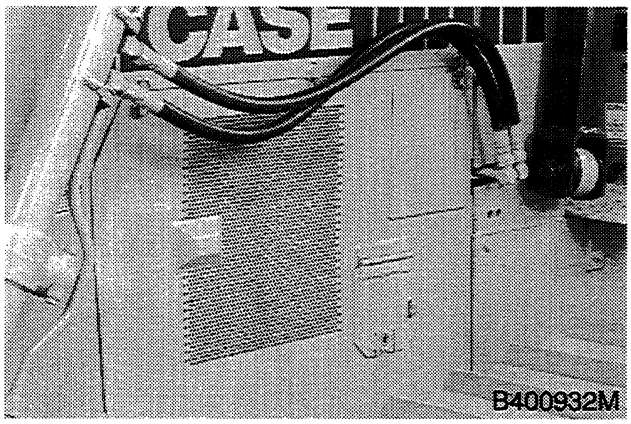
RADIATOR

Removal

STEP 1
Park the machine on a level surface, lower the blade and rear mounted equipment to the floor, stop the engine, and apply the parking brake.

STEP 2


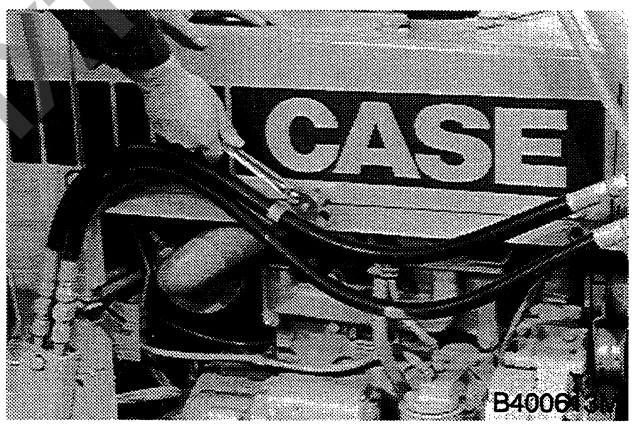
Remove the engine side panels.

STEP 3


Remove the precleaner or cap from the air cleaner tube.

STEP 4


Remove the rubber seal from the air cleaner tube.

STEP 5


Remove the cap screws, bolts, and nuts that fasten the hood in place.

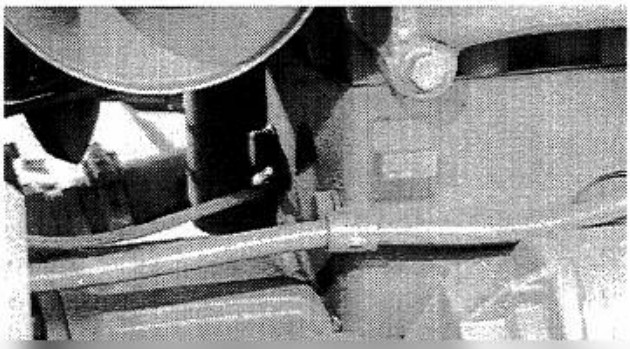
STEP 6


Remove the hood.

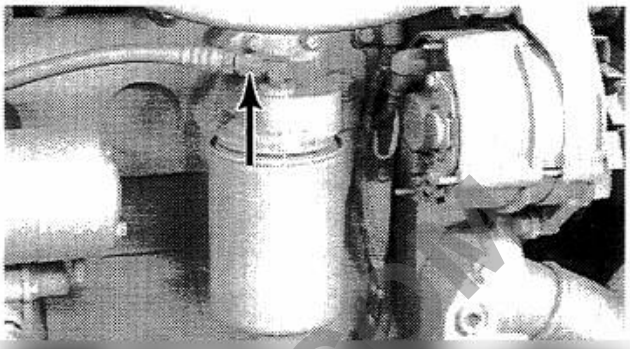
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STEP 60



STEP 63

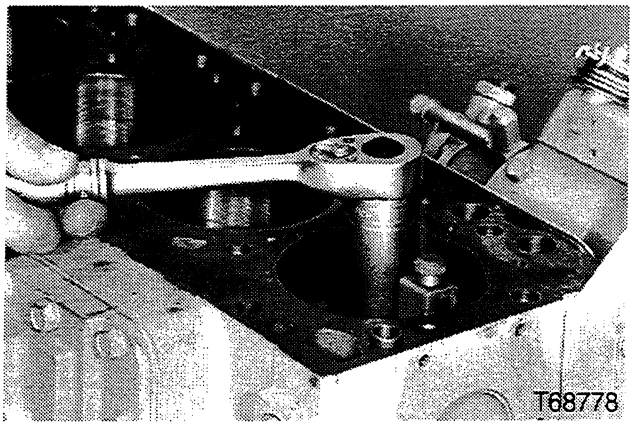


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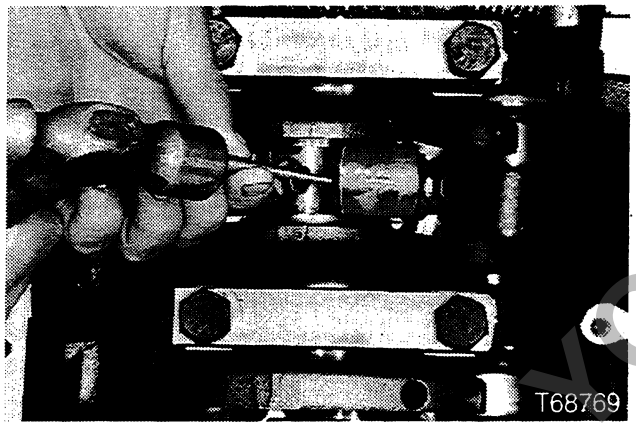
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STEP 80



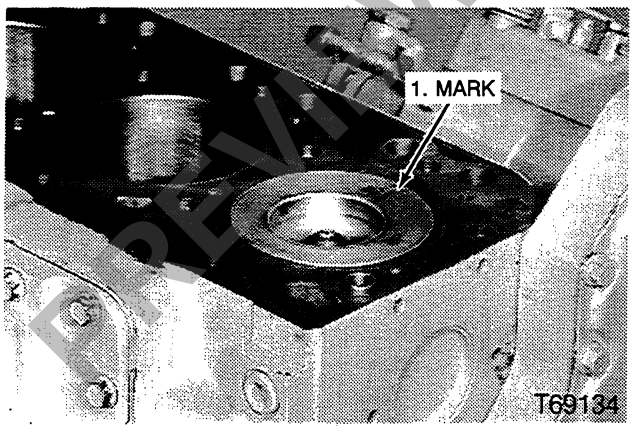
Install a ridge reamer and remove the ridge from the cylinder walls.

STEP 81



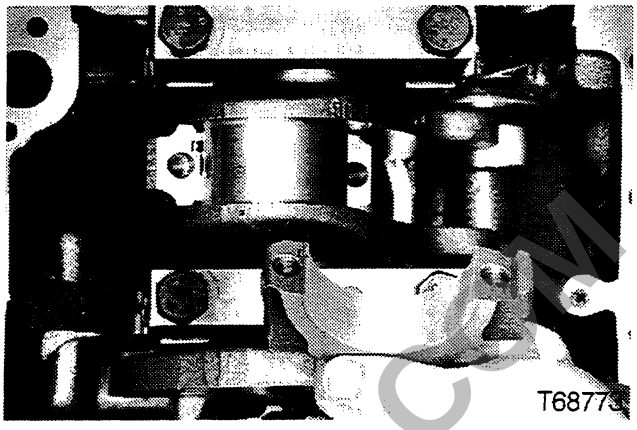
Put a mark on each rod cap for cylinder identification.

STEP 82



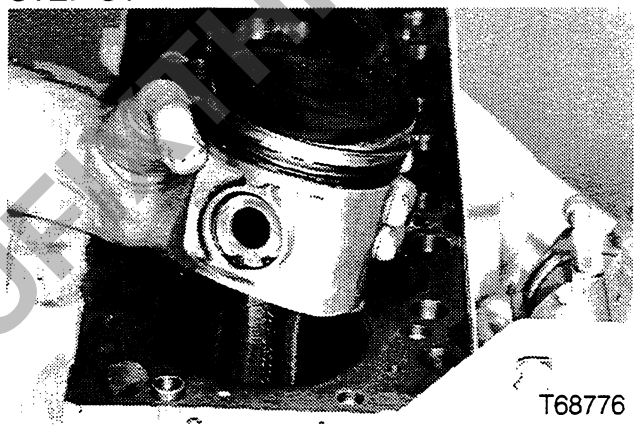
Put an identification mark on each piston for assembly.

STEP 83



Remove the rod cap.

STEP 84



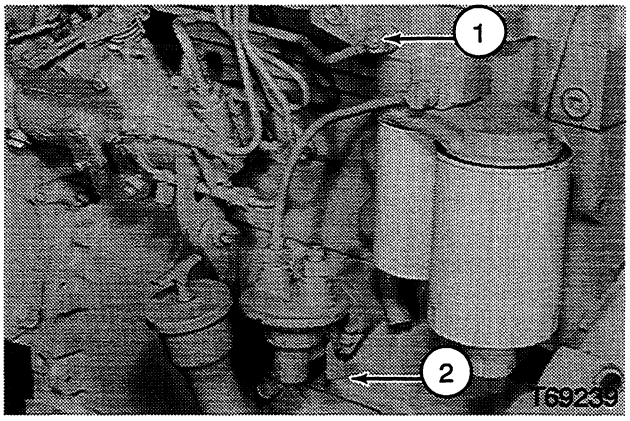
Remove the pistons from the top of the engine block.

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BLEEDING AIR FROM THE FUEL SYSTEM

STEP 5 4-390 ENGINE

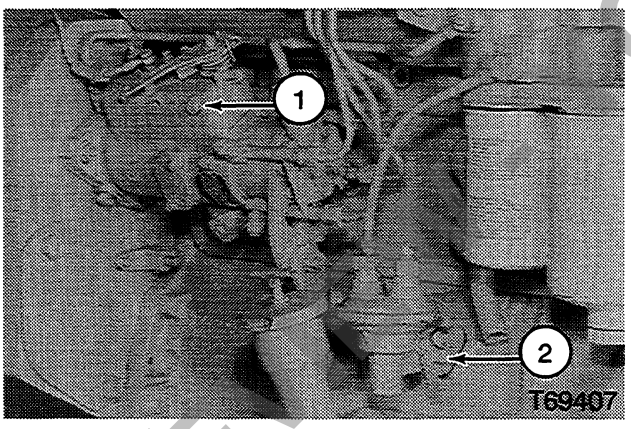


1. Bleed Screw
2. Primer Pump

Make sure there is fuel in the fuel tank. Loosen the bleed screw and actuate the primer pump. Tighten the bleed screw when clear fuel with no air bubbles flows from the bleed screw.

NOTE: *If the primer pump can not be actuated, rotate the engine until the primer pump can be actuated.*

STEP 6 4-390 ENGINE

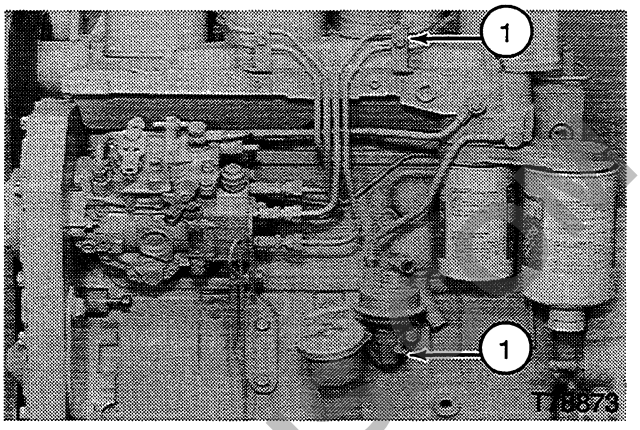


1. Bleed Screw
2. Primer Pump

Put the key switch in the ON position. Loosen the bleed screw on the fuel injection pump. Actuate the primer pump. Tighten the bleed screw when clear fuel with no air bubbles flows from the bleed screw.

NOTE: *If the primer pump can not be actuated, rotate the engine until the primer pump can be actuated.*

STEP 7 4T-390 ENGINE



1. Bleed Screw
2. Primer Pump

Make sure there is fuel in the fuel tank. Loosen the bleed screw and actuate the primer pump. Tighten the bleed screw when clear fuel with no air bubbles flows from the bleed screw.

NOTE: *If the primer pump can not be actuated, rotate the engine until the primer pump can be actuated.*

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SAFETY RULES

Never try to charge the battery if the electrolyte in the battery is frozen. 47-83A

Never cause sparks to occur or smoke near batteries that are charging or have been recently charged. 13-8A

Disconnect the ground cable first when the battery cables are disconnected from the battery.

Connect the ground cable last when the battery cables are connected to the battery. 47-55A

Some batteries have a ventilation tube. If there is battery acid in the ventilation tube, this battery acid can be released when the battery is turned upside down. If you turn the battery upside down, make sure that the end of the ventilation tube is away from you and away from any other people in the area. Battery acid can cause severe burns. 48-57B

If the battery(s) in this machine must have nonspill caps, do not operate the machine if the nonspill caps do not work correctly, or if the nonspill caps are not in place. 48-99A

Battery acid causes severe burns. Batteries contain sulfuric acid. Avoid contact with skin, eyes, or clothing. Antidote: EXTERNAL-Flush with water. INTERNAL-Drink large quantities of water or milk. Follow with milk of magnesia, beaten egg, or vegetable oil. Call physician immediately. Eyes: Flush with water for 15 minutes and get prompt medical attention.

Batteries produce explosive gases. Keep sparks, flame, and cigarettes away. Ventilate when charging or using in enclosed area. Always shield eyes when working near batteries.

Keep out of reach of children. D-47-53A

SPECIAL TOOLS

Order special tools from one of the following companies:

In the U.S.A. and Canada
Service Tools
P.O. Box 314
Owatonna, Minnesota 55060

In Europe
VL Churchill Ltd.
P.O. Box 3, Daventry
Northants, NN11 4NF
England

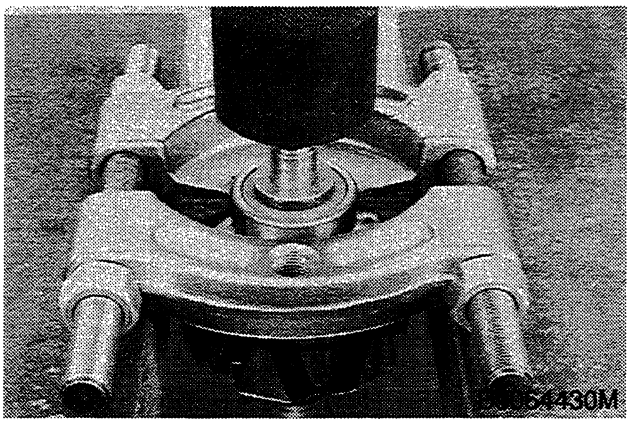


The CAS-10147 tester is used to do the Capacity (Load) Test.

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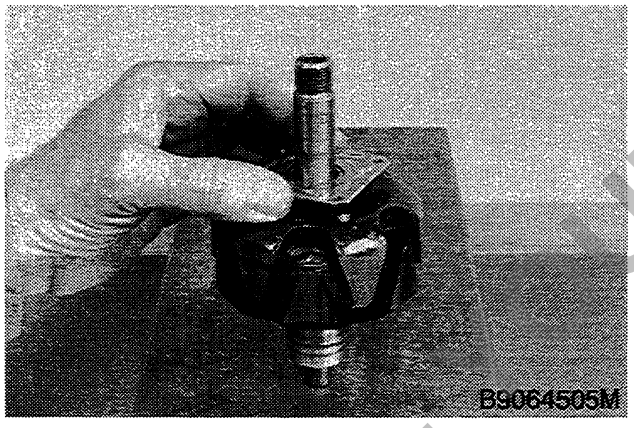
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STEP 13



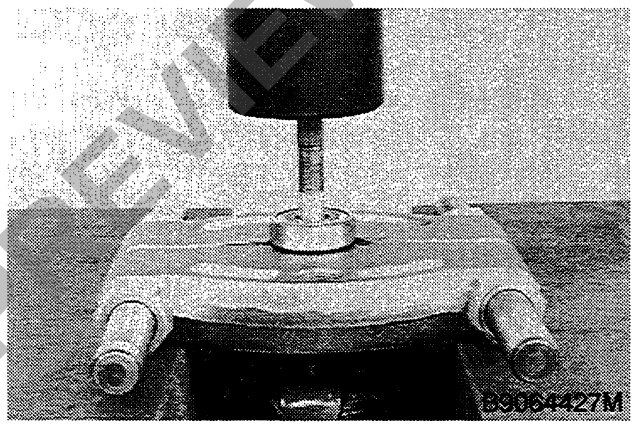
Use an acceptable puller and press the rotor out of the spacer and bearing.

STEP 14



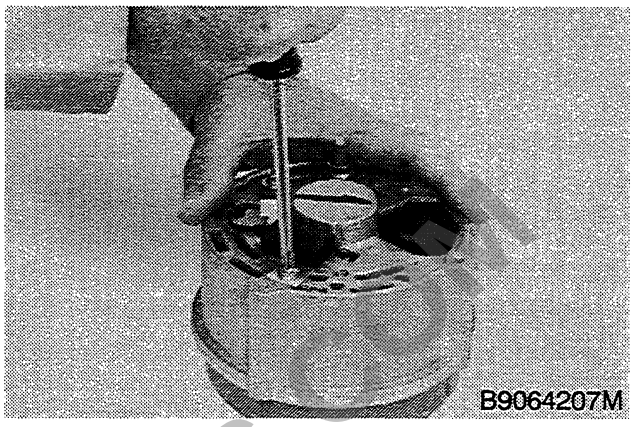
Remove the retainer.

STEP 15



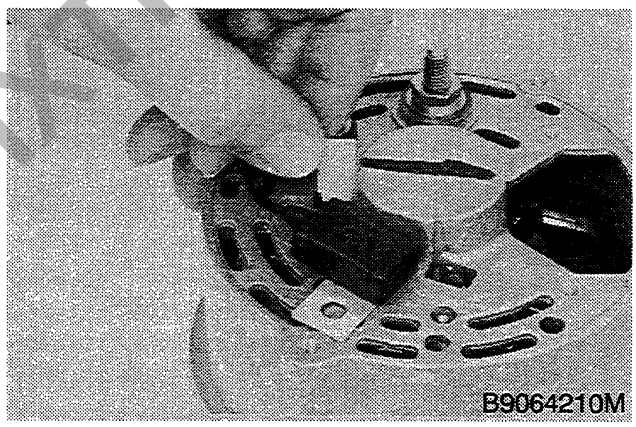
Use an acceptable puller and driver and press the rotor out of the other bearing.

STEP 16



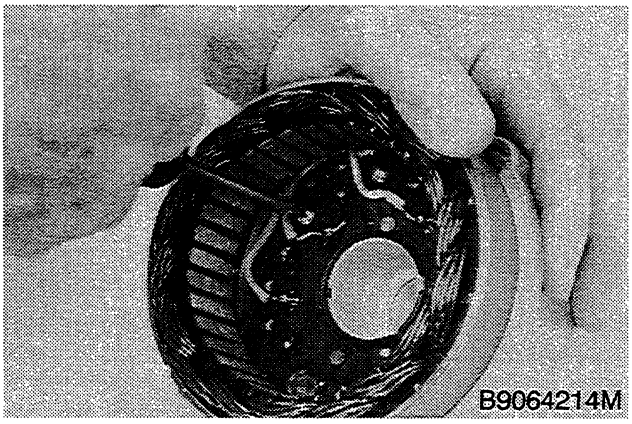
Loosen and remove the screw that holds the condenser.

STEP 17



Disconnect the lead from the condenser from the terminal and remove the condenser.

STEP 18



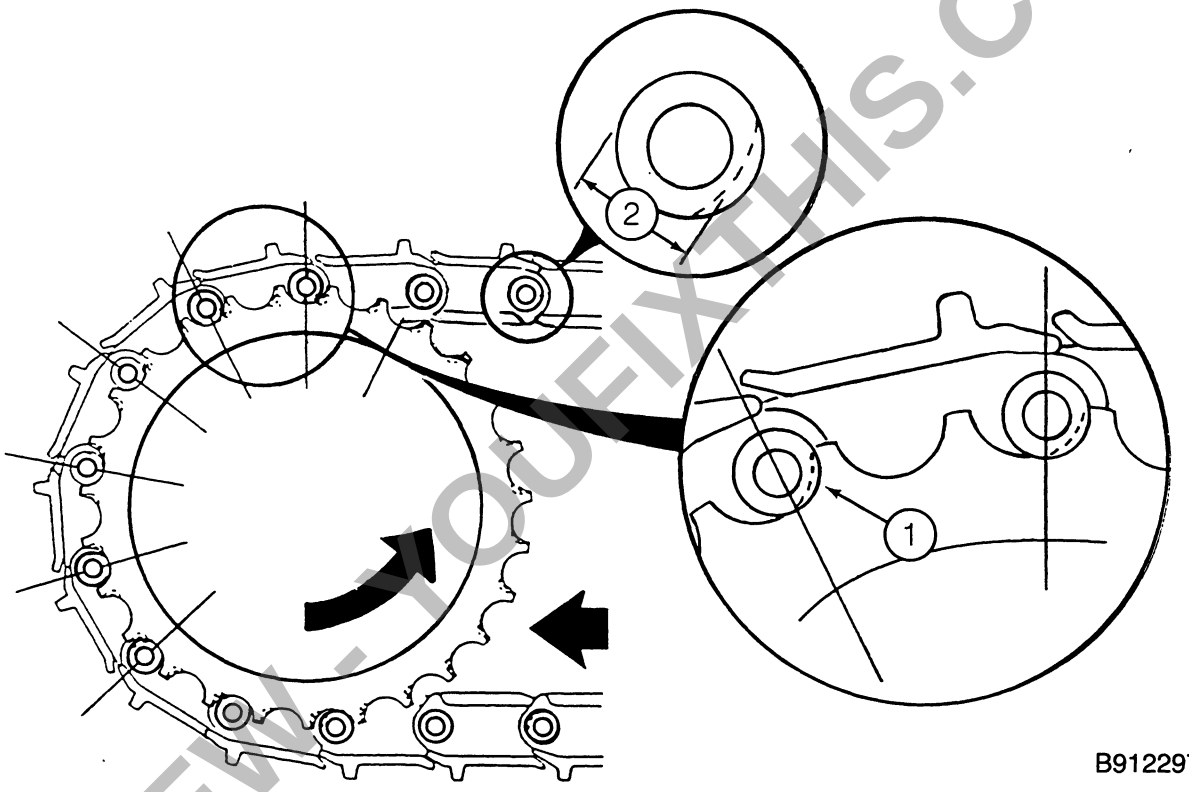
Loosen and remove the two screws that hold the rectifier bridge.

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Sprocket Reverse Drive Side Wear (Machine Traveling in Reverse)

Reverse drive side wear can be the most severe wear you can have with the sprocket teeth and bushings. When moving in reverse, the sprocket teeth contact the chain bushings at about 12 o'clock. Most of the torque required to move the machine is transfered to the track chain between 12 and 11 o'clock. During this time the bushing is rotating against the sprocket. A pocket forms on the reverse side of the sprocket tooth where the rotating bushing is making contact. This contact causes accelerated wear, especially when the machine is moving at high speed.



B912297J

1. Reverse Wear of the Sprocket
2. Reverse Wear of the Bushing

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STEP 22
Put the track in position under the sprocket, track rollers, and the idler

STEP 23
Lift the machine and remove the blocks

STEP 24
Lower the machine until the teeth on the sprocket are just above the bushings in the chain links.

STEP 25
Move the track forward or backward until the bushings are in alignment with the teeth on the sprocket.

STEP 26
Align the track with the idler.

STEP 27
Lower the machine onto the track.

STEP 28
Connect a chain hoist to the end of the track

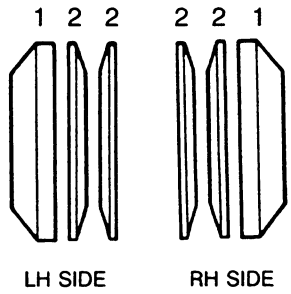
STEP 29
Use the chain hoist to lift the track over the sprocket, carrier roller, and the idler. Use a prybar to align the chain links in the track with the teeth in the sprocket.

STEP 30
Disconnect the chain hoist from the track.

STEP 31
If necessary, clean the master bushing and master pin.

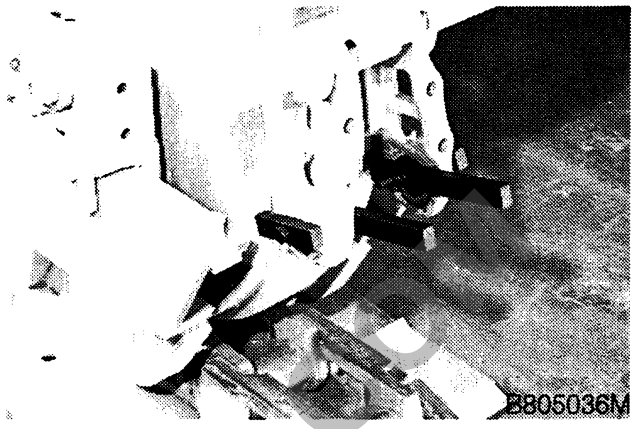
STEP 32
Lubricate the master bushing, master pin, and seals with the oil specified on Page 3.

STEP 33
It is recommended that new seals be used Install two seals and a spacer in each side of the master link as shown below.

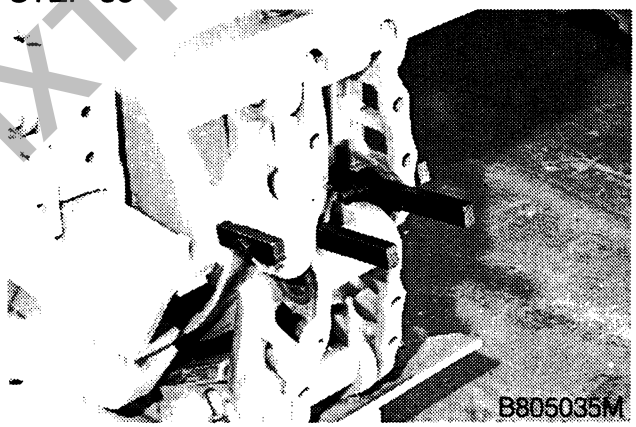


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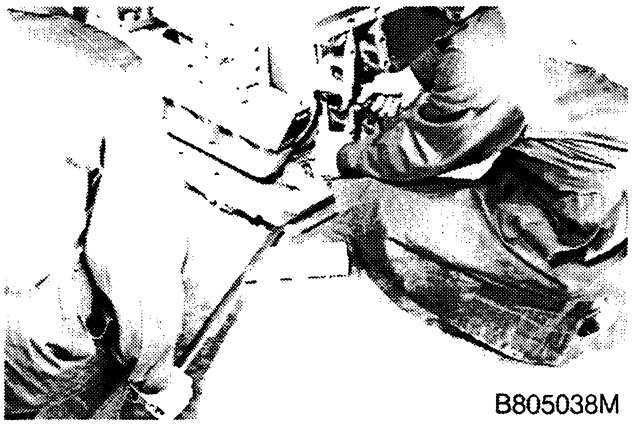
1. Spacer
2. Seals

STEP 34


Use the tools on Page 3 to push the seals into the master link. Make sure the seals are even with the sides of the master link

STEP 35


Put the two ends of the chain together. Push the chain together until the end of the chain holds the seals in position.

STEP 36


Use a prybar to help hold the chain together Remove the seal holding tools.

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TABLE OF CONTENTS

REMOVAL.....3

INSTALLATION.....4

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Problem: Loss of Power Equal in BothTracks

Do the stall tests in Section 2000. Is the engine good?
NO → Repair the engine as required.

YES ↓

Check the track tension of the tracks and adjust as required. Is there still a problem?
NO → Troubleshooting complete.

YES ↓

Check the setting of the pressure regulator valve. Is the setting as specified on page 3?
NO → Adjust the setting of the pressure regulator valve. Is there still a problem?
NO ↓ Troubleshooting complete.

YES ↓ (YES from previous step)

Check pressure for forward and reverse clutches. Is the pressure as specified on page 3?
NO → Loss of pressure can be caused by bad seals in the clutch, bad sealing rings on the main shaft, a worn bore in the retainer at the front of the main shaft, leakage in the modulator valve, or leakage in the transmission control valve.

↓ Check the parts in the modulator valve for wear and damage.

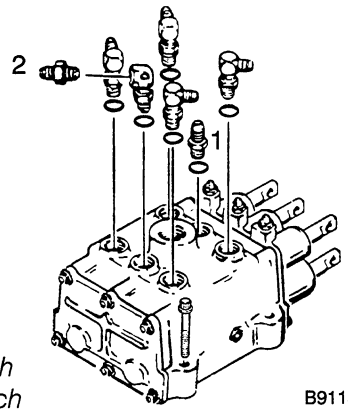
↓ To find whether the problem is in the transmission or the transmission control valve, disconnect the tube for the forward or reverse clutch at the transmission control valve. Install a steel cap on the fitting and check the pressure again. If the pressure is as specified on page 3, the problem is in the transmission. Repair as required.

YES ↓

Check the clutch cutout linkage. See Section 9000 for adjustment procedure. Is there still a problem?
NO → Troubleshooting complete.

YES ↓

Loss of power can also be caused by worn friction discs in the clutches. Disassemble the transmission and repair as necessary.



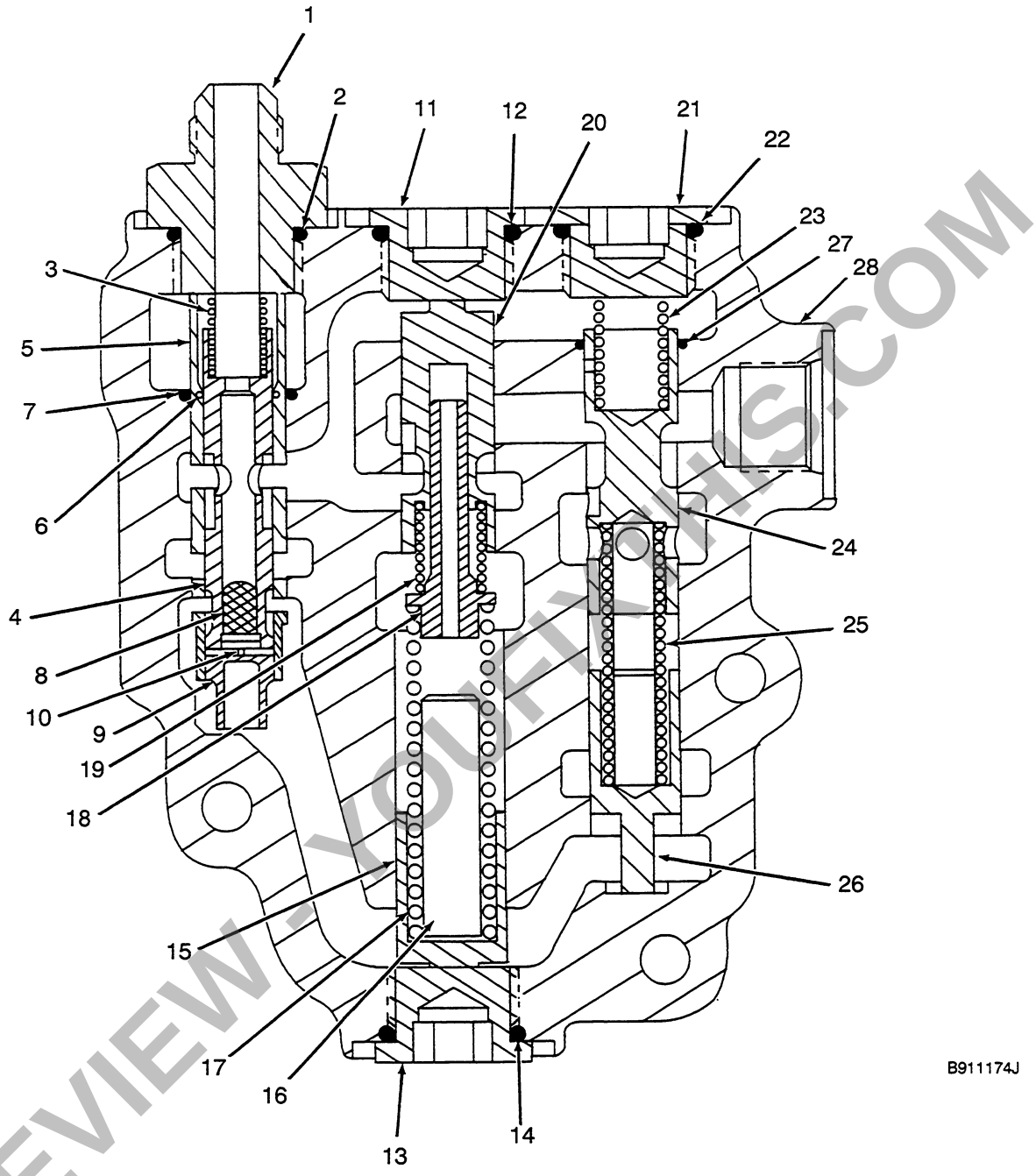
1. Foward Clutch
2. Reverse Clutch

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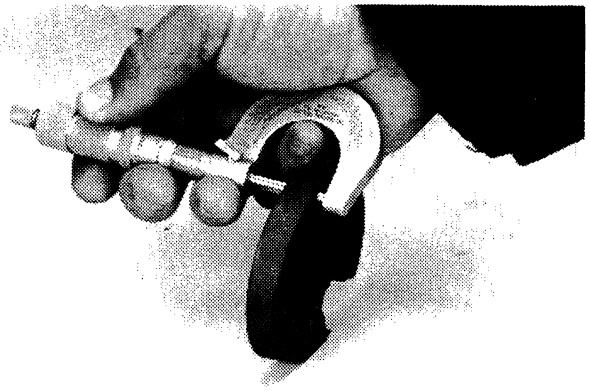


1. Fitting
2. O-ring
3. Spring
4. Flow Spool
5. Flow Sleeve
6. Snap Ring
7. Snap Ring
8. Screen
9. Retainer
10. Orifice (Part of Retainer)
11. Plug
12. O-ring
13. Plug
14. O-ring
15. Piston
16. Pin
17. Spring
18. Spring Guide
19. Spring
20. Modulator Spool
21. Plug
22. O-ring
23. Spring
24. Track Spool
25. Spring
26. Poppet
27. Snap Ring
28. Body

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STEP 48



A17414

Remove the retainer and measure the thickness.

STEP 49

Subtract the thickness of the retainer from the measurement in Step 47. The answer is the required shim pack dimension for the sprocket shaft.

STEP 50



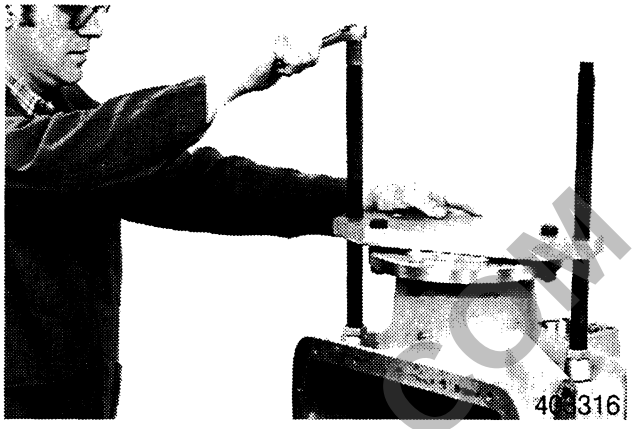
403300

Measure shims to get the proper shim pack dimension.

Keep the shims together along with a new retainer and new cap screws for use later in this procedure.

NOTE: *The cap screws and retainer must be replaced for maximum operating life.*

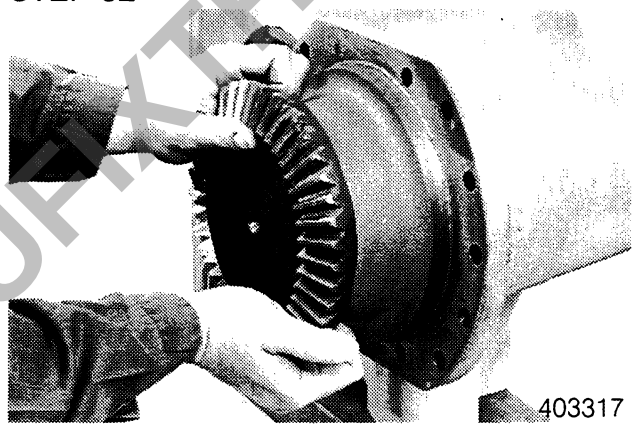
STEP 51



403316

Use the tool CAS-1555 to remove the sprocket shaft from the housing.

STEP 52

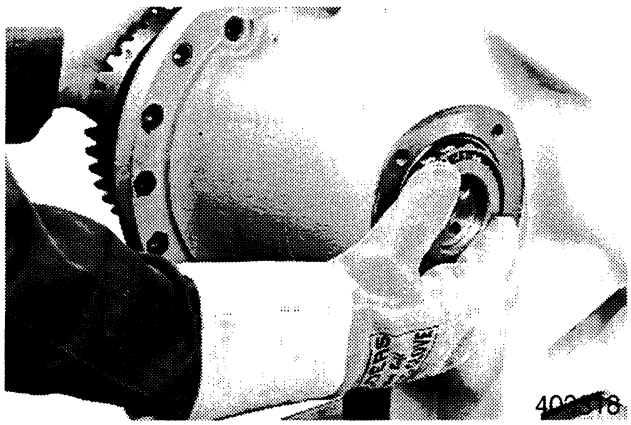


403317

Install the input shaft in the housing. Use great care not to damage the seal when installing the shaft.

> ⚠ *Use insulated gloves or mittens when working with hot parts.* 47-41B

STEP 53



403318

Hold the input shaft in place and install the heated bearing on the input shaft.

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ADJUSTMENT OF DIRECTION CONTROL LINKAGE

1. Remove top and front covers for the control linkage.

2. Remove the seat.

3. Disconnect the linkage from the spool in the transmission control valve.

4. Install the CAS-2224 F/R gauge block on top of the bellcrank for the direction control linkage.

5. Check to make sure that the direction control lever moves freely in the neutral locks.

6. If the direction control lever does not move freely in the neutral locks, loosen the top and bottom lock nuts on both control rods connected to the bellcrank. Turn the control rods as required until the direction control lever moves freely in the neutral locks. Prevent the control rods from turning and tighten the lock nuts.

7. Make sure that the direction spool is in NEUTRAL.

8. Connect the linkage to the direction spool without moving the direction spool. Adjust the length of the control rod as required.

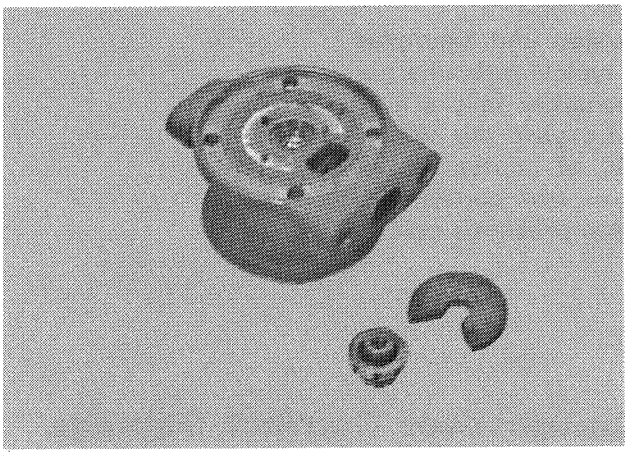
9. Remove the F/R gauge block.

10. Lower the parking brake lever and make sure that the direction control lever engages the neutral locks. Adjust the length of the control rod as required.

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Coked Center Housing



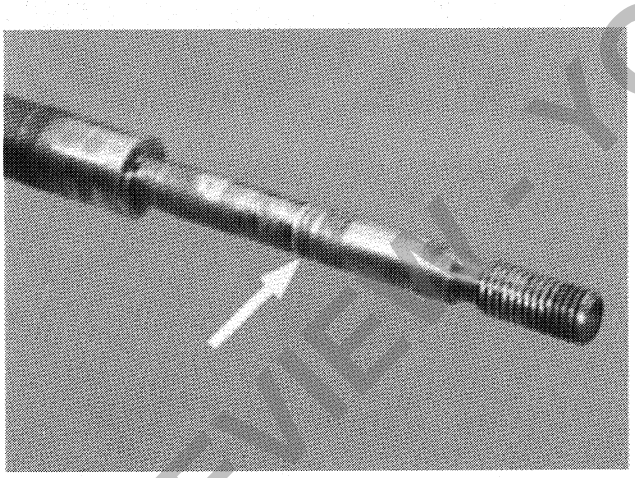
Coked (sludged) center housing failures are generally caused by high exhaust temperatures due to over-fueling, over-loading the engine, dirty engine oil, or plugged oil return. Also examine bearings for sludge.

Scored Bearing Surface



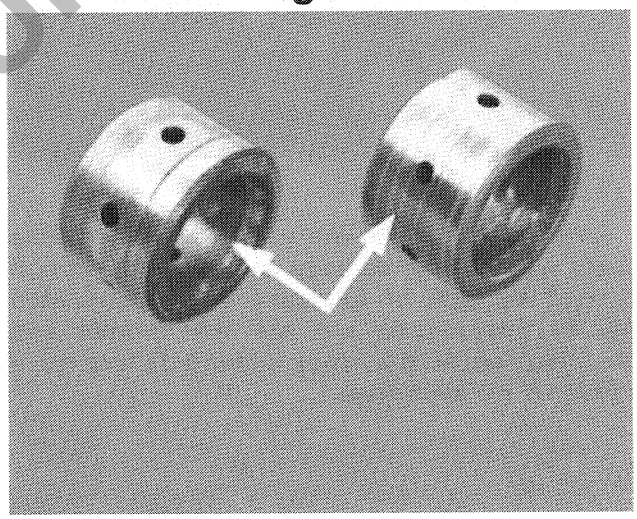
The bearing surfaces of this shaft were scored due to dirty engine oil. Evidence of a contaminated oil failure calls for careful, thorough examination of engine lube system.

Scored Turbine Shaft



The scoring of this shaft was caused by a loose compressor wheel lock nut.

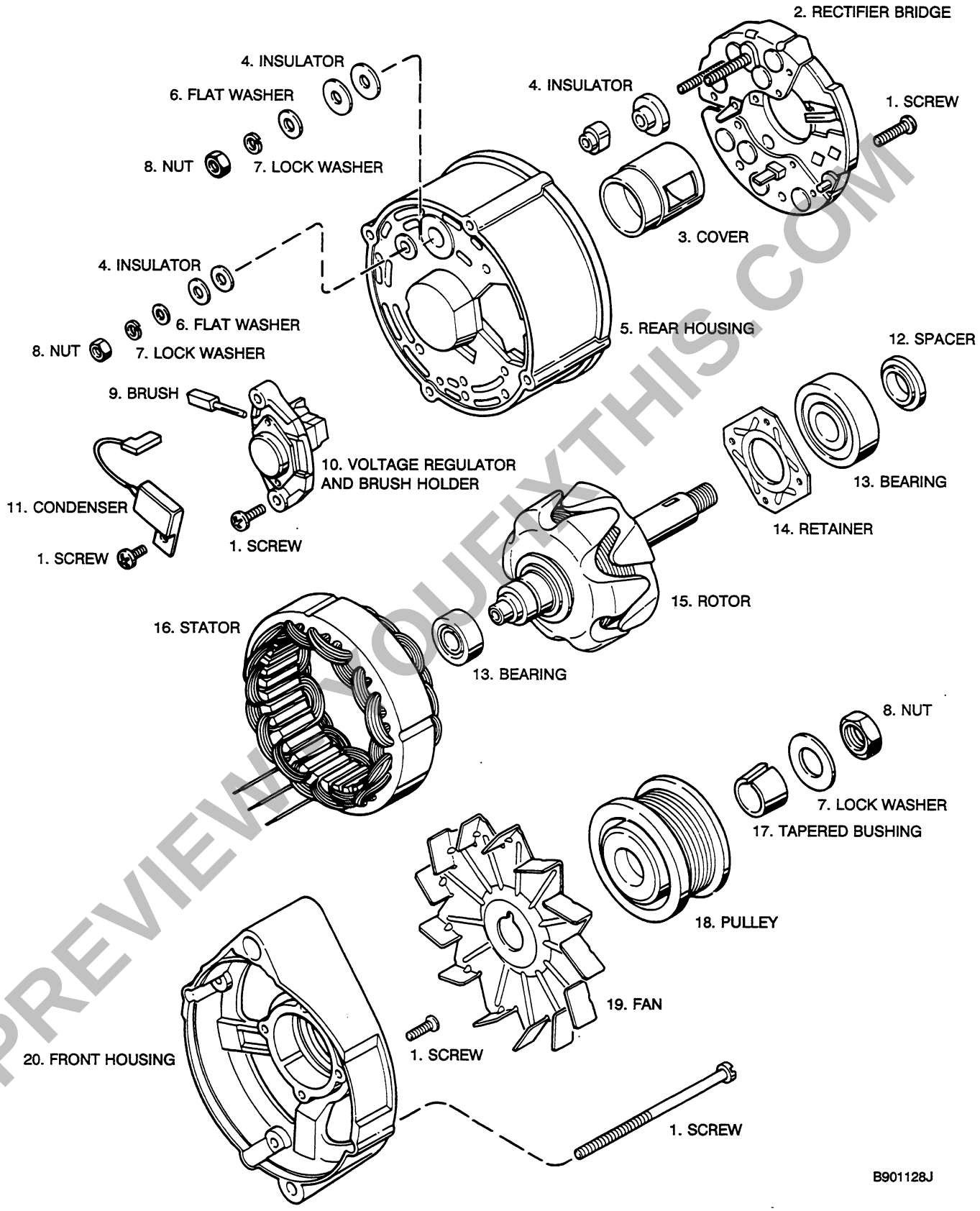
Scored Bearings



Scoring on the inside and outside surfaces of the bearings is definitely attributed to dirty engine oil.

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The purpose of this section is to help you measure the wear of undercarriage components as accurately as possible.

Also, by measuring wear and using the charts that are available for your machine, you will be able to determine the remaining life of all the components.

MACHINE SPECIFICATIONS MANUAL

Pages from the Machine Specifications Manual 8-17960 or the service manual for your machine will help you with the measuring procedure.

TRACK MEASURING TOOL KIT

The special tools shown below are used to measure the wear of track system components. You can order the kit from:

In the U.S.A. and Canada

Service Tools
PO Box 314
Owatonna, MN 55060

In Europe

VL Churchill Ltd
P.O. Box 3, Daventry
Northants, NN11 4NF
England



B4007091J

CAS-1950A Measuring Tools Kit.

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DISASSEMBLY

See the following illustration. Disassemble the modulator valve in the sequence of the reference numbers.

INSPECTION

1. Clean all parts in cleaning solvent.

2. Discard the O-rings.

3. Inspect the bores in the body for wear, scratches, and other damage. Use a new modulator valve as necessary.

4. Check the springs according to the specifications on page 2. Install new springs as necessary.

5. Inspect the flow spool, flow sleeve, track spool, poppet, modulator spool, and piston for wear and damage.

6. Clean the screen in the flow spool and the orifice in the flow sleeve.

ASSEMBLY

Assemble the modulator valve in the reverse of the reference numbers.

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TYPES OF CONTAMINATION

There are two basic types of contamination, microscopic and visible.

1. Microscopic contamination occurs when very fine particles of foreign material are in suspension in the hydraulic oil. These particles are too small to see or feel. Microscopic contamination can be found by identification of the problems that the microscopic contamination can cause or by testing in a laboratory. Examples of the problems:

   a. Cylinder rod seals leak.

   b. Control valve spools do not return to neutral.

   c. The hydraulic system has a high operating temperature.

2. Visible contamination is foreign material that can be found by sight, touch, or odor. Visible contamination can cause a sudden failure of a component. Examples of visible contamination:

   a. Particles of metal or dirt in the oil.

   b. Air in the oil.

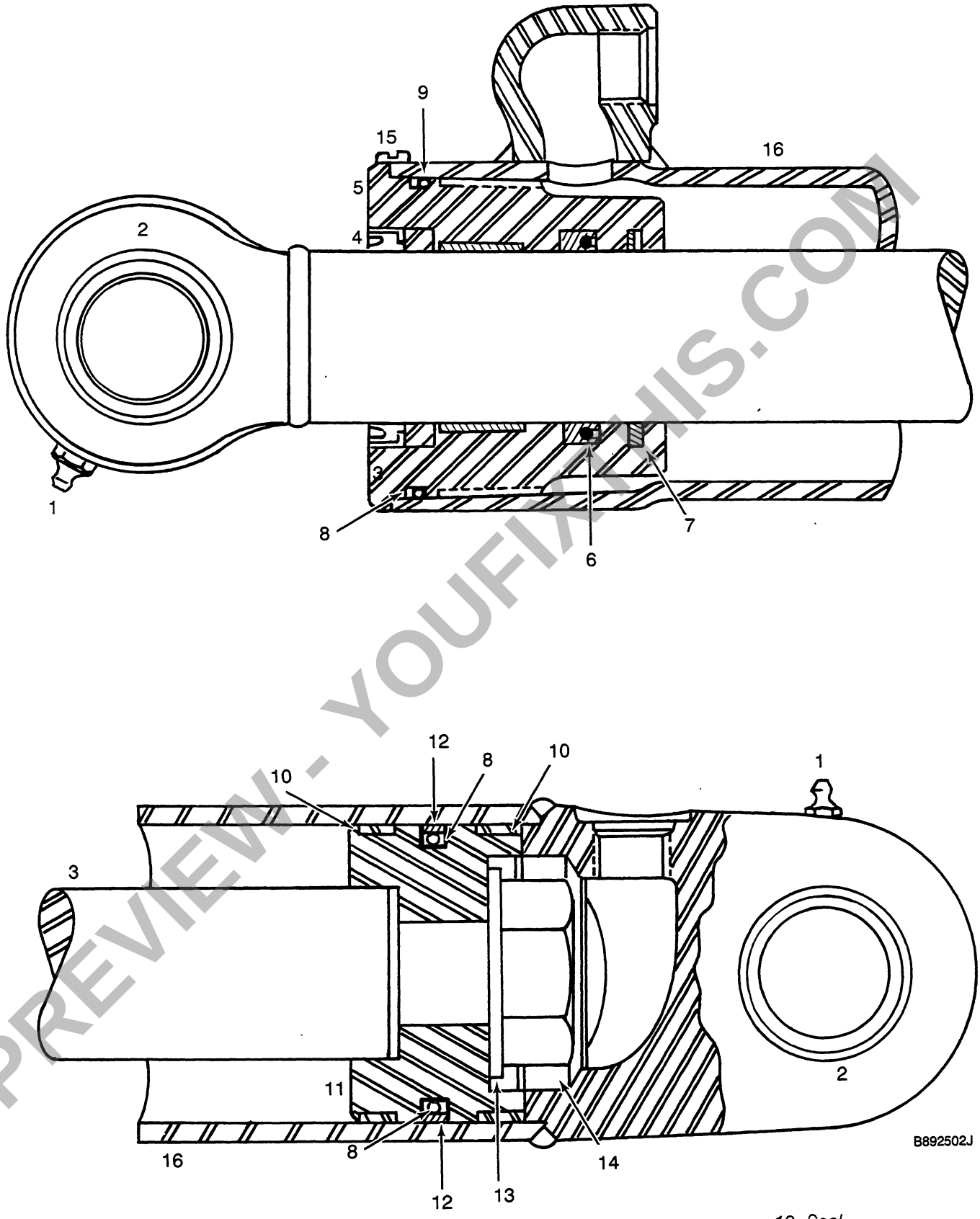
   c. The oil is dark and thick.

   d. The oil has the odor of burned oil.

   e. Water in the oil. See page 8003-8.

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1. Plug
2. Bushing
3. Piston Rod
4. Wiper
5. Gland
6. Wide Seal
7. Narrow Seal
8. Backup Ring
9. O-ring
10. Wear Ring
11. Piston
12. Seal
13. Hardened Washer
14. Cap Screw
15. Self-Tapping Screw
16. Tube

Angle and Ripper Cylinder

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