DOOSAN

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June 2004

WHEEL LOADER

Shop Manual

M400-V

Serial Number 3001 and Up

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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 is 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 200-V	3001 and Up
Mega 400-V	3001 and Up

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June 2004

PRECAUTIONS WHEN HANDLING FLUIDS AT HIGH TEMPERATURE

Immediately after operations are stopped, the coolant, engine oil, and hydraulic oil are at high temperature and the radiator and hydraulic tank are still under pressure. Attempting to remove the cap, drain the oil or coolant, or replace the filters may lead to serious burns. Always wait for the temperature to go down, and follow the specified procedures when carrying out these operations.

To prevent hot coolant from spurting out, shut down engine, wait for the coolant to cool, then loosen the cap slowly to relieve the pressure.

To prevent hot oil from spurting out, shut down engine, wait for the oil to cool, then loosen the cap slowly to relieve the pressure.

Figure 5

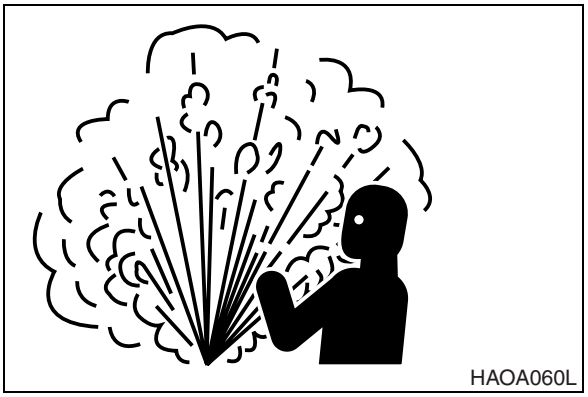

Figure 6

INJURY FROM WORK EQUIPMENT

Do not enter or put your hand, arm or any other part of your body between movable parts, such as between the work equipment and cylinders, or between the machine and work equipment.

If the control levers are operated, the clearance between the machine and the work equipment will change and this may lead to serious damage or personal injury.

If going between movable parts is necessary, always position and secure the work equipment so that it cannot move.

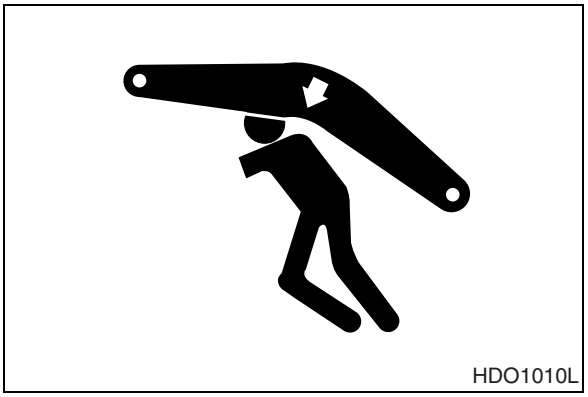

Figure 7

USE SOLID SUPPORT BLOCKING

Never rely on lift jacks or other inadequate supports when work is being done. Block wheels fore and aft to prevent any movement.

DIGGING BENEATH OVERHANGS

Digging beneath an overhang is dangerous. Overhang could collapse on top of operator and cause serious injury or death. Go on to another digging area before steep overhangs are formed. Know height and reach limits of wheel loader and plan ahead while working. Park wheel loader away from overhangs before work shut down.

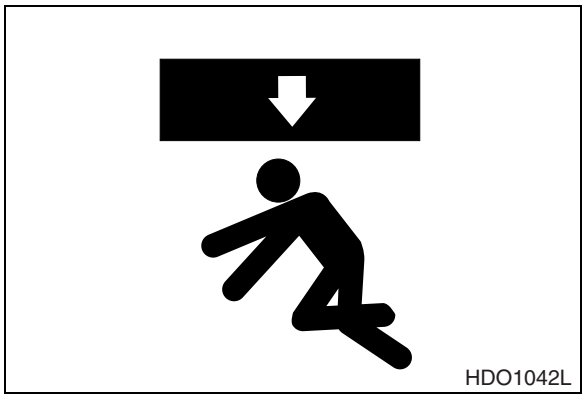

Figure 17

DIGGING BENEATH WHEEL LOADER

Digging beneath wheel loader is dangerous. Earth beneath could collapse. This could cause wheel loader to tip, which could cause serious injury or death to operator. Working around deep pits, trenching or along high walls may require support blocks, especially after heavy rainfalls or during spring thaws.

STAY ALERT FOR PEOPLE MOVING THROUGH WORK AREA

When loading a truck you should always know where the driver is.

Avoid loading over the cab of a truck even if the driver is in a safe spot. Someone else could have gone inside, for any number of reasons. Avoid working where unseen passersby might be.

Slow down work cycle and use slower travel speeds in congested or populated areas. Use a commonly understood signal so that other members of work crew can warn operator to slow or halt work in an impending hazardous situation.

Figure 18

BE AWARE OF AND CONFORM TO LOCAL REGULATIONS

Minimum levels of insurance coverage, work permits or certification, physical barriers around work site or restricted hours of operation may be mandated by governing authorities. There may also be guidelines, standards or restrictions on equipment that may be used to perform certain kinds of work. Check and follow all local requirements, which may also be related to below ground hazards and power lines.

PRECAUTIONS WITH HIGH-PRESSURE LINE, TUBES AND HOSES

When inspecting or replacing high-pressure piping or hoses, check that the pressure has been released from the circuit. Failure to release the pressure may lead to serious injury. Always do the following;

- Wear protective glasses and leather gloves.
- Fluid leaks from hydraulic hoses or pressurized components can be difficult to see but pressurized oil has enough force to pierce the skin and cause serious injury. Always use a piece of wood or cardboard to check for suspected hydraulic leaks. Never use your hands or expose your fingers.
- Do not bend high-pressure lines. Do not strike high-pressure lines. Do not install lines, tubes or hoses that are bent or damaged.
- Make sure that all clamps, guards and heat shields are installed correctly to prevent vibration, rubbing against other parts, and excessive heat during operation.
  - If any of the following conditions are found, replace the part.
  - Damage or leakage from hose end.
  - Wear, damage, cutting of covering, or exposure of strengthening wire layer.
  - Cover portion is swollen in places.
  - There is twisting or crushing at movable parts of hose.
  - Foreign material is embedded in the covering.
  - Hose end is deformed.

NOTE: *Refer to "Hose In-service Lifetime Limit (European Standard ISO 8331 and EN982 CEN)" in Operation and Maintenance Manual, for additional European regulations.*

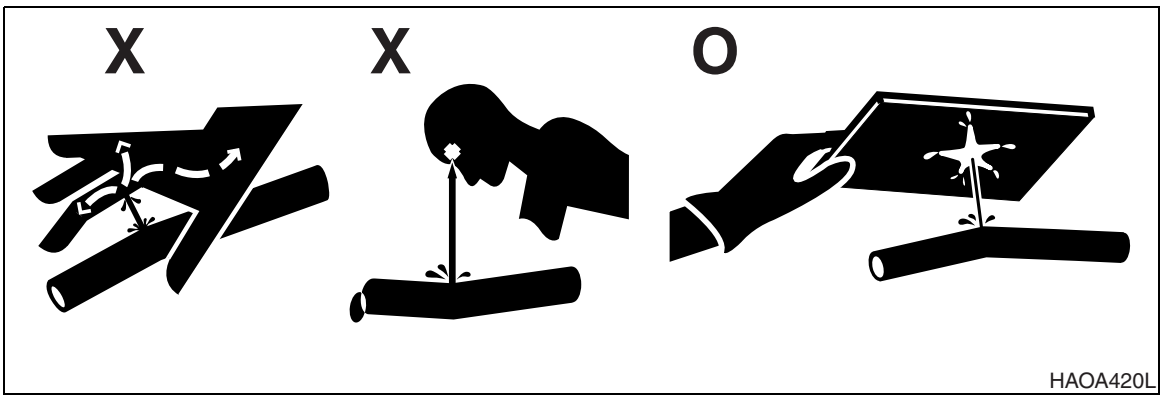

Figure 29

OBTAIN IMMEDIATE MEDICAL ATTENTION IF PRESSURIZED OIL PIERCES SKIN.

⚠ WARNING!

Failure to obtain prompt medical assistance could result in gangrene or other serious damage to tissue.

TABLE OF CONTENTS

WORKING CAPACITIES

BUCKET CAPACITY

Standard toothed bucket has a capacity of 3.9 m^3 (5.1cu. yd.). An optional bucket equipped with a cutting edge and no teeth has a capacity of 3.9 m^3 (5.1 cu. yd.).

TIPPING LOAD

Static Tipping Load with bucket in Over Front position is 16,420 kg (36,200 lb). With bucket in Fully Turned position, Static Tipping Load is 14,016 kg (30,900 lb).

MATERIAL WEIGHT

The data below describes weight of a cubic meter (cubic yard) of many types of workload materials.

APPROXIMATE WEIGHT OF WORKLOAD MATERIALS

MATERIAL	LOW WEIGHT OR DENSITY 1,100 KG/M^3 (1,850 LB/YD^3), OR LESS	MEDIUM WEIGHT OR DENSITY 1,600 KG/M^3 (2,700 LB/YD^3), OR LESS	HIGH WEIGHT OR DENSITY 2,000 KG/M^3 (3,370 LB/YD^3), OR LESS
Charcoal	401 kg/m^3 (695 lb/yd^3)	----------	----------
Coke, blast furnace size	433 kg/m^3 (729 lb/yd^3)	----------	----------
Coke, foundry size	449 kg/m^3 (756 lb/yd^3)	----------	----------
Coal, bituminous slack, piled	801 kg/m^3 (1,350 lb/yd^3)	----------	----------
Coal, bituminous r. of m., piled	881 kg/m^3 (1,485 lb/yd^3)	----------	----------
Coal, anthracite	897 kg/m^3 (1,512 lb/yd^3)	----------	----------
Clay, DRY, in broken lumps	1,009 kg/m^3 (1,701 lb/yd^3)	----------	----------
Clay, DAMP, natural bed	----------	1,746 kg/m^3 (2,943 lb/yd^3)	----------

IMPORTANT

Hydraulic system operating conditions (repetitive cycling, heavy work loads, fluid circulating under high-pressure) make it extremely critical that dust, grit or any other type of contamination be kept out of the system. Observe fluid and filter change maintenance interval recommendations and always preclean any exterior surface of the system before it is exposed to air. For example, the reservoir fill cap and neck area, hoses that have to be disassembled, and the covers and external surfaces of filter canisters should all be cleaned before disassembly.

MAINTENANCE SERVICE AND REPAIR PROCEDURE

GENERAL PRECAUTIONS

Fluid level and condition should always be checked whenever any other type of maintenance service or repair is being performed.

NOTE: *If the unit is being used in an extreme temperature environment (in subfreezing climates or in high temperature, high humidity tropical conditions), frequent purging of moisture condensation from the hydraulic reservoir drain tap should be a regular and frequent part of the operating routine. In more moderate, temperate climates, draining reservoir sediment and moisture may not be required more than once or twice every few months.*

Inspect drained oil and used filters for signs of abnormal coloring or visible fluid contamination at every oil change. Abrasive grit or dust particles will cause discoloration and darkening of the fluid. Visible accumulations of dirt or grit could be an indication that filters are overloaded (and will require more frequent replacement) or that disintegrating bearings or other component failures in the hydraulic circuit may be imminent or have already occurred. Open the drain plugs on the main pump casings and check and compare drain oil in the pumps. Look for evidence of grit or metallic particles.

Vibration or unusual noise during operation could be an indication of air leaking into the circuit (Refer to the appropriate Troubleshooting section for component or unit for procedures.), or it may be evidence of a defective pump. The gear type pilot pump could be defective, causing low pilot pressure, or a main pump broken shoe or piston could be responsible.

NOTE: *If equipped, indicated operating pressure, as shown on the multidisplay digital gauge on the Instrument Panel ("F-Pump" and "R-Pump") will be reduced as a result of a mechanical problem inside the pump. However, pressure loss could also be due to cavitation or air leakage, or other faults in the hydraulic system.*

Check the exterior case drain oil in the main pumps. If no metallic particles are found, make sure there is no air in the system. Unbolt and remove the tank return drain line from the top part of the swing motor, both travel motors and each main pump. If there is air in any one of the drain lines, carefully prefill the assembly before bolting together the drain line piping connections. Run the system at low rpm.

STANDARD TORQUES

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MODEL	SERIAL NUMBER RANGE
ALL MODELS	ALL RANGES

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May 2002

I. "Loctite" Fastener Adhesives

Product	Application	Color	Removal	Breakaway Cure Strength (in lb) of Sealer Alone
222	Low strength for 6 mm (1/4") or smaller fasteners.	Purple	Hand tools	45
242 or 243	Medium strength for 6 mm (1/4") and larger fasteners.	Blue	Hand tools	80
262	High strength for high grade fasteners subject to shock, stress and vibration.	Red	Heat/260°C (500°F) Remove HOT (NO solvent)	160
271	Extra high strength for fine thread fasteners up to 25 mm (1") diameter.	Red	Heat/260°C (500°F) Remove HOT	160
272	High temperature/high strength for hostile environments to 232°C (450°F).	Red	Heat/316°C (600°F) Remove HOT	180
277	Extra high strength for coarse thread fasteners 25 mm (1") diameter and larger.	Red	Heat/260°C (500°F) Remove HOT	210

II. "Loctite" Pipe Thread Sealant

Product	Application	Color	Removal	Required Setup
545	"No-filler/nonclog" formula for high-pressure hydraulic systems. Over application will not restrict or foul system components.	Purple	Hand tools	4 Hours (or 1/2 hour with Locquic "T" Primer)
656	Solvent resistant, higher viscosity tapered thread sealer.	White	Hand tools	4 Hours (or 1/2 hour with Locquic "T" Primer)

III. "Loctite" gasket/flange sealer

Product	Application	Color	Notes
518	Gasket eliminator specifically made for aluminum flanges/surfaces. For hydraulic systems to 34,475 kPa (5,000 psi).	Red	Use Locquic "N" primer for fast (1/2 - 4 hours) setup. Unprimed setup 4 - 24 hours.
504	Low-pressure/wide-gap gasket eliminator compound. Fills gaps to 0.0012 mm (0.030"), cures to rigid seal.	Orange	Use Locquic "N" primer for faster (1/2 - 4 hours) setup. Unprimed setup 4 - 24 hours.
515	General purpose, fast setup, flexible-cure gasket eliminator. For nonrigid assemblies subject to shock, vibration or deflection.	Purple	Use Locquic "N" primer for faster (1/4 - 2 hours) setup. Unprimed setup 1 - 12 hours.

GENERAL DESCRIPTION

THEORY OF OPERATION

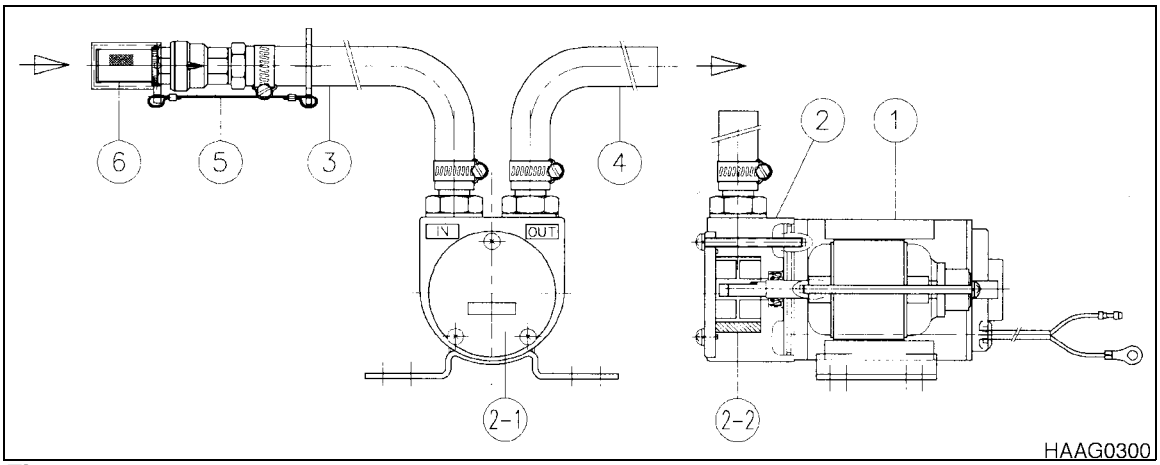

Figure 1

Reference Number	Description
1	Motor
2	Pump
2-1	Pump Cover
2-2	Rotor and Vane

Reference Number	Description
3	Inlet Hose
4	Outlet Hose
5	Check Valve
6	Strainer Cap

The fuel pump consists of a motor, pump, switch, and hose assembly.

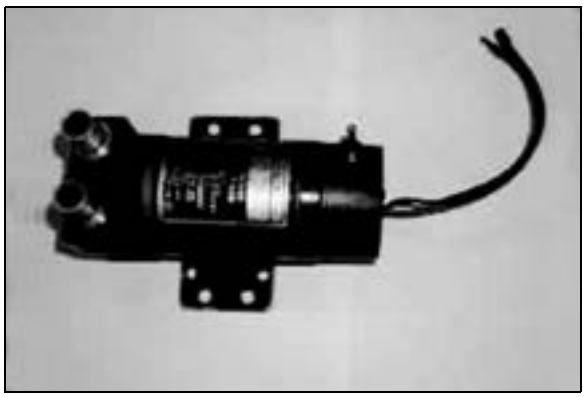

Figure 2

CENTER JOINT (ARTICULATION JOINT)

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MODEL	SERIAL NUMBER RANGE
Mega 400-V	1001 and Up

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December 2000

Oil Drain

Remove drain plugs 1 and 2 and drain oil.

Oil Filling

Provide drain plugs (M24x1.5) with new O-ring and install them.

Tightening torque M_A= 7.14 kg•m (52 ft lb).

Fill oil to the overflow on filler/level plug 3.

Filling quantity approx. 30.0 liters (8 U.S. gal.).

Check

Check oil level after a few minutes and fill up to the specified level, until level remains constant.

Provide filler/level plug (M36x1.5) with new O-ring and install it.

Tightening torque M_A= 13.26 kg•m (96 ft lb).

Oil Change Intervals

1st oil change after 500 operating hours, further oil changes every 1500 operating hours, however, at least once a year.

Oil Level Check

Oil level check once a month, but especially before starting a vehicle with new or repaired axles and axle components respectively.

Bleeders

At initial operation and during the oil change intervals, clean Bleeder 3 and 5 and make a functional check.

Brake

For the pneumatic-hydraulic or via an accumulator system operated brake actuation the following oils are permissible:

1.Motor oils SAE 10W according to specification MIL-L 2104 C, MIL-L 46152, API-CC, CD, SC, SD, SE

2.ATF-Oils Type A, Suffix A, Dexron of II D

Brake Bleeding at the Vehicle

1. Open the bleeder (4).
2. Slowly depress the brake pedal until oil flows from bleeder.
3. Close the bleeder again.
4. Slowly pressurize the brake and hold the pressure for some seconds.

   NOTE: *The brake piston extends and the cylinder chamber fills p with oil. The air accumulates in the upper section of cylinder chamber.*
5. Release the brake pedal and loosen the brake.

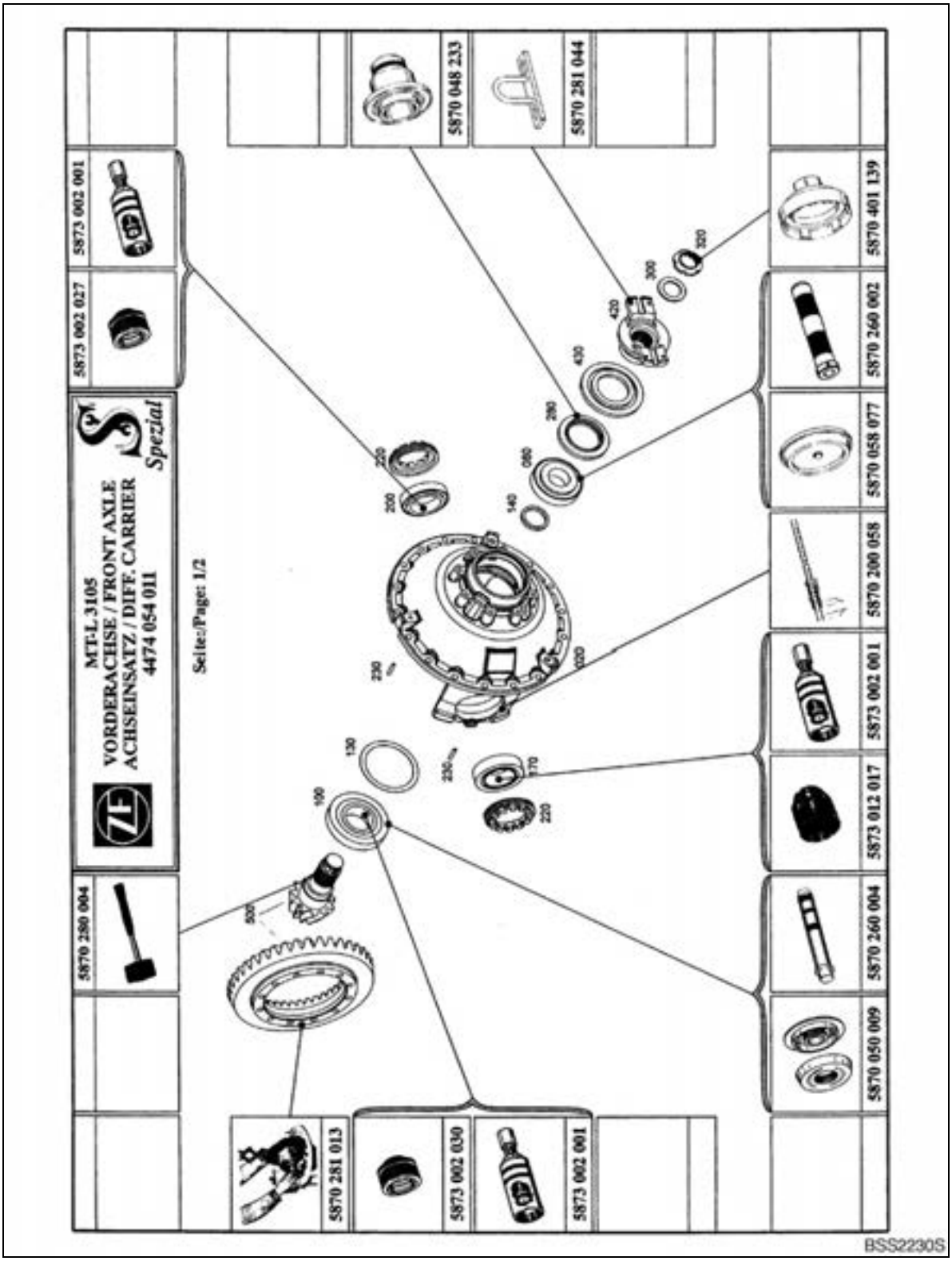
MT-L 3105
VORDERACHSE / FRONT AXLE
ACHSEINSATZ / DIFF. CARRIER
4474 054 011
Spezial
Seite:/Page: 1/2
5870 280 004
5873 002 001
5873 002 027
5870 048 233
5870 281 044
5870 401 139
5870 260 002
5870 058 077
5870 200 058
5873 002 001
5873 012 017
5870 260 004
5870 050 009
5870 251 013
5873 002 030
5873 002 001
BSS2230S

Figure 9

11. Lift planet carrier from brake housing.

    (S) Internal extractor 5870 300 019

Figure 27

12. Remove retaining ring.

    (S) Set of external pliers 5870 900 015

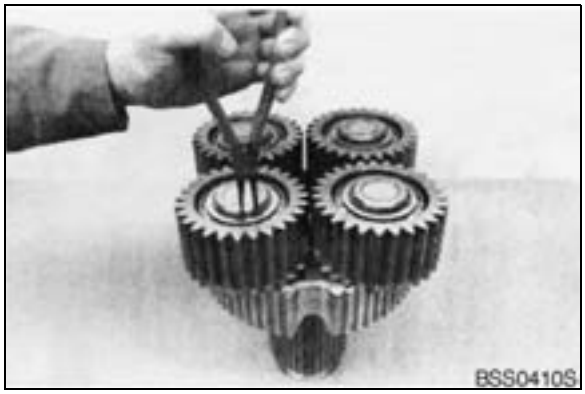

Figure 28

13. Remove planet gear and remove released inner bearing race.

    (S) Three-armed puller 5873 971 002

Figure 29

14. Remove inner bearing race.

    (S) Gripping insert 5873 001 020

    (S) Basic set 5873 001 000

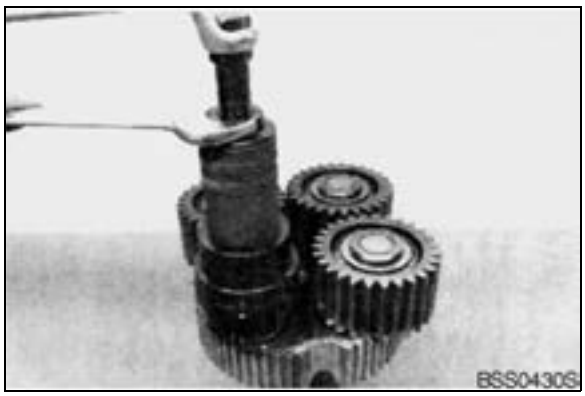

Figure 30

10. Clean annular groove of brake housing with mineral spirits.

    Then insert guide ring into annular groove (also see Figure 62) and secure with Loctite #415 at its extremities.

    NOTE: *Guide ring must have contact on whole circumference.*

    NOTE: *Upon installation orifice of guide ring must show upwards (12 o'clock).*

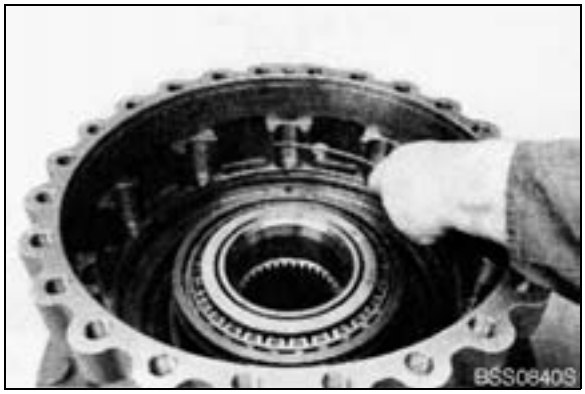

Figure 63

11. Insert piston into brake housing and install it cautiously until seated.

    NOTE: *Apply sufficiently oil on sliding surface of piston or support rings, U-rings and guide ring (use W-10 oils).*

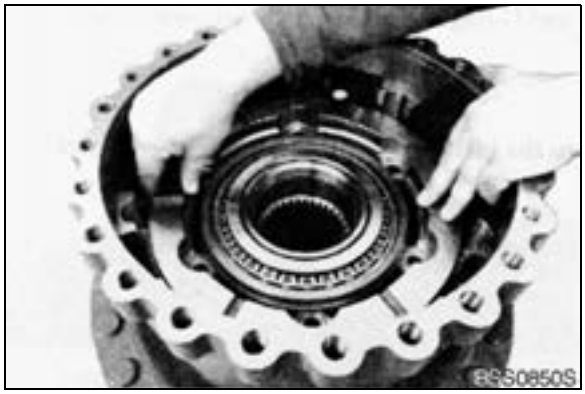

Figure 64

12. Insert pins into assembly fixture (S) until seated.

    (S) Assembly fixture 5870 345 096

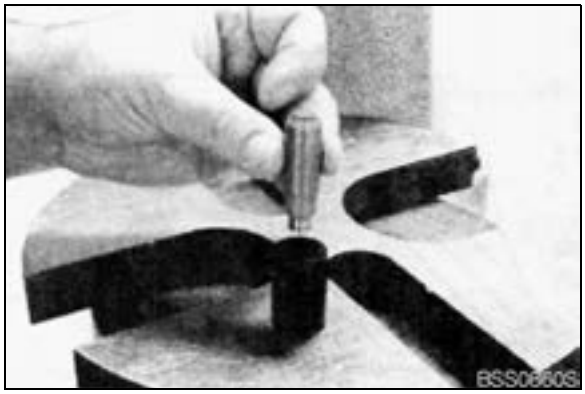

Figure 65

13. Press gripping rings (4x, see arrows) onto pins until seated on assembly fixture (S).

    NOTE: *The exact installation dimension (see Figure 68) of gripping rings is obtained when using specified assembly fixture.*

    NOTE: *Observe installation position, install gripping rings with orifices offset by 180° to each other.*

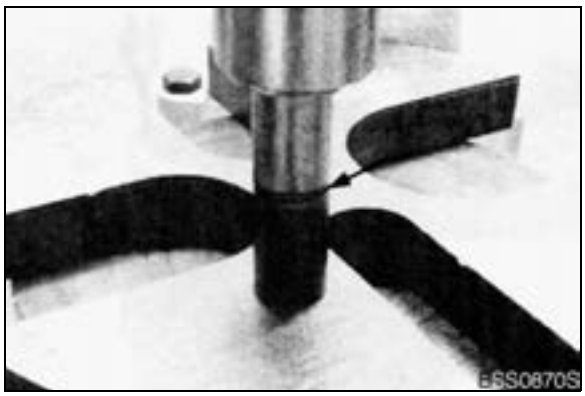

Figure 66

DISASSEMBLY OF DIFFERENTIAL CARRIER AND BRAKE TUBES

Disassembly of Differential Carrier

1. Fasten axle on assembly truck.

   (S) Assembly truck 5870 350 000

   (S) Holding fixtures 5870 350 077

   (S) Clamps 5870 350 075

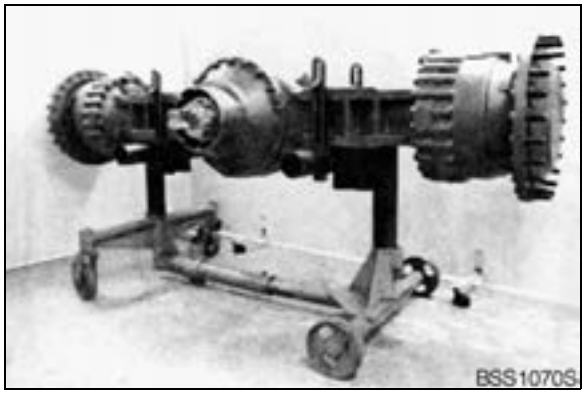

Figure 97

2. Remove plugs (3x, Figure 98, Figure 99) and drain oil from axle casing.

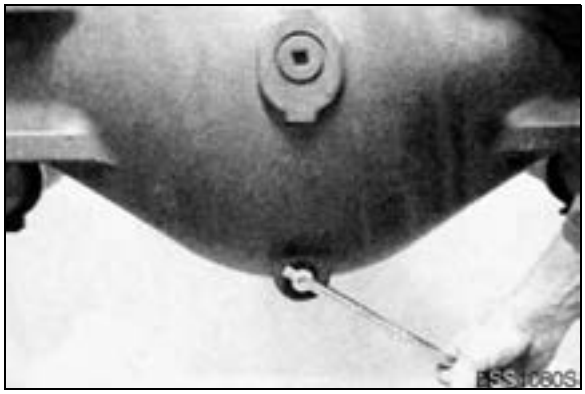

Figure 98

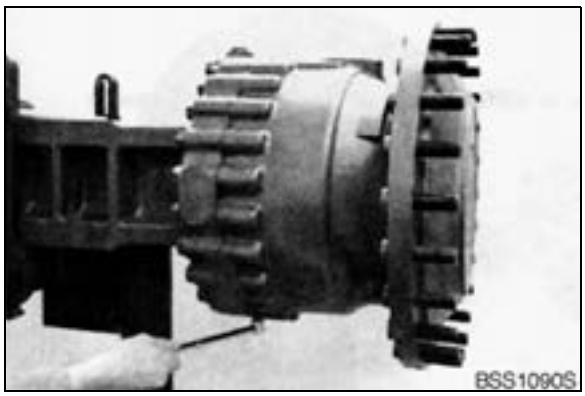

Figure 99

3. Secure output using lifting tackle (S) and remove hexagon screws.

   (S) Lifting bracket 5870 281 043

   NOTE: *Repeat steps (Figure 100 thru Figure 102) on both output sides.*

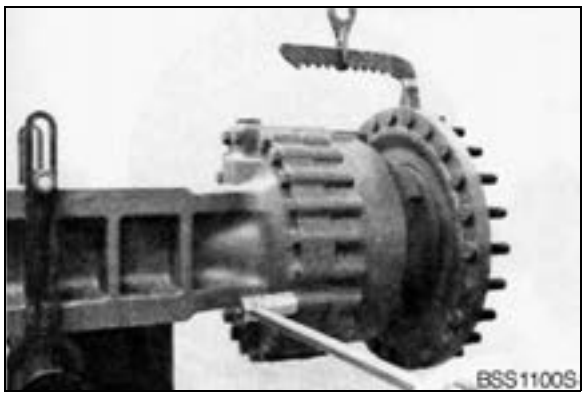

Figure 100

REASSEMBLY OF OIL PIPES AND DIFFERENTIAL CARRIER

Reassembly of Oil Pipes

1. Preassemble connection part as shown in (Figure 135).

Reference Number	Description
1	Vent valve
2	Connection part
3	O-ring
4	Rectangular ring

NOTE: *Repeat steps (Figure 135 thru Figure 150) on both output sides.*

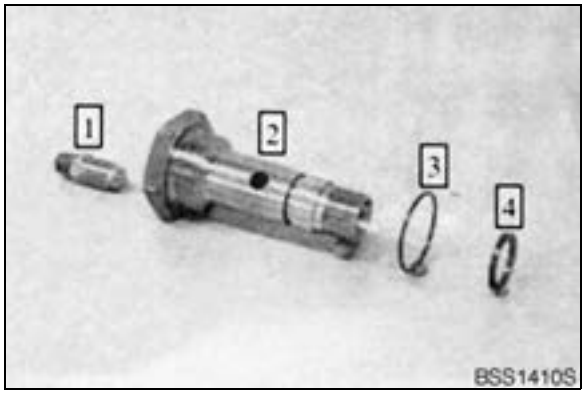

Figure 135

2. Install connection part.

   Tightening torque M_A = 13.26 kg•m (96 ft lb)

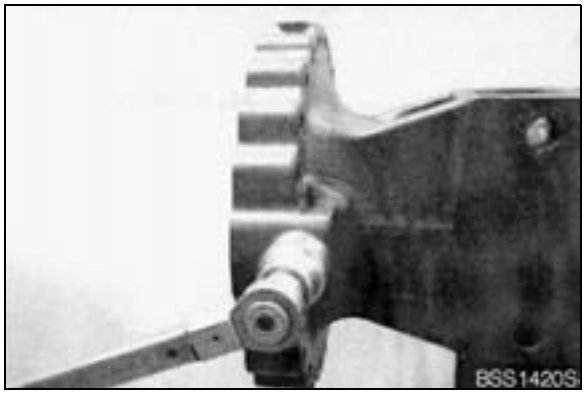

Figure 136

3. Provide union screw with new O-ring and install it.

   Tightening torque M_A = 15.30 kg•m (111 ft lb)

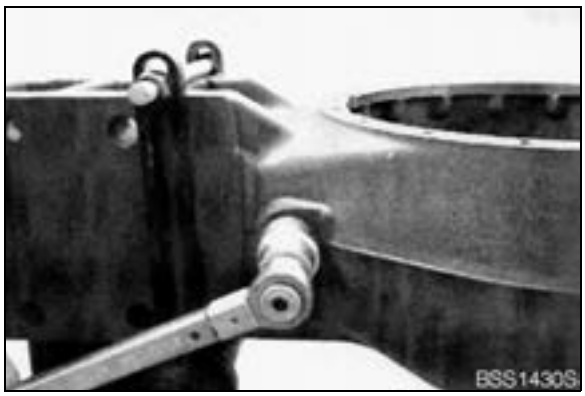

Figure 137

Reassemble of Limited Slip Differential

1. Place both thrust washers into differential housing.

   NOTE: *Before installation, all single parts of differential must be oiled according to ZF List of lubricants TE-ML 05.*

Figure 167

2. Starting with an outer clutch disk, install alternately outer and inner clutch disks.

   NOTE: *Thickness of disk pack must be identical on both sides.*

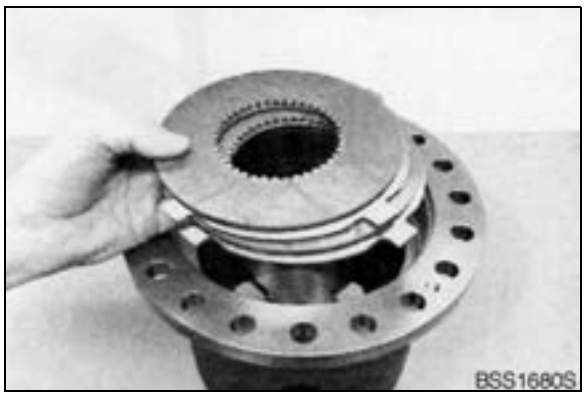

Figure 168

3. Install pressure ring.

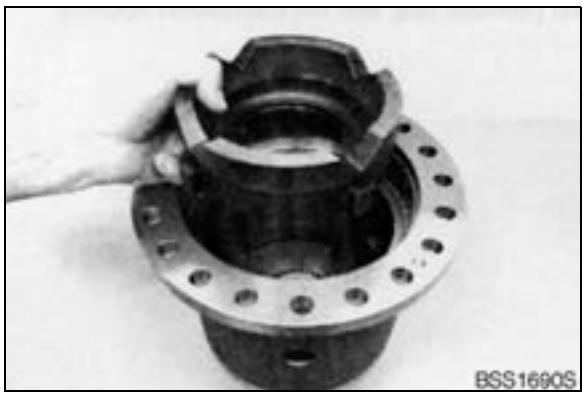

Figure 169

4. Insert axle bevel gear until seated and at same time assemble all inner clutch disks with splines.

Figure 170

2. MOUNTING AND BASIC SETTING REGULATIONS

Basic brake setting is required after mounting new brake lining plates or brake disks, and during all repair stages and in case of insufficient braking performance.

All mounting and basic setting work must be carried out on brake when cold. Proceed as follows:

1. Release the screw cap (12).
2. Release the lock nut (11) (size 24 or 30) and turn the adjusting screw (7) counterclockwise using a size 8 or 10 socket wrench until the pressure bolt (8) comes to rest against the face surface of piston (6).
3. In this status, the brake can be mounted onto brake disk and fastened.
4. Mount the pressure connection and apply necessary release pressure to the brake until the bank of cup springs (5) is completely pretensioned.
5. Turn the adjusting screw (7) manually clockwise until both brake pads (3) and (4) make contact with the brake disk (it is then no longer possible to turn the adjusting screw (7) without exerting a major amount of force).
6. Turn the adjusting screw (7) counterclockwise in order to set the following rated clearances:

Type	Adjusting screw	Clearance (mm)		Revolutions
Small	M16 (size 8)	min.	0.5	1/4
		Rated clearance	1.0	12
		max.	1.5	3/4
Large	M20 (size 10)	min.	1.0	2/5
		Rated clearance	2.0	4/5
		max.	3.0	1 1/5

7. Hold the adjusting screw in position (7) with a hexagonal socket wrench and lock with lock nut (11).
8. Mount the screw cap (12) and tighten as far as possible manually.
9. Mount the pressure connection in accordance with the instructions of axle/gear manufacturer and bleed the piston chamber using bleeding valve (19).

3. ADJUSTING REGULATIONS

During this adjusting process, the parking brake must be released; i.e. the bank of cup springs (5) must be completely pretensioned.

1. Stand the vehicle on an even surface and secure against rolling away. Only then, release the parking brake.
2. Release the screw cap (12) and unscrew.
3. Release the lock nut (11) (size 24 or 30) and turn the adjusting screw (7) with socket wrench size 8 or 10 manually clockwise until the two brake pads (3) and (4) make contact with the brake disk.
4. Turn the adjusting screw (7) counterclockwise and set the clearance specified in the above table.
5. Hold the adjusting screw (7) in position with the hexagonal socket wrench and lock with the lock nut (11).
6. Mount the screw cap (12) and tighten as far as possible manually.
7. Actuate the brake valve several times and check the braking efficiency of parking brake on a slope.

Reference Number	Description
1	Front Axle
2	Rear Axle
3	Axle Support (Front)
4	Axle Support (Rear)
5	Packing

Reference Number	Description
6	Bushing
7	Thrust Plate
8	Thrust Cap
9	Thrust Washer

NOTE: *1) 28 kg•m (203 ft lb) Threaded area: Loctite #262*

NOTE: *2) 170 kg•m (1230 ft lb)*

NOTE: *3) 170 kg•m (1230 ft lb)*

NOTE: *4) Inner surface: Grease (Assemble with chamfered surface toward axle.)*

NOTE: *5) Assemble with lip pointing outward.*

NOTE: *6) Assemble with groove pointing toward plate (7).*

NOTE: *7) Apply grease and assemble.*

NOTE: *8) Tightening Torque: 80 ±8 kg•m (580 ±58 ft lb) (Bolt: 20 - M22x1.5)*

NOTE: *9) Tightening Torque: 80 ±8 kg•m (580 ±58 ft lb) (Bolt: 20 - M22x1.5)*

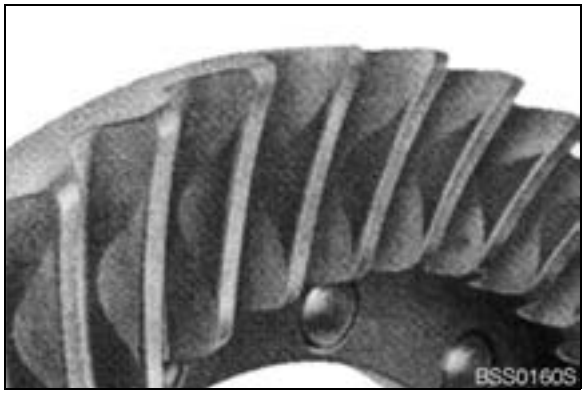

Figure 8

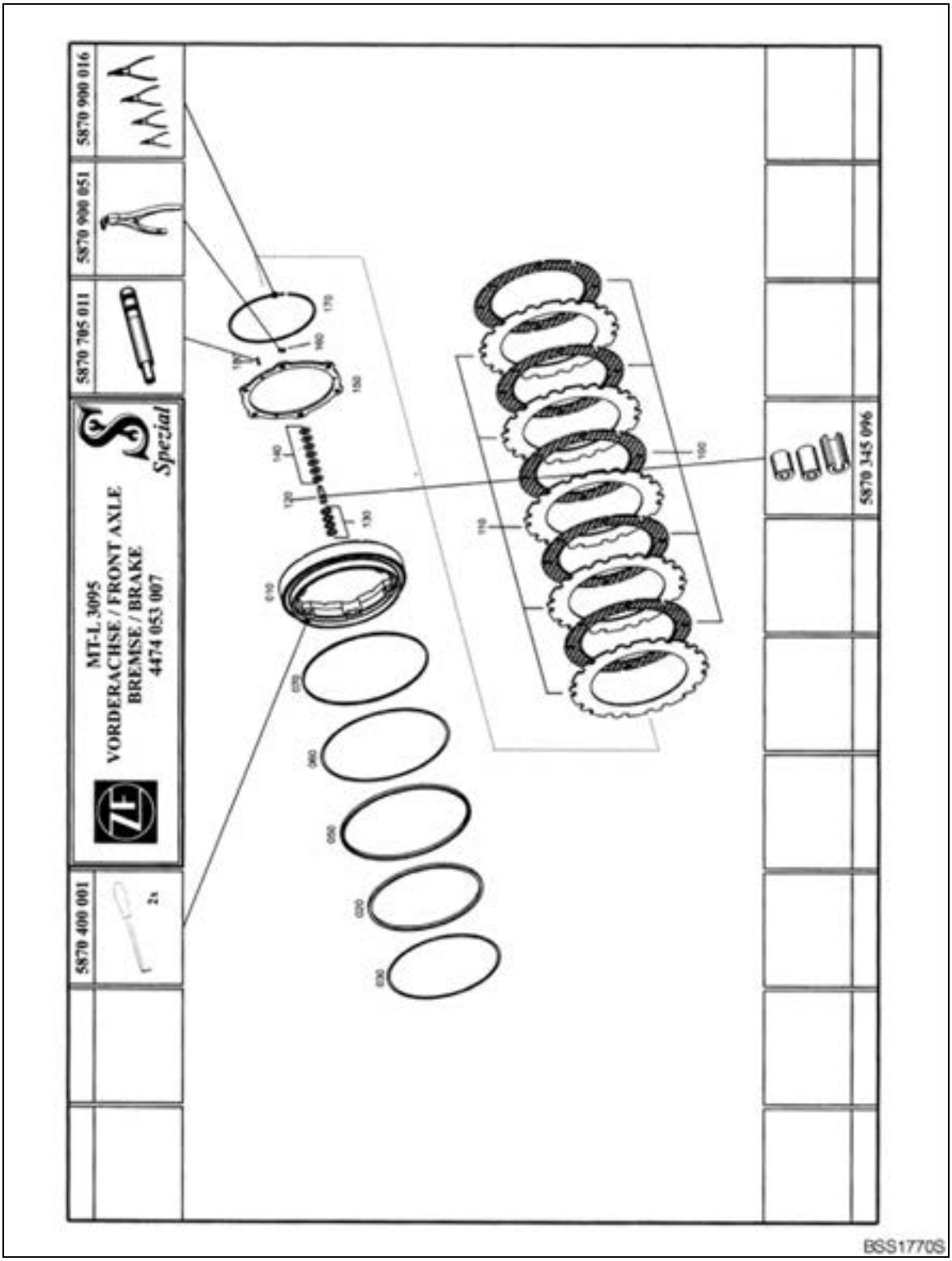
5870 900 016
5870 900 051
5870 705 011
MT-L 3095
VORDERACHSE / FRONT AXLE
BREMSE / BRAKE
4474 053 007
Spezial
5870 345 096
5870 400 001
BSS1770S

Figure 15

33. Remove inner bearing race from output shaft.

    (S) Rapid grip 5873 014 013

    (S) Basic set 5873 004 001

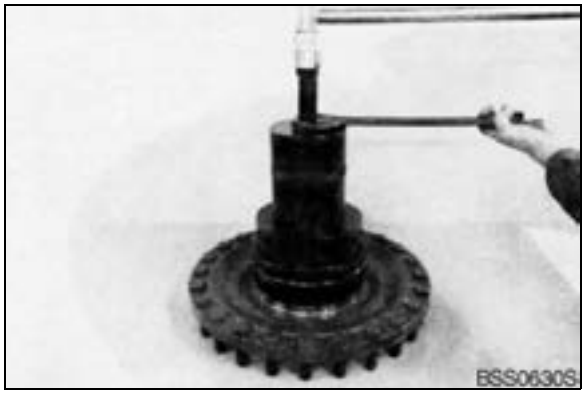

Figure 50

34. Press off bearing sheet from output shaft.

    (S) Pry bar set 5870 345 065

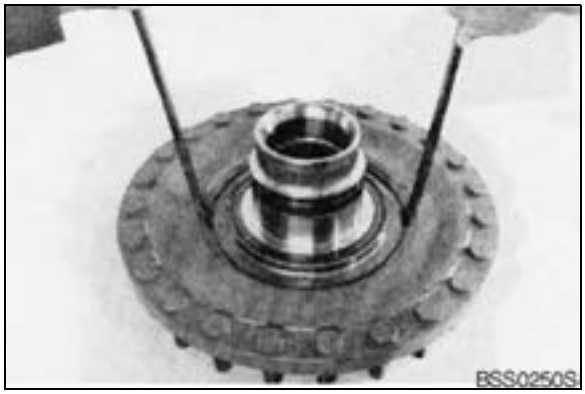

Figure 51

31. Assemble sun gear shaft until seated.

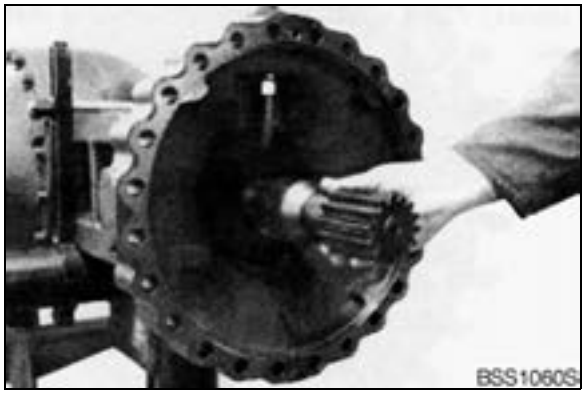

Figure 86

32. Determine Dimension II from face of sun gear shaft up to mounting face of axle casing.

    Dimension II, e.g. 43.00 mm

    (S) Digital depth gauge 5870 200 072

    (S) Gauge blocks 5870 200 066

    (S) Straightedge 5870 200 022

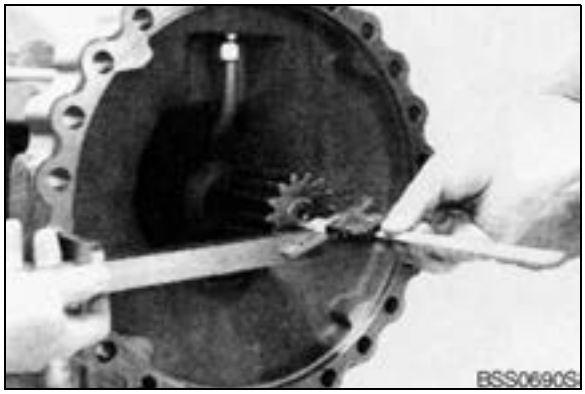

Figure 87

EXAMPLE

Dimension I		46.20 mm (1.8189 in)
Dimension II	-	43.00 mm (1.6929 in)
Difference		3.20 mm (0.1260 in)
required end play, e.g.	-	1.00 mm (0.0394 in)
Difference = shim, e.g.	=	2.20 mm (0.0866 in)

33. Insert sun gear shaft into planet carrier.

Figure 88

4. Remove shaft seal from axle drive housing.

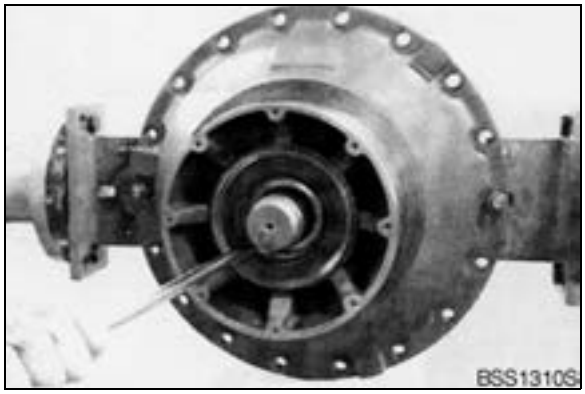

Figure 121

5. Press drive pinion from axle drive housing using two-armed puller (S) and remove released inner bearing race.

   (S) Two-armed puller 5870 970 007

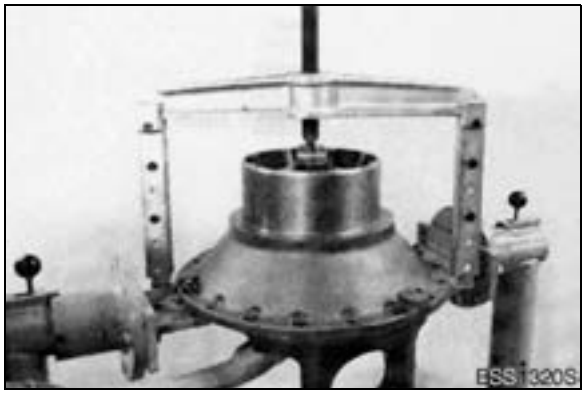

Figure 122

6. Remove spacer ring and pull inner bearing race from drive pinion.

   (S) Gripping insert 5873 002 032

   (S) Basic set 5873 002 001

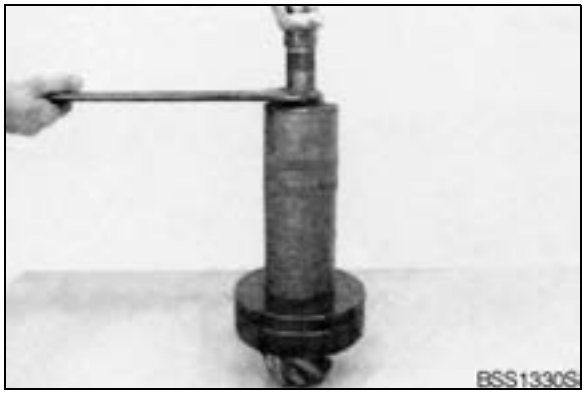

Figure 123

7. If necessary, remove both outer bearing races from axle drive housing.

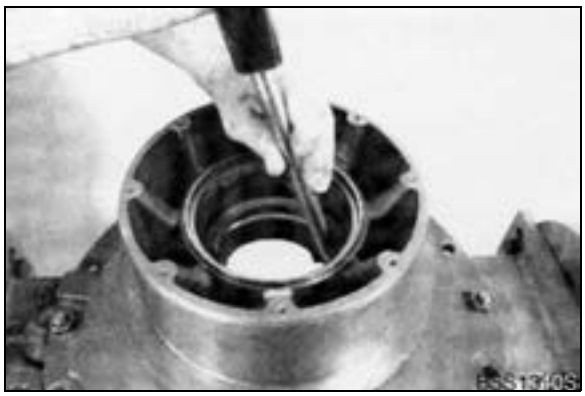

Figure 124

11. Check rolling moment (1.5 ~ 3.0 Nm).

    NOTE: *For new bearings, it should be tried to achieve maximum value of rolling moment.*

    NOTE: *If required rolling moment is not obtained, correct it with an adequate spacer ring (Figure 148), according to following indications:*

    Rolling moment too low - install a thinner spacer ring

    Rolling moment too high - install a thicker spacer ring.

    Then loosen slotted nut again and pull input flange from drive pinion.

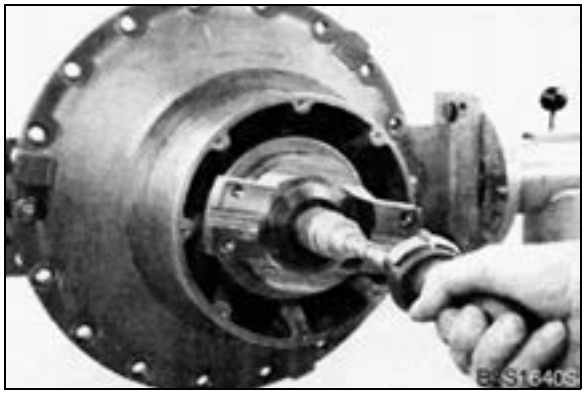

Figure 154

12. Install shaft seal with sealing lip showing to oil chamber (downwards).

    (S) Driver 5870 048 233

    NOTE: *The exact installation position of shaft seal will be obtained by using exact driver (S).*

    NOTE: *Just before installation, wet outer diameter of shaft seal with mineral spirits. and fill space between sealing and dust lip with grease.*

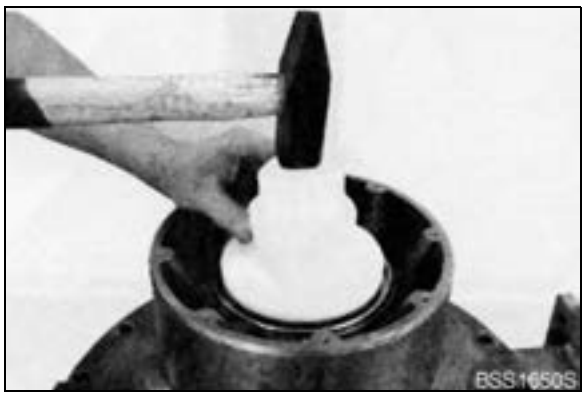

Figure 155

13. Assemble input flange and finally fasten in using washer and slotted nut.

    Tightening torque M_A = 122.37 kg•m (885 ft lb)

    NOTE: *Apply Loctite #262 onto thread of slotted nut.*

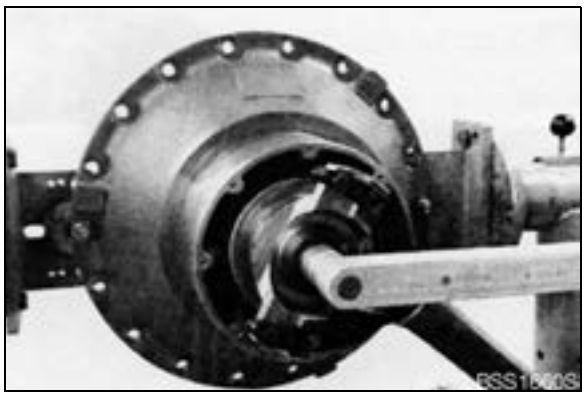

Figure 156

AIR CONDITIONER

⚠ 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 is 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-V (Tier I & II)	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 and Up
Mega 400-V	1001 and Up
Mega 500-V	1001 thru 2000
Mega 500-V (Tier II)	2001 and Up

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Defroster

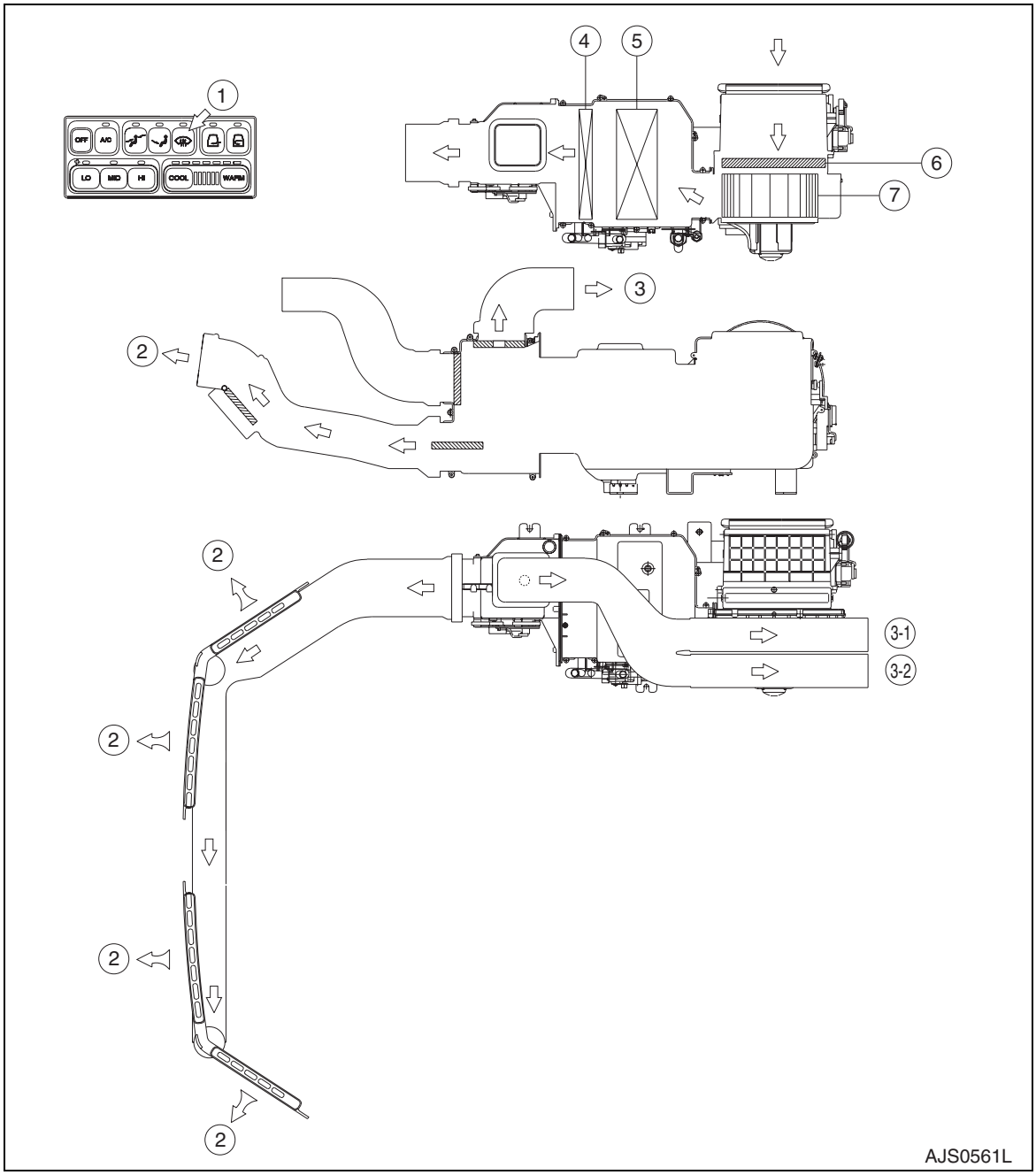

Figure 11

Reference Number	Description
1	Selector Switch
2	Defroster Vent
3	Rear Vent
3-1	Rear Vent (R)
3-2	Rear Vent (L)

Reference Number	Description
4	Heater Core
5	Evaporator Core
6	Air Filter
7	Blower Motor

5. The new refrigerant oil (PAG type) has a high moisture absorption characteristic. When the refrigerant system vacuum seal has been broken, immediately plug up all openings to prevent moisture from entering into the system.
6. When joining unions which use O-ring seals, lightly coat O-rings with refrigerant oil. Be careful not to drip oil on the threads of the nut.
7. Be certain the O-rings are seated properly on the refrigerant line lip. Always use new O-rings when reassembling parts. Do not reuse old O-rings.
8. Use a vacuum pump to evacuate refrigerant system of air.
9. When charging the refrigerant system with the engine running, do not open the high-pressure valve on the manifold gauge as the reverse flow of high-pressure refrigerant will rupture the hose.
10. When releasing the high-pressure hose after completing the charging process, quickly disconnect the hose to minimize refrigerant released to the air.

REPAIR AND REPLACEMENT PROCEDURE

1. Work Procedure.
   A. Before repairing or replacing any refrigerant components first, return all refrigerant oil to the compressor and perform recovery procedures.
2. Operating Condition.
   A. Run engine at maximum engine speed.
   B. Select "HI" blower fan speed and select A/C switch to "ON."
   C. Set the temperature control switch for maximum cooling and leave running for approximately 20 minutes.

   NOTE: *The manifold gauge dial pointer can vary depending on the outdoor temperatures.*

TRANSMISSION ELECTRIC COMPONENTS

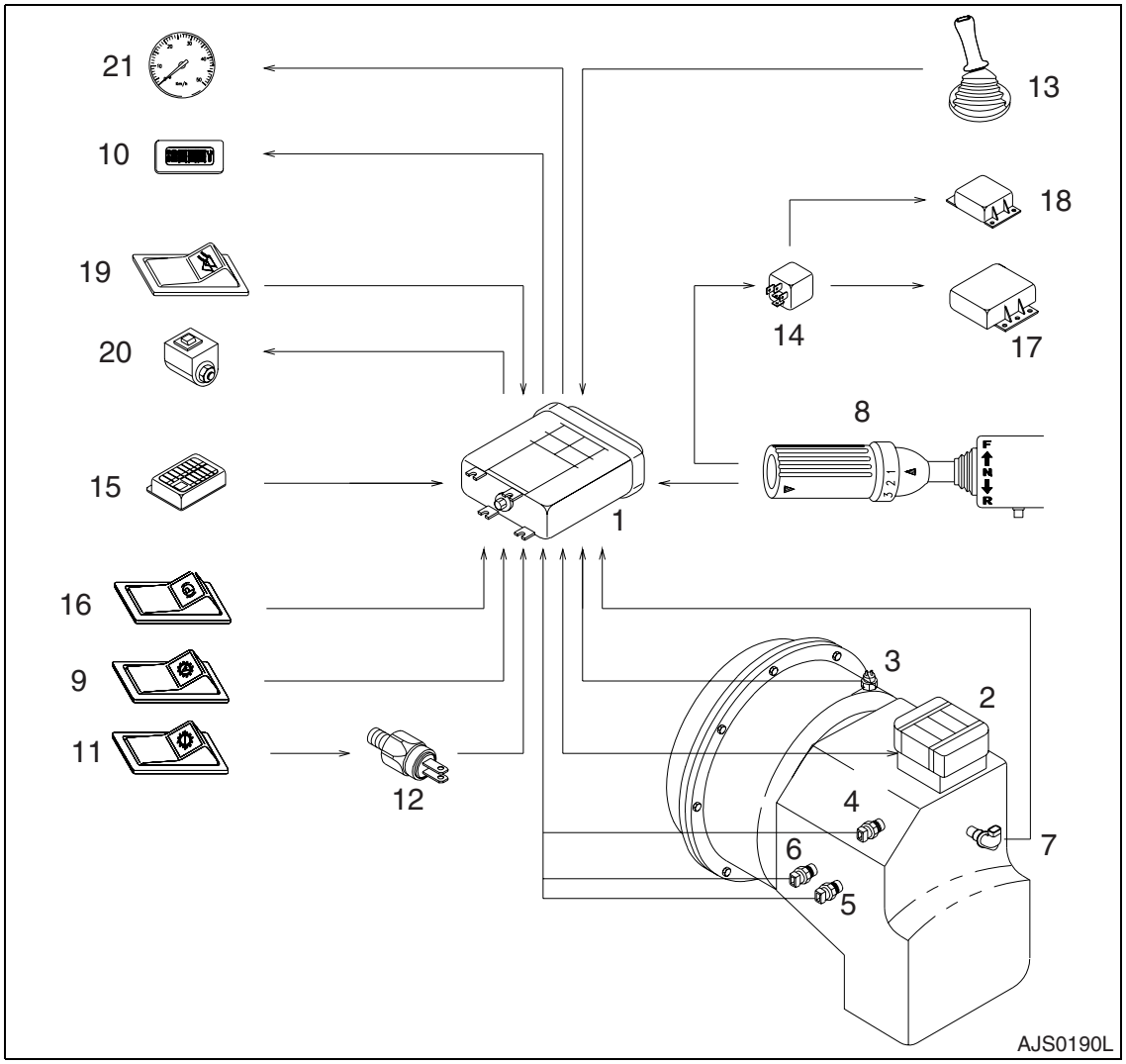

Figure 5

Reference Number	Description
1	T/M Controller
2	T/M Control Valve
3	T/M Oil Temperature Sensor
4	Engine Pickup Sensor
5	Central Gear Pickup Sensor
6	Turbine Pickup Sensor
7	Output Speed Sensor
8	Shift Lever Switch
9	Auto Selector Switch
10	Display
11	T/M Cutoff Switch

Reference Number	Description
12	T/M Cutoff Pressure Switch
13	Downshift Switch
14	Safety Starter Switch
15	Fuse Box
16	Parking Brake Switch
17	Control Unit
18	Starter Controller
19	LIS (Load Isolation System) Switch (Option)
20	LIS Solenoid Valve
21	Speedometer

Neutral

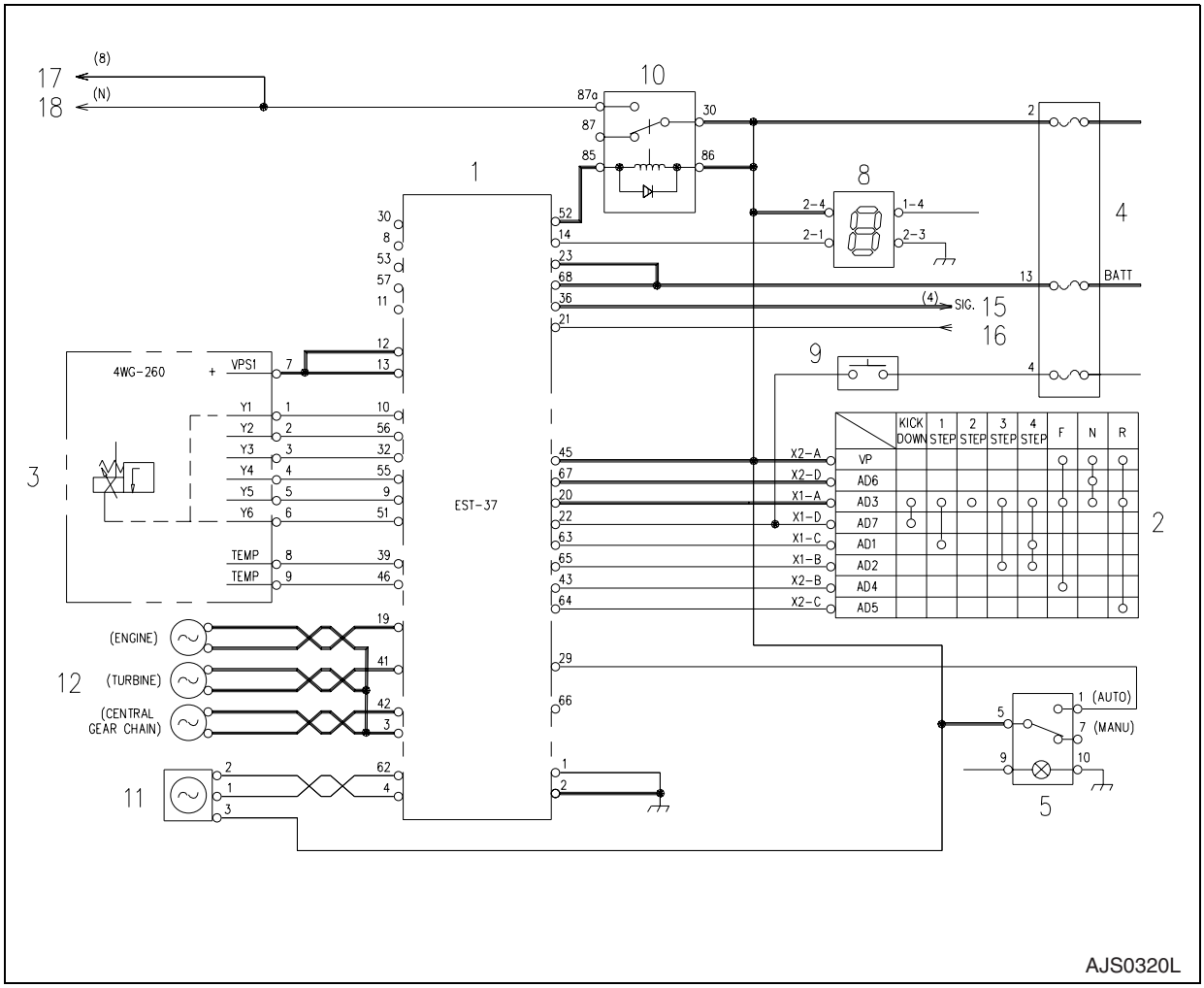

Figure 22

When all transmission solenoid valves are de-energized (OFF) the transmission is in "NEUTRAL."

Downshift (Auto Selector Switch "I" - Auto Mode)

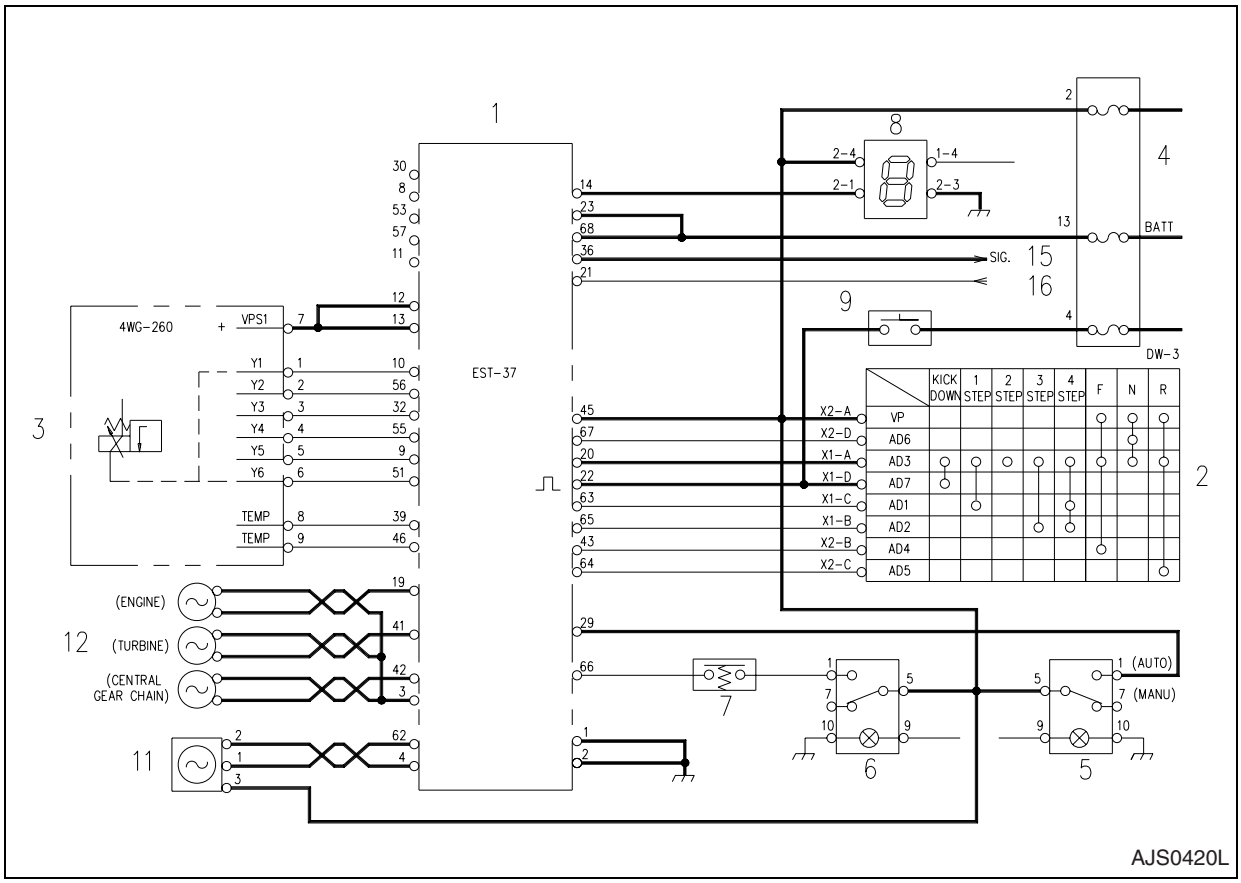

Figure 33

When the auto selector switch (Figure 33) is in the "I" position, the "29" terminal of transmission controller is energized. This allows the transmission to automatically upshift and downshift gears depending on the load and on the engine speed.

If either downshift switch (Figure 30) is activated, a pulse signal is sent to the "22" terminal of transmission controller. This signal shifts the transmission to the next lowest gear.

Automatic Gear Selection	Downshift Switch "Activated"
Fourth Gear	Downshift to Third Gear
Third Gear	Downshift to Second Gear
Second Gear	Downshift to First Gear
First Gear	Remains in First Gear

When either downshift (Figure 30) is depressed a second time, the transmission pulse signal of the "22" is interrupted and the transmission returns to normal operation.

NOTE: *The fourth to the third gear changes without any rpm change when the downshift switch is pressed.*

NOTE: *The third to the second gear, and the third to the first gear, changes occur when the rpm is reduced 200 - 300 rpm from current setting.*

2. Mark installation position of different covers, housing and cable harness with valve housing.

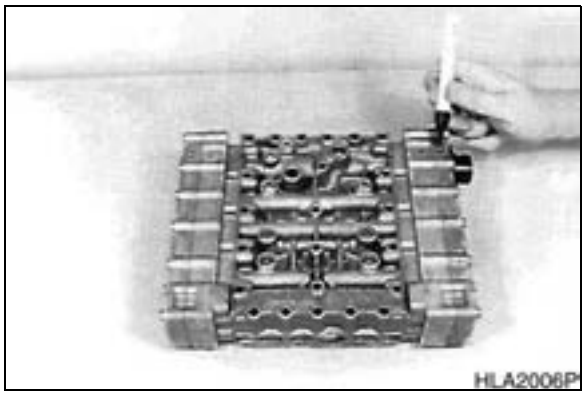

Figure 45

3. Loosen socket head screws.
4. Separate duct plate, 1st gasket, intermediate plate and 2nd gasket from valve housing.

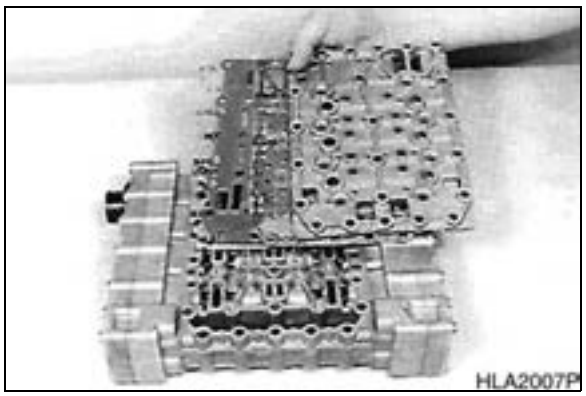

Figure 46

5. Remove retaining clip.

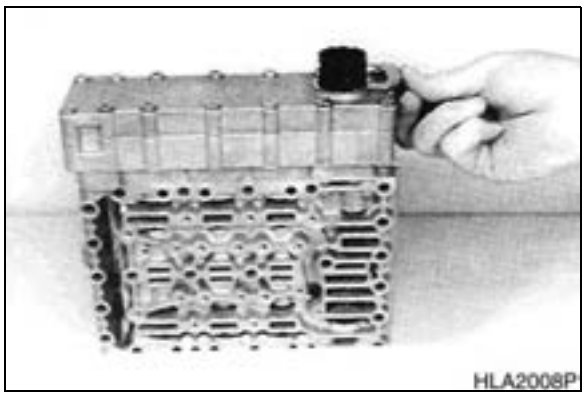

Figure 47

6. Loosen socket head screws.
7. Separate cover from housing and cable harness.

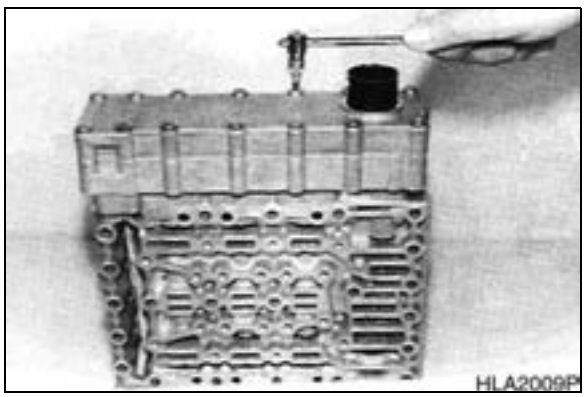

Figure 48

2. Loosen screw connection.
3. Separate bearing cover from converter bell, using three jacking screws.

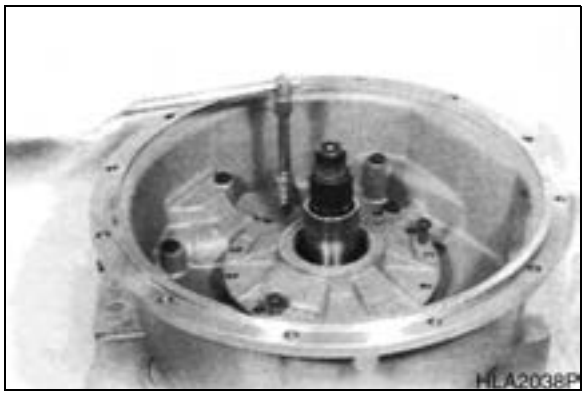

Figure 77

4. Pull oil feed flange out of converter bell, using special device (S).

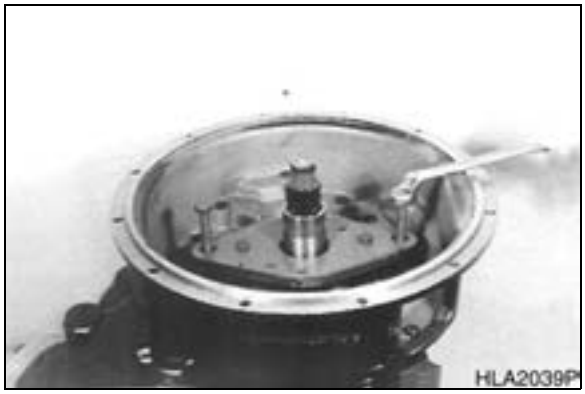

Figure 78

5. Remove converter safety valve (composed of ball, spring and disk.).

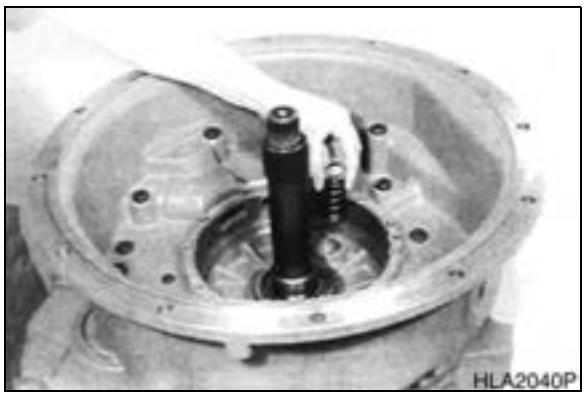

Figure 79

6. Separate converter bell from gearbox housing, using lifting device and pry bar.

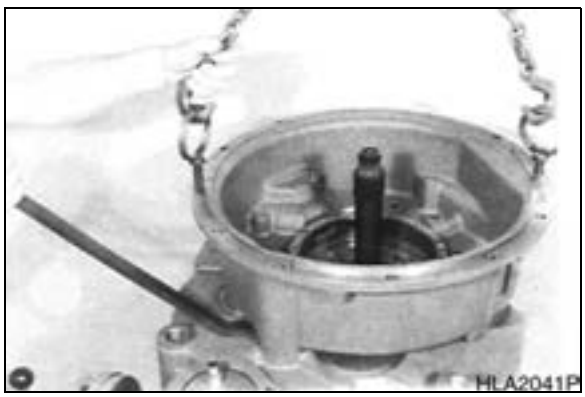

Figure 80

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DISASSEMBLE POWER TAKE-OFF II

1. Remove retaining ring and remove shim(s).

Figure 117

2. Pull PTO shaft using internal puller out of housing bore until outer bearing race is released.

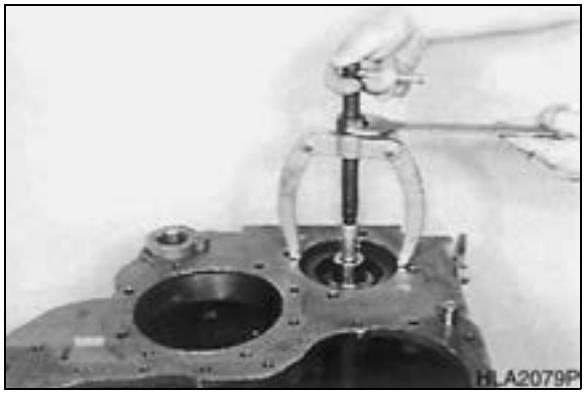

Figure 118

3. Take shaft out of housing.

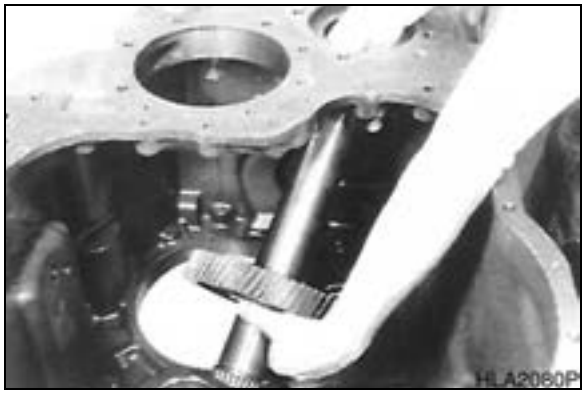

Figure 119

4. Pull inner bearing race from shaft (Figure 120).
5. Press opposite inner bearing race from shaft.

   NOTE: *Separation of shaft and gear is not possible.*

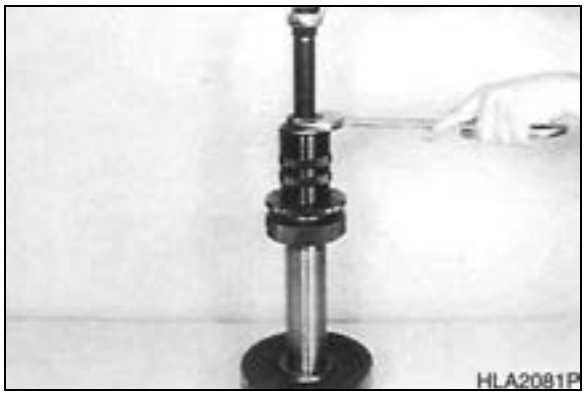

Figure 120

TRANSMISSION REASSEMBLY

POWER TAKE-OFF II

1. Cool shaft down (about 80°C (176°F)) and heat gear (about 120°C (248°F)) and assemble, resp. press it against shoulder.

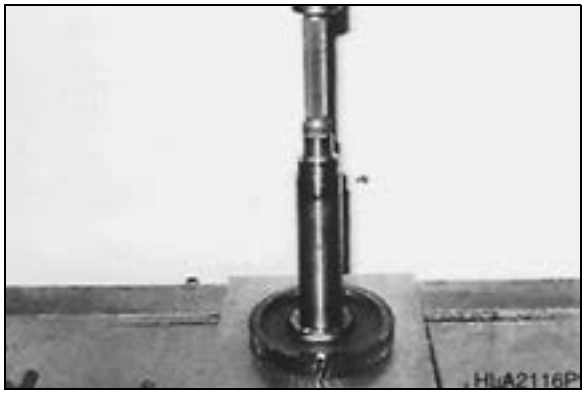

Figure 155

2. Press inner bearing race against shoulder. Press opposite inner bearing race against shoulder until contract is obtained.

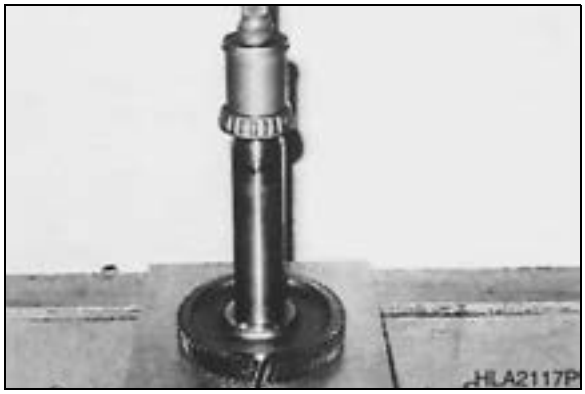

Figure 156

3. Insert outer bearing race (Figure 157) into housing bore until seated.

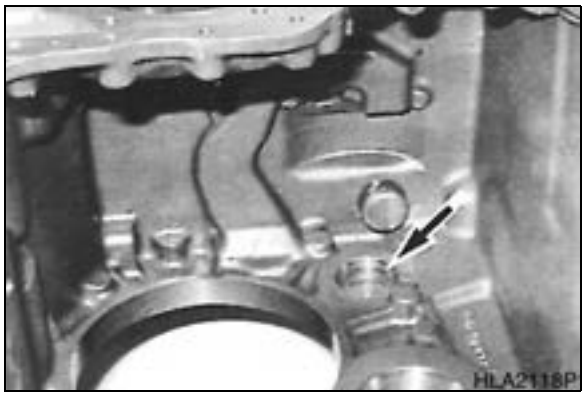

Figure 157

3. Spur gear K4

IMPORTANT

The following steps (Figure 182 thru Figure 185) are describing reassembly of spur gear bearing-K4. Version with ball bearing.

At the version with the tapered roller bearing, the reassembly has to be carried out accordingly as at spur gear KR. In this connection pay attention to steps of Figure 193 thru Figure 203.

4. Heat ball bearing and assemble it until seated. See Figure 182.

   NOTE: *Before install the spur gear (Figure 183), cool ball bearing.*

5. Mount Oil feed ring (Figure 183).

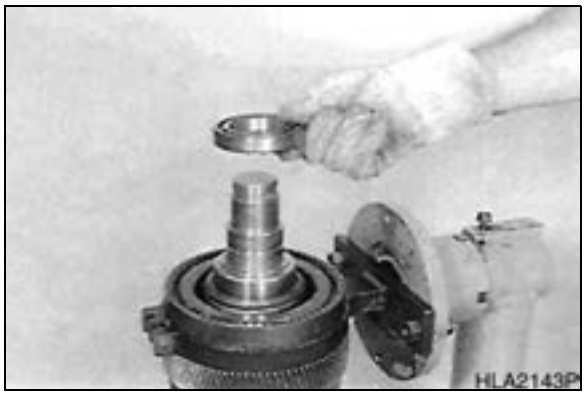

Figure 182

Figure 183

IMPORTANT

Carry out steps of Figure 184 and Figure 185 in immediate sequence, to prevent a cooling down of the components. Heat bearing bore of the spur gear (Figure 184) and ball bearing (Figure 185) to about 120°C.

6. Install heated spur until all inner plates are accommodated.

Figure 184

13. Heat inner bearing race (clutch bearing) and place it against shoulder.

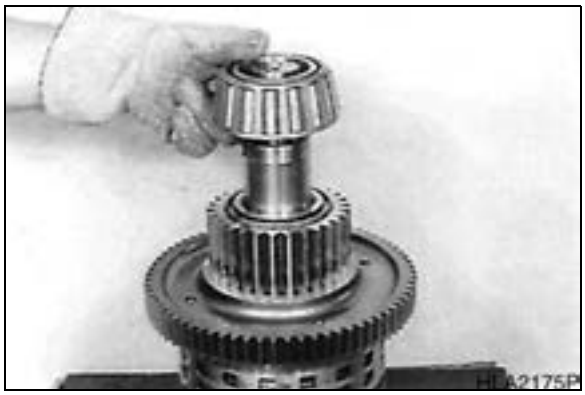

Figure 214

14. Preload complete clutch pack through both inner bearing races (Figure 215) with 100,000 N (10 ton) In this way, an exact contact of components, resp. the setting of the complete bearing is ensure.

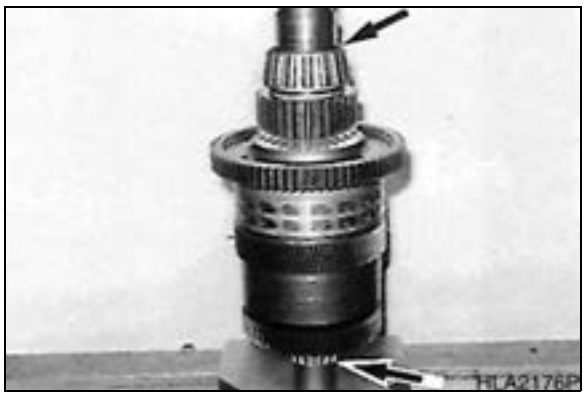

Figure 215

15. Install and tighten both slotted nuts.

    NOTE: *Torque limit 82 kg•m (590 ft lb).*

    NOTE: *Pay attention to installation position of slotted nuts chamfer is always facing inner bearing race. Secure slotted nuts with Loctite #262.*

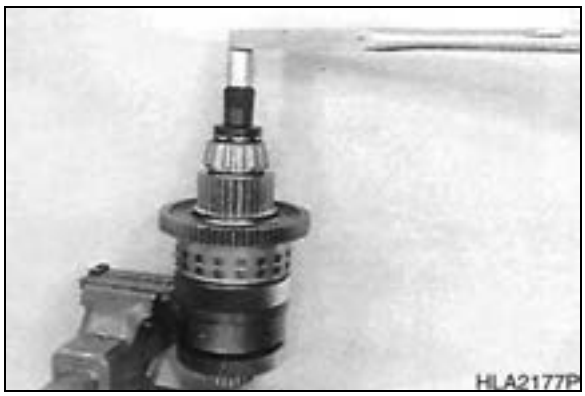

Figure 216

4. Install roll pin.

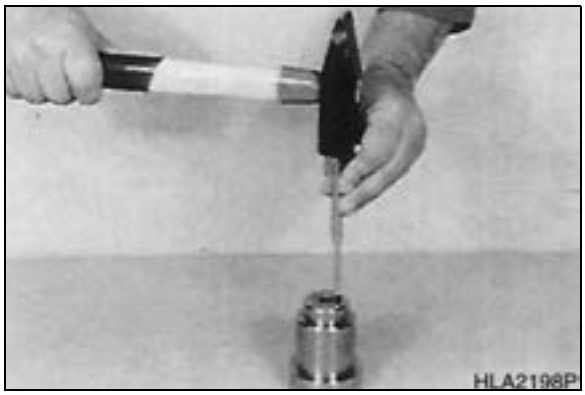

Figure 248

5. Adjust axial play of layshaft gear bearing = 0.00 - 0.05 mm (0.0000 - 0.0020 in).

6. (Figure 249, EXAMPLE D):

   A. Determine Dimension I, see Figure 249.

   NOTE: *Dimension I, e.g. 57.10 mm (2.2480 in).*

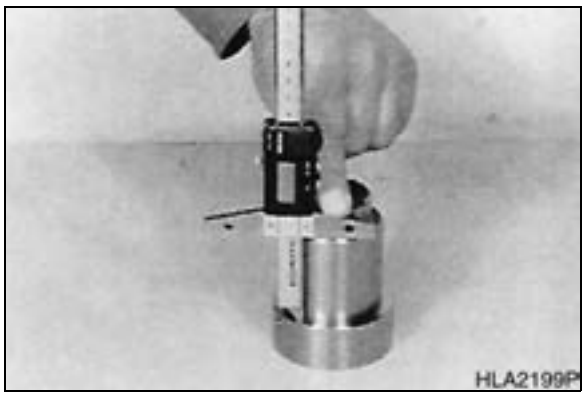

Figure 249

   B. Install both inner bearing races and determine Dimension I: (total height of layshaft bearing).

   NOTE: *Dimension II, e.g. 53.95 mm (2.1240 in).*

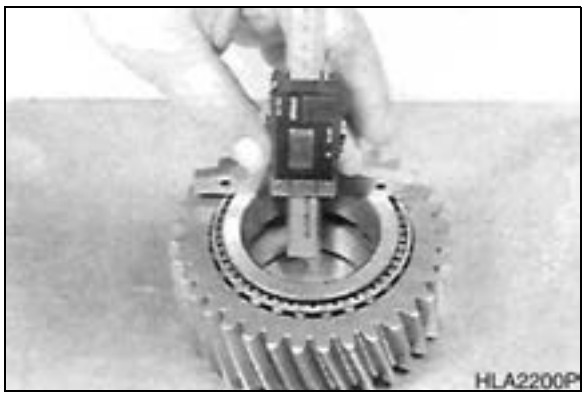

Figure 250

35. Install rectangular rings (3 pieces, see Figure 282) and engage them. Now, grease rectangular rings and align them centrically.

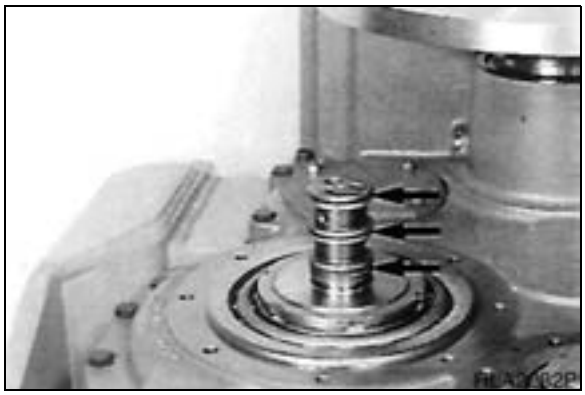

Figure 282

36. Pull cover using hex. head screws uniformly against shoulder.

    NOTE: *Torque limit (M10/8.8) 4.69 kg•m (33.93 ft lb).*

37. Mount bearing cover KR/K2 accordingly.

    NOTE: *Bearing preload KR/K2 = 0.02 - 0.25 mm (0.0008 - 0.0098 in).*

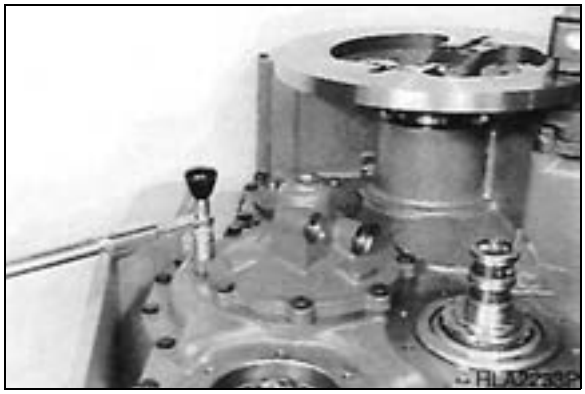

Figure 283

38. Close both bores of bearing cover KV/K1 using slotted plug.

    NOTE: *Insert slotted plug with Loctite #262.*

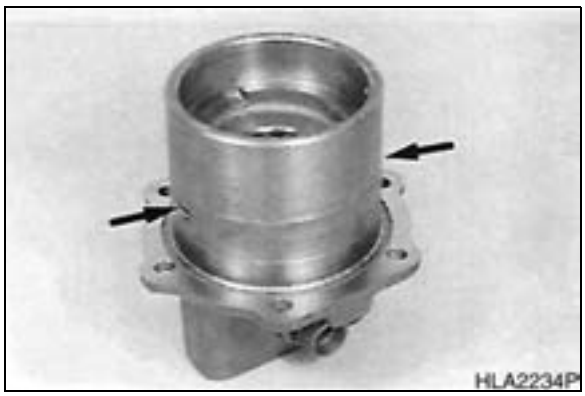

Figure 284

39. Adjust bearing preload clutch KV/K1 = 0.15 - 0.20 mm (0.0059 - 0.0079 in) (Figure 285, EXAMPLE G).

    A. Install outer bearing race.

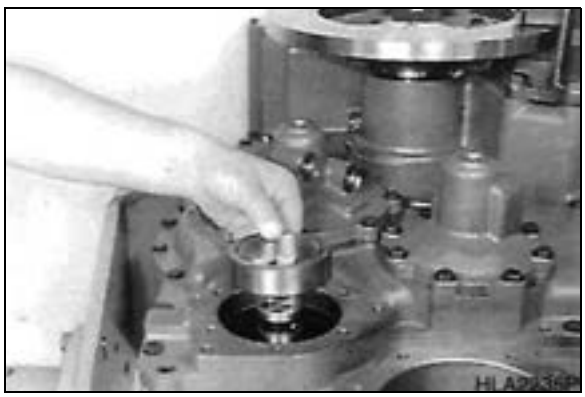

Figure 285

INPUT - CONVERTER

1. Insert outer bearing race into housing bore until seated and install bearing race, see Figure 320.

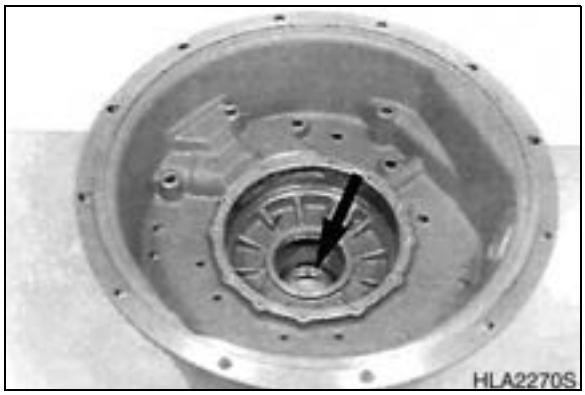

Figure 320

2. Install spur gear (Figure 321) starting from side, with long collar showing, and position it.

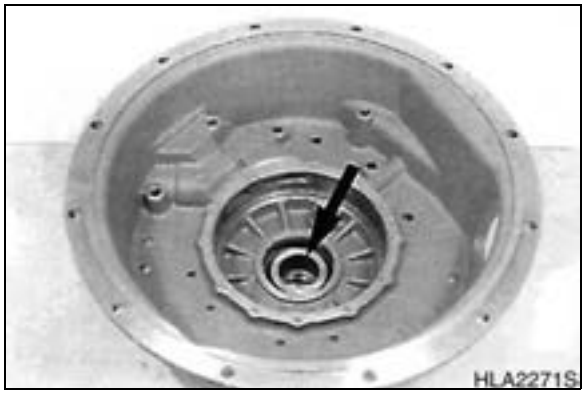

Figure 321

3. Insert both roll pins (Ø 2.50 mm (0.0984 in) and Ø 1.50 mm (0.0591 in)) flush mounted into bore (Figure 322) of drive shaft.

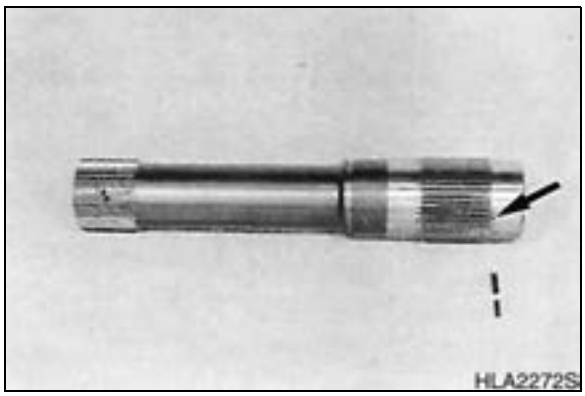

Figure 322

4. Cool down drive shaft and install it until seated.

Figure 323

Symbol	Meaning	Remarks
WE	Warning high engine speed.	Changes between actual gear/direction while driving, in neutral only displayed if no fault is detected (spanner).
PN	Direction F or R selected while parking brake engaged.	Transmission in neutral until parking brake is released. **CAUTION**: Vehicle starts to move after release of parking brake.
F or R flashing	Direction F or R selected while turbine speed is to high. **CAUTION:** Gear will engage if turbine speed drops.	----------
EE flashing	No communication with display.	Checked wiring from TCU to display.

Fault Code (hex)	Meaning of the Fault Code (Possible reason for fault detection.)	Reaction of the TCU	Possible Steps to Repair	Remarks
3C	Logical error at output speed input. TCU measures a output speed over a threshold and at the next moment the measured speed is zero. • Cable / connector is defective and has bad contact. • Speed sensor has an internal defect. • Sensor gap is incorrect.	Special mode for gear selection. Op-Mode: substitute clutch control. If a failure is existing at turbine speed. TCU shifts to neutral. Op-Mode: limp home.	Check cable from TCU to sensor. Check connectors. Check speed sensor. Check sensor gap.	This fault is reset after power up of TCU.
3E	Output speed zero doesn't fit to other speed signals. If transmission is not neutral and the shifting has finished. TCU measures output speed zero and turbine speed or internal speed not equal to zero. • Speed sensor has an internal defect. • Sensor gap is incorrect.	Special mode for gear selection. Op-Mode: substitute clutch control. If a failure is existing at turbine speed. TCU shifts to neutral. Op-Mode: limp home.	Check sensor signal of output speed sensor. Check sensor gap of output speed sensor. Check cable from TCU to sensor.	This fault is reset after power up of TCU.
71	S.C. to battery voltage at clutch K1. The measured resistance value of valve is out of limit, voltage at K1 valve is too high. • Cable / connector is defective and has contact to battery voltage. • Cable / connector is defective and has contact to another regulator output of TCU. • Regulator has an internal defect.	TCU shifts to neutral. Op-Mode: limp home. If failure at another clutch is pending. TCU shifts to neutral. Op-Mode: TCU shut down.	Check cable from TCU to gearbox. Check connectors from TCU to gearbox. Check regulator resistance. [1)] Check internal wire harness of gearbox.	[1)] See “Measurement of Resistance at Actuator/sensors and Cable” on page 35.

* Only Mega 400-III PLUS
** Only Series "V"
Gray shaded boxes are error codes for other applications. They are only given for general reference purposes.

Fault Code (hex)	Meaning of the Fault Code (Possible reason for fault detection.)	Reaction of the TCU	Possible Steps to Repair	Remarks
B4	Slippage at clutch K4. TCU calculates a differential speed at closed clutch K4. If this calculated value is out of range, TCU interprets this as slipping clutch. • Low-pressure at clutch K4. • Low main pressure. • Wrong signal at internal speed sensor. • Wrong signal at turbine speed sensor. • Sensor gap is incorrect. • Clutch is defective.	TCU shifts to neutral. Op-Mode: limp home. If failure at another clutch is pending. TCU shifts to neutral. Op-Mode: TCU shut down.	Check pressure at clutch K4. Check main pressure in system. Check sensor gap at internal speed sensor. Check sensor gap at turbine speed sensor. Check signal at internal speed sensor. Check signal at turbine speed sensor. Replace clutch.	----------
B5	Slippage at clutch KV. TCU calculates a differential speed at closed clutch KV. If this calculated value is out of range, TCU interprets this as slipping clutch. • Low-pressure at clutch KV. • Low main pressure. • Wrong signal at internal speed sensor. • Wrong signal at turbine speed sensor. • Sensor gap is incorrect. • Clutch is defective.	TCU shifts to neutral. Op-Mode: limp home. If failure at another clutch is pending. TCU shifts to neutral. Op-Mode: TCU shut down.	Check pressure at clutch KV. Check main pressure in system. Check sensor gap at internal speed sensor. Check sensor gap at turbine speed sensor. Check signal at internal speed sensor. Check signal at turbine speed sensor. Replace clutch.	----------

* Only Mega 400-III PLUS
** Only Series "V"
Gray shaded boxes are error codes for other applications. They are only given for general reference purposes.

HYDRAULICS

CYLINDERS

⚠ 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 is 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 250-V (Tier I)	1001 thru 2000
Mega 300-V (Tier I)	1001 and 2000
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

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DISASSEMBLY

NOTE: *Keep on hand a container large enough to hold all of the oil in cylinder being repaired. When cylinder rod and head are removed, oil will run out of cylinder.*

NOTE: *Dispose of drained fluids according to local regulations.*

1. Use an allen wrench to remove bolts that hold cylinder head to cylinder tube. See Figure 7.

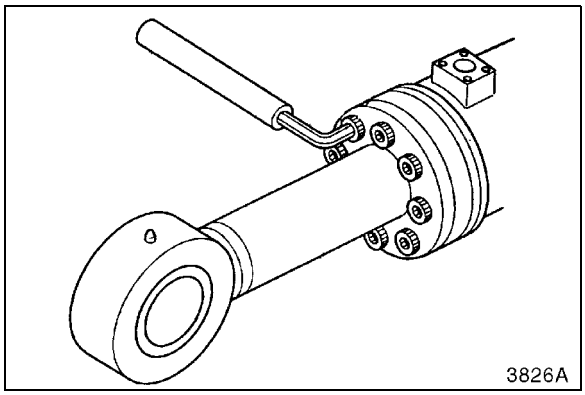

Figure 7

2. Support cylinder rod with a lifting sling. See Figure 8. Slide cylinder rod out of cylinder tube. Rotate cylinder rod slightly as it is being pulled from cylinder tube. This will make it easier to pull rod out of tube.

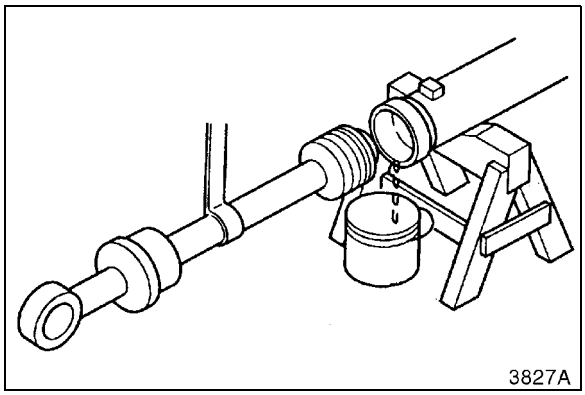

Figure 8

3. Set cylinder rod assembly in a repair fixture and secure rod in place. See Figure 9. Use a power wrench and socket to remove nut that holds piston on rod.

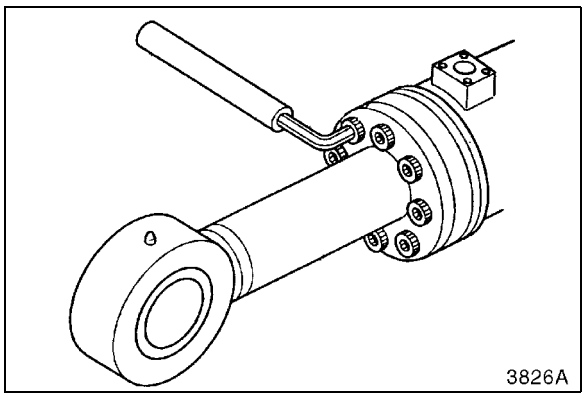

Figure 9

22. Install bolts in cylinder head and tighten them to torque specified in bolt torque chart. See Figure 36. Double check to make sure that hole in cylinder head is align with port in cylinder tube.

    NOTE: *After rebuilding a cylinder, or after loosening a cylinder hydraulic line, air must be bled from hydraulic system. To bleed air from system, first extend and retract a cylinder (or pair of cylinders) about 5 times at low engine rpm. Stop cylinder about 100 mm (4 in) short of full extension and full retraction. Then fully extend and retract cylinder about 5 times, also at low engine rpm.*

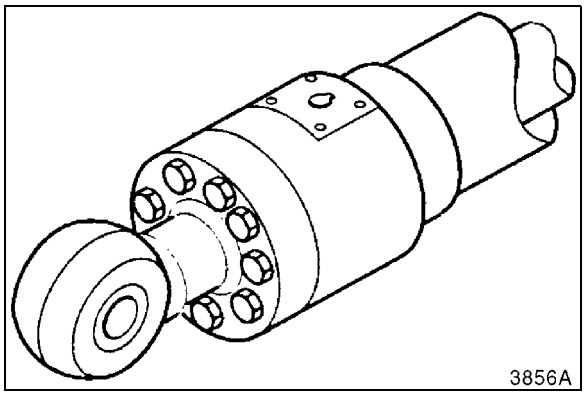

Figure 36

GENERAL DESCRIPTION

This section describes the servicing of "T6DMY" series pumps. Some additional information is provided with regards to shaft seals and bolt torques for other models in the series. The T6DMY information in indicated with an asterisk (*) or shading when appropriate.

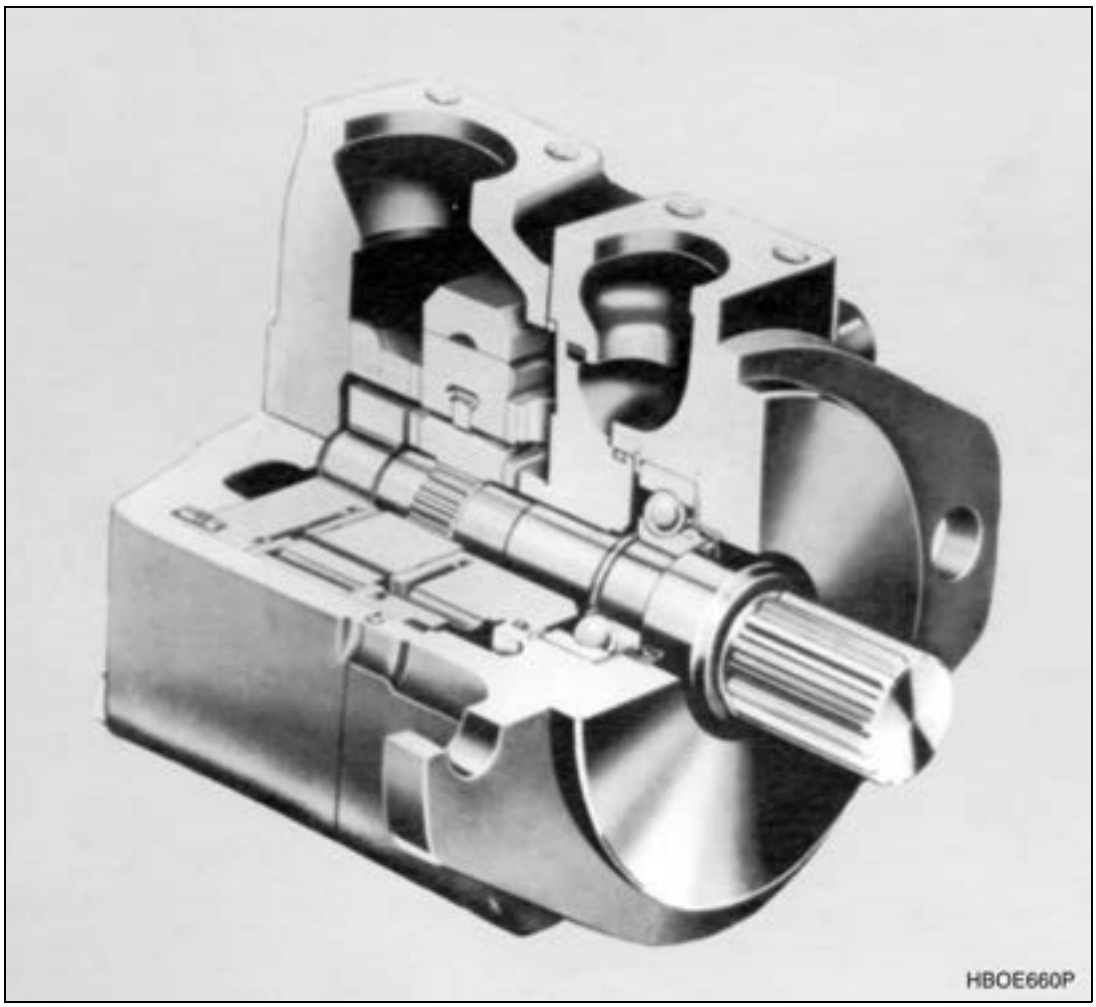

Figure 1

CONSTRUCTION

General

Pumps in this series are used to develop hydraulic fluid flow for operation of industrial and mobile equipment. The positive displacement pumping cartridges are of the rotary vane type with shaft side loads hydraulically balanced. Flow rate depends on pump size and speed at which it is driven.

All units are designed so that direction of rotation, pumping capacity and port positions can be readily changed to suit particular applications.

Reference Number	Description
1	Body; Outlet
3	Shaft; Seal
4	Spacer; Washer
5	Shaft (No. 127)
6	Bearing
7	Ring; Retaining
8	Ring; Spirolox
9	Ring; Backup
10	O-ring
11	O-ring
12	Ring; Seal

Reference Number	Description
13	Plate; Outlet Support
14	Pack; Seal
15	Plate Kit; Flex Side
16	Rotor
17	Vane & Insert
18	Plate; Inlet Support
19	Pin
20	Screw; Hex Head
21	Cover
22	Bolt
23	Ring

SPECIFICATIONS

Main Pump	Specification
Type	Fixed vane
Displacement	121.5 cc/rev. (7.41 in^3/rev.)
Maximum flow rate	240 liters/min. (63.4 gpm)

E. Locate scribe mark on cam ring, outlet support plate, and flex side plate. Hold outlet support plate and flex side plate together and assemble over cam ring and rotor with scribe marks in-line.

F. Hold cartridge together to prevent movement and turn assembly over so outlet support plate rests on a flat surface, and flat wooden board is up. (See Figure 22.) Remove flat wooden board.

Figure 22

G. Lubricate exposed surface of rotor and vanes with system fluid. Locate scribe mark on inlet support plate and flex side plate. Hold inlet support plate and flex side plate together and assemble over cam ring and rotor with scribe marks in-line. (See Figure 23.)

NOTE: *The cast-in arrows next to socket head screws, indicate cartridge direction of rotation.*

H. Thread two socket head screws into cartridge until snug (hand tight).

NOTE: *The O.D. of all component parts of cartridge kit must be in-line with each other or cover cannot be installed. Align cartridge as follows:*

Figure 23

TROUBLESHOOTING, TESTING AND ADJUSTMENT

Table below lists the common difficulties experienced with vane pumps and hydraulic systems. It indicates, possible causes and remedies for each of the problems listed.

Problem	Possible Cause	Remedy
Excessive noise in pump.	Low oil level in reservoir.	Fill reservoir to proper level with recommended fluid.
	Air in system.	Open reservoir cap and operate system until purged. Bleed hydraulic lines at highest point down stream of pump while system is under pressure.
	Vacuum condition.	Check inlet (suction) line and fittings for air leaks.
	Oil too thick.	Be certain correct type of oil is used in system. Warm up pump in cold weather until noise disappears.
	Damaged or missing pump seals at mating surfaces.	Locate and replace damaged or missing seals.
	Cartridge kit not assembled properly.	Reassemble cartridge kit.
	Pump inlet/outlet lines reversed.	Reconnect lines to proper port connections.
Pump overheating.	Internal leakage.	If excessive internal leakage exists, return to shop for complete overhaul.
	Heat exchanger not functioning.	Locate trouble and repair or replace.
System not developing pressure.	Relief valve open.	Repair or replace.
	Loss of fluid internally (slippage).	Return to shop for evaluation and repair.
	Cartridge kit not assembled properly.	Reassemble kit.
	Cartridge kit assembled for opposite rotation.	Reassemble kit to proper rotation.
	Pump inlet/outlet lines reversed.	Reconnect lines to proper port connections.
	Disconnected or broken drive mechanism.	Locate and repair.
Loss of fluid.	Ruptured hydraulic lines.	Locate and repair.
	Leaking or missing seals.	Locate and repair.

GENERAL DESCRIPTION

THEORY OF OPERATION

The brake pedal valve is attached to, and operated by, the brake pedal. See Figure 1. The valve contains two spools. See Figure 2. One spool ports fluid to the brake pistons in the front axle, and the other spool ports fluid to the brake pistons in the rear axle. Maximum system operating pressure is 80 ±3 bars (1,160 ±44 psi). If something in one of the circuits should fail, the other circuit will continue to operate.

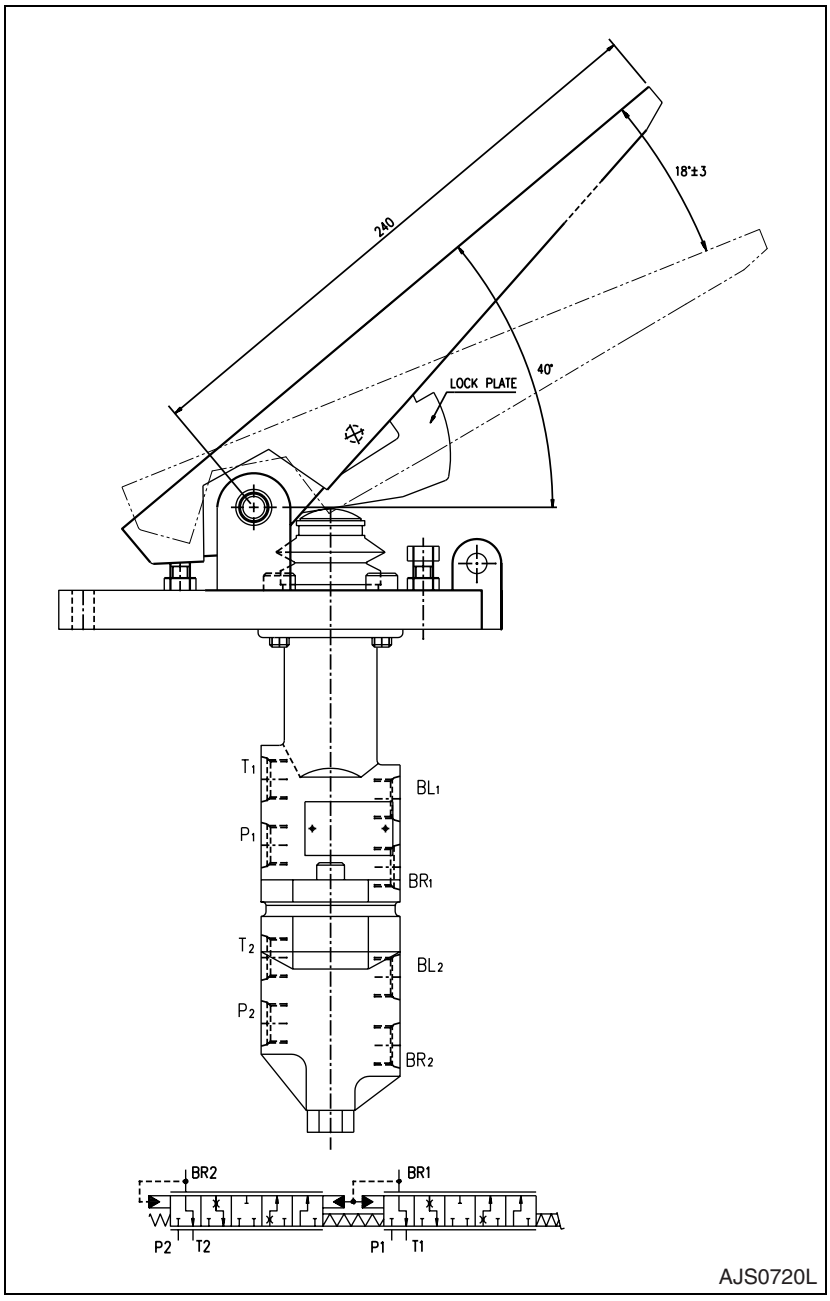

Figure 1

SPECIFICATIONS

	2-Spool (STD.)	3-Spool (OPT.)
Name	MRT40D1F1 - 56	MRT40D1F1D1 - 52
Type	Pilot Control with Float spool	
Spool Diameter	ø 40 mm (1.5748 in)	
Spool Arrangement	Bucket - Boom	Bucket - Boom - Auxiliary
Main relief pressure	200 kg/cm^2 @ 210 l/min (2,840 psi @ 55.4 gpm)	
Overload relief pressure	240 kg/cm^2 @ 20 l/min (3,400 psi @ 5.3 gpm)	

OVERLOAD RELIEF VALVE WITH MAKEUP FUNCTIONS

NOTE: *To be installed at rod and head sides of bucket circuit and rod side of boom circuit.*

FUNCTION

The overload relief valve is located between the cylinder and control valve spool. It prevents damage to the cylinder and valves. It relieves any high-pressure in the circuit, that is generated when a cylinder is under an external load, with a main valve spool being in the middle position.

OPERATION

Operation as Overload Relief Valve

Below set pressure

Hydraulic pressure in cylinder port flows to chamber "X" through orifice in end of plunger "D" which is held against seat "K" by spring. Seat "K" also seats at the cylinder port due hydraulic oil pressure difference and spring force.

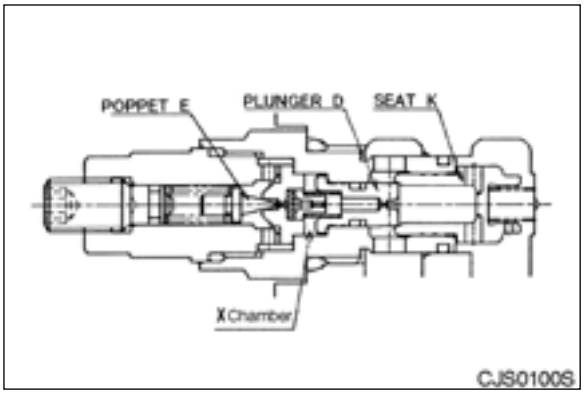

Figure 4

Above set pressure

The poppet "E" is pushed to left and opens when hydraulic oil pressure rises above the spring force due to abnormally high-pressure of oil in cylinder circuit and chamber "X." Oil is then ported to tank through an orifice in its body. This causes decreased oil pressure in chamber "X," that allows plunger "D" to move to the left, which opens the oil passage to tank port. This allows hydraulic oil to flow from the cylinder to the tank.

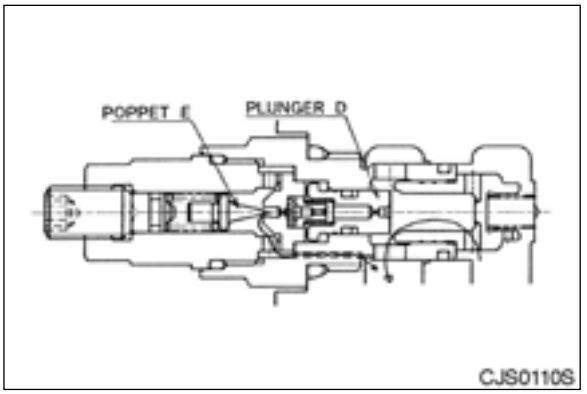

Figure 5

Width across flat: 12 mm

Torque: 3.8 - 4.2 kg•m (27 - 30 ft lb)

(Use Loctite #262.)

REASSEMBLY OF MULTI CONTROL VALVE

1. Do reassembly in reverse order of disassembly.

FLOW AMPLIFIER (DANFOSS)

⚠ 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 is 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 400-V	1001 and Up
Mega 500-V	1001 thru 2000
Mega 500-V (Tier II)	2001 and Up

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G. Counter pressure valve with orifice shown dismantled.

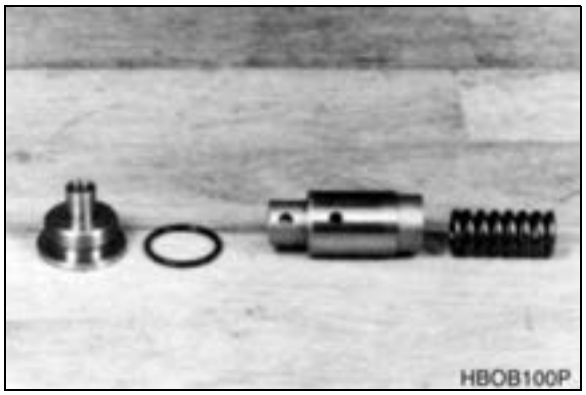


Figure 11

2. Removing pressure relief valve.

   A. Unscrew plug with washer (hex socket for 8 mm internal hexagon).

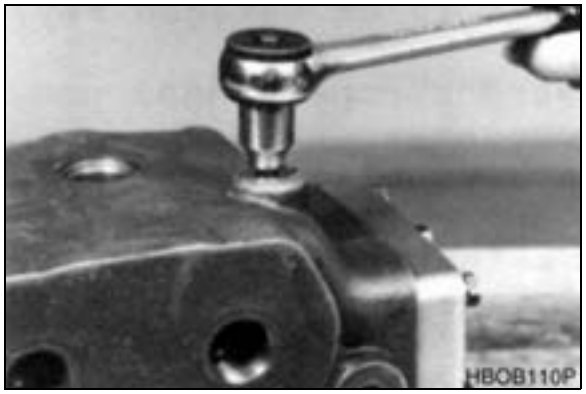


Figure 12

   B. Screw pressure relief valve out (10 mm hexagon key).

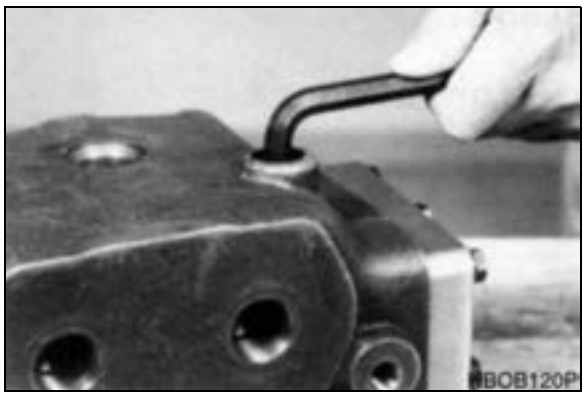


Figure 13

   C. Remove washer (magnetic rod).

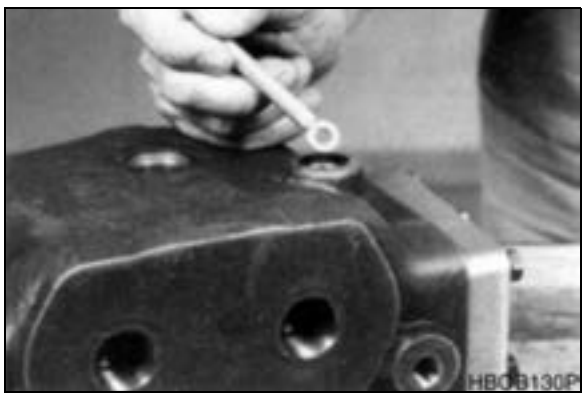


Figure 14

C. Priority valve spool with throttle check valve for internal PP shown dismantled.

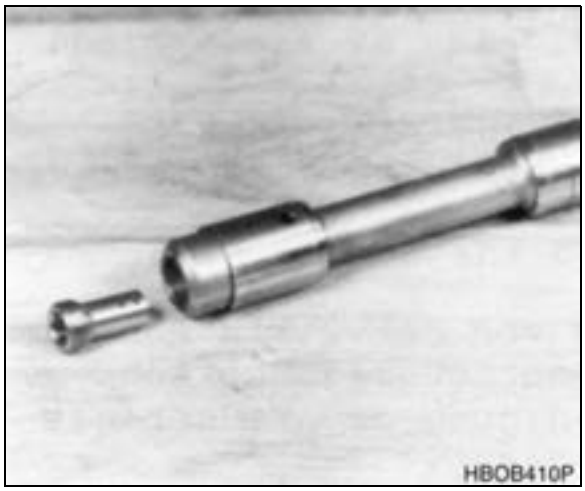


Figure 42

12. Dismantling of amplifier spool.

    A. Carefully remove spring from recess with 3 mm screwdriver.

    NOTE: *Avoid damage to spring ring.*

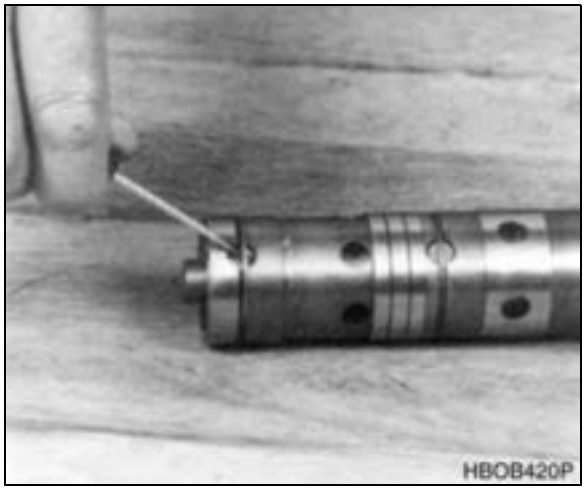


Figure 43

    B. Carefully guide spring ring back.

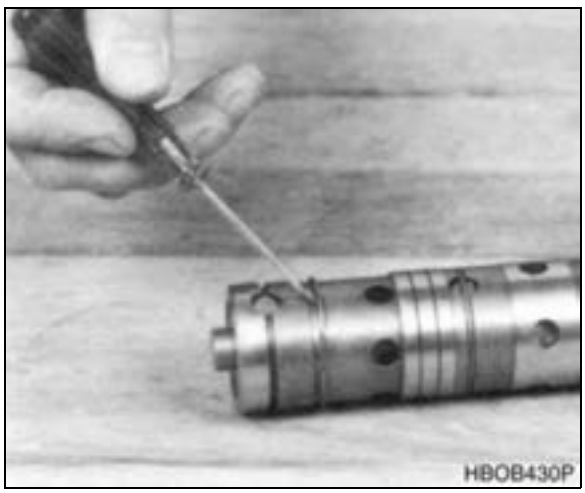


Figure 44

E. Install pilot valve. Remember O-ring.

Figure 68

F. Tighten with torque wrench for 19 mm external hexagon. Use a mandrel. Tightening torque: 2 ±0.5 daNm. (175 ±45 in lb).

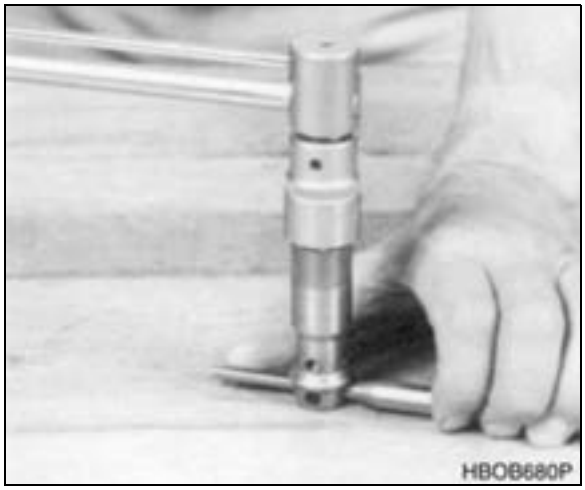


Figure 69

G. Install housing.

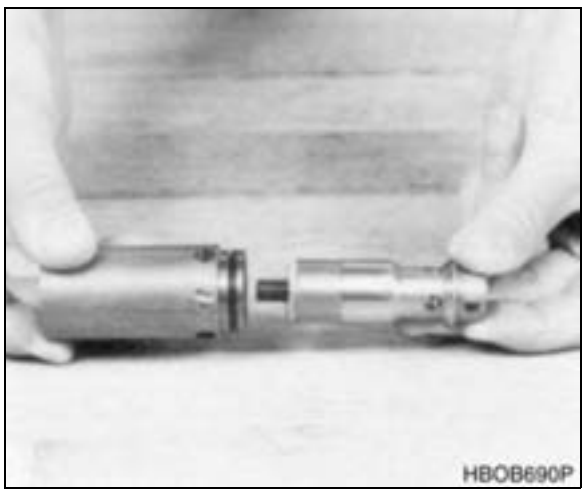


Figure 70

C. Install spring in plug with Vaseline. Install assembled plug and spring. Remember O-ring. Tightening torque 2.5 ±0.03 daNm (220 ±25 in lb).

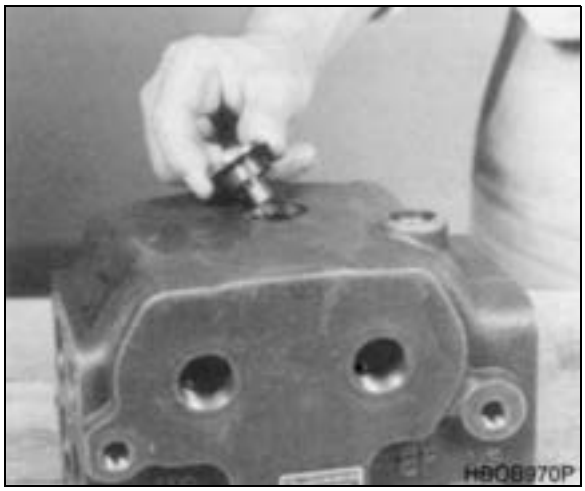


Figure 98

12. Installation of spools.

A. Install directional spool. Install priority valve spool.

NOTE: *Spring control must be placed in correct position against LS-connection.*

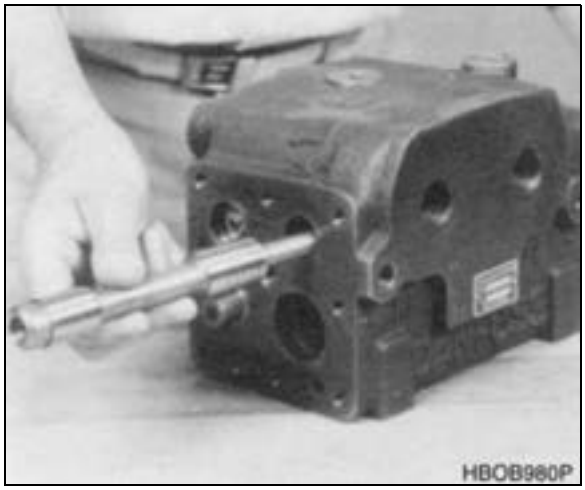


Figure 99

B. Install spring.

NOTE: *Spring must be by LS-connection.*

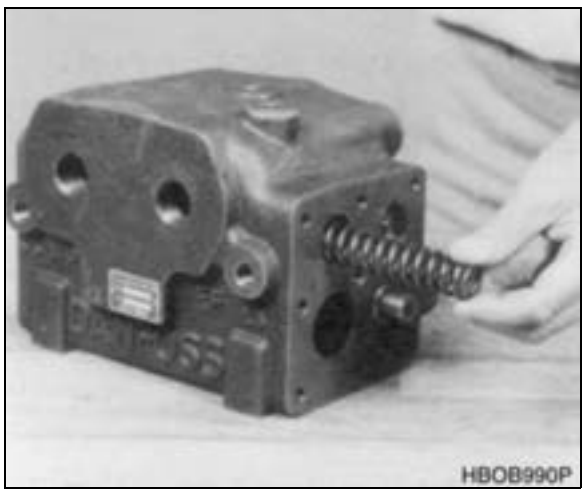


Figure 100

GENERAL DESCRIPTION

POWER STEERING SYSTEM

Power Steering Unit.

The machine contains a fully hydraulic steering unit. See Figure 1. Rotating the steering wheel controls hydraulic flow through the steering valve. Figure 2, shows the hydraulic schematic for the steering system. The steering valve meters the volume of pump flow that is supplied to the steering cylinders

Reference Number	Description
1	Bearing
2	Centering Springs
3	Sleeve
4	Center Pin
5	Check Valve
6	Gerotor
7	End Cap
8	Spool
9	Drive Shaft
10	Housing

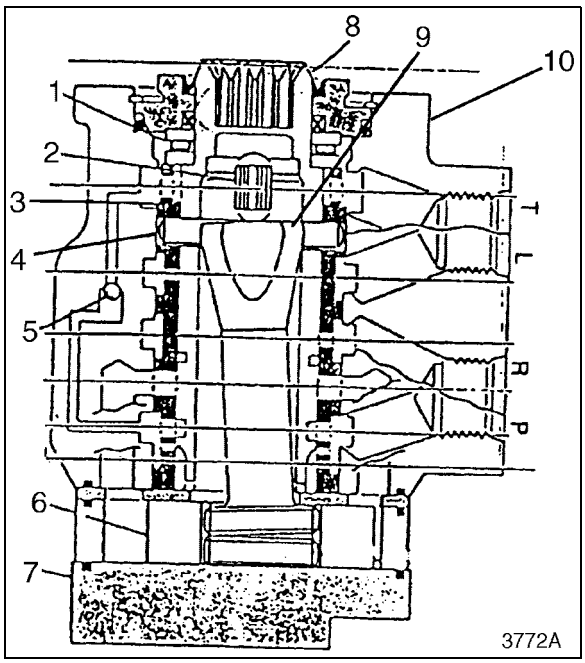


Figure 1

The steering unit contains a gerotor. This allows the operator to steer the machine when the engine is not running or when the steering pump has failed. The gerotor functions as a manual hydraulic pump that is powered by the rotation of the steering wheel. Rotating the steering wheel will cause the gerotor to draw oil from the hydraulic tank and send this oil to the steering cylinders.

The shaft that is rotated by the steering wheel is attached to the spool (8, Figure 1) by the engagement of a spline. The spool is surrounded by a sleeve (3). The spool and sleeve are connected by the centering spring (2). At the steering wheel neutral position, the center pin does not contact the spool. A drive shaft (9) extends through the spool. The upper end of the drive shaft engages the center pin (4). The lower end of the drive shaft engages the spline in the gerotor (6).

DISASSEMBLY

It is very important to keep the inside of the steering unit clean. Make sure that the outside of the steering unit is clean before opening the unit. Use a wire brush and solvent to clean the entire unit.

1. Remove steering column from steering unit. Bolt steering unit to stabilizing base. Bolt base to work bench.
2. Remove bolts from steering unit end cover. See Figure 10.

Figure 10

3. Remove end cover from unit. See Figure 11.

Figure 11

4. Lift cylinder gear off unit. See Figure 12. Remove two O-rings.

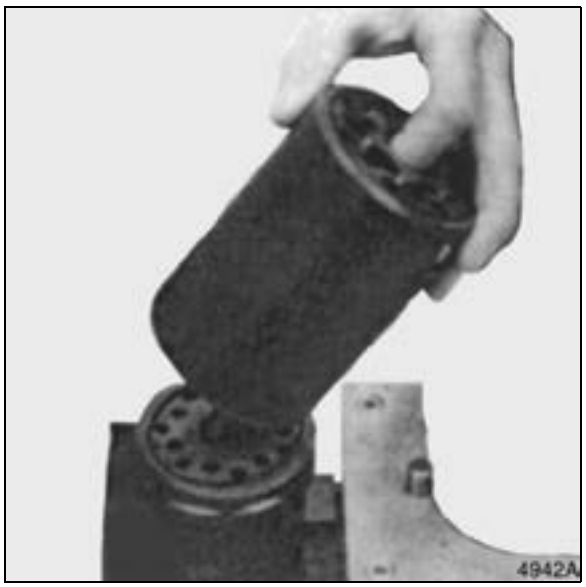


Figure 12

13. The sleeve will push the O-ring and backup ring into correct position. See Figure 43.

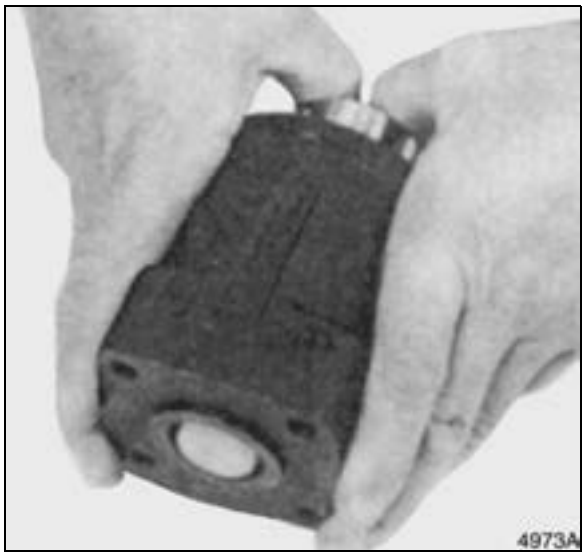


Figure 43

14. Bolt housing back into stabilizing base. See Figure 44.

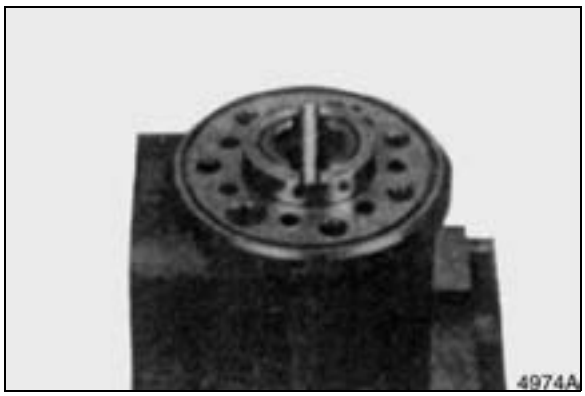


Figure 44

15. Insert ball into hole. See Figure 45.

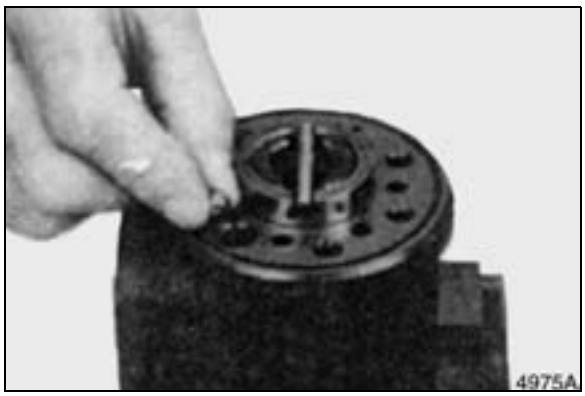


Figure 45

GENERAL DESCRIPTION

THEORY OF OPERATION

The unloading valve is made up of three cartridges C1, C2, and C3. When pressure in the main pump output line is low, the unloading valve diverts output from the steering pump and directs it to the main pump output line. This line supplies the boom, bucket, and option control valves. This additional fluid creates faster cycle times. When pressure in the main pump output line is high, the unloading valve directs steering pump flow to tank.

Output from the steering pump passes through the priority valve that is part of the flow amplifier. See the hydraulic schematic. (Figure 1). This flow then passes out of the flow amplifier and enters the unloader valve at port EF. This flow is present at port A of C3 and present at port B of C2. See Figure 2. This flow raises the check spool (2) at C3 when the pressure in the output line from the main pump is below 160 kg/cm^2 (2,275 psi) at port P2. This allows output from the steering pump to join flow from the main pump to supply the boom, bucket, and option control valves.

The pressure at port B of C2 is also present at port C of C2. When pressure in the main pump output line is above 160 kg/cm^2 (2,275 psi), this pressure forces spool (5) of C1 to move against the force of spring (6), which allows the oil in chamber C of C2 to flow through port D of C1 and back to tank. When oil in chamber C flows to tank through port D, the pressure in chamber C drops due to the venturi effect of the orifice (7) in check spool (4). This allows the pressure at B to lift check spool (4) off its seat. This allows the oil that is flowing into port B to flow past check spool (4) to tank. This is the output from the steering pump that is being directed back to tank.

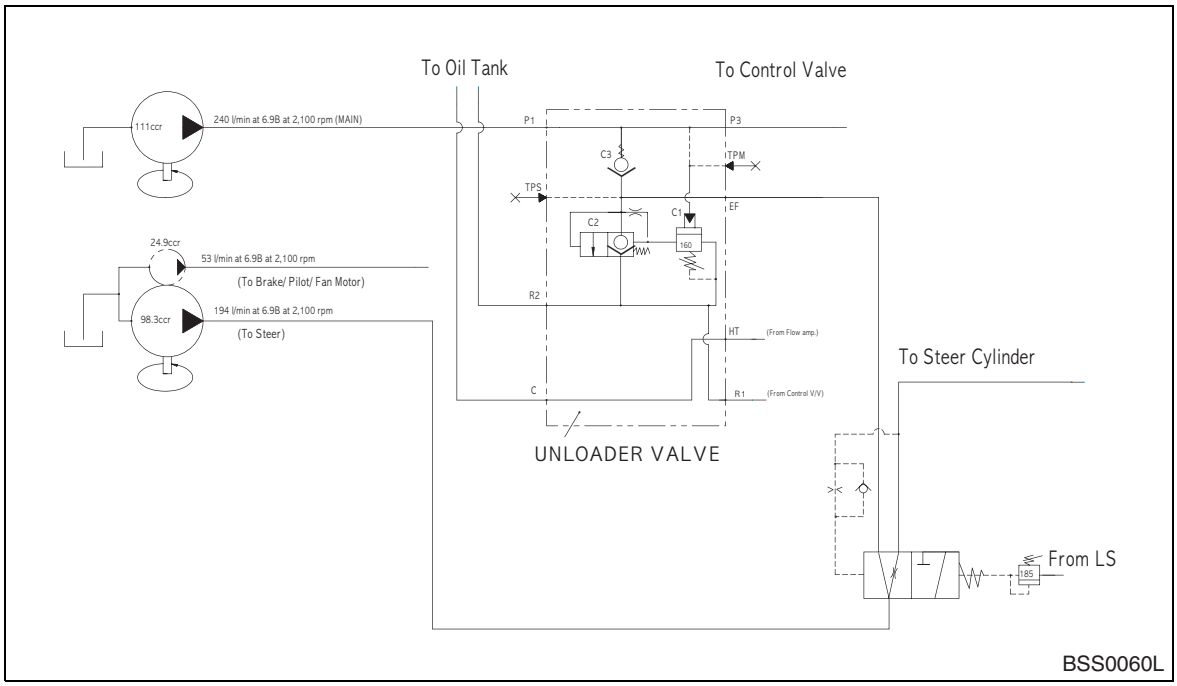
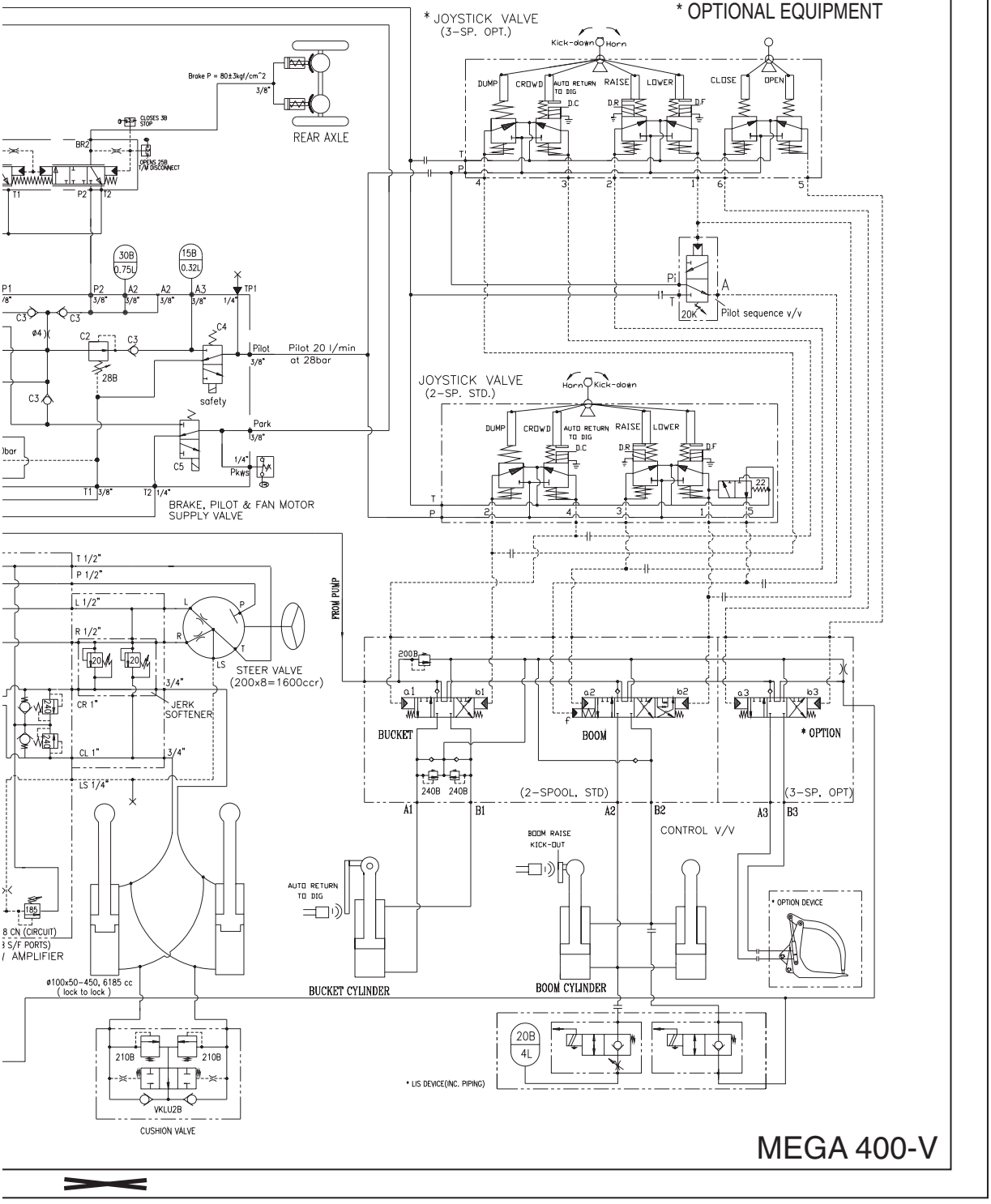


Figure 1 Unloading circuit


* OPTIONAL EQUIPMENT
* JOYSTICK VALVE
(3-SP. OPT.)
Kick-down
Horn
DUMP
CROWD
AUTO RETURN TO DIG
RAISE
LOWER
CLOSE
OPEN
D.C
D.R
D.F
REAR AXLE
Brake P = 80±3kgf/cm^2
3/8"
CLOSES 3B STOP
BR2
OPENS 25B T/M DISCONNECT
T1
P2
T2
30B 0.75L
15B 0.32L
TP1
P1
A2
A3
1/4"
C3
Ø4
C2
C4
28B
safety
Pilot
Pilot 20 l/min at 28bar
Park
C5
1/4"
Pkws
BRAKE, PILOT & FAN MOTOR SUPPLY VALVE
Pi
A
T
20K
Pilot sequence v/v
JOYSTICK VALVE
(2-SP. STD.)
22
T 1/2"
P 1/2"
L 1/2"
R 1/2"
L
P
R
T
LS
STEER VALVE
(200x8=1600ccr)
FROM PUMP
20
CR 1"
JERK SOFTENER
3/4"
CL 1"
LS 1/4"
185
8 CN (CIRCUIT)
S/F PORTS)
AMPLIFIER
ø100x50-450, 6185 cc
(lock to lock)
200B
a1
b1
a2
b2
a3
b3
BUCKET
BOOM
* OPTION
240B
240B
(2-SPOOL, STD)
(3-SP. OPT)
A1
B1
A2
B2
A3
B3
CONTROL V/V
BOOM RAISE KICK-OUT
AUTO RETURN TO DIG
* OPTION DEVICE
BUCKET CYLINDER
BOOM CYLINDER
20B
4L
* LIS DEVICE(INC. PIPING)
210B
210B
VKLU2B
CUSHION VALVE
MEGA 400-V

BSS0330L

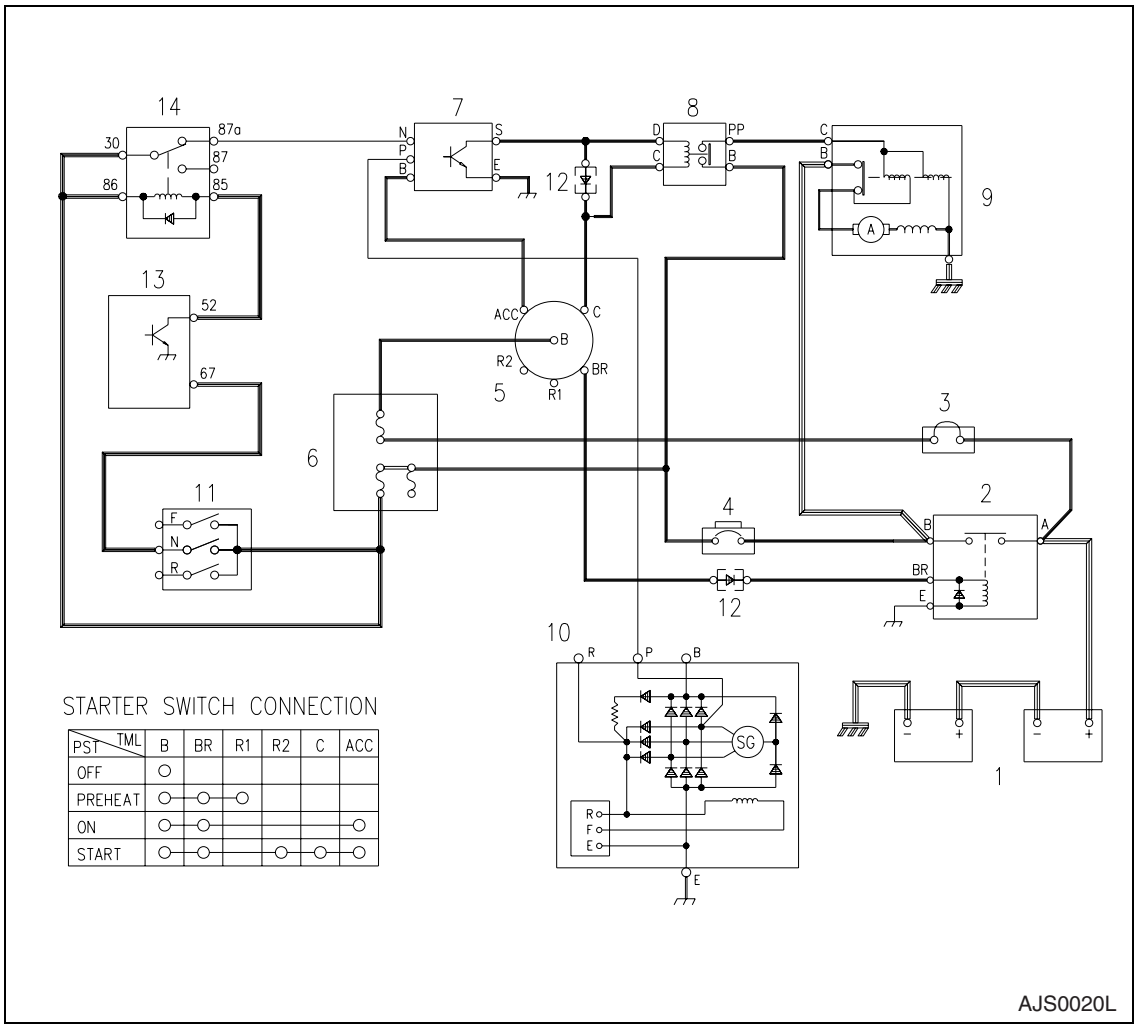


Figure 2 STARTER CIRCUIT (1) - WHILE STARTING

Reference Number	Description
1	Battery
2	Battery Relay
3	Fusible Link
4	Circuit Breaker
5	Starter Switch
6	Fuse Box
7	Starter Controller

Reference Number	Description
8	Starter Relay
9	Starter
10	Alternator
11	Transmission Selector Switch
12	Diode
13	Transmission Controller
14	Safety Starter Relay

MONITORING SYSTEM

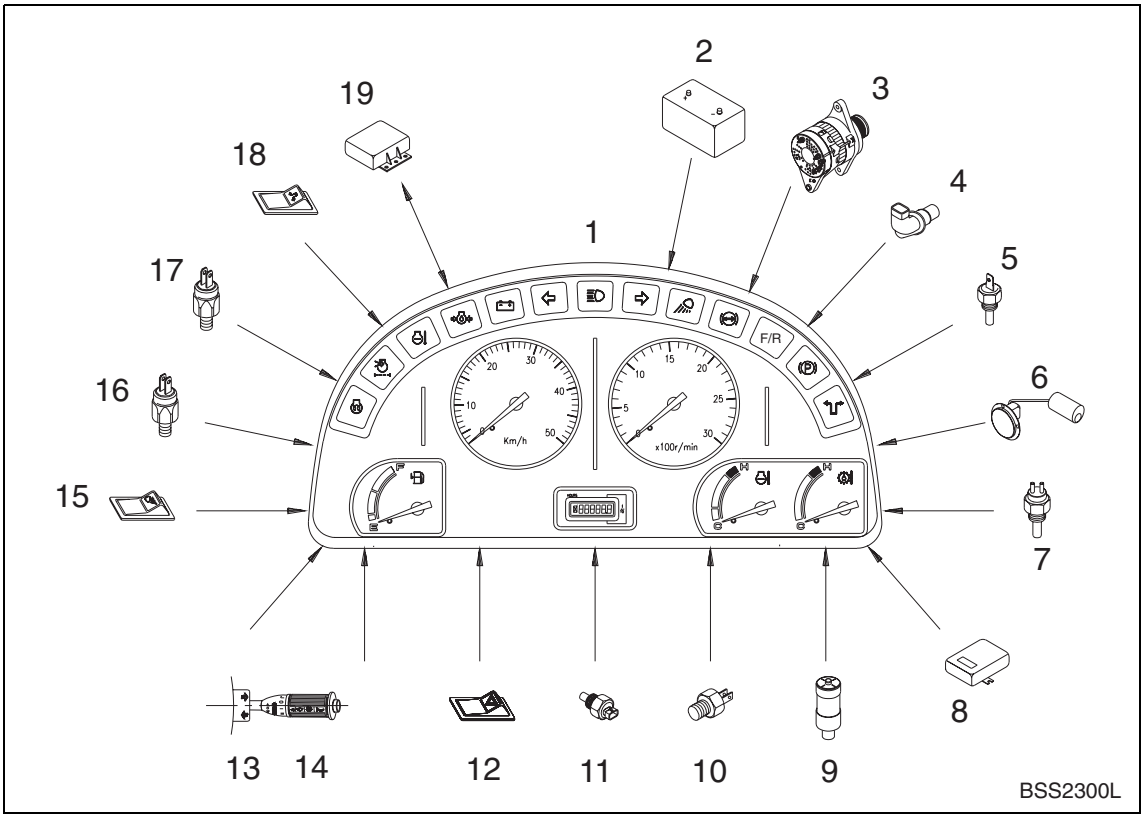


Figure 11

Reference Number	Description
1	Instrument Panel
2	Battery
3	Alternator
4	Speed Sensor
5	Coolant Temperature Sensor
6	Fuel Sensor
7	Transmission Oil Temperature Sensor
8	Preheat Controller
9	Air Cleaner Indicator

Reference Number	Description
10	Engine Coolant Temperature Switch
11	Engine Oil Pressure Switch
12	Hazard Warning Light Switch
13	Turn Signal Light Switch
14	High Beam Switch
15	Working Light Switch
16	Brake Oil Pressure Switch
17	Parking Brake Pressure Switch
18	Emergency Steering Switch
19	Control unit

The monitoring system displays the various data and warning signals onto the instrument panel by processing the information gathered from the various sensors throughout the equipment.

Characteristic of Operation

	Input		Output
1	When the starter switch is "ON."		All warning lights are turned "ON" and turned "OFF" after 2 - 2.5 seconds.
2	When "R" terminal voltage of alternator	is below 12 ±1 V	Battery warning light turns "ON," L5
		is above 12 ±1 V	Battery warning light turns "OFF," L5
3	When "R" terminal voltage of alternator is above 12 ±1 V	Engine oil pressure switch is "ON."	Warning buzzer sounds after 8 ±1 seconds.
		Coolant temperature switch is "ON."	Warning buzzer sounds immediately
		Brake oil pressure switch is "ON."	Warning buzzer sounds immediately
		Forward or Reverse lever switch is "ON" and Parking brake pressure switch is "ON."	Warning buzzer sounds immediately

Emergency Steering Pump

This is an electrically powered hydraulic pump and includes an emergency steering relay (1, Figure 22), which is excited by the signal of the emergency steering timer.

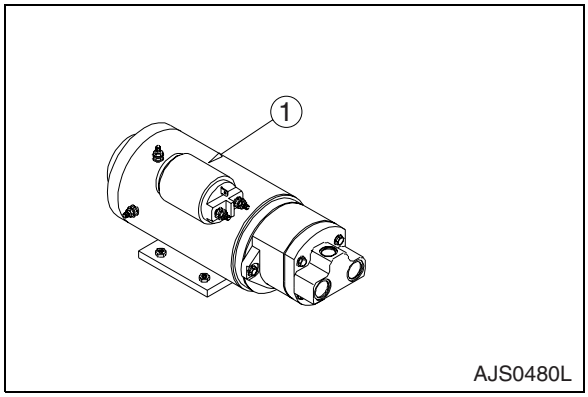


Figure 22 EMERGENCY STEERING PUMP

Emergency Steering Switch

1. When the switch is in the "I" position, the emergency steering pump and the emergency steering indicator of the instrument panel are activated simultaneously.
2. The basic usage of this switch is testing function whether the emergency steering system is all right or not.

> **WARNING**
>
> **Make sure that no persons are near the machine when testing the function of the emergency steering system, there is a risk that someone may be crushed between the front and the rear frame.**

3. This returns automatically when not pressed down.

   NOTE: *Because the emergency steering pump consumes high current, it's forbidden to use continuously to avoid discharging of battery and a risk of overheating.*

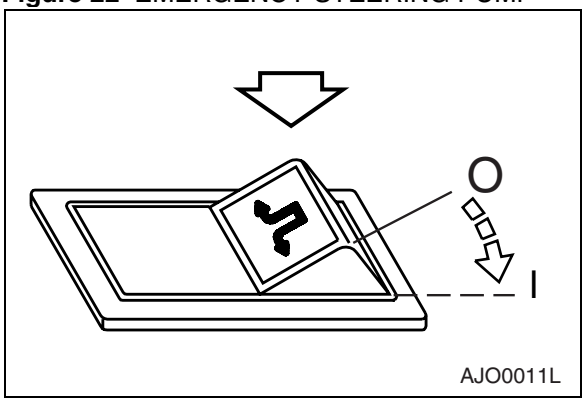


Figure 23 EMERGENCY STEERING SWITCH

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