

WINGET

OPERATING INSTRUCTIONS & SPARE PARTS LIST

FOUR/70 DIESEL DUMPER (CAPACITY 70 CWT)

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INTRODUCTION

This Parts & Operators Manual is a re-print of the manual last published in 1978 and contains some amended part numbers.

Note: this publication is applicable to machines with serial numbers from and including 4/70-3001

Health & Safety legislation and working practices applicable to Site Dumpers, both 2 and 4 wheel Drive, Rigid Chassis and Articulated Chassis have changed considerably in the years since this manual was last published and immediately following this Introduction are notes on the Safe Use of Site Dumpers. These notes supersede and replace all previous 'Dumper Safety' notes issued with Winget FOUR/70 Four Wheel Drive Dumpers.

Reference is made on a number of pages to 'bolt c/w nut and washer', this no longer the case, fixings such as nuts, bolts, screws and washers should be ordered as individual items. A number of Whitworth and B.S.F fixings are now no longer available, in these cases the nearest metric equivalent size will be supplied.

The contents of this manual although correct at the time of publication, may be subject to alteration by the manufacturers without notice and Winget Limited can accept no responsibility for any errors or omissions contained within the following pages. Nor can we accept any liability whatsoever arising from the use of this manual howsoever caused.

Winget Limited operate a policy of continuous product development. Therefore, some illustrations or text within this publication may differ from your machine.

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DUMPER SAFETY

Safety is the responsibility of all persons working with this machine. Think "safety" at all times. Read and remember the contents of this handbook.

MACHINE MODIFICATIONS

WARNING Any modifications to the machine will affect its working parameters and safety factors. Refer to the Manufacturers before fitting any non-standard equipment or parts.



The Manufacturers accept no responsibility for any modifications made after the machine has left the factory, unless previously agreed by the Manufacturers in writing; the Manufacturers will accept no liability for damage to property, personnel or the machine if failure is brought about due to such modifications, or fitment of spurious parts.

TRAINING

WARNING Only trained operators should use this machine.



Operators should hold an appropriate full motor vehicle driving licence and undergo both a safety awareness course and a driver training course for Site dumpers run by the C.ITB or equivalent body leading to the award of a CTA.

It is strongly recommended that operators read the H.S.E. publication "Safe Working with Small Dumpers" which is available from government bookshops (HMSO) or from other bookshops quoting the following number ISBN 011 8836935. Another useful publication is British Standard number BS 6264, "Procedure for Operator Training For Earth Moving Machinery" available from the British Standard Institution.

OPERATION

WARNING *NEVER* use the machine for purposes other than those for which it was designed. This machine was designed to carry loads such as soil, clay, sand, wet concrete, stone or other similar materials. It was not designed to carry loads which may move around in the skip uncontrollably, nor to carry any loads or materials which overhang the skip in any way. If in any doubt as to the suitability of this machine for a particular task, contact your nearest Distributor or the Manufacturer for advice.



ALWAYS be aware of local and national regulations governing the use of the machine.

NEVER commence work with the machine until the "Daily (or every ten hours)" service checks have been made. (See *Service Section for details*)

ALWAYS check wheel nut tightness daily.

NEVER carry passengers.

Where seat belt restraints are fitted as part of Rops/Fops Protection they must be worn. Ensure that the seat and seat belt are securely fixed to the machine. Check that the seat belt is in good condition, free from cuts and frayed edges.

ALWAYS remain in the driving seat whenever the engine is running. Never attempt to operate any controls unless seated.

ALWAYS apply the parking brake before leaving the driver's seat.

DUMPER SAFETY

NEVER dismount with the engine running, and never leave the machine unattended with the key in the starter switch.

When Battery Isolators are fitted they must be activated only when the engine is turned off except in cases of emergency.

Activating a Battery Isolator when the engine is running can result in damage to the electrical components and circuits.

NEVER fill the fuel or hydraulic tanks with the engine running.

ALWAYS drive only on surfaces that are known to be stable.

ALWAYS keep the floor plates and walkways clean.

NEVER drive the machine close to the edge of any excavation. Always use effective wheel stops to prevent the machine running close to the edge. Make sure that the stops are in proportion to the size of the wheels and are set sufficiently far enough back from the edge of any excavation to prevent the weight of the load causing a collapse.

NEVER adjust the tyre pressures in an attempt to improve traction on soft ground or obtain a softer ride on hard ground. Incorrectly adjusted tyres can affect the steering and handling characteristics.

NEVER attempt to free a machine which is 'bogged down' by pushing with the bucket of a backhoe loader, tracked excavator or other similar machine.

NEVER make unnecessary "crash stops" when travelling at speed, especially in forward direction.

NEVER work under an unpropped skip. *If the dumper was supplied with a special Skip Support always ensure that it is used.*

Some articulating dumpers are manufactured with an articulation lock. If your machine has this feature proceed as follows:

ALWAYS fit the articulation lock when working within the articulation point crush zone.

NEVER attempt to lift the machine unless the articulation lock is engaged.

SKIPS AND LOADING

WARNING *NEVER* exceed the rated payload. The weights of all loads above skip water level must be checked.



NEVER remain on the machine when loading the skip with excavators or loaders. Stop the engine, apply the parking brake, dismount, and stand well clear.

ALWAYS ensure that the load is evenly distributed in the skip.

NEVER carry loads or heap materials in such a manner as to affect the forward vision.

ALWAYS take extra care when tipping non free running loads.

NEVER use the skip in a tipped position to bulldoze heaped materials level or to backfill material into excavations.

DUMPER SAFETY

TOWING

WARNING NEVER attempt to start the engine of a dumper by towing or pushing.



Dumpers are not designed as towing vehicles, but loads (including weight of trailer) not exceeding the rated payload of the dumper may be towed on dry level ground in first gear, providing the dumper skip is loaded with half the rated payload to ensure tyre adhesion when braking.

ALWAYS use a purpose made towing pin.

NEVER tow loads up, down or across gradients.

GRADIENTS

WARNING NEVER operate *Four Wheel Drive articulated steer dumpers* on any gradients which exceed 25% (1 in 4), or across gradients which exceed 16% (1 in 6).



NEVER operate *Two Wheel Drive rigid chassis dumpers* on any gradients which exceed 10% (1 in 10), or across gradients which exceed 10% (1 in 10).

ALWAYS remember that slippery or loose surface conditions can adversely affect safe machine operation, including braking, particularly on gradients.

ALWAYS choose routes that avoid steep, slippery or loose gradients.

NEVER coast down gradients. Always negotiate gradients in first gear.

ALWAYS drive forwards up gradients when loaded.

ALWAYS reverse down gradients when loaded.

ALWAYS keep the load facing uphill.

NEVER park on a gradient. If this is unavoidable, ALWAYS chock the wheels.

NEVER attempt to turn on a gradient.

NEVER tow up, down or across a gradient.

NEVER operate high discharge or rotating skips on gradients.

HYDRAULICS

WARNING ALWAYS "Dump" residual pressure from the system before leaving the machine or before carrying out any maintenance or adjustments.



If maintenance work requires the skip to be in the raised position, then it must be raised and supported before dumping the pressure.

Dump pressure by switching off the engine, then moving the hydraulic control lever several times in each direction.

NEVER leave the machine unattended with pressure in the system.

ALWAYS purge hydraulic rams before commencing work. With the engine running operate the hydraulic control to fully extend and retract the rams.

ALWAYS practise the greatest cleanliness in maintaining hydraulic components.

DUMPER SAFETY

SERVICING

WARNING ALWAYS report any defect at once, before an accident or consequential damage can occur.



ALWAYS conform to service schedules except where:

- 1 Warning lights or warning indicators call for immediate attention.
- 2 Adverse conditions necessitate more frequent servicing.

ALWAYS wear correctly fitting protective clothing. Loose or baggy clothing can be extremely dangerous when working on running engines or machinery.

ALWAYS, where possible, work on or close to engines or machinery only when they are stopped. If this is not practical, remember to keep tools, test equipment and all parts of your body well away from the moving parts.

ALWAYS dump pressure from the hydraulic system before carrying out any kind of maintenance or adjustment. (*see Hydraulics Warnings*).

ALWAYS avoid contact with exhaust pipes, exhaust manifolds and silencers when the engine is running; these can be very hot.

ALWAYS work out of doors, or in a well-ventilated area.

NEVER run an engine in an enclosed space. Exhaust fumes in enclosed areas can kill.

ALWAYS disconnect battery cables and remove battery before using an external charger, carrying out welding repairs or to prevent unauthorised usage when unattended or during a repair.

NEVER allow unqualified personnel to attempt to repair, remove or replace any part of the machine, or anyone to remove large or heavy components without adequate lifting tackle.

NEVER attempt to modify or repair Rops Frames or Fops Canopies by welding, drilling or any other means. Attempts to do so will invalidate Rops/Fops Certification.

ALWAYS obtain advice before mixing oils; some are incompatible. If in doubt drain and refill.

NEVER allow oils and fuels to come into regular contact with skin. This can lead to serious skin diseases including, medical evidence suggests, skin cancer. ALWAYS wear protective gloves when handling oils and fuels whether topping up, draining or refilling. ALWAYS wash hands if oils or fuels come into contact with the skin.

Many liquids used in this machine are harmful if taken internally or splashed into the eyes. In the event of accidentally swallowing oils, fuels, anti-freeze, battery acid etc, DO NOT encourage vomiting, seek qualified medical assistance immediately.

ALWAYS dispose of waste oils and fuels into waste oil storage tanks. If storage tanks are not available consult your distributor or local authority for addresses of local designated disposal points. It is illegal to dispose of waste oil into drains or water courses or to bury it.

DUMPER SAFETY

Equipment which includes friction materials will sometimes contain asbestos. When removing friction material dust from components, such as when servicing brakes or clutches, do not blow out with an airline; it could be harmful to inhale the dust. Remove the dust with a vacuum cleaner or wipe clean with a damp rag. Waste should be placed in a sealed container, marked, and disposed of in accordance with local or national regulations.

The accumulated dust found in clutch housings may contain lead/antimony. No food should be eaten at a work place contaminated by this dust. Hands must be washed before eating. Do not blow out dust with an airline.

ALWAYS ensure that the starting handle is clean and in good condition. Keep the engine starting dog, and the part of the starting handle that mates with it, lightly lubricated (*Refer to the Engine Handbook*).

NEVER work under an unpropped skip. ***If the dumper was supplied with a special Skip Support always ensure that it is used.***

Some articulating dumpers are manufactured with an articulation lock. If your machine has this feature, ALWAYS fit the articulation lock when servicing or working on the machine.

PREPARATION FOR USE

Before the Dumper is put into service, always check the following points:

Engine

Check the oil level on the dipstick, topping up if necessary to the full mark.

Gearbox

Check the oil level on the dipstick, topping up if necessary to the full mark.

Drive Axles and Transfer case.

Remove filler/level plugs from drive axles and filler/level plug from transfer case and check that oil is up to bottom of holes. Top up if necessary, through filler/level plugs.

Fuel Tank

Fill tank with diesel oil until approximately 1" from the top.

NOTE: Never allow fuel level to fall below 2" deep in the bottom of the tank.

Hydraulic Tank

Fill the hydraulic tank. Before removing the cap, clean the surrounding area to prevent the possible entry of foreign matter.

Brake System

Ensure that both brake cylinder reservoirs are full of fluid. Top up if necessary to within $\frac{1}{4}$ " of the top of the reservoirs. Use only brake fluid that conforms to B.S. - SAE.J.1703.

Miscellaneous

Check all wheel nuts for tightness.

Check all nuts and bolts for tightness, loose nuts and bolts may lead to damage not covered by Warrantv.

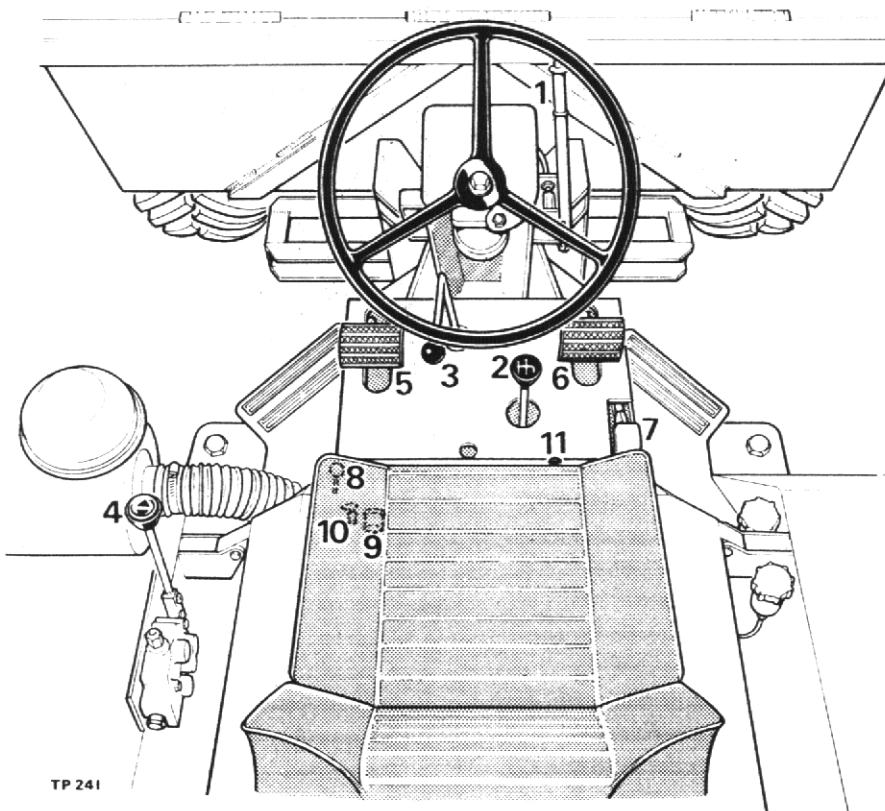


FIG.1
Layout of controls

KEY:

- 1 HANDBRAKE
- 2 GEARLEVER
- 3 HIGH-LOW GEARLEVER
- 4 SKIP CONTROL LEVER
- 5 CLUTCH PEDAL
- 6 BRAKE PEDAL
- 7 ACCELERATOR PEDAL
- 8 ENGINE STOP
- 9 AMMETER
- 10 START SWITCH
- 11 SEAT ADJUST LEVER

SPECIFICATION Fig. 2

Dimensions:

A.	Overall height	6' 7½"	(2.01 m)
B.	Skip loading height	4' 7"	(1.40 m)
C.	Wheelbase	7' 0"	(2.13 m)
D.	Overall length	13' 2½"	(4.02 m)
E.	Ground clearance	1' 1"	(0.33 m)
F.	Overall Width	6' 8"	(2.03 m)
G.	Skip ground clearance when tipped	1' 7"	(0.48 m)
H.	Overall height tipped	7' 9"	(2.36 m)
J.	Discharge forward of tyre	1' 7"	(0.48 m)
K.	Overhang	3' 4"	(1.02 m)
L.	Wheel track	5' 8"	(1.72 m)
M.	Prow width	6' 4"	(1.93 m)

Skip Capacities

Water Level	50ft ³	(1416 litres)
Stuck Level	69ft ³	(1954 litres)
Heaped	89ft ³	(2520 litres)
Maximum Payload	7840 lb.	(3556 kg.)

Tank Capacities:

Diesel fuel tank	12 imp. galls.	(54.5 litres)
Hydraulic oil tank	12 imp. galls.	(54.5 litres)

Turning circle	27' 6"	(8.36 m)
Vehicle weight	3 Ton 0 cwt 3 qtr.	(3086 Kg)
Hydraulic relief valve	1750 p.s.i.	(123.1 kg/cm ²)
Rear axle articulation	12¾"	(324 mm)
Maximum steering angle	35°	
Tyre pressure	40 p.s.i.	(2.8 kg/cm ²)

Road Speeds:

	low		high	
	m.p.h.	k.p.h.	m.p.h.	k.p.h.
1st forward	2.0	(3.21)	4.12	(6.62)
2nd forward	3.90	(6.27)	8.02	(12.90)
3 rd forward	6.47	(10.40)	13.33	(21.44)
Reverse	1.88	(3.02)	3.88	(6.24)

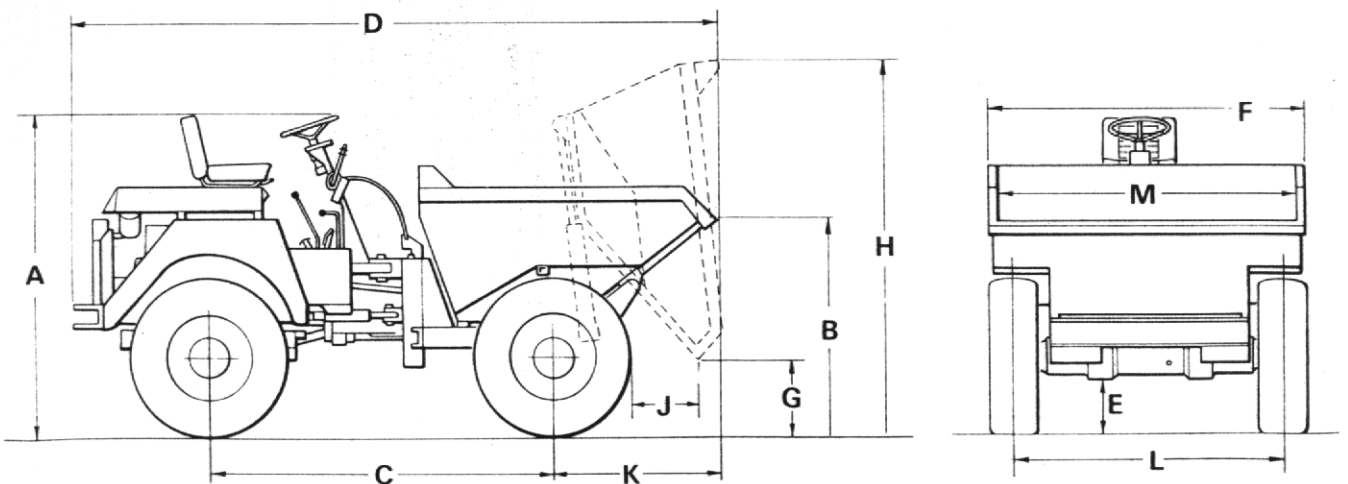


FIG. 2

GENERAL MAINTENANCE

Periodic Maintenance

1. DAILY check engine oil level and fill to full mark on dipstick, if necessary.
2. DAILY FILL FUEL TANK, or as often as proves necessary, to within approximately 1" of the top. Never allow there to be a depth of less than 2" of fuel in the tank.
3. WEEKLY check oil level in the gearbox and fill to full mark on the dipstick if necessary.
4. WEEKLY remove oil level/filler plugs from drive axles and transfer case. Oil levels should be to bottom of holes. Top up if necessary.
5. WEEKLY check oil level in the hydraulic tank. Always clean the surrounding area before removing the cap to prevent the possible entry of foreign matter. Fill tank, if necessary to within 1" of the top.
6. WEEKLY check brake fluid level in the master cylinder reservoirs and top up if necessary, to within ¼" of the top.
7. WEEKLY apply grease to all grease nipples.
8. WEEKLY check all wheel nuts and tighten, if necessary.
9. WEEKLY check tyre pressures (40 lb/sq.in)
10. FREQUENTLY check all nuts and bolts and tighten, if necessary.

Lubrication (See Fig. 4)

Period	Key	Description	Lubrication	No. of points
Daily	1	Engine	Engine Oil	1
	2	Fuel Tank	Diesel Fuel	1
Weekly	3	Gearbox	Gear Oil	1
	4	Drive Axles	Axle Oil	2
	5	Hydraulic Tank	Hydraulic Oil	1
	6	Brake Master Cylinder Reservoirs	Brake Fluid	2
	7	Ram Bearings	Grease Gun	4
	8	Footbrake Pedal	Grease Gun	1
	9	Clutch Pedal	Grease Gun	1
	10	Clutch Cross Shaft	Grease Gun	2
	11	Skip Pivot	Grease Gun	2
	12	Transmission Brake Cable	Grease Gun	1
	13	Chassis Centre Pivot	Grease Gun	2
	14	Propeller Shafts	Grease Gun	12
	15	Trunnion Assembly	Grease Gun	1
	16	Transfer Box	Axle Oil	1

NB. FOR RECOMMENDED LUBRICATING OILS SEE CHART

Oil Capacities

Lister 22 pints (12.5 litres)

Engine Petter . . . 12 pints (6.8 litres)

Drive Axle 16 pints (9.1 litres)

Gearbox 4 pints (2.27 litres)

Transfer Case 1 pint (.57 litres)

- NOTES: 1. Rear Axle Articulation Points consist of Silentbloc bushes and do not require lubrication.
2. For full details on the lubrication and maintenance of the engine, refer to the appropriate manufacturer's manual.

OPERATION

Starting

1. Insert the ignition key in the isolating switch and turn clockwise.
Lister Engine – switch is below front of operator's seat, towards left of operator.
Petter Engine – switch is below right-hand side of operator's seat, towards rear.
2. Press the start button alongside the switch. DO NOT operate starter motor for more than 20 seconds at a time.
3. Where the ambient temperature is 5°F (–15°C) or below, a cold starting aid should be fitted, after consultation with the Engine Manufacturer or Agent.

Stopping

Pull the engine stop control knob, positioned below the front and to the left of the operator's seat, until the engine stops.

Gear Shift and High-Low Range Levers

(See Fig. 3)

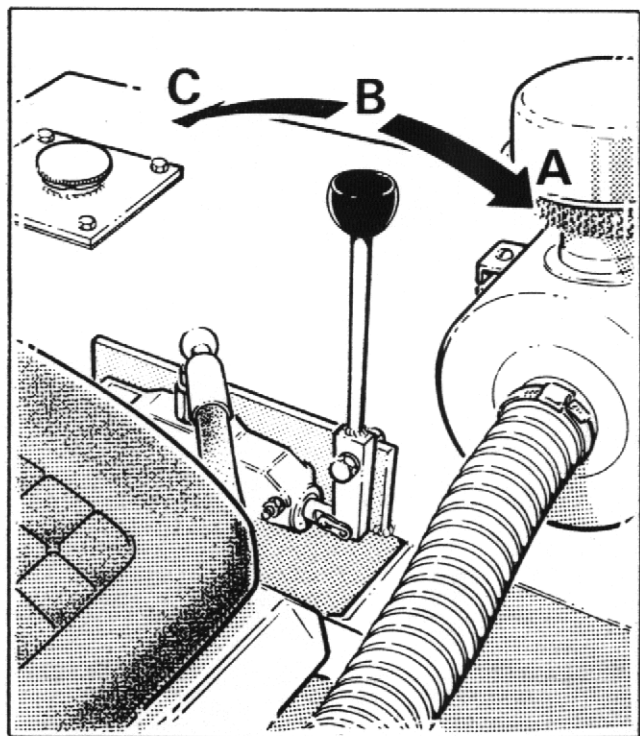
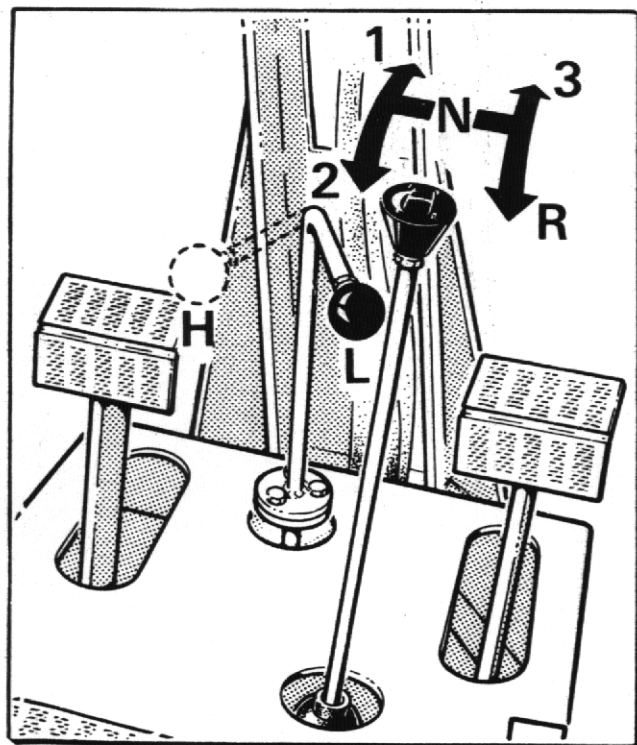
1. The Four/70 Dumper is fitted with three forward (1) (2) (3) and one reverse (R) gear in each range, giving a total of six forward and two reverse gears.
2. When changing gear in either the high (H) or the low (L) range the clutch pedal is used in the normal manner.
3. When changing from the high range to the low range or vice versa always bring the dumper to a stop.
 - a) Bring the dumper to a stop using the brake.
 - b) Set the gear shift lever in neutral (N) and apply parking brake.
 - c) Move the range selector lever to the required range.
Note: It is not necessary to depress the clutch pedal.
 - d) Proceed in the new range.

Skip Control Lever

(See Fig. 4)

1. The control lever has three positions, DUMP (A), HOLD (B) and RETURN (C).
2. Push the lever forward to DUMP (A) to deposit the load.
3. Pull the lever back to RETURN (C) to return the skip to the carrying position.

NOTE: If the handle is released when in the DUMP or RETURN position it will automatically return to the HOLD position and the motion of the skip will cease. In this way the speed at which the load is deposited can be finely controlled.



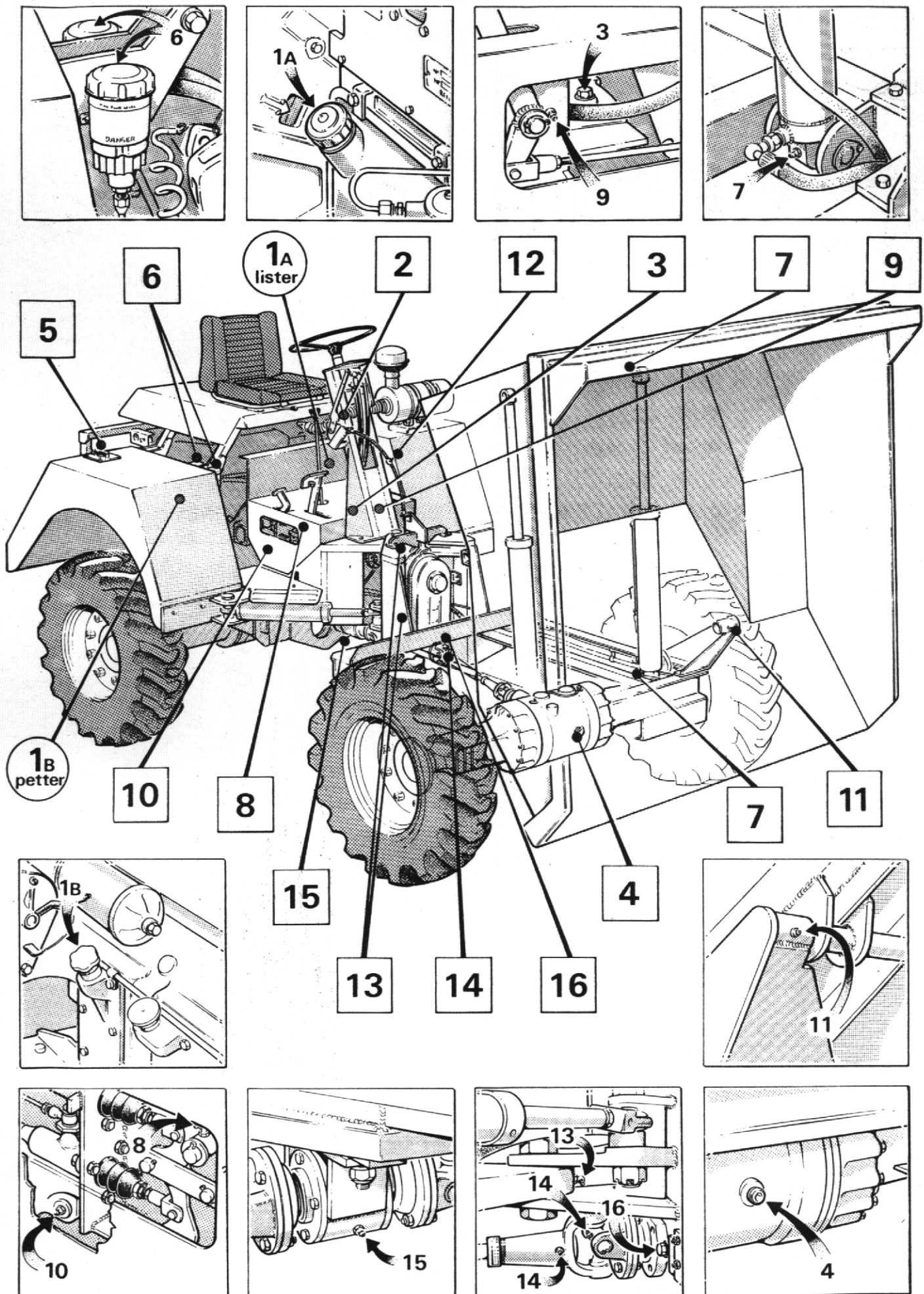


FIG. 5

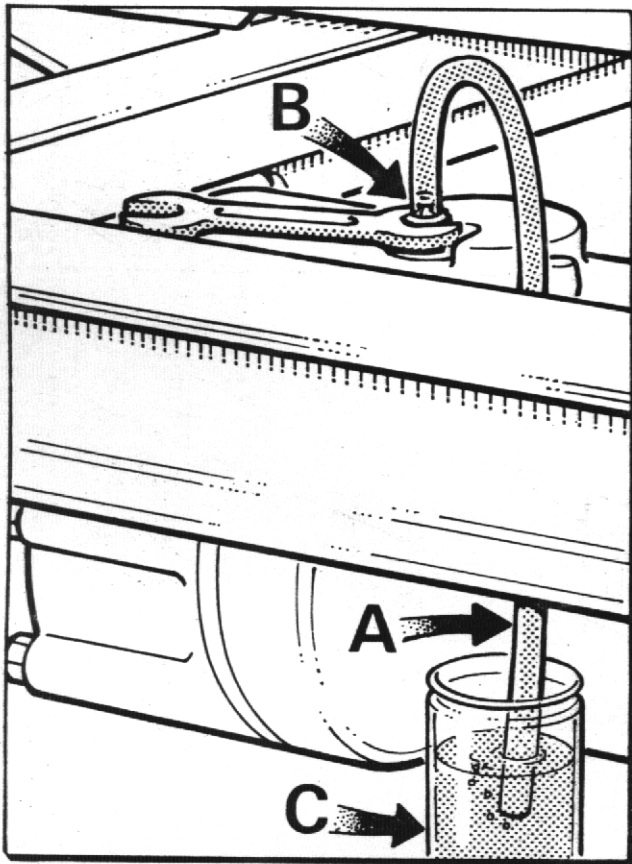


FIG. 6

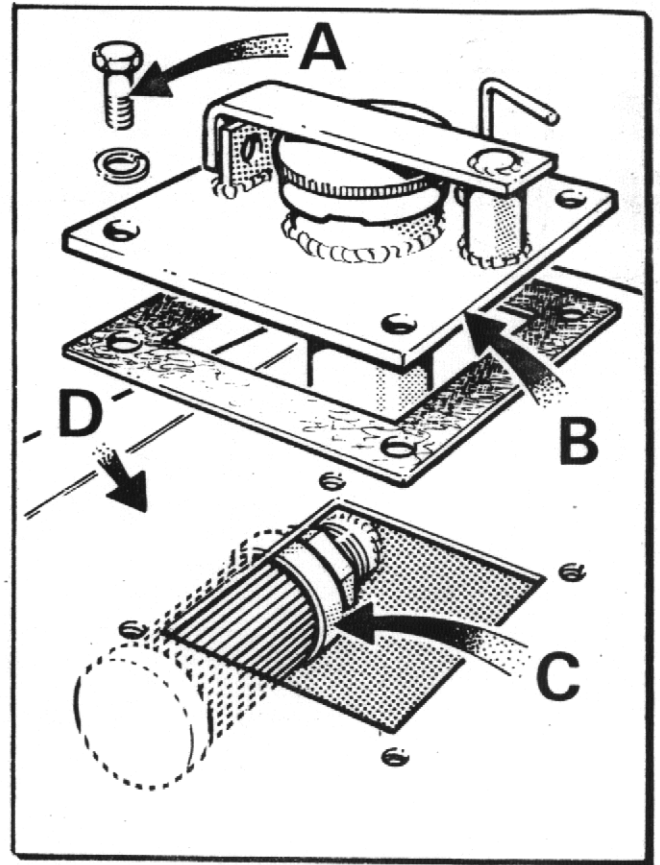
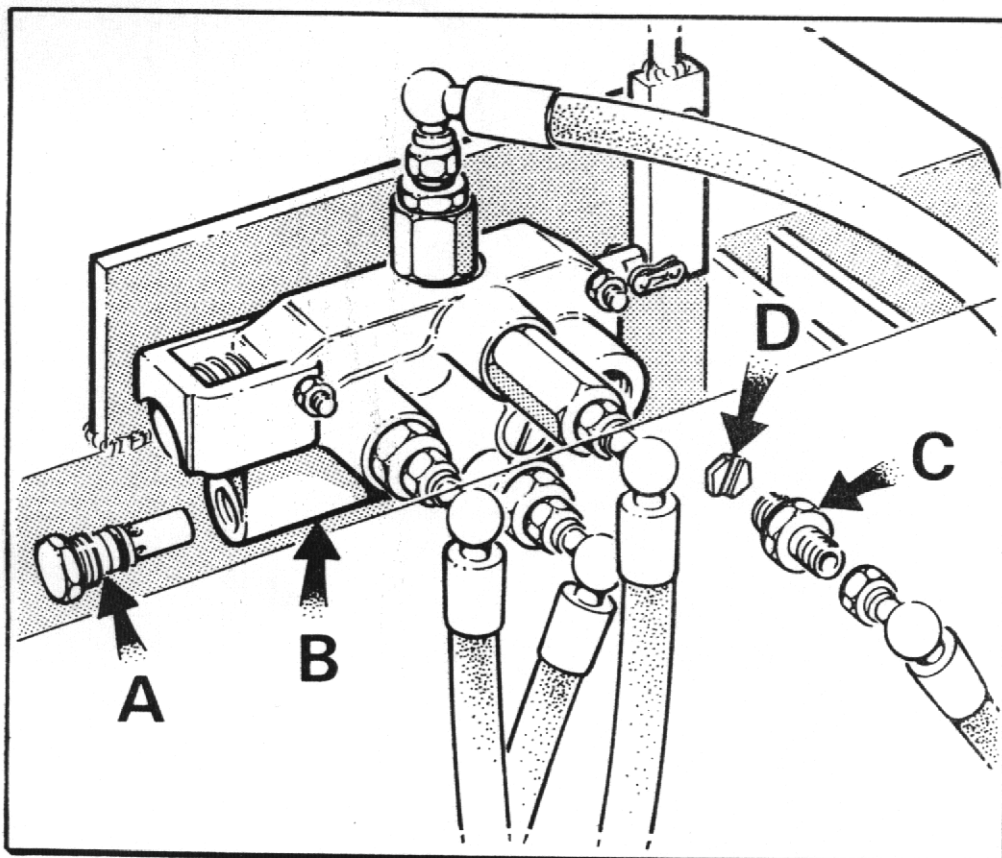


FIG. 7



TP 245

FIG. 8

Brake System

The brake system is designed to require the minimum of maintenance, and, providing hydraulic fluid in the reservoirs is not allowed to fall below the recommended level, no defects should normally occur. Fluid loss must be supplemented by topping up the reservoirs with Brake fluid that conforms to B.S. SAE J 1703. If air is present in the system, it will be indicated by sluggish response of the brakes and by spongy action of the brake pedal. This may be due to air being introduced at a loose joint or by the reservoir fluid not being maintained at the correct level. These defects must be remedied immediately and the complete system bled.

To bleed the system proceed as follows:—

(See Fig. 6)

1. Check that all connections are tight and all bleed screws are closed.
2. Fill the reservoirs with Brake fluid.
3. Attach bleeder tube (A) to one of the bleed screws (B) and immerse the other end in a small quantity of brake fluid contained in a glass jar (C). Slacken the bleed screw and operate the brake pedal up and down through its full stroke until the fluid pumped into the jar contains no air bubbles. Hold down the pedal and close the bleed screw. Remove bleeder tube and release the pedal.
4. Repeat on the other bleed screw completing one axle and then passing on to the other.
5. Continue until all air has been bled from the system.
6. Lock all bleed screws and top up the reservoirs to the correct level.
7. Apply normal working load on the brake pedal for two or three minutes and examine the entire system for leaks.

- NOTES: 1. It is advisable to bleed the system in this order — Right hand front, Left hand front, Left hand rear then Right hand rear. This ensures the longest line is bled first.
2. During the entire operation it is essential that the reservoir levels are kept topped up to prevent further air from being drawn into the system. Only use new fluid for topping up.

Main Hydraulic System

The main hydraulic system controls the dumper steering and the dumping and return of the skip. If the skip fails to operate or does so extremely slowly, carry out the following procedures until the fault is rectified.

1. Check that the hydraulic tank is full of oil.

(See Fig. 7)

2. a) Remove four setscrews (A) securing filler cap assembly and remove assembly.
b) Unscrew suction filter (C) from inside tank (D) and wash in white spirit. Dry with moisture-free compressed air.
c) Replace suction filter and filler cap assembly.
Note:— If suction filter cannot be thoroughly cleaned, fit a new one.
3. Check that hydraulic pressure is correct.
a) Fit a 2000 p.s.i. gauge into the hydraulic line to the base of the rams.
b) Operate control lever to dump skip and check that the pressure reading on the gauge is 1750 p.s.i. when the ram is fully extended and the relief valve is 'blowing'.

(See Fig. 8)

4. Remove relief valve cartridge (A) (hexagon head) from end of control valve (B) opposite to control lever and replace with a new one.
5. Remove hose adaptor (C) from control valve, remove hexagonal orifice plate (D) and wash in white spirit. Dry using moisture-free compressed air. DO NOT poke wire etc. into the orifice. Re-fit plate and hose adaptor with slot of orifice plate facing outwards.

If all of these procedures fail to correct the fault contact your local Winget agent.

Periodically check the hose between the pump and the tank to ensure that it is not deformed. Any deformation in the hose may result in a restricted flow and damage to the pump.

IMPORTANT: On no account should the steering valve be dismantled. Should it require attention, remove it complete and return to the factory.

RECOMMENDED LUBRICATING OILS

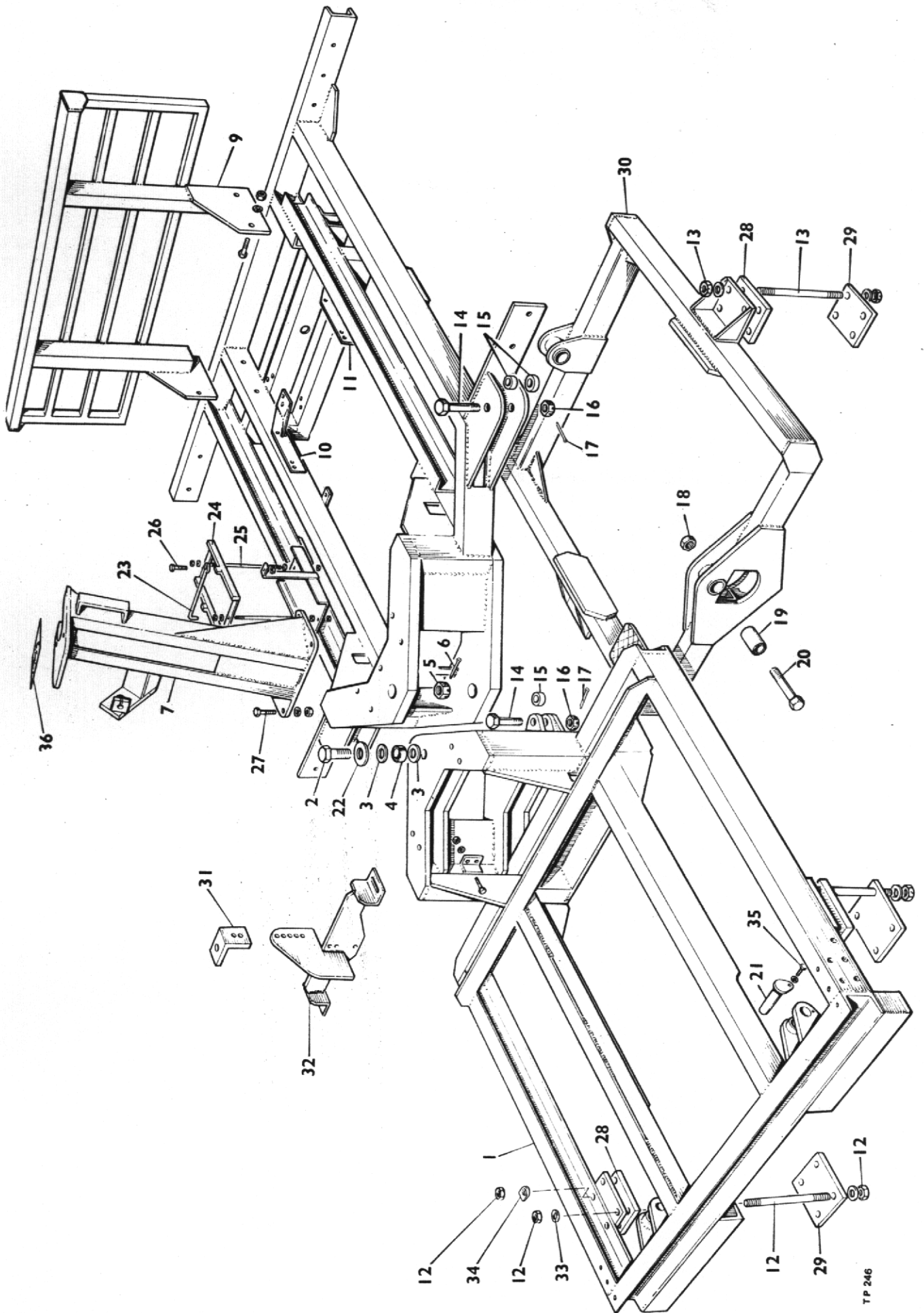
COMPANY	ENGINE	DRIVE AXLE	TRANSFER BOX	GEARBOX	WHEEL BEARINGS & OTHER GREASE POINTS	HYDRAULIC SYSTEM
(U.K.) ESSO (Overseas)	ESSOLUBE HDX 20W ESSOLUBE HDX 30 ESSOLUBE HDX 20W ESSOLUBE HDX 10W	TORQUE FLUID 62	GEAR OIL GP 90/140 GEAR OIL GP 140 GEAR OIL GP 90/140 GEAR OIL GP 80	ESSOLUBE HDX 30 ESSOLUBE HDX 30	BEACON 2 BEACON 2	NUTO H44 NUTO H54 NUTO H44 NUTO H40
(U.K.) CASTROL (Overseas)	DEUSOL CRI 20 DEUSOL CRI 30 DEUSOL CRI 20 DEUSOL CRI 10	AGRICASTROL AS AGRICASTROL AS SPECIAL	DEUSOL EP 90 DEUSOL GEAR EP 140 DEUSOL GEAR EP 90 DEUSOL GEAR EP 80	DEUSOL CRI 30 DEUSOL CRI 30	CASTROL SPHEEROL APT 2 CASTROL SPHEEROL APT 2	CASTROL HYSPIN AWS 32
(U.K.) SHELL (Overseas)	ROTELLA SX OIL 20/20W ROTELLA SX OIL 30 ROTELLA SX OIL 20/20W ROTELLA SX OIL 10W		SPIRAX 90 EP SPIRAX 140 EP SPIRAX 90 EP SPIRAX 80 EP	ROTELLA SX OIL 30 ROTELLA SX OIL 30	RETINAX A RETINAX A	TELLUS OIL 27
(U.K.) BP (Overseas)	VANELLUS 20 VANELLUS 30 VANELLUS 20 VANELLUS 10W		GEAR OIL SAE 90 EP GEAR OIL SAE 140 EP GEAR OIL SAE 90 EP GEAR OIL SAE 80 EP	VANELLUS 30 VANELLUS 30	ENERGREASE L2 ENERGREASE L2	ENERGOL HLP 65
(U.K.) MOBIL (Overseas)	DELVAC 1220 DELVAC 1230 DELVAC 1220 DELVAC 1210 DELVAC SPECIAL 10W-30	MOBILFLUID 422	MOBILUBE HD 90 MOBILUBE GX 90 MOBILUBE HD 140 MOBILUBE GX 140 MOBILUBE HD 90 MOBILUBE GX 90 MOBILUBE HD 80 MOBILUBE GX 80	DELVAC 1230 DELVAC 1230	MOBILGREASE MP MOBILGREASE SUPER	DTE 24
(U.K.) WALKERS CENTURY (Overseas)	CENTLUBE HD 20 CENTLUBE HD 30 CENTLUBE HD 20 CENTLUBE HD 10		CENTURY EP 90 CENTURY EP 140 CENTURY EP 90 CENTURY EP 80	CENTLUBE HD 30 CENTLUBE HD 30	REGULUS A2 REGULUS A2	CENTURY PWL A HYD. OIL CENTURY PWL A HYD. OIL

IN THE UNLIKELY EVENT OF THE ABOVE OILS NOT BEING AVAILABLE
EQUIVALENT OILS SUPPLIED BY A REPUTABLE MANUFACTURER MAY BE USED.

SPARE PARTS SECTION

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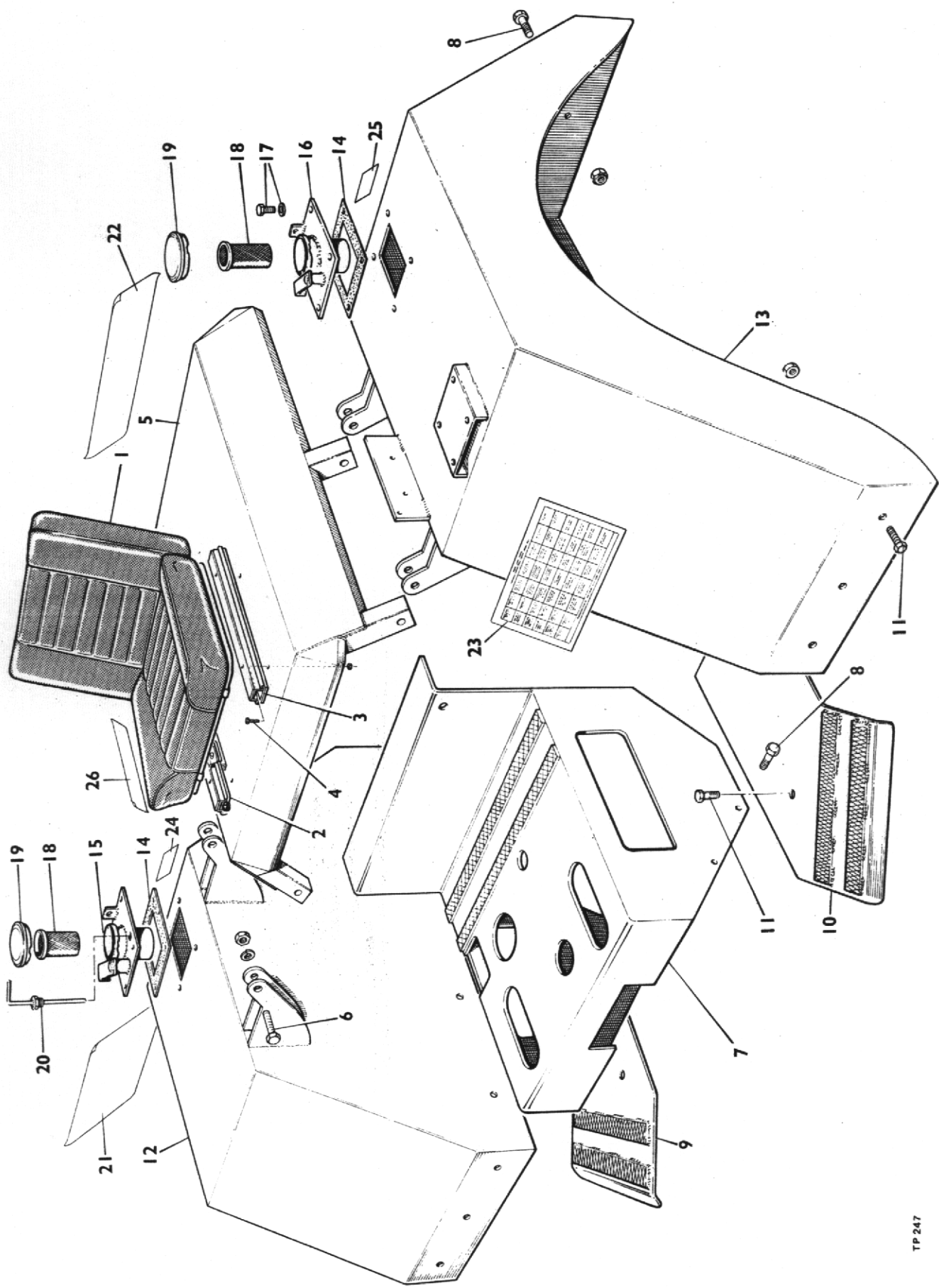
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CHASSIS

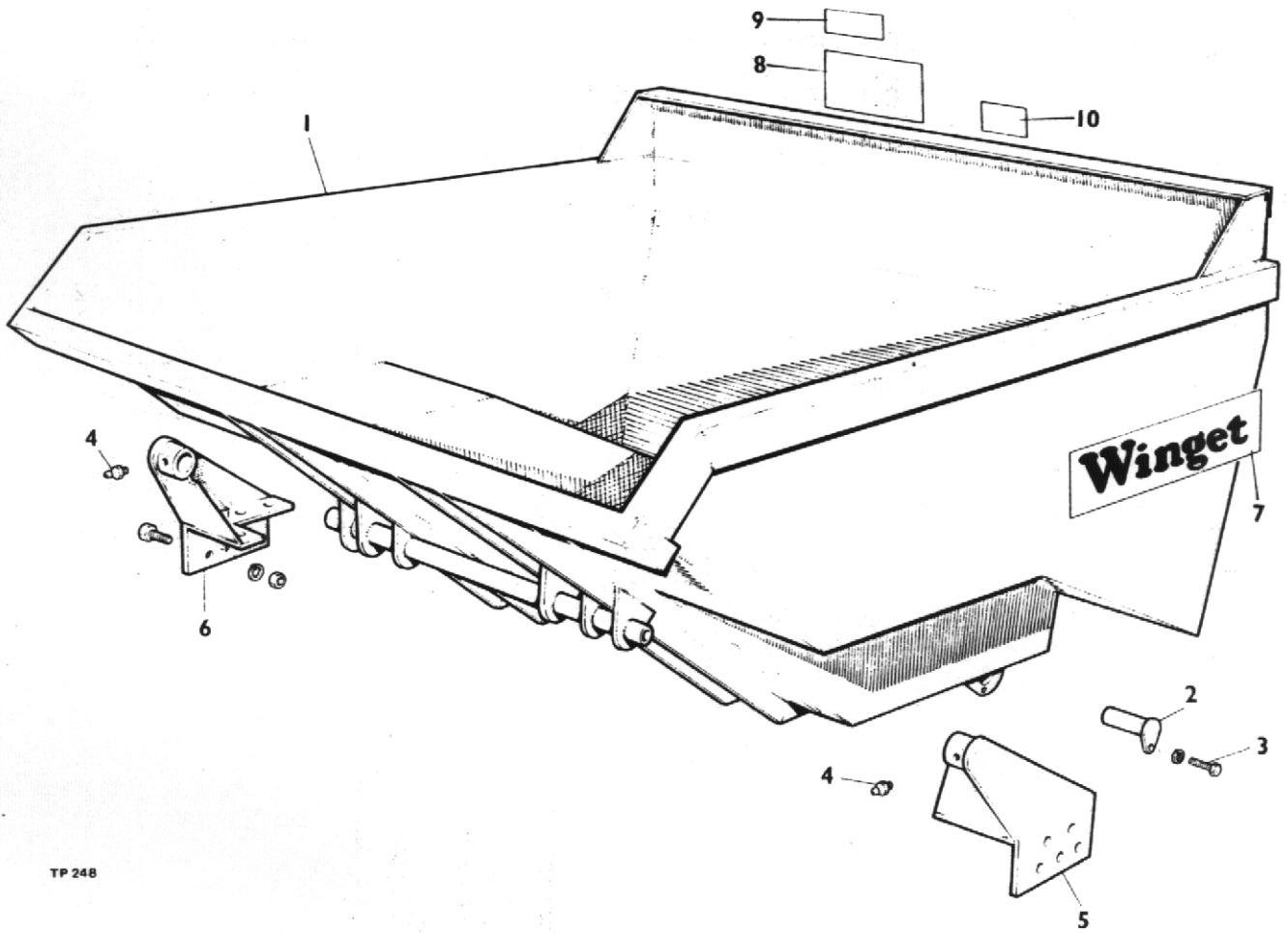
Item No.	Part No.	Description	Qty
1	4-60-344	Front Chassis	1
2	4-60-103	Centre Pivot Bolts	2
3	ESE 199	Centre Pivot Spacer	4
4	4-60-214	Centre Pivot Bearing	2
5	4-60-171	Centre Pivot Nut	2
6		Split Pin 3/16" x 3" Long	2
7	4-60-120	Steering Column	1
8	4-60-343	Rear Chassis	1
9	4-60-131	Rear Frame	1
10	4-60-187	R.H. Rear Engine Mounting Bracket (Petter)	1
11	4-60-188	L.H. Rear Engine Mounting Bracket (Petter)	1
12	4-60-341	Axle Stud M20 x 250mm long & Nuts	8
13	4-60-340	Axle Stud M20 x 230mm Long & Nuts	8
14	4-60-104	Steering Ram Bolt	4
15	4-60-112	Steering Ram Bolt Spacer	6
16	4-60-172	Steering Ram Bolt Nut	4
17		Split Pin 3/16" x 2 1/2" Long	4
18		Nut M24	2
19	MH 5236	Silentbloc Bush	2
20		Bolt, M24 x 127mm long	2
21	4-35-178	Ram Pin	2
22	4-60-240	Washer	4
23	4-60-326	Battery Lock Bar	1
24	ESE 178	Battery Clamp	1
25	ESE 179-4	Battery Rod and Nuts	2
26		Bolt M10 x 25mm & Nut	1
27		Bolt 3/8" UNF x 2 1/2" long & Nut	4
28	4-60-345	Axle Spacer	4
29	ESE 153	Axle Clamp Plate	4
30	4-60-319	Articulating Frame	1
31	4-60-256-4	Transmission Brake Cable Bracket	1
32	4-60-256	Transmission Brake Bracket	1
33		Washer 3/4" dia	28
34		Taper Washer 3/4" dia	4
35		Bolt M8 x 25mm long	2
36	4-60-210	Label - Gear Positions	1

8307AA
 M20 x 250mm
 NUT 7357
 WASH. 267310



MUDWINGS AND COVERS

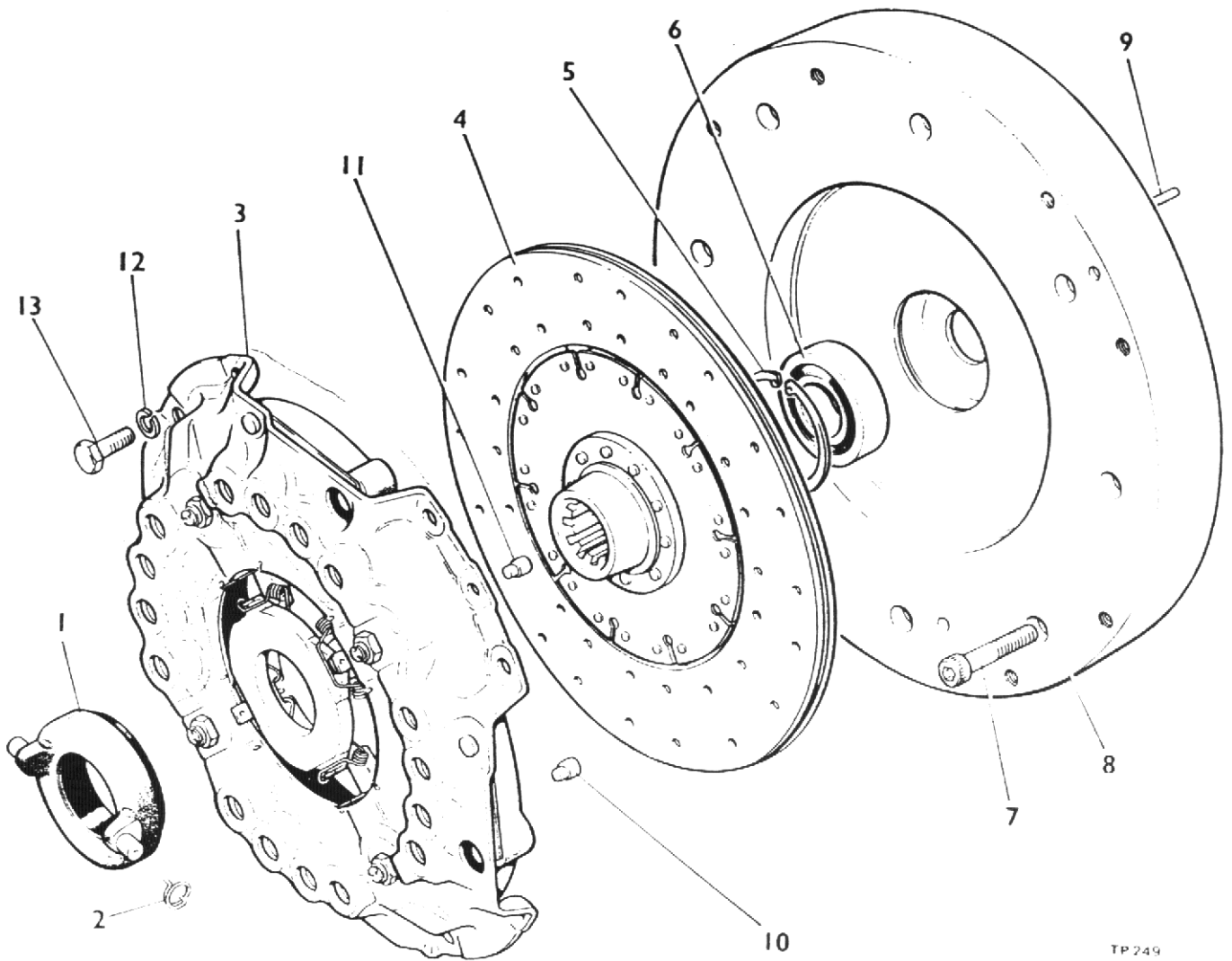
Item No.	Part No.	Description	Qty
1	FSE 145	Seat	1
2	56876	Seat Slide R.H.	1
3	81988	Seat Slide L.H.	1
4		Bolt M8 x 20mm long & Nut	8
5	4-60-323	Engine Cover	1
6		Bolt M12 x 65mm long & Nut	4
7	4-60-322	Gearbox Cover	1
8		Bolt M10 x 25mm long & Nut	18
9	4-60-117	Footplate R.H.	1
10	4-60-118	Footplate L.H.	1
11		Bolt M10 x 35mm long & Nut	12
12	4-60-122	Hydraulic Tank & R.H. Mudwing	1
13	4-60-121	Fuel Tank & LH Mudwing	1
14	5ST 18 B	Gasket	2
15	4-60-206	Tank Filler Assembly R.H.	1
16	4-60-200	Tank Filler Assembly L.H.	1
17		Bolt 5/16" UNF x 3/4" long & Springwasher	8
18	P.1263-3	Filter	2
19	P.2792	Cap	2
20	4-60-226	Dipstick (Hydraulic Oil)	1
21	DM 210	Label - Machine Identification & Payload	1
22	DM 154	Label - Winget	1
23	DM 196	Label - Recommended Lubricants	1
24	4-60-126-2	Label - Hydraulic Oil	1
25	4-60-126-1	Label - Diesel Fuel	1
26	4-60-233-1	Label - Negative Earth (Lister)	1
	4-60-233-2	Label - Positive Earth (Petter)	1



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SKIP

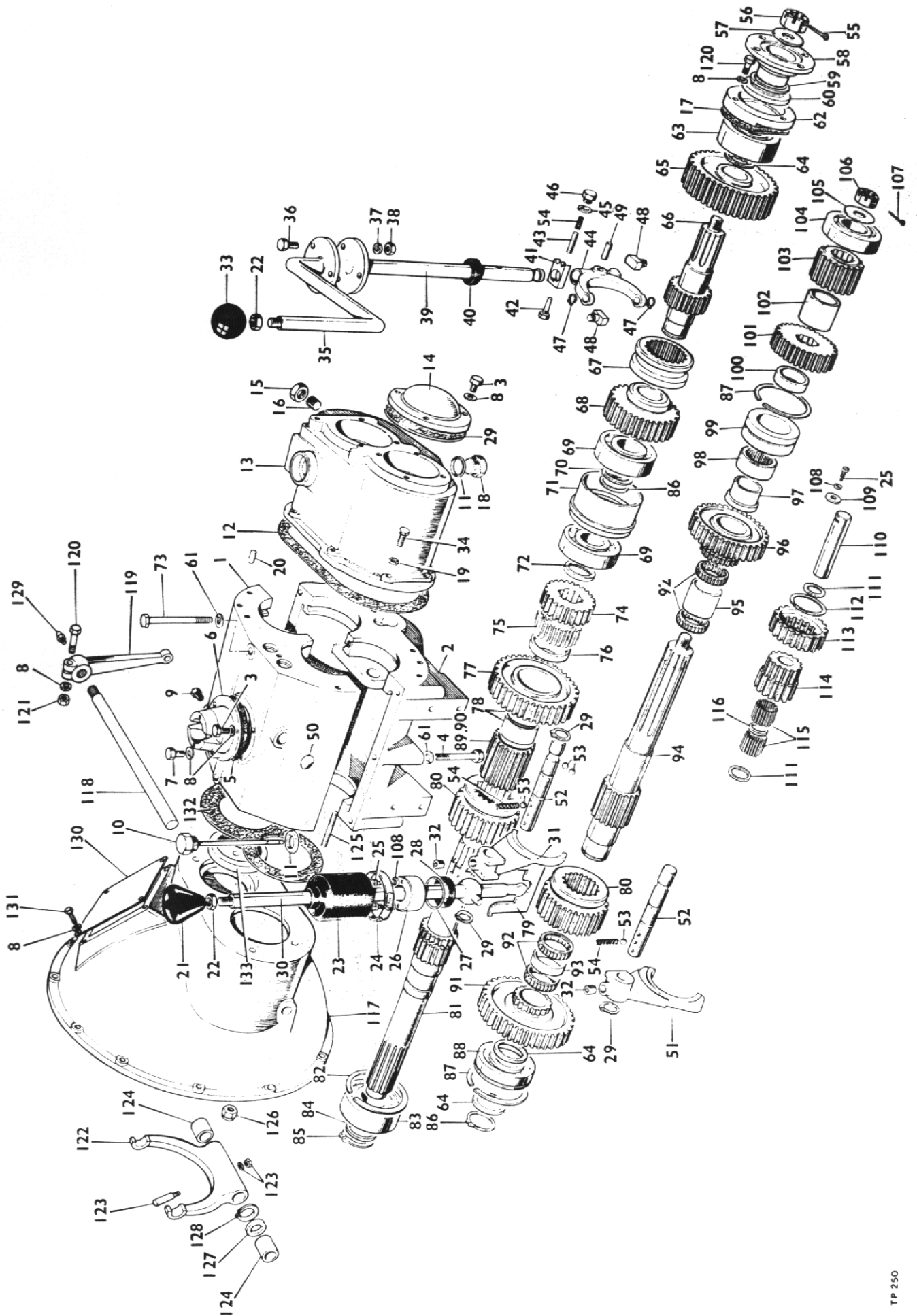
Item No.	Part No.	Description	Qty.
1	4-60-108	Skip Assembly	1
2	4-35-226	Ram Pin	2
3		5/16" UNF Bolt x 3/4" Long	2
4	5ST.100	Grease Nipple	2
5	4-60-106	Skip Mounting Bracket (L.H.)	1
6	4-60-105	Skip Mounting Bracket (R.H.)	1
7	DM 154	Label - Winget	2
8	DM 180	Label - Dumper Safety	1
9	DM 157	Label - Warning	1
10	DM 106	Label - Handbrake	1



TP249

CLUTCH ASSEMBLY 12"

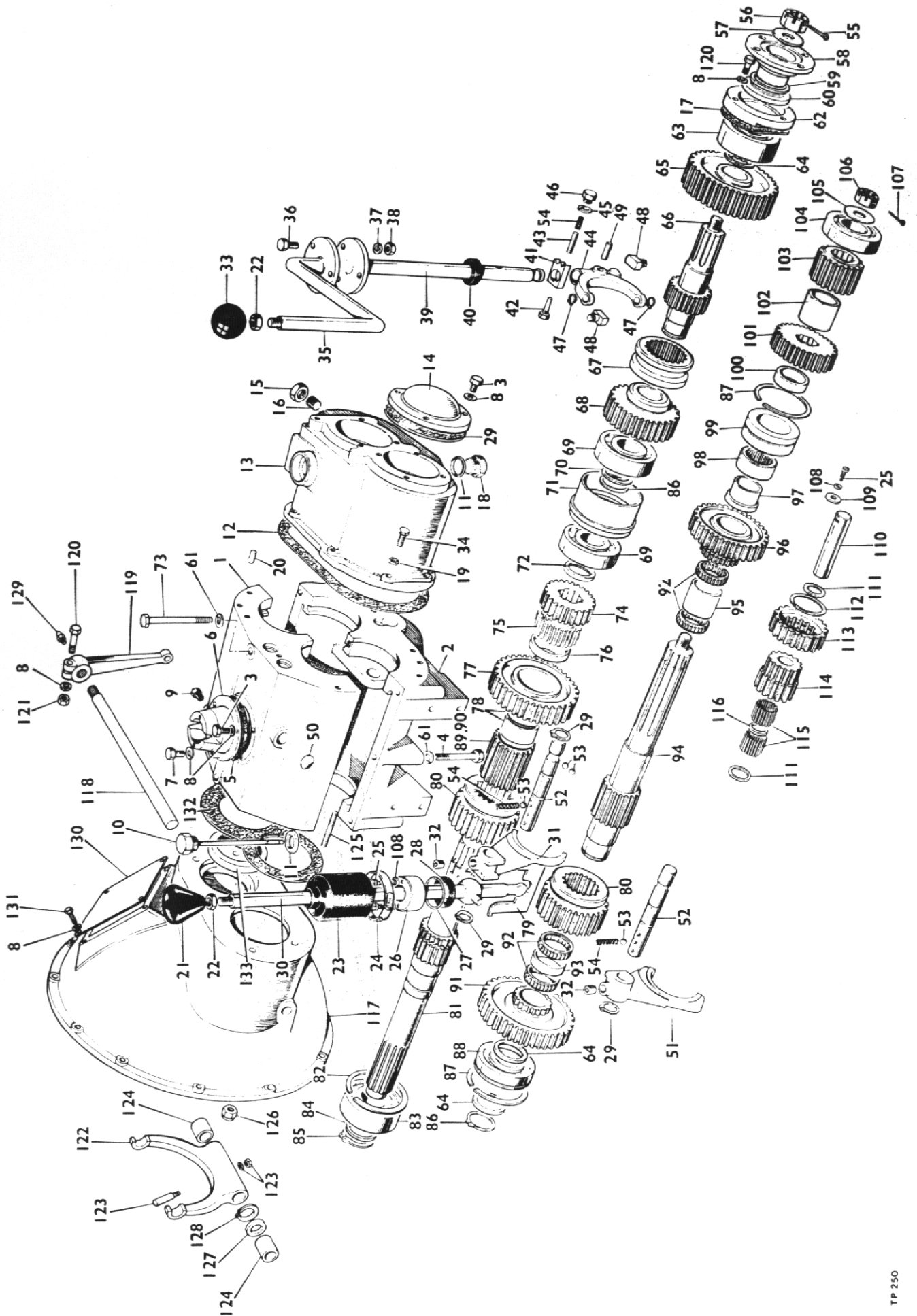
Item No.	Part No.	Description	Qty.
1	10579A02	Clutch Release Bearing	1
2	10579A0101	Retainer Spring	2
3	10597A03	Cover Assembly	1
4	10598A04	Drive Plate	1
5	130052MM	Circlip	1
6	88S15D	Bearing	1
7	287S04H	Capscrew (Petter) 3/8"x2"	8
8	CM2514	Flywheel Assembly (Petter)	1
9		Dowel 3/8" Dia (Petter)	1
10	CM2529	Dowel 3/8"x5/16" Dia (Petter)	1
11	CM2530	Dowel 3/8"x1/4" Dia (Petter)	1
12	41S05	Washer Spring 3/8"	8
13	28S03D	Screw Set 3/8"UNFx3/4"	8
	10948A06	Clutch Kit (comprises of items 1, 2, 3 & 4)	1



CM15-6 GEARBOX

30/02A01

Item No.	Part No.	Description	Qty.
1	CM.2481	Gearcase - Upper Half	1
2	CM.2480	Gearcase - Lower Half	1
3	USF.31	Bolt	6
4	UBF.153	Bolt - Gearcase	6
5	CM.2074	Joint - Top Cover	1
6	CM.2098	Top Cover	1
7	UBF.91	Dowel Bolt - Top Cover	1
8	W.112	Spring Washer	16
9	CM.2106	Breather	1
10	CM.2510	Dipstick	1
11	CP.1068	Washer	3
12	CM.2508	Joint	1
13	CM.2496	Transfer Case	1
14	CM.2329	End Cover	1
15	N.113	Lock Nut - Thin	1
16	CP.1081	Grubscrew	1
17	CM.2073	Gasket	1
18	CP.1189	Drain Plug	2
19	W.113	Washer	8
20	CM.2064	Dowel	2
21	CM.2607	Knob	1
22	UN.512	Lock Nut	2
23	CM.2197	Rubber Cover - Gear Lever	1
24	CM.2198	Clip	1
25	CM.2177	Screw - Cheese Head	3
26	CM.2163	Felt Washer Retainer	1
27	CM.2196	Spring	1
28	CM.2162	Felt Washer	1
29	CM.2605	Gasket	1
30	CM.2513S/A	Gear Lever	1
31	CM.2288	Sel Fork 3rd. and Reverse	1
32	CP.1257	Grub Screw	2
33	40M.645	Knob	1
34	USF.52	Setscrew	8
35	4-60-148	Auxiliary Gear Lever Extension	1
36		Bolt 5/16" BSF x 7/8" Long	3
37		Lockwasher 5/16" Dia.	3
38		Nut 5/16" BSF	3
39	CM.2512S/A	Auxiliary Gear Lever	1
40	40M.620	Oil Seal	1
41	40M.617	Detent Plate	1
42	CP.1062	Bolt, Selector	1
43	CM.2509	Plunger	1
44	CM.2663	Selector Fork C/W Items 39, 41 & 42	1
45	HB.129	Shakeproof Washer	1
46	USF.3	Setscrew	1
47	CP.1061	Circlip	2
48	CP.1060	Trunnion, Gear Change	2
49	CP.1092	Spiral Pin	1
50	CM.2113	Sealing Disc	1
51	CM.2287	Sel Fork - 1st. and 2nd.	1
52	CM.2714	Selector Shaft	2



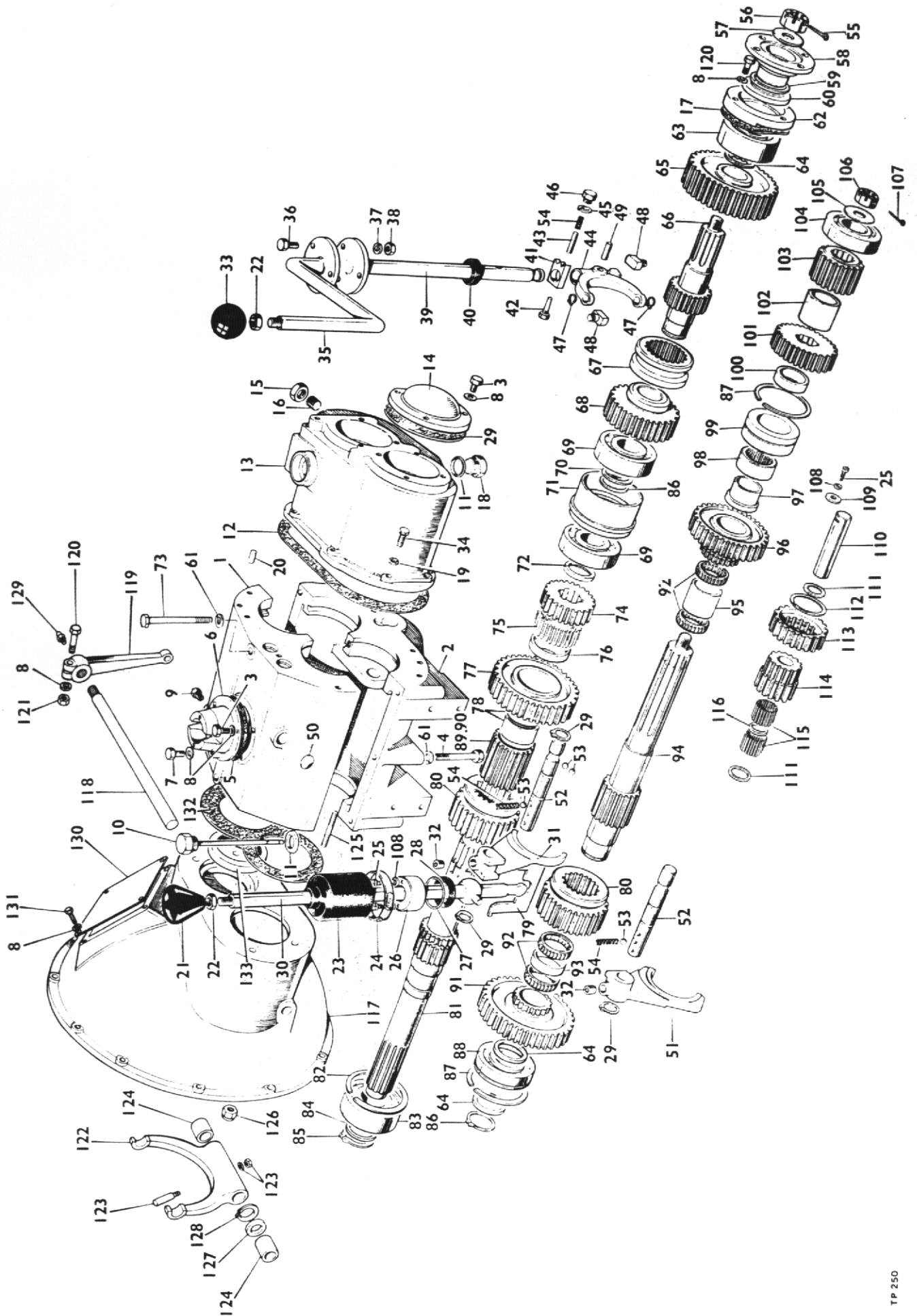
CM15-6 GEARBOX Cont'd.



Item No.	Part No.	Description	Qty.
53	CP.1077	Detent Ball	4
54	CM.2103	Detent Spring	3
55	CP.1106	Split Pin	1
56	UN.503	Slotted Nut	1
57	CM.2488	Washer - Coupling	1
58	40M.589	Coupling C/W Dust Shield	1
59	CM.2537	Dust Shield	1
60	40M.167	Oil Seal	1
61	W.108	Shakeproof Washer	8
62	CM.2331	Bearing Cap	1
63	CM.2325	Bearing - Output Shaft	1
64	CM.2100	Bearing Spacer	3
65	CM.2333	Low Ratio Driven Gear	1
66	CM.2493	Output Shaft	1
67	CM.2334	Operating Sleeve	1
68	CM.2335	High Ratio Driven Gear	1
69	CM.2068	Bearing - Layshaft	2
70	CM.2258	Bearing Spacer	1
71	CM.2246	Bearing Housing	1
72	CM.2712	Spacer	1
73	UBF.213	Bolt	2
74	CM.2024	2nd. Speed Wheel - Main Shaft	1
75	CM.2556	Bearing	30
76	CM.2555	Spacer - Rev. Wheel Main Shaft	1
77	CM.2612	Rev. Wheel - Main Shaft	1
78	CM.2579	Bearing	2
79	CM.2285	Baulk Plate	1
80	CM.2586	Sliding Gear	2
81	CM.2553	Primary Shaft	1
82	CM.2077	Circlip	1
83	CM.2383	Bearing - Input	1
84	CM.2016	Spacer - Input	1
85	CM.2067	Circlip	1
86	CM.2053	Circlip - Layshaft	2
87	CM.2060	Snap Ring	2
88	CM.2052	Bearing - Layshaft Front	1
89	CM.2621	Sliding Gear C/W Bearings	1
90	CM.2453	Sliding Gear	1
91	CM.2611	1st. Speed Wheel	1
92	CM.2315	Bearing	4
93	CM.2213	Spacer - 1st. Speed Wheel	1
94	CM.2450	Layshaft	1
95	CM.2312	Spacer - 2nd. Speed Wheel	1
96	CM.2097	2nd. Speed Wheel - Layshaft	1
97	CM.2248	Bearing Inner Race	1
98	CM.2256	Needle Bearing	1
99	CM.2249	Bearing Housing	1

x 2756
x 2753
x 2752
x 2757

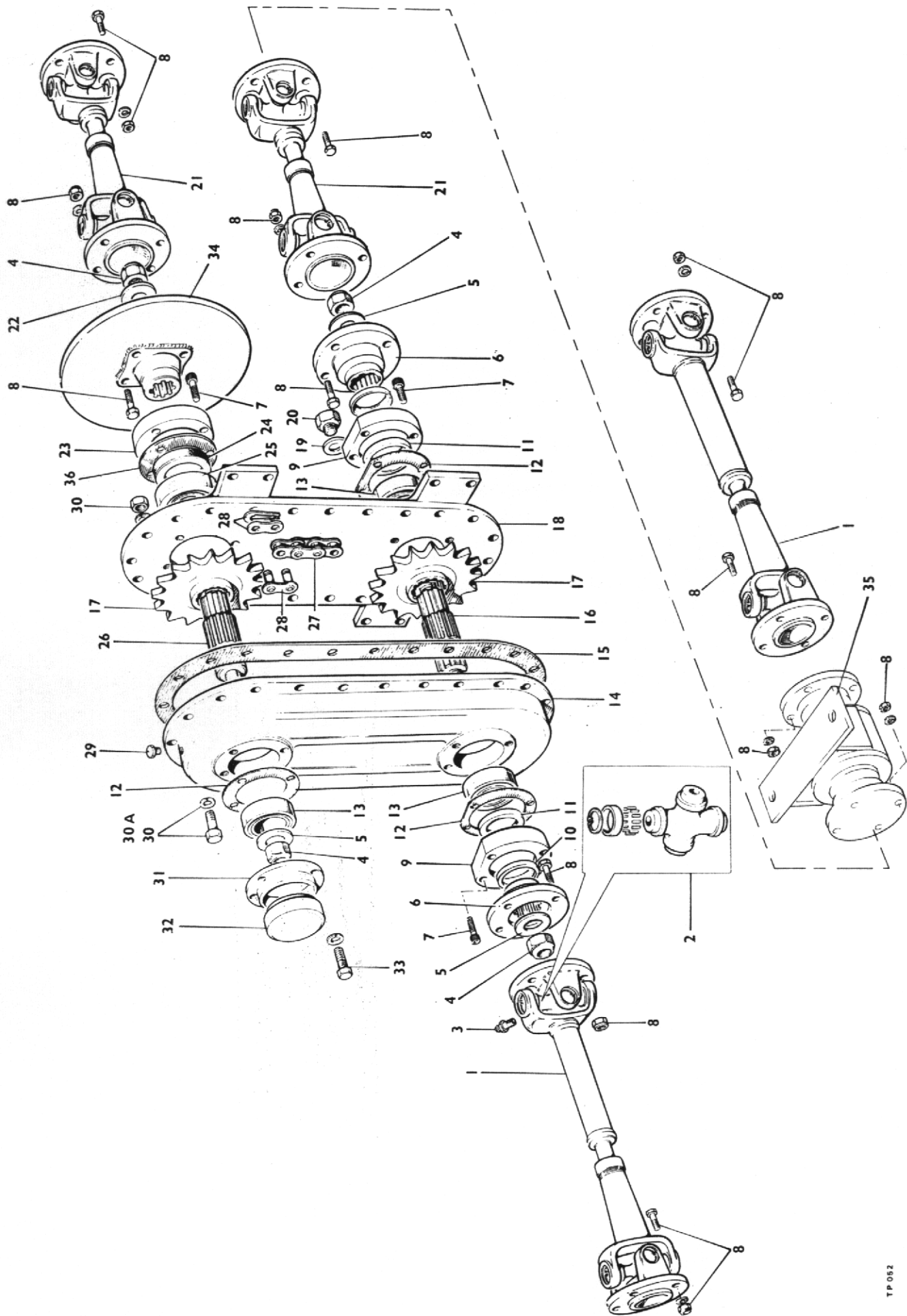
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CM15-6 GEARBOX Cont'd



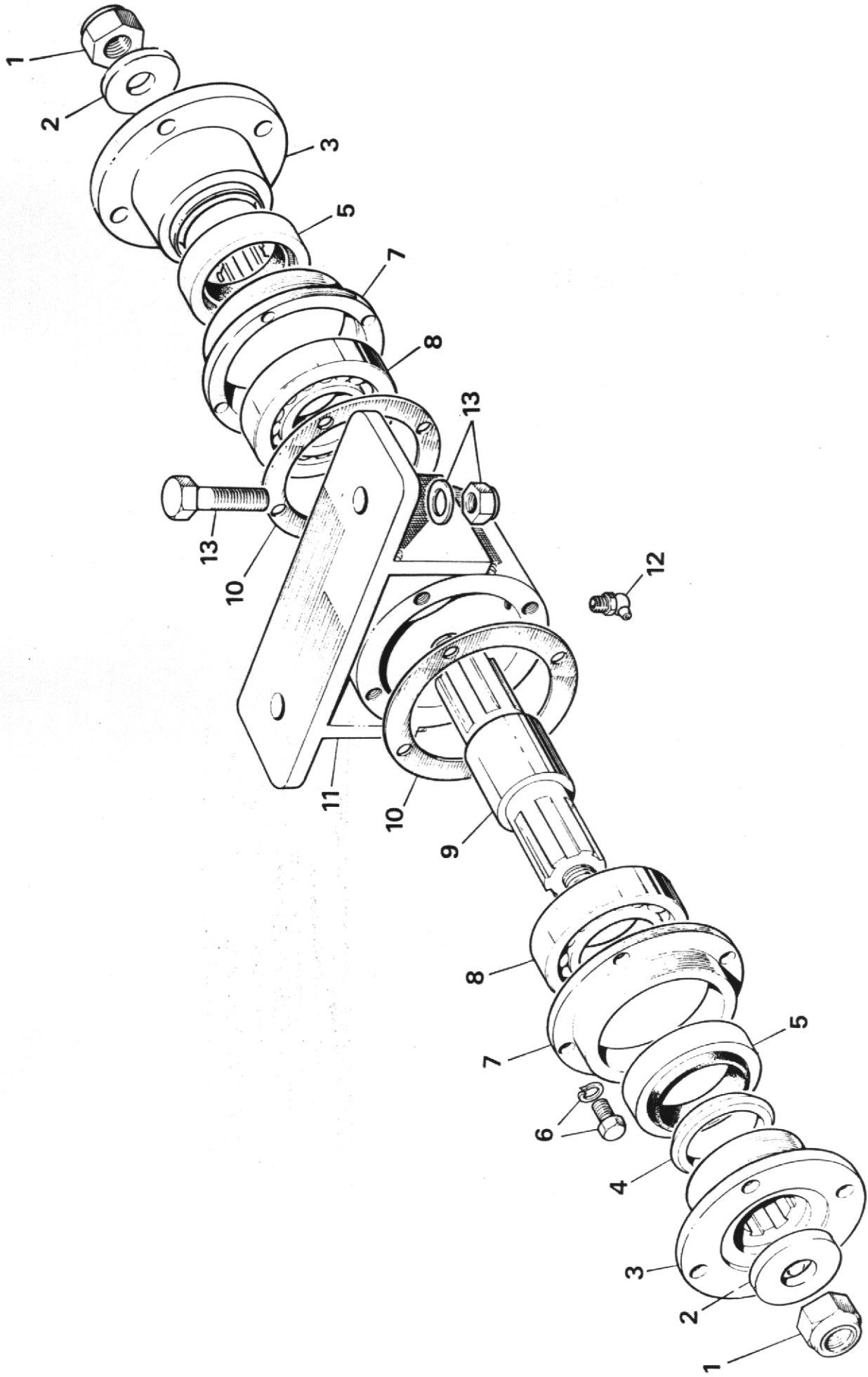
Item No.	Part No.	Description	Qty.
100	CM.2252	Spacer - Layshaft	1
101	CM.2250	High Ratio Drive Gear	1
102	CM.2253	Spacer Layshaft	1
103	CM.2251	Low Ratio Drive Gear	1
104	BK.195	Roller Bearing	1
105	CM.2123	Washer	1
106	UN.502	Slotted Nut	1
107	CP.1004	Split Pin	1
108	W.130	Washer	3
109	CM.2124	Washer - Rev. Spindle	1
110	CM.2584	Reverse Pinion Shaft	1
111	CM.2582	Thrust Washer	2
112	CM.2359	Circlip	1
113	CM.2344	Reverse Cluster Wheel	1
114	CM.2583	Reverse Cluster Pinion	1
115	CM.2580	Rollers - Reverse Cluster	46
116	CM.2581	Spacer - Reverse Cluster	1
117	CM.2360	Clutch Housing	1
118	CM.2386	Clutch Cross Shaft	1
119	CM.2090	Clutch Op. Lever	1
120	UBF.71	Bolt	5
121	UN.501	Nut	
122	CM.2407	Clutch Op. Fork	1
123	CM.2084S/A	Cotter, Nut and Washer S/A	1
124	CM.2387	Bush, Cross Shaft	2
125	CM.2382	Stud, Clutch Housing	6
126	UN.518	Nyloc Nut	6
127	CM.2417	Washer, Cross Shaft	2
128	CP.1099	Circlip	1
129	CP.1069	Grease Nipple	2
130	CM.2474	Inspection Cover	1
131	USF.11	Set Screw - Insp. Cover	4
132	CM.2475	Gasket	1
133	CM.2465	Input Shaft Seal	1



TRANSFER BOX & PROP SHAFTS

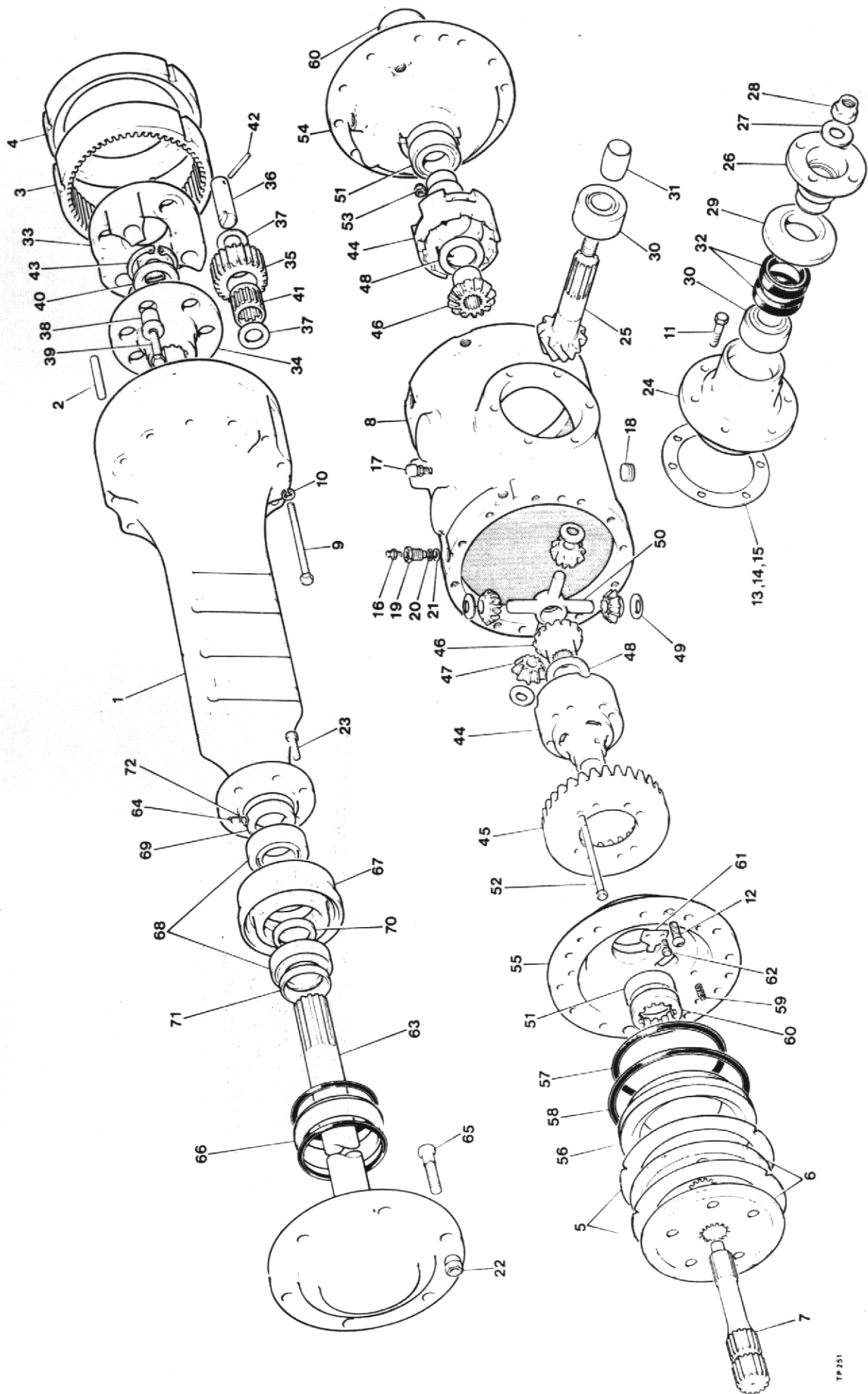
Item No.	Part No.	Description	Qty.
	4-60-272	Transfer Box Complete (with brake disc)	1
1	4-60-277	Prop Shafts to Drive Axles	2
2	K.5.GB.18	Repair Kit	As req'd.
3	94GB.2459	Grease Nipple	8
4	UN.580	Nut	4
5	CP.1264	Washer	3
6	40M.589	Flange (with Dust Shield)	2
7		Capscrew ¼" UNF x 1" Long	12
8	ESE 214	Prop Shaft Bolt 7/16" UNF x 1 1/8" Long & Nut	32
9	CM.2206	Oil Seal Housing	2
10	CM.2537	Dust Shield	2
11	40M.167	Oil Seal	2
12	CM.2073	Gasket	3
13	CM.2068	Bearing	3
14	4-35-96	Main Case	1
15	4-35-20	Joint	1
16	4-60-253	Output Shaft	1
17	4-35-17	19 Tooth Sprocket (Sub Assy)	2
18	4-60-269	Main Cover	1
19	CP.1068	Fibre Washer	1
20	CP.1189	Filler Plug	1
21	1350.YSA	Prop Shafts	2
22	4-60-265	Washer	1
23	4-60-264	Oil Seal Housing	1
24	SP.193	Oil Seal	1
25	40M.713	Bearing	1
26	4-60-262	Input Shaft	1
27	4-35-18	Chain	1
28	4-35-18A	Chain Connecting Link	1
29	CM.2106	Breather	1
30	UBF.71	Housing Screw ¼" UNF x 1¼" Long, two Spring Washers & Nut	16
30A		Housing Screw ¼" UNF x 1½" Long, two Spring Washers & Nut	8
31	40M.622	Bearing Housing	1
32	4-60-263	Bearing Housing Cap	1
33	UBF.31	Bearing Housing Screw ¼" UNF x ¾" Long & Spring Washer ..	4
34	4-60-266	Flange & Brake Disc Assy	1
35	4-60-261	Trunnion (See Page 31)	1
36	40M.712	Gasket	1

276-113



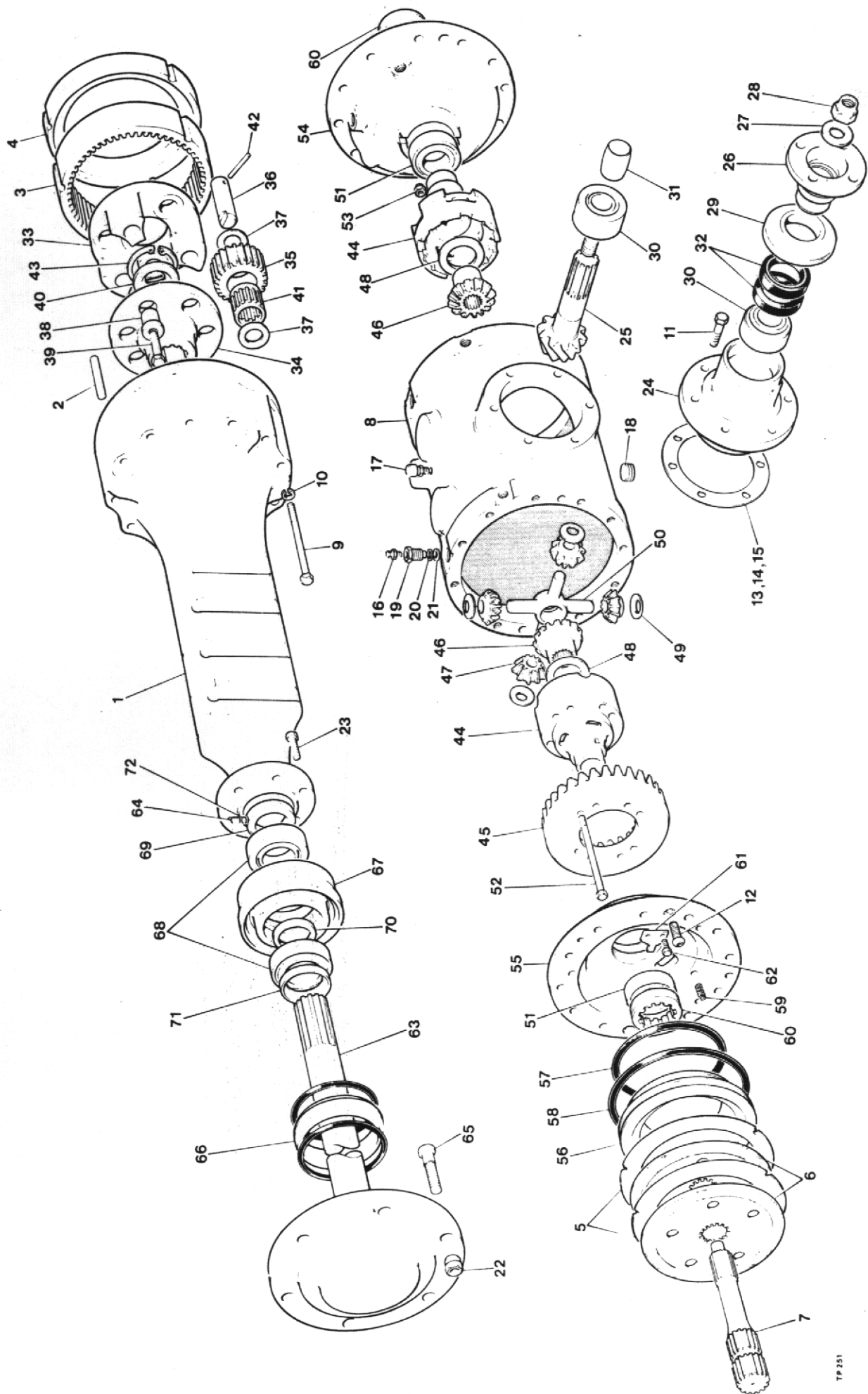
TRUNNION ASSEMBLY

Item No.	Part No.	Description	Qty.
	4-60-261	Trunnion Assembly Complete	1
1	UN.580	Companion Flange Nut, 3/4" UNF Self Locking	2
2	CP.1264	Thick Washer, 3/4" Dia.	2
3	40M.589	Companion Flange C/W Dust Shield	2
4	CM.2537	Dust Shield	2
5	40M.167	Oil Seal	2
6		Housing Bolt 1/4" UNF. x 3/4" Long	8
7	40M.622	Oil Seal Housing	2
8	CM.2068	Bearing	2
9	4-60-251	Shaft	1
10	4-35-20A	Gasket	2
11	4-35-143	Housing	1
12	T.90	Grease Nipple	1
13		Mounting Bolt 5/8" BSF. x 2" Long & Nut	2



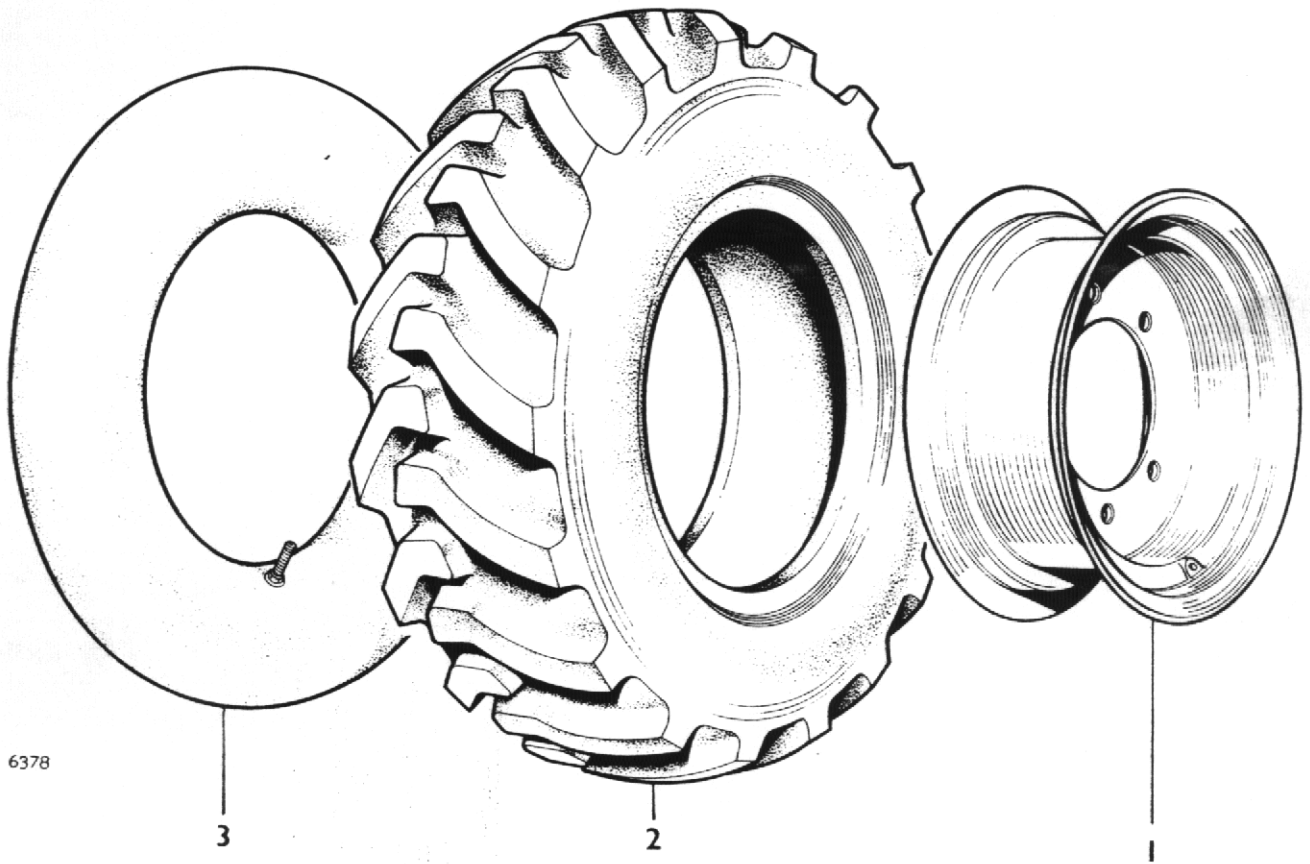
DRIVE AXLE

Item No.	Part No.	Description	Qty.
1	400-0020	Axle Arm	2
2	010-0020	Pin	6
3	420-0070	Annulus	2
4	402-0880	Brake Spacer Plate	2
5	400-0890	Brake Fixed Plate	2
6	400-0750	Oil Immersed Brake Disc	2
7	420-0090	Sun Gear	2
8	402-0011	Main Axle Casing	1
9	004-0060	Bolts - Main Axle Casing	24
10	009-0060	Spring Washers	24
11	012-0060	Hex. Screws	6
12	006-0270	Hex. Socket Button Hd. Screw	4
13	400-2350	Pinion Adjuster Shim	AR
14	400-2290	Pinion Adjuster Shim	AR
15	400-2210	Pinion Adjuster Shim	AR
16	008-0090	Brake Bleed Valve	2
17	008-0070	Relief Valve 1/8 in. BSPT	1
18	008-0020	Hex. Socket BSPT Plug - 3/4 in. BSPT	2
19	400-1070	Brake Pipe Adaptor	4
20	002-0200	'O' Ring	4
21	009-0100	Dowty Washer	4
22	ESE 260	Wheel Nuts	16
23	012-0060	Hex. Screw	16
24	400-2300	Input Pinion Cartridge	1
25	400-2000	Spiral Bevel Pinion	1
26	400-2180	Drive Flange	1
27	400-2190	Drive Flange Washer	1
28	400-2200	Drive Flange Nut	1
29	400-0910	Oil Seal Cover	1
30	001-0070	Pinion Bearing	2
31	400-1050	Pinion Bearing Spacer	1
32	002-0070	Pinion Oil Seal	2
33	400-0060	Planet Carrier	1
34	400-0260	Carrier Drive Flange	1
35	420-0080	Planet Gear	3
36	400-0250	Planet Pins	3
37	400-0270	Planet Thrust Washer	6
38	400-0370	Planet Carrier Bush	3
39	012-0120	Planet Carrier Bolt	3
40	400-1320	Axle Shaft Thrust Spacer	1
41	001-0150	Planet Cage Roller	3
42	010-0030	Spring Dowel	3
43	003-0120	Circlip	1



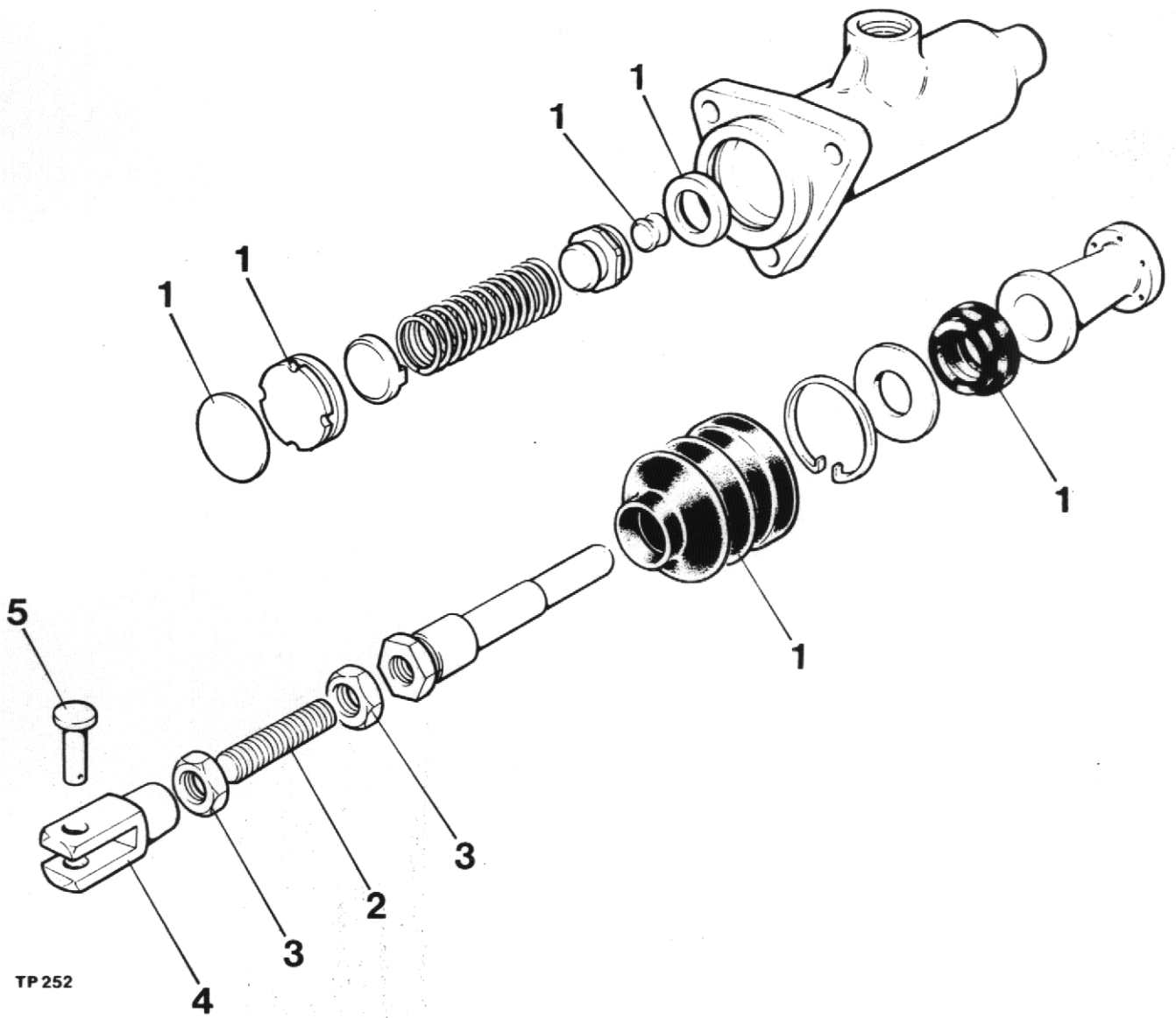
DRIVE AXLE (Cont'd.)

Item No.	Part No.	Description	Qty
44	401-9520	Diff. Case Process Assembly	1
45	400-2010	Spiral Bevel Wheel	1
46	400-2090	Diff. Wheel	2
47	400-2100	Diff. Pinion	4
48	400-2110	Diff. Wheel Thrust Washer	2
49	400-2120	Diff. Pinion Thrust Washer	4
50	400-2130	Diff. Spider	1
51	001-0080	Diff. Bearing	2
52	004-0080	Bolts	8
53	007-0100	Nyloc Nuts	8
54	402-0761	Brake Cylinder (R.H.)	1
55	402-0771	Brake Cylinder (L.H.)	1
56	400-0780	Brake Piston	2
57	002-0080	Piston Oil Seal	2
58	002-0090	Piston Oil Seal	2
59	011-0010	Compression Spring	6
60	400-2150	Bearing Adjusting Nut	2
61	400-2160	Bearing Adjusting Nut - Lock Plate	2
62	012-0010	Screw - Lock Plate	4
63	400-9790	Axle Shaft and Wheel Flange Assembly	2
64	012-0230	Grub Screw M6 x 6mm Long	2
65	400-0450	Wheel Stud	16
66	002-0120	Shaft Oil Seal	2
67	400-0140	Oil Seal Housing	2
68	001-0170	Shaft Bearings	4
69	400-0800	Locking Collar	2
70	400-1670	Bearing Cone Spacer	2
71	400-1610	Axle Shaft Distance Piece	2
72	250-1690	Pellet	2
404		Drive Axle Complete - (2 per m/c)	



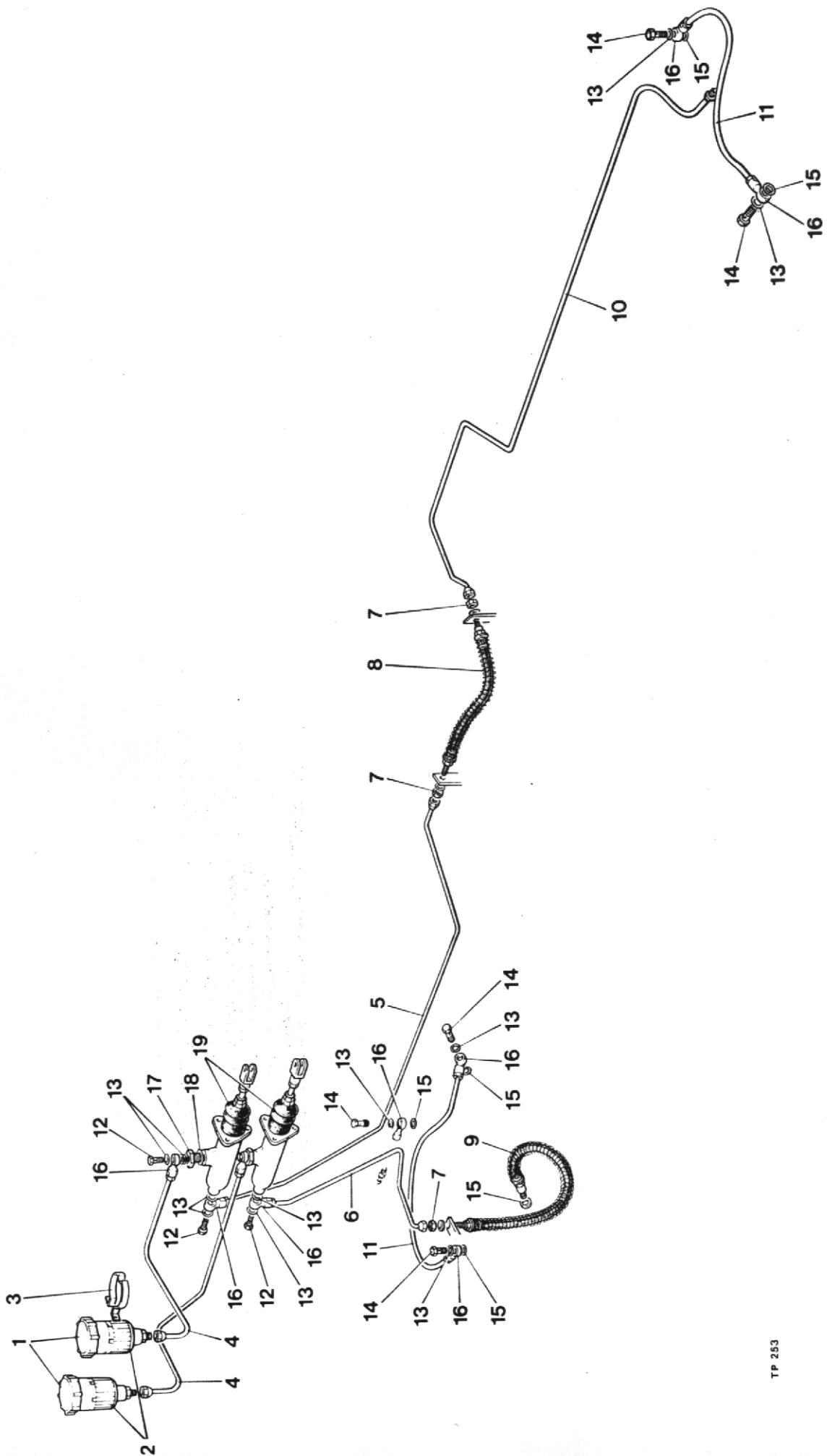
WHEELS AND TYRES

Item No.	Part No.	Description	Qty.
	24S01	L/H Wheel Assembly	2
	24S02	R/H Wheel Assembly	2
1	30183A01	Wheel rim 9 x 18	4
2	20S14	Tyre 12.5 x 18-10 ply	4
3	23S05	Tube 12.5 x 18	4



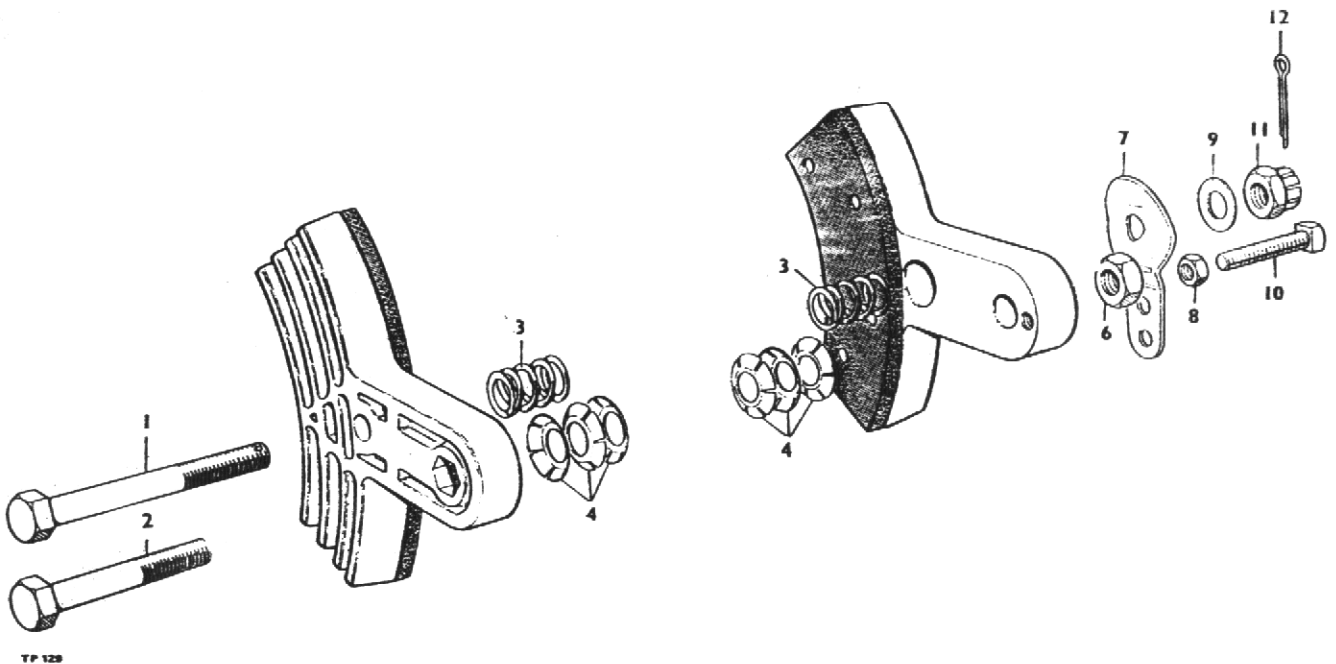
BRAKE MASTER CYLINDER

Item No.	Part No.	Description	Qty.
	22128-3	Master cylinder Assembly (less items 2 to 5 inc.)	2
1	SSB 793	Seal Kit	A/R
2	ESE 189	Threaded Rod	1
3		Nut 7/16" UNF	2
4	4-60-339	Clevis	1
5	FSE 375	Clevis Pin	1



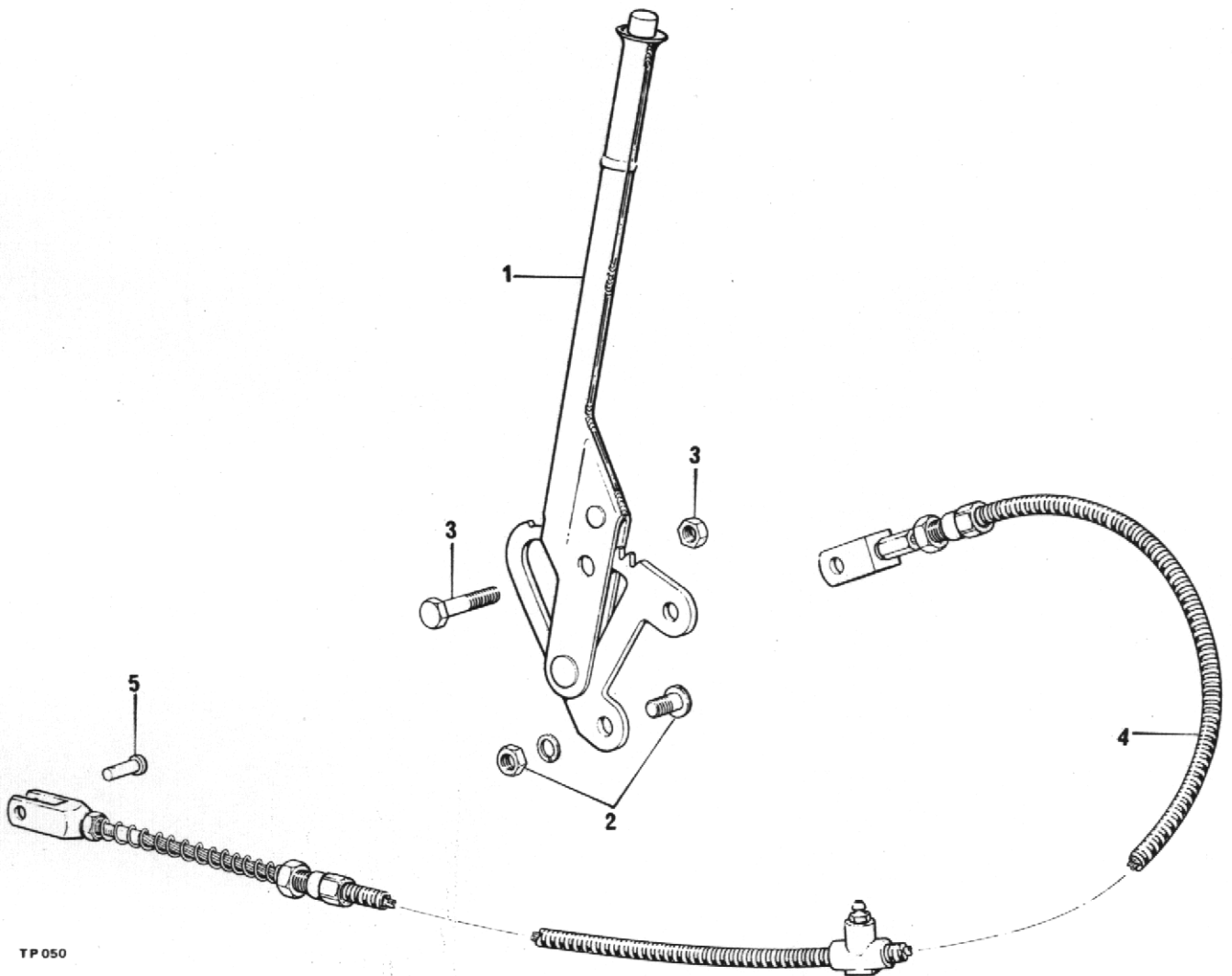
BRAKE PIPES AND FITTINGS

Item No.	Part No.	Description	Qty.
1	64474602	Header Tank Cap	2
2	64046158	Header Tank	2
3	378620	Header Tank Clip	2
4	DM 194-1	Pipe 1/4" dia x 21" long	2
5	DM79-3	Pipe 3/16" dia x 38" long	1
6	DM 79-2	Pipe 3/16" dia x 19" long	1
7	64100050	Thin Nut	3
8	64046115	Flex. Pipe 9 1/2" long	1
9	64047903	Flex. Pipe 11" long	1
10	DM 79-1	Pipe 3/16" x 49" long	1
11	DM 78-16	Pipe 3/16" x 13 1/2" long	2
12	64473063	Banjo Bolt	4
13	378700	Copper Washer	17
14	376102W	Banjo Bolt	5
15	378703	Copper Washer	6
16	64474287	Banjo	9
17	ESE 187	Adaptor	2
18	KL 44532	Copper Washer 3/4" ID x 15/16" OD x 1/16" thick	2
19	22128-3	Master Cylinder	2



CALIPER, parking brake

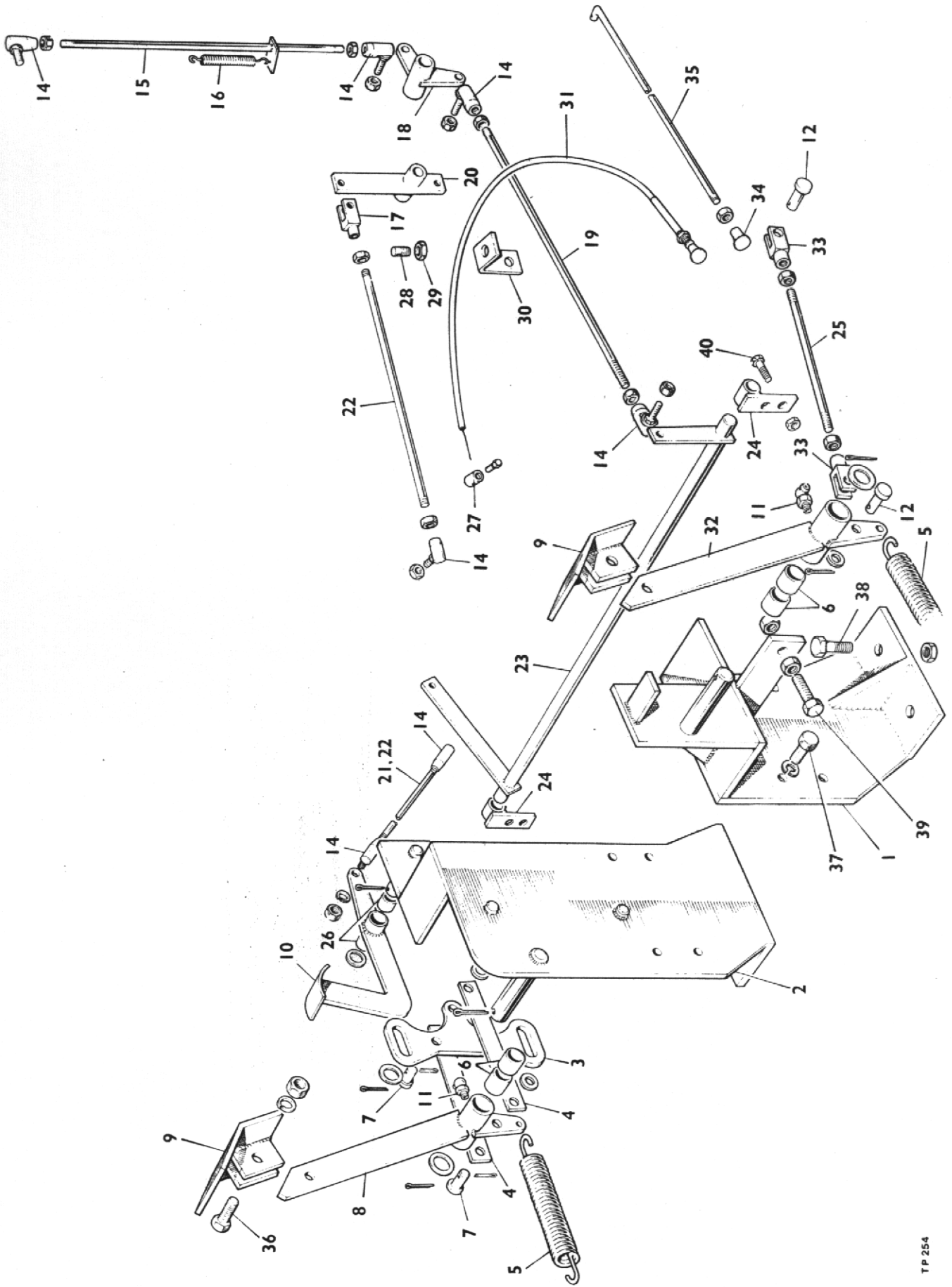
Item	Part no	Description	Qty
1A	10578A01	CALIPER, one pair, assembly	1
1	28S02T	SCREW	1
2	28S02P	SCREW	1
3	10578A0101	SPRING, centring	2
4	10578A0102	WASHER, tension	6
6	9S02	NUT	1
7	10578A0104	CAM	1
8	230S01	NUT, locking	1
9	10578A0105	WASHER	1
10	66S01H	SCREW, set	1
11	227S02	NUT, castle	1
12	44S01C	PIN, cotter	1
13	1072A4	PAD c/w rivets	2



TP050

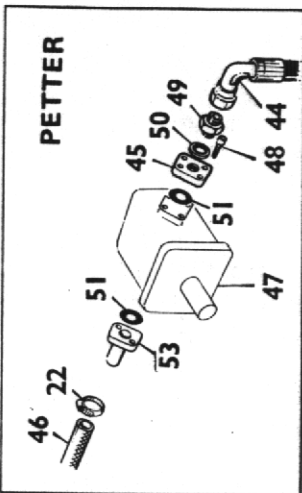
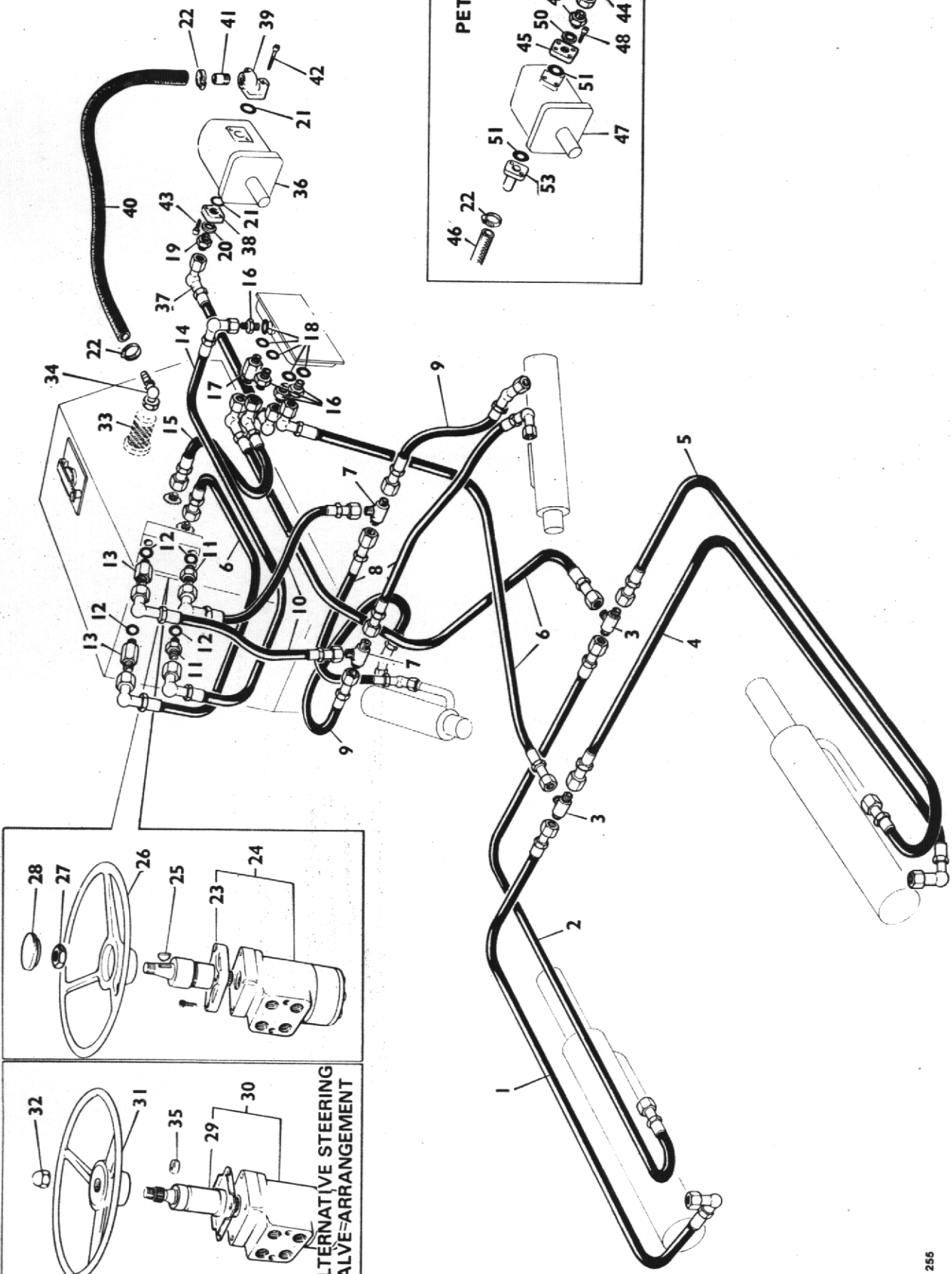
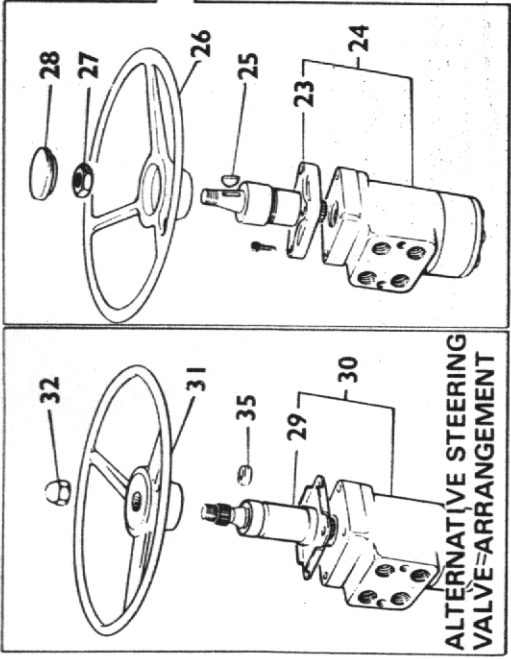
TRANSMISSION HANDBRAKE ASSEMBLY

Item No.	Part No.	Description	Qty.
1	303	Handbrake Assembly	1
2		Mushroom Hd. Bolt, 3/8" BSF x 1" Long & Nut	2
3		Hex. Hd. Bolt, 3/8" BSF x 1 3/4" Long & Nut	1
4	4-60-254	Brake Cable	1
5	4-35-264	Clevis Pin	1



PEDALS AND CONTROLS

Item No.	Part No.	Description	Qty.
1	4-60-169	Gearbox Bracket — L.H.	1
2	4-60-333	Gearbox & Brake Cylinder Bracket — R.H.	1
3	4-60-119	Footbrake Balance Arm	1
4	4-60-193	Footbrake Balance Arm Link	2
5	C173-B	Return Spring	2
6	WB1212	Pedal Bush	4
7	C174XL	Clevis Pin	2
8	4-60-335	Brake Pedal	1
9	4-60-130	Pedal Pad	2
10	4-60-338	Accelerator Pedal	1
11	T90	Grease Nipple — (90°)	2
12	C174X	Clevis Pin	2
13	C174Y	Clevis Pin	1
14	C160B	Accelerator Rod Ball Ends	7
15	C240	Accelerator Rod (Lister)	1
16	C173D	Spring (Lister)	1
17	C174D	Clevis	1
18	4-60-164	Bell Crank (Lister)	1
19	4-60-165	Accelerator Rod	1
20	4-60-237	Accelerator Transfer Lever (Petter)	1
21	4-60-167	Accelerator Rod (Lister)	1
22	4-60-167	Accelerator Rod (Petter)	2
23	4-60-221	Accelerator Transfer Shaft	1
24	4-60-162	Accelerator Transfer Shaft Bracket	2
25	F506B	Clutch Rod	1
26	WB0808	Bush	2
27	4-35-196	Solderless Nipple (Petter)	1
28	4-60-242	Clamp Screw (Petter)	1
29	4-60-241	Hex. Nut 3/8" UNF (Petter)	1
30	4-60-236	Cable Bracket (Petter)	1
31	4-60-239	Engine Stop Control Cable (Petter)	1
32	4-60-128	Clutch Pedal	1
33	C174A	Clevis	2
34	4-60-243	Knob 1/4" UNF (Lister)	1
35	4-60-225	Engine Stop Control Rod (Lister)	1
36		Bolt M10 x 40mm long & Nut	2
37		Bolt 3/8" UNF x 1" long & Springwasher	8
38		Bolt M12 x 40mm long & Nut	4
39		Bolt M10 x 45mm long & 2 Nuts	1
40		Bolt M8 x 25mm long & Nut	4



HYDRAULIC SYSTEM

Item No.	Part No.	Description	Qty.
1	4-60-135	Hose 77" Long ST. - 90°	1
2	4-60-136	Hose 71" Long ST' - ST	1
3	2ST-72-M	Tee	2
4	4-60-137	Hose 61" Long ST' - 90°	1
5	4-60-138	Hose 80" Long ST. - ST	1
6	T63-E	Hose 73" Long ST. - 90°	3
7	4-60-207	Tee	2
8	4-35-108-H	Hose 33½" Long ST. - 90°	2
9	4-60-134	Hose 15" Long ST. - 135°	2
10	4-60-133	Hose 48" Long ST. - 90°	2
11	4-35-40K	Adaptor (Short) 3/8" BSP x ¾" UNF	2
12	2ST-72J	'O' Ring	4
13	4-60-115	Adaptor (Long) 3/8" BSP x ¾" UNF	2
14	4-60-132	Hose 73" Long 90° - 90°	1
15	3SH-60	Hose 51" Long ST. - 90°	1
16	CSE 186	Adaptor 3/8" BSP x 7/8" UNF	4
17	4-60-158	Adaptor (Long) 3/8" BSP x 7/8" J.I.C.	1
18	S9698	'O' Ring	5
19	T14J	Adaptor 3/8" x 3/8" BSP (Lister)	1
20	T14I	Sealing Washer (Lister)	1
21	DH-69A5	'O' Ring (Lister)	2
22	T63M	Clip	2
23	SCA315	Steering Column (Taper/Key Type)	1
24	4-60-292	Steering Valve Complete (Taper/Key Type) - (OSP315)	1
25		Woodruff Key No. 11	1
26	153	Steering Wheel (Taper/Key Type)	1
27	4-60-247	Steering Wheel Nut	1
28	153A	Steering Wheel Cap	1
29	099-530063	Steering Column (Taper/Serration Type)	1
30	4-60-293	Steering Valve Complete (Taper/Serration Type) - (OSP315)	1
31	347K	Steering Wheel (Taper/Serration Type)	1
32	C318	Domed Nut 5/8" UNF	1
33	UC1457	Suction Filter	1
34	BSE109	90° Hose Fitting ¾" BSP	1
35	CSE182	Spacer	2
	150-4206	Seal Kit for Steering Valve (Not Illustrated)	A/R

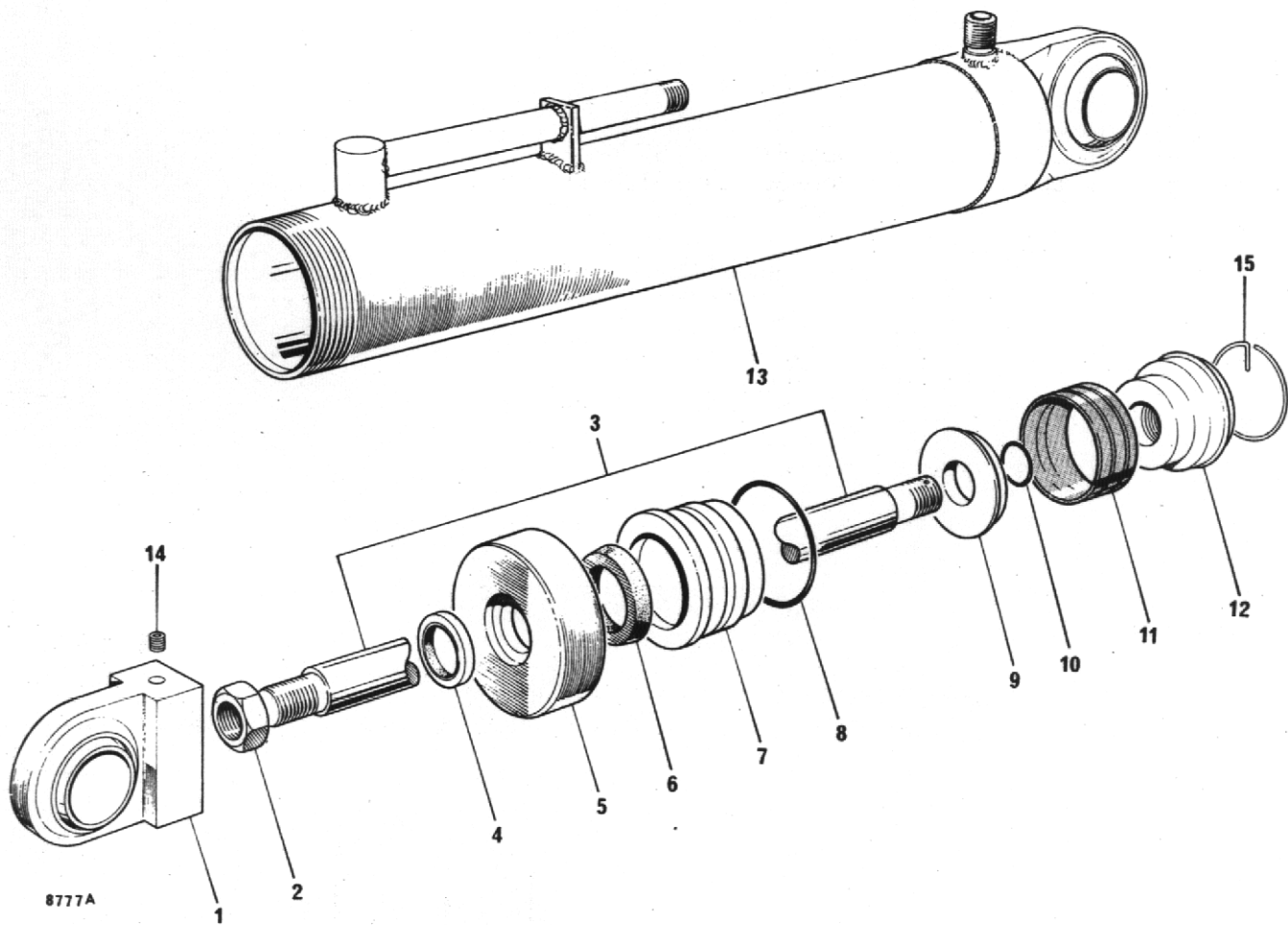
NOTE: Should it be necessary to fit seal kit seal kit 150-4206. Extreme caution must be exercised to ensure that no foreign matter enters the unit.

4/60 LISTER

36	IP3072 ATDFB	Hydraulic Pump	1
37	3SH62	Hose 47" Long 90° - 90°	1
38	4-35-261	Outlet Adaptor	1
39	IPE4	Elbow Adaptor	1
40	4-60-160	Hose ¾" Dia. Cotton Braid	1
41	T48	Tube	1
42		Capscrew 5/16" UNC x 2¼" Long	2
43		Capscrew 5/16" UNC x 1" Long	2

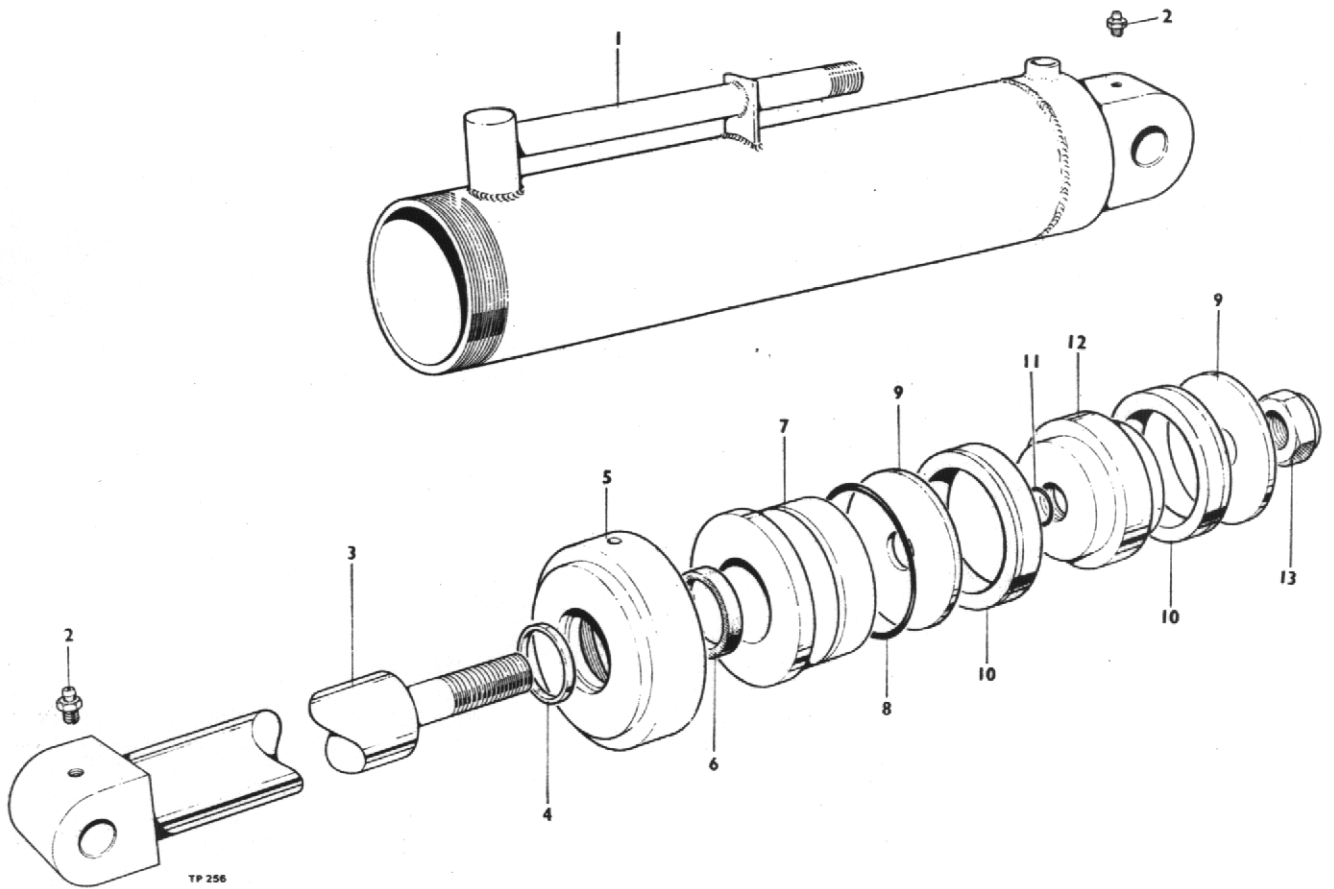
4/60 PETTER

44	4-60-132	Hose 73" long 90° - 90°	1
45	4-35-261	Adaptor	1
46	4-60-161	Hose ¾" Dia. x 29" long Cotton Braid	1
47	7702 IP 3060AF	Hydraulic Pump	1
48		Capscrew 5/16" UNF x 1" Long	8
49	T14J	Adaptor 3/8" x 3/8" BSP	1
50	T14I	Sealing Washer	1
51	DH69A5	'O' Ring	2
52	X14	'P' Clip (not illustrated)	1
53	5ST 111	Adaptor	1



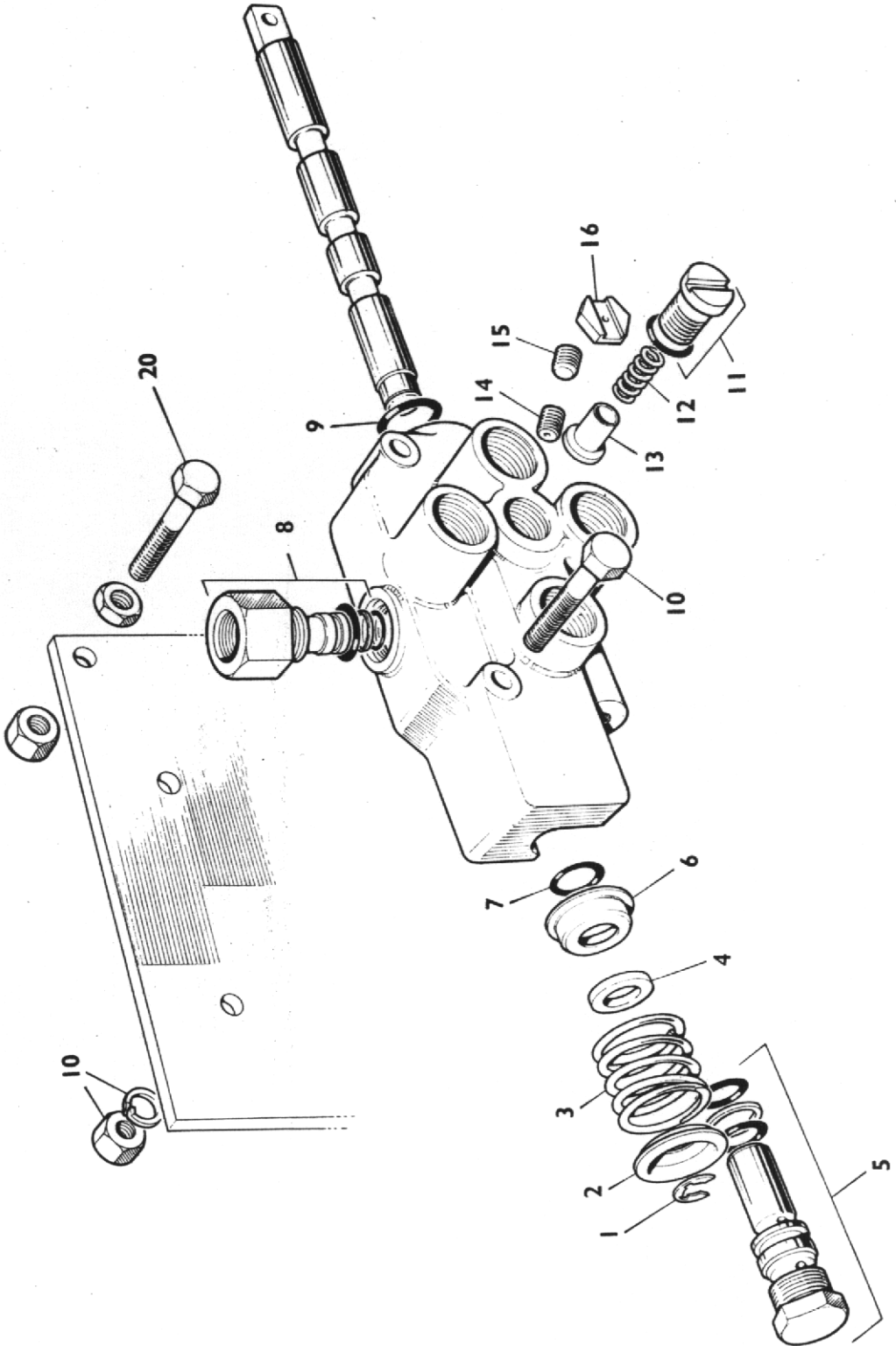
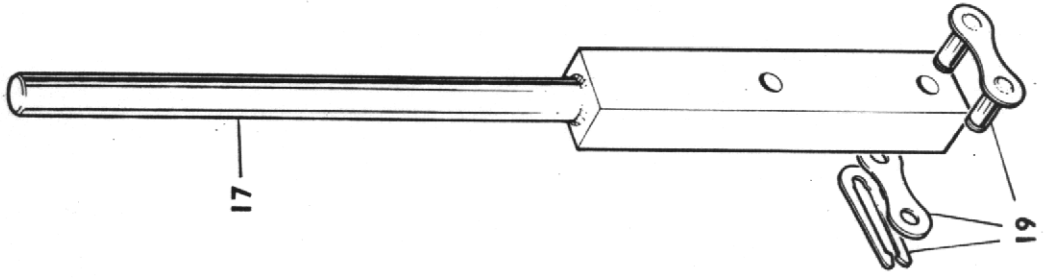
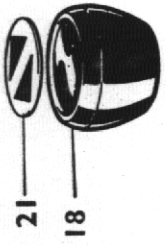
STEERING RAM

Item No.	Part No.	Description	Qty.
	TD3894	Ram Complete (2 Per Machine)	
1	K1/11	Piston Rod Fitting	1
2	K1/19	Locknut	1
3	K1/2	Piston Rod	1
4	K1/18	Wiper	1
5	K1/4	Tube Cap	1
6	K1/17	Sleeve Seal	1
7	K1/5	Sleeve	1
8	K1/16	Sleeve 'O' Ring	1
9	K1/15	Backing Washer	1
10	K1/13	Piston 'O' Ring	1
11	K1/12	Piston Seal	1
12	K1/14	Piston Head	1
13	K1/20	Cylinder, Bosses & End Cap	1
14	K1/21	Grub Screw	1
15	K1/22	Spring Ring	1
	CSE 189	Seal Kit (comprising Items 4, 6, 8, 10 & 11)	A/R



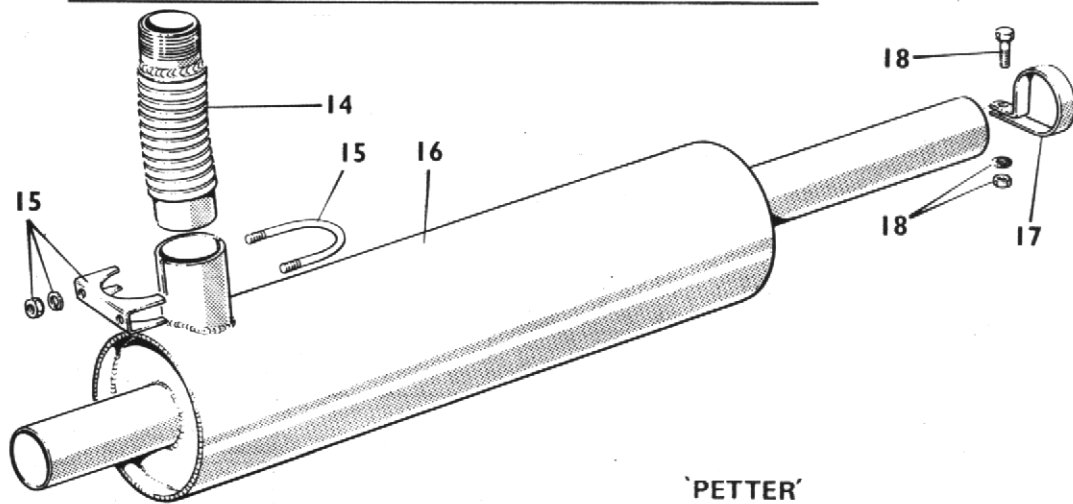
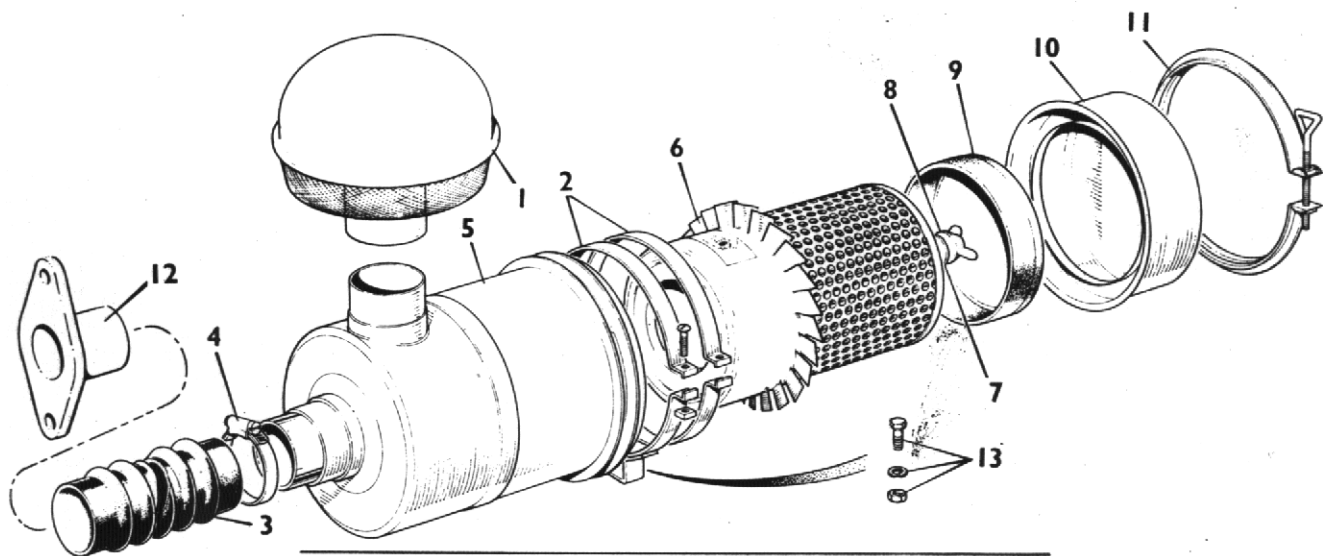
TIPPING RAM

Item No.	Part No.	Description	Qty.
	BE-3	Cylinder Assembly Complete (Two per m/c)	
1	BE3-21	Cylinder Body	1
2	BE3-20	Grease Nipple	2
3	BE3-22	Piston Rod Assembly	1
4	BE3-15	Wiper	1
5	BE3-6	Tube Cap	1
6	BE3-16	Sleeve Seal	1
7	BE3-7	Sleeve	1
8	BE3-13	Sleeve 'O' Ring	1
9	BE3-10	Backing Washer	2
10	BE3-14	Piston Seal	2
11	BE3-12	Piston 'O' Ring	1
12	BE3-9	Piston Head	1
13	BE3-11	Lock Nut	1
	CSE 190	Seal Kit (comprising Items 4, 6, 8, 10 & 11)	A/R

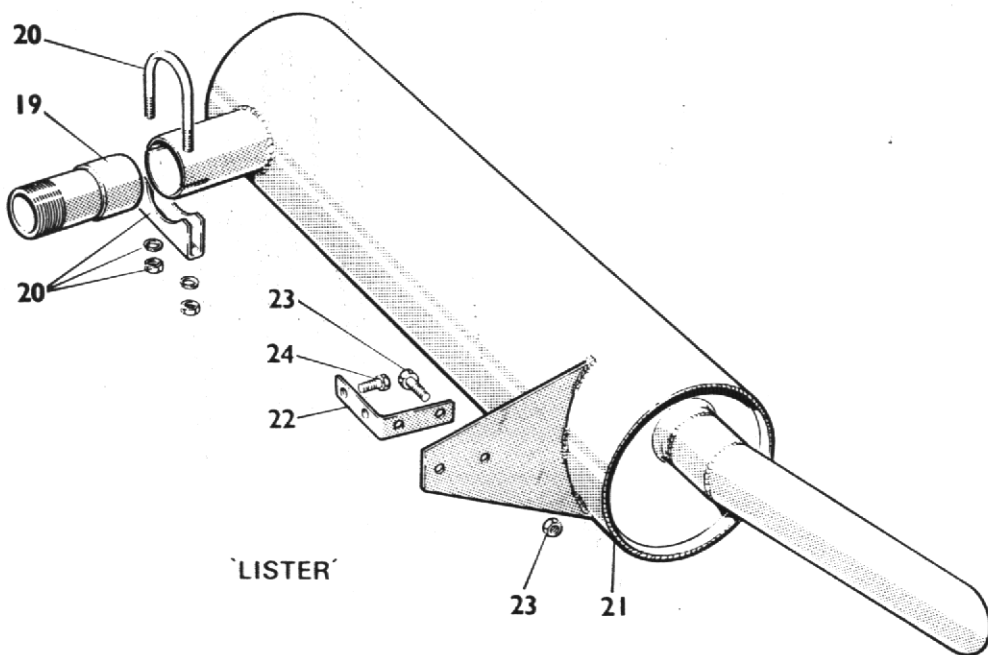


HYDRAULIC CONTROL VALVE

Item No.	Part No.	Description	Qty.
	300-024-GAA	Valve Assembly Only, Complete	1
1	16124-50	Clip Ring	1
2	15546-6	Washer, Shallow	1
3	30501-39	Spring, Spool	1
4	16048-31	Spacer Washer	1
5	32018-J9	Relief Valve Assembly	1
6	30501-10	Washer, Deep	1
7	100-146-012	'O' Ring 3/32" x 5/8" I/D	1
8	30501-15	Pressure Beyond Plug Assembly	1
9	100-147-063	'O' Ring	1
10		Bolt, Nut 5/16" UNF x 2 1/2" Long	2
11	30501-17	Plug Assembly Lift Check	1
12	30501-13	Spring, Lift Check	1
13	30501-12	Plunger, Lift Check	1
14	300024004	1/16" - 27 NPTF Plug (.070")	1
15	16062-1	1/8" - 27 NPTF Plug	1
16	16097-451	Orifice Plate (.0935")	1
17	4-60-316	Actuating Lever	1
18	F4-45-184	Lever Knob	1
19	4-60-178	Chain Link	1
20		Bolt, 3/8" BSF x 2" long and Nuts	1
21	DM 156	Label	1



'PETTER'



'LISTER'

AIR CLEANER AND EXHAUST SYSTEM

Item No.	Part No.	Description	Qty.
	10532A05	Air Cleaner Assembly, comprising of items 5,6,7,8,9,10 & 11	1
1	V2003201	Stack Cap	1
2	V2003271	Bracket	2
3	460190	Hose Connecting-Lister	1
	460191	Hose Connecting-Petter	1
4	97S12	Clip Hose	2
6	V600484	Element Air Filter 8"	1
7/8	V600487	Nut & Gasket Kit	1
9	DU766	Baffle	1
10	DU769	Cup Assembly	1
11	DU420	Clamp Assembly	1
12	460232	Manifold Adaptor-Petter only	1
13	11S02C	Screw Set M6	4
13A	17S03	Washer Spring	4
13B	7S02	Nut M6	4

EXHAUST SYSTEM (PETTER)

14	460147	Flexible Pipe	1
15	153S12	Clamp Exhaust	1
16	460248	Silencer	1
17	460149	Clip	1
18	8S04C	Screw Set M10	1
18A	17S05	Washer Spring M10	1
18B	7S04	Nut M10	1

EXHAUST SYSTEM (LISTER)

19	460296	Adaptor	1
20	153S12	Clamp Exhaust	1
21	460295	Silencer	1
22	460321	Bracket	1
23	11S02C	Screw Set M6	1
23A	61S02	Nut Binx M6	2
24	66S01A	Screw Set ¼ UNC X 1"	2

WINGET



NEWAGE 250 & 400 SERIES AXLE SERVICE MANUAL

WINGET LIMITED

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Introduction

Winget Limited gratefully acknowledge the assistance given by Newage Transmissions Limited in the preparation of this manual, however neither Winget Limited or Newage Transmissions can be held responsible for any errors or omissions.

The procedures described within this manual should enable experienced service personnel to strip, repair and re-build Newage 250 & 400 series axles fitted to Winget Site Dumpers and Forklifts in a safe and competent manner. The procedures are not intended to be used by personnel who are unfamiliar with the product or mechanically inexperienced.

It is assumed that personnel are aware of the Health and Safety Regulations which should be applied but the following should act as a reminder.

Whenever possible any repairs or service should be carried out in a clean environment. If work must be carried out on site or in the field steps should be taken to ensure that dirt or foreign materials cannot enter the assembly.

Ensure all work tools are in good condition and only use the correct tool for the job in hand.

Always wear safety spectacles when using soft or hard faced hammers, chisels, drifts or when using air tools. Wear safety spectacles when cleaning components or when grinding.

Do not misuse air lines and be aware of the damage compressed air can cause if misused.

Always make sure lifting equipment is in good condition and the Safe Working Load exceeds the weight of the component to be lifted.

Always use suitable supports i.e. axle stands or baulks of timber in conjunction with hydraulic jacks etc. Never rely on hydraulic jacks alone to support a machine.

Be aware of hot surface temperatures and take care when draining hot oils. Always dispose of waste oils in accordance with local and national regulations.

Whenever possible always disconnect the battery or battery isolator when working on the machine to prevent electrical shorts and unauthorised starting.

Refer to the operators handbook for a guide to the correct sequence for assembling components and sub-assemblies.

Oils, fuels, silicone sealer etc can cause skin diseases if allowed to contaminate the skin. Always apply barrier creams, wear suitable protective clothing or when contamination is unavoidable clean the area with soap and water as soon as possible. Do not use thinners or other solvents to clean skin.

Health and Safety is a matter of common sense. If common sense is applied correctly the risk of accidents can be reduced.

Spares for Newage Axles fitted to Winget Equipment can only be obtained from Winget Limited or one of our authorised distributors and not from Newage Transmissions Limited. Always quote your machines serial number and model together with axle serial number and model when ordering spare parts.

250 & 400 Series axles are designed to operate under arduous conditions and providing they are regularly and correctly maintained they will provide long trouble free service.

Whilst every effort is made to ensure the contents of this manual are accurate Winget Limited and Newage Transmissions reserve the right to alter specification without prior notification and certain sections of this manual may then no longer apply.

250 SERIES AXLE

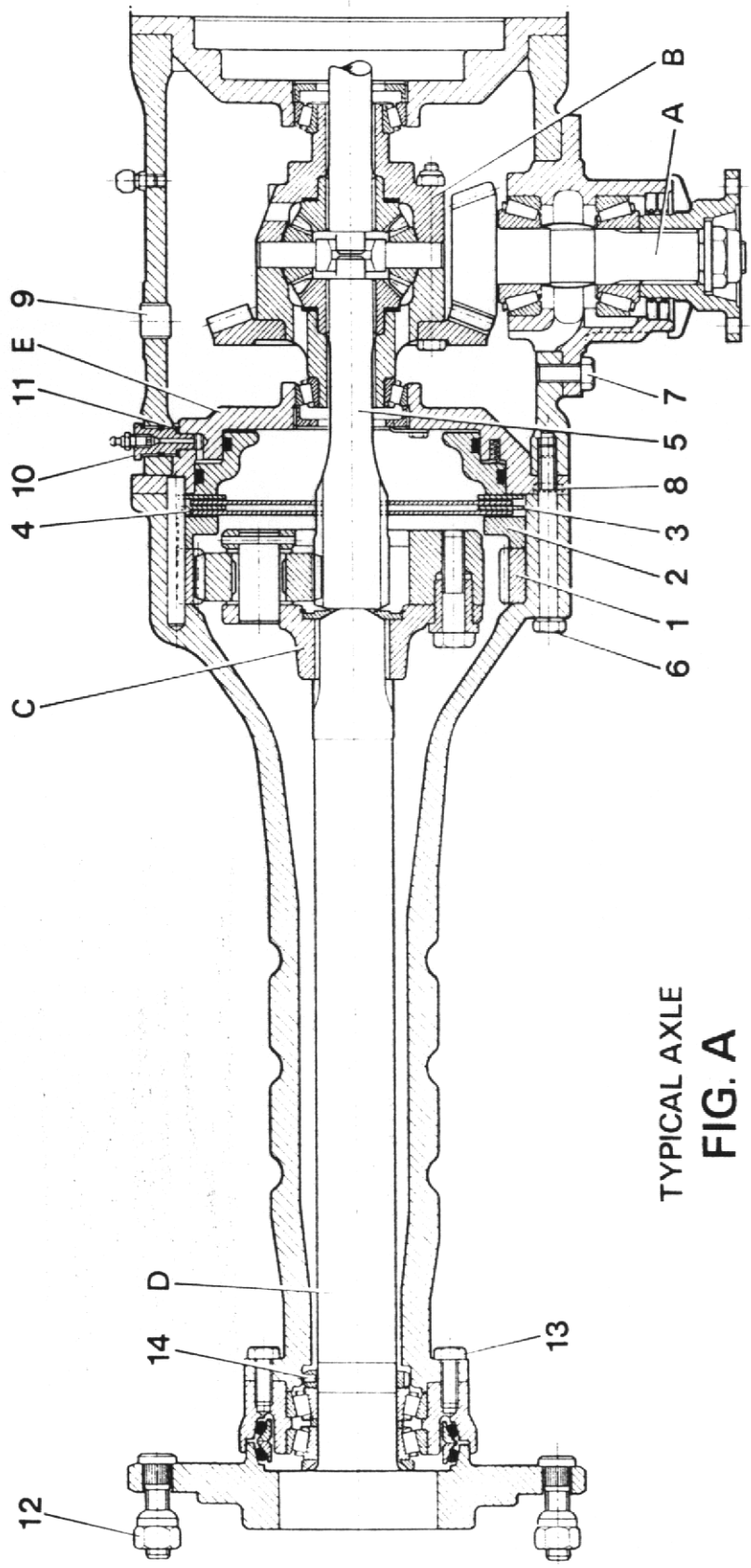
FITTED TO
WINGET FOUR/45 C.D.P. DUMPER
WINGET 4FL2500 ROUGH TERRAIN FORKLIFT

400 SERIES AXLE

FITTED TO
WINGET FOUR/60 DUMPER
WINGET 4FL5000 ROUGH TERRAIN FORKLIFT

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PINION CARTRIDGE	3
CROWNWHEEL AND DIFFERENTIAL	4
SETTING UP CROWNWHEEL AND PINION	5
PLANETARY GEARS	6
BRAKES	7
AXLE SHAFT ASSEMBLY	8
SPIRAL BEVEL GEAR TOOTH CONTACTS	10
TORQUE SETTINGS FOR ALL FASTENERS	11



TYPICAL AXLE
FIG. A

DISMANTLING AND ASSEMBLING AXLE

Pinion Cartridge

(See Fig. A)

1. Remove drain plug (9) and drain axle oil, remove screws (7) and pull out cartridge (A), using easing screws if required.

(See Fig. B)

2. Remove nut (5) in coupling flange, (3) holding flange with special tool (AA). Remove flange and knock out pinion (2).
3. If front bearing is damaged or worn, remove cone and roller assembly by splitting cage and using a bearing puller to remove the cone.
4. If required, bearing cups (7) and oil seals (9) can be drifted out from the pinion cartridge.

To re-assemble with new pinion, bearings, seals etc., the procedure is as follows:—

5. Press bearing cups and oil seals into cartridge.
6. Press front pinion bearing to pinion shaft.
7. Pack gap between seal lips $\frac{3}{4}$ way round with grease.
8. Assemble pinion to cartridge, push on spacer (8) and tail bearing drive flange, washer and nut. (Check drive flange, seal wear surface is free from damage.)

NOTE: If new bearings are fitted, a new collapsible spacer (8) must be fitted.

9. Tighten nut (5) holding coupling flange with special tool, until bearing spacer collapses 21 kpm (150 lb. ft. min.) and continue to tighten until all pinion end float is removed.
10. Turn nut until a drag is felt when turning the coupling flange and check the bearing preload using a piece of string wound round the flange and a spring balance (see Fig. C).

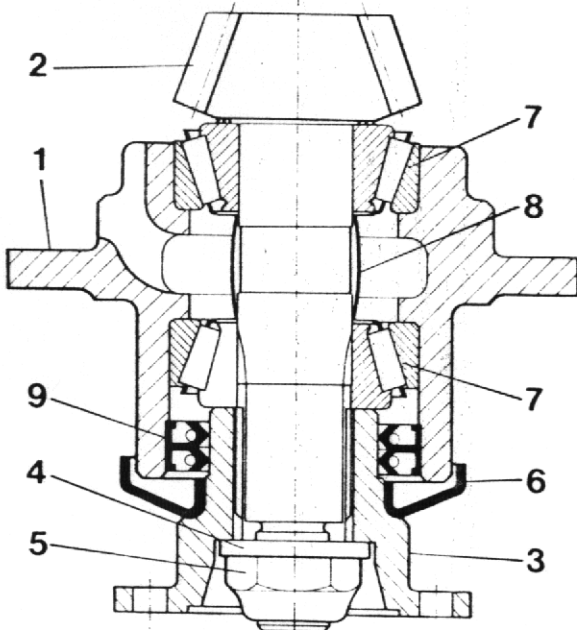


FIG. B

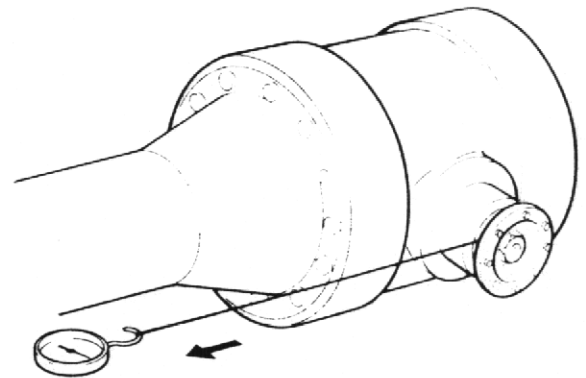


FIG. C

11. Pull the spring balance until the pinion turns smoothly and note the reading (should be 3.5–5.5 kg for new bearings and (1.75–2.75 kg) for old bearings on the 250 Series axle, and 4.5–6.5 kg for old bearings on the 400 Series axle.
12. Gradually tighten nut and re-check until correct reading is obtained.

NOTE: Above preload figures should not be exceeded.

13. Assemble pinion cartridge to centre casing, applying sealer between shims, centre case flange and cartridge flange.

NOTE: Ensure cartridge oil slot is in correct position (see Fig. D).

14. Tighten screws holding cartridge to main case.

Crownwheel and Differential (Ref. B)

(See Fig.A)

1. Drain axle oil, remove screws (6) and pull off left hand axle arm assembly.
2. Remove brake feed and bleed adaptors (10).
3. Slacken screws (8) and remove brake cylinder (E) using easing screws if required.
4. Lift out crownwheel and differential assembly (B).
5. Slacken nuts (11) (See Fig. E), remove crownwheel and split differential unit.
6. Thrust washers (5) and (6) should be replaced if they show signs of damage or excessive wear.
7. Check all internal rubbing surfaces of diff. cases (1) for signs of wear.
8. Diff. bearing cone and roller assys. (9) can be pulled or drifted off diff. case halves.

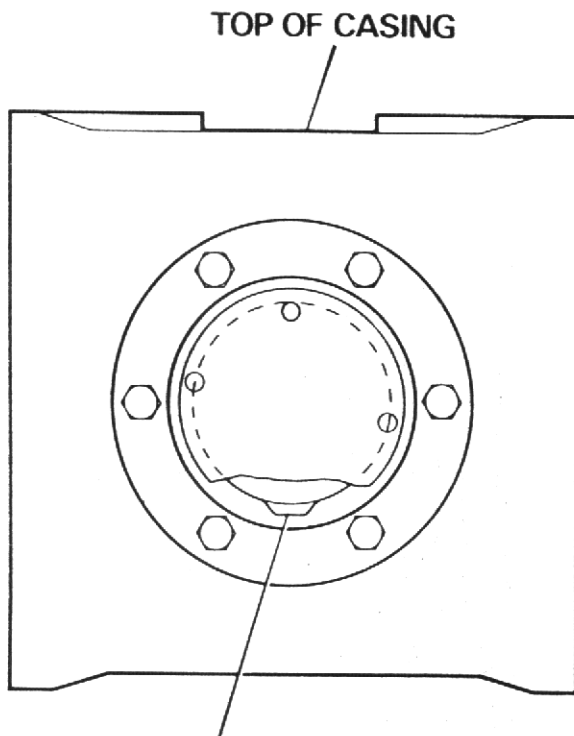


FIG. D

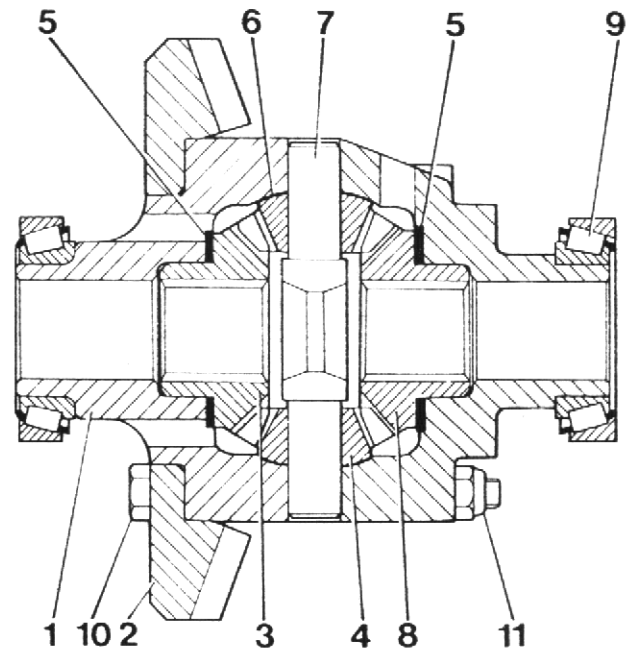


FIG. E

9. Re-assemble differential unit, ensuring that typed marks on diff. halves are aligned.
10. Assemble crownwheel, bolts (10) and torque up nuts (11).
11. Engage a sun gear (7) in a diff. gear and ensure that differential gears turn freely.
12. Press on new diff. bearings if required.
13. If diff. bearings are not replaced, then the diff. can be put back in the centre case and the brake cylinder replaced, without adjusting the bearing nuts (6). (See Fig. F)

14. If the diff. bearings are replaced, then it will be necessary to reset the crownwheel backlash and the bearing preload. (See Crownwheel and Pinion Set Up.)
15. Brake cylinder, centre case and axle arm flange faces should be cleaned, oil sealer scraped off and new sealer applied prior to re-assembly.
16. Replace brake cylinder and axle arm assembly, all screws and bolts being tightened to the correct torque.

Setting up Crownwheel and Pinion

1. Assemble pinion cartridge as described previously.
2. Assemble crownwheel and diff. assembly as described.
3. Assemble and seal one cylinder to main casing using screw (8) (See Fig.A). Push in diff. bearing cup and screw in lock ring (6) (See Fig. F).
4. Stand centre case on cylinder end and lower in diff. assembly, locating the diff. bearing halves together and ensuring that crownwheel and pinion are in mesh.
5. Seal and fit other brake cylinder and assemble bearing cup and lock ring.
6. Tighten lock ring until bearing end float is removed.
7. On pinion cartridge use a depth gauge to measure dimension 'X' from front face of pinion to cartridge flange (see Fig.G).

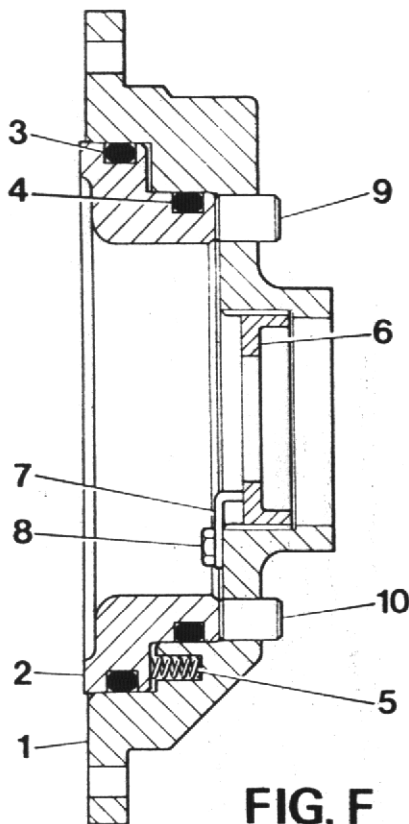


FIG. F

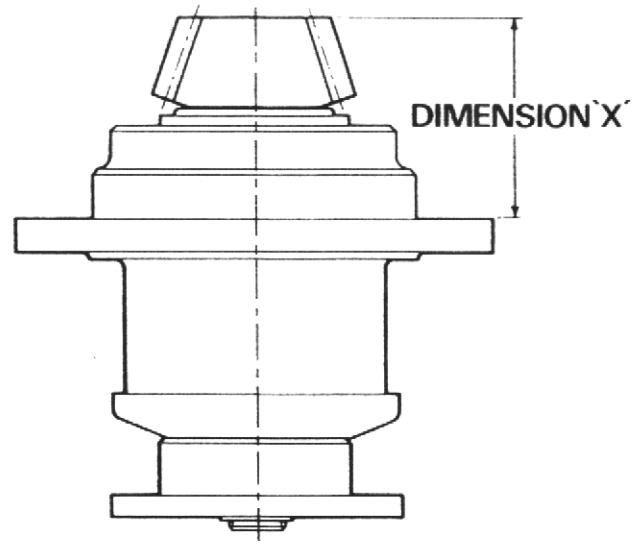


FIG. G

8. On centre case use a depth gauge to measure dimension 'Y' from pinion cartridge flange surface to ground diameter on differential casing (see Fig. H).
9. Read pinion mounting distance (M.D.) from front face of pinion. Pinion head thickness = (see front face of pinion), diff. case ground diameter = 129.50 mm. on the 400 series and 108.76 mm on the 250 series. Calculate as follows:

$$(\text{M.D.} - \text{Head thickness} - \frac{\text{Diff. case dia.}}{2}) = 'A'$$

$$('Y' - 'X') = 'B'$$

('A' - 'B') = Shim thickness to be placed between pinion cartridge flange and centre case flange.

10. Select shims, place on pinion cartridge and assemble cartridge to centre casing.

NOTE: It is required to know the spring balance reading required to turn pinion in its bearings, as described previously.

11. Adjust diff. bearing lock rings to give correct backlash between crownwheel and pinion.
(See Page 11)

This can be measured by using a dial gauge with its pointer in a coupling flange hole (see Fig. J).

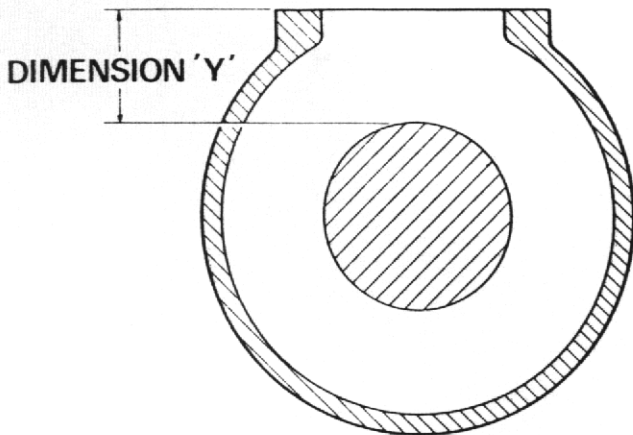


FIG. H

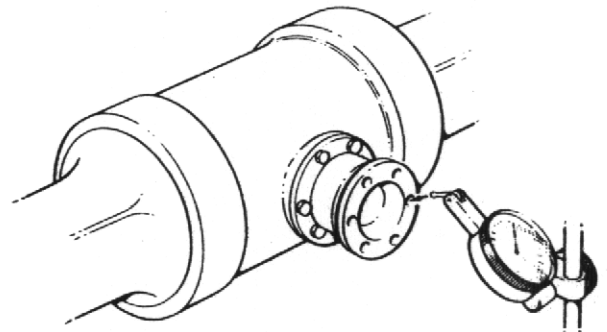


FIG. J

12. Tighten lock rings equally at each end of the differential to preload the bearings. The preload can be checked by turning the pinion coupling flange by means of string and spring balance as previously described. (Check that backlash is maintained.)

13. The additional spring balance load for the diff. bearings is shown.

14. Slacken and remove screws holding pinion cartridge in place and pull out cartridge. Brush on some paint, Engineers Blue etc. to a few crownwheel teeth and replace the pinion cartridge.

15. Turn the coupling flange a few turns in both directions then slacken screws and lift out.

16. Examine the contact on both sides of the crownwheel teeth and check that it is similar to that shown in fig. S and is similar to original factory marking shown on teeth.

17. If marking is satisfactory, replace pinion cartridge with sealer on flange surfaces and torque up screws.

(See Fig. F)

18. Put lock tabs (7) in place in cylinders and tighten screws (8). (Ensure that screws have locking compound applied.)

19. Bend over locking tabs into slots in lock rings (6).

Planetary Gears (Ref. C)

1. Drain axle oil and remove axle arm as explained previously.

(See Fig. A)

2. Lift out sun shaft (5), brake plates (2, 3 & 4) and planetary assembly.

(See Fig. K)

3. Check planet gear (3) end float using feelers. (Should not be greater than 2mm.)

4. Remove lock wire where used, slacken bolts (7) and tap bolt heads to split planetary assembly.

5. Lift off planet gears (3), thrust washers (5) and needle bearings (9).

6. Inspect all parts for wear or damage and replace if required.
7. If planet pins (4) are worn, remove by drifting out spring pin (10), and push planet pin from hole in planet carrier (1).

NOTE: On re-assembly, tap in spring pin until flush with outside of planet carrier and peen over edge of hole.

8. To assemble, place gears, washers, bearings etc. on planet pins and locate carrier drive flange (2) on planet pins and push both halves together.
9. Push dowels (6) home, tighten bolts and fit lock wire if required.

(See Fig. A)

10. If annulus (1) shows signs of wear, remove using puller (BB) and fit new part. (Ensure that new annulus is fully home in its location bore.)
11. Check axle shaft (1) (see Figs. L & N), splines for wear or damage and if satisfactory, locate planetary on splines.
12. Re-assemble sun shaft, brake plates, etc. clean axle arm and brake cylinder flange faces, re-seal and assemble axle arm as previously described.

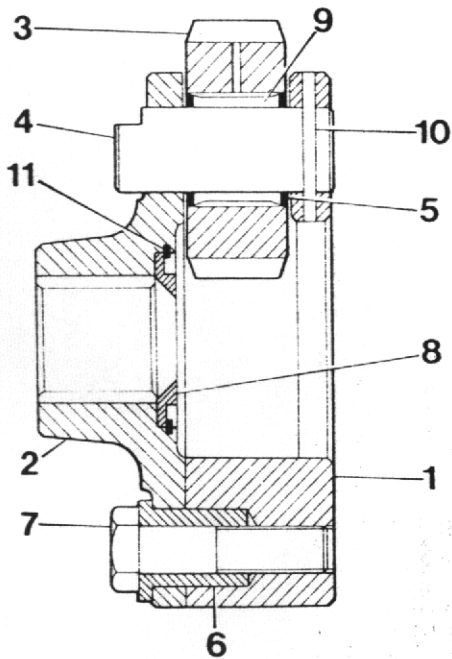


FIG. K

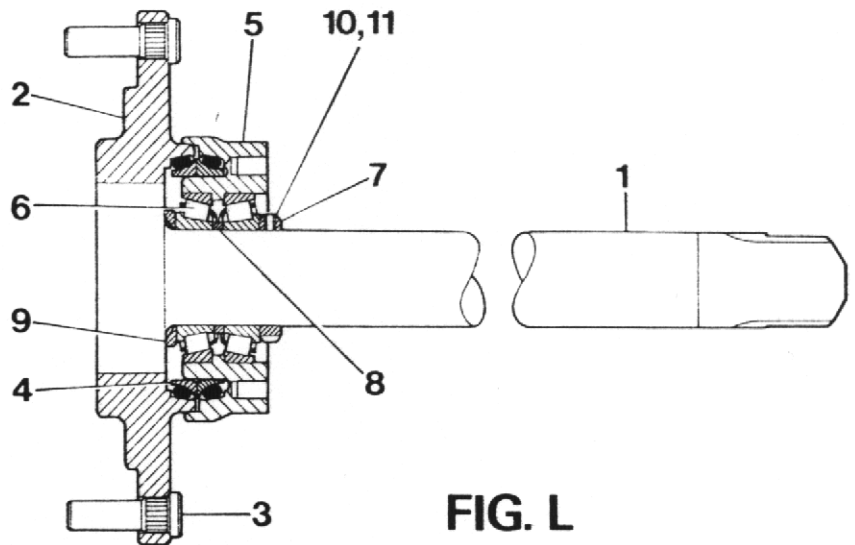


FIG. L

Brakes

IMPORTANT NOTE

It is essential that all cylinder bores, piston, seals, are kept clean and free from all lubricating oils. The seals can be lightly coated with brake fluid that conforms to SAE J1703 prior to assembly.

1. The dismantling procedure is the same as for the planetary gears.
2. When the sintered plates and the fixed plates are removed from the axle arm, examine both for excess wear. The thickness of the sintered plate should not be less than 4mm. The thickness of the fixed plate should not be less than 2mm.
3. To check the piston/cylinder assembly it is not essential to remove the cylinder from the centre case, but if required, remove brake feed and bleed fittings (10), screws, (8) (see Fig. A) and lift out cylinder from centre case using easing screws if required.

(See Fig. F)

4. Pull the piston (2) from the cylinder and examine the seals (3 & 4) and cylinder walls for signs of damage.

5. When refitting the piston to the cylinder ensure that the 3 springs (5) are in place in their holes in the rear of the cylinder.
6. Clean and seal cylinder and centre case flange surfaces and bolt cylinder in place with screws (8). (See Fig. A)
7. Examine brake plate splines for damage before assembling to sun shaft.

NOTE: When plates are assembled to sun shaft, ensure that holes line up to ensure an oil passage through the plates.

8. Assemble all brake plates and axle arm as previously described.
9. Re-fit, brake bleed and feed adaptors (10) if removed, ensuring that sealing washer (11) is properly located. (See Fig. A)

Axle Shaft Assembly (400 series axle)

(See Fig. A)

1. Slacken and remove screws (13) holding assembly to axle arm.
2. Tap rear of wheel flange to remove shaft assembly from axle arm.

(See Fig. L)

3. Slacken screw (11) in shaft locking ring (7) and unscrew locking ring using special tool (CC).
4. Tap seal housing (5) to remove from axle shaft.
5. Inspect bearings, oil seals and shaft for signs of wear or damage.
6. If a new oil seal is required, it is advisable to fit using the special tool (DD). (See Fig. M)
7. If new shaft bearings are required, they are supplied complete with the shaft spacer and are preset to give the correct running adjustment. Remove the old bearing cups (6) from the oil seal housing and fit new parts. Assemble the oil seal halves to the wheel flange and the oil seal housing.
8. Assemble the bearing/seal housing assembly to the axle shaft and tighten the locking ring behind the bearings.
9. Tighten the screw (11), compressing the nylon insert (10) onto the threaded part of the shaft.
10. Clean the rear surface of the oil seal housing and the axle arm flange surface. Reseal, fit the shaft assembly to the axle arm and tighten screws (13). (See Fig. A)

Axle Shaft Assembly (250 series axle)

(See Fig. A)

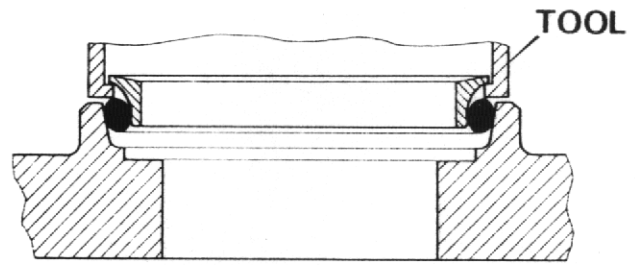
1. Slacken and remove screws (13) holding assembly to axle arm.
2. Tap rear of wheel flange to remove shaft assembly from axle arm.

(See Fig. N)

3. Slacken screw (15) in shaft locking ring (7) and unscrew locking ring using special tool CC.
4. Tap seal housing (5) to remove from axle shaft.
5. Inspect bearings, oil seals and shaft for signs of wear or damage.
6. If a new oil seal is required, it is advisable to fit using the special tool DD (see Fig. M).
7. A single unitised taper roller bearing is used and if a new unit is required, then it is necessary to adjust shims (10 to 13) to provide the correct clamping load on the bearing. The procedure is as follows:—
 - a) Remove old bearing from oil seal housing and fit new unit.
 - b) On small end of axle arm, use a vernier depth gauge to measure from the end of the spigot location on the flange (see Fig. P). Let this dimension be 'X'.
 - c) Measure the depth inside the oil seal housing, from the mating face with the axle arm to the end of the bearing outer race. Let this dimension be 'Y'. (See Fig. R)
 - d) The amount of shims to go adjacent to the bearing = ('Y' - 'X') + 0.075 mm (0.003").
 - e) Insert the necessary shims in the oil seal housing.

(See Fig. N)

8. Assemble the oil seal housing to the shaft (1) and tighten the locking ring (7).
9. Tighten the screw (15), compressing the nylon insert (14) onto the threaded part of the shaft.
10. Clean the rear surface of the oil seal housing and the axle arm flange surface. Reseal, fit the shaft assembly to the axle arm and tighten screws (13). (See Fig. A)



TOOL DD
FIG. M

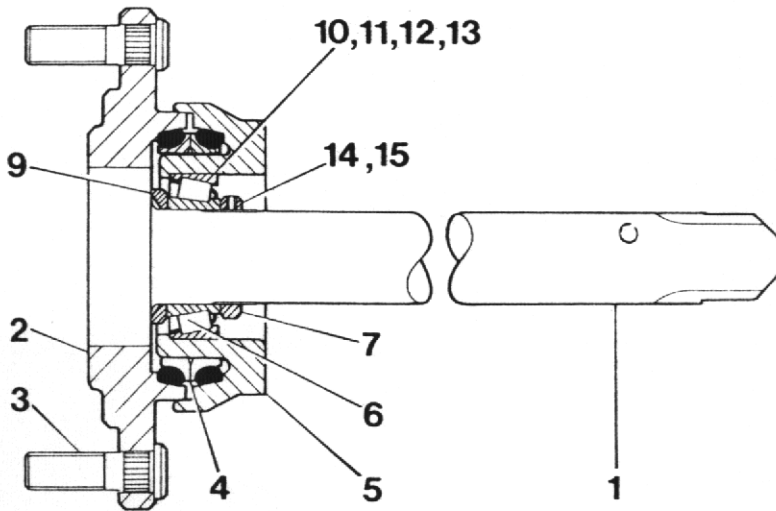


FIG. N

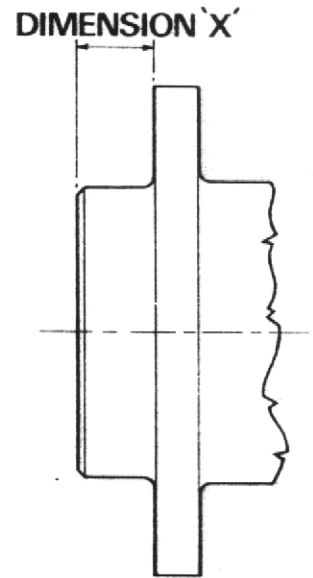


FIG. P

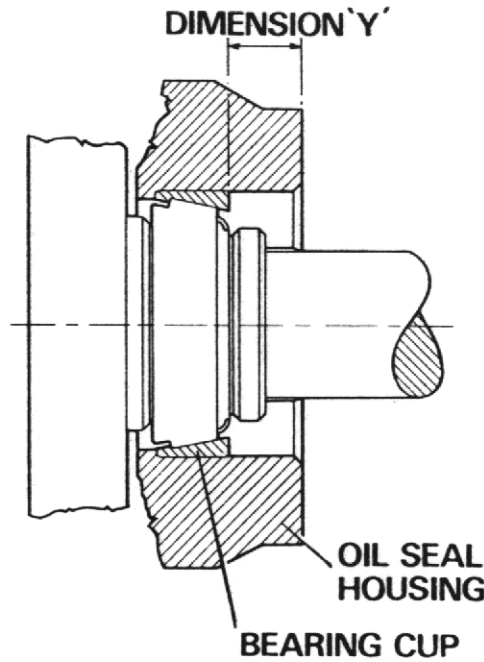


FIG. R

Surfaces to be Sealed with Liquid Sealant
Use "Loctite Plastic Gasket" Grade 275
"Avdelbond" Grade 120/121 OR Similar

1. Pinion cartridge flange to main casing.
2. Brake cylinder flanges to main casing.
3. Axle arm to brake cylinder.
4. Oil seal housing to axle arm flange.

Apply a thin film of sealant to one of the surfaces, having first cleaned the surfaces concerned. Assemble the parts and tighten fasteners.
Having dismantled an assembly, scrape old sealant off the surfaces, clean and apply fresh solution.

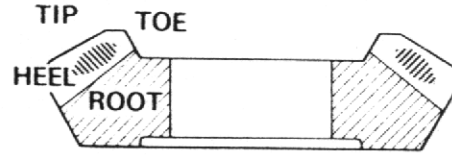
SPIRAL BEVEL GEAR TOOTH CONTACTS

CROWN WHEEL

CONVEX FLANK & CONCAVE FLANK

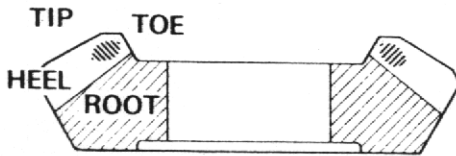
Contact may vary, but generally is approx, in the tooth centre, equispaced between root and tip. The marking may be towards toe on some gears on both flanks, or marking crossed slightly i.e. towards toe on convex flank and heel on concave flank or vice versa.

If, compared to the factory tooth contact, the contact appears as shown below, then corrective action should be taken as follows:



1 CONVEX FLANK

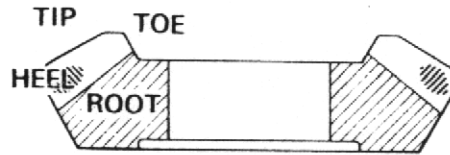
Contact further to toe and tip than factory marking.



CONCAVE FLANK

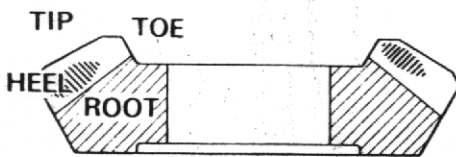
Contact further to heel and tip than factory marking.

ERROR: Pinion too far out of mesh, recheck and decrease shims below pinion cartridge flange.



2 CONVEX FLANK

Contact further to heel and root than factory marking.



CONCAVE FLANK

Contact further to toe and root than factory marking.

ERROR: Pinion too far into mesh, recheck and increase shims below pinion cartridge flange.

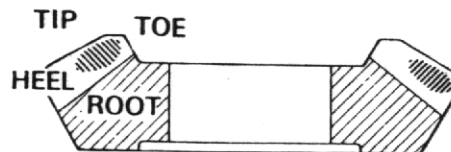


FIG.S

ADDITIONAL LOAD ON SPRING BALANCE FOR DIFFERENTIAL BEARING PRELOAD WHEN CROWN WHEEL & PINION ARE IN MESH.

400

No. Teeth Pinion	No. Teeth Wheel	Additional Spring Balance Pull (Kg)	
		New Brgs.	Used Brgs.
11	31	2.75-3.25	1.4-1.8
11	29	3.0 -3.4	1.4-1.8
18	33	4.0 -5.0	2.0-2.5

250

No. Teeth Pinion	No. Teeth Wheel	Bolt Circle Dia. Coupling Flange (mm)	Additional Spring Balance Pull (Kg)	
			New Brgs.	Used Brgs.
11	29	95	3.8-5.2	2.0-2.7
17	29	95	5.9-8.0	3.0-4.1
11	29	80	4.1-5.7	2.0-3.0
17	29	80	6.6-8.8	3.2-4.3

TORQUE SETTINGS FOR ALL FASTENERS (SERIES 250)

Fastener Ref. No. Fig. A.	Description	Tightening Torque	
		Kpm.	(lb. ft.)
(Diff. Assy.)	M10 Bolt + Nut	5.6	(40)
(Planetary Assy.)	M12 Bolt	10	(72)
(Brake Cyl. Assy.)	M12 Cap Screw	10	(72)
6	Axle Arm—Main Case Bolts	5.6	(40)
7	Pinion Cart.—Main Casing Screws	5.6	(40)
8	Brake Cyl.—Main Case Screws	5.6	(40)
10	Brake Pipe Adaptor—Brake Cyl.	2.7	(20)
12	Wheel Nut (18 mm)	28	(200)
	Wheel Nut ($\frac{7}{8}$ " BSF)	42	(300)
13	Axle Arm—Oil Seal Housing	5.6	(40)
14	Axle Shaft Locking Ring		(350)

TORQUE SETTINGS FOR ALL FASTENERS (SERIES 400)

Fastener Ref. No. Fig. A.	Description	Tightening Torque	
		Kpm.	(lb. ft.)
(Diff. Assy.)	M10 Bolt + Nut	5.6	(40)
(Planetary Assy.)	M16 Bolt	25	(180)
(Brake Cyl. Assy.)	M12 Cap Screw	10	(72)
6	Axle Arm—Main Case Bolts	10	(72)
7	Pinion Cart.—Main Casing Screws	10	(72)
8	Brake Cyl.—Main Case Screws	10	(72)
10	Brake Pipe Adaptor—Brake Cyl.	2.7	(20)
12	Wheel Nut (18 mm)	28	(200)
	Wheel Nut ($\frac{7}{8}$ " BSF)	42	(300)
13	Axle Arm—Oil Seal Housing	10	(72)
14	Axle Shaft Locking Ring	62	(450)

LIST OF BACKLASH FIGURES FOR DIFFERENT RATIOS ETC.

400	No. Teeth Pinion	Backlash Measured via Hole in Flange (mm)
	11	0.31-0.39
	18	0.21-0.26

250

No. Teeth Pinion	Bolt Circle Dia. on Flange	Backlash Measured via Hole in Flange (mm)
11	95	0.27-0.36
17	95	0.17-0.23
11	80	0.22-0.30
17	80	0.14-0.19

DECIMAL, FRACTIONAL AND METRIC EQUIVALENTS

Inches		Milli- metres	Inches		Milli- metres
Fractions	Decimals		Fractions	Decimals	
1/64	0.015625	0.397	33/64	0.515625	13.097
1/32	0.03125	0.794	17/32	0.53125	13.494
3/64	0.046875	1.191	35/64	0.546875	13.891
1/16	0.0625	1.588	9/16	0.5625	14.288
5/64	0.078125	1.984	37/64	0.578125	14.684
3/32	0.09375	2.381	19/32	0.59375	15.081
7/64	0.109375	2.778	39/64	0.609375	15.478
1/8	0.125	3.175	5/8	0.625	15.875
9/64	0.140625	3.572	41/64	0.640625	16.272
5/32	0.15625	3.969	21/32	0.65625	16.669
11/64	0.171875	4.366	43/64	0.671875	17.066
3/16	0.1875	4.763	11/16	0.6875	17.463
13/64	0.203125	5.159	45/64	0.703125	17.859
7/32	0.21875	5.556	23/32	0.71875	18.256
15/64	0.234375	5.953	47/64	0.734375	18.653
1/4	0.250	6.350	3/4	0.750	19.050
17/64	0.265625	6.747	49/64	0.765625	19.447
9/32	0.28125	7.144	25/32	0.78125	19.844
19/64	0.296875	7.541	51/64	0.796875	20.241
5/16	0.3125	7.938	13/16	0.8125	20.638
21/64	0.328125	8.334	53/64	0.828125	21.034
11/32	0.34375	8.731	27/32	0.84375	21.431
23/64	0.359375	9.128	55/64	0.859375	21.828
3/8	0.375	9.525	7/8	0.875	22.225
25/64	0.390625	9.922	57/64	0.890625	22.622
13/32	0.40625	10.319	29/32	0.90625	23.019
27/64	0.421875	10.716	59/64	0.921875	23.416
7/16	0.4375	11.113	15/16	0.9375	23.813
29/64	0.453125	11.509	61/64	0.953125	24.209
15/32	0.46875	11.906	31/32	0.96875	24.606
31/64	0.484375	12.303	63/64	0.984375	25.003
1/2	0.500	12.700	1	1.000	25.400

INCHES INTO MILLIMETRES

Inches	0	1	2	3	4	5	6	7	8	9
0	0	25.40	50.80	76.20	101.60	127.00	152.40	177.80	203.20	228.60
10	254.00	279.40	304.80	330.20	355.60	381.00	406.40	431.80	457.20	482.60
20	508.00	533.40	558.80	584.20	609.60	635.00	660.40	685.80	711.20	736.60
30	762.00	787.40	812.80	838.20	863.60	889.00	914.40	939.80	965.20	990.60
40	1016.00	1041.40	1066.80	1092.20	1117.60	1143.00	1168.40	1193.80	1219.20	1244.60
50	1270.00	1295.40	1320.80	1346.20	1371.60	1397.00	1422.40	1447.80	1473.20	1498.60
60	1524.00	1549.40	1574.80	1600.20	1625.60	1651.00	1678.40	1701.80	1727.20	1752.60
70	1778.00	1803.40	1828.80	1854.20	1879.60	1905.00	1930.40	1955.80	1981.20	2006.60
80	2032.00	2057.40	2082.80	2108.20	2133.60	2159.00	2184.40	2209.80	2235.20	2260.00
90	2286.00	2311.40	2336.80	2362.20	2387.60	2413.00	2438.40	2463.80	2489.20	2514.61

Use in conjunction with above table.

Example: Find equivalent mm. for 84 5/8".

$$84'' = 2133.60 \text{ mm.}$$

$$5/8'' = 15.875 \text{ mm.}$$

$$84 \text{ } 5/8'' = 2149.475 \text{ mm.}$$

CALIFORNIA

Proposition 65 Warning

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm