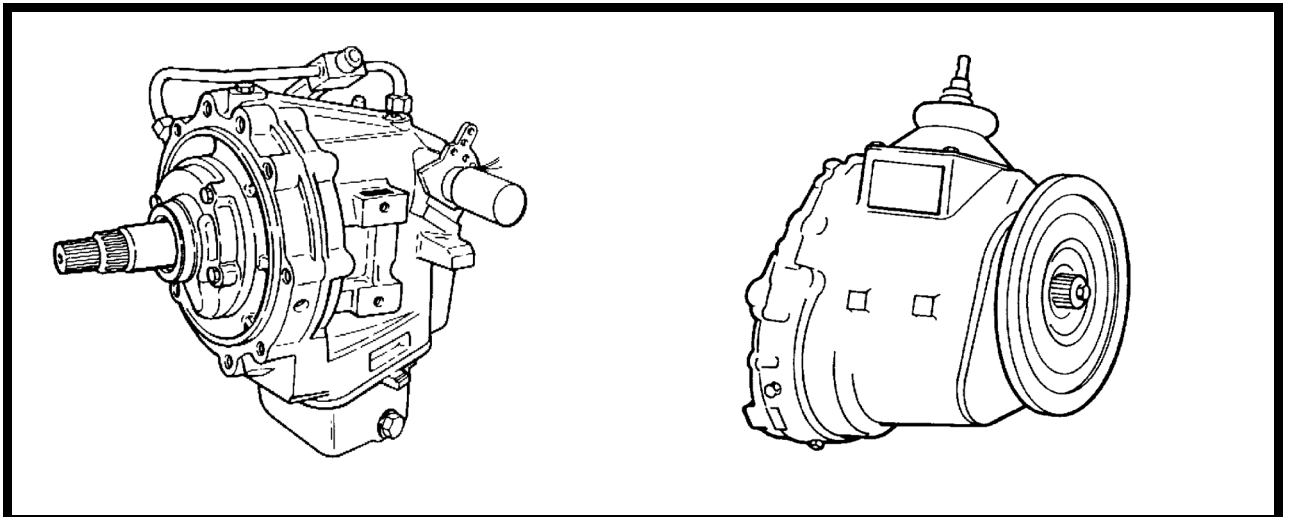


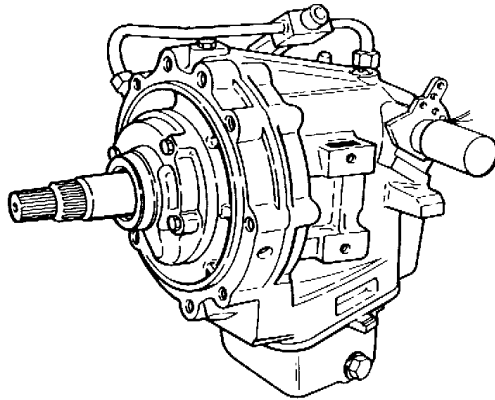
WINGET

WORKSHOP MANUAL 4C4000 & 4C5000 HYDRAULIC TRANSMISSION AND 4 SPEED GEARBOX



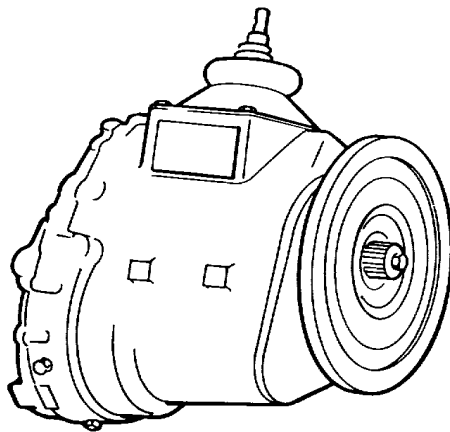
WINGET LIMITED
PO BOX 41
EDGEFOLD INDUSTRIAL ESTATE
PLODDER LANE
BOLTON
LANCS
BL4 OLS
TEL: ++ 44 (0) 1204 854650
FAX: ++ 44 (0) 1204 854663
service@winget.co.uk
parts@winget.co.uk
www.winget.co.uk

Section 1



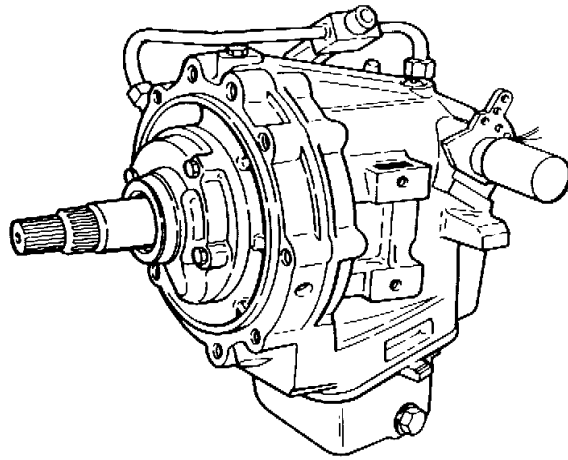
T72 HYDRAULIC TRANSMISSION

Section 2



TURNER 4 SPEED GEARBOX

Section 1



T72 HYDRAULIC TRANSMISSION

INTRODUCTION

The procedures described within this manual should enable experienced service personnel to strip, repair and re-build the T72 Hydraulic Transmission fitted to Winget 4C4000 & 4C5000 Site Dumpers in a safe and competent manner. The procedures are not intended to be used by personnel who are unfamiliar with Winget products nor mechanically inexperienced.

It is assumed that personnel are aware of the Health & 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 works 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 airlines 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 operator's 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 & Safety is a matter of common sense. If common sense is applied correctly the risk of accidents can be reduced.

Always quote your machine's serial number and model together with the transmission serial number when ordering spare parts.

The T72 Transmission is designed to operate under arduous conditions and providing it is regularly and correctly maintained it will provide long trouble free service.

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.

Hydraulic Transmission

DESCRIPTION

General

The transmission consists of a planetary gear set and multiple disc clutches. The input and output shafts are in line.

Hydraulic pressure is provided by a crescent type pump. The pump is driven at engine speed by converter drive lugs. Oil from the pump is sent to the pressure regulator valve. A converter relief valve prevents excessive converter pressure. Oil discharged from the converter relief valve is returned to the transmission sump.

The standard valving is a forward-neutral-reverse selector valve. A dump valve permits de-clutching without shifting to neutral.

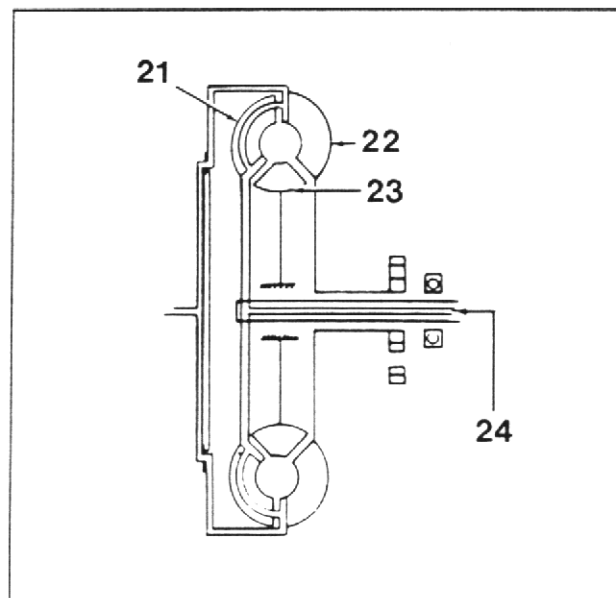
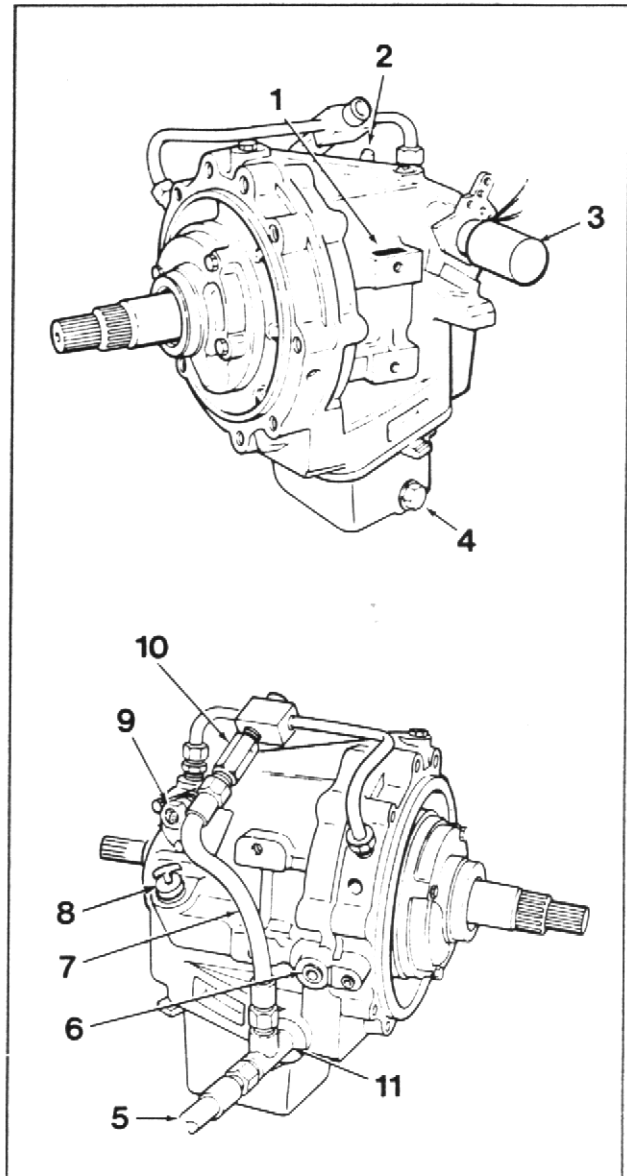
- 1 Serial number
- 2 Breather
- 3 Electric solenoid
- 4 Drain plug
- 5 Cooler return hose
- 6 Outlet to oil cooler
- 7 Bypass hose
- 8 Dipstick
- 9 Safety start switch
- 10 Converter relief valve
- 11 Return from oil cooler

Forward is direct drive. A planetary gear set (1.1:1 ratio) is used to obtain reverse.

The transmission oil pump is driven by the converter drive lugs. It supplies oil pressure to operate the clutch packs, lubricate parts, and provide cooling.

Converter & Input Shaft

The converter impeller is driven by the engine and turns at engine speed. Hydraulic fluid, from the impeller (22), moves the turbine (21), causing it to turn and drive the input shaft (24). Under stall conditions, turbine speed can be zero. A sprag clutch permits the stator (23) to free-wheel in the direction of engine rotation. The sprag clutch prevents stator rotation opposite to engine rotation.

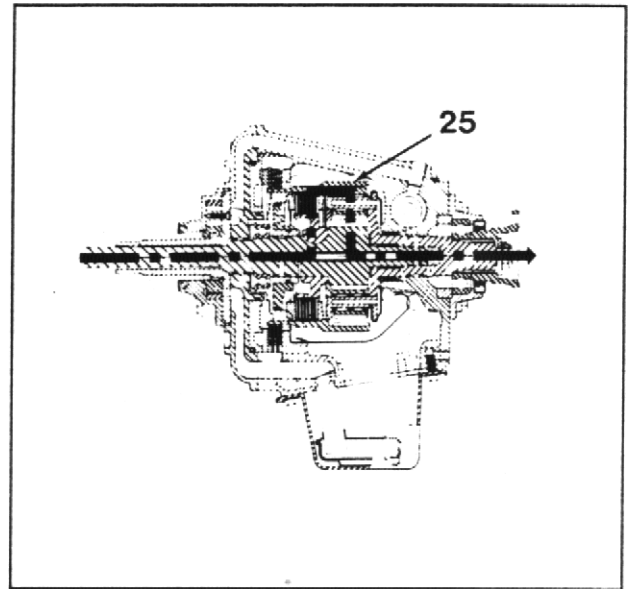


TRANSMISSION

Hydraulic Transmission

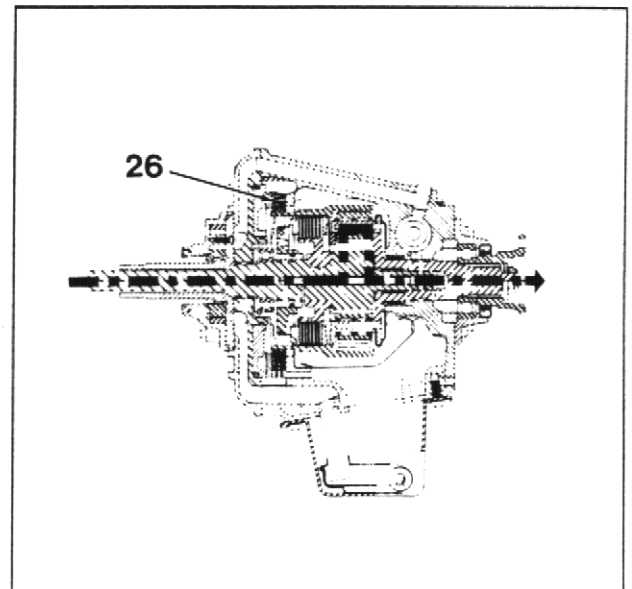
Forward power flow

The forward clutch (25) is applied hydraulically when the shift lever is placed in the forward position. This connects the input shaft to the output shaft. The unit then transmits power at a 1 to 1 speed ratio in the same direction of rotation as the engine.



Reverse power flow

The reverse clutch (26) is applied hydraulically when the shift lever is placed in reverse position. The applied clutch holds the ring gear. The input shaft and sun gear, driven by the engine, drive pinions, which drive the carrier output shaft. The output shaft turns opposite to engine rotation at a 1.1:1 speed reduction ratio.



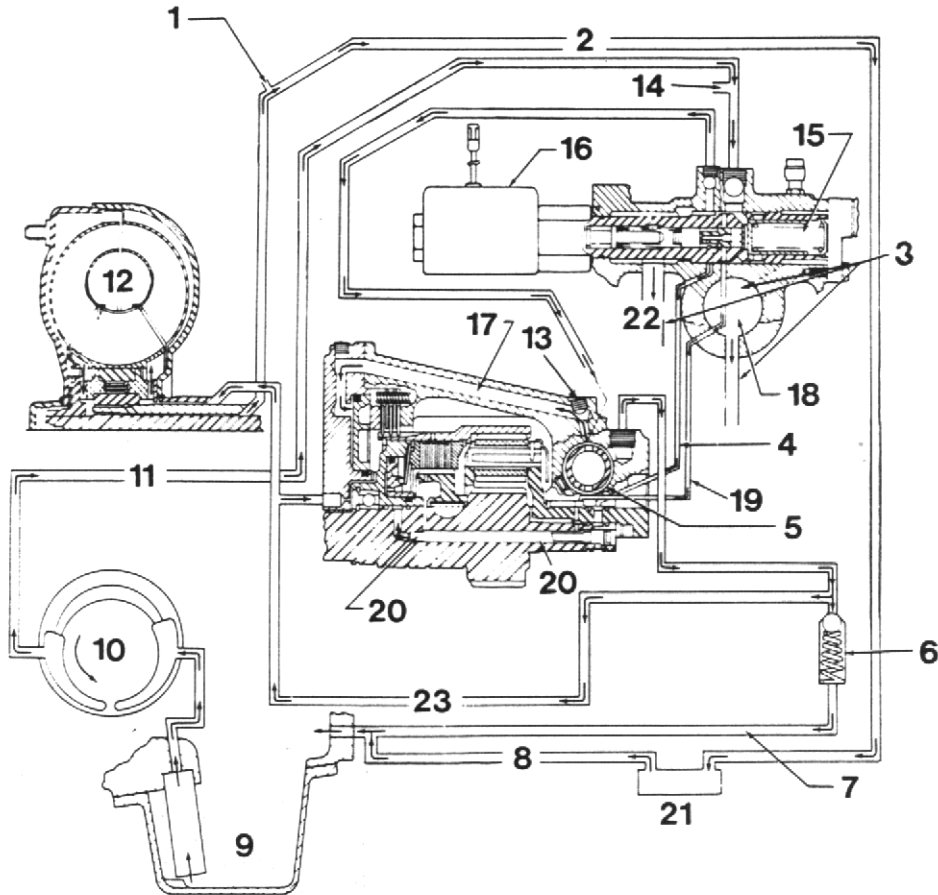
Technical specification

DESCRIPTION	SPECIFICATION
Speeds	One Forward One Reverse
Horsepower (net)	
Intermittent - Frwd/Rev	60 @ 2200 RPM
Continuous Forward	45 @ 2200 RPM
Continuous Reverse	30 @ 2200 RPM
Maximum Torque	400 lb.-ft.
Maximum Input Speed	3000 RPM
Weight with converter housing	140 lbs.

TRANSMISSION

Hydraulic Transmission

Hydraulic circuit



- | | |
|---|--|
| 1 Converter out pressure tap - 1/8" gas plug located on right side near midpoint of adaptor | 14 Line pressure tap - 3/8" BSP plug located over selector valve |
| 2 Converter out to cooler - external | 15 Regulator valve |
| 3 Drain holes to oil pan | 16 Electric solenoid |
| 4 Forward clutch pressure tap (located behind shift lever) | 17 Reverse clutch feed |
| 5 Selector valve: forward/neutral/reverse | 18 Rear bearing lube |
| 6 Converter relief valve | 19 Lube line |
| 7 Return from converter relief valve | 20 Forward clutch feed |
| 8 Cooler - return to oil pan | 21 Cooler |
| 9 Oil pan | 22 To sump |
| 10 Pump | 23 External converter feed pipe |
| 11 Pump to regulator and selector valve | |
| 12 Converter | |
| 13 Reverse clutch pressure tap - a 1/8" gas plug centred at rear over valve | |

Hydraulic circuit

Oil from the sump enters the pump suction passage and is directed to the pump. The pump supplies oil under pressure through passages to the pressure regulator and selector valve.

Oil pressure on the end of the regulator valve moves the valve, compressing the spring. This movement allows oil to flow to the converter. Oil from the converter goes to cooler and returns to sump.

Check valve

An external check valve is located in the pipework running from the valve body to the front of the case. The check valve dumps excess hydraulic fluid back to the sump and prevents high converter pressure.

Selector valve

The selector valve shifts transmission from neutral to forward or reverse. When selector valve is placed in the forward position, oil is directed to the forward clutch. When the selector valve is placed in reverse position, oil is fed to the reverse clutch. When one clutch is engaged the other is exhausted by a slot in the selector valve.

Dump valve

The dump valve does not regulate pressure. It is either on or off. The dump valve is operated electrically.

INSPECTION

General

The transmission, cooler, cooler lines, and control linkage should be inspected at regular intervals. Regular inspections will ensure proper operation and help detect minor problems that can be corrected before they cause a transmission failure.

Scheduled inspections

The following recommended inspection intervals are based on normal operating conditions. Intervals should be adjusted for extremes of temperature or other adverse operating conditions.

TRANSMISSION

Hydraulic Transmission

INSPECTION INTERVAL			
INSPECTION TASK	WEEKLY	PERIODIC 1 month or 100 hours, whichever comes first	SAFETY Annual or 1000 hours, whichever comes first
<p>GENERAL</p> <p>WARNING: FAILURE TO PERFORM THESE INSPECTIONS AT REQUIRED INTERVALS CAN RESULT IN INJURY TO PERSONNEL.</p> <p>Inspect control linkage and shift lever for operation. There should be no sticking, binding, or looseness.</p>		X	X
<p>OIL COOLER AND LINES</p> <p>CAUTION: Failure to perform these inspections at required intervals can result in transmission failure.</p> <p>Inspect cooler for signs of leakage, damage, or loose mounting bolts.</p> <p>Inspect all connection points for signs of leaks.</p>		X	X
<p>TRANSMISSION</p> <p>Inspect for damage or signs of leakage around housing and/or bolts.</p> <p>Remove dipstick. Check oil for signs of water or other contaminants. Check (smell) oil for signs of burnt oil (overheating). If found, replace fluid. See Maintenance.</p> <p>Inspect breather. Check for movement of cap. If no movement replace breather. Check mounting bolts for tightness. If loose, tighten to torque specified.</p>	X	X	X
<p>ELECTRIC SOLENOID</p> <p>Inspect connector on electric solenoid for looseness, corrosion or damage. Clean or repair as required.</p>		X	

MAINTENANCE

General

Maintenance to the transmission will normally consist of the following items.

- Checking oil level or changing oil. Regular scheduled oil changes are an important part of transmission maintenance.

WARNING: *SHIFT LINKAGE AND DUMP VALVE CONTROLS MUST BE ADJUSTED FOR PROPER OPERATION OF TRANSMISSION.*

- Checking pressure in each circuit (if a problem is detected).
- **CAUTION:** Transmission mounting bolts should be checked and tightened to torque specified. Do not overtighten. Damage to the transmission can result.

Lubrication.

Check Oil Level.

- **CAUTION:** Clean around the area of dipstick, before removing. Small particles of dirt can cause damage to internal components and cause valves to stick.
- Place selector lever in neutral. Run engine until oil is warm. Shut off engine. Immediately insert clean dipstick and read oil level.

NOTE: Oil level must be checked immediately to prevent an incorrect reading. Oil drains back into transmission from cooler, lines, and converter.

- If oil level is below full, add fluid.

NOTE: Hydraulic fluid - see *SERVICE DATA*. Do not mix different oils.

- Install dipstick. Run engine, as before, and check for correct level.

Hydraulic Transmission

Changing Oil

Oil in transmission, converter and cooler should be changed after every 1,000 hours of operation. Severe service conditions or high operating temperatures may require more frequent changes.

- Place selector lever in neutral. Run engine for five minutes at a fast idle. Shut down engine.

CAUTION: Clean around the area of drain plug, before removing. Small particles of dirt can cause damage to internal components and cause valves to stick.

- Remove drain plug and drain oil from transmission, cooler, and cooler lines into a suitable container.

NOTE: About half the oil in the converter will drain.

- Check oil for signs of metal or rubber particles.

CAUTION: A few small metal particles are normal. However, if large metal chips or a large number of particles are found, this could be an early sign of transmission failure. The transmission should be disassembled and inspected for internal damage.

NOTE: Particles of rubber can indicate cooler line wear. Each line should be inspected for cracks or fraying and should be replaced if damaged.

NOTE: When metal or rubber particles are found, or if hydraulic fluid is found to be contaminated, the sump and internal strainer should be removed and cleaned.

- Fill transmission with new hydraulic fluid.

NOTE: The amount of oil required will vary based on length of cooler lines. Use an amount equal to about three-fourths the quantity removed.

- Install dipstick. Run engine for two minutes to fill cooler and cooler lines with oil. Top-up oil to the correct level.

TROUBLESHOOTING

General

Before troubleshooting the transmission, do the following.

- Check oil level and condition of oil. See Maintenance for details.
- Check transmission, oil cooler and oil cooler lines for physical damage or leakage. Correct any problem.
- Check that engine, converter, or drive train are not causing the problem.

Perform all pressure checks at normal operating temperature. Refer to Specification section for details. Pressure gauges used should have a range of 0-200 or 0-300 psi. They must be accurate.

CAUTION: Never stall transmission for periods exceeding 15 seconds. Shift into neutral and let transmission cool. Failure to do this can result in severe damage to transmission.

Perform stall checks in forward or reverse while applying service brakes and with engine at full throttle.

Guidelines

When troubleshooting, shift into each selector position to determine when noise or problem occurs. Determine which parts are moving. This will help pinpoint the cause. Use the following information as a guide to common problems.

Converter

Some transmission problems are converter related. Check and/or replace converter when the following problems occur.

- Poor acceleration with reduced maximum speed and overheating (stall speed normal) indicates stator one-way clutch has locked in engaged condition

Hydraulic Transmission

- A tinny sound coming from converter indicates defective converter blades.
- A large drop in stall speed indicates that converter one-way clutch is not holding.

Clutches

Check and/or replace clutches when the following problems occur.

- A high stall speed. This can indicate a slipping clutch. The slipping clutch will usually squeal.

NOTE: The slipping clutch will normally overheat. This can result in warped plates. In severe overheating plates can weld together. This will cause a lock-up condition in transmission when other clutch is applied.

- No drive or reduced drive in one direction can indicate faulty clutch parts.

WARNING: DO NOT OPERATE TRANSMISSION IF THE FOLLOWING CONDITION IS SUSPECTED. FAILURE TO COMPLY CAN RESULT IN PERSONAL INJURY BECAUSE TRANSMISSION CAN NOT BE DISENGAGED.

- Drive in forward or reverse when transmission is in neutral.

NOTE: This will normally cause a lock-up condition when other clutch is applied.

TRANSMISSION

Hydraulic Transmission

Troubleshooting Tables

PROBLEM	CAUSE	CORRECTION
LEAKS: 1. At pump or output shaft seal. 2. Between seal and bore. 3. At gasket(s). 4. Loss of oil with no trace of missing oil. 5. Oil out of breather.	 Faulty seal. Misalignment. Rough shaft. Rough housing bore. Loose bolts. Defective gaskets. Face(s) not flat. Oil leaking from cooler or cooler lines. High oil level. Water in oil.	 Replace. Correct. Replace. Replace seal. Torque bolts properly. Replace gaskets. Replace defective parts. Replace cooler, or cooler lines that are defective. Correct oil level. Change oil.
MALFUNCTION IN FORWARD AND REVERSE: 1. Low oil pressure. 2. No oil pressure. 3. High oil temperature.	 Regulator valve jammed. Internal leakage. Low oil level. Pump defective. Regulator valve jammed. Internal leakage. Pump defective. No oil. Regulator valve jammed. Cooler line defective. Restrictions in cooler lines or cooler.	 Clean and polish. Replace defective sealing rings. Add oil. Replace pump. Clean and polish. Replace defective parts. Replace pump. Add oil. Clean and polish. Replace cooler line. Back flush to remove restrictions.

TRANSMISSION

Hydraulic Transmission

Troubleshooting Tables (continued)

PROBLEM	CAUSE	CORRECTION
MALFUNCTION IN FORWARD AND REVERSE: (Cont.)		
3. High oil temperature.	Defective cooler.	Replace cooler.
	Defective temperature sensor.	Replace sensor.
4. No power, noise.	Broken gear teeth — gears not meshed.	Replace defective parts.
5. No line pressure.	Heavy weight oil (90 weight).	Remove and use proper weight oil.
	Suction tube blocked.	Inspect and clean.
6. Noisy in Forward and Reverse.	Misalignment of converter housing or converter with engine.	Align converter and housing.
	Damaged gears.	Replace damaged gears.
	Worn universal joints.	Repair or replace.
7. Harsh shift from forward-reverse or reverse-forward	Declutching electric solenoid inoperative.	Test electrical circuit for current to solenoid. If no current repair or replace defective parts.
		Test electric solenoid. Replace if defective.
MALFUNCTION IN REVERSE:		
1. Clutch drags or does not release.	Warped clutch plate.	Replace defective parts.
	Mechanical failure.	Replace defective parts.
	Tight pack clearance.	Increase clearance to specification.
2. Clutch does not apply.	Low pressure.	See low oil pressure.
	Defective parts.	Replace defective parts.
3. Harsh engagement.	High pressure - valve sticking.	Clean and polish regulator valve.
	Engine idle too fast.	Adjust engine idle.
	Linkage binding or misadjusted.	Repair as required
4. Soft engagement.	Low pressure.	See low oil pressure.
5. Won't move or sluggish.	Forward clutch seized.	Replace defective parts.
	Worn or broken sealing rings.	Replace defective parts.

TRANSMISSION

Hydraulic Transmission

Troubleshooting Tables (continued)

PROBLEM	CAUSE	CORRECTION
MALFUNCTION IN FORWARD: 1. Clutch drags or does not release. 2. Clutch does not apply. 3. Harsh engagement. 4. Soft engagement. 5. Won't move or sluggish.	Warped clutch plate. Mechanical failure. Tight pack clearance. Low pressure. Defective parts. High pressure - valve sticking. Engine idle too fast. Linkage binding or misadjusted. Low pressure. Reverse clutch seized. Worn or broken sealing rings.	Replace defective parts. Replace defective parts. Increase clearance to specification. See low oil pressure. Replace defective parts. Clean and polish regulator valve. Adjust engine idle. Repair as required See low oil pressure. Replace defective parts. Replace defective parts.
MISCELLANEOUS PROBLEMS: 1. Hydraulic noise or buzz. 2. Gear noise in forward. 3. Gear noise in reverse.	Low oil level, or air in hydraulic circuit. Regulator valve sticking. Broken, pitted, or cracked gear teeth. Broken, pitted, or cracked gear teeth.	Check oil level and fill if low. Operate engine in neutral at 1200 RPM to remove air. Clean and polish. Replace defective parts. Replace defective parts.
MALFUNCTION IN NEUTRAL: 1. Drives in forward direction. 2. Drives in reverse direction.	Warped forward clutch plates or mechanical failure of clutch. Exhaust blocked in control valve. Warped reverse clutch plates or mechanical failure of clutch. Exhaust blocked in control valve.	Replace defective parts. Clean control valve. Replace defective parts. Clean control valve.

TRANSMISSION

Hydraulic Transmission

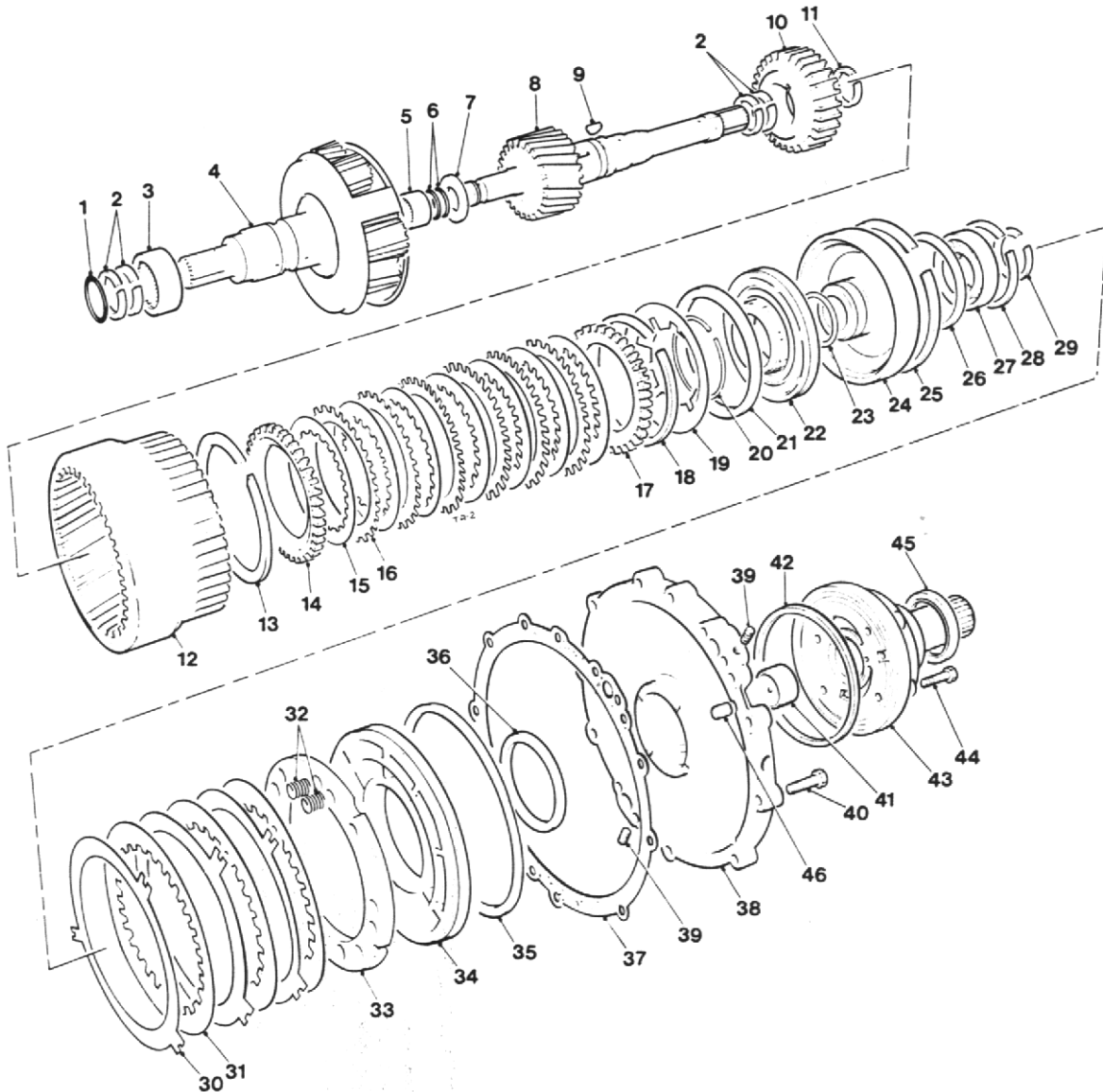
Troubleshooting Tables (continued)

PROBLEM	CAUSE	CORRECTION
MALFUNCTION IN NEUTRAL: (Cont.)		
3. Noisy in neutral only.	Worn bushings in pump.	Replace pump.
	Worn sprag or sprag races in converter.	Replace converter.
	Oil level low.	Add oil.
4. Transmission overheating.	Oil level low. Cooler too small or restricted lines.	Add oil.
	Pump pressure low - worn or damaged pump.	Check pressures. If low, inspect pump. If worn or damaged, replace.
	Converter sprag clutch worn and slipping.	Replace converter.
	Clutches slipping.	Check sealing rings. Replace if damaged.
	Internal leakage bypassing cooler.	Locate and fix leak.
	Temperature sensor defective.	Replace sensor.

TRANSMISSION

Hydraulic Transmission

ADAPTOR, INPUT SHAFT & CLUTCH ASSEMBLY

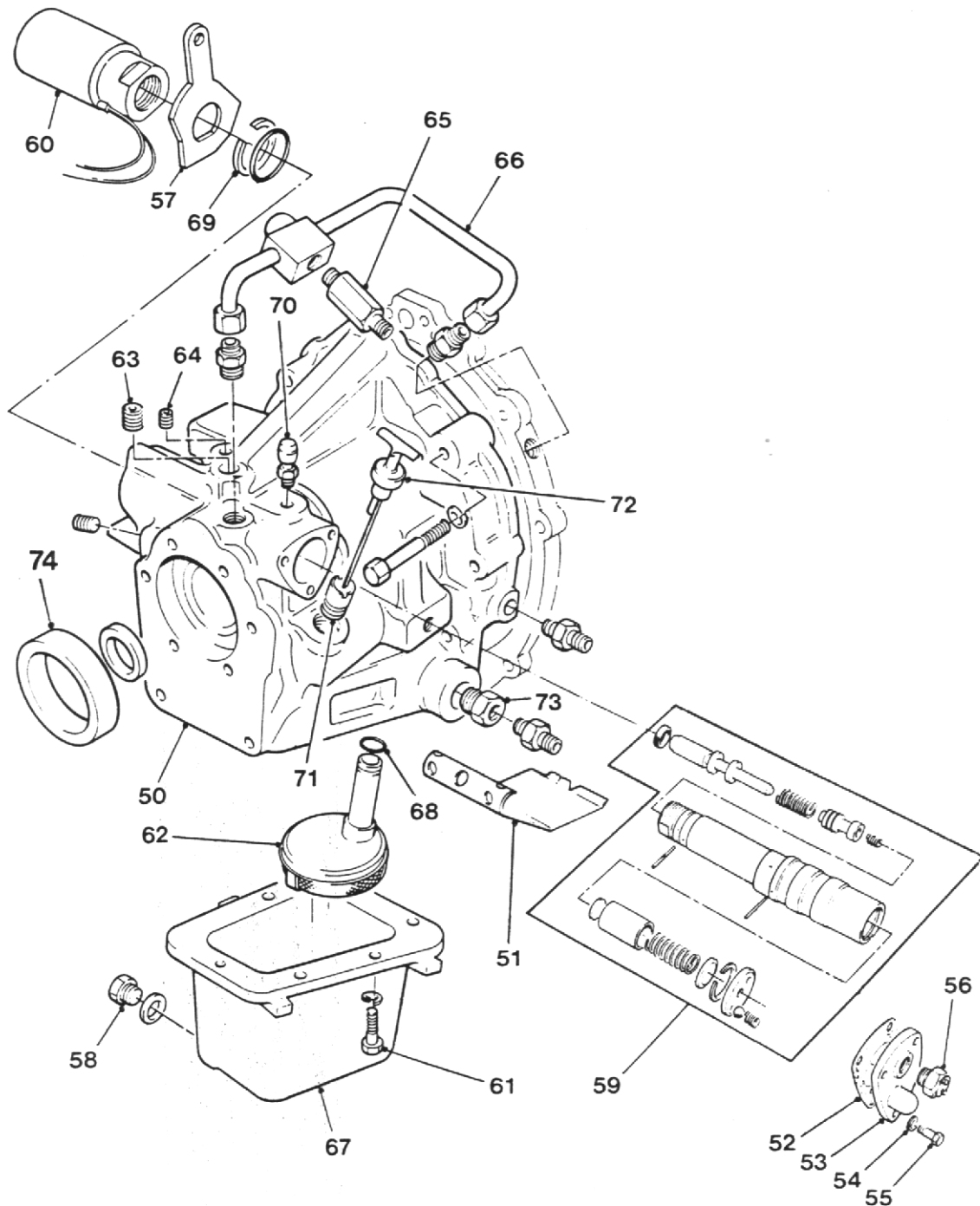


- | | | |
|------------------------------|---------------------------------|------------------------------------|
| 1 'O' RING | 16 PLATE, clutch, steel | 31 PLATE, friction, reverse clutch |
| 2 RING, sealing | 17 PLATE, pressure | 32 SPRING, pressure plate |
| 3 BEARING, needle | 18 RING, snap | 33 PLATE, pressure, reverse clutch |
| 4 CARRIER | 19 SPRING, belleville, clutch | 34 PISTON, reverse clutch |
| 5 BEARING, needle | 20 RING, bearing, clutch spring | 35 RING, sealing |
| 6 RING, sealing | 21 RING, sealing, piston | 36 RING, sealing |
| 7 WASHER, thrust, clutch hub | 22 PISTON | 37 GASKET, adaptor |
| 8 DRIVE GEAR assembly | 23 RING, sealing | 38 ADAPTOR, forward/reverse |
| 9 KEY, woodruff | 24 CYLINDER, forward clutch | 39 PLUG, dryseal |
| 10 HUB, forward clutch | 25 RING, snap | 40 BOLT, hex head |
| 11 RING, snap | 26 WASHER, thrust | 41 BUSH |
| 12 GEAR, ring | 27 BEARING | 42 GASKET, pump |
| 13 RING, snap | 28 RING, snap | 43 PUMP assembly |
| 14 PLATE, pressure | 29 RING, snap | 44 BOLT, hex head |
| 15 PLATE, clutch, friction | 30 PLATE, steel, reverse clutch | 45 SEAL, oil |
| | | 46 DOWEL |

TRANSMISSION

Hydraulic Transmission

CASING AND SOLENOID



50 CASE, transmission
51 BAFFLE
52 GASKET
53 COVER
54 WASHER, locking
55 BOLT, 7/8" long
56 SWITCH, neutral
57 LEVER, shift

58 PLUG, drain
59 VALVE, forward/reverse
60 SOLENOID
61 BOLT, 1" long
62 STRAINER, oil
63 PLUG, 3/8 - 18
64 PLUG, 1/8 - 27
65 CHECK VALVE, assembly

66 TUBE, converter feed
67 PAN, oil
68 'O' RING
69 RING, snap
70 BREATHER
71 TUBE, filler
72 DIPSTICK
73 BUSHING, pipe
74 SLEEVE

Hydraulic Transmission

OVERHAUL

General

Before removal and dismantling, review the following procedures. Use the proper hand tools, slings, or hoists for the job.

WARNING: KEEP WORK AREA, TOOLS, AND TRANSMISSION CLEAN. WIPE UP ANY SPILLED TRANSMISSION FLUID TO PREVENT ACCIDENTS. AS REQUIRED, WEAR SAFETY GLASSES, SAFETY SHOES AND A HARD HAT TO PREVENT PERSONAL INJURY.

Dismantling

General

Before starting dismantling, review the exploded-view illustrations. The transmission can be disassembled by following the index numbers on the illustrations. Note the following items:

- Remove O-rings, sealing rings, and oil seals carefully to prevent damage if they must be reused. Good maintenance practice recommends that these be replaced at overhaul.
- Do not press out bearings unless an inspection indicates repair/replacement is required, or cleaning can not be done properly.
- Keep matched parts or sets together. Do not reverse or mix them.

Valve - Forward/Reverse

Remove the three hex head bolts (55) with lockwashers (54), switch (56), cover (53), and gasket (52) from transmission case (50).

Remove shift lever (57) and associated parts. Pull valve assembly (59) from transmission case bore.

Oil Baffle

Press down on front end of oil baffle (51), forcing baffle locating holes off special bosses. The baffle can then be removed from case.

TRANSMISSION

Hydraulic Transmission

Pump

Remove pump to adaptor bolts (44) and pull pump straight forward from transmission. It may be necessary to tap pump with plastic hammer to free it from the gasket and snap fit. Never strike the pump bolt bosses as the pump bolts seal against faces of bosses.

Place pump (43) on bench with converter support resting on bench and remove the flat head screw. Lower the housing and gears straight down to bench. Mark gears with a marking pencil so gears can be replaced with gear faces located as they were when removed.

Inspect gears for nicks, excessive wear, cracks or mutilation. Check drive gear bushing for wear. Stator support should be checked for face and journal wear. Check housing gear pockets for wear or other damage. Oil seals should always be replaced.

Pumps are only serviced as assemblies. The oil seal is the only pump part which can be purchased separately.

Adaptor

Disconnect and remove the connector tube assembly and fittings.

Remove capscrews (40) from adaptor and remove the adapter (38). The reverse clutch pressure plate (33) may stick to piston (34) and should be caught to prevent damage. Use compressed air to force the reverse clutch piston (34) from the adaptor. Remove the sealing rings from piston and adaptor.

Inspect reverse clutch piston and adaptor for wear, scoring and burrs. Replace all sealing rings which are found to be brittle or mutilated. It is suggested that all sealing rings and gaskets should always be discarded and replaced with new ones.

Reverse Clutch

Remove clutch pressure plate (33) pressure plate springs (32) dowel pins (46) and clutch plates.

Check clutch plates for wear, scoring, burrs and overheating. All plates should be flat. Springs should not be bent or mutilated and should all have approximately the same free height.

Hydraulic Transmission

Forward Clutch and Drive Gear

Remove the thrust washer (26) from front face of clutch cylinder.

Pull drive gear and clutch assembly from case.

Remove the thrust washer (7) from front face of pinion cage and output shaft.

Place drive gear and clutch assembly in a suitable fixture and remove the snap ring (29) from the groove in drive gear. Drive gear (8) and forward clutch hub can be pressed or a soft hammer may be used to drive these parts from the remaining clutch parts.

Remove the two cast iron sealing rings (2) from the carrier (4).

The clutch hub (10), can be pressed from the drive gear after removing the snap ring (11) from groove in drive gear.

Remove the snap ring (28) and annular bearing (27) from clutch cylinder bore.

Remove the ring gear snap ring (25) from the ring gear groove. Place ring gear and clutch assembly front face down on a suitable ring or fixture, which will clear the outside diameter of forward clutch cylinder. Use a 2.25 inch (57.15 mm) diameter bar to press against the exposed clutch cylinder hub to press clutch cylinder (24) and piston (22) out of ring gear (12).

Remove clutch spring (19) snap rings (13 & 18) and plates (14, 15, 16 & 17) from ring gear (12).

Use compressed air to force the piston (22) from clutch cylinder (24). Remove the sealing rings (21 & 23) from piston and clutch cylinder.

Inspect all clutch parts for wear, mutilation and scoring. Clutch friction (15) and steel (16) plates should be flat. All plates should not be damaged from heat or build-up. Check clutch spring (19) for cracks.

TRANSMISSION

Hydraulic Transmission

Pinion Cage and Output Shaft.

Pull pinion cage and output shaft (4) forward out of case. Use a soft hammer when necessary to drive shaft out of annular bearing (3).

Worn or damaged needle bearings should be pressed from case rear bore and a new bearing should be carefully pressed into case using proper tools to keep bearing aligned while being pressed into position.

Cleaning

WARNING: CLEANING SOLVENTS CAN BE TOXIC, FLAMMABLE, AN IRRITANT TO THE SKIN, OR GIVE OFF HARMFUL FUMES. AVOID PROLONGED CONTACT, INHALATION OF VAPORS, OR SMOKING. FAILURE TO COMPLY CAN RESULT IN INJURY OR DEATH TO PERSONS.

- Rinse all metal parts in solvent to remove dirt, grease, and transmission fluid.
- Take special care to remove all solvent from oil passages, grooves, and bearings.
- Air dry clutch plates.
- If O-rings are to be re-used, air dry them.

Inspection

General

- Inspect case for cracks. Check sealing surfaces for nicks, scratches, or burrs that can cause leaks.
- Inspect gears for unusual wear patterns, chipped, cracked, or broken teeth.
- Inspect bearings for chips, cracks, galling, or missing bearings. Checks for signs of over-heating.
- Inspect threaded parts for stripped, damaged threads, or burrs.
- Inspect springs for distortion, cracks, or other damage.

Hydraulic Transmission

Repair

General.

- Remove scratches, burrs, or minor surface defects with very fine emery cloth.
- Threaded holes can be retapped using the same size tap. Do not make the holes oversize.
- Replace damaged screws, nuts or 'O' rings.

Assembly.

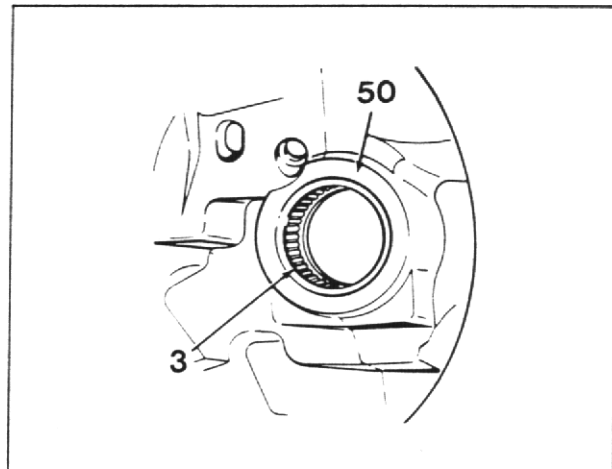
General.

- Prior to assembly, dip or coat internal parts with transmission fluid. Let excess fluid drain off.
- Use a light coat of vasoline to position or hold a gasket, O-ring, or small part for assembly. Apply to sealing rings before assembly.
- Inspect assemblies pressed together for proper fit and position.
- Check that each snap ring is fully engaged in groove.
- Threaded plugs, screws, and bolts should be tightened to the torques shown in *SPECIFICATIONS*.
- If removed, press sleeve (74) into back of transmission case.

NOTE: The following procedures are correct for most transmissions. However, some minor differences may be found on transmission being assembled.

If removed, press needle bearing (3) into case (50).

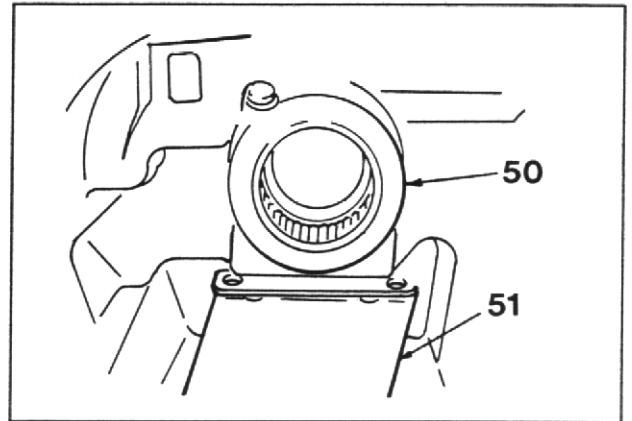
NOTE: Do not press bearing to bottom of bore. Bearing should be 1/8 to 3/16 inch below face of bore.



TRANSMISSION

Hydraulic Transmission

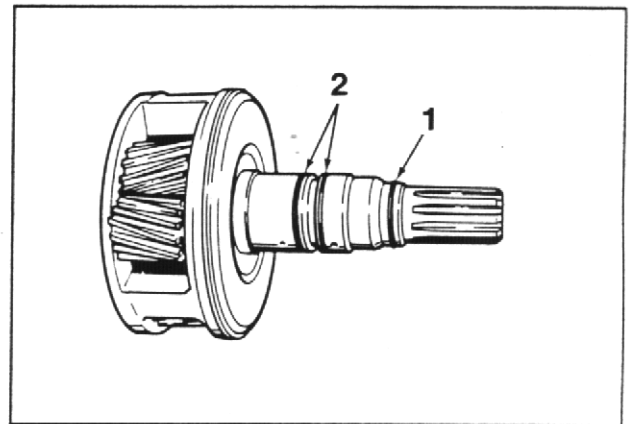
Install baffle (51) in case (50).



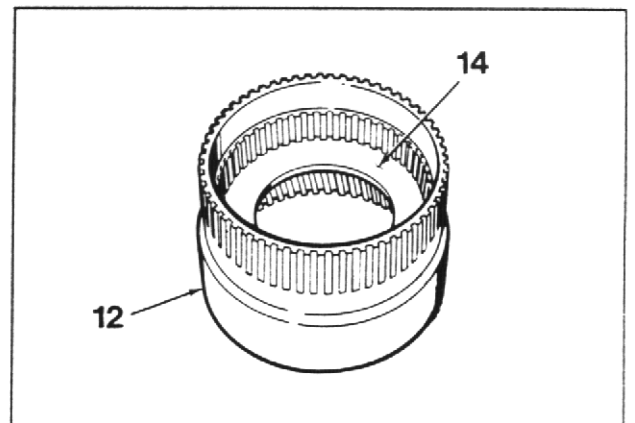
Lubricate 'O' ring (1) and sealing rings (2) with vasoline.

Install sealing rings in grooves of carrier. Compress each sealing ring until it locks in place.

Install 'O' ring in outer groove of carrier. Check that 'O' ring is not twisted or cut. Replace if damaged.

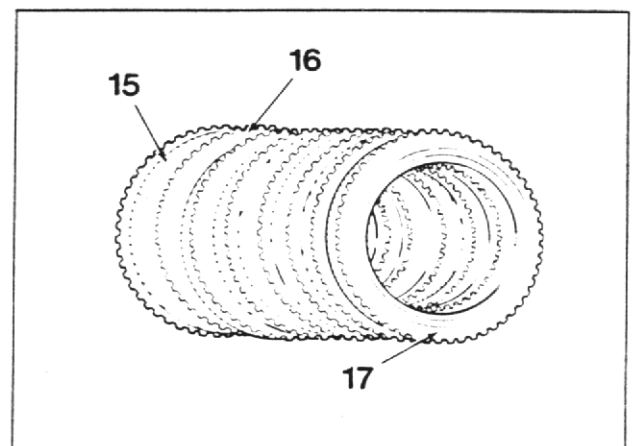


Install clutch pressure plate (14) in ring gear (12). Flat face upwards.



Starting with a friction clutch plate (15), alternately stack friction clutch plates and steel clutch plates (16).

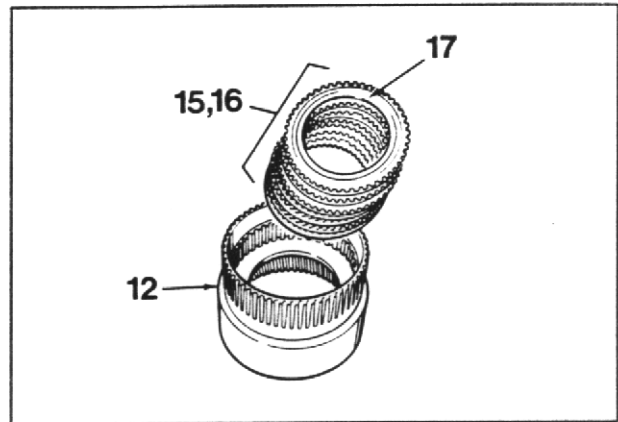
Place pressure plate (17) on top of clutch plates.



TRANSMISSION

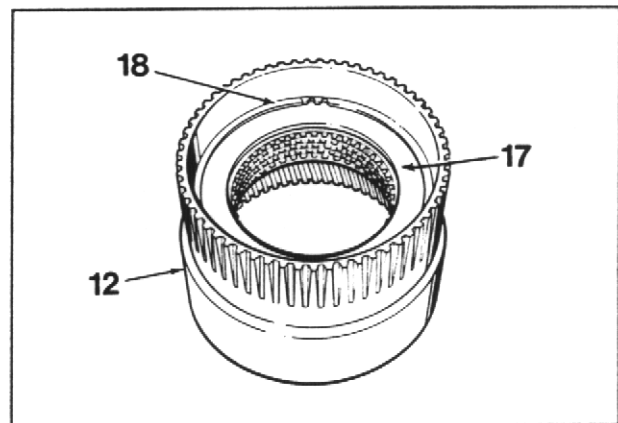
Hydraulic Transmission

Install clutch plates (15 & 16) and pressure plate (17) in ring gear (12).

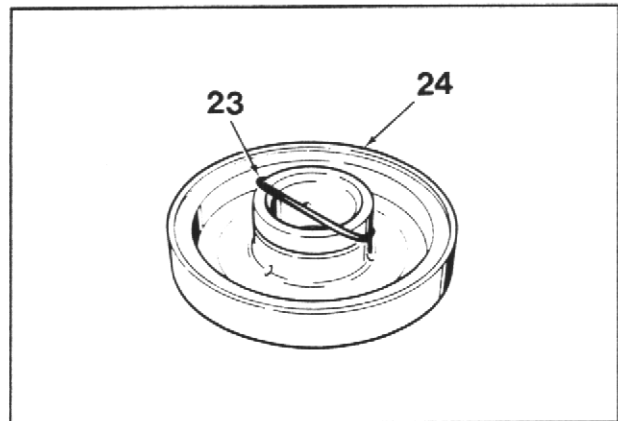


Install snap ring (18) in ring gear (12).

CAUTION: Several different snap rings are used to assemble the clutch group. They have different thicknesses. Be sure the correct snap ring is used.



Lubricate sealing 'O' ring (23) lightly with vasoline and install in groove of forward clutch cylinder (24).

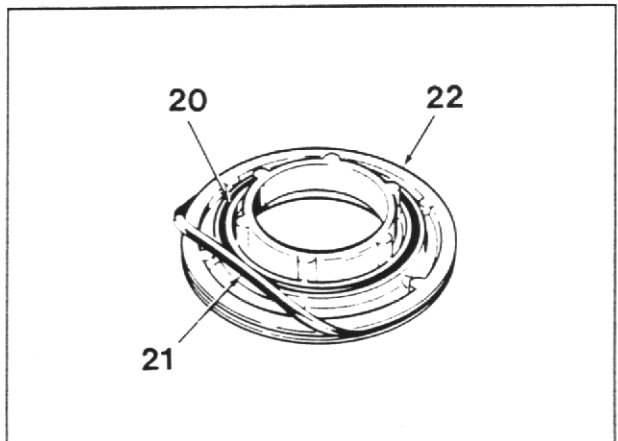


Lubricate clutch spring bearing ring (20) and piston sealing ring (21) with vasoline.

Install clutch spring bearing ring (20) in groove on piston (22) face.

Install piston sealing ring (21) in outer groove of piston (22).

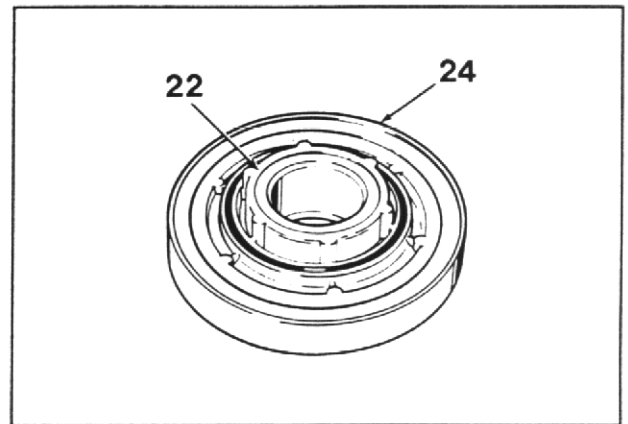
NOTE: Check that piston sealing ring is not twisted, cut, or deformed. Replace if damaged.



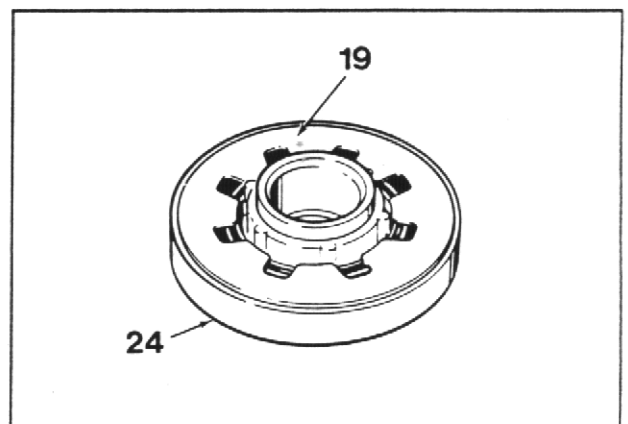
TRANSMISSION

Hydraulic Transmission

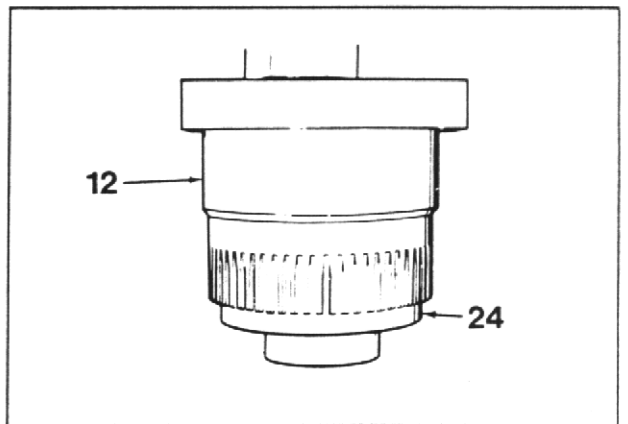
Install piston (22) in forward clutch cylinder (24).



Place clutch belleville (dish) spring (19) inside rim of forward clutch cylinder (24). Spring is dished. The inside of the spring should be lower than the outside.

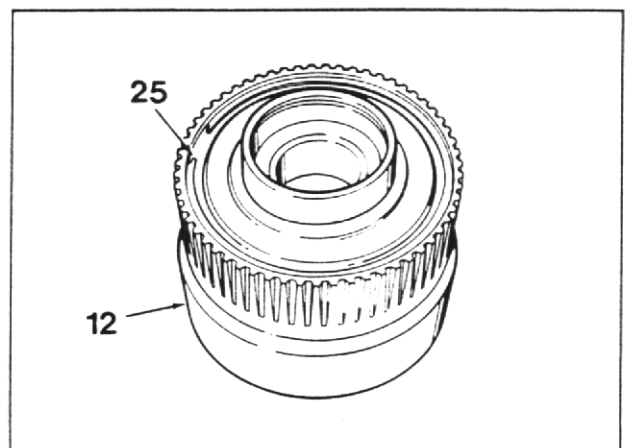


Install ring gear (12) over forward clutch cylinder (24), with piston (22) and spring (19) facing up. Press ring gear down over clutch cylinder.



Remove clutch assembly from press. Install snap ring (25) in groove of ring gear (12).

CAUTION: Several different snap rings are used to assemble the clutch group. They have different thicknesses. Be sure the correct snap ring is used.

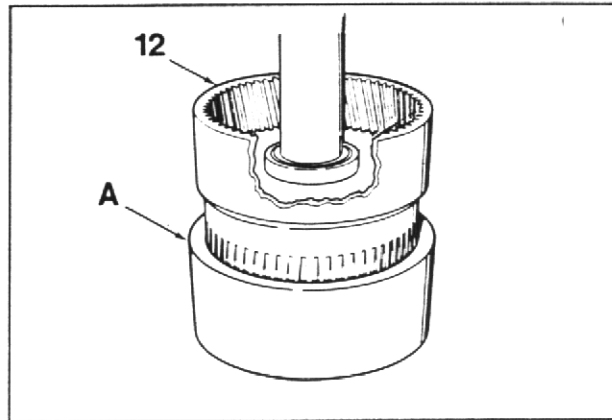


TRANSMISSION

Hydraulic Transmission

Place ring gear (12) in press with external splines facing down. Press clutch cylinder (24) against snap ring. This will give proper clutch pack clearance. Remove clutch assembly from press.

A Tool assembly



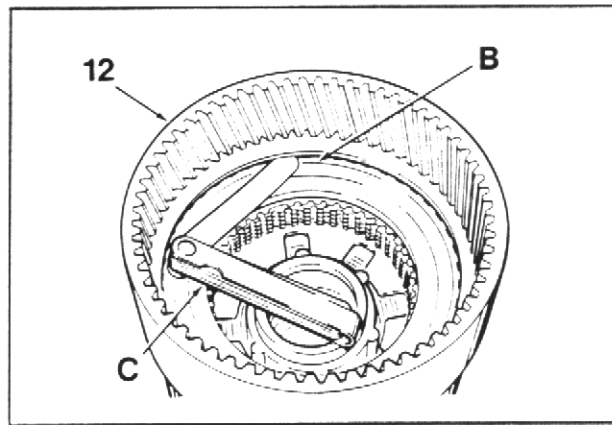
Push down, by hand, on clutch plates. Measure snap ring gap. Select proper thickness snap ring or combination of snap rings to set clutch pack clearance. Refer to chart below.

Part Number	Snap Ring Thickness		Colour
	in.	mm	
V600271	.050-.054	1.3-1.4	Green
V600272	.074-.078	1.9-2.0	Orange
V600273	.096-.100	2.4-2.5	White

Clearance for bronze pack 0.035"-0.054".

Clearance for paper pack 0.021"-0.046".

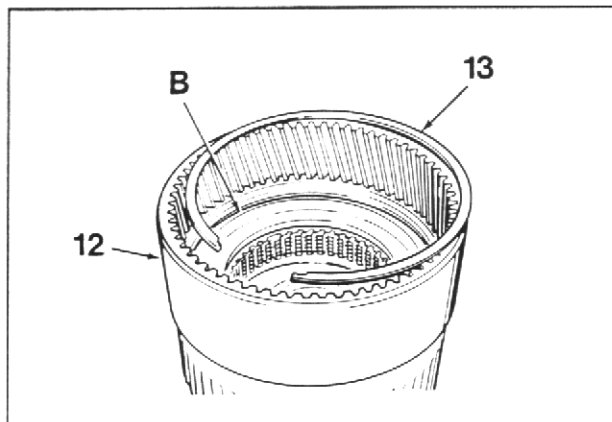
More than one snap ring may be required.



B Snap ring groove

C Feeler gauge

Install selected snap ring(s) (13) in groove of ring gear (12).

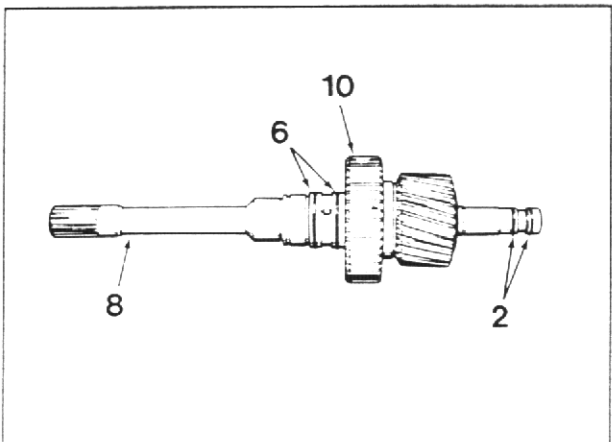


If removed, install woodruff key (9) in drive gear assembly (8). Slide forward clutch hub (10) on drive gear assembly (8) and align with woodruff key (9). Press forward clutch hub (10) onto drive gear assembly (8) and against shoulder.

Install snap ring (11) in groove of drive gear assembly.

Lubricate sealing rings (2 & 6) with vasoline and install in grooves of drive gear assembly (8).

Compress each sealing ring (2 & 6) until it locks in place.



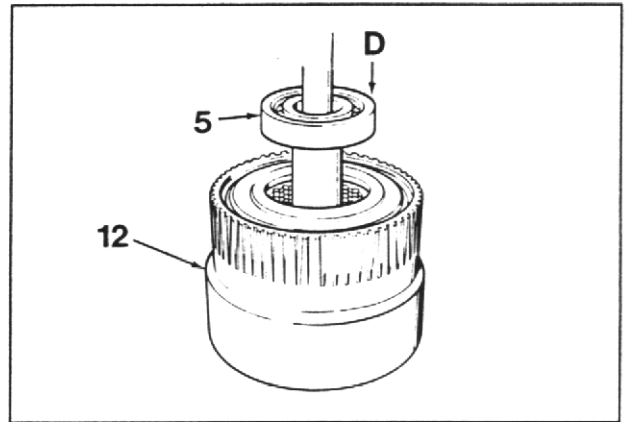
TRANSMISSION

Hydraulic Transmission

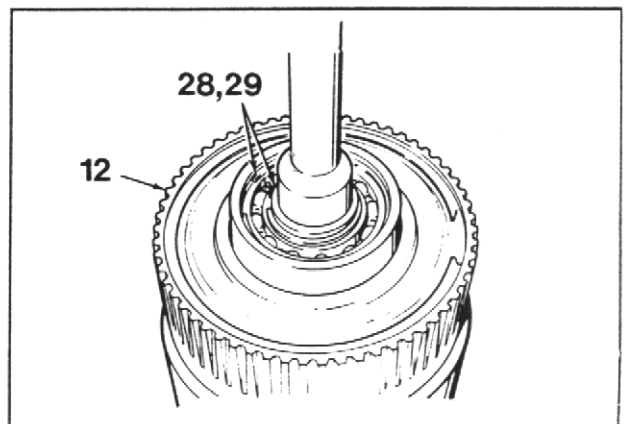
Install drive gear assembly (8) in ring gear (12).
Slide bearing (5) down drive gear assembly.

Place complete assembly in press. Press bearing
onto drive gear assembly (8) and against
shoulder.

D Press

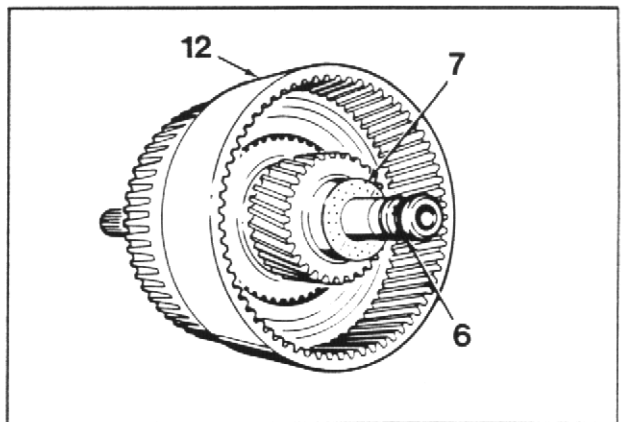


Install snap rings (28 & 29) in grooves of drive
gear assembly (8) and forward clutch cylinder
(24).



Apply vasoline to bronze thrust washer (7). Install
over end of shaft and against face of gear.

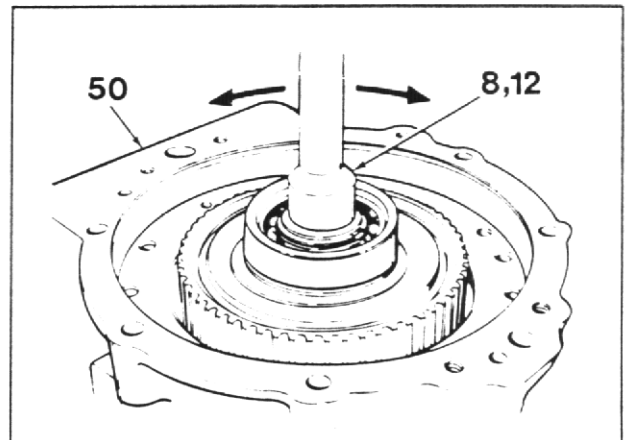
Lubricate sealing rings (6).



Install clutch and input shaft assembly (8 & 12) in
case (50).

CAUTION: Carefully lower assembly, making sure
sealing rings engage mating bore. Force fitting
can cut the rings.

Rotate clutch and input shaft group back and forth
to engage ring gear teeth with pinion gear teeth.



TRANSMISSION

Hydraulic Transmission

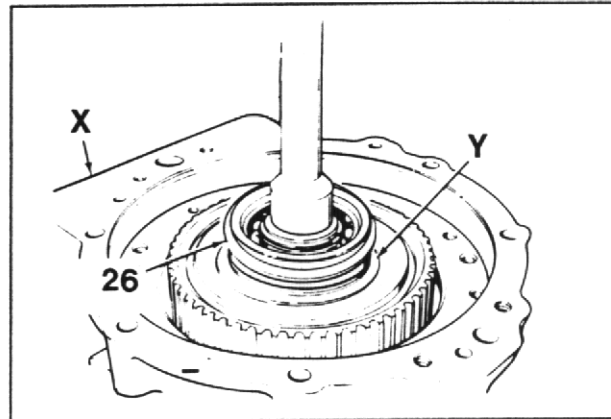
If original case and clutch cylinder are used. Install thrust washer (26) on face of clutch cylinder ('Y').

Select thrust washer (26) as follows:

Position case vertically as shown. Measure from face of case, 'X', without gasket, to face of clutch cylinder, 'Y'.

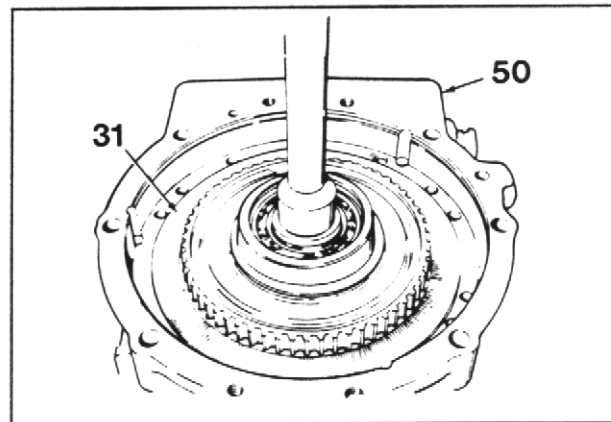
When dimension is 0.433 inch (11.0 mm) or less, use 500209 thrust washer.

When dimension is greater than 0.433 (11.0 mm), use 500210 thrust washer.



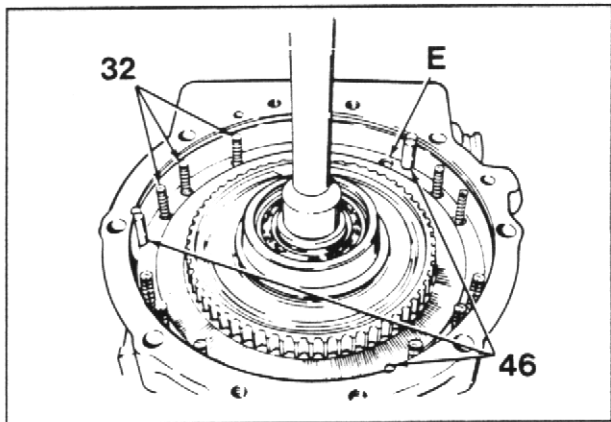
Install one bronze reverse clutch friction plate (31) in case.

NOTE: Models with paper reverse plates require a steel separator next to case.



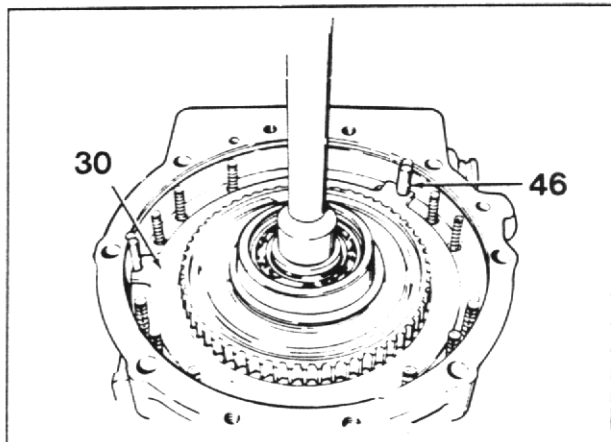
Install three dowel pins (46) and eleven pressure plate springs (32) in case.

E NOTE: One pressure plate spring has been deleted. Do not install a spring in this hole.



Install one reverse clutch steel plate (30) in case with large part of tab to left of dowel pin (46).

Alternately stack remaining reverse clutch friction plates (31) and reverse clutch steel plates (30) in case.

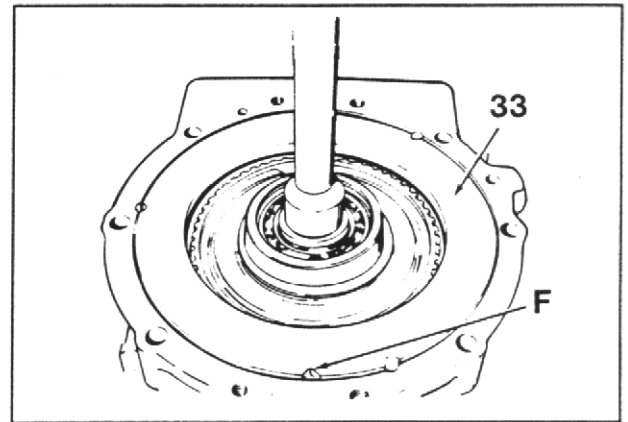


TRANSMISSION

Hydraulic Transmission

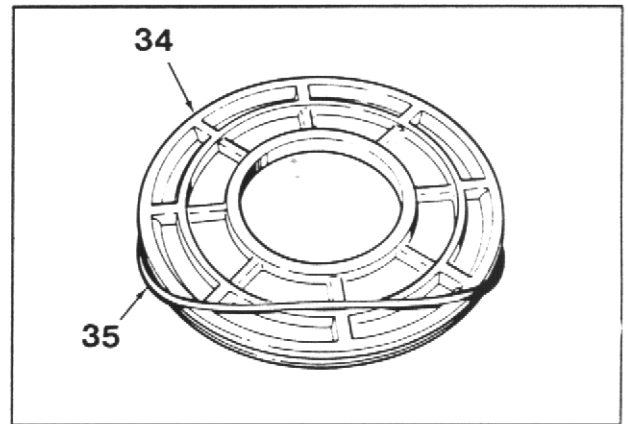
Install reverse clutch pressure plate (33) in case with three half moons aligned with dowel pins (46). Be sure all springs are seated in their holes.

'V' notch must be at position 'F'.



Lubricate sealing ring (35) with vasoline and install in groove of reverse clutch piston (34).

NOTE: Be sure sealing ring is not twisted, cut or distorted. Replace if damaged.



If removed, press adaptor bushing (41) into adaptor (38). Lip of adaptor bushing must be below chamfer in bore of adaptor (38).

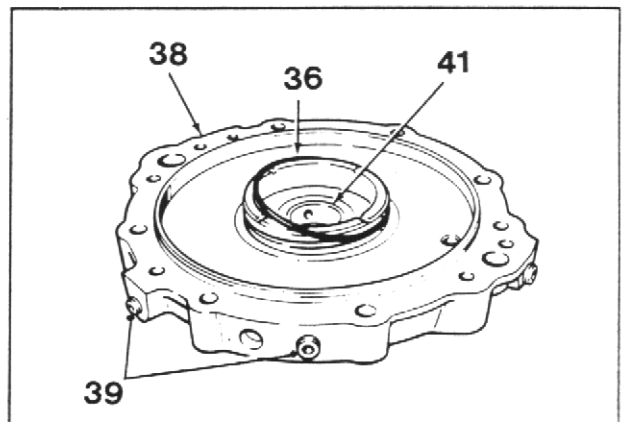
Lubricate sealing ring (36) with vasoline and install in groove of adaptor (38).

NOTE: Be sure sealing ring (36) is not twisted, cut, or distorted. Replace if damaged.

If removed, install dryseal plugs (39) in adaptor (38).

Service bushing not available. When replaced with a production bushing it is necessary to bore in position.

NOTE: The hole in bushing may be positioned anywhere in bore.

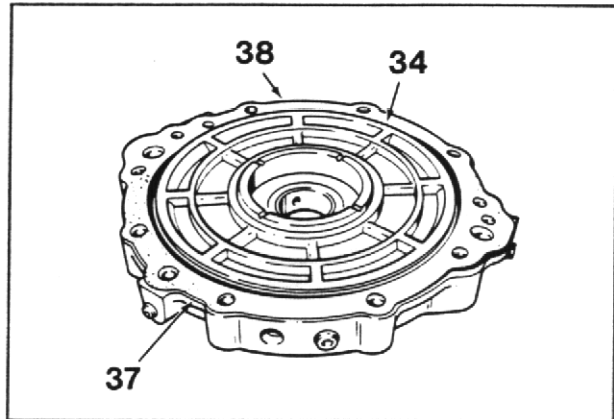


TRANSMISSION

Hydraulic Transmission

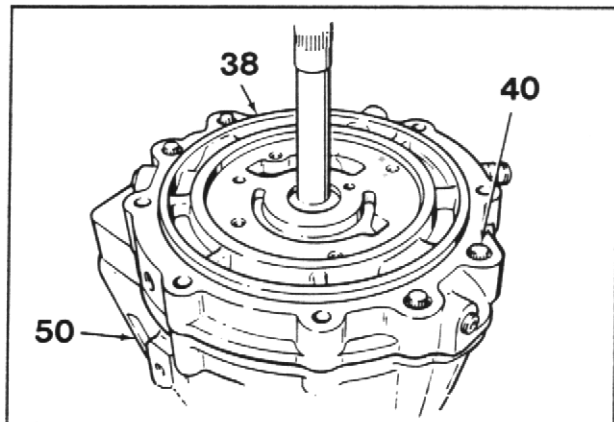
Install reverse clutch piston (34) in adaptor (38).

Lightly coat gasket (37) with vasoline and place on adaptor (38).



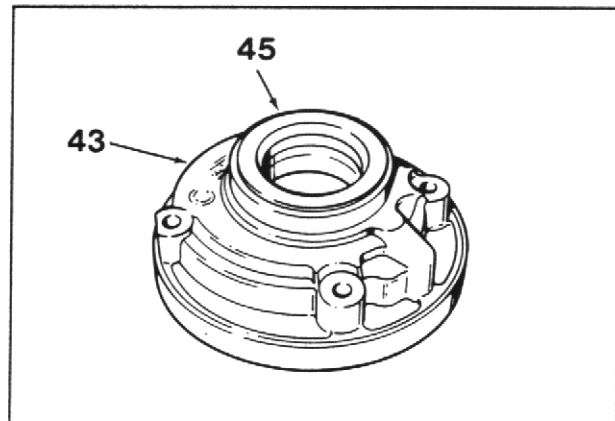
Install adaptor (38) on case (50) and align bolt holes.

Thread four bolts (40) into case. Tighten in a criss-cross pattern to final torque specified in "Specifications".



Press oil seal (45) into pump body (43).

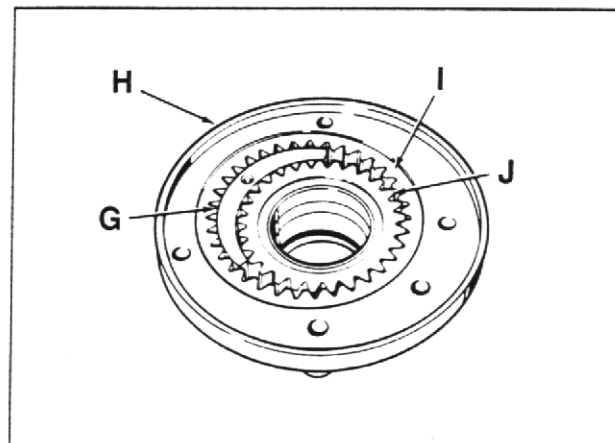
CAUTION: Oil seal must be installed dry. Lubricants can damage rubber coating.



Install gears in pump body.

NOTE: Pump gears should be installed the same side down as they were removed.

- G Crescent
- H Pump body
- I Driven gear
- J Drive gear



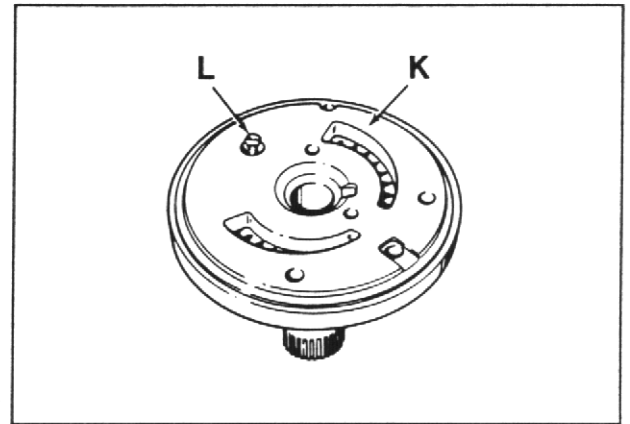
TRANSMISSION

Hydraulic Transmission

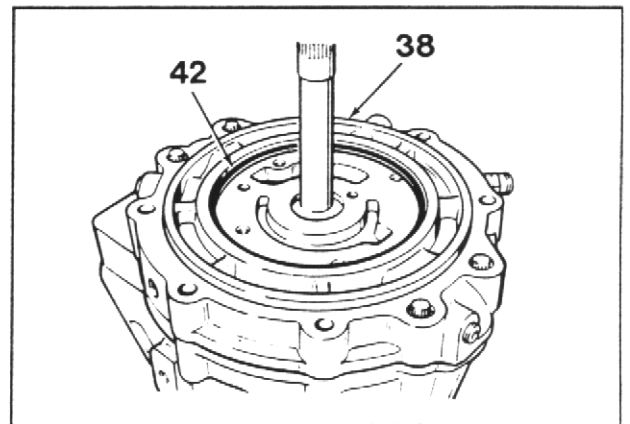
Install converter support (K) in pump body. While holding together install screw (L) and tighten.

NOTE: Using a small blade screwdriver, spin driven gear to be sure it turns freely without binding.

CAUTION: Internal bushing must be lightly coated with vasoline.



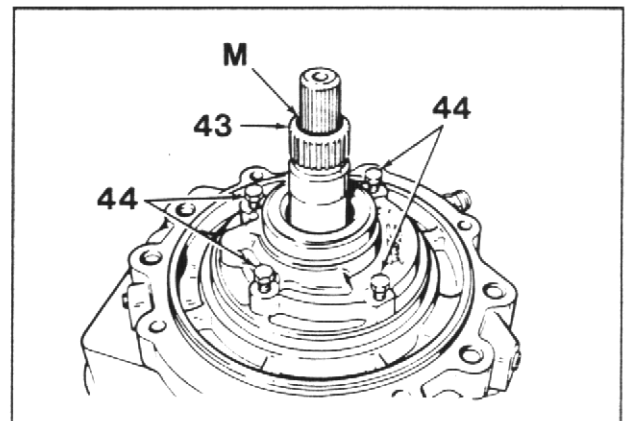
Lubricate pump gasket (42) with vasoline and install in groove of adaptor (38).



Install pump assembly (43) on top of adaptor (38) and align bolt holes.

Thread four bolts (44) into adaptor. Tighten in a criss-cross pattern to final torque specified in "Specifications".

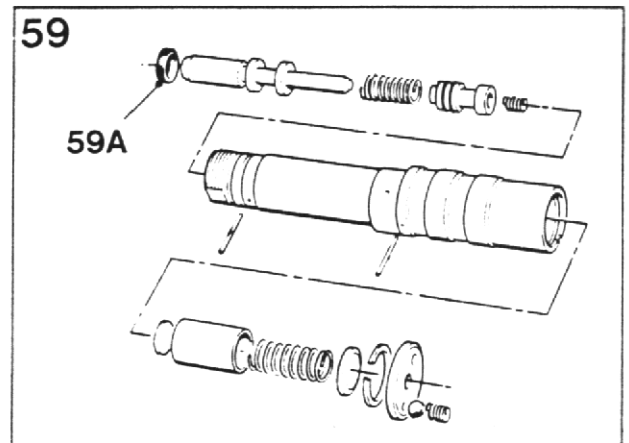
Grease bushing (M).



Assemble valve assembly (59).

Lubricate 'O' ring (59A) with vasoline and install on end of valve assembly.

NOTE: Newer models will have two O-rings.

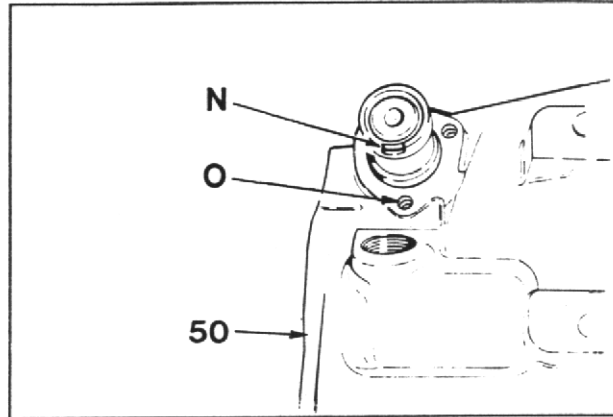


TRANSMISSION

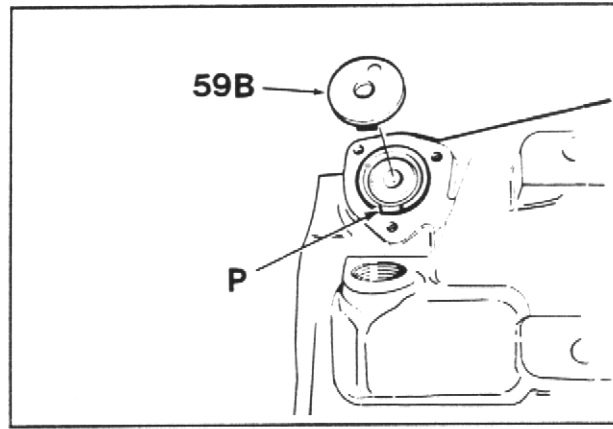
Hydraulic Transmission

Lubricate valve O.D. Slide valve assembly into side of case (50).

Align notch (N) with bolt hole (O).



Install switch cam (59B) on end of valve assembly. Be sure tab on switch cam sets in notch (P) of valve assembly.



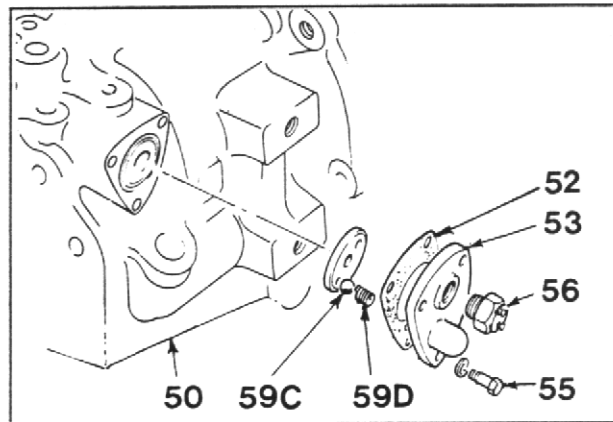
Install valve cover as follows:

Install steel ball (59C) and poppet spring (59D) in valve cover (53).

Position gasket (52) on case. Place valve cover over gasket and align bolt holes.

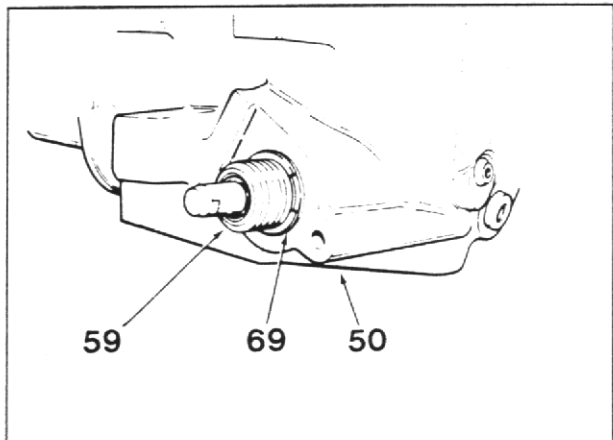
Thread three bolts (55) and lockwashers into case. Tighten bolts in a criss-cross pattern to final torque specified in "Specifications".

If removed, lubricate 'O' ring with vasoline and install in groove of neutral switch (56). Tighten neutral switch assembly to torque specified in "Specifications".



Install snap ring (69) in groove of valve assembly (59).

CAUTION: Do not hit or rest case on end of valve plunger. Internal valve could be damaged.



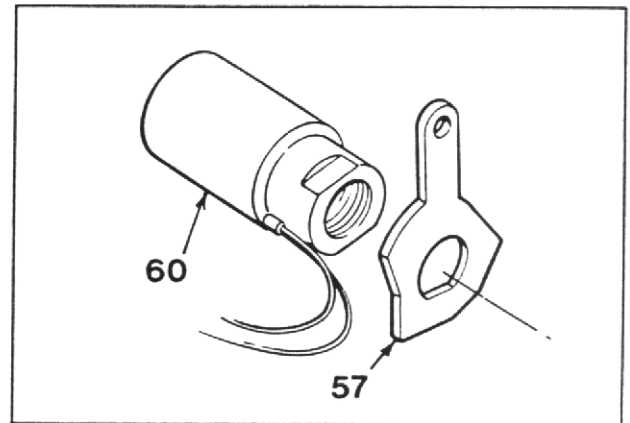
TRANSMISSION

Hydraulic Transmission

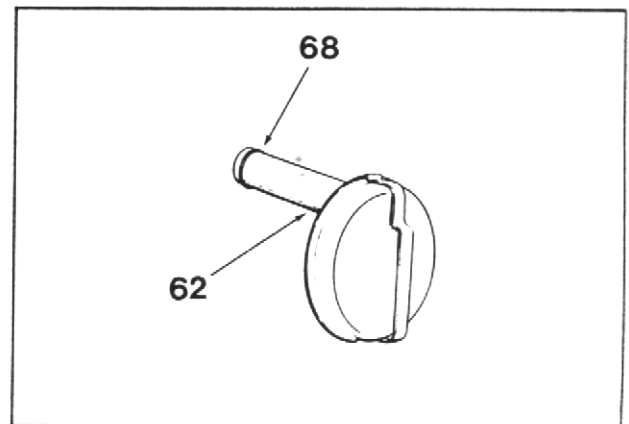
Solenoid Activated Valve: Install electric solenoid as follows:

Install lever (57) on end of valve assembly (59).

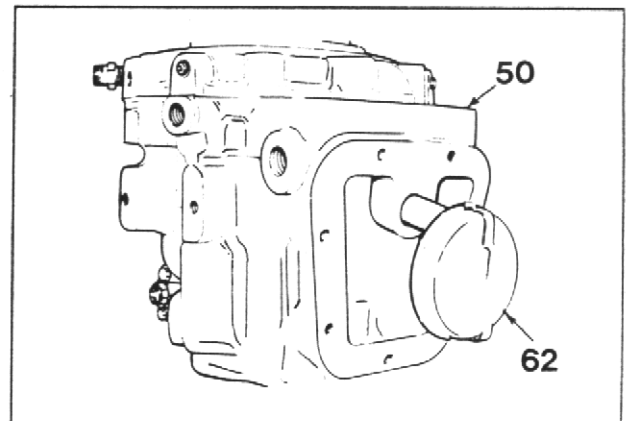
Thread solenoid (60) onto end of valve assembly and tighten.



Lubricate 'O' ring (68) with vasoline and install in groove of oil screen assembly (62).



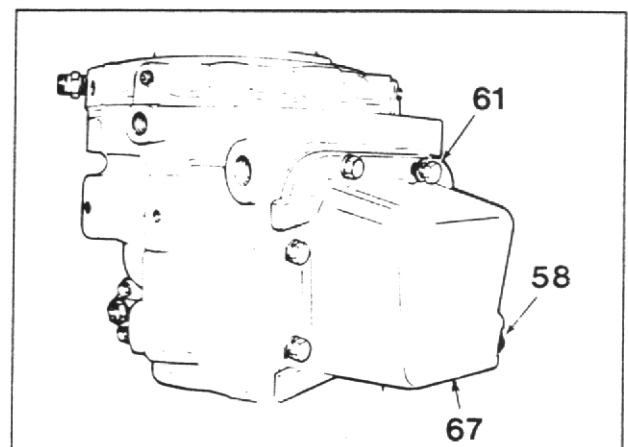
Install oil screen (62) assembly in bottom of case (50).



Run a bead of silastic (RTV) sealing compound on face of oil pan (67). Immediately install oil pan on case and align bolt holes.

Thread seven bolts (61) and lockwashers into case. Tighten in a crisscross pattern to final torque specified in "Specifications".

If removed, thread drain plug (58) and gasket into side of oil pan. Tighten drain plug to torque specified in "Specifications".



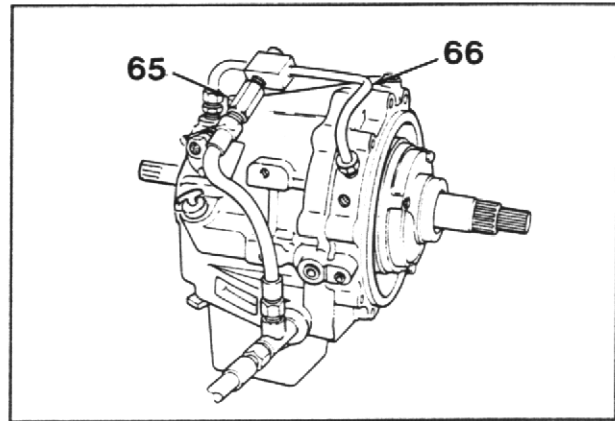
TRANSMISSION

Hydraulic Transmission

Thread check valve assembly (65) into converter feed tube (66).

Install converter feed tube (66) on case and tighten nuts.

If removed, install breather (70), filler tube (71), dipstick (72), and pipe (73) bushing in case (50).

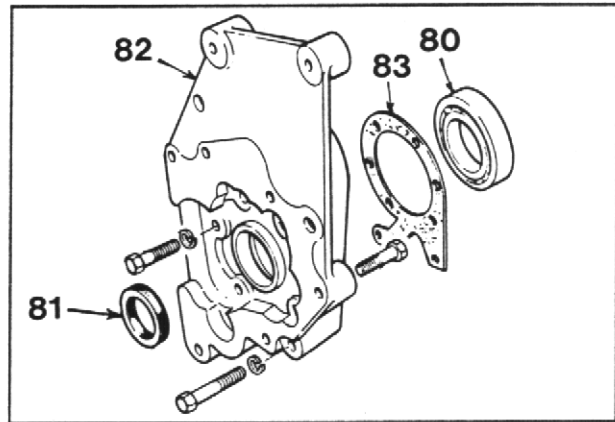


Install adaptor housing components as follows:

Install bearing (80) and oil seal (81) in adaptor (82).

Place adaptor front gasket (83) and adaptor (82) on back of case and align bolt holes.

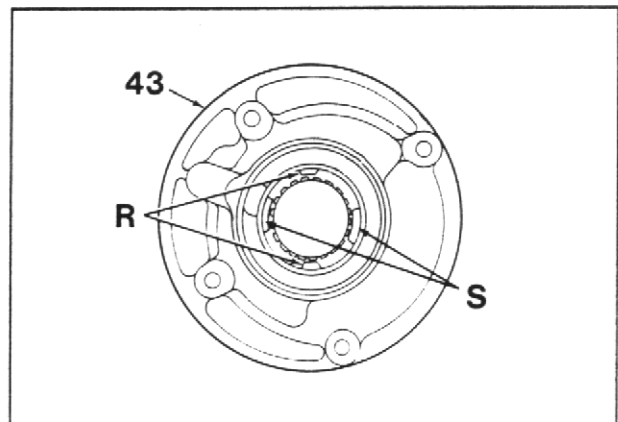
Thread bolts and lockwashers into case. Tighten in a crisscross pattern to torque specified in "Specifications".



Pump (43) driven lugs adjustment

CAUTION: Converter drive lugs (S) must not be located on top of pump driven lugs (R).

Rotate converter until converter drive lugs are positioned in spaces between pump driven lugs.



TRANSMISSION

Hydraulic Transmission

Re-Installation

CAUTION: After a major transmission failure the converter must be replaced. Cooler and cooler lines must be flushed to remove contaminated hydraulic fluid and metal/rubber particles. Failure to comply can result in premature wear or failure of overhauled transmission.

General

Check bore and face of converter housing with crankshaft. TIR must not be more than 0.010 inch.

Assemble transmission to engine, and then install bolts. Do not use bolts to draw transmission against engine.

WARNING: CHECK SHIFT LINKAGE OPERATION (FORWARD IS FORWARD, REVERSE IS REVERSE). THERE SHOULD BE NO STICKING OR BINDING.

TRANSMISSION

Hydraulic Transmission

SPECIFICATIONS

Bolt and Fastener Torques (Non-Lubricated)

ITEM No.	DESCRIPTION	FT-LB	Nm
40	3/8-16 x 1-1/4 Cap Screw	27-37	37-50
58	Drain Plug	25-30	34-41
55	1/4-20 x 7/8 Hex Head Bolt	8-11	11-15
44	5/16-18 x 1-3/4 Hex Head Bolt	17-22	23-30
61	3/8-16 x 1 Hex Head Bolt	22-37	30-50
63	3/8-18 Dryseal Plug	17-22	23-30
64	1/8-27 Dryseal Plug	7-12	9-16
56	9/16-18 Neutral Switch	22-30	30-41
65	Check Valve Assembly	17-27	23-37

Test Pressures

General.

Perform all pressure checks at normal operating temperature. Pressure gauges used should have a range from 0-200 or 0-300 psi. They must be accurate.

NOTE: Pressures shown are typical at an oil temperature of 140 degrees F. Variations can occur due to plumbing, fittings and cooler differences.

PRESSURE TAP	ENGINE RPM	TYPICAL RANGE		TYPICAL RANGE	
		PSI	PSI	kPA	kPA
Forward Main Line	600	45	80	310	552
	1000	100	120	689	827
	2000	125	150	862	1034
Reverse Main Line	600	60	105	414	724
	1000	105	130	724	896
	2000	120	150	827	1034
Forward	600	40	80	276	552
	1000	90	115	621	793
	2000	110	145	758	1000
Reverse	600	58	105	400	724
	1000	103	130	710	896
	2000	115	150	793	1034
Converter In	600	1	45	7	310
	1000	4	70	28	483
	2000	70	95	414	655
Converter Out (Cooler In)	600	1	40	7	276
	1000	2	45	14	310
	2000	10	50	69	345

WINGET LIMITED

Registered in England No. 1977110

Registered Office:

P.O. Box 89,
Smethurst Lane,
Bolton, Lancs. BL4 0WW

Tel: (0204) 665165

Fax: (0204) 665206

Telex: 635594 WINGET G

Date: September, 1991

**For the attention of:
PARTS & SERVICE MANAGERS****SERVICE BULLETIN SB4****Subject: Transmission dump solenoid
4C4000 & 4C5000 Dumpers**

Owing to the poor service life encountered with the dump solenoid, part number 95720G, when fitted to the 4C4000 and 4C5000 dumpers, we have decided to phase out this part with immediate effect.

The new solenoid kit will be part number V2003261.

An additional part, disc spring part number V2003055, will be included in the solenoid kit.

Retail price for the kit will be £141.36.

Although the new solenoid kit replaces the original part, initial fitting requires a modification to the dump/pressure relief valve.

Fitting instructions are as follows.

Remove the old solenoid (25).

Remove selector lever (1) and snap ring (2).

Remove the three screws (23) securing the starter inhibitor switch (24) and cover (21); take care not to lose detent ball (18) and spring (19) behind cover.

Remove switch cam (17) at end of valve.

Push valve assembly out of casing - push from solenoid side towards inhibitor switch. Knock out and remove spring pin (9).

Remove plunger (5), seal (4) and spring (6).

Examine 'O' ring round circumference of valve (3) (later valves have two 'O' rings), and replace if damaged.

Refit valve, ensuring that the notch in the starter switch lines up with the lower of the three screw holes.

Refit switch cam (17), detent spring (19) and ball (18).

Examine joint (20) round starter switch cover (21) and replace if necessary.

Refit cover.

Reconnect wiring to switch (24).

Refit snap ring (2) and selector lever (1).

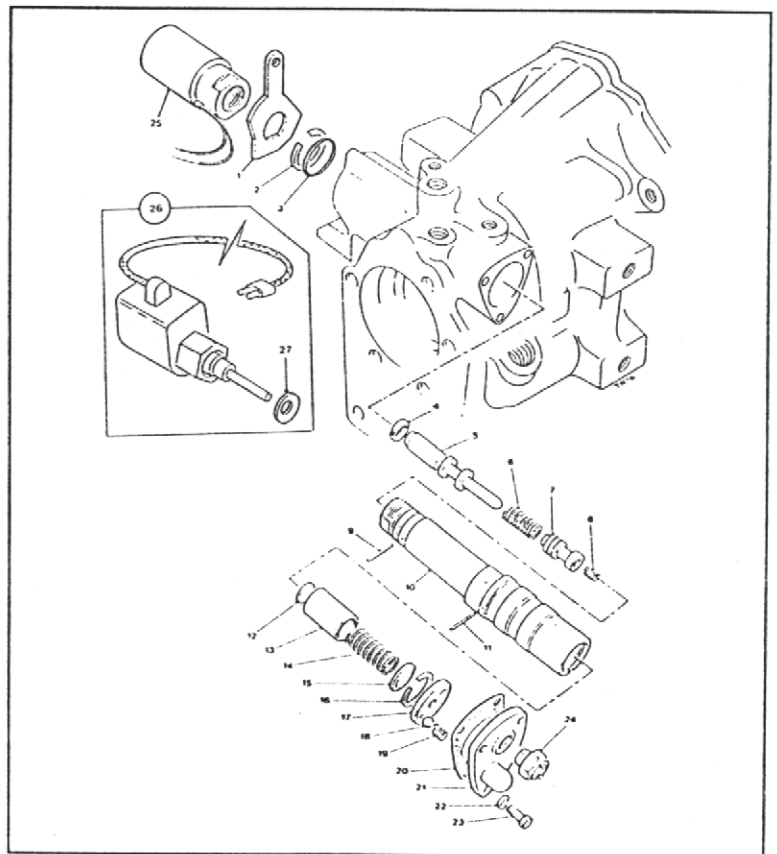
Fit disc spring (27), part number V2003055, large diameter next to selector lever (1).

Fit new solenoid.

Connect wiring using male and female bullet connectors.

Start engine, check and top-up transmission oil

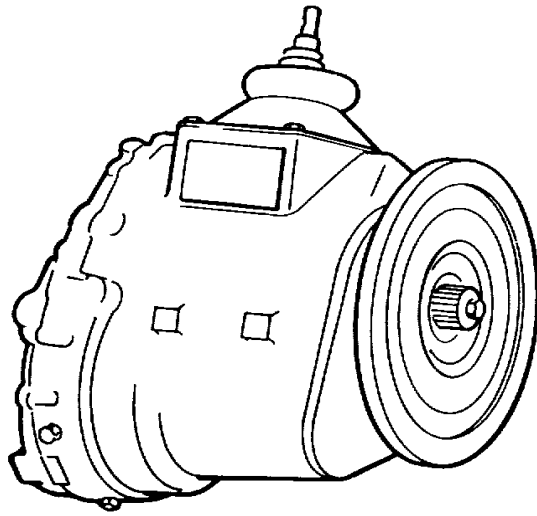
Operate dump pedal and check operation of solenoid.



WARNING! To avoid premature burning out of the solenoid due to overloading, it is necessary to permanently disconnect the parking brake dump switch and wiring, if fitted. No warranty claims for solenoid failures will be accepted if the parking brake dump switch is not disconnected when fitting replacement solenoids. This instruction is not applicable to machines fitted only with a parking brake warning light

WARNING! With all electrical solenoids and switches, avoid directing high pressure water cleaners, steam cleaners or hosepipes directly at or onto the solenoid or wiring.

Section 2



TURNER 4 SPEED GEARBOX

INTRODUCTION

The procedures described within this manual should enable experienced service personnel to strip, repair and re-build the Turner 4 Speed Gearbox fitted to Winget 4C4000 & 4C5000 Site Dumpers in a safe and competent manner. The procedures are not intended to be used by personnel who are unfamiliar with Winget products nor mechanically inexperienced.

It is assumed that personnel are aware of the Health & 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 works 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 airlines 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 operator's 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 & Safety is a matter of common sense. If common sense is applied correctly the risk of accidents can be reduced.

Always quote your machine's serial number and model together with the transmission serial number when ordering spare parts.

The Turner 4 Speed Gearbox is designed to operate under arduous conditions and providing it is regularly and correctly maintained it will provide long trouble free service.

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.

Main Gearbox

DESCRIPTION

General

The ratio gears and the selector mechanism (1) are all housed within the gearbox casing.

When running, the gears are in constant mesh and have a sliding dog tooth engagement with the synchromesh assembly.

When one of the first three gear positions (2, 3 or 4 respectively) is selected, power from the hydraulic transmission is transferred to the countershaft (7) via the main drive gear (5) and countershaft drive gear (6). The countershaft transmits power to the transfer gearbox via the gear selected and the mainshaft (8).

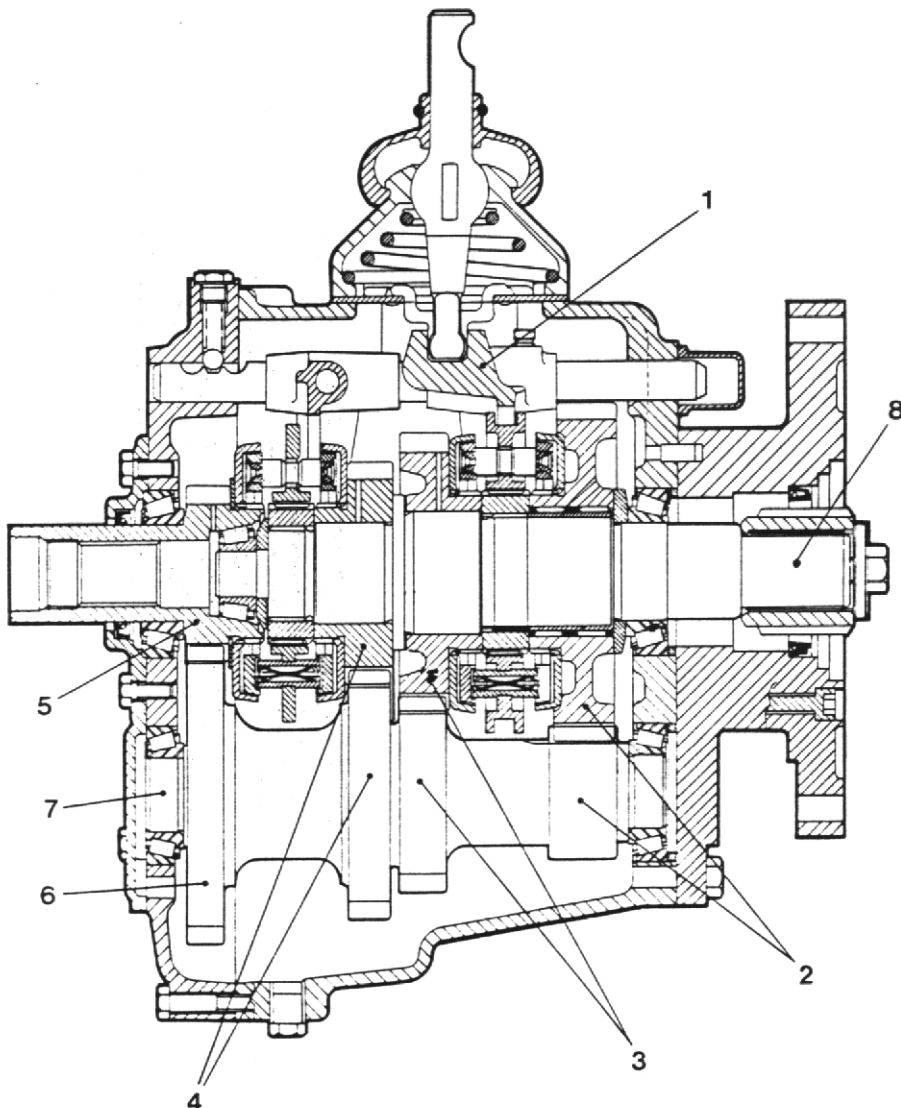
Selection of fourth gear transmits power directly to the transfer gearbox via the main drive gear and

mainshaft, which are connected together by the synchromesh hub.

The synchromesh unit comprises a synchro hub, synchro rings, synchro cups, internal dog teeth, blocker pins and split energiser pins.

The two synchro rings are connected by the blocker pins and split energiser pins and encased by the two synchro cups and the synchrohub.

The hydraulic transmission allows for selection of reverse gear.



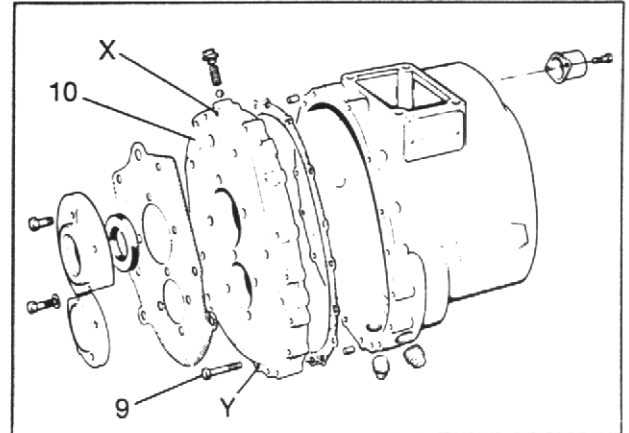
TRANSMISSION

Main Gearbox

OVERHAUL

Dismantling

Remove the set screws (9) from the gearcase front cover (10) leaving two screws diagonally in situ at (X) and (Y) to retain the casing.

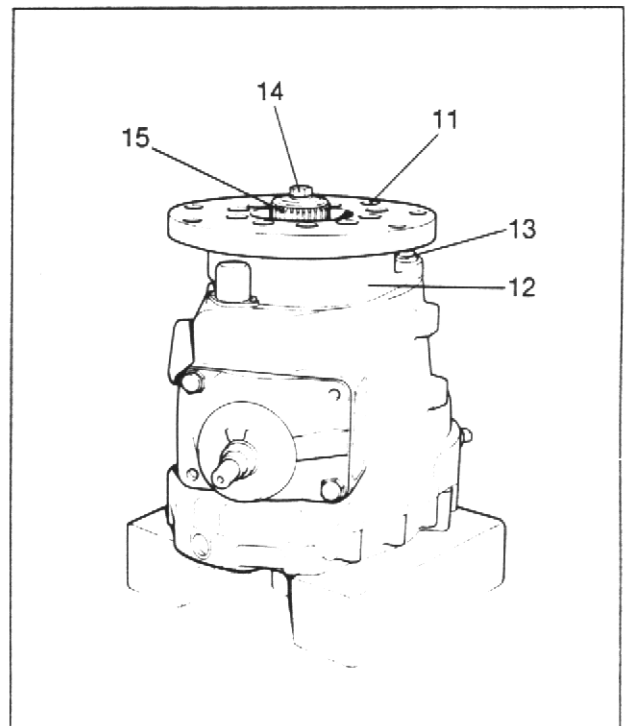


Stand the gearbox upright on two blocks of wood and remove the socket screws (11), from the adaptor plate (12).

Remove the two screws (13) from the adaptor plate flange.

Remove the bolt and plate washer (14) securing the splined coupling (15) to the mainshaft and lift the coupling clear of the gear case.

Lift off the adaptor plate and place on a clean work surface.

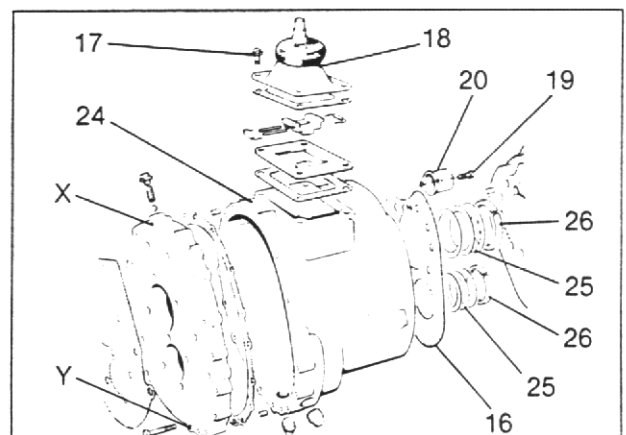


Remove and discard the gasket (16) from behind the adaptor plate.

Release the bolts and washers (17) securing the gear lever assembly (18) to the gear case and remove the lever assembly.

Release the screws (19) securing the selector rod cap (20) to the gearbox casing and remove the cap.

Remove the remaining two bolts (at X and Y) from the front cover and lift the gear case (24) clear, retaining shims (25) and spacers (26).



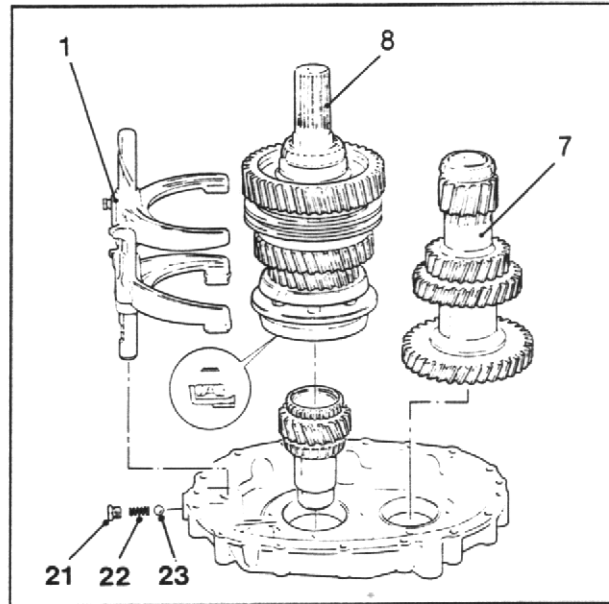
TRANSMISSION

Main Gearbox

Remove the plug (21) and extract the spring (22) and selector retaining ball (23) from the front cover.

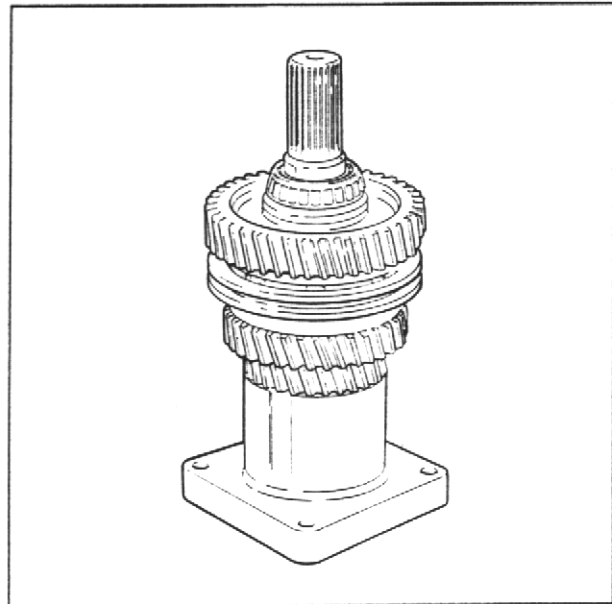
Tilt the counter shaft (7) to allow the mainshaft (8) and selector fork (1) assemblies to be withdrawn.

Clean and inspect the selector mechanism for evidence of wear or damage. Renew as necessary.



If it is necessary to split the mainshaft, do so as follows, using a suitable puller and the support block.

Ensure when the synchro assemblies are removed the synchro cups retain their original positions on the synchro rings.



TRANSMISSION

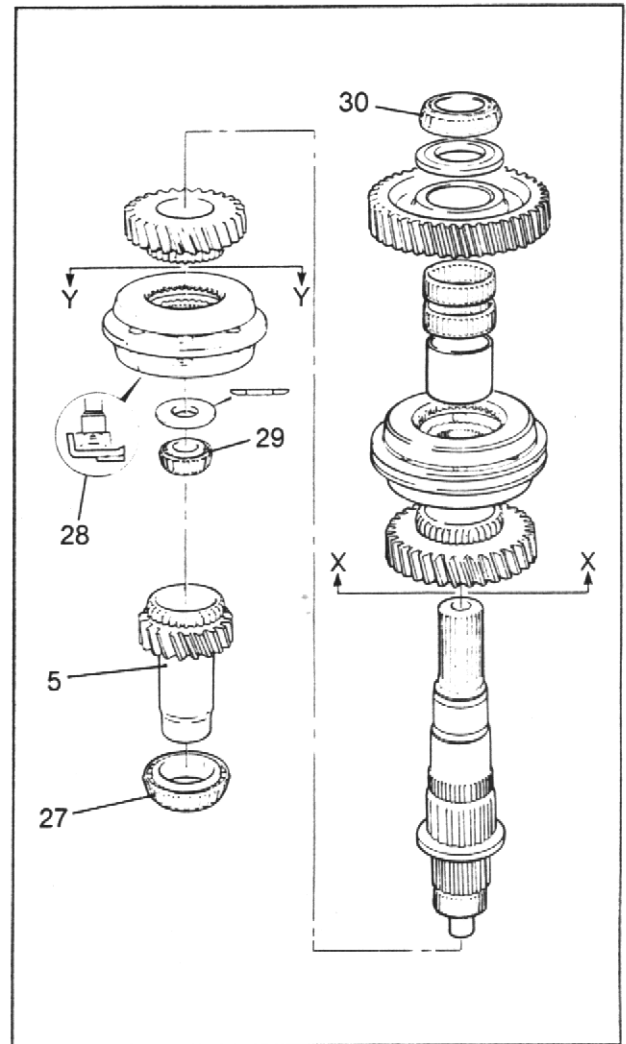
Main Gearbox

- Stand the shaft vertically in the support block. Do not stand the shaft on its bearings.
- With the shaft in the support block, pull at position (X).
- Invert the shaft and pull at position (Y).
- Pull bearing (27) off main drive gear. (5).

Assembly

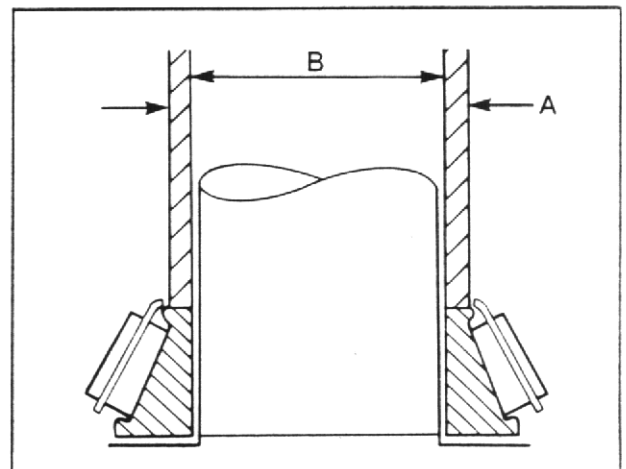
When reassembling the mainshaft, note the following:

- Ensure the synchro cup with integral spacer (28) is installed with the spacer facing the drive gear (5).
- Coat the gearshaft with clean gear oil before fitting gears.
- Carefully clean the bearings; inspect for damage or wear and replace if necessary. Liberally coat with clean gear oil on reassembly.
- Refit taper roller bearings; when replacing bearings extreme care is needed to avoid damage to the roller cage. The cage protrudes approximately 1.5mm above the cone face and use of a tube in excess of the sizes given will result in serious damage to the bearing assembly.



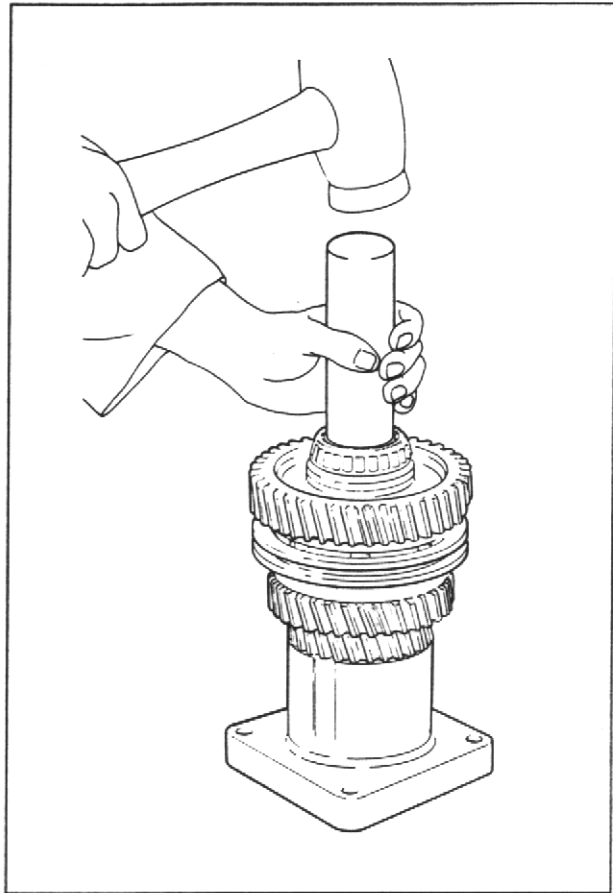
Tube Sizes

Item	Bearing	A	B
27 & 30	Mainshaft	54mm	46mm
29	Mainshaft	30mm	22mm
-	Countershaft front/rear	43mm	36mm



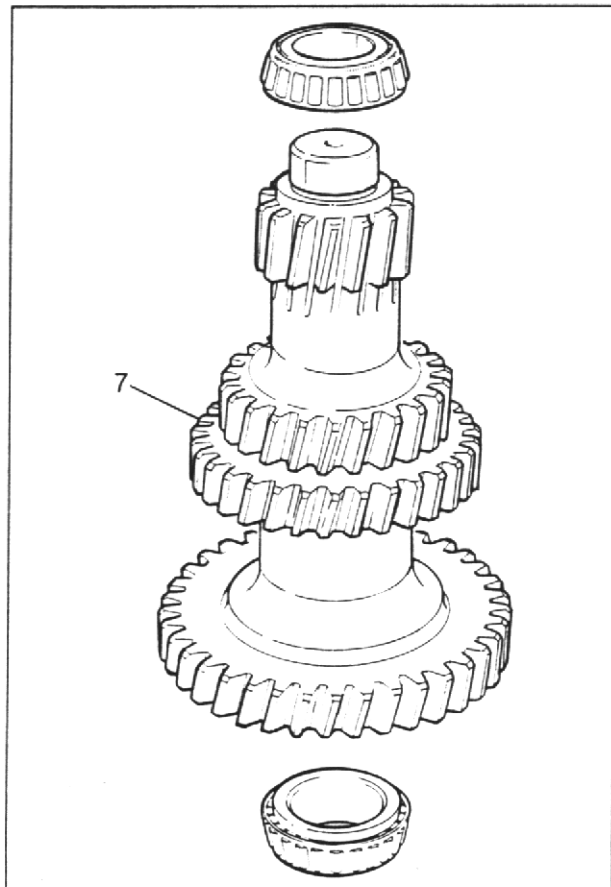
Main Gearbox

- e) Press bearings onto the mainshaft using the correct tubes.



Note: the counter shaft (7) is not a serviceable item. If wear is present, renew the complete shaft.

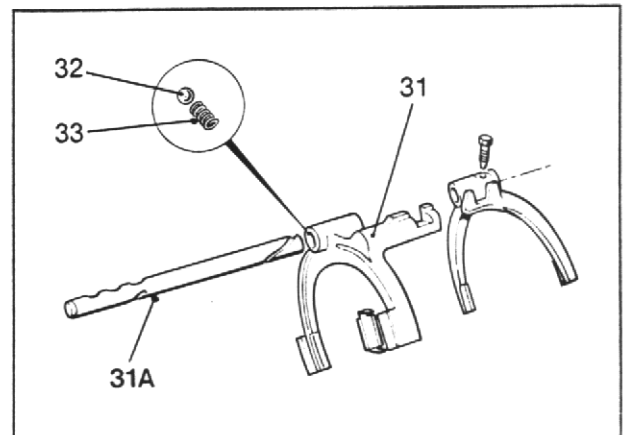
Press bearings onto the counter shaft using the correct tube.



TRANSMISSION

Main Gearbox

Note: when removing the selector fork (31) from the rail (31A), take care not to loose the ball (32) and spring (33).



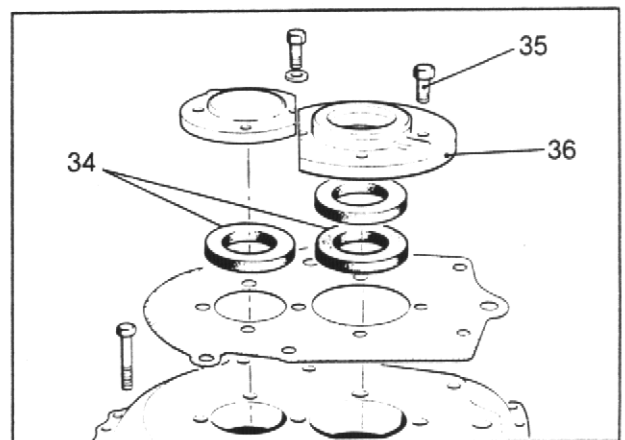
Clean and inspect the bearing cups (34) in the end cover for evidence of wear or damage.

Renew as necessary.

When reassembling the bearing cups into the end cover proceed as follows:

- a) Start the bearing sleeve (34) into the end cover and pull down using set screws (35) and housing (36). Tighten to a torque of 27 Nm (20 lbs ft).

Note: all bolts used on this gearbox are self locking nylon patch bolts and do not require washers. The bolts are suitable for re-use 10-12 times.



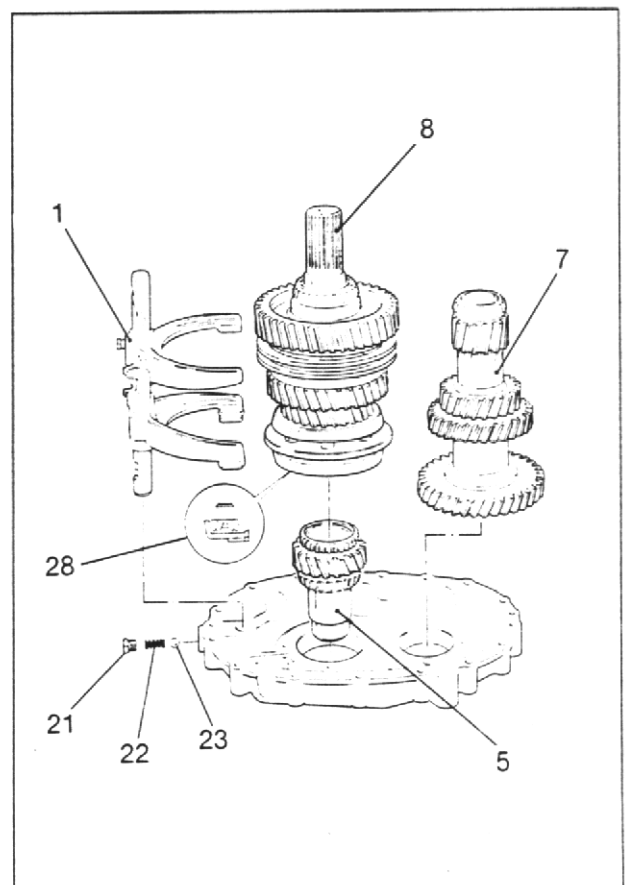
Install drive gear (5) into the end cover. Position the counter shaft (7) so that it is tilting away from the mainshaft's position (8).

Install the selector fork assembly (1) and mainshaft (8) into position and carefully intermesh the counter shaft.

Note: Ensure that the synchro cup with integral spacer (28) is fitted as shown.

CAUTION: take care not to trap your fingers between the gearshaft and counter shaft.

Refit the selector retaining ball (23), spring (22) and plug (21) into the end cover.



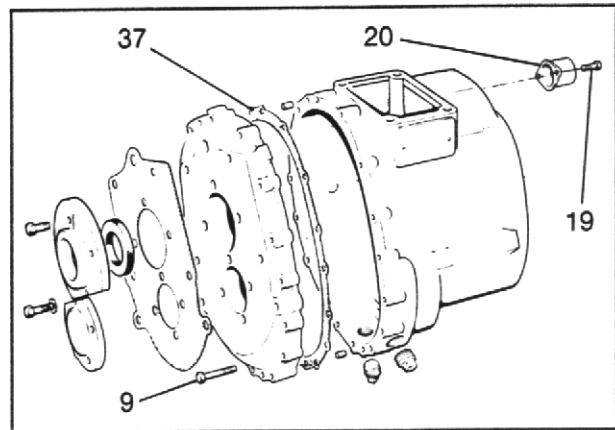
TRANSMISSION

Main Gearbox

Place the gasket (37) on the end cover.

Carefully lower the gearbox casing over the gearshafts and onto the end cover. Secure the casing in position with the bolts (9). Tighten to 27Nm (20lbs ft).

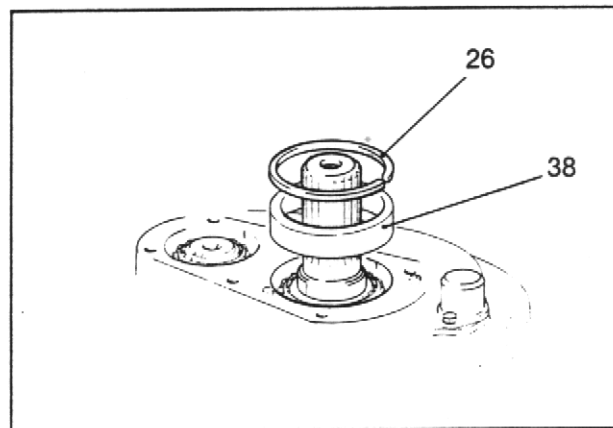
Refit the cap (20) by running a bead of instant gasket in a ring around the cap flange, then circle each of the bolt holes. Secure with screws (19).



Note: The following procedure must be adopted to adjust the mainshaft and countershaft end float when the mainshaft, countershaft, maindrive gear, gear case or any taper roller bearings are replaced.

a) Fit the mainshaft bearing cup (38).

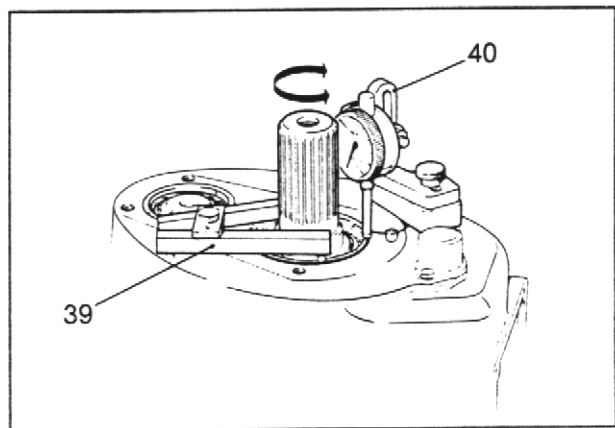
b) Fit the spacer ring (26), without shims.



c) Hold the spacer ring using the special tool (39) and tighten the set screw on the tool to a torque of 5 lbs ft (6.78 Nm). Rotate the maindrive gear to settle the bearings and recheck the screw torque setting. Repeat until the bearings have finally settled.

d) Using special tool (40) measure and record the average depth of the spacer ring below the gear case face at two diametrically opposite points.

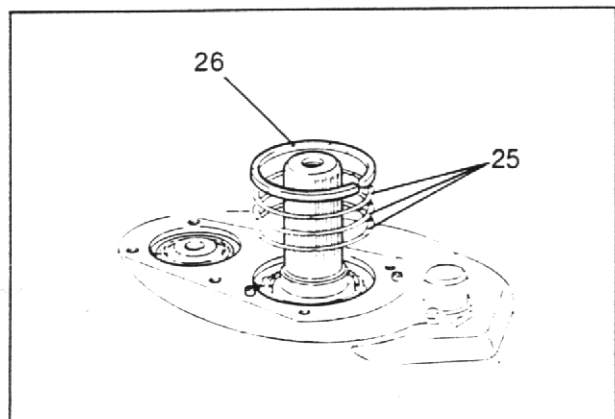
Add .005" (.127mm) to the reading obtained. the resultant figure is the thickness of shim (25) to be fitted under the spacer ring (26).



This adjustment should allow an end float of .001" to .003" (.025 to .076mm)

e) Remove the special tools. Install the appropriate shims (25) under the spacer ring (26).

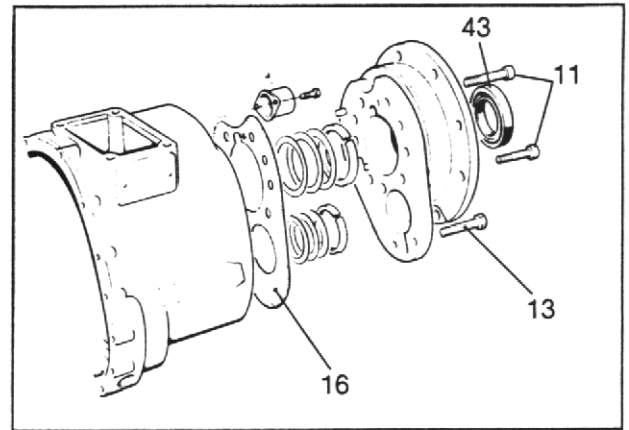
f) Repeat the above operations for the end float of the counter shaft bearings.



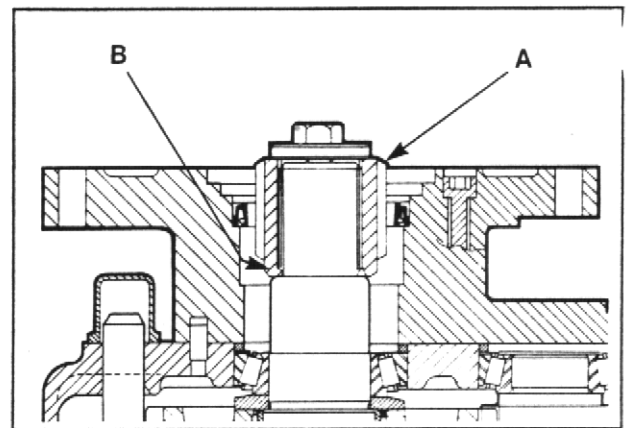
TRANSMISSION

Main Gearbox

Fit a new gasket (16) and adaptor plate seal (43). Replace the adaptor plate and secure to the gearbox casing with socket screws (11) and set screws (13).



Replace the splined coupling (A) ensuring that the flanged end (B) is innermost.



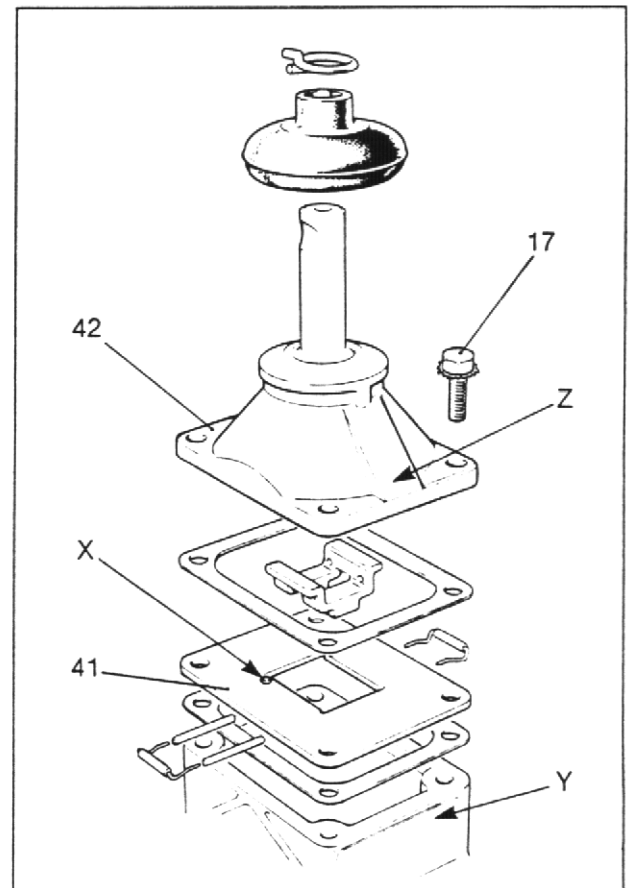
Gear selector assembly:

Before assembling the gear selector assembly coat both faces of the gaskets with jointing compound.

Install plate (41) with rivets (X) away from the serial number plate (Y).

Install cover (42) with flange (Z) towards the serial number plate (Y).

Fit bolts (17) and tighten to a torque of 41 Nm (30 lb ft).



TRANSMISSION

Main Gearbox

FAULT FINDING

PROBLEM	CAUSE	CORRECTION
NOISES Growling, humming or grinding. Hissing, thumping or bumping Squealing. Noise occurs in neutral only. Noise occurs in gear only.	Damaged or worn gears. Damaged or worn bearings Seized free running gears. Counter shaft or its bearing worn or damaged. Excessive backlash in gears. Mainshaft pilot bearing worn. Mainshaft rear bearing worn. Sliding gear teeth worn or damaged. Selector forks loose. Selector fork pads or grooves in gear worn. Dog teeth worn. Selector rod poppet spring broken. Selector rods worn or damaged. Selector fork pads out of position. Excessive end float in gears or shafts. Synchroniser bronze worn. Steel chips embedded in the bronze. Synchronised components damaged. Sliding gears tight on splines. Chips wedged between splines of shaft or gear. Synchroniser spring pins damaged.	Renew. Renew Check and renew. Renew damaged parts. Adjust. Renew. Renew. Renew gears. Renew worn parts. Renew worn parts. Renew. Renew. Renew. Reposition or renew. Check thrust washers and mating faces. Adjust as necessary. Renew synchro pack. Check blocker pins. Continue using, chips will either embed below bronze or be rejected. Renew. Free or renew. Remove chips. Check that gears are not locking behind torque lock. Renew synchro.