

## TORQUE DATA FOR HYDRAULIC FITTINGS

### FITTINGS, CONNECTIONS AND PLUGS

| Diameter x Pitch | Newton / Metres | Pounds / Feet | Kilogram / Metres |
|------------------|-----------------|---------------|-------------------|
| 10 mm x 1        | 20              | 14.5          | 2                 |
| 12 mm x 1.5      | 35              | 26            | 3.6               |
| 14 mm x 1.5      | 45              | 33.2          | 4.6               |
| 16 mm x 1.5      | 60              | 44            | 6.1               |
| 18 mm x 1.5      | 70              | 51            | 7.1               |
| 22 mm x 1.5      | 100             | 73            | 10.2              |
| 27 mm x 2        | 200             | 147           | 20.4              |
| 33 mm x 2        | 280             | 207           | 28.6              |
| 42 mm x 2        | 380             | 281           | 38.8              |

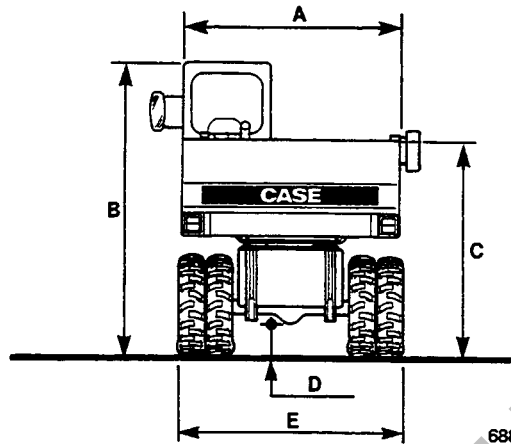
### NUTS FOR TUBES AND HOSES

| Diameter x Pitch | Newton / Metres | Pounds / Feet | Kilogram / Metres |
|------------------|-----------------|---------------|-------------------|
| 16 mm x 1.5      | 20              | 14.5          | 2                 |
| 18 mm x 1.5      | 35              | 26            | 3.6               |
| 20 mm x 1.45     | 45              | 33.2          | 4.6               |
| 24 mm x 1.5      | 60              | 44            | 6.1               |

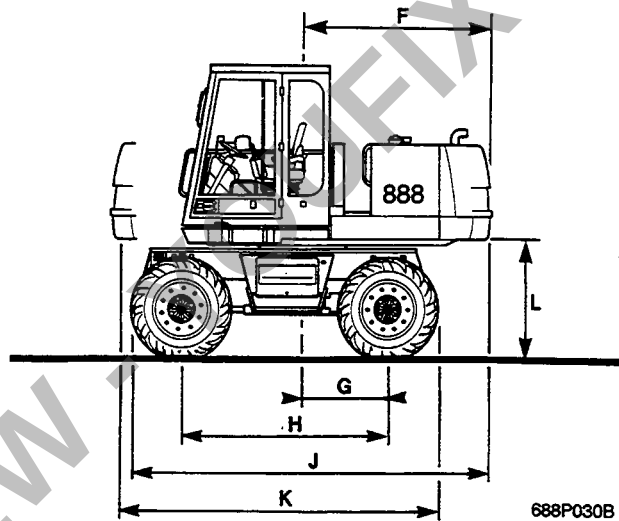
### FLANGES

| Diameter x Pitch | Newton / Metres | Pounds / Feet | Kilogram / Metres |
|------------------|-----------------|---------------|-------------------|
| 8 mm x 1.5       | 28              | 21            | 2.9               |
| 10 mm x 1.5      | 55              | 41            | 5.6               |
| 12 mm x 1.75     | 90              | 67            | 9.2               |
| 14 mm x 2        | 145             | 107           | 14.8              |
| 16 mm x 2        | 230             | 170           | 23.5              |

## GENERAL DIMENSIONS (Model 888P)



688P030A



688P030B

### SPECIFICATIONS

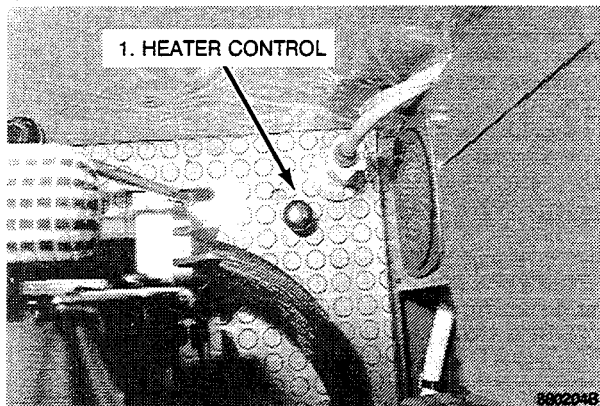
|        |               |            |
|--------|---------------|------------|
| A..... | 2.44 m        | 8 ft 0 in  |
| B..... | 3.16 m        | 10 ft 4 in |
| C..... | 2.44 m        | 8 ft 0 in  |
| D..... | 0.31 m        | 1 ft 0 in  |
| E..... | 2.46 m        | 8 ft 1 in  |
| F..... | Radius 2.40 m | 7 ft 9 in  |
| G..... | 1.03 m        | 3 ft 4 in  |
| H..... | 2.50 m        | 8 ft 2 in  |
| J..... | 4.38 m        | 14 ft 4 in |
| K..... | 3.97 m        | 13 ft 1 in |
| L..... | 1.32 m        | 4 ft 3 in  |

**STEP 35**

Install the key and turn the master disconnect switch to the ON position.



**WARNING:** *Never run the engine in a closed building. Proper ventilation is required under all circumstances.*

**STEP 36**

Push down the heater control in the cab to allow circulation of engine coolant and to allow trapped air to collect at the air bleed screw.

Start and run the engine for five minutes. Stop the engine.



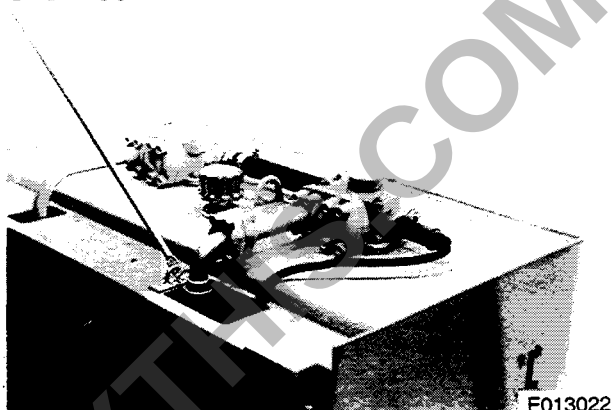
**WARNING:** *Hot coolant will spray out of the air bleed screw. To avoid injury, care must be taken when removing air from the cooling system.*

**STEP 37**

Open the air bleed screw until there is a flow of coolant without air bubbles. Tighten the air bleed screw.

**STEP 38**

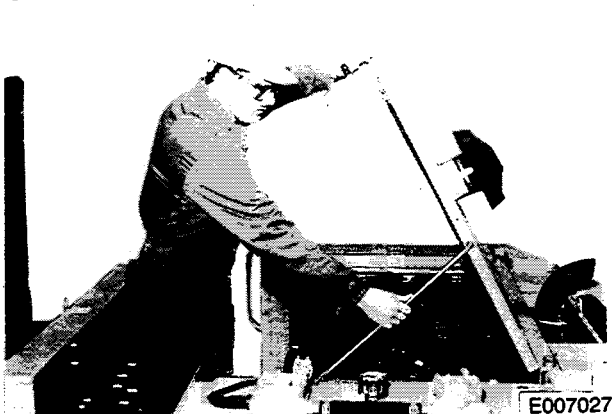
Check the engine coolant level in the engine coolant recovery bottle. The level of engine coolant must reach the upper mark. Add engine coolant only to the recovery bottle, NOT to the radiator.

**STEP 39**

Start and run the engine at LOW IDLE. Fully extend all the attachment cylinders. Stop the engine. Check the level of oil in the hydraulic oil tank. The level of oil must reach level 2 on the indicator on the front of the hydraulic oil tank. If oil is required, remove the plug from the top of the filter housing. Screw in the funnel and add specified hydraulic oil as required. Remove the funnel and install and tighten the plug. Start and run the engine. Lower the attachment to the ground. Stop the engine.

**STEP 40**

Check for and repair any hydraulic oil or engine coolant leaks.

**STEP 41**

Install the engine front cover. Close the engine upper access cover. Install the access panels under the radiator, engine and hydraulic oil tank.

## Control Panel Voltage Test

NOTE: Check test panel warning lamp filament by using check switch (ST6) before carrying out test.

NOTE: Turn the key to the ON position.

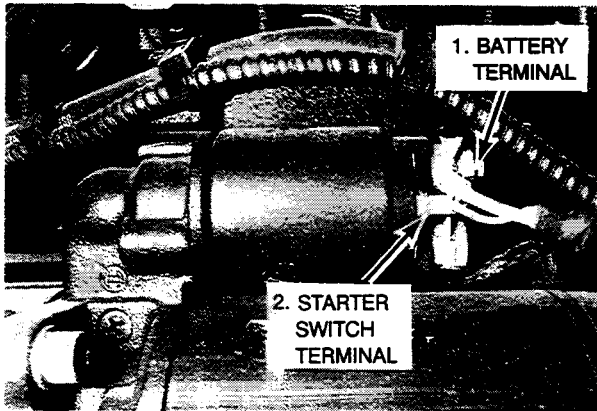
|    | <u>Test Points</u>                                                                   | <u>Reading</u> | <u>Possible Cause of Bad Reading</u>                                                                                 |
|----|--------------------------------------------------------------------------------------|----------------|----------------------------------------------------------------------------------------------------------------------|
| 5  | Between the blocked air filter lamp (H17) and chassis ground.                        | 24 Volts       | Check the circuit between the fuse F3 and the bulb. Check continuity of pressure switch and associated circuits.     |
| 6  | Between the blocked hydraulic oil filter lamp (H5) and chassis ground.               | 24 Volts       | Check the circuit between the fuse F3 and the bulb. Check continuity of pressure switch and associated circuits.     |
| 7  | Between the pilot pressure lamp (H9) and chassis ground.                             | 24 Volts       | Check the circuit between the fuse F3 and the bulb. Check continuity of pressure switch and associated circuits.     |
| 8  | Between the engine temperature gauge (P1) and chassis ground.                        | 24 Volts       | Check the circuit between the fuse F3 and the gauge. Check continuity of temperature sender and associated circuits. |
| 9  | Between the fuel level gauge (P2) and chassis ground.                                | 24 Volts       | Check the circuit between the fuse F3 and the gauge. Check continuity of fuel level sender and associated circuits.  |
| 10 | Between the engine oil pressure lamp (H13) and chassis ground.                       | 24 Volts       | Check the circuit between the fuse F3 and the gauge. Check continuity of pressure switch and associated circuits.    |
| 11 | Between the steering pressure warning lamp (H6) and chassis ground.                  | 24 Volts       | Check the circuit between the fuse F25 and the bulb. Check continuity of pressure switch and associated circuits.    |
| 12 | Between the parking brake pressure warning lamp (H14) and chassis ground.            | 24 Volts       | Check the circuit between the fuse F25 and the bulb. Check continuity of pressure switch and associated circuits.    |
| 13 | Between the minimum brake pressure and filter warning lamp (H10) and chassis ground. | 24 Volts       | Check the circuit between the fuse F25 and the bulb. Check continuity of pressure switch and associated circuits.    |

## Installation

### STEP 86

Install the starter motor. Install the three mounting bolts and washers and tighten to a torque of 43 Nm (32 lb ft).

### STEP 87



Install the battery cable and wire number 2 on the battery terminal and install and tighten the washer and nut. Install wire number 4 on the starter switch terminal and install and tighten the washer and screw.

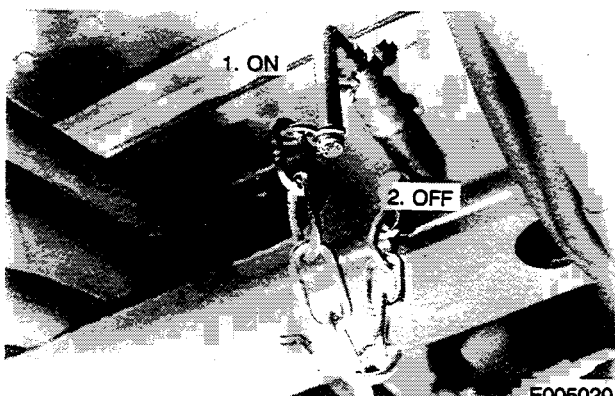
### STEP 88

Install the access panel under the engine.

### STEP 89

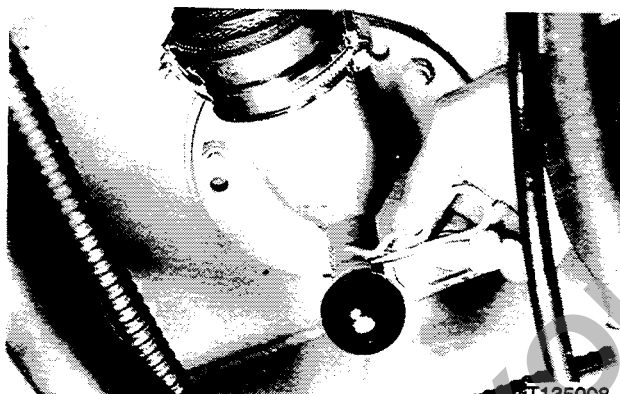


Install the key and turn the master disconnect switch to the ON position.

**STEP 7**

E005020

Set the master disconnect switch to the OFF position.

**STEP 8**

T135008

Remove the access panel under the hydraulic oil tank. Remove the locking pin and pull down the knob to close the hydraulic oil tank shut-off valve.

**STEP 9**

T135019

Operate the emergency foot pump while operating the control levers in all directions to release the hydraulic pressure in all circuits.

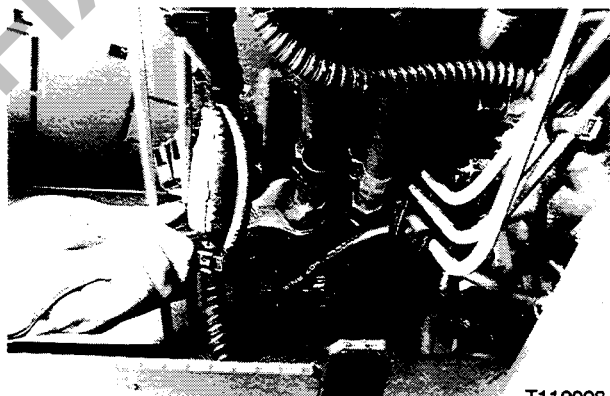
**STEP 10**

T112027

Tag the four hydraulic hoses connected to the steering orbitrol valve.

**STEP 11**

Remove securing ties and move cables and hoses clear to give access to steering orbitrol valve fittings.

**STEP 12**

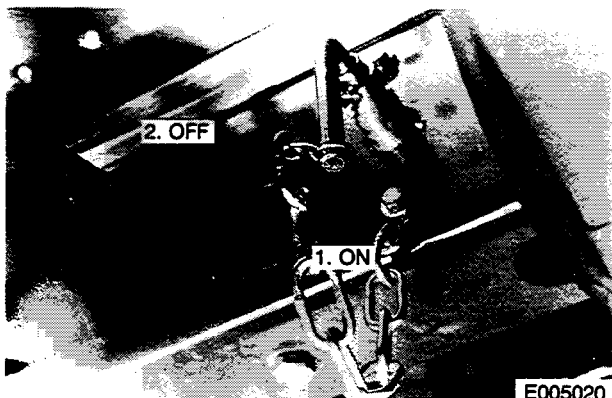
T112028

Disconnect and cap the four hoses on the steering orbitrol valve.

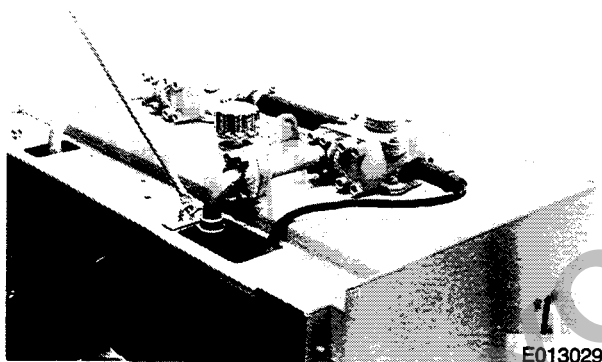
**STEP 13**

T112033

Remove floor mat to give access to the steering orbitrol valve securing screws.

**STEP 67**

Install the key and set the master disconnect switch to the ON position.

**STEP 68**

Check the level of oil in the hydraulic oil tank. The level of oil must be between level 3 and level 5 on the indicator on the front of the hydraulic oil tank. If oil is required, remove the plug on top of the filter housing and install the funnel. Add specified hydraulic oil as required. Remove the funnel and install and tighten the plug.



**WARNING:** Never operate the engine in an enclosed building. Proper ventilation is required in all circumstances.

**STEP 69**

Disengage the swing locking pin. Remove the wheel wedges. Start and run the engine at LOW IDLE and carry out a functional check of all disturbed systems. Stop the engine. Check for and repair any hydraulic oil leaks.

**STEP 70**

Check the hydraulic oil level and top-up as necessary.

**STEP 71**

Replace the lower access panel under the hydraulic oil tank.

## Disassembly

**NOTE:** For removal of the Steering Cylinder Refer to Section 5003.

### STEP 23

### STEP 21



T141034

Remove the breather to vent oil drainage.



E064008

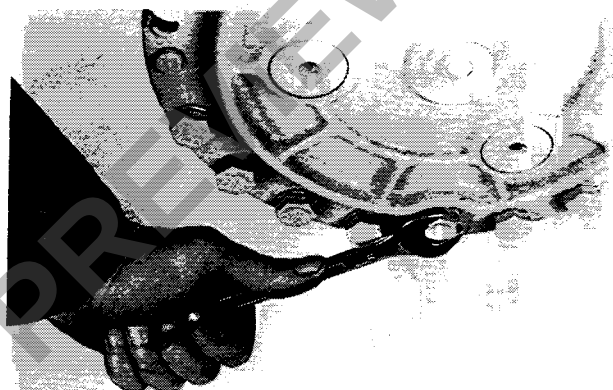
Remove the screw from the axle pivot mounting.

### STEP 24

### STEP 22



E031018

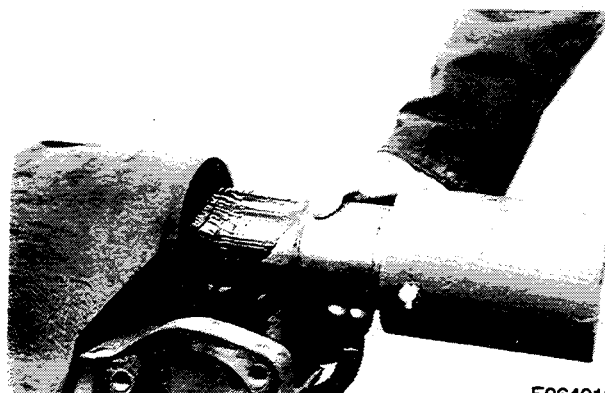


E031017

Drain the axle and hub reduction gears.

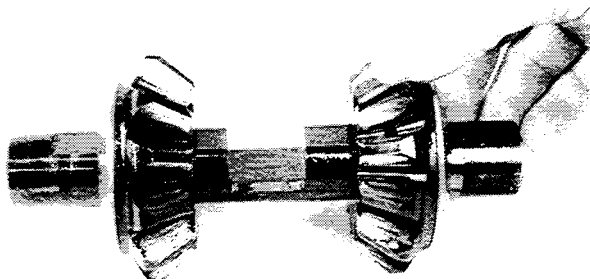


E064010



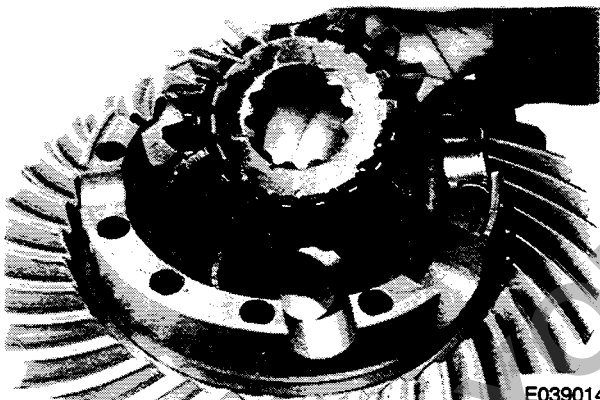
E064013

Using a drift, remove the pivot extension from the axle pivot mounting.

**STEP 93**

E039033

Remove the gears and thrust washers from each pinion.

**STEP 94**

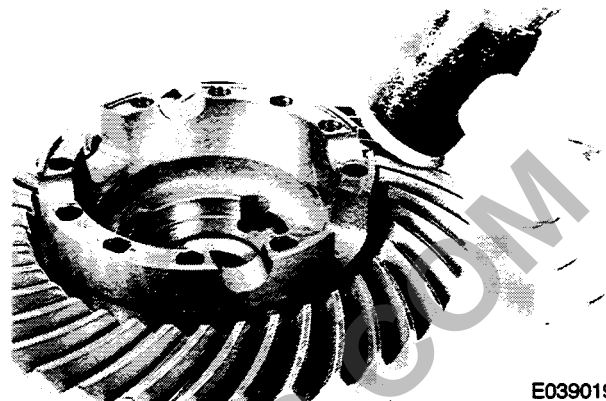
E039014

Remove the side gear.

**STEP 95**

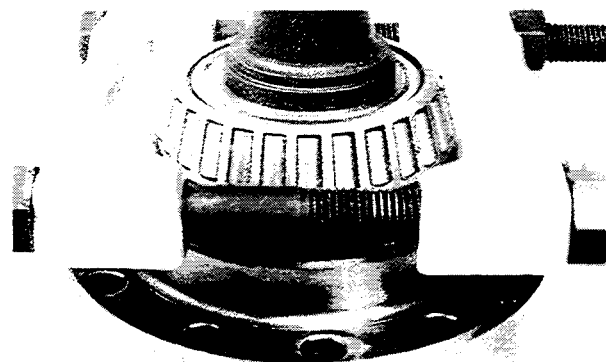
E039016

Remove the thrust washer.

**STEP 96**

E039019

Using a soft hammer, remove the ring gear.

**STEP 97**

E039027

Using special tool (Puller CAS-10563), press the bearing from each case half.

## Disassembly and Assembly

### STEP 29

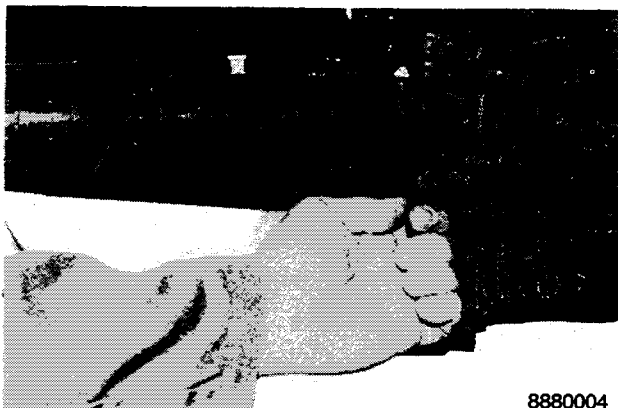
Refer to Steps 6 to 11 for disassembly of the drive shaft.

### STEP 30

Refer to Steps 12 to 17 for assembly of the drive shaft.

## Installation

### STEP 31



8880004

Support the drive shaft and install the retaining screws into the gearbox coupling.

### STEP 32



8880003

Position the drive shaft and install the retaining screws into the differential coupling. Tighten the retaining screws to a torque of 100 Nm (73 lb ft).

### STEP 33

Tighten the drive shaft to gearbox coupling retaining screws to a torque of 100 Nm (73 lb ft).

### STEP 34

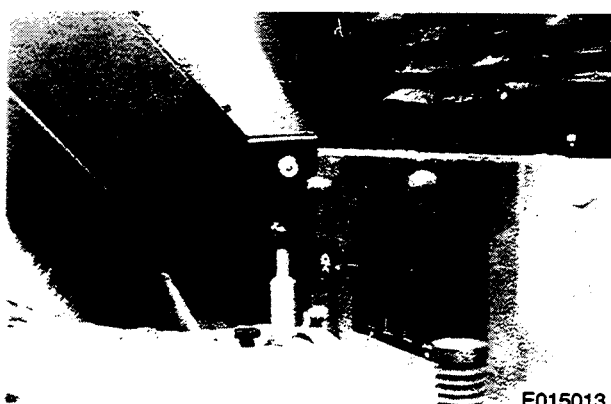
Check the drive shaft for any play in the universal joints.

### STEP 35



Install the key and turn the master disconnect switch to the ON position.

### STEP 36



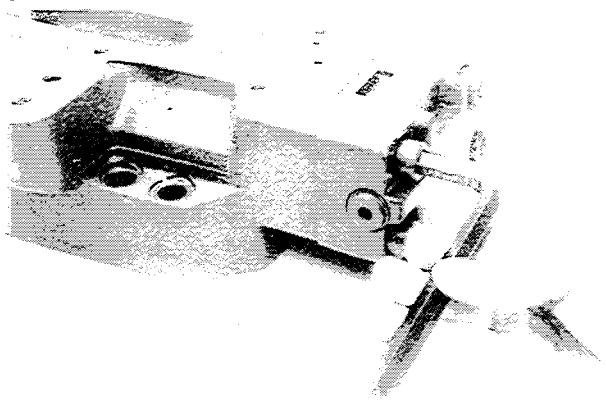
E015013

Release the swing locking pin and remove the blocks from the wheels.

# CONNECTION BLOCK

## Disassembly

### STEP 49



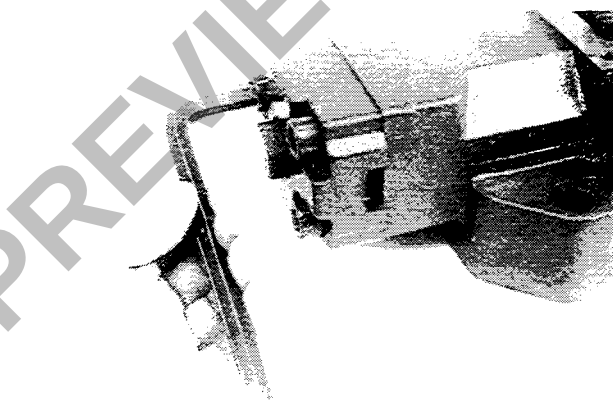
Loosen and remove the Allen screws from the end cover on the connection block.

### STEP 50



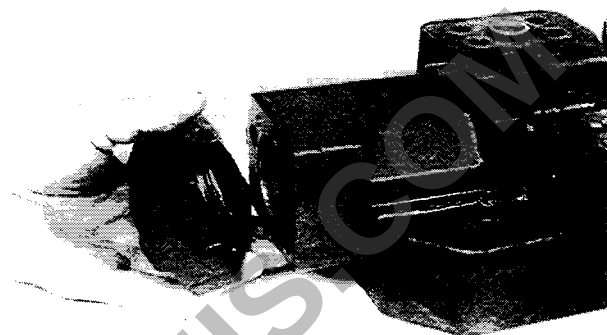
Remove the cover.

### STEP 51



Loosen and remove the Allen screws from the opposite end cover on the connection block.

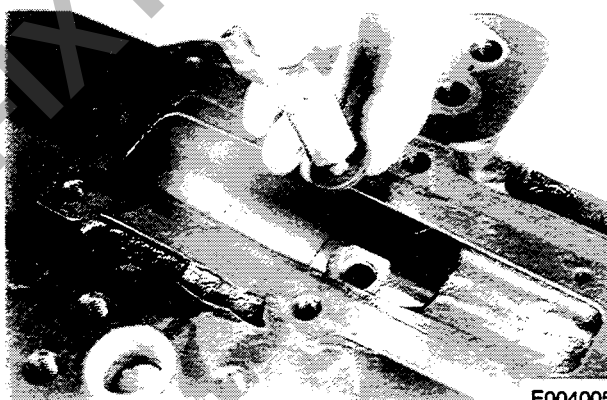
### STEP 52



E002034

Remove the cover.

### STEP 53



E004005

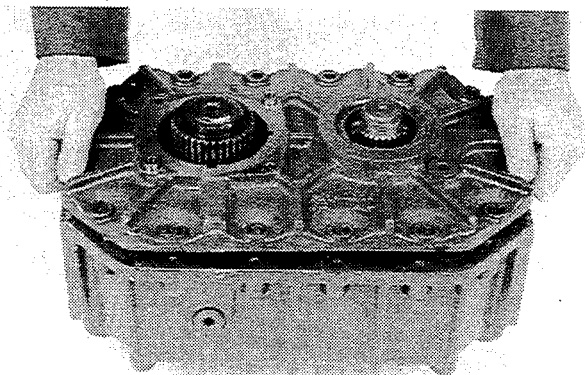
Loosen and remove the lever fork and setting shims from the setting piston.

### STEP 54



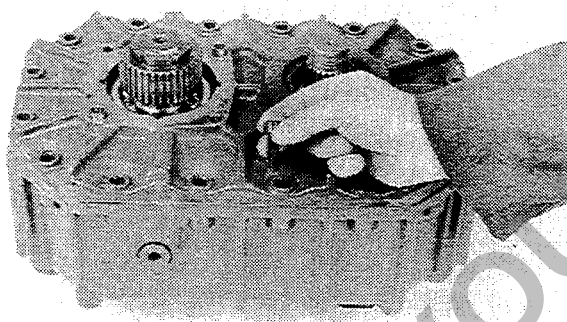
E004009

Remove the setting piston.

**STEP 25**

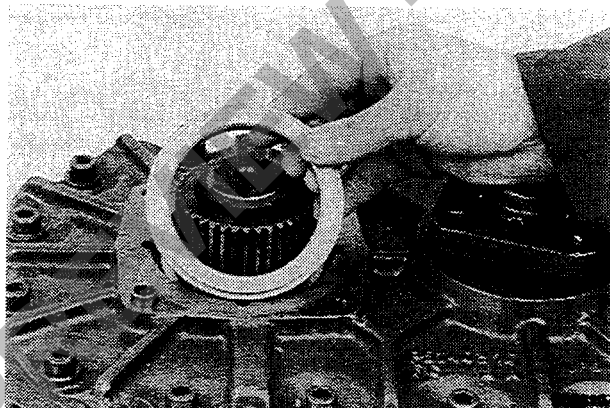
D06525

Cover the joint faces with B17555 (LOCTITE 515) and install the gearbox cover plate.

**STEP 26**

D06527

Install and tighten the cover plate bolts.

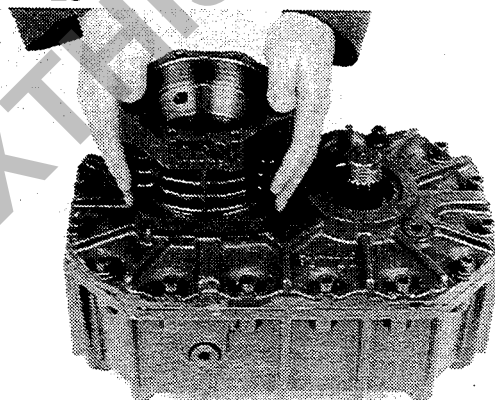
**STEP 27**

Install the spacer over the hub and locate the safety pin in the slot in the cover plate.

**STEP 28**

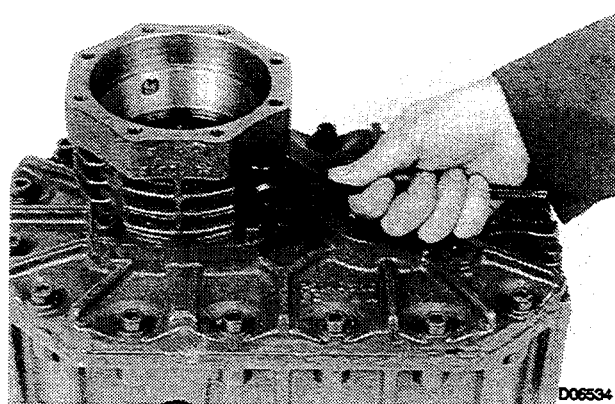
D06531

Install a new o-ring in the clutch housing joint.

**STEP 29**

D06533

Install the clutch housing onto the gearbox cover plate.

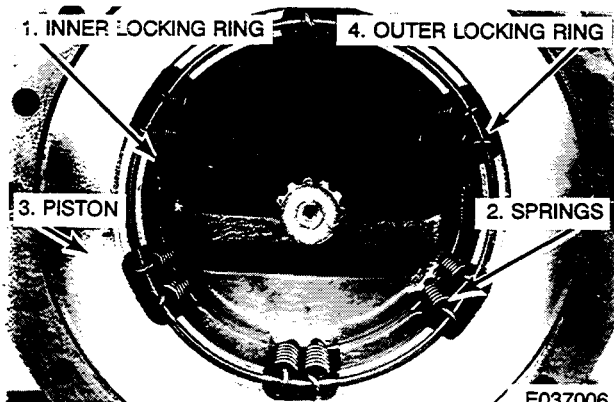
**STEP 30**

D06534

Install and tighten the clutch housing retaining bolts.

## Installation

## STEP 37



E037006

Install the piston, locking rings and springs into the axle housing.

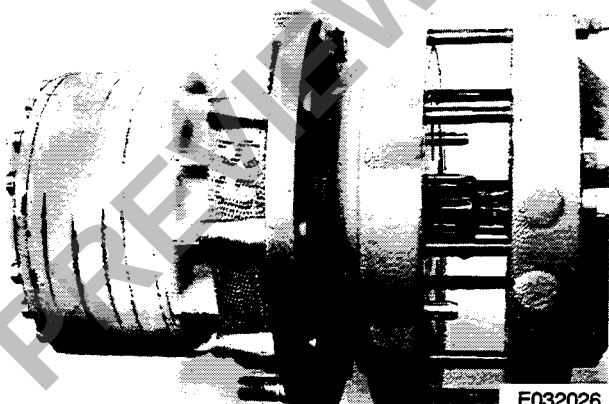
## STEP 38



E044030

Install a new O-ring to the axle housing flange.

## STEP 39



E032026

Using a suitable lifting sling and hoist, install the service brake assembly onto the axle.

## STEP 40



E032023

Install and tighten the lock nuts to a torque of 144-172 Nm (106-127 lb ft).

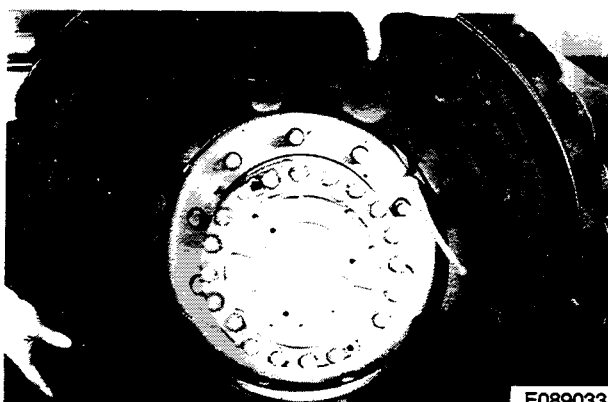
## STEP 41



E089031

Install the inner wheel to the axle.

## STEP 42



E089033

Install the rubber spacer.

## TESTING AND ADJUSTING THE FLOW SETTING VALVE FOR FORWARD DRIVE (USING A FLOWMETER)

### STEP 1

Install a flowmeter into the hydraulic circuit refer to Page 8. Connect the multi-tester to Connection B on the flowmeter.

### STEP 2

Start the engine. Raise the machine from the ground using the rear stabilizers and dozer blade.

**NOTE:** *If the machine is not equipped with a dozer blade use the attachment to raise the machine.*

### STEP 3

Heat the hydraulic oil to the correct temperature, refer to Page 8 STEPS 2 and 3

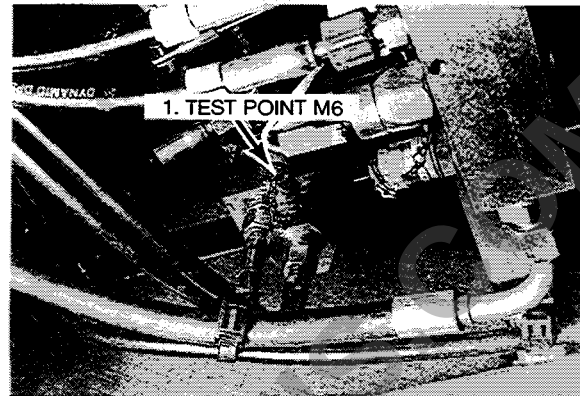
### STEP 4

With engine at full speed engage the travel control lever into forward drive position. Press the travel pedal fully down and keep it there. Take a note of the flow.

The flow must be between 160 and 170L/min (35 and 37 gal/min). If the flow is not correct adjust the Travel Flow Setting Valve (L). Loosen the locknut and turn the screw clockwise to decrease and counterclockwise to increase the flow. Tighten the locknut.

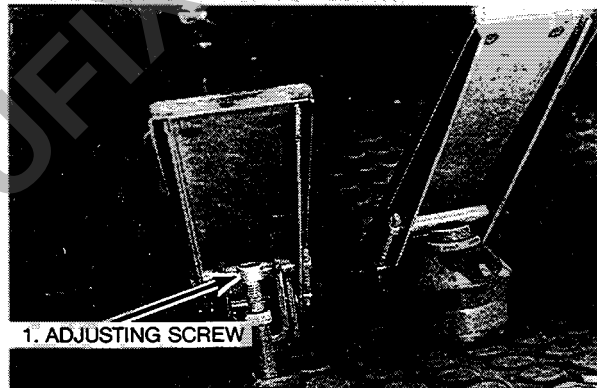
**NOTE:** *If the correct flow cannot be obtained by adjusting the Travel Flow Setting Valve (L) refer to STEPS 5 and 6.*

### STEP 5



Connect a multi-tester or 0 to 40 Bar (0 to 600 PSI) pressure gauge to TEST POINT M6.

### STEP 6



With the engine at full speed engage the travel control lever into the forward drive position. Press the travel pedal fully down and keep it there.

Take a note of the pressure.

The pressure must be between 23 and 24 bar (333 and 348 PSI). If the pressure is not correct adjust the travel pedal adjusting screw. Loosen the locknut and turn the screw clockwise to increase or counterclockwise to decrease the pressure. Tighten the locknut. Disconnect the multi-tester from TEST POINT M6.

### STEP 7

Repeat STEP 4 to check the flow after setting the pressure.

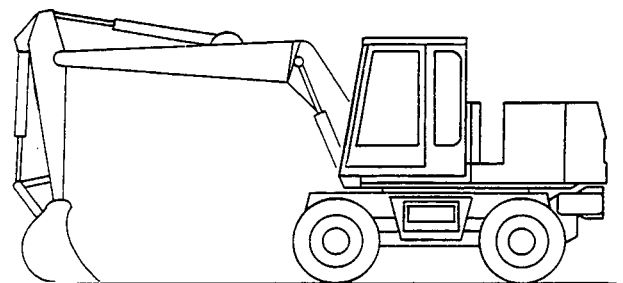
## High Pressure Pump and Regulator Removal



**WARNING:** When the machine is operating, the engine systems and the hydraulic pump systems heat up to a high temperature. To avoid the possibility of being burnt by hot metal or scalded by oil or water, allow the machine to cool before starting any maintenance work.

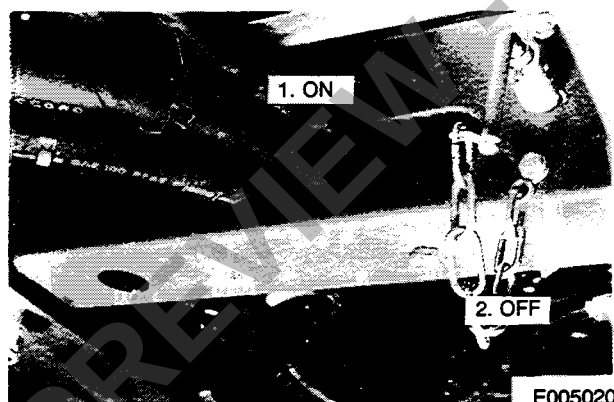
**NOTE:** The fixed flow pump can be removed without removing the variable flow pump and regulator. If the fixed flow pump only is to be removed, refer to Fixed Flow Pump Removal on page 45.

### STEP 1



Park the machine on hard level ground. Position the attachment as shown and engage the upper structure swing locking pin. Stop the engine and wedge the front and rear wheels.

### STEP 2



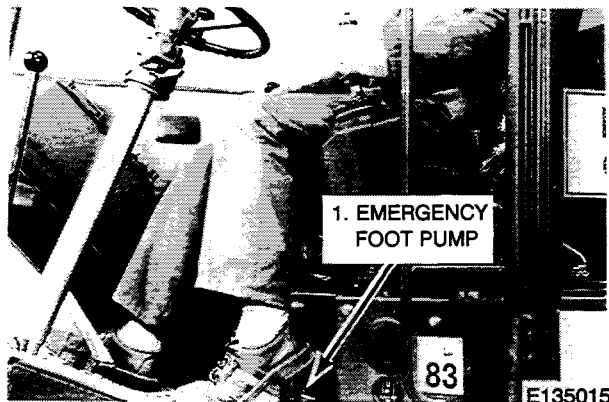
Set the master disconnect switch to the OFF position and remove the key.

### STEP 3

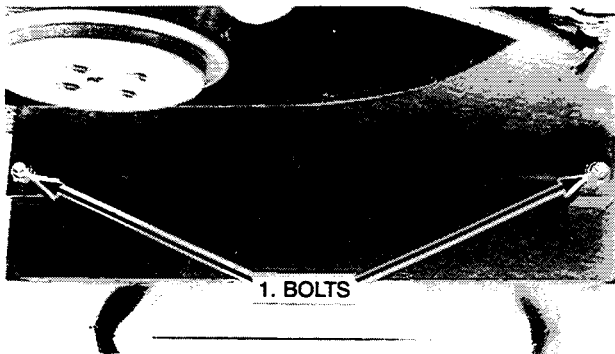


Remove the lower access panel under the engine to gain access to the hydraulic oil tank shut-off valve. Remove the locking pin, pull the shut-off valve knob down to the closed position.

### STEP 4

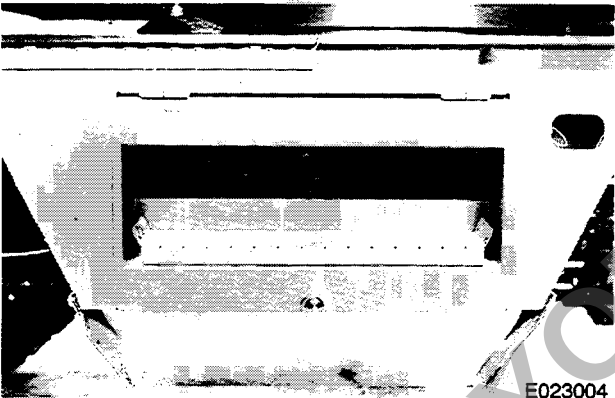


Operate the emergency foot pump while operating the control levers in all directions to release the hydraulic pressure in all circuits.

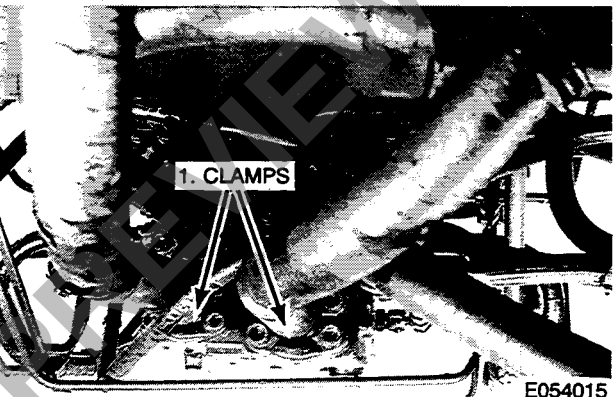
**STEP 6**

E023009

Remove the two bolts, washers and nuts securing the travel valve cover box.

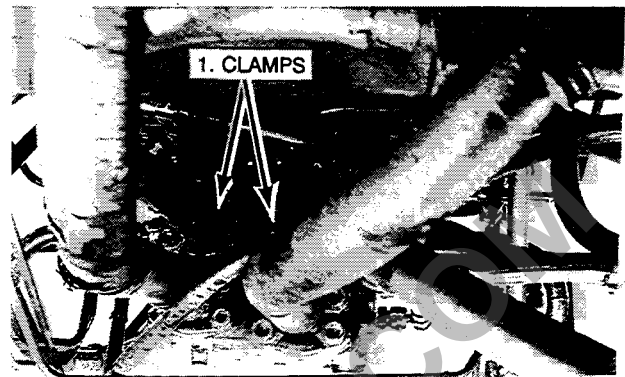
**STEP 7**

Slide the box rearwards to free it from its hinges. Remove the box from the machine.

**STEP 8**

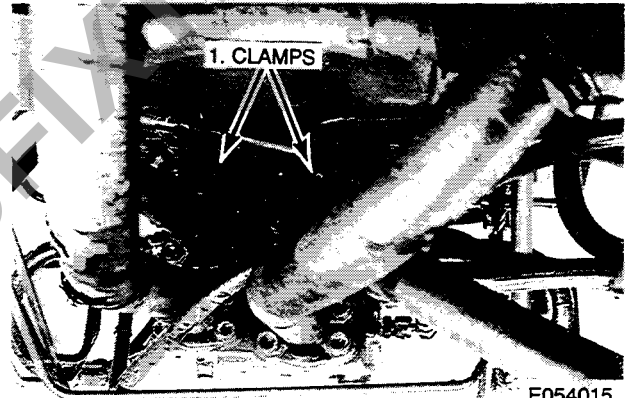
E054015

Mark the position of the feed hose and return hose clamps, tag the hoses. Remove the eight screws securing the clamps to the valve. Remove and discard O-ring.

**STEP 9**

E054015

Mark the position of the travel motor hose clamps and tag the hoses. Remove the eight screws securing the clamps to the valve. Remove and discard the O-rings from the hose ends.

**STEP 10**

E054015

Tag the stabilizer and dozer blade feed pipes. Remove the eight Allen screws securing the clamps to the valve. Remove and discard the O-rings.

**STEP 11**

Tag and remove the remaining pipes and hoses.

**NOTE:** Cap the openings and hoses to prevent foreign material from entering the hydraulic system.

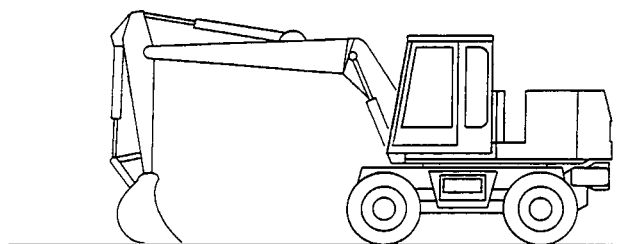
## STABILIZER VALVE

### Removal



**WARNING:** When the machine is operating, the engine systems and the hydraulic pump system heat up to a high temperature. To avoid the possibility of being burnt by hot metal or scalded by hot oil or water, allow the machine to cool before starting any maintenance work.

#### STEP 1



Park the machine on hard level ground. Position the attachment as shown and engage the upperstructure swing locking pin. Stop the engine. Wedge the front and rear wheels.

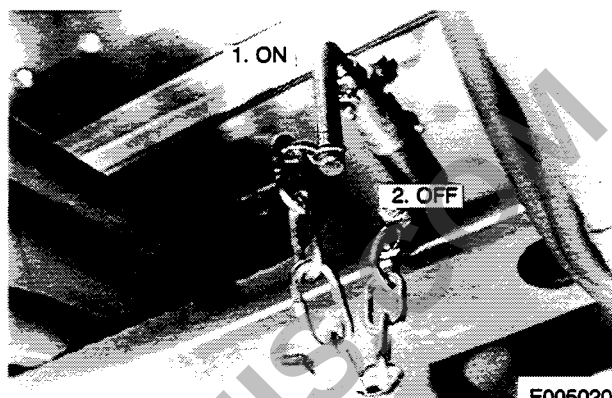
#### STEP 2



T135019

Operate the emergency foot pump while operating the hand control levers in all directions to release the pressure in all the hydraulic circuits.

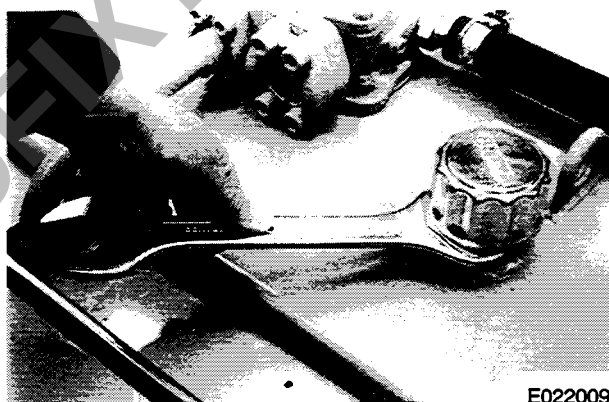
#### STEP 3



E005020

Set the master disconnect switch to the OFF position and remove the key.

#### STEP 4



E022009

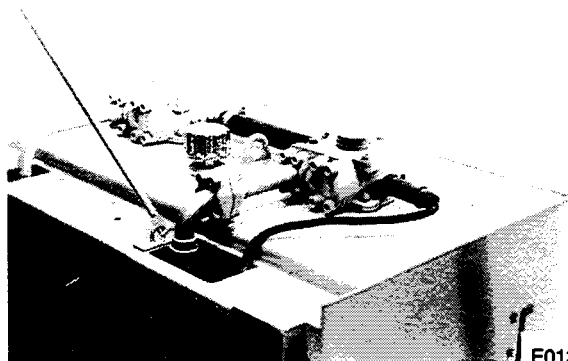
Remove the breather to release the pressure in the hydraulic oil tank. Install and tighten the breather.

#### STEP 5



T135008

Remove the access panel under the hydraulic oil tank. Remove the pin and pull down to knob to close the hydraulic oil tank shut off valve.

**STEP 42**

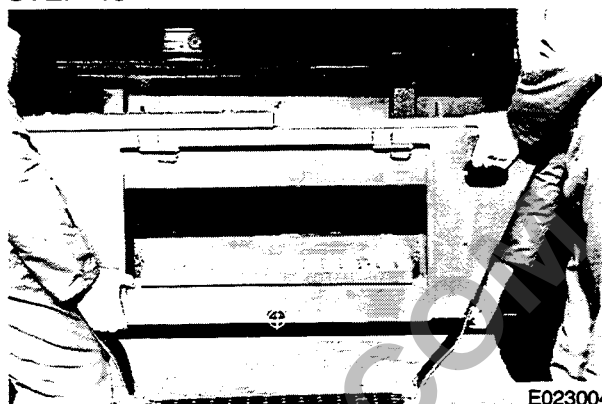
Start and run the engine at LOW IDLE. Raise the attachment off the ground. Fully retract the bucket and dipper cylinders. Lower the attachment to the ground. Stop the engine. Check the level of oil in the hydraulic oil tank. The level of oil must be between level 3 and level 5 on the indicator at the front of the hydraulic oil tank. If oil is required, remove the plug from the top of the filter housing. Screw in the funnel and add specified hydraulic oil as required. Remove the funnel, install and tighten the plug.

**STEP 43**

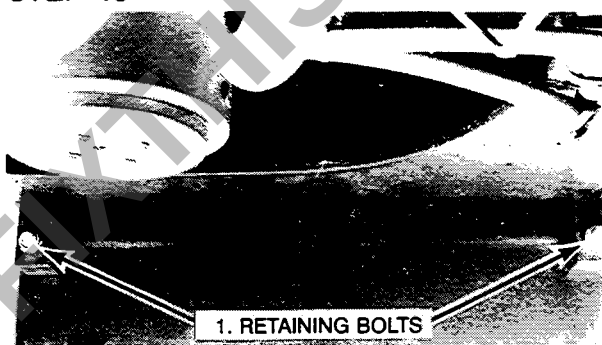
Start and run the engine. Raise the attachment. Drive the machine down a short ramp or other downward slope to check the operation of the drive speed limiter. Stop the engine. If adjustment is required to the speed limiter, refer to Section 8001.

**STEP 44**

Check for and repair any hydraulic oil leaks at the drive speed limiter.

**STEP 45**

Position the travel valve cover box.

**STEP 46**

Install the two bolts, washers and nuts securing the cover box to the machine. Tighten the bolts to a torque of 52 Nm (38 lb ft).

**STEP 47**

Install the access panel under the hydraulic oil tank.

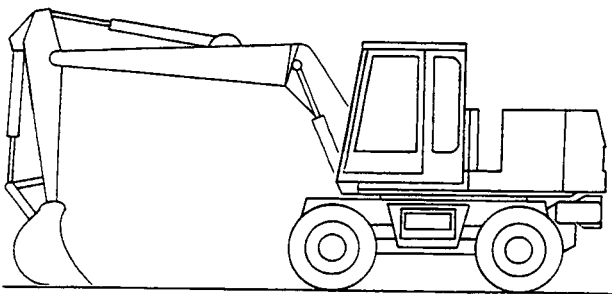
## FORWARD AND REVERSE TRAVEL CONTROL VALVE

### Removal



**WARNING:** When the machine is operating, the engine systems and the hydraulic pump systems heat up to a high temperature. To avoid the possibility of being burnt by hot metal or scalded by oil or water, allow the machine to cool before starting any maintenance work.

#### STEP 1



Park the machine on hard level ground. Position the attachment as shown and engage the upperstructure swing locking pin. Stop the engine and wedge the front and rear wheels.

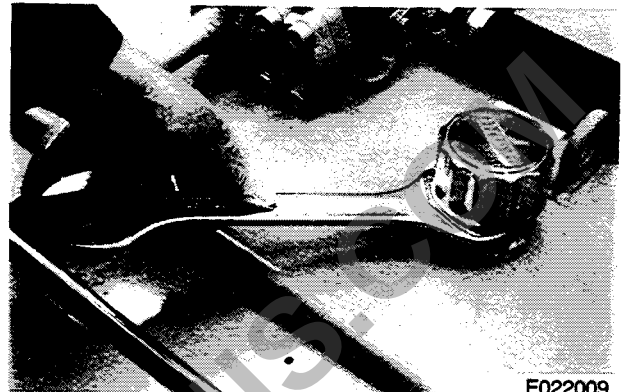
#### STEP 2



T135019

Operate the emergency foot pump while operating the hand control levers in all directions to release the pressure in all the hydraulic circuits.

#### STEP 3



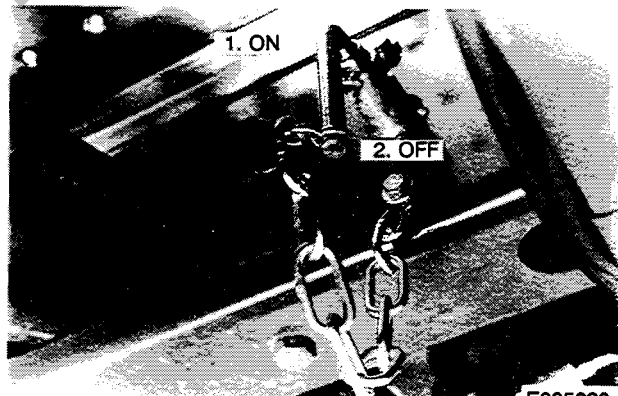
E022009

Remove the breather cap to release the pressure in the hydraulic oil tank. Install and tighten the breather.

#### STEP 4

Remove the lower access panel under the engine to gain access to the hydraulic oil tank shut-off valve. Remove the locking pin, pull the shut-off valve knob down to the closed position.

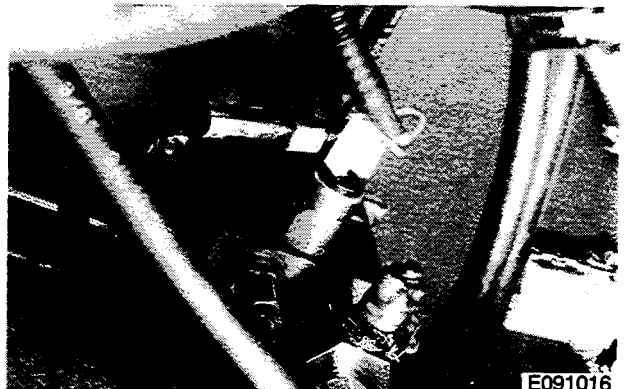
#### STEP 5



E005020

Set the master disconnect switch to the OFF position and remove the key.

#### STEP 6



E091016

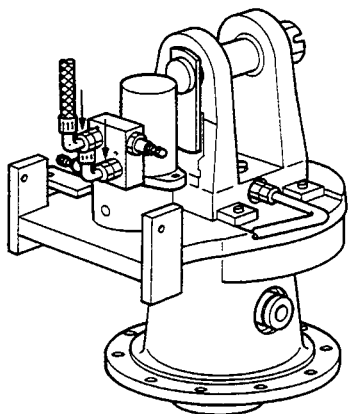
Tag, disconnect and cap the hydraulic hoses.

## Installation

### STEP 16

Mount the safety valve on the swing motor with the four fixing screws and two new "O" rings. Tighten to a torque of 25 to 27.5 N.m (18 to 19.8 lb ft).

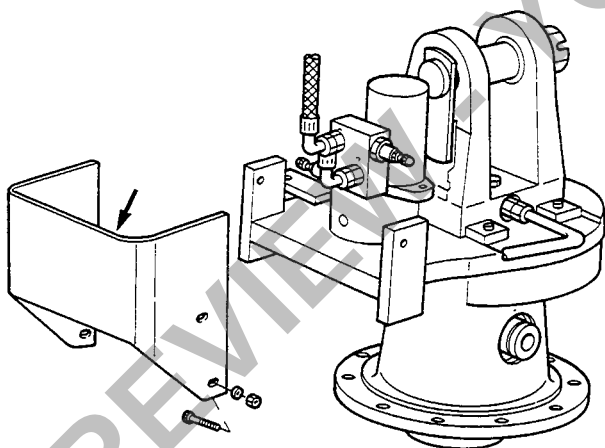
### STEP 17



1080701B

Remove the hose plugs, install new seals and connect the hoses to the safety valve.

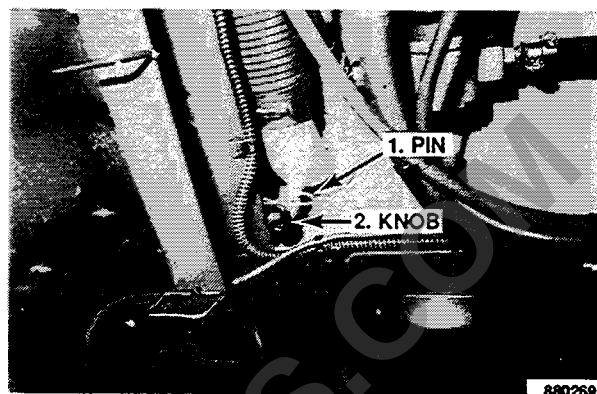
### STEP 18



1080701A

Install the clamshell swing motor cover.

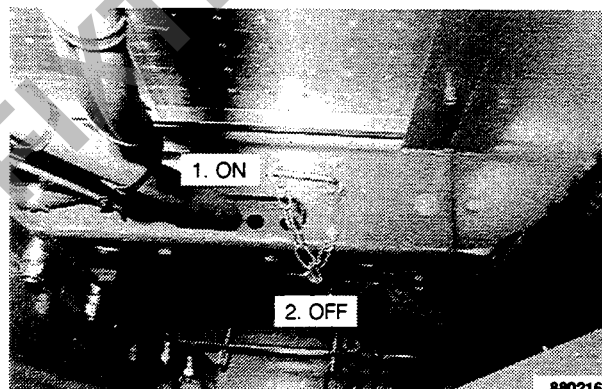
### STEP 19



880269A

Push the knob up and install the pin to open the hydraulic oil reservoir shut off valve.

### STEP 20



880216A

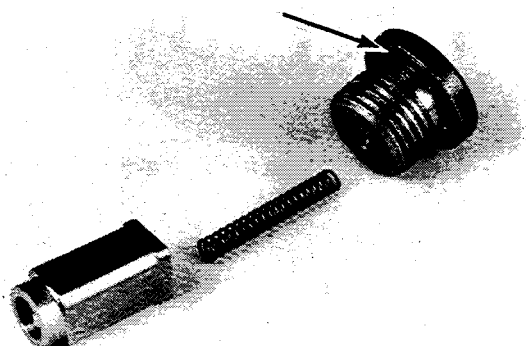
Install the key and turn the master disconnect switch to the ON position.

### STEP 21

Start up the engine and operate the clamshell swing control. Check that there are no leaks in the circuit.

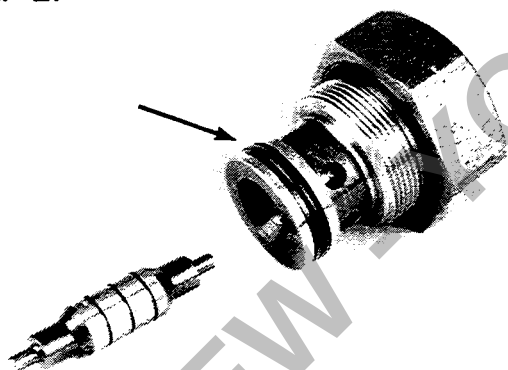
**STEP 25**

Clean and inspect all component parts for wear and damage. Check the piston and cylinder bore for scoring etc. Replace as necessary.

**STEP 26**

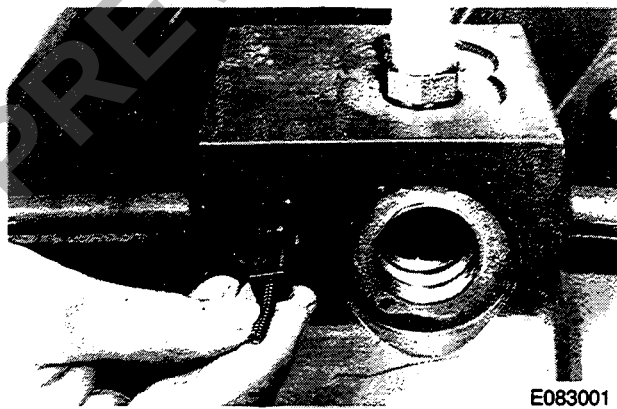
E083003

Install a new O-ring onto the plug.

**STEP 27**

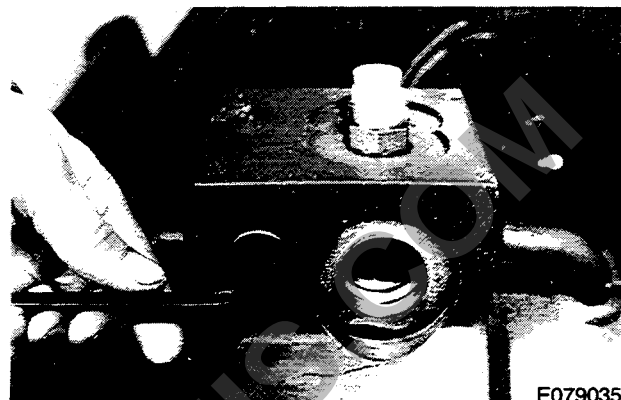
E083005

Install a new O-ring onto the plug body.

**STEP 28**

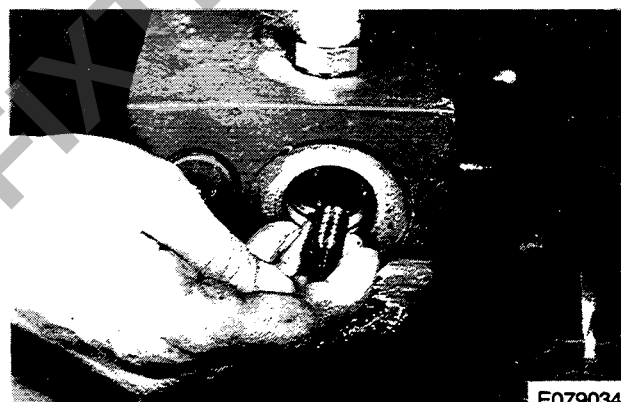
E083001

Install the plunger and spring into the connection block.

**STEP 29**

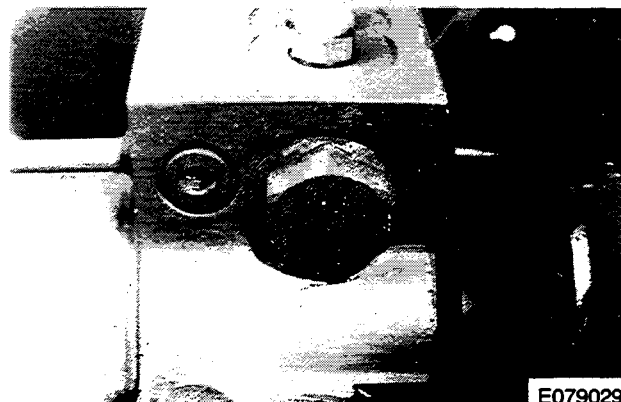
E079035

Install and tighten the plug.

**STEP 30**

E079034

Install the piston into the connection block.

**STEP 31**

E079029

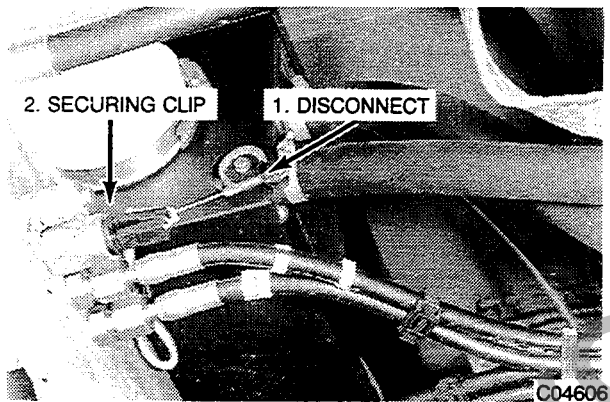
Install and tighten the plug.

## STEP 7



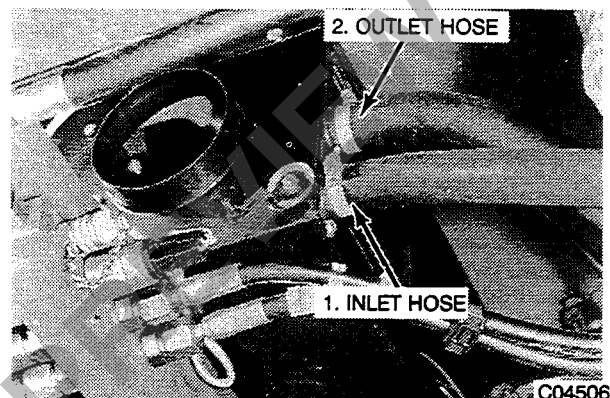
Remove the lower turntable access cover.

## STEP 8



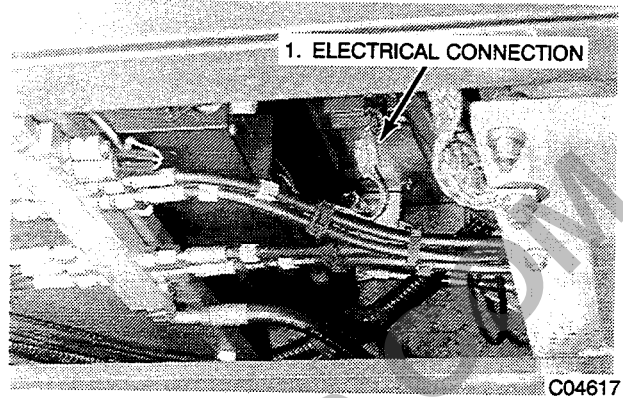
Disconnect the heater control cable and remove the securing clip.

## STEP 9



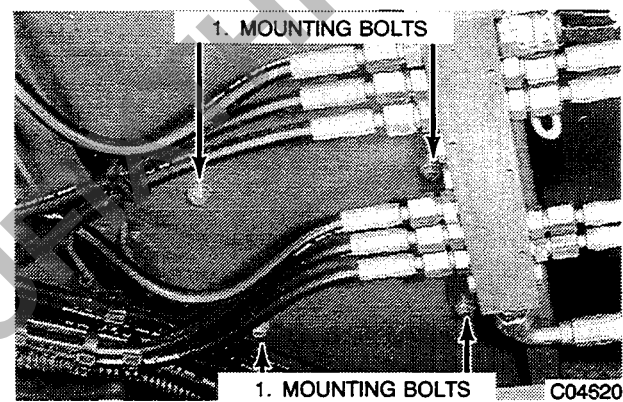
Disconnect and cap the inlet and outlet heater hoses.

## STEP 10



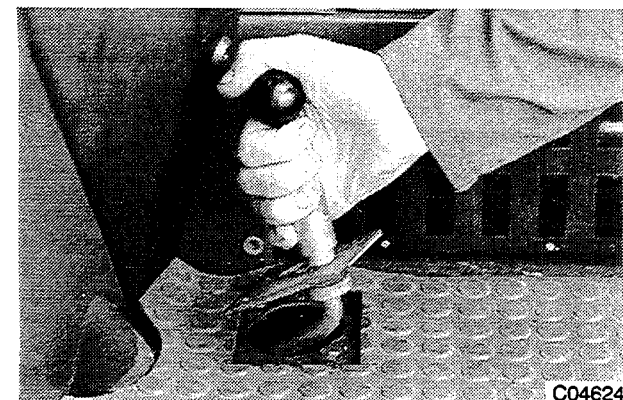
Disconnect the electrical connection.

## STEP 11



Remove the heater mounting bolts.

## STEP 12



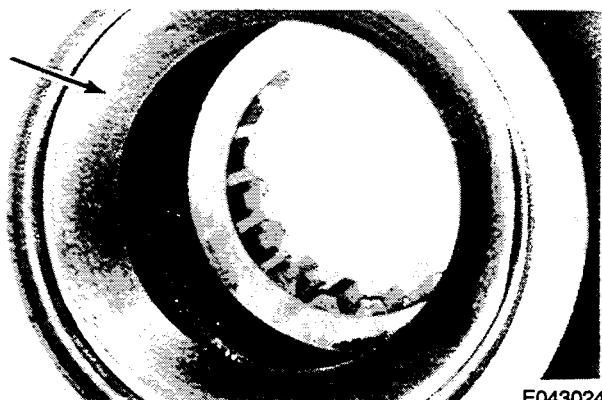
Remove the swing lock pin.

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6005-26

**STEP 98**



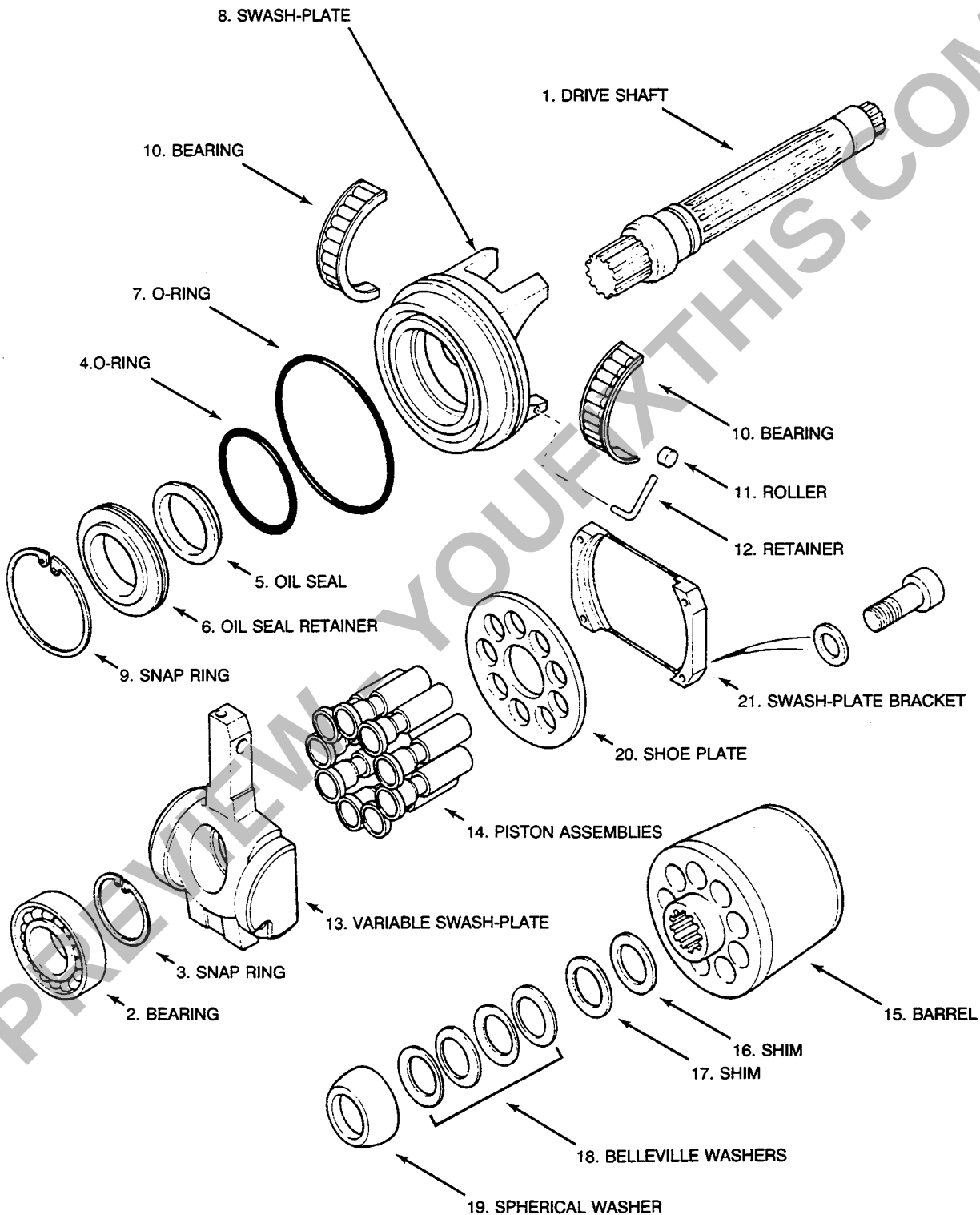
E043024

Extract the outer bearing cups from each side of the housing.

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## Variable Flow Pump Assembly

**NOTE:** If necessary, refer to Regulator Disassembly on page 22, Bearing Housing Disassembly on page 29 and Fixed Flow Pump Disassembly on page 33 before assembling the variable flow pump.



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