ST35X / ST40X
TRACTORS SERVICE MANUAL
FORM NUMBER 79021727
TABLE OF CONTENTS

MAJOR COMPONENT

FIG. 0-07: Identification and terminology of major components, as given in this book, are as follows:

1. Front Wheels
2. Fuel Tank Filler
3. Stabilizer
4. Lift Rod
5. Lower Link
6. Rear Wheels
7. Operator's Seat
8. Instrument Panel
9. Steering Wheel
10. Fender
11. Reflector/Tail Light
12. Steering Cylinder
13. Hood
14. Front Grille
15. Battery
16. Front Bumper
17. Engine
18. Foot Step
19. Transmission
20. Front Wheel-Drive Shaft
21. Headlight
22. Front Axle
23. Front Axle Pivot
24. Lift Arm
25. Rear Axle
26. Drawbar
27. Turn/Hazard Light
28. Center Housing
29. Roll-Over Protective Structure (ROPS)

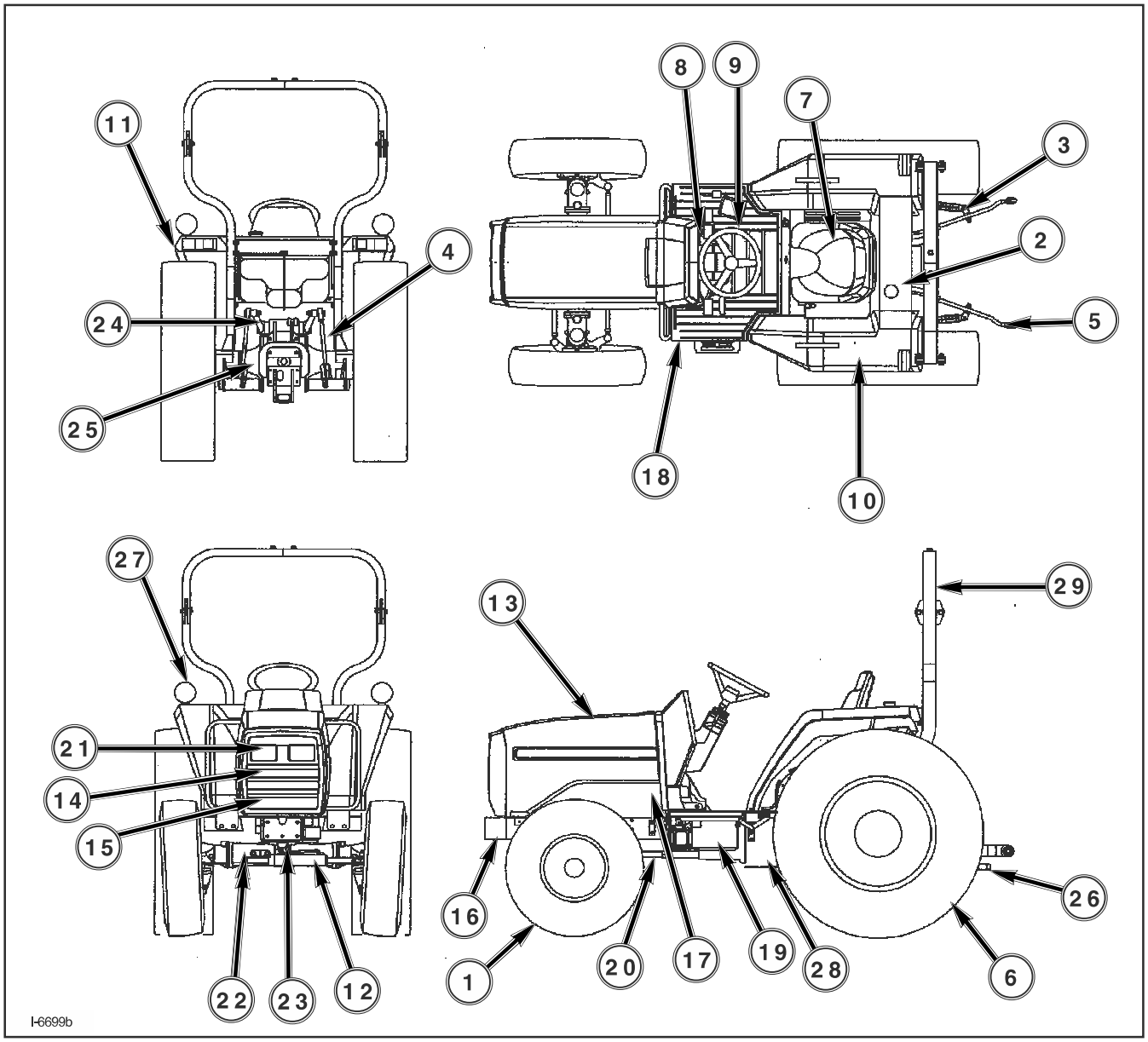


FIG. 0-07

SHEET METAL AND 3-POINT LINKAGE

HOOD SIDE PANELS (ST35X, ST40X, MT275)

Removal and Installation

FIG. 1A-01: To access radiator, battery and engine components, right and left hood side panels can be easily removed.

To remove; turn locking levers, 1, downward to unlock. Pull outward on bottom edge at points indicated and then lift side panel upward to disengage and remove.

Reinstall in reverse order making sure top edge of side panel engages correctly. Push inward on bottom edge and turn lever, 1, rearward to lock.

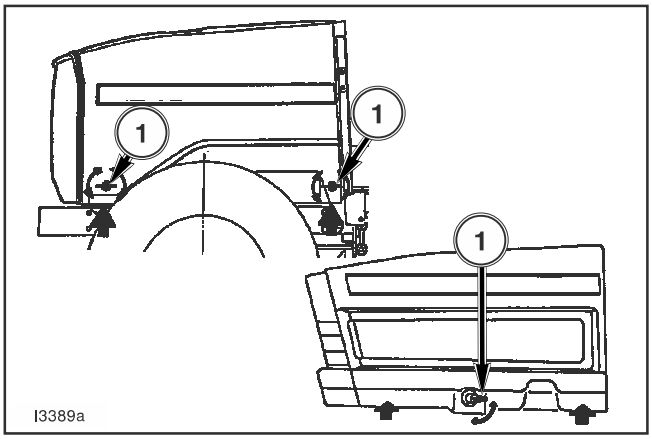


FIG. 1A-01

FRONT GRILL (ST35X, ST40X, MT275)

Removal and Installation

FIG. 1A-02: To permit battery removal, front grill should be removed.

To remove; turn locks, 2, one-quarter turn counterclockwise. Tip top of grill outward and disconnect headlight wiring couplers, 3. Lift grill upward to disengage lower hooks and remove from Tractor.

Reinstall in reverse order making sure lower hooks engage on pins. It will be necessary to push inward on locks, 2, and then turn one-quarter turn clockwise to secure.

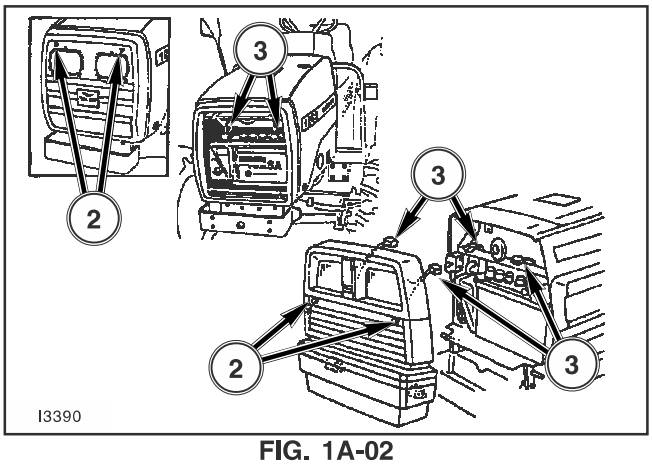


FIG. 1A-02

HOOD (ST35X, ST40X, MT275)

Removal and Installation

FIG. 1A-03: Remove side panels and front grill.

Disconnect wiring attached to hood. Remove bolts holding hood in position, and remove hood.

Reverse procedures to install hood.

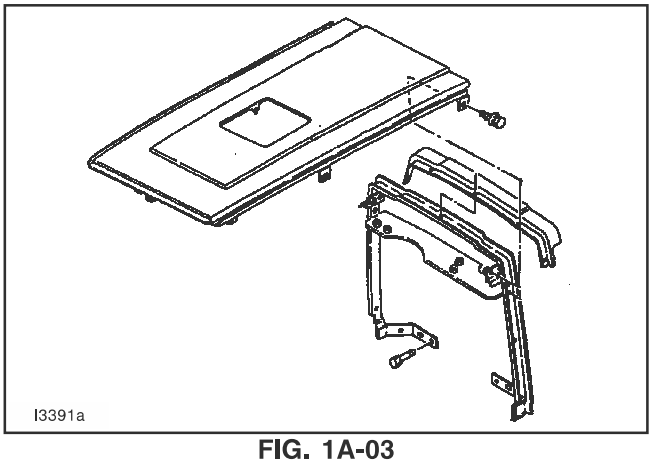


FIG. 1A-03

MAJOR COMPONENTS

GENERAL PRECAUTIONS FOR SEPARATION AND REINSTALLATION

Before Operation

- Always be safety-conscious in selecting clothes to wear and suitable tools to use.
- Before disassembly, be sure that you familiarize yourself with the assembled condition for subsequent reference in reassembly.
- Keep parts and tools in proper order during operations.
- When servicing electrically charged parts, be sure to disconnect the negative (-) battery terminal.
- To prevent oil or water leaks, use liquid gasket as required.
- When reassembling disassembled parts, discard used gaskets, O-rings, or oil seals and install new ones.
- When lifting up only the front or rear part of the tractor, be sure to wedge the grounded wheels.
- When the tractor is jacked up, be sure to support the entire tractor with something like a stand. Lifting it up with a jack only, is a dangerously unstable procedure.
- When replacing parts use authorized genuine Massey Ferguson & AGCO parts only. Massey Ferguson, AGCO, and Challenger assumes no responsibility for accidents, operating problems or damage caused by the use of imitation parts. Also, the use of unauthorized parts will result in relatively poor machine performance.

PRECAUTIONS TO BE FOLLOWED WHEN INSTALLING STANDARDIZED PARTS

Roller or Ball Bearings

- When a bearing is fitted in by the outer race, use an installer which is specially designed to push only the outer race.
- The installer must be designed to install the bearing on the shaft in a parallel position.
- When installing a bearing which appears the same on both sides, install it so that the face which has the identification number faces in a direction for easy visual identification. All the bearings which are to be installed in the transmission case should be placed so that their identification number faces outward.
- If a shaft or a hole where a bearing is to be installed has a inner seat, the bearing should be pushed in completely until it is seated.
- Installed bearings should turn smoothly.

Oil Seals

- Oil seal installer should be designed so as not to deform the oil seals.
- During installation, be careful not to damage the lips, and assure that it is pushed in parallel to the shaft or hole.
- When oil seals are installed, there should be no turnover of the lips nor dislocation of the springs.
- When a multi-lip seal is installed, the grooves between lips should be filled with grease.
- Use a lithium-based grease.
- There should be no oil or water leaks through the installed seals.

O-Rings

- O-rings should be coated with grease before installing.
- Installed O-rings should have no slack or twist.
- Installed O-rings should maintain proper airtightness.

FIG. 1B-21: Remove floor mat, left hand platform and right hand platform to improve accessibility.

FIG. 1B-21

FIG. 1B-22: Disconnect all wire harness connectors between engine and firewall. Label wires to aid in reassembly. Disconnect tachometer cable from engine.

FIG. 1B-22

FIGS. 1B-23 & 24: Remove belt shield from alternator (if equipped). Remove bolt from lower steering column u-joint. Slide u-joint rearward to disconnect steering column from steering orbit roll.

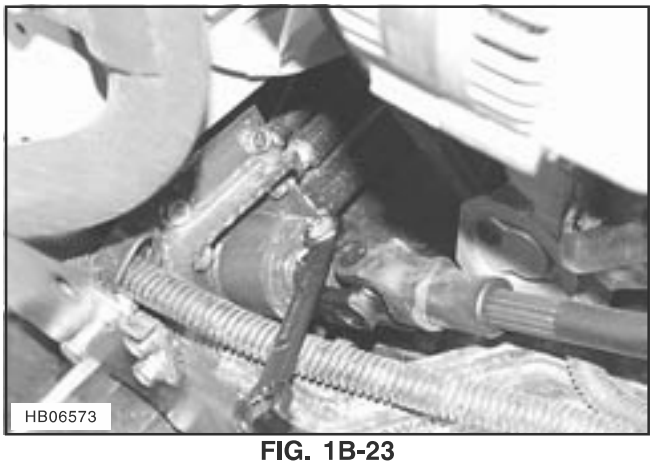


FIG. 1B-23

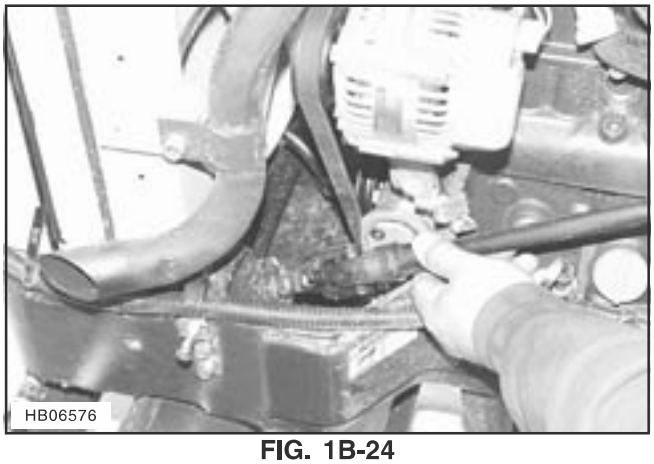


FIG. 1B-24

FIG. 1B-50: Remove brake housing, A, from rear housing.

NOTE: Axle housing must be removed in order to remove brake housing.

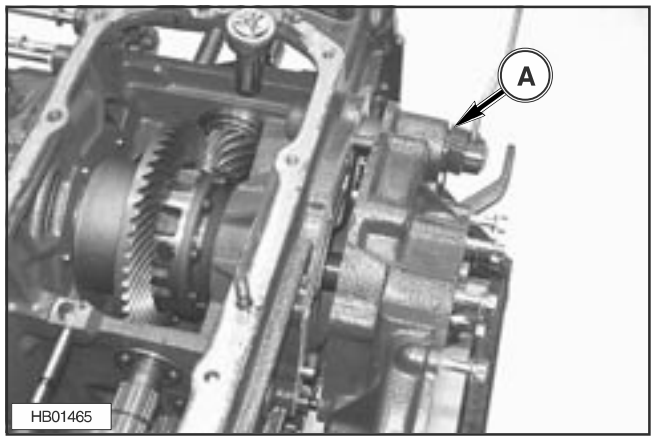


FIG. 1B-50

Installation

Reassemble in reverse order of disassembly.

Refill transmission with oil up to specified level.

NOTE: Use sealant between brake housing and differential housing and between axle housing and brake housing.

HYDRAULIC LIFT CYLINDER COVER

Removal and Installation

Parts which can be inspected during this operation:

- PTO change gears
- Control valve
- Control linkage
- Piston and lift crank linkage

Disassembly

FIG. 1B-51: Remove seat assembly and seat panel, 1, after removing slow return valve knob, 2, differential lock pedal, 3, and 4WD lever, 4. Remove hydraulic lever and quadrant, 5 on RH side.

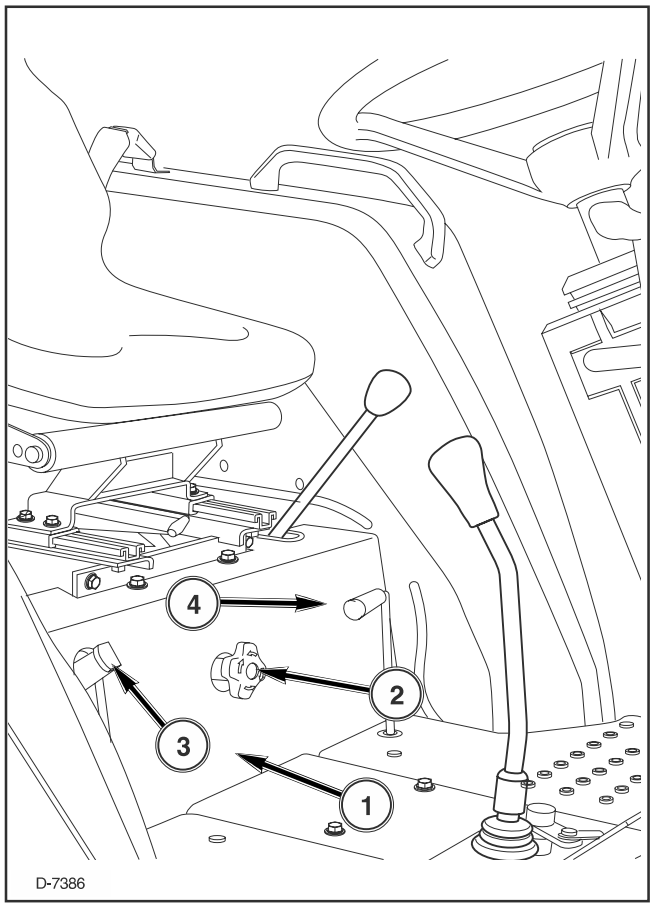


FIG. 1B-51

FIGS. 3A-10: & 11: The pressure type radiator cap has a pressure valve, 1, and a vacuum valve, 2, as shown in the figure. Both valves are held against their seats by springs while the pressure in the cooling system remains within a specified range, thus keeping the cooling system air-tight.

When the pressure in the radiator rises higher than the specified value, it overcomes the force of the pressure valve spring and open the pressure valve to re- lease excess pressure through the overflow pipe as shown in the figure.

When the coolant temperature falls enough to cause the vapor to condense in the cooling system and decrease the coolant volume, the radiator pressure becomes negative. When this occurs, the vacuum valve, 2, opens to let outside air into the radiator as shown in the figure, thus preventing the radiator from being deformed.

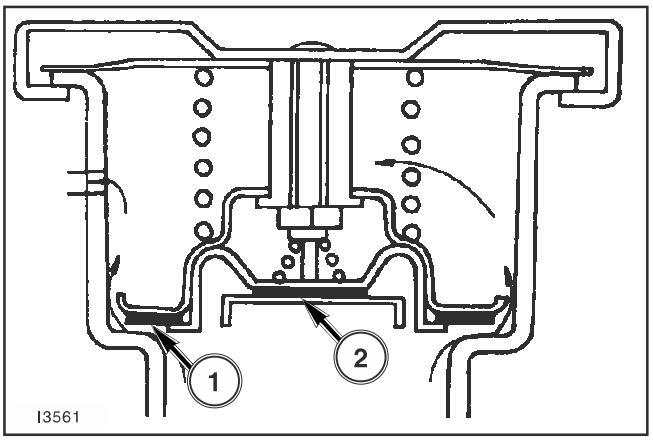


FIG. 3A-10

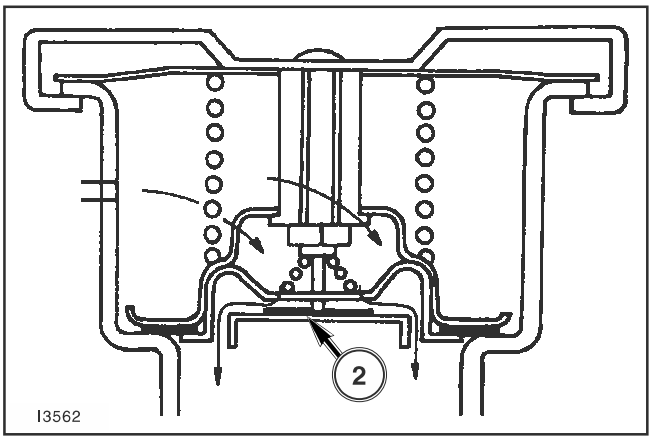


FIG. 3A-11

Reassembly

Reassemble the radiator in the reverse order of disassembly.

NOTE: The rubber hoses should be clamped securely and must not interfere with the cooling fan.

The radiator cores must not interfere with the cooling fan.

Coolant Level Inspection and Coolant Replacement

When the radiator is hot after operation, be sure to wait until the coolant cools down sufficiently before removing the radiator cap. If this is not done, heated vapor might burst out and cause burns. Use fresh water from a faucet as the coolant.

When the coolant is replenished or changed, let the engine idle for a while for the coolant to circulate sufficiently in the cooling system and replenish if necessary after stopping the engine.

Antifreeze

When the weather is cold, use an antifreeze to prevent the engine from freezing. The freezing point differs according to the mixture ratio of water and anti- freeze. Therefore, prepare an antifreeze solution which will have a freezing point lower than the estimated lowest atmospheric temperature in your environment.

Fuel Tank Filler Cap

When fuel tank filler cap is removed, a hissing or popping noise may be noticed. This is due to cap design and is a normal condition. Do not alter cap or use unapproved replacement as fuel leakage may occur in event of Tractor upset.

Throttle Lever

FIG. 3A-28: Hand throttle lever should remain in position selected by operator. Through normal use, friction against lever may decrease, causing lever to move out of selected position. Turn adjusting nut, 1, as required to retain throttle lever in position selected.

NOTE: Throttle lever friction adjustment is accessed by removing rear steering column cover.

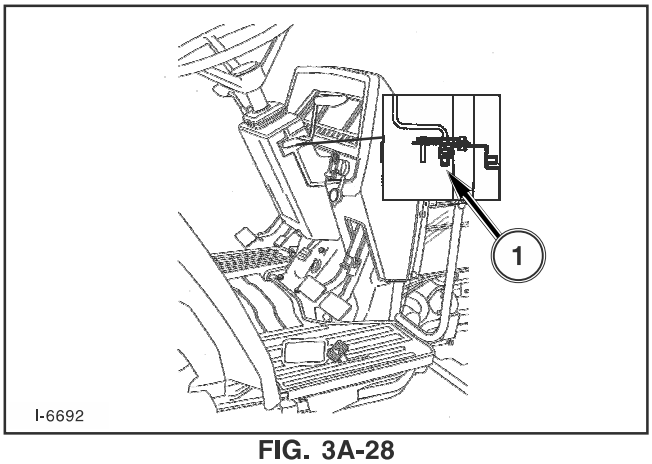


FIG. 3A-28

Repair of friction surface

FIG. 4A-12: The friction surface should be ground down or machines to finish it to 12u (4.7 x 10) to 25u (9.8 x 10) in surface smoothness. The machining limit of the pressure plate surface in thickness is 1.0 mm (0.039 in.) as shown at “X”.

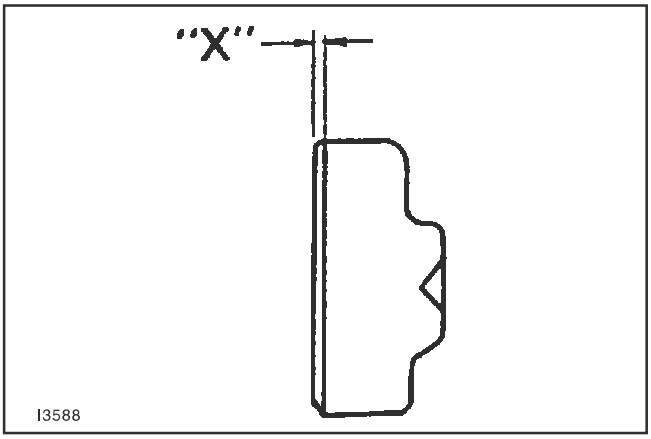


FIG. 4A-12

Adjustment of pressure springs

FIG. 4A-13: When the friction surface of the pressure plate and the flywheel are repaired by grinding or machining, the installation height of the pressure springs increases by the ground-off value both on the flywheel and the friction plate resulting in decreased spring tension. Consequently, adjusting washers equivalent to the ground-off value, must be inserted between the spring seat and the pressure spring, as shown at “A”.

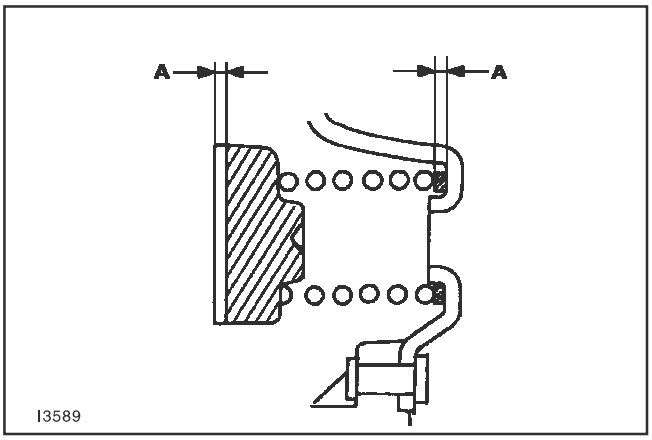


FIG. 4A-13

Inspection of the pressure springs

FIG. 4A-14: Check the pressure springs for free length, deviation from vertical and tension, and replace them if they are fatigued or deformed.

Measure their free length with vernier calipers. Excessively fatigued ones should be replaced.

Free length	Usable limit
63.1 mm (2.48 in.)	58.6 mm (2.30 in.)

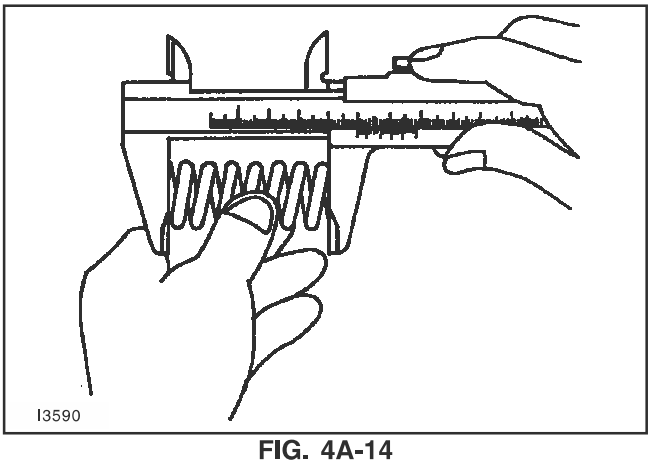


FIG. 4A-14

FIG. 4A-15: Measure the deviation from vertical using a square. Replace springs which are slanted more than approximately 2 degrees, as shown at “X”.

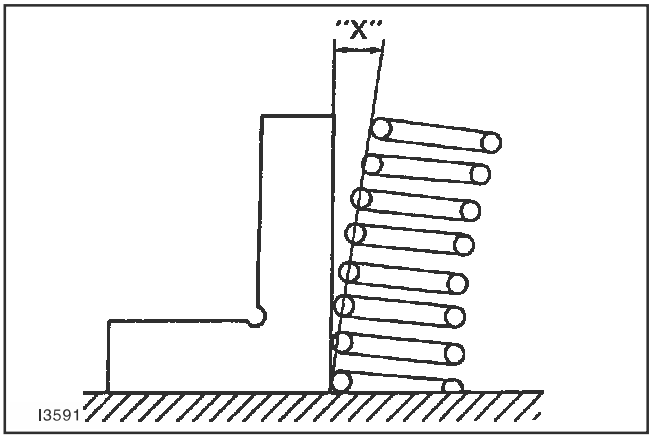


FIG. 4A-15

TRANSMISSION

GENERAL DESCRIPTION

The wheel driving system is composed of the following major components:

Transmission	Front Transmission	Forward/Reverse Gears (Shuttle shift mechanism) PTO clutch pack
	Spacer Transmission	Main Gears (Main Shift) Range gears (Speed range shift) Front drive gears (4WD)
	Differential	Ring gear Differential Differential lock

FIG. 5A-1: The transmission is of constant mesh design and produces 8 speeds forward and 8 speeds reverse; 4 speeds by main gears and 2 speed ranges by range gears; Forward/Reverse gears shuttle.

Shuttling between forward and reverse gears is done mechanically with synchronizers.

The PTO drive system is composed of the independent PTO clutch and the PTO change gears. The PTO clutch pack is engaged hydraulically.

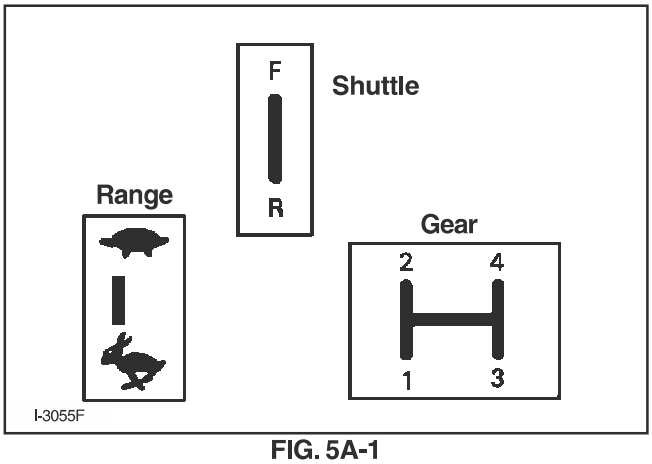


FIG. 5A-1

OPERATION OF PTO SOLENOID

FIG. 5A-8: The PTO solenoid valve is located on the LH side of the transmission housing.

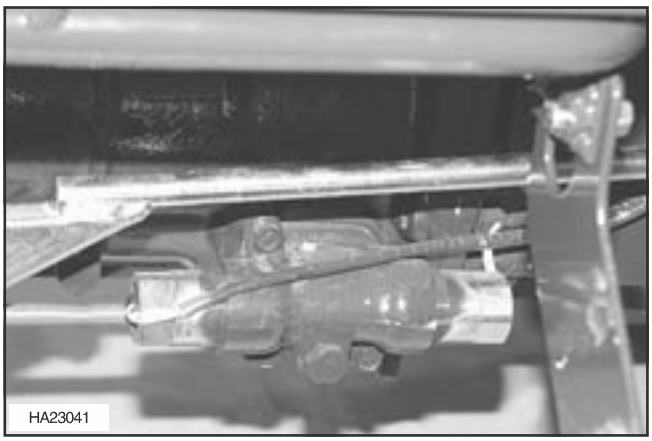


FIG. 5A-8

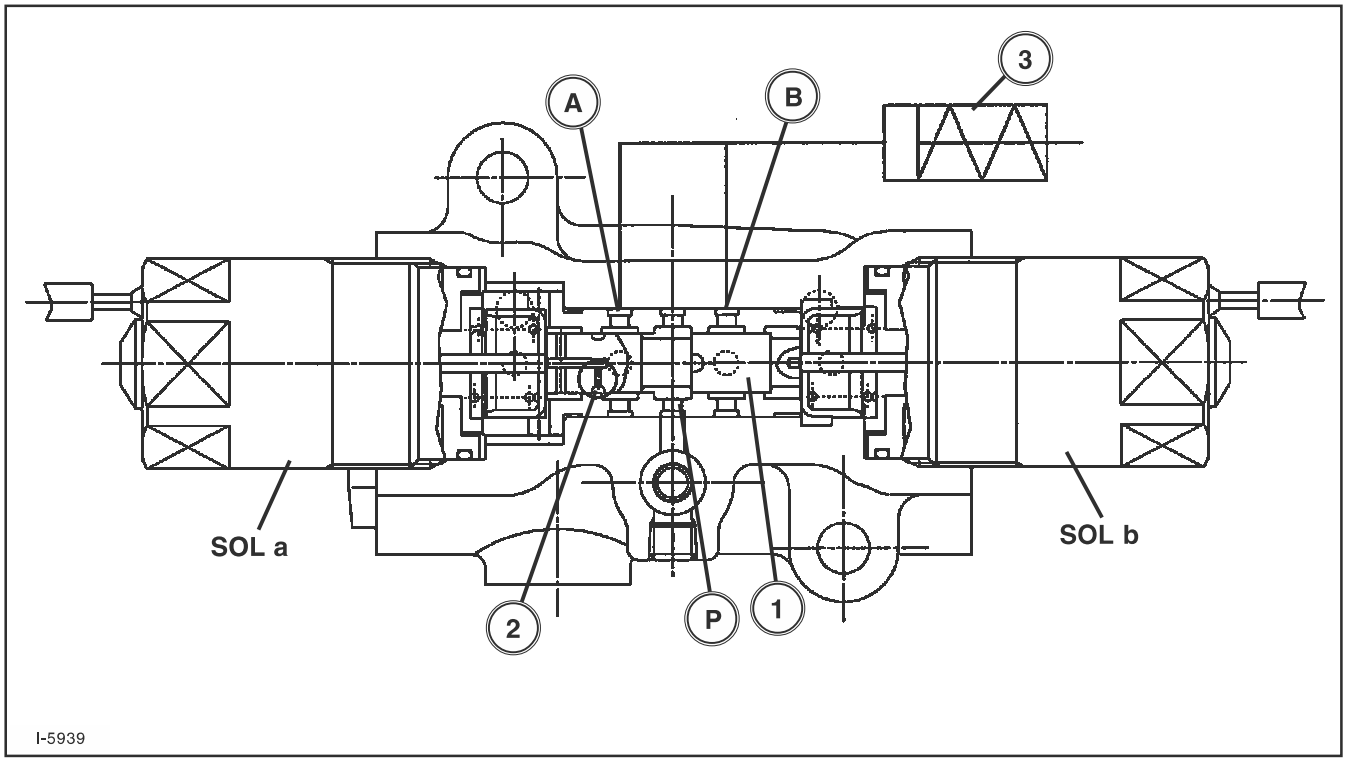


FIG. 5A-9

FIG. 5A-9: This solenoid valve turns on and off the PTO output by engaging the clutch smoothly without shock by controlling the flow and pressure of the fluid whose pressure is regulated at a constant level by the reducing valve to the PTO clutch, 3.

The fluid regulated by the reducing valve flows to port P of the solenoid valve. While the solenoid valve is in neutral, no fluid flows to the clutch.

When the solenoid on “SOL a” side is energized by the signal from the timer unit, spool, 1, shifts to the right and fluid flows to port, B, which is connected to port A. The flow from port B interconnected with port A brings about half clutch engagement because part of the fluid escapes to the drain port through orifice, 2, in spool, 1, relevant to port A when clutch discs are met to each other by means of the clutch piston.

1	Spool
2	Orifice
3	PTO Clutch
A	Port A
B	Port B
P	Port P
SOL a	Solenoid a (half pressure)
SOL b	Solenoid b (full pressure)

NOTE: Kgf/cm² x 14.223 = psi

Half pressure: 7.5-9 kg/cm² (106-128 psi)

Full pressure: 16-18 kg/cm² (227-256 psi)

Mechanical Shuttle

FIG. 5A-27: Component List

1. Sleeve
2. O-ring
3. Oil seal
4. Input gear A / 19T (PTO)
5. Oil seal
6. Support
7. Front transmission case
8. Plate
9. Oil seal
10. Input gear B / 18T (Transmission)
11. Gear / 33T
12. Idler shaft
13. Shaft
14. Gear / 29T
15. Washer, Thrust
16. Gear / 28T
17. Needle bearing
18. Reverse shaft
19. Synchronizer assembly
20. Gear / 23T
21. Bushing 30x35x45
22. Needle bearing
23. Gear
24. Collar / 26x35x3
25. PTO drive gear / 29T
26. PTO clutch assembly
27. PTO drive shaft
28. Coupling

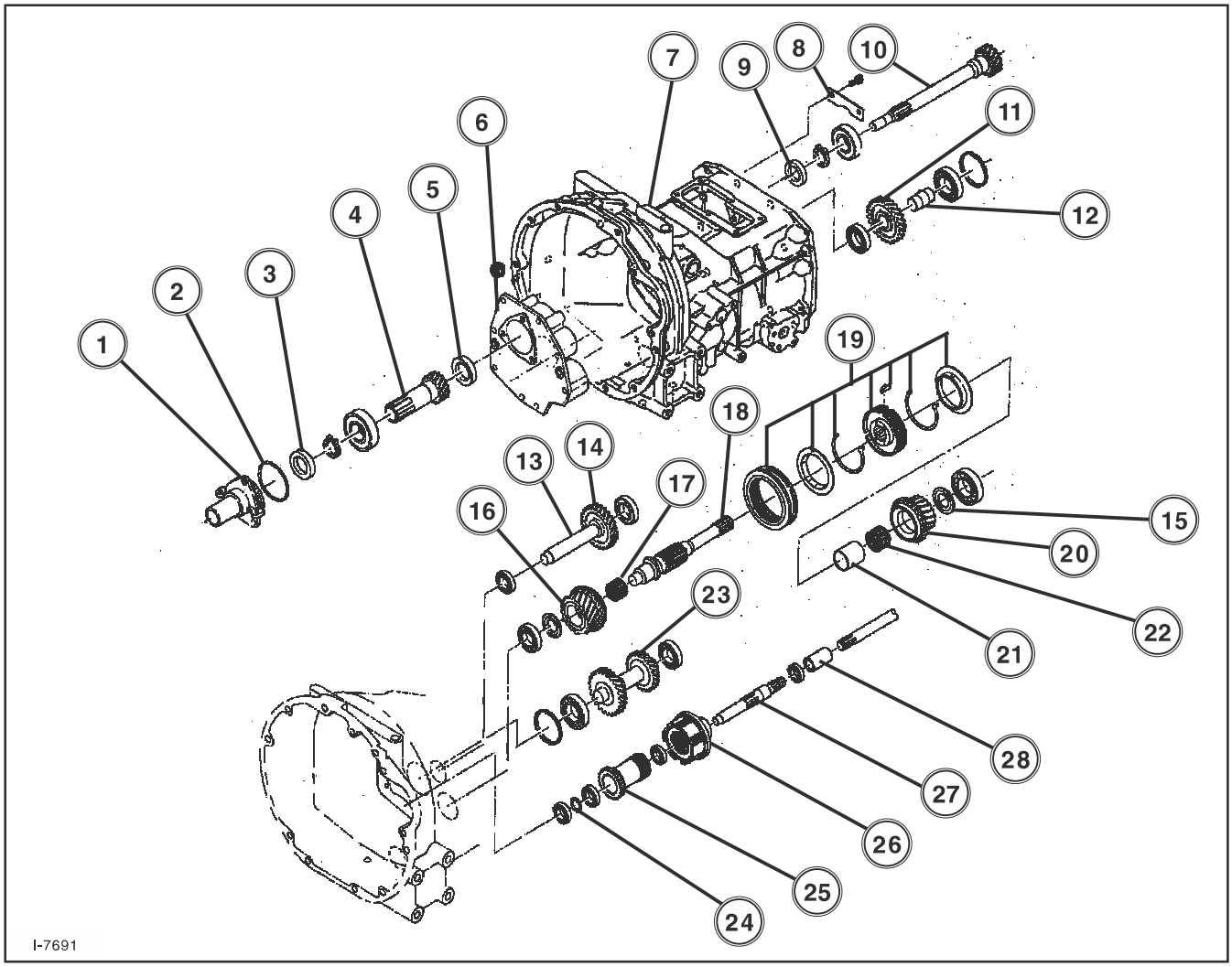


FIG. 5A-27

FIG. 5A-50: Line up PTO clutch brake tab, 1, with notch in input support metal.

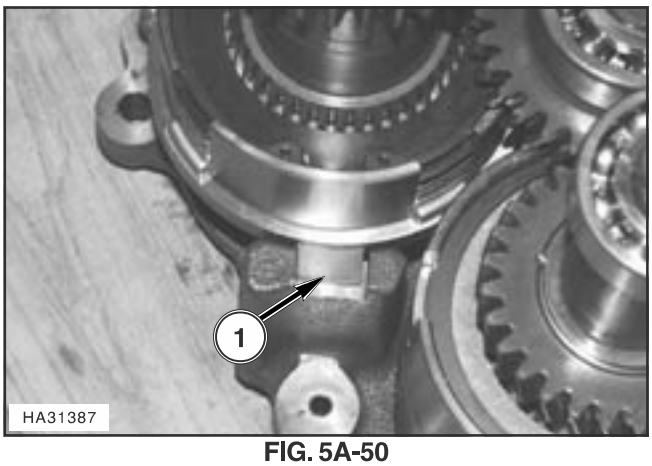


FIG. 5A-50

FIG. 5A-51: Make sure o-ring, 1, is installed before installing input support metal.

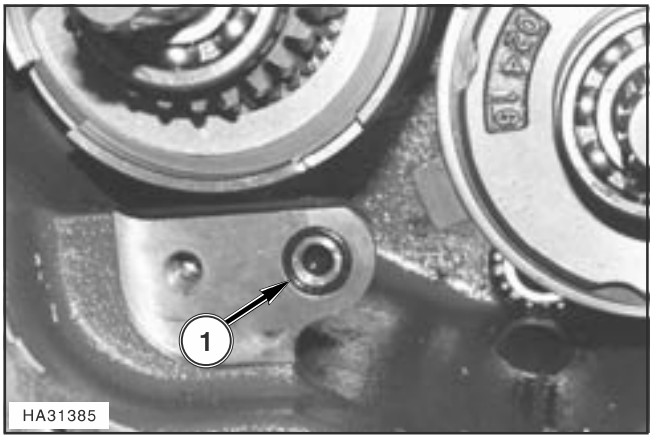


FIG. 5A-51

FIG. 5A-52: Make sure all seals are properly installed. The oil groove on the thrust washers faces the gears.

Reassemble in reverse order. Use silicon sealer between the front transmission and spacer transmission.

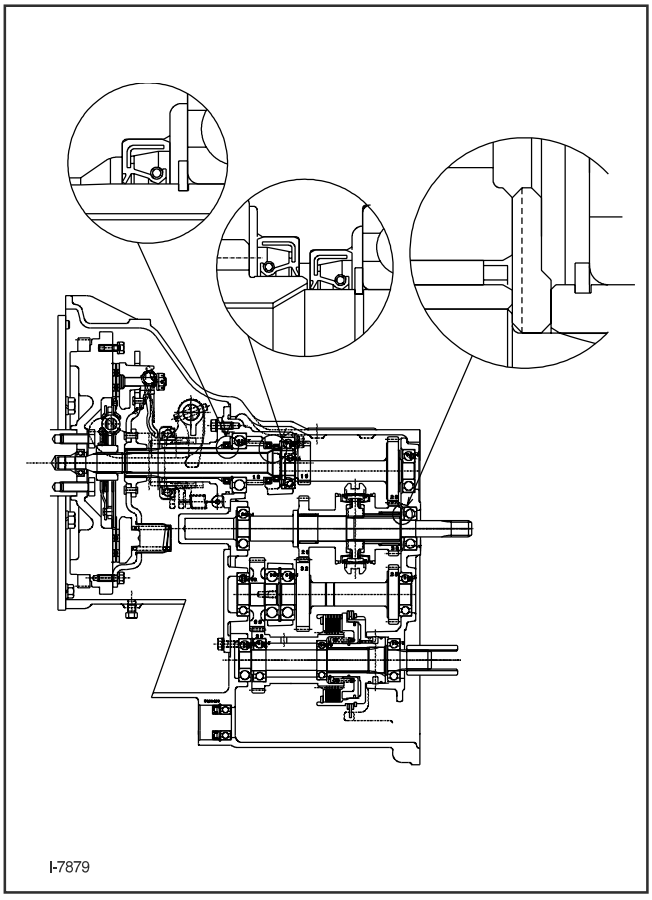


FIG. 5A-52

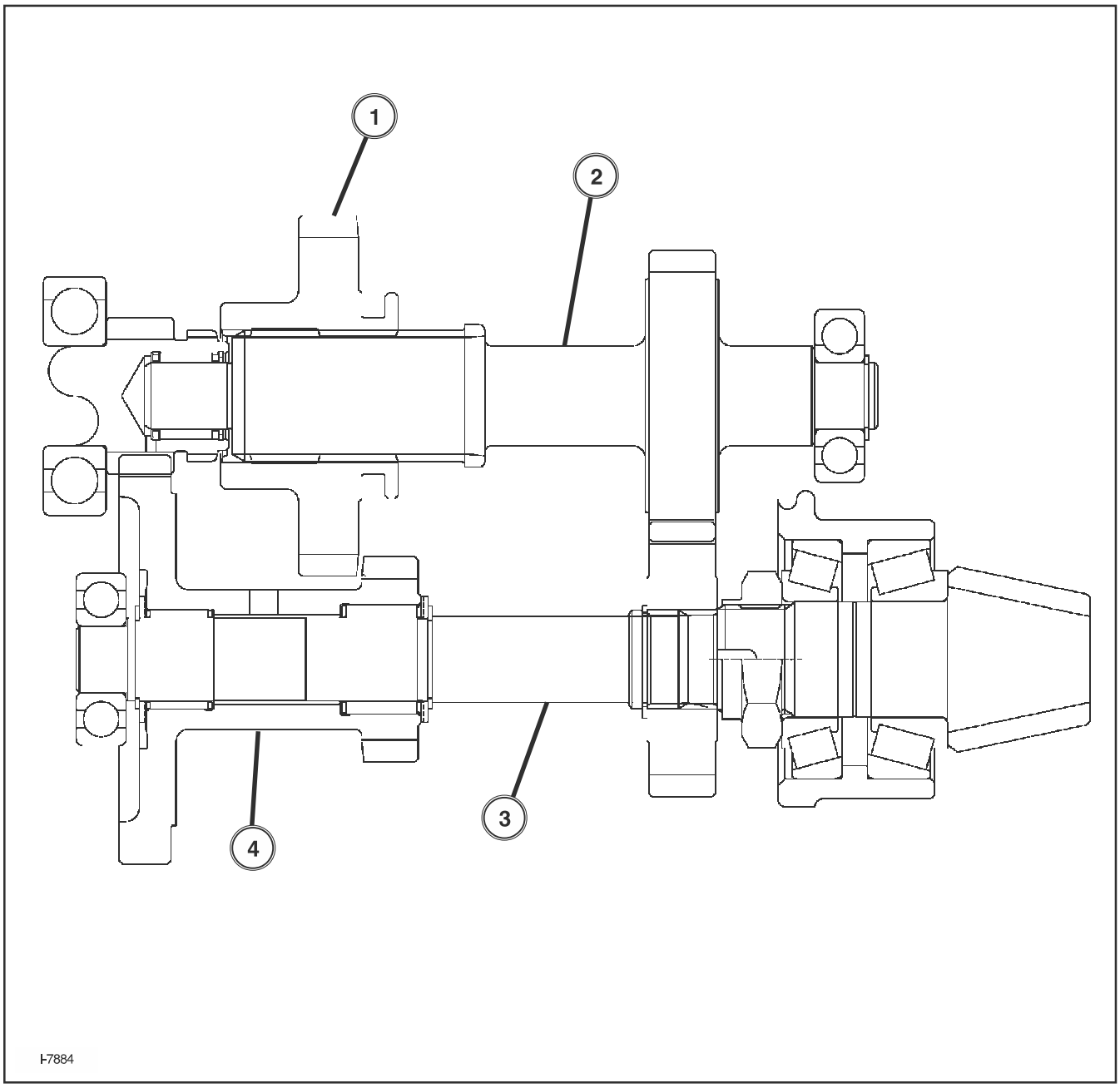


FIG. 5A-69

RANGE GEARS

FIG. 5A-69: Range Change Construction

1) Hi/Lo Shift Collar
2) Output Shaft
3) Pinion Shaft
4) Hi/Lo Range Gear

RING GEAR AND PINION

Removal and Installation

FIG. 5A-86: Remove lift arm housing from differential housing as outlined in section 1B.

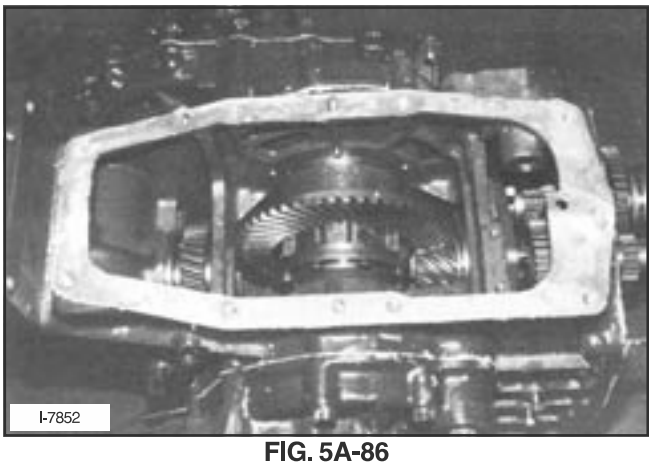


FIG. 5A-86

FIGS. 5A-87: Check back lash of ring and pinion gear. Back lash should be 0.1-0.2 mm (0.004-0.008 in.).

FIG. 5A-87

FIG. 5A-88: Separate spacer transmission from differential housing as outlined in section 1B.

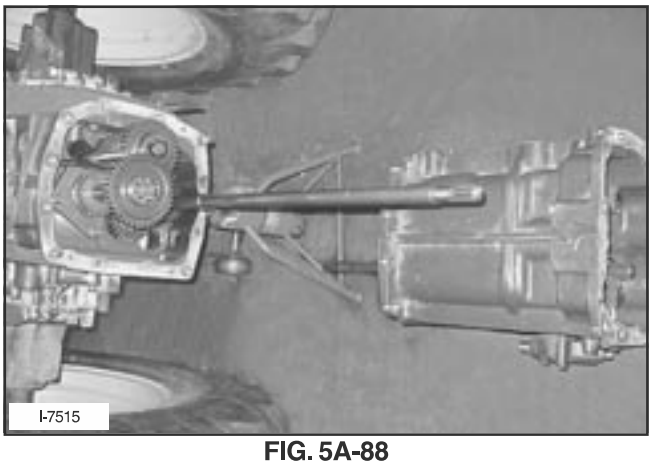


FIG. 5A-88

FIG. 5A-89: Remove LH and RH wheel housings and brake housing as outlined in 1B.

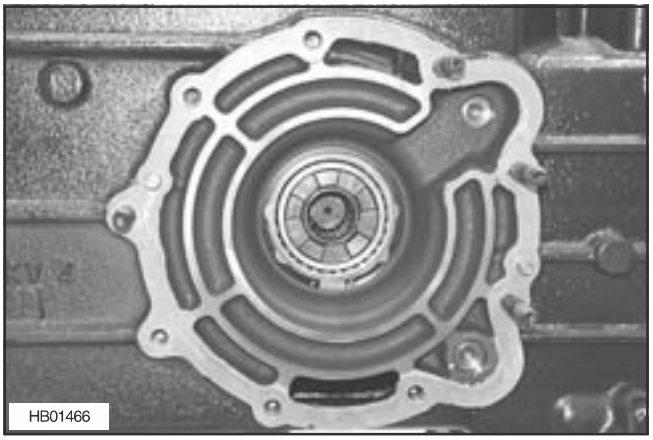
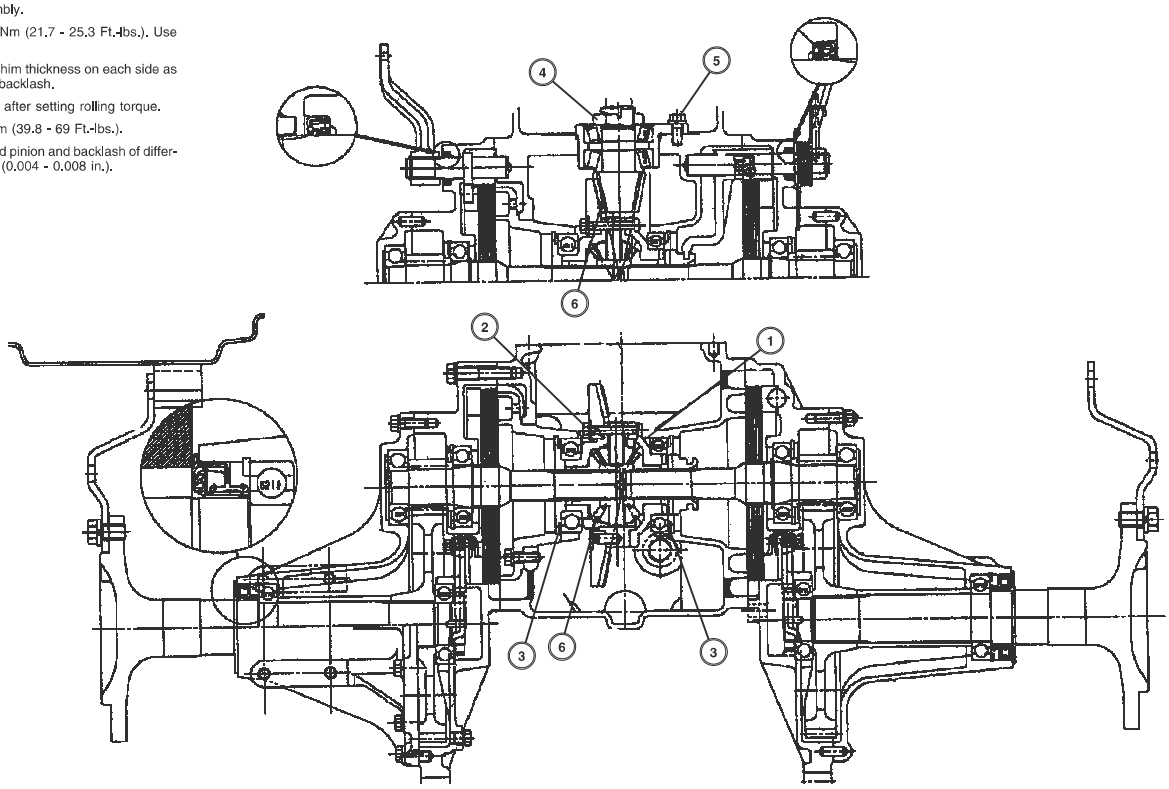


FIG. 5A-89

1. Apply grease to assembly.
2. Torque to 29.4 - 34.3 Nm (21.7 - 25.3 Ft.-lbs.). Use loctite on bolts.
3. Use 0.4mm (.016 in.) shim thickness on each side as a starting point to set backlash.
4. Never fail to stake nut after setting rolling torque.
5. Torque to 53 - 93.5 Nm (39.8 - 69 Ft.-lbs.).
6. Set backlash of ring and pinion and backlash of differential to 0.1 - 0.2 mm (0.004 - 0.008 in.).



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Final Drive Assembly

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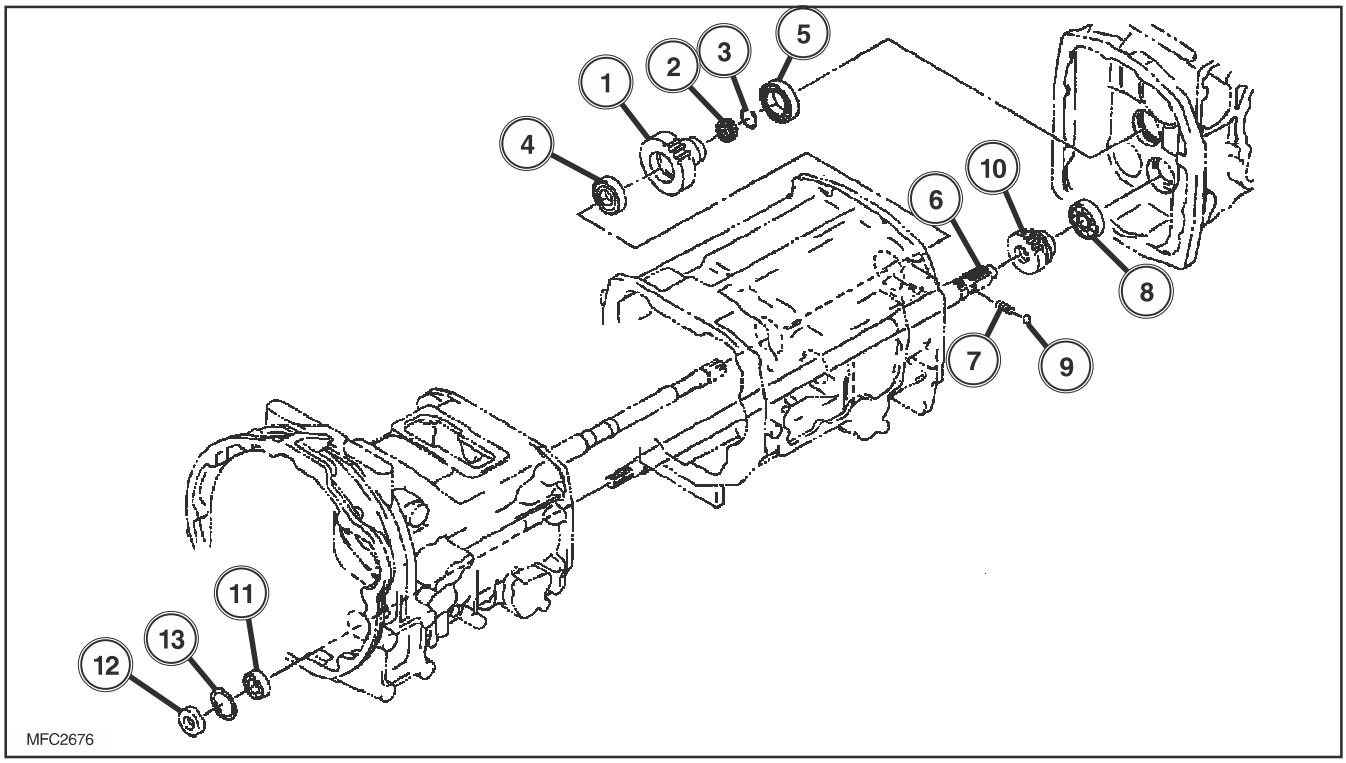

FIG. 5A-127

FIG. 5A-127: 4WD Gear

1. Idler gear, 27T
2. Bearing, Needle
3. Ring, Snap
4. Bearing, Ball
5. Bearing
6. Shaft, 4WD
7. Spring, Shifter
8. Bearing
9. Ball
10. Sliding Gear, 22T
11. Bearing
12. Seal, Oil
13. Ring, Snap

Disassembly

Remove both wheels.

Remove the drain plug from the final case on both sides and drain oil from the final case.

Remove front axle as outlined in “SPLITTING FRONT AXLE” unless only the front case assembly or its components need to be serviced.

FIG. 6A-09: Remove pinion shaft oil seal. Remove snap ring from pinion shaft.

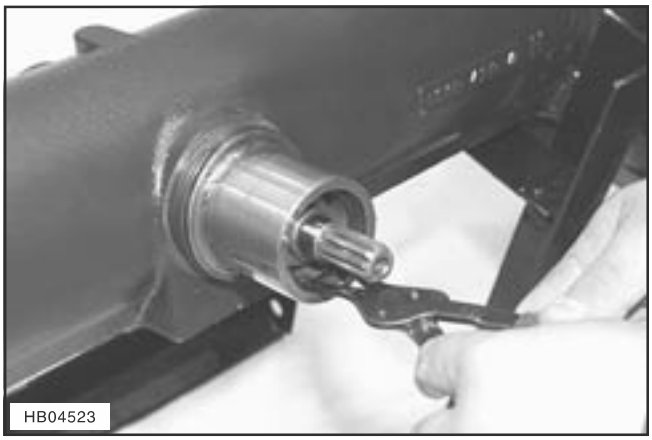

FIG. 6A-09

FIG. 6A-10: Remove pinion shaft assembly, 1, collar, 2, rear shims, 3, and front shims, 4. Remove staked nut, 5, and use a hydraulic press to remove pinion shaft bearings, 6.

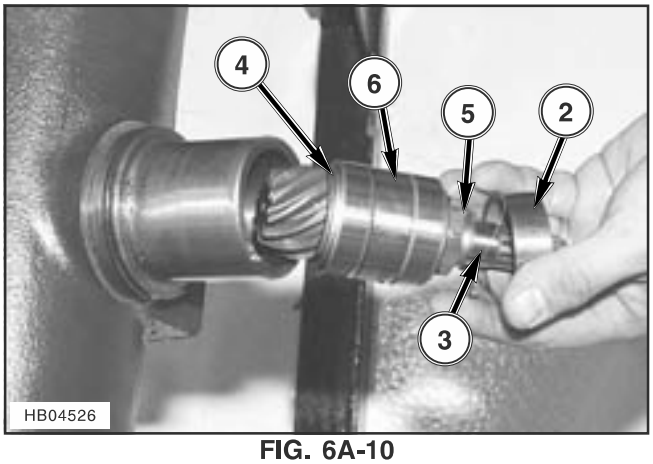

FIG. 6A-10

FIG. 6A-11: Remove left and right hand final case assemblies. Inspect the o-ring, 1, on the axle housing.

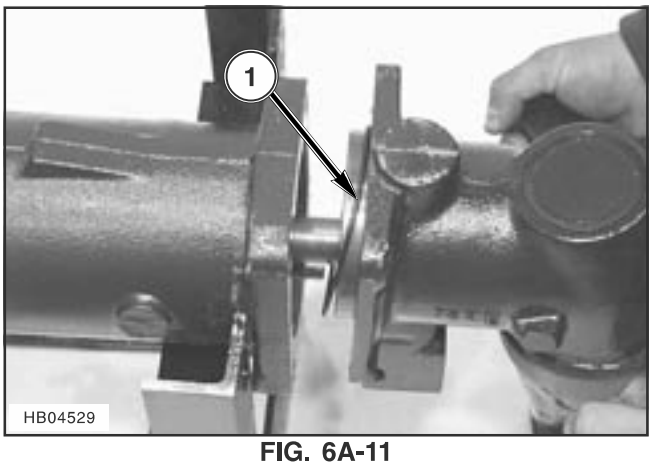

FIG. 6A-11

FIG. 6A-12: Remove left and right hand axle shafts.

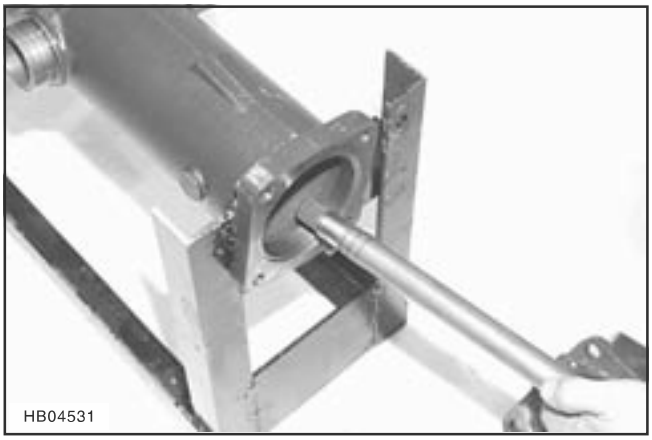

FIG. 6A-12

FIG. 6A-38: Remove bearing, bevel gear (11T) and shaft.

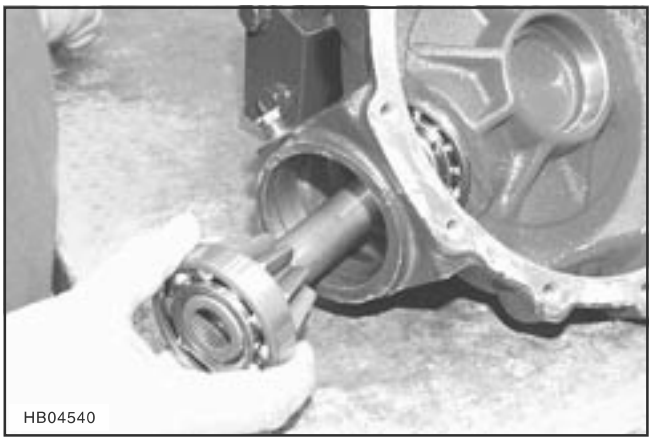

FIG. 6A-38

FIG. 6A-39: Remove snap ring, bearing and bevel gear (17T).

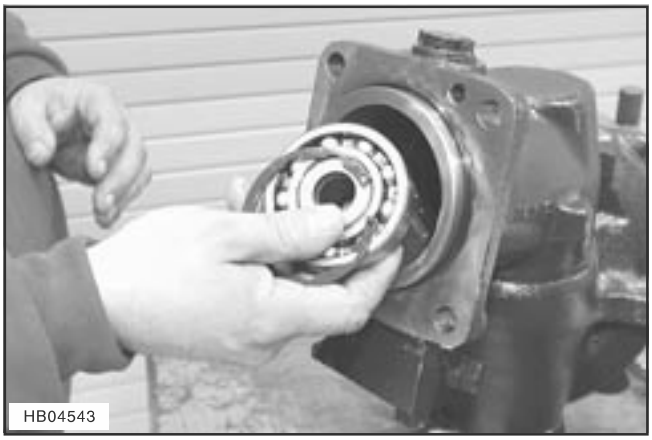

FIG. 6A-39

FIG. 6A-40: Remove bevel gear (17T) and bearing.

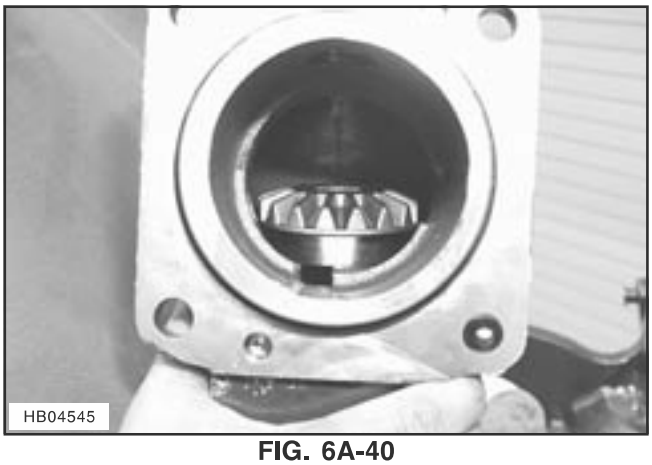

FIG. 6A-40

FIG. 6A-41: Divide final case into final case A, 1, and final case B, 2. The final case pivot seal can be accessed at this point.

NOTE: Seal should be discarded and replaced when reassembled.

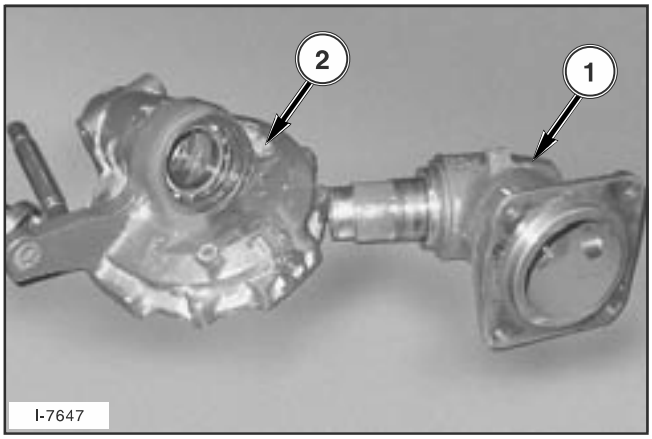

FIG. 6A-41

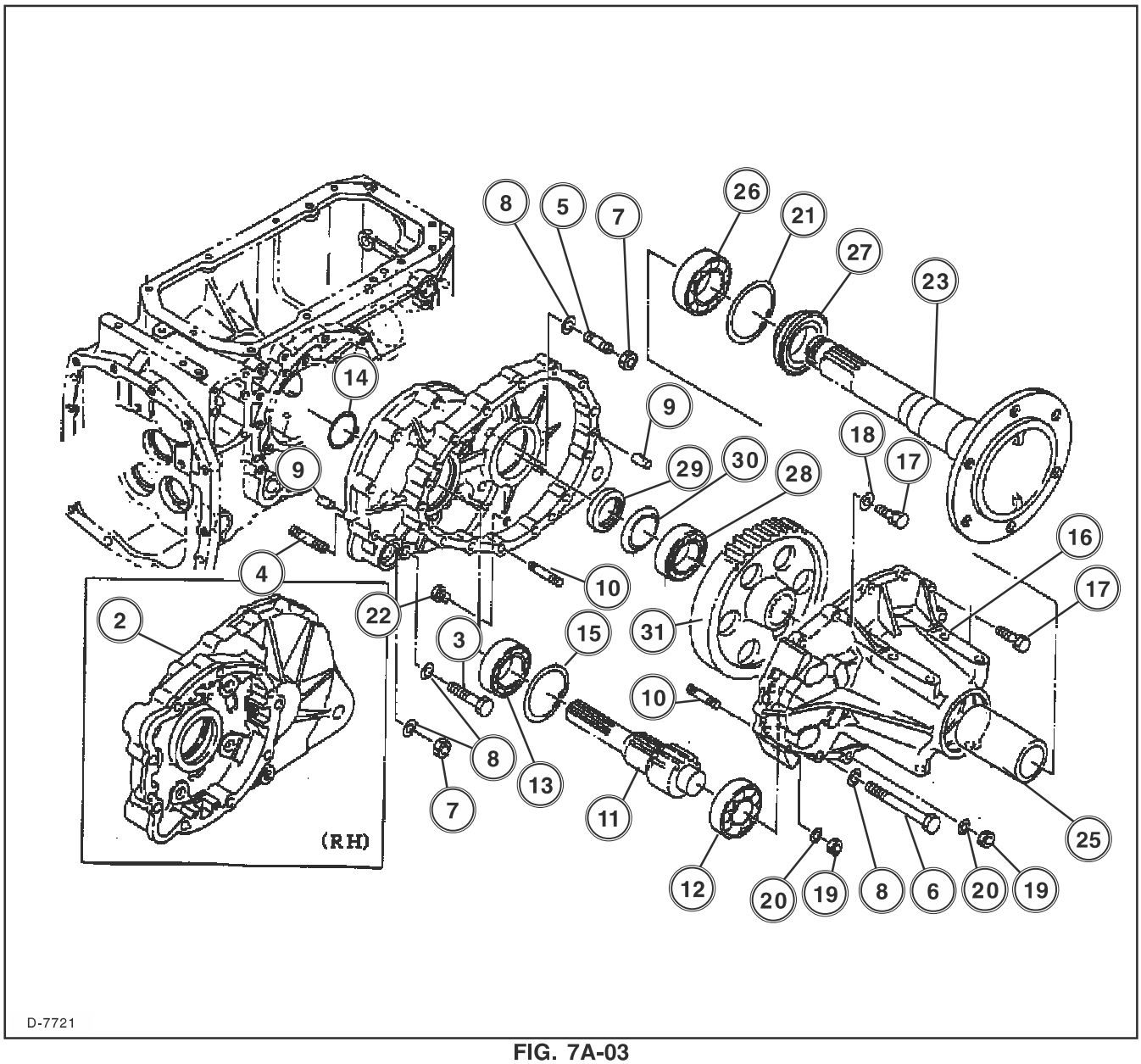

FIG. 7A-03

FIG. 7A-03: Rear axle housing components.

1. Spacer Housing - Left
2. Spacer Housing - Right
3. Bolt (M12x60)
4. Stud Bolt (M12x60)
5. Stud Bolt (M12x35)
6. Bolt (M12x120)
7. Nut (M12)
8. Lock Washer (M12)
9. Pin (10x24)
10. Stud Bolt
11. Spur Gear (10)
12. Bearing
13. Bearing
14. Snap Ring
15. Snap Ring
16. Axle Housing
17. Bolts (M10x30)
18. Washer (M10)
19. Nut (M10)
20. Lock Washer (M10)
21. Snap Ring
22. Screw Seal Plug
23. Wheel Shaft
24. Spur Gear (54)
25. Collar (120)
26. Bearing
27. Oil Seal Assembly
28. Bearing
29. Bearing Nut
30. Bearing Washer
31. Bull Gear

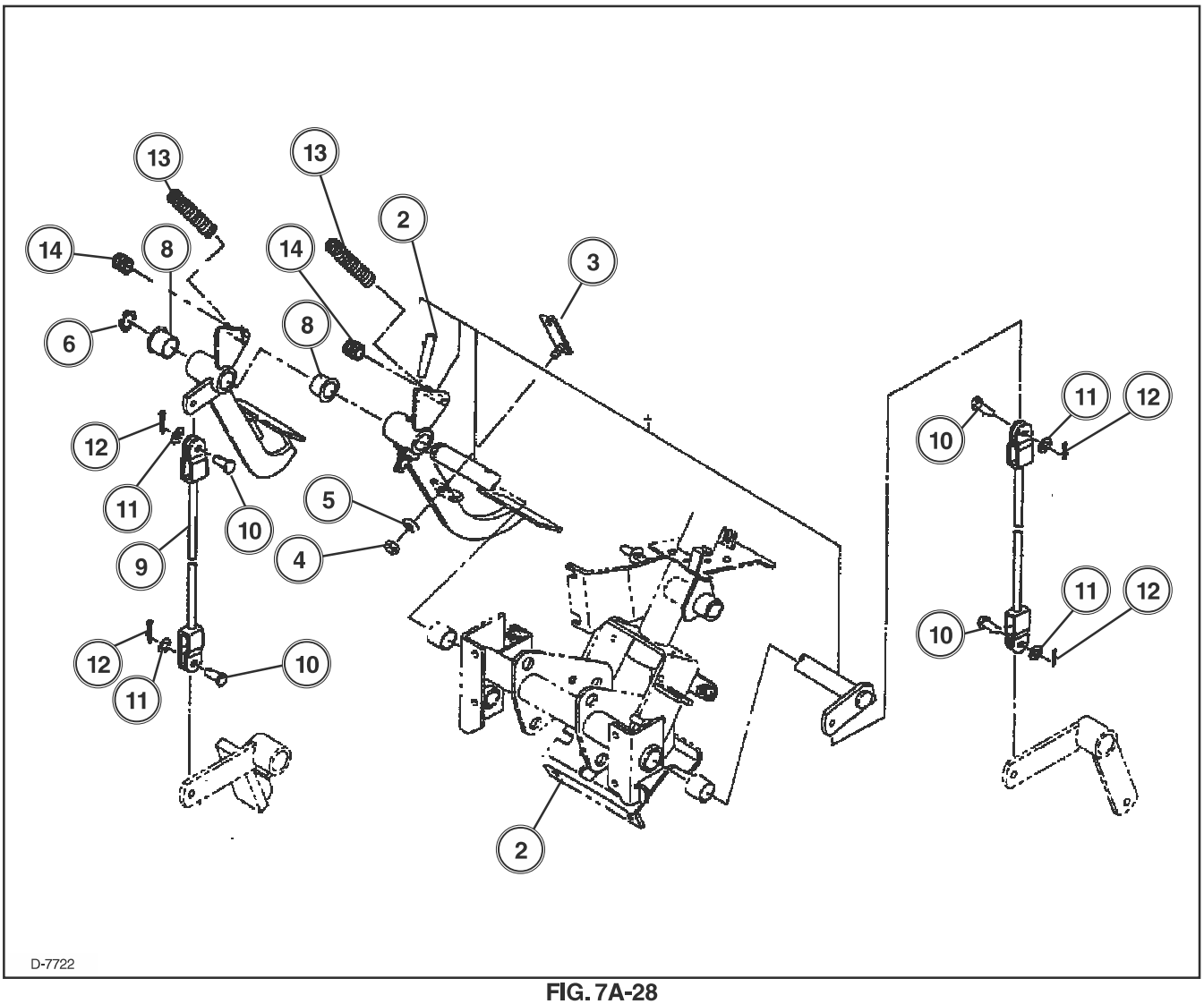

FIG. 7A-28

BRAKE LINKAGE

FIG. 7A-28: Brake Pedal And Linkage - Component List

1. Brake Pedal Set - Left
2. Split Taper Pin (8x50)
3. Lock Plate Assembly
4. U-Nut (M8)
5. Coned Disc Spring
6. Snap Ring
7. Brake Pedal Assembly - Right
8. Bush (20x23x20)
9. Rod Assembly
10. Pin
11. Washer (M8)
12. Cotter Pin (2x20)
13. Spring
14. Corrugated Tube

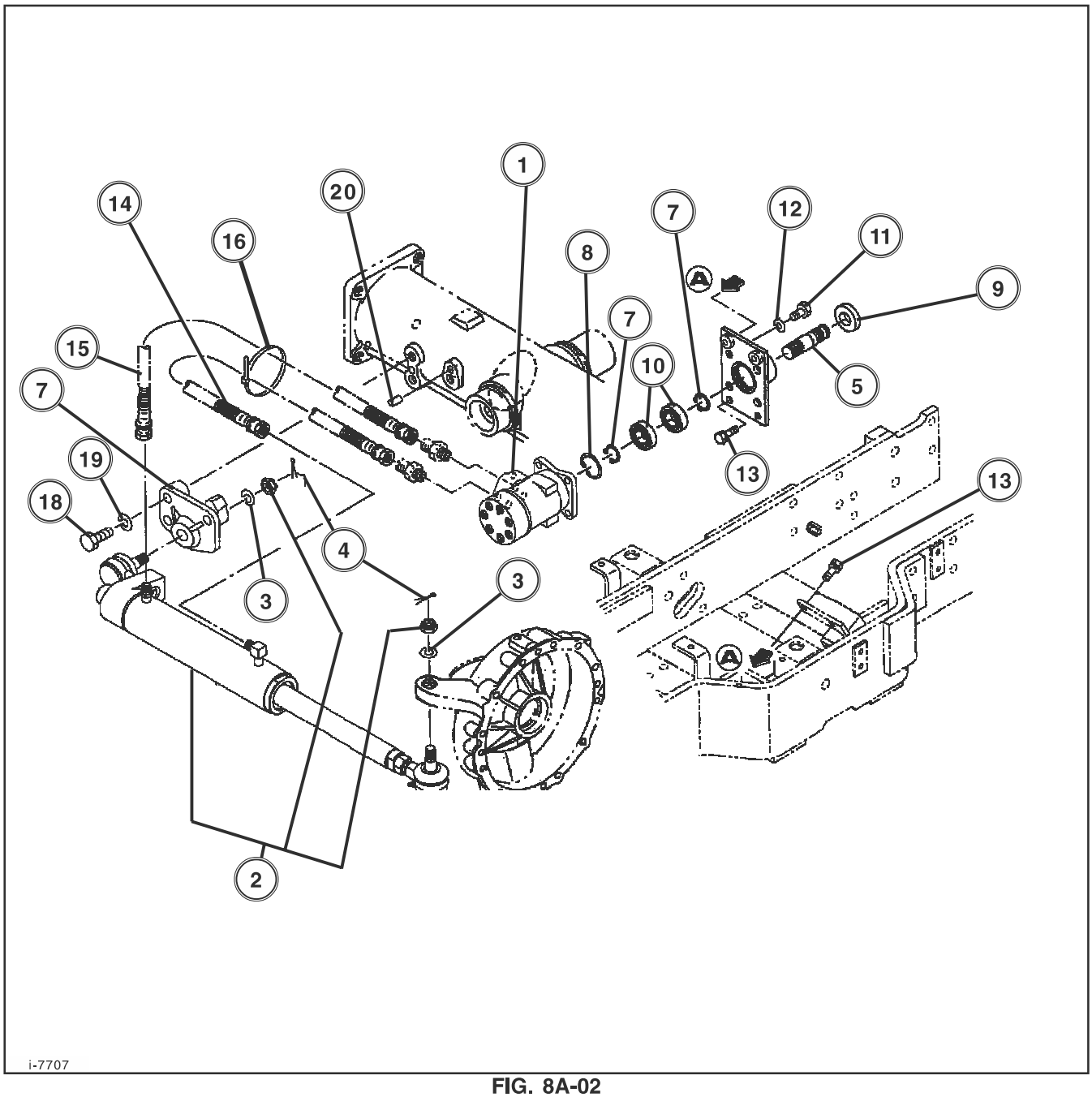

FIG. 8A-02

1. Steering Orbit Roll
2. Cylinder Assy
3. Lockwasher M14
4. Pin / Cotter 3x25
5. Shaft
6. Housing Assy
7. Snap Ring
8. Snap Ring
9. Oil Seal
10. Bearing
11. Bolt M10x1.25x20
12. Lockwasher M10
13. Bolts M8x20
14. Hose Assy / 650
15. Hose Assy / 450
16. Band / Wire / 250
17. Bracket Cylinder
18. Bolt M14x60
19. Lockwasher M14
20. Pin - 10x24

Re-Assembly of Gerotor Side

FIG. 8A-27: Insert ball into the bolt hole and make sure that the ball is seated in the proper position.

NOTE: Make sure that the spool/sleeve assembly is deformed a little when the ball is installed.

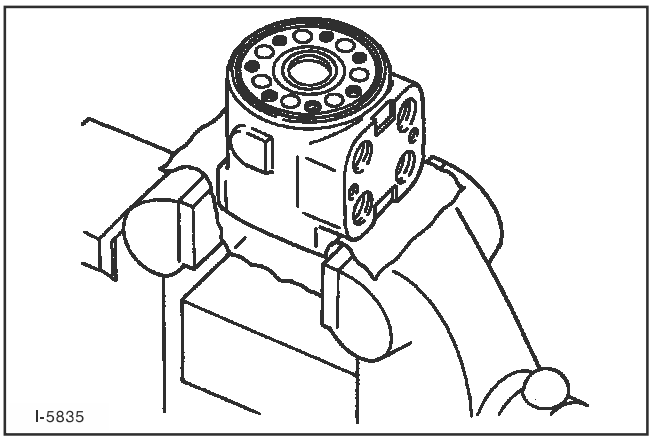

FIG. 8A-27

FIG. 8A-28: Insert 0-ring, 31, into housing.

Place spacer plate, 10, as shown and align the oil holes.

NOTE: The bolt hole and oil holes are different.

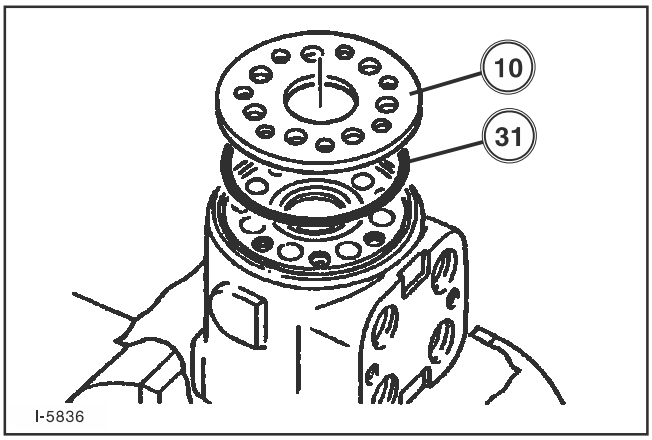

FIG. 8A-28

FIG. 8A-29: Insert drive, 11.

NOTE: Provide a guide line, A, on the drive end face parallel with the pin axis with a felt pen for correct installation.

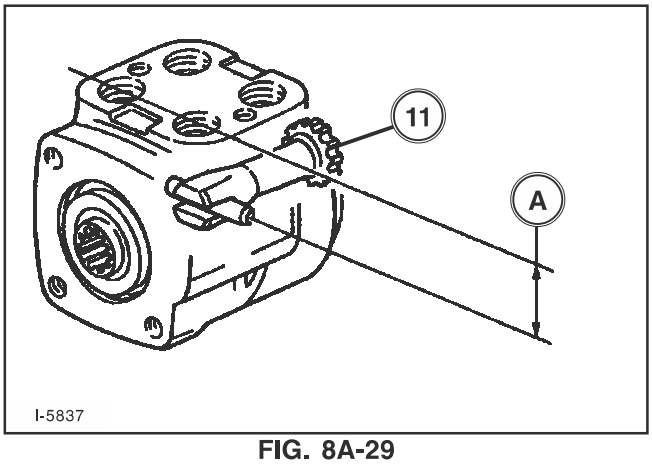

FIG. 8A-29

FIG. 8A-30: Insert O-ring, 31, on gerotor.

Install 0-ring, 34, and seal, 33, on gerotor, 7.

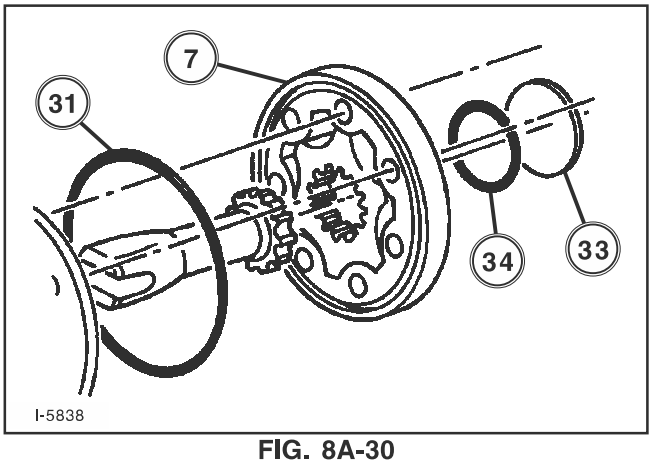

FIG. 8A-30

SPECIFICATIONS

Piston and cylinder	Lift (at lower link top end)	1300 kgf (2866.0 lbs)
Control valve	Cylinder port leaks (under a pressure of 9800 kPa (100 kgf/cm²) with gear oil of SAE 80]	5 cc (0.305 cu.in.)/min. or less
Safety valve (installed outside cylinder head)	Cracking pressure	16181 kPa (2347 psi)
	Relief Pressure	19119 kPa (1849 psi)
Main Relief valve	Cracking pressure	14100 kPa (2045 psi)
	Relief Pressure	15691 kPa (2275 psi)
Gear pump (Main)	Delivery (91% efficiency): LPM (GPM)	29.2 (7.7)
	Fluid	Permatran III, 821XL or Equivalent GL4-80
Suction filter	Rated flow: liter (U.S. Qts)	35 (33)/min.
	Filtration density	150-mesh
	Filtration area	754 cm² (117 sq. in.)
Line filter	Rated flow	20.5 liters/19.4 U.S. qts./min.
	Filtration density	0.01 mm (0.0004 in.)
	Filtration area	2200 cm² (341 sq.in.)
Gear Pump (Auxiliary)	Delivery (91% efficiency): LPM (GPM)	17 (4.5)
	Fluid	Permatran III, 821XL or Equivalent GL4-80
Steering Relief Valve	Relief Pressure	6865 Kpa (995 psi)

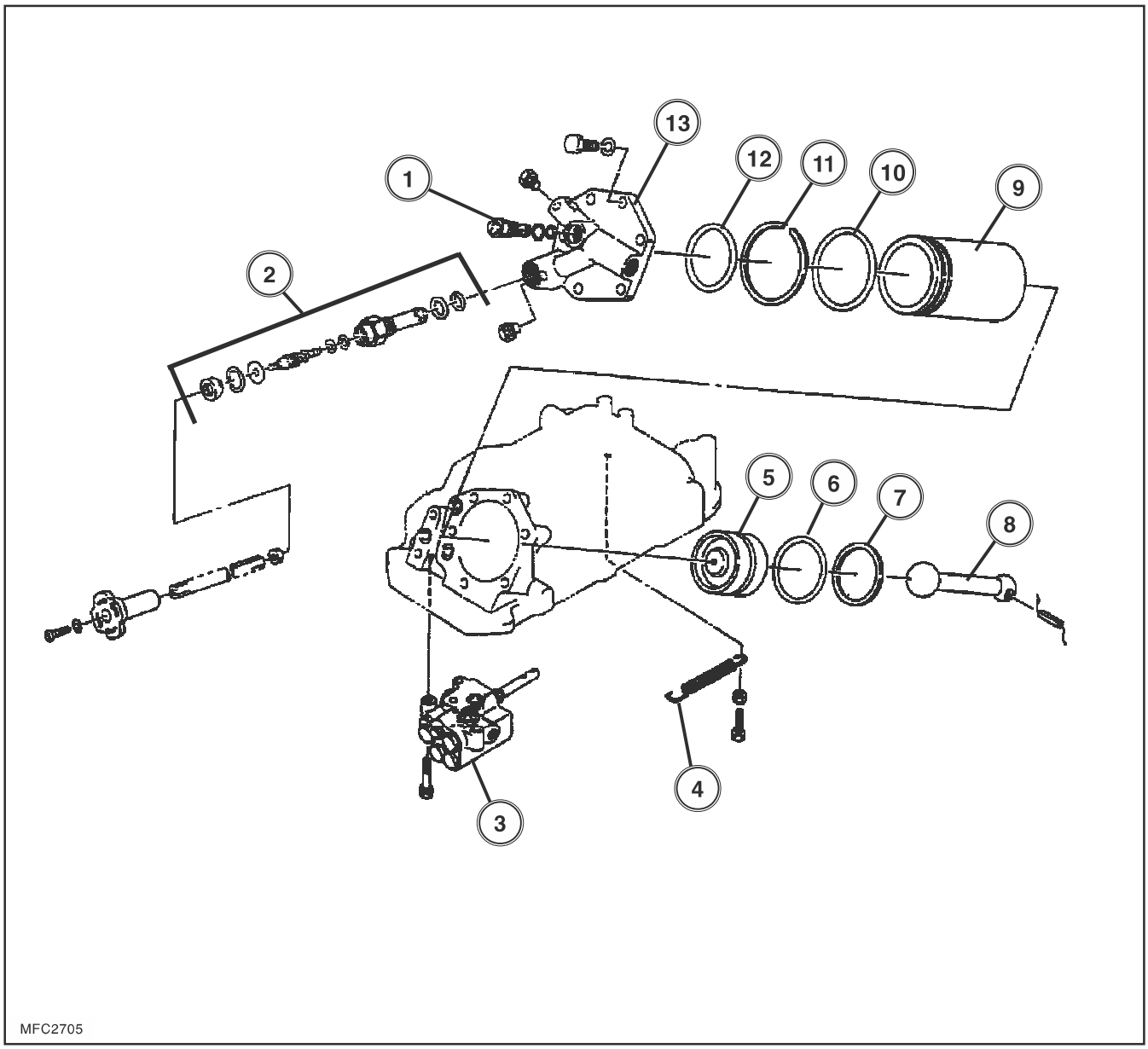

FIG. 9A-20

FIG. 9A-20: Lift Cylinder

1. Safety (relief) valve assembly
2. Slow drop valve assembly
3. 3-pt. (main) control valve
4. Spring
5. Piston
6. O-ring
7. Back-up ring
8. Connecting rod
9. Cylinder
10. O-ring
11. Snap ring
12. O-ring
13. Cylinder head

Pump delivery pressure is imposed upon the right- hand side of spool, B, (unloading 1) and combined force of the pump delivery pressure and the force of spring, C, upon the left-hand side. As pushed areas on both sides are the same, spool, B, is shifted rightward and closes orifice, 35. Consequently pump delivery pressure rises along with the pressure in passage, 25.

When the pressure in passage, 25, exceeds the combined force of that of spring, E, and the cylinder holding pressure which holds check valve poppet, D, closed, the poppet is shifted leftward connecting passage, 25, and chamber, 24, with each other. Then the pump delivery fluid flows into the cylinder through port C via. chamber, 4, orifice, 9, chamber, 3, passage, 25, and chamber, 24, and activates the piston. The pump delivery fluid also flows into chamber, 18, through passage, 17, and shifts spool, H, (unloading valve 2), while chamber, 22, is disconnected from port T but is connected with chamber, 19. Thus pressure difference between chambers, 21 and 39, is equalized out and poppet, I, is shifted rightward, making the pressure in chambers, 39, 21, and 22, the same as that in chamber, 13.

Suppose that the piston push-up pressure is 9804 kpa (1422 psi), and the pressure in chambers, 24 and 26, is also 9804 kpa (1422 psi), then the pressure in passage, 25, is 9907 kpa (1437 psi): 9804 kpa (1422 psi), plus 96 kpa (14 psi) - the force of spring E converted into hydraulic pressure - and the pressure in chambers, 3, 1, and 13, also becomes 9907 kpa (1437 psi). Here the pressure-imposed upon the left-hand side of spool, B, (unloading valve 1) is maintained at the combined pressure of the pressure in chamber, 13: 9907 kpa (1437 psi) and that by spring C: 689 kpa (100 psi), that is, 10590 kpa (1536 psi).

In this way, the pump delivery pressure is always maintained at a lever higher than the piston push-up pressure by 689 kpa (100 psi), so the pressure difference between, in front of, and behind orifice, 9: pressure difference between chambers, 4 and 3, is maintained at a constant 786 kpa (114 psi) independent from cylinder push-up pressure or fluid volume delivered by the pump. Therefore the fluid volume which passes orifice, 9, is constantly controlled at a level conforming to the open area of the orifice. This means that subtle flow control or damping of shocks at the starting and ending of lifting operation is easily achieved by adjusting the opening of orifice, 9. If the spool is shifted enough to fully open orifice, 9, the pressure difference between, in front of, and behind the orifice (between chambers, 4 and 3) is flattened out. So pressure imposed upon both sides of spool, B, (unloading 1) is equalized and the spool is shifted rightward by the spring force. Then all fluid from the pump flows into the cylinder to push up the piston at full speed.

If the pump should stop delivering fluid resulting form a stalled engine, pump breakdown, etc., the check valve poppet, D, closes immediately to block the pas- sage from the cylinder, thus lowering of the implement is prevented.

Lowering position

When spool, A, is shifted to the lowering position, orifice, 6, is opened, orifice, 7, is closed, and chamber, 1, is connected to the tank, while orifice, 11, is closed, orifice, 10, is opened, chamber, 5, is connected to chamber, 4, and the passage to the tank is closed. Chamber, 3, is connected to chamber, 2.

In the same manner as in the neutral position, unloading pilot pressure becomes zero and almost all fluid delivered by the pump flows out into the tank through chamber, 15, orifice, 35, and chamber, 14. Pump delivery pressure becomes 689-786 kpa (100- 114 psi). Orifice, 10, is opened, allowing part of the fluid delivered by the pump to flow into chamber, 5, and through passage, 31, into chamber, 32.

As pump delivery pressure 689-786 kpa (100-114 psi) is imposed upon the right-hand side of pilot spool, F, in this stage, the spool is shifted leftward overcoming the force of spring, G. By this shifting, passage, 30, is closed and chamber, 26, is connected to port T through passage, 29, chamber, 33, orifice, 36, and chamber, 34. Consequently the force imposed upon the left-hand side of check valve poppet, D, becomes that of spring, E, alone. On the other hand, cylinder holding pressure is imposed upon the right-hand side surface of the poppet except the area covered by the seat, and the poppet is shifted to open. By this action, the fluid from the cylinder flows out and into the tank from port T through chamber, 24, chamber, 25, orifice, 8, chamber, 2, and passage, 40, so the piston is released. When the opening of orifice, 8, is small, some pressure is built up on chamber, 3, and works as braking pressure to control the lowering speed of the lift. Of course when the orifice is opened fully, no braking pressure is built up, so the lift lowers at full speed.

Down Position

FIG. 9A-53: The fluid from port B pushes up stop ring, 9, of poppet, 10, until the ring comes into contact with adjust screw, 6, as it reaches chamber, R. Consequently, the extent choke, C, opening is determined by the positioning of adjust screw, 6: that is, when adjust screw, 6, is screwed in clockwise, the opening of choke, C, decreases and the lowering speed of the lift arm slows down; whereas the opening of choke, C, increases and the lowering speed of the lift is accelerated when the adjust screw is unscrewed counterclockwise. When the adjust screw is screwed in completely, the poppet comes into contact with body seat, S, and the choke is closed completely, so the lift arm stops.

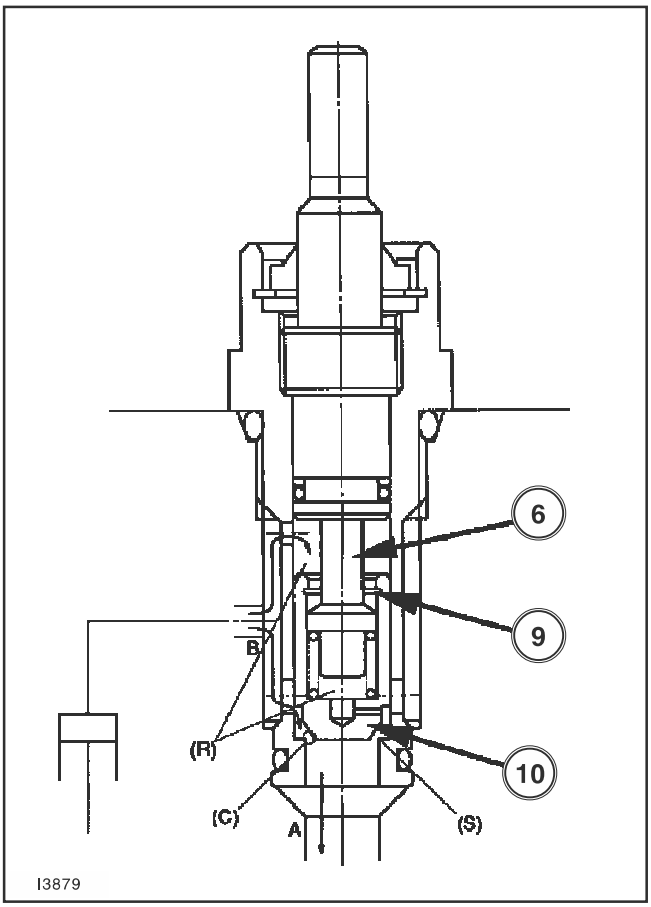

FIG. 9A-53

Up Position

FIG. 9A-54: The flow from port A, overcoming the force of spring, 11, pushes up poppet, 10, and choke, C, is fully opened regardless of the position of adjust screw, 6. Thus the fluid flows to port B and the cylinder, which results in raising the lift arm.

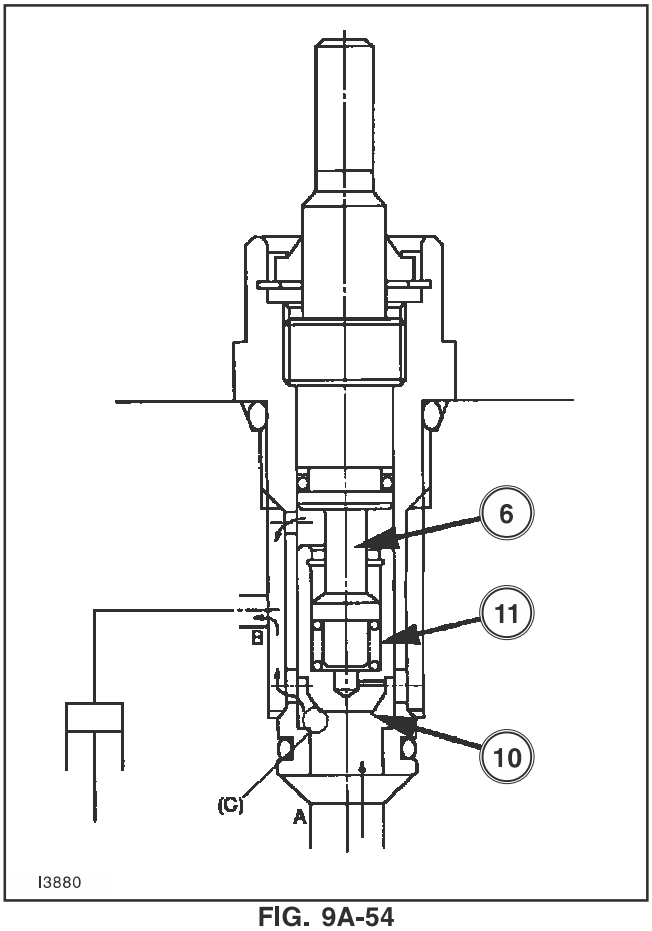

FIG. 9A-54

Problems	Causes	Counter Measures
When hydraulic control lever is raised, relief, valve beeps.	Maladjusted lever stopper check valve	Readjust lever stopper guide position.
	Poor link mechanism	Inspect, readjust, repair, or replace link mechanism if necessary.
Fluid overheating	Excessively high working pressure	Inspect and adjust.
	Too high or low viscosity of working fluid	Replace with fluid of adequate viscosity.
	Insufficient fluid	Maintain specified level by replenishing.
Defective draft control	Poor torsion bar	Inspect and replace if necessary.
	Poor link mechanism	Inspect, adjust, replace, or replace if necessary.
Pump noise	Partially clogged suction filter or suction piping.	Clean.
	Air inhaled through suction piping connections	Inspect and retighten.
	Air inhaled through intake piping connection for pump	Inspect and retighten.
	Loosened pump cover tightening bolts	Inspect and retighten.
	Too rich oil viscosity	Replace with oil of specified viscosity.
	Trapped foreign matter	Disassemble and clean.
	Broken or worn pump parts	Inspect and replace defective parts.
Excessive wear, deflection or damage of pump	Dirty fluid	Eliminate foreign matter and inspect filters.
	Circuit pressure exceeds pump capacity	Adjust relief valve or replace if necessary.
	Oilless operation due to insufficient oil quantity	Inspect transmission oil level and maintain specified oil level by replenishing.
		In either case, clean, and repair pump parts and replace damaged ones if necessary.
Oil leaks outside pump.	Broken or fatigued oil seal or O-ring	Replace.

Inspection

FIGS. 10A-17 - 19: Each switch circuit is as shown, so check each switch for continuity across respective terminals with a tester. Replace a defective switch as an assembly.

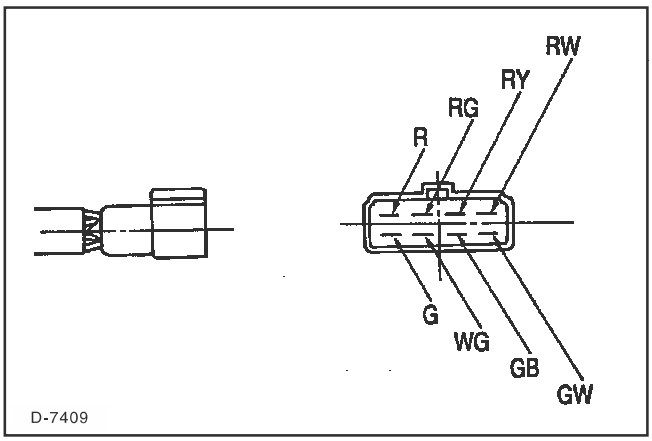

FIG. 10A-17

Lighting:

Color code	R (Red)	RG (Red/Green)	RW (Red/White)	RY (Red/Yellow)
	B_1*1	T	1	2
OFF**2				
1	●	●	●	
2	●	●		●

*1 : Terminals
**2 : Switching positions

D-7410

FIG. 10A-18

Flasher:

Color code	G (Green)	WG (White/Green)	GB (Green/Black)
	B2*1	R	L
1**2	●	●	
OFF			
2	●		●

*1 : Terminals
**2 : Switching positions

D-7411

FIG. 10A-19

ENGINE OIL PRESSURE INDICATOR

The oil light will go on when engine oil pressure drops below 68 kPa (10 psi) when engine oil temperature is between -20°C to 150°C.

Torque the oil pressure sending unit to 15 Nm (11 ft.-lbs.).