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TRAILER LIGHTWEIGHT GS CARGO

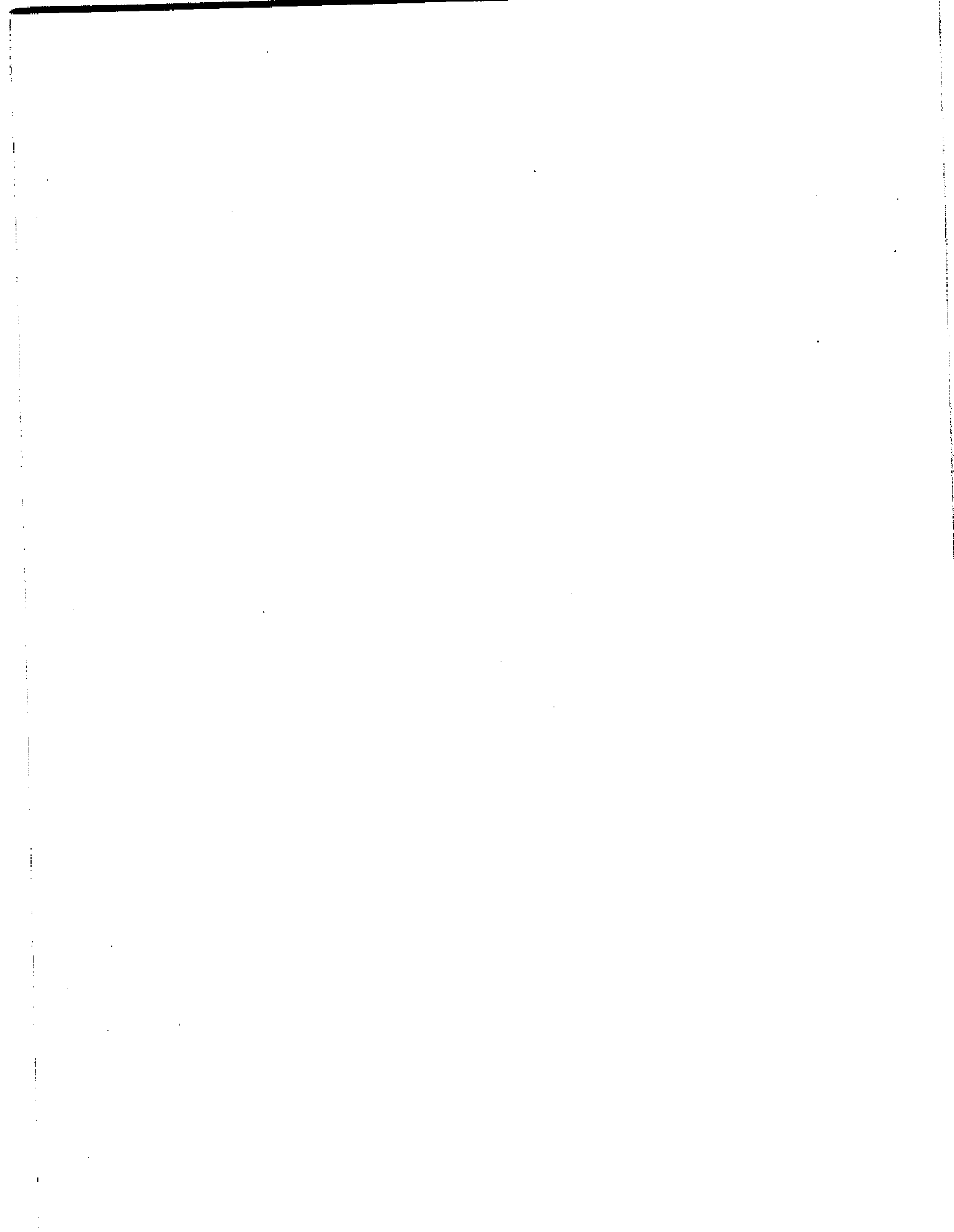
TECHNICAL DESCRIPTION

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

BY COMMAND OF THE DEFENCE COUNCIL

Kenneth T. Brown

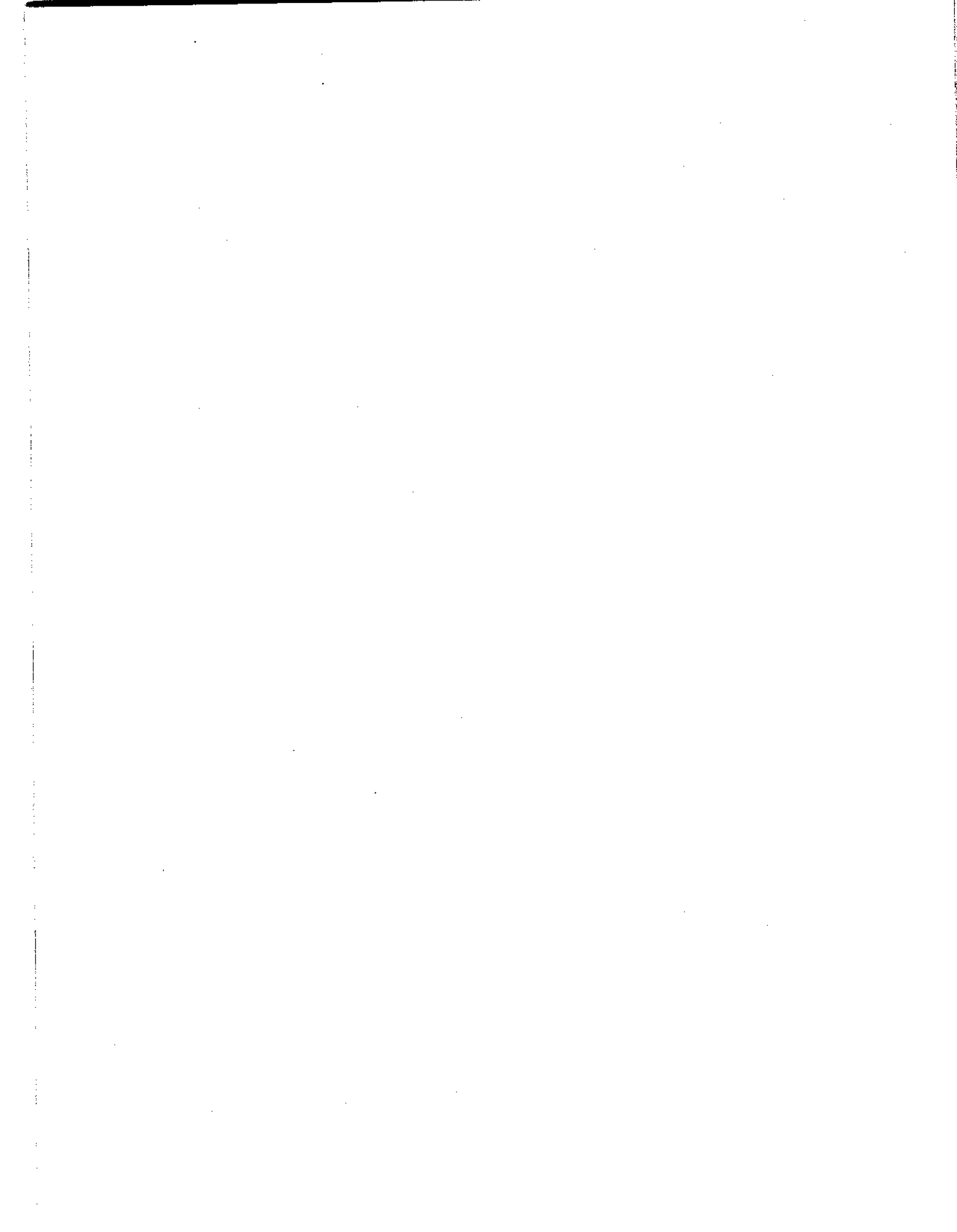
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TECHNICAL DESCRIPTION

Chapter

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

PREFACE

Sponsor: DEC ELS

INTRODUCTION

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

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

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

RELATED AND ASSOCIATED PUBLICATIONS

Related publications

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

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

* Category/sub-category not published

Associated publications

5 A full list of associated publications is as follows:

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

LIST OF ABBREVIATIONS

6 The following abbreviations are used in this publication:

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

CHAPTER 1
CHASSIS AND BODY
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Para	Description	Page
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7	Cargo body	
10	Jockey wheel, rear stands and tow hitch	
15	Axle, hubs and suspension	

Fig	Description	Page
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2	Axle and suspension (body removed for clarity)	5/6

DESCRIPTION

Chassis

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

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

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

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

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

Towing eye and damper assembly

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

Cargo body

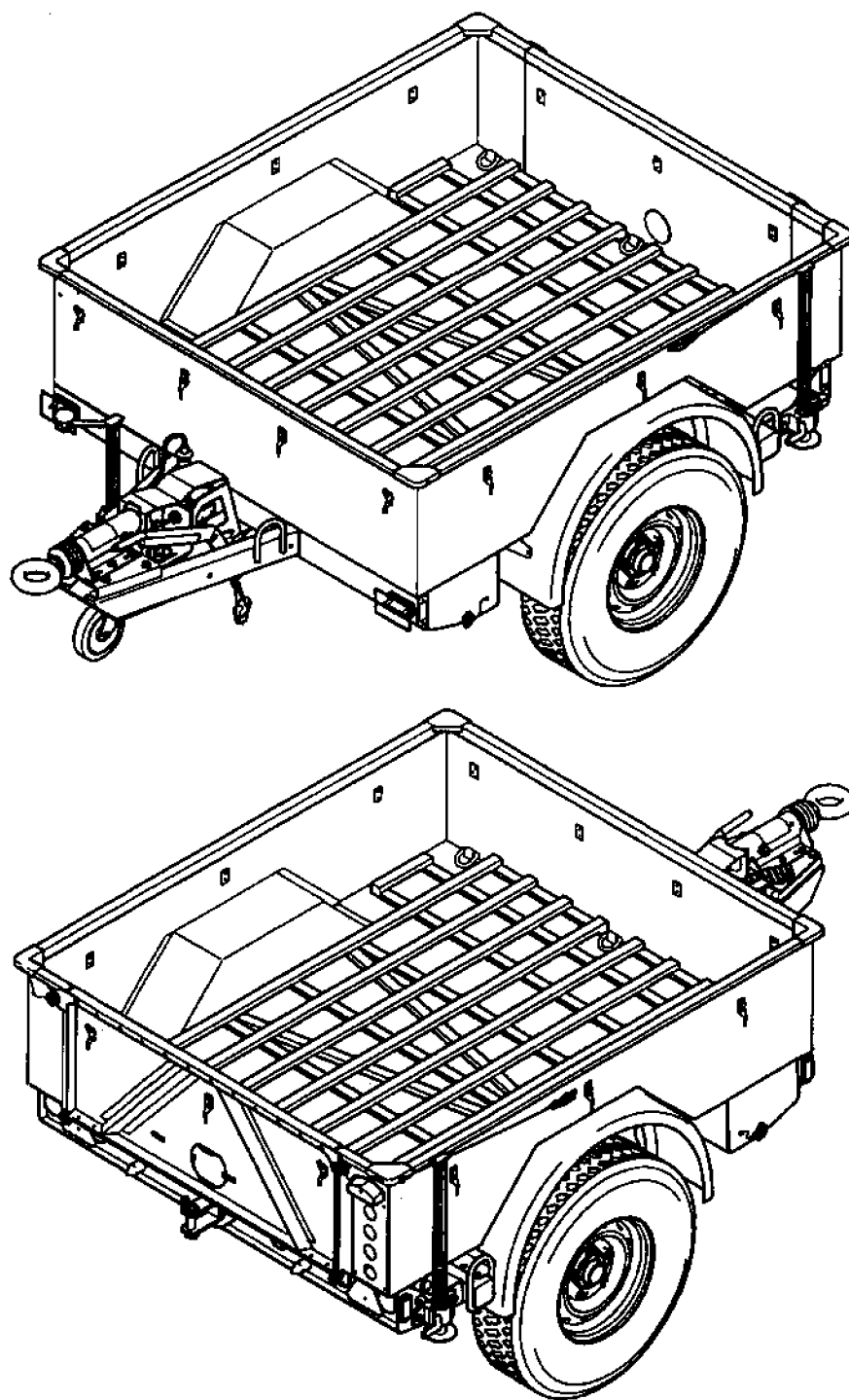
7 The all metal cargo body is formed from stainless steel panel assemblies welded together. Hooks are riveted to the front, sides and rear of the trailer, three to each side and four to the front panel and rear panel and tailgate to engage the tilt cover securing rope. The cargo body assembly is fixed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

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

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

KEY TO FIG 1

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



TRL/027

Fig 1 Trail r lightw lght GS cargo

Jockey wheel, rear stands and tow hitch

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

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

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

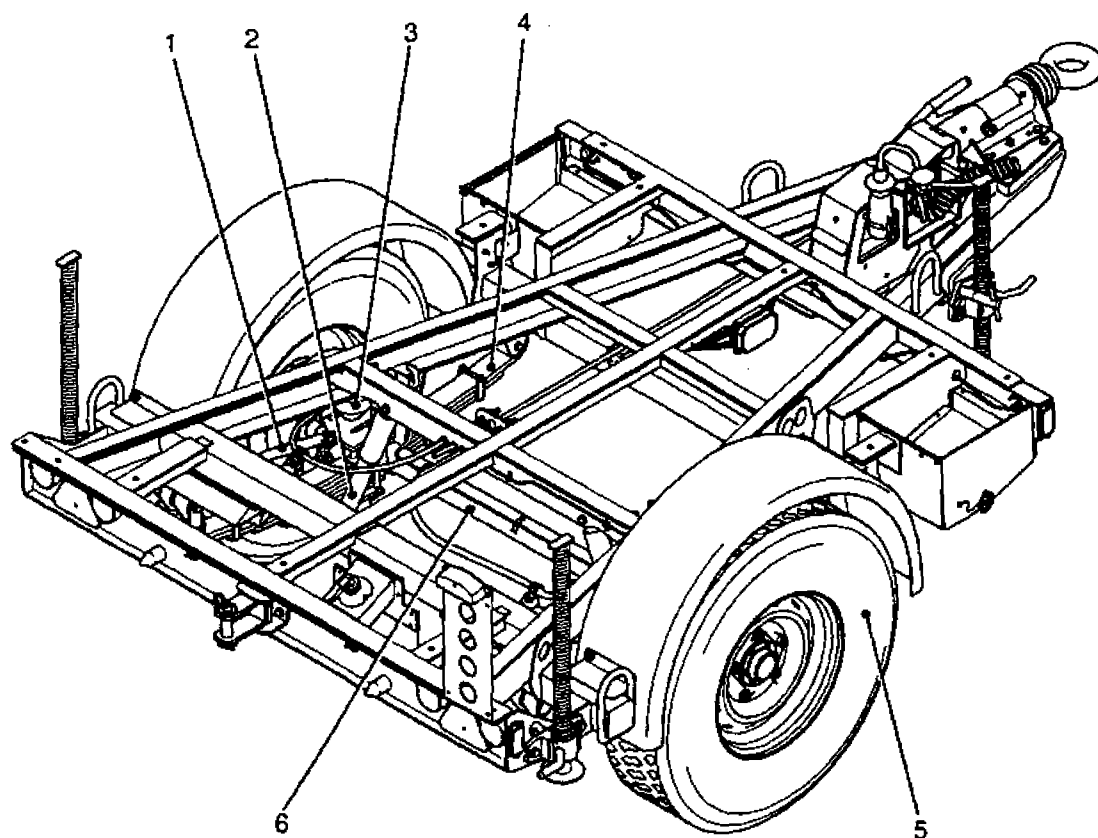
13 When parked, the trailer should be at level by adjusting the jockey wheel and rear stands.

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

Axle, hubs and suspension

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

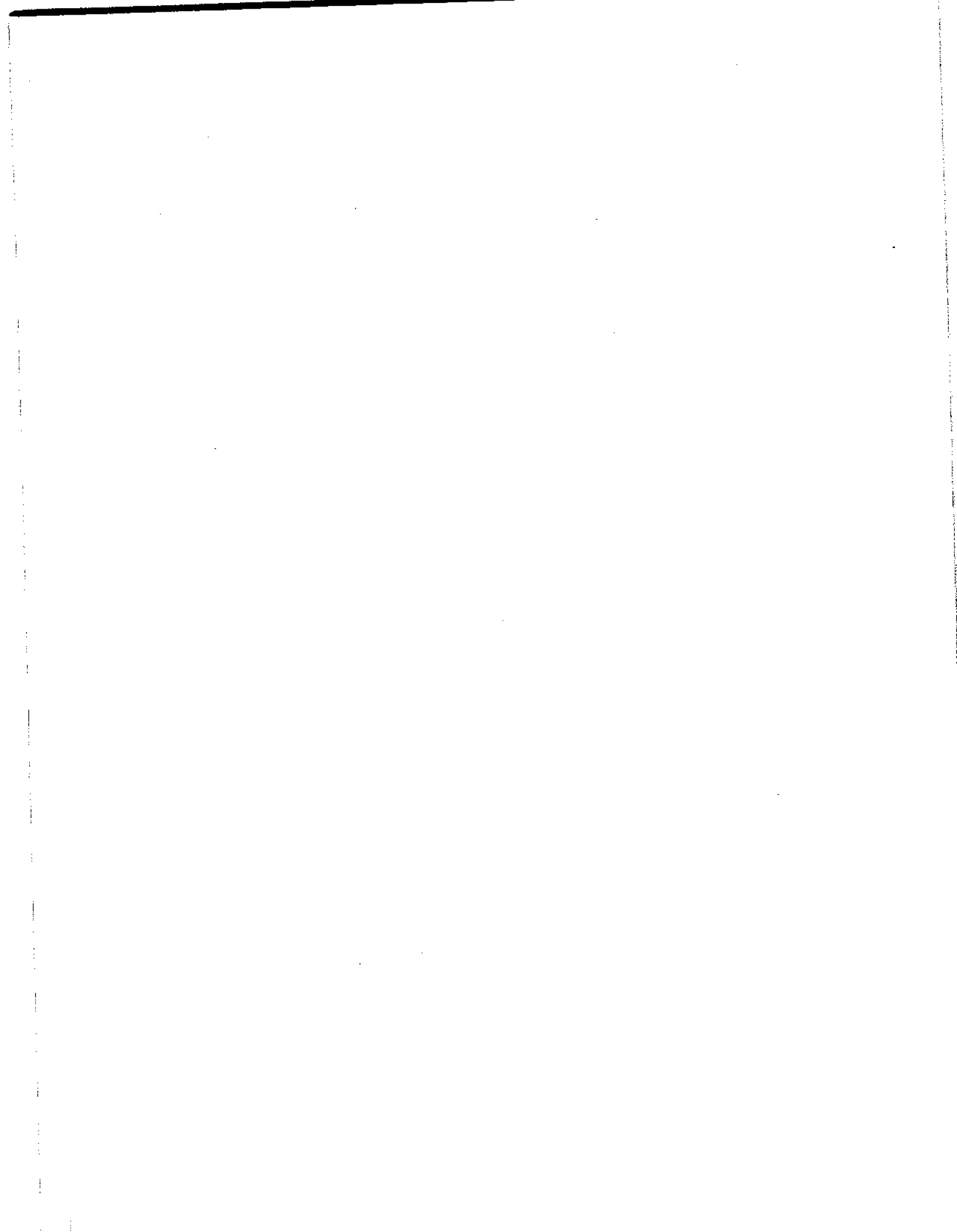
16 The semi-elliptical suspension springs (4) are attached at each end to hanging brackets on the chassis through rubber bushes. The rear spring mountings have a drop link arrangement. The springs are attached to the axle using a U bolt and stud configuration. The shock absorbers (2) are attached to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



TRL/048

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

Fig 2 Axle and suspension (body removed for clarity)



CHAPTER 2
BRAKING SYSTEM
CONTENTS

Para

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

Fig

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2	Handbrake assembly	4

INTRODUCTION

General

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

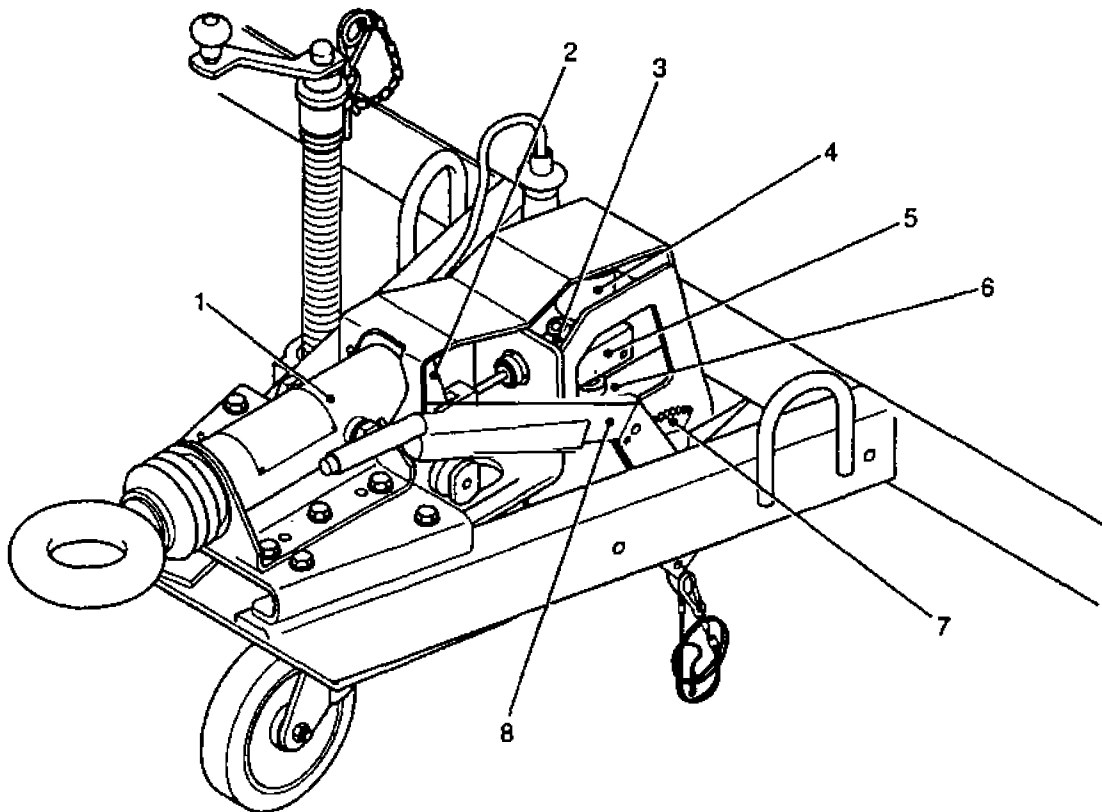
2 The braking systems comprises:

- 2.1 Master cylinder (Fig 1(3)).
- 2.2 Overload protection accumulator (6).
- 2.3 Auto-reverse valve block.
- 2.4 Calipers.
- 2.5 Handbrake (8) and breakaway cable.
- 2.6 Mechanical linkages, cables and hydraulic pipes.

DETAILED DESCRIPTION**Master cylinder**

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

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



TRL/036

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

Fig 1 Brake components (drawbar)

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

Overload protection accumulator

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

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

8 The accumulator is a non-maintenance unit.

Auto-reverse valve

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

Callipers

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

Handbrake

11 The handbrake is a mechanical system comprising:

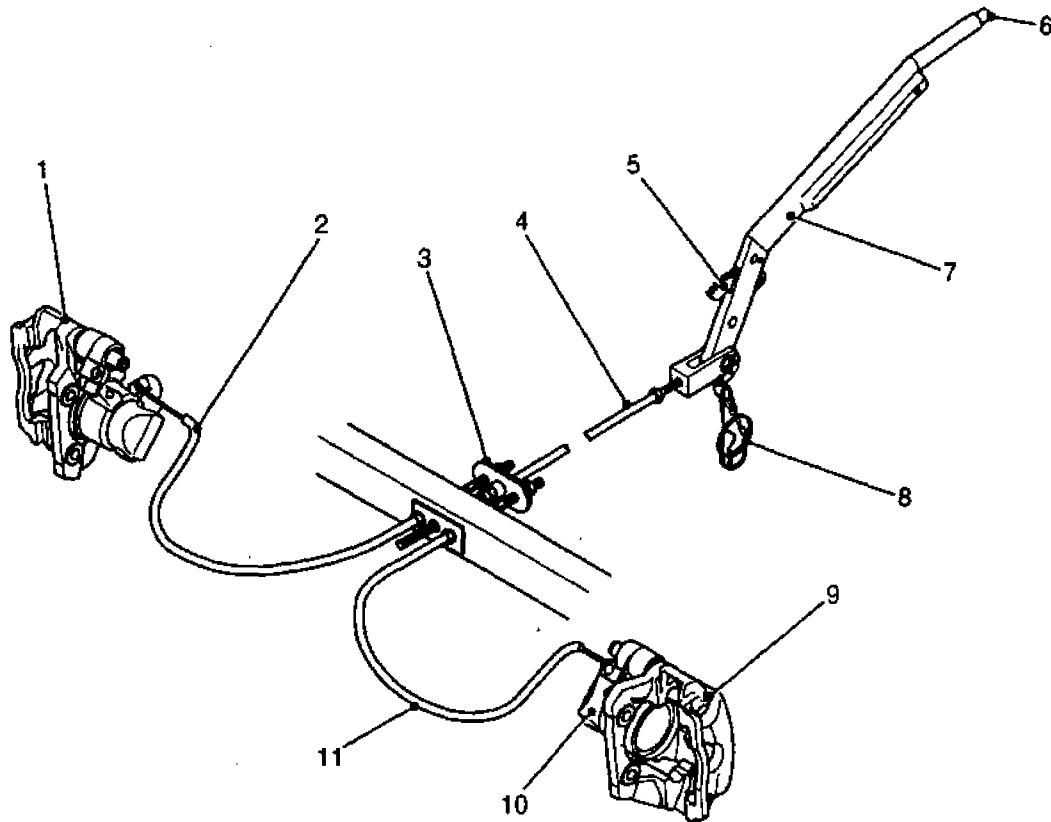
- 11.1 Handbrake lever (Fig 2 (7)).
- 11.2 Brake rod (4) and balance bar (3).
- 11.3 Cables (2 and 11).
- 11.4 Handbrake arm (on calipers).

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

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

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

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



TRL/037

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

Fig 2 Handbrake assembly

SYSTEM OPERATION**Forward**

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

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

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

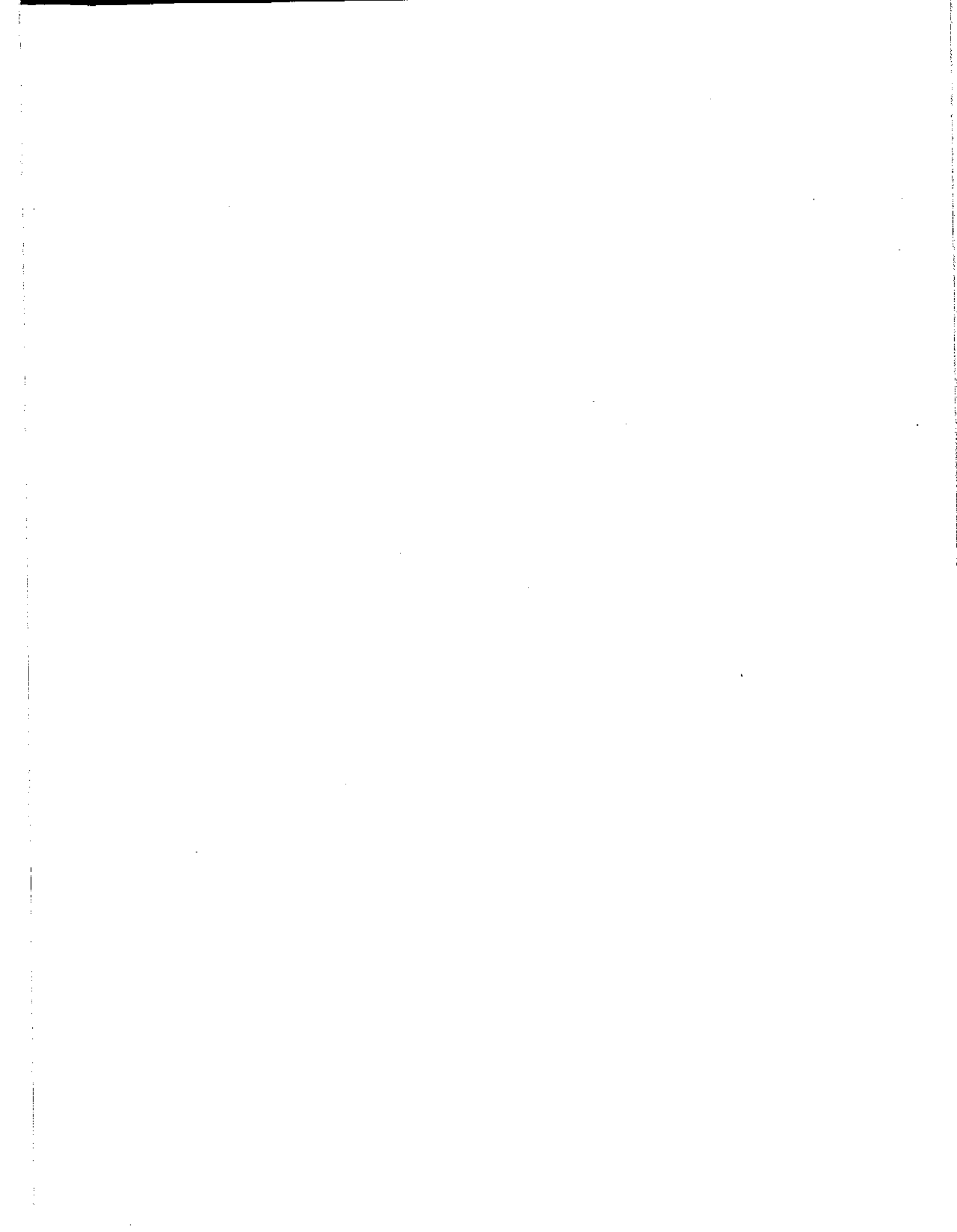
Reverse

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

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

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

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



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

Fig

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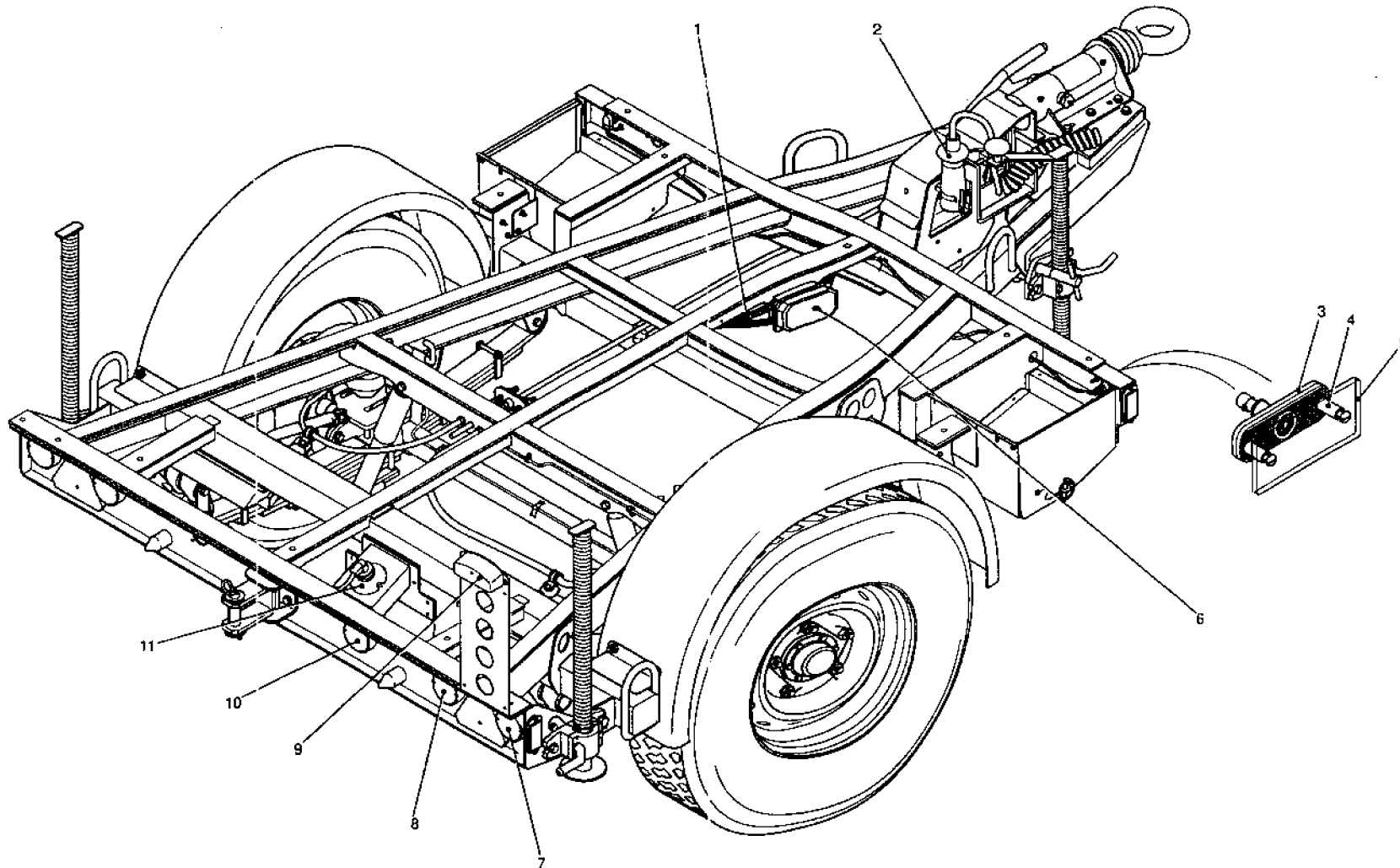
1	Electrical equipment.....	2
2	Light unit and branch connector	3

INTRODUCTION

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

Wiring harness

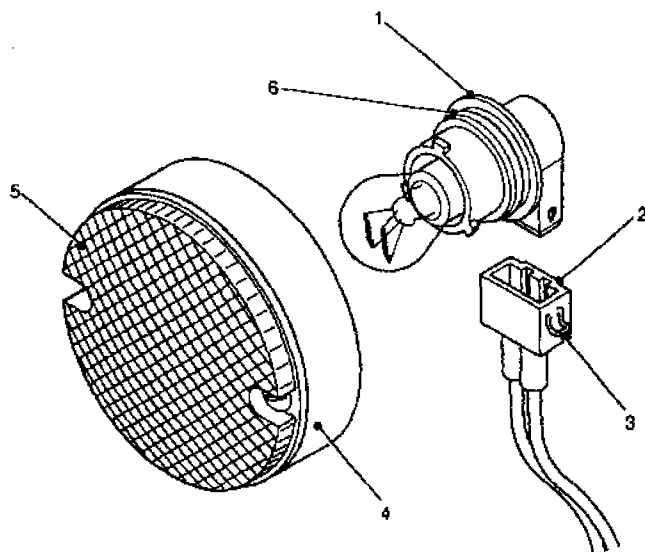
- 3 The wiring harness fitted to the trailer is a multi-branched assembly which interconnects the trailer lights with the towing vehicle lights, via the NATO plug and socket.
- 4 The harness is a single exchange item which must be replaced as an assembly. The terminal box (6) is a factory sealed unit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



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

Fig 1 Electrical equipment

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

Fig 2 Light unit and branch connector

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

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

Light units

Rear lights

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

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

Front marker light

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

Convoy light

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

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