4400 and 4500 Telescopic Handlers

DCEO-Mannheim
TM4541 (23JAN01)
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ENGLISH

Introduction

FOREWORD

This manual is written for an experienced technician. Essential tools required in performing certain service work are identified in this manual and are recommended for use.

Live with safety: Read the safety messages in the introduction of this manual and the cautions presented throughout the text of the manual.

This is the safety-alert symbol. When you see this symbol on the machine or in this manual, be alert to the potential for personal injury.

Information is organized in groups for the various components requiring service instruction.

Technical Manuals are concise guides for specific machines. They are on-the-job guides containing only the vital information needed for diagnosis, analysis, testing, and repair.

Fundamental service information is available from other sources covering basic theory of operation, fundamentals of troubleshooting, general maintenance, and basic type of failures and their causes.

GS,TMIFC -19-10SEP97

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All information, illustrations and specifications in this manual are based on the latest information available at the time of publication. The right is reserved to make changes at any time without notice.

TM4541-19-23JAN01

Section 05
Safety

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RECOGNIZE SAFETY INFORMATION

This is the safety-alert symbol. When you see this symbol on your machine or in this manual, be alert to the potential for personal injury.

Follow recommended precautions and safe operating practices.

T81389 -UN-07DEC88

DX,ALERT -19-03MAR93

PREVENT MACHINE RUNAWAY

Avoid possible injury or death from machinery runaway.

Do not start engine by shorting across starter terminals. Machine will start in gear if normal circuitry is bypassed.

NEVER start engine while standing on ground. Start engine only from operator's seat, with transmission in neutral.

GS002 -UN-18AUG95

GS,BYPAS1 -19-15JUL95

HANDLE FLUIDS SAFELY—AVOID FIRES

When you work around fuel, do not smoke or work near heaters or other fire hazards.

Store flammable fluids away from fire hazards. Do not incinerate or puncture pressurized containers.

Make sure machine is clean of trash, grease, and debris.

Do not store oily rags; they can ignite and burn spontaneously.

TS227 -UN-23AUG88

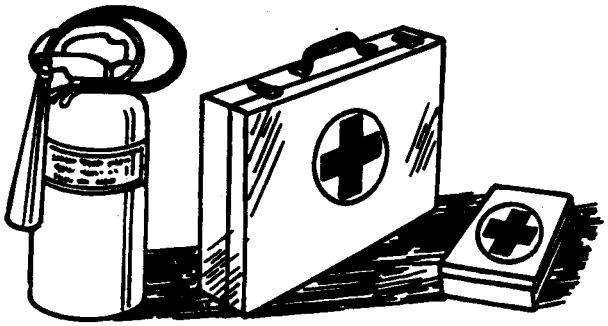
DX,FLAME -19-04JUN90

PREPARE FOR EMERGENCIES

Be prepared if a fire starts.

Keep a first aid kit and fire extinguisher handy.

Keep emergency numbers for doctors, ambulance service, hospital, and fire department near your telephone.



TS291 -UN-23AUG88

DX,FIRE2 -19-03MAR93

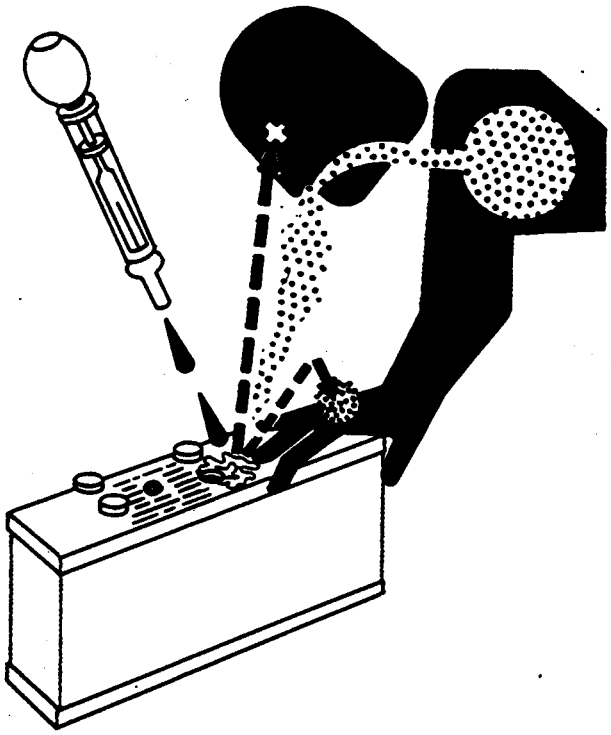
PREVENT ACID BURNS

Sulfuric acid in battery electrolyte is poisonous. It is strong enough to burn skin, eat holes in clothing, and cause blindness if splashed into eyes.

Avoid the hazard by:
1. Filling batteries in a well-ventilated area.
2. Wearing eye protection and rubber gloves.
3. Avoiding breathing fumes when electrolyte is added.
4. Avoiding spilling or dripping electrolyte.
5. Use proper jump start procedure.

If you spill acid on yourself:
1. Flush your skin with water.
2. Apply baking soda or lime to help neutralize the acid.
3. Flush your eyes with water for 15—30 minutes. Get medical attention immediately.

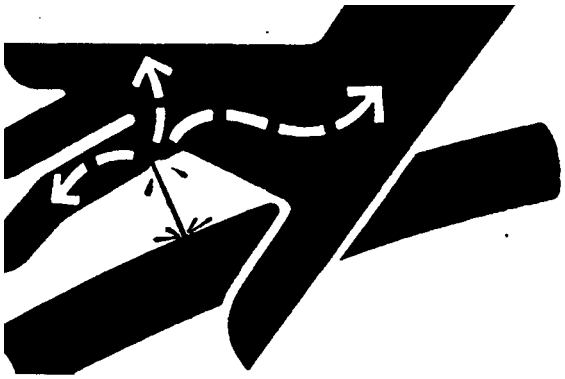
If acid is swallowed:
1. Do not induce vomiting.
2. Drink large amounts of water or milk, but do not exceed 2 L (2 quarts).
3. Get medical attention immediately.



TS203 -UN-23AUG88

DX,POISON -19-21APR93

AVOID HIGH-PRESSURE FLUIDS



X9811 -UN-23AUG88

Escaping fluid under pressure can penetrate the skin causing serious injury.

Avoid the hazard by relieving pressure before disconnecting hydraulic or other lines. Tighten all connections before applying pressure.

Search for leaks with a piece of cardboard. Protect hands and body from high pressure fluids.

If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result. Doctors unfamiliar with this type of injury should reference a knowledgeable medical source. Such information is available from Deere & Company Medical Department in Moline, Illinois, U.S.A.

DX,FLUID -19-03MAR93

PARKING AND LEAVING THE MACHINE

LX002510 -UN-17JAN95

LX002 510

Lower attachment or carriage to the ground before leaving the machine.

Shut off engine, select neutral with both the gear lever and the forward/reverse control.

Apply handbrake, remove main switch key and lock the operator's cab. Position chock blocks.

Never leave machine unattended as long as engine is still running.

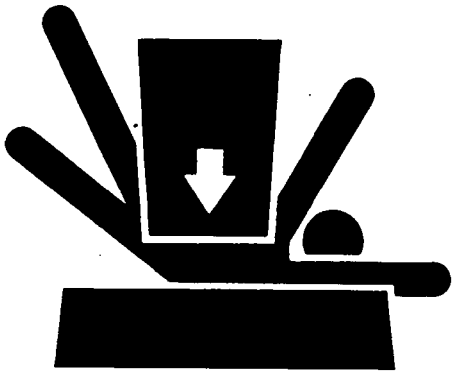
Never leave the cab when driving.

GS,PARK -19-01SEP95

SUPPORT MACHINE PROPERLY

A raised boom can drop suddenly and cause serious injury. Before working under a raised boom, install a boom safety strut.

Do not support the machine on cinder blocks, hollow tiles, or props that may crumble under continuous load. Do not work under a machine that is supported solely by a jack. Follow recommended procedures in this manual.



TS229 -UN-23AUG88

GS,LOWER -19-01JUL95

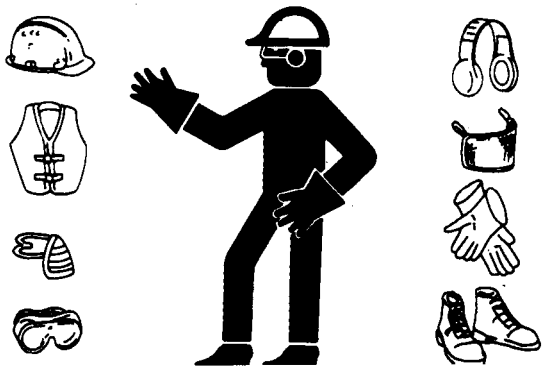
WEAR PROTECTIVE CLOTHING

Wear close fitting clothing and safety equipment appropriate to the job.

Prolonged exposure to loud noise can cause impairment or loss of hearing.

Wear a suitable hearing protective device such as earmuffs or earplugs to protect against objectionable or uncomfortable loud noises.

Operating equipment safely requires the full attention of the operator. Do not wear radio or music headphones while operating machine.

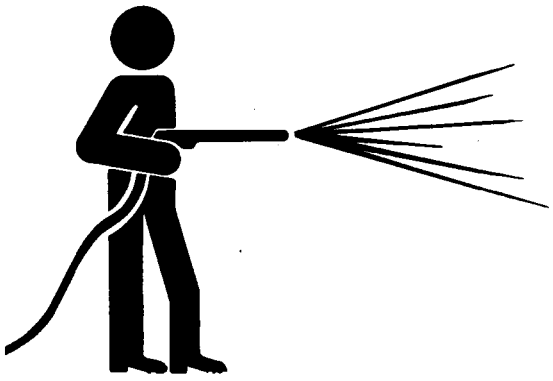


TS206 -UN-23AUG88

DX,WEAR -19-10SEP90

WORK IN CLEAN AREA

Before starting a job:
- Clean work area and machine.
- Make sure you have all necessary tools to do your job.
- Have the right parts on hand.
- Read all instructions thoroughly; do not attempt shortcuts.



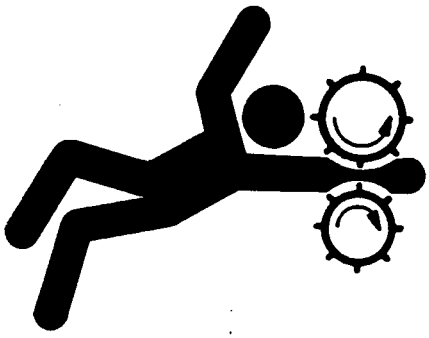
T6642EJ -UN-18OCT88

DX,CLEAN -19-04JUN90

SERVICE MACHINES SAFELY

Tie long hair behind your head. Do not wear a necktie, scarf, loose clothing, or necklace when you work near machine tools or moving parts. If these items were to get caught, severe injury could result.

Remove rings and other jewelry to prevent electrical shorts and entanglement in moving parts.



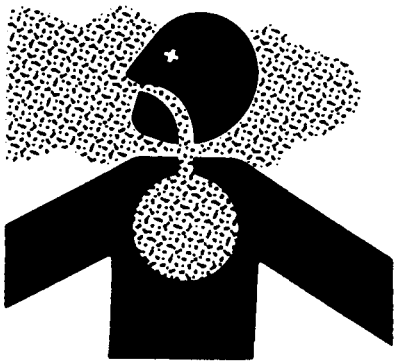
TS228 -UN-23AUG88

DX,LOOSE -19-04JUN90

WORK IN VENTILATED AREA

Engine exhaust fumes can cause sickness or death. If it is necessary to run an engine in an enclosed area, remove the exhaust fumes from the area with an exhaust pipe extension.

If you do not have an exhaust pipe extension, open the doors and get outside air into the area.

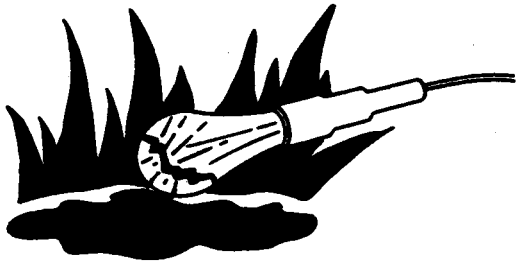


TS220 -UN-23AUG88

DX,AIR -19-04JUN90

ILLUMINATE WORK AREA SAFELY

Illuminate your work area adequately but safely. Use a portable safety light for working inside or under the machine. Make sure the bulb is enclosed by a wire cage. The hot filament of an accidentally broken bulb can ignite spilled fuel or oil.

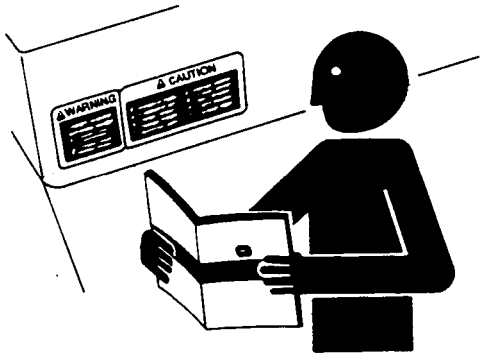


TS223 -UN-23AUG88

DX,LIGHT -19-04JUN90

REPLACE SAFETY SIGNS

Replace missing or damaged safety signs. See the machine operator's manual for correct safety sign placement.



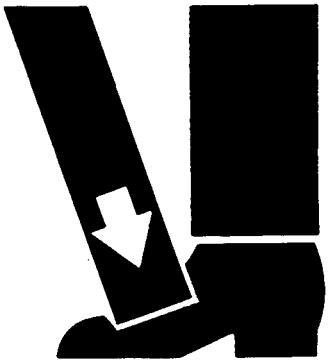
TS201 -UN-23AUG88

DX,SIGNS1 -19-04JUN90

USE PROPER LIFTING EQUIPMENT

Lifting heavy components incorrectly can cause severe injury or machine damage.

Follow recommended procedure for removal and installation of components in the manual.



TS226 -UN-23AUG88

DX,LIFT -19-04JUN90

AVOID HEATING NEAR PRESSURIZED FLUID LINES

Flammable spray can be generated by heating near pressurized fluid lines, resulting in severe burns to yourself and bystanders. Do not heat by welding, soldering, or using a torch near pressurized fluid lines or other flammable materials. Pressurized lines can be accidentally cut when heat goes beyond the immediate flame area.

TS953 -UN-15MAY90

DX,TORCH -19-03MAR93

REMOVE PAINT BEFORE WELDING OR HEATING

Avoid potentially toxic fumes and dust.

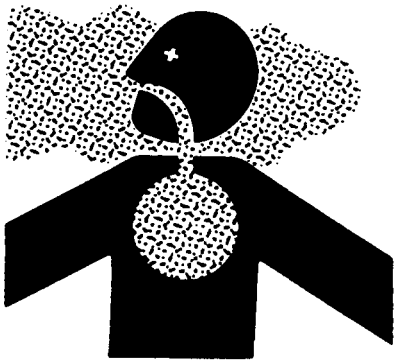
Hazardous fumes can be generated when paint is heated by welding, soldering, or using a torch.

Do all work outside or in a well ventilated area. Dispose of paint and solvent properly.

Remove paint before welding or heating:

• If you sand or grind paint, avoid breathing the dust. Wear an approved respirator.

• If you use solvent or paint stripper, remove stripper with soap and water before welding. Remove solvent or paint stripper containers and other flammable material from area. Allow fumes to disperse at least 15 minutes before welding or heating.



TS220 -UN-23AUG88

DX,PAINT -19-03MAR93

DISASSEMBLY OF THE TORQUE CONVERTER HOUSING

1. Using a suitable tool to prevent the drive shaft yoke from turning, unscrew retaining stake nut (1). Remove the nut, washer (2) and yoke (3) from the splined shaft. Discard the stake nut. Repeat for stake nut (4), washer (5) and yoke (6).

2. Remove and discard seal (7).

3. Loosen and remove the six retaining screws (8). Lift the valve/pump assembly (9) away from cover (10). Put the valve/pump to one side unless the reason for disassembly is a fault in these components. In such a situation proceed to step (9).

NOTE: The mating faces of the valve and cover are sealed using liquid gasket compound which, once cured, firmly holds the surfaces together. It may be necessary to device a method of jacking the two apart.

4. Lift out gear (11), located against the bell housing, from inside the cover (10). Check for damage to the drive dogs. Damage indicates misalignment during assembly and, if excessive, necessitates replacement of the gear.

5. Inspect the thrust washers (12) for damage and if necessary discard and renew. Damaged thrust washers are a sign of damage to the surfaces against which they run. Check the relevant surfaces of the gear and the bell housing for scoring, dress if necessary and clean thoroughly. If the surfaces are badly scored, renew the components. Remove and discard PTFE washer (13) and O-ring (14).

6. Unscrew bolts (15) and separate cover (10) from bell housing (16). See NOTE at step 3.

7. If necessary, remove drive shaft yoke oil seal (17).

NOTE: Unless there is evidence of oil leakage the oil seal can be re-used and should not be removed.

8. Lift out the assembly comprising drive shaft and gear (18), bearing (19) from the bell housing. Check the bearings for wear and if necessary remove and renew.

9. Return to the valve/pump assembly (9) removed at step 3. Remove banjo bolt (20) and adapter (21). Discard the two O-rings (22) and (23) from the banjo bolt and the O-ring (24) from the face of the adapter.

10. Remove snap ring (25) and withdraw the assembly comprising drive shaft (26), bearing (27), seal (28), snap ring (29) and PTFE ring (30).

11. Remove the four retaining bolts (31) and lift the transmission oil pump clear of the valve.

NOTE: Take care not to damage the pump/valve block mating faces.

12. Remove and discard rubber pump sealing ring (32).

13. Separate the cover plate (33) and shaft (34) of the pump. Check that gear (35) rotates freely but without discernible play on its white metal bearing. Also look for debris and/or signs of scoring.

Check pump gear (36) for free movement in cover plate (33). Also check for debris and/or signs of scoring. Examine the gear drive dogs, damage to which indicates misalignment during assembly.

NOTE: Pump components cannot be renewed individually. If there is evidence of unacceptable wear or damage to any part of the pump, the complete unit must be renewed.

14. Remove plug (37) and take out the pressure maintaining valve components (38, 39, 40). Check that spool (40) moves freely in its bore and that it does not stick against its seat (using a magnetic probe should move it in and out). If necessary dress the seat and fit a new spool. Severe damage will necessitate renewal of the valve block.

NOTE: Ensure that spool (40) is not slotted at its inner end. A slot ended spool is used on all other transmissions, but if fitted here will cause high pressure on this unit.

Remove plug (41) and take out the torque converter relief valve components (42, 43, 44). Check the ball (44) and seat for signs of damage. If necessary dress the seat and renew the ball. Severe damage will necessitate renewal of the valve block.

NOTE: New plugs must only be fitted with new spring, and vice-versa.

GS4400,20 -19-01FEB97

ASSEMBLY

Assembly is the reverse of the disassembly procedure.

Note the following points:

1. Renew all O-rings and PTFE seals.

2. Oil the bearing races to avoid dry running at start up.

3. Check that all oil galleries are clear.

4. Check that the cross drilling (X) behind the pressure maintenance valve is clear.

5. Graese thrust rings (12) to avoid dry running at start up.

6. When fitting yokes (3) and (6), take care not to damage seals (16) and (7) respectively. Damage will cause the unit to suck in air instead of oil during priming.

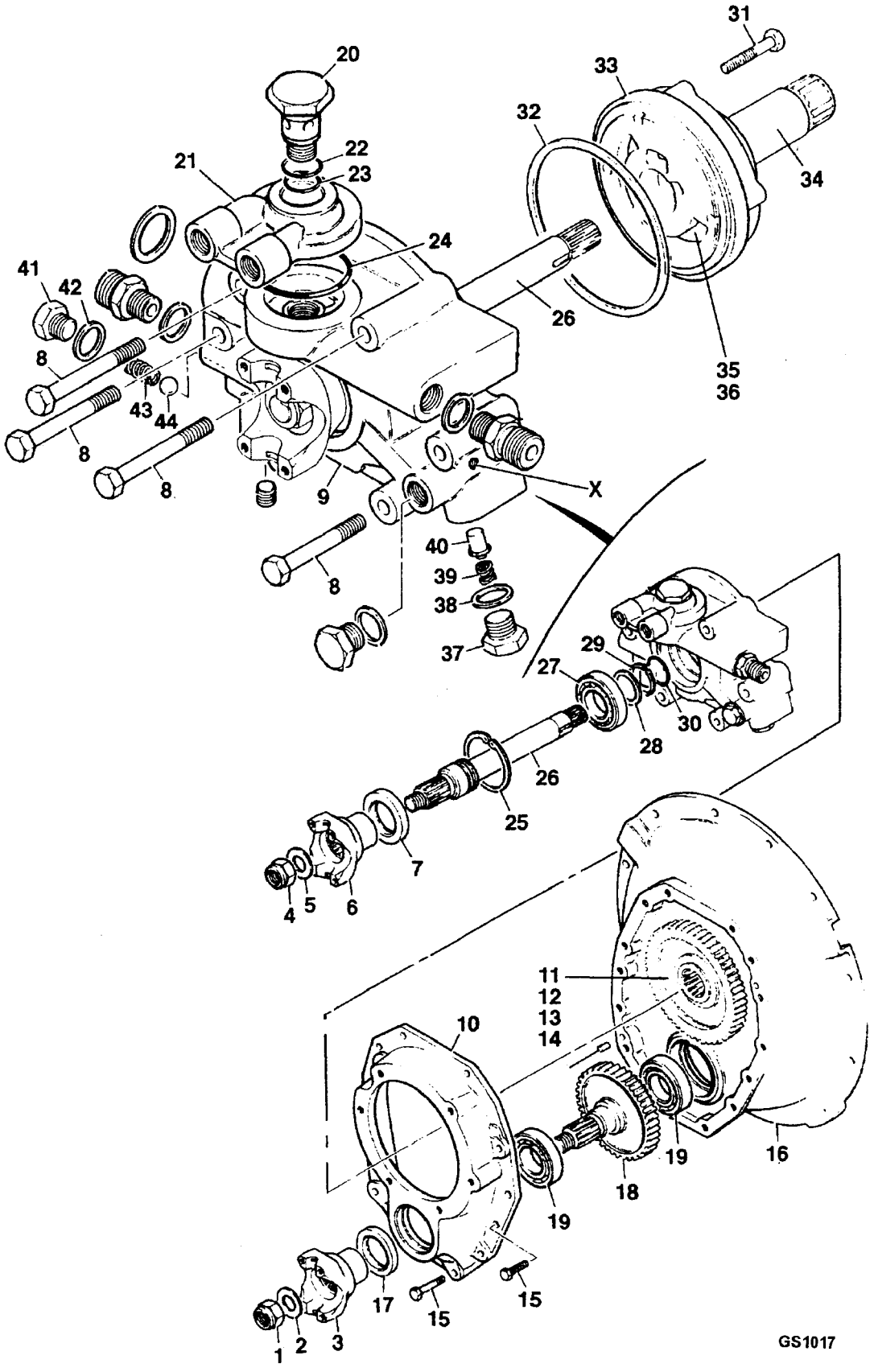
7. Position yokes (3) and (6) on their splines so that access to the staking point is not impeded. Stake using a square ended staking tool.

SPECIFICATIONS

Item	Measurement	Specification
Torque Settings		
1, 4	Torque	300 N·m; 221 lb-ft
8, 15	Torque	56 N·m; 41.3 lb-ft
20	Torque	102 N·m; 75 lb-ft
31	Torque	28 N·m; 20.6 lb-ft

GS4400,21 -19-01FEB97

TORQUE CONVERTER HOUSING WITH HYDRAULIC PUMP DRIVE



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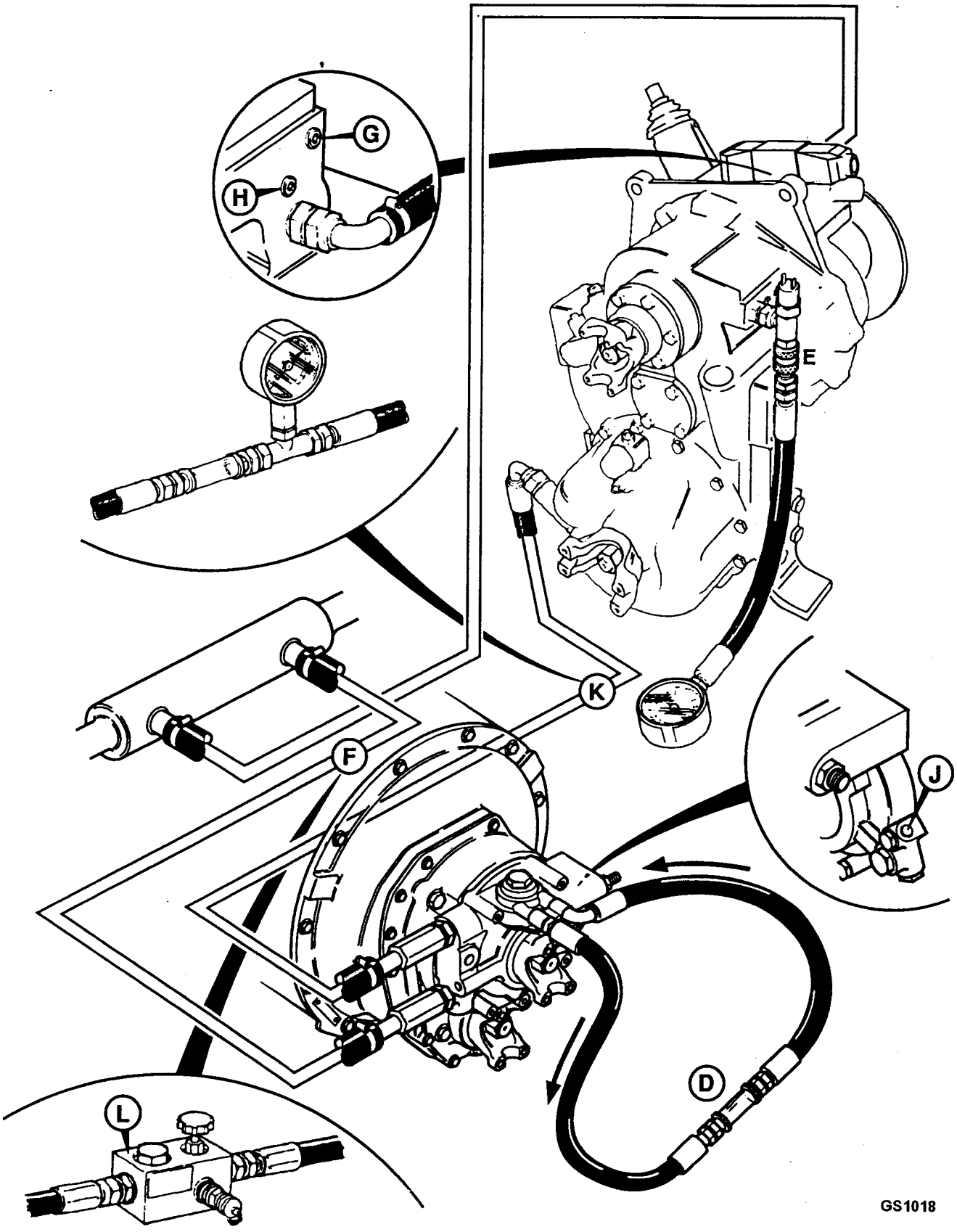
TORQUE CONVERTER HOUSING WITH HYDRAULIC PUMP DRIVE

1—Stake nut
2—Washer
3—Yoke
4—Stake nut
5—Washer
6—Yoke
7—Seal
8—Screw
9—Valve/pump assembly
10—Cover
11—Gear
12—Washer
13—PTFE washer
14—O-ring
15—Bolts
16—Cover
17—Oil seal
18—Gear
19—Bearing
20—Banjo bolt
21—Adapter
22—O-ring
23—O-ring
24—O-ring
25—Snap ring
26—PTO drive shaft
27—Bearing
28—Seal
29—Snap ring
30—PTFE ring
31—Retaining bolts
32—Sealing ring
33—Cover plate
34—Shaft
35—Gear
36—Pump gear
37—Plug
38—Valve component
39—Valve component
40—Spool
41—Plug
42—Relief valve component
43—Relief valve component
44—Relief valve component

GS4400,380 -19-01FEB97

TORQUE CONVERTER STALL TEST (REMOTE FILTER)



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GS4400,23 -19-01FEB97

TORQUE CONVERTER STALL TEST

D—Flow meter assembly
F—Oil cooler inlet line
G—Port
H—Port
J—Port
K—Pressure gauge/flow meter
L—Valve

Ensure that the engine and transmission are at normal working temperature. Run engine at maximum speed and check the **No load speed**. See **Engine technical data** for correct figure; adjust if necessary. Apply parking brake and footbrake firmly. Select 4th speed forward or 3rd speed forward (Germany only) and open throttle fully. Engine speed should be as specified at **Torque converter stall** in transmission technical data. Select reverse and repeat test.

NOTE: Do not stall the converter for longer than 10 seconds or the transmission fluid will overheat.

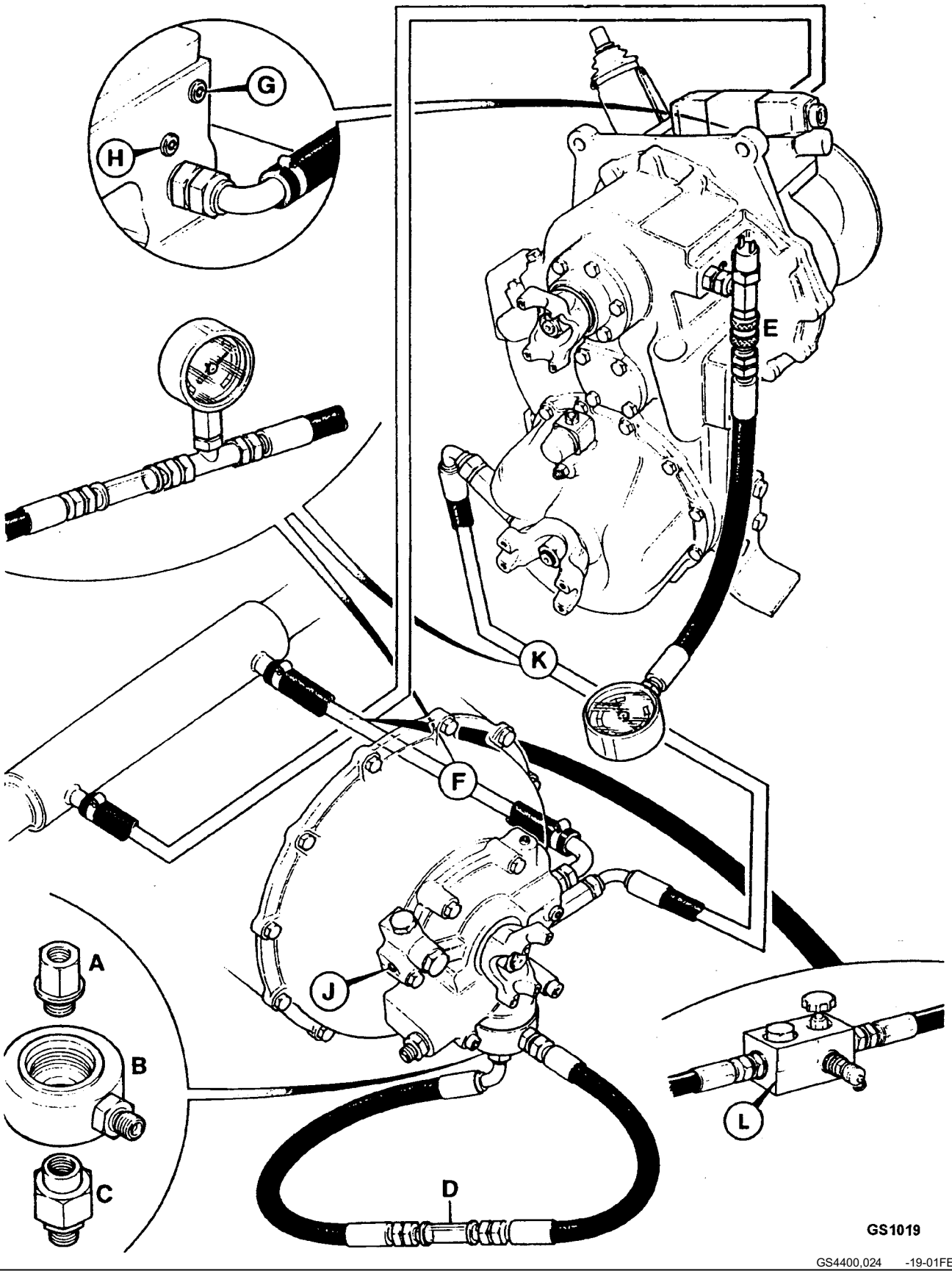
If engine speeds are higher than the stated figures check the transmission for clutch slippage or internal leakage.

If engine speeds are below the stated figures either the engine is losing power and should be serviced/overhauled or the torque converter reaction member clutch is slipping. To check the engine , select neutral, open throttle fully and operate a function to blow off the main relief valve. Engine speed should fall to slightly above the maximum governed speed (see engine technical data). If engine speed is correct the torque converter is faulty.

NOTE: Maximum governed speed is a datum figure only. It cannot be adjusted or checked with the engine installed in the machine.

GS4400,24 -19-01FEB97

TORQUE CONVERTER STALL TEST (ATTACHED FILTER)



GS4400,024 -19-01FEB97

PRESSURE AND FLOW TEST

NOTE: The tests must be carried out only in the following order, step by step.

CAUTION: Take care when disconnecting hydraulic hoses and fittings as the oil will be hot.

1. Stop engine, disconnect filter flow/return hoses from the converter valve block and connect flow meter assembly (D), and connect a 0-2000 kPa (0-20 bar; 290 psi) pressure gauge to screwed connector (E).

2. Start engine and run at 1000 rpm. The flowmeter will show the pump flow which should be as shown in Specifications. A low reading indicates a worn pump or blocked suction strainer. The pressure gauge will show the main line pressure (see Specifications). A low reading can be caused by either a faulty pressure maintenance valve or a worn pump. A high reading indicates a faulty pressure maintenance valve or, if the pump flow is low, the oil cooler may be blocked.

3. Stop engine, remove flow test adapters and refit filter. Connect pressure gauge and flowmeter into converter out line as shown at (F). Run engine at 1000 rpm with transmission in neutral. Note converter out pressure and oil cooler flow, which should be as shown in Specifications. A high pressure together with low flow could be caused by a blocked oil cooler. (See also check 7.)

4. With parking brake and footbrake firmly applied, select forward and check flow reading, which should not fall by more than 4.5 liters (1.2 US gal) per minute. A low reading indicates a high leakage rate in that particular clutch, which could be caused by worn or broken piston seals or shaft sealing rings. Select reverse and repeat the test.

5. If the clutch leakage rate is high, the clutch pressures may be checked by connecting the pressure gauge into ports (G) and (H) and repeating test (4). A low reading would confirm a high leakage rate in the particular clutch selected.

6. Stop engine, connect the pressure gauge into port (J) in the converter valve block, and fit a load valve (L) into the converter out line (see note).

NOTE: Make sure that the load valve (L) has been screwed fully out before starting the engine, otherwise the converter seals will be damaged.

Start engine, run at 1000 rpm and slowly screw down the load valve while observing the gauge reading, which should rise to setting of the converter relief (safety) valve .

NOTE: Do not allow the pressure to exceed 1030 kPa; 10.3 bar; 149.3 psi or damage to the converter seals will be caused.

If the reading is higher than specified, the relief (safety) valve must be faulty. A low reading indicates a faulty relief (safety) valve, leaking converter piston ring type seal or leaking pump seal.

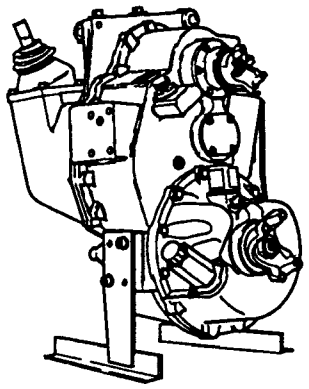
NOTE: Before refitting the plug at (J), apply Loctite 242 to the threads.

7. Stop engine and connect pressure gauge and flowmeter into return line from oil cooler to converter valve block as shown at (K). Start engine, and with transmission in neutral check flowmeter reading, which will show the cooler flow rate (see Specifications). The pressure gauge will show the lubrication pressure (see Specifications). Low flow and pressure readings could indicate a blocked oil cooler.

GS4400,25 -19-01FEB97

DISASSEMBLY OF THE GEARBOX

1. Mount the gearbox on a suitable stand as shown.



GS1020 -UN-26MAR97 GS1020

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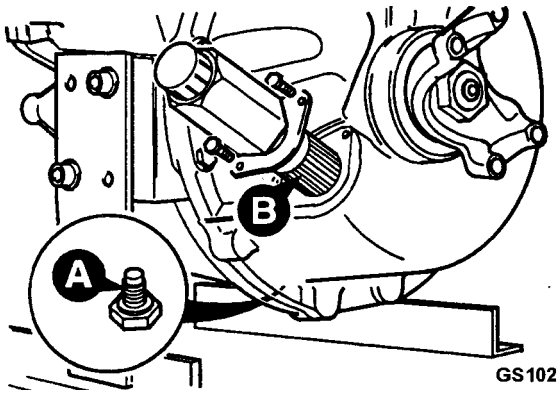
2. Drain the oil (if not already done) by removing the magnetic drain plug (A). Clean the plug. Remove the suction strainer (B). Discard the strainer gasket.



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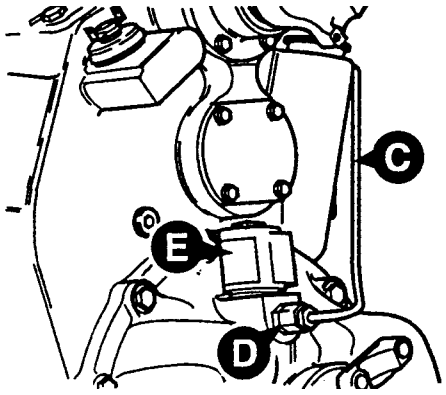
GS4400,27 -19-01FEB97

3. If fitted, disconnect and remove the 4 WD clutch hydraulic pipe (C) and non-return valve (D). Remove the 4 WD clutch solenoid securing nut and lift off the solenoid (E). Retain the solenoid nut and washer.



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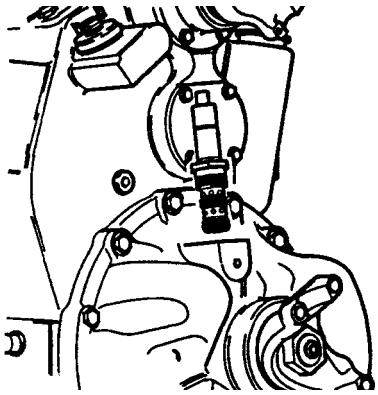
4. Remove the 4 WD clutch valve. Unstake and slacken off the front drive shaft retaining nut using a suitable tool, in preparation for removing the coupling.



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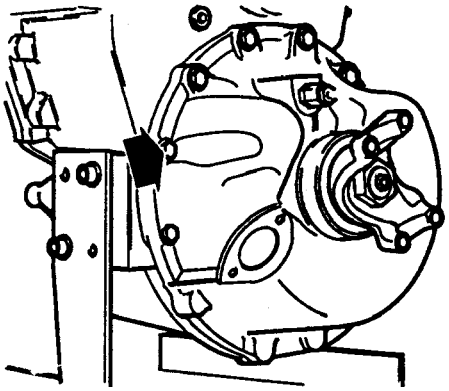
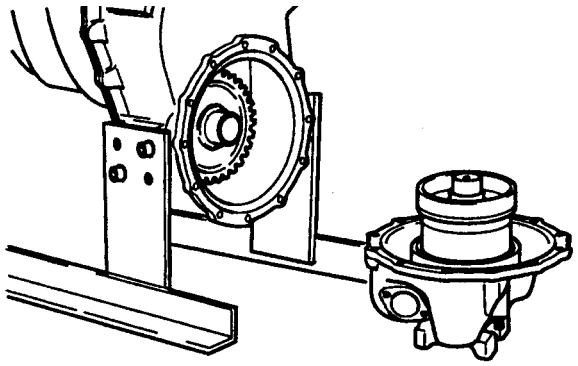
5. Remove the 4 WD clutch housing bolts. Note that there are four bolts on the rear face of the flange (not shown).



GS4400,30 -19-01FEB97

6. Pull off the 4 WD clutch and housing. Discard the gasket.



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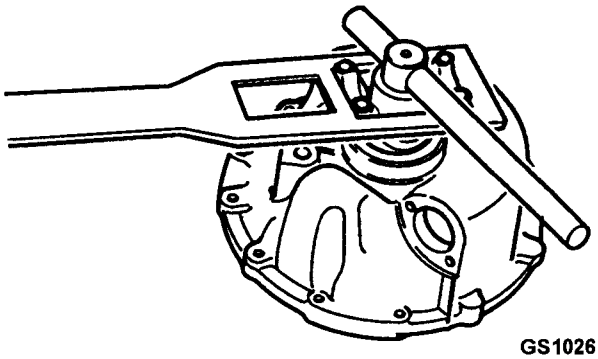
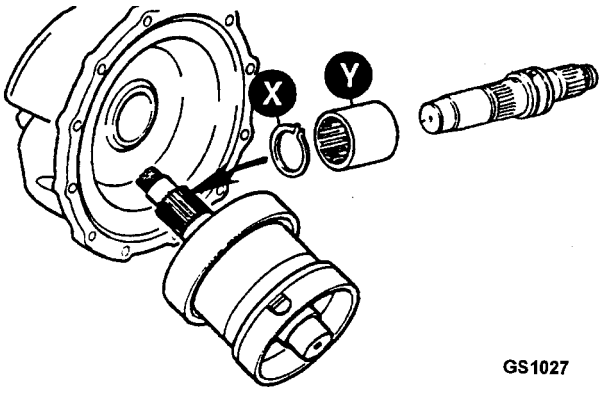
7. Using a suitable tool to hold the coupling, remove the front drive shaft retaining nut and its washer. Pull off the coupling yoke.



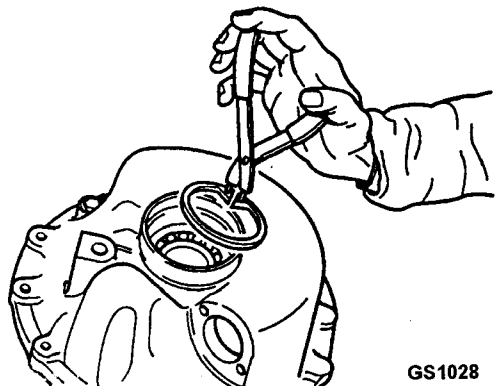
GS4400,32 -19-01FEB97

8. Remove the 4 WD clutch from the housing (snap ring X and sleeve Y not used on 4400 and 4500).



GS4400,33 -19-01FEB97

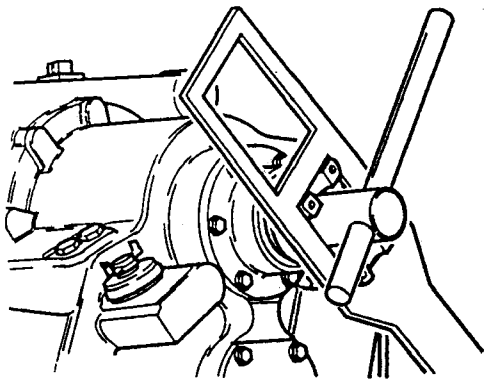
9. Remove the seal, snap ring and bearing.



GS1028 -UN-26MAR97

GS4400,34 -19-01FEB97

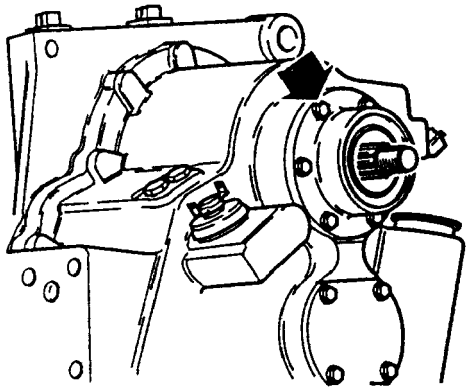
10. Using a suitable tool to hold the coupling, unstake and remove the input shaft retaining nut and its washer. Pull off the coupling yoke.



GS1029 -UN-26MAR97

GS4400,35 -19-01FEB97

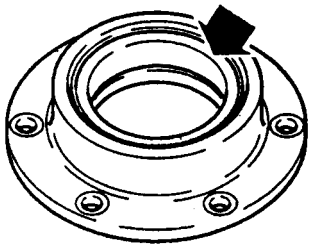
11. Unscrew the bolts and remove the bearing cap.



GS1030 -UN-26MAR97

GS4400,36 -19-01FEB97

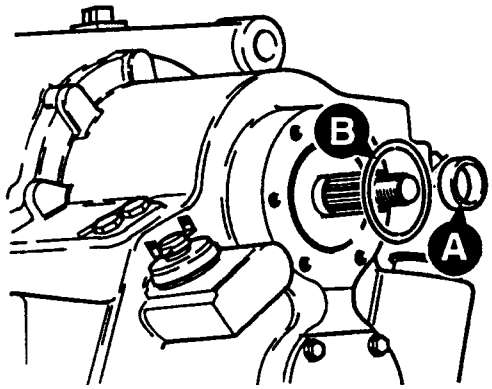
12. Remove the seal.



GS1031 -UN-26MAR97

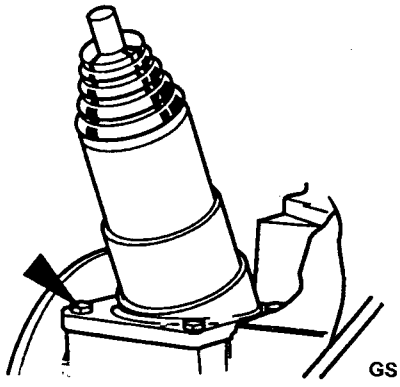
GS4400,37 -19-01FEB97

13. Remove spacer (A) and shims (B).



GS4400,38 -19-01FEB97

14. Remove the screws and lift off the gear lever turret. Discard the gasket.



GS4400,39 -19-01FEB97

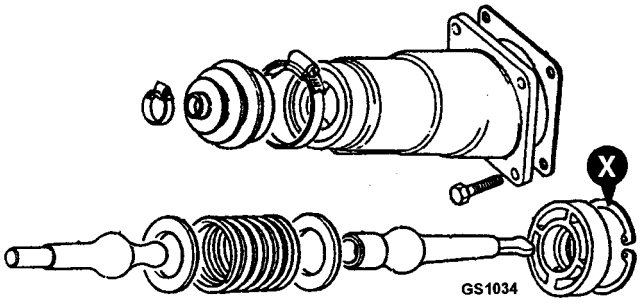
15. Components of the gear lever turrets.

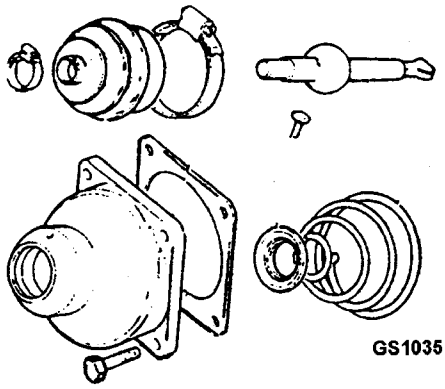
NOTE: On rear engined machines, the gearbox will have a smaller turret. On these gearboxes, if there is excessive play in the lever, renew the turret assembly complete.

Slacken clamps and remove rubber boot.

16. For large turret assembly, remove spring retaining snap ring (X). For small turret assembly release spring from the locating lugs inside the housing.

CAUTION: Beware of spring pressure acting on nylon seat when snap ring is removed.





GS4400,39A -19-01FEB97