Ministry of Defence

Army Equipment Support Publication

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PRELIMINARY MATERIAL

PREFACE

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INTRODUCTION

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

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

3 The subject matter of this publication may be affected by Defence Instructions and Notices (DIN), Standard Operating Procedures (SOP) or by local regulations. When any such instruction, Order or Regulation contradicts any portion of this publication it is to be taken as the overriding authority.

RELATED AND ASSOCIATED PUBLICATIONS

Related publications

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

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	3	Service Engineered Modification Instructions (RAF only)	831	831	831	831

*Category / Subcategory not published.

Associated publications

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

Reference	Title
2590-N-105	Wheel and Tyre Changer for DROPS, IMMLC (fitted to Truck, 4 Tonne, 4 x 4, Leyland)
291O-F-101	CAV Fuel injection pump DPS
JSP 351	MT Driver's handbook

WARNINGS AND CAUTIONS

WARNINGS

(1) DO NOT CARRY START PILOT CANISTERS IN THE CAB.

(2) DO NOT EXPOSE START PILOT CANISTERS TO A NAKED FLAME, SPARK OR ANY INTENSE HEAT SOURCE.

(3) ENSURE THAT ALL PERSONNEL ARE KEPT CLEAR OF THE AREA IMMEDIATELY IN FRONT OF THE VEHICLE WHEN TILTING THE CAB AND THAT THERE IS ADEQUATE CLEARANCE IN FRONT AND ABOVE THE CAB.

(4) DO NOT REMOVE THE PRESSURE OR FILLER CAPS FROM THE COOLING SYSTEM HEADER TANK WHILST THE ENGINE IS RUNNING OR WHEN THE SYSTEM IS HOT.

CAUTIONS

6 There are no CAUTIONS applicable to this category.

ABBREVIATION AND SYMBOLS

ABBREVIATIONS

7 The following abbreviations are used in this category:

Abbreviation	Definition
AESP	Army Equipment Support Publication
BFPO	British Forces Post Office
DGS&E-TIG	Director General Safety and Engineering-Technical Information Group
DIN	Defence Instructions and Notices
FRACAS	Failure Reporting Analysis and Corrective Action System
GSV IPT	General Support Vehicle Integrated Project Team
MoD	Ministry of Defence
SOP	Standard Operating Procedures
UK	United Kingdom

SYMBOLS

8 There are no symbols applicable to this category.

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CHAPTER 1

ENGINE

CONTENTS

GENERAL DESCRIPTION

1 All 4 tonne vehicles are fitted with one of the following engine types:

1.1 All vehicles were fitted with the Leyland DAF 300 Series diesel engine. This turbocharged and water cooled engine has a six cylinder in-line configuration, with a four stroke cycle, direct injection combustion and compression ratio of 17:1. The engine has a bore of 102 mm (4.02 in.) and a stroke of 120 mm (4.72 in.) providing an engine capacity of 5.88 litres (360 $in.^3$). Net installed power is 108 kW (145 bhp) @ 2600 rev/min; Net installed torque is 477 Nm (352 lbf ft) @ 1600 rev/min.

1.2 All vehicles have been fitted with a modified Leyland DAF 300 Series diesel engine; designated Euro 1. This engine conforms to current legislative exhaust emission levels (88/77/EEC Directive Step 1). This turbocharged and water cooled engine has a six cylinder in-line configuration, with a four stroke cycle, direct injection combustion and a compression ratio of 18:1. The engine has a bore of 102 mm (4.02 in.) and a stroke of 120 mm (4.72 in.) providing an engine capacity of 5.88 litres (360 $in.^3$). Net installed power is 108 kW (145 bhp)@ 2500 rev/min; Net installed torque is 494 Nm (364 lbf ft)@ 1550 rev/min.

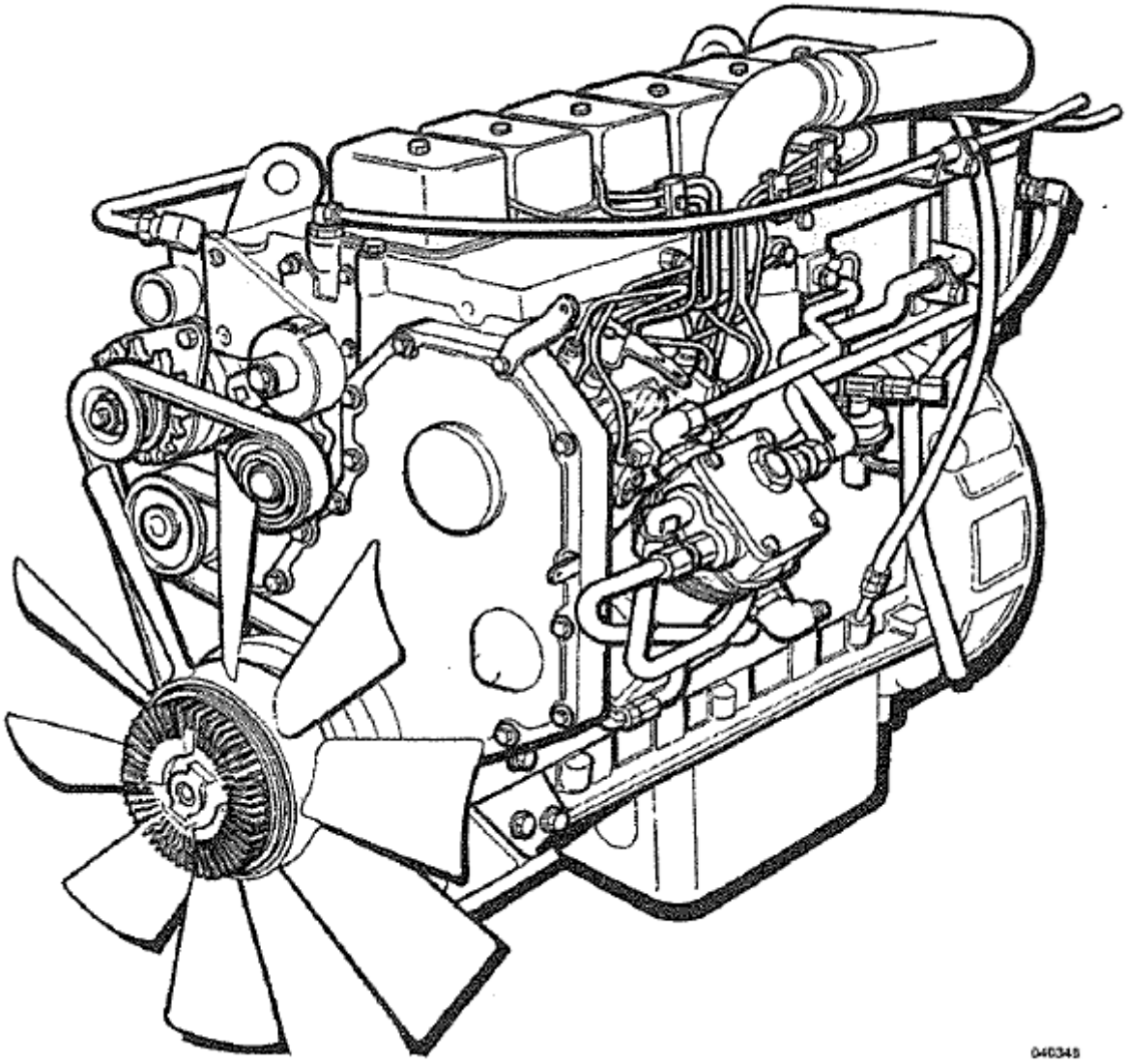


Fig 1 Engine assembly - induction side

2 The crankshaft (Fig 3 (5)) is a balanced, forged steel unit with seven main bearings; end thrust is controlled by flanged bearings fitted to No. 6 main bearing. Crankshaft oil seals both front and rear are the double lipped 'Teflon' type.

3 The pistons are secured to the connecting rods with free floating hollow gudgeon pins which are secured with circlips. A set of three piston rings is fitted to the piston. The small-end of the connecting rod is angle cut to provide additional bearing surface.

4 The camshaft (4) is gear driven by the crankshaft and not only operates the valve gear but has a special lobe which operates the lift pump.

5 The cylinder head is a one piece cross-flow design with two valves per cylinder. It has integral valve guides and hardened valve seat surfaces. Injectors are mounted in the head for direct injection into the cylinder. The cylinder head gasket is a laminated design, pre-coated with sealant on both sides around the water holes. The gasket consists of integral fire rings to seal the cylinder bores and orifices to control coolant flow.

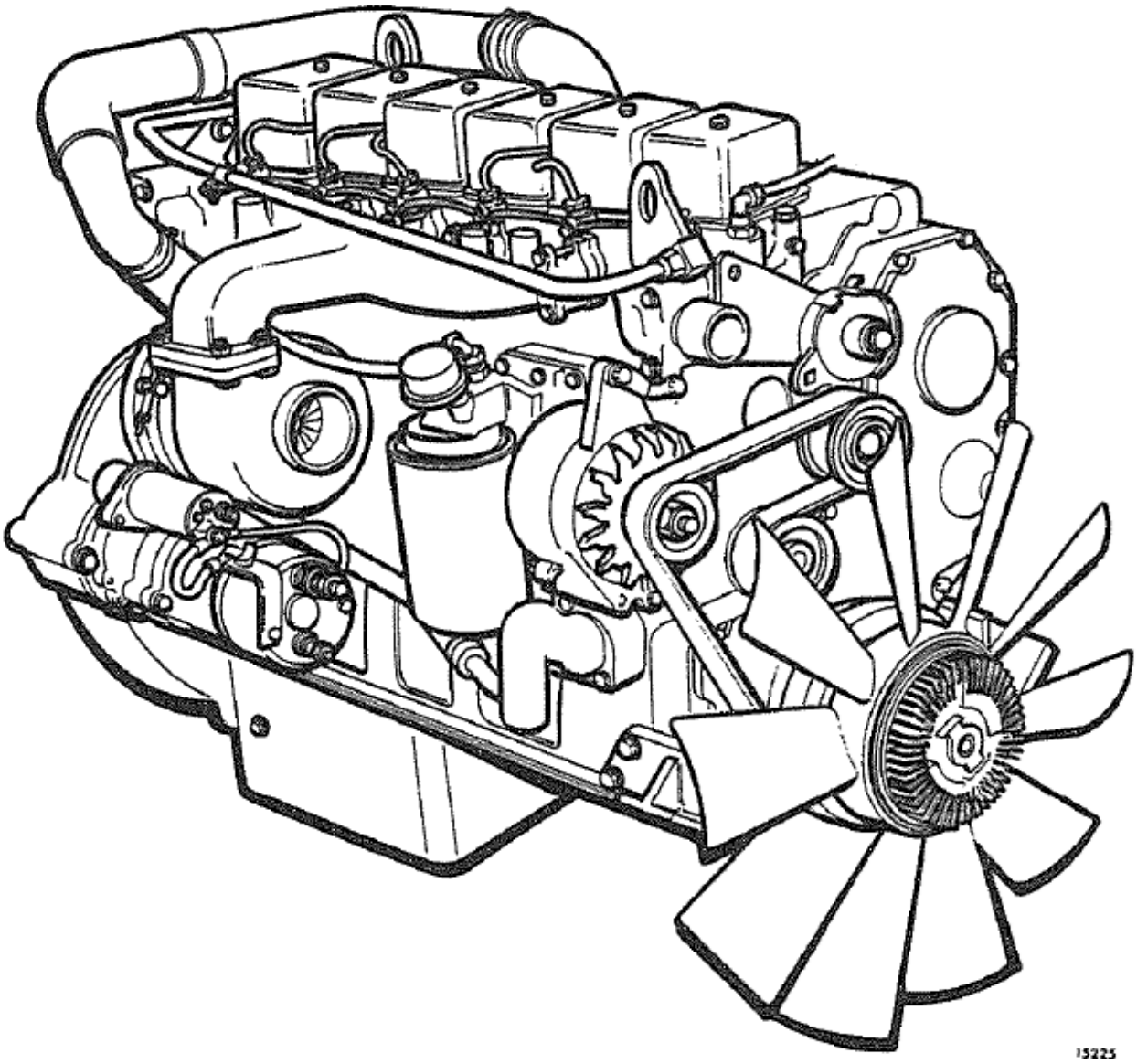


Fig 2 Engine assembly - exhaust side

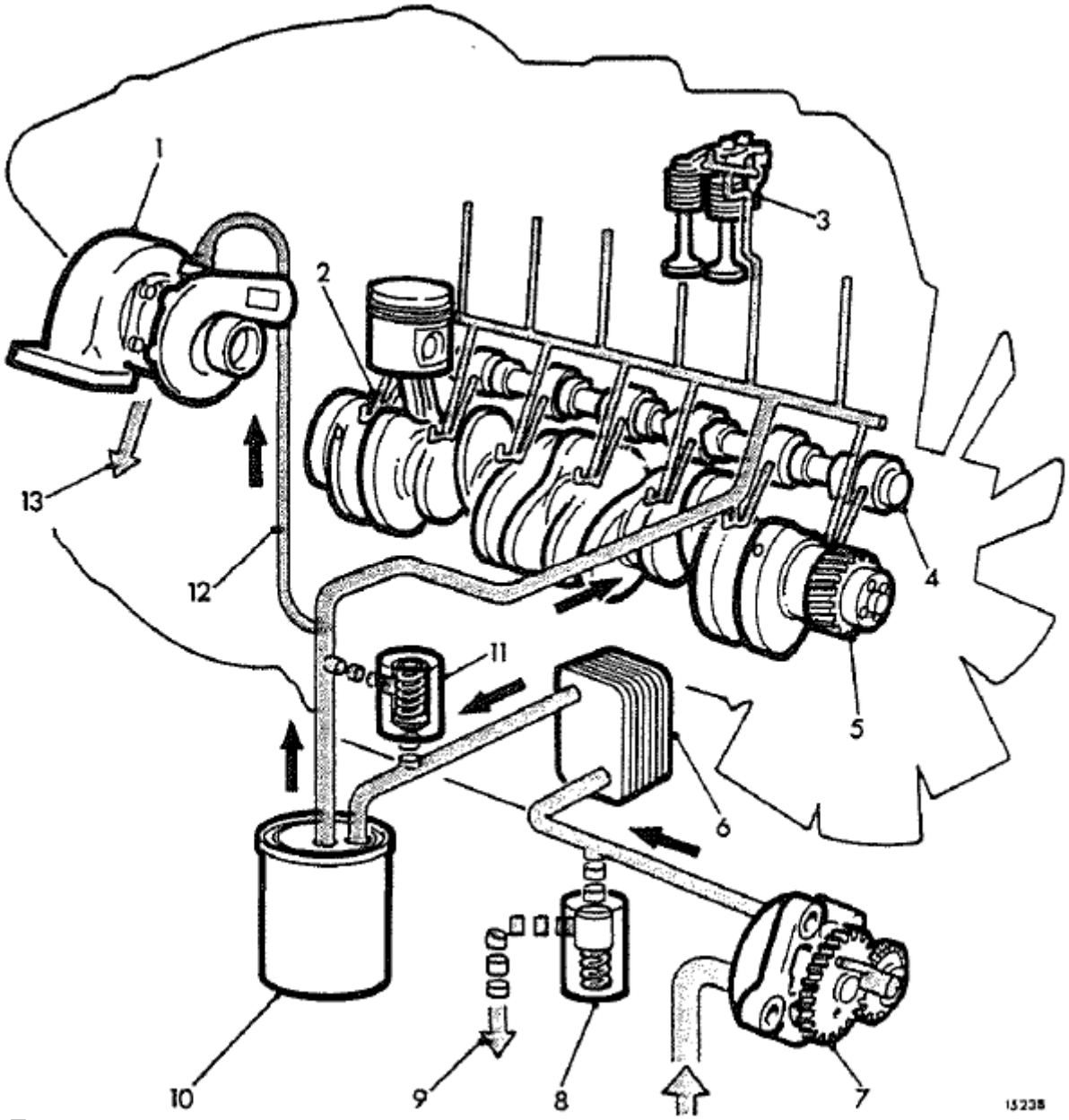
6 A rotary type oil pump (7) is gear driven through helical gears from the crankshaft. Oil is drawn from the sump and passed to the oil cooler (6) via a regulating valve (8), which if the oil pressure supplied from the pump is excessive, diverts part of the oil back to the sump.

7 The oil flows through the oil cooler where it is cooled by engine coolant and passes into the oil filter (10). In the event of a restricted oil filter, a by-pass valve (11) in the oil cooler cover will allow the oil to bypass the filter.

8 The turbocharger (1) receives filtered, cooled and pressurised oil through a supply line (12) from the oil filter head. A drain line connected to the bottom of the turbocharger returns oil to the sump.

9 Crankshaft main bearings and valve gear are lubricated by pressurised oil directly from the main oil gallery. Drillings in the crankshaft supply oil to the connecting rod big-end bearings. Oil is supplied to the camshaft through drillings in the crankcase main bearings, whilst smaller drillings in the crankcase main bearings supply oil to the piston cooling nozzles, which provide lubrication for the gudgeon pins.

10 Lubrication for the valve gear is supplied through separate drillings in the cylinder block; oil flows through the drillings and across the oil transfer slot in the cylinder head gasket. From the slot, oil flows across the bottom of the rocker pedestal, up a vertical drilling in the pedestal into the rocker shaft to lubricate the rocker levers. Oil then flows through drillings in the rocker levers to lubricate the valve stems, push-rods and cam-followers.



1	Turbocharger	8	Oil pressure regulating valve
2	Piston cooling nozzle	9	Oil return
3	Valve gear	10	Oil filter
4	Camshaft	11	Filter by-pass valve
5	Crankshaft	12	Turbocharger oil feed
6	Oil cooler	13	Oil return
7	Oil pump		

Fig 3 Lubricating oil system

CHAPTER 2

CLUTCH

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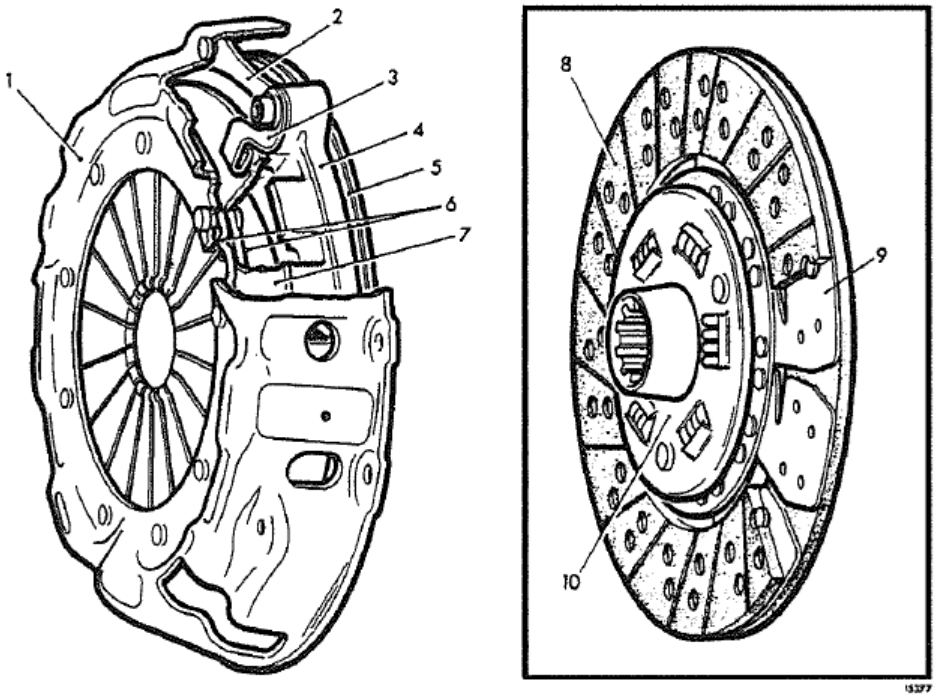
CLUTCH

1 The clutch (Fig 1) is a single dry plate type, comprising a 330 mm (13 in.) driven plate and a self adjusting diaphragm spring cover/pressure plate assembly.



1	Clutch cover	6	Fulcrum rings
2	Drive strap	7	Diaphragm spring
3	Retractor clip	8	Friction facing
4	Pressure plate	9	Spring plate
5	Driven plate	10	Drive hub

Fig 1 Clutch assembly

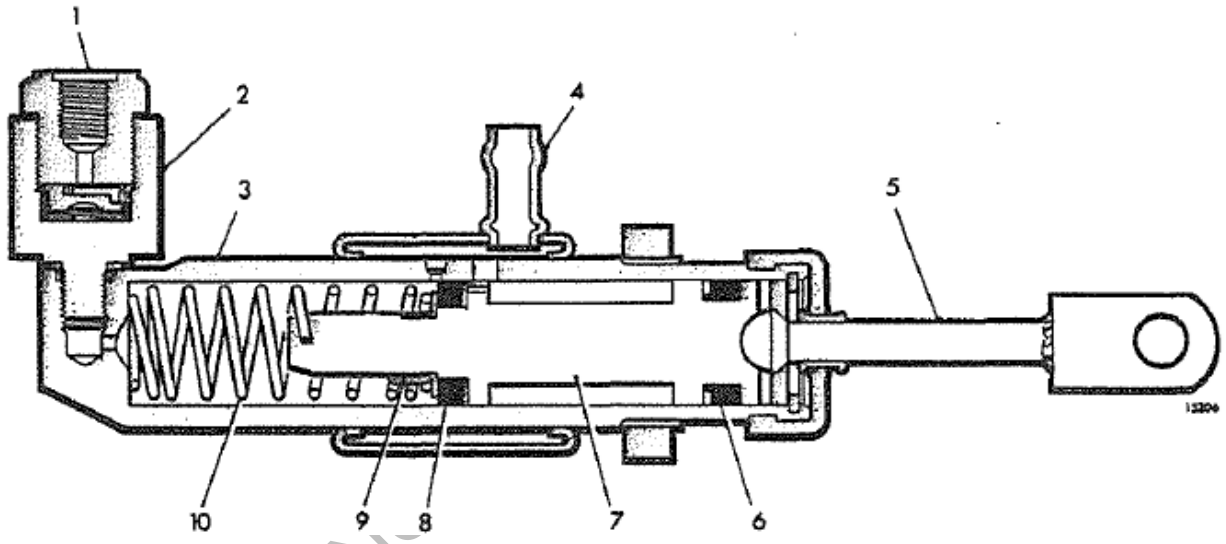
2 The driven plate (5) is of the spring mounted friction facing type with a multiple coil spring drive hub (10). The friction facings (8) have an annular frictional lining of 330 mm (13 in.) outside diameter, 200 mm (7.87 in.) inside diameter and 4 mm (0.157 in.) thick non asbestos friction material.

3 When the clutch pedal is depressed, the release bearing applies pressure to the diaphragm fingers which move inwards and pivot on the fulcrum rings (6) to lift up the spring outer edge. The retractor clips (3) raise the pressure plate (4) flexing the drive straps (2) to release the driven plate and disconnect the input shaft drive to the gearbox.

4 When the clutch pedal is released, the diaphragm spring forces the pressure plate to compress the spring mounted friction facings, thus giving a smooth clutch engagement. Drive is also cushioned by the drive hub multiple coil springs.

CLUTCH MASTER CYLINDER

5 The clutch master cylinder (Fig 2) is a single plunger centre valve type with a non-adjustable pushrod (5).



1	Outlet port	6	Piston seal
2	Restrictor valve	7	Hydraulic piston
3	Hydraulic cylinder	8	Main piston seal
4	Inlet port	9	Spring retainer
5	Push rod	10	Return spring

Fig 2 Section view of the clutch master cylinder

6 When the clutch pedal is depressed the push-rod moves along the cylinder bore, closing off the fluid supply from the reservoir. The pressure created operates the piston in the clutch servo slave cylinder.

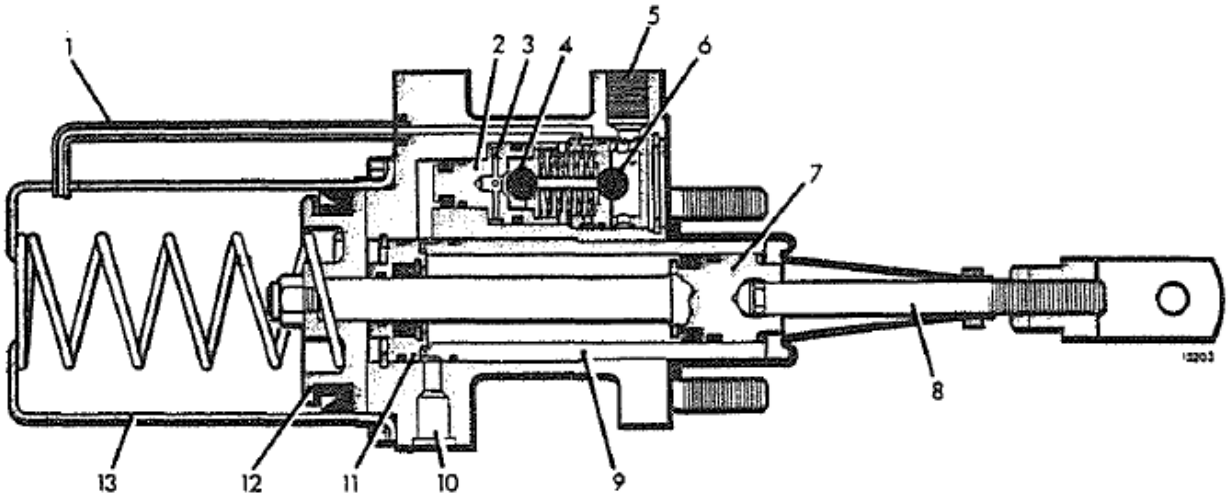
7 When the clutch pedal is released, the return spring (10) moves the piston (7) towards its end stop faster than the fluid is displaced to the master cylinder. This causes the lip of the main seal (8) to release, allowing fluid to pass over the seal lip and through the holes in the piston, which are uncovered during the return movement of the piston.

8 When the piston is in the fully released position, the main seal opens the by-pass port in the cylinder, which releases all pressure within the master cylinder; the by-pass port also allows for expansion or contraction of the fluid caused by changes in temperature.

9 The restrictor valve (2) checks the return of fluid to the master cylinder during 'bleeding'; this ensures a fresh charge of fluid everytime the piston is displaced and consequently assist the purge of air from the system.

CLUTCH SERVO CYLINDER

10 The clutch servo cylinder (Fig 3) is an air/hydraulic unit which provides air assistance whenever the clutch pedal is depressed.



1	Air passage	8	Push rod
2	Reaction plunger	9	Hydraulic cylinder
3	Exhaust passage	10	Hydraulic inlet port
4	Exhaust valve	11	Seal housing
5	Air inlet port	12	Air piston
6	Inlet valve	13	Air cylinder
7	Hydraulic piston		

Fig 3 Section view of the clutch servo slave cylinder

11 The unit is self adjusting, therefore as the clutch facings wear, the piston/push-rod (7) and (8) assembly moves rearward and, throughout the life of the clutch, the servo piston travel required to disengage the clutch is constant.

12 Air pressure of 3.5 bar (50 lbf/in.^{2}) is supplied to the servo cylinder from a pressure reducing valve situated in the essential auxiliary line. For detailed information on the pressure reducing valve, refer to Chap 10.

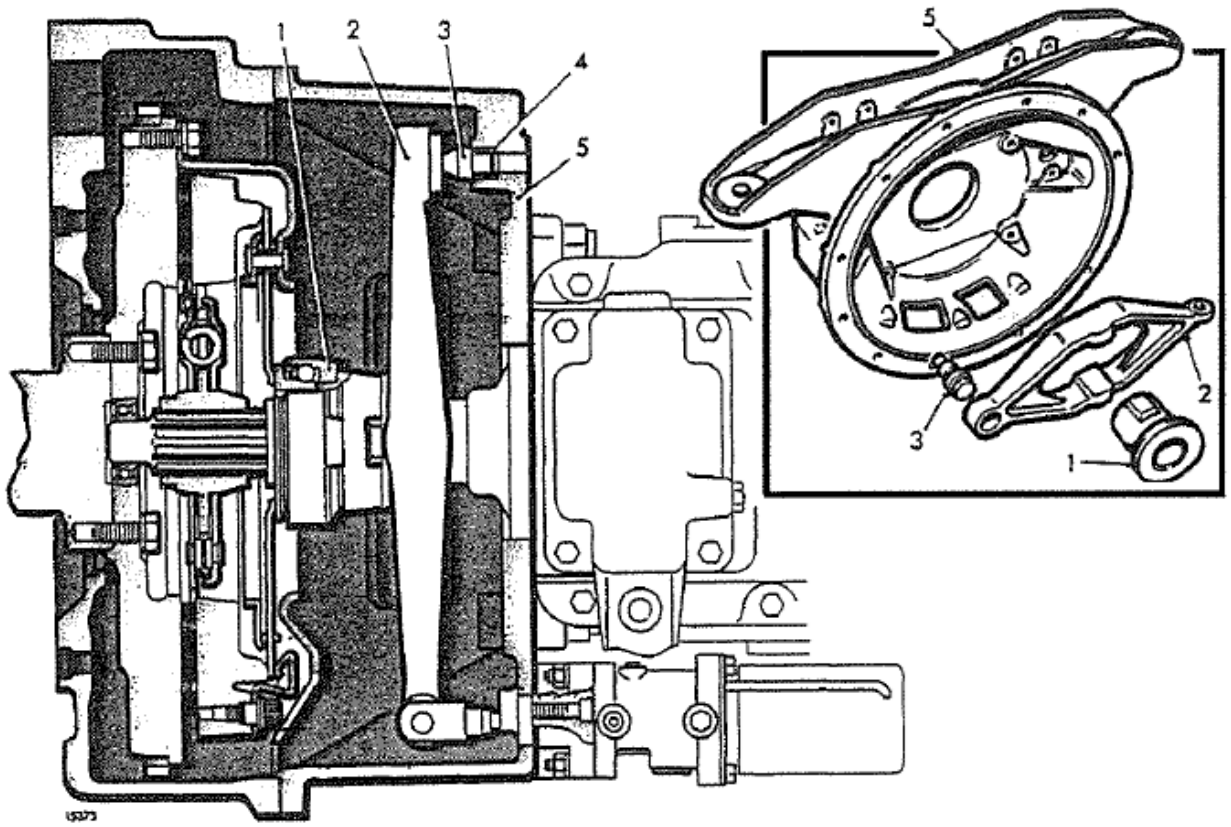
13 When the clutch pedal is depressed, hydraulic fluid from the clutch master cylinder is displaced through the hydraulic inlet port and the pressure created acts on the reaction plunger (2) and the hydraulic piston (7). The pressure moves the reaction plunger off its seat, closing the exhaust valve (4) and opening the inlet valve (6). Air then passes through the inlet valve and the passage (1) to the air cylinder. Air pressure acting on the piston (12) assists the movement of the hydraulic piston, thus disengaging the clutch.

14 When the clutch pedal is held in a partially depressed position, the air pressure acting on the reaction plunger overcomes the hydraulic pressure behind the plunger causing the inlet valve to seat, stopping the air supply to the air cylinder. With both valves seated the push-rod remains stationary until the clutch pedal is further depressed or released.

15 When the clutch pedal is released the hydraulic fluid pressure acting on the plunger decreases. The return spring moves the plunger which opens the exhaust valve, allowing the air from the air cylinder to exhaust to atmosphere.

CLUTCH RELEASE MECHANISM

16 The clutch release mechanism (Fig 4) comprises a rotating ball release bearing, self centring release lever and a pivot ball pin.



1	Release bearing	4	Pivot bush
2	Clutch release lever	5	Clutch housing
3	Pivot ball pin		

Fig 4 Clutch release mechanism

17 The release bearing is a pre-sealed, rotating ball type, which is loosely mounted in the release lever. The bearing is permanently in contact with the diaphragm fingers, and when the engine is running the bearing rotates irrespective of whether the clutch is engaged or disengaged. There is no free travel and adjustment takes place automatically.

18 The self centring release lever has a ball pin as a pivot point, the advantage of this type of lever is the uniform loading of the release bearing.

CHAPTER 3

GEARBOX

CONTENTS

INTRODUCTION

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CHAPTER 4

TRANSFER

CONTENTS

INTRODUCTION

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