Mega 200/200TC-III

Shop Manual

4023-7131E-R1

Serial Number 0001 and Up

DOOSAN reserves the right to improve our products in a continuing process to provide the best possible product to the market place. These improvements can be implemented at any time with no obligation to change materials on previously sold products. It is recommended that consumers periodically contact their distributors for recent documentation on purchased equipment.

This documentation may include attachments and optional equipment that is not available in your machine's package. Please call your distributor for additional items that you may require.

Illustrations used throughout this manual are used only as a representation of the actual piece of equipment, and may vary from the actual item.

WHEEL LOADER SAFETY

⚠ CAUTION!

Follow all safety recommendations and safe shop practices outlined in the front of this manual or those contained within this section.

Always use tools and equipment that are in good working order.

Use lifting and hoisting equipment capable of safely handling load.

Remember, that ultimately safety is your own personal responsibility.

MODEL	SERIAL NUMBER RANGE
Mega 130	0001 and Up
Mega 160	0001 and Up
Mega 200-III	1001 and Up
Mega 250-III	1001 and Up
Mega 400-III PLUS	1001 and Up

January 2000

Keep fuel and other fluid reservoir caps tight and do not start engine until caps have been secured.

BOOST STARTING OR CHARGING ENGINE BATTERIES

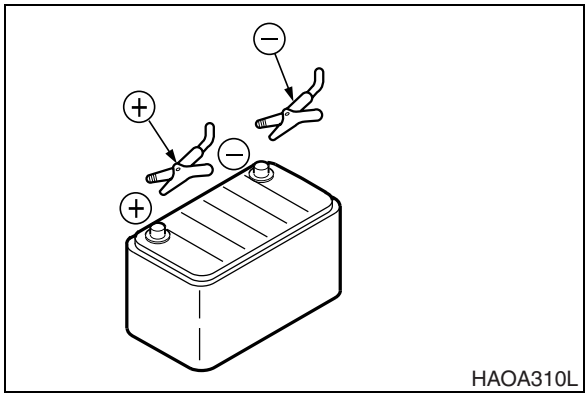

Figure 10

Turn "OFF" all electrical equipment before connecting leads to battery. This includes electrical switches on battery charger or boost starting equipment.

When boost starting from another machine or vehicle do not allow two machines to touch. Wear safety glasses or goggles while required parallel battery connections - positive to positive and negative to negative - are made.

24 volt battery units consisting of two series connected twelve volt batteries have a cable connecting one positive terminal on one of the 12 volt batteries to a negative terminal on the other battery. Booster or charger cable connections must be made between nonseries connected positive terminals and between negative terminal of booster battery and metal frame of machine being boosted or charged. Refer to procedure and illustration in Operation and Maintenance Manual.

Connect positive cable first when installing cables and disconnect negative cable first when removing them. Final cable connection, at metal frame of machine being charged or boost started, must be as far away from batteries as possible.

KEEP "PINCH POINT" AREAS CLEAR - USE CAUTION IN REVERSE

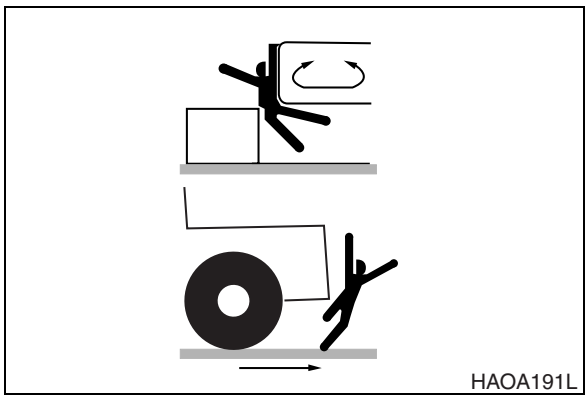

Figure 11

Use a signal person in high traffic areas and whenever operator's view is not clear, such as when traveling in reverse.

Anyone standing near wheels, or working assemblies of the attachment, is at risk of being caught between moving parts of machine.

Never allow anyone to ride on any part of machine or attachment, including any part of operator's cabin.

TRAVEL PRECAUTIONS

When traveling, wheel loader always keeps lights on; make sure that you are in compliance with all state and local regulations concerning warning flags and signs.

Attachment control levers should not be operated while traveling.

Fold in work equipment so that outer end of boom is as close to machine as possible, and is 200 mm - 300 mm (8" - 12") above ground.

Never travel over obstacles or slopes that will cause machine to tilt severely. Travel around any slope or obstacle that causes 10° tilt, or more.

SPECIFICATIONS

SPECIFICATIONS

General Specifications

MEGA 200-III		
ITEM		**SPECIFICATION**
Standard Bucket Capacity		1.8 m^3 (2.35 yd^3)
Vehicle Weight		10,520 kg (23,193 lb)
Engine		
	Type	*DOOSAN* DB58T
	Horsepower	128 ps gross (126 hp gross) @ 2,200 rpm
	Max. Torque	44 kg•m (325.49 ft lb) @ 1,600 rpm
Transmission		
	Type	Full Power Shift
	Speeds	4 Forward, 3 Reverse
Brake Systems		
	Travel Brakes	4 Wheel, Wet Disk
	Parking Brake	Dry Disk type, Spring applied oil released internal S.A.H.R. brake
Performance		
	Travel Speed	7 - 36 km/h (4.3 - 22.5 MPH)
	Steering Angle	+ 40°
	Min. Tire Turning Radius	4,950 mm. (16' 3")
	Safe Operating Load	3,240 kg (7,143 lb)
	Max. Breakout Force	10,900 kg (24,030 lb)
	Bucket Rise Time	5.2 Seconds
	Bucket Dump Time	1.3 Seconds
	Bucket Descent Time	3.3 Seconds
	Maximum Gradeability	58% (30°)

Brake System

Brake Pump	
Type	Gear
Displacement	10 cc/rev. (0.61 in^3/rev)
Rated Flow	25 l/min (6.60 gpm)
Service Brake Valve	
Brake Pressure	40 bar (580 psi)
Pedal Force	20 kg @ 6 kg/cm^2, (44 lb @ 85.34 psi), 175 RAD
Parking Brake	
Type	Spring Applied Oil Released Internal S.A.H.R. Brake
Max. Parking Torque	2,860 kg•m (20,686 ft lb)
System and Pressure	
System	Full Hydraulic, Separate Dual Line
Service Brake Relief Pressure	50 bar (725 psi)
Parking Brake Release Pressure	39 - 50 Bar (566 - 725 psi)
Cut-in / Cut-out Pressure	120 / 140 Bar (1,740 - 2,031 psi)
Brake Distance	

GENERAL MAINTENANCE

Normal Bearing

Smooth even surfaces with no discoloration or marks.

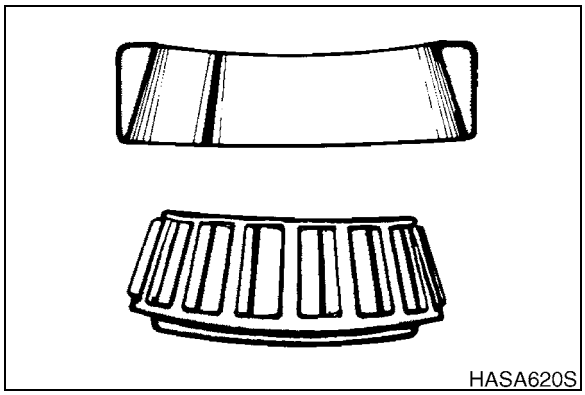

Figure 2

Bent Cage

Cage damage due to improper handling or tool usage.

Replace bearing.

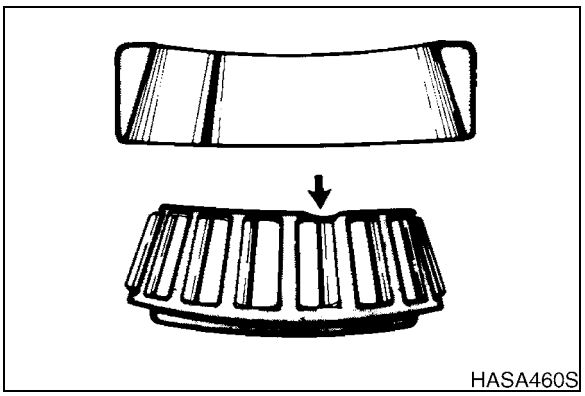

Figure 3

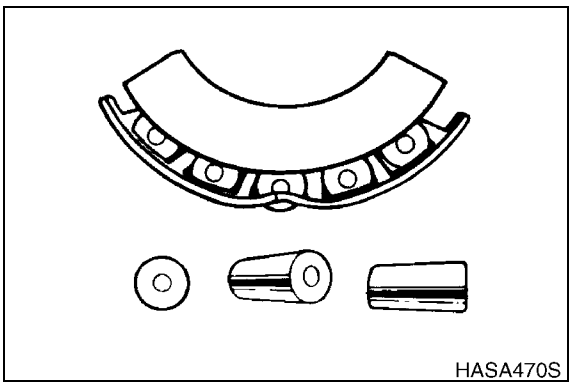

Figure 4

Galling

Metal smears on roller ends due to overheat, lubricant failure or overload.

Replace bearing - check seals and check for proper lubrication.

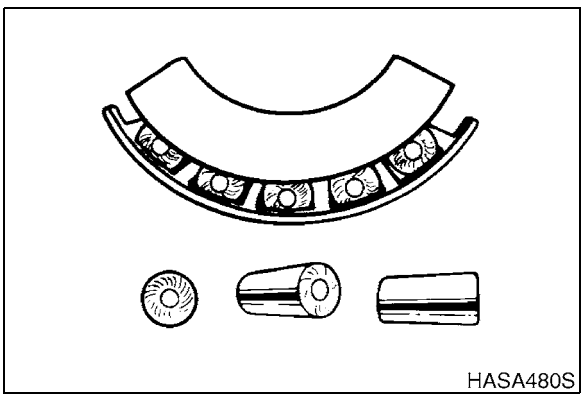

Figure 5

The following General Torque Values must be used in all cases where **SPECIAL TORQUE VALUES** are not given.

NOTE: *TORQUE VALUES LISTED THROUGHOUT THIS MANUAL ARE LUBRICATED (WET) THREADS; VALUES MUST BE INCREASED 1/3 FOR NONLUBRICATED (DRY) THREADS.*

THREAD SIZE	HEAT TREATED MATERIAL GRADE 5 AND GRADE 8			
	GRADE 5 (3 RADIAL DASHES ON HEAD)		GRADE 8 (6 RADIAL DASHES ON HEAD)	
	FOOT POUNDS (ft lb)	NEWTON METER (Nm)	FOOT POUNDS (ft lb)	NEWTON METER (Nm)
1/4" - 20	6	8	9	12
1/4" - 28	7	9	11	15
5/16" - 18	13	18	18	24
5/16" - 24	15	20	21	28
3/8" - 16	24	33	34	46
3/8" - 24	27	37	38	52
7/16" - 14	38	52	54	73
7/16" - 20	42	57	60	81
1/2" - 13	58	79	82	111
1/2" - 20	65	88	90	122
9/16" - 12	84	114	120	163
9/16" - 18	93	126	132	179
5/8" - 11	115	156	165	224
5/8" - 18	130	176	185	251
3/4" - 10	205	278	290	393
3/4" - 16	240	312	320	434
7/8" - 9	305	414	455	617
7/8" - 14	334	454	515	698
1" - 8	455	617	695	942
1" - 14	510	691	785	1064
1 1/8" - 7	610	827	990	1342
1 1/8" - 12	685	929	1110	1505
1 1/4" - 7	860	1166	1400	1898
1 1/4" - 12	955	1295	1550	2102
1 3/8" - 6	1130	1532	1830	2481
1 3/8" - 12	1290	1749	2085	2827
1 1/2" - 6	1400	2034	2430	3295
1 1/2" - 12	1690	2291	2730	3701
1 3/4" - 5	2370	3213	3810	5166
2" - 4 1/2	3550	4813	5760	7810

NOTE: *If any bolts and nuts are found loose or at values less than what the chart states, it is recommended that the loose bolt and/or nut be replaced with a new one.*

FUEL TRANSFER PUMP

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MODEL	SERIAL NUMBER RANGE
Mega 130	0001 and Up
Mega 160	0001 and Up
Mega 200-III	1001 and Up
Mega 200-V (Tier I and II)	1001 and Up
Mega 250-III	1001 and Up
Mega 250-V (Tier I)	1001 thru 2000
Mega 250-V (Tier II)	2001 and Up
Mega 300-V (Tier I)	1001 thru 2000
Mega 300-V (Tier II)	2001 thru 3000
Mega 300-V	3001 and Up
Mega 400-III PLUS	1001 and Up
Mega 400-V	1001 and Up
Mega 500-V	1001 thru 2000
Mega 500-V (Tier II)	2001 and Up
Solar 130LC-V	0001 and Up
Solar 130W-V	0001 and Up
Solar 140LC-V	1001 and Up
Solar 140W-V	1001 and Up
Solar 160W-V	1001 and Up

Models continued on back of cover.

January 2004

AXLE (CLARK-HURTH)

⚠ CAUTION!

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MODEL	SERIAL NUMBER RANGE
Mega 160	1021 and Up
Mega 200-III	1001 thru 1025, 1041 thru 1054, 1061 thru 1070
Mega 200TC-III	1001 and Up

February 1999

MAINTENANCE AND LUBRICATION

Operation	Period	Lubricant
Check Levels:		SAE 85W90 API GL4 - L-2105
Differentials	Monthly	With additives for oil immersed disk brakes.
Planetary Reduction	Every 400 hours	
Oil Change:		SAE 85W90 API GL4 - L-2105-B
Differentials	Every 1,500 hours	With additives for oil immersed disk brakes.
Planetary Reduction	Every 1,500 hours	
Greasing:		
Under normal use	Monthly	**Grease**: Multipurpose lithium base
Under heavy duty use	Weekly	
Screw and bolt torque	Every 200 hours	-----
Service brake circuit	Only for mineral oil use, e.g. ATF Dexron II. Make sure that master cylinder seals are suitable for mineral oil.	

BRAKE DISK

Wear Check and Replacement

1. Insert feeler gauge into oil level check hole to check thickness of brake disks.

   Minimum thickness:

   Mega 200-III: S = 4,5 mm (0.177 in)

   Mega 160: S = 1.25 mm (0.049 in)

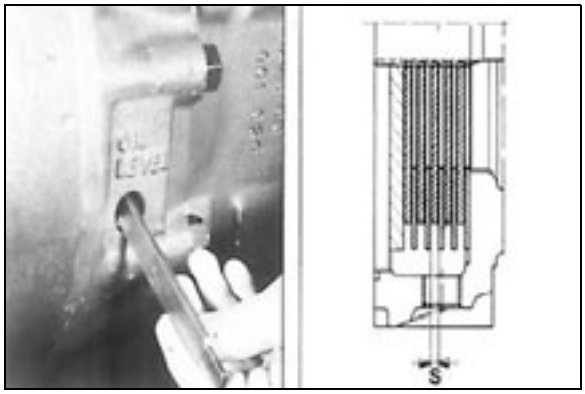


Figure 1

2. Remove mounting nuts, remove axle housing.

   NOTE: *Axle housing must be removed horizontally.*

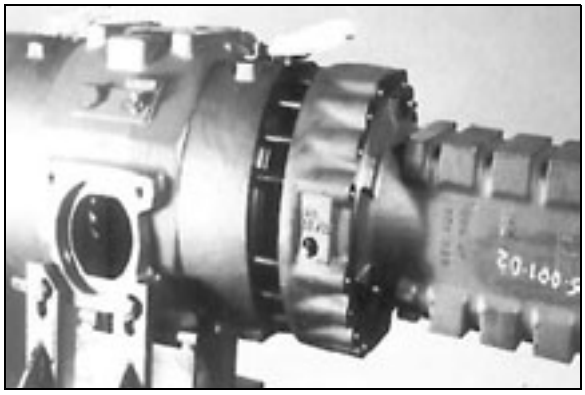


Figure 2

4. Inspect for wear or damage and replace any parts as required.

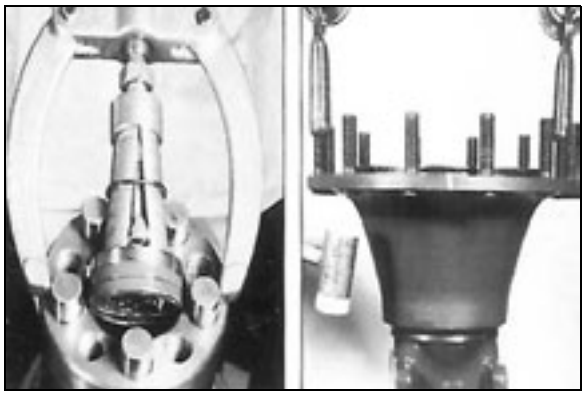


Figure 29

5. Install outer races and taper roller bearings. A special tool T21 is required (refer to "Special Tools" in back of this section).

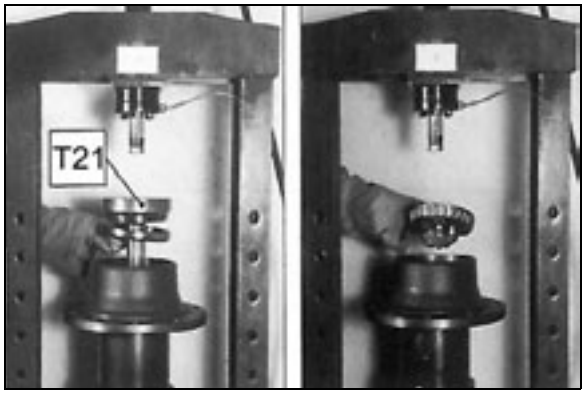


Figure 30

6. Install seal. A special tool T23 is required (refer to "Special Tools" in back of this section).

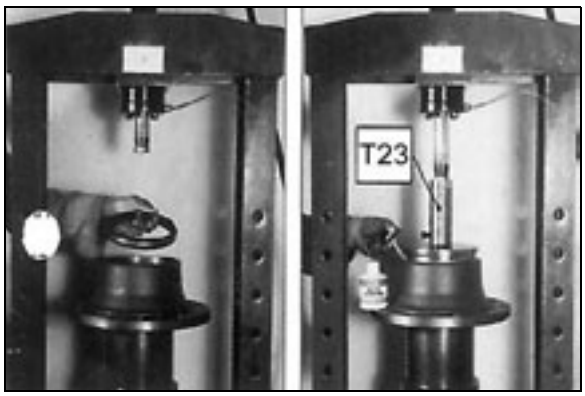


Figure 31

7. Install wheel studs.

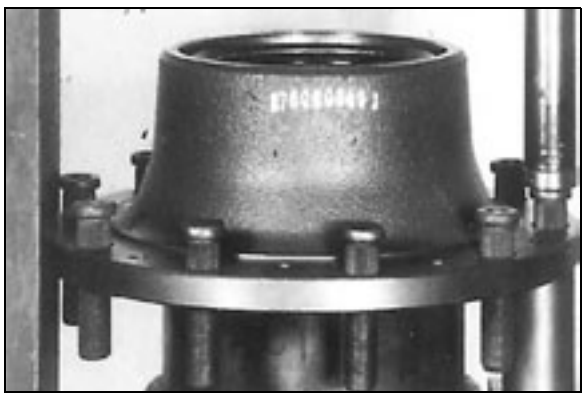


Figure 32

13. Remove axle housing.

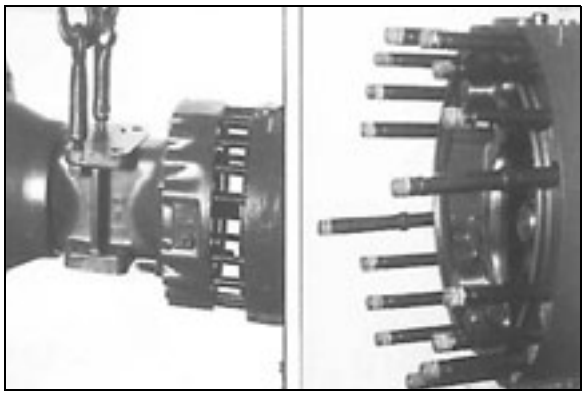


Figure 65

14. Remove differential carrier, then remove bevel gear.

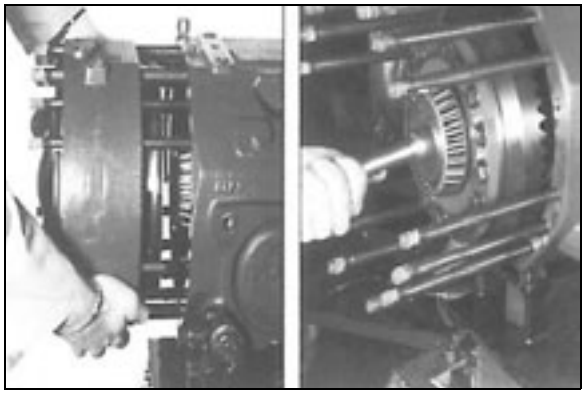


Figure 66

15. Remove bearing, then remove spring pin from cross shaft.

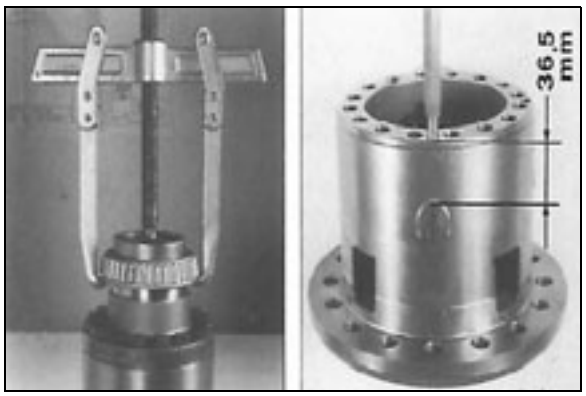


Figure 67

NOTE: *Replace fitting bolts of crown wheel every time they are removed.*

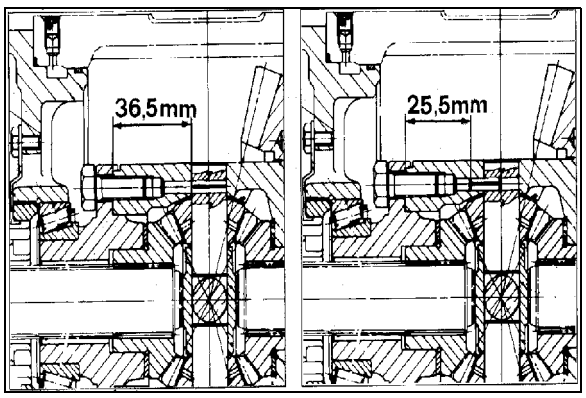


Figure 68

DISASSEMBLY AND ASSEMBLY OF AXLE UNITS

⚠ WARNING!

Lift and handle all heavy components using proper equipment. Make sure that assemblies or components are held by proper slings and hooks. Use specific lift eyes. Make sure that nobody is close to the unit to be lifted.

Drain oil from central section plug (2).

Drain oil side final drives through bolt (3) and plug (4).

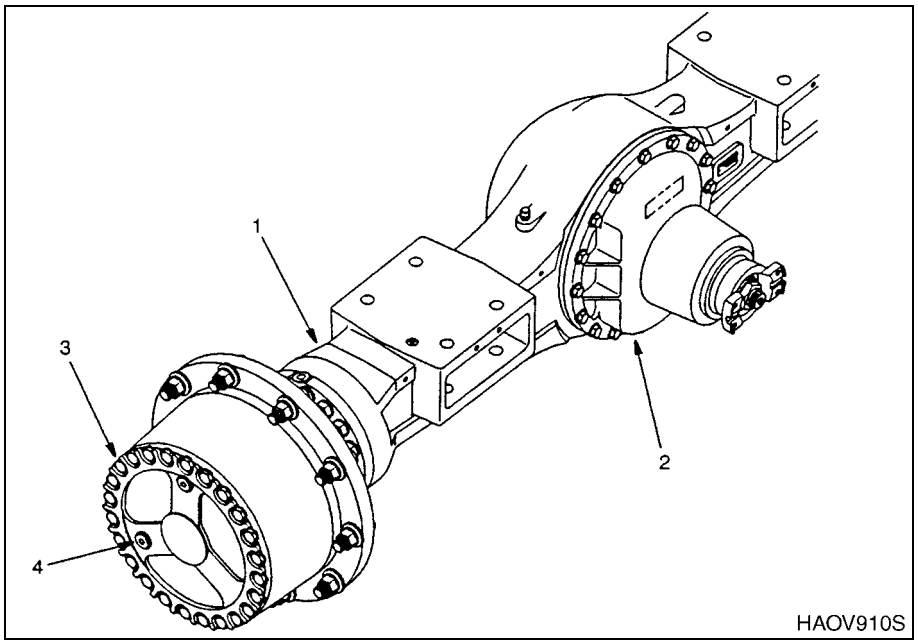


Figure 1 LOCATION OF OIL FILLING AND DRAINING PLUGS ON AXLE CASING AND SIDE FINAL DRIVES.

E. Adjusting tooth contact and backlash.

NOTE: *Adjust the backlash, and at the same time adjust tooth contact.*

1) Adjust backlash as follows:

a) Movement of the bevel gear is done with nut (3, Figure 11). At this time, so as not to change bearing, turn each nut the same amount, in the same direction.

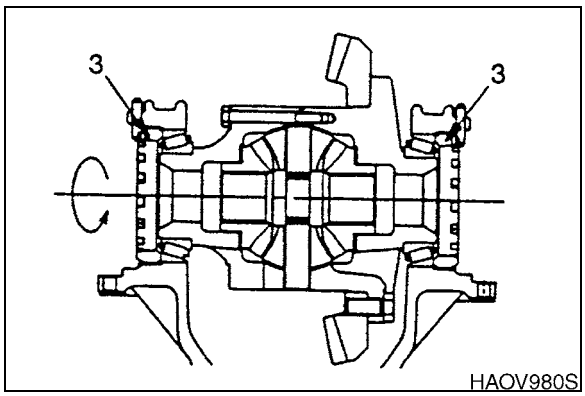


Figure 11

b) Put dial (1, Figure 12) gauge in vertical contact with forward tooth face, and while turning adjusting nut, adjust until dial gauge fluctuation becomes 0.2 - 0.28 mm (0.008 - 0.011 in).

NOTE: *Measure at three or four places, and keep pinion gear from rotating when measuring.*

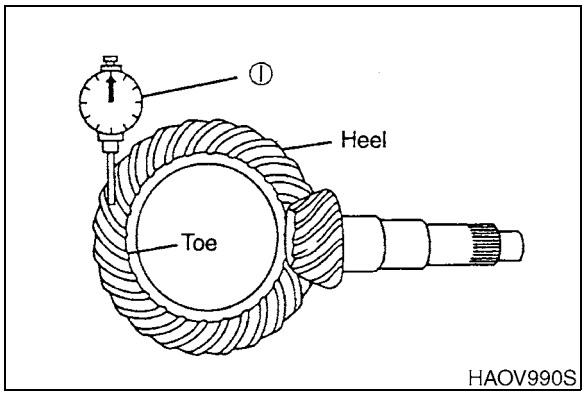
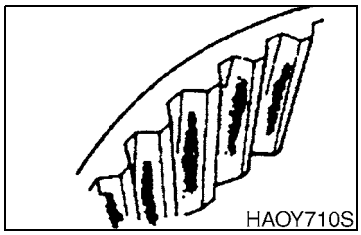


Figure 12

2) Adjust tooth contact as follows:

a) Adjust bevel pinion by adjusting shims (16, Figure 10) between differential camerand bearing cup (13).

b) Coat the face of seven or eight pinion teeth lightly with prussian bluing. Hold the bevel gear by hand to act as a brake, rotate the pinion gear forward and backward and inspect the pattern left on the teeth.

Tooth Contact	Possible Cause	Procedure for Adjustment
	The tooth contact pattern should start about 5.0 mm (0.1969 in) from the toe of the bevel gear and cover about 50% of the length of the tooth. It must be in the center of the tooth height.	Adjust the pinion gear by adjusting the shims at the bearing. Adjust the bevel gear in the same way has when adjusting backlash.

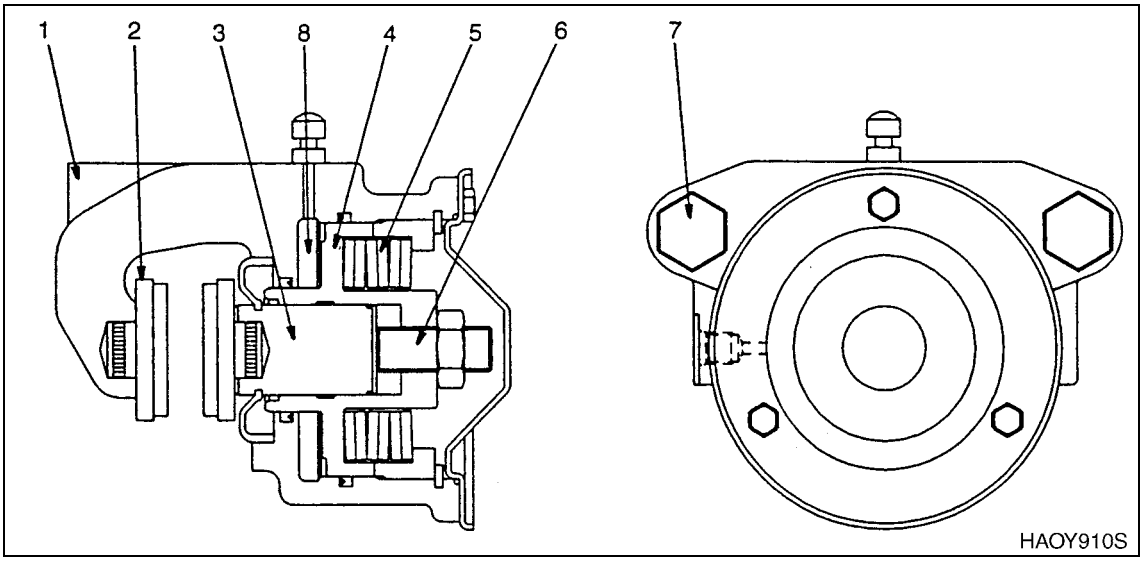


Figure 4

Reference Number	Description
1	Caliper
2	Pad
3	Push. Rod
4	Piston

Reference Number	Description
5	Disk Spring Stack
6	Adjuster Screw
7	Guide Pins
8	Oil Chamber

SPECIAL TOOLS AND MATERIALS

LUBRICANTS AND SEALANTS

Fuchs Renocal FN 745

7. Insert disk spring stack (5, Figure 17) completely into piston (6). Do not change the disk springs within the stack.

   NOTE: *The orientation of the installed disk spring stack with 5 disk springs has to be in accordance with Figure 18. The orientation of the installed spring stack with 6 disk spring has to be according to Figure 19. The installation or replacement of the disk spring stack is only allowed as a complete assembly.*

8. Grease disk spring stack.

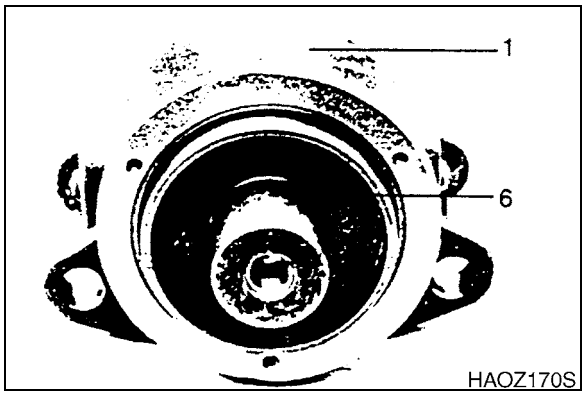


Figure 17

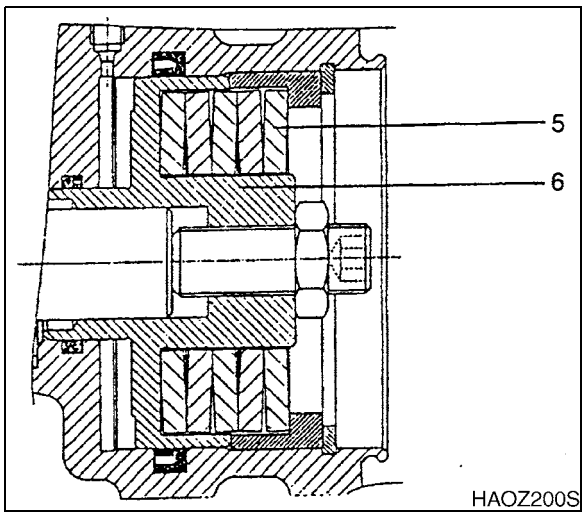


Figure 18

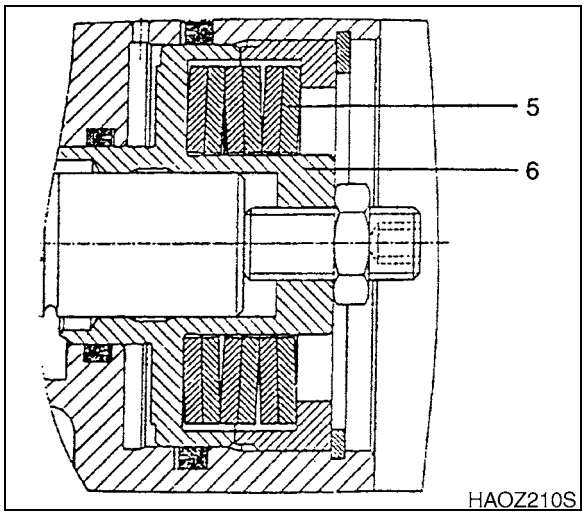


Figure 19

Refrigerant Pressure Check

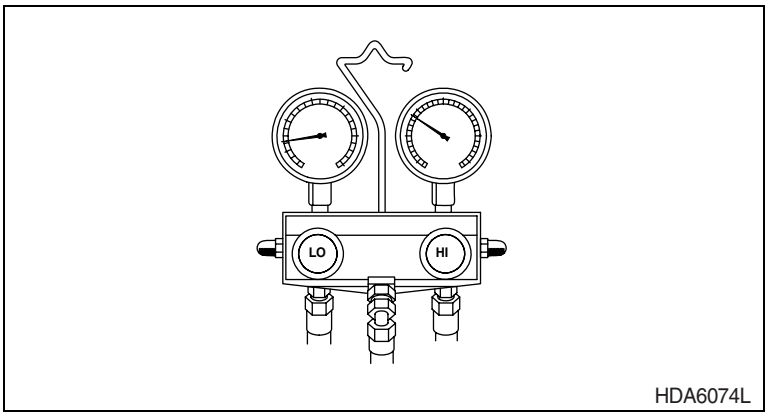


Figure 3

1. Open all doors and windows.
2. Install manifold gauge set.
3. Start engine and maintain engine speed at 1,800 - 2,000 rpm.
4. Check high / low-pressure of refrigerant.

1	**High-pressure: 8 - 10 kg/cm^2 (114 - 142 psi)** **Low-pressure: Approximately 1 kg/cm^2 (14 psi)**		
Possible Cause: Low Refrigerant Level			
Step	**Inspection Item**		**Remedy**
1	Check for traces of refrigerant oil.	Yes	Reassemble using correct tightening torque.
		No	Go to next step.
2	Using a leak detection device or soapy water check for refrigerant leakage at all major components and joints.	Yes	Repair leaking component.
		No	Recharge system to correct pressure.

2	**High-pressure: Over 23 kg/cm^2 (327 psi)** **Low-pressure: Approximately 2.5 - 3 kg/cm^2 (35 - 42 psi)**		
Possible Cause: Overcharge, Frost on condenser			
Step	**Inspection Item**		**Remedy**
1	Check for condenser pin damage or contamination.	Yes	Clean, repair or replace condenser.
		No	Refrigerant overcharge.

3. Using a refrigerant leak detector or soapy water check each joint for leakage.

Reference Number	Description
1	Refrigerant Leak Detection Device

4. If a leak is detected, check for O-ring damage or correct tightening torque and replace or repair as necessary.

5. If no leaks are detected, proceed with the charging process.

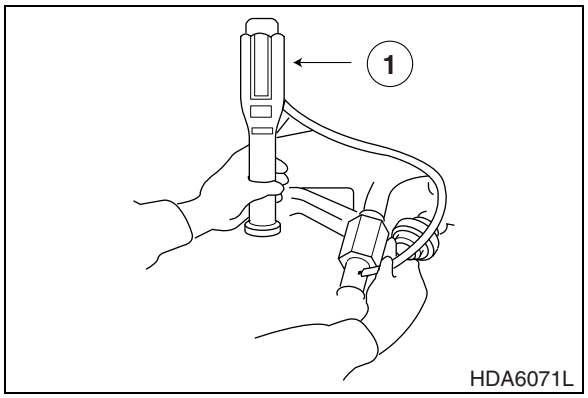


Figure 10

⚠ WARNING!

For accurate refrigerant leak detection, perform leak detection procedure in a well ventilated area.

REFRIGERANT CHARGING

1. Perform the vacuuming procedure, vacuum holding and leaking tests as described in the proceeding headings.

   NOTE: *First charge the refrigerant system with 100 g (3.5 ounces) of refrigerant with the engine off. Then using the manifold gauges as a guide fully charge the system with the engine running.*

   When exchanging refrigerant containers, press the manifold gauge low side valve to eliminate air from the charging hose.

Reference Number	Description
1	To Compressor
2	Low-pressure Side
3	High-pressure Side
4	From Receiver
5	Refrigerant Supply Container

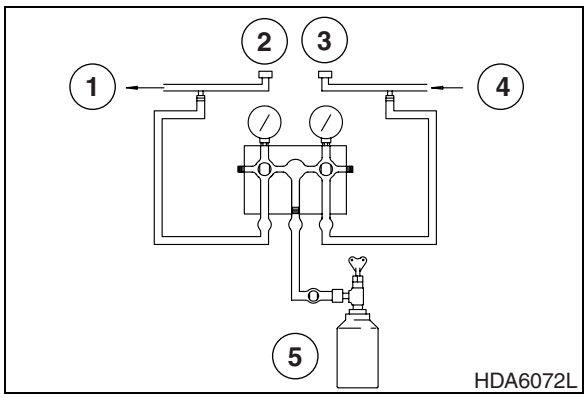


Figure 11

2. Charge the system by opening the manifold gauge low side valve.

   Initial charge amount: 100 g (3.5 ounces).

3. If refrigerant does not flow freely into system, try starting engine first before operating air conditioner.

   - Temperature control switch setting: Maximum Cooling.

     Blower Speed Setting: Hi (3 step).

When either directional clutch is selected to the opposite clutch is relieved of pressure and vents back through the direction selector spool. The same procedure is used in the speed selector.

The direction or speed clutch assembly consists of a drum with the internal splines and a bore to receive a hydraulically actuated piston. The piston is oil tight' by the use of sealing rings. A steel disk with external splines is inserted into the drum and rests against the piston. Next, a friction disk with splines at the inner diameter is inserted. Disks are alternated until the requested total is achieved. A heavy backup plate is then inserted and secured with a retaining ring. A hub with O.D. splines is inserted into the splines of a disks with teeth on the inner diameter. The disks and hub are free to increase in speed or rotate in the opposite direction as long as no pressure is present in that specific clutch.

To engage the clutch, as previously stated, the control valve is placed in the desired position. This allows oil under pressure to flow from the control valve, through a passageway, to a chosen clutch shaft. This shaft has a drilled passageway for oil under pressure to enter the shaft. Oil pressure sealing rims are on the clutch shaft. These rings direct oil under pressure to a desired clutch. Pressure of the oil forces the piston and disks against the heavy backup plate. The disks, with teeth on the outer diameter, clamping against disks with teeth on the inner diameter, enables the hub and clutch shaft to be locked together and allows them to drive as a unit.

There are bleed balls or bleed orifices, depending upon the model, in the clutch piston which allow quick escape for oil when the pressure to the piston is released.

The pressure spike is the time required by the spool to recover its reaction force.	
1	Reverse Accumulator
2	Flow Restrictor Orifice
3	Forward Accumulator
4	Reverse Regulator
5	Reverse Regulator
6	Regulator Spool Orifice
7	Controlled Reverse Clutch Pressure Check Port
The spike pressure is used to fill the pressure supply path rapidly.	
8	Reverse Accumulator
9	Flow Restrictor Orifice
10	Forward Accumulator
11	Forward Regulator
12	Reverse Regulator
13	Regulator Spool Orifice
14	Controlled Reverse Clutch Pressure Check Port

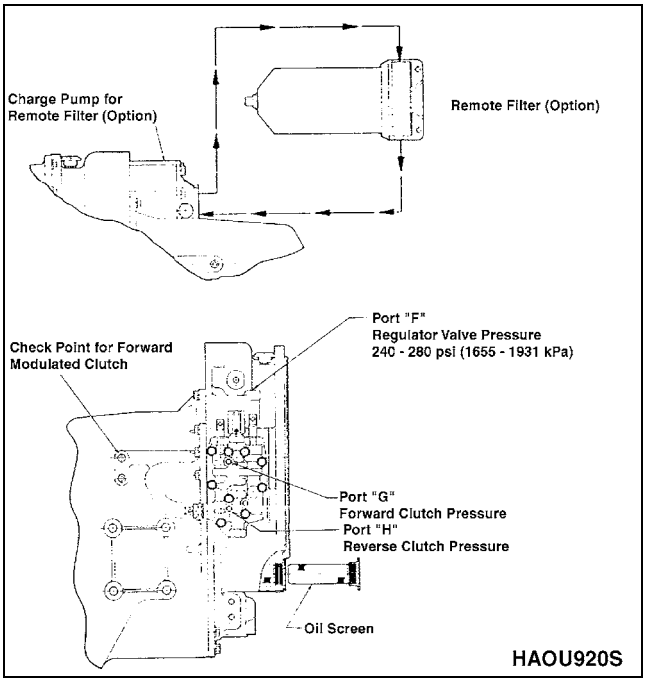


Figure 17

Oil Temperature Gauge Specifications: 1. Normal Operating Temperature: 180 - 250°F [82 - 121°C] 2. Red Lined Temperature: 250°F [121°C]	**Notes:** **Port "L"** - Converter Outlet Temperature Port is to be used for Converter Outlet Temperature Pickup. Gauge is to be in the Operator Compartment. See Oil Temperature Gauge Specifications. **Port "M"** - Converter Outlet Pressure. Pressure must be measured during normal vehicle "Production" test. Converter outlet pressure equals the total pressure drop of the Heat Exchanger, Heat Exchanger Lines and back pressure of the transmission lubricated system. **Ports "A," "F," "K," "L," and "M" -** These ports can be used for field "Trouble Shooting" or vehicle "Production Line" tests. **Ports "F," "L," and "M"** - These ports are to be used as a check points for normal vehicle "Production Line" test. **Port "F"** - Clutch Pressure - It is recommended that clutch pressure be monitored by a gauge having an indicator dial range of 0 - 400 PSI [0 - 2758 kPa] and in the Operator Compartment. **Ports "G" and "H"** - Backup Warning - These ports are provided for installation of Backup Pressure Switch for Warning Light or Horn.
Operating Specifications: 25 PSI [173 kPa] Min. pressure at 2000 rpm engine speed and a max. of 70 PSI [483 kPa] outlet pressure at a no-load governed speed.	
Test Conditions: 1. Converter Outlet Oil Temperature 180 - 220°F [82 - 104°C]. 2. Transmission in neutral.	
Hose line Operating Requirements: 1. Pressure lines - Suitable for operation from ambient to 250°F. [121°C] continuous operating temperature. Must withstand 300 PSI [2068 kPa] continuous pressure, with 600 PSI [4137 kPa] intermittent Hydraulic Hose Specifications. 2. See Lubrication Specifications. 3. All hose lines must conform to S.A.E. Spec. Number J 1019 Tests and Procedures for High Temperature Transmission Oil Hose.	

6. Remove reaction member retainer ring.

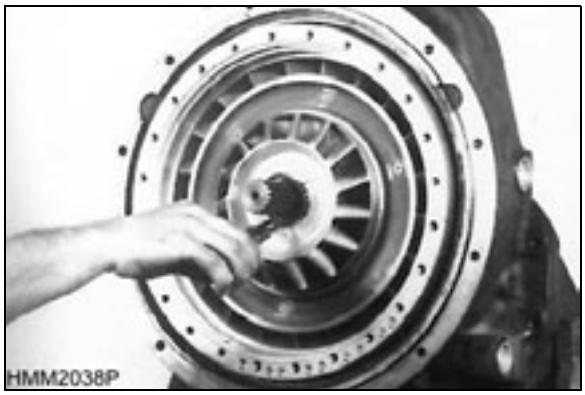


Figure 42

7. Remove reaction member.

   NOTE: *Some units will have a fixed reaction member and some units will have a free-wheel reaction member. The fixed is a one piece and the freewheeling is an assembly. Remove as an assembly*

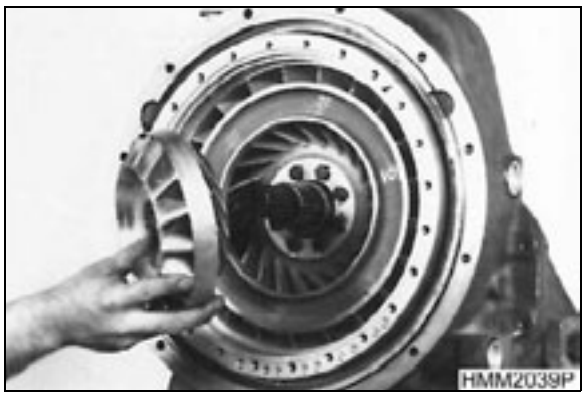


Figure 43

8. Remove reaction member spacer.

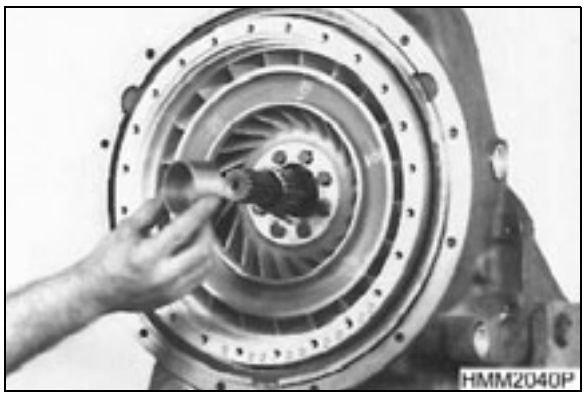


Figure 44

9. Remove impeller and hub assembly.

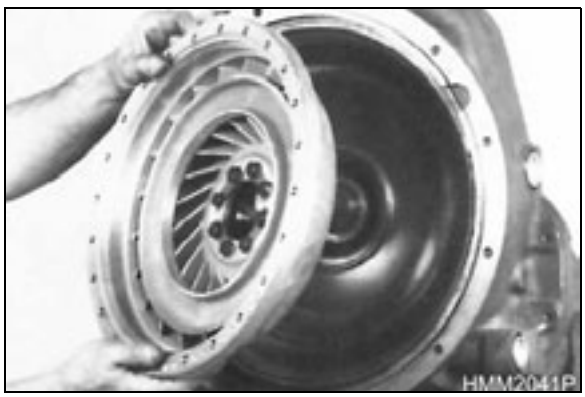


Figure 45

42. Remove sealing ring sleeve.

Figure 79

43. Remove forward clutch rear bearing.

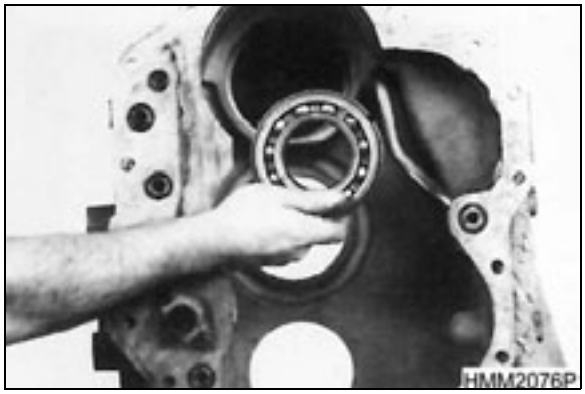


Figure 80

44. Remove output shaft front bearing cap bolts and washer.

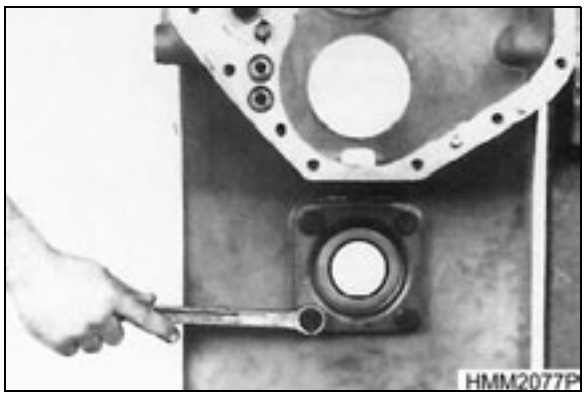


Figure 81

45. Remove bearing cap and shims.

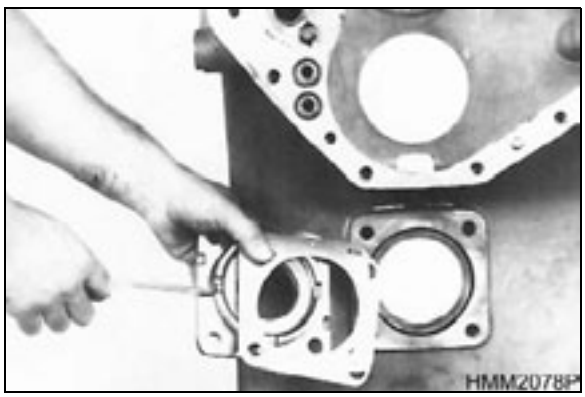


Figure 82

3. Position piston in 1st clutch drum as shown. Use caution as not to damage inner and outer piston sealing rings.

Figure 119

4. Position piston return spring spacer over clutch shaft.

Figure 120

5. Install Belleville washers (piston return springs). **See note**. First washer with large diameter toward spacer. Alternate seven (7) washers. See Figure 121.

   NOTE: *Belleville washers in the 1st clutch are different than washers in the forward and reverse clutch, 1st clutch washers have (4) four holes in them (for identification only).* ***Do not*** *mix 1st clutch washers with forward and reverse washers.*

Figure 121

6. Install piston return spring (Belleville washers) retainer ring on clutch shaft.

Figure 122

3. Position piston return spring and spring retainer on clutch shaft.

Figure 158

4. Compress spring and install retainer ring.

Figure 159

5. Install one steel disk.

Figure 160

6. Install one friction disk. Alternate steel and friction disks until the proper amount of disks are installed. First disk next to the piston is steel, last disk installed is friction.

Figure 161

Disassembly of 3rd Speed Clutch

1. Remove end plate retainer ring.

Figure 198

2. Remove end plate.

Figure 199

3. Remove inner and outer clutch disks.

Figure 200

4. Remove return spring retainer ring.

Figure 201

7. Remove clutch piston. Remove clutch shaft oil sealing rings and expander springs.

Figure 238

Reassembly of Forward Clutch

NOTE: *See cleaning and inspection.*

1. Install clutch piston outer and inner seal rings.

   NOTE: *Ring must be sized before installing in clutch drum. Sizing is best accomplished by rotating piston while holding a round object against the new seal ring as shown. Rotate piston until seal ring is flush with outer diameter of piston.*

Figure 239

2. Install clutch piston in clutch drum. Use caution not to damage seal rings.

Figure 240

3. Position piston return spring spacer over clutch shaft.

Figure 241

12. Position oil baffle in transmission sump.

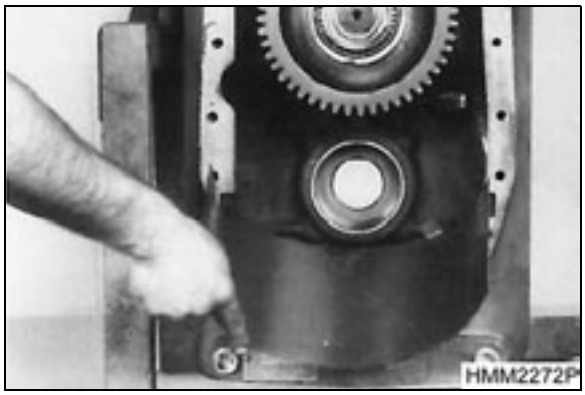


Figure 278

13. Position output shaft assembly in front bearing bore, use caution as not to damage front oil seal.

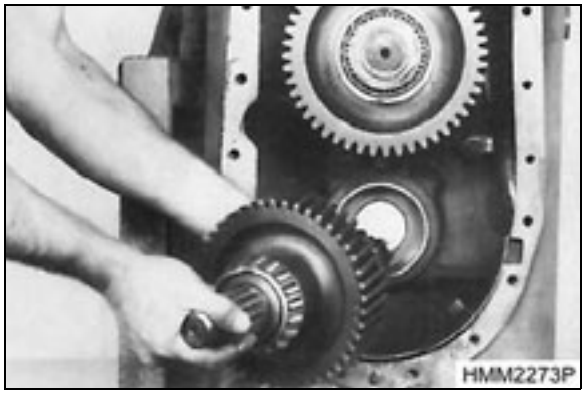


Figure 279

14. Install 1st clutch rear bearing spacer.

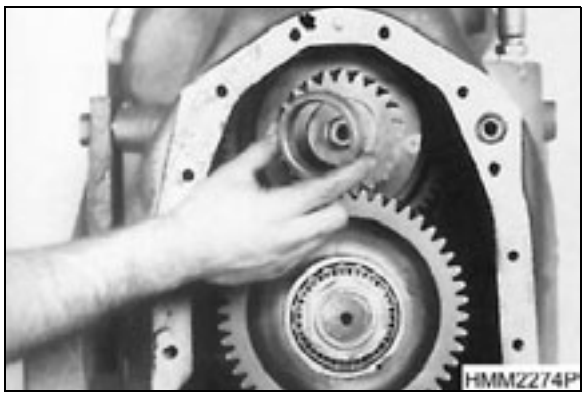


Figure 280

15. Install 1st clutch rear bearing.

    NOTE: *Bearing locating ring groove must be out.*

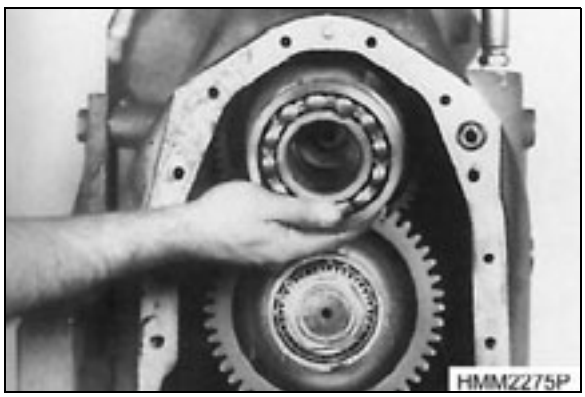


Figure 281

11. Install inner bearing on shaft with large diameter of taper down. Position bearing spacer on shaft.

Figure 316

12. Position reverse idler gear on shaft with hub of gear up. Install outer taper bearing in gear with large diameter of taper up.

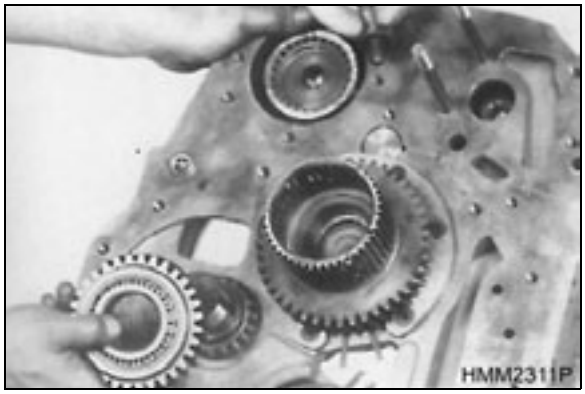


Figure 317

13. Position outer spacer on shaft.

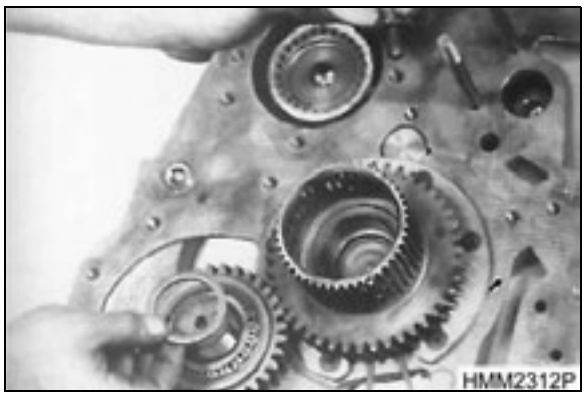


Figure 318

14. Install shaft retainer nut. Tighten nut 200 - 250 ft lb torque [271.2 - 388.8 Nm].

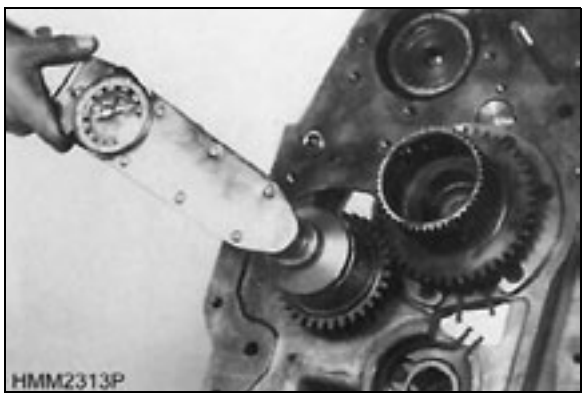


Figure 319

16. Connect pressure line from shuttle valve from control valve. Connect wires from control valve to shuttle valve solenoid.

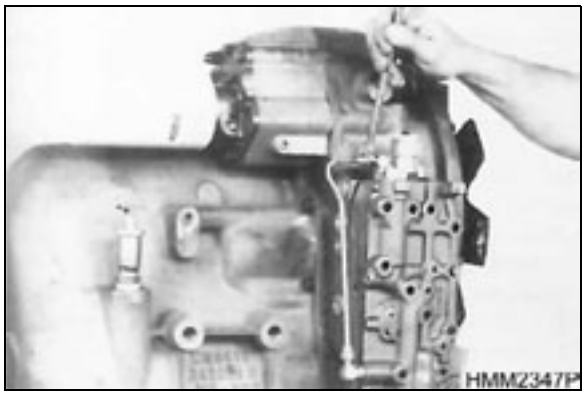


Figure 353

17. Install control valve to housing screws and lock washers.

    NOTE: *Use Loctite #262 on upper right-hand screw. Tighten screws to specified torque. (See torque chart.)*

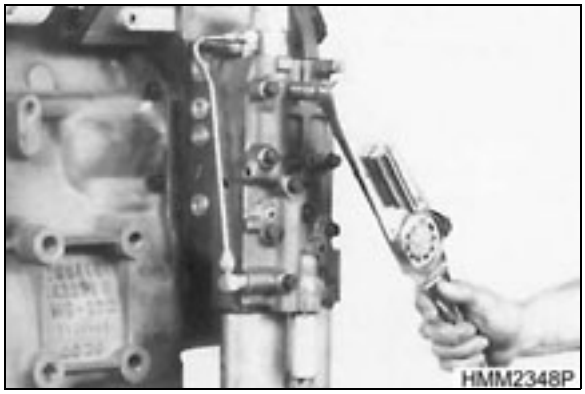


Figure 354

18. If auxiliary pump drive is not used, position a new gasket and cover on opening. Install bolts and washers and tighten to specified torque. (See torque chart).

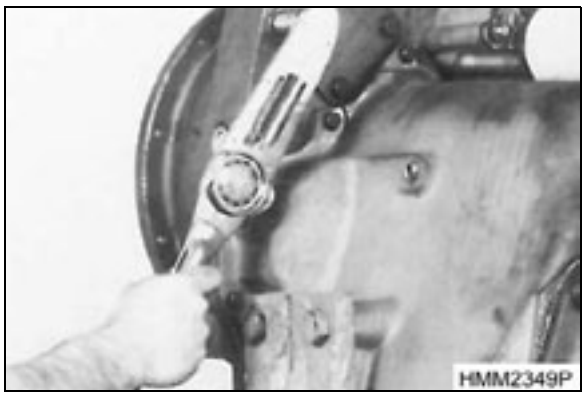


Figure 355

REMOVAL OF SEALING RING SLEEVE

NOTE: The following photos are not of the HR Converter Housing, but the sleeve removal procedure is identical.

1. Remove clutch front bearing retaining ring.

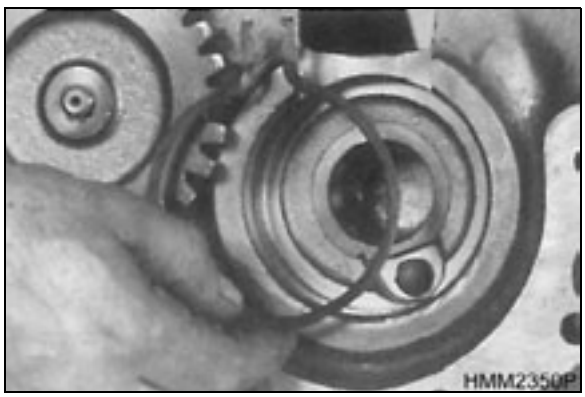


Figure 356

Drive Plate Installation Procedure

(1) TO FACILITATE ASSEMBLY, ALIGN SMALL HOLES IN DRIVE PLATES - SEE FIGURE 342.

Cleaned tapped holes and studs thoroughly with Loctite #755 Solvent. Must be free of any grease or oil. Spray Loctite #747 Primer "T" in tapped holes and on studs and allow to dry. Apply Loctite #262 Thread locker to both tapped holes and (16 NC thread) stud end. Assemble to Fig. 342 shown. Remove excess Loctite after assembly. Allow 30 minutes minimum before installing on engine.

NOTE: *If Loctite #747 Primer "T" is not used, allow 24 hours for the thread locker to cure before installing on engine.*

Position drive plate and weld nut assembly on impeller cover studs with weld nuts toward cover. Align intermediate drive plate and backing ring with studs in impeller cover.

NOTE: *Two dimples 180° apart in backing ring must be out (toward engine flywheel). Install washers and stud nuts. With a calibrated torque wrench, tighten nuts 26 - 29 ft lb [35.3 - 39.3 Nm] torque.*

Reference Number	Description
1	Gear
2	Gear
3	Coupling (Splined)
4	Flange (Mounting)
5	Bushing
6	Seal (Shaft)
7	Retaining Ring
8	O-ring
9	Plate
10	Seal (Element)
11	Seal (Energizer)
12	Body
14	O-ring
15	Washer
16	Screw, Socket Set - M12
17	Nut, M12
18	Gear
19	Gear

Reference Number	Description
20	Coupling, Splined
21	Body
22	Cover
23	Bolt, M12 x 120
24	Plate, Adapter
25	Pin, Dowel
26	Bushing
27	Bushing
28	Gear
29	Gear
30	Body
31	Cover
32	Bolt
34	Ring, Backup
35	Seal
36	O-ring
37	Washer, Lock

TROUBLESHOOTING ACCUMULATOR CHARGING VALVE

Problem	Possible Cause	Remedy
Accumulator charging cycle repeats frequently when accumulator is not normally being discharged in service.	Leaking accumulator lines or fittings.	Check lines and fittings for leaks and correct.
	Incorrect setting of accumulator gas charge.	Check accumulator gas charge.
	Inoperative charging valve.	Replace charging valve.
Accumulator starts to charge, but does not reach high limit.	No oil or low oil level in tank.	Check oil level and add oil.
	Pump worn or inoperative and not delivering full flow or pressure.	Check pump.
	Inoperative system relief valve (valve leaking or has low setting so full flow and pressure are not available).	Check relief valve.
	Inoperative charging valve.	Repair or replace charging valve.
Accumulator charging time too long.	No oil or low oil level in tank.	Check oil level and add oil.
	Relief valve setting too low.	Check valve setting and adjust.
	Pump worn or inoperative and not delivering full flow or pressure.	Check pump.
	Inoperative charging valve.	Repair or replace valve.
Accumulator fails to start charging.	No oil or low oil level in tank.	Check oil level and add oil.
	Worn or inoperative pump.	Check pump pressure and flow.
	Inoperative relief valve.	Check relief valve setting.
	Air in accumulator line.	Bleed accumulator line.
	Check oil level and add oil.	Repair or replace valve.
Very rapid cycling of charging valve.	Incorrect setting of accumulator gas charge.	Check accumulator gas charge,
	Check oil level and add oil.	Repair or replace valve.
Lack of adequate flow thru valve.	Inoperative pump.	Check pump pressure and delivery.
	Inoperative relief valve.	Check relief valve setting.
	Blocked lines.	Replace lines.
	Inoperative charging valve.	Repair or replace valve.

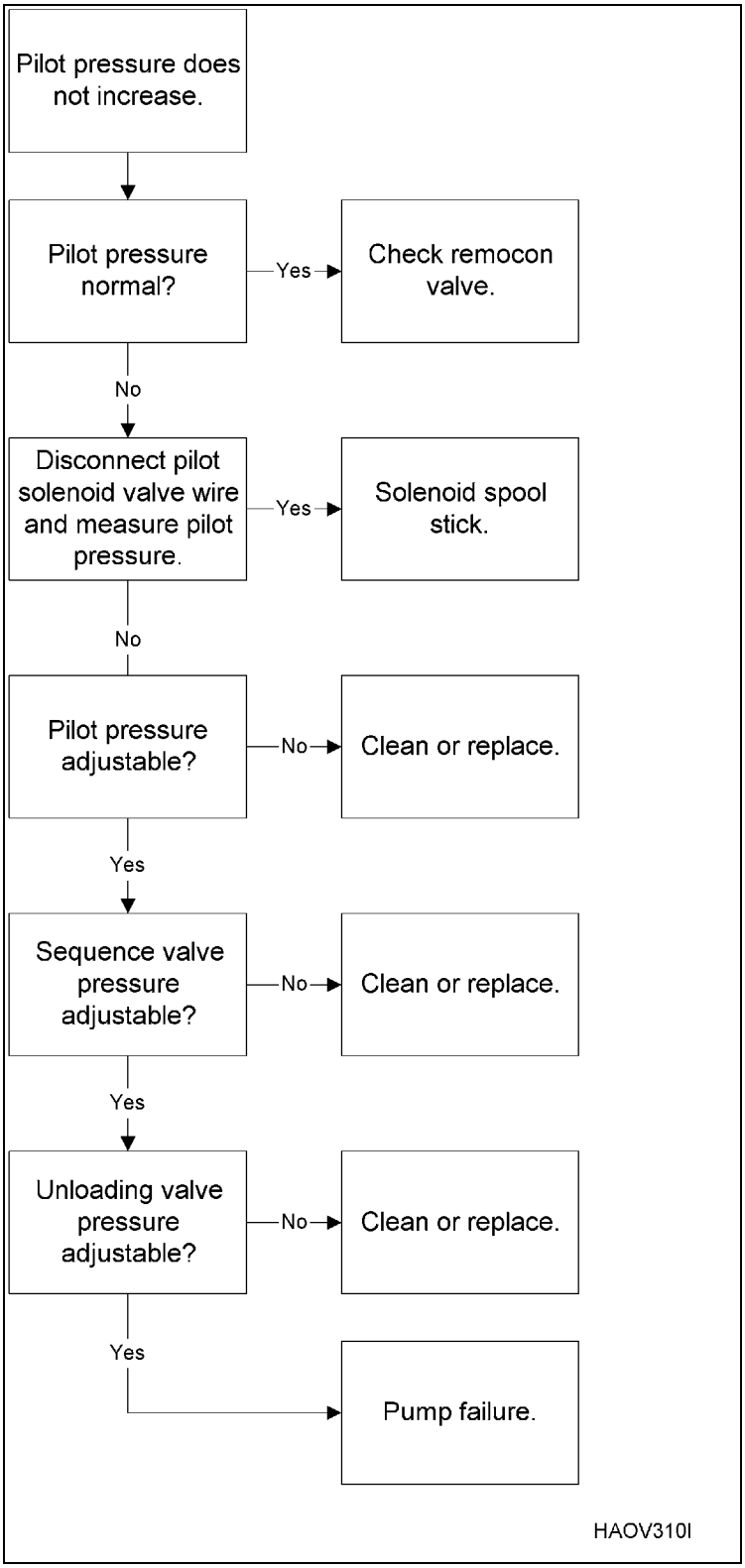

Pilot pressure does not increase.
Pilot pressure normal?
Yes
Check remocon valve.
No
Disconnect pilot solenoid valve wire and measure pilot pressure.
Yes
Solenoid spool stick.
No
Pilot pressure adjustable?
No
Clean or replace.
Yes
Sequence valve pressure adjustable?
No
Clean or replace.
Yes
Unloading valve pressure adjustable?
No
Clean or replace.
Yes
Pump failure.
HAOV310I

Figure 14

ACCUMULATOR CHARGING

⚠ WARNING!

In the event of a diaphragm or upper valve failure, or any type of accident or handling fault, the upper chamber of the accumulator could at some point require repressurization. Depending upon the specific procedures and safety precautions recommended for the type and model accumulator that has been installed on your machine, a specialized adapter and/or filling tool may be required to perform the procedure. Consult your dealer or *DOOSAN* After Sales Service for more information and follow recommended procedures carefully. All accumulators may contain gas held under high-pressure. Careless handling or improper disassembly could release explosive stored energy, resulting in an accident or injury.

NOTE: *Some machines use 320 cc (19.53 in^3) Bosch Accumulators with a nitrogen precharge (P1) pressure of 15 kg/cm^2 (213 psi). Always verify precharge pressure by checking the manufacturer's data label on the exterior of the accumulator.*

CHARGING THE ACCUMULATOR WITH NITROGEN

1. Remove the protective cap (10, Figure 3) and the protective plug (11) from the accumulator (6).

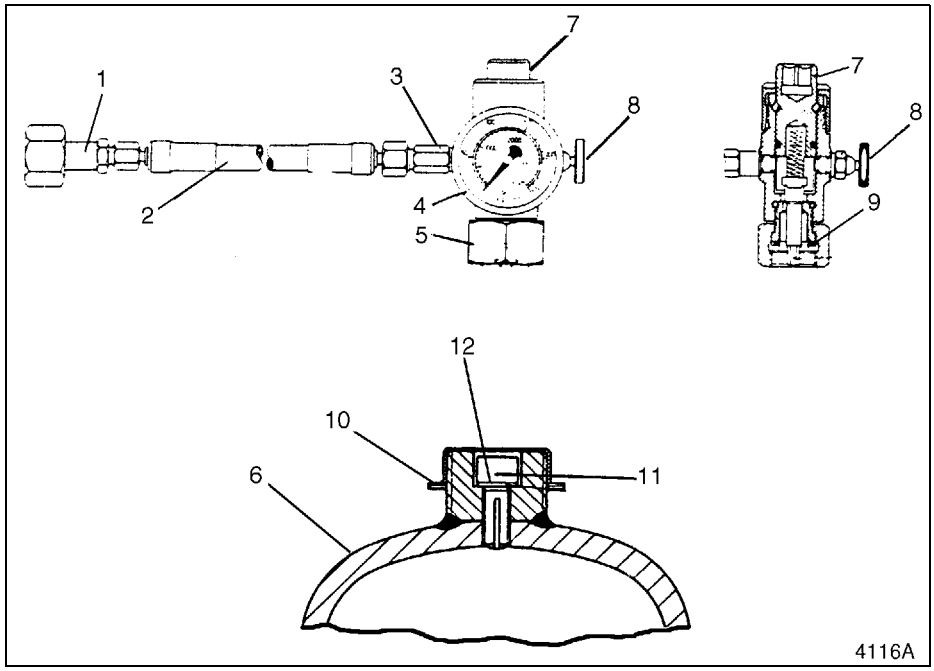


Figure 3

Problem	Possible Cause	Remedy
Slow bucket and boom movements.	Reduced oil flow due to dirty filter or dirty intake line.	Disassemble and clean parts.
	Air drawn into circuit through loose connections.	Tighten intake connections.
	Reservoir oil level too low.	Fill reservoir to correct level.
	Relief valve pressure setting incorrect.	Adjust relief valve pressure.
	Damaged pump shaft or pump drive sleeve.	Replace damaged parts.
	Pump worn or damaged internally.	Replace worn or damaged parts.
	Relief valve sticking.	Disassemble and inspect cartridge. Clean or replace cartridge.
	Air in pressure line.	Perform cylinder bleeding procedure to remove air. Tighten or replace pressure line.
	Damaged pipe or hose.	Replace pipe or hose.
	Worn cylinder seals.	Replace worn parts.
Low-pressure, shown by weak upward movement of boom and bucket.	Reduced oil flow due to dirty filter or dirty intake line.	Disassemble and clean parts.
	Reservoir oil level too low.	Fill reservoir to correct level.
	Relief valve pressure setting incorrect.	Adjust relief valve pressure.
	Pump worn or damaged internally.	Replace worn or damaged parts.
	Relief valve sticking.	Disassemble and inspect cartridge. Clean or replace cartridge.
	Worn cylinder seals.	Replace worn parts.
	Low pump output due to dirty discharge pipes.	Remove and clean pump discharge pipes.
	Relief valve spring is weak. Relief valve poppet worn.	Replace worn parts.
Cylinder drops when control valve is in neutral.	Worn plunger in control valve.	Replace plunger.
	Stuck overload relief valve due to worn seat surface.	Replace worn parts.
	Loose pipes or joints.	Tighten parts.
	Worn piston seal on hydraulic cylinder.	Replace seal.
Vibration or excessive noise.	Excessive resistance in pump intake line.	Inspect intake line and clean or replace as necessary.
	Air being drawn into intake line.	Inspect pipe joints and tighten.
	Chattering relief valve.	Change oil, replace valve.

16. Install wear ring (1, Figure 30) on piston.

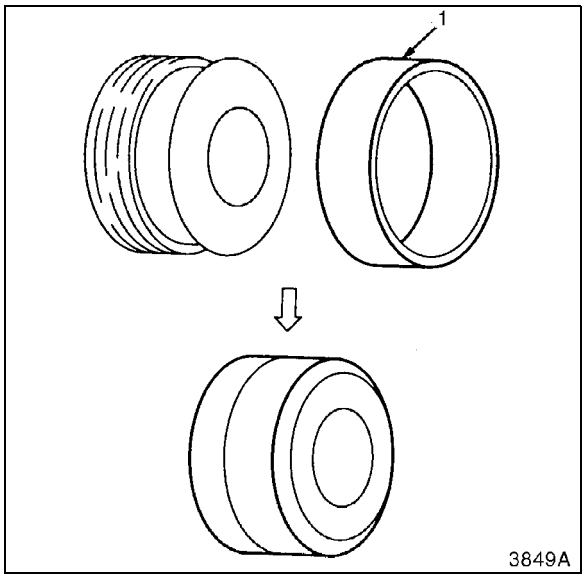


Figure 30

17. Set cylinder rod (1, Figure 31) into a repair fixture (2). Securely clamp rod to fixture. Exercise caution to prevent nicks or scratches to chrome plated areas of rod. chrome plated area is oil sealing surface of rod.

Reference Number	Description
1	Cylinder Rod
2	Repair Fixture

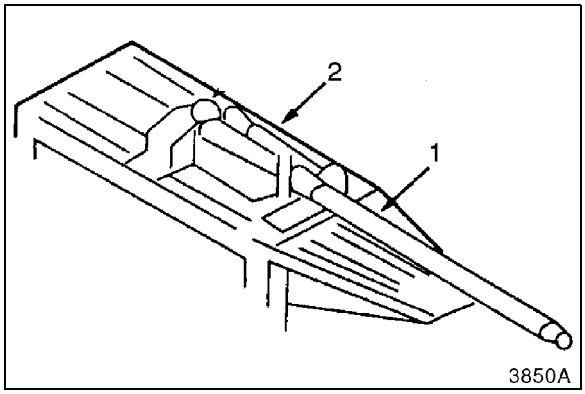


Figure 31

18. Slide cylinder head assembly (1, Figure 32) onto cylinder rod (2). Use caution to prevent threads on rod from damaging seal inside cylinder head.

Reference Number	Description
1	Cylinder Head
2	Cylinder Rod

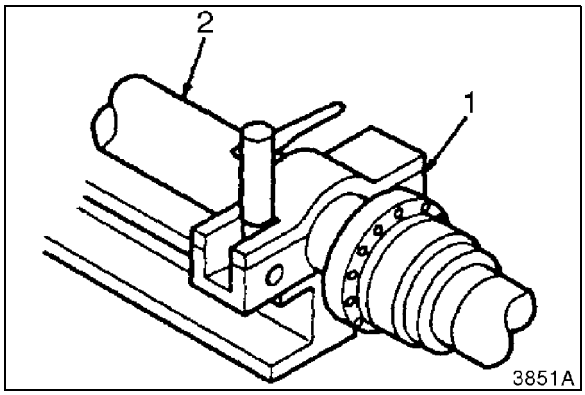


Figure 32

10. Install retainer assembly (16, Figure 3) in housing.

    NOTE: *Depress retainer (16) until it bottoms on spacer (14). Spools (9 and 12) and retainer (16) should return when released If the spools and retainer do not return when released, the bore of sleeves (8 and 11) were possibly damaged when installed.*

11. Install shims (S) (17, Figure 3), springs (18*, 19 and 20) and piston (22) in housing bore.

    NOTE: *Some models also use a 1/4" spacer with shims. For proper brake pressure setting, Install the same number of shims and spacer that were removed during disassembly. (If spools 9 and 12), sleeves (8 and 11), or spring (20) were replaced, shim adjustment may be required.)*

REASSEMBLY

NOTE: *The relief valve pressure can be changed by changing springs. The following table displays the characteristics of the three springs available. See Figure 13.*

Pressure in Bars	Wire Diameter (A)	Coil Diameter (B)	Spring Height (C)
4 bar (58 psi)	2.5 mm (0.0984")	12.5 mm (0.4921")	50.0 mm (1.9685")
7 bar (100 psi)	3.0 mm (0.1181")	12.5 mm (0.4921")	50.0 mm (1.9685")
10 bar (145psi)	3.2 mm (0.1260")	12.5 mm (0.4921")	50.0 mm (1.9685")

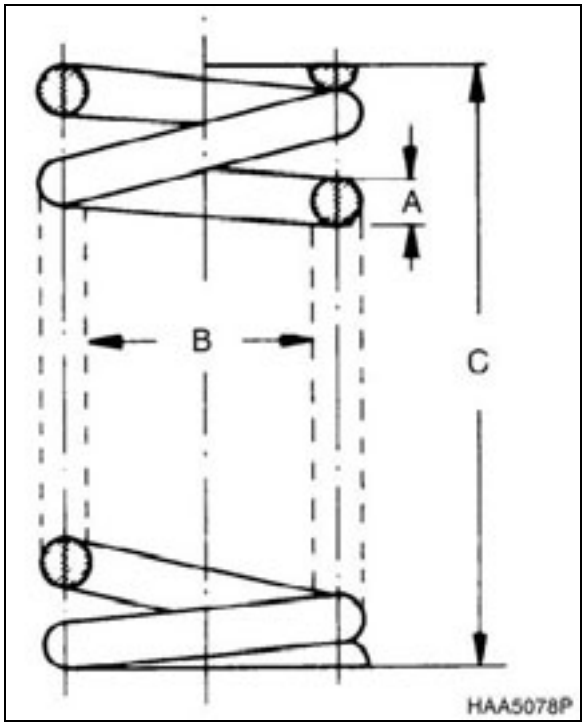


Figure 13

1. Figure 14, shows PP plug and spool.

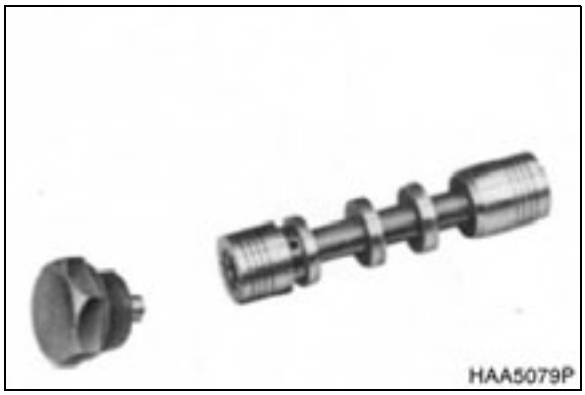


Figure 14

17. Push neutral position springs out of groove in spool. See Figure 25.

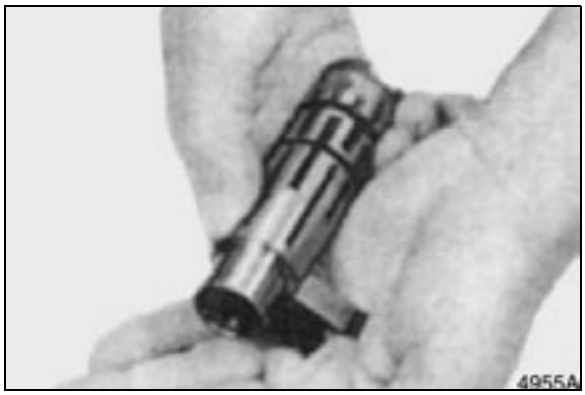


Figure 25

18. Remove dust seal from housing. See Figure 26. Remove O-ring and backup ring from inside housing.

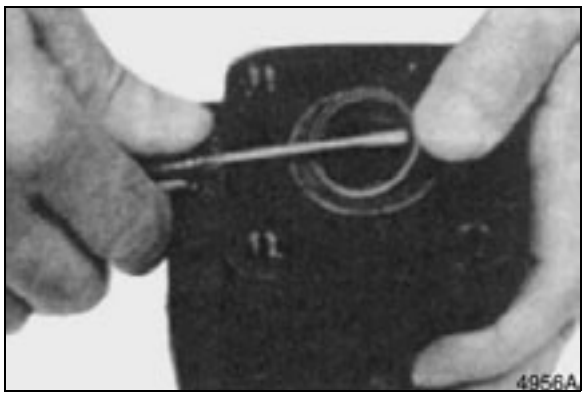


Figure 26

19. Figure 27, shows all parts removed from steering unit. Clean all parts before assembly. Use only new O-rings and seals.

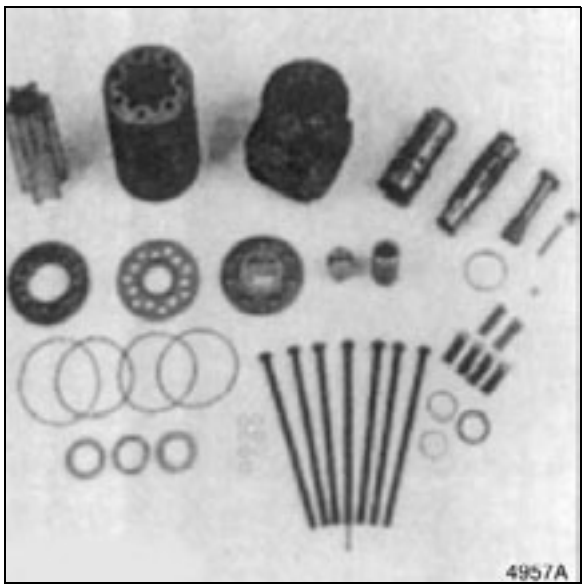


Figure 27

CLEANING AND INSPECTION

For general cleaning and inspection procedures, refer to "General Maintenance Procedures" section.

26. Use a screwdriver to install OSPL 800 and 1000 spacers (If equipped.). See Figure 56.

    NOTE: *Refer to parts manual for our unit to determine if these parts are installed.*

Figure 56

27. Install end cover. See Figure 57.

Figure 57

28. Install a washer and roll pin into hole shown in Figure 58.

Figure 58

29. Install six remaining bolts and tighten them. See Figure 59. Cross tighten bolts and roll pin to 48.1 Nm (35 ft lb).

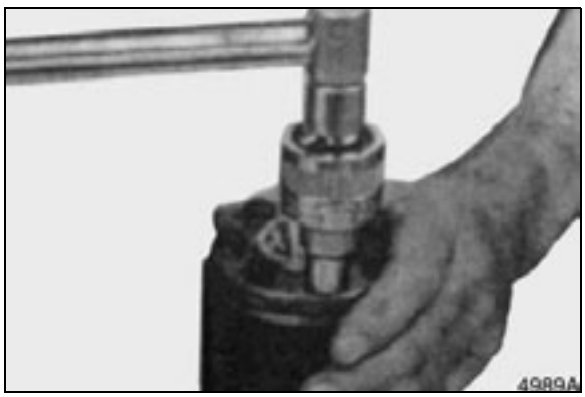


Figure 59

ELECTRICAL SYSTEM

Operation of the Start Circuit (2) - Immediately After Start

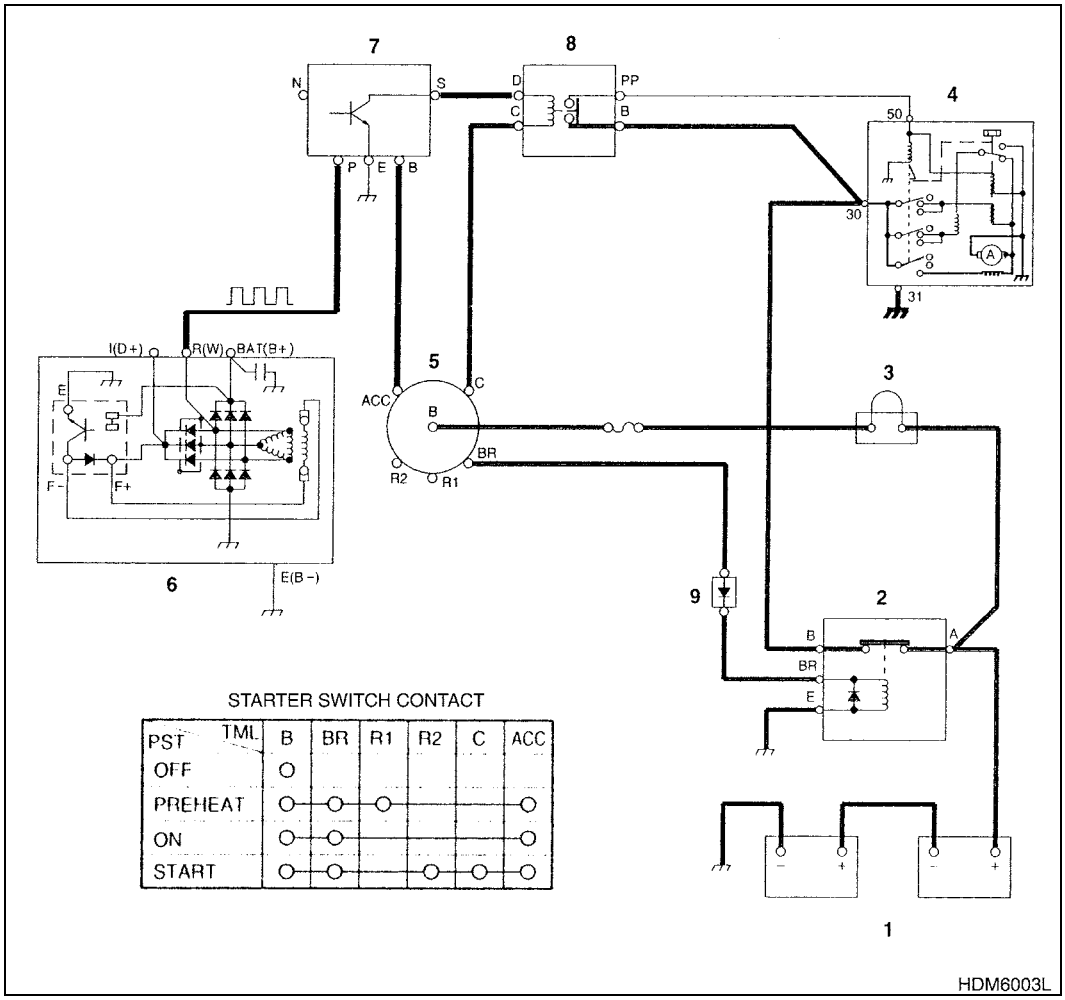


Figure 3 OPERATION OF START CIRCUIT (2) - IMMEDIATELY AFTER START

Reference Number	Description
1	Battery
2	Battery Relay
3	Fusible Link
4	Starter
5	Starter Switch

Reference Number	Description
6	Alternator
7	Starter Controller
8	Starter Relay
9	Diode

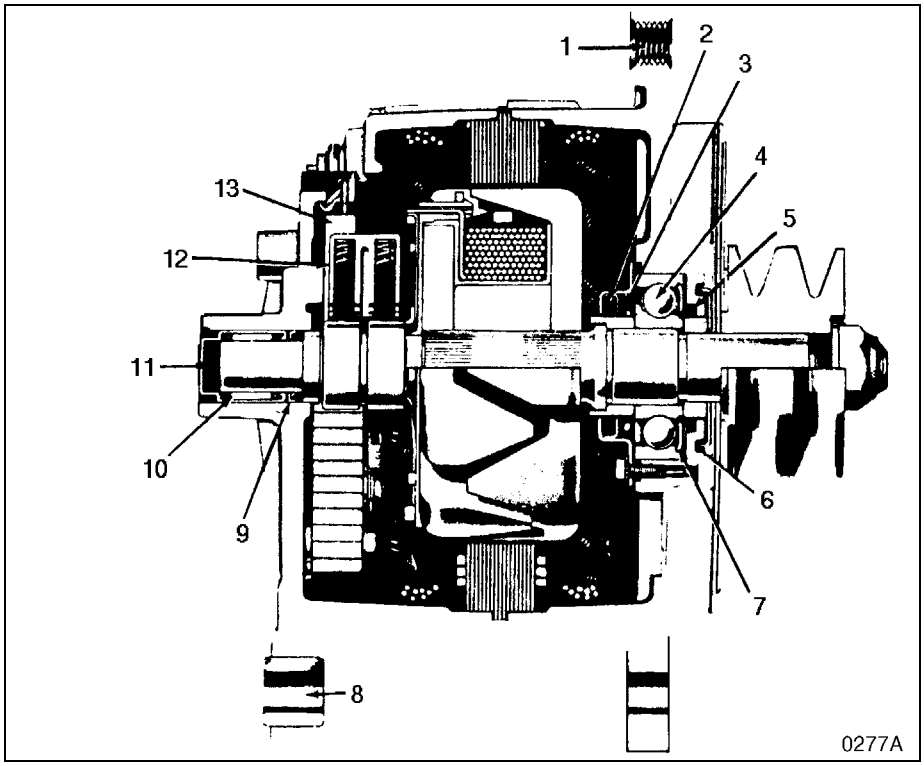


Figure 12

Reference Number	Description
1	Steel Thread Insert
2	Felt Seal
3	Large Grease Reservoir
4	Heavy-duty Ball Bearing
5	Felt Seal
6	Labyrinth Seal
7	Lip Seal

Reference Number	Description
8	Adjustable Mounting Bushing
9	Lip Seal
10	Extra-long Roller Bearing
11	Large Grease Reservoir
12	Shielded Brush Assembly
13	Integrated-circuit Regulator

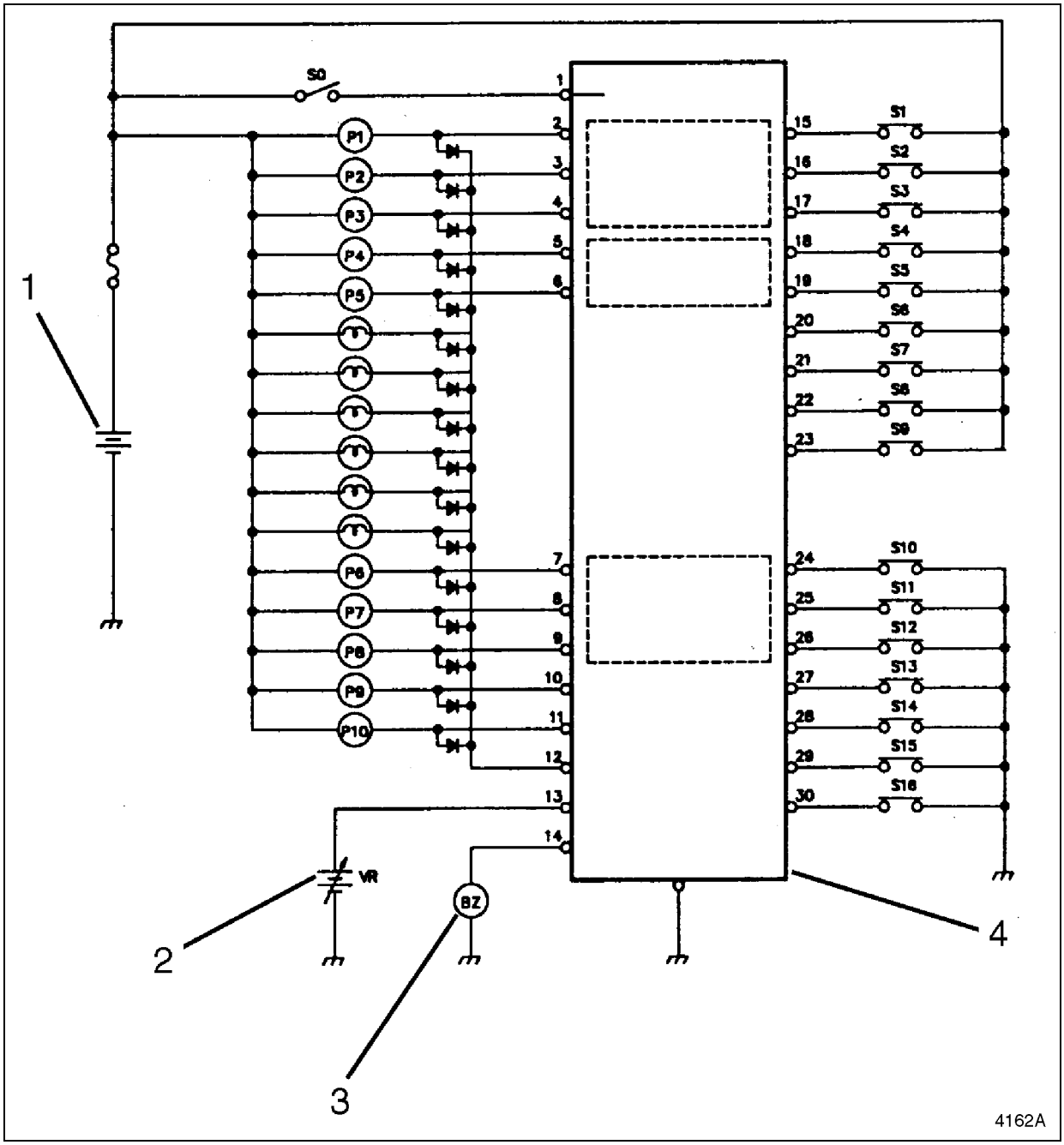


Figure 27

Switch Position (Figure 27)		Result
SO → "ON"		All Warning Lights "ON," Buzzer sounds for 2 seconds
S1 - S3 → "ON" (OFF)		P1 - P3 →› "ON" (OFF)
S4 - S5 → "ON" (OFF)		P4 - P5 → "ON" (OFF)
S9 → "ON"	S10 → "ON" (OFF)	P6 → "ON" (OFF)