

**Disconnecting the remote control unit**

- 23 To disconnect the remote control unit, proceed as follows:
  - 23.1 Press the on/off switch on the remote control unit. The lamp in the switch goes off.
  - 23.2 Disconnect the remote control unit.

**Visual check**

- 24 Carry out a visual check of the complete winch system after every operation with the winch. The rope, hydraulic lines, electrical connections, etc. must be checked. Contact your Unit for assistance if necessary.

## EMERGENCY OPERATION

### WARNINGS

(1) **DANGER TO PERSONNEL. THE OPERATOR MUST BE CLEAR OF THE PROHIBITED HAZARD AREAS.**

(2) **DANGER TO PERSONNEL. THERE IS NO PROPORTIONAL SPEED CONTROL OF THE ROPE WHEN CARRYING OUT WINCH OPERATIONS IN EMERGENCY MODE.**

25 Refer to Fig 9. In the event of a malfunction, or damage to the remote control, the winch can be operated using the emergency control.

26 To operate in the emergency mode, proceed as follows:

26.1 Make sure that the PTO is running at the working speed.

26.2 Remove the protective cap from the emergency control unit, at the end of the RCU cable.

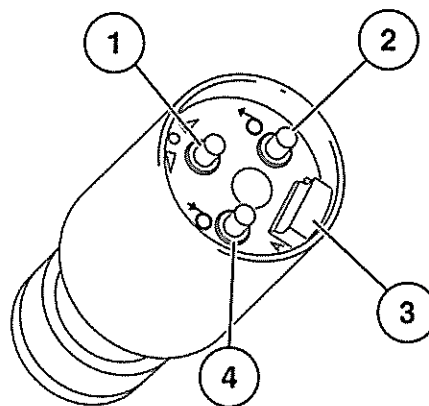
26.3 Make sure that the vehicle electrical systems are operational.

26.4 Press the Activate button (1) on the emergency control unit.

26.5 Press button (2) to pay out the winch rope.

26.6 Press button (4) to wind in the winch rope.

27 The Configuration switch (3) is not to be adjusted. This is set to the factory default position A.



1 – Activate button

2 – Pay out winch button

3 – Configuration switch

4 – Wind in winch button

Fig 9 Emergency operation

### CLUTCH FAILS TO ENGAGE OR DISENGAGE

28 If the clutch does not engage, pull the rope and operate the remote control in the rope in direction until the clutch engages.

### CAUTION

**WINCH DAMAGE.** The clutch must not be operated when the rope is under load.

29 If the clutch does not disengage, the rope is under load. Release the rope by operating the remote control in the rope out direction.

**FAULT DIAGNOSIS**

30 The operating fault diagnosis is listed in Table 1.

**TABLE 1 FAULT DIAGNOSIS**

Ser (a)	Symptom (b)	Possible cause (c)	Remedy (d)
1	Engaged winch does not turn in the direction of rope out.	PTO not engaged.	Engage PTO.
		No load on the rope (free-wheel winches only).	Operate winch in the rope out direction while manually pulling the rope.
		Remote control unit not connected or activated.	Connect and/or activate the remote control unit.
		Electrical supply switched off.	Switch on the electrical supply.
		Hydraulic, brake or electrical system fault.	Contact your Unit for assistance.
2	Engaged winch does not turn in the direction of rope in.	PTO not engaged.	Engage PTO.
		Remote control unit not connected or activated.	Connect and/or activate the remote control unit.
		Electrical supply switched off.	Switch on the electrical supply.
		Hydraulic, brake or electrical system fault.	Contact your Unit for assistance.
3	Winch rattles in the direction of rope out.	Hydraulic brake not opening correctly.	Contact your Unit for assistance.
		Hydraulic oil pressure too low.	
		Hydraulic oil pump speed is too low.	
4	Winch does not rotate at selected speed.	Hydraulic oil pressure too low.	Contact your Unit for assistance.
		Hydraulic oil pump or motor faulty.	
5	Winch does not achieve intended pulling force.	Hydraulic oil pressure too low.	Contact your Unit for assistance.
		Pressure relief valve incorrectly adjusted.	
		Hydraulic oil pump, motor or brake are faulty.	
		Rope pulley, rollers or fairleads are not freely rotating.	Check and lubricate. Contact your Unit for assistance if necessary.
6	Winch does not hold the vehicle.	Hydraulic pressure in the return line is too high.	Contact your Unit for assistance.
		Hydraulic brake is leaking or faulty.	
		Remote control unit is faulty.	
		Main control valve not allowing oil to return to the reservoir when in the neutral position.	



**CHAPTER 3-5**

**OPERATOR INSPECTIONS**

**CONTENTS**

Para

- 1 Introduction
- Maintenance
- 3 Checking the rope (WARNING)
- 5 Cleaning the rope (CAUTION)
- 7 Rope care
- 12 Rope end safety colouring

Fig

Page

- 1 Checking the rope .....2
- 2 Diagram to show coloured section of rope (viewed from below).....3

**INTRODUCTION**

- 1 This chapter provides the operator maintenance of the self recovery winch.
- 2 The operator is only allowed to carry out the following maintenance and inspection activities:
  - 2.1 Check the rope for damage.
  - 2.2 Cleaning the rope.
  - 2.3 Lubricate the rope.
  - 2.4 Rope end safety colouring.

**MAINTENANCE****Checking the rope****WARNING**

**DANGER TO PERSONNEL. THE WINCH ROPE IS STRESSED TO VERY HIGH LOADS. CARRY OUT A FULL CHECK FOR DAMAGE.**

3 Refer to Fig 1. The rope must be inspected and checked for any signs of damage. Various types of damage are illustrated.

4 If the rope needs replacing, contact the Unit for assistance.



GDR3013R

Fig 1 Checking the rope

**Cleaning the rope****CAUTION**

**DAMAGE TO EQUIPMENT. Do not use solvents to clean the rope.**

5 The rope must be cleaned with water applied to a brush.

6 Do not use high pressure washers.

### Rope care

- 7 The rope must be kept properly lubricated.
- 8 To lubricate the rope, proceed as follows:
  - 8.1 Apply rope care agent either by completely spraying, or by using a brush.
  - 8.2 Make sure that the rope is treated with rope care agent before it dries out.
- 9 If ropes are not regularly used, they may dry out. Dry ropes must be cleaned with a wire brush, then properly lubricated.
- 10 Frequent applications of rope care agent provides better protection.
- 11 Cleaning and lubrication of the rope should only be carried out in dry weather.

### Rope end safety colouring

- 12 Refer to Fig 2. A 2m portion of the rope after the last four windings is coloured in order to give the correct safety margin for winch operation.
- 13 To determine which portion of the rope to colour, proceed as follows:
  - 13.1 Measure the dimensions A, B and C.
  - 13.2 If  $B + C$  is less than A, then colour the rope at outlet 1.
  - 13.3 If  $B + C$  is greater than A, then colour the rope at outlet 2.
- 14 For suitable colouring materials, contact your Unit for assistance.

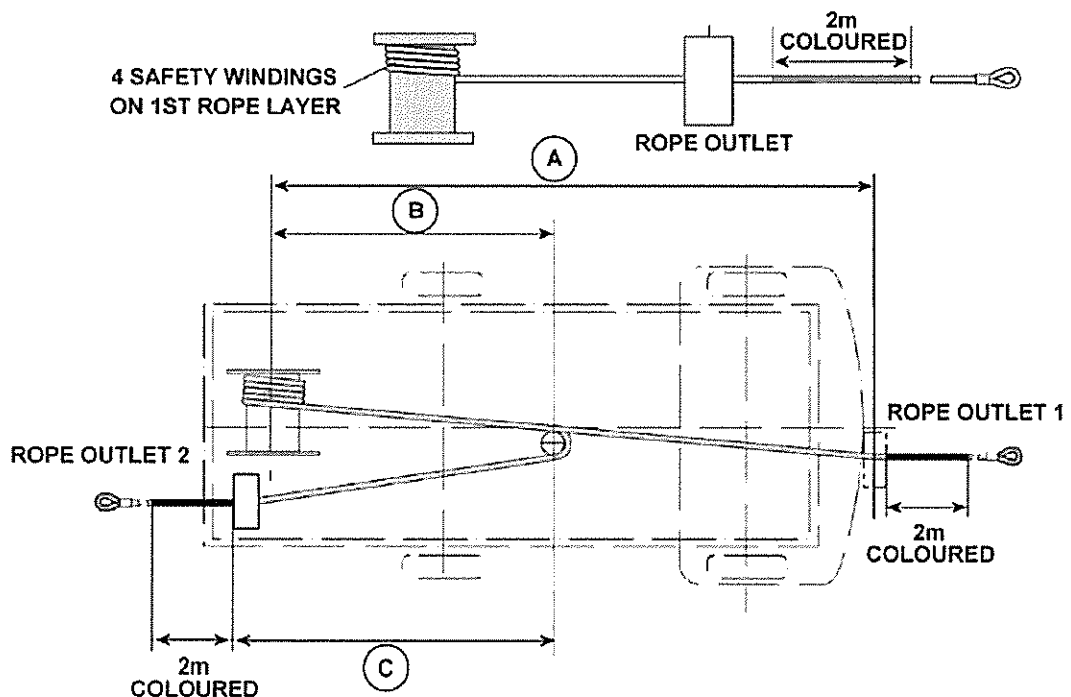


Fig 2 Diagram to show coloured section of rope (viewed from below)

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**CHAPTER 4-0**

**CRANE**

**CONTENTS**

Chapter

- 4-1 Technical data
- 4-2 Operating precautions
- 4-3 General description
- 4-4 Operating instructions

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**CHAPTER 4-1**

**TECHNICAL DATA**

**CONTENTS**

Para

- 1 Introduction

Table

Page

1	Capacity and dimensions .....	2
2	Rating .....	2
3	Weight.....	2

**INTRODUCTION**

- 1 This chapter provides technical data for the crane.

TABLE 1 CAPACITY AND DIMENSIONS

Ser (a)	Parameter (b)	HIAB 088 ATD (6 Tonne MM) (c)	HIAB 099 ATD (9 Tonne MM) (d)	HIAB 111 ATD (15 Tonne MM) (e)
1	Lifting capacity maximum (ton/m)	7.7	8.8	10.2
2	Reach (m)	4.3	5.7	6.3
3	Reach lifting capacity	at 1.4m: 3000kg at 2.1m: 3550kg at 2.9m: 2620kg at 4.1m: 1880kg	at 1.3m: 4000kg at 2.4m: 3600kg at 3.0m: 2920kg at 4.2m: 2080kg at 5.5m: 1600kg	at 2.0m: 5000kg at 2.8m: 3600kg at 3.3m: 3100kg at 4.7m: 2160kg at 6.2m: 1620kg
4	Height in stowed position (mm)	1260	1260	1550
5	Height with horizontal boom (mm)	2010	2010	2300
6	Installation space (mm)	800	800	800
7	Support leg hydraulic spread (mm)	3600	3600	3600
8	Slewing angle (deg)	210	210	210

TABLE 2 RATING

Ser (a)	Parameter (b)	HIAB 088 ATD (6 Tonne MM) (c)	HIAB 099 ATD (9 Tonne MM) (d)	HIAB 111 ATD (15 Tonne MM) (e)
1	Working pressure (MPa)	26	30	27
2	Power supply (V DC)	24	24	24
3	Fuse (A)	7.5 to 10	7.5 to 10	7.5 to 10

TABLE 3 WEIGHT

Ser (a)	Parameter (b)	HIAB 088 ATD (6 Tonne MM) (c)	HIAB 099 ATD (9 Tonne MM) (d)	HIAB 111 ATD (15 Tonne MM) (e)
1	Weight, including support legs (kg)	1450	1500	1600



**CHAPTER 4-2**

**OPERATING PRECAUTIONS**

**CONTENTS**

Para

- 1 Introduction (WARNINGS) (CAUTION)
- 2 Before operation (WARNINGS)  
During operation
- 4 Safety points (WARNINGS)
- 5 Operational points (WARNING) (CAUTIONS)
- 6 Faults (WARNING) (CAUTION)

Table

Page

1	Minimum distance from overhead electricity lines.....	3
---	---	---

**INTRODUCTION**

1 This chapter lists the warnings and cautions to be obeyed, and describes the precautions to be observed when operating the crane.

**WARNINGS**

- (1) RISK OF INJURY. KEEP CLEAR OF THE MOVING STABILIZER BEAM.
- (2) RISK OF INJURY. THE CRANE CAN TIP OVER IF THE STABILIZER BEAMS ARE NOT FULLY EXTENDED.
- (3) RISK OF INJURY. KEEP CLEAR OF THE MOVING STABILIZER LEG.
- (4) RISK OF INJURY. THE CRANE CAN TIP OVER IF THE STABILIZER LEGS ARE NOT LOCKED.
- (5) RISK OF INJURY. THE CRANE CAN TIP OVER IF THE STABILIZER LEGS DO NOT SUPPORT THE CRANE CORRECTLY.
- (6) RISK OF INJURY. DO NOT ALLOW THE HOOK TO FALL FROM THE BOOM AS THE BOOMS UNFOLD.
- (7) RISK OF INJURY. DO NOT MOVE THE VEHICLE IF A HEIGHT WARNING IS PRESENT.
- (8) RISK OF INJURY. KEEP AWAY FROM ANY HYDRAULIC OIL LEAKING FROM A COUPLING, HOSE OR LINE. HIGH PRESSURE HYDRAULIC OIL IS A HEALTH HAZARD.
- (9) RISK OF INJURY. MAKE SURE THAT THE AREA IS CLEAR OF PERSONNEL BEFORE DEPLOYING THE STABILIZER LEGS.
- (10) RISK OF ACCIDENTS. FOR NORMAL OPERATIONS, SWITCH ON THE HAZARD LIGHTS TO INDICATE THAT CRANE OPERATIONS ARE IN PROGRESS.
- (11) RISK OF ACCIDENTS. THE OPERATOR MUST BE SATISFIED THAT AMBIENT LIGHT CONDITIONS PROVIDE SUFFICIENT VISIBILITY TO ALLOW CRANE OPERATIONS TO BE CARRIED OUT SAFELY.
- (12) RISK OF ACCIDENTS. DO NOT USE THE CRANE TO LIFT PERSONNEL.
- (13) RISK OF ACCIDENTS. THE CRANE SHOULD NEVER BE USED DURING THUNDERSTORMS/LIGHTNING.

**CAUTION**

**CRANE DAMAGE.** Make sure that all crane defects are rectified immediately.

**BEFORE OPERATION**

2 Before operating the crane, the following warnings must be observed:

**WARNINGS**

- (1) RISK OF ACCIDENTS. ENGAGE THE VEHICLE PARKING BRAKE, OTHERWISE THE VEHICLE MAY BEGIN TO SLIDE DURING LIFTING.
- (2) RISK OF ACCIDENTS. NEVER USE THE STABILIZER LEGS AS A PARKING BRAKE. THE VEHICLE MAY START TO SLIDE.

- (3) RISK OF INJURY. PERSONAL PROTECTIVE EQUIPMENT MUST BE WORN (HARD HAT, STEEL TOE SHOES, GLOVES) WHEN OPERATING THE CRANE.
- (4) RISK OF ACCIDENTS. CHECK THAT THE GROUND IS SUFFICIENTLY FLAT. IF ON A GENTLE SLOPE PLACE CHOCKS UNDER THE WHEELS.
- (5) RISK OF ACCIDENTS. CHECK THAT THE GROUND IS FIRM AND NOT UNDERMINED. LOOK OUT FOR SEWERS, CELLARS, EXCAVATIONS, ETC. THE STABILIZER LEGS MUST NOT SINK INTO THE GROUND.
- (6) RISK OF ACCIDENTS. IF THE GROUND IS NOT FIRM ENOUGH, USE SUPPORT PLATES UNDERNEATH THE STABILIZER LEGS FOR ADDITIONAL SUPPORT. CHECK THAT THE SUPPORT PLATE AS IT COMES UNDER LOAD IS NOT PUSHED INTO THE GROUND.
- (7) RISK OF ACCIDENTS. CHECK THAT THE STABILIZER LEG SUPPORT PLATES DO NOT BEND UNDER LOAD.
- (8) RISK OF ACCIDENTS. CHOCK THE WHEELS WHEN OPERATING THE CRANE.
- (9) RISK OF ACCIDENTS. MAKE SURE THAT THE WORKING AREA IS CLEARLY MARKED (WITH CONES).
- (10) RISK OF ACCIDENTS. MAKE SURE CHECK THAT THERE ARE NO OBSTACLES WITHIN THE WORKING RANGE/AREA OF THE CRANE.
- (11) RISK OF INJURY. MAINTAIN THE MINIMUM DISTANCE FROM OVERHEAD ELECTRICITY LINES.

3 The minimum distance between the crane and overhead electricity lines is given in Table 1. Maintain these minimum distances unless directed by local procedures.

**TABLE 1 MINIMUM DISTANCE FROM OVERHEAD ELECTRICITY LINES**

Ser (a)	Voltage (V) (b)	Distance to insulated line, minimum (m) (c)	Distance to un-insulated line, minimum (m) (d)
1	Less than 500	0.5	2
2	500 to 40,000 (train and tram lines)	1.5	4
3	Greater than 40, 000	To be advised	6

**DURING OPERATION****Safety points**

4 Obey the following safety warnings:

**WARNINGS**

- (1) RISK OF INJURY. IF ANYONE ENTERS THE WORKING AREA, STOP OPERATION IMMEDIATELY.
- (2) RISK OF INJURY. MAKE SURE THAT WHEN OPERATING THE CRANE THAT A CLEAR VIEW OF THE LOAD IS ALWAYS POSSIBLE.
- (3) RISK OF INJURY. ENLIST THE HELP OF AN ASSISTANT IF THE WORKING AREA CANNOT BE FULLY OBSERVED, ESPECIALLY IF A REMOTE CONTROL IS NOT AVAILABLE AND MOBILITY IS LIMITED.
- (4) RISK OF INJURY. VISUAL SIGNS MUST BE FULLY UNDERSTOOD BY THE OPERATOR.
- (5) RISK OF INJURY. BE AWARE OF THE SAFETY OF THE PERSON GIVING VISUAL SIGNS.
- (6) RISK OF INJURY. DO NOT WALK OR STAND UNDER THE BOOM SYSTEM OR A SUSPENDED LOAD.
- (7) RISK OF INJURY. ONLY USE LIFTING EQUIPMENT, HOIST BELTS, CHAINS AND OTHER LIFTING EQUIPMENT THAT HAS BEEN SPECIFICALLY DESIGNED FOR THAT PURPOSE.
- (8) RISK OF INJURY. ALWAYS CHECK THE LIFTING CAPACITY AND VALIDITY OF CERTIFICATION BEFORE USING ANY LIFTING TOOLS.
- (9) RISK OF ACCIDENTS. DO NOT USE THE CRANE TO LIFT PERSONNEL.
- (10) RISK OF ACCIDENTS. DO NOT USE THE CRANE IN HIGH WINDS. THE CRANE MAY BEHAVE UNPREDICTABLY WHEN WIND SPEEDS ARE GREATER THAN 44 MPH.
- (11) RISK OF ACCIDENTS. DO NOT DRIVE THE VEHICLE WITH A LOAD SUSPENDED FROM THE CRANE.

**Operational points**

5 Obey the following operating warning and cautions:

**WARNING**

**RISK OF INJURY. SWITCH OFF THE CONTROL SYSTEM (OR PUSH THE STOP BUTTON ON THE REMOTE CONTROL) WHENEVER OPERATION OF THE CRANE IS PAUSED OR ENDED (EVEN WHEN WALKING TO ANOTHER WORKING POSITION).**

**CAUTIONS**

- (1) **CRANE DAMAGE.** Do not slew the crane at full speed to the final position. The slewing system will be damaged.

- (2) **CRANE DAMAGE.** Do not lower the boom at full speed from a high position, the crane will be damaged and may go into uncontrolled movement, in particular, if the overload protection system gives a pre-warning.
- (3) **CRANE DAMAGE.** Make sure the load does not come into contact with the booms.
- (4) **CRANE DAMAGE.** Do not use the crane for long continuous periods (more than 2 hours). Long continuous use can shorten the life of the crane.
- (5) **CRANE DAMAGE.** Do not use the crane to drag loads over the ground or load bed, only move the crane when the load is suspended.
- (6) **CRANE DAMAGE.** Do not use the crane to push loads over the ground.
- (7) **CRANE DAMAGE.** Do not clean the electronic system of the crane by using a high pressure water jet.
- (8) **CRANE DAMAGE.** Do not expose the electronic system of the crane to high electrical voltage, the safety system could be damaged.
- (9) **CRANE DAMAGE.** Do not immerse the controller in water or other liquid.
- (10) **CRANE DAMAGE.** Make sure that all defects are rectified immediately.
- (11) **CRANE DAMAGE.** Do not use the crane if its operating condition is not known.
- (12) **CRANE DAMAGE.** To avoid damage, operate the crane with smooth gentle lever movements.
- (13) **CRANE DAMAGE.** If a hydraulic cylinder reaches its end position, release the operating lever, otherwise, damage will occur to the hydraulic system.

#### Faults

#### WARNING

**RISK OF INJURY. KEEP AWAY FROM ANY HYDRAULIC OIL LEAKING FROM A COUPLING, HOSE OR LINE. HIGH PRESSURE HYDRAULIC OIL IS A HEALTH HAZARD.**

- 6 If a hydraulic oil leak develops, contact your Unit for assistance.

#### CAUTION

**CRANE DAMAGE. Stop crane operations immediately if the hydraulic pump produces abnormal noises, contact your Unit for assistance.**

- 7 If the hydraulic pump makes abnormal noises, contact your Unit for assistance.

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CHAPTER 4-3

GENERAL DESCRIPTION

CONTENTS

Para

1	Introduction
	Components
2	General
3	Base and column assembly
4	Booms
5	Stabilizer legs
6	Hydraulic system
8	Summary of controls and indicators
9	User interface panel
10	Control valve panel
12	Stabilizer beam valve (CAUTION)
13	Remote control
	Functions of controls and indicators
15	User interface panel (WARNING)
17	Control valve panel
19	Load plate and load diagram
21	Remote control
	System functions
25	Safety system
27	Automatic power off
28	Stabilizer leg inhibit
29	Control valve monitoring
30	Automatic oil diversion
34	Automatic speed control
35	Overload protection
37	Maximum load moment
41	Locking crane by overload protection
43	Overload protection release
46	Overload protection at end of stroke operation
47	Height warning for first boom
48	Stabilizer supervision

Fig

Page

1	Crane main assemblies.....	2
2	Base and column assembly .....	3
3	Booms.....	3
4	Stabilizer legs .....	4
5	Hydraulic system .....	5
6	User interface panel .....	6
7	Control valve panel.....	7
8	Stabilizer beam valve .....	7
9	Remote control .....	8
10	Controls and indicators.....	9
11	User interface panel .....	10
12	Blackout lighting system .....	11
13	Control valve panel.....	12
14	Load plate and load diagram.....	13

(continued)

**CONTENTS (continued)**

Fig		Page
15	Remote control.....	14
16	Remote control buttons.....	14
17	Remote control LEDS .....	15
18	Safety system .....	16
19	Overload protection.....	18
20	Maximum load moment.....	19

**INTRODUCTION**

1 This chapter provides a general description of the main assemblies and systems of the HIAB 088 ATD crane.

**COMPONENTS**

**General**

- 2 Refer to Fig 1. The crane consists of the main assemblies that follow:
  - 2.1 Base and column assembly.
  - 2.2 Booms.
  - 2.3 Hydraulic system.
  - 2.4 Safety system.
  - 2.5 User interface panel and valve control panel (see illustration).
  - 2.6 Remote control.

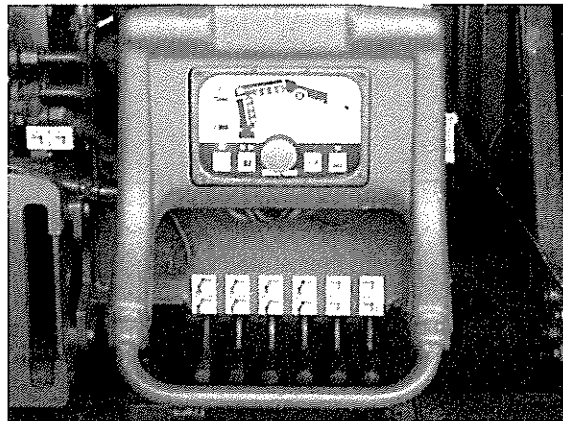
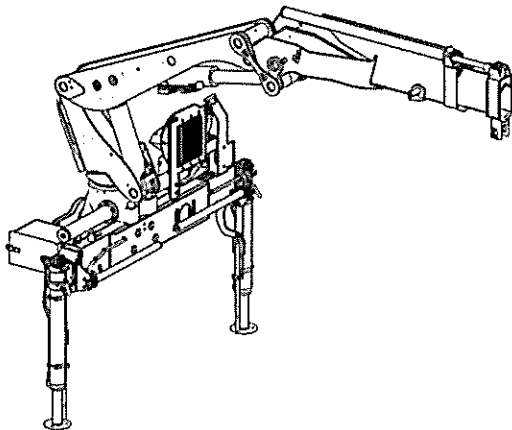


Fig 1 Crane main assemblies



**Base and column assembly**

- 3 Refer to Fig 2. The base and column assembly contains the following:
  - 3.1 Base that supports the column in two bearings.
  - 3.2 Slewing assembly.
  - 3.3 Stabilizer beams and legs.

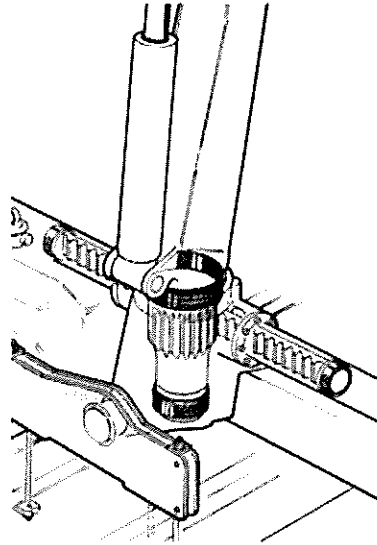
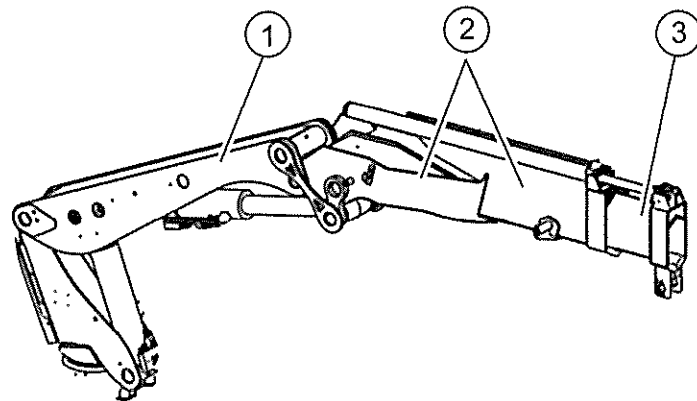


Fig 2 Base and column assembly

**Booms**

- 4 Refer to Fig 3 for the three booms.



1 – First boom

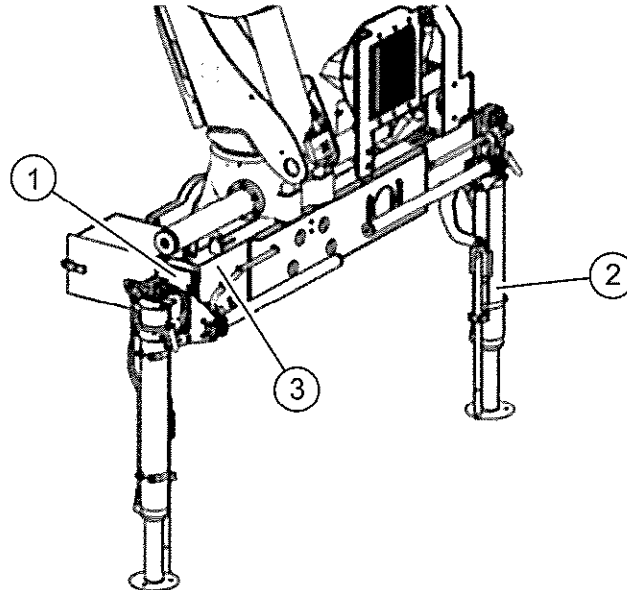
2 – Second boom

3 – Extension boom

Fig 3 Booms

**Stabilizer legs**

5 Refer to Fig 4. The two stabilizer legs (2) are each mounted on a stabilizer beam (1), which slides in a housing (3). The stabilizer legs (2) support the crane during operation.



1 – Stabilizer beam

2 – Stabilizer legs

3 – Housing

Fig 4 Stabilizer legs

**Hydraulic system**

6 Refer to Fig 5. The hydraulic system consists of the following:

- 6.1 Hydraulic reservoir.
- 6.2 Hydraulic pump.
- 6.3 Filter.
- 6.4 Oil cooler.
- 6.5 Control valve panel.
- 6.6 Stabilizer beam valves.
- 6.7 First boom cylinder.
- 6.8 Second boom cylinder.
- 6.9 Extension boom cylinder.
- 6.10 Slewing cylinders.
- 6.11 Load holding valves.

7 The load holding valves (4) are installed on all hydraulic cylinders to hold the cylinder in position after the control valve is released. The load holding valves will also hold the hydraulic cylinders in position if the hydraulic power is turned off.

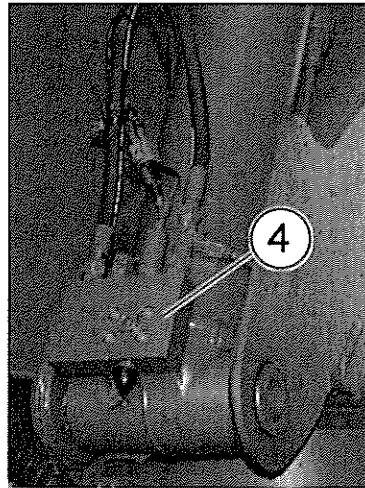


Fig 5 Hydraulic system

#### SUMMARY OF CONTROLS AND INDICATORS

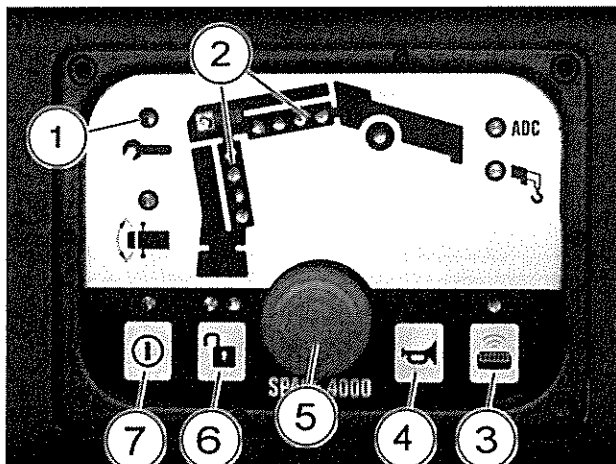
- 8 The crane is operated and monitored by means of the following:
- 8.1 User interface panel.
  - 8.2 Stabilizer beam valves.
  - 8.3 Control valve panel.
  - 8.4 Remote control.
  - 8.5 Crane parking indicator.

**User interface panel**

9 Refer to Fig 6. The controls and indicators in the user interface panel are listed in the legend below.

**NOTE**

Those items not annotated are not used.



- 1 – Service LED
- 2 – Cylinder pressure LED
- 3 – Remote pushbutton
- 4 – Horn pushbutton

- 5 – Stop button
- 6 – Overload protection pushbutton with two LED
- 7 – Safety on/off pushbutton with LED

Fig 6 User interface panel

**Control valve panel**

10 Refer to Fig 7. The control valve panel is equipped with six control levers as follows:

- 10.1 Slewing.
- 10.2 First boom.
- 10.3 Second boom.
- 10.4 Extension boom.
- 10.5 Stabilizer beam left.
- 10.6 Stabilizer beam right.

11 A load plate is mounted on the control valve panel to provide the maximum load for various reaches of the crane, refer to Para 19.

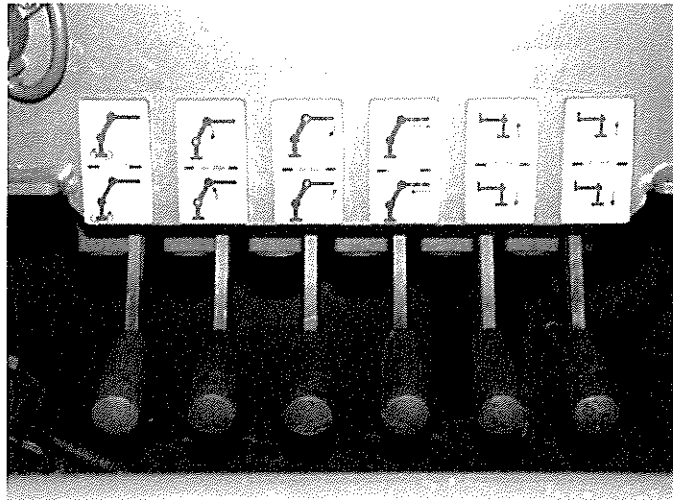


Fig 7 Control valve panel

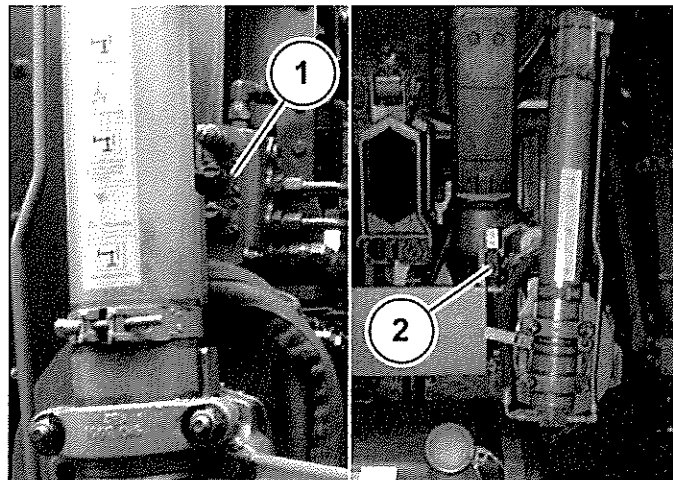
**Stabilizer beam valve**

**CAUTION**

**EQUIPMENT DAMAGE.** Do not attempt to drive the vehicle with the stabilizer legs incorrectly stowed. If the legs are incorrectly stowed and attempts are made to drive the vehicle, a brief audible alarm will be heard.

12 Refer to Fig 8. The stabilizer beam valves are equipped with two levers as follows:

- 12.1 Stabilizer beam out/in (1), right side.
- 12.2 Stabilizer beam out/in (2), left side.



1 – Stabilizer beam out/in, right side

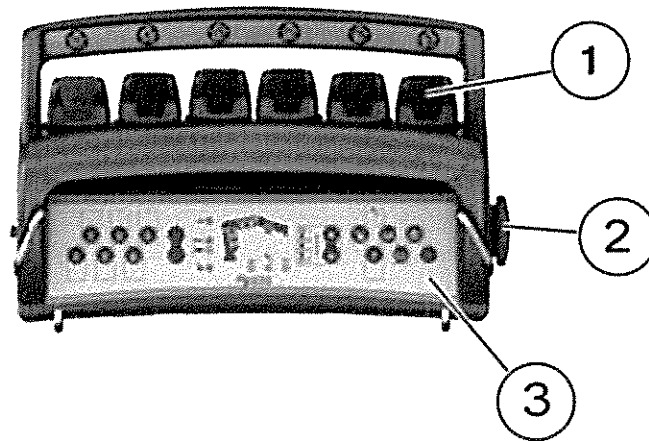
2 – Stabilizer beam out/in, left side

Fig 8 Stabilizer beam valve

**Remote control**

13 Refer to Fig 9. The remote control is equipped with controls and a display (3). The six control levers (1) and pushbutton (2) are as follows:

- 13.1 Slewing lever.
- 13.2 First boom lever.
- 13.3 Second boom lever.
- 13.4 Extension boom lever.
- 13.5 Stabilizer beam left lever.
- 13.6 Stabilizer beam right lever.
- 13.7 Stop pushbutton (2).



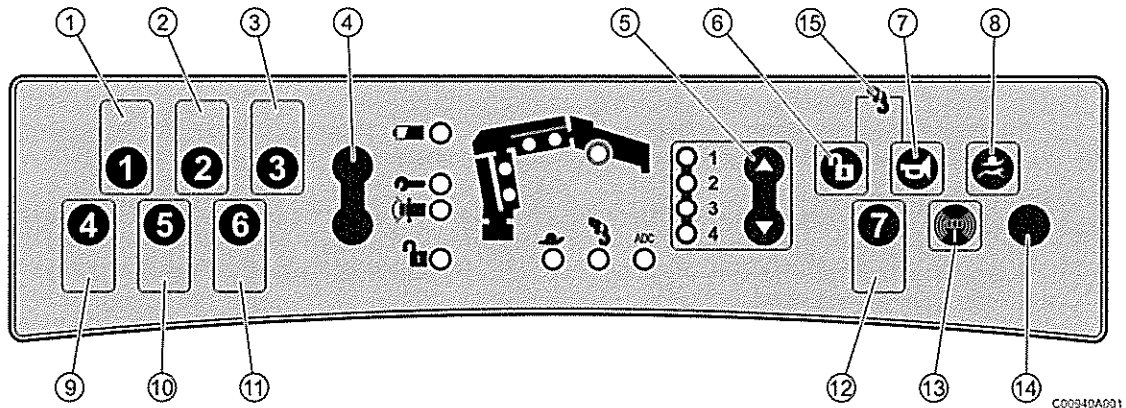
1 – Control levers

2 – Pushbutton

3 – Display

Fig 9 Remote control

14 Refer to Fig 10. The controls and indicators in the display of the remote control are shown in Fig 10.



- |   |                          |
|---|--------------------------|
| 1 to 4 Not in use                         | 7 – Horn pushbutton      |
| 5 – Lock/unlock (menu choices not in use) | 8 – Low speed pushbutton |
| 6 – Overload protection pushbutton        | 9 to 15 Not in use       |

Fig 10 Controls and indicators

## FUNCTIONS OF CONTROLS AND INDICATORS

### User interface panel

15 Refer to Fig 11. The functions of the controls and indicators in the user interface panel are as follows:

15.1 Service LED (1), which has three functions as follows:

15.1.1 Green indicates a service is required. Contact your Unit for assistance.

15.1.2 Constant red indicates an error is detected in the system. The crane will work with a reduced load capacity and/or reduced speed.

15.1.3 Flashing red indicates a disturbed connection or an error in the user panel. The crane will work with a reduced load capacity and/or reduced speed.

15.2 Cylinder pressure LED (2) x8, showing the pressure in the cylinders and boom condition as follows:

15.2.1 One green LED - 50% of max pressure present.

15.2.2 Two green LED - 70% of max pressure present.

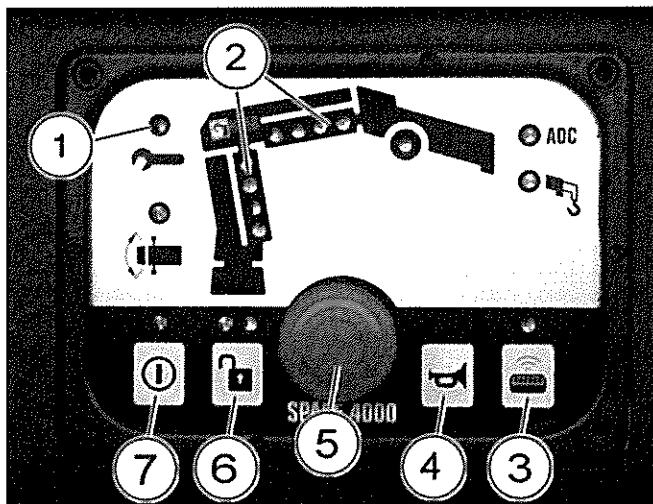
15.2.3 Three LED flashing red - 90% of max pressure present.

15.2.4 Four red LED - rated pressure present.

15.2.5 Four LED flashing red - first boom too high.

15.3 The remote pushbutton (3) selects remote or manual control. The integral LED comes on for remote operation, goes off for manual operation and flashes if no signal is present for remote operation.

- 15.4 The horn pushbutton (4) operates the horn.
- 15.5 The stop pushbutton (5) stops all movements of the crane immediately when pressed.
- 15.6 The overload protection pushbutton (6) has two functions as follows:
- 15.6.1 Disconnects the automatic dump function (Para 30). The integral green LED comes on green when the stop switch is off and electrical power is available for the dump valve. The green LED goes out when the dump valve is off.
- 15.6.2 Releases the overload protection temporarily (Para 43). The integral, dual colour LED comes on red when the overload protection is activated and flashes red when the release pushbutton is held pressed. The dual colour LED comes on green when operating the stabilizer leg valve.
- 15.7 The safety on/off pushbutton (7) switches the safety system on and off. The integral LED comes on when the safety system is on. The LED flashes when the safety system is on and a stop pushbutton is pressed in.



- |                           |   |
|---------------------------|---|
| 1 – Service LED           | 5 – Stop button                                 |
| 2 – Cylinder pressure LED | 6 – Overload protection pushbutton with two LED |
| 3 – Remote pushbutton     | 7 – Safety on/off pushbutton with LED           |
| 4 – Horn pushbutton       |   |

Fig 11 User interface panel



**WARNING**

**RISK OF INJURY. INDICATORS IN THE USER CONTROL PANEL WILL NOT COME ON IN VEHICLE BLACKOUT CONDITIONS**

16 Refer to Fig 12. The user interface panel is connected to the vehicle's blackout lighting system. Therefore, no indicators will come on in blackout conditions. There will be no indication that the crane is switched on or off.

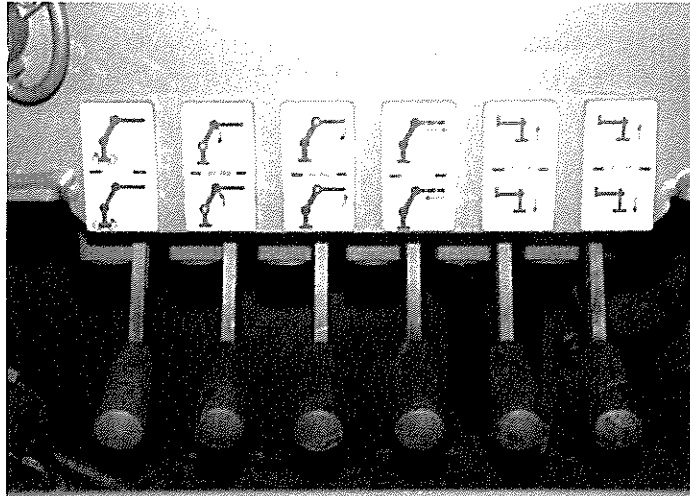


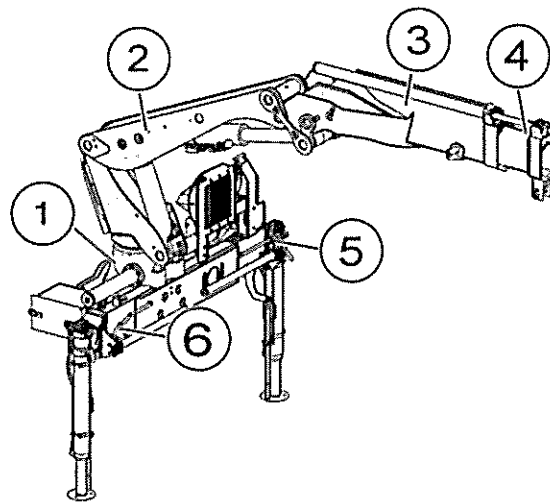
Fig 12 Blackout lighting system

**Control valve panel**

17 Refer to Fig 13. The functions of the control valves in the control valve panel are as follows:

- 17.1 Slewing (1), clockwise and anticlockwise.
- 17.2 First boom (2), up and down.
- 17.3 Second boom (3), up and down.
- 17.4 Extension boom (4), out and in.
- 17.5 Stabilizer beam left (5), out and in.
- 17.6 Stabilizer beam right (6), out and in.

18 The speed of a function is proportional to the position of the associated lever, provided that the oil flow is sufficient. Functions will stop if there is insufficient oil flow.



- |                 |                           |
|-----------------|---------------------------|
| 1 – Slewing     | 4 – Extension boom        |
| 2 – First boom  | 5 – Stabilizer beam left  |
| 3 – Second boom | 6 – Stabilizer beam right |

Fig 13 Control valve panel

### Load plate and load diagram

19 Refer to Fig 14. The load plate on the control valve panel shows the maximum weight that may be lifted for a given number of reaches, with the first boom in the optimum position.

20 The load diagram shows the maximum weight that may be lifted in the entire working zone. The white area is the working zone. The x axis gives the reach and the y axis gives the height. The curves give the maximum loads of 1880kg, 2620kg, 3550kg and 3000kg. Therefore, the working zone is to the left of the curve for a given maximum load.

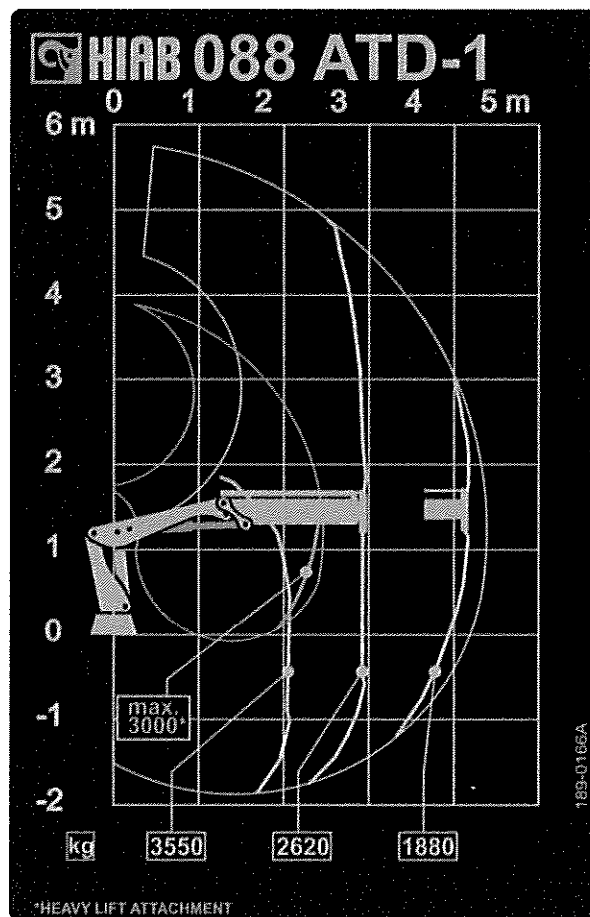
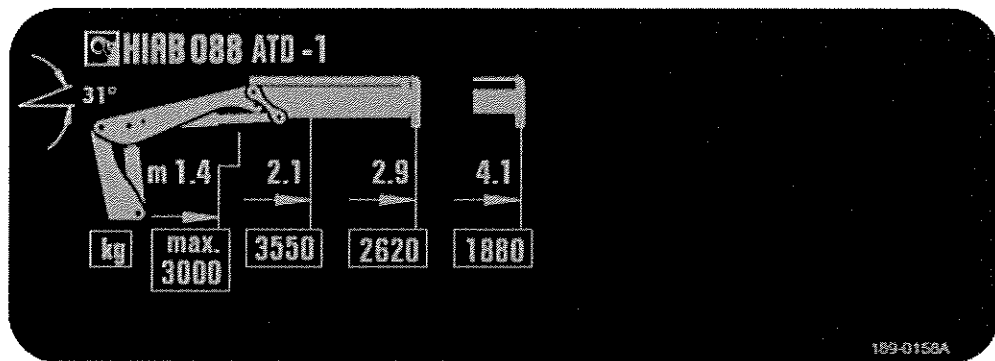
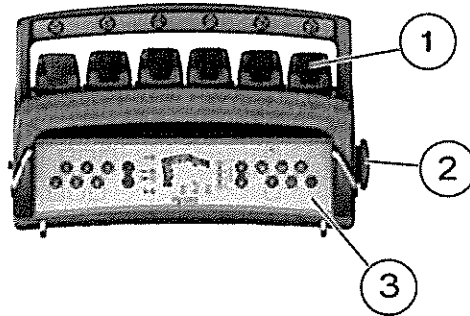


Fig 14 Load plate and load diagram

**Remote control**

21 Refer to Fig 15. The functions of the six control valves (1) in the remote control are identical to those levers in the control valve panel (Para 17).

22 The function of the stop pushbutton (2) in the remote control is identical to the stop pushbutton in the user interface panel (Para 15.5). Pressing the stop pushbutton (2) stops all crane functions. Turn the stop pushbutton clockwise to release the pushbutton.



1 – Control valves

2 – Stop pushbutton

3 – Display

Fig 15 Remote control

23 Refer to Fig 16. The functions of the controls and indicators in the display of the remote control are as follows:

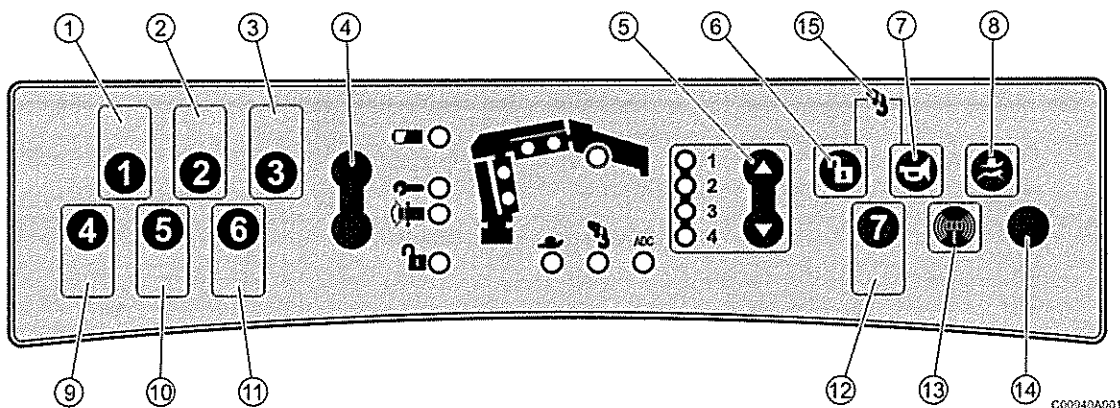
23.1 The overload protection pushbutton (6) functions in an identical manner to the overload protection pushbutton in the user interface panel (Para 15.6).

23.2 The horn pushbutton (7) operates the horn.

23.3 The speed selector pushbutton (8) selects the speed of operation. The control levers must be set to neutral before operating this pushbutton. The functions are as follows:

23.3.1 Leopard mode - normal speed (default speed at switch-on).

23.3.2 Snail mode - reduced speed for precision work.



1 to 4 – Not in use

5 – Lock/unlock (menu choices not in use)

6 – Overload protection pushbutton

7 – Horn pushbutton

8 – Low speed pushbutton

9 to 15 – Not in use

Fig 16 Remote control buttons

23.4 Refer to Fig 17. Cylinder pressure LED (5) x4 show the pressure in the cylinders. The four LED function in a similar manner to the eight cylinder pressure LED in the user interface panel. The functions of the four LED are as follows:

23.4.1 LED comes on green - 70% of maximum pressure present.

23.4.2 LED flashing red - 90% of maximum pressure present.

23.4.3 LED come on red - rated pressure present.

23.5 The low speed LED (7) comes on when slow speed is selected (Para 23.3.2).

23.6 The overload protection LED (4) comes on when the overload protection is activated (Para 23.1). Flashing indicates slow drive for 5 seconds.

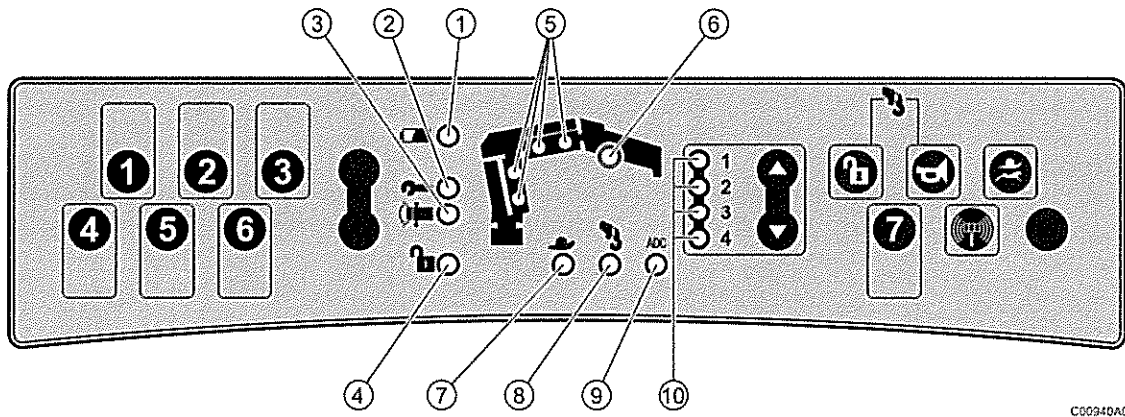
23.7 The service LED (2) comes on when a service is required. Contact your Unit for assistance.

**NOTES**

(1) LED (1) not in use.

(2) LED (8 to 10) not in use.

24 The remote control can be locked to prevent unwanted operation, refer to Chap 4-4.



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- |                             |                   |
|-----------------------------|-------------------|
| 1 – Not used                | 6 – Not used      |
| 2 – Service LED             | 7 – Low speed LED |
| 3 – Not used                | 8 – Not used      |
| 4 – Overload protection LED | 9 – Not used      |
| 5 – Cylinder pressure LEDs  | 10 – Not used     |

Fig 17 Remote control LEDs

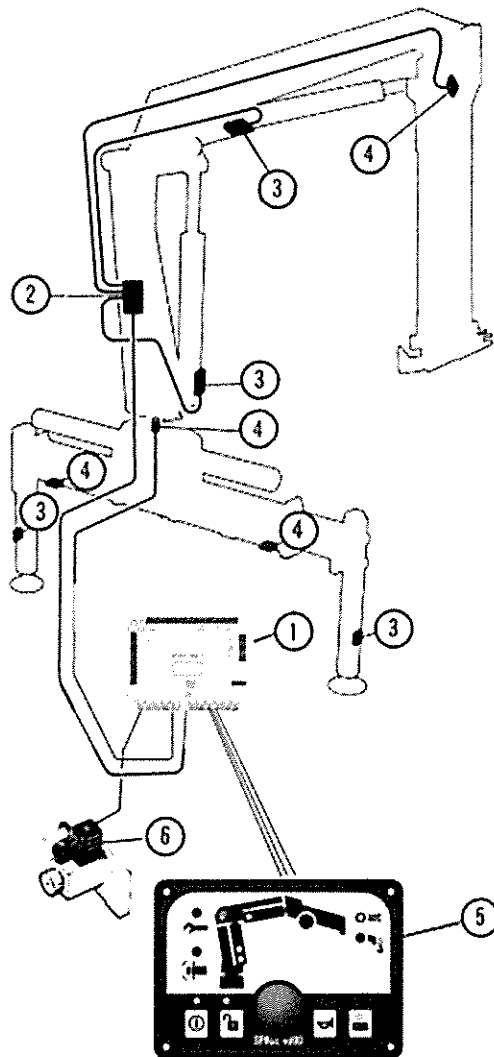
**SYSTEM FUNCTIONS**

**Safety system**

25 Refer to Fig 18. The safety system consists of the following:

25.1 Microprocessor (1).

- 25.2 Connection box (2), which connects the microprocessor to the sensors and indicators through electrical leads.
- 25.3 Pressure sensors (3), which monitor the hydraulic pressure in the stabilizer legs, first boom and second boom.
- 25.4 Indicators (4), which show the position of the second boom, stabilizer beams and column.
- 25.5 User interface panel (5) (Para 15).
- 25.6 Dump valve (6), which is used to control the flow of hydraulic oil (Para 30).
- 25.7 Spool sensors, which monitor the position of various control valves.
- 25.8 Warning LED.



- |                      |                          |
|----------------------|--------------------------|
| 1 – Microprocessor   | 4 – Indicators           |
| 2 – Connection box   | 5 – User interface panel |
| 3 – Pressure sensors | 6 – Dump valve           |

Fig 18 Safety system

26 The microprocessor controls the crane according to signals that are provided from the various sensors. For example, the movement of the control levers is monitored by the sensors at their spools. Other sensors monitor the load, position and movement of the crane. The microprocessor responds as follows:

26.1 A warning is given when prohibited movements or speeds are approached.

26.2 When prohibited movements or speeds are reached, the response is as follows:

26.2.1 In remote control, prohibited movements are stopped.

26.2.2 In manual control, all movements are stopped. When a control valve is moved too far, all movements are stopped by the action of the dump valve (Para 29).

26.3 A warning is given when a fault is detected in the safety system. Depending on the fault, the speed and/or load capacity is reduced. The crane is switched off for serious faults.

#### **Automatic power off**

27 The crane is switched off if the crane is not used for 30 minutes, to prevent discharging the vehicle battery.

#### **Stabilizer leg inhibit**

28 Raising the stabilizer legs is disabled when the crane is not parked.

#### **Control valve monitoring**

29 The crane is stopped if the control valve panel is operated while the crane is in remote control. The microprocessor notes that the control valve in the panel has moved further than the equivalent movement of the lever on the remote control. When this happens, the hydraulic oil is diverted into the hydraulic tank to stop the crane.

#### **Automatic oil diversion**

30 Hydraulic oil is supplied to the crane or diverted to the tank through a dump valve, which is controlled by the microprocessor. The automatic oil diversion is enabled when the crane is switched on.

31 The hydraulic oil is diverted back to the hydraulic tank if no control lever is moved for 3 seconds. Diverting the hydraulic oil prevents over-heating. The next movement of a control valve stops the diversion of the hydraulic oil.

32 The hydraulic oil is also diverted back to the hydraulic tank when an overload condition is sensed by the microprocessor.

33 The stabilizer leg control valves are not equipped with spool sensors, therefore, the automatic oil diversion must be disabled (Para 15.6 and 23.1) when using the leg control valves.

#### **Automatic speed control**

34 When working close to the rated capacity, the speed of operation is automatically reduced to redistribute the hydraulic power. Normal speed is resumed when the load decreases from close to the rated capacity.

**Overload protection**

35 Overload protection prevents overloading of the crane. A prohibited movement will stop the crane (Para 37).

36 The cylinder pressure LED flash red when 90% of maximum pressure is present in a cylinder and the LED come on red when the rated pressure is present (Para 15.2 and 23.4).

**Maximum load moment**

37 Crane movements are stopped if they would increase the load beyond the maximum load moment (maximum lifting capacity), and a warning is given.

38 Certain movements are locked, depending on whether the second boom is above or below the horizontal.

39 Refer to Fig 19. If the second boom is above the horizontal, the movements are locked as follows:

39.1 First boom up or down locked.

39.2 Second boom down locked normally. However, the microprocessor will allow the second boom to be lowered for a short time at reduced speed.

39.3 Extension boom out locked.

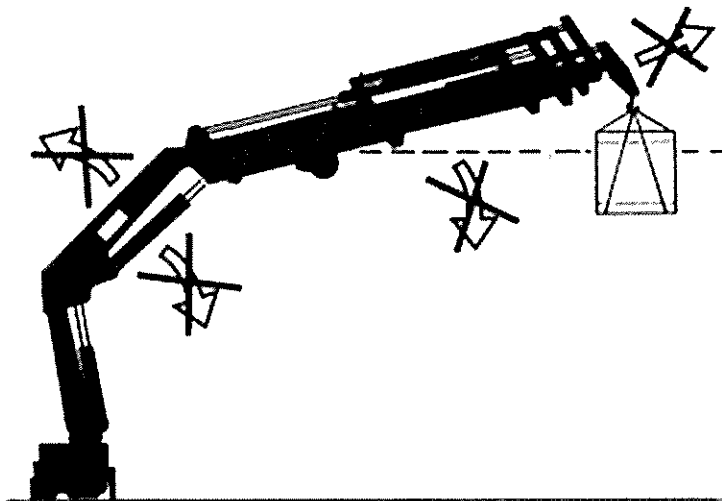


Fig 19 Overload protection

40 Refer to Fig 20. If the second boom is below the horizontal, the movements are locked as follows:

40.1 First boom up locked.

40.2 First boom down locked for certain situations.

40.3 Second boom up locked.

40.4 Extension boom out locked.



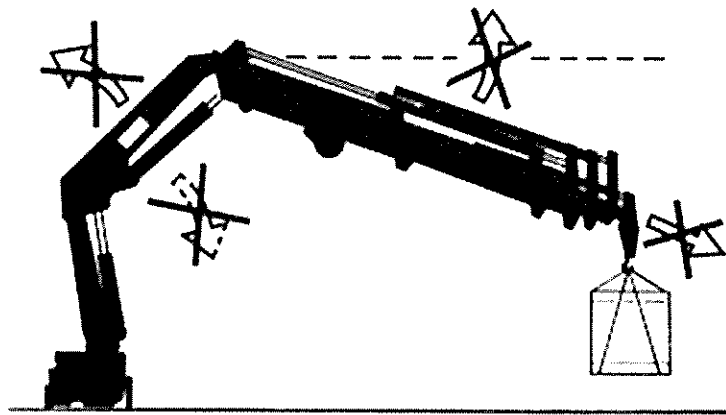


Fig 20 Maximum load moment

#### **Locking crane by overload protection**

41 The crane boom can be locked by the overload protection in certain situations, and no movements are possible. The overload protection LED in the user interface panel or the remote control will come on.

42 To disable the locking, the crane should be operated to reduce the load moment, or the overload protection can be released (Para 15.6 and 23.1).

#### **Overload protection release**

43 Overload protection release is provided to release the crane from the locked condition (Para 15.6 and 23.1). The overload protection release must not be used to deliberately overload the crane.

44 There is a time limit of a few seconds in which the overload protection is released so the crane can be operated.

45 If the overload protection is re-established, there is approximately a 30 second delay before the overload protection can be released again.

#### **Overload protection at end of stroke operation**

46 The overload protection limit can be reached if the first or second boom cylinder go the end of their stroke. The safety system interprets this condition as an overload. If the second boom is pointing up, no downward movement is normally possible. However, the microprocessor will allow the second boom to be lowered for a short time at reduced speed.

#### **Height warning for first boom**

47 When the first boom is in a too-high position and the safety system is switched off, the cylinder pressure LED will flash for a period of time (Chap 4-4). The vehicle must not be moved.

#### **Stabilizer supervision**

48 The raising of the stabilizer legs is prevented when the boom is operating. The stabilizer legs can be only be raised when the crane is parked in the transport position

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CHAPTER 4-4

OPERATING INSTRUCTIONS

CONTENTS

Para

1	Introduction (WARNINGS) (CAUTIONS)
5	Remote control
10	Power take-off
12	Starting the crane
14	Stopping the crane
	Stabilizer operation
15	Positioning the stabilizer legs (WARNINGS)
17	Stowing the stabilizer legs (WARNINGS) (CAUTIONS)
	Crane stowage
18	Unstowing the crane
21	Stowing the crane (CAUTION)
	Operating the crane
22	Lifting the load (WARNING) (CAUTIONS)
23	Speed of operation
24	Releasing the overload protection
28	Operating the automatic oil diversion (WARNING)
30	Height warning first boom (WARNING)
31	Locking and unlocking the remote control
33	After operation (WARNING) (CAUTION)
34	Emergency stop
36	Bleeding the hydraulic system
37	Fault diagnosis

Table

Page

1	Fault diagnosis .....	18
---	-----------------------	----

Fig

Page

1	Remote control .....	4
2	Starting the crane (1) .....	5
3	Starting the crane (2) .....	5
4	Stopping the crane .....	6
5	Positioning the stabilizer legs .....	7
6	Valve .....	8
7	Lowering the stabilizer legs .....	9
8	Support plate .....	9
9	Stowing the stabilizer legs (1) .....	10
10	Stowing the stabilizer legs (2) .....	11
11	Unstowing the crane .....	12
12	Stowing the crane .....	12
13	Lifting the load .....	13
14	Speed of operation .....	14
15	Height warning first boom .....	15
16	Locking and unlocking the remote control .....	16
17	After operation .....	17

**INTRODUCTION**

1 This chapter provides the operating instructions for the crane.

**WARNINGS**

- (1) **RISK OF INJURY. THE CRANE MUST ONLY BE OPERATED BY PERSONS TRAINED IN THE OPERATION OF THE HIAB CRANE.**
- (2) **RISK OF INJURY. PERSONAL PROTECTIVE EQUIPMENT MUST BE WORN (HARD HAT, STEEL TOE SHOES, GLOVES) WHEN OPERATING THE CRANE.**
- (3) **RISK OF INJURY. THE OPERATOR MUST BE STANDING IN THE CORRECT POSITION TO AVOID CONTACT WITH THE STABILIZER LEG MECHANISM DURING DEPLOYMENT AND STOWAGE OPERATIONS.**
- (4) **RISK OF INJURY. STABILISER BEAMS SHOULD BE EXTENDED FULLY FOR ALL CRANE OPERATIONS.**
- (5) **RISK OF ACCIDENTS. FOR NORMAL OPERATIONS, SWITCH ON THE HAZARD LIGHTS TO INDICATE THAT CRANE OPERATIONS ARE IN PROGRESS.**
- (6) **RISK OF ACCIDENTS. THE OPERATOR MUST BE SATISFIED THAT AMBIENT LIGHT CONDITIONS PROVIDE SUFFICIENT VISIBILITY TO ALLOW CRANE OPERATIONS TO BE CARRIED OUT SAFELY.**
- (7) **RISK OF INJURY. DO NOT DRIVE THE VEHICLE IF THERE IS A LOAD SUSPENDED FROM THE CRANE.**
- (8) **RISK OF INJURY. ONLY USE LIFTING EQUIPMENT, HOIST BELTS, CHAINS AND OTHER LIFTING EQUIPMENT THAT HAS BEEN SPECIFICALLY DESIGNED FOR THAT PURPOSE.**
- (9) **RISK OF INJURY. CHECK THE LIFTING CAPACITY AND VALIDITY OF CERTIFICATION BEFORE USING ANY LIFTING TOOLS.**
- (10) **RISK OF INJURY. MAKE SURE THAT THE WORKING AREA IS CLEARLY MARKED (WITH CONES).**
- (11) **RISK OF INJURY. IF ANYONE ENTERS THE WORKING AREA, STOP OPERATION IMMEDIATELY.**
- (12) **RISK OF INJURY. MAKE SURE WHEN OPERATING THE CRANE THAT A CLEAR VIEW OF THE LOAD IS ALWAYS POSSIBLE.**
- (13) **RISK OF INJURY. ENLIST THE HELP OF AN ASSISTANT IF THE WORKING AREA CANNOT BE FULLY OBSERVED, ESPECIALLY IF A REMOTE CONTROL IS NOT AVAILABLE AND MOBILITY IS LIMITED.**
- (14) **RISK OF INJURY. VISUAL SIGNS MUST BE FULLY UNDERSTOOD BY THE OPERATOR.**
- (15) **RISK OF INJURY. BE AWARE OF THE SAFETY OF THE PERSON GIVING ANY VISUAL SIGNS.**
- (16) **RISK OF INJURY. ALWAYS SWITCH OFF THE CONTROL SYSTEM (OR PUSH THE STOP BUTTON ON THE REMOTE CONTROL) WHENEVER OPERATION OF THE CRANE IS PAUSED OR ENDED (EVEN WHEN WALKING TO ANOTHER WORKING POSITION).**

(17) **RISK OF INJURY. DO NOT WALK OR STAND UNDER THE BOOM SYSTEM OR A SUSPENDED LOAD.**

(18) **RISK OF ACCIDENTS. DO NOT USE THE CRANE IN HIGH WINDS. THE CRANE MAY BEHAVE UNPREDICTABLY WHEN THE WIND SPEEDS ARE GREATER THAN 44 MPH.**

(19) **RISK OF ACCIDENTS. WHEN CARRYING OUT MAINTENANCE PROCEDURES ON THE CRANE MAKE SURE THAT THE PROCEDURES ARE CARRIED OUT EFFICIENTLY AND SAFELY.**

#### CAUTIONS

(1) **CRANE DAMAGE.** When unfolding the crane, make sure there is no contact with the surrounding bodywork of the vehicle or its equipment.

(2) **CRANE DAMAGE.** Make sure that the area around the stabilizer beam is clear before retraction.

(3) **CRANE DAMAGE.** Do not use aggressive cleaning agents on the crane.

(4) **CRANE DAMAGE.** Do not use high pressure cleaners on the control valves, cylinders, oil tank or electronic parts. Only the crane surface may be cleaned using a high pressure cleaner.

(5) **EQUIPMENT DAMAGE.** Do not spill hydraulic oil on crane components when topping up.

2 The crane is mounted between the cab and load platform of the vehicle.

3 The crane is mounted so that the mechanism is biased to the left side of the vehicle.

4 The manual control box is mounted on the left side of the vehicle.

#### REMOTE CONTROL

5 Refer to Fig 1. Connect the cable between the remote control and the connector on the crane.

6 Start the safety system: press the on/off button (1). The indicator lights up. The system self checks for 2 to 4 seconds.

7 Press the button (2) to disconnect the automatic dump function.

8 Carry the remote control in a convenient operating position using the waistbelt or the shoulder strap.

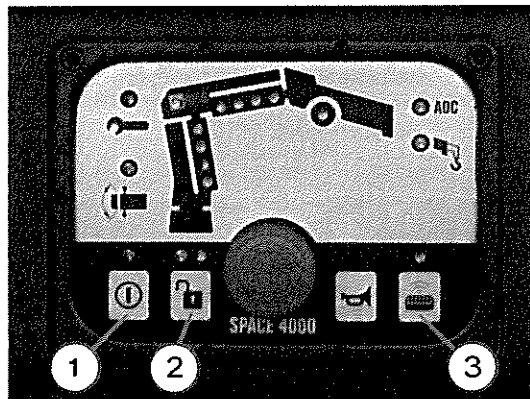
9 To switch on the remote control, proceed as follows:

9.1 Press the remote pushbutton (3) in the user interface panel.

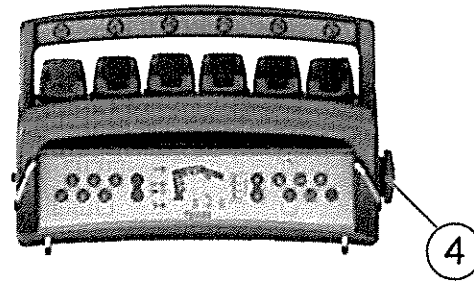
9.2 Release the stop pushbutton (4) on the remote control.

9.3 Make sure that the MENU LED 1 blinks. The LED comes on continuously when communication is established with the crane.

9.4 If the MENU LED 1 is off, press the MENU pushbutton repeatedly until the MENU LED 1 comes on.



- 1 – On/off button  
2 – Button



- 3 – Remote pushbutton  
4 – Stop pushbutton

Fig 1 Remote control

### Power take-off

10 To engage the Power Take-Off (PTO), proceed as follows:

#### NOTE

The vehicle cannot be put into gear when the PTO is engaged.

- 10.1 Make sure that the vehicle is stationary and the parking brake is applied.
  - 10.2 Run the engine at idle speed.
  - 10.3 Make sure that the gear switch is in N.
  - 10.4 Press the bottom of the PTO switch. The check lamp in the switch comes on.
- 11 To disengage the PTO, press the top of the switch. The check lamp in the switch goes off.

### Starting the crane

12 Refer to Fig 2. To start the crane, proceed as follows:

- 12.1 Engage the PTO.
- 12.2 Press the bottom of the crane switch. The check lamp in the switch comes on.
- 12.3 Refer to Fig 3. Press the on/off (1) button on the user interface panel, the engine idle speed will increase automatically.

#### NOTE

When the crane is started, a warning light is shown on the panel of check lights. A warning symbol and message are also shown, alternately with other active warning messages, on the driver's display.

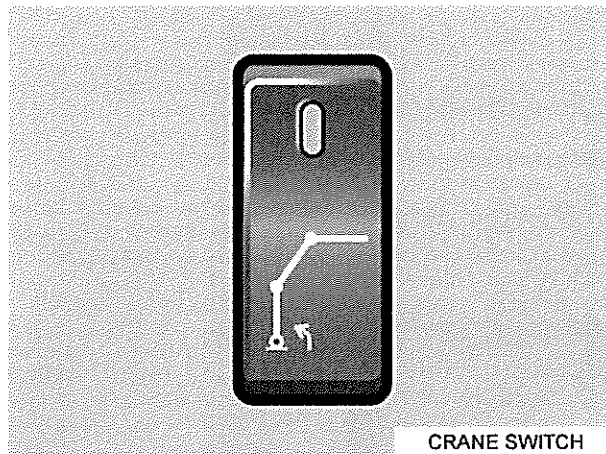


Fig 2 Starting the crane (1)

13 Refer to Fig 3. To start the crane at temperatures below 0°C, proceed as follows:

13.1 Engage the PTO.

13.2 Press the bottom of the crane switch. The check lamp in the switch comes on.

13.3 Press the on/off button (1) on the user interface panel, the engine idle speed will increase automatically.

13.4 Allow the hydraulic system to idle for a few minutes. Do not touch the control levers.

NOTE

Wear on the hydraulic system is greater when starting in cold temperatures than in normal temperatures.

13.5 Operate the stabilizer leg control for 1 minute to warm up the oil, refer to Para 16.

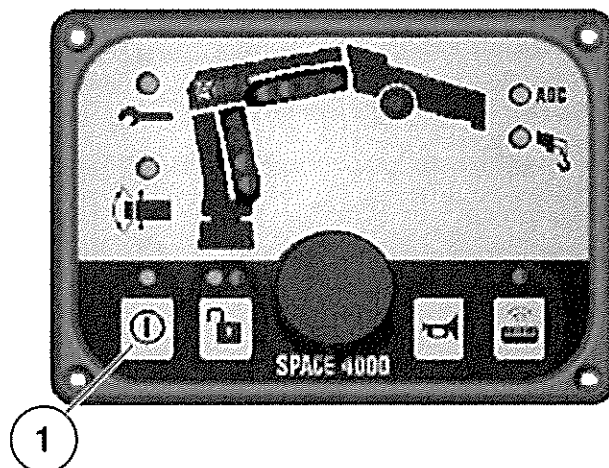


Fig 3 Starting the crane (2)

**Stopping the crane**

14 Refer to Fig 4. To stop the crane, proceed as follows:

- 14.1 Press the on/off pushbutton (1).
- 14.2 Press the top of the crane switch.
- 14.3 Disengage the PTO.

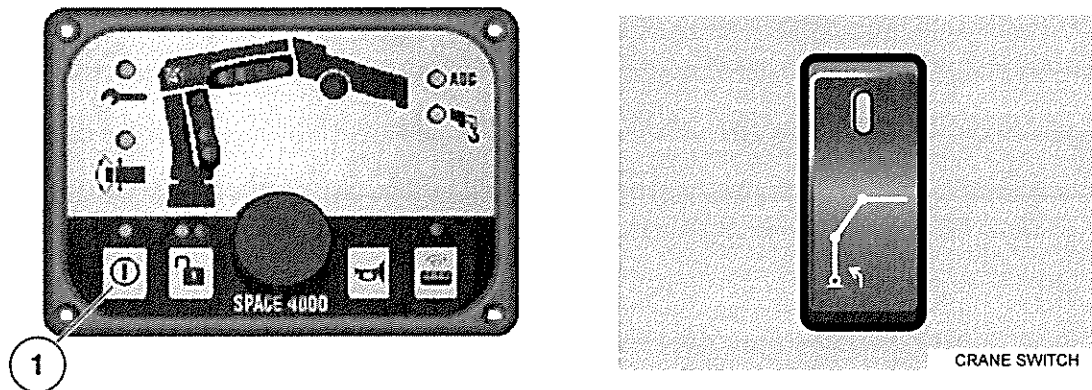


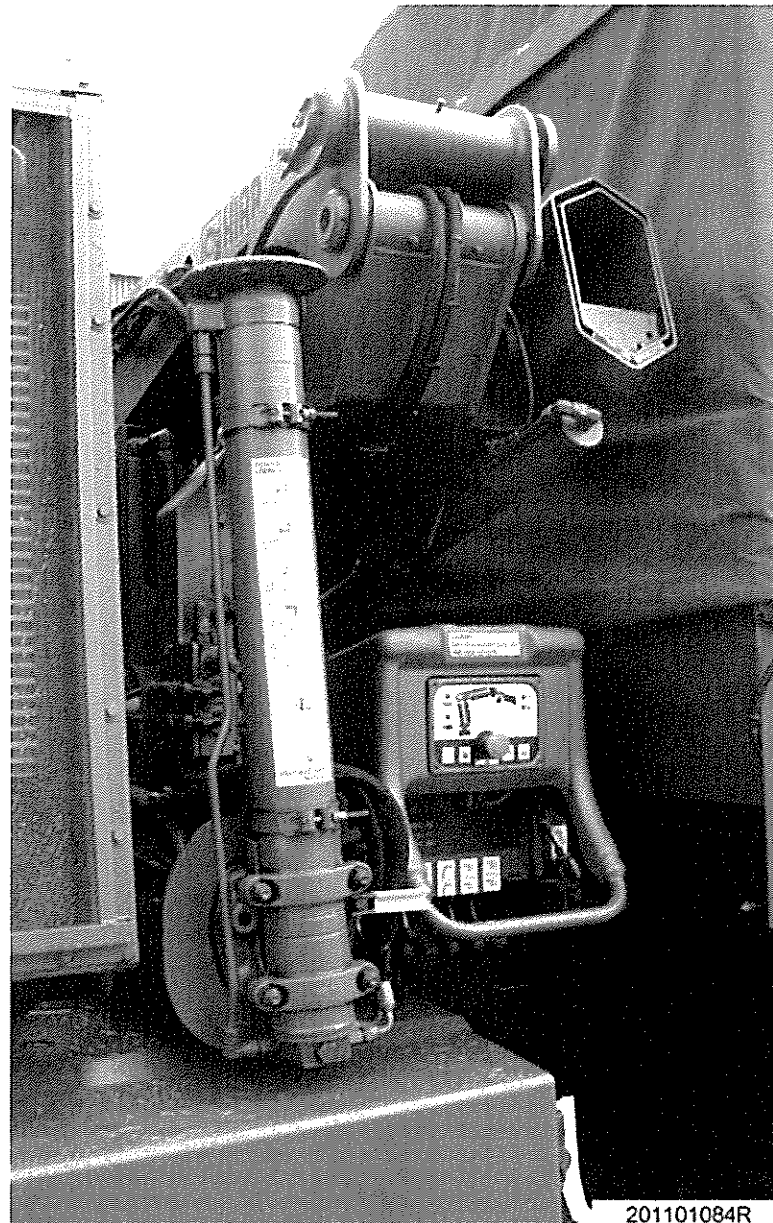
Fig 4 Stopping the crane

**STABILIZER OPERATION****Positioning the stabilizer legs****WARNINGS**

- (1) **RISK OF INJURY. CHECK THAT THE STABILIZER OPERATING LEVERS ARE IN THE NEUTRAL POSITION. OTHERWISE THE STABILIZER MAY START MOVING AT SYSTEM STARTUP.**
- (2) **RISK OF INJURY. WHEN OPERATING THE STABILIZER LEGS MAKE SURE THAT THE STABILIZER LEGS CAN BE SEEN. DO NOT STAND IN FRONT OF THE HYDRAULICALLY OPERATED STABILIZER EXTENSIONS.**
- (3) **RISK OF INJURY. THE CRANE CAN TIP OVER IF THE STABILIZER BEAMS ARE NOT FULLY EXTENDED.**

15 Figure 5 below illustrates the position of the stabilizer legs.





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Fig 5 Positioning the stabilizer legs

16 Refer to Fig 6. To raise and lower a stabilizer leg, proceed as follows:

**WARNING**

**RISK OF INJURY. KEEP CLEAR OF THE STABILIZER BEAM AND THE ADJACENT HOSES. STAND BEHIND AND CLEAR OF THE BEAM (LOADBED SIDE).**

- 16.1 Operate the valve (1) to extend one of the stabilizer beams fully.
- 16.2 Use the waistbelt or the shoulder strap to place the remote controller in a convenient position.
- 16.3 Connect the remote control to the connection point of the crane.
- 16.4 Switch on the remote control, refer to Para 9.

**WARNING**

**RISK OF INJURY. MAKE SURE THAT THE LEG IS FULLY RETRACTED AS UNCONTROLLABLE LEG MOVEMENT MAY OCCUR.**

- 16.5 Make sure that the stabilizer leg is fully retracted, so that the base plate is touching the cylinder.

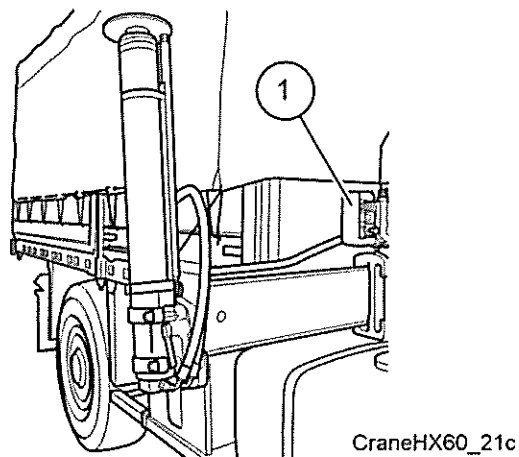


Fig 6 Valve

- 16.6 Refer to Fig 7. Support the stabilizer leg, then release the locking pin (1) of the tilting mechanism. Make sure that the locking pin remains released while the stabilizer leg is moved.
- 16.7 Manually move the stabilizer leg forwards, until the stabilizer leg rests on the pushrod.
- 16.8 Stand behind and well clear on the loadbed side of the stabilizer beam.
- 16.9 Operate the stabilizer leg valve to make the leg tilt forwards, then hang down vertically.

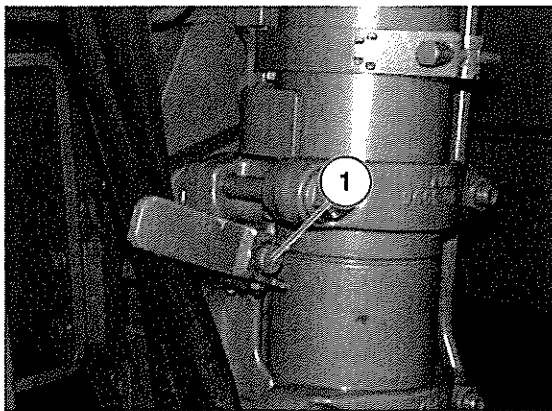
**WARNINGS**

(1) **RISK OF INJURY. CHECK THAT THE STABILIZER LEGS AND THE STABILIZER BEAMS ARE IN THE CORRECT POSITION.**

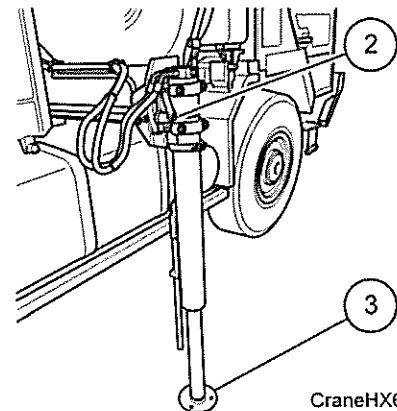
(2) **RISK OF INJURY. CHECK THAT THE TILTING MECHANISM IS LOCKED WHEN PARKED AND DURING OPERATION.**

16.10 Lock the locking pin (2) of the tilting mechanism.

16.11 Lower the stabilizer leg, until the base plate (3) is firmly on the ground and some of the vehicle weight is taken from the vehicle suspension.



1 – Locking pin



2 – Locking pin

3 – Base plate

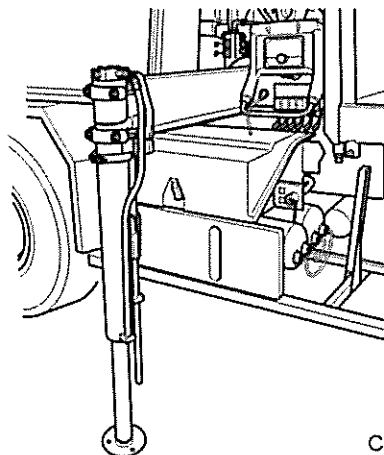
CraneHX60\_25b

Fig 7 Lowering the stabilizer legs

16.12 Refer to Fig 8. Make sure that the support plates do not sink into the ground and do not bend. Use suitable supports to spread the load if necessary, for example on soft ground.

16.13 Repeat the procedure for the other stabilizer leg.

16.14 Check that the crane is levelled up using the levelling aid fitted to the manual control box.



CraneHX60\_26b

Fig 8 Support plate

**Stowing the stabilizer legs****CAUTION**

**EQUIPMENT DAMAGE.** Do not lift the stabilizer legs until the crane has been securely stowed.

17 Refer to Fig 9. To stow the stabilizer legs, proceed as follows:

17.1 Make sure you have a clear view of the stabilizer legs.

17.2 Raise a stabilizer leg until just clear of the ground.

17.3 Release the locking pin of the tilting mechanism. Make sure that the locking pin remains released while the stabilizer leg is moved.

**WARNINGS**

(1) **RISK OF INJURY. KEEP CLEAR OF THE STABILIZER BEAM AND THE ADJACENT HOSES. STAND BEHIND AND CLEAR OF THE BEAM (VEHICLE LOADBED SIDE).**

(2) **RISK OF INJURY. KEEP CLEAR OF THE MOVING STABILIZER LEG AS IT WILL RAPIDLY MOVE UP AND TILT TOWARDS THE FRONT OF THE VEHICLE.**

17.4 Stand on the loadbed side of the stabilizer beam, then fully retract the stabilizer leg.

17.5 Stop the movement when the leg reaches the vertical position.

17.6 Engage the locking pin of the tilting mechanism.

17.7 Press the stop pushbutton (1) on the remote control.

17.8 Press the overload protection pushbutton (2) to disconnect the automatic dump function.

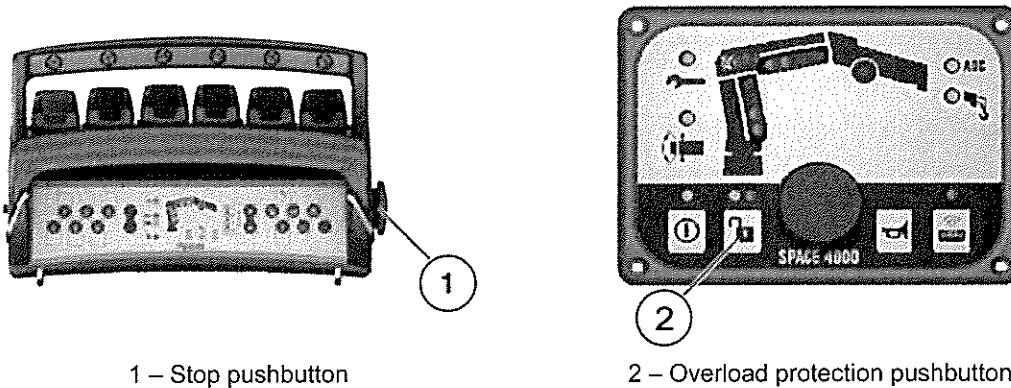


Fig 9 Stowing the stabilizer legs (1)

**WARNING**

**RISK OF INJURY. KEEP CLEAR OF THE STABILIZER BEAM AND THE ADJACENT HOSES. STAND BEHIND AND CLEAR OF THE BEAM (VEHICLE LOADBED SIDE).**

**CAUTION**

**EQUIPMENT DAMAGE.** Make sure that the area around the stabilizer beam is clear before retraction.

- 17.9 Refer to Fig 10. Operate the valve (1) to retract the stabilizer beam.
- 17.10 Operate the valve to retract the stabilizer beam on the opposite side of the vehicle.
- 17.11 Press the safety on/off pushbutton (2) to switch off the safety system.
- 17.12 Disengage the PTO.

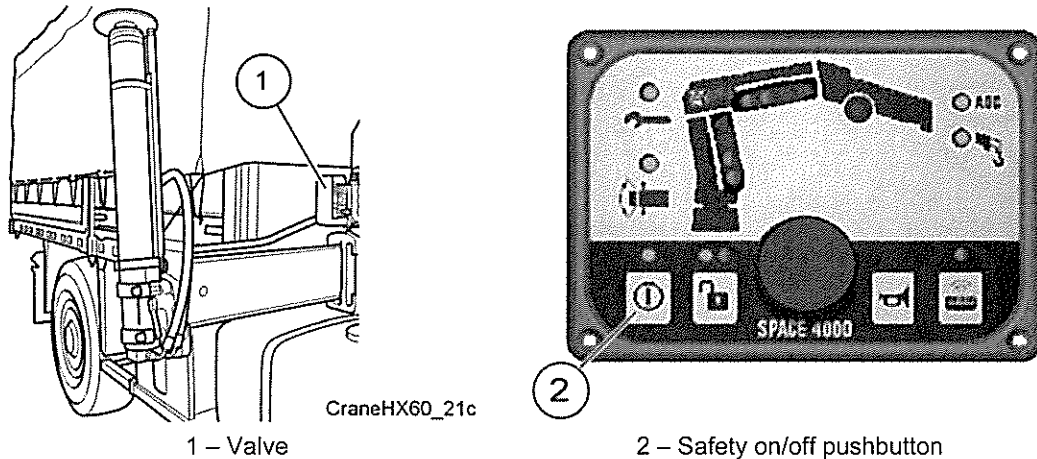


Fig 10 Stowing the stabilizer legs (2)

## CRANE STOWAGE

### Unstowing the crane

- 18 Refer to Fig 11. To unstow the crane, proceed as follows:
  - 18.1 Fully retract the extension boom (3).
  - 18.2 Fold the second boom (2) fully against the first boom (1).
  - 18.3 Unfold the first boom (1).
  - 18.4 Unfold the second boom (2) when the first boom (1) is free of the base (approximately 60 degrees above horizontal).
  - 18.5 Slew the crane into the working position.
- 19 To release the hook, pull the retaining pin (4) and allow the hook to hang down.
- 20 The crane is now ready to use.

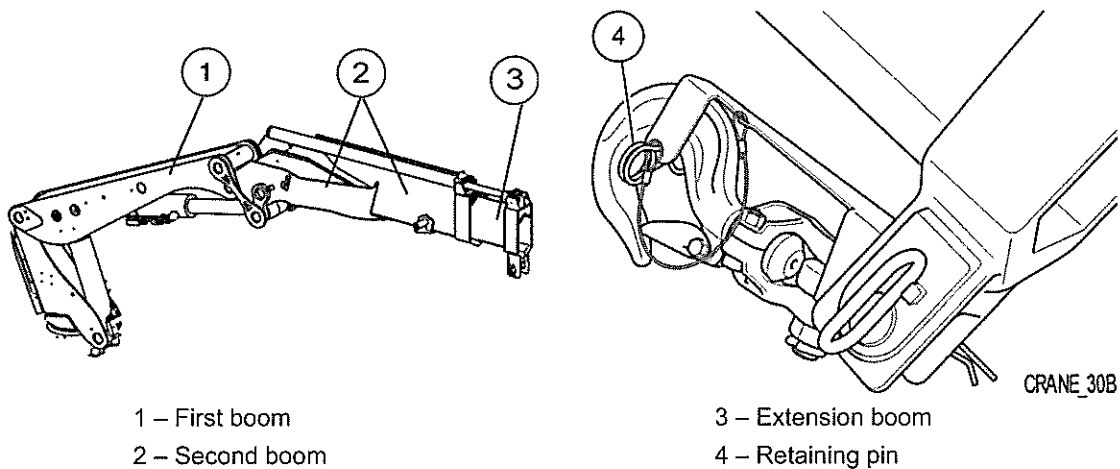


Fig 11 Unstowing the crane

**Stowing the crane**

21 Refer to Fig 12. To stow the crane, proceed as follows:

**CAUTION**

**CRANE DAMAGE.** Do not slew the crane at full speed to the final position. The slewing system will be damaged.

- 21.1 Slew the crane until the crane is aligned with the stowage position.
- 21.2 Fully retract the extension boom.
- 21.3 Fully fold the second boom.
- 21.4 Lower the first boom onto the stowage slots on the column and the base (1).
- 21.5 Extend the extension boom to the correct stowing width. The back of the extension boom should be approximately flush with the back of the second boom.
- 21.6 Make sure the crane is stowed within the width of the vehicle.
- 21.7 Manually stow the hook with care.

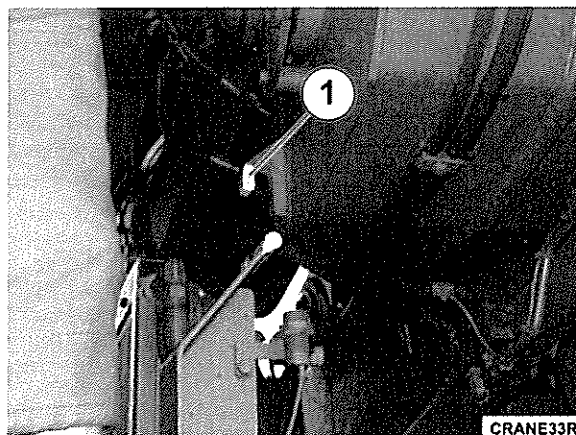


Fig 12 Stowing the crane

## OPERATING THE CRANE

### Lifting the load

#### WARNING

**RISK OF INJURY. MAINTAIN THE MINIMUM DISTANCE FROM OVERHEAD ELECTRICITY LINES.**

#### CAUTIONS

- (1) **VEHICLE DAMAGE.** Stop crane operations immediately if the hydraulic pump produces abnormal noises.
- (2) **CRANE DAMAGE.** Make sure that the load does not come into contact with the booms.

#### NOTE

If the crane is operated when the handbrake is not applied, an audible alarm sounds in the cab.

22 Refer to Fig 13. When lifting loads, observe the following:

22.1 Work close to the load. Place the vehicle as close to the load as possible. Always attempt to work with the extension boom almost fully retracted.

22.2 Lift heavy loads with the first boom in the optimum position, refer to the load plate on the valve control panel. Do not lift heavy loads with the boom straight, angle the second boom and first boom in relation to each other.

22.3 When lifting loads at the extreme limit of the working zone, angle the second boom down. Only operate the first boom.

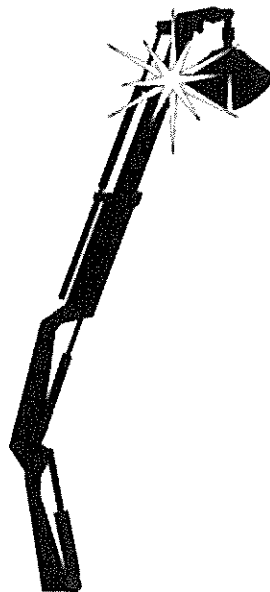


Fig 13 Lifting the load

**Speed of operation**

23 Refer to Fig 14. The speed of the crane depends on the function that is selected, and how many functions are operating at the same time.

**Releasing the overload protection**

24 Using the remote control to release the overload protection, press the overload protection pushbutton (1). The overload protection LED (2) will flash.

25 Using the user interface panel to release the overload protection, press and hold the overload protection pushbutton (3). The associated LED will blink. The LED will flash if the overload protection can be released.

26 Operate the crane function that will reduce the load moment (excluding the extension out). If the overload continues to be present after a few seconds, the crane will stop. The LED will come on.

27 If the overload protection is re-established, there is approximately a 30 second delay before the overload protection can be released again.

**Operating the automatic oil diversion****WARNING**

**RISK OF INJURY. KEEP AWAY FROM ANY HYDRAULIC OIL LEAKING FROM A COUPLING, HOSE OR LINE. HIGH PRESSURE HYDRAULIC OIL IS A HEALTH HAZARD.**

28 Refer to Fig 15. Using the remote control to operate the automatic oil diversion, proceed as follows:

28.1 To disconnect, press the overload protection pushbutton (1). The overload protection LED (2) will come on.

28.2 To reconnect, press again the overload protection pushbutton (1). The overload protection LED (2) will go off.

29 Using the user interface panel to operate the automatic oil diversion, proceed as follows:

29.1 To disconnect, press the overload protection pushbutton (3). The associated LED will come on.

29.2 To reconnect, press again the overload protection pushbutton (3). The associated LED will go off.

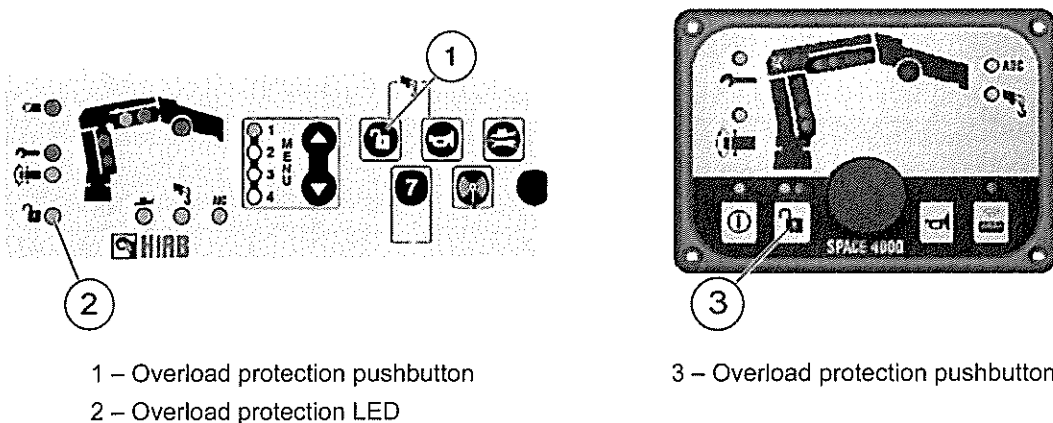


Fig 14 Speed of operation



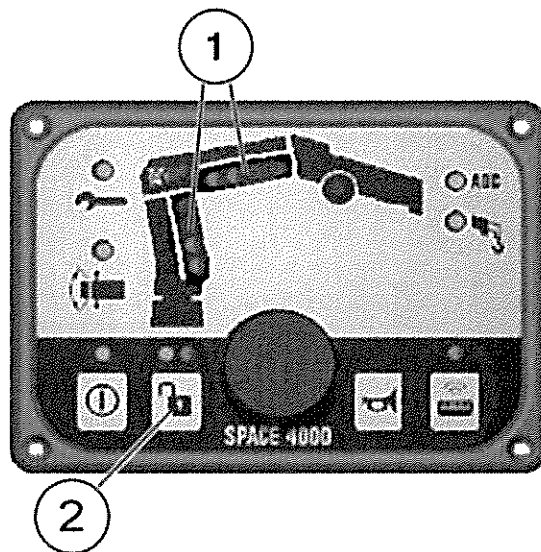
### Height warning first boom

#### WARNING

**RISK OF INJURY. DO NOT MOVE THE VEHICLE IF A HEIGHT WARNING IS PRESENT.**

30 Refer to Fig 15. If the cylinder pressure LED (1) flash to indicate a height warning, proceed as follows:

- 30.1 Press the safety on/off pushbutton (2) to switch on the safety system.
- 30.2 Park the crane in the transport position (Para 21).
- 30.3 Press the safety on/off pushbutton (2) to switch off the safety system.
- 30.4 The vehicle may be moved.



1 – Cylinder pressure LEDs

2 – Safety on/off pushbutton

Fig 15 Height warning first boom

#### Locking and unlocking the remote control

31 Refer to Fig 16. To lock the remote control, proceed as follows:

- 31.1 Make sure that the stop pushbutton (1) is pressed in.
- 31.2 Press the two MENU pushbuttons simultaneously, and at the same time release the stop pushbutton.
- 31.3 Check that the MENU LED flash simultaneously for approximately 5 seconds. The remote control is inoperative.
- 31.4 Press the stop pushbutton.

32 To unlock the remote control, proceed as follows:

- 32.1 Make sure that the stop pushbutton (1) is pressed in.

- 32.2 Press the two MENU pushbuttons simultaneously, and at the same time release the stop pushbutton.
- 32.3 Check that the MENU LED flash simultaneously for approximately 5 seconds.
- 32.4 Check that the MENU LED 1 comes on. The remote control is operative.

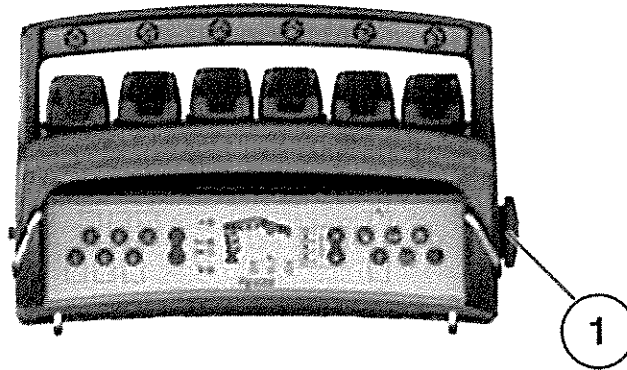


Fig 16 Locking and unlocking the remote control

#### AFTER OPERATION

#### WARNING

**RISK OF ACCIDENTS. ALWAYS CHECK PHYSICALLY THE CORRECT STOWAGE OF THE CRANE BEFORE DRIVING THE VEHICLE. DO NOT RELY ON THE SIGNALS IN THE VEHICLE CAB.**

- 33 Refer to Fig 17. Before driving the vehicle, carry out the checks that follow:

#### CAUTION

**CRANE DAMAGE.** With the crane in its fully stowed position and before driving away, make sure that:

- (a) The visual and audible indications in the vehicle cab indicate correct stowage of the crane.
  - (b) There is no pump flow to the crane control valves.
  - (c) The power take-off or power supply is disengaged, and the crane's operating system is switched off.
  - (d) A physical check is carried out to confirm the crane boom is folded and resting on its parking supports.
- 33.1 Check that the Power Take-Off (PTO) is disengaged.
  - 33.2 Check that the on/off pushbutton (1) is switched off in the user interface panel.

**EMERGENCY STOP**

- 34 Refer to Fig 17. Press the emergency stop button (2) on the user interface panel.
- 35 Press the emergency stop pushbutton (3) on the remote control.

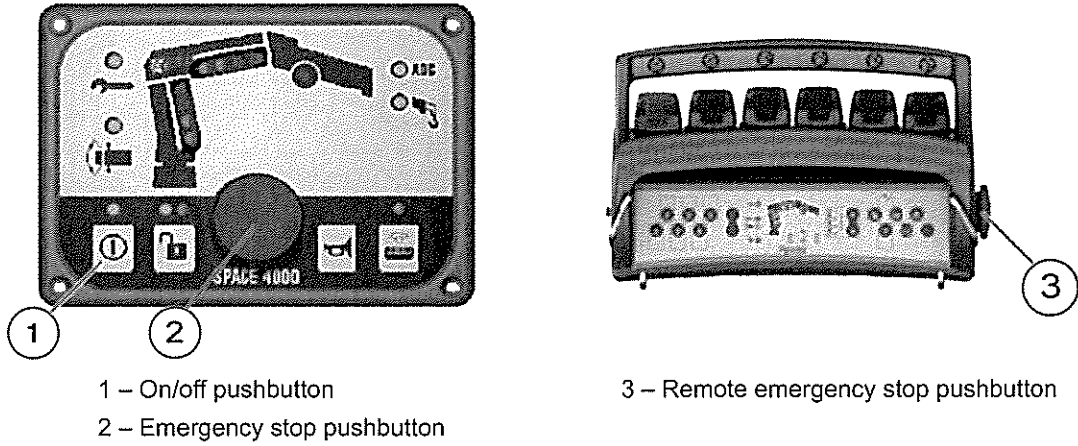


Fig 17 After operation

**BLEEDING THE HYDRAULIC SYSTEM**

- 36 If the crane works slowly or jerkily, there may be air in the hydraulic system. To bleed the air from the hydraulic system, fully extend and then retract each cylinder at least twice.

**FAULT DIAGNOSIS**

37 The operating fault diagnosis is listed in Table 1.

**TABLE 1 FAULT DIAGNOSIS**

<b>Ser (a)</b>	<b>Symptom (b)</b>	<b>Possible cause (c)</b>	<b>Remedy (d)</b>
1	Crane appears not to switch on. The LED remain off.	The power supply connector is loose.	Reconnect.
		The vehicle is in blackout mode.	Check.
2	Crane does not respond to controls; LED are on in the user interface panel.	The overload protection has inhibited movements of the crane.	Carry out movements to reduce the load moment.
			Release the overload protection if necessary.
3	Crane functions do not work or work incorrectly. The lifting capacity and speed of operation are reduced. The service LED is on.	The safety system has detected a fault.	Contact your Unit for assistance.
4	The stabilizer beams will not extend.	The dump valve is not activated.	Activate the dump valve.
		Hydraulic fault.	Contact your Unit for assistance.
5	The slewing movements are irregular or produce abnormal noise.	Insufficient oil in the hydraulic tank.	Check the oil level and top-up if necessary.
		Insufficient oil in the slewing mechanism.	Contact your Unit for assistance.
		The upper slewing bearing is insufficiently lubricated.	Contact your Unit for assistance.
		The bearings in the slewing mechanism are damaged.	Contact your Unit for assistance.
6	The hydraulic oil pump produces an abnormal noise, refer to Para 11.	The filler cap on the hydraulic oil tank is blocked.	Clear the blockage or replace the filler cap.
		Insufficient oil in the hydraulic tank.	1. Check the oil level and top-up if necessary. 2. Bleed the system, refer to Para 36.
		The hydraulic oil pump is damaged.	Contact your Unit for assistance.
7	Hydraulic oil leaking from a coupling, hose or line, refer to Para 11.	Damaged or loose component.	1. Press the stop pushbutton. 2. Disengage the PTO. 3. Contact your Unit for assistance.

**CHAPTER 5-0**

**BODY**

**CONTENTS**

Chap

- 5-1 Technical data – Tail lift
- 5-2 General description - Tail lift
- 5-3 Operating instructions - Tail lift

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**CHAPTER 5-1**

**TECHNICAL DATA - TAIL LIFT**

**CONTENTS**

Para

- 1 Introduction  
Specification tail lift
- 2 Physical data

**INTRODUCTION**

- 1 This chapter provides technical data for the tail lift.

**SPECIFICATION TAIL LIFT**

**Physical data**

2 This section details the physical data for the tail lift.

Deployed Length ..... 1750mm

Width ..... 2400mm

Lifting capacity ..... 750kg



CHAPTER 5-2

GENERAL DESCRIPTION – TAIL LIFT

CONTENTS

Para

- 1 Introduction
- 2 Tail lift
- 3 Hydraulic power pack and cylinders
- 5 Tail lift platform
- 8 Control selector switch
- 10 Control boxes
- 14 Remote control

Fig

Page

1	Hydraulic power pack and cylinder.....	2
2	Tail lift platform .....	3
3	Tail lift platform lowered.....	3
4	Tail lift platform stowage lock .....	4
5	Control selector switch .....	4
6	Control boxes .....	5
7	Tail lift remote control .....	5

**INTRODUCTION**

1 This chapter provides a general description of the tail lift.

**TAIL LIFT**

2 The tail lift is used to load and unload goods, it consists of:

2.1 Hydraulic power pack and cylinders.

2.2 Tail lift platform.

2.3 Control selector switch.

2.4 Control boxes.

2.5 Remote control.

**Hydraulic power pack and cylinders**

3 Refer to Fig 1. The hydraulic power pack and cylinders are installed below the flatbed floor. The hydraulic power pack is electrically powered.

4 The hydraulic cylinders tilt, lower and raise the platform.



Fig 1 Hydraulic power pack and cylinder

**Tail lift platform**

- 5 Refer to Fig 2. The tail lift platform is at the rear of the vehicle and must be opened before lowering.



Fig 2 Tail lift platform

- 6 Refer to Fig 3. After opening, the tail lift platform can be lowered to the ground.



Fig 3 Tail lift platform lowered

7 Refer to Fig 4. When in the closed position, the tail lift platform is mechanically locked with the platform stowage lock (1).

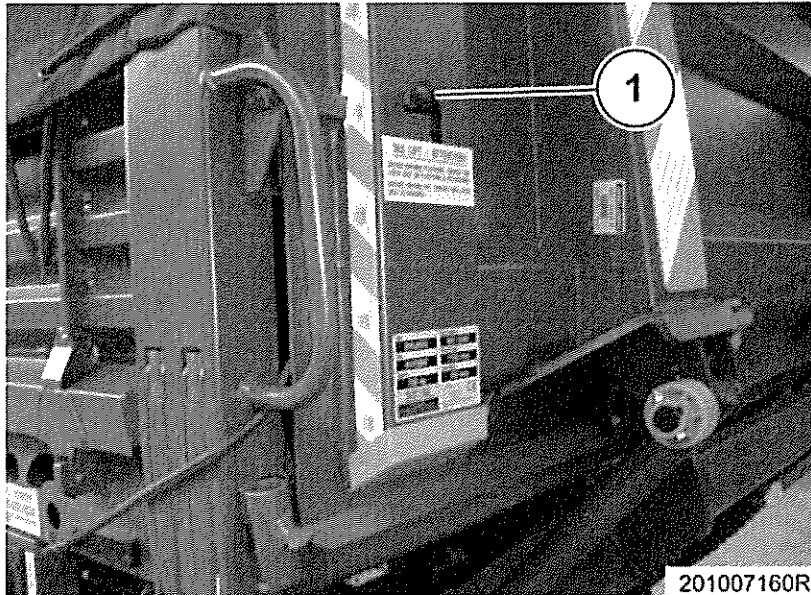


Fig 4 Tail lift platform stowage lock

#### Control selector switch

8 Refer to Fig 5. The control selector switch (1) is installed above the left-hand rear light assembly.

9 The control selector switch (1) activates the left-hand or right-hand control boxes and remote control socket, depending upon the position of the switch.

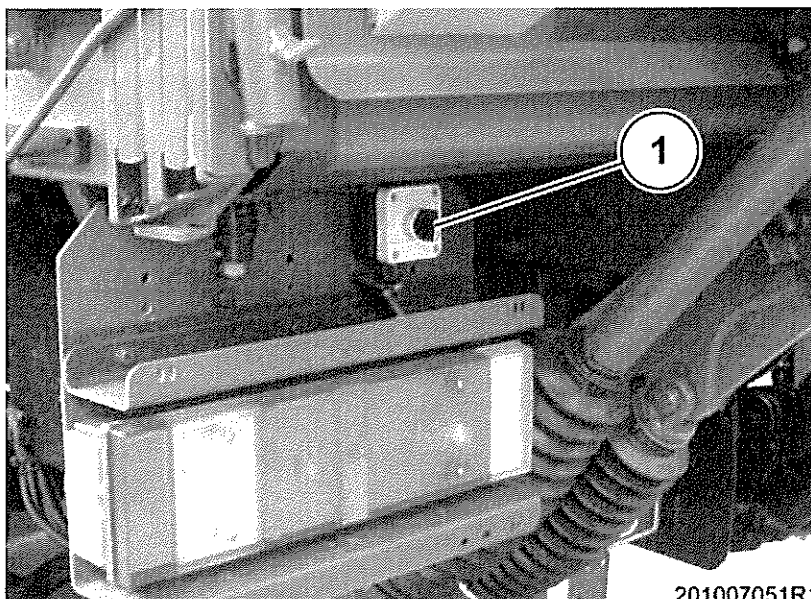
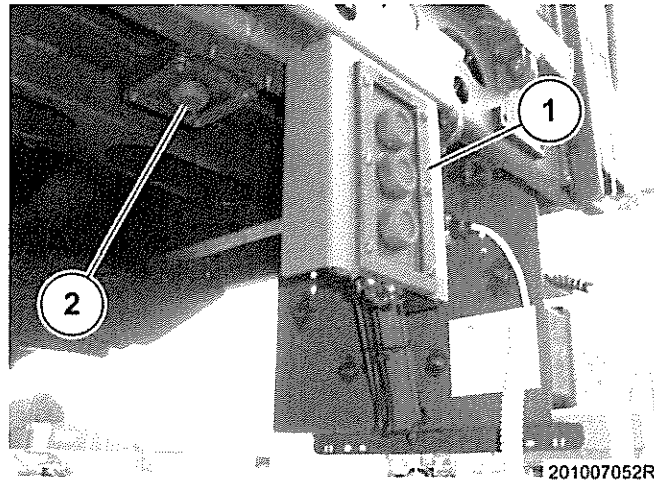


Fig 5 Control selector switch

**Control boxes**

- 10 Refer to Fig 6. Control boxes are installed at the rear of the vehicle, on the left and right-hand sides.
- 11 The control boxes tilt (open/close), lower and raise the tail lift platform.
- 12 The power control box (2) (left-hand shown) is installed underneath the flatbed floor.
- 13 The tilt, up and down control box (1) (left-hand shown) is installed on the side of the vehicle.



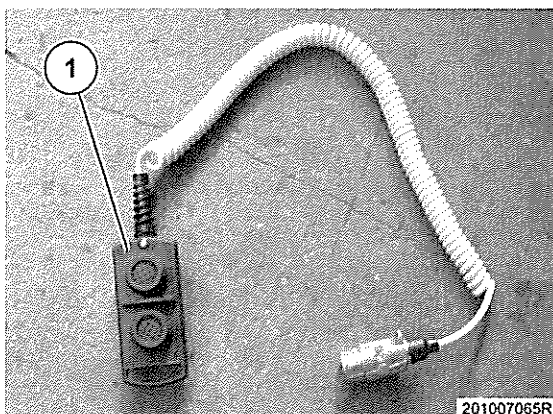
1 – Tilt control box

2 – Power control box

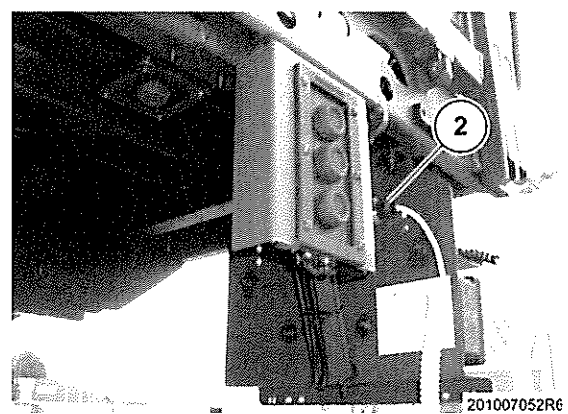
Fig 6 Control boxes

**Remote control**

- 14 Refer to Fig 7. The remote control (1) can only be used to raise or lower the tail lift platform.
- 15 The remote control connects to a socket (2) (left-hand shown) adjacent to the tilt, up and down control box.
- 16 The remote control can be connected to the left-hand or right-hand socket.



1 – Remote control



2 – Socket

Fig 7 Tail lift remote control

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CHAPTER 5-3

OPERATING INSTRUCTIONS – TAIL LIFT

CONTENTS

Para

- 1 Introduction (WARNINGS)  
Tail lift platform operation
- 2 Prepare the tail lift platform for operation (WARNINGS)
- 3 Open the tail lift platform (WARNING) (CAUTION)
- 4 Lower the tail lift platform (WARNINGS) (CAUTION)
- 7 Raise the tail lift platform (WARNINGS)
- 10 Close the tail lift platform (WARNING)
- 11 Stow the tail lift platform

Fig

Page

1	Tail lift platform switch .....	2
2	Tail lift stowage lock .....	3
3	Control selector switch .....	3
4	Opening the tail lift platform.....	4
5	Lower the tail lift platform.....	5
6	Tail lift platform fully lowered .....	5
7	Lower the tail lift platform using the remote control.....	6
8	Raise the tail lift platform .....	7
9	Raise the tail lift platform using the remote control .....	7
10	Close the tail lift platform .....	8
11	Stow the tail lift platform .....	8
12	Tail lift platform switch .....	8

**INTRODUCTION**

- 1 This chapter provides the operating instructions for the tail lift.

**WARNINGS**

(1) **PERSONAL INJURY. MAKE SURE THAT ALL PERSONNEL ARE CLEAR OF THE AREA DURING LOADING AND UNLOADING OPERATIONS.**

(2) **RISK OF INJURY. TO PREVENT A TRIP HAZARD DURING REMOVAL AND INSTALLATION OF EQUIPMENT MAKE SURE THAT ALL ITEMS ARE REMOVED FROM THE FLATBED AND STORED CLEAR OF OPERATIONS.**

**TAIL LIFT PLATFORM OPERATION****Prepare the tail lift platform for operation**

- 2 To prepare the tail lift platform for operation, proceed as follows:

**WARNING**

**PERSONAL INJURY. DO NOT OPERATE THE TAIL LIFT PLATFORM UNLESS THE VEHICLE IS STATIONARY AND THE PARKING BRAKE IS APPLIED.**

- 2.1 Apply the parking brake, use wheel chocks if necessary.
- 2.2 Refer to Fig 1. Press the bottom of the tail lift platform switch. The check lamp in the switch comes on.



Fig 1 Tail lift platform switch



**WARNING**

**DANGER TO PERSONNEL. MAKE SURE THAT THE AREA TO THE REAR OF THE VEHICLE IS CLEAR BEFORE YOU RELEASE THE TAIL LIFT PLATFORM STOWAGE LOCK.**

2.3 Refer to Fig 2. Release the tail lift platform stowage lock (1).

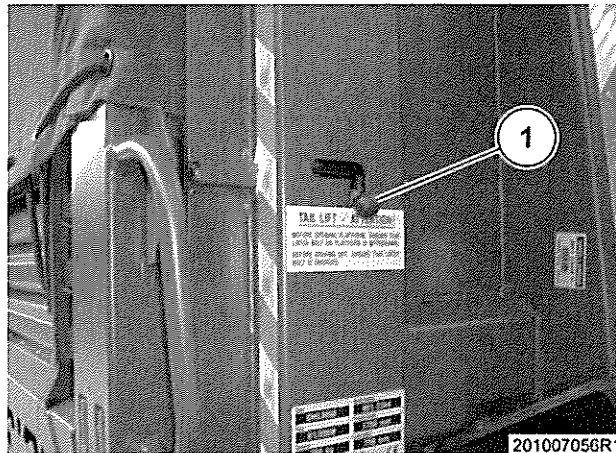
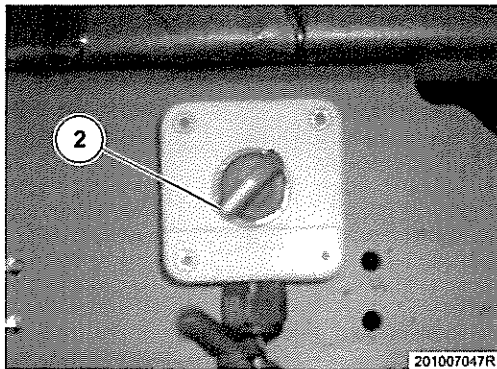
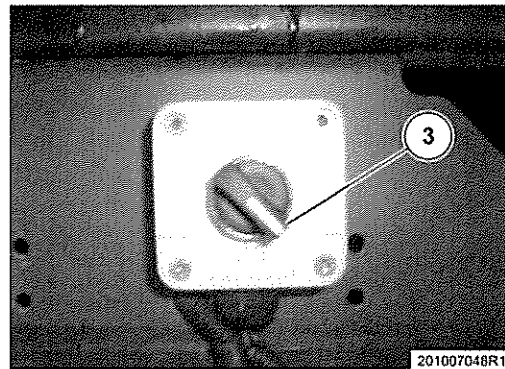


Fig 2 Tail lift stowage lock

2.4 Refer to Fig 3. Turn the control selector switch to the left-hand control position (2) or the right-hand control position (3) as required.



2 – Left-hand control position



3 – Right-hand control position

Fig 3 Control selector switch

**Open the tail lift platform****WARNING**

**DANGER TO PERSONNEL. MAKE SURE THAT THE AREA TO THE REAR OF THE VEHICLE IS CLEAR WHEN OPERATING THE TAIL LIFT PLATFORM.**

**CAUTION**

**EQUIPMENT DAMAGE. Do not open the tail lift platform when the stowage lock is engaged. Make sure that the stowage lock is released before you open the platform.**

3 Refer to Fig 4. To open the tail lift platform, proceed as follows:

3.1 Press and hold the power button (1).

3.2 Press and hold the tilt button (3) and the down button (2).

3.3 When the tail lift platform is level with the flatbed or at the position required, release the buttons (1, 2 and 3).

**NOTE**

The position of the platform can be finely adjusted by using the tilt up and tilt down functions.

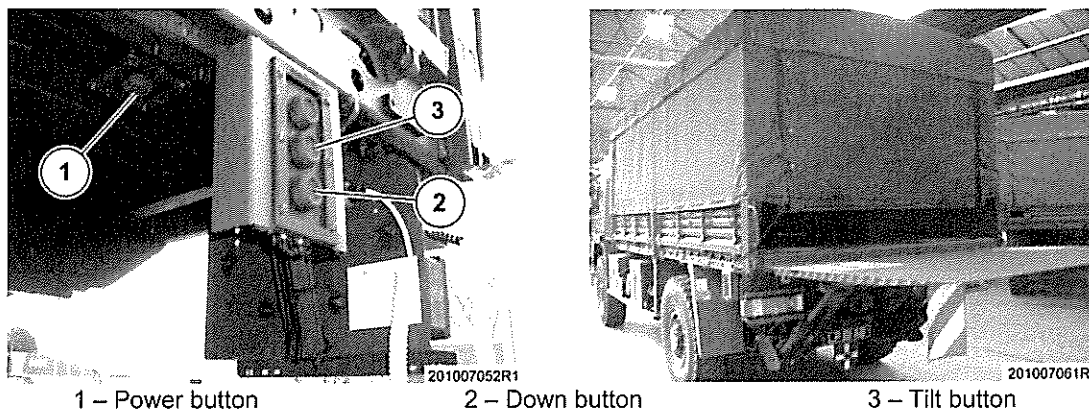


Fig 4 Opening the tail lift platform

**Lower the tail lift platform****WARNINGS**

(1) **DANGER TO PERSONNEL. DANGER OF CRUSHING BETWEEN THE GROUND AND TAIL LIFT PLATFORM. MAKE SURE THAT THE AREA TO THE REAR OF THE VEHICLE IS CLEAR WHEN OPERATING THE TAIL LIFT PLATFORM.**

(2) **PERSONAL INJURY. WHEN LOWERING THE TAIL LIFT PLATFORM KEEP FEET AND HANDS CLEAR OF THE PLATFORM.**

(3) **DANGER TO PERSONNEL. WHEN STANDING ON THE TAIL LIFT PLATFORM DURING OPERATION WITH THE REMOTE CONTROL, STAND IN ONE OF THE MARKED AREAS.**

**CAUTION**

**EQUIPMENT DAMAGE.** Do not lower the tail lift platform when the platform is in the closed position.

**NOTE**

The tail lift has an auto tilt function. When the forward edge of the platform touches the ground and the down button is still depressed, the rear edge will automatically drop to ground level.

4 Refer to Fig 5. When you stand on the tail lift platform and use the remote control, make sure that you stand in one of the marked areas (1).

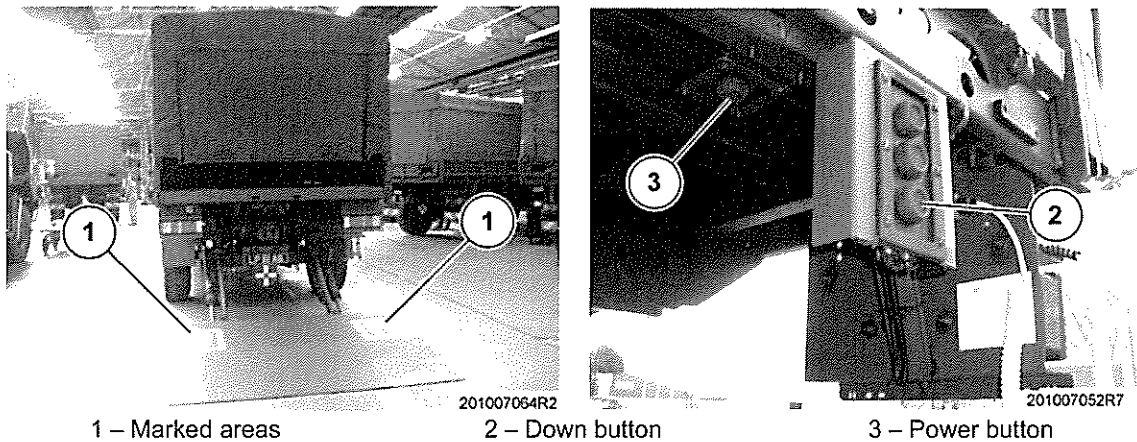


Fig 5 Lower the tail lift platform

5 Refer to Fig 6. To lower the tail lift platform using the control boxes, proceed as follows:

- 5.1 Press and hold the power button (3).
- 5.2 Press and hold the down button (2).
- 5.3 When the tail lift platform reaches the ground, release the buttons (2 and 3).



Fig 6 Tail lift platform fully lowered

- 6 Refer to Fig 7. To lower the tail lift platform using the remote control, proceed as follows:
- 6.1 Connect the remote control to the socket (4) on the control side selected.
  - 6.2 On the remote control, press and hold the down button (5).
  - 6.3 When the tail lift platform reaches the ground, release the down button (5).

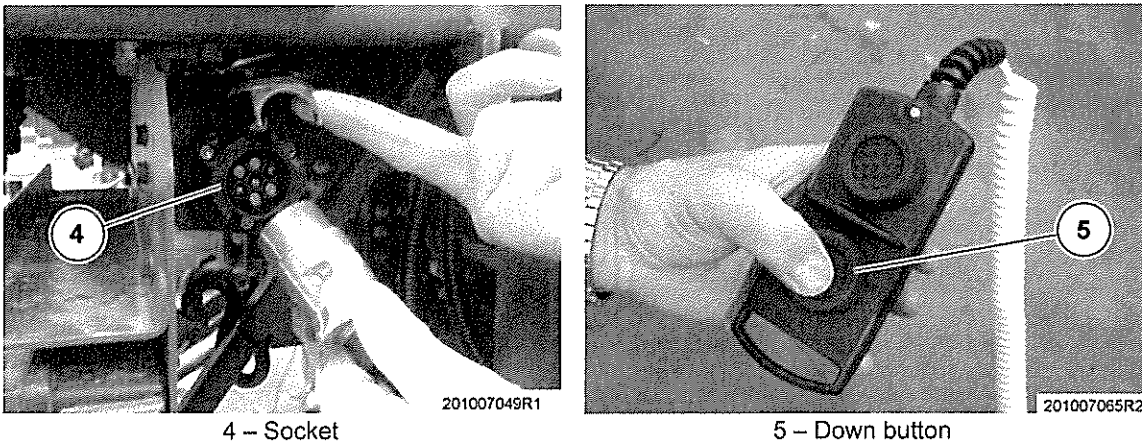


Fig 7 Lower the tail lift platform using the remote control

#### Raise the tail lift platform

#### WARNINGS

- (1) **DANGER TO PERSONNEL. MAKE SURE THAT THE AREA TO THE REAR OF THE VEHICLE IS CLEAR WHEN OPERATING THE TAIL LIFT PLATFORM.**
- (2) **DANGER TO PERSONNEL. WHEN STANDING ON THE TAIL LIFT PLATFORM DURING OPERATION WITH THE REMOTE CONTROL, STAND IN ONE OF THE MARKED AREAS.**

- 7 Refer to Fig 8. When you stand on the tail lift platform and use the remote control, make sure that you stand in one of the marked areas (1).
- 8 To raise the tail lift platform using the control boxes, proceed as follows:
- 8.1 Press and hold the power button (3).
  - 8.2 Press and hold the up button (2).
  - 8.3 When the tail lift platform is level with the flatbed, release the buttons (2 and 3).

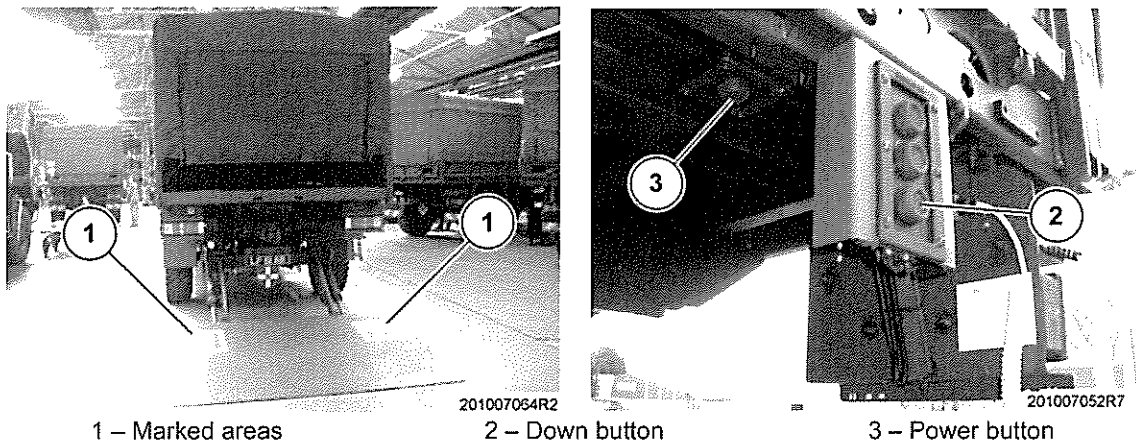


Fig 8 Raise the tail lift platform

9 Refer to Fig 9. To raise the tail lift platform using the remote control, proceed as follows:

- 9.1 Connect the remote control to the socket (4) on the control side selected.
- 9.2 On the remote control, press and hold the up button (5).
- 9.3 When the tail lift platform is level with the flatbed, release the up button (5).

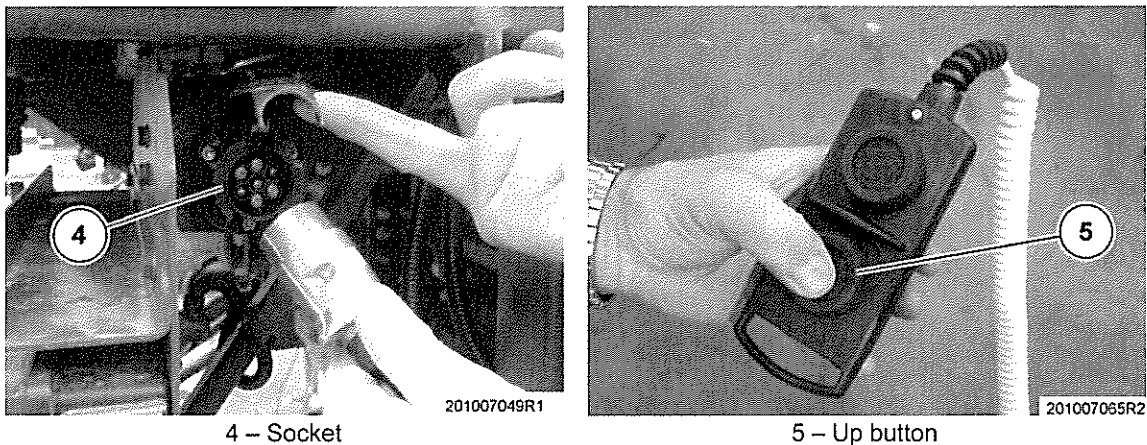


Fig 9 Raise the tail lift platform using the remote control

#### Close the tail lift platform

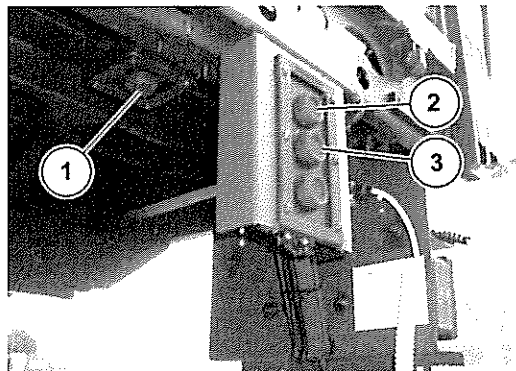
#### WARNING

**DANGER TO PERSONNEL. DANGER OF CRUSHING BETWEEN THE TAIL LIFT PLATFORM AND THE VEHICLE. MAKE SURE THAT THE AREA TO THE REAR OF THE VEHICLE IS CLEAR WHEN CLOSING THE TAIL LIFT PLATFORM.**

10 Refer to Fig 10. To close the tail lift platform, proceed as follows:

- 10.1 Make sure that the tail lift platform is horizontal and level with the vehicle loadbed.
- 10.2 Press and hold the power button (1).
- 10.3 Press and hold the tilt button (3) and the up button (2).

10.4 When the tail lift platform is vertical and cannot travel any further, release the buttons (1, 2 and 3).



1 – Power button

2 – Up button

3 – Tilt button

Fig 10 Close the tail lift platform

**Stow the tail lift platform**

11 Refer to Fig 11. To stow the tail lift platform, proceed as follows:

- 11.1 Turn the control selector switch to the off position.
- 11.2 If necessary, disconnect the remote control.
- 11.3 Close the tail lift platform stowage lock (1).

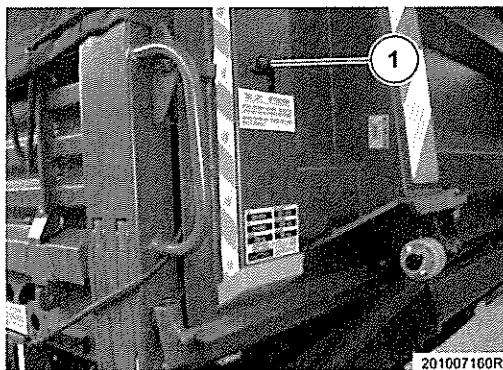


Fig 11 Stow the tail lift platform

11.4 Refer to Fig 12. Press the top of the tail lift platform switch.



Fig 12 Tail lift platform switch

CHAPTER 6-0

DENIAL OF EQUIPMENT

CONTENTS

Para

- Vehicle denial
- 1 Mandatory directive
- 3 Degree of damage
- 5 Spare parts
- 6 Means and procedures
- 8 Mechanical
- 9 Burning (WARNING)
- 10 Gunfire (WARNING)
- 11 Priorities

Table

Page

1	Priorities for denial.....	4
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## VEHICLE DENIAL

### Mandatory directive

1 Denial of the equipment when subject to capture by the enemy, will be undertaken by the user arm, ONLY WHEN, in the judgement of the unit commander concerned, such action is necessary in accordance with orders of, or policy established by the Army or Divisional Commanders.

2 The reporting of the denial of the equipment is to be done through command channels.

### Degree of damage

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

3.1 Methods of denial should achieve such damage to equipment and essential spare parts, that it will not be possible to restore the equipment to a usable condition in the combat zone either by repair or by cannibalization.

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

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

4 In general, denial of essential parts, followed by burning, will usually be sufficient to render the equipment useless. However, selection of the particular method of denial requires imagination and resourcefulness in utilization of the facilities at hand under the existing conditions. Time is usually critical.

### Spare parts

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

## MEANS AND PROCEDURES

6 If denial is ordered, due consideration should be given to:

6.1 Selection of a point of denial that will cause greatest obstruction to enemy movement and also prevent hazard to friendly troops from fragments or ricocheting projectiles which may occur incidental to the denial by gunfire.

6.2 Observance of appropriate safety precautions.

7 Of the several means of denial, those most generally applicable are mechanical, burning and gunfire. The information given in Paras 8, 9 and 10 are for guidance only.

### Mechanical

8 This requires an axe, pick, crowbar or similar implement. The equipment should be destroyed in accordance with the priorities given in Table 1.



## Burning

### WARNING

**DANGER TO LIFE AND LIMB. DUE CONSIDERATION SHOULD BE GIVEN TO THE HIGHLY FLAMMABLE NATURE OF GASOLINE AND ITS VAPOUR. CARELESSNESS IN ITS USE MAY RESULT IN PAINFUL BURNS.**

9 This requires gasoline, oil or other flammable liquid.

9.1 Remove and empty the portable fire extinguishers.

9.2 If quantities of combustibles are limited, smash all vital elements, such as switches, instruments and control levers.

9.3 Place ammunition and charges in and about the equipment so that the greatest damage will result from the explosion.

9.4 Pour gasoline and oil over the equipment. Ignite by means of an incendiary grenade fired from a safe distance, by a burst from a flame thrower, by a combustible train of suitable length or other appropriate means. Take cover immediately.

## Gunfire

### WARNING

**DANGER TO LIFE AND LIMB. FIRING ARTILLERY AT RANGES OF 500 YARDS OR LESS AND FIRING GRENADES OR ANTI-TANK ROCKETS SHOULD BE FROM COVER.**

10 When destroying the equipment by gunfire, proceed as follows:

10.1 Remove and empty the portable fire extinguishers.

10.2 Smash all vital elements as outlined in Para 9.

10.3 Destroy the equipment by gunfire, using tank guns, self-propelled guns, artillery, rifles with rifle grenades, or launchers with anti-tank rockets.

## Priorities

11 The priorities for denial should be considered as follows:

11.1 Priority must be given to the denial of classified equipment and associated documents.

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

11.3 A guide to priorities for denial of the equipment is shown in Table 1.

**[REDACTED]**

[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
		[REDACTED]	[REDACTED]
		[REDACTED]	[REDACTED]
		[REDACTED]	[REDACTED]
		[REDACTED]	[REDACTED]
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