ST25
TRACTOR
SERVICE MANUAL
79019162

Electrical system	
System voltage	12 volt - negative (-) ground
Battery CCA @ 0°F (-18°)	450 CCA
Charging	40 amp alternator with internal regulator
Capacities	
Engine crankcase with filter	2.7 liters (2.9 US qts.)
Transmission and differential housing (including hydraulics) (liters)	14.0 liters (14.8 US qts.)
Fuel tank	23 liters (24.3 US qts.)
Cooling system	7.1 liters (7.5 US qts.)
Front axle - four-wheel drive	2.7 liters (2.9 US qts.)
Track setting	
Front two-wheel drive	
Agricultural tires (dished in only)	750 mm (29.52″)
Turf tires (dished in only)	900 mm (35.43″)
Front four-wheel drive	
Agricultural tires	755 mm (29.52″)
Turf tires	870 m (34.3″)
Rear two-wheel drive	
Agricultural tires (dished in only)	800 - 920 mm (31.49″ – 36.2″)
Turf tires (dished in only)	900 mm (35.43″)
Maximum axle loading	
Front axle (4WD)	650 kg (1432.99 lbs)
Rear axle	750 kg (1653.45 lbs)
	Total limit: 1200 kg (2645.52 lbs)
Tire size	
Front	
Agricultural tire	5.00-12 4PR
Turf tire	23 x 10.5-12
Rear	
Agricultural tire	9.50-16 4PR
Turf tire	315/75D-15

SEPARATION OF FRONT TRANSMISSION CASE FROM REAR TRANSMISSION CASE

1. Drain the transmission oil.
2. Remove the cylinder case and change metal.
3. Remove the brake rod.
4. Remove the parking brake rod from parking brake lever.
5. Remove the bolt at the delivery pipe on rear axle housing (RH).
6. Remove the PTO metal.
7. Pull out the bearings and PTO gear on PTO drive shaft.
8. Remove the bolts between the front and rear transmission case.
9. Separate the front transmission case from rear transmission case.

REMOVAL OF MID-PTO

1. Drain the transmission oil.
2. Remove the rod from mid-PTO lever.
3. Remove the mid-PTO assembly.

SEPARATION OF REAR AXLE HOUSING FROM REAR TRANSMISSION CASE

1. Drain the transmission oil.
2. Drain the transmission oil in the rear axle from bottom of rear axle housing.
3. Remove the fender.
4. Remove the brake rod.
5. Remove the delivery pipe.
6. Remove the parking brake shaft with bracket.
7. Remove one of the tires.

NOTE: Support part of joint front and rear transmission case with a floor jack.

8. When removing the right-hand rear axle housing, remove the diff-lock pedal.
9. Remove the bolts between the rear axle housing and rear transmission case.
10. Separate the rear axle housing from rear transmission case.

REMOVAL OF FRONT AXLE

1. Remove the bolt of 4WD shaft-cover and remove the 4WD shaft-cover from pivot metal.
2. Remove the 4WD drive shaft with 4WD shaft-cover.
3. Manual-steering: Disconnect the drag rod from drag arm.
4. Power steering: Disconnect the hose from orbitrol.
5. Remove the front tires.

NOTE: The front part of the tractor should be raised and blocked a head of time.

6. Drain the front axle oil from bottom of both final cases.
7. Remove the center pivot and the setting bolts for the front axle bracket, and the front axle can be removed downward.

NOTE: The front axle is a very heavy component, remove it carefully while supporting with a floor jack.

REMOVAL OF RADIATOR

1. Remove the hood, side cover and front grill.
2. Drain the coolant.
3. Disconnect the upper and lower hose.
4. Disconnect the drain hose.
5. Remove the radiator shroud.
6. Remove the radiator with radiator stay.

NOTES

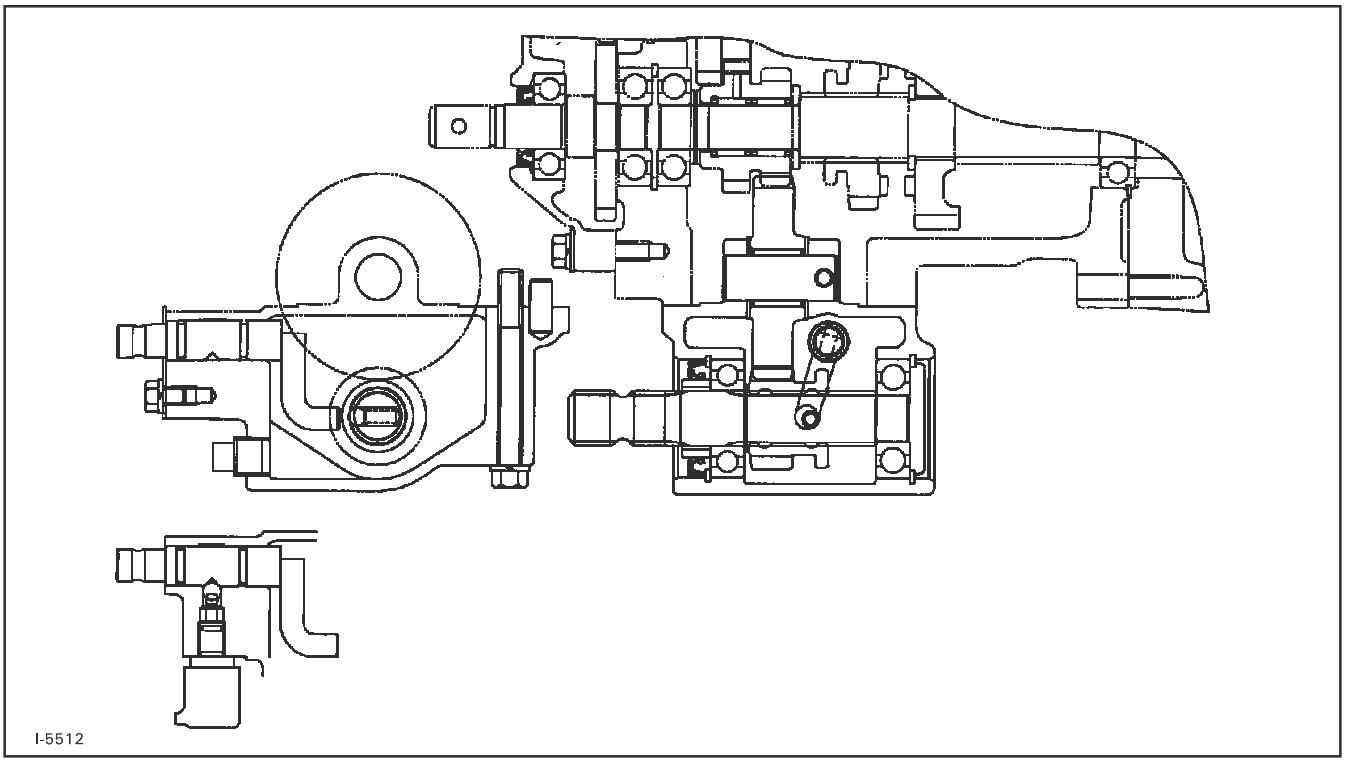

FIG. 7

MID PTO

Construction

FIG. 7: Construction of Mid PTO.

Disassembly

1. Separate the mid-PTO assembly from front transmission case referring to Disassembly of Major Components.
2. Remove the wire and spring pin.
3. Remove the counter shaft, then pick out the counter gear and related parts.
4. Remove the cap and snap ring.
5. Remove the shaft assembly to rear direction.
6. Remove the mid-PTO lever assembly from 4WD lever.

Inspection

Check each gear and shaft for tooth and bearing damage, etc.

Check to see that each bearing turns smoothly.

Make sure that the oil seal lips and lip contact surface on shafts have no flaw.

Precautions for Re-Assembly

When assembling, pay attention to the installing direction of the gears, collars, etc. Never forget to install bearings and collars.

After assembly, make sure that each shift lever moves smoothly.

Operating load at lever top

GEAR and HST types.

MID-PTO SHIFT LEVER 6kgf (24 lbs.ft.)
13lbs.ft.

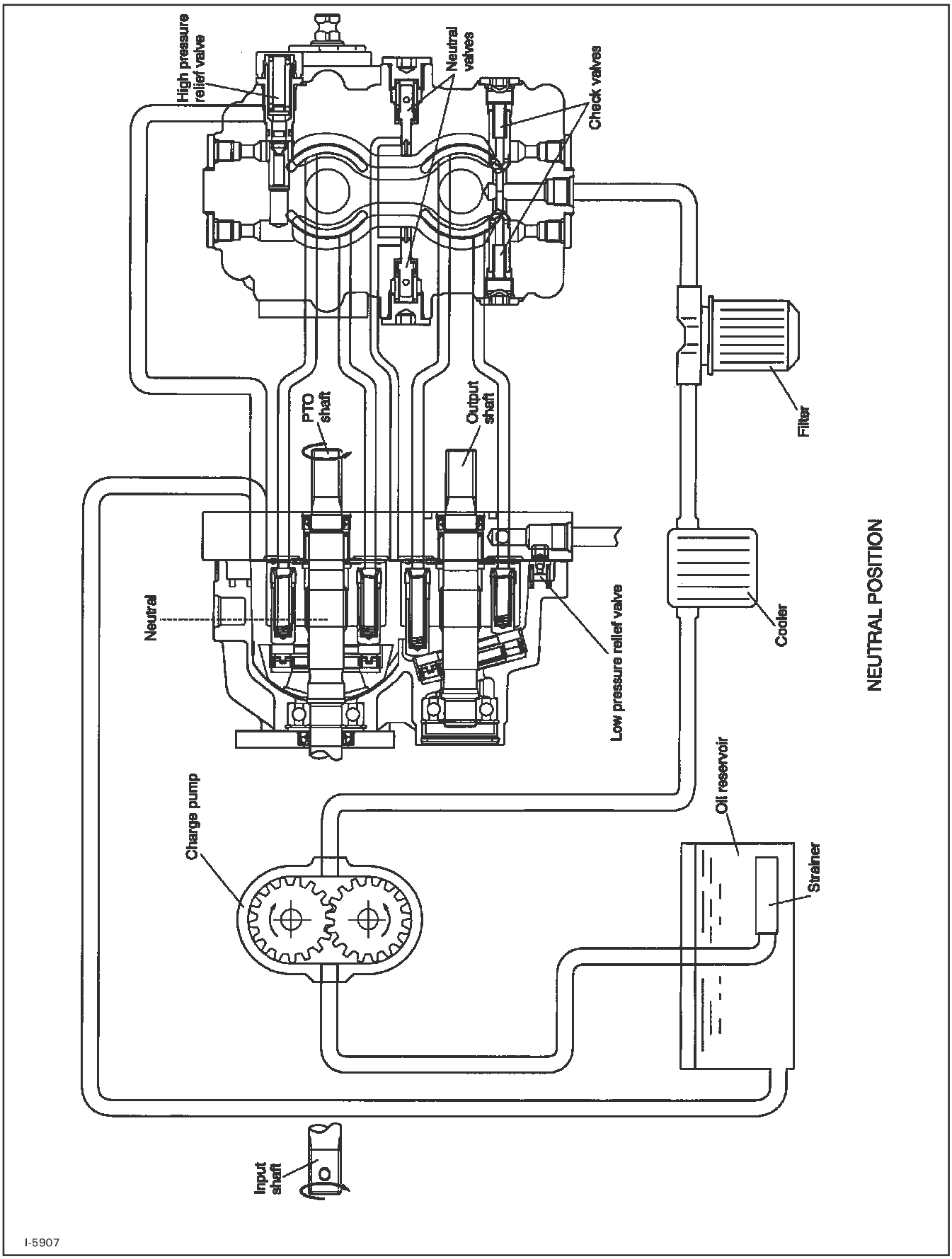

FIG. 2

FIG. 2: Neutral position.

List of friction parts

FIG. 11: Listed are parts relevant to the pistons and cylinder block.

Slant board (pump), 4.

Cylinder block, 3.

Piston, 5.

Valve plate (pump), 6.

Valve plate (motor), 7.

Thrust bearing, 13.

Spring, 20.

Spring holder, 41.

NOTE: The friction parts for the pump and for the motor should be kept separately.

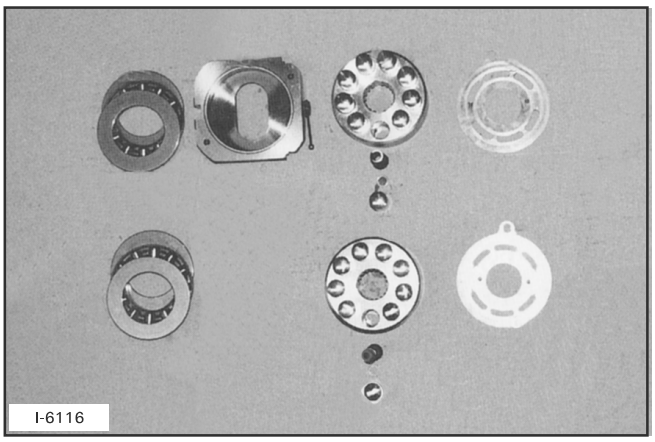

FIG. 11

Disassembly of the port block

FIG. 12: Disassembly of the relief valve. Remove the relief valve, 27. Disassembly of the check valve. Remove the plug (PF3/8), 33, and then spring, 21 and poppet, 30. Removal of the neutral valve. Remove the plug (PF ½), 74, and then remove the shims, 79 and, 80. After that, remove the spring, 75, and piston assembly, 76.

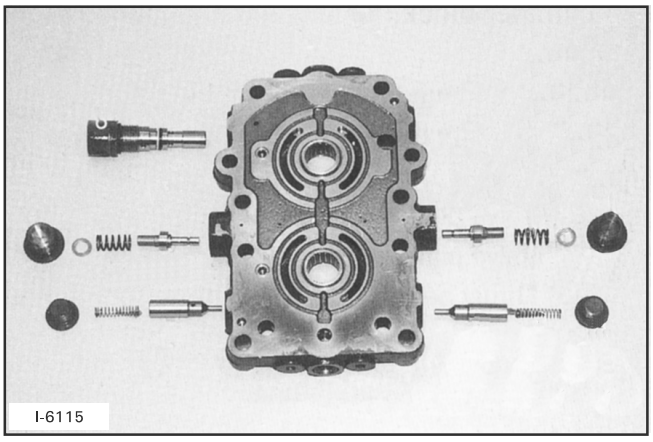

FIG. 12

Preparation for final assembly of the case

FIG. 39: Install the straight pins, 50, into the case, 1.

Apply thin coat of lithium-based grease to the surface contacting the gasket and apply the gasket, 49, to the case, 1.

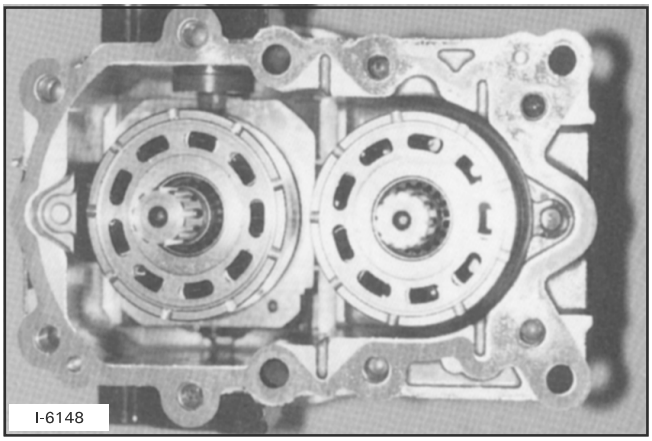

FIG. 39

FIG. 40: Set up the spring, 22, in the case.

NOTE: Apply grease to the spring ahead of time to prevent it from falling out.

Take care not to allow the valve plates to fall.

Make certain that the piston assemblies are properly housed in the cylinder blocks.

Make sure that the spring for the low pressure relief valve is properly positioned in the case.

Before installing the port block onto the pump and motor shafts, the splined parts of the shafts should be wrapped with paper tape to protect the lips of the oil seats in the port block.

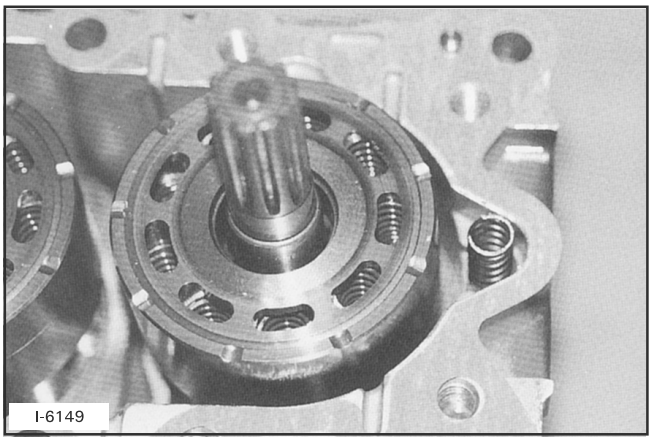

FIG. 40

Installation of the port block

Tighten the eight socket-head bolts, 55, to the specified torque.

Tightening torque	71 ft/# ± 7.1 ft/# 5 ± 0.5 kgf·m (face-to-face width: 8 mm)

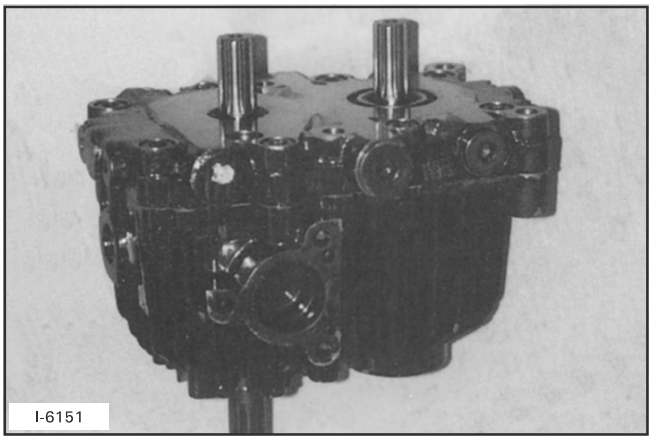

FIG. 41

Reassembly of the cover

FIG. 41: Press in the oil seal, 61, into the cover, 19.

Press-in extent	Flush with cover surface

NOTE: Install the oil seal using the press-in jig and a hand

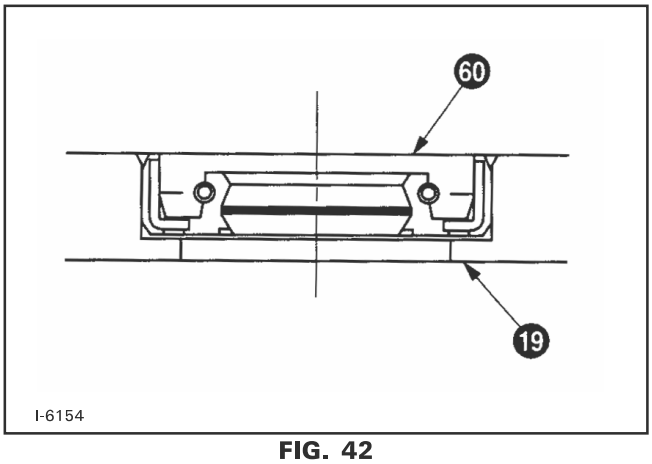

FIG. 42

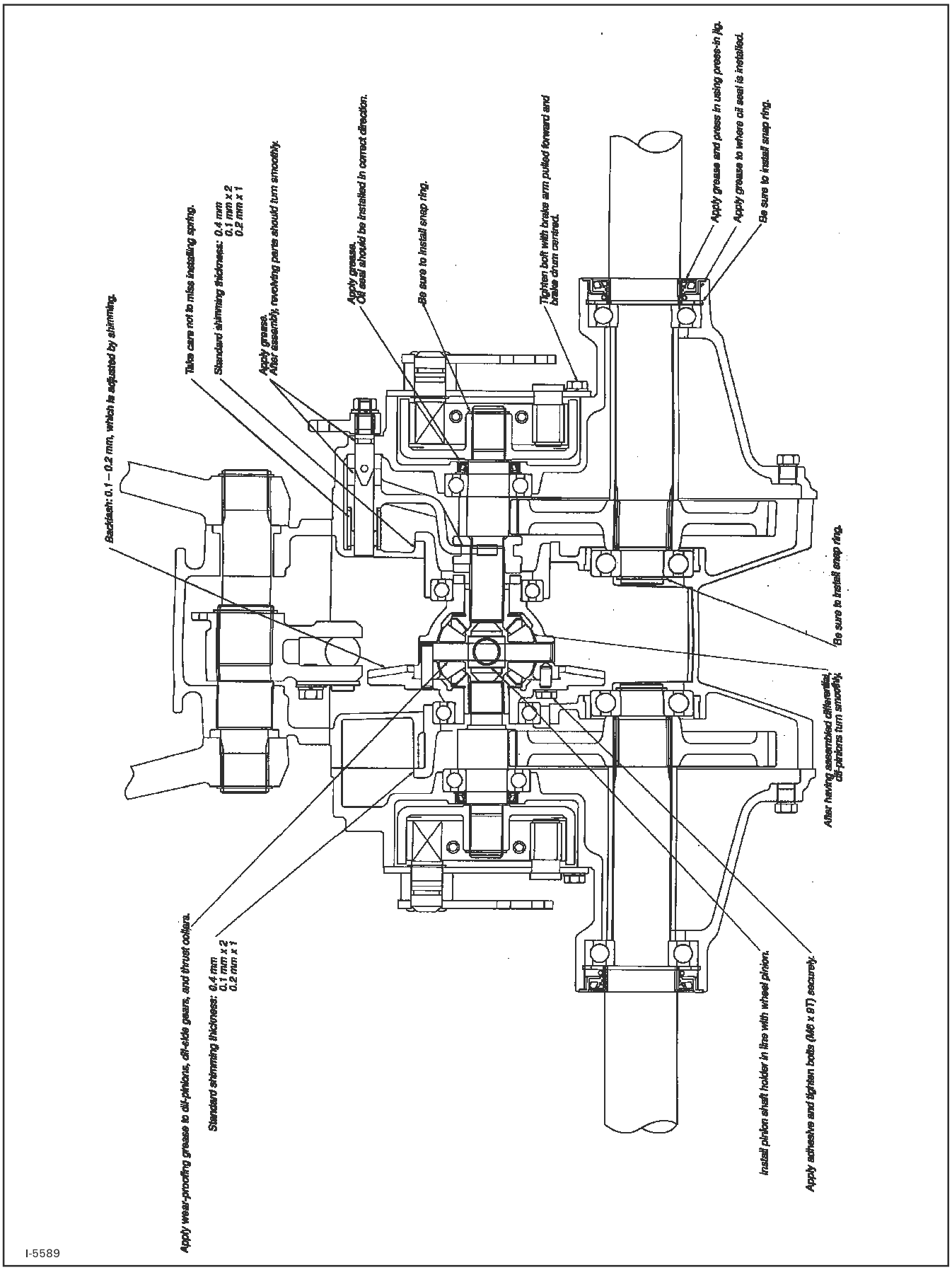

FIG. 3

FIG 3: Pre-Caution for Re-assembly - Rear Differential

FRONT AXLE

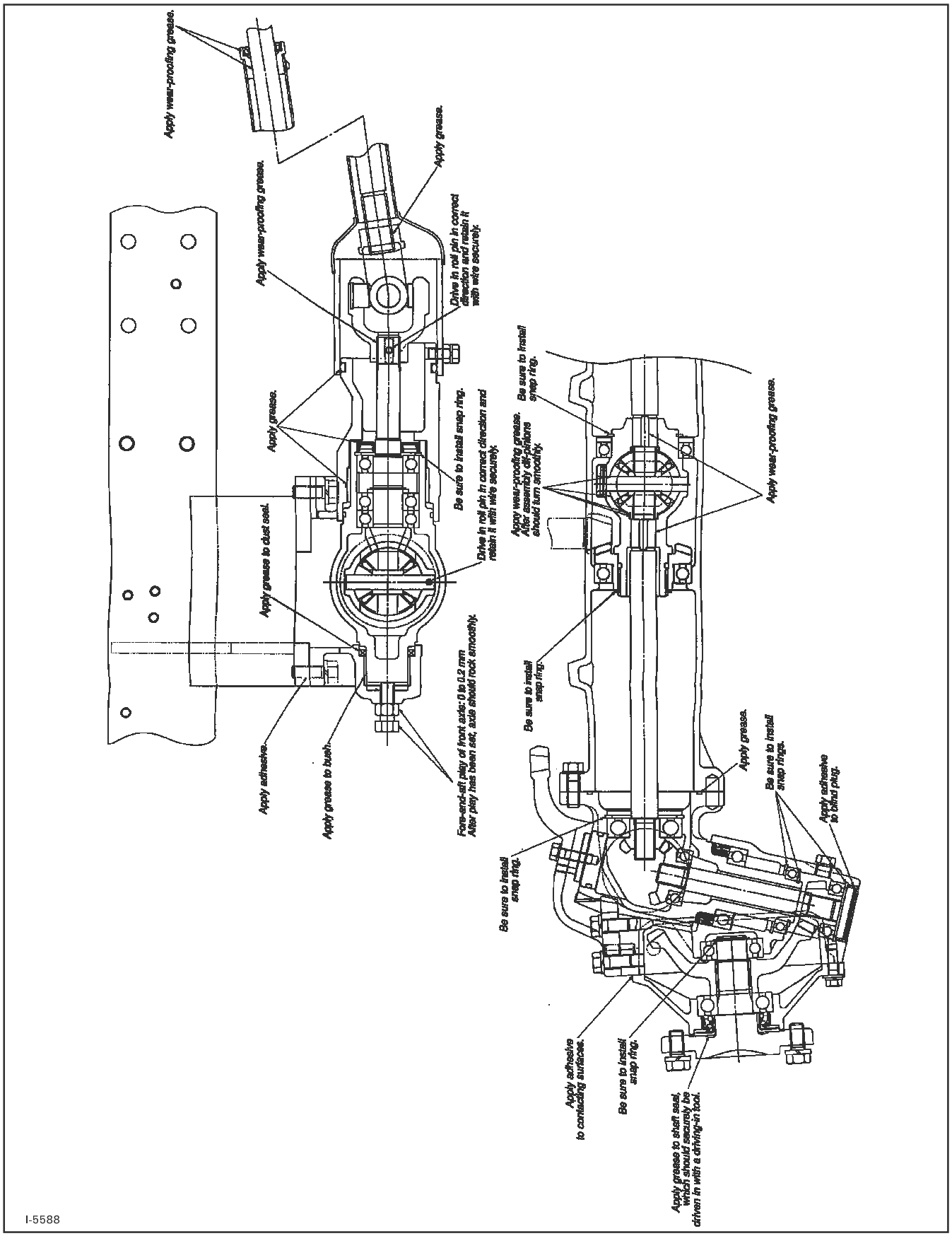

FIG. 1

FIG. 1: Pre-Caution for Re-assembly - Front Axle (4WD)

HYDRAULIC SYSTEM

GENERAL DESCRIPTION

Mechanical Transmission

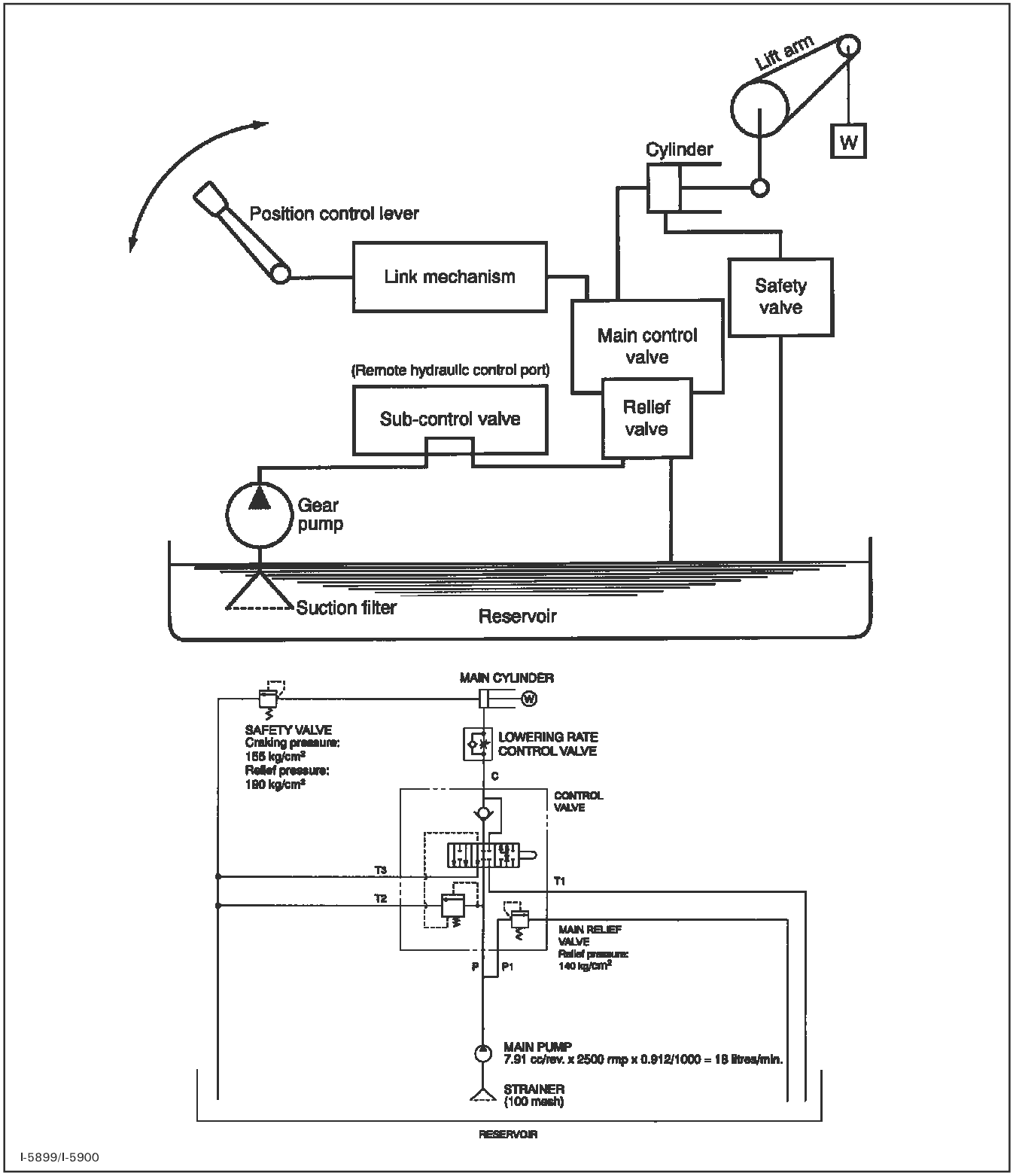

FIG. 1

FIG. 1: Manual system diagram.

REASSEMBLY

Reassemble in reverse order of disassembly by following these instructions:

Carefully and thoroughly clean all parts. Never allow foreign matter into the system.

When installing the lift crank and the lift arm on the lift shaft, align the marks on the lift crank and the lift arm. The difference in height about the ground between both lift arms must be maintained within 6mm (.24") when they are lowered by 8 degrees from the level position.

FIG. 8: When installing the adjust pin, 1, apply grease to the groove for O-ring, 2, and over the friction surface.

Before installing the control valve, 3, secure the O-ring with grease so that it will not drop.

When installing the adjust pin through the cylinder case, make the projection of the valve, with which the descending speed of the valve is adjusted, be securely seated in the groove in the end of the adjust pin. Temporarily tighten the valve to confirm that the adjust pin turns smoothly before securely tightening the valve.

Before and after installing the valve assembly, confirm that the spool works normally.

FIG. 9: When installing the safety valve assembly, mount the O-ring, 1, with a thin coat of grease. Do this carefully to assure that it is not damaged. Then tighten the valve to the specified torque: 8.5 - 10 kgfm (61.5 - 72.3 ft. lbs.).

FIG. 10: After having installed the parts inside the cylinder case: shaft, crank, links, etc., make sure the spool link, the related parts, and the spool work smoothly.

When installing the sub-control cover and the cylinder head, make certain that the oil holes, 1, are not clogged.

FIG. 11: Adjust the starting torque oft he control lever, 1, to between 1.5 (3.3lbs) and 1.8kg (4.0lbs) with the aid of the bolt M6 x 40.

When installing the suction pipe assembly, securely clamp the rubber hose connecting pipe A and B so as not to let air in. Centering deflection between pip A and B should be maintained within 4mm (.16"). Take care not to apply excessive stress to the connecting rubber hose during installation.

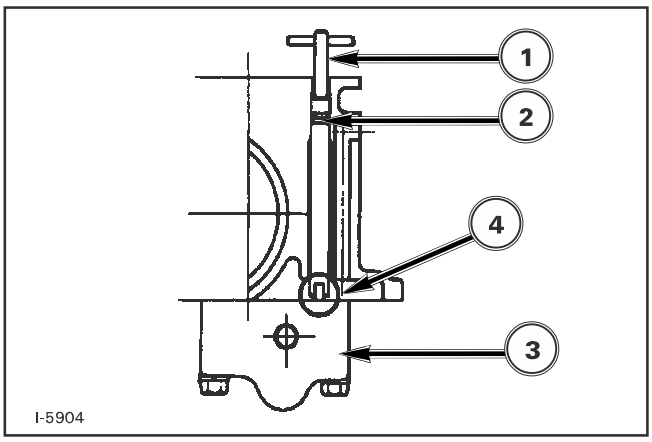

FIG. 8

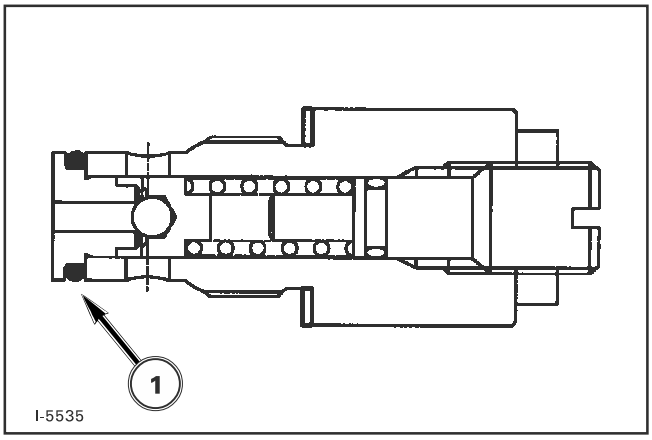

FIG. 9

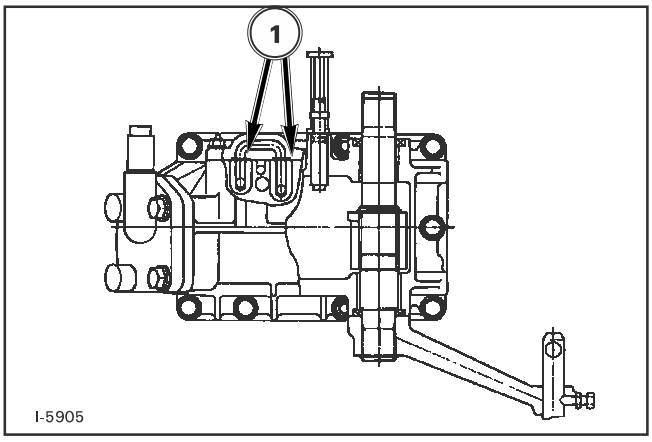

FIG. 10

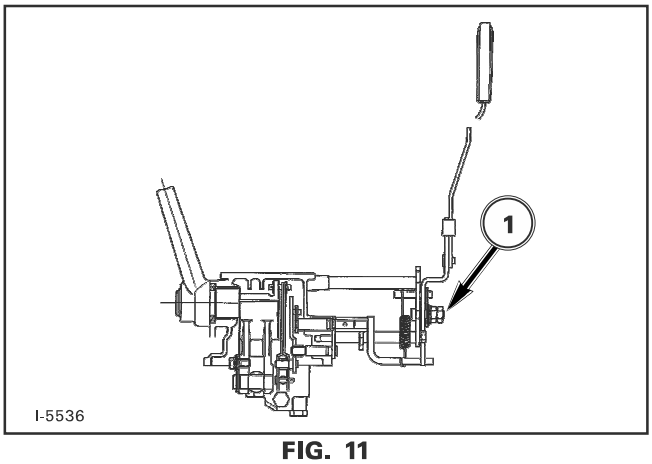

FIG. 11

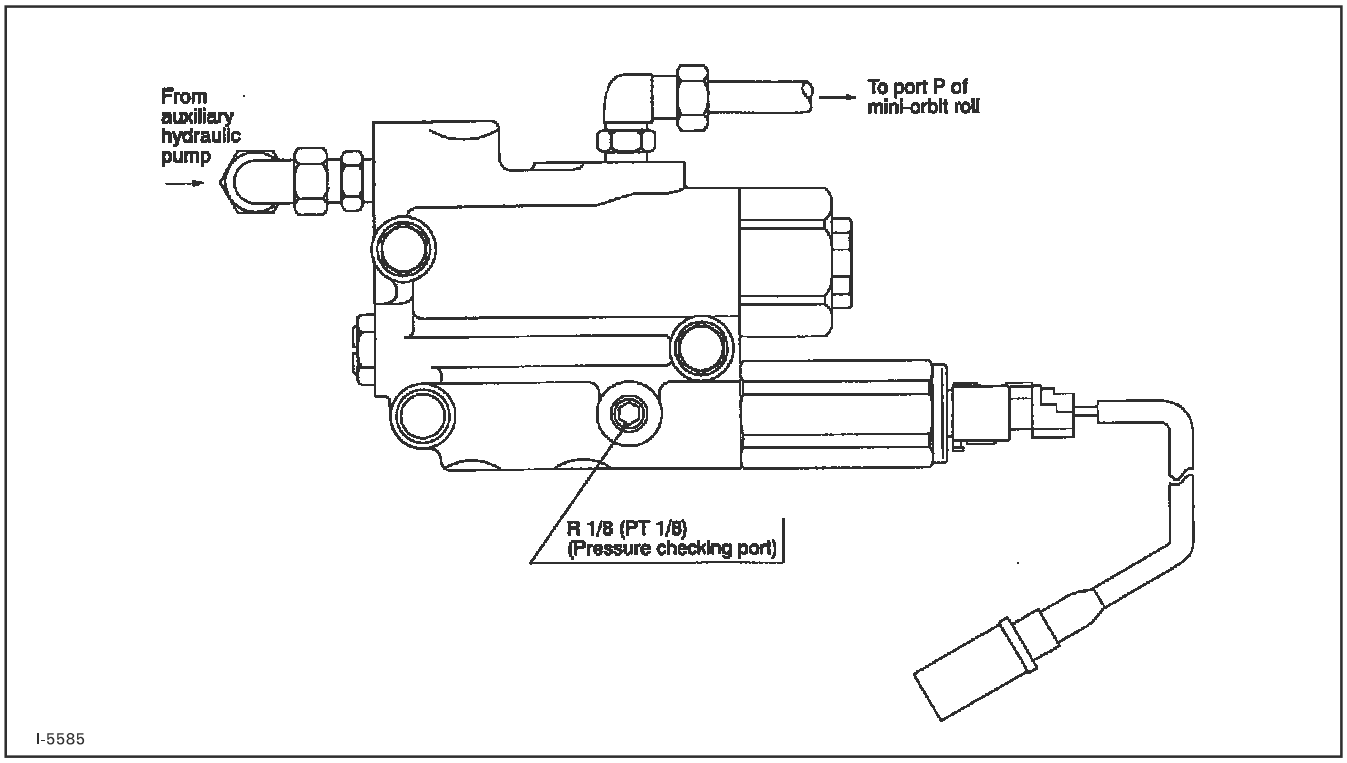

FIG. 23

Inspection and Adjustment

FIG. 23: The valve should be inspected and adjusted as described below when it is installed on the machine:

Connect a pressure gauge to the pressure checking port shown above.

Start the engine and accelerate it to a speed faster than 1500 rpm.

The relief pressure with the PTO switch turned on should be adjusted to be 18 ± 1 kgf/cm² (261 psi) by turning the adjusting screw.

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Problems	Causes	Countermeasures
METERS, GAUGES AND SWITCHES		
Tachometer and Meter Cable		
Pointer does not work.	Poor meter assembly. Broken meter cable.	Replace. Replace.
Pointer moves but is very unstable.	Poor Meter Poorly lubricated meter cable. Meter cable is being broken.	Replace. Lubricate. Replace.
Turn signal and hazard warning switch		
Both lamps do not flash.	Open Circuit. Burnt-out bulbs. Poor turn signal switch. Poor battery. Poor flasher unit.	Repair. Replace. Replace switch assembly. Recharge or take necessary countermeasures. Replace unit.
Head lamp switch		
Lamps do not light up as indicated when switch is turned to each position (Small, Low, High)	Burnt-out bulbs. Open Circuit. Poor battery. Poor battery grounding. Poor starter switch. Poor light switch. Blown-out fuse.	Replace. Repair. Recharge or take necessary counter measures. Repair. Replace switch assembly. Replace switch assembly. Replace.
Head lamps are dim with switch turned to Low or High.	Poor battery capacity. Poorly contacted terminals. Poor bulbs. Poor light switch.	Recharge. Repair. Replace. Replace switch assembly.
Starter switch		
Glow plugs and heater signal do not heat up red.	Poor battery. Poor circuit wiring. Burnt-out heater signal. Poor starter switch. Poor glow plugs.	Recharge or take necessary countermeasures. Repair. Replace. Replace switch assembly. Replace.
Starter does not work when starter switch is turned to start.	Poor battery. Poor circuit wiring. Poorly contacted terminals. Poor starter assembly. Poor horn relay. Poor safety switch.	Recharge or take necessary countermeasures. Repair. Repair. Refer to Engine manual. Replace. Replace.

PART NAMES AND INSPECTION ITEMS	TYPE	STANDARD VALUE FOR REASSEMBLY	USABLE LIMITS	SERVICE INSTRUCTION AND REMARKS
HYDRAULIC SYSTEM				
Safety valve assembly (Tightening torque) mm (inch)		8.5-10.0 kfg/m (61.5-72.3 ft.lbs)		
Control valve bolts (Tightening torque) mm (inch)		13.-1.8 kfg/m (9.4-13.0 ft.lbs)		
Flow-control valve (Tightening torque)				
Operation force of control lever to UP				
Relief set pressure (cracking)		120 kgf/cm^2 (1706.8 psi)		
Lift capacity (at lower link end)		550 kgf (1411 lbs.ft.)		
Lift arm top clearance mm (inch)		3-5 (.19-.2)		
Standard length of position rod				Set just prior to relief valve opening.
Position control lever stopper				
ENGINE ACCESSORIES				
Anti-freeze density in engine coolant				Refer to engine manual
Fan belt tension mm (inch)		8-10 (.31-.4)		Refer to engine manual
Air-cleaner				
Exhaust opening direction				
Operation force of throttle lever (lbf)		6-8 kgf (13.23-17.64)		Adjust
POWER-ASSISTED STEERING SYSTEM				
INTEGRAL ORBIT ROLL				
Cylinder mm (inch)		Dimension between rod ends 355 ± 2 (13.98 ± .08)		Adjust
GEAR PUMP				
Gear contacting evidence around intake port		Less than 1/2 of gear housing bore diameter		
Contact evidence width mm (inch)	)	0.05 or less (.002 or less	0.1 (.004)	Replace pump body
Pump gear shaft diameter				
Clearance between metal bore and gear shaft mm (inch)		0.07-0.08 (.0027-.003)		
Clearance between metal shaft dia and body bore mm (inch)		0.015-0.025 (0006-0008)		
Clearance between metals mm		0.010-0.020		
Gear's off-set projection against metal dia		0.005-0.015		
Pump cover tightening torque		3.0-3.5 kgf-m		
Gear pump starting torque		0.3 kgf-m		

After re-assembly, check the following items.

a. Steering shaft's starting torque in the neutral (straight travelling) position and with the sector shaft installed:

Starting torque	2.5 - 9.5 kgf-cm (0.18 - 0.69 ft-lbs)

b. Steering starting torque when assembled completely:

Starting torque	12.5 kgf-cm (0.90 ft-lbs) or less

c. Working angles of sector shaft:

Working angles	38° each in both directions