1845B UNI-LOADER

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CASE CORPORATION

Printed in U.S.A.
Issued November 1983
Revised April 1985

MAINTENANCE CHART

This chart shows the maximum intervals of service for the correct maintenance of the machine. Shorten the intervals as required when operating conditions are severe.

INTERVAL	SERVICE	INSTRUCTIONS
After first 2 hours of operation	Check drive belt tension	Section 4007
After every 2 hours of operation until there is no change	Tighten wheel nuts to 80 to 90 pound-feet (108 to 122 N m, 11 to 12 kg/m).	
After first 20 hours of operation	Do the After Delivery Check.	Operators Manual
After first 100 hours of operation	Check adjustment of chains.	Section 6007
After 10 hours of operation or daily, whichever occurs first	Check level of engine oil. Check level of hydraulic oil. Check level of coolant in radiator. Check warning lamps. Clean dust cup in air cleaner. Lubricate pivot points for loader. If equipped, lubricate pivot points for backhoe or grapple. Clean or replace decals that cannot be read.	 Operators Manual Section 2000
After 50 hours of operation	Check level of fluid in battery. Check for water and sediment in fuel system. Check pressure in tires. Lubricate shaft for cluster sprockets. Lubricate pivot points for cross shaft for control levers. Lubricate pivot points for parking latch.	 Operators Manual Section 6011 Operators Manual Operators Manual Operators Manual
After first 100 hours of operation	Change the engine oil. Check drive belt tension. If equipped, clean spark arresting muffler. Check level of gear lubricant in each planetary.	 Section 4007 Section 2000 Operators Manual

Exhaust Valve

	U.S. Value	Metric Value
Tappet clearance (COLD and HOT)	.014″	.356mm
Face angle	44°	44°
Face run-out (max.)	.002″	.051mm
O.D. of head	1.398 to 1.408″	35.509 to 35.763mm
O.D. of stem	.3399 to .3409″	8.634 to 8.659mm
Minimum Serviceable Limit	.3389″	8.608mm
Length	6.340 to 6.364″	161.036 to 161.646mm
Insert seat angle	45°	45°
Seat contact width	.0608 to .0962″	1.544 to 2.443mm
Seat run-out (max.)	.002″	.051mm
Insert height	.2475 to .2525″	6.286 to 6.413mm
O.D. of insert	1.4495 to 1.4505″	36.817 to 36.843mm
I.D. of insert	1.245 to 1.255″	31.623 to 31.877mm

Intake Valve Guides

Length	3.250″	82.550mm
O.D.	.6565 to .6575″	16.675 to 16.701mm
I.D. (installed and reamed)	.3429 to .3439″	8.710 to 8.735mm
Maximum Serviceable Limit	.3449″	8.761mm
Protrusion above cylinder head	.875″	22.225mm
Valve stem clearance in guide	.001 to .003″	.025 to .076mm
Maximum Serviceable Limit	.004″	.102mm

Exhaust Valve Guides

Length	3.125″	79.375mm
O.D.	.6565 to .6575″	16.675 to 16.701mm
I.D. (installed and reamed)	.3429 to .3439″	8.710 to 8.735mm
Maximum Serviceable Limit	.3449″	8.761mm
Protrusion above cylinder head	.875″	22.225mm
Valve stem clearance in guide	.002 to .004″	.051 to .102mm
Maximum Serviceable Limit	.005″	.127mm

Valve Spring

Free length	2.375″	60.325mm
Total coils	8.25	
Wire diameter	.162″	4.115mm
I.D.	.958 to .978″	24.333 to 24.841mm
Compressed to 1.521″ (38.63mm) (valve open)	110 to 118 lbs.	49.90 to 53.52 kg
Compressed to 1.875″ (47.63mm) (valve closed)	53 to 59 lbs.	24.04 to 26.76 kg

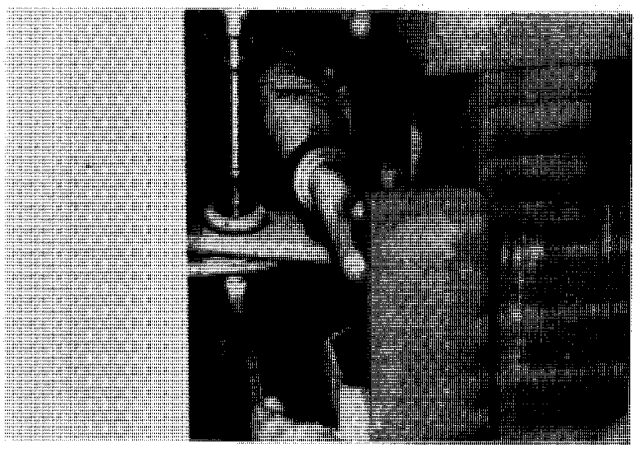
Crankshaft (Cont'd)

	U.S. Value	Metric Value
Connecting rod journal std. O.D.	2.0605 to 2.0615″	52.337 to 52.362mm
.002″ (.051mm) O.D. undersize, grind to	2.0585 to 2.0595″	52.286 to 52.311mm
.010″ (.254mm) O.D. undersize, grind to	2.0505 to 2.0515″	52.083 to 52.108mm
.020″ (.508mm) O.D. undersize, grind to	2.0405 to 2.0415″	51.289 to 51.854mm
.030″ (.762mm) O.D. undersize, grind to	2.0305 to 2.0315″	51.575 to 51.600mm
Connecting rod journal maximum taper	.001″	.025mm
Journals out-of-round (max.)	.001″	.025mm
Undersize main bearing liners for service	.002,.010,.020,.030″	.051,.254,.508,.762mm
Main bearing oil clearance	.0012 to .0042″	.031 to .107mm
Main bearing journal std. O.D.	2.6230 to 2.6240″	66.624 to 66.650mm
.002″ (.051mm) O.D. undersize, grind to	2.6210 to 2.6220″	66.573 to 66.599mm
.010″ (.254mm) O.D. undersize, grind to	2.6130 to 2.6140″	66.370 to 66.396mm
.020″ (.508mm) O.D. undersize, grind to	2.6030 to 2.6040″	66.116 to 66.142mm
.030″ (.762mm) O.D. undersize, grind to	2.5930 to 2.5940″	65.862 to 65.888mm
Main bearing block bore I.D. without liners	2.816 to 2.817″	71.526 to 71.552mm
Main journal width between cheeks:		
2nd	1.499 to 1.502″	38.075 to 38.151mm
3rd	1.745 to 1.755″	44.423 to 44.577mm
Connecting rod journals width between cheeks	1.3105 to 1.3145″	33.287 to 33.388mm

Camshaft

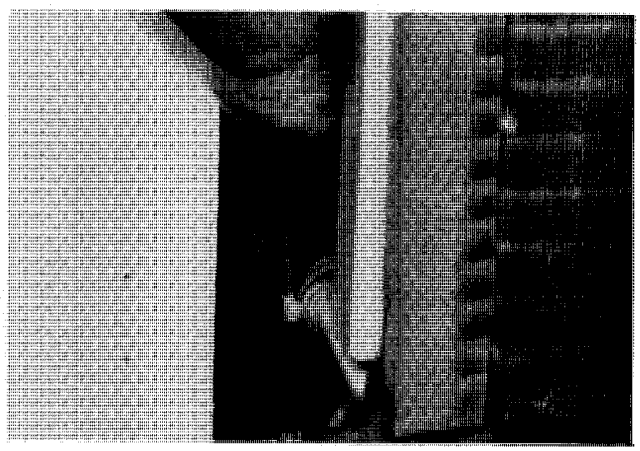
Type	Parabolic	
Bushings	3, Replaceable	
Bushing Lubrication:		
Front bushing	Pressure lubricated from oil pump	
Intermediate and Rear bushing	Gravity flow lubricated	
Oil clearance	.002 to .007″	.051 to .178mm
I.D. of bushing installed	1.752 to 1.753″	44.501 to 44.526mm
Maximum Serviceable Limit	1.755″	44.577mm
Bushing width:		
1st (front)	1.307 to 1.317″	33.198 to 33.452mm
2nd,	.713 to .723″	18.110 to 18.364mm
3rd (rear)	1.177 to 1.197″	29.896 to 30.404mm
O.D. of each bearing surface	1.749 to 1.750″	44.425 to 44.450mm
Minimum Serviceable Limit	1.748″	44.399mm

31. Loosen and remove the nut, lock washer, and flat washer from the bolt in each top radiator mount.



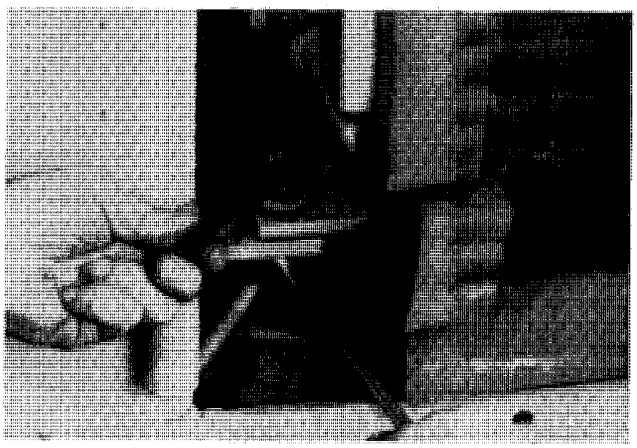
308505

32. Loosen the rear clamp on the bottom hose.



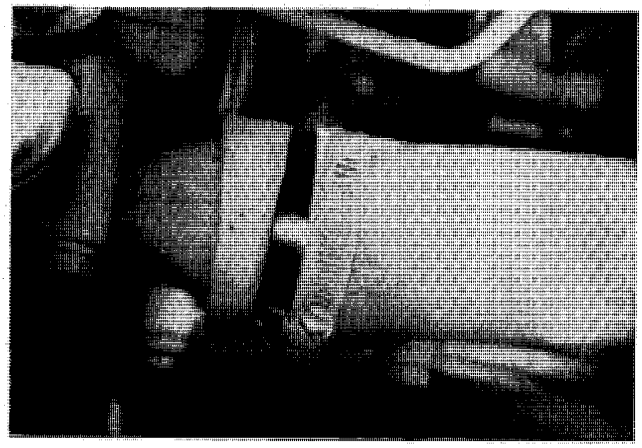
308506

33. Loosen and remove the nut, lock washer, and flat washer from the bolt in each bottom radiator mount.



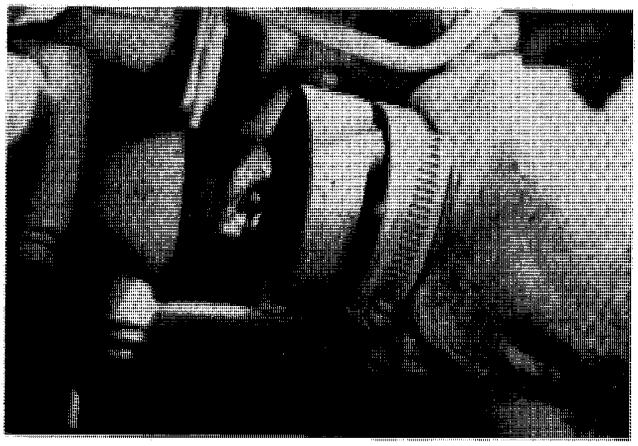
308509

34. Loosen the clamp on the bottom radiator hose at the water pump.



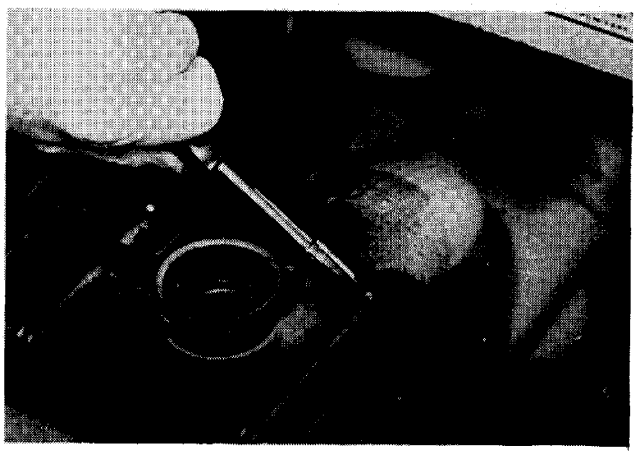
308511

35. Remove the bottom radiator hose.



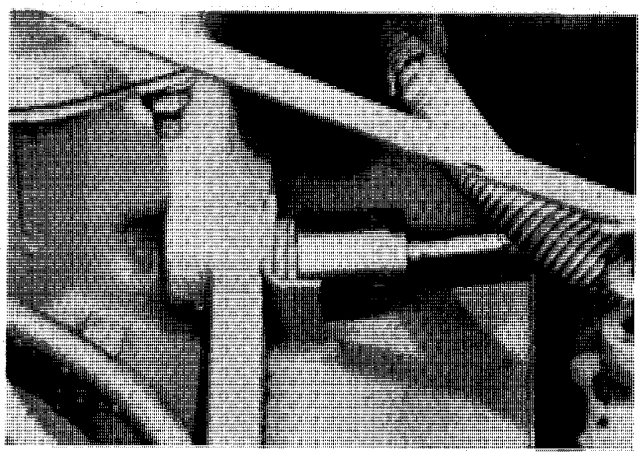
308518

36. Loosen the clamp on the top radiator hose at the radiator.



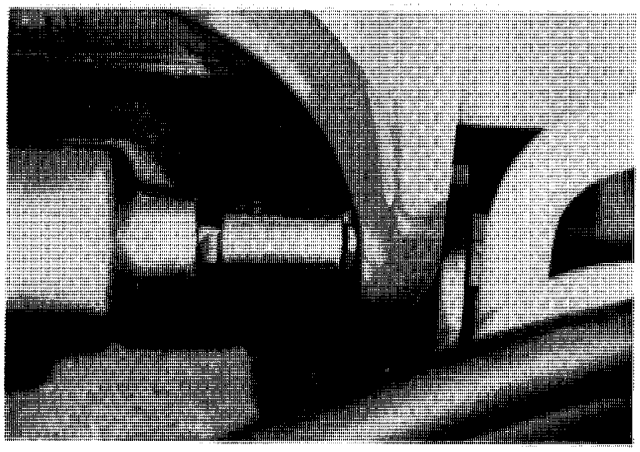
308520

12. Install and tighten the cap screw and lock washer, and lock washer and nut that hold the guard.



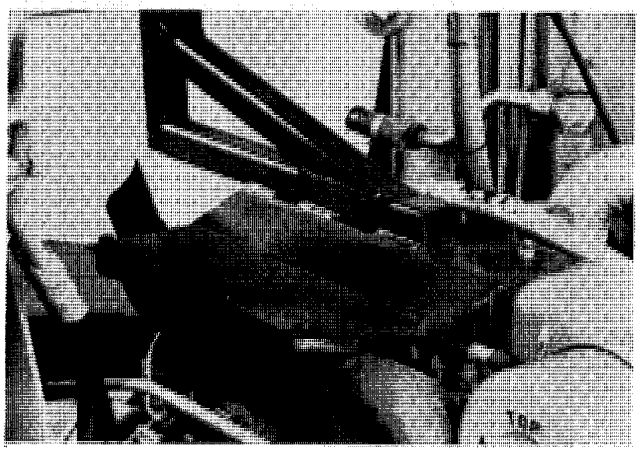
308733

13. Install and tighten the lock washer and nut that fastens the engine to the front engine mount.



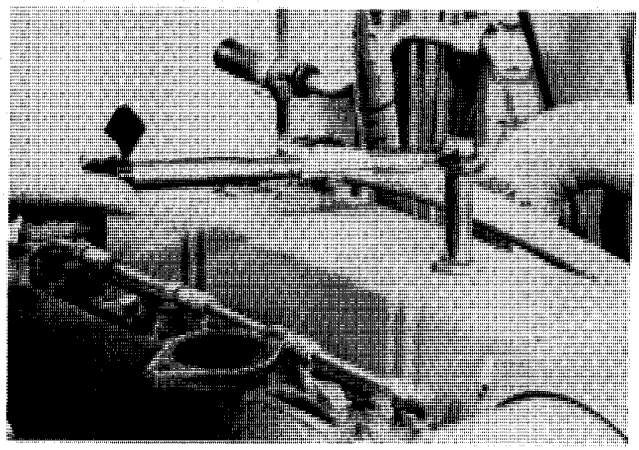
308729

14. Remove the lifting equipment.



308836

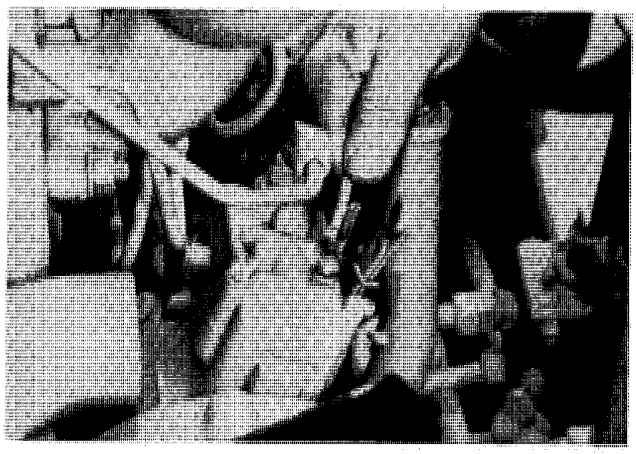
15. If necessary, install and tighten the nuts that hold the valve cover to 48 to 72 pound-inches (6 to 8 N m, 0.6 to 0.8 kg/m).



308937

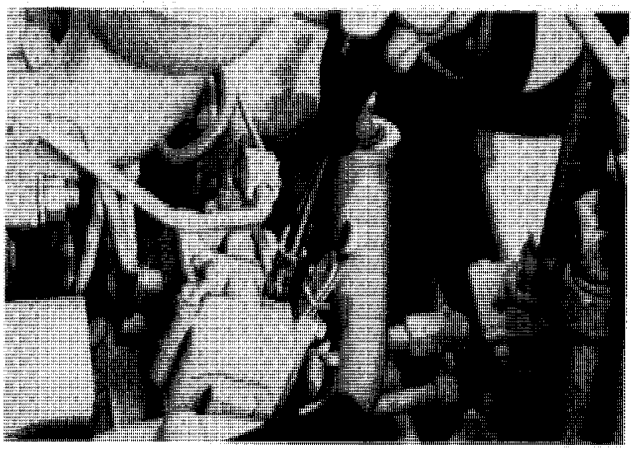
16. If the machine has a diesel engine:

a. Connect the wire to the terminal on the fuel injection pump.



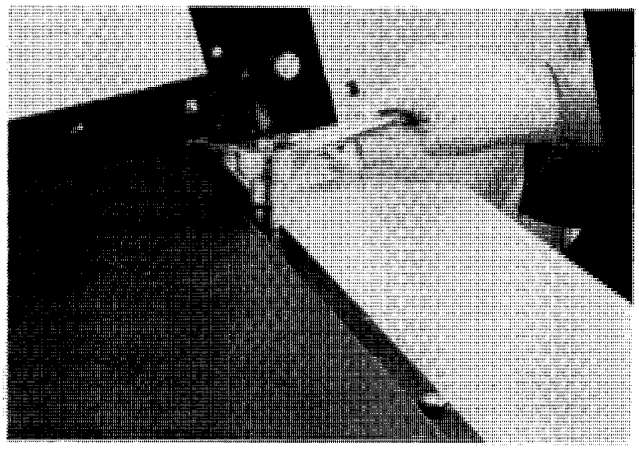
308827

b. Tighten the nut.



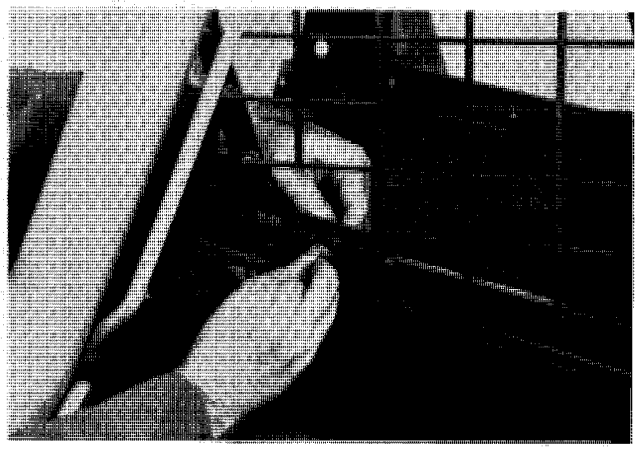
308826

75. Install the bolts, lock washers, and nuts that hold the heat shield and tighten the nuts.



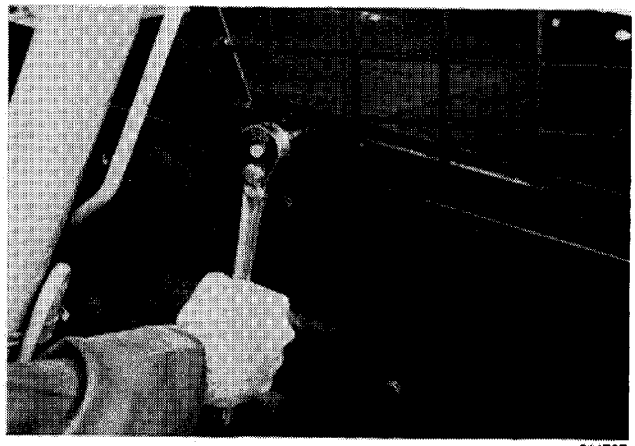
309136

76. Install the carriage bolts, lock washers, and nuts at the rear of each screen.



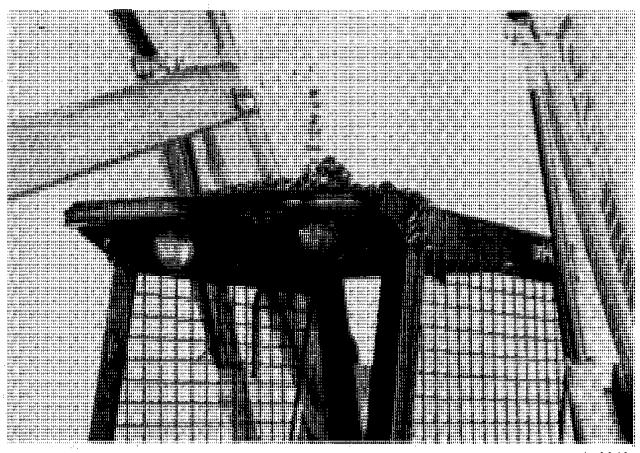
309233

77. Tighten the nuts.



311737

78. Remove the lifting equipment.



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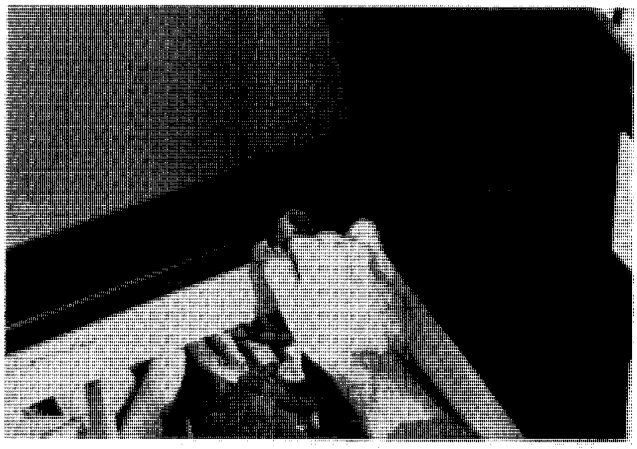
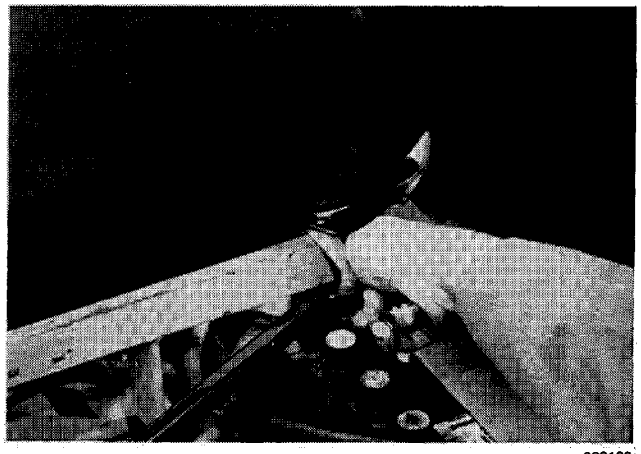
79. Install a hardened washer, the left seat belt (buckle), bolt, lock washer and nut.



80. Tighten the nut to 54 to 64 pound-feet (73 to 87 N m, 8 to 9 kg/m).



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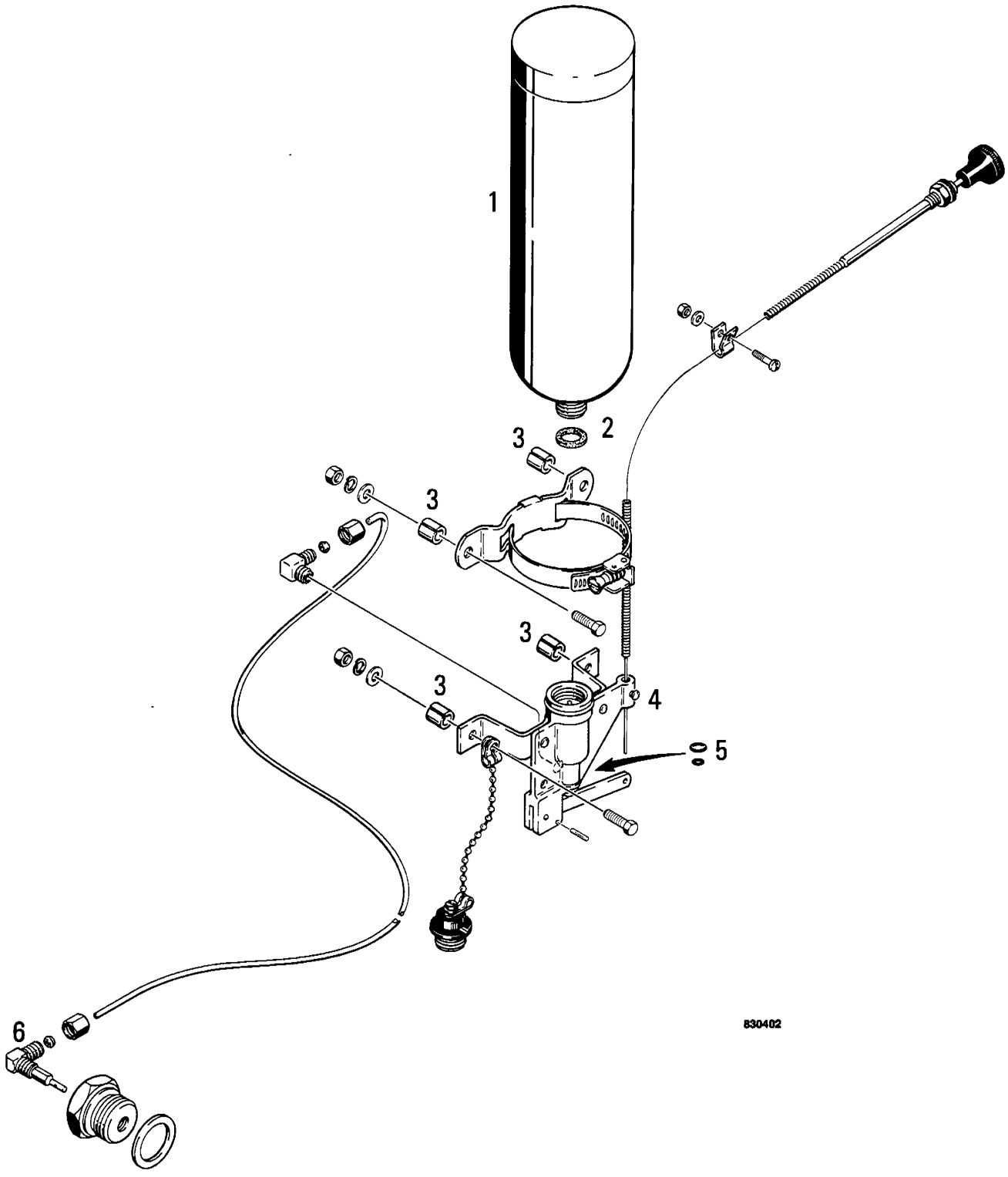


1. *Starting Fluid Container*
2. *Gasket*
3. *Spacer. Used With Noise Control Only*
4. *Valve*
5. *O-Ring*
6. *Nozzle. Must Be Installed Horizontal As Shown.*

Ether Injection System

Section 2001

ENGINE DIAGNOSIS

188 and 207 Diesel Engines

CASE CORPORATION Rac. 9-78875 PRINTED IN U.S.A.

ENGINE OVERHEATS

1. Fan Belt Loose

Check fan belt for proper tension. Check that the belt is not covered with oil or worn badly and riding very deep in pulley groove. Check for pulley groove wear.

2. Low Coolant Level

Check coolant level in radiator and refill if necessary.

3. Water Pump Malfunction

Remove the radiator cap and observe the coolant to see if there is movement which indicates the water pump is pumping. Move the fan back and forth to check for any defective bearings. Check around the water pump for any signs of coolant leakage indicating a bad water pump seal. Remove water pump and rebuild or replace.

4. Thermostat Inoperative

If there is high coolant temperature and boiling coolant, remove thermostat and test it.

5. Engine Timing Incorrect

Combustion will not occur in the cylinder at the correct moment (degrees BTDC) if the engine timing is incorrect. This can cause pre-combustion and serious damage to the engine. Check for proper engine timing.

6. Tractor Mechanical Drag

A mechanical drag on a unit can cause low horsepower and engine overheating. Causes of some mechanical drags are defective brakes, bad bearings or gears in transmission.

7. Radiator Cap Inoperative

Test radiator cap to see that it relieves at the correct pressure. Inspect cap gasket for proper sealing. An inoperative cap can cause water pump cavitation and lower coolant boiling points.

8. Radiator Fins Bent

Bent or damaged fins can cause a cooling system to overheat because of restricted air flow through the radiator core. All of the fin area is needed to dissipate the engine heat from the radiator.

9. Radiator Fins Plugged With Dirt

Radiator fins must be clean so air can flow through the radiator fins and help dissipate the heat of the coolant. Items that affect radiator cooling are: oil and grease on fins, leaves, and attachments covering radiator air inlet.

10. Cylinder Head Gasket Blown

A blown cylinder head gasket will cause one or two cylinders to loose power and cause an engine to miss. Compression leaking into the water system can also cause the cooling system pressure to rise and blow engine coolant out the radiator overflow. Take a compression test to help determine a defective head gasket, or remove radiator cap, run engine and check for gas bubbles rising in coolant at radiator opening.

11. Injection Pump Malfunction

A malfunctioning injection pump will usually under-fuel the engine. A common cause is a sheared key on the injection pump drive, preventing fuel to be delivered to injectors. Adjust or replace the injection pump or parts as required.

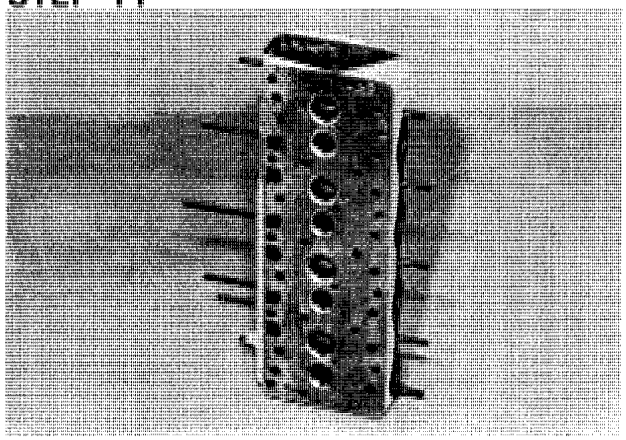
12. Radiator Baffling Missing

The removal of or non-reinstalling of radiator baffling, whether foam rubber or sheet metal, will cause cooling air flow to escape around the radiator instead of drawing in cool external air through the radiator.

13. Engine Low On Oil

An engine low on oil could lose lubrication to internal parts and start scoring pistons, sleeves and damage engine bearings. Proper oil level is required to help dissipate some of the engine heat. Check engine oil level every eight hours of operation. Low engine oil can also give low oil pressure readings.

STEP 11

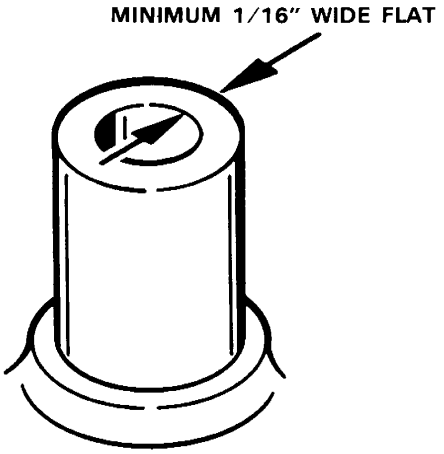


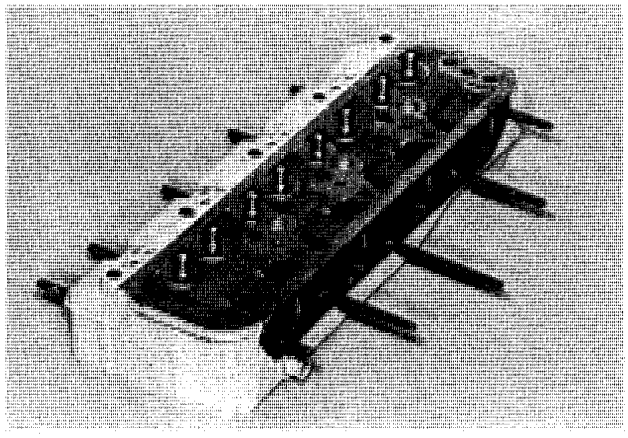
Wash, clean and inspect head. Use a rotary brush to clean around and down into valve ports. Refer to Section 2015 for complete head reconditioning.

STEP 12

Clean valves with a fine power drive wire brush, removing all carbon and varnish deposits. Be careful not to scratch valve stems. Refer to Section 2015 for valve inspection.

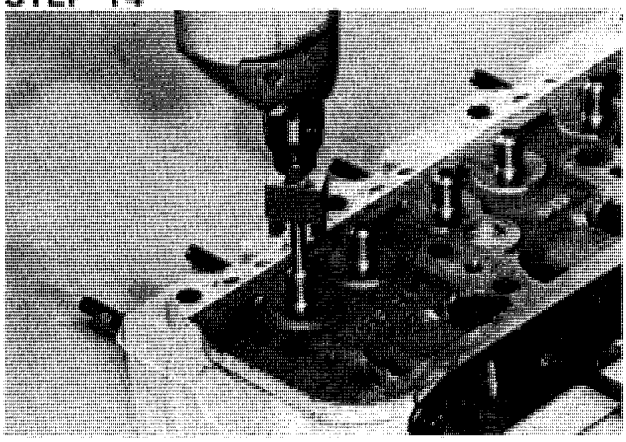
STEP 13





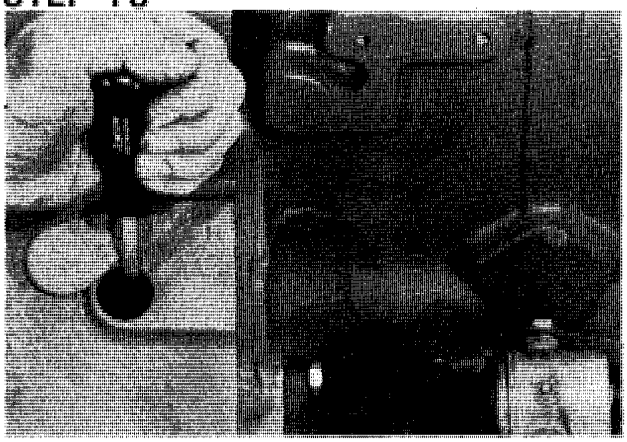
Check valve guide top surface. There must be a minimum of a 1/16" wide flat around entire top surface.

STEP 14

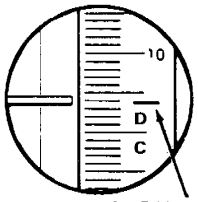


Use M20615 tool in a electric drill (if required) to provide necessary flat area on valve guide. *IMPORTANT:* Do not exceed 450 RPM drill speed when using valve guide cutting tool.

STEP 18

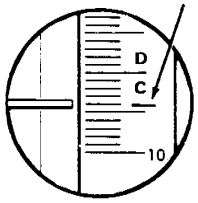


Crank engine clockwise until dial indicator hand stops moving. Reset indicator to zero.



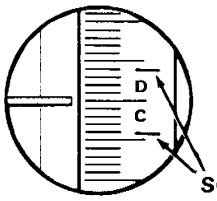
SCRIBE MARK

Crank engine clockwise until .010" shows on the dial indicator. Scribe a mark on the flywheel in line with timing pointer.



Crank engine counter-clockwise past zero mark on indicator until .010" shows on the dial indicator. Again, scribe a mark on the flywheel in line with timing pointer.

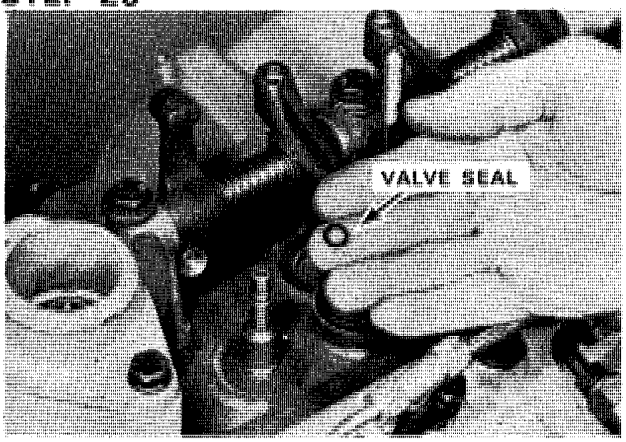
STEP 19



SCRIBE MARKS

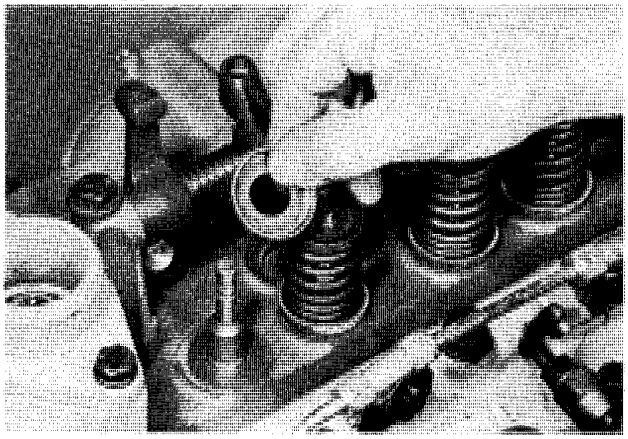
Half the distance between these two scribe marks on the flywheel will be the top dead center (TDC).

STEP 20



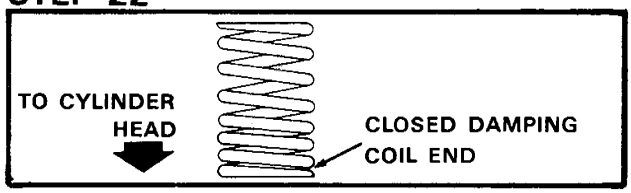
Remove valve stem seal from lower valve stem groove.

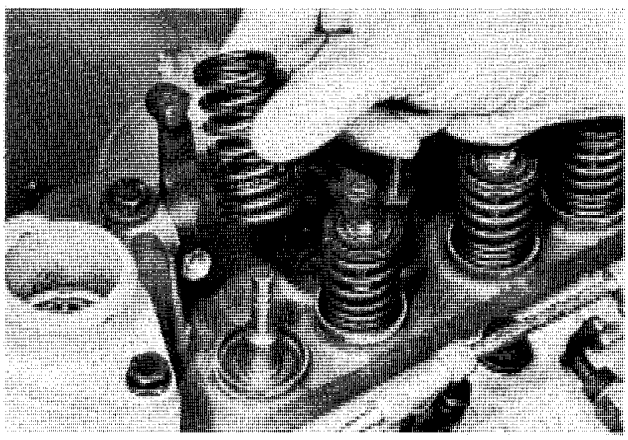
STEP 21



Install the spring seat.

STEP 22

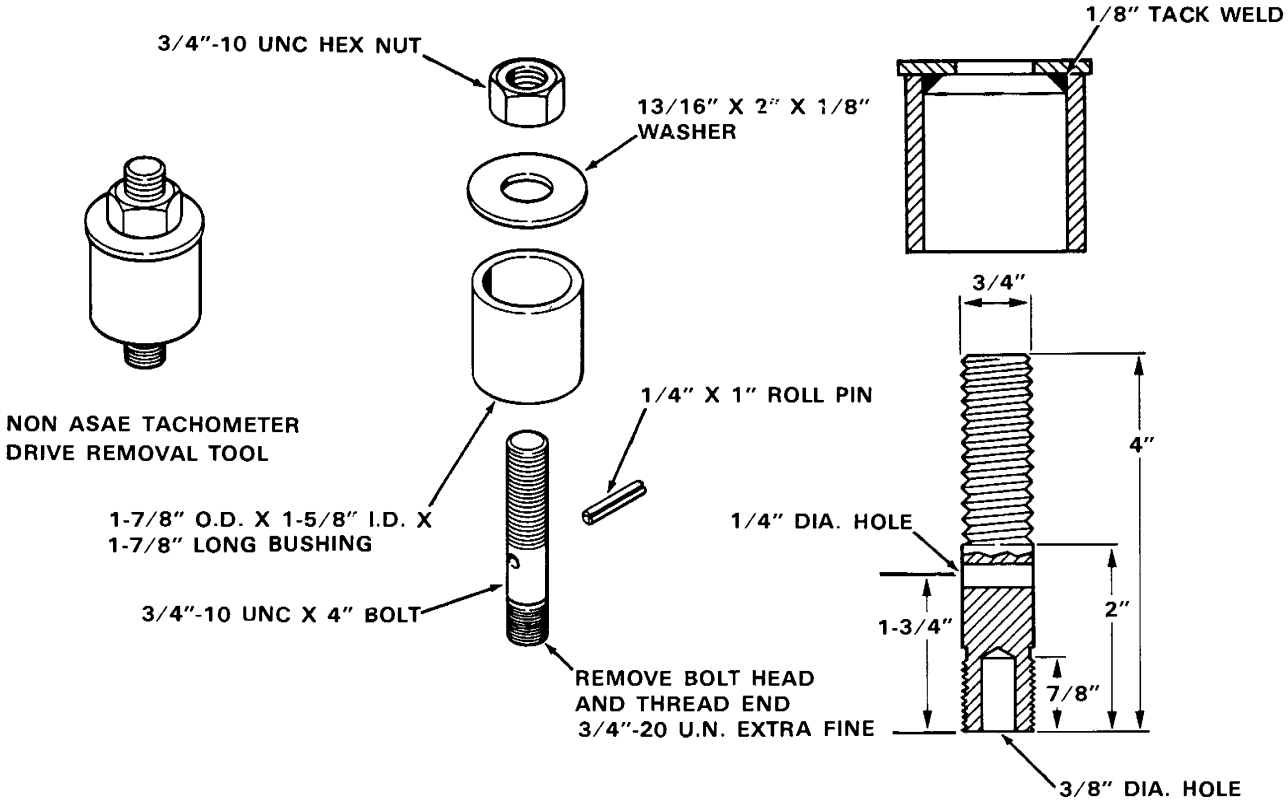


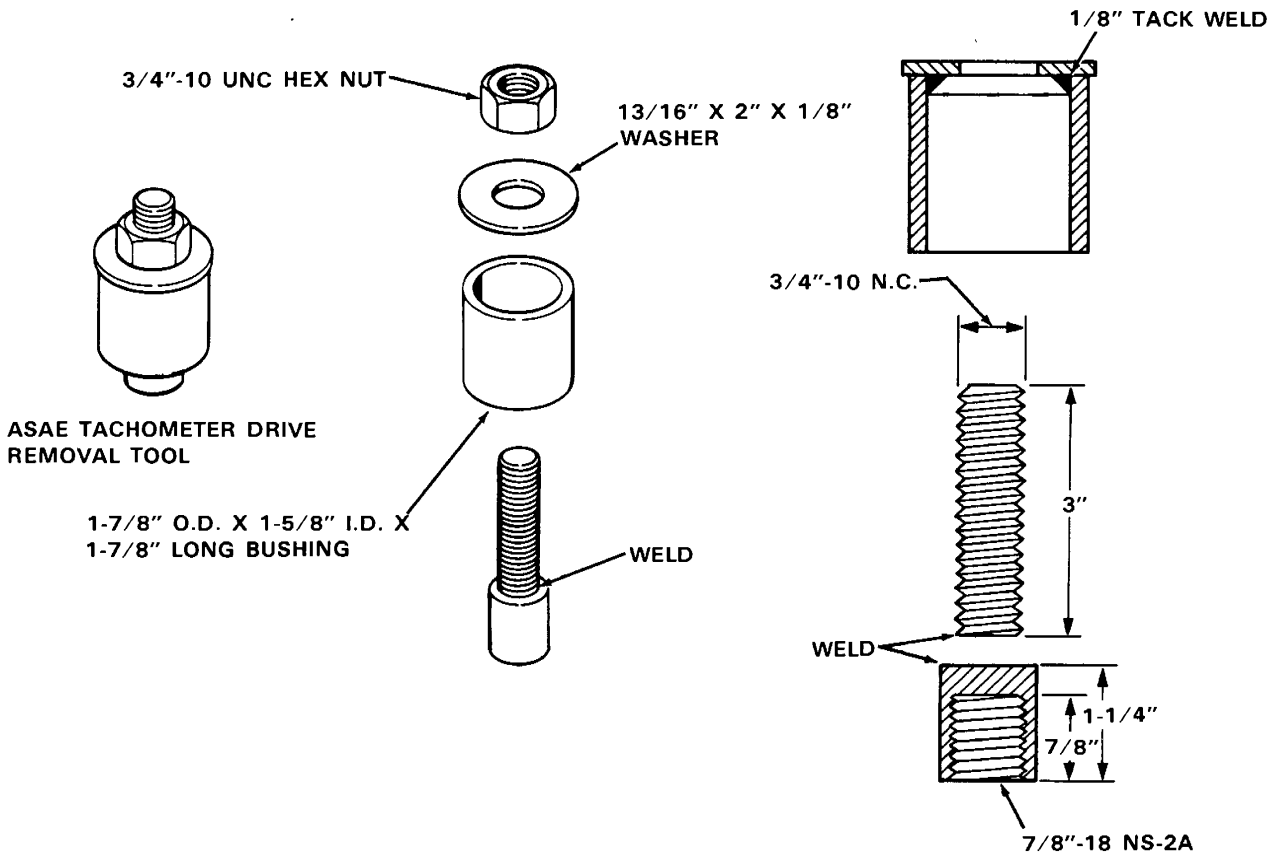


Install the spring with the damping coil end on top of the cylinder head. See inset above.

SPECIFICATIONS FOR TOOLS WHICH MUST BE MADE

Tachometer Drive Removal Tool





Valves and Valve Seats Inspection

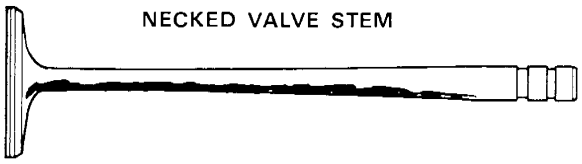
STEP 53

Clean valves with a fine power driven wire brush, being careful not to scratch valve stems.

STEP 54

INSPECT THE VALVES FOR THE FOLLOWING CONDITIONS.

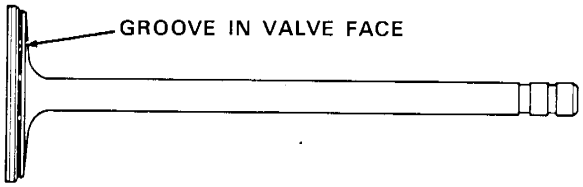
NECKED VALVE STEM



NOTE: REPLACE VALVE IF THIS CONDITION EXISTS.

This condition can be caused by lack of lubrication, plugged water passages or operating the engine under continuous overload at excessive RPM.

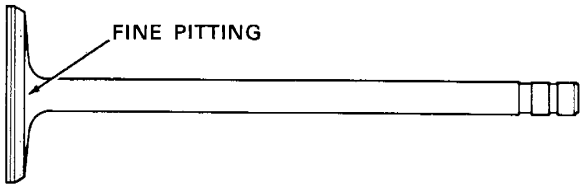
GROOVE IN VALVE FACE



NOTE: REFACE OR REPLACE VALVE IF THIS CONDITION EXISTS.

This condition can be caused by abrasives entering the engine through the intake system or not servicing the air intake system regularly.

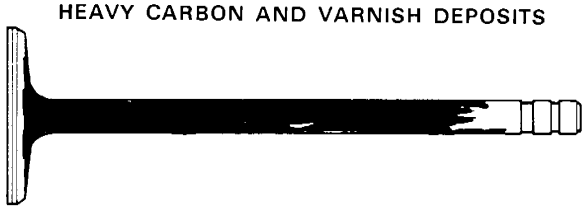
FINE PITTING



NOTE: THIS IS A NORMAL CONDITION

Small amounts of very fine pitting may be found on the surfaces of the valve face or seat after the valves are cleaned. This condition is normal and will not affect engine performance. This fine pitting is caused by a normal oxidation process and can happen on any engine during the run-in period. It is not necessary to grind valves or seats if this fine pitting is found, since pitting will generally recur after the engine is run for a few hours.

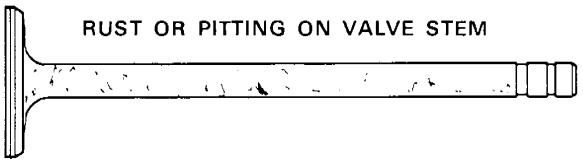
HEAVY CARBON AND VARNISH DEPOSITS



NOTE: CLEAN AND REFACE VALVES IF THIS CONDITION EXISTS OR REPLACE VALVES.

This condition is usually caused by worn valve guides or bad seals on the valves, allowing oil to pass by the valves. Low operating temperature is still another cause or worn piston rings and sleeves will allow too much oil to reach the combustion chamber.

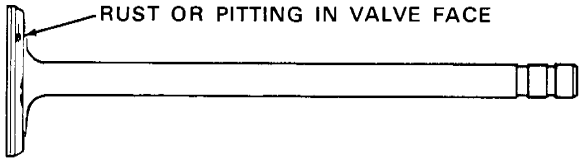
RUST OR PITTING ON VALVE STEM



NOTE: REPLACE VALVE IF THIS CONDITION EXISTS.

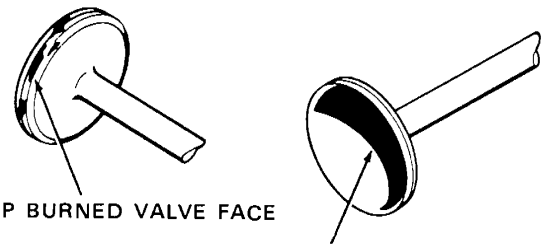
This condition can be caused by using poor quality engine oil or fuel and by improper engine storage.

RUST OR PITTING IN VALVE FACE



NOTE: REFACE OR REPLACE VALVE IF THIS CONDITION EXISTS.

This condition can be caused by using poor quality engine oil or fuel.



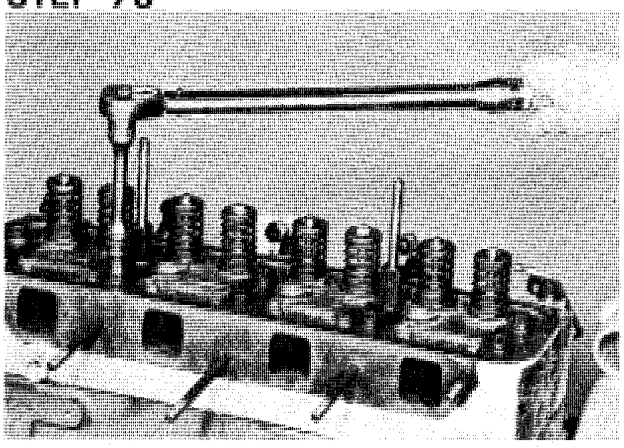
DEEP BURNED VALVE FACE

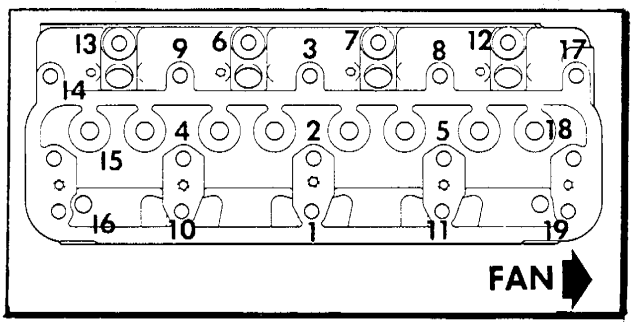
DISHED VALVE HEAD

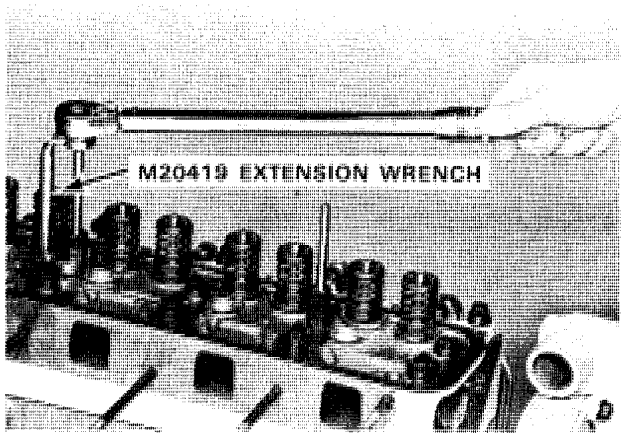
NOTE: IF EITHER OF THESE CONDITIONS EXIST, REPLACE THE VALVES.

These conditions are usually caused by running the engine under excessive loads at high engine temperature, grinding valve face too thin or improper valve grinding.

STEP 78



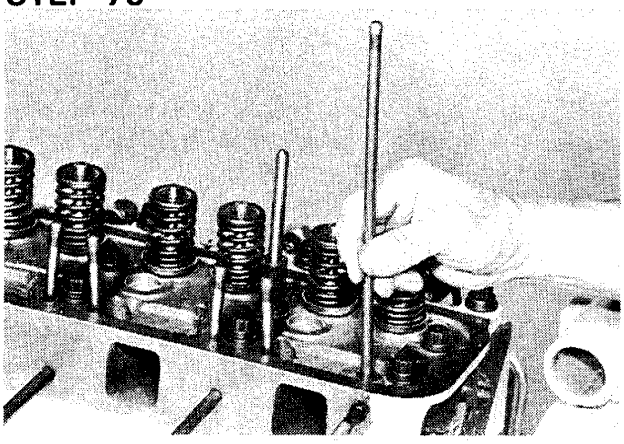




Coat bolt threads, washers and underside of bolt heads or nuts (where used) with HDM #30 oil. Torque all cylinder head bolts and nuts (on to stud) using a torque of 50% to 70% of final torque listed below and in a sequence as shown in inset. Repeat torquing sequence and bring nuts or bolts to full torque.

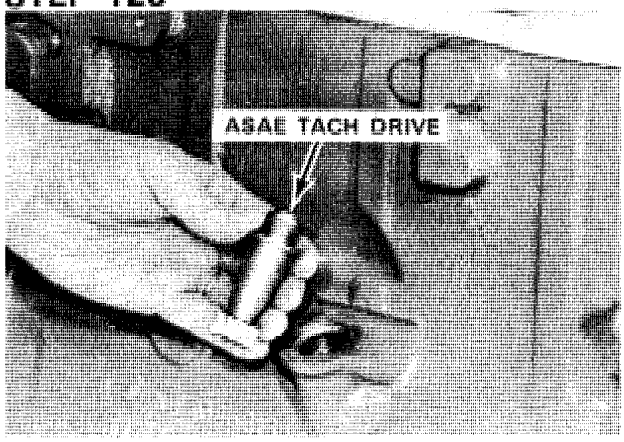
1. Nuts w/hardened washers-torque 95-105 ft. lbs.
2. Grade 8, 12 pt. hd. bolts - torque 110-115 ft. lbs.
3. Flanged nuts - torque 90-100 ft. lbs.

STEP 79

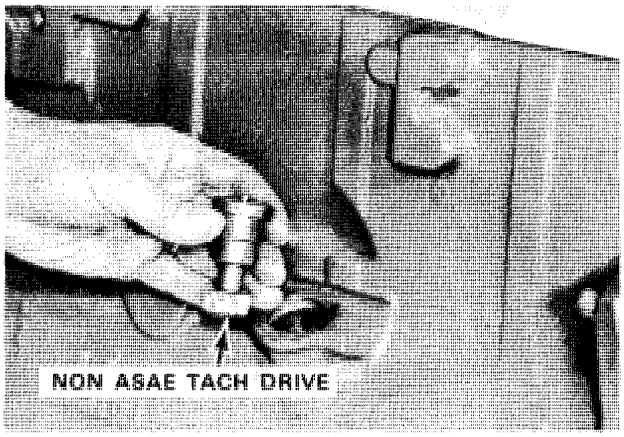


Check push rods for wear and straightness before installing into cylinder head. Coat push rods with HDM #30 oil.

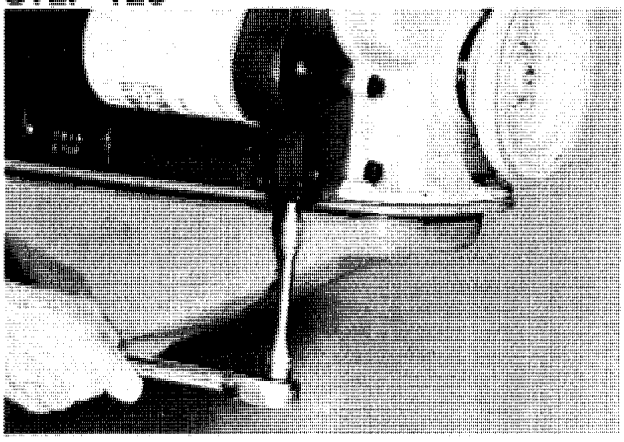
STEP 125



Remove the tachometer drive from the special tool.

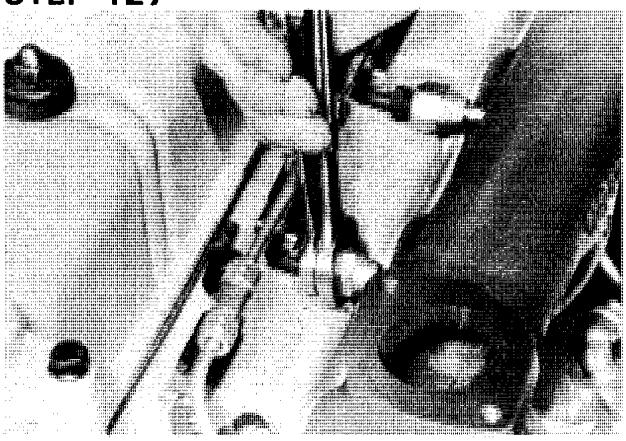


STEP 126



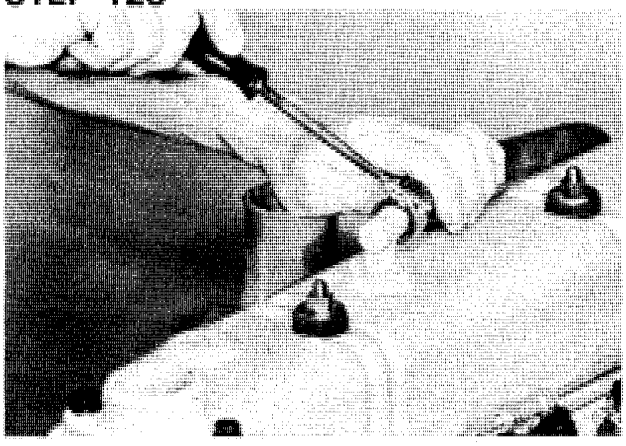
Remove the engine oil pan.

STEP 127



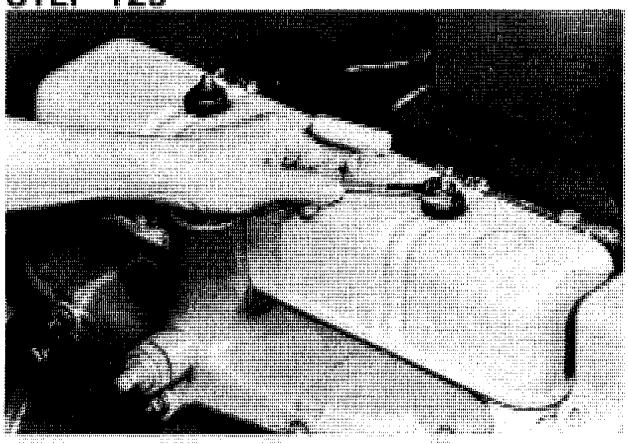
Disconnect fuel injectors inlet fitting using the one-hand, two wrench method to minimize damage.

STEP 128



Remove breather tube.

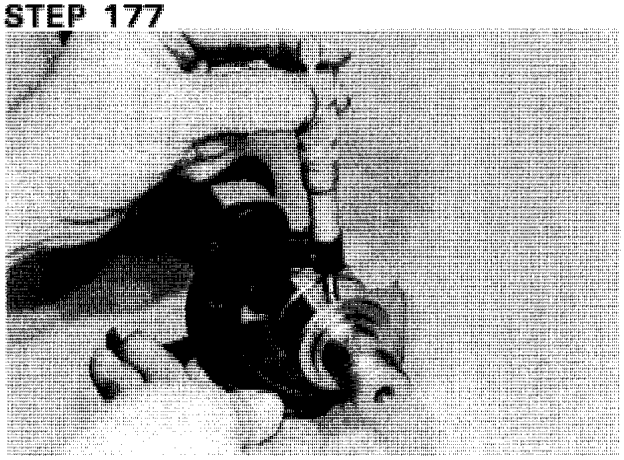
STEP 129



Remove valve cover nuts and gaskets.

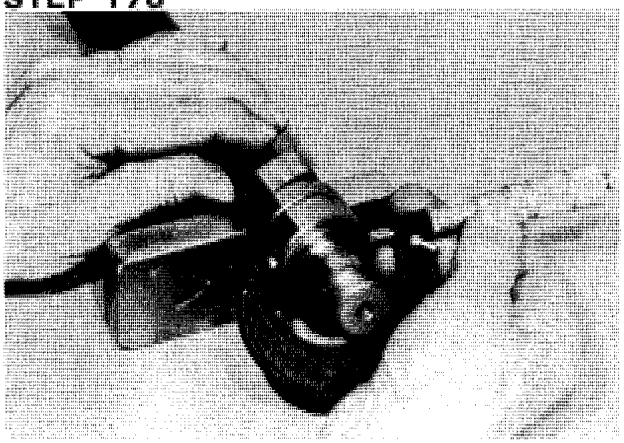
Camshaft Assembly And Installation

STEP 177



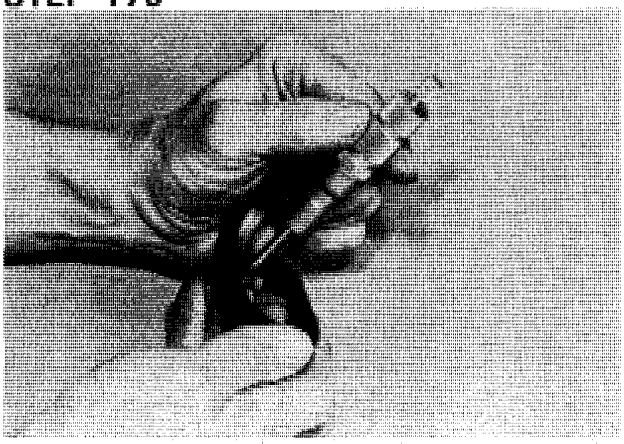
With a micrometer, measure the front and rear of each bearing surface on the camshaft.

STEP 178



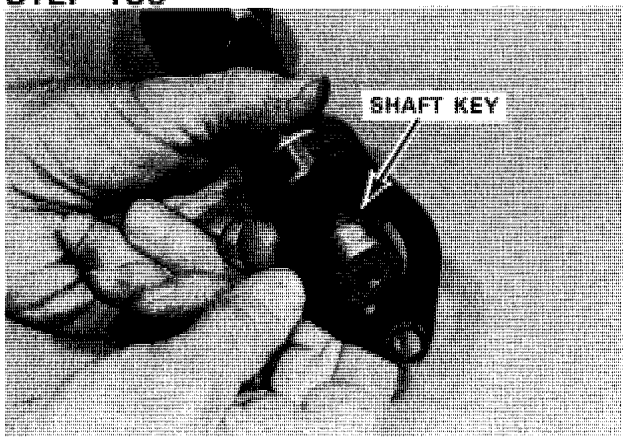
Each bearing surface must be measured in four places. Measure front and rear bearing surfaces again, 90° from first measurement. If the O.D. of any bearing surface is less than 1.748", the camshaft must be replaced.

STEP 179



Check the thickness of the thrust washer. If thickness is less than .147", replace the thrust washer.

STEP 180



Clean the camshaft thoroughly and blow out the oil holes with compressed air. Place the thrust washer on the camshaft and install the shaft key.

Section 2025

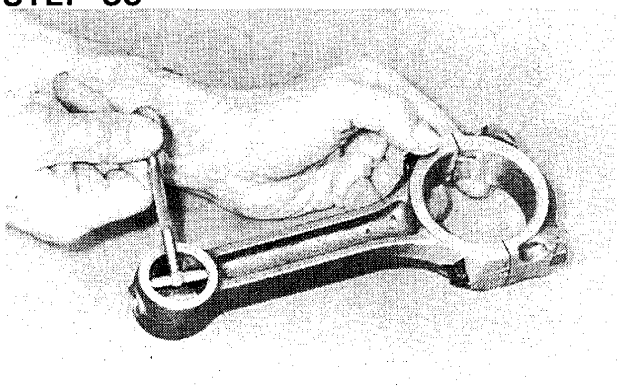
CYLINDER BLOCK, SLEEVES, PISTONS AND RODS

188 Diesel Engines

CASE CORPORATION Rac. 9-78855 PRINTED IN U.S.A.

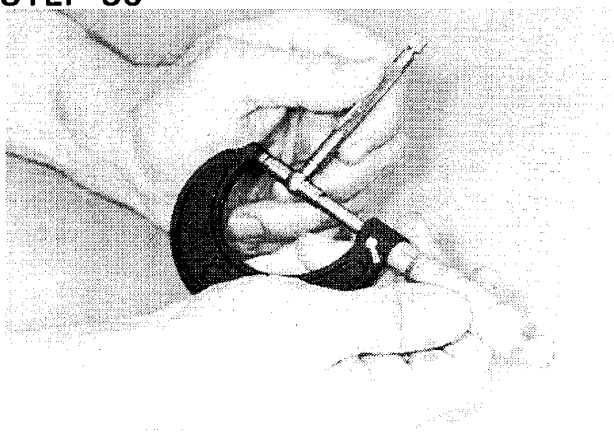
Piston and Connecting Rod Inspection and Installation

STEP 35



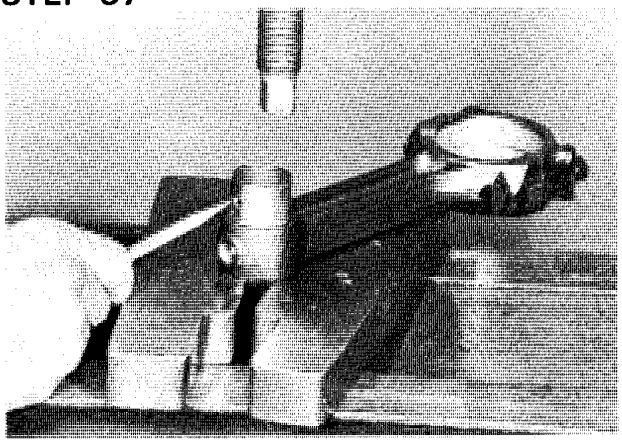
Measure the I.D. of connecting rod bushing for wear.

STEP 36



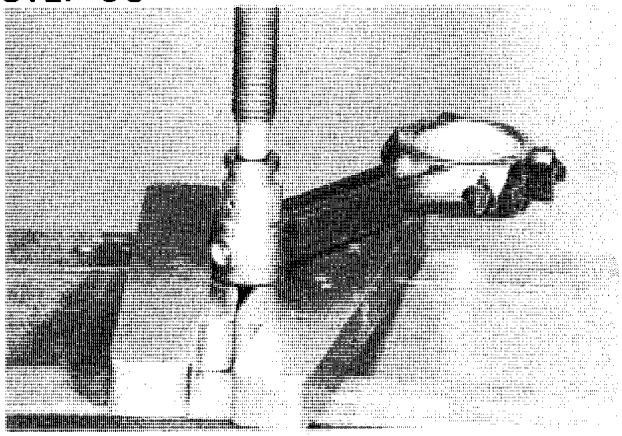
If I.D. is greater than 1.2510", the bushing must be replaced.

STEP 37



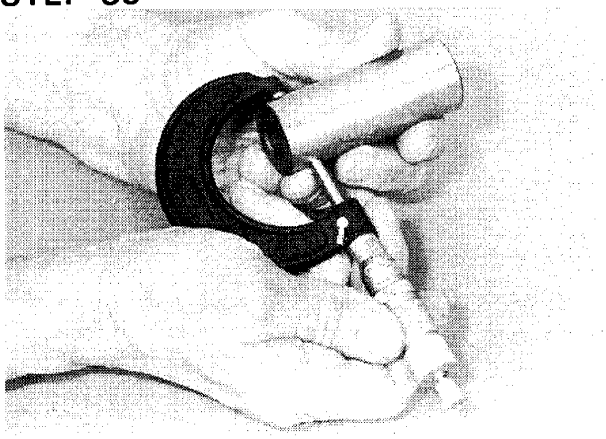
Align the oil holes of bushing and connecting rod before pressing in new bushing.

STEP 38



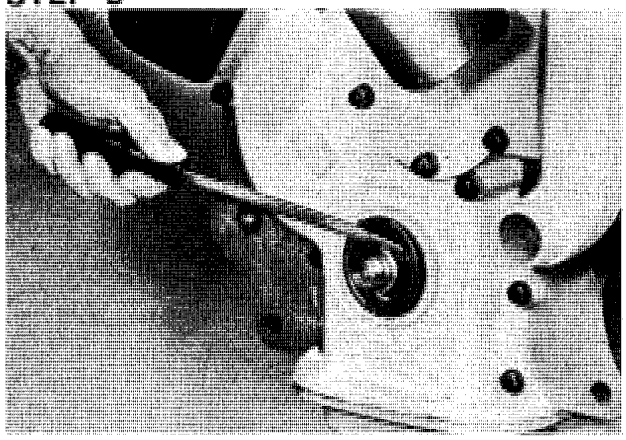
Press bushing into connecting rod until it is flush with rod. After bushing is installed in rod, it must be reamed to size. Carefully ream bushing 1.2502" to 1.2504" if new piston pins are to be installed. If piston pins are to be reused, ream the bushing .0004" to .0015" larger than piston pin diameter.

STEP 39



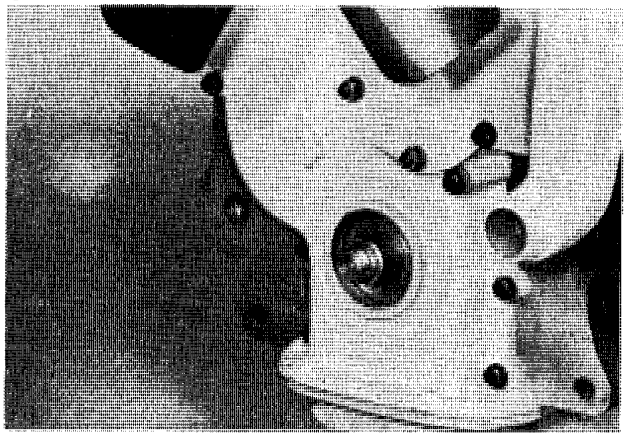
Measure piston pin diameter. Replace pin if diameter is less than 1.2495".

STEP 5



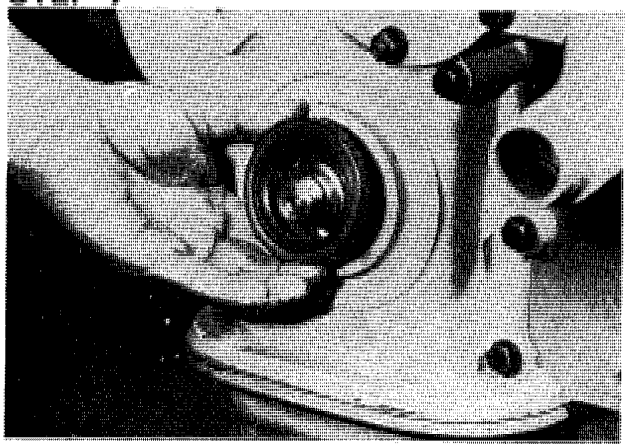
Remove front oil seal from timing gear cover.

STEP 6



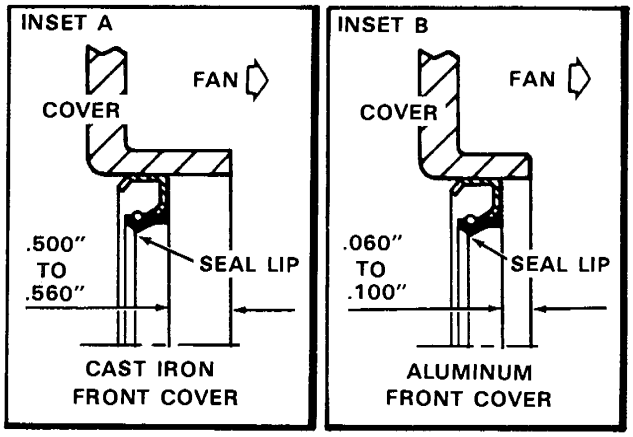
Front oil seal removed.

STEP 7

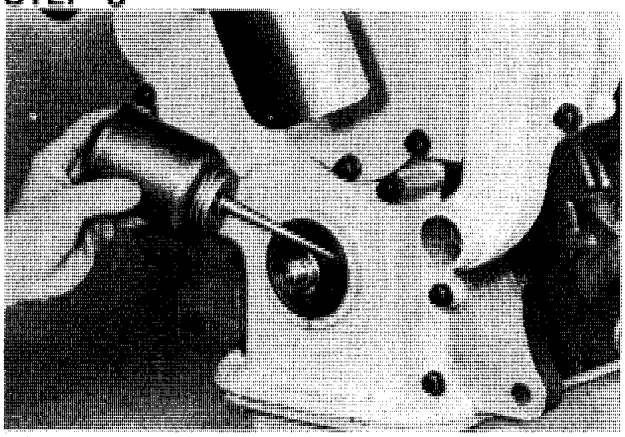


Install a new seal in the timing gear cover, with the seal lip inward, to a depth from the outer edge as shown in Inset A or B.

STEP 7 (Cont'd)

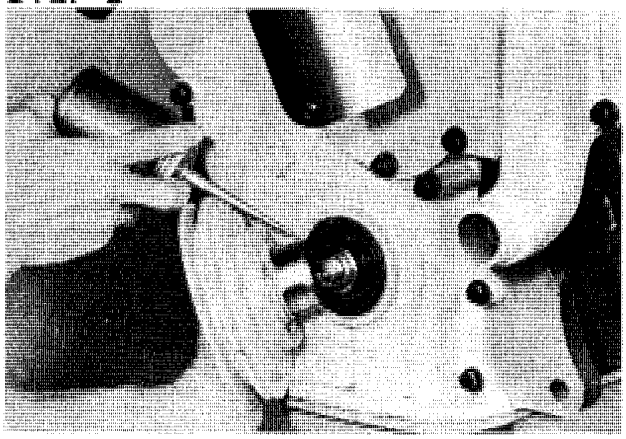


STEP 8



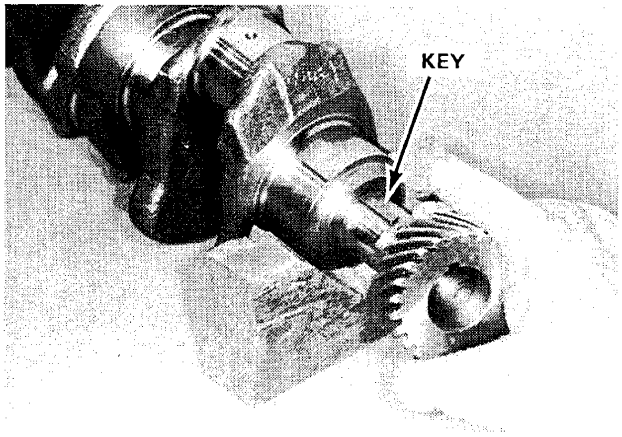
Apply HDM No. 30 oil to front oil seal.

STEP 9



Apply HDM No. 30 oil to shaft of crankshaft pulley. Install pulley on crankshaft.

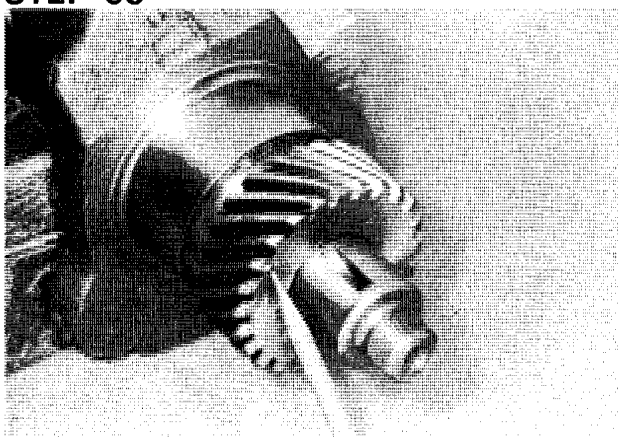
STEP 64



Install key and heated crankshaft gear with timing mark outward, on crankshaft.

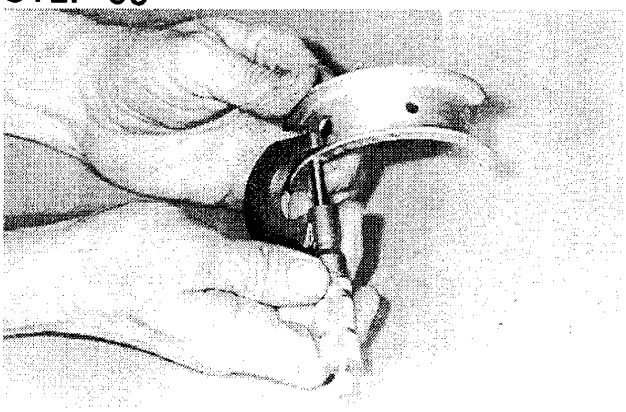
CAUTION: *Always wear asbestos gloves to prevent burning your hands when handling heated parts.*

STEP 65



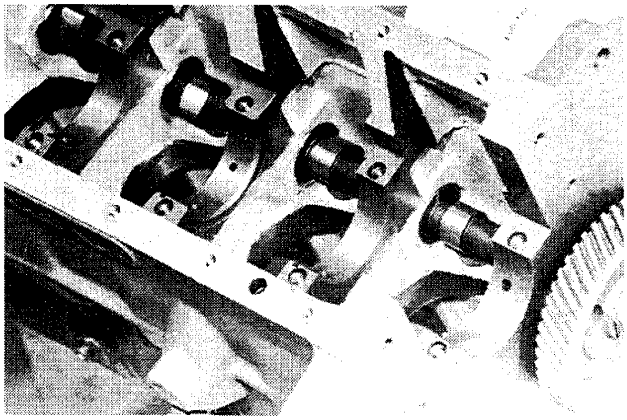
Make sure the timing mark on crankshaft gear is outward.

STEP 66



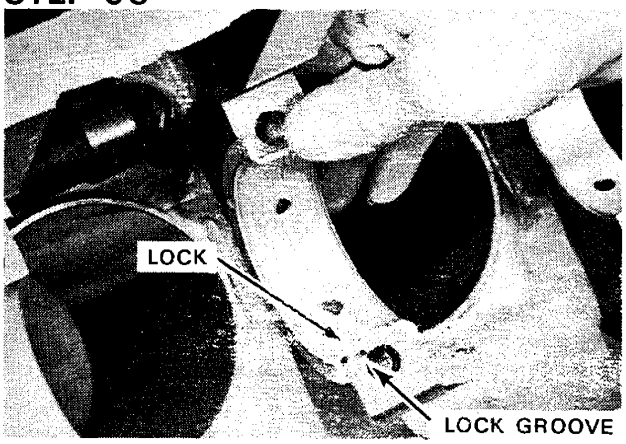
Measure thickness of thrust surface of center main bearing liner. Minimum thickness of thrust surface is .1025". Replace liner if dimension is less than specified.

STEP 67



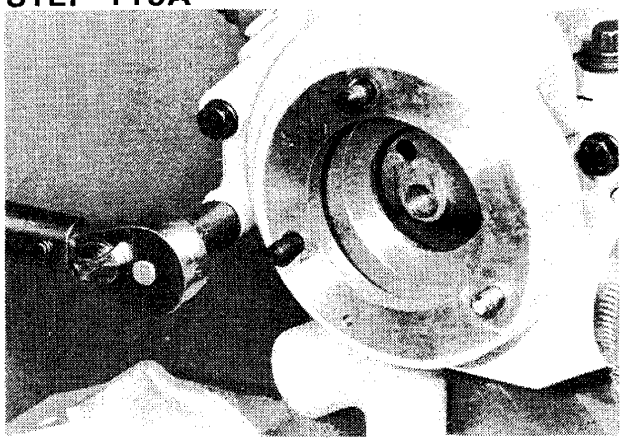
IMPORTANT: The bearing bore in the block and the bearing caps must be absolutely clean and free of dirt or grease. Any dirt left behind the bearing liners will interfere with the lube cooling of the bearing liners and will result in "hot spots" and premature failure.

STEP 68



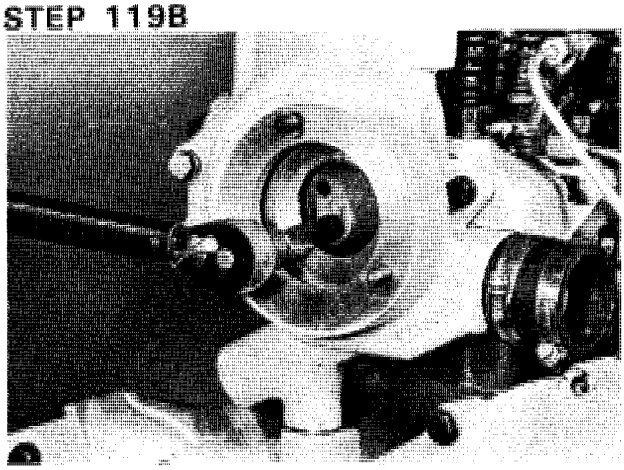
Install bearing liners in engine block, with lock of liner engaging lock groove in block.

STEP 119A



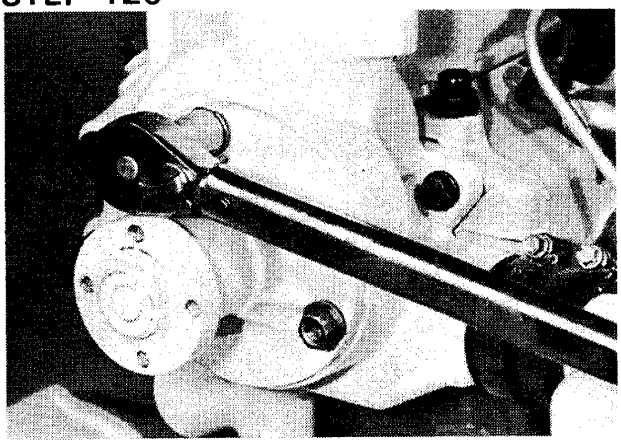
Install water pump housing outer mounting bolts and torque 35 to 42 ft. lbs.

STEP 119B



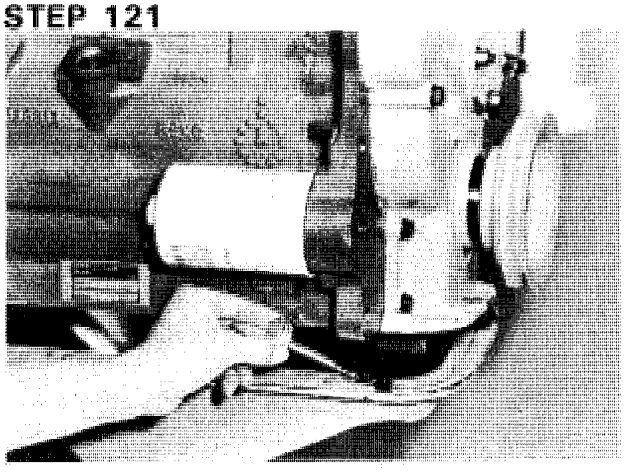
IMPORTANT: Apply Loctite Primer"T" and Loctite #271 (Case B17429 and B17423) on water pump housing inner socket hd.capscrew threads to prevent capscrew backing out into impeller. Install capscrew and torque 35 to 42 ft. lbs.

STEP 120



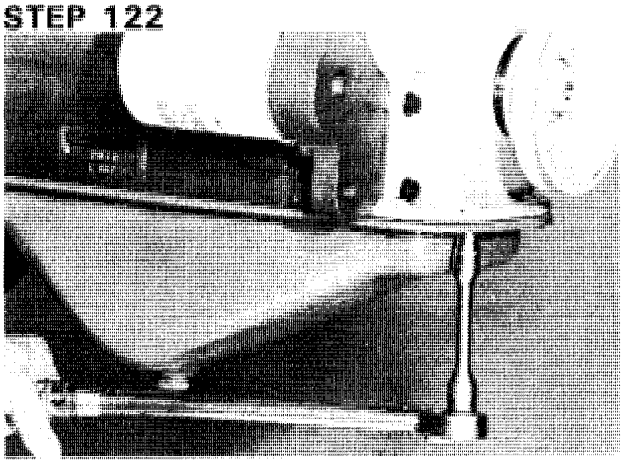
Install the water pump and gasket. Torque the pump mounting nuts 25 to 30 ft. lbs.

STEP 121

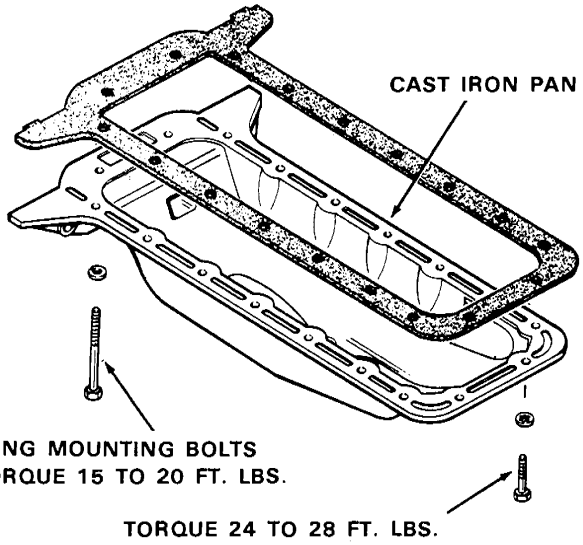


Apply No. 2 Permatex on both sides of new oil pan gasket at the front and rear portions only.

STEP 122

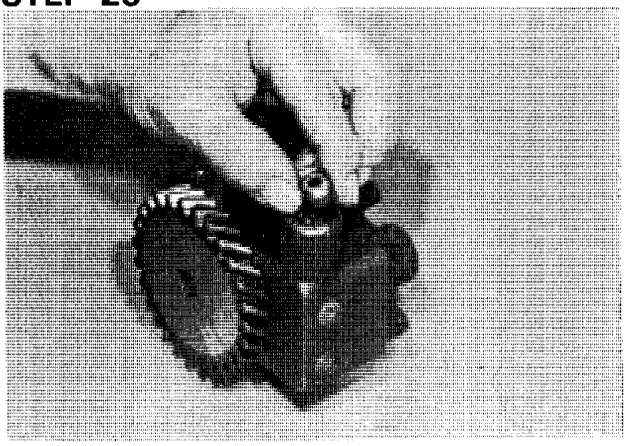


Install oil pan and gasket. Torque stamped steel oil pan mounting bolts 10 to 12 ft. lbs.



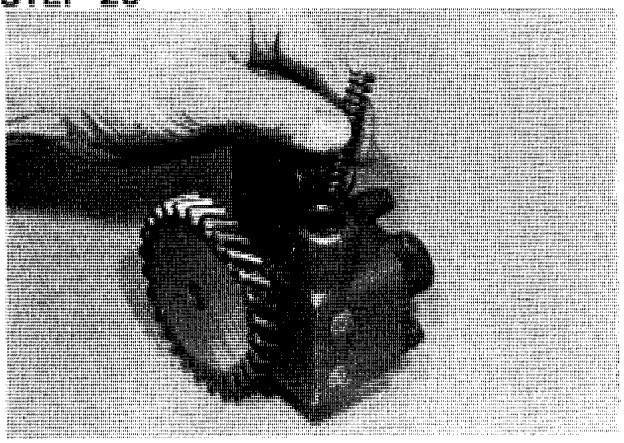
If equipped with cast iron oil pan, install long bolts to the rear of the engine and torque 15 to 20 ft. lbs. Torque remaining mounting bolts 24 to 28 ft. lbs.

STEP 25



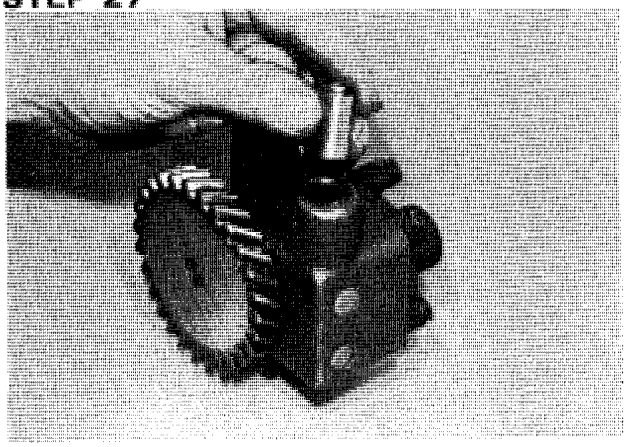
Remove cup plug from body.

STEP 26



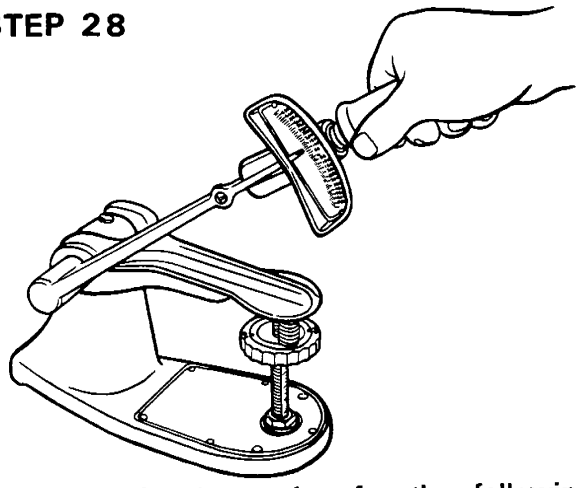
Remove relief valve spring from body.

STEP 27



Remove relief valve from body.

STEP 28

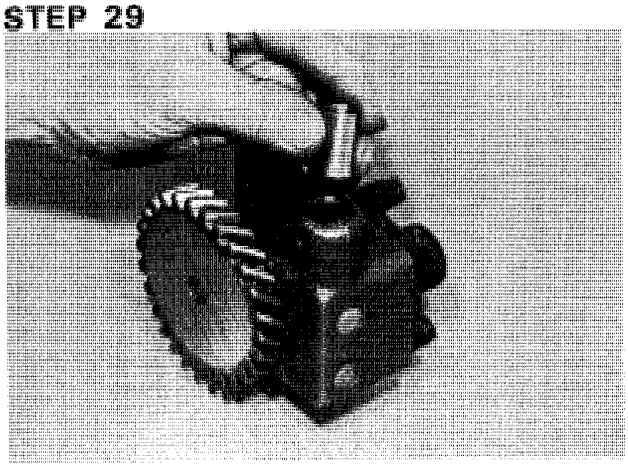


Check relief valve spring for the following:

Free length ..... 2.125"

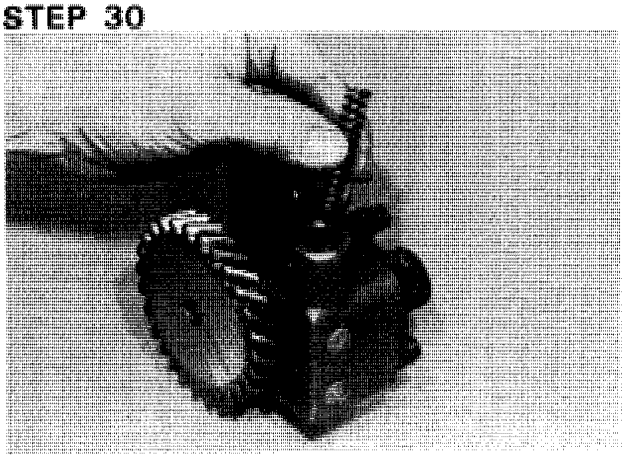
Load at 1.44" ..... 18 to 19 lbs.

STEP 29



Install relief valve in body with closed end toward pump.

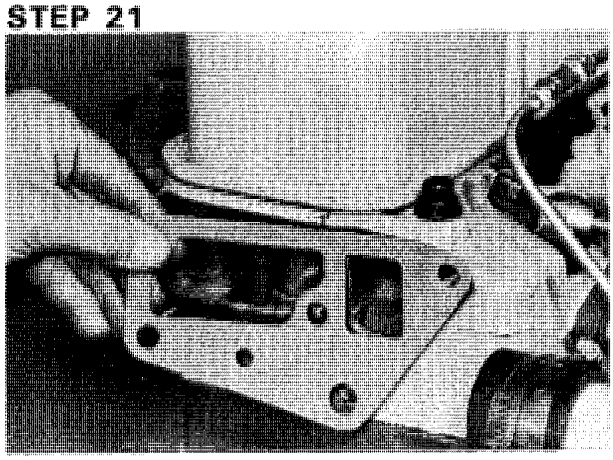
STEP 30



Install relief valve spring in body.

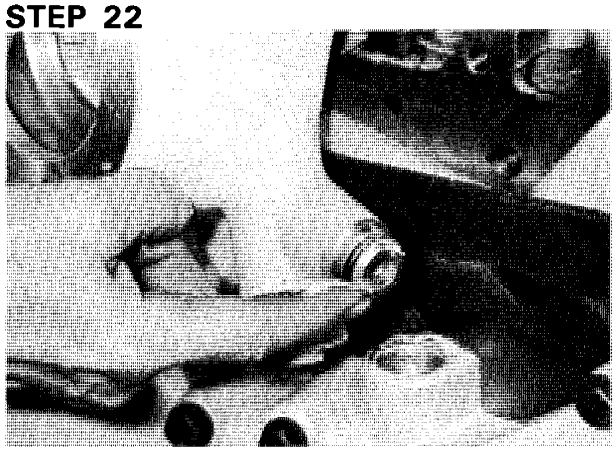
Installation

STEP 21



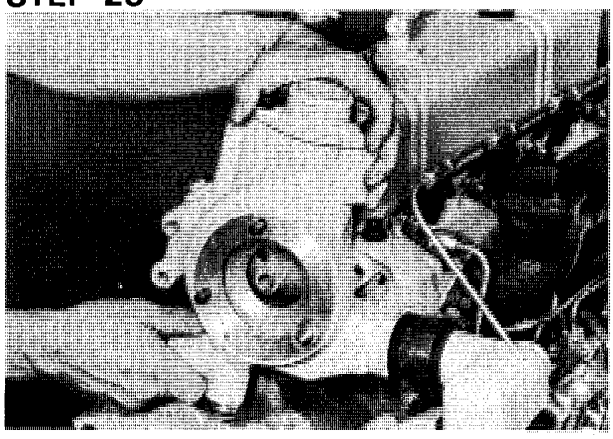
Remove all old gasket material from mounting surface. Install a new water pump housing to cylinder head gasket.

STEP 22



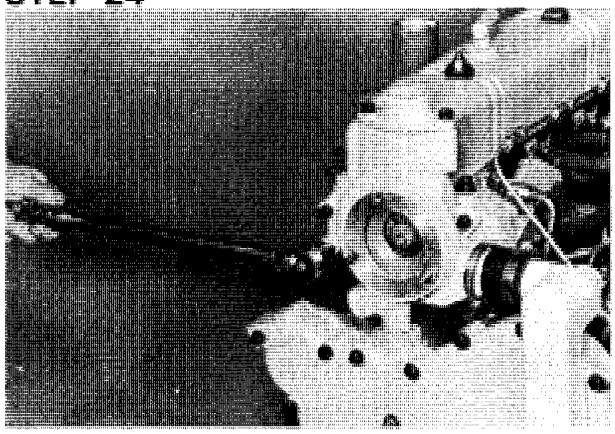
Install a new "O" ring, using lubriplate.

STEP 23



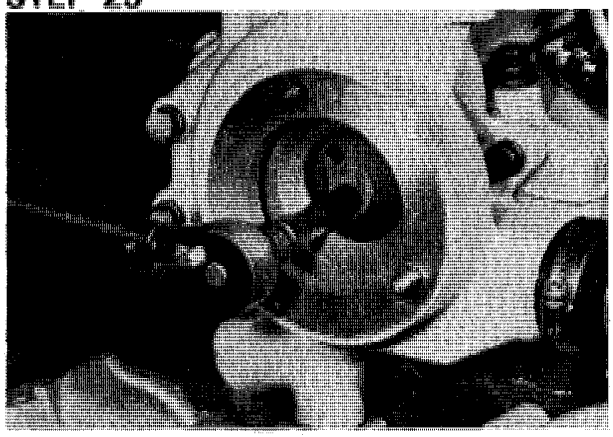
Install water pump housing to water tube and timing gear housing.

STEP 24



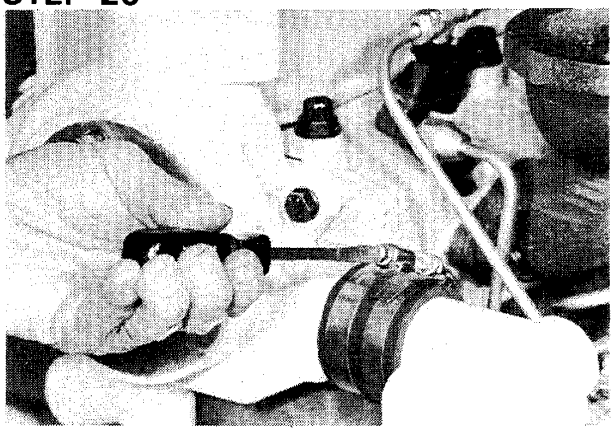
Install outer bolts, and torque 35 to 42 ft. lbs.

STEP 25



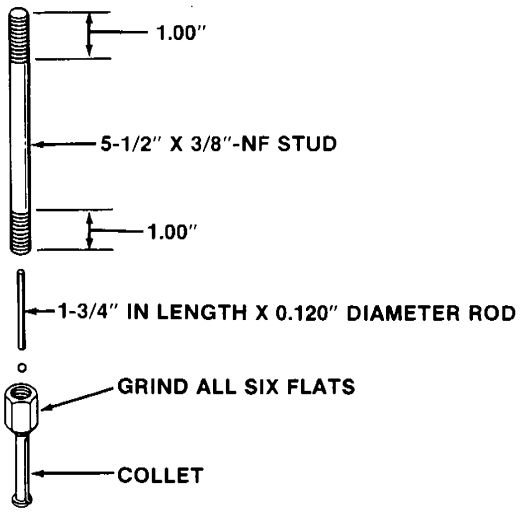
IMPORTANT: Apply Loctite Primer"T" and Loctite #271 (Case B17429 and B17423) on water pump housing inner socket hd.capscrew threads to prevent capscrew backing out into impeller. Install capscrew and torque 35 to 42 ft. lbs.

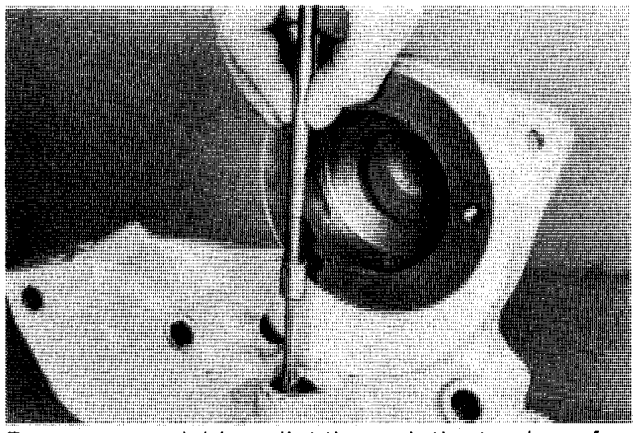
STEP 26



Inspect water pump housing to water tube hose for cracks and deterioration. Replace if necessary. Install hose on water pump housing and on water tube. Secure with clamps.

STEP 31

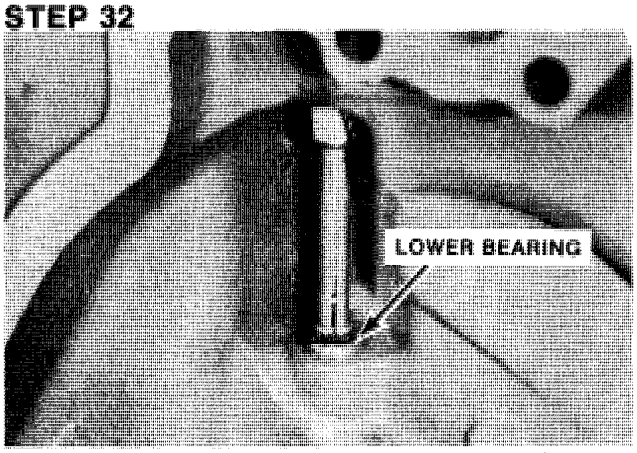




Put an expandable collet through the top bore for the governor control arm.

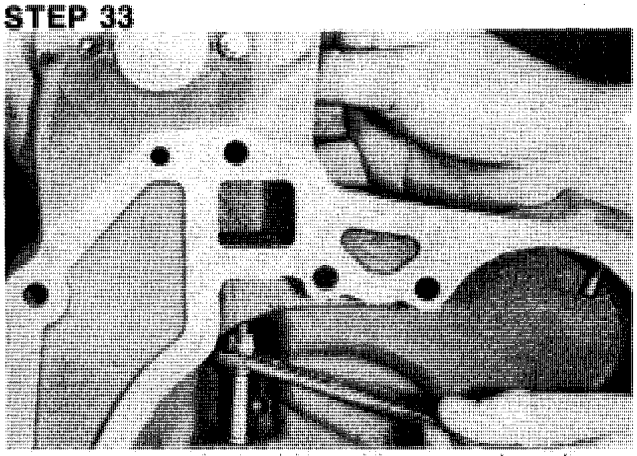
NOTE: *Use an expandable collet (Snap On Number CG41-13). Grind the six sides of the hex boss. Use a rod, 1-3/4" (44.45 mm) long x 0.120" (3.048 mm) diameter, for the ball actuator. Use a 3/8" NF x 5-1/2" stud to turn inside the collet.*

STEP 32



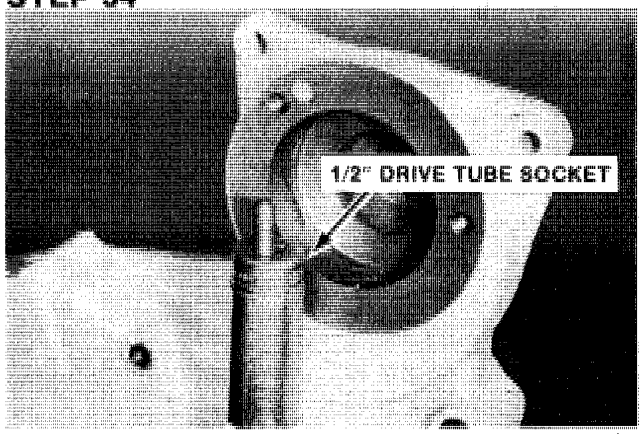
The collet must go through the lower bearing.

STEP 33



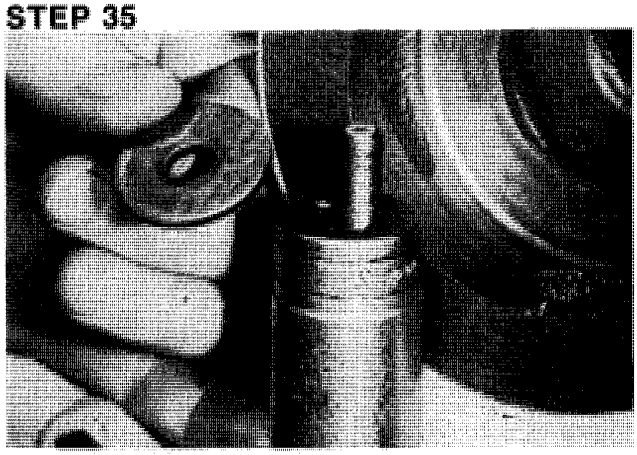
Hold the collet in position with a wrench and turn the stud by hand to expand the collet lip under the lower bearing.

STEP 34



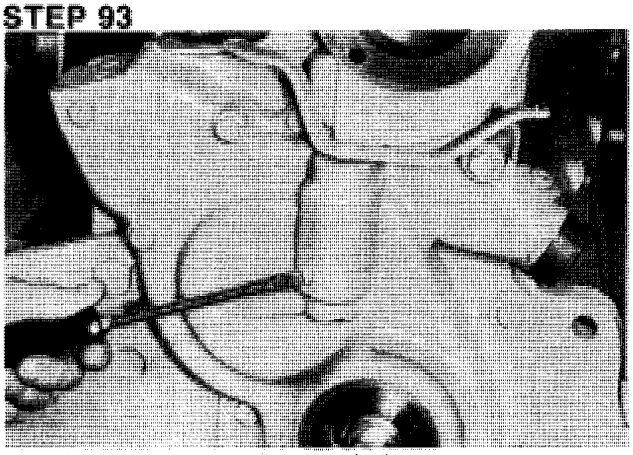
Install a 1/2" drive tube socket over the collet stud.

STEP 35



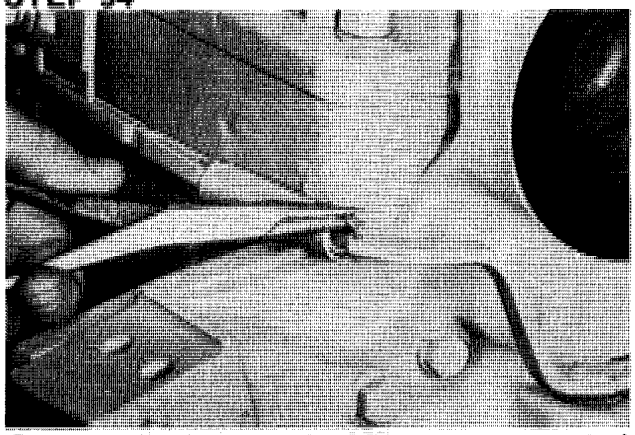
Install a flat washer on the collet stud.

STEP 93



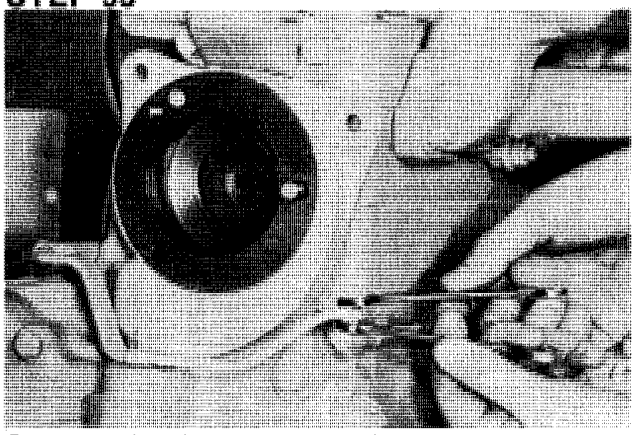
Install the set screw in the timing gear cover.

STEP 94



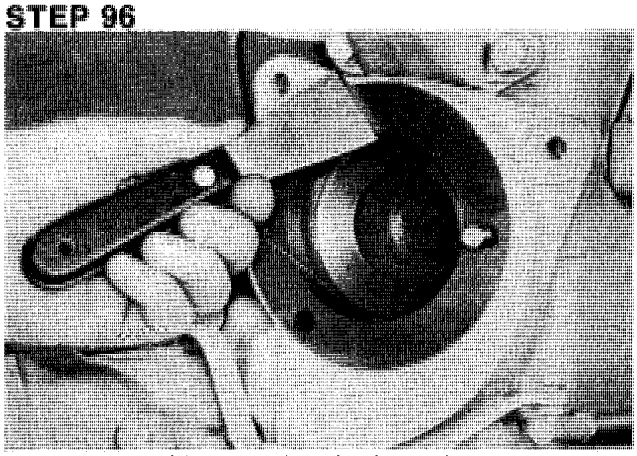
Connect the inner and outer governor control springs to the governor control lever.

STEP 95



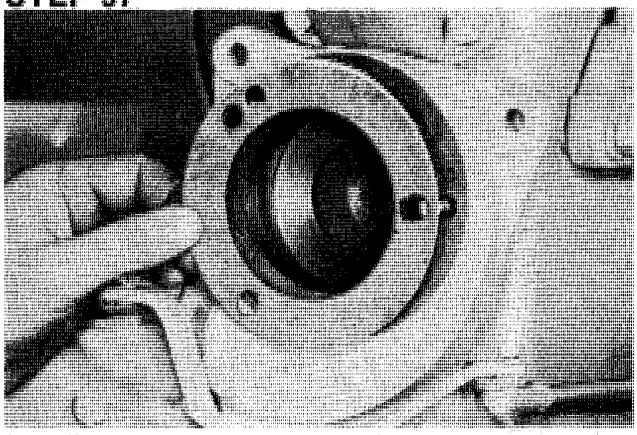
Connect the throttle rod to the governor control lever.

STEP 96



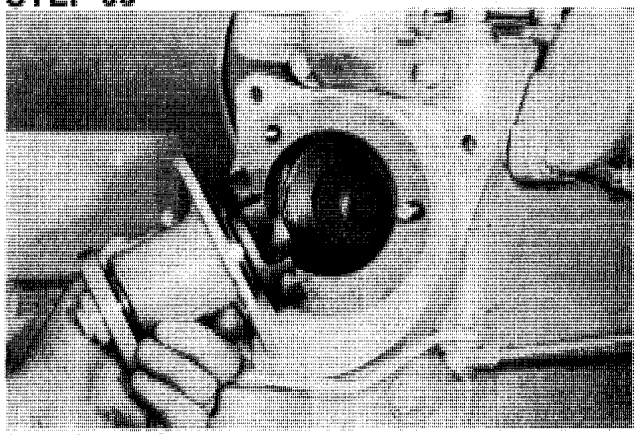
Remove any foreign material from the water pump and timing gear cover flange.

STEP 97



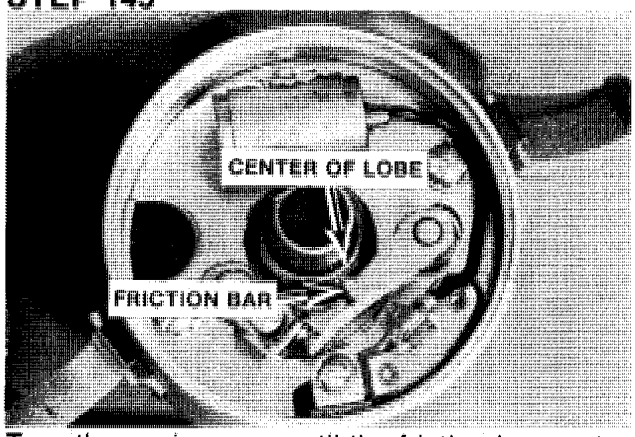
Install a new water pump gasket.

STEP 98



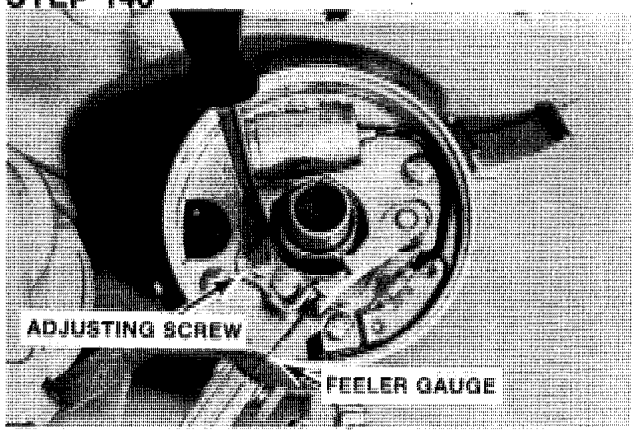
Install the water pump.

STEP 145



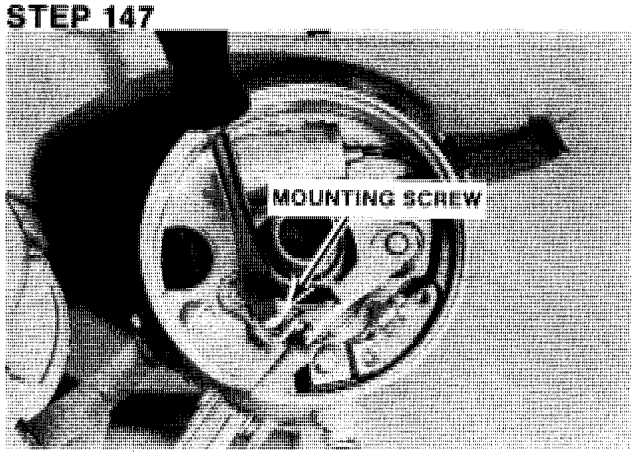
Turn the engine over until the friction bar on the point set is on the center of one of the four camshaft lobes.

STEP 146



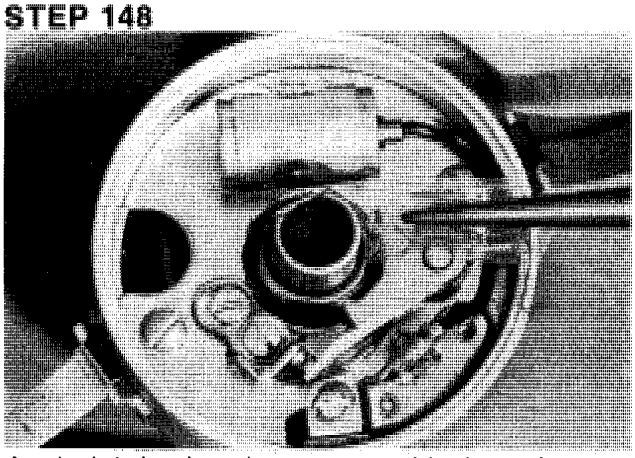
Turn the adjusting screw until the gap between the points is 0.020" (0.508 mm). Use a feeler gauge.

STEP 147



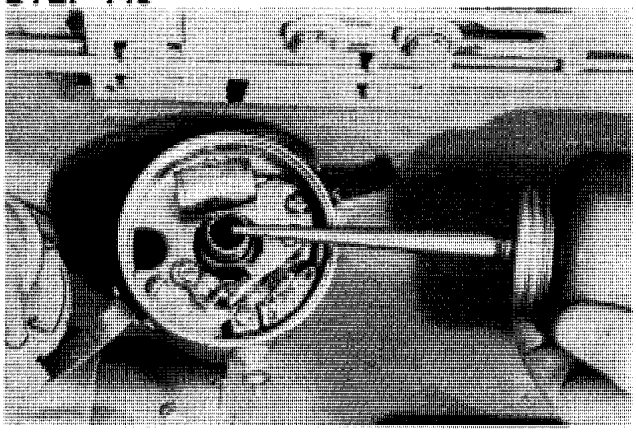
Tighten the mounting screw while keeping the gap at 0.020" (0.508 mm).

STEP 148



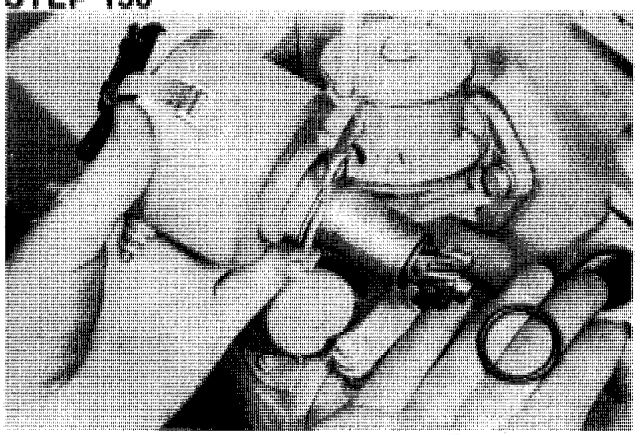
Apply lubrication that comes with the point and condenser kit to the camshaft lobes.

STEP 149



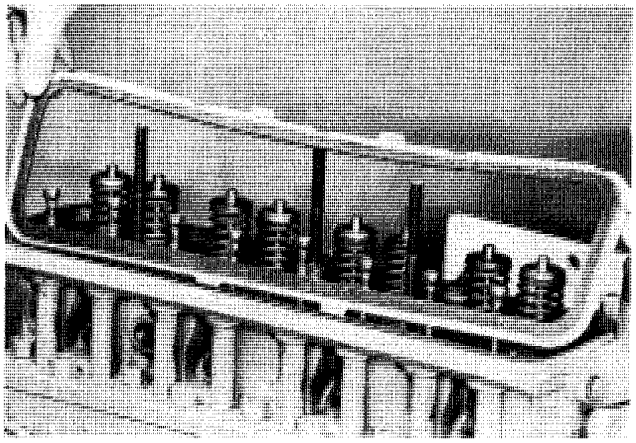
Put one drop of oil on the oil wick inside the distributor camshaft.

STEP 150



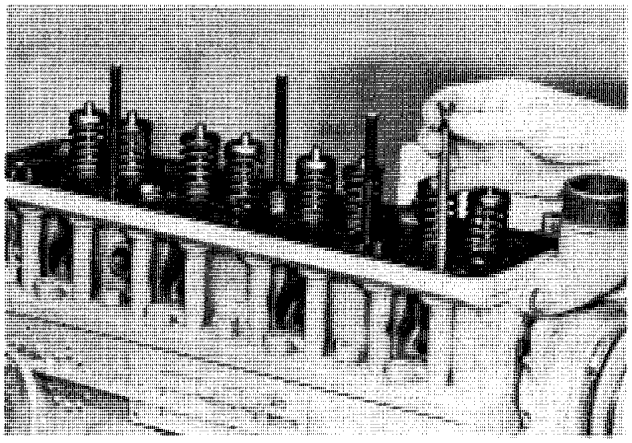
Install a new o-ring on the distributor body if the body was removed from the engine block. Install the body into the engine block.

STEP 30



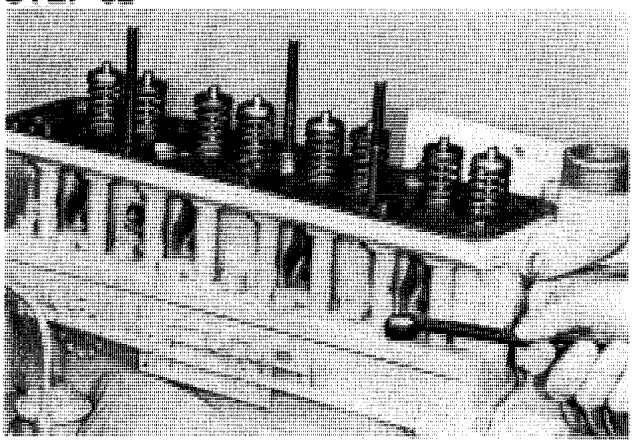
Remove the cover gasket.

STEP 31



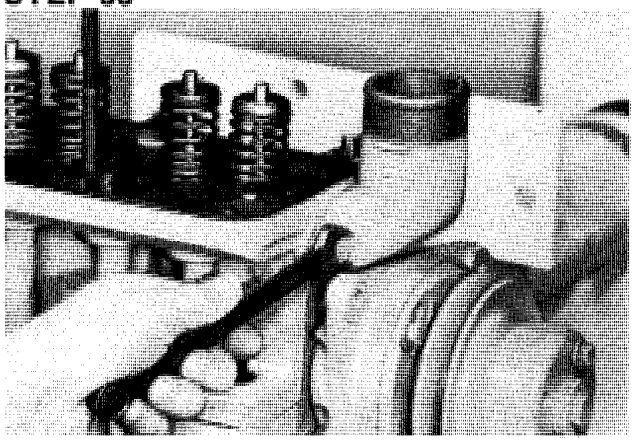
Remove the push rods.

STEP 32



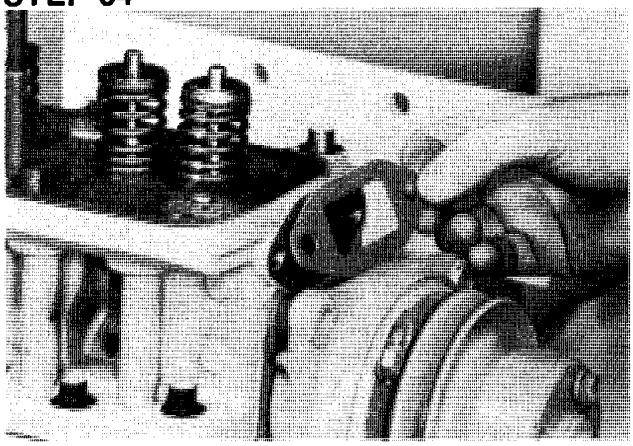
Remove the cylinder head retaining nuts.

STEP 33



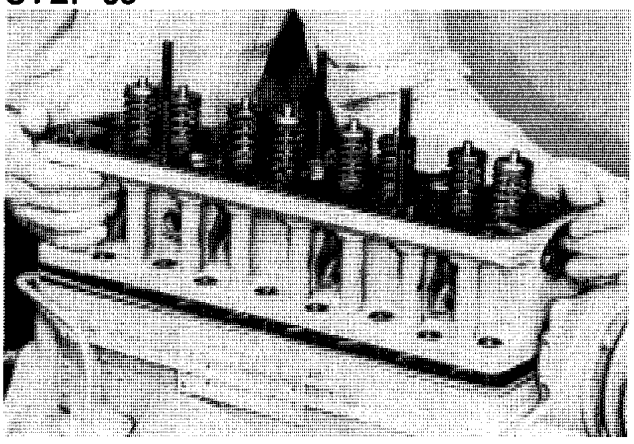
Remove the water outlet elbow from the cylinder head.

STEP 34



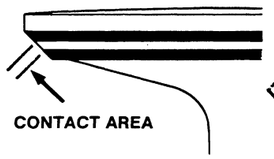
Remove the elbow gasket.

STEP 35

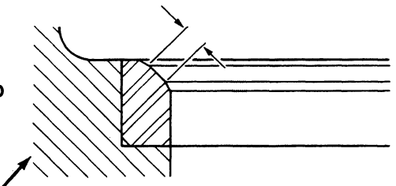


Remove the cylinder head assembly.

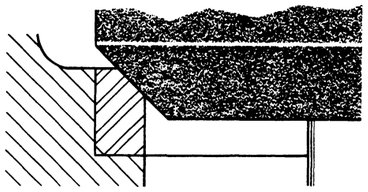
SEAT CONTACT AREA ON VALVE TOO NARROW



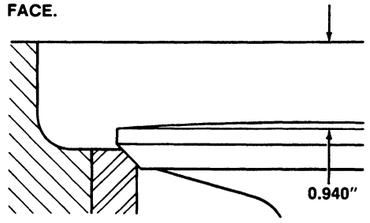
IF THE VALVE CONTACT AREA ON THE SEAT LOOKS LIKE THIS (A SEAT THAT HAS BEEN GROUND BEFORE)



→ USE A 45 DEGREE STONE TO INCREASE THE CONTACT AREA.

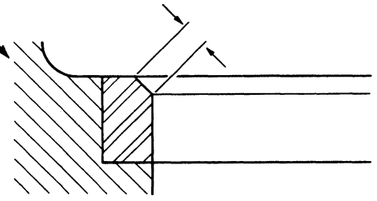


→ CHECK THAT THE VALVE HEAD IS NOT RECESSED MORE THAN 0.940" (23.876 MM) BELOW THE CYLINDER HEAD SURFACE.



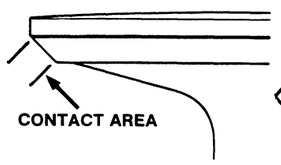
→ IF THE VALVE HEAD IS RECESSED MORE THAN 0.940" (23.876 MM), REPLACE THE VALVE AND VALVE SEAT.

IF THE VALVE CONTACT AREA ON THE SEAT LOOKS LIKE THIS

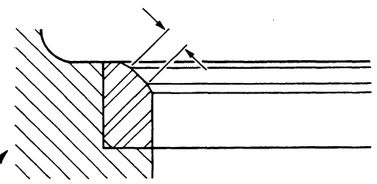


→ THE VALVE AND THE VALVE SEAT MUST BE REPLACED BECAUSE MORE GRINDING WILL NOT CHANGE THE LOWER CONTACT POINT.

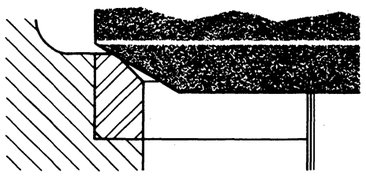
SEAT CONTACT AREA ON VALVE TOO WIDE



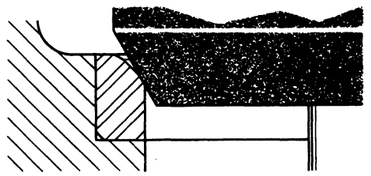
IF THE VALVE CONTACT AREA ON THE SEAT LOOKS LIKE THIS (A SEAT THAT HAS BEEN GROUND BEFORE)



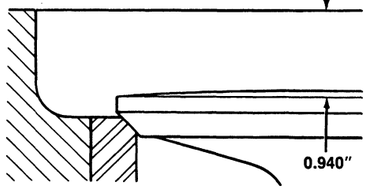
→ USE A 30 DEGREE STONE TO LOWER THE UPPER CONTACT AREA.



→ USE A 60 DEGREE STONE TO LIFT THE LOWER CONTACT AREA.

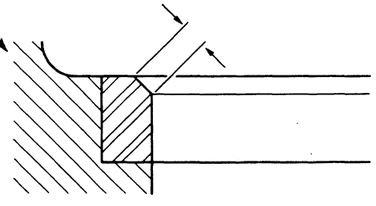


→ CHECK THAT THE VALVE HEAD IS NOT RECESSED MORE THAN 0.940" (23.876 MM) BELOW THE CYLINDER HEAD SURFACE.

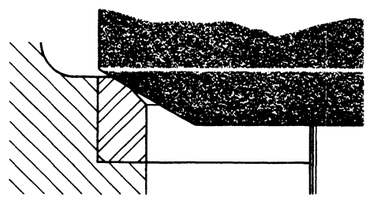


→ IF THE VALVE HEAD IS RECESSED MORE THAN 0.940" (23.876 MM), REPLACE THE VALVE AND VALVE SEAT.

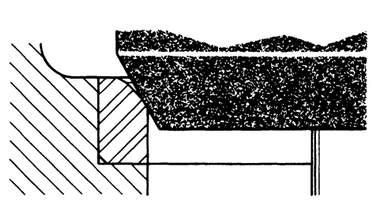
IF THE VALVE CONTACT AREA ON THE SEAT LOOKS LIKE THIS



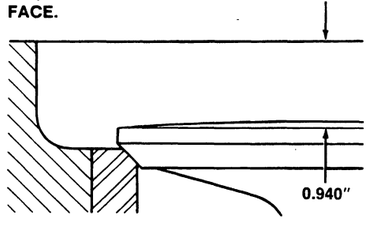
→ USE A 30 DEGREE STONE TO LOWER THE UPPER CONTACT AREA.



→ USE A 60 DEGREE STONE TO LIFT THE LOWER CONTACT AREA.

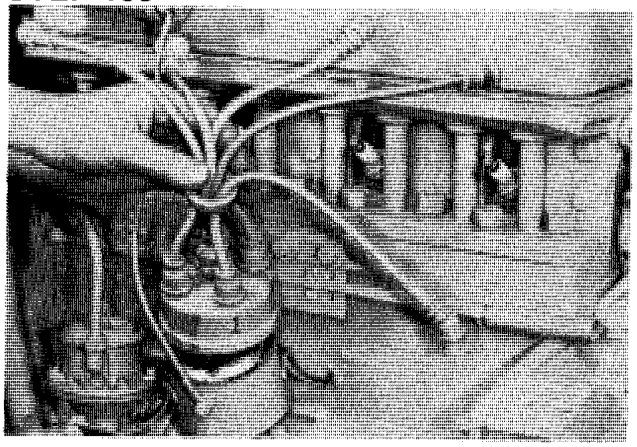


→ CHECK THAT THE VALVE HEAD IS NOT RECESSED MORE THAN 0.940" (23.876 MM) BELOW THE CYLINDER HEAD SURFACE.



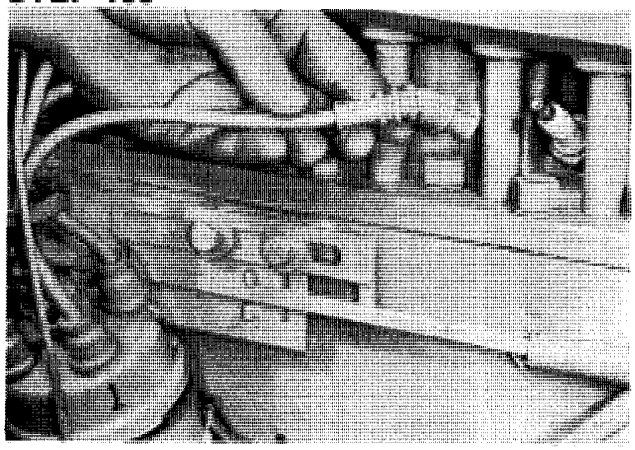
→ IF THE VALVE HEAD IS RECESSED MORE THAN 0.940" (23.876 MM), REPLACE THE VALVE AND VALVE SEAT.

STEP 108



Install the distributor cap.

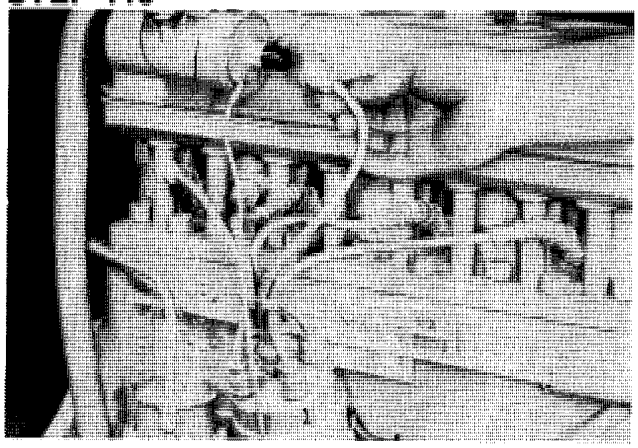
STEP 109



Install the spark plug wires to the spark plugs.

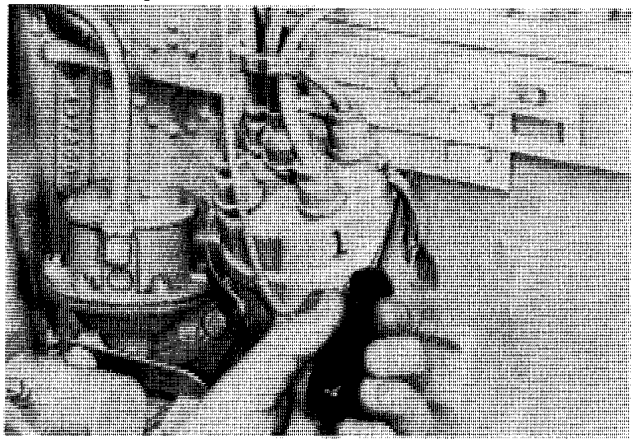
NOTE: *Make sure that the spark plug wires are connected to the correct cylinder spark plugs. See Step 9.*

STEP 110



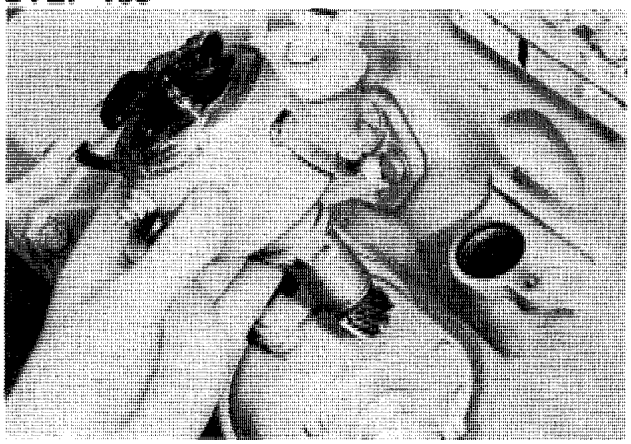
Connect the ignition coil to distributor wire at the coil.

STEP 111



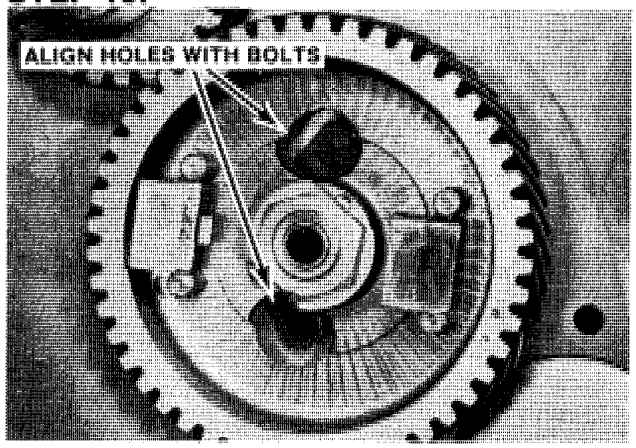
Fasten the distributor body clamps to the distributor cover.

STEP 166



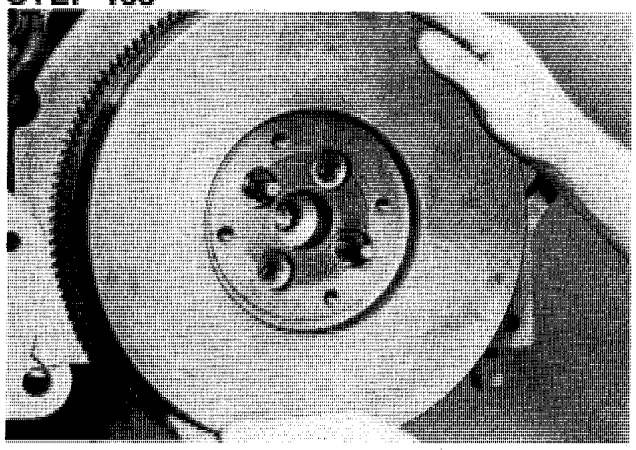
Remove the distributor. See Section 2102 of the Service Manual for removal.

STEP 167



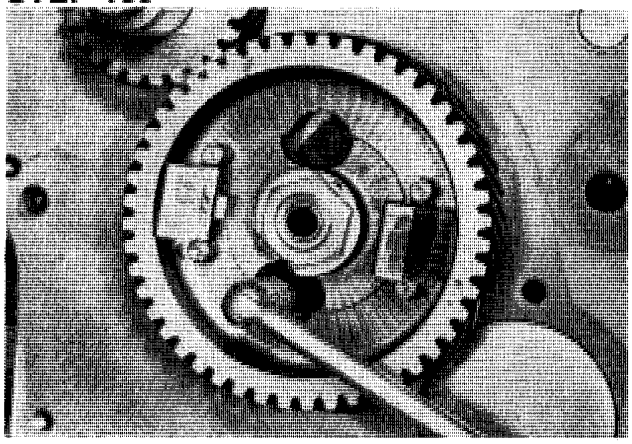
Turn the flywheel to align the holes in the camshaft gear with the bolts in the thrust plate.

STEP 168



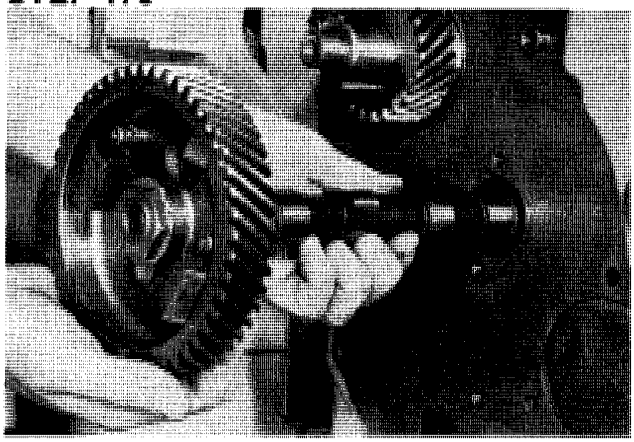
Remove the flywheel. See Section 2135 of the Service Manual for removal.

STEP 169



Remove the thrust plate retaining bolts.

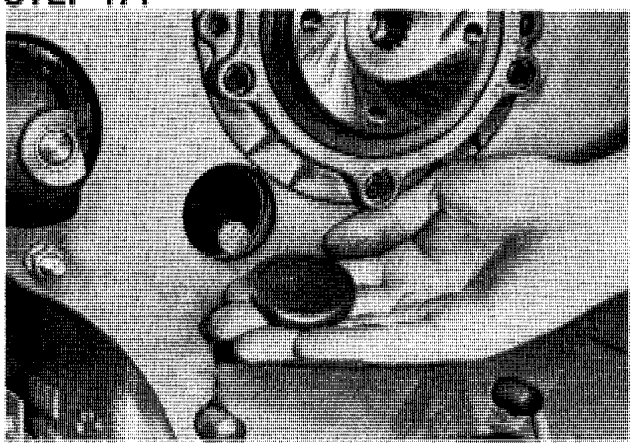
STEP 170



Remove the camshaft assembly.

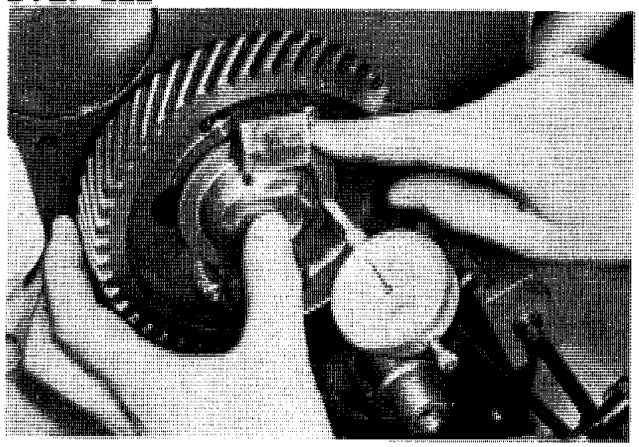
NOTE: *Make sure that the push rod lifters are lifted off of the camshaft lobes before removing the camshaft assembly.*

STEP 171



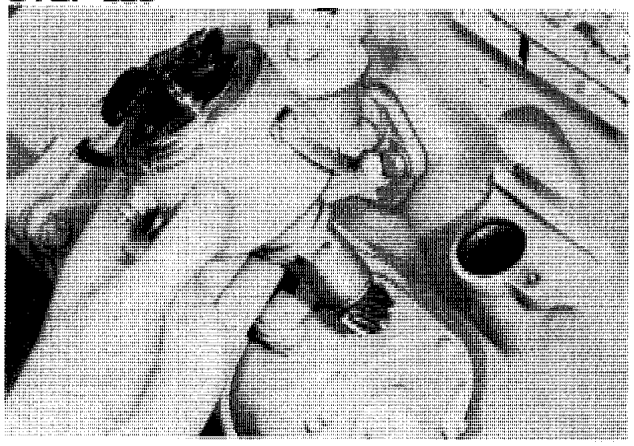
Use a rod to push the rear camshaft cup plug out of the cylinder block.

STEP 222



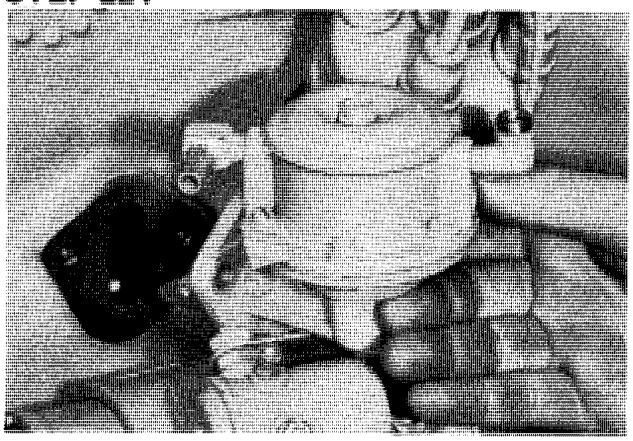
Check the governor shaft assembly for run-out. Use a dial indicator. Apply hand pressure to the governor shaft and rotate the governor shaft to check for run-out. Run-out must not be more than 0.010" (0.254 mm). Replace the governor shaft if the run-out is more than 0.010" (0.254 mm).

STEP 223



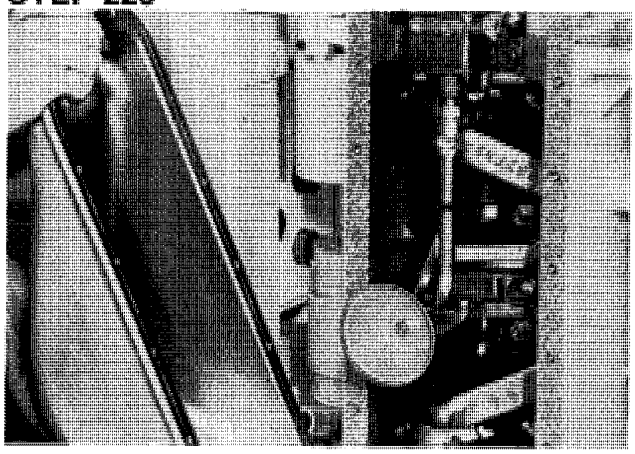
Install the distributor. See Section 2102 of the Service Manual for installation.

STEP 224



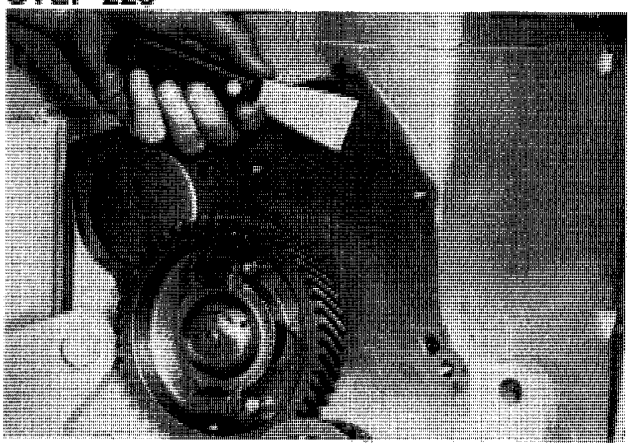
Install the fuel pump. See Section 2102 of the Service Manual for installation.

STEP 225



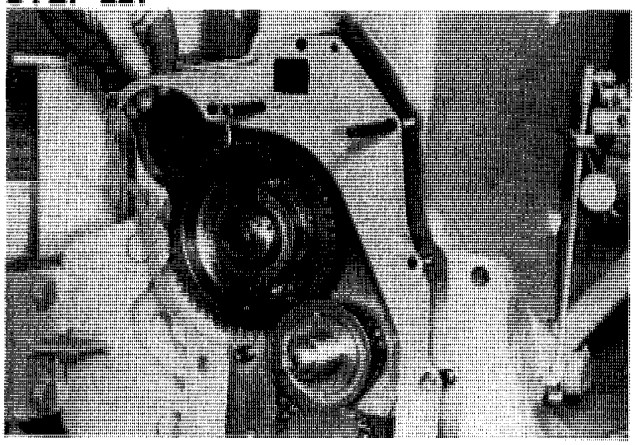
Install the oil pan. See Section 2145 of the Service Manual for installation.

STEP 226



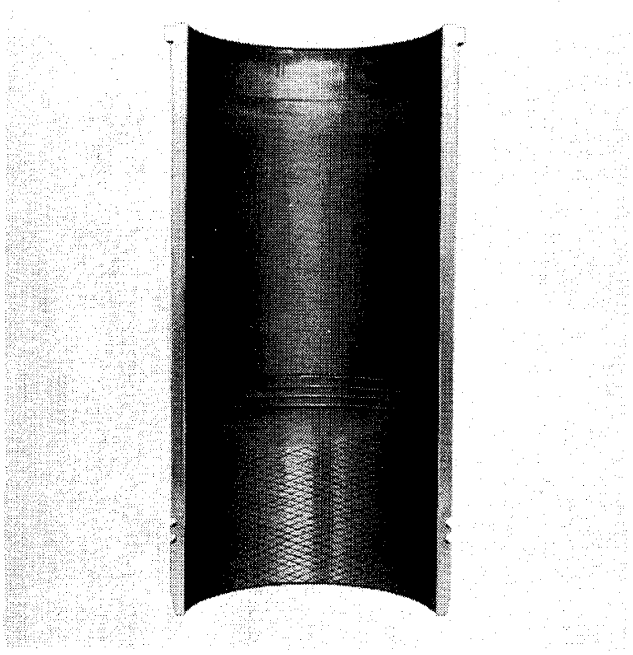
Remove any foreign material from the surface of the engine block and the timing gear cover.

STEP 227



Install a new timing gear cover gasket. Use two 3/8" studs to hold the gasket in position.

Dusted Sleeve



Too much wear in the piston ring movement area, shows a dusting failure.

A dusting failure will cause the following:

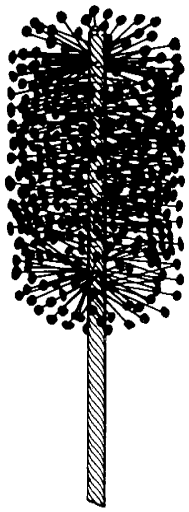
1. Lower area of piston wall will show wear.
2. Too much piston ring groove wear.
3. Too much piston ring side clearance.
4. Washed away areas of the piston ring lands where the aluminum will be gone.
5. Piston rings will have too much face contact and wear which can be seen as a reduction in radial width and an increase in end gap.
6. Chrome piston rings will show wear through the face. The chrome will be worn off and base iron can be seen.
7. The cylinder head can have smooth intake ports and worn valve guides.

All of these conditions are caused by dirt which is mixed with the intake air.

SLEEVE GLAZE REMOVAL

STEP 20

IMPORTANT: *Cover the crankshaft journals with a clean cloth before removing the glaze from the sleeves. The cloth will prevent dirt and other foreign material caused by the brush operation, from falling on the crankshaft.*



GLAZE REMOVAL POWER BRUSH

(CAS-10081) 3" THROUGH 3.5"

The glaze must be removed from the cylinder sleeve if new rings are used in an old sleeve, so that the piston rings can correctly seat against the sleeve during the run-in time.

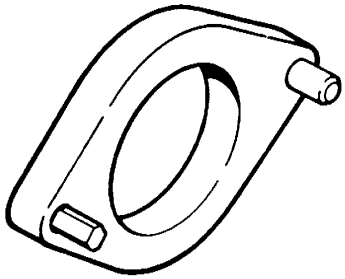
Use a double spiral brush of 180 grit silicone carbide to remove the glaze.

Too much glaze (smooth surface) on cylinder sleeve walls of a new engine or an engine with an overhaul is caused by run-in procedure that is not correct.

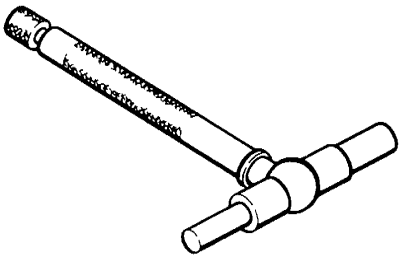
Glaze does not permit the piston rings to seat correctly in the cylinder sleeves which will cause too much oil consumption.

Too much glaze on the cylinder sleeves can be prevented by correctly giving the operator instructions in the correct run-in procedure. See Section 1129 of the Service Manual for run-in instructions.

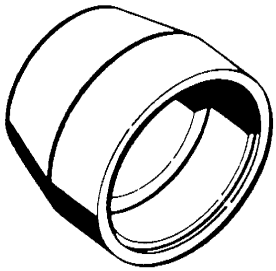
SPECIAL TOOLS



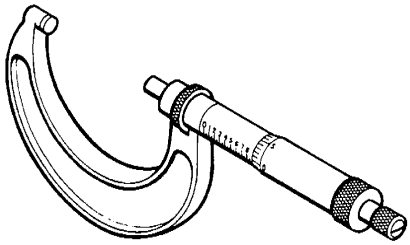
REAR SEAL RETAINER
ALIGNMENT TOOL CAS-1178



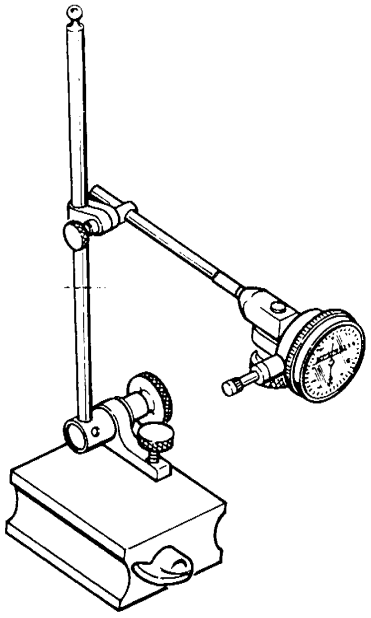
0" TO 5" BORE GAUGE
OR INSIDE MICROMETER



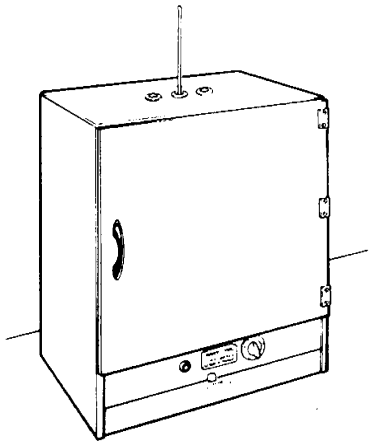
REAR SEAL POSITIONING
TOOL CAS-1171-5



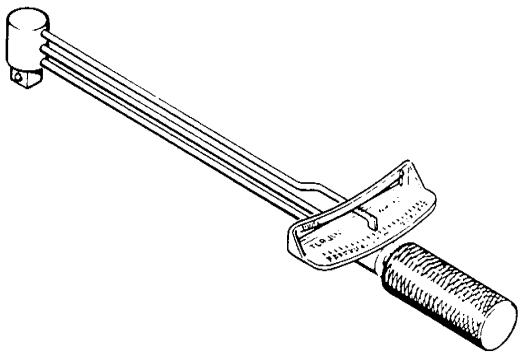
0" TO 5" MICROMETER



DIAL INDICATOR



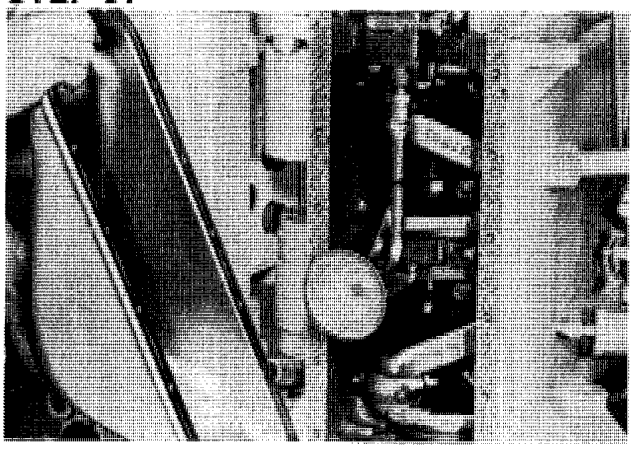
BEARING HEATER/OVEN
CAS-10133



FOOT POUND TORQUE WRENCH

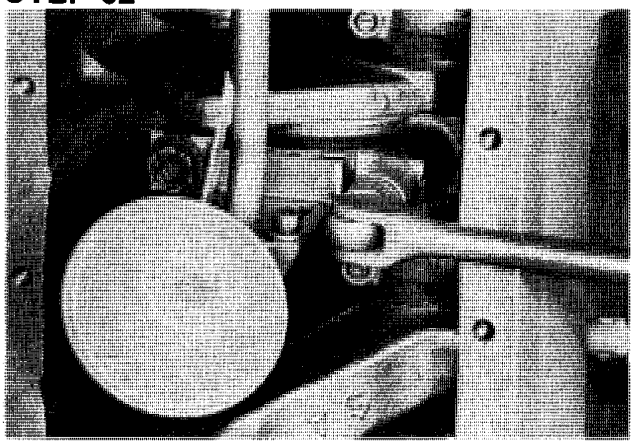
REPLACEMENT OF THE MAIN BEARINGS WITHOUT REMOVING THE CRANKSHAFT

STEP 61



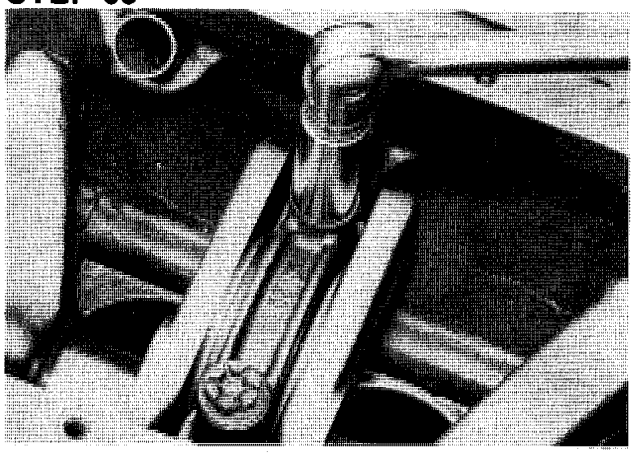
Remove the oil pan. See Section 2145 of the Service Manual for removal.

STEP 62



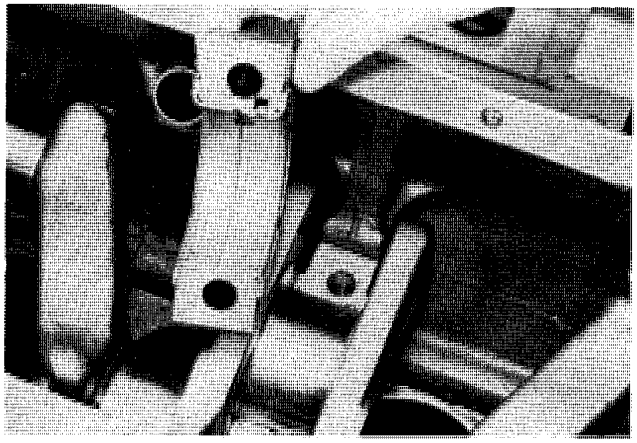
Remove the oil pump suction tube. See Section 2145 of the Service Manual for removal.

STEP 63



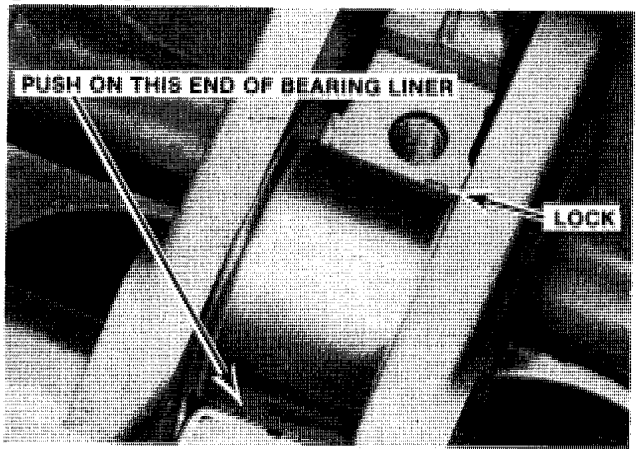
Remove the bolts from the main bearing caps.

STEP 64



Remove the main bearing caps.

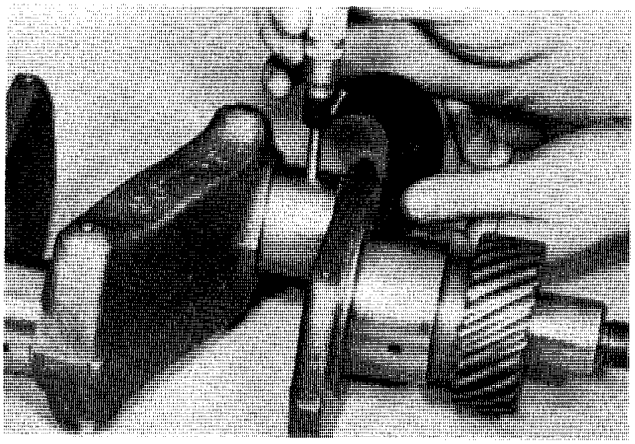
STEP 65



Push on the end of the bearing liners with a putty knife and turn the crankshaft to remove the bearing liners.

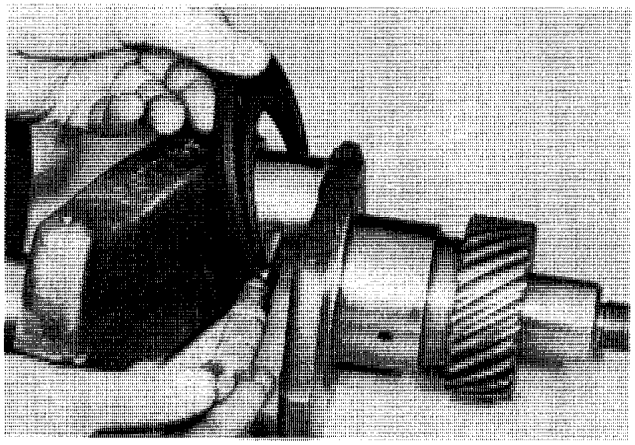
NOTE: *Push on the end of the bearing liner that is opposite the end of the bearing liner with the lock.*

STEP 117



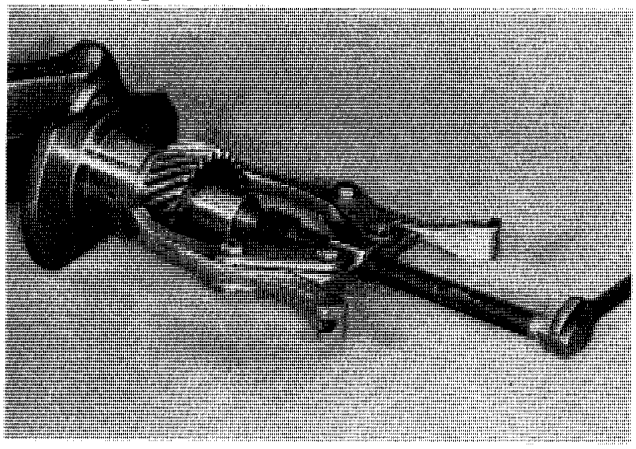
Measure the connecting rod journals for taper. Measure the front and rear of each journal. Grind the journals if the taper is more than 0.002" (0.0508 mm).

STEP 118



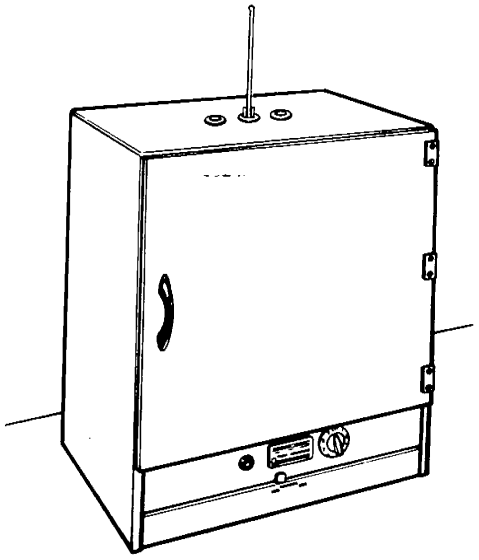
Check the rod journals again, 90 degrees from the first measurements (Step 117) for out-of-round. Grind the journals if the out-of-round is more than 0.001" (0.0254 mm).

STEP 119



Remove the crankshaft gear if the gear is damaged or worn. Use a puller to remove the gear.

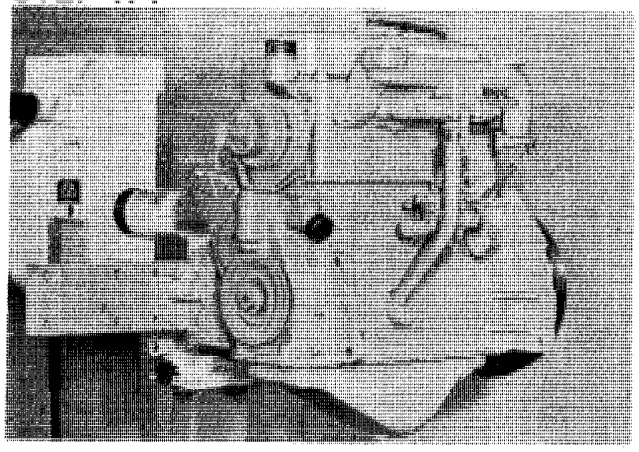
STEP 120



Heat the crankshaft gear. Use a bearing heater oven (CAS-10133).

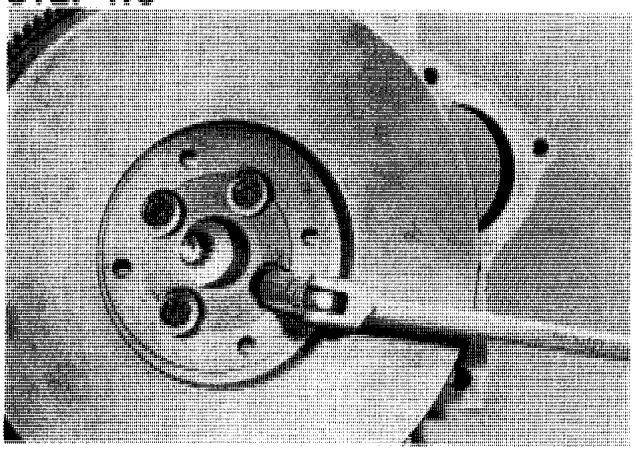
FLYWHEEL

STEP 174



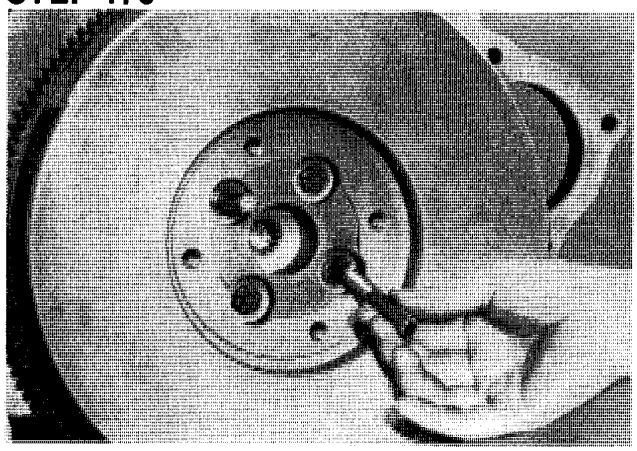
The engine must be separated from the vehicle before the rear oil seal can be removed. See the engine removal section of the Service Manual for the engine separation.

STEP 175



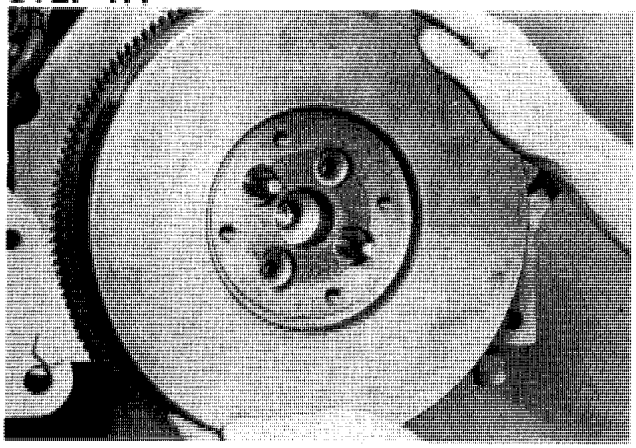
Remove the bolts that hold the flywheel assembly to the crankshaft.

STEP 176



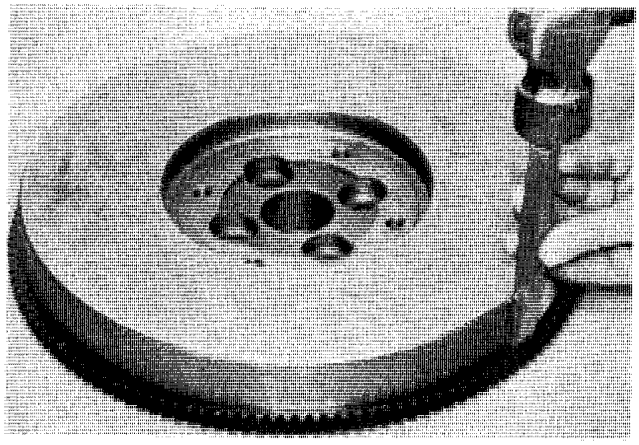
Install two 7/16" NF studs into the bolt holes as guides to remove the flywheel.

STEP 177



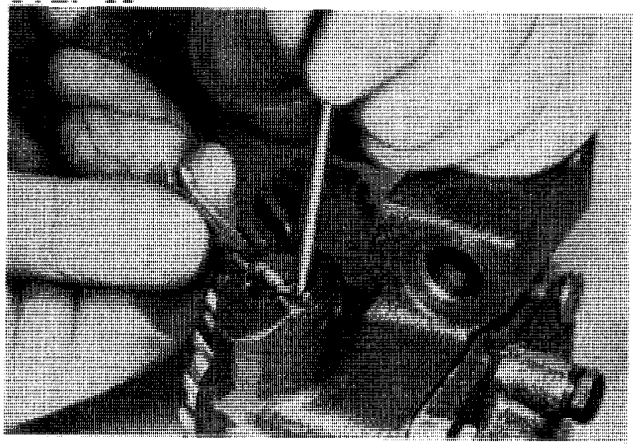
Remove the flywheel.

STEP 178



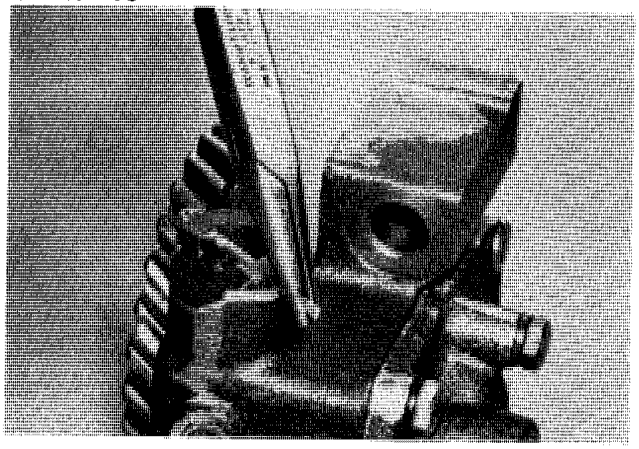
Remove the ring gear from the flywheel. Use a drift and hammer. Work around the circumference of the ring gear.

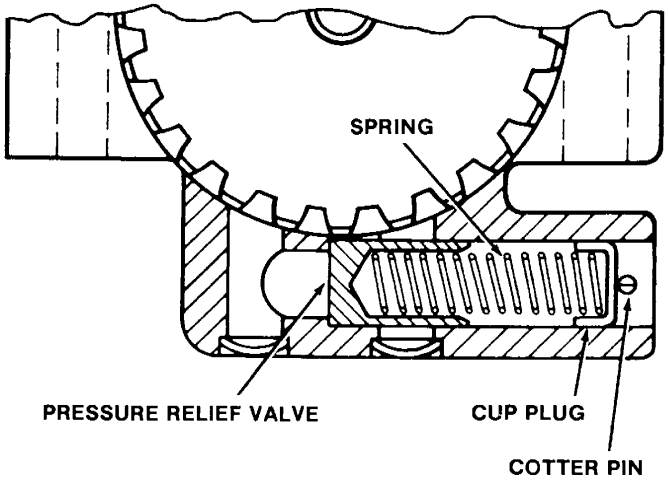
STEP 39



Compress the cup plug and spring until the cup plug is below the cotter pin hole. Install a new cotter pin through the hole in the body.

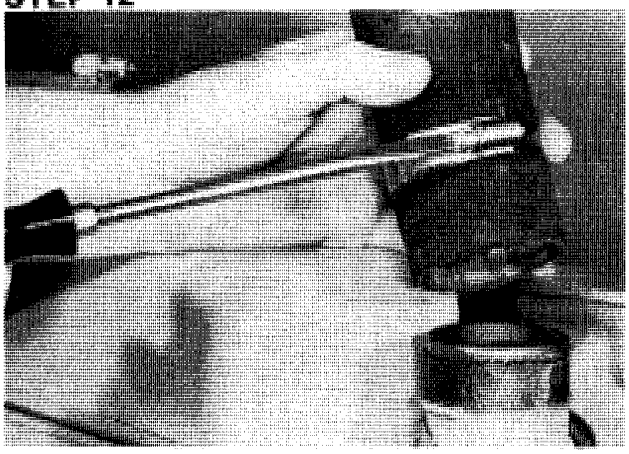
STEP 40





Bend the ends of the cotter pin.

STEP 12

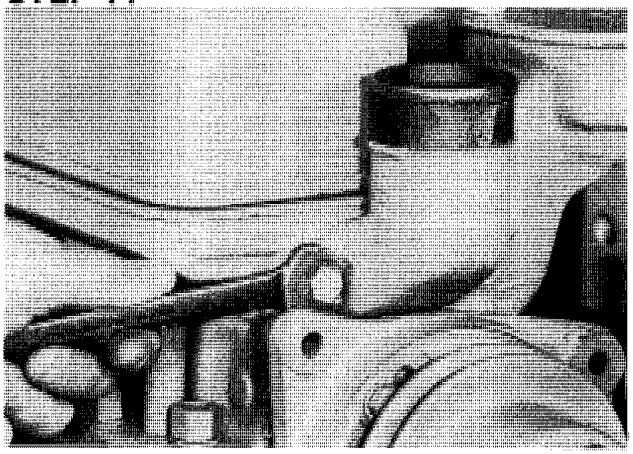


Loosen the upper hose clamp.

STEP 13

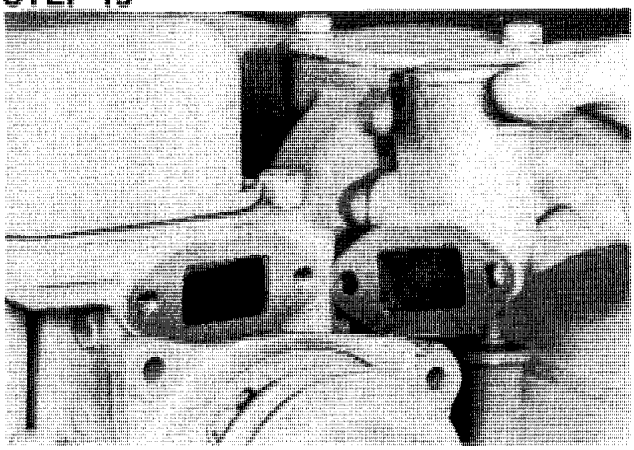
Remove the sleeve support from the hose.

STEP 14



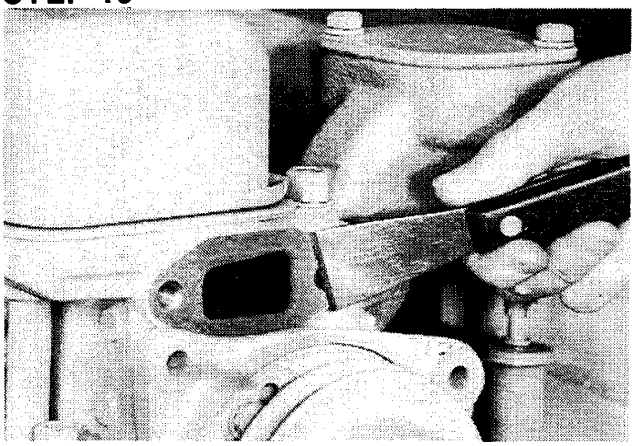
Remove the mounting bolts for the water outlet elbow.

STEP 15



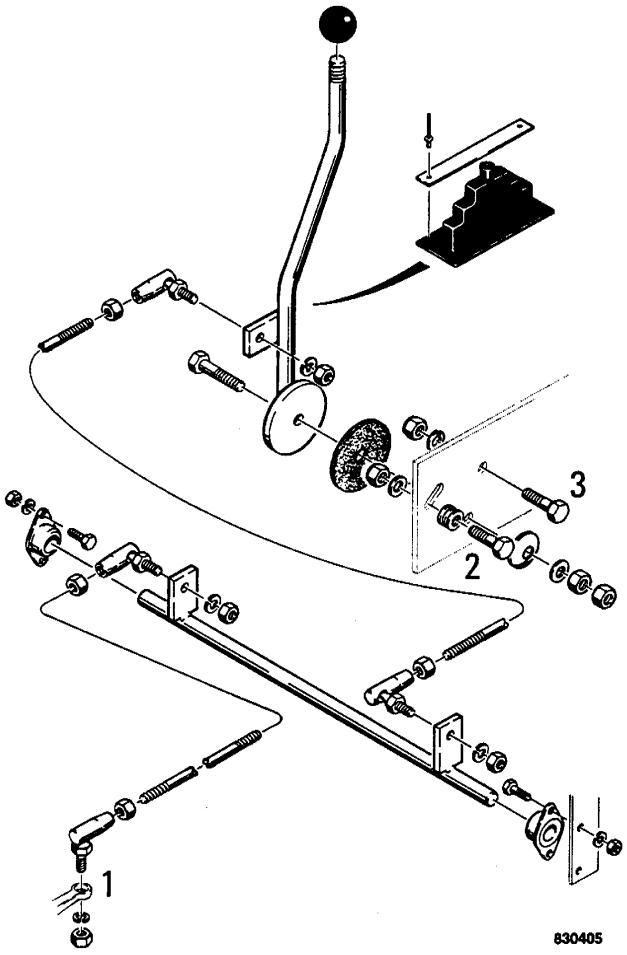
Remove the elbow.

STEP 16



Remove any foreign material from the cylinder head and water outlet elbow flanges.

Adjustment Procedure for Gasoline Engine



1. *Connected to Governor Linkage*
2. *Low Idle Stop*
3. *Full Throttle Stop*

1. Engage the parking latch.

2. Remove the seat.

3. Connect a tachometer to the terminal on the side of the distributor.

4. Start the engine and check the low idle speed and the full throttle speed.

5. Stop the engine.

6. If the full throttle speed is not as specified, check the adjustment of the governor linkage on the engine; especially the full throttle adjustment. See Section 2102 for instructions.

7. When the full throttle speed is correct, with the engine stopped move the throttle lever all the way forward.

8. If the throttle lever does not touch the full throttle stop, adjust the length of the throttle rod connected to the throttle lever so that throttle lever is against the full throttle stop.

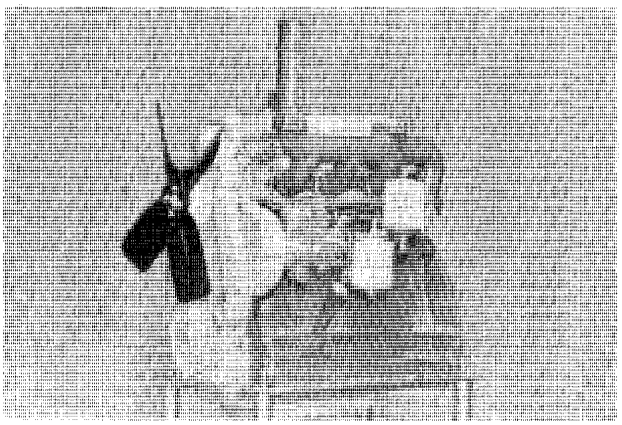
9. If the low idle speed was not as specified:

   a. Loosen the low idle stop.

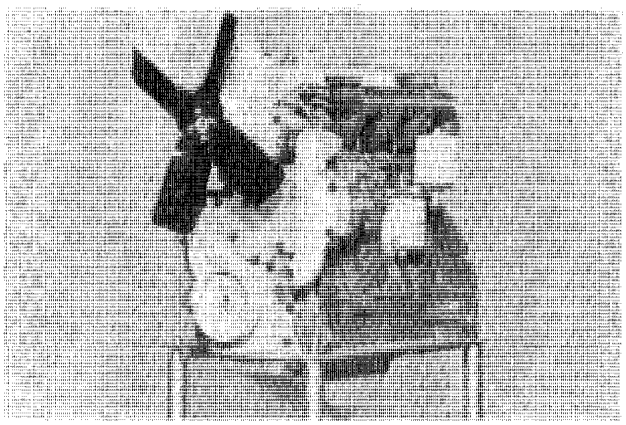
   b. Start the engine and adjust the low idle speed at the carburetor.

   c. When the low idle speed is correct, move the low idle stop against the throttle lever and tighten the nut.

FUEL PUMP REMOVAL

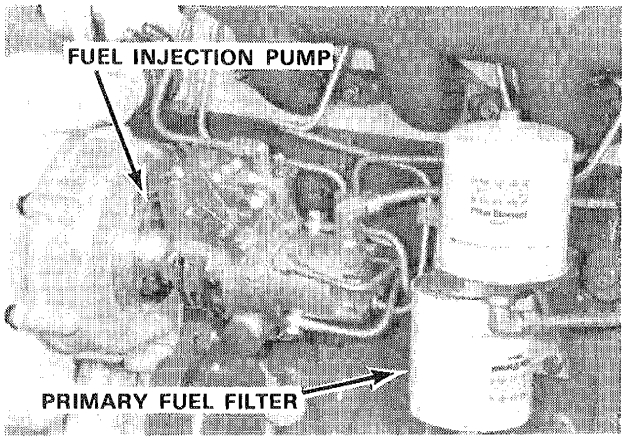


188 DIESEL ENGINE



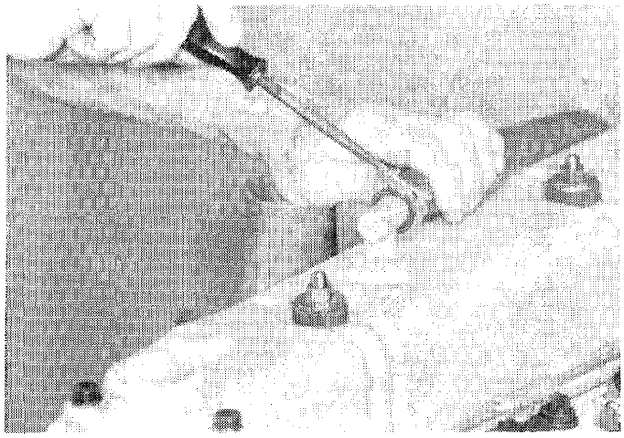
207 DIESEL ENGINE

STEP 1



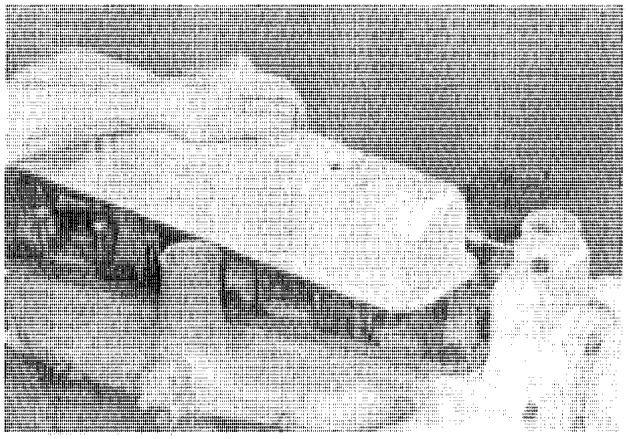
Prior to performing any service work, steam clean the engine thoroughly in the area of the fuel injection pump and lines. Close the fuel tank shutoff valve. Remove the drain plug from the primary fuel filter to drain the filters.

STEP 2



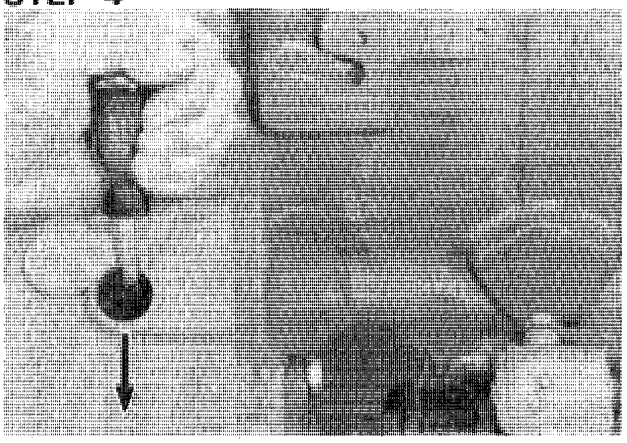
Remove the breather hose.

STEP 3



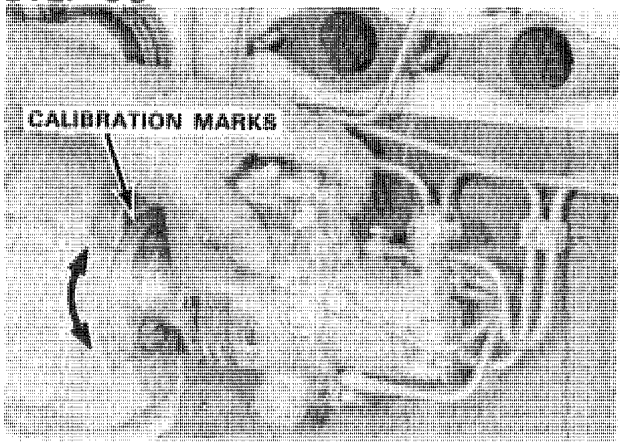
Remove valve cover from cylinder head.

STEP 4



Crank engine clockwise until TDC mark on flywheel is in line with timing pointer as seen through the flywheel housing timing hole.

STEP 58

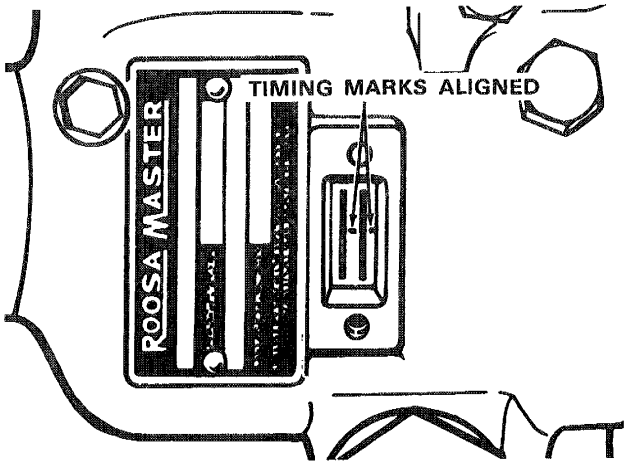


In the event that timing marks are not in alignment, rotate pump toward or away from engine until timing marks are aligned. To advance timing, move top of pump away from engine. To retard pump timing, move top of pump toward engine.

NOTE: There are 0-12° marks on top side of pump flange. They are calibration marks for Service Station use only.

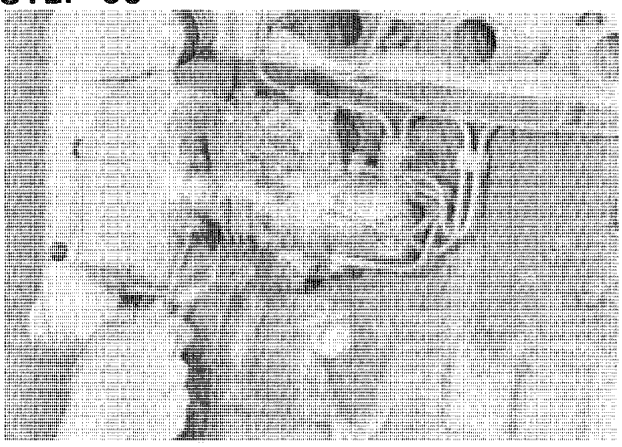
WARNING: *Never attempt to adjust timing with the engine running. This could result in serious injury to the mechanic or damage to injection pump.*

STEP 59



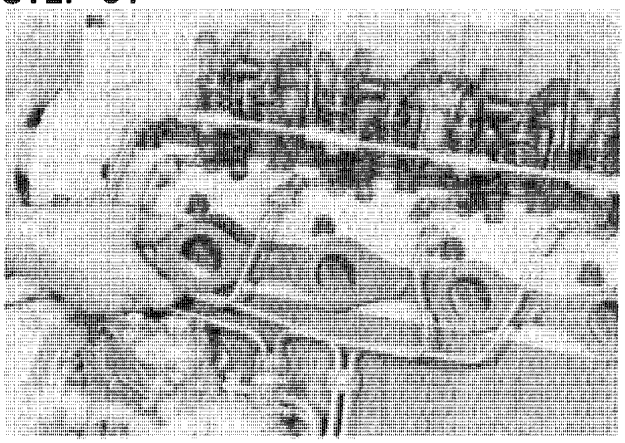
Timing marks aligned for proper timing.

STEP 60



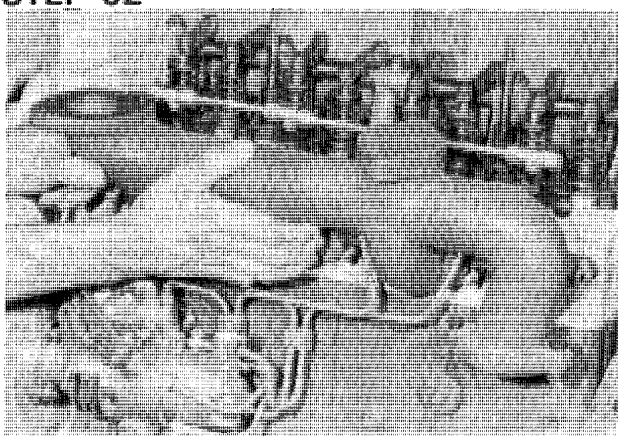
Install fuel pump mounting nuts and torque 35 to 42 ft. lbs.

STEP 61



Install a new exhaust manifold gasket.

STEP 62



Install exhaust manifold on studs of cylinder head.

Section 3013

ROOSA MASTER FUEL INJECTORS

188 and 207 Diesel Engines

APPLICATION

Part Numbers		Color	Engine Application
Case	Roosa Master	Code Band	
A37836	17206, 18054	No Color	188D
A50970	20552	No Color	207D
A51234	19993, 20348	No Color	188D
A51987	22945	White & Red	207DT
A140827	20674	White & Blue	207D
A140828	20673	White & Yellow	188D
A140829	20671	White	188D
A154542	22365	White & Green	207D

SPECIFICATIONS

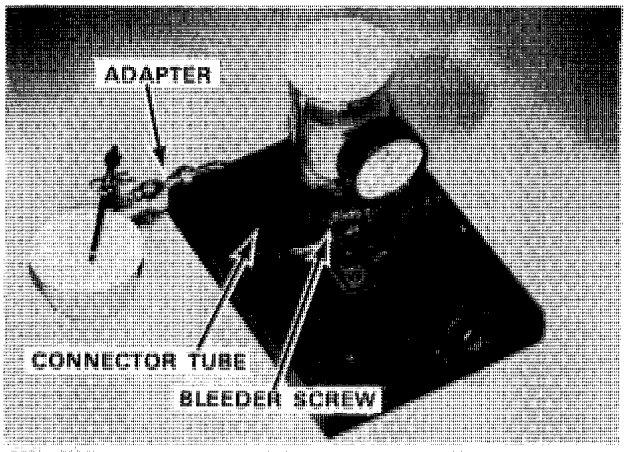
Part Numbers		Spray Angle	Spray Orifice Size	Sac Hole Length	Sac Hole Size	Opening Pressure	
Case	Roosa Master					New	Used
A37836	17206,18054	160°	0.011" (0.279 mm)	0.195" (4.953 mm)	0.042" (1.066 mm)	2750 to 2850 (18 958.5 kPa) to (19 647.9 kPa)	2550 to 2650 (17 579.8 kPa) to (18 269.1 kPa)
A50970	20552	150°	0.011" (0.279 mm)	0.095" (2.413 mm)	0.042" (1.066 mm)		
A140827	20674	150°	0.011" (0.279 mm)	0.095" (2.413 mm)	0.042" (1.066 mm)		
A51234	19993,20348	160°	0.011" (0.279 mm)	0.095" (2.413 mm)	0.042" (1.066 mm)	3150 to 3250 (21 716.1 kPa) to (22 405.5 kPa)	2950 to 3050 (20 337.3 kPa) to (21 026.7 kPa)
A51987	22945	150°	0.010" (0.254 mm)	0.095" (2.413 mm)	0.042" (1.066 mm)		
A140829	20671	160°	0.011" (0.279 mm)	0.095" (2.413 mm)	0.042" (1.066 mm)		
A154542	22365	160°	0.010" (0.254 mm)	0.095" (2.413 mm)	0.042" (1.066 mm)		
A140828	20673	150°	0.010" (0.254 mm)	0.095" (2.413 mm)	0.042" (1.066 mm)	2750 to 2850 (18 958.5 kPa) to (19 647.9 kPa)	2550 to 2650 (17 579.7 kPa) to (18 269.1 kPa)

Rac 9-78807

Printed in U.S.A.
December, 1980

CASE CORPORATION

INJECTOR TEST STAND



An "Approved" Injector Test Stand, Case Part No. M20322 (Bacharach No. 65-934D), is required for testing and adjusting the injectors and can be purchased through the Service Parts Supply, J. I. Case Co., Racine, Wisc. Except for descriptions referring especially to adjustments on the test stand itself, all of the following instructions will apply to all makes. Operating instructions are also furnished with the test stand.

An injector tool kit, Case Part No. M20520 (Bacharach No. 60-0010), is required to service the injectors. A compression gauge adapter, Bacharach No. 70-314 (D-558) is also included in the tool kit. This kit is used in conjunction with the Case Diesel Tool Kits, Case Part No. M20247 (CD-800) and Case Part No. M20246 (CD-350).

The test stand is used to perform the following checks:

1. Check and adjust the injector opening pressure. This is a duplicate of the factory procedure.

2. Check the injector assembly for fuel leakage.

3. Check and adjust the injector leak-off.

4. Accurately check the injector spray pattern.

Fuel injectors must be checked on the test stand when performing the following service operations:

1. Whenever an injector has been removed from the engine for cleaning, the injector must be checked on the test stand prior to installing it on the engine.

2. When a new injector assembly is to be installed, it must be checked on the test stand prior to installing it on the engine.

3. When a complete engine overhaul is performed, the injectors should be removed and checked on the test stand.

4. When an injector is suspected to be the cause of unsatisfactory engine performance, it should be removed from the cylinder head and checked on the test stand prior to disassembling it.

IMPORTANT: *ALWAYS CHECK THE PERFORMANCE OF AN INJECTOR ON THE TEST STAND BEFORE DISASSEMBLING IT. IF IT CHECKS OUT SATISFACTORILY, THERE IS NO NEED TO DISASSEMBLE OR ADJUST IT.*

Preparing Test Stand

1. After filling the test stand fuel reservoir, loosen the bleeder screw.

2. When the fuel flowing from the bleeder screw opening is free of air bubbles, tighten the screw.

3. Wash the connector tube and adapter in clean diesel fuel. Blow clean with filtered compressed air and connect securely to the test stand.

4. Operate the hand lever slowly until clean fuel flows from the adapter.

5. The test stand is now ready for use. NOTE: Complete operation and maintenance instructions are furnished with the test stand. Follow the instructions carefully.

Section

3033

MODEL 267 SERIES ZENITH CARBURETOR FOR THE 188G AND 159G SPARK IGNITION ENGINES

CASE CORPORATION

Rac 9-77016

PRINTED IN U.S.A.

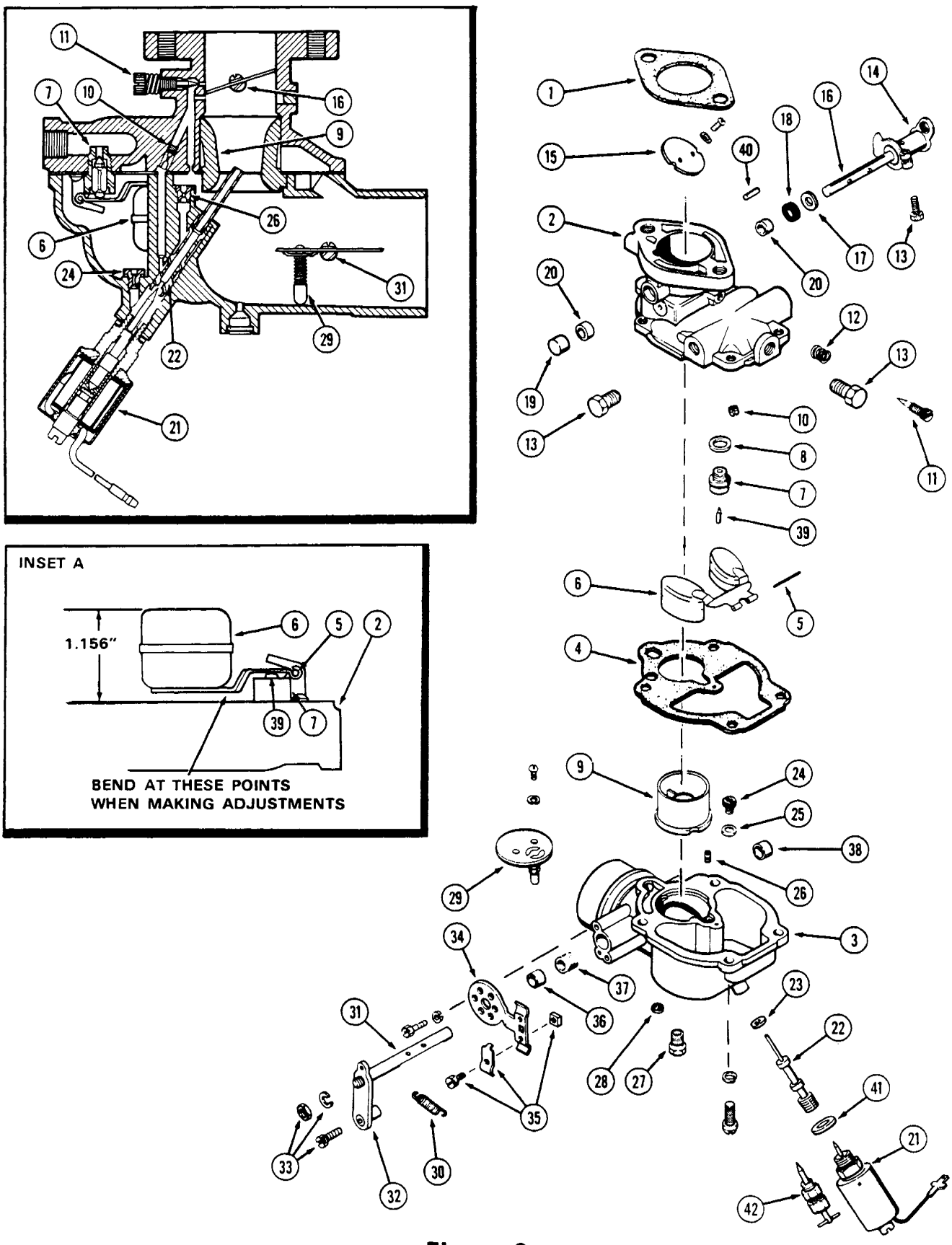


Figure 6

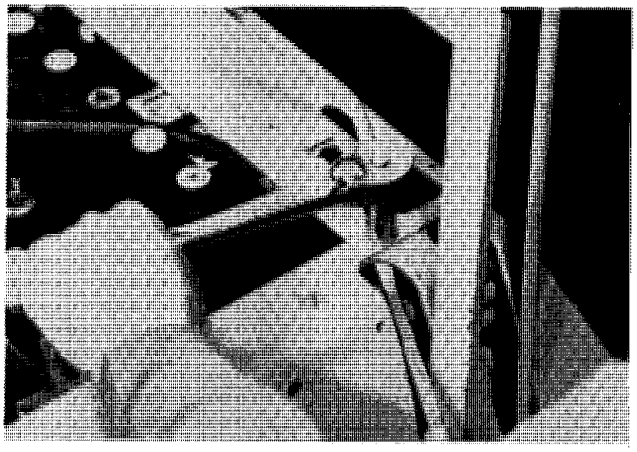
4. Make sure that the load control is in the OFF position.

311535

5. Loosen and remove the knob from the control lever for the parking latch.

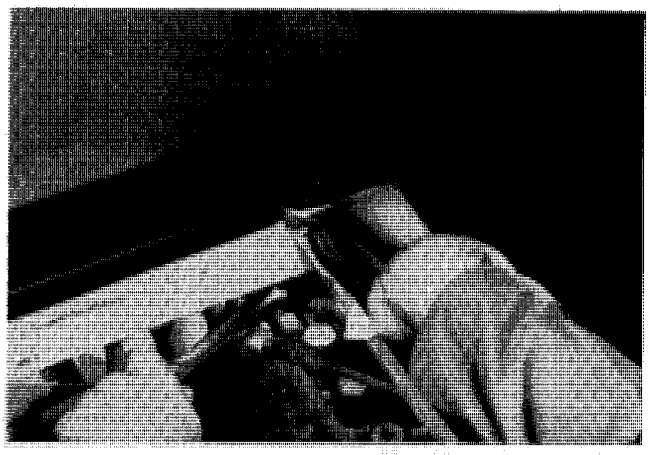
309120

6. Loosen and remove the nut, lock washer, flat washers, and bolt at the front of the left closure panel.



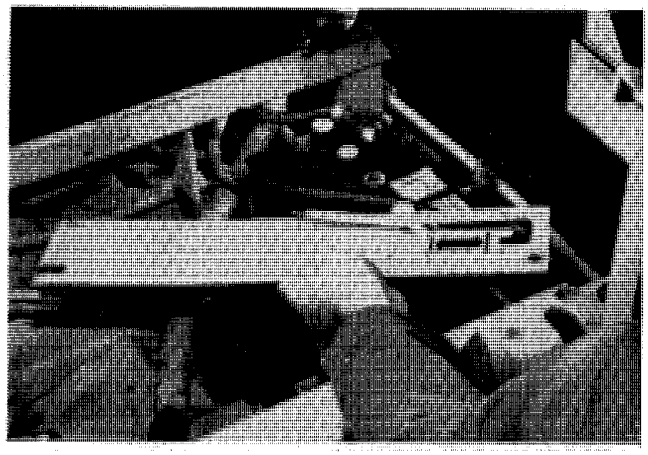
309121

7. Loosen the nut on the bolt for the left seat belt.



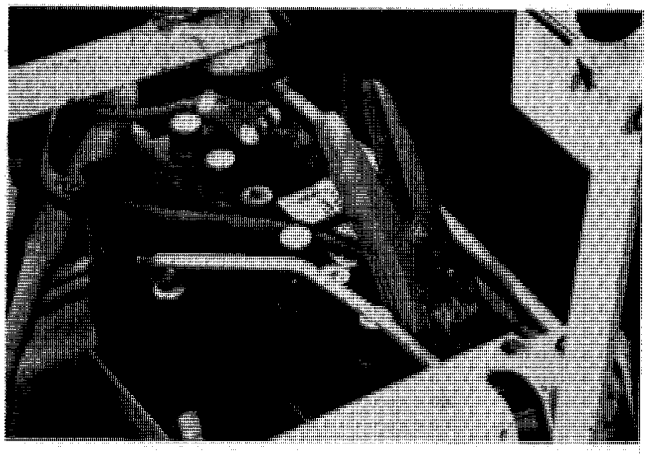
305513

8. Remove the closure panel.

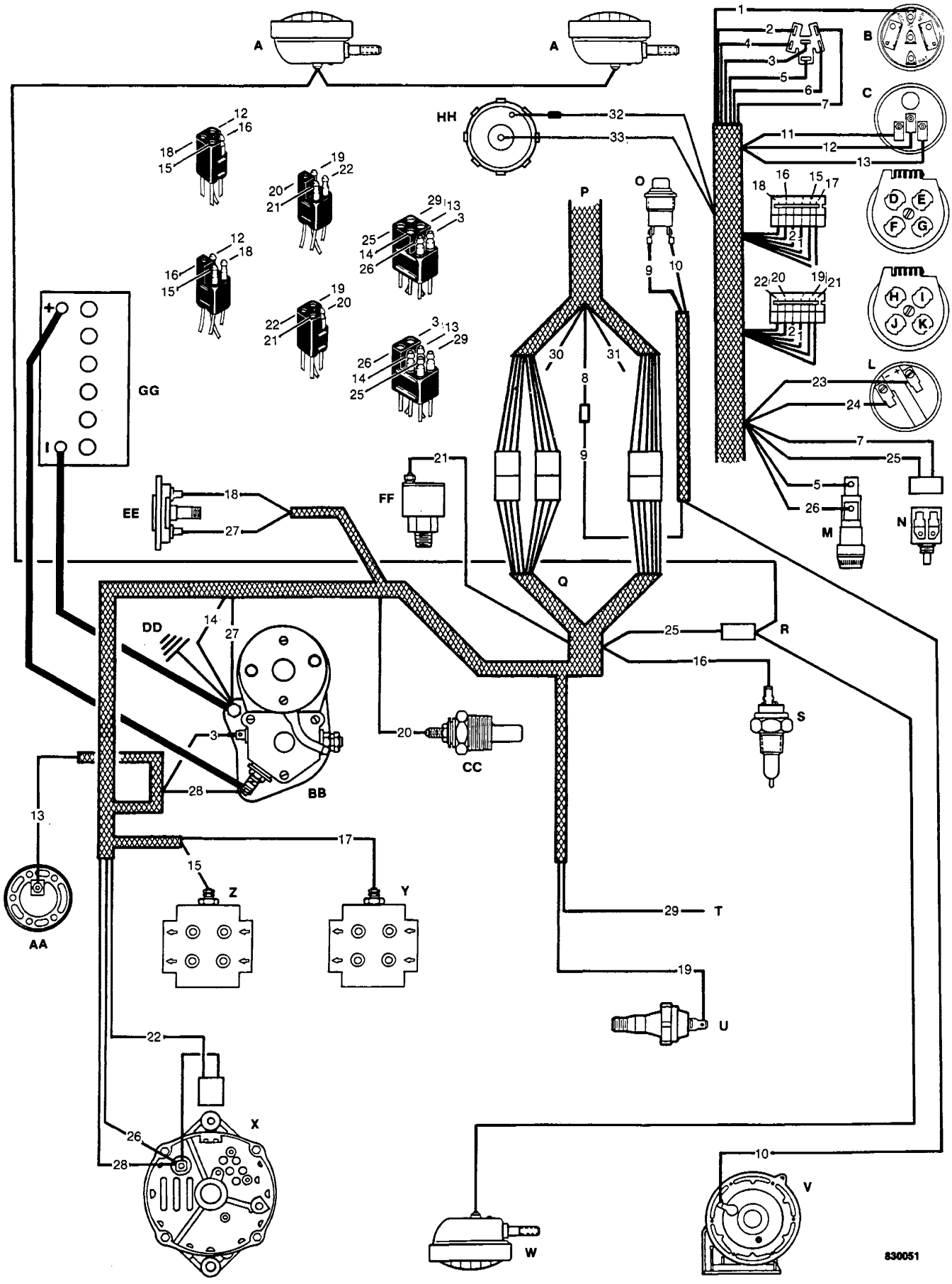


309123

9. Connect the positive load cable to the positive battery post.



309124


A
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CC
AA
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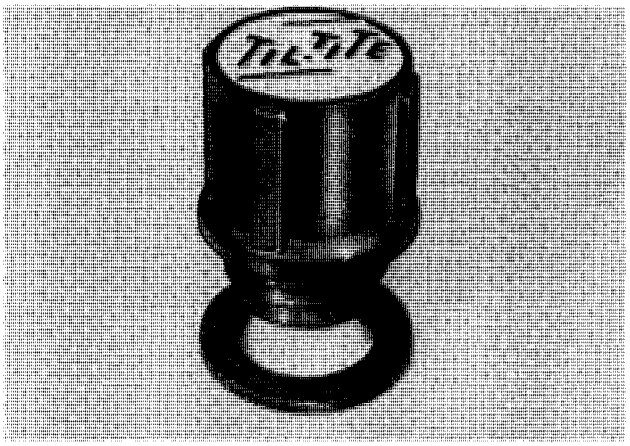
U
V
W
X
Y
Z
830051

NONSPILL CAPS

CAUTION: *The battery(s) on this machine are equipped with nonspill caps. Make absolutely certain that replacement battery(s) has nonspill caps. DO NOT operate this machine unless the battery(s) is equipped with nonspill caps and that they function properly.* 46-80

This machine comes from the manufacturer with a battery that has nonspill caps. These nonspill caps prevent electrolyte leakage, which can cause personal injury and damage to the machine if the machine turns over in an accident.



Nonspill Cap for the Battery 800305

The nonspill caps have a valve with a stem made of lead and rubber. When the nonspill cap is turned upside down, the weight of the lead holds the rubber stem against the breather hole, preventing the loss of electrolyte.

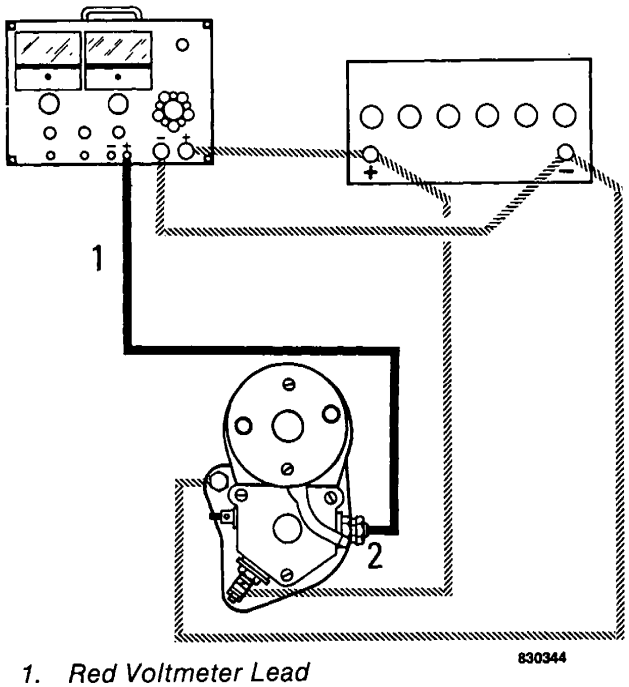
If the breather hole and valve are closed by foreign material, pressure in the battery can become high enough to break the case of the battery. Always check the breather hole for foreign material when you check the electrolyte level. If there is foreign material over the breather hole, turn the nonspill cap upside down and clean the nonspill cap. Move the nonspill cap up and down rapidly. You must be able to hear the movement of the valve. If you cannot hear the valve, wash the nonspill cap and loosen the valve. Move the nonspill cap up and down rapidly to remove the water.

When you remove a nonspill cap, check the condition of the rubber gasket. If the rubber gasket is gone or is damaged, install a new nonspill cap.

Missing or broken nonspill caps MUST be replaced with new nonspill caps. DO NOT use any other type of cap to replace nonspill caps.

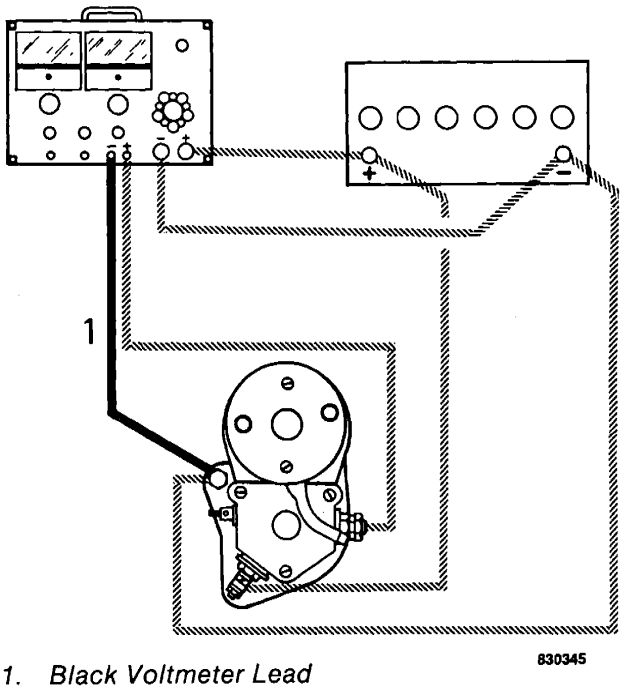
When you install a new battery, the new battery MUST have nonspill caps. You can use the nonspill caps from the old battery if the nonspill caps are in good condition.

5. Connect the red voltmeter lead to the motor terminal on the starter solenoid.



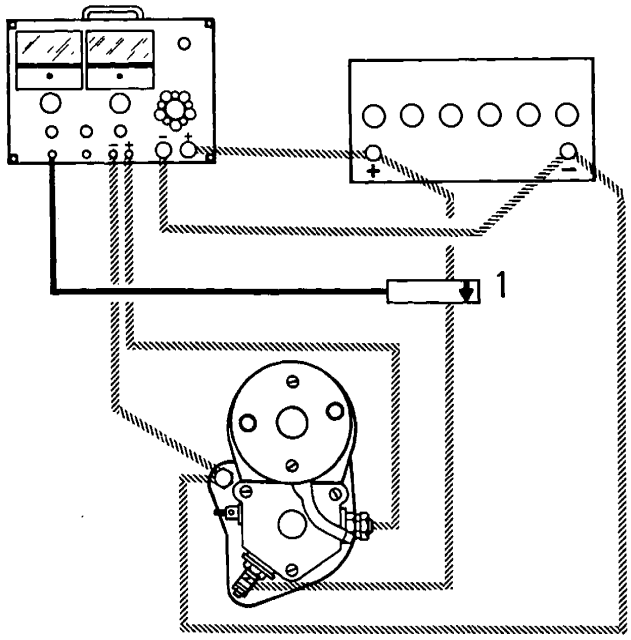
1. *Red Voltmeter Lead*
2. *Motor Terminal*

6. Connect the black voltmeter lead the mounting flange on the starter.



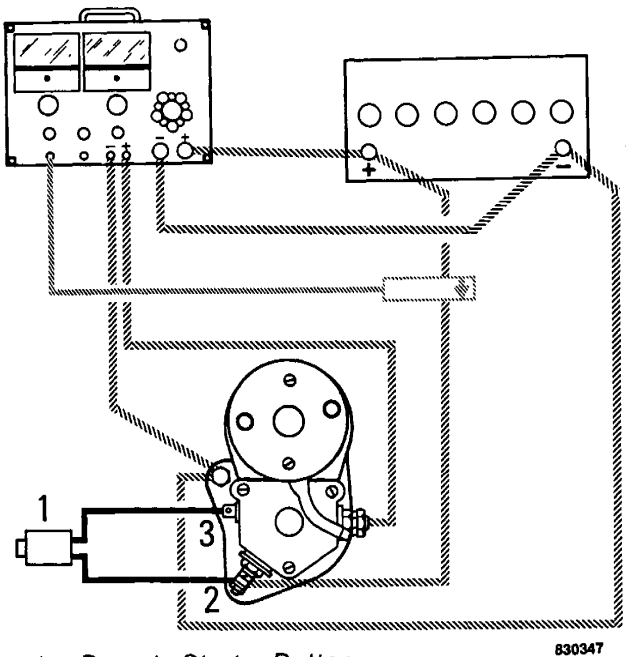
1. *Black Voltmeter Lead*

7. Fasten the ammeter clamp around the positive battery cable so that the tip of the arrow is toward the starter.



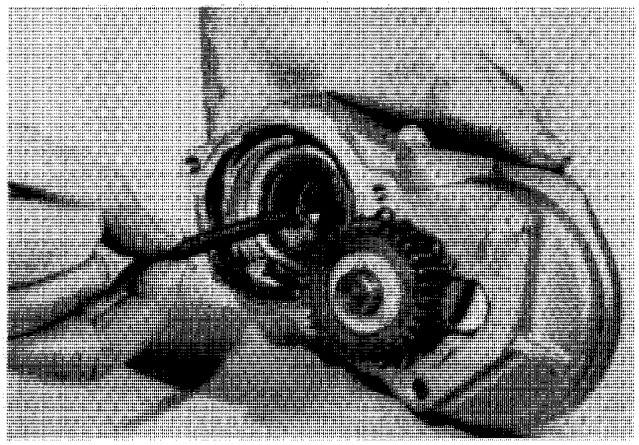
1. *Ammeter Clamp*

8. Connect the leads from the remote starter button to the Battery and Switch terminals.



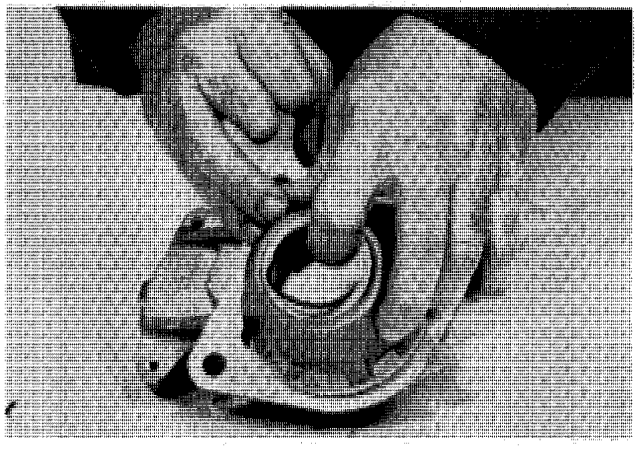
1. *Remote Starter Button*
2. *Battery Terminal*
3. *Switch Terminal*

8. Apply a small amount of the same lubricant to the spring and install the spring.



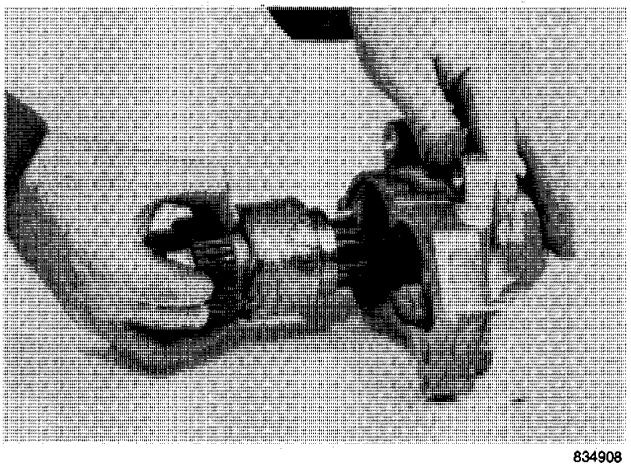
834911

9. Install the O-ring in the groove in the starter drive housing.



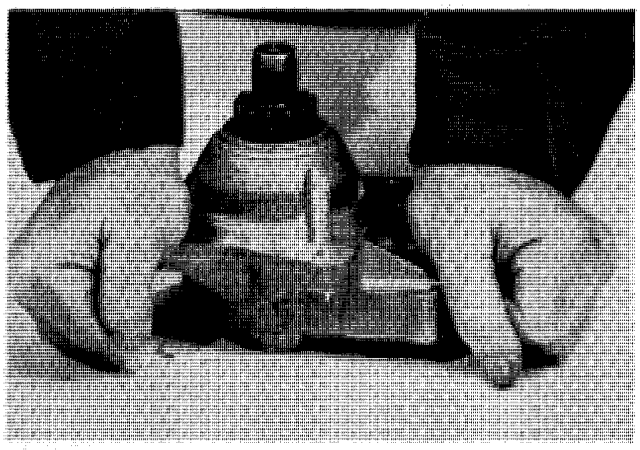
834920

10. Lubricate the teeth at the front of the starter drive and the O-ring in the starter drive housing and install the starter drive.



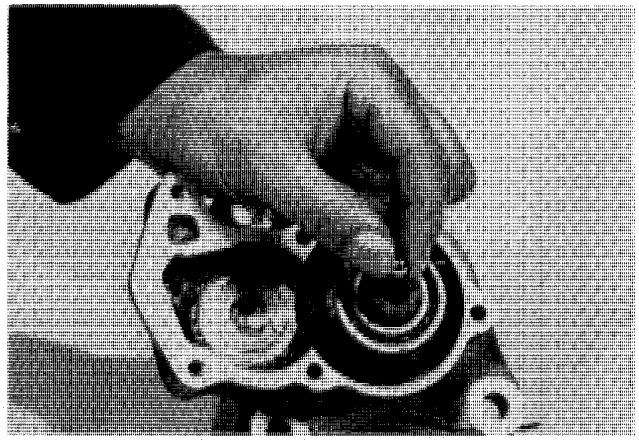
834908

11. Push down on the starter drive housing as shown to push the starter drive all the way into the starter drive housing.



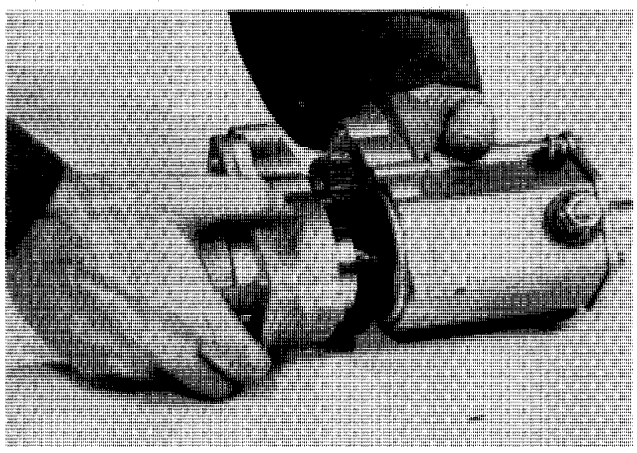
834921

12. Put a small amount of the same lubricant in the hole in the starter drive and install the steel ball.



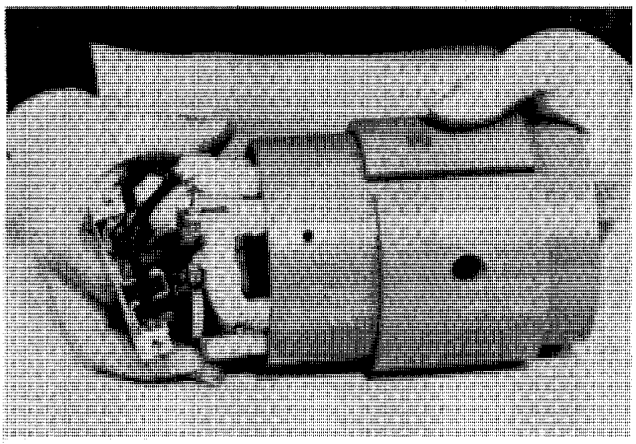
835112

13. Assemble the starter drive housing and starter solenoid assembly.



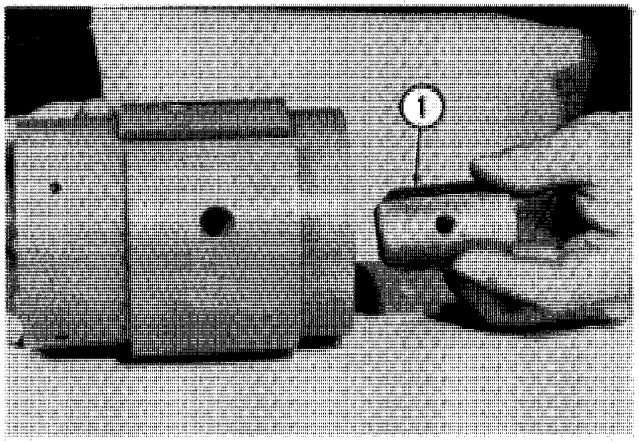
834906

6. Install the multiple field coils and brush holder assembly.



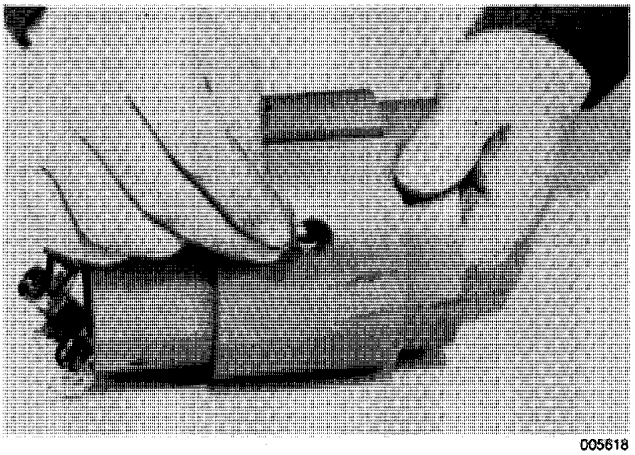
005410

7. Install a pole shoe as shown.



1. Long Lip of Pole Shoe 005407

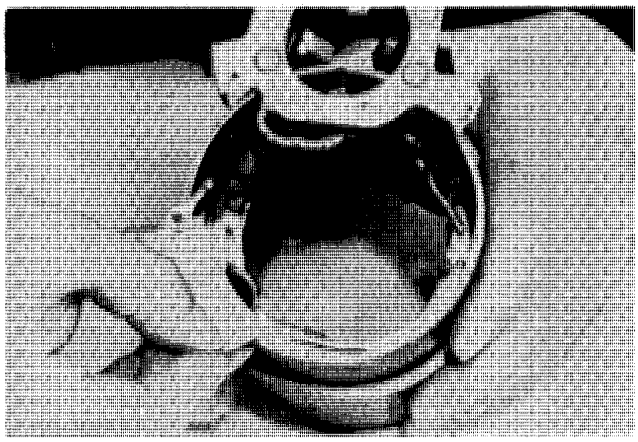
8. Install a pole shoe screw.



005618

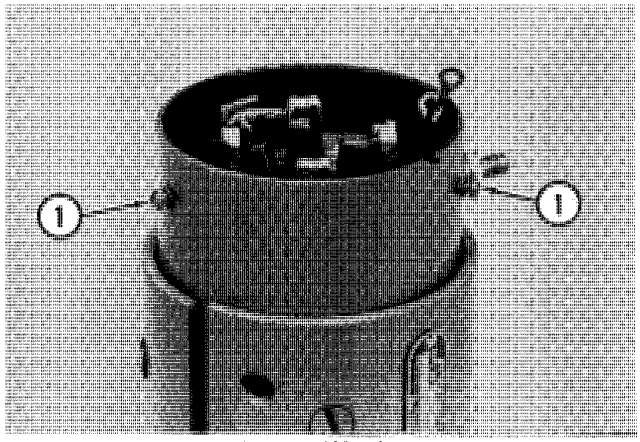
9. Repeat steps 7 and 8 for the other pole shoes.

10. Install an insulator at each bend in the connector. The insulators prevent a short circuit between the connector and the cap screws that hold the starter together.



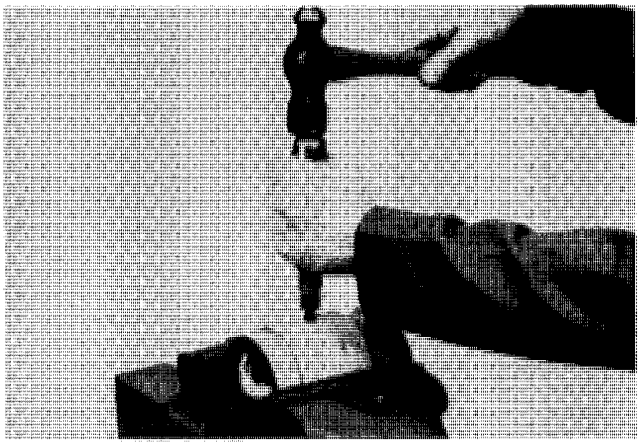
005619

11. Install the screws and lock washers that hold the brush holder. Tighten the screws.



1. Screw and Lock Washer 005405

12. Tighten the pole shoe screws.



311803

CHARGING CIRCUIT AND ALTERNATOR

The charging circuit includes the battery, alternator with an internal voltage regulator, 20 ampere fuse, key switch, warning lamp for the alternator, and the wiring to connect these parts together. The charging circuit is shown in the schematic illustration on this page.

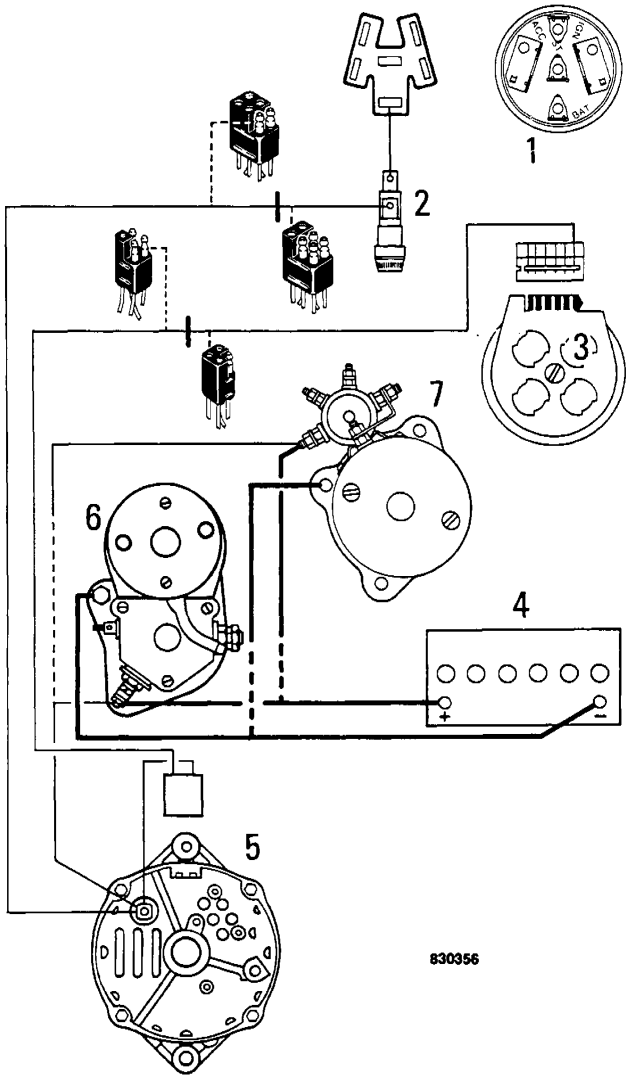
The components of the alternator are the front housing, rotor, stator, rectifier bridge, diode trio, voltage regulator, brush holder, and the rear housing.

When the rotor is turned inside the stator an alternating current is generated in the stator coils. This alternating current is changed to direct current (rectified) by the positive rectifier diodes and the negative rectifier diodes in the rectifier bridge. The positive rectifier diodes and the negative rectifier diodes are connected to the stator coils. The direct current leaves the alternator at the BAT terminal.

All rectifier diodes have a high resistance to the flow of current in one direction and a low resistance to current flow in the opposite direction. Each negative rectifier diode and positive rectifier diode is connected to the stator to let the current flow in the low resistance direction. The high resistance of the opposite direction prevents the flow of current from the battery to the alternator.

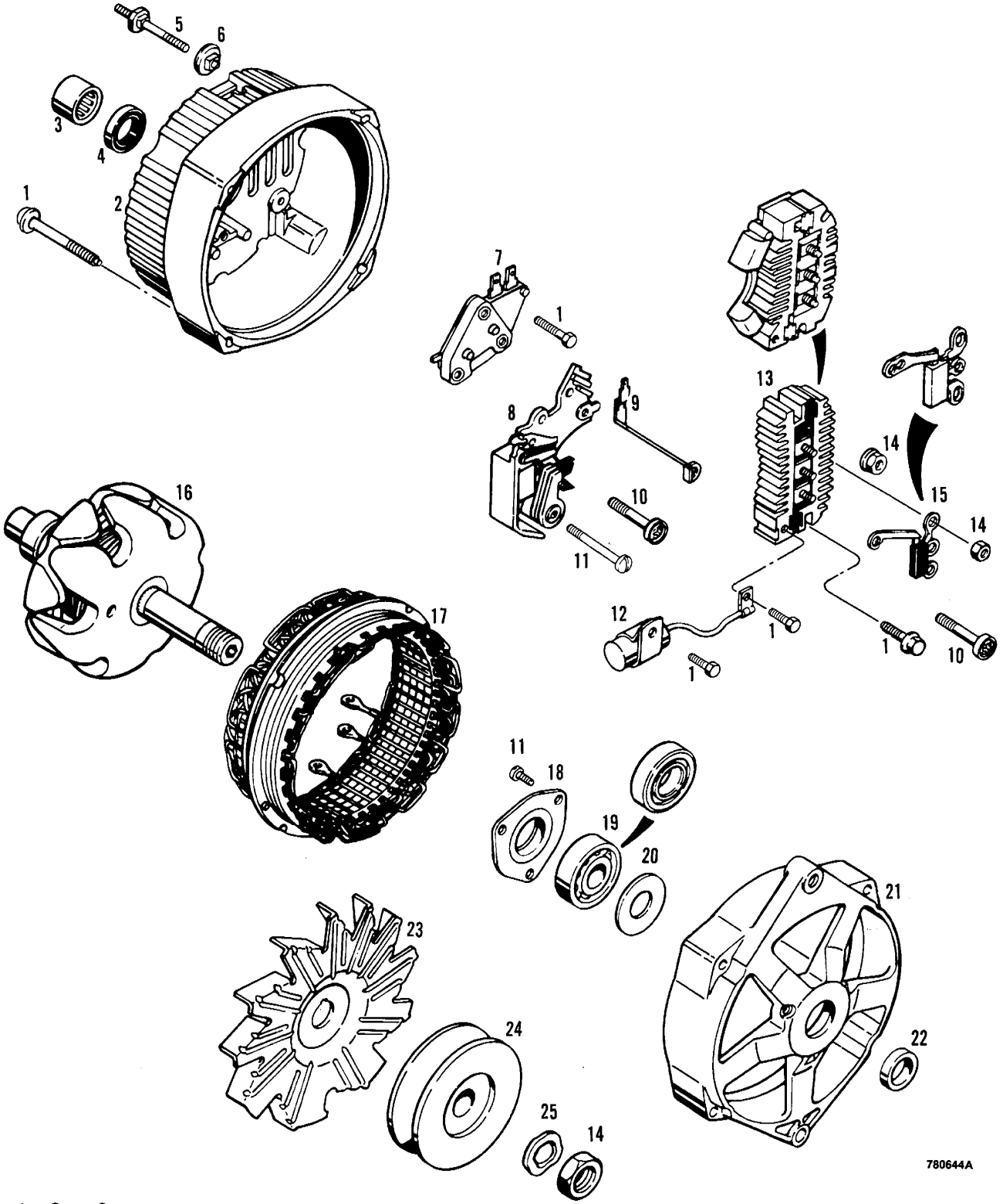
The rotor (field) is an electric magnet. A starting current must be sent to the field before the alternator will start charging. The current to cause the alternator to begin charging comes from the battery through the 20 ampere fuse, key switch, and voltage regulator. When the voltage from the alternator is higher than the battery voltage the current for the field is controlled by the voltage regulator.

The output of the alternator is controlled by changing the amount of current that is sent to the field. A part of the voltage regulator works to start or stop, or increase or decrease the current flow to the field. The voltage regulator is able to control the output of the alternator by comparing the difference between the output voltage and the battery voltage.



1. *Key Switch*
2. *20 Ampere Fuse*
3. *Warning Lamp For Alternator*
4. *12 Volt Battery*
5. *Alternator*
6. *Starter, Diesel Engine*
7. *Starter, Gasoline Engine*

The condenser connected to the rectifier bridge is used to decrease the surges of high voltage that can cause damage to the diode trio, negative rectifier diodes or positive rectifier diodes. If a new diode trio or rectifier bridge is installed, it is recommended that a new condenser be installed also.



1. *Cap Screw*
2. *Rear Housing*
3. *Bearing*
4. *Seal*
5. *BAT Terminal*
6. *Insulator*
7. *Voltage Regulator*
8. *Brush Holder*
9. *Connector, If Used*
10. *Insulator Screw*
11. *Flat Head Screw*
12. *Condenser*
13. *Rectifier Bridge*
14. *Nut*
15. *Diode Trio*
16. *Rotor*
17. *Stator*
18. *Bearing Retainer*
19. *Bearing*
20. *Flat Washer, If Used*
21. *Front Housing*
22. *Spacer*
23. *Fan*
24. *Pulley*
25. *Lock Washer*

c. Tighten the screw that holds the breaker point in place.

3. Before installing the distributor, lubricate the cam with the lubricant that was part of the kit. Do not use oil for a lubricant.

Mechanical Advance

The mechanical advance is checked to see if the timing is advanced the correct amount and at the correct speed for maximum performance of the engine.

Before checking the mechanical advance, make sure that the dwell is correct.

The most accurate and easiest way to check the mechanical advance is to use a distributor tester.

The mechanical advance can be checked with the distributor installed in the engine. Multiply the speed and advance specifications by two for the correct specifications.

DEGREES OF ADVANCE ±1 DEGREE
AT SHAFT SPEED

RPM (R/MIN)	DEGREES OF ADVANCE
275	0
300	1
480	9
740	14
1100	18

1. If the advance is not as specified at 300 rpm (r/min):

a. Bend the lug for the short spring away from the shaft to decrease the advance.

b. Bend the lug for the short spring toward the shaft to increase the advance.

2. If the advance is not as specified at 740 rpm (r/min):

a. Bend the lug for the long spring away from the shaft to decrease the advance.

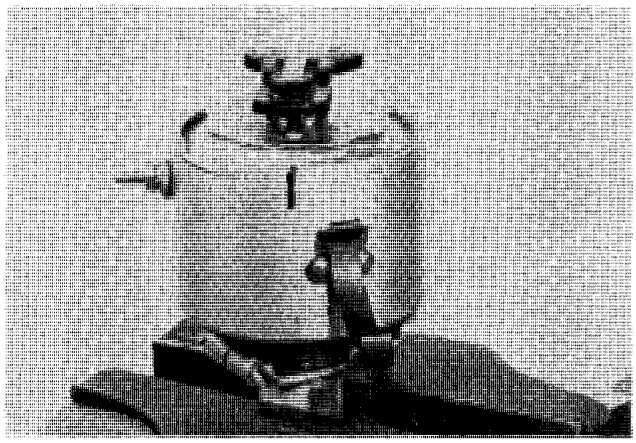
b. Bend the lug for the long spring toward the shaft to increase the advance.

3. Always check the advance after an adjustment.

4. If the weights move freely and the advance cannot be adjusted to the correct specification, install new springs and check the advance again.

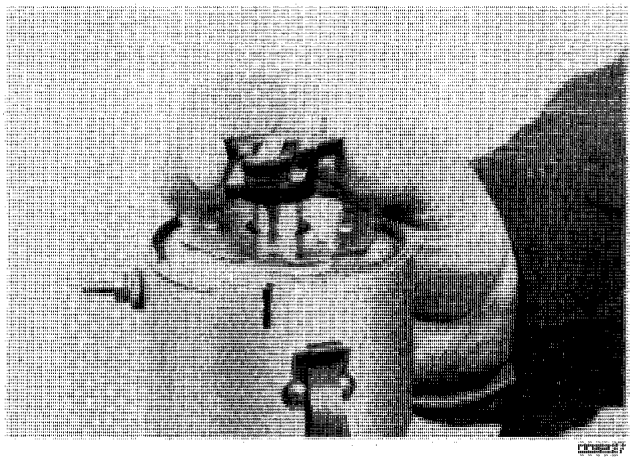
Disassembly

1. Fasten the distributor in a vise that has soft jaws.

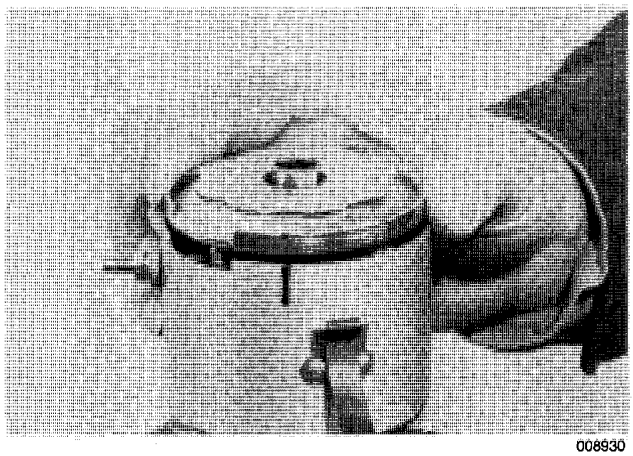


008926

2. Remove the rotor.



3. Remove the cover.



008930

6002

HYDROSTATIC SYSTEM TROUBLESHOOTING

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CASE CORPORATION

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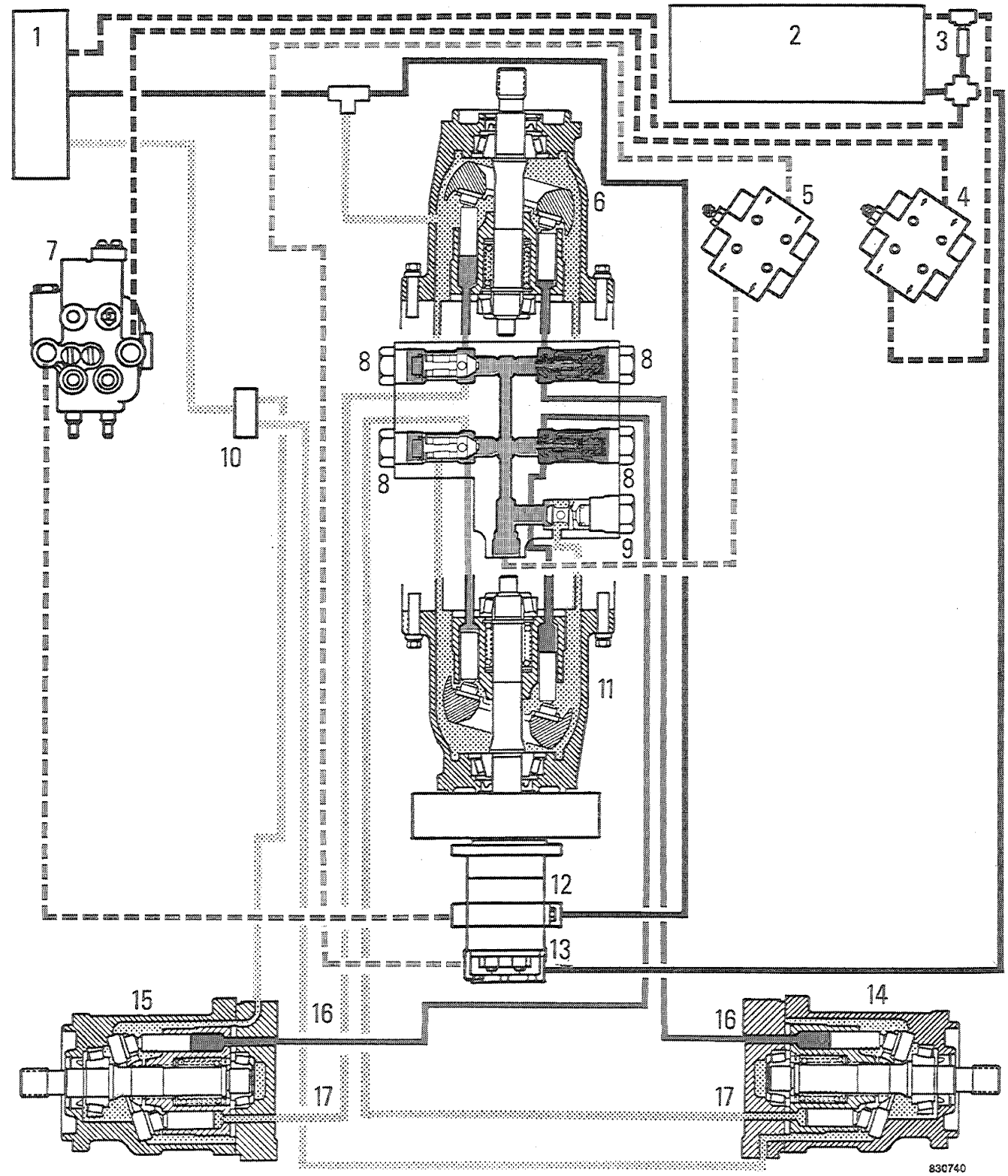
Issued November 1983

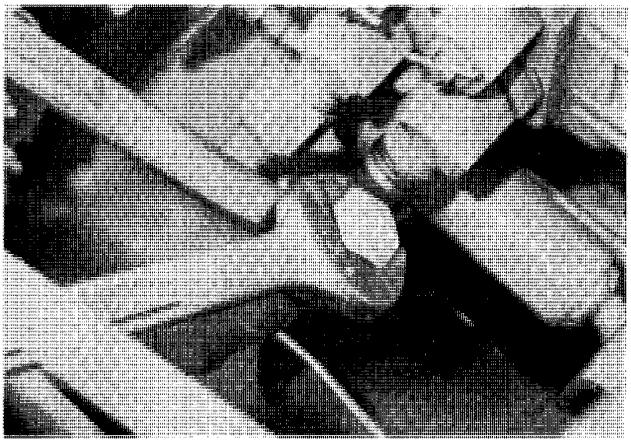


- *Suction Oil*
- *Return Oil*
- *Equipment Pump Flow*
- *Oil To Motor*
- *Oil From Motor*
- *Charging Pump Flow*
- *Charge Pressure*
- *Lubricating And Return Oil*

1. *Reservoir*
2. *Oil Cooler*
3. *Bypass Valve*
4. *System Filter*
5. *Charging Circuit Filter*
6. *Right Piston Pump*
7. *Control Valve*
8. *Check Valve And Circuit Relief Valve*
9. *Charge Pressure Valve*
10. *Manifold*
11. *Left Piston Pump*
12. *Equipment Pump*
13. *Charging Pump*
14. *Left Motor*
15. *Right Motor*
16. *A Port*
17. *B Port*

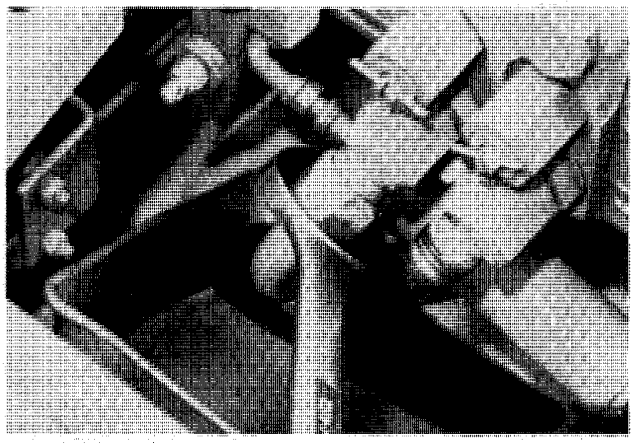
Oil Flow, Machine Moving Backward

48. Install a plug in the hose.



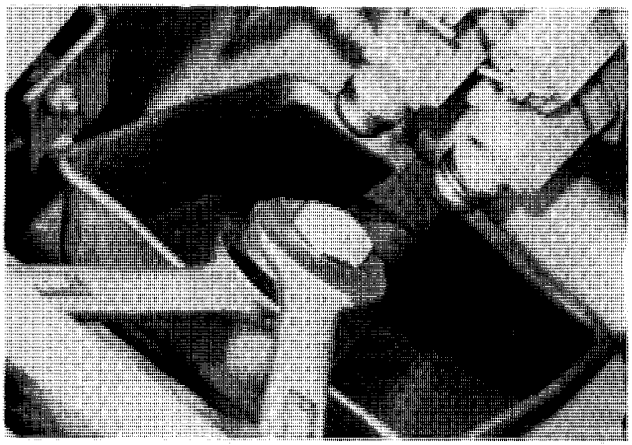
306325

49. Disconnect the other hose.



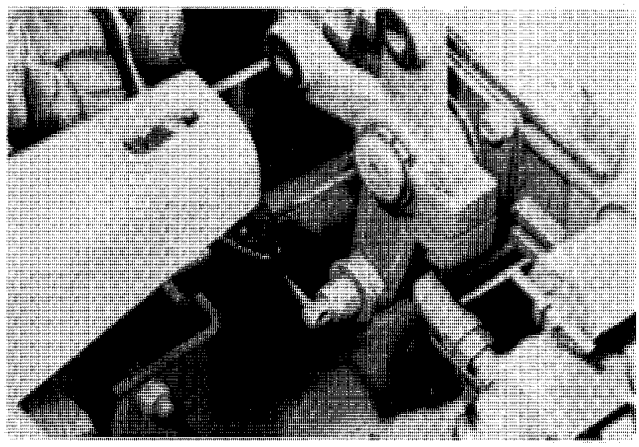
306326

50. Install a plug in the hose.



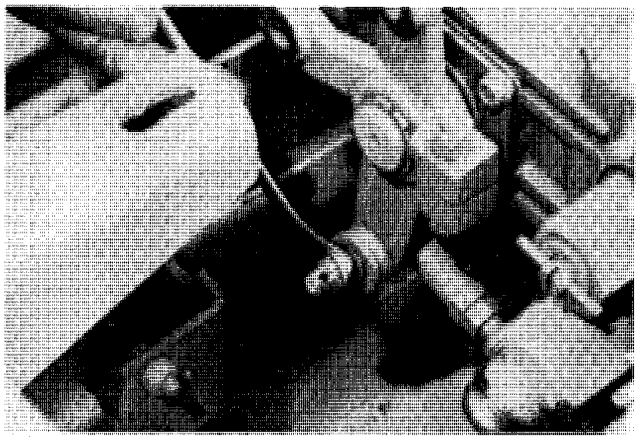
306327

51. Remove the cotter pin from the bolt that connects the shock absorber to the control arm.



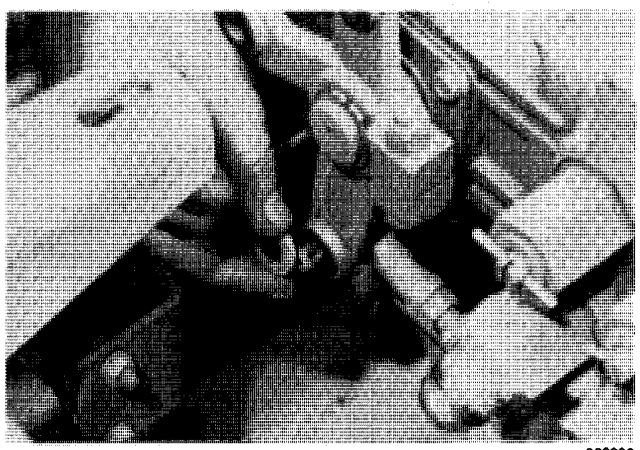
306328

52. Loosen and remove the self-locking nut from the bolt.



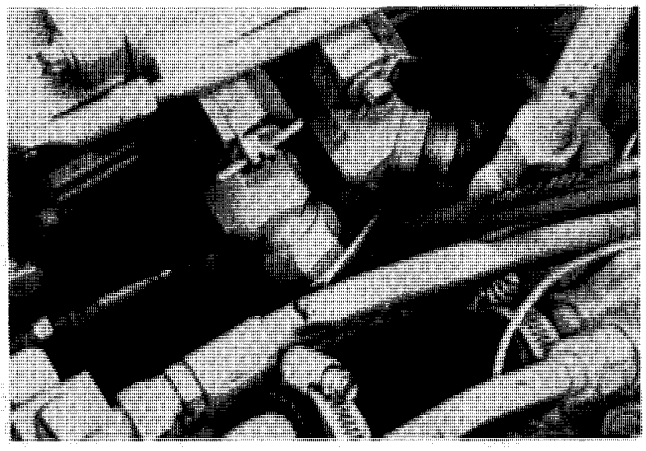
306329

53. Remove the bolt and three flat washers.



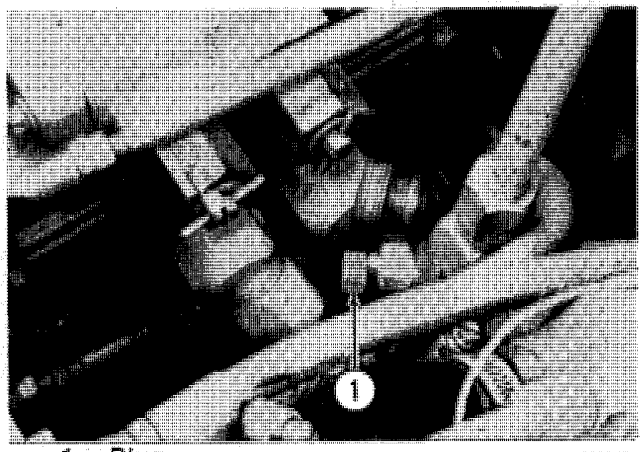
306330

35. Connect the hose to the rear port.



306344

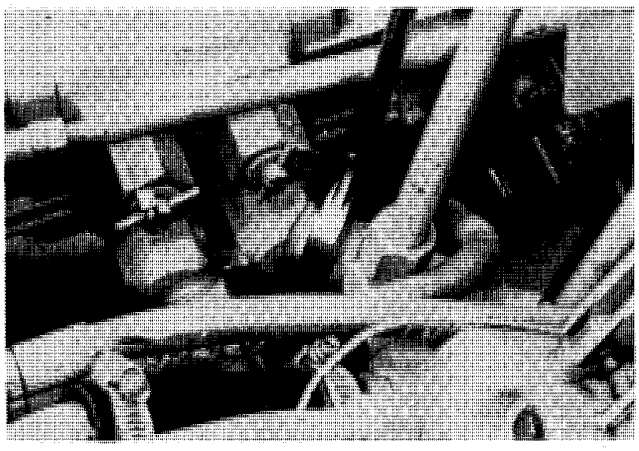
36. Loosen and remove the plug from the other hose.



1. Plug

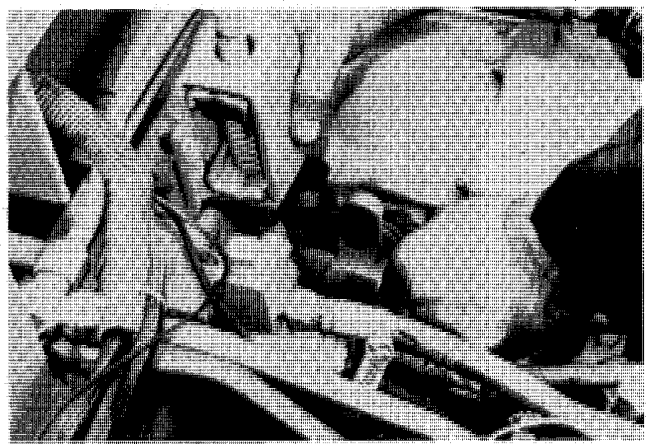
306343

37. Connect the hose to the front port.



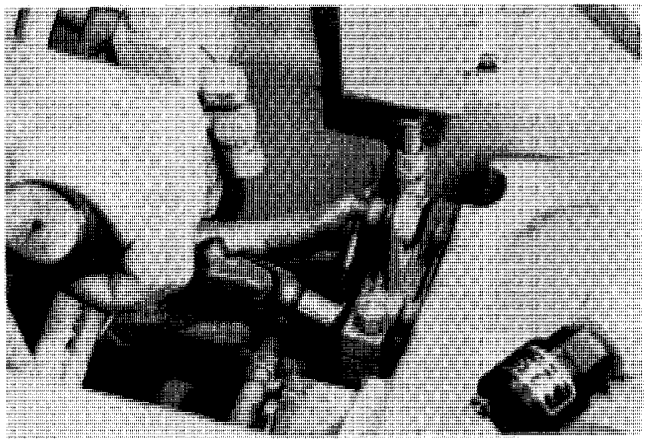
306342

38. Make sure the key has been installed in the shaft and start the control arm onto the shaft.



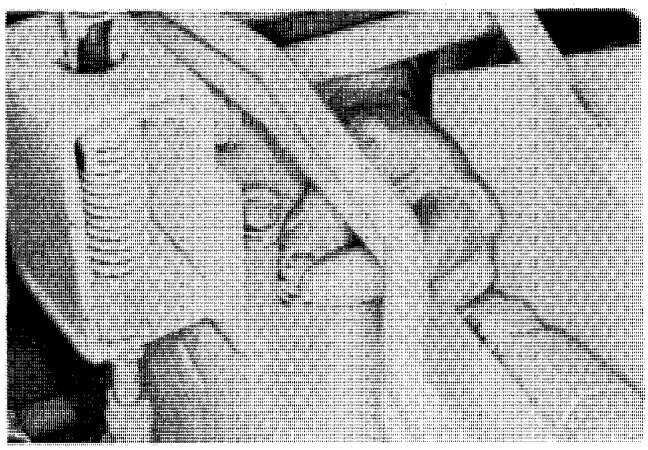
306341

39. Use a hammer to drive the control arm onto the shaft.

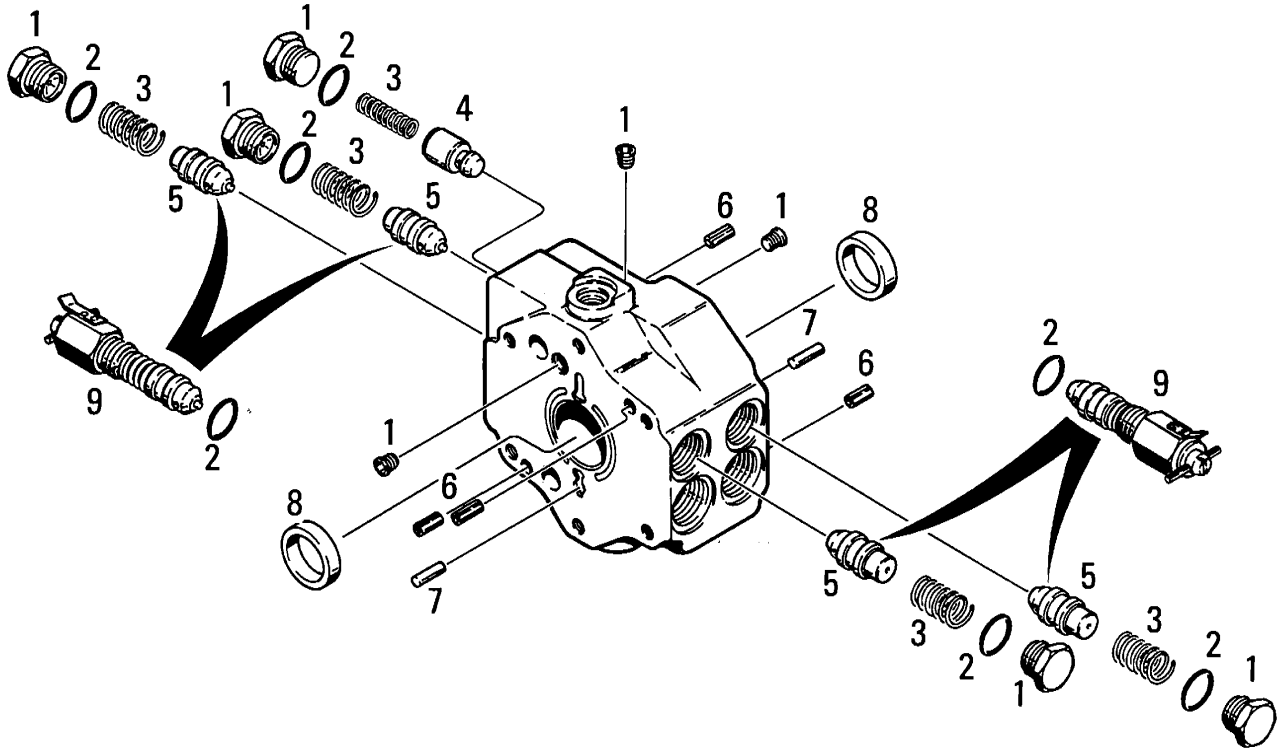


306631

40. Install the carriage bolts, lock washers, and nuts that hold the neutral control.



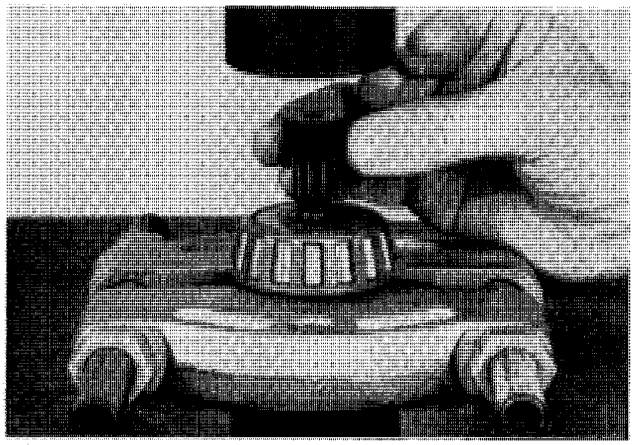
307422



1. *Plug*
2. *O-ring*
3. *Spring*
4. *Poppet*
5. *Circuit Relief Valve*
6. *Roll Pin*
7. *Dowel Pin*
8. *Bearing Cup*
9. *Optional Circuit Relief Valve*
10. *Valve Block*

Valve Block

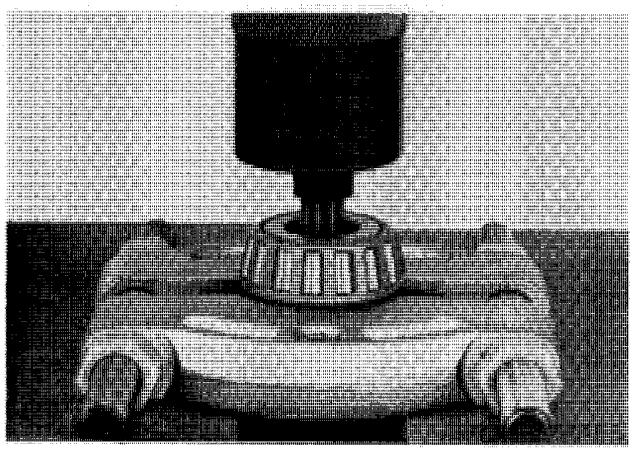
28. Put an acceptable driver on the shaft.



318316

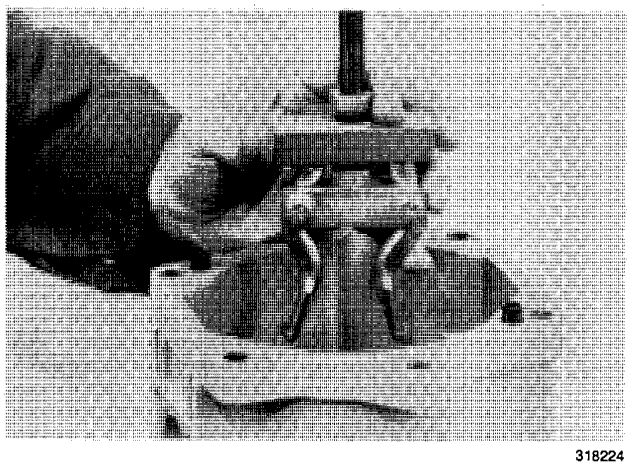
29. Press the shaft out of the bearing.

NOTE: *If a new bearing is to be installed, the bearing cup in the housing must be replaced.*



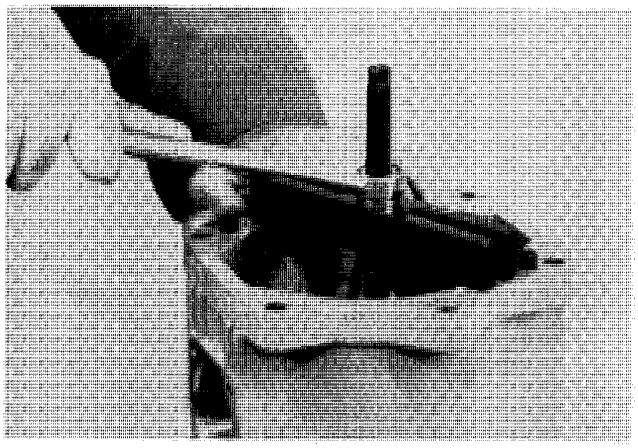
318317

30. Install the puller shown on page 6004-2 to remove the bearing cup from the housing.



318224

31. Remove the bearing cup from the housing.

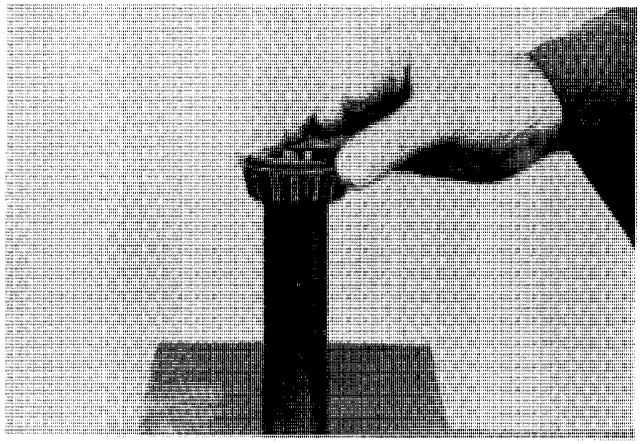


318225

32. Inspect the parts according to instructions in this section.

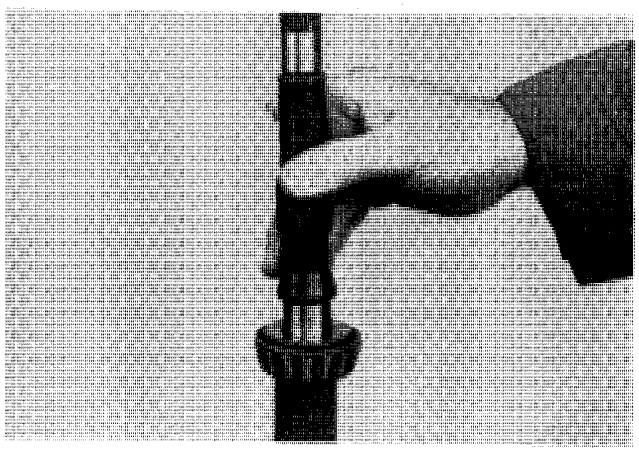
Assembly

1. Put the bearing for the shaft in the press on a hollow support that touches the race only.



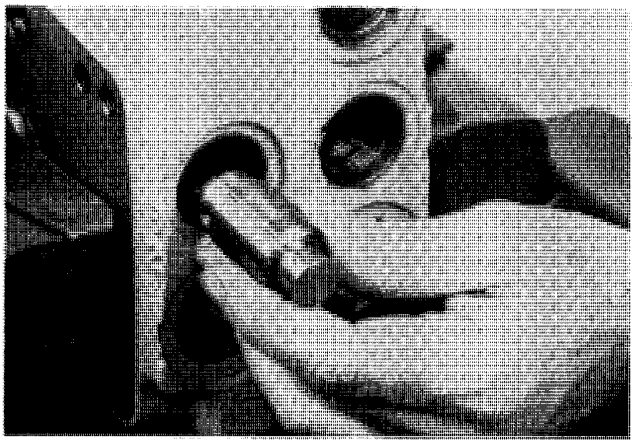
318318

2. Start the shaft into the bearing.



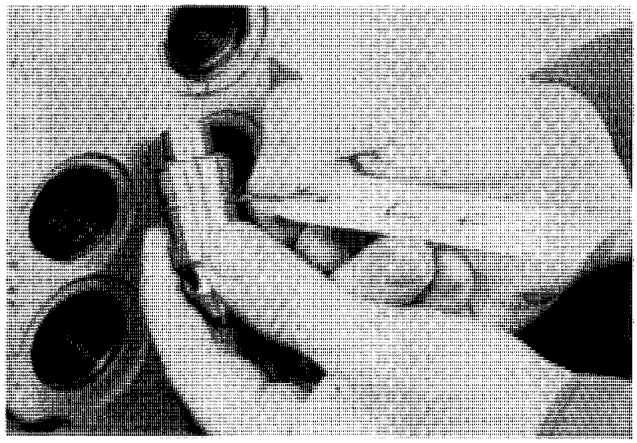
318319

13. Remove the other circuit relief valve.



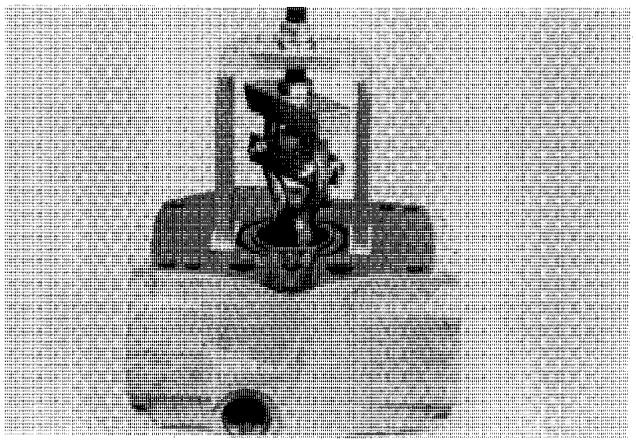
318218

14. Fasten an identification tag to the circuit relief valve.



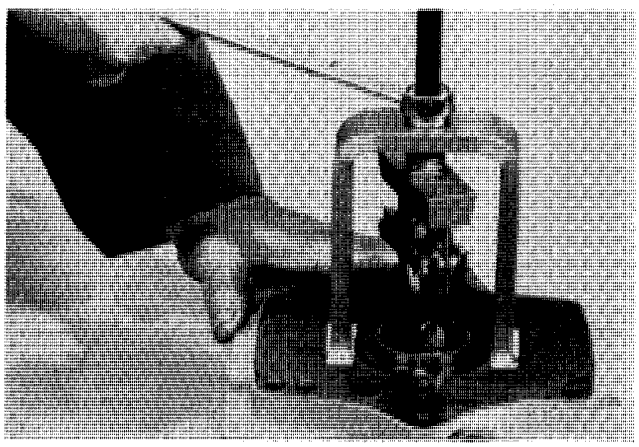
318219

15. Install the puller shown on page 6004-2 for removal of a bearing cup. Use shim stock between the puller and face of the valve block to prevent damage to the face.



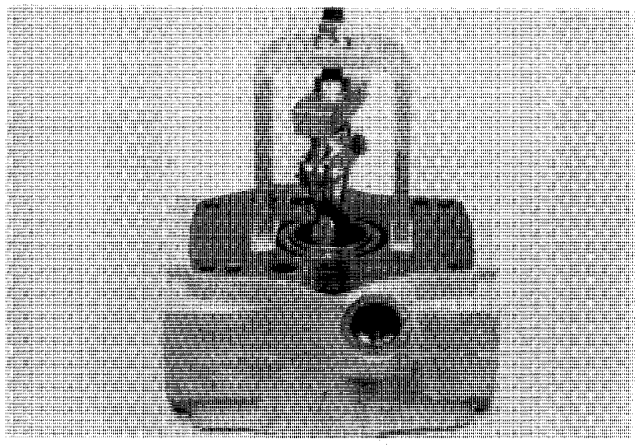
318222

16. Remove the bearing cup.



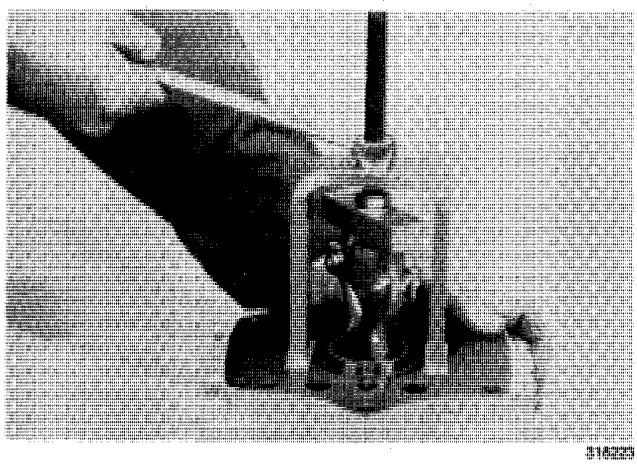
318221

17. Install the puller to remove the other bearing cup. Use shim stock between the puller and face of the valve block to prevent damage to the face.



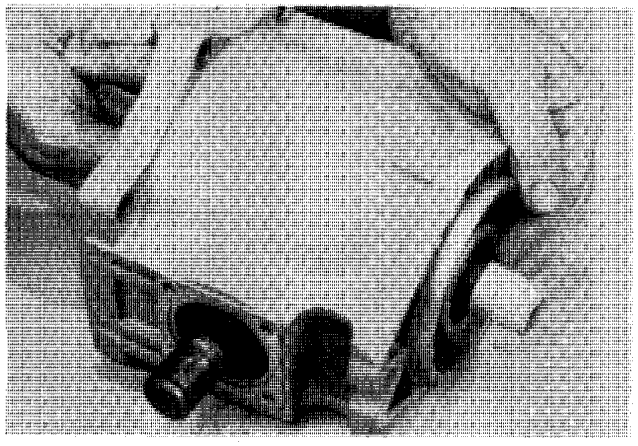
318220

18. Remove the bearing cup.



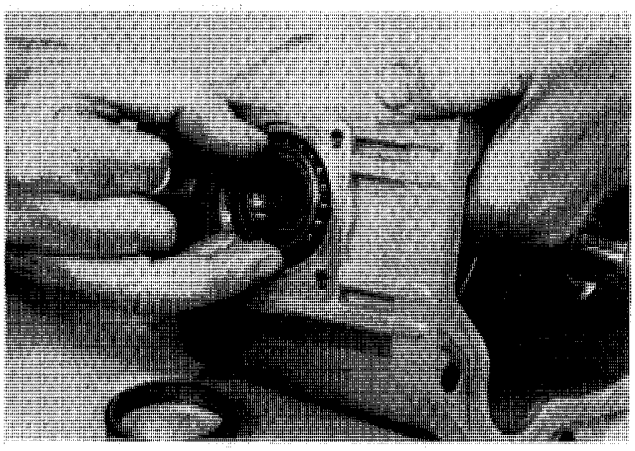
318223

14. Install the shaft into the seal.



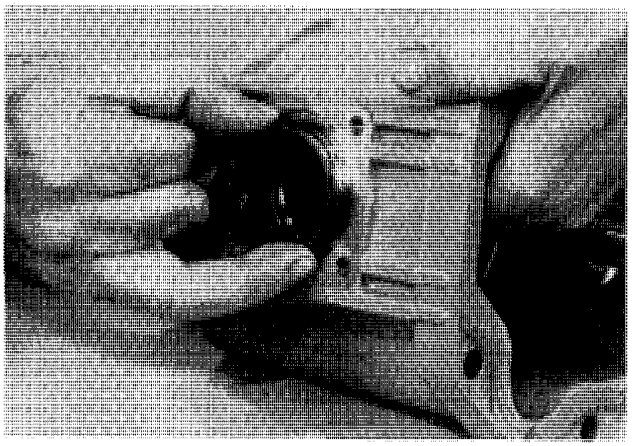
318442

15. Install the bearing on the short shaft of the swash plate.



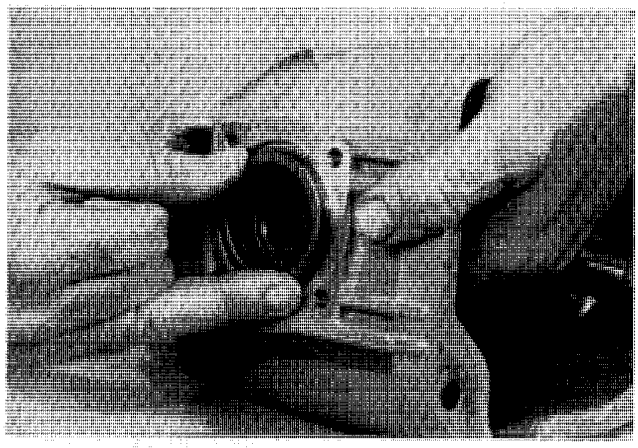
318443

16. Install the bearing cup.



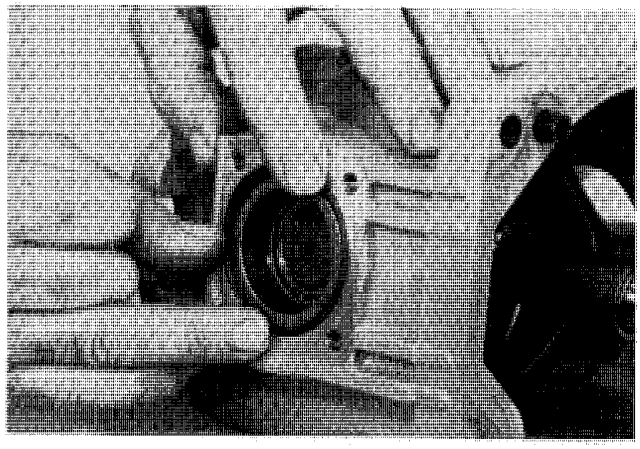
318444

17. Install the spacer.



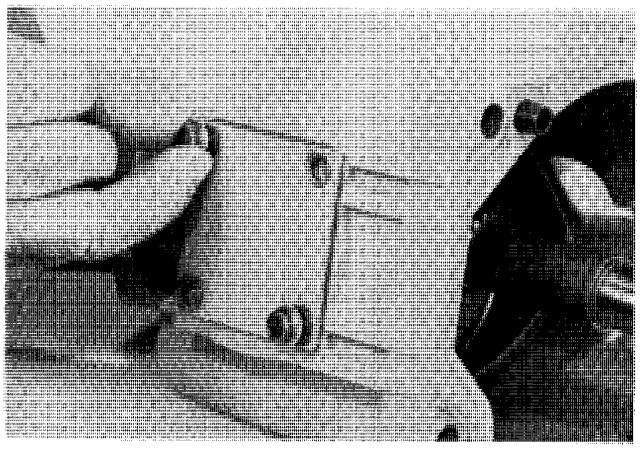
318401

18. Install a new O-ring.



318402

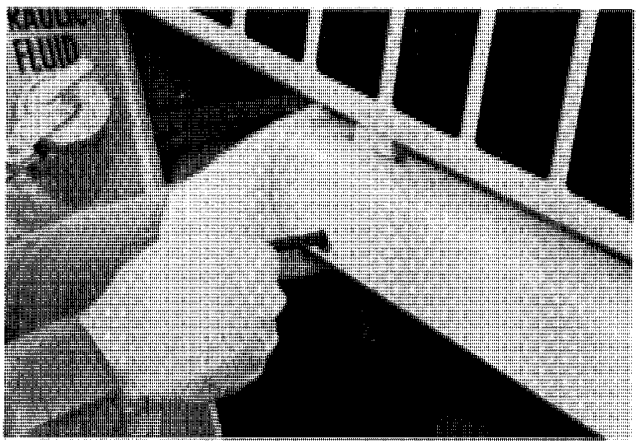
19. Install one .010 inch (2.5 mm) shim (brown), the cover, and the cap screws that hold the cover.



318403

REMOVAL

1. Remove the pins that hold the strut in place and lower the strut.



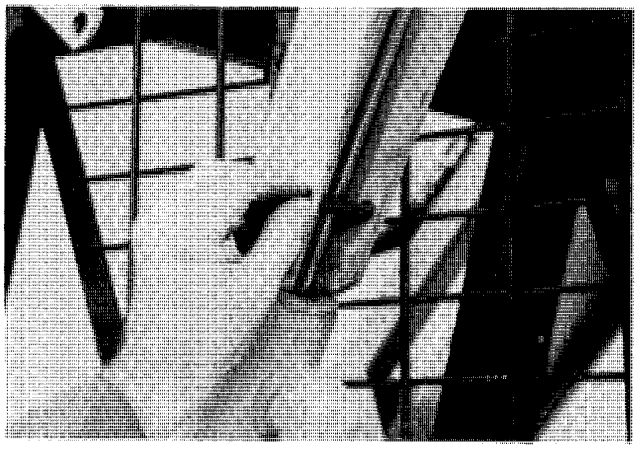
305537

2. Start the engine and raise the loader frame until the strut is on the piston rod and against the end of the lift cylinder.

305538

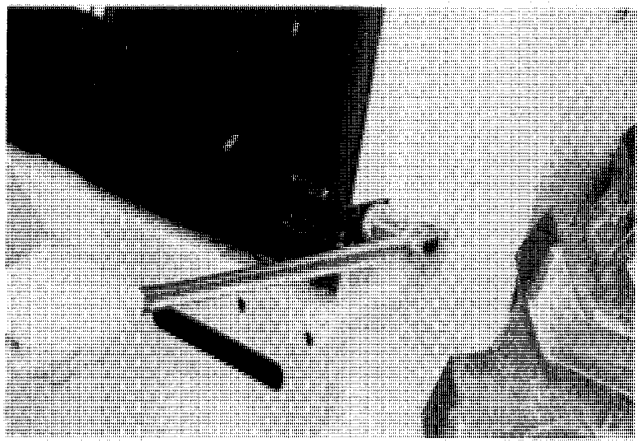
3. Stop the engine.

4. Install the pins that hold the strut in place.



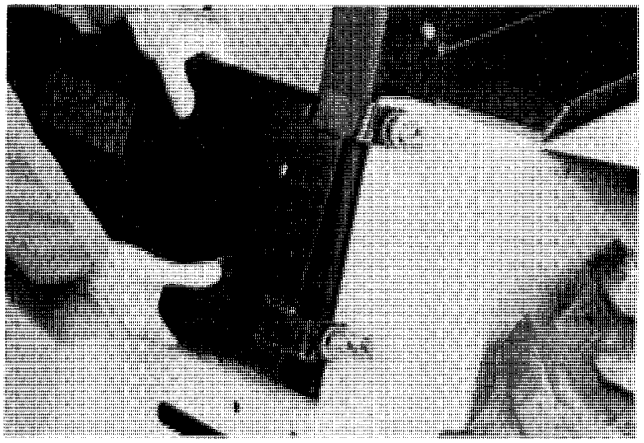
305539

5. Loosen the nuts that hold the guard in place.



305541A

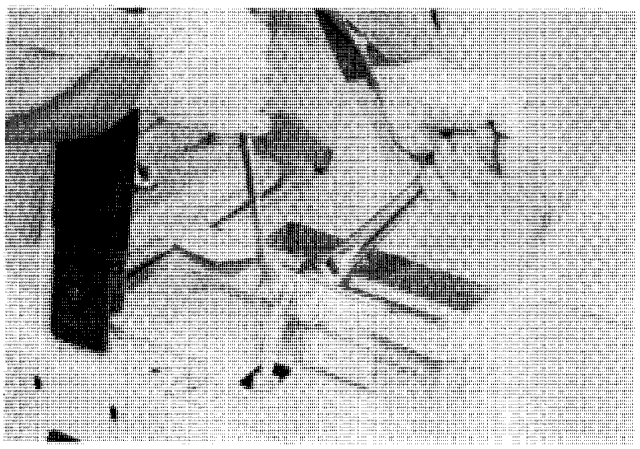
6. Remove the guard.



309212

7. If the machine has auxiliary circuits:

   a. Loosen and remove the nut and lock washer from the bolt that connects the linkage to the pedal.

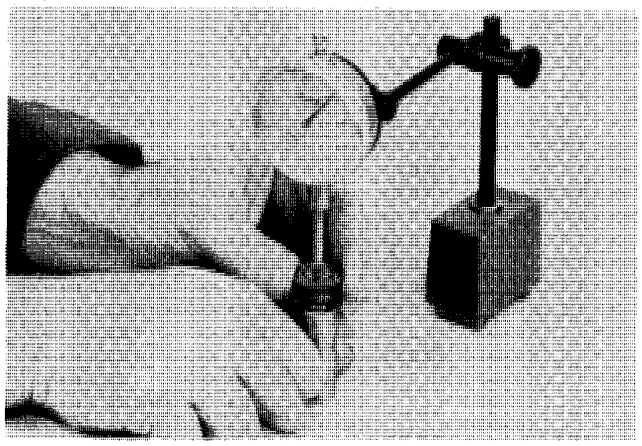


305519

INSPECTION

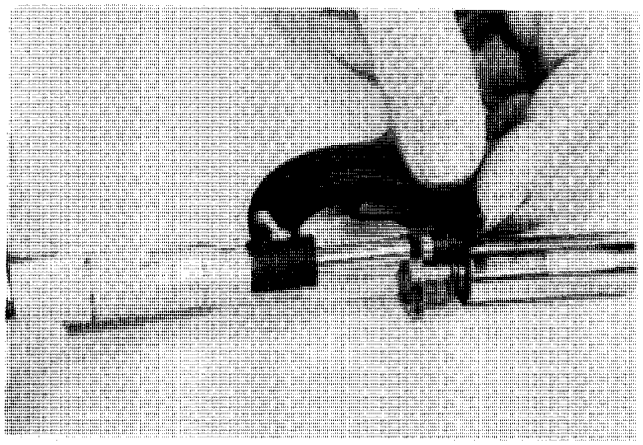
1. Clean all parts in cleaning solvent.

2. Use compressed air to dry the piston and shoe joint. Then measure the end play of each piston. If the end play is more than .005 inch (0.127 mm), the piston must be replaced.



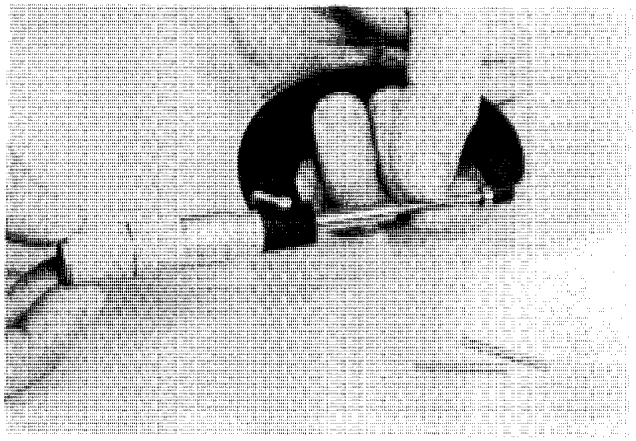
313202

3. Measure the thickness of each shoe. If there is more than .001 inch (0.025 mm) between the highest and lowest measurement, all pistons must be replaced.



313327

4. Measure the length of the pins. If the pins are not of equal length, install new pins.



313328

5. Inspect the face of the cylinder block for wear, scoring, and grooves. If a groove connects two or more cylinders, the cylinder block must be replaced.

6. Lubricate the pistons and cylinders with clean oil. Check the fit of a piston in each bore. The piston must not be loose in the cylinder and must move freely.

7. Inspect the support for wear, cracks, and scoring.

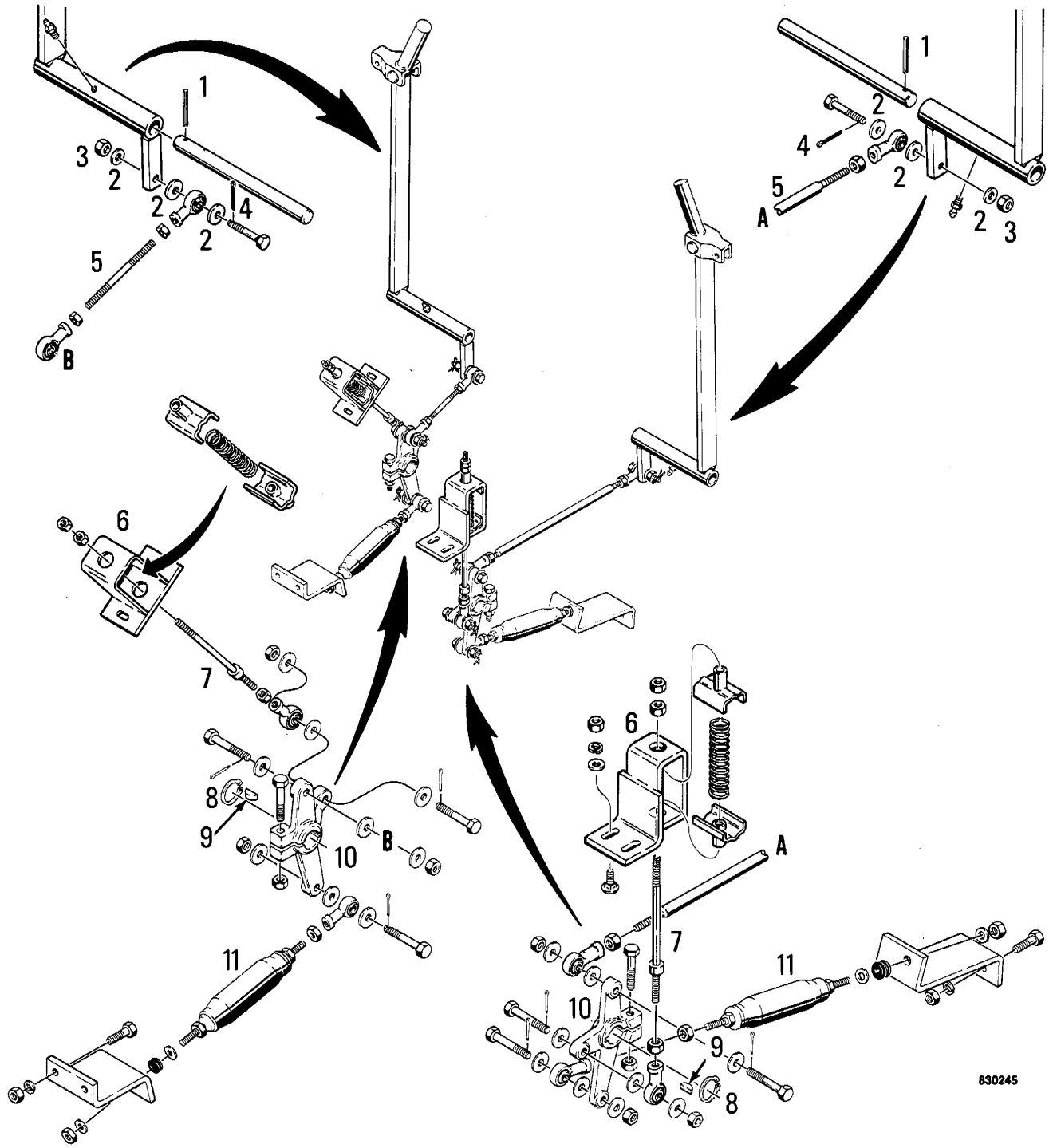
8. Inspect the center of the guide for wear and scoring. Also check for cracks.

NOTE: *If either the support or guide are to be replaced, both parts must be new.*

9. Inspect the bronze face of the wear plate for wear, scoring, and grooves. Also check for cracks.

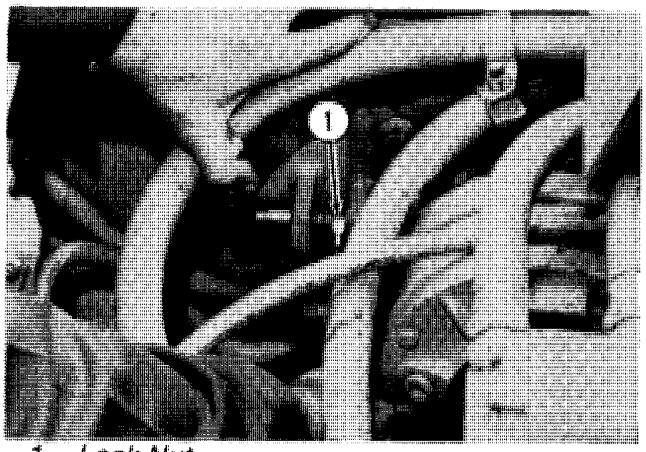
10. Inspect the shoe plate for wear and cracks.

11. Inspect the bearings and bearings cups for flat areas, scoring, pitting and other damage. If either part is to be replaced, both parts must be new.



1. *Roll Pin*
2. *Hardened Washer. Used At All Ball Joint Connections.*
3. *Self-Locking Nut. Tighten With A Force Equal To 30 To 35 Pound-Feet (41 To 48 N m, 4 To 5 kg/m)*
4. *Cotter Pin*
5. *Control Rod*
6. *Neutral Control*
7. *Neutral Control Rod*
8. *Snap Ring*
9. *Woodruff Key*
10. *Control Arm*
11. *Shock Absorber*

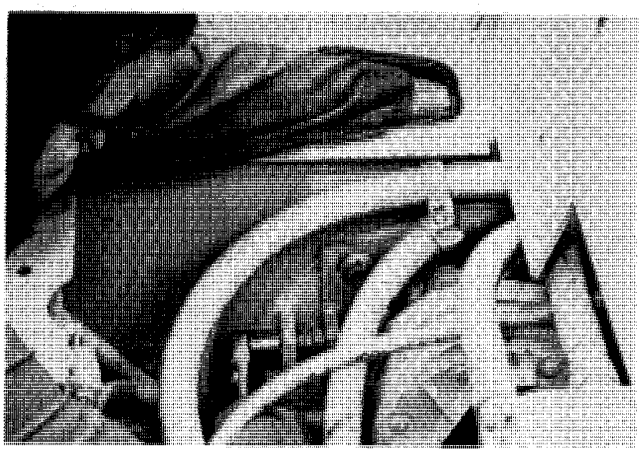
26. Loosen the lock nut on the adjusting bolt.



1. Lock Nut

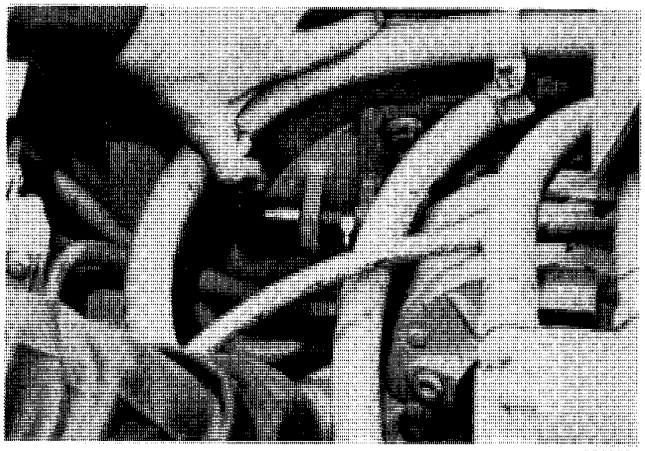
306835

27. Turn the adjusting bolt clockwise to tighten the drive chain or counterclockwise to loosen the drive chain. Check the deflection as you turn the adjusting bolt.



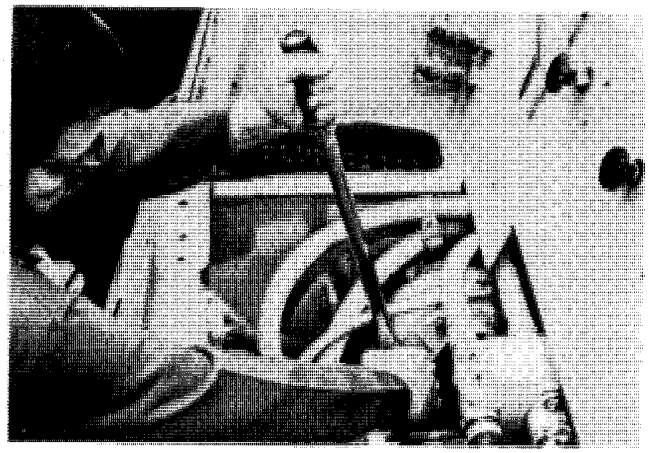
306835

28. When the deflection is correct, tighten the lock nut on the adjusting bolt.



306836

29. Tighten the four self-locking nuts to 80 to 100 pound-feet (108 to 135 N m, 11 to 13 kg/m).



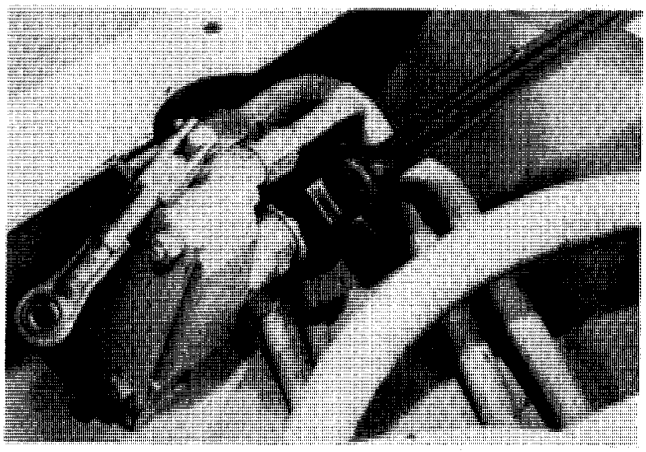
306838

30. If the machine has an auxiliary control valve:

a. Start the vacuum pump.

b. Remove the cap from the outlet port and the tee fitting.

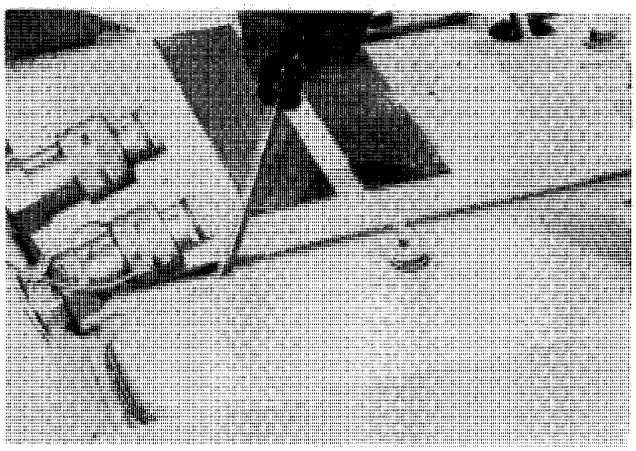
c. Connect the tube to the outlet port and the tee fitting.



306844

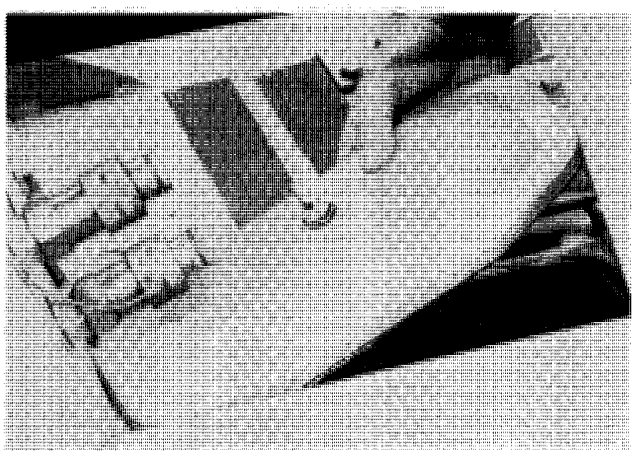
d. Stop the vacuum pump.

13. Loosen the cover.



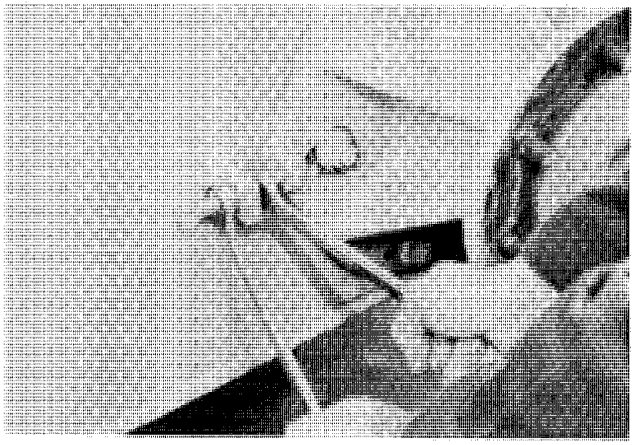
307014

14. Remove the cover.



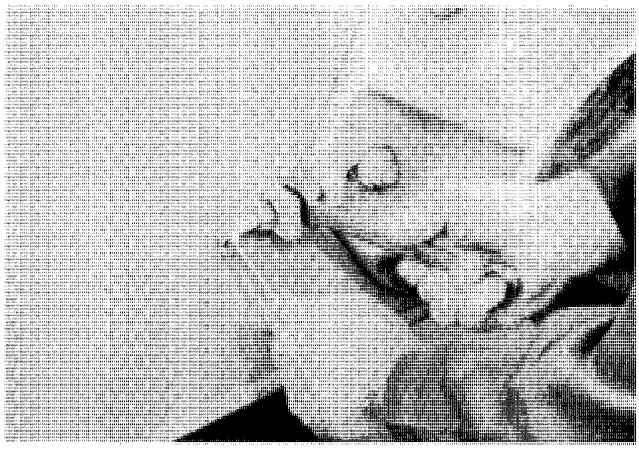
307015

15. Loosen the nuts on the adjusting bolt.



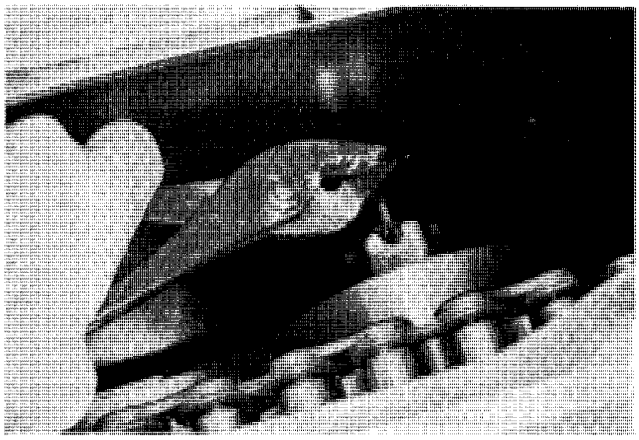
307016

16. Turn the adjusting bolt out of the inner nut several turns.



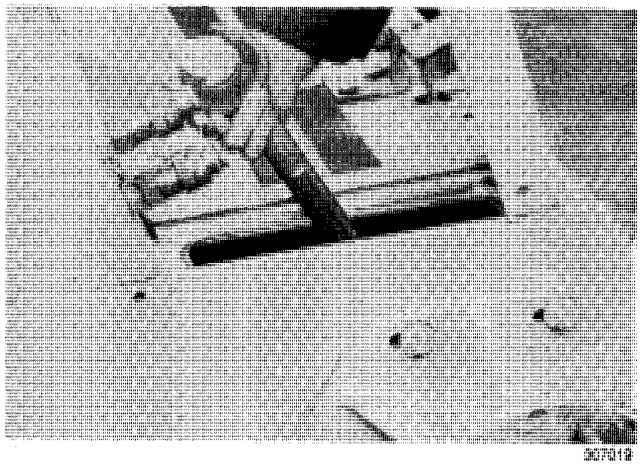
307017

17. Remove the cotter pin that holds the nut on the axle.



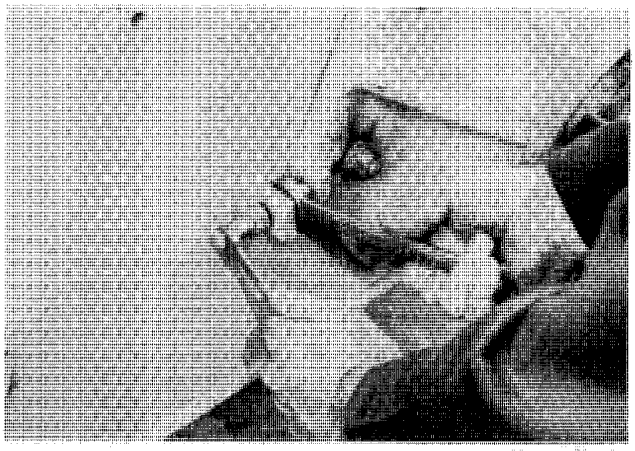
307426

18. Loosen the nut.



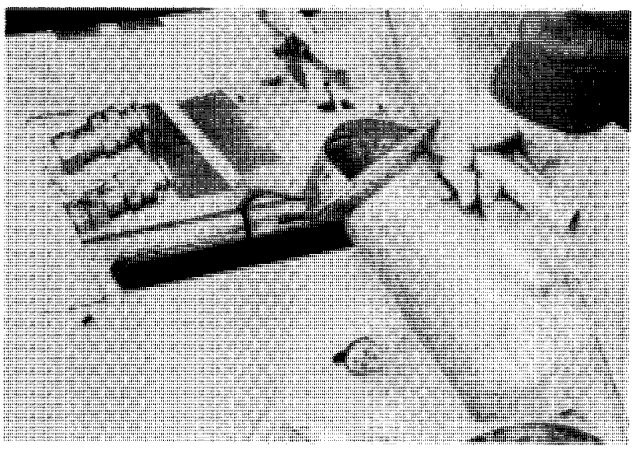
307018

25. Tighten the lock nut on the adjusting bolt.



307339

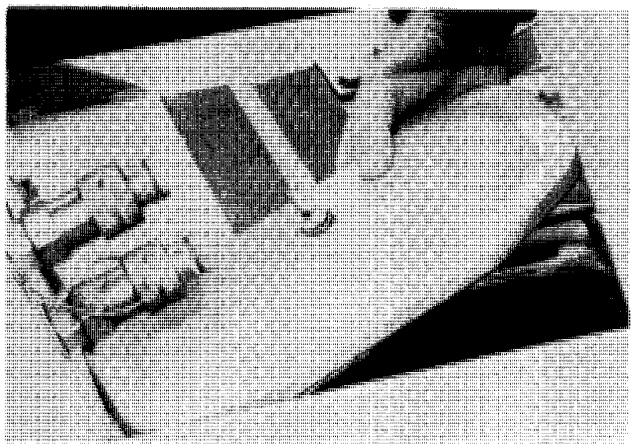
26. Make sure that the drain plug has been installed and fill the chain compartment with the oil specified in Section 1002.



308003

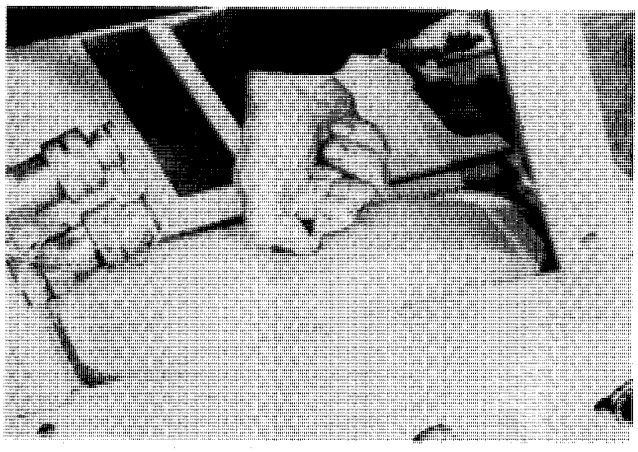
27. Check the condition of the gasket on the cover, and if necessary, install a new gasket.

28. Install the cover.



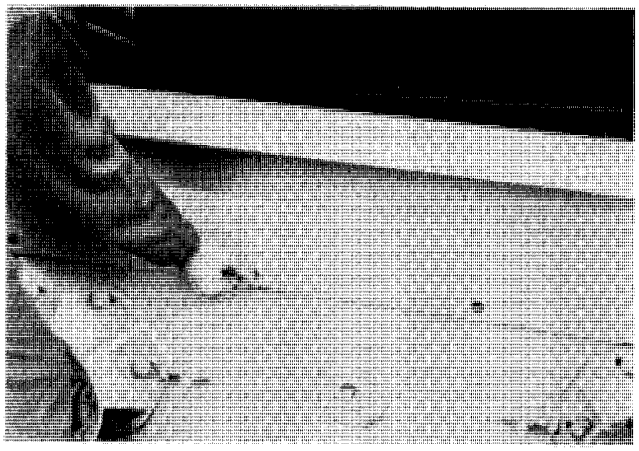
307015

29. Tighten the wing nut.



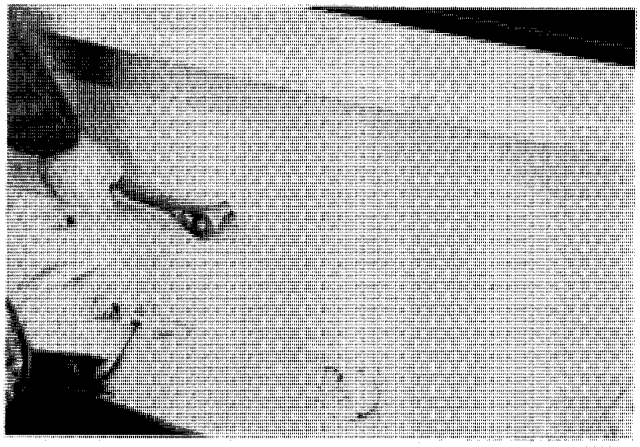
308004

30. Hold the fender in place and install a cap screw.



306914

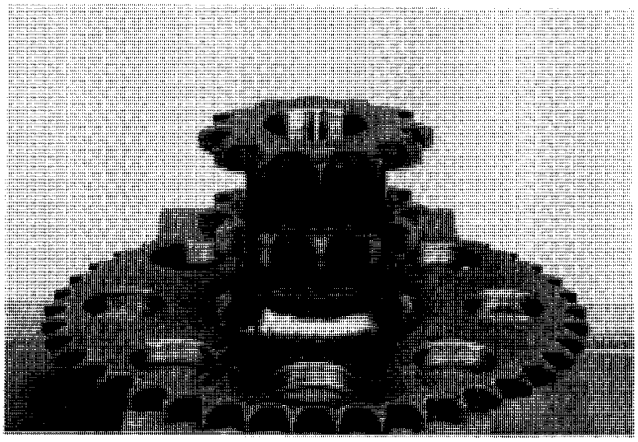
31. Install the remainder of the cap screws, and hold the fender in alignment with the frame and tighten the cap screws.



308006

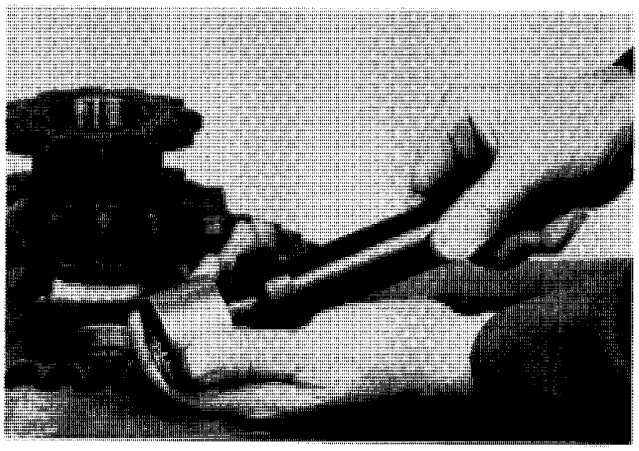
3. Clean the bore of the cluster sprocket.

4. Put the cluster sprocket in the press for installation of a bearing.



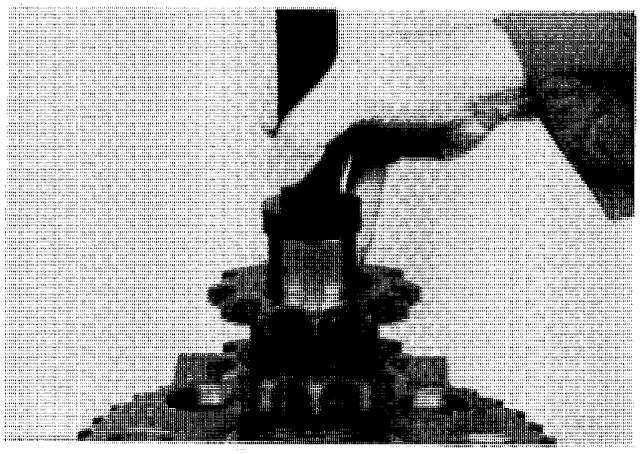
307226

5. Install the new bearing on a driver as shown so that the seal in the bearing is toward the driver.



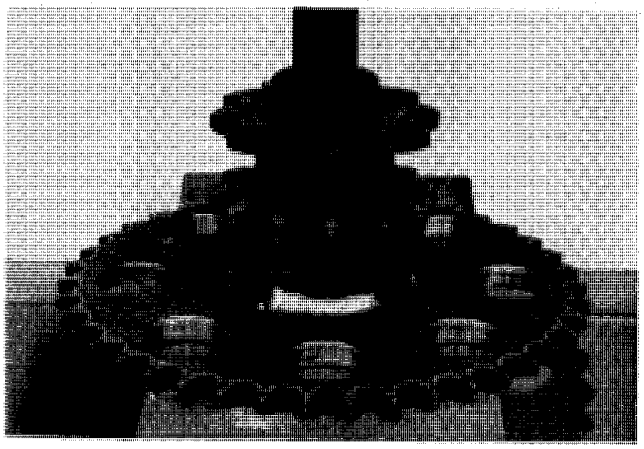
307227

6. Start the bearing into the bore.



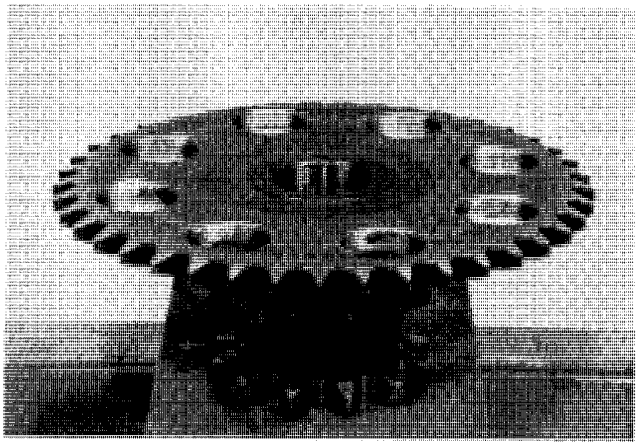
307228

7. Press the bearing into the bore until the driver touches the cluster sprocket.



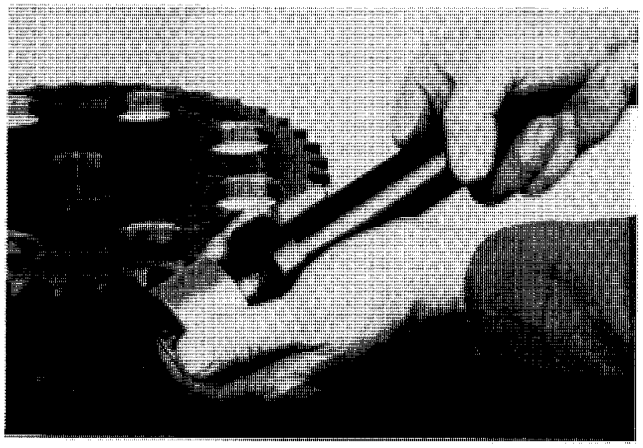
307229

8. Put the cluster sprocket in the press for installation of the other bearing.



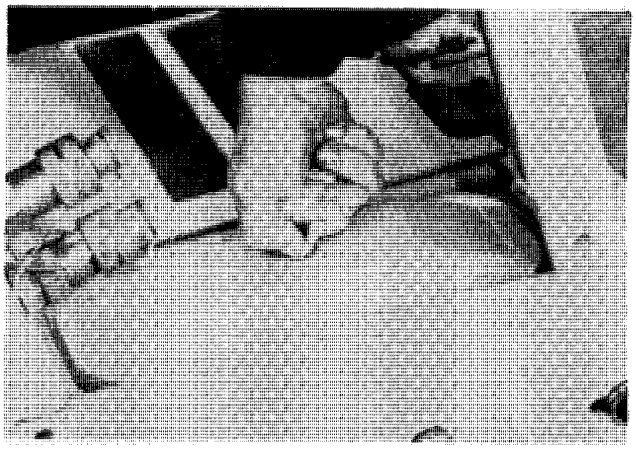
307230

9. Install the new bearing on the driver as shown so that the seal in the bearing is toward the driver.



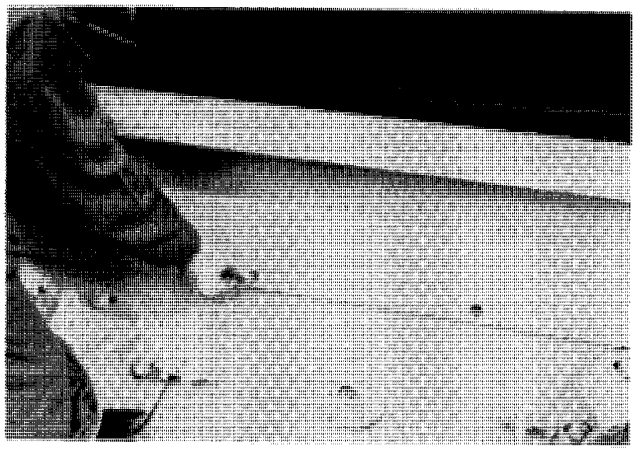
307231

67. Tighten the wing nut.



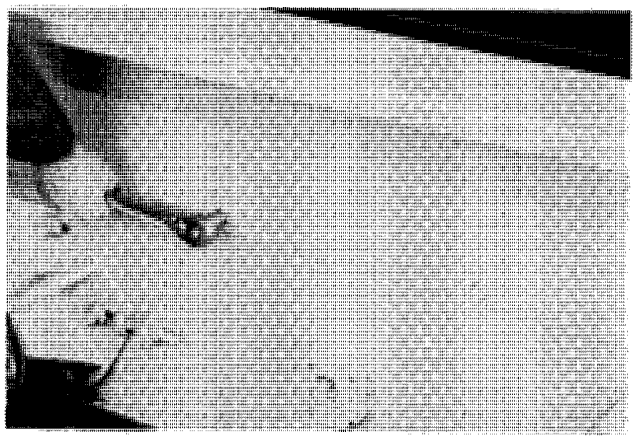
308004

68. Hold the fender in place and install a cap screw.



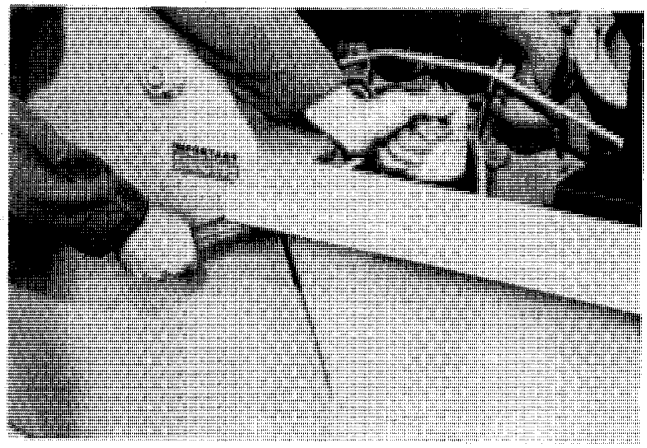
306914

69. Install the remainder of the cap screws, and hold the fender in alignment with the frame and tighten the cap screws.



308006

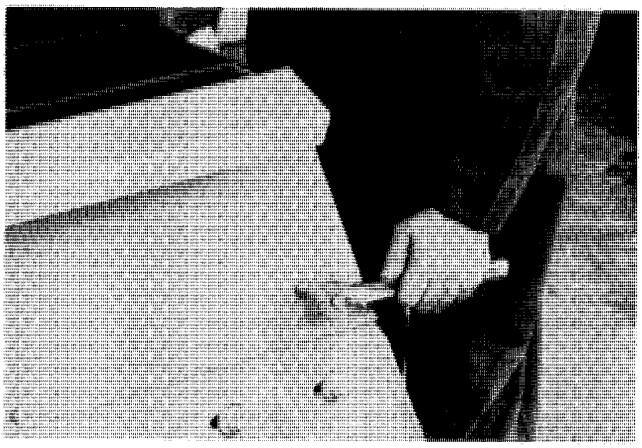
70. Install the bolt, flat washers, lock washer, and nut at the rear of the fender, and tighten the nut.



306912

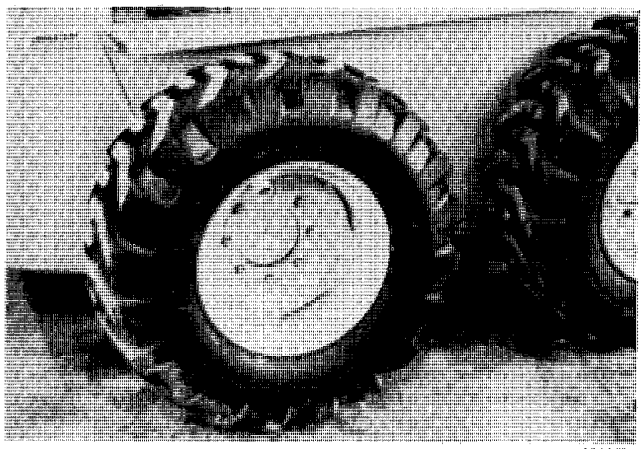
71. Install the bolt, flat washers, lock washer, and nut near the top center of fender and tighten the nut.

72. Install the bolts, flat washers, clamps, lock washers, and nuts at the front of the fender and tighten the nuts.



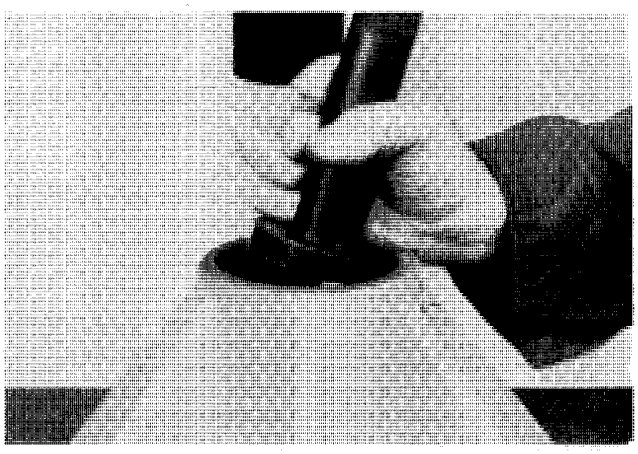
306911

73. Install the wheels.



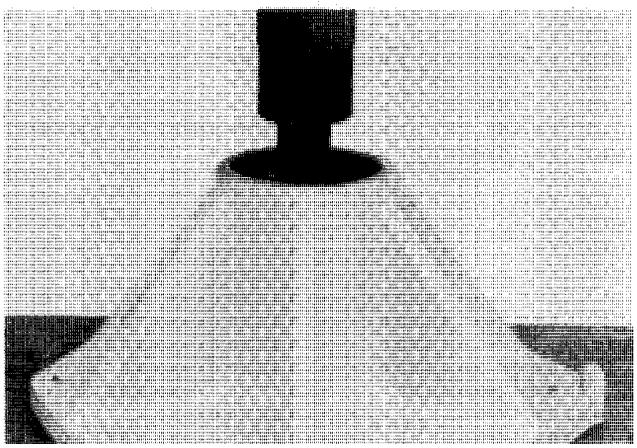
308007

5. Put an acceptable driver on the inner bearing for removal of the seal and inner bearing.



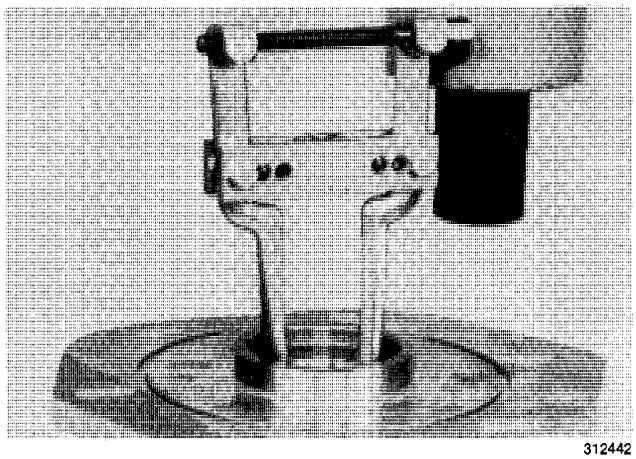
312440

6. Press the inner bearing and seal out of the axle housing.



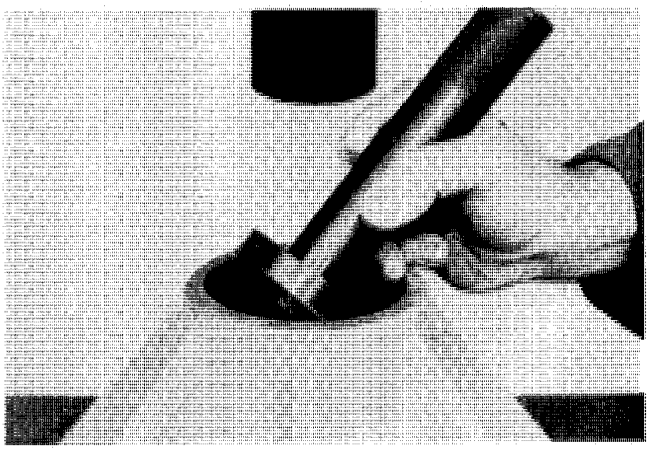
312441

7. Install an acceptable puller in a bearing cup.



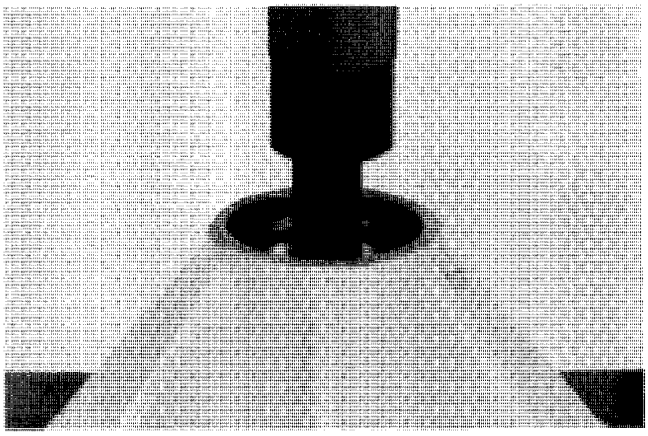
312442

8. Turn the housing over so the puller is down. Put an acceptable driver on the puller.



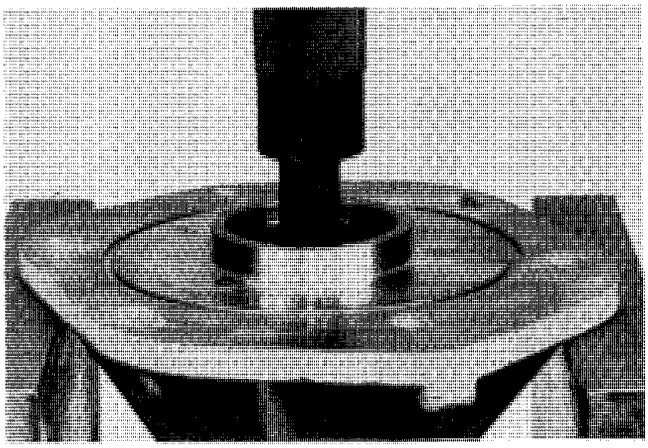
312443

9. Press the bearing cup out of the axle housing.



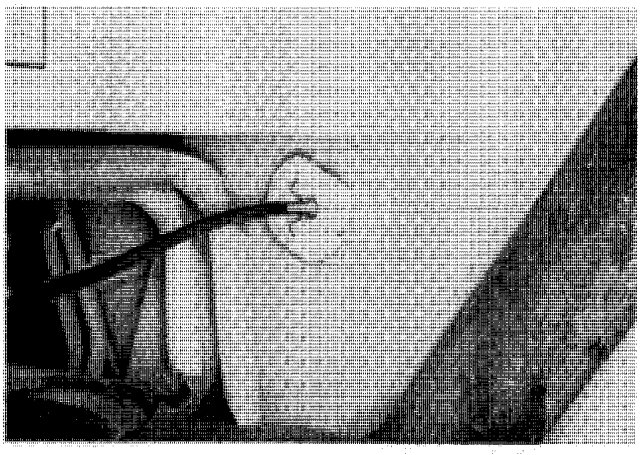
312444

10. Use the same method to press the other bearing cup out of the axle housing.



312533

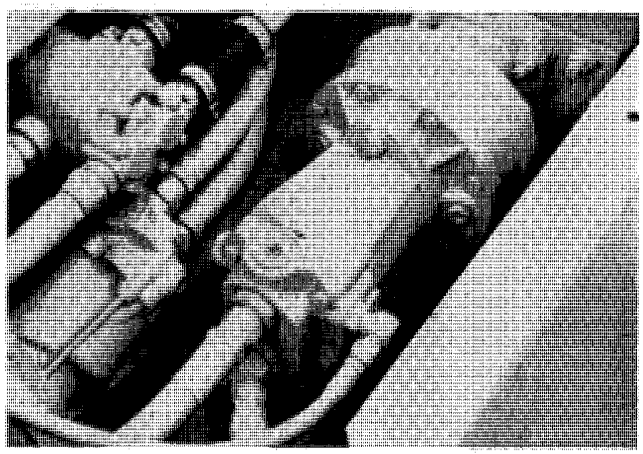
12. Connect a vacuum pump to the reservoir.



307413

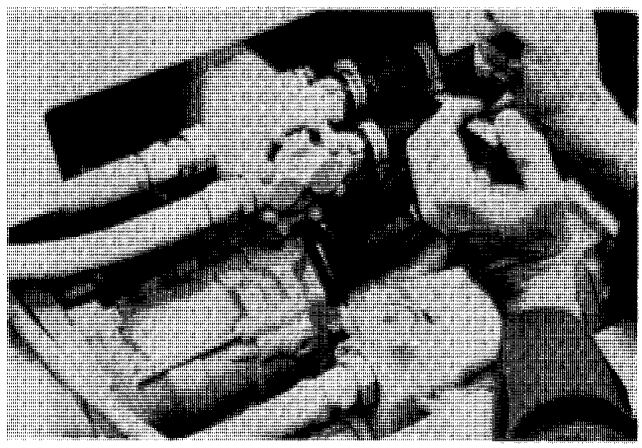
13. Start the vacuum pump.

NOTE: *The following procedure shows the removal of the right planetary because the right planetary is the most difficult to remove. When removing the left planetary, follow this procedure but do not do steps 21, 22, and 25.*



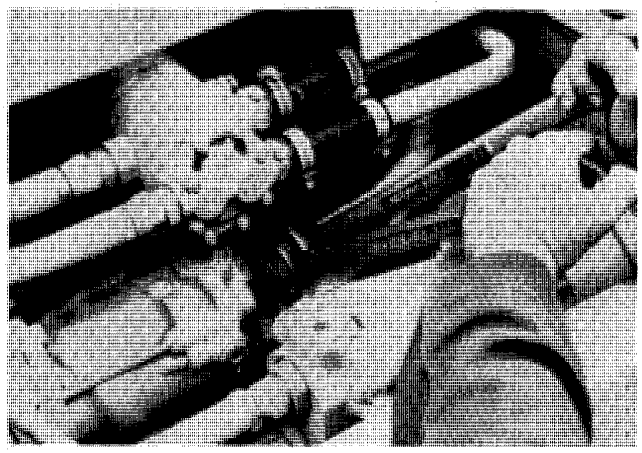
306406

14. Disconnect the top hose from the motor.



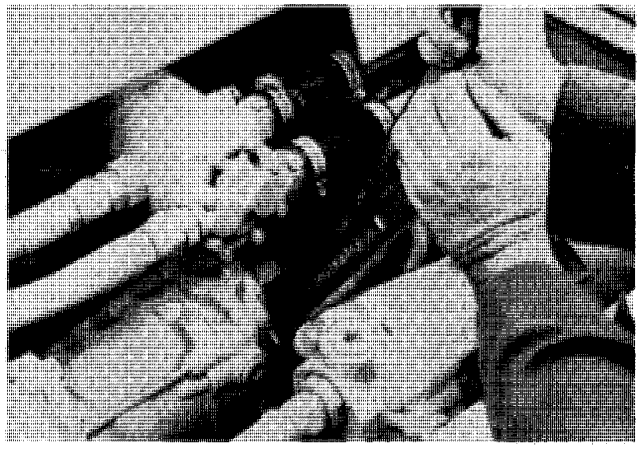
306407

15. Install a cap on the fitting and a plug in the hose.



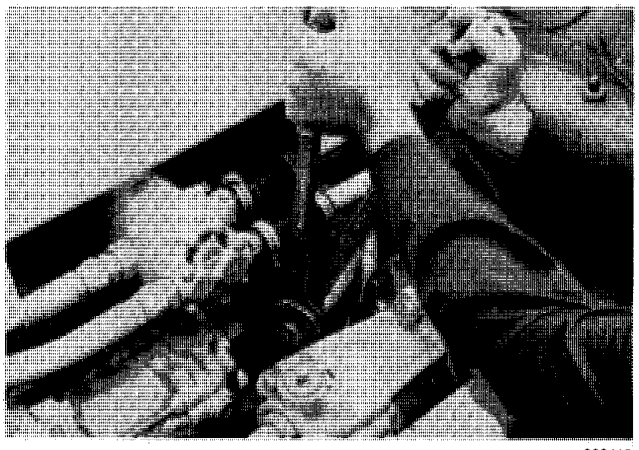
306408

16. Disconnect the bottom hose.



306409

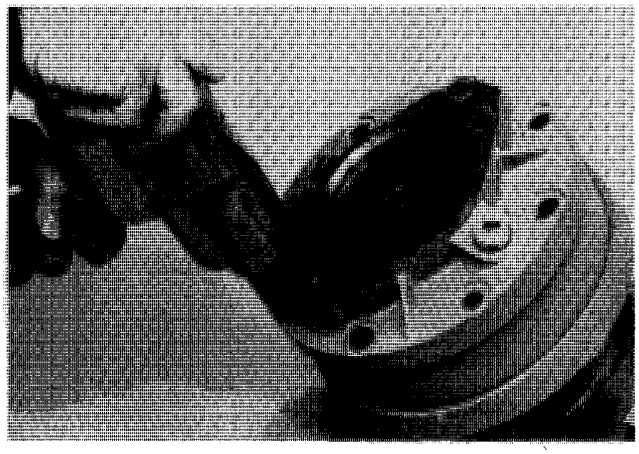
17. Install a cap on the fitting and a plug in the hose.



306410

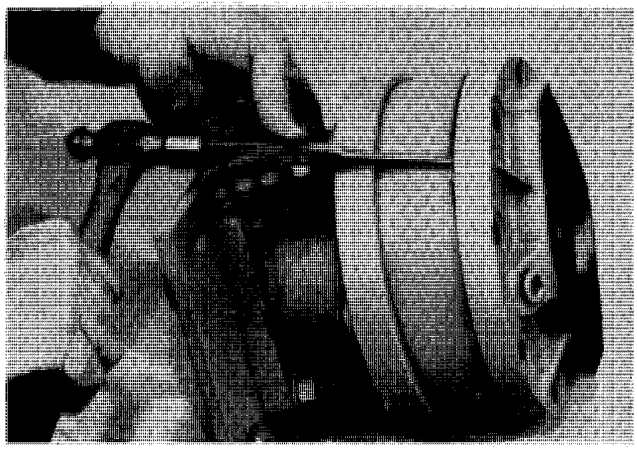
DISASSEMBLY

1. Loosen and remove the cap screws that hold the cover.



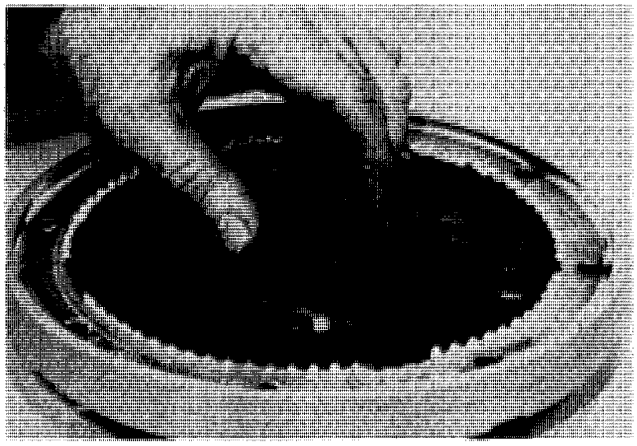
312227

2. Remove the cover.



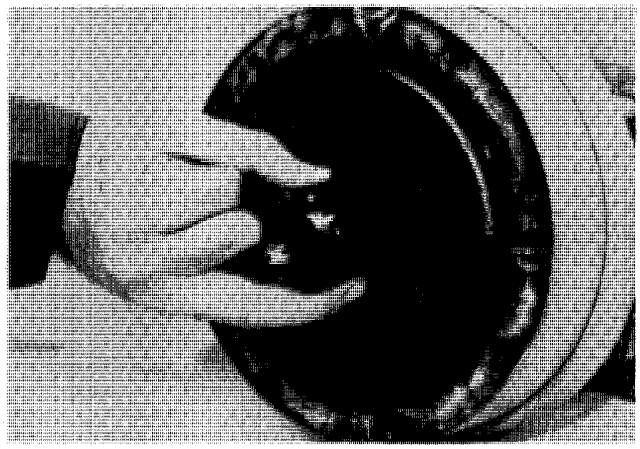
312228

3. Remove the thrust washer from the cover (or sun gear).



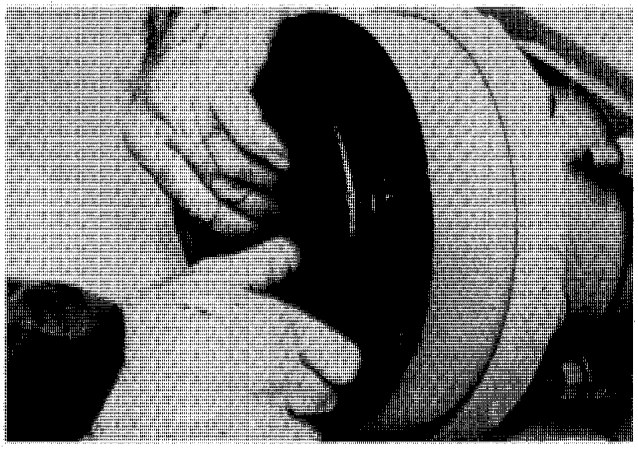
312315

4. Remove the sun gear.



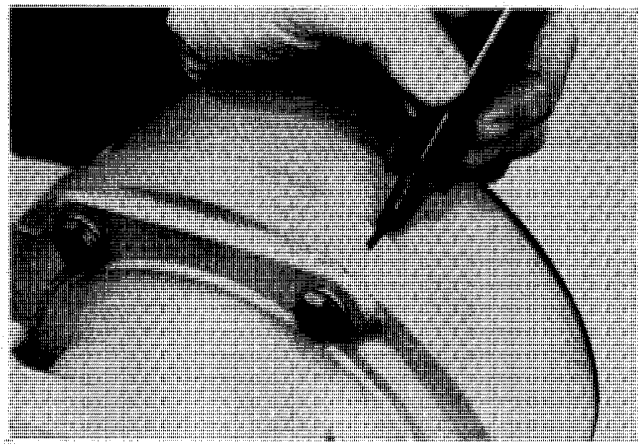
312229

5. Remove the carrier assembly.



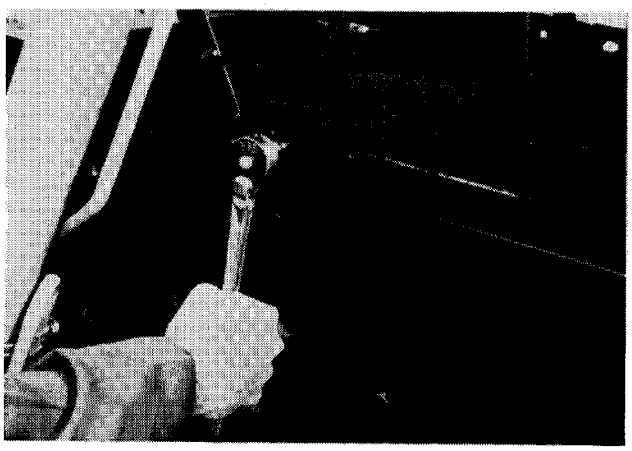
312230

6. Make an alignment mark on the ring gear and housing.



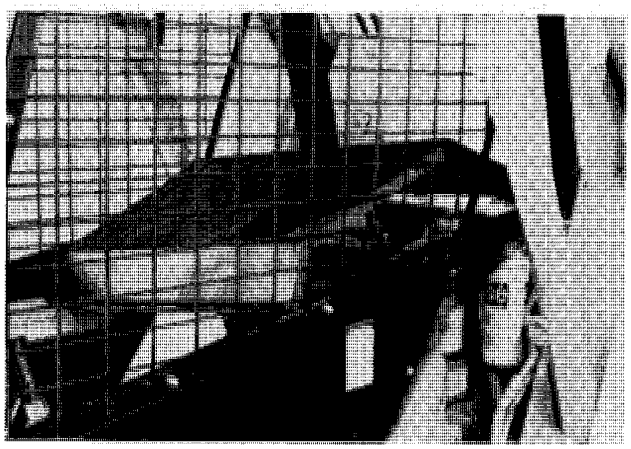
312329

19. Loosen and remove the nuts, lock washers, and carriage bolts at the rear of each screen.



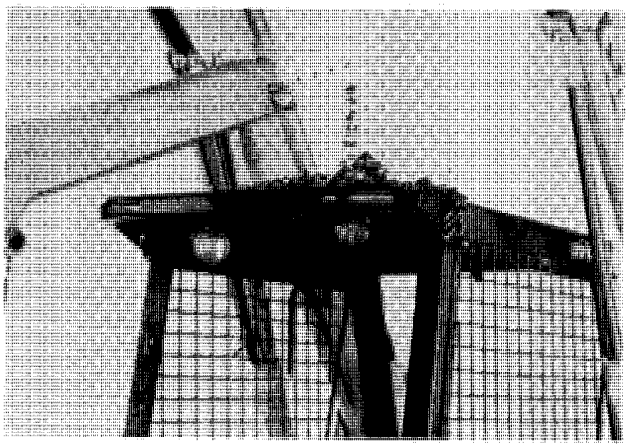
311737

20. Raise the heat shield as shown for clearance of the control levers.



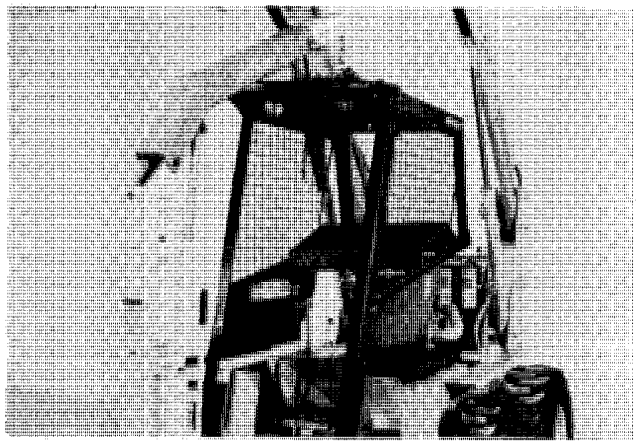
309002

21. Fasten acceptable lifting equipment to the ROPS canopy.



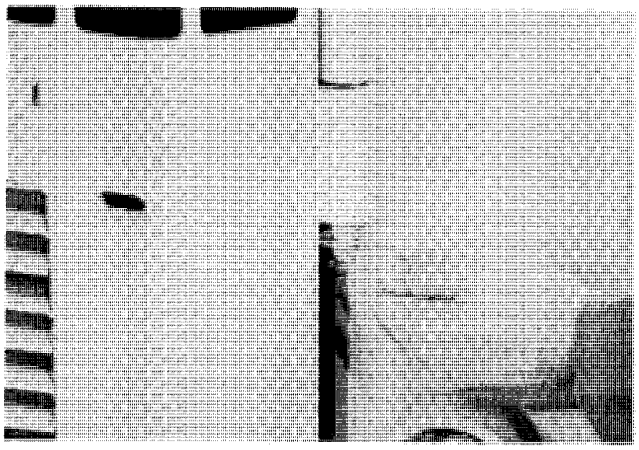
309043

22. Remove the ROPS canopy from the machine.



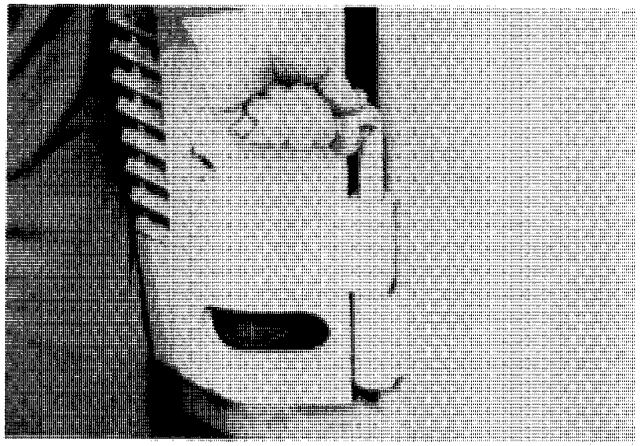
309040

23. Remove the hair pins.



308541

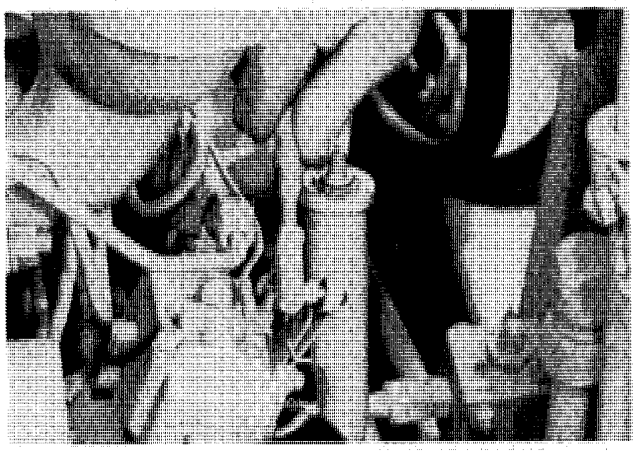
24. Remove the pins from one side.



308542

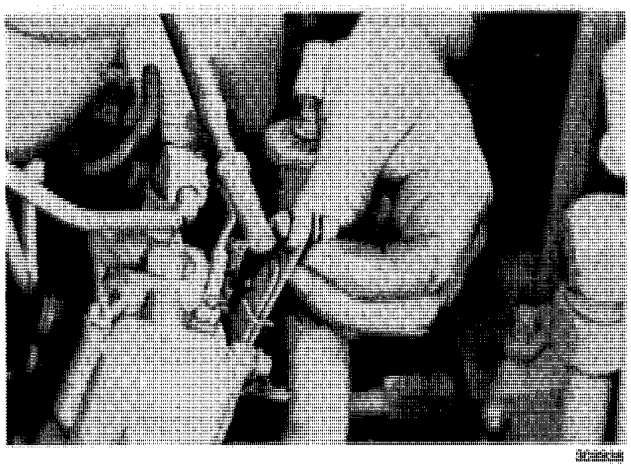
14. If the machine has a diesel engine:

a. Connect the throttle rod to the fuel injection pump.

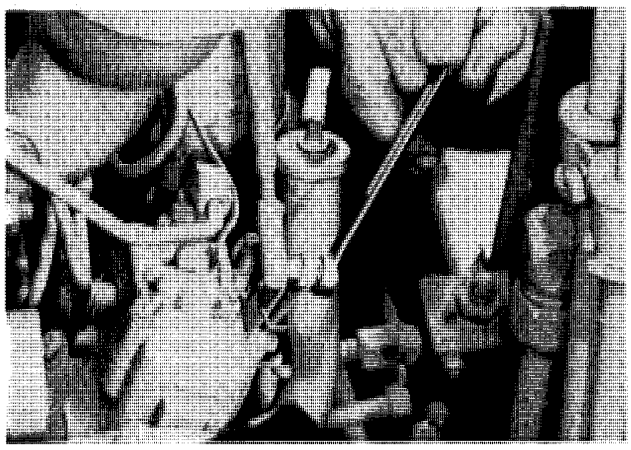


308825

b. Install the lock washer and nut.

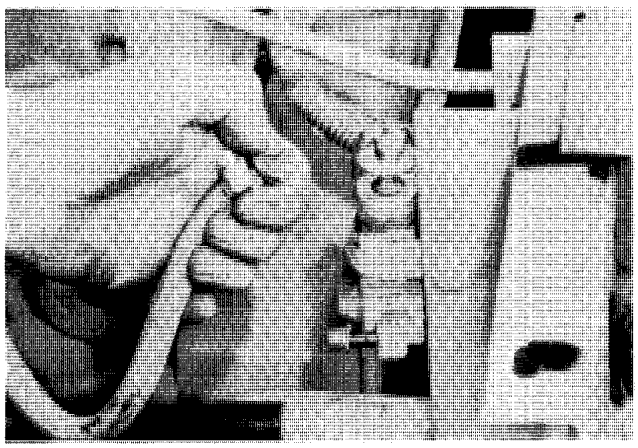


c. Tighten the nut.



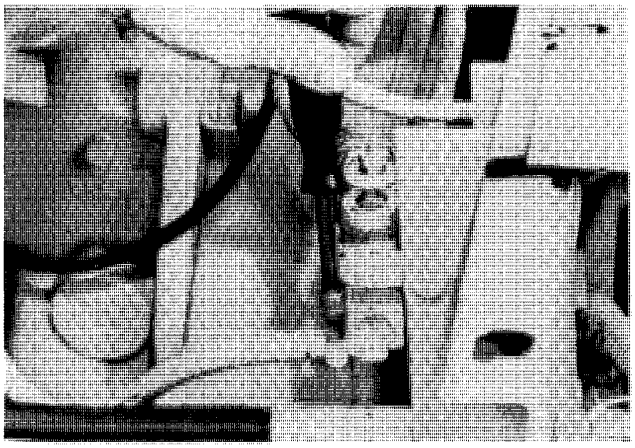
308824

d. Remove the cap from the stem and the plug from the hose.



308721

e. Install the hose on the stem and tighten the clamp.



308719

15. If the machine has a gasoline engine:

a. Connect the choke cable to the choke lever.

b. Install the clamp and screw that holds the choke cable in place.

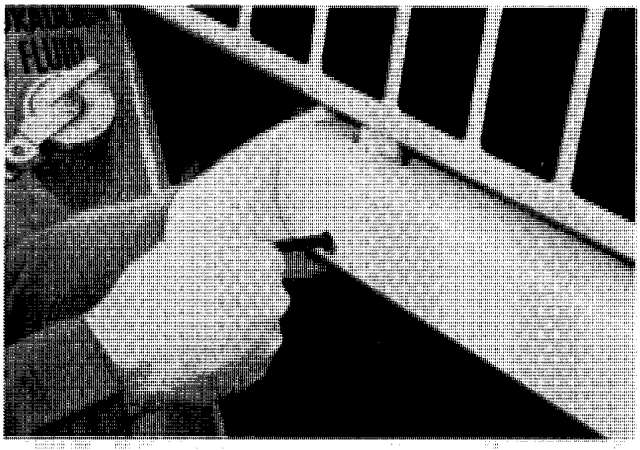
c. Tighten the screw.

d. Tighten the screw that fastens the choke cable to the choke lever.

e. Connect the hose to the carburetor.

f. Tighten the clamp on the hose.

84. Hold the strut in place and install the pins.



305537

7001

PARKING LATCH

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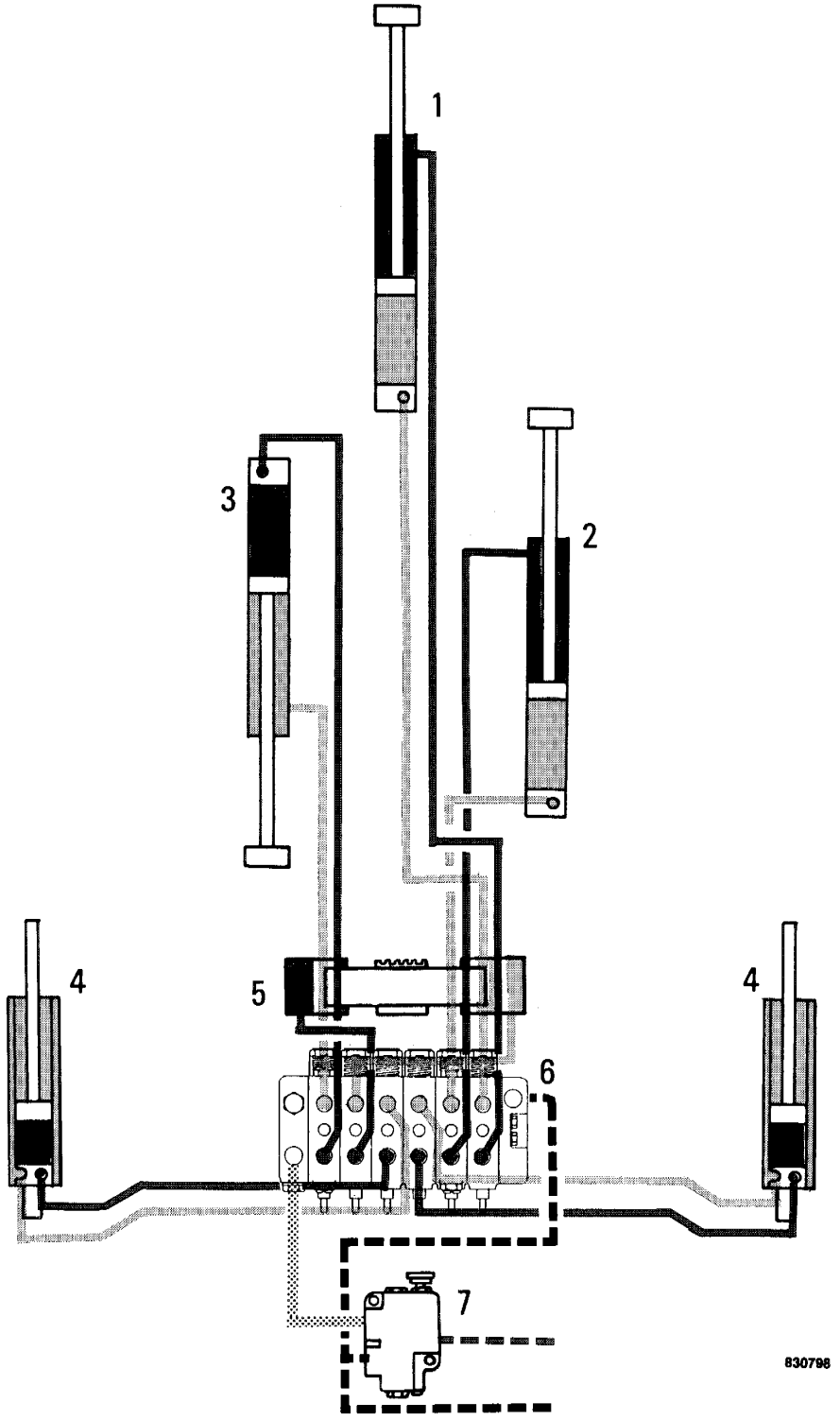
Issued November 1983



Return Oil
Equipment Pump Flow
Oil To Backhoe Control Valve
Oil To And From A Port
Oil To And From B Port

1. *Bucket Cylinder*
2. *Dipper Cylinder*
3. *Boom Cylinder*
4. *Stabilizer Cylinder*
5. *Swing Cylinder*
6. *Backhoe Control Valve*
7. *Flow Control Valve*

Hydraulic Diagram for D100 Backhoe

FLOWMETER TESTS

General Information

The flowmeter measures the volume, pressure, and temperature of the hydraulic oil as the hydraulic oil flows through the flowmeter.

Test No.1 will indicate whether or not there are problems in the line between the reservoir and the equipment pump, and whether or not the equipment pump is working within acceptable standards of efficiency.

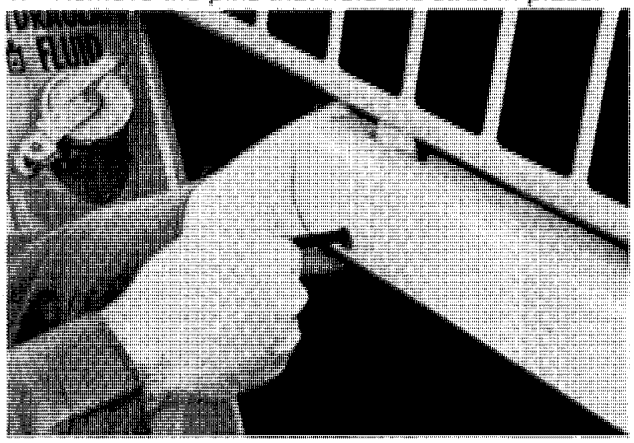
Test No. 2 will indicate if there are problems in the loader hydraulic circuits.

Test No. 3 will indicate if there are problems in the backhoe hydraulic circuits.

A check sheet is at the end of this section. A copy of the check sheet can be made to use as a record for the test results.

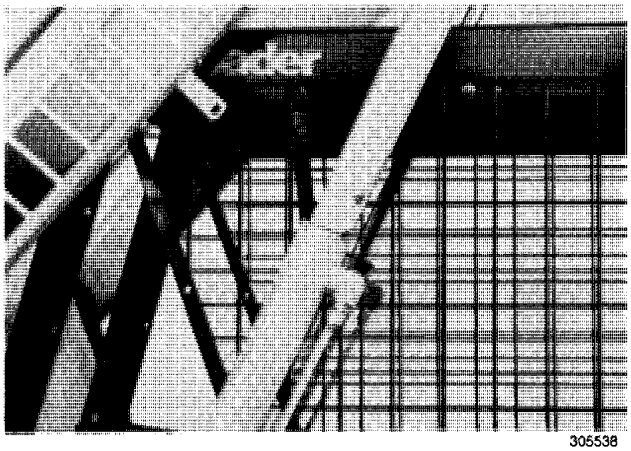
Test No. 1 - Equipment Pump

1. Remove the pins that hold the strut in place.



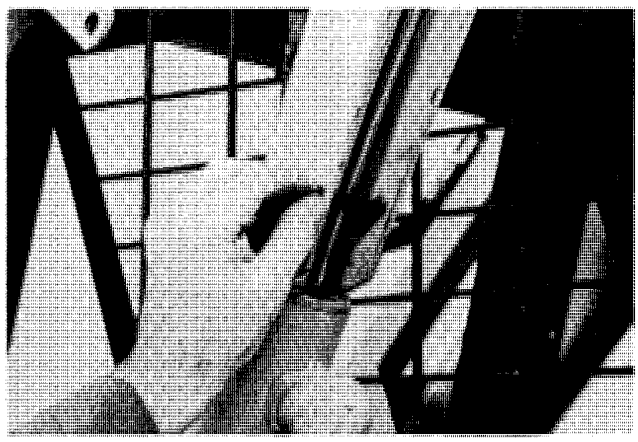
305537

2. Start the engine and raise the loader frame until the strut is against the lift cylinder.



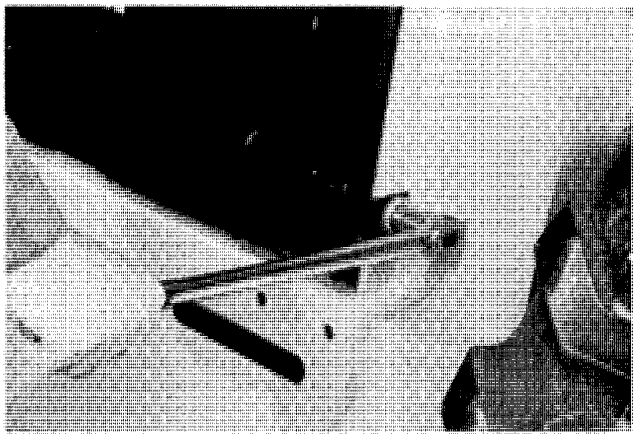
305538

3. Install the pins that hold the strut.



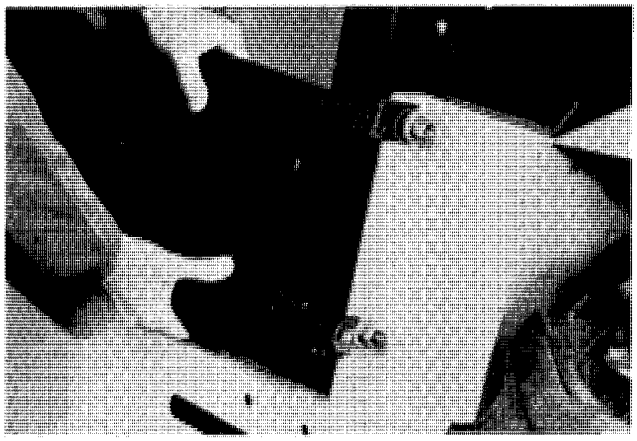
305539

4. Loosen the nuts on the bolts that hold the ROPS canopy and guard.



305541A

5. Remove the guard.

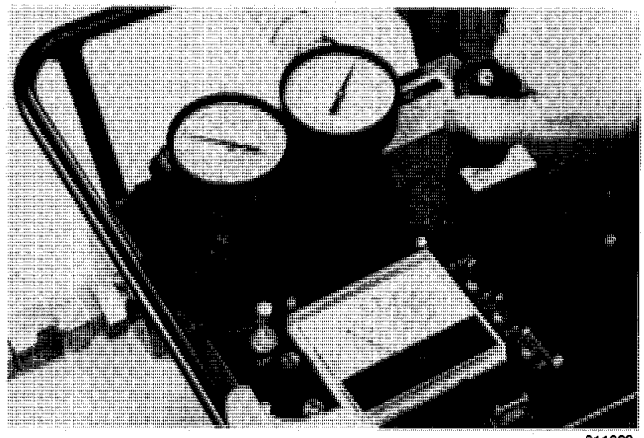


309212

21. Have the other person help you complete the test.

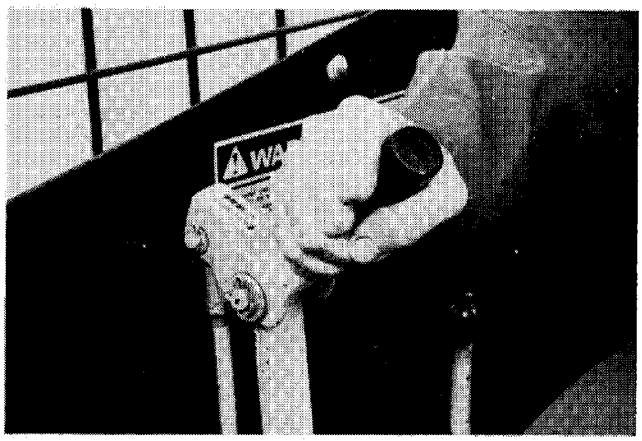
22. Start the engine and use the tachometer to adjust the engine speed to 2000 rpm (r/min).

23. Close the pressure valve until the pressure gauge indicates 2000 psi (13 789 kPa, 140 kg/cm²).



311629

24. Hold the bucket control lever in the Rollback position and adjust the pressure valve to keep the pressure as specified. Adjust the engine speed to keep the engine running at 2000 rpm (r/min). Read the flow gauge.



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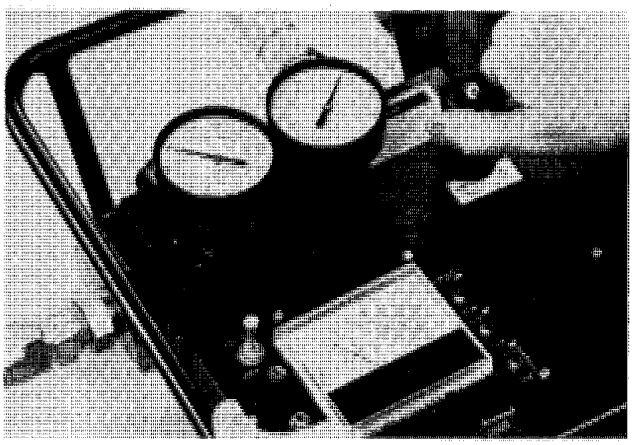
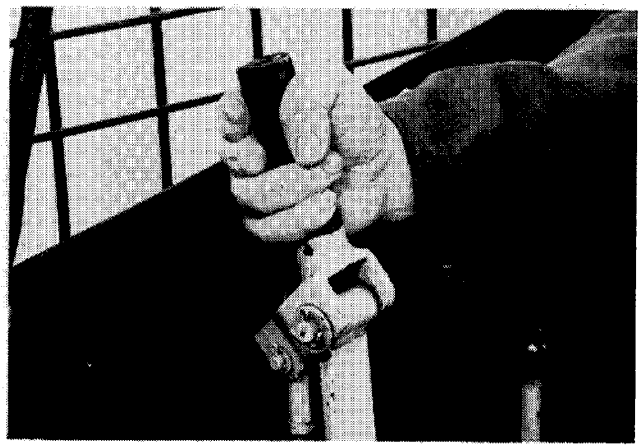


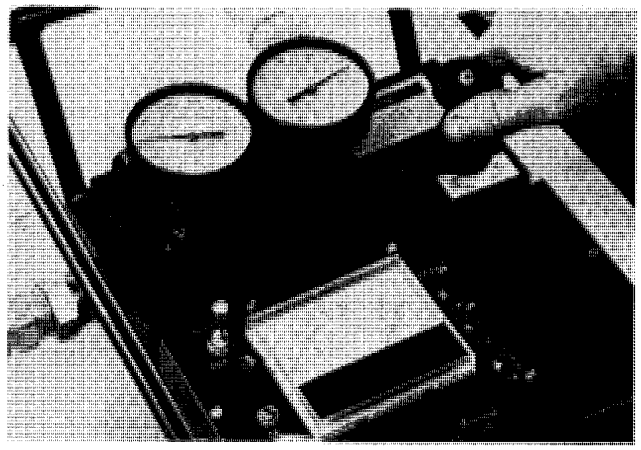
311629

25. Write the reading of the flow gauge on the check sheet.

26. Hold the bucket control lever in the Dump position and adjust the pressure valve as required to keep the pressure at 1500 psi (10 342 kPa, 105 kg/cm²). Adjust the engine speed to keep the engine running at 2000 rpm (r/min). Read the flow gauge.



311726



311723

27. Write the reading of the flow gauge on the check sheet.

METRIC MEASURE CHECK SHEET
PRESSURE IN kPa

Owner ______________________ Date________ Hours________
Model ______________________ Product Identification Number ____________
Oil temperature. At start of test ________°C. At end of test ________°C.

Test No. 1 - Equipment Pump

1. ____________ L/min at 0 kPa at 2000 r/min
2. ____________ L/min at 8273 kPa at 2000 r/min
3. ____________ L/min at 10 342 kPa at 2000 r/min
4. ____________ L/min at 11 721 kPa at 2000 r/min
5. ____________ L/min at 13 789 kPa at 2000 r/min

The efficiency of the equipment pump is line 5 divided by line 1.

Example:

```
      .80
56/45.00
   44 8
      20
```

.80=80% efficient

Test No. 2 - Loader Circuits and Main Relief Valve

Main relief valve begins to open at ________ kPa
Main relief valve completely open at ________ kPa. Specified setting 15 685 to 16 375 kPa

Engine speed 2000 r/min

Rollback ____________L/min at 13 789 kPa
Dump ____________L/min at 10 342 kPa
Lift ____________L/min at 13 789 kPa
Lower ____________L/min at 13 789 kPa

Clam close ____________L/min at 8273 kPa
Clam open ____________L/min at 8273 kPa
Grapple close ____________L/min at 13 789 kPa
Grapple open ____________L/min at 13 789 kPa

Test No. 3 Backhoe Circuits and Main Relief Valve

Main relief valve begins to open at ________ kPa.
Main relief valve completely open at ______ kPa.

Specified setting for D100 backhoe is 14 651 to 15 340 kPa. See page 8002-31 to check main relief valve for D130 backhoe.

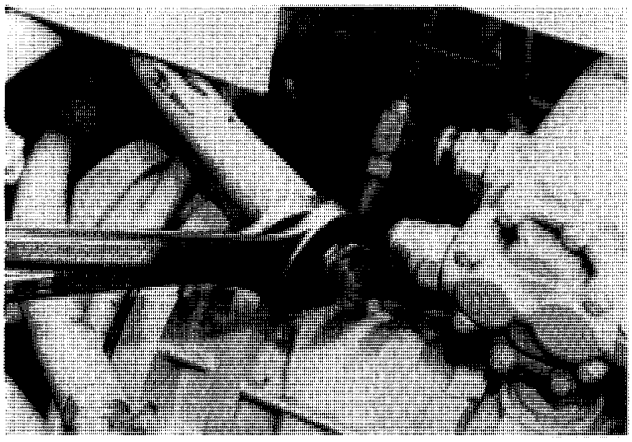
Engine speed 2000 r/min

Test pressure, D100-11721 kPa, D130-13 789 kPa

Right stabilizer, lower ____________L/min raise ____________L/min
Left stabilizer, lower ____________L/min raise ____________L/min
Bucket, dump ____________L/min load ____________L/min
Dipper, out ____________L/min in ____________L/min
Boom, raise ____________L/min lower ____________L/min
Swing, right ____________L/min left ____________L/min

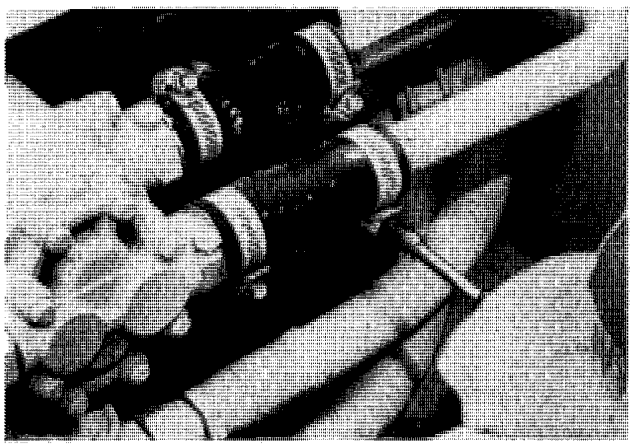
Scarifier, raise ____________L/min lower ____________L/min

15. Install a plug in the hose.



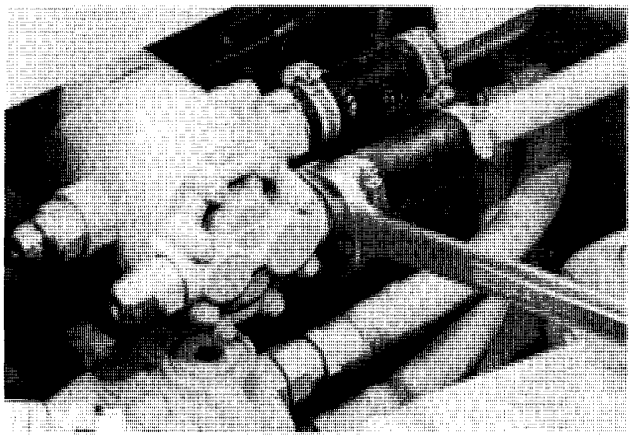
306138

16. Loosen the outer clamp on the hose to the inlet port of the charging pump.



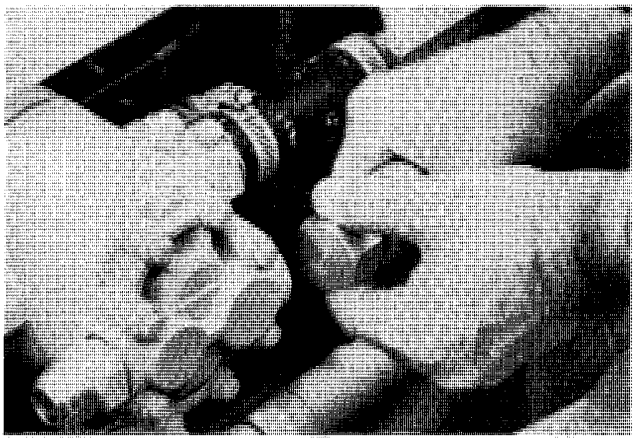
306139

17. Loosen the fitting in the inlet port and turn the fitting out of the inlet port.



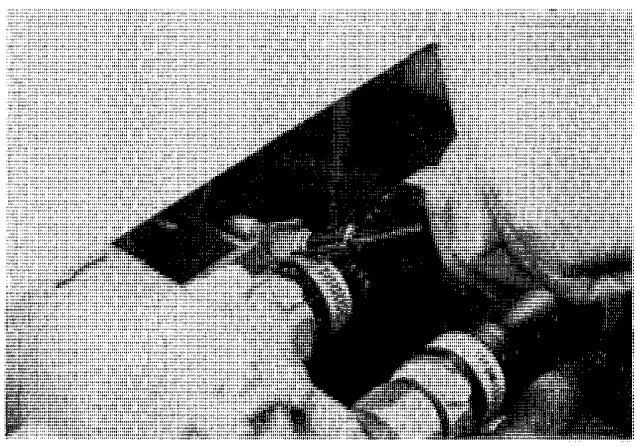
306140

18. Install a cap on the fitting.



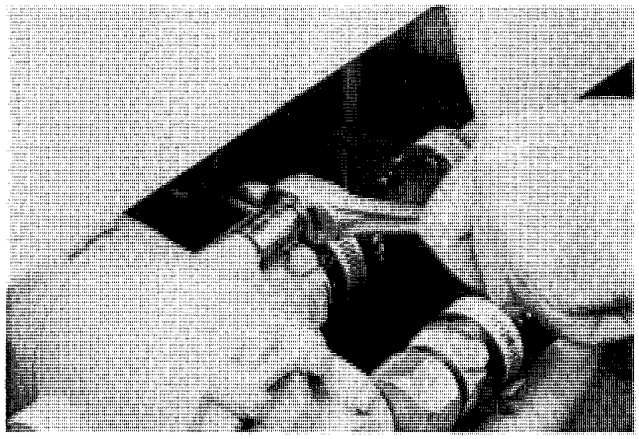
306141

19. If necessary, loosen the inner clamp on the hose to the inlet port of the equipment pump.



306142

20. Loosen and remove the cap screws that hold the port adapter in place.



306143

Identification of Causes of Pump Failure

SYMPTOM(S)	POSSIBLE CAUSE(S)	REMEDY
Worn areas have a smooth, dull surface as if made by fine sandpaper. Edges are round instead of square.	Contaminated oil. Particles are too small to see or feel (microscopic contamination).	Filter the hydraulic oil according to instructions for Cleaning the hydraulic System, Section 8003. When the system is clean, service the hydraulic system at the specified intervals.
Many scratches or grooves. Surfaces can be rough.	Metal particles in oil. Particles are large enough to see or feel (visible contamination).	Clean the entire hydraulic system according to instructions for Cleaning the Hydraulic System, Section 8003.
Pitting. Noisy operation, as if the pump is full of glass balls. Wear on ends of gears and thrust plates.	Air bubbles (cavitation) in oil caused by a restriction or leak in the inlet line to the pump. Low oil level in the reservoir.	Inspect and repair the inlet line as required. Check oil level. Add oil if the level is low.
Broken parts or cracks.	Relief valve does not work correctly or is set too high.	Check the pressure setting of the main relief valve and circuit relief valve(s), if equipped. Adjust or repair as required.
Burned areas. Oil has a burned odor.	Control valve spool not returning to Neutral. Relief valve is set too low.	Check spool travel and control linkage. Repair as required. Check the pressure setting of the main relief valve and circuit relief valve(s), if equipped. Adjust or repair as required.

GENERAL INFORMATION

The loader control valve is a two spool, open center valve. Oil from the hydraulic pump flows into the inlet port and through an open center passage to the spools. The return oil flows to the outlet port through passages in the top and the bottom of the loader control valve.

Load check valves between the work ports and each spool prevent reverse flow of oil between the cylinders and the loader control valve as the spool is moved into a power position.

If the machine is equipped with an auxiliary hydraulic system, the loader control valve has a power beyond fitting in the side outlet port. The power beyond fitting connects the open center passage in the loader control valve with the inlet line for the auxiliary control valve. The power beyond fitting prevents the oil in the open center passage from flowing to the other outlet port of the loader control valve. All the oil flowing through the open center passage must flow to the auxiliary control valve.

NOTE: *If the machine does not have an auxiliary hydraulic system, the side outlet port has a plug instead of a power beyond fitting.*

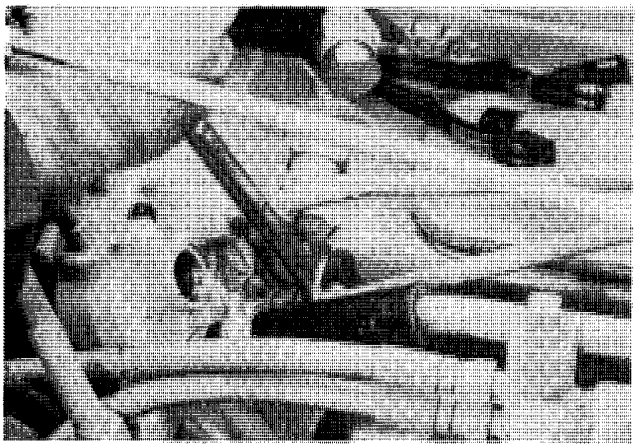
The main relief valve for the hydraulic system is at the inlet of the loader control valve. The main relief valve is not adjustable. The main relief valve prevents the pressure in the system from becoming too high. The main relief valve also controls the pressure in the auxiliary hydraulic system.

See page 8005-4 for operation of the loader control valve.

b. Tighten the nut at each end of the tube.

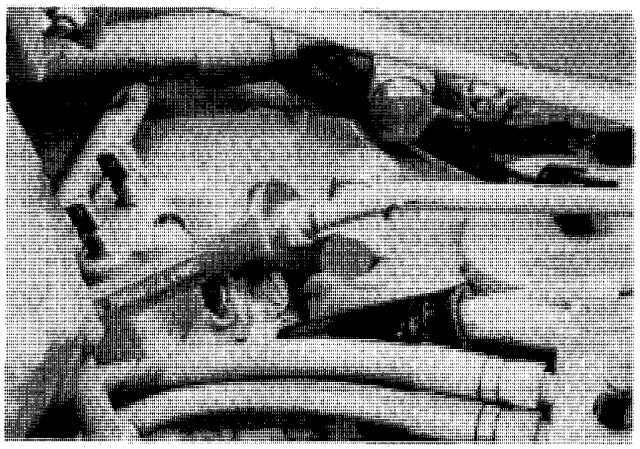
305820

7. Connect the tube to the B port of the bucket spool.



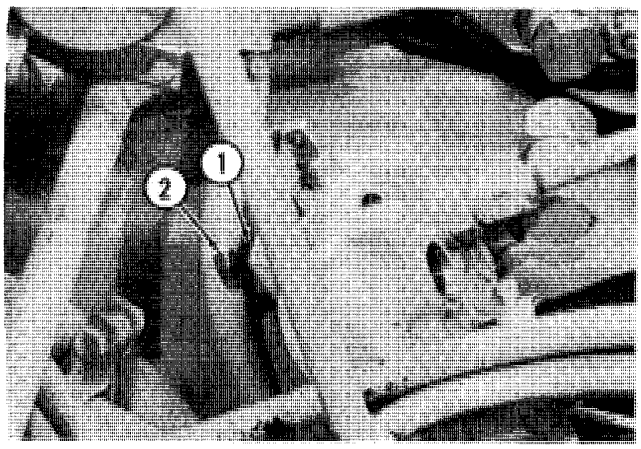
305830

8. Connect the tube to the A port of the bucket spool.



305831

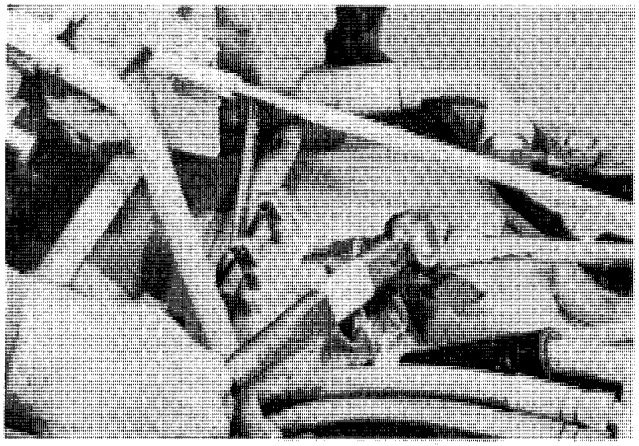
9. Install a self-locking nut and flat washer on each bolt.



1. *Flat Washer*
2. *Self-locking Nut*

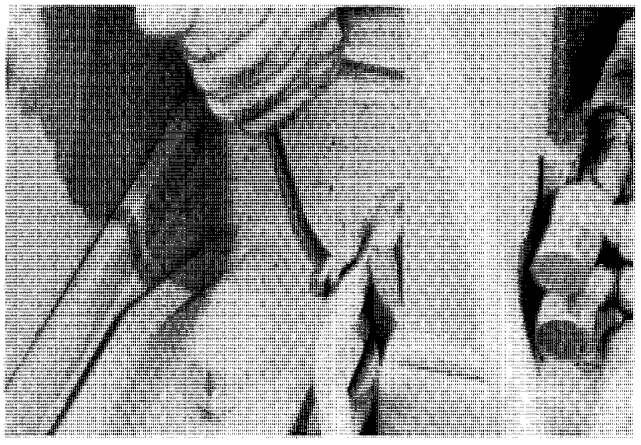
305832

10. Tighten the self-locking nuts to 10 to 12 pound-feet (14 to 16 N m, 1.4 to 1.6 kg/m).



305833

11. Tighten the cap screw that holds the clamp for the tube from the bucket spool.

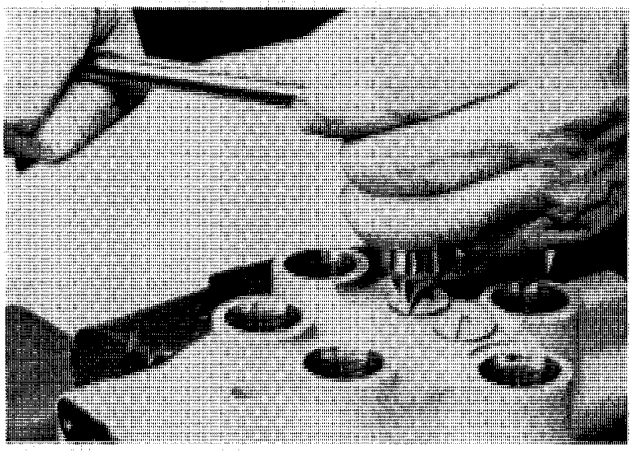


305837

7. Install the springs.

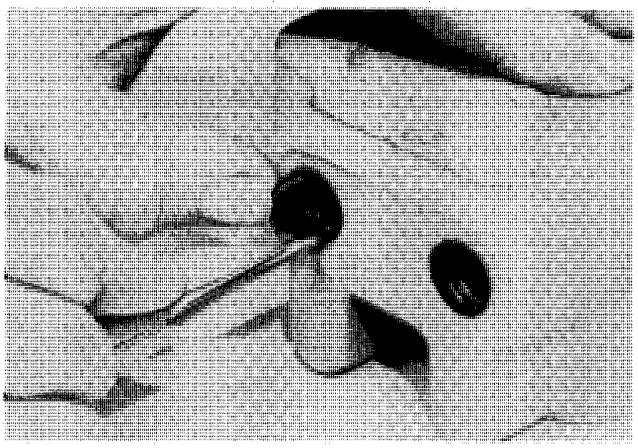
313929

8. Install and tighten the plugs.



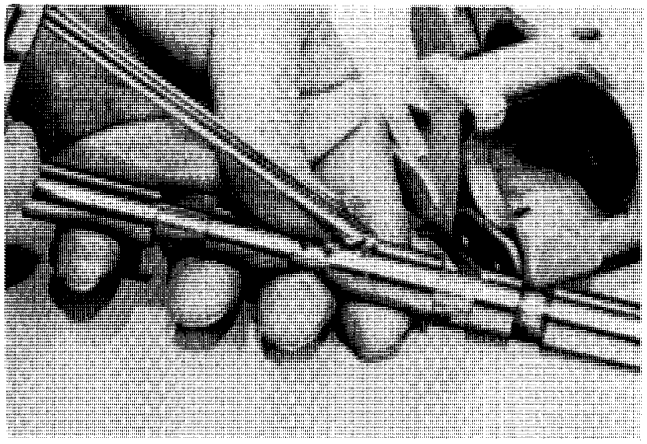
313930

9. Install a new O-ring in the groove in the bore for the lift spool.



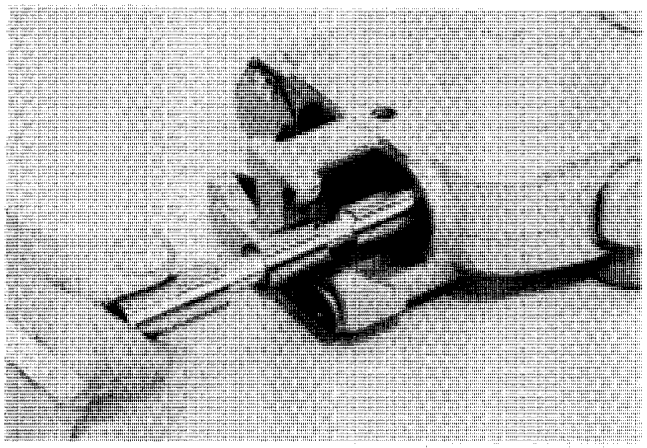
313936

10. Lubricate the lift spool and bore with clean oil.



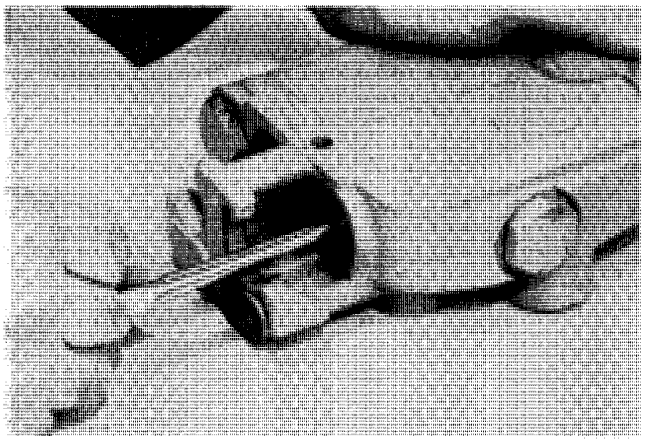
313937

11. Install the lift spool.



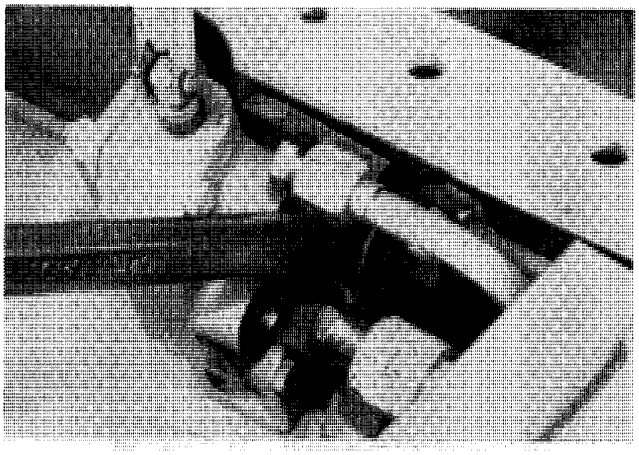
313938

12. Push the lift spool into the body until the groove in the bore can be seen.



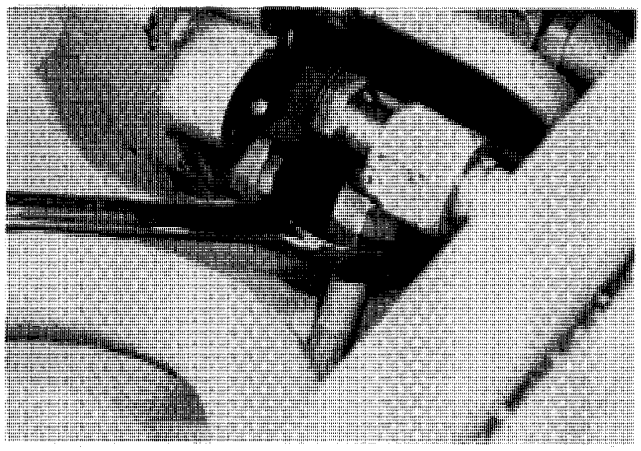
313939

21. Disconnect the tube from the inlet port.



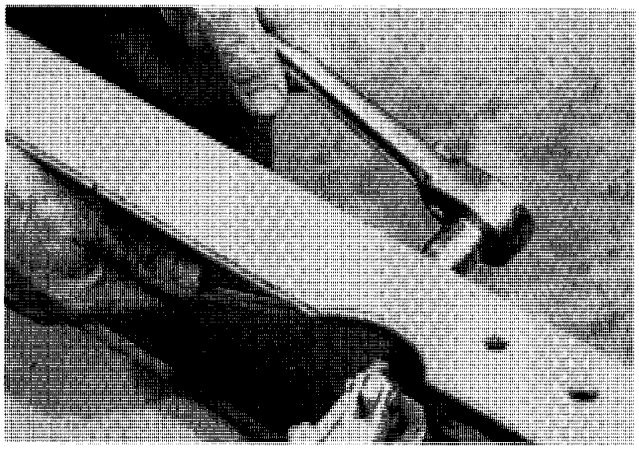
306039

22. Disconnect the tube from the B port.



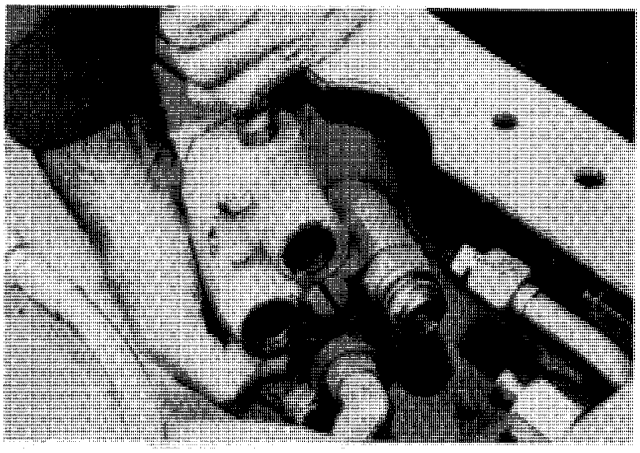
306040

23. Loosen and remove the nuts and lock washers from the bolts that hold the mounting bracket.



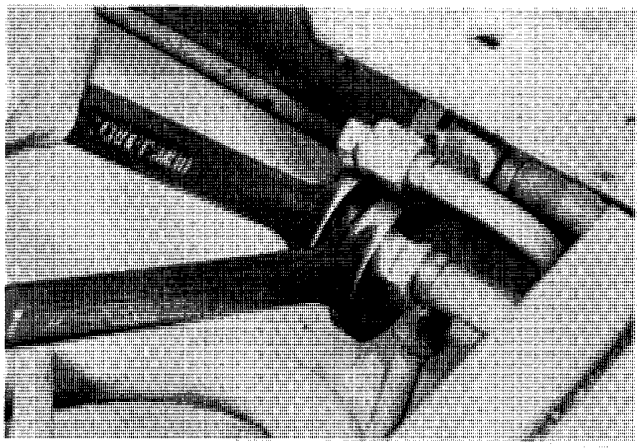
306044

24. Remove the auxiliary control valve.



306001

25. Install plugs in the remainder of the tubes.



306003

26. Stop the vacuum pump.

8007

BACKHOE CONTROL VALVE

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Written In *Clear And Simple English*

CASE CORPORATION

8-41760

Printed in U.S.A.
Issued November 1983

49. Loosen and remove the cap screw and lock washer that holds the right side of the backhoe control valve.

50. Loosen the two cap screws on the left side.

51. Hold the backhoe control valve and remove the two cap screws and lock washers.

52. Remove the backhoe control valve.

D100 Backhoe

1. Extend the dipper all the way and lower the boom until the bucket is on the floor.

2. Loosen and remove the cap screw, lock washer, and clamp that hold the hoses in place at the bottom of the boom.

3. Loosen and remove the nuts, bolts, and clamps that fasten the hoses to the side of the boom.

4. Disconnect the hose from the closed end of the dipper cylinder.

5. Install a plug in the hose and a cap on the fitting.

6. Disconnect the hose from the rod end of the dipper cylinder.

7. Install a plug in the hose and a cap on the fitting.

8. Disconnect a hose from a tube in the boom.

9. Install a cap on the hose and a plug in the tube.

10. Fasten an identification tag to the hose.

11. Repeat steps 8, 9, and 10 for the remainder of the hoses in the boom.

12. Disconnect the top hose from the bucket section.

13. Install a cap on the hose.

14. Fasten an identification tag to the hose.

15. Disconnect the bottom hose from the bucket section.

16. Install a cap on the hose.

17. Fasten an identification tag to the hose.

18. Repeat steps 12 through 17 for the dipper and boom sections.

19. Disconnect the tubes from the stabilizer and swing sections.

20. Install a plug in each tube.

21. Disconnect the tube from the inlet port.

22. Install a plug in the tube.

23. Disconnect the tube from the outlet port.

24. Install a plug in the tube.

25. Loosen and remove the cap screws and lock washers that hold the cover in place.

26. Remove the cover.

27. Disconnect the linkage from the spools.

    a. Remove the cotter pin.

    b. Remove the clevis pin.

28. Loosen the three cap screws that hold the backhoe control valve in place.

29. Hold the backhoe control valve in place and remove the cap screws.

30. Remove the backhoe control valve.

SELECTOR VALVES

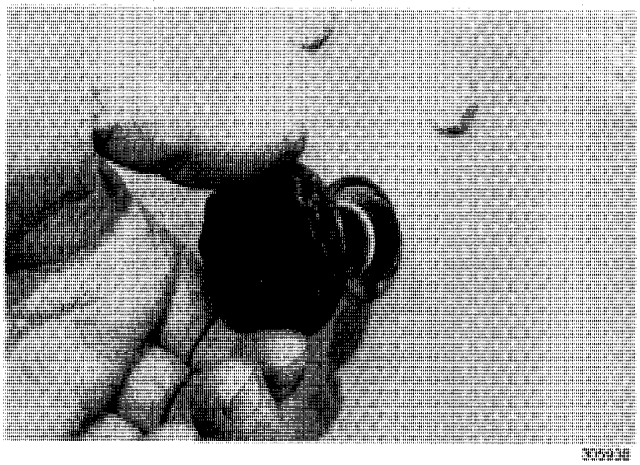
Removal

Selector Valve for Front and Rear Auxiliary Circuits

1. Remove the seat.

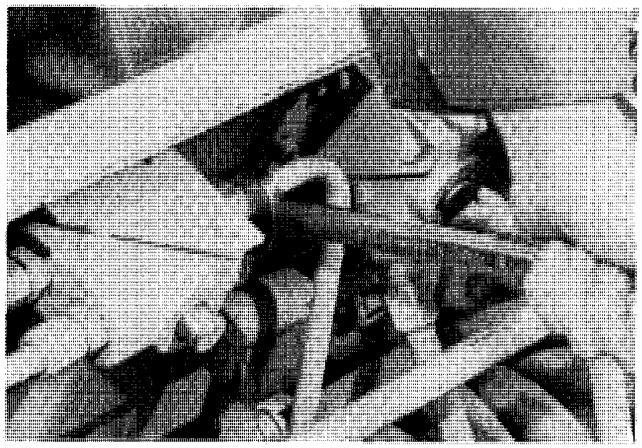
2. Remove the dirt and grease from the selector valve and the area around the selector valve.

3. Loosen and remove the knob. If necessary, use pliers on the snap ring at the rear of the spool to prevent the spool from turning.



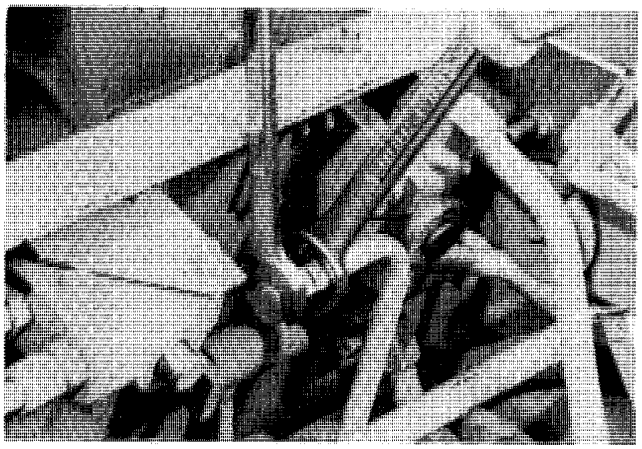
305916

4. Disconnect the inlet tube.



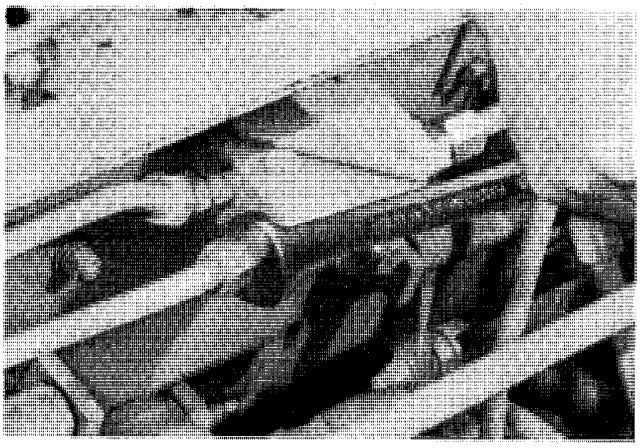
305917

5. Install a plug in the tube.



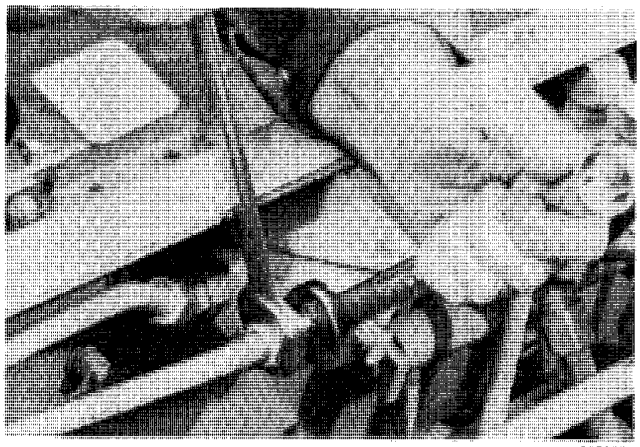
305918

6. Disconnect an outlet tube.



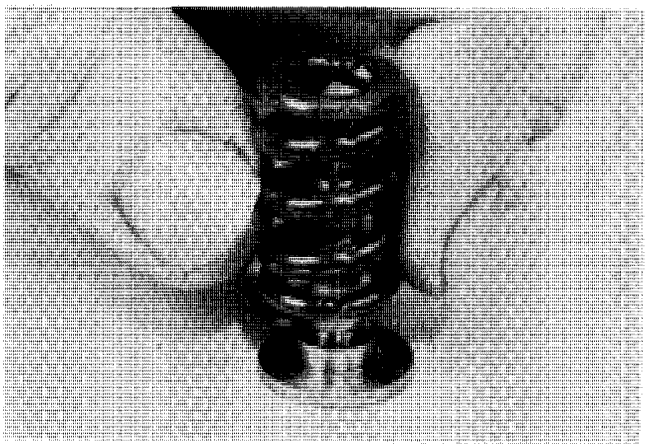
305919

7. Install a plug in the tube.



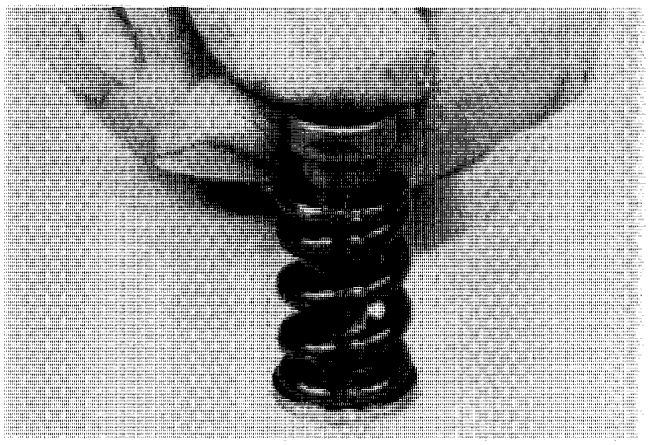
305920

3. Install the spring on the spring guide.



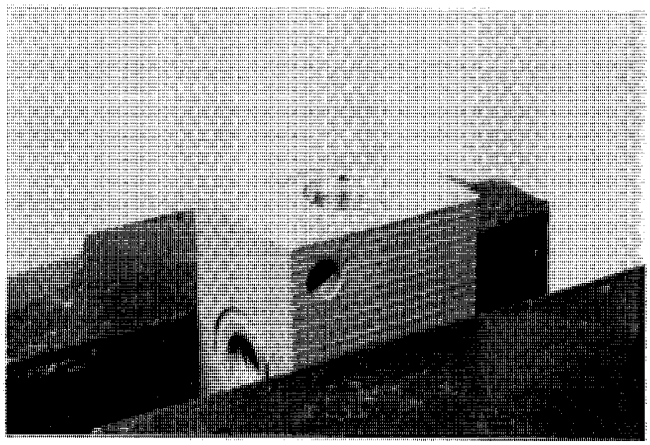
313527

4. Push the poppet onto the spring guide.



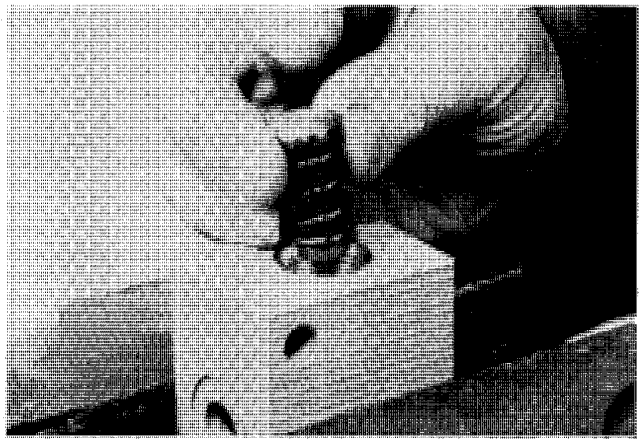
313528

5. Fasten the body in the vise.



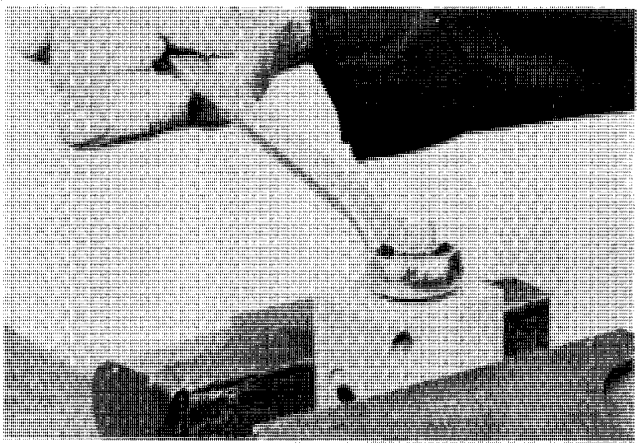
313530

6. Install the poppet and spring assembly.



313531

7. Install and tighten the adjusting screw assembly.



313518

15. Drive the pivot pin out of the dipper.

16. Remove the driver.

17. Remove the bucket cylinder.

Swing Cylinder

1. Remove all dirt from the hose connection at the rod end of the swing cylinder.

2. Remove the top cotter pin from the pivot pin for the piston rod eye.

3. Drive the pivot pin out of the links.

4. Disconnect the hose from the elbow.

5. Install a cap on the hose.

6. Loosen and remove the nuts from the bottom U-bolt.

7. Remove the U-bolt.

8. Loosen the nuts on the top U-bolt.

9. Hold the swing cylinder and remove the nuts from the U-bolt.

10. Remove the swing cylinder.

Stabilizer Cylinder

1. Remove all dirt and grease from the connections at the stabilizer cylinder.

2. Lower the stabilizer to the floor.

3. With the engine stopped, move the stabilizer control lever in both directions to relieve any pressure in the circuits.

4. Remove the cotter pin from the top pivot pin.

5. Drive the pivot pin out of the mounting frame.

6. Move the stabilizer cylinder away from the mounting frame as far as possible.

7. Disconnect the hose at the closed end of the stabilizer cylinder.

8. Install a cap on the hose.

9. Disconnect the hose at the rod end of the stabilizer cylinder.

10. Install a cap on the hose.

11. Remove the cotter pin from the pivot pin for the piston rod.

12. Drive the pivot pin out of the stabilizer.

13. Remove the driver.

14. Remove the stabilizer cylinder.

D100 Backhoe Cylinders

Boom Cylinder

1. Remove all dirt from the hose and tube connections to the boom cylinder.

2. Extend the dipper all the way and lower the bucket to the floor.

3. Put a support below the boom and dipper pivot to hold the boom.

4. Move the boom control lever in both directions to relieve any pressure in the circuits.

5. Loosen and remove the nut and flat washer from the bolt that holds the retainer for the pivot pin for the piston rod eye.

6. Remove the bolt and retainer.

7. Drive the pivot pin out of the swing tower.

8. Retract the piston rod all the way.

9. Disconnect one of the hoses from a tube.

10. Install a plug in the tube.

11. Disconnect the other hose.

12. Install a plug in the tube.

13. Loosen and remove the nut and flat washer from the bolt that holds the retainer for the pivot pin for the boom cylinder.

14. Remove the bolt and retainer.

15. Drive the pivot pin out of the boom.

16. Remove the boom cylinder.

15. Install a new seal in the groove(s).

16. Fasten the tube in the vise. Be careful to prevent damage to the tube.

17. Lubricate the inside of the tube and the piston with clean oil.

18. Push the piston straight into the tube.

19. Lubricate the O-ring on the gland with clean oil.

20. Push or drive the gland into the tube far enough so that the lock ring can be installed.

21. Install the lock ring in the groove in the tube.

22. Install the ring nut.

23. Tighten the ring nut to the torque value on page 8009-2.

24. Install new O-rings on the hoses for the bucket cylinder.

25. Lubricate the O-rings with clean oil and install the hoses in the bucket cylinder.

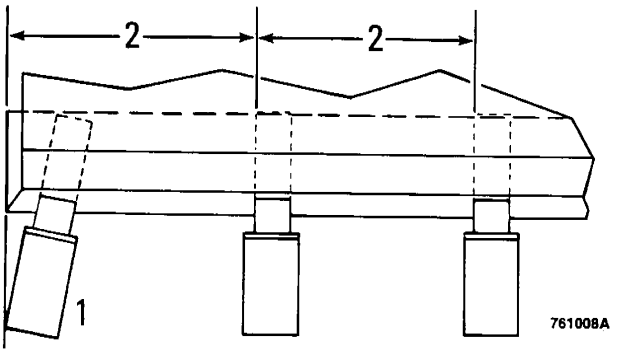
BUCKET TEETH

Replacement of Tooth Shank

1. Use carbon arc rod or an acteylene cutting torch to remove the welds that hold the tooth shank in place.

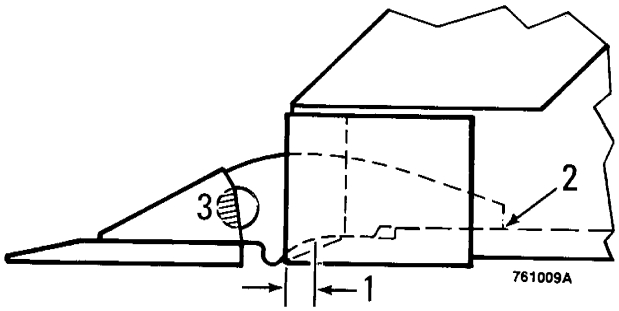
2. Use a grinder to remove any welds or extra material that will prevent the tooth shank from fitting correctly.

3. See the following illustration for the correct location of the tooth shank on the cutting edge.



1. *Install Outside Bucket Teeth So That Tooth Point Is Even With Cutting Edge*
2. *D17617 Bucket ..... 8-7/8 Inches (225 mm)*
   D17618 Bucket ..... 10-5/6 Inches (261 mm)

4. Weld the tooth shank to the cutting edge. See the following illustration for weld specifications. Use E7018 welding rod.



1. *1/4 Inch (6 mm). No Weld In This Area On Both Sides*
2. *1/4 Inch (6 mm) Fillet. Weld All Around Two Times*
3. *Bent Area Of Tooth Point*

Replacement of Tooth Point

1. Heat the part of the tooth point that has been pressed into the hole on each side of the tooth shank.

2. Use an acceptable tool to lift the heated area out of the hole.

3. Use a pair of pliers to remove the tooth point from the tooth shank.

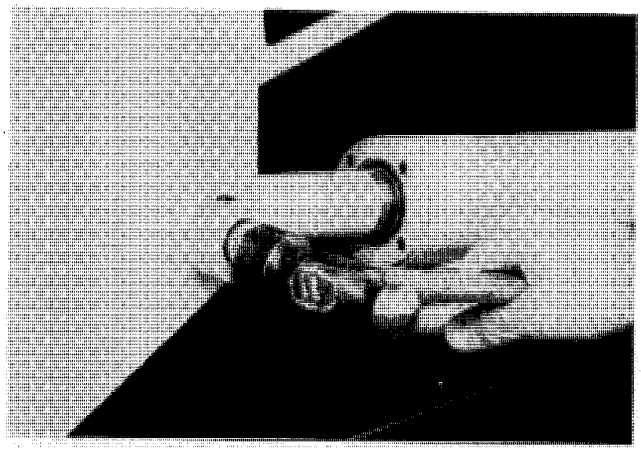
4. Install a new tooth point on the tooth shank.

5. Heat the part of the tooth point that will be pressed into the hole on each side of the tooth shank.

6. Have another person push the tooth point against the tooth shank.

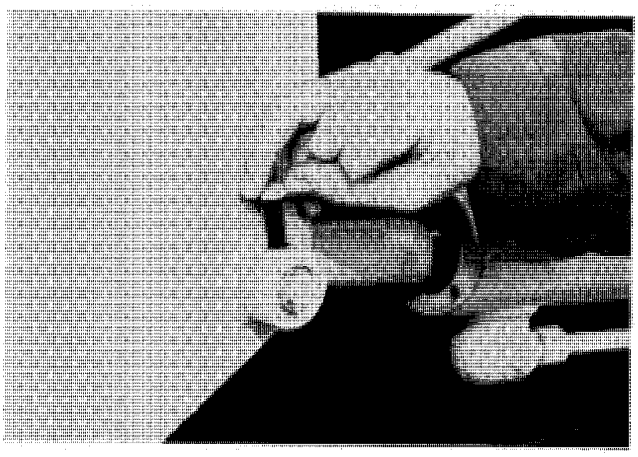
7. Use an acceptable tool and drive the heated part of the tooth point into the hole on each side of the tooth shank.

22. Drive the pivot pin all the way into the loader frame.



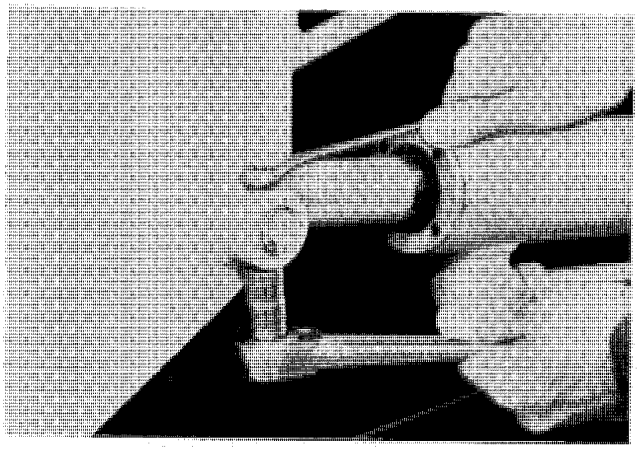
310130

23. Install the bolt.



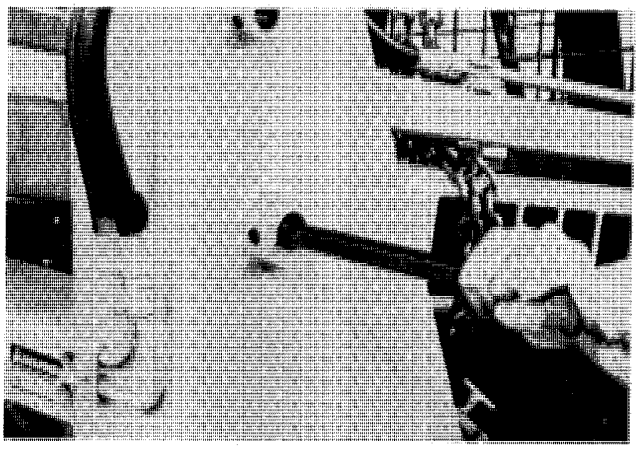
310131

24. Install and tighten the self-locking nut.



310132

25. Use the prybar and lifting equipment to align the loader frame with the frame.



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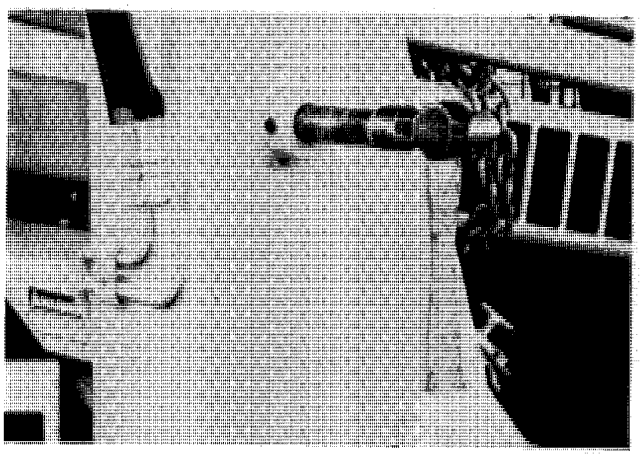
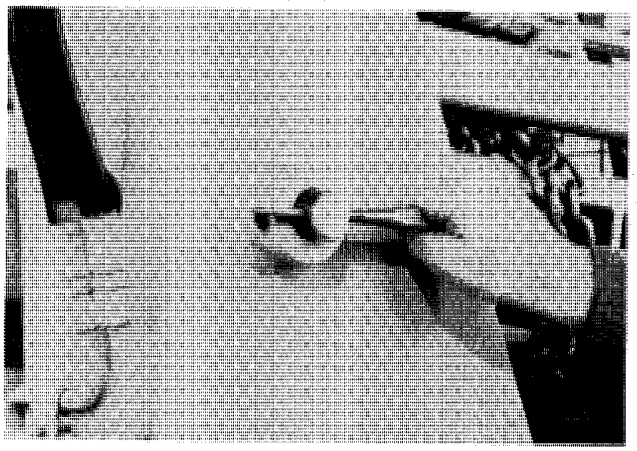
26. Drive the pivot pin for the loader frame into the frame but not all the way.

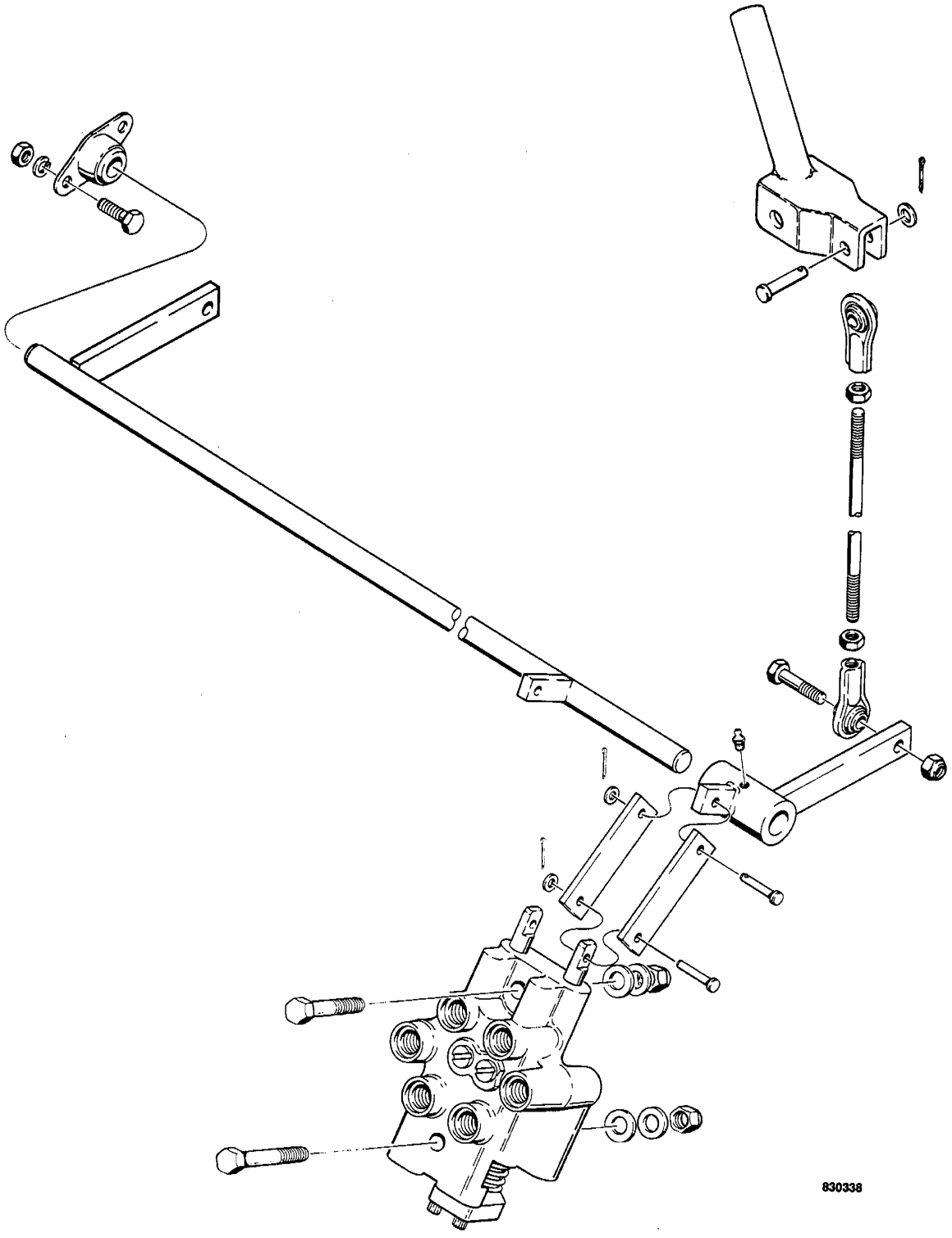


310338

27. Align the hole in the pivot pin with the hole in the frame and drive the pivot pin all the way into place.



310339



Control Installation for Auxilary Valve

38. Loosen and remove the cap screws and bumper.

39. Remove the hoses from the swing tower.

40. Carefully move the machine away from the boom.

41. Put a jack below the swing tower.

42. Loosen and remove the nuts and lock washers from the bolts that hold the swing tower.

43. Remove the bolts.

44. Remove the swing tower.

45. Disengage the tab of the lock ring from the nut.

46. Loosen and remove the nut.

47. Remove the lock ring.

48. Remove the mounting bracket from the swing tower.

49. If necessary, remove the bearing from the swing tower.

50. If the bearing for the swing tower in the mounting frame is to be replaced:

a. Loosen and remove the cap screws that hold the cover.

b. Remove the cover.

c. Remove the bearing from the mounting frame.

Installation

1. If necessary, install a new bearing in the mounting frame.

2. If necessary, install a new bearing in the mounting bracket.

3. Install the mounting bracket on the swing tower.

4. Install a new lock ring.

5. Install the nut.

6. Tighten the nut and align a tab on the lock ring with a notch in the nut.

7. Bend the tab into the notch.

8. Install the swing tower.

9. Install the bolts that hold the mounting bracket.

10. Install the lock washers and nuts on the bolts.

11. Tighten the nuts.

12. Install the cover, if removed.

13. Install the cap screws that hold the cover.

14. Tighten the cap screws.

15. Carefully move the machine forward to engage the swing tower with the boom.

16. Align the boom with the swing tower.

17. Install the pivot pin for the boom.

18. Install the bumper and cap screws on the right side of the boom.

19. Tighten the cap screws.

20. Remove the plug from the tube and the cap from the hose without identification.

21. Connect the hose to the tube.

22. Remove the plug from the next tube and the cap from the hose.

23. Connect the hose to the tube.

24. Install the insulator and clamp over the tubes.

25. Tighten the cap screw.

26. Remove the plug from the next tube and the cap from the hose.

27. Connect the hose to the tube.

28. Install the clamp and bolt that hold the tube.

29. Install the self-locking nut on the bolt.

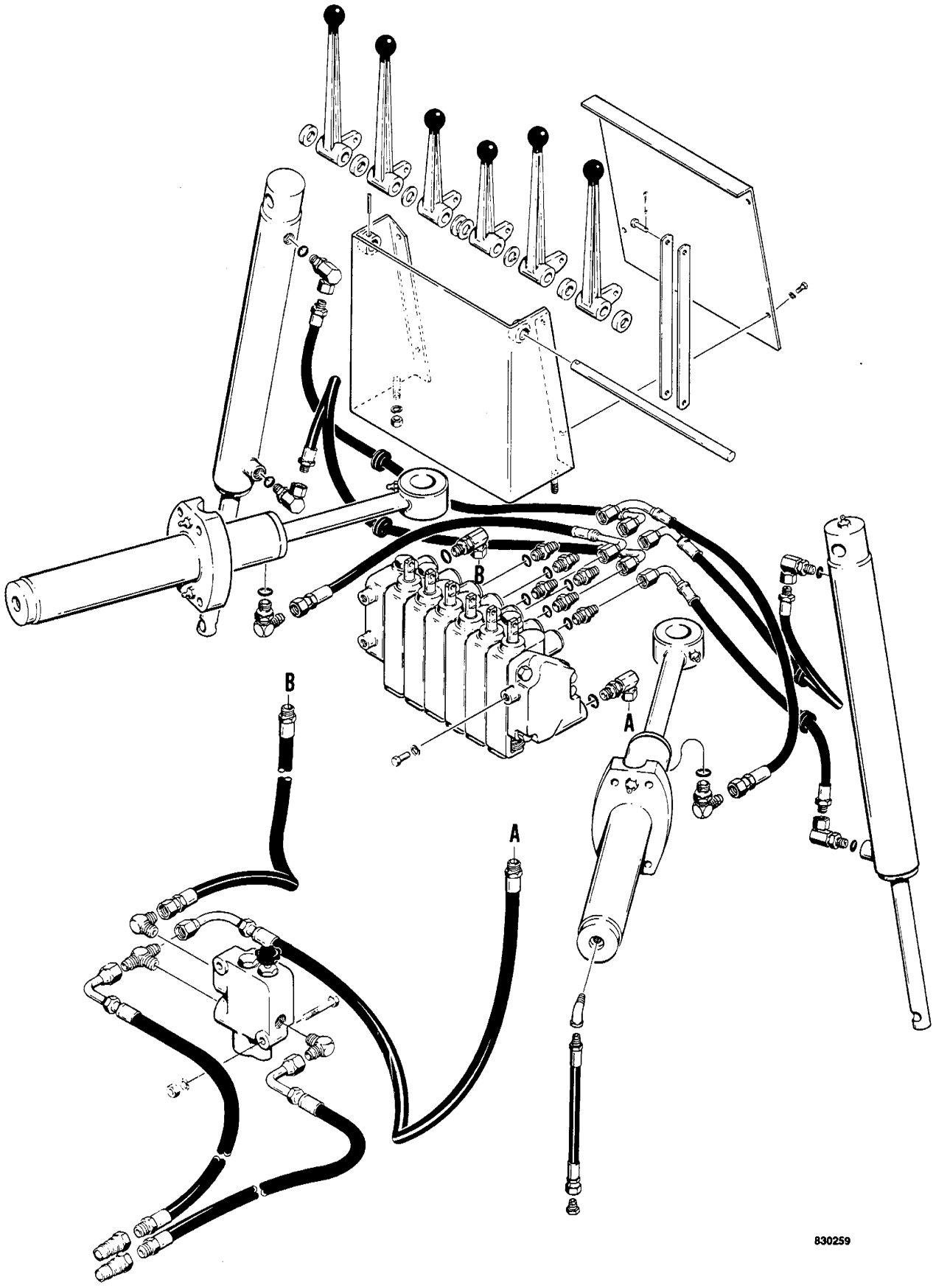
30. Tighten the self-locking nut.

31. Remove the plug from the next tube and the cap from the hose.

32. Connect the hose to the tube.

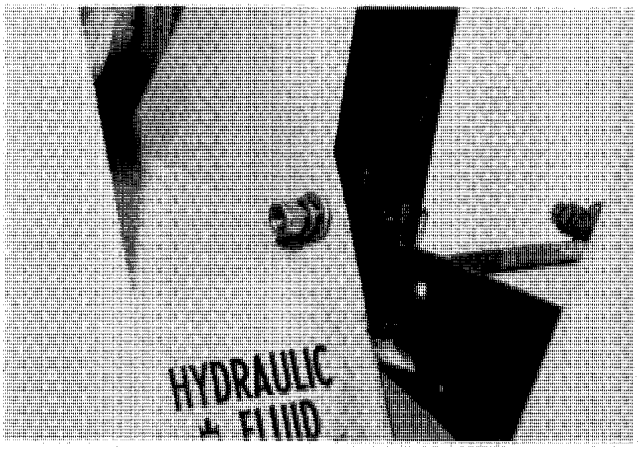
33. Remove the plug from the next tube and the cap from the hose.

34. Connect the hose to the tube.



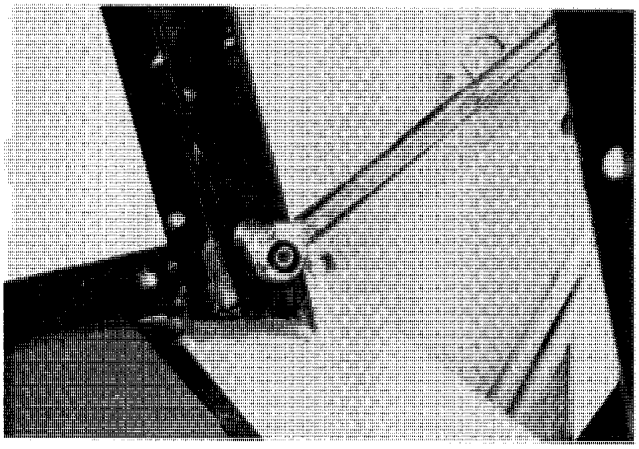
D130 Primary, Swing, and Stabilizer Hydraulic Installation

7. Install a flat washer, lock washer, and nut on each top bolt.



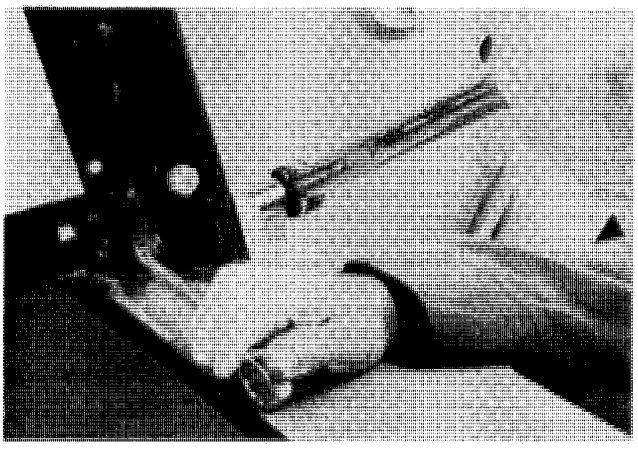
309139

8. Tighten each top bolt to 80 to 96 pound-feet (109 to 130 N m, 11 to 13 kg/m).



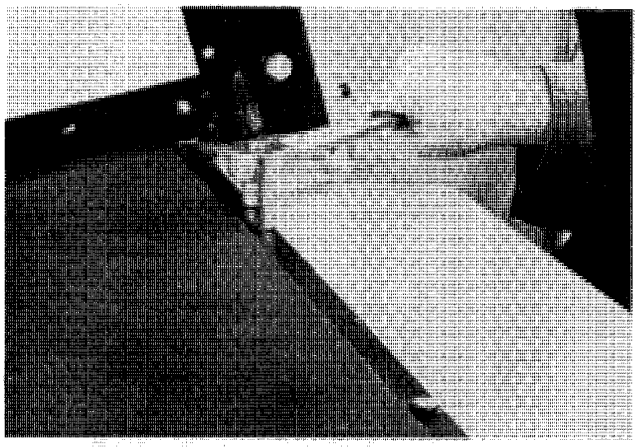
309133

9. Tighten each bottom bolt to 65 to 75 pound-feet (88 to 102 N m, 9 to 10 kg/m).



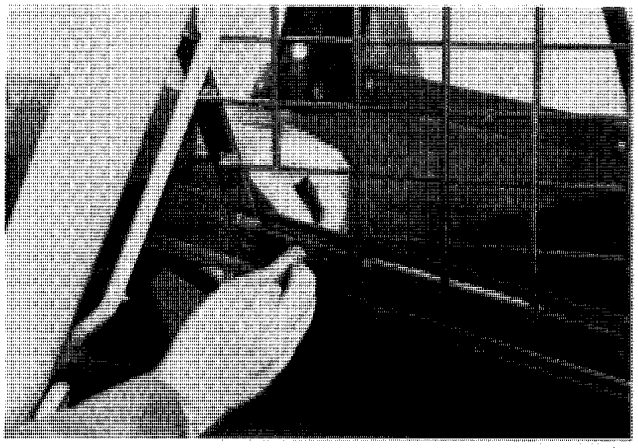
309132

10. Install the bolts, lock washers, and nuts that hold the heat shield and tighten the nuts.



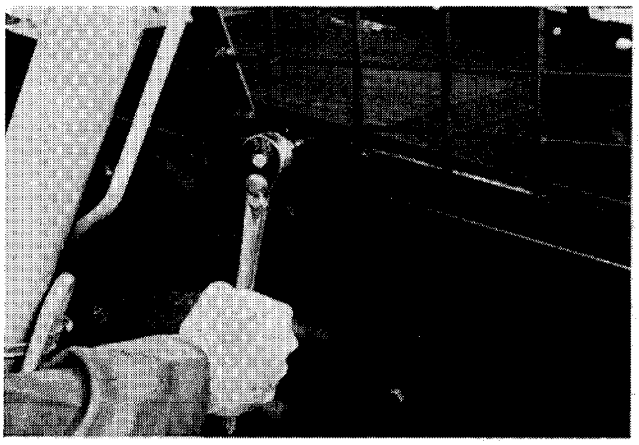
309136

11. Install the carriage bolts, lock washers, and nuts at the rear of each screen.



309233

12. Tighten the nuts.



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