650G/850G Crawlers
Service Manual No. 7-48201
Table of Contents

Reprinted

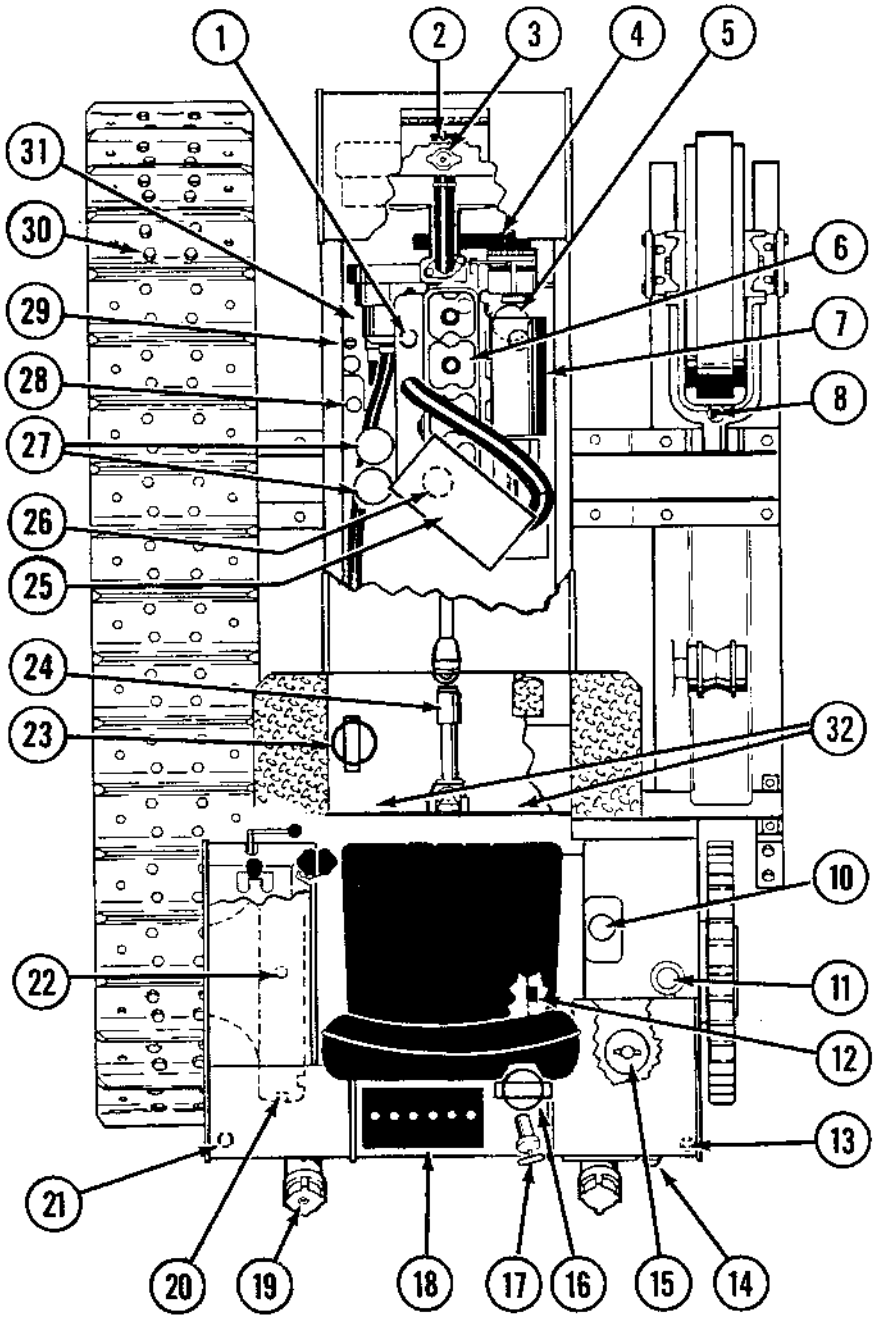
TORQUE SPECIFICATIONS - STEEL HYDRAULIC FITTINGS

Tube OD Hose ID	Thread Size	Pound-Inches	Newton metres
37 Degree Flare Fitting			
1/4 inch 6.4 mm	7/16-20	72 to 144	8 to 16
5/16 inch 7.9 mm	1/2-20	96 to 192	11 to 22
3/8 inch 9.5 mm	9/16-18	120 to 300	14 to 34
1/2 inch 12.7 mm	3/4-16	180 to 504	20 to 57
5/8 inch 15.9 mm	7/8-14	300 to 696	34 to 79
Tube OD Hose ID	Thread Size	Pound-Inches	Newton metres
3/4 inch 19.0 mm	1-1/16-12	40 to 80	54 to 108
7/8 inch 22.2 mm	1-3/16-12	60 to 100	81 to 135
1.0 inch 25.4 mm	1-5/16-12	75 to 117	102 to 158
1-1/4 inch 31.8 mm	1-5/8-12	125 to 165	169 to 223
1-1/2 inch 38.1 mm	1-7/8-12	210 to 250	285 to 338

Tube OD Hose ID	Thread Size	Pound-Inches	Newton metres
Straight Threads with O-ring			
1/4 inch 6.4 mm	7/16-20	144 to 228	16 to 26
5/16 inch 7.9 mm	1/2-20	192 to 300	22 to 34
3/8 inch 9.5 mm	9/16-18	300 to 480	34 to 54
1/2 inch 12.7 mm	3/4-16	540 to 804	57 to 91
Tube OD Hose ID	Thread Size	Pound-Inches	Newton metres
5/8 inch 15.9 mm	7/8-14	58 to 92	79 to 124
3/4 inch 19.0 mm	1-1/16-12	80 to 128	108 to 174
7/8 inch 22.2 mm	1-3/16-12	100 to 160	136 to 216
1.0 inch 25.4 mm	1-5/16-12	117 to 187	159 to 253
1-1/4 inch 31.8 mm	1-5/8-12	165 to 264	224 to 357
1-1/2 inch 38.1 mm	1-7/8-12	250 to 400	339 to 542

Split Flange Mounting Bolts		
Size	Pound-Inches	Newton metres
5/16-18	180 to 240	20 to 27
3/8-16	240 to 300	27 to 34
7/16-14	420 to 540	47 to 61
Size	Pound-Feet	Newton metres
1/2-13	55 to 65	74 to 88
5/8-11	140 to 150	190 to 203

850G Maintenance Locations



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IF YOU OPERATE THE MACHINE IN SEVERE CONDITIONS, LUBRICATE AND SERVICE THE MACHINE MORE FREQUENTLY. IT IS RECOMMENDED THAT YOU SEE YOUR CASE DEALER FOR INFORMATION ON THE SYSTEMGARD LUBRICATION ANALYSIS PROGRAM.

SEE YOUR OPERATORS MANUAL FOR MAINTENANCE OF SAFETY RELATED ITEMS AND FOR DETAILED INFORMATION OF THE SERVICE ITEMS ON THIS CHART. OPERATORS MANUALS, SERVICE MANUALS, PARTS CATALOGS AND MAINTENANCE DECALS ARE AVAILABLE FOR THIS MACHINE FROM YOUR CASE DEALER.

RUN-IN INSTRUCTIONS

Engine Lubrication

Fill the 4-390 engine crankcase with CC/SF, CD/SF, CE/SF or CF-4 service classification oil. Use the correct viscosity rating for the ambient air temperature. Install new oil filters after the engine is rebuilt.

Fill the 4T390 and the 4TA 390 engine crankcase with CE/SF or CF-4 service classification oil. Use the correct viscosity rating for the ambient air temperature. Install new oil filters after the engine is rebuilt.

Run-In Procedure for Rebuilt Engine

Step 1 Disconnect the wire to the electric shut-off on the injection pump so that the engine will not start. Crank the engine for 30 seconds until there is oil pressure, then reconnect the wire.

Step 2 Remove the air from the cooling system at the temperature sending unit.

Step 3 Run the engine at 1000 RPM minimum load for 5 minutes and check for oil leaks.

Step 4 During the Run-In, continue to check the oil pressure, coolant level, and coolant temperature.

Run-In Procedure for Rebuilt Engines (with a Dynamometer)

The following procedure must be followed when using a PTO dynamometer to Run-In the engine. The dynamometer will control the engine load at each speed and will remove stress on new parts during Run-In.

During the Run-In, continue to check the oil pressure, coolant level and coolant temperature.

STEP	TIME	ENGINE SPEED	DYNAMOMETER SCALE LOAD
1	5 Minutes	1000 RPM	50
2	5 Minutes	1100 RPM	1/2
3	5 Minutes	2200 RPM	Full

Run-In Procedure for Rebuilt Engines (without a Dynamometer)

STEP	TIME	ENGINE SPEED	LOAD
1	5 Minutes	1000 RPM	No Load
2	5 Minutes	1100 RPM	Light Load
3	5 Minutes	2200 RPM	Light Load

Run-In Procedure (Agriculture Equipment)

For the first 8 hours of field operation stay one gear lower than normal. For the next 12 hours DO NOT " lug" the engine. Prevent "lugging" by moving the lever to a lower gear. The engine must not be " lugged" below the rated engine RPM during early hours of life.

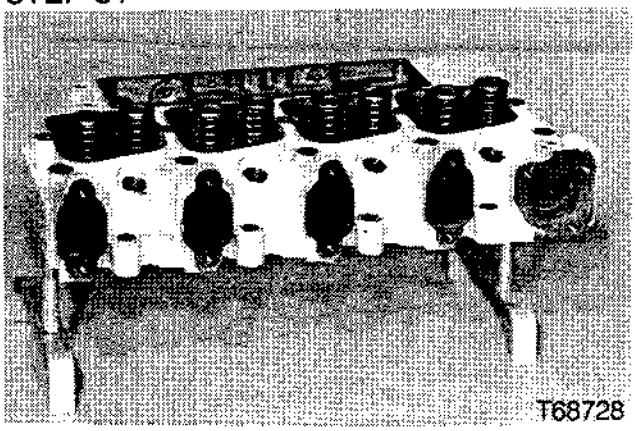
Run-In Procedure (Construction Equipment)

For the first 8 hours, operate the engine at full throttle maintaining a normal load. Avoid converter or hydraulic stall. The engine must not be "lugged" below the Rated Engine RPM (Do not stall the engine more than 10 seconds).

NOTE: CASE CORPORATION reserves the right to make improvements in design or changes in specifications at any time without incurring any obligation to install them on units previously sold.

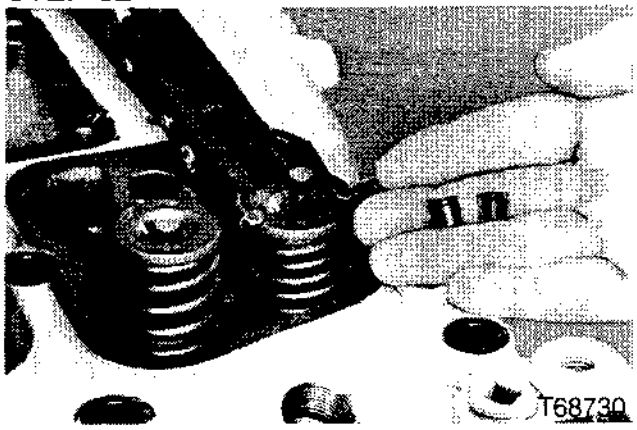
CYLINDER HEAD DISASSEMBLY

STEP 31



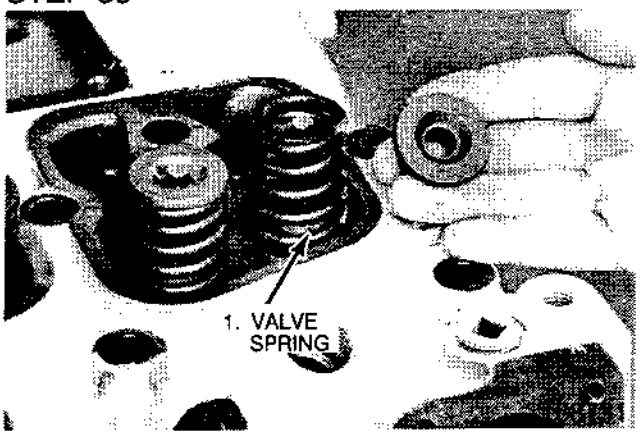
Put the cylinder head on a clean work surface.

STEP 32



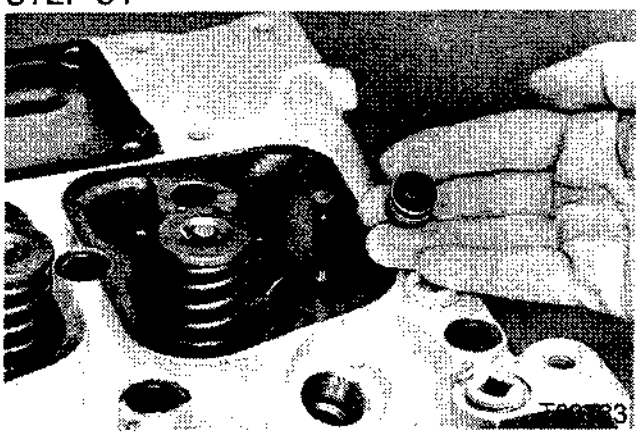
Use a valve spring compressor to push down the valve springs. Remove the valve keepers.

STEP 33



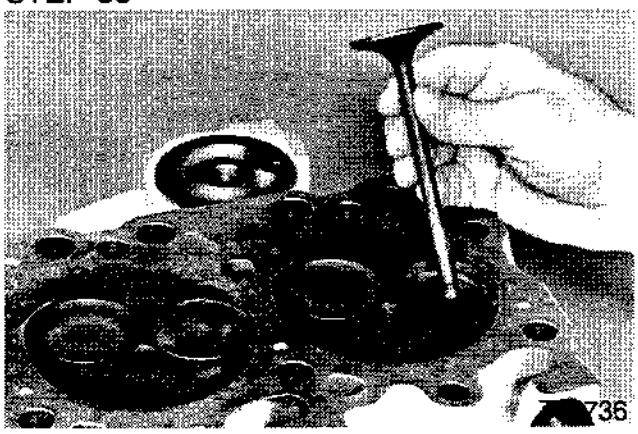
Remove the valve spring retainers and the valve spring.

STEP 34



Remove the valve seals.

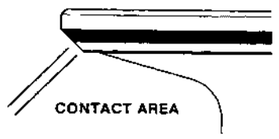
STEP 35



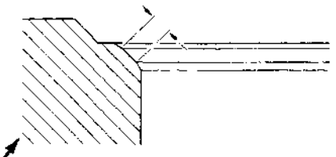
Remove the valves.

DIAGNOSIS OF DIFFERENT DYE PATTERNS
45 Degree Exhaust valves

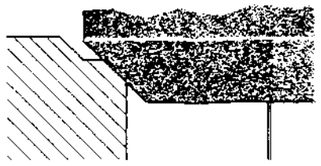
SEAT CONTACT AREA ON THE VALVE TO LOW



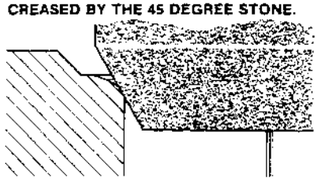
IF THE VALVE CONTACT AREA ON THE SEAT LOOKS LIKE THIS (A SEAT THAT HAS BEEN GROUND).



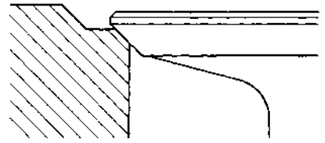
→ USE A 45 DEGREE STONE TO LIFT AND TO MAKE WIDER, THE CONTACT AREA.



→ USE A 60 DEGREE STONE TO NARROW THE LOWER CONTACT AREA, INCREASED BY THE 45 DEGREE STONE.

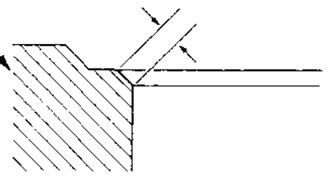


→ CHECK THAT THE VALVE HEAD IS NOT RECESSED MORE THAN 1.52 mm, BELOW THE CYLINDER HEAD SURFACE.

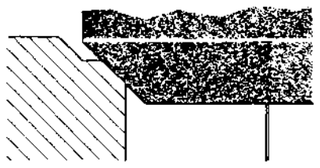


→ IF THE VALVE HEAD IS RECESSED MORE THAN 1.52 mm, REPLACE THE VALVE AND INSTALL A VALVE SEAT.

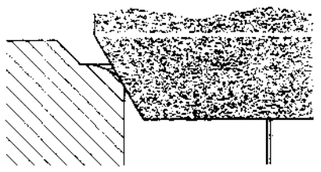
IF THE VALVE CONTACT AREA ON THE SEAT LOOKS LIKE THIS.



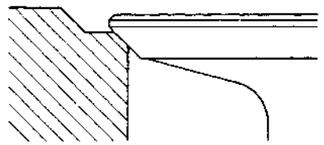
→ USE A 45 DEGREE STONE TO LIFT THE CONTACT AREA.



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

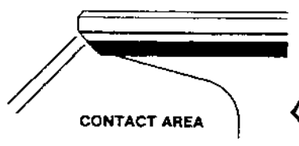


→ CHECK THAT THE VALVE HEAD IS NOT RECESSED MORE THAN 1.52 mm BELOW THE CYLINDER HEAD SURFACE.

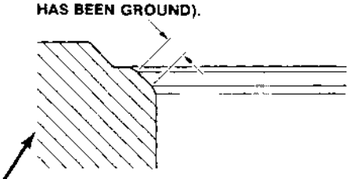


→ IF THE VALVE HEAD IS RECESSED MORE THAN 1.52 mm, REPLACE THE VALVE AND INSTALL A VALVE SEAT.

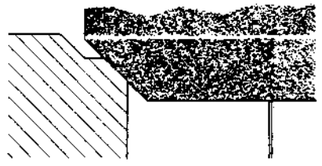
SEAT CONTACT AREA ON THE VALVE TOO HIGH



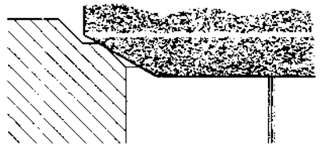
IF THE VALVE CONTACT AREA ON THE SEAT LOOKS LIKE THIS (A SEAT THAT HAS BEEN GROUND).



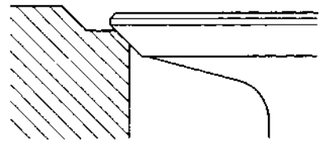
→ USE A 45 DEGREE STONE TO LOWER AND TO MAKE WIDER, THE CONTACT



→ USE A 30 DEGREE STONE TO NARROW THE UPPER CONTACT AREA, INCREASED BY THE 45 DEGREE STONE.

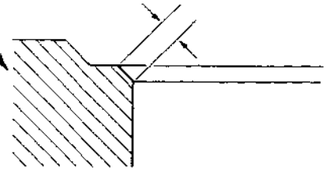


→ CHECK THAT THE VALVE HEAD IS NOT RECESSED MORE THAN 1.52 mm, BELOW THE CYLINDER HEAD SURFACE.



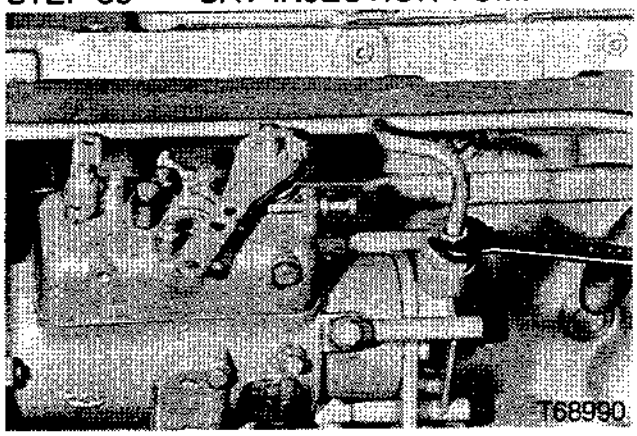
→ IF THE VALVE HEAD IS RECESSED MORE THAN 1.52 mm, REPLACE THE VALVE AND INSTALL A VALVE SEAT.

IF THE VALVE CONTACT AREA ON THE SEAT LOOKS LIKE THIS.



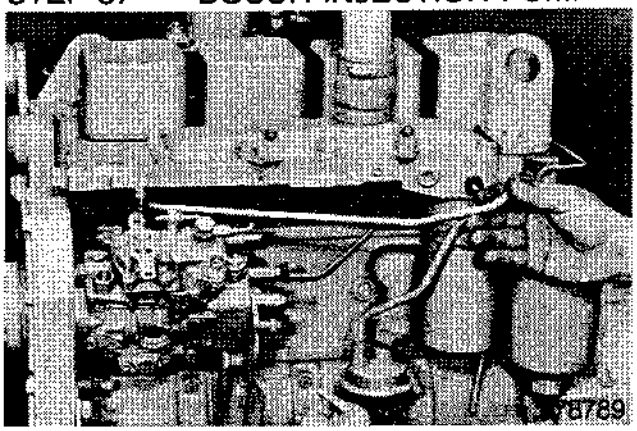
→ THE VALVE MUST BE REPLACED AND A VALVE SEAT MUST BE INSTALLED BECAUSE MORE GRINDING WILL NOT CHANGE THE LOWER CONTACT POINT.

STEP 86 CAV INJECTION PUMP



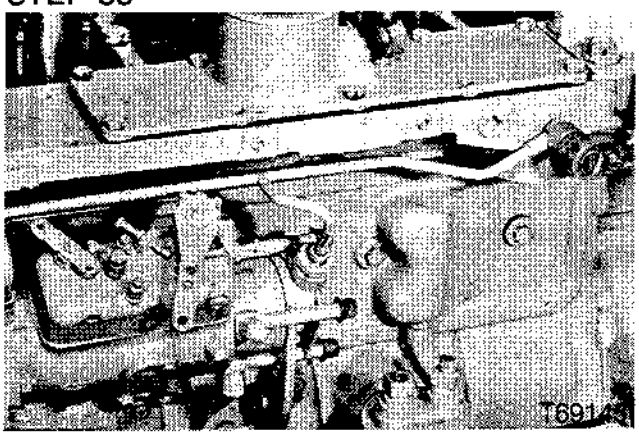
Connect and tighten the inlet tube nuts.

STEP 87 BOSCH INJECTION PUMP



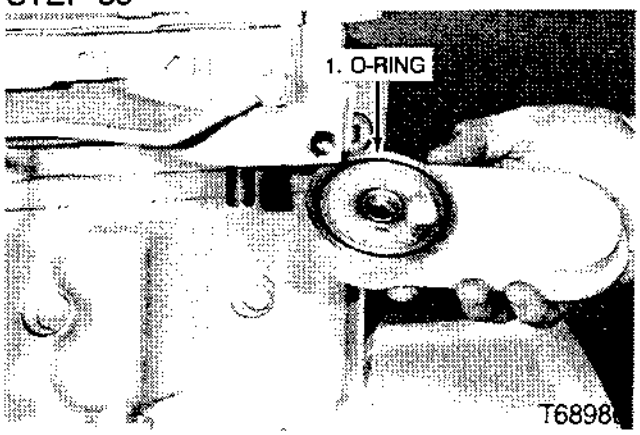
Install the injection pump inlet tube.

STEP 88



Tighten the fuel outlet fitting to a torque of 29 to 35 Nm.

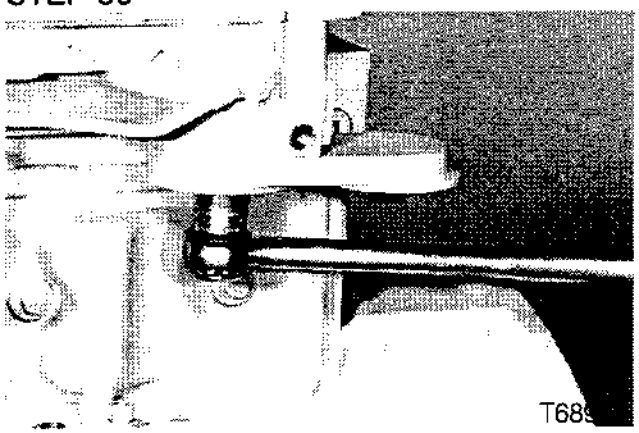
STEP 89



Install the inlet tube. Install a new o-ring on the filter housing and install the filter housing.

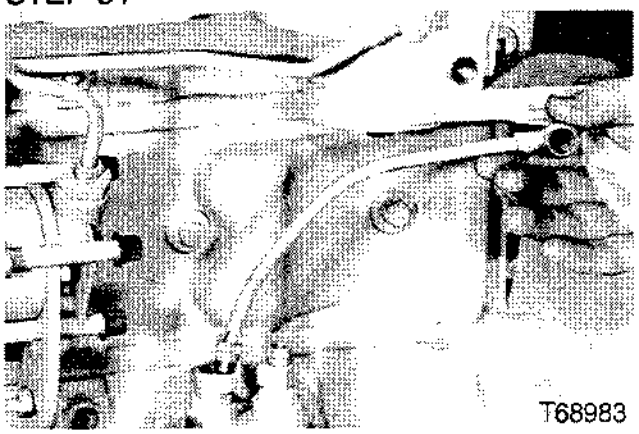
NOTE: *Some engines have single fuel filters.*

STEP 90



Install the filter housing nut and tighten to a torque of 29 to 35 Nm.

STEP 91



Install the lift pump outlet tube.

SPECIFICATIONS

CYLINDER BLOCK

ID of Cylinder	102.00 to 102.04 mm
Maximum Service Limit	102.116 mm
Maximum Cylinder Out of Round	0.038 mm
Maximum Cylinder Taper	0.076 mm
Maximum Warpage of Cylinder Block Surface	More than 0.010 mm in any 50 mm diameter area or more than 0.075 mm overall end to end or side to side
Maximum Amount of Material that can be Removed During Resurfacing	0.50 mm
Standard Piston Finish Housing of Cylinder Bore	102.00 to 102.116 mm
0.5 mm Oversize Piston Machine Cylinder Block Bore to	102.40 to 102.44 mm
0.5 mm Oversize Piston Finish Honing of Cylinder Block Bore	102.50 to 102.54 mm
1.0 mm Oversize Piston Machine Cylinder Block Bore to	102.90 to 102.94 mm
1.0 mm Oversize Piston Finish Honing of Cylinder Block Bore	103.00 to 103.04 mm

CYLINDER SLEEVE

Machine Cylinder Block Bore to	104.485 to 104.515 mm
Machine Cylinder Sleeve Bore to	101.90 to 101.94 mm
Finish Honing Cylinder Sleeve to	102.00 to 102.04 mm

PISTON

OD 12 mm From the Bottom, 90 Degrees from Piston Pin	101.873 to 101.887 mm
Minimum Service Limit	101.823 mm
Piston Clearance	0.113 to 0.293
ID of Piston Pin Bore	40.006 to 40.012 mm
Maximum Service Limit	40.025 mm
Protrusion Above Cylinder Block (Maximum)	0.660 mm

PISTONS RINGS

No. 1 Compression

End Gap in 102.02 ID Cylinder	0.25 to 0.55 mm
Maximum Service Limit	0.806 mm
Side Clearance	0.075 to 0.120 mm
Maximum Service Limit	0.15 mm

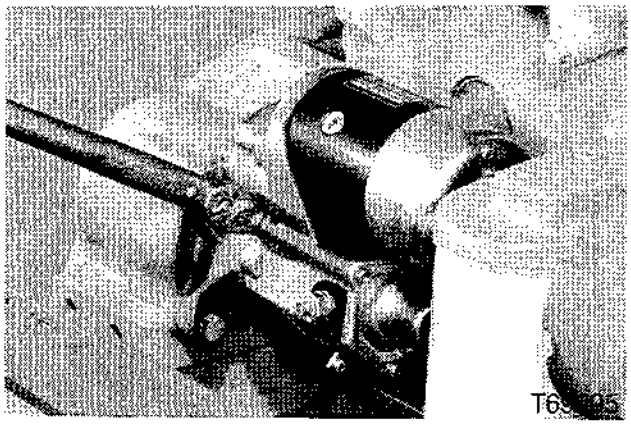
No. 2 Compression

End Gap in 102.02 ID Cylinder	0.25 to 0.55 mm
Maximum Service Limit	0.806 mm
Side Clearance	0.075 to 0.120 mm
Maximum Service Limit	0.15 mm

No. 3 Oil Control Ring

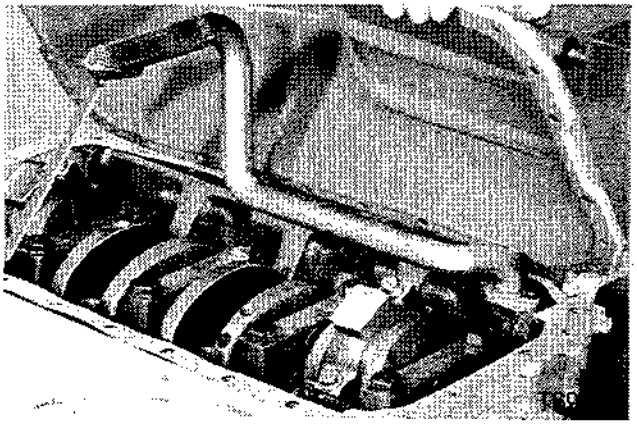
End Gap in 102.02 ID Cylinder	0.25 to 0.55 mm
Maximum Service Limit	0.806 mm

STEP 37



Install the starter and tighten the bolts to a torque of 39 to 47 Nm.

STEP 38



Install the engine oil pan. See Section 2445 for oil pan installation.

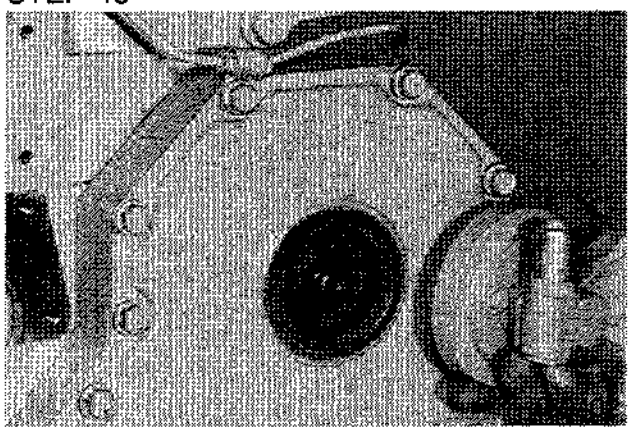
FRONT OIL SEAL AND WEAR SLEEVE INSTALLATION

Used when crankshaft flange is worn and standard seal does not stop oil flow.

STEP 39

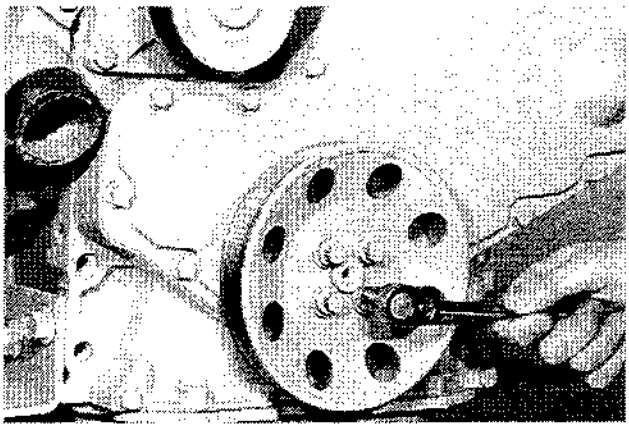
Lift the belt tensioner and remove the fan belt.

STEP 40



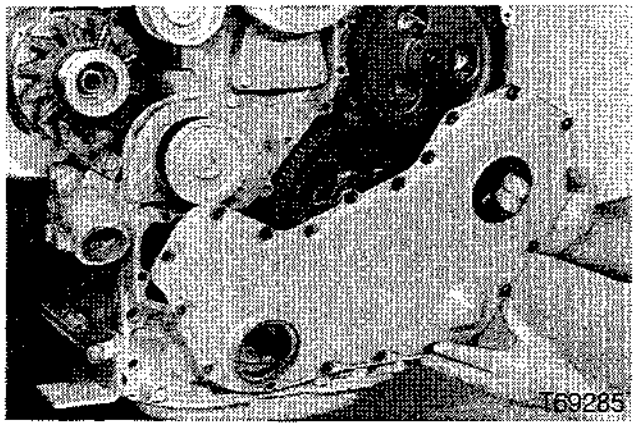
Remove the tachometer drive, if equipped.

STEP 41



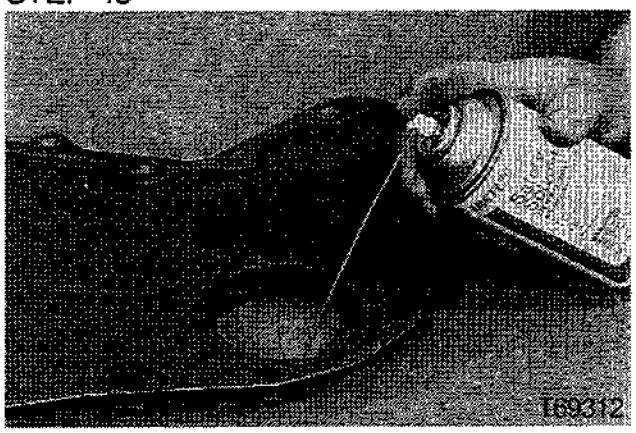
Remove the bolts from the crankshaft pulley and remove the crankshaft pulley.

STEP 42



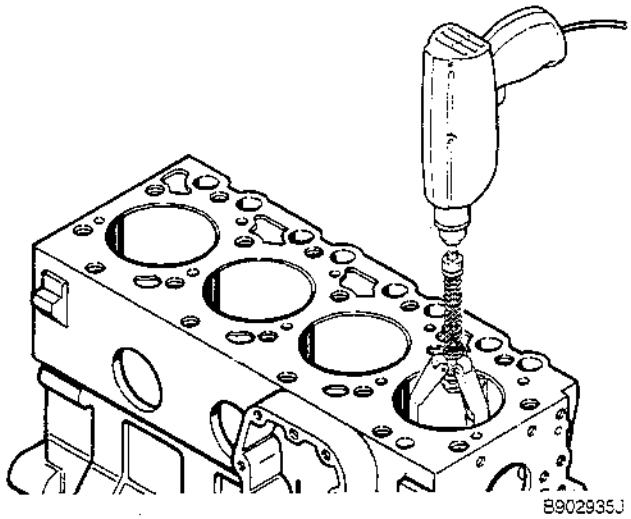
Remove the bolts and the front cover.

STEP 43



Remove the oil seal and clean the seal surface with Loctite safety solvent.

STEP 90

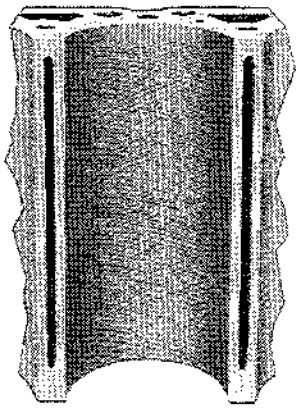


Use a 3/8 inch or 1/2 inch drill to power the cylinder hone. Use a lubricant/coolant with the hone to keep the hone and the stones free of foreign material.

Start the hone at the top of the cylinder bore and actuate the hone up and down until the correct cross-hatch pattern is reached. The correct cross-hatch pattern is 45 to 60 degrees from horizontal.

Use a 250 to 300 grit stone to reach the correct cylinder bore finish of 0.4 to 0.8 micrometers.

STEP 91



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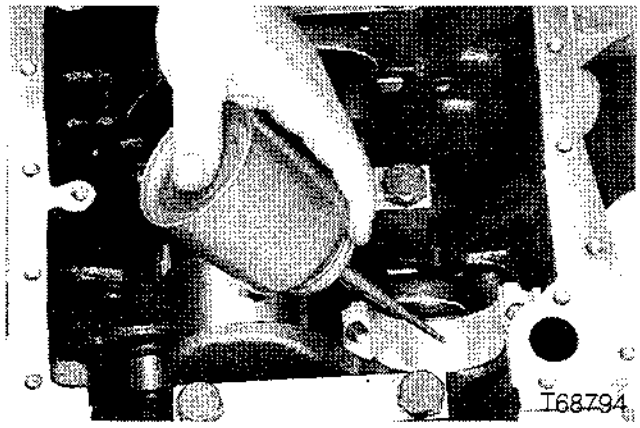
After removing the glaze, clean the cylinder walls with a clean cloth, warm water and a mild detergent soap. After cleaning the cylinder walls, clean the cylinder walls again with clean engine oil.

NOTE: *Clean the cylinder walls until a clean white cloth keeps completely clean, one cleaning operation is not enough.*

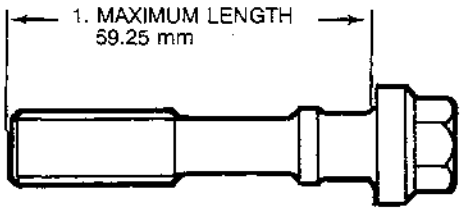
IMPORTANT: *Do not use gasoline, diesel fuel or kerosene to clean cylinders because these materials will not remove the abrasives from the sleeve surface.*

STEP 134



Apply lubrication to the bearing liners before installation, using clean engine oil.

STEP 135

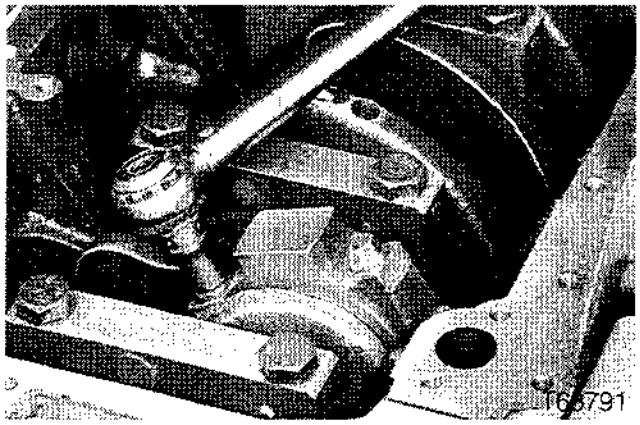


7L92

Measure the length of the connecting rod bolts. If the bolt length is more than 59.25 mm the bolt must be replaced.

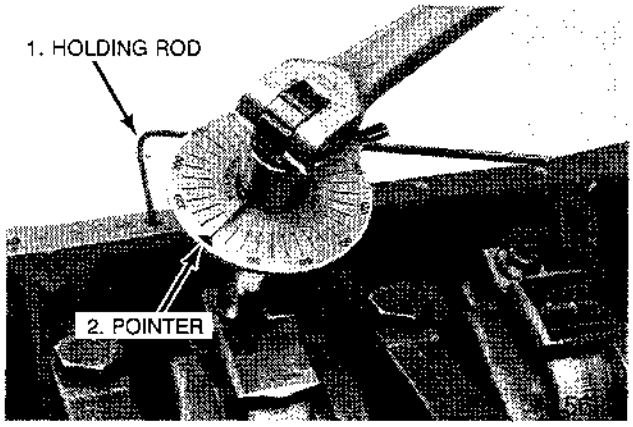
IMPORTANT: *Each bolt length must be checked before installation.*

STEP 136



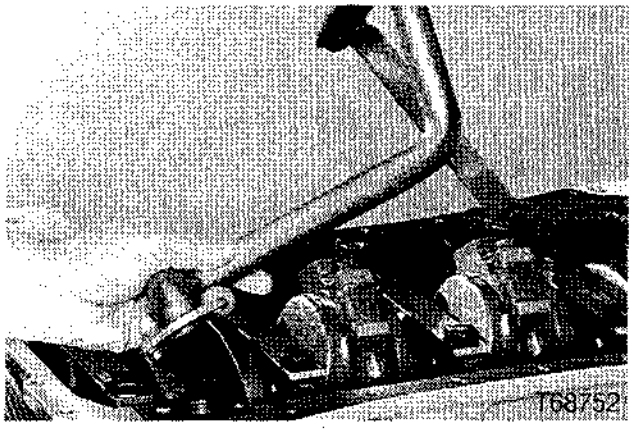
Lubricate the connecting rod bolts with clean engine oil and tighten the bolts to a torque of 60 Nm.

STEP 137



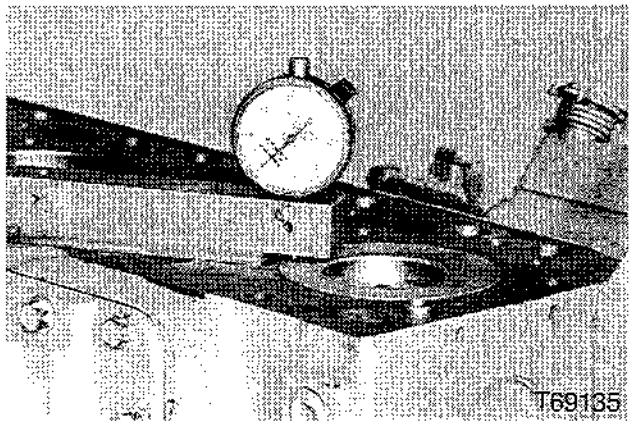
Install the torque angle gauge. Position and lock the holding rod. Turn the pointer to 60 degrees. Tighten the bolt until the pointer is at 0 degrees.

STEP 138



Install the engine oil inlet tube. See Section 2445 of the service manual for the inlet tube and the oil pan installation.

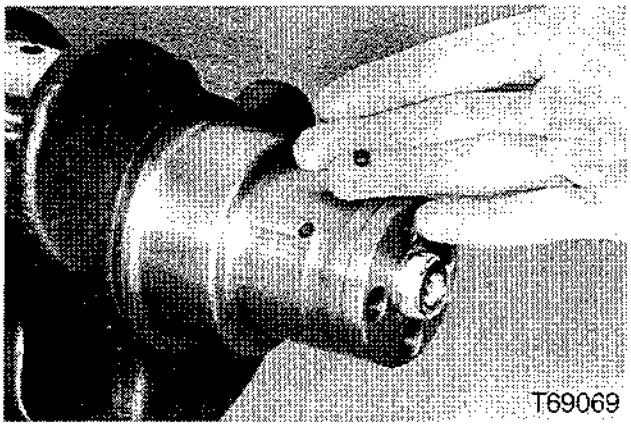
STEP 139



Use a dial indicator to check piston protrusion. The piston protrusion must not be more than 0.660 mm plus any amount of material removed during resurfacing.

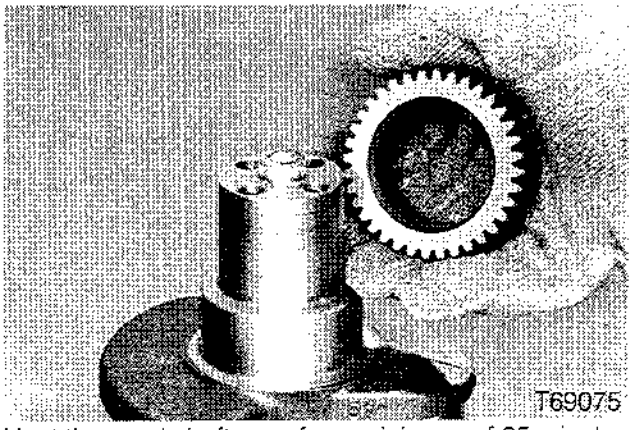
CRANKSHAFT GEAR INSTALLATION

STEP 190



Install the crankshaft gear pin or woodruff key.

STEP 191

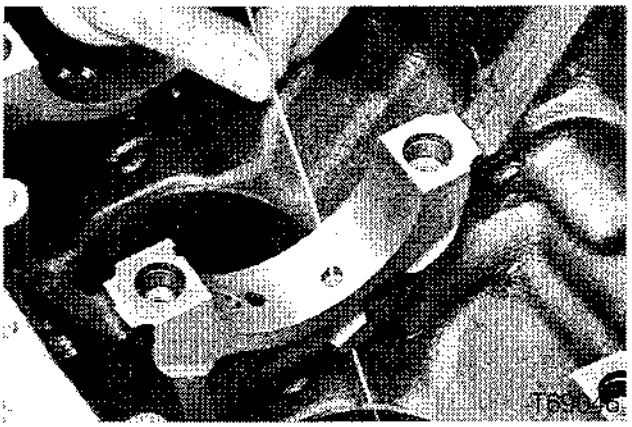


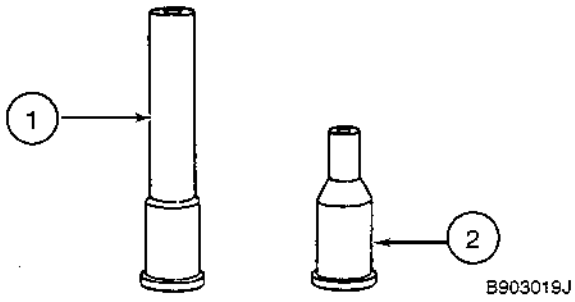
Heat the crankshaft gear for a minimum of 25 minutes at 250°F (121°C). Use a bearing heater oven.

Install the heated gear on the crankshaft.

CRANKSHAFT INSTALLATION

STEP 192

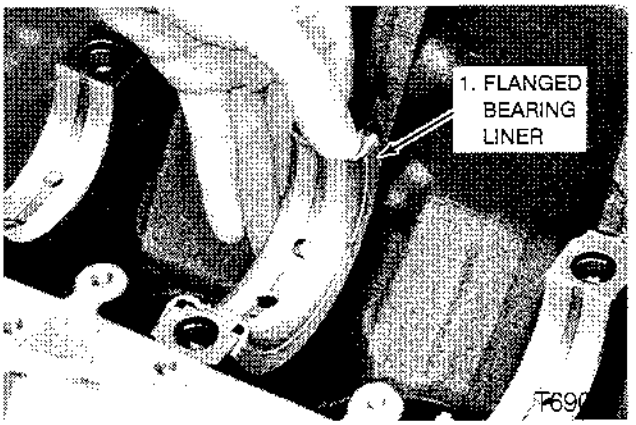




1. Late Production Oil Spray Nozzle
2. Early Production Oil Spray Nozzle

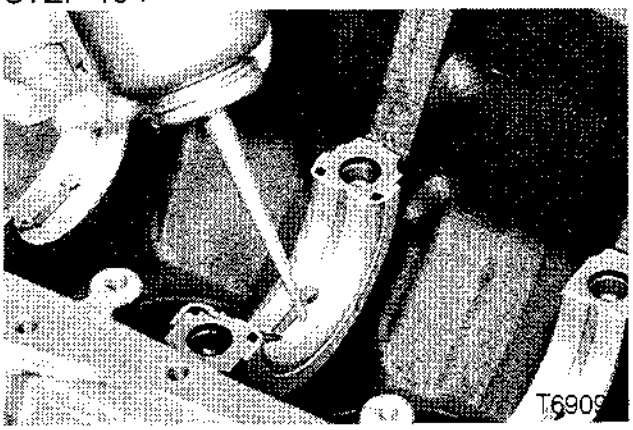
Clean the oil spray nozzle with a small wire. If the nozzle is damaged it must be replaced.

STEP 193



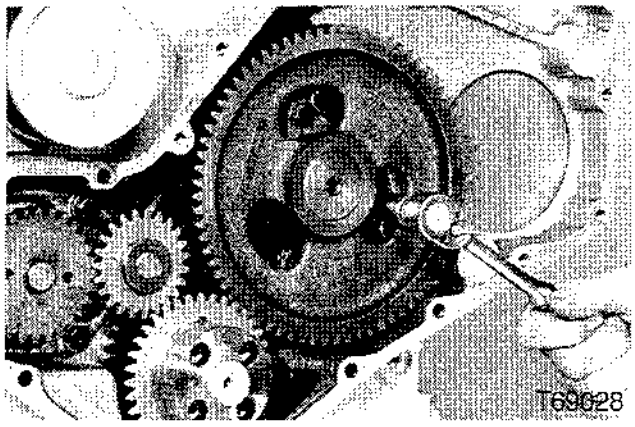
Install the bearing liners. The flanged bearing liner must be installed on the second journal from the rear of the block. The remainder of the bearing liners have no flange.

STEP 194



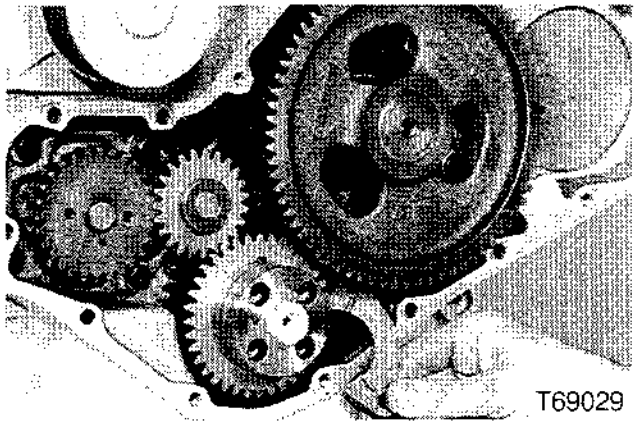
Add lubrication to the bearing liners. Use clean engine oil.

STEP 252



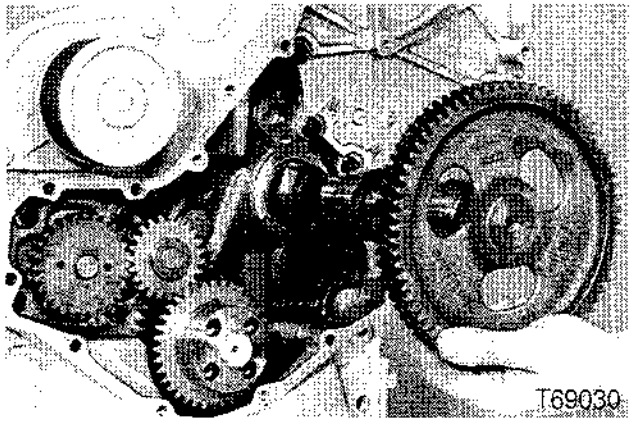
Remove the bolts from the camshaft thrust plate.

STEP 253



Remove the camshaft thrust plate.

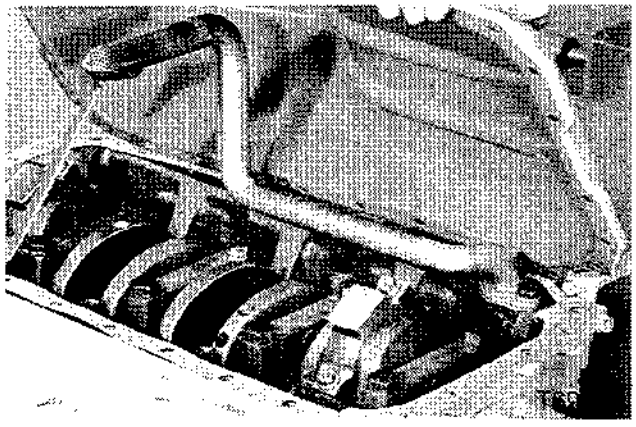
STEP 254



Remove the camshaft from the engine block.

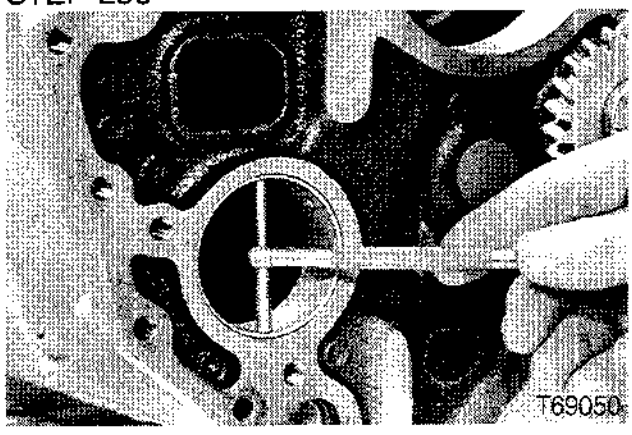
Camshaft Bore and Bushing Inspection

STEP 255



Remove the engine oil pan. See Section 2445 in the service manual.

STEP 256

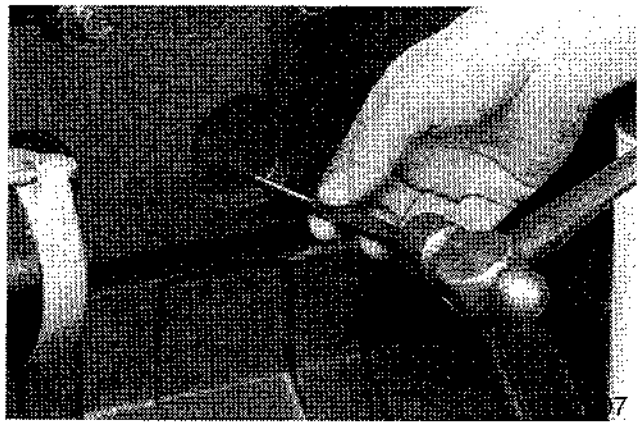


Measure the camshaft bores. Use a bore gauge. The bores must be measured in two positions. Take a second measurement 90 degrees from the first measurement.

NOTE: *The crankshaft and pistons have been removed for photographic purposes. These parts do not have to be removed to service the camshaft.*

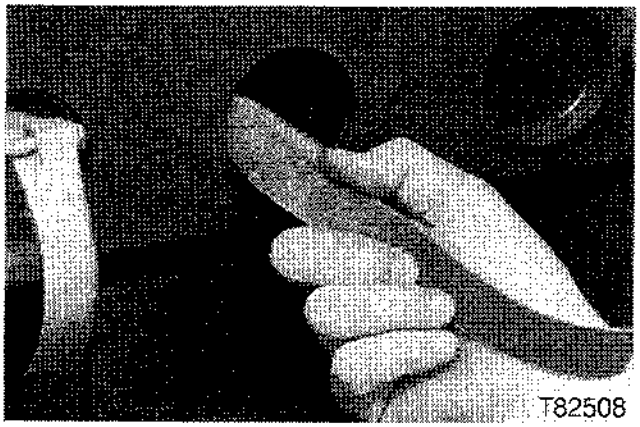
58 mm Expansion Plugs

STEP 303



Remove the expansion plug from the cylinder block.

STEP 304

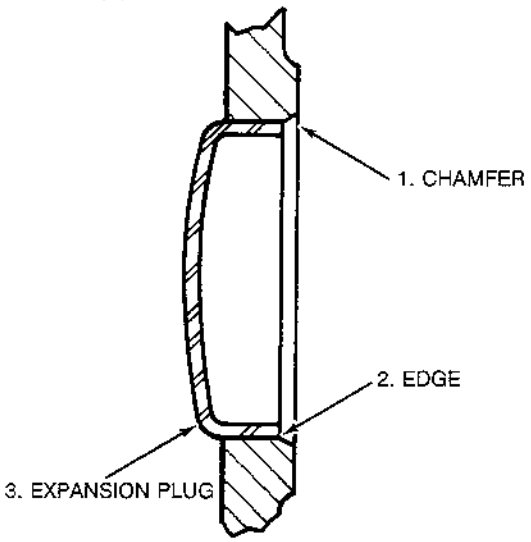


Clean the sealing surface of all foreign material.

STEP 305

Apply Loctite 277 to the sealing surface of the expansion plug.

STEP 306



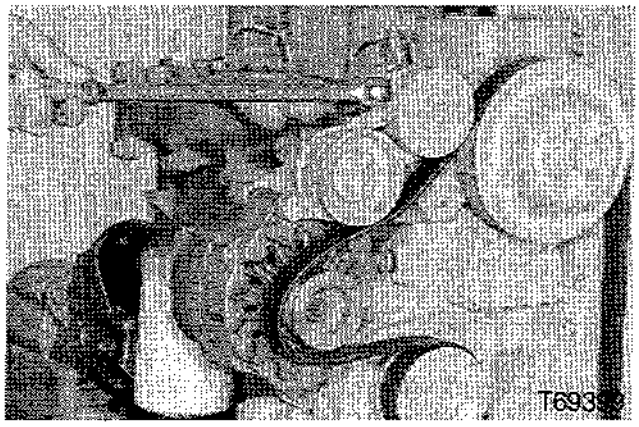
Install the expansion plug into the cylinder block, until the top edge of the expansion plug is even with the bottom edge of the chamfer.

SPECIAL TORQUES

Oil Pump Retaining Bolts	21 to 27 Nm
Front Cover Retaining Bolts	21 to 27 Nm
Crankshaft Pulley Retaining Bolts	120 to 130 Nm
Fan Pulley Bracket Retaining Bolts	23 to 25 Nm
Fan Pulley Bolts	
Grade 8.8 Size M8	25 to 31 Nm
Grade 10.9 Size M8	37 to 43 Nm
Grade 8.8 Size M10	51 to 62 Nm
Grade 10.9 Size M10	51 to 62 Nm
Filter Housing Retaining Bolts	21 to 27 Nm
Oil Inlet Tube Retaining Bolts	18 to 30 Nm
Oil Pan Drain Plug	68 to 82 Nm

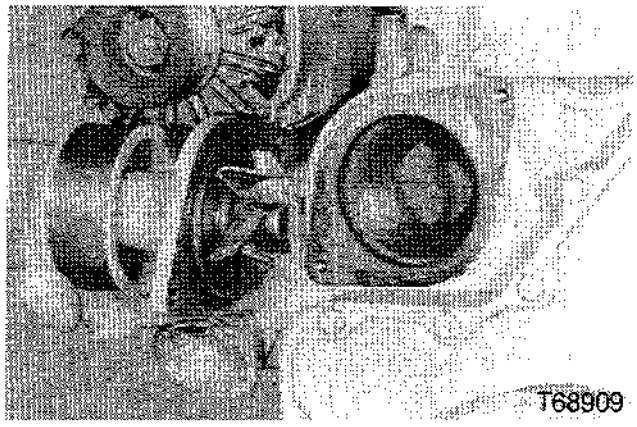
WATER PUMP
Removal

STEP 1



Lift the belt tensioner pulley and remove the fan belt.

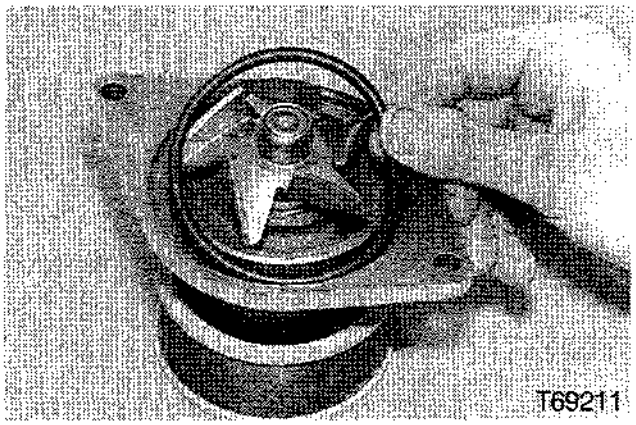
STEP 2



Remove the water pump bolts and the water pump.

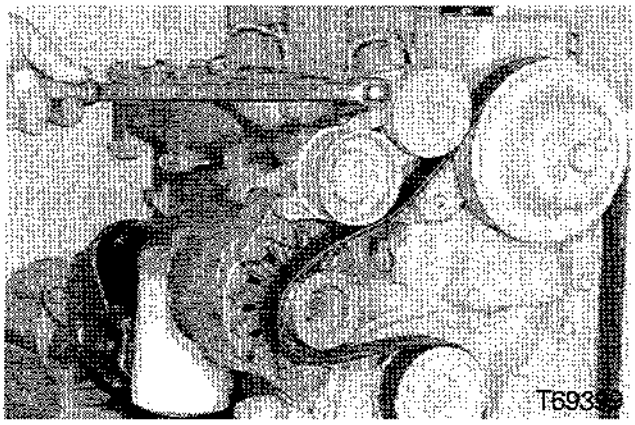
Installation

STEP 3



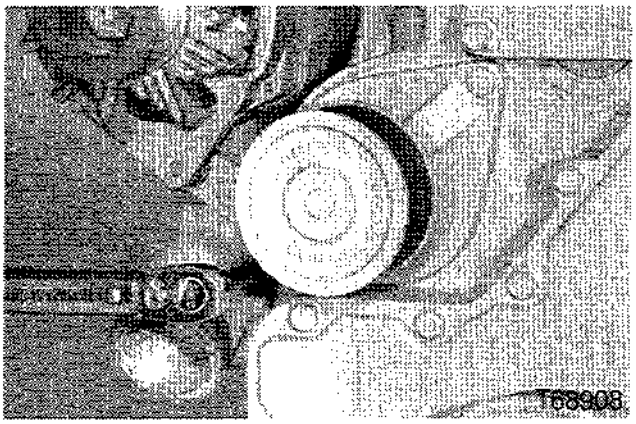
Install a new o-ring into the water pump housing.

STEP 5



Lift the belt tensioner pulley and install the fan belt.

STEP 4



Install the water pump and tighten the water pump retaining bolts to a torque of 21 to 27 Nm.

Section

2465

TURBOCHARGER

Written In *Clear And Simple English*

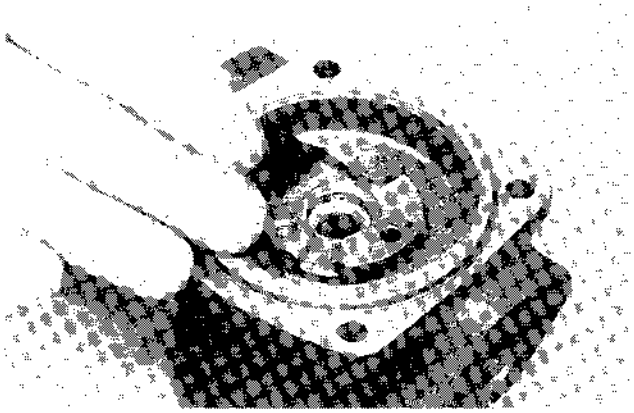
IMPORTANT: *This Turbocharger was made using the Metric Measurement system. All measurements and checks must be made with metric tools to make sure of an accurate reading when inspecting parts.*

CASE CORPORATION

Rac 8-25550

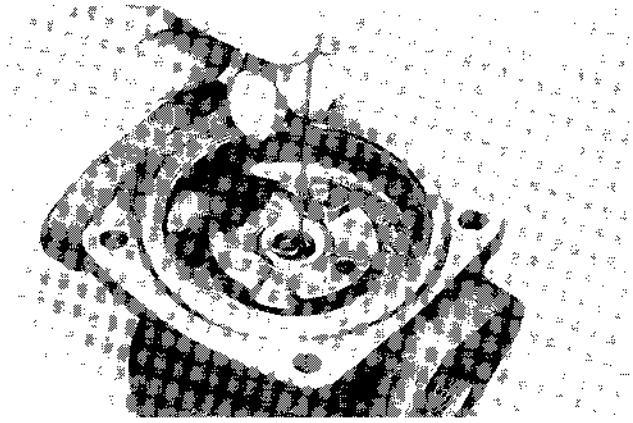
Printed in U.S.A.
June, 1984

STEP 43



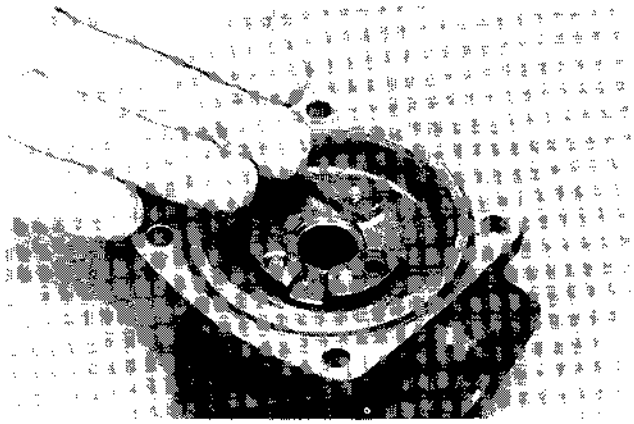
Remove the outer bearing retaining ring.

STEP 44



Use a wire hook and pull the bearing from the center housing.

STEP 45



Remove inner bearing retaining ring.

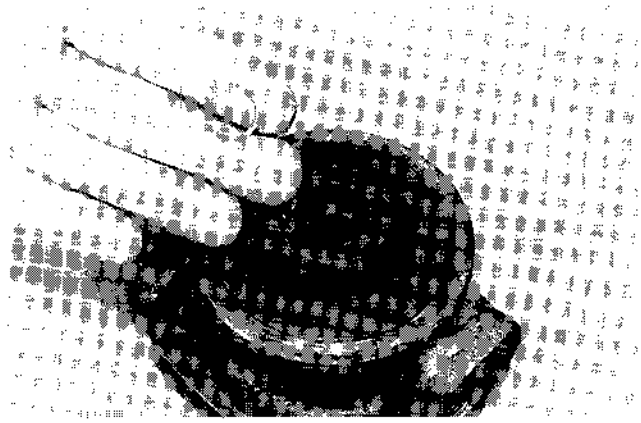
STEP 46

Turn the center housing over and remove the outer bearing retaining ring.

STEP 47

Use a wire hook and pull the bearing from the center housing.

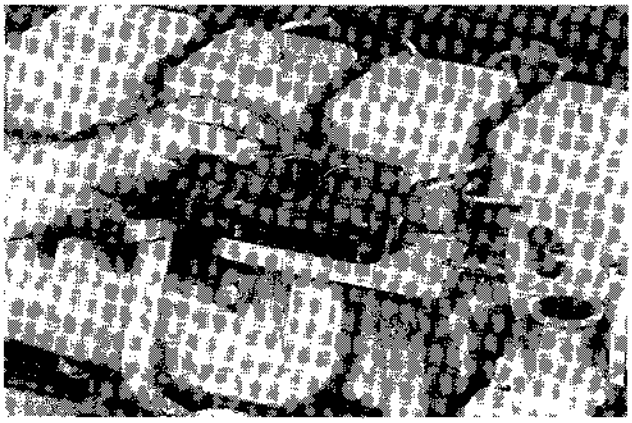
STEP 48



Remove the inner bearing retaining ring.

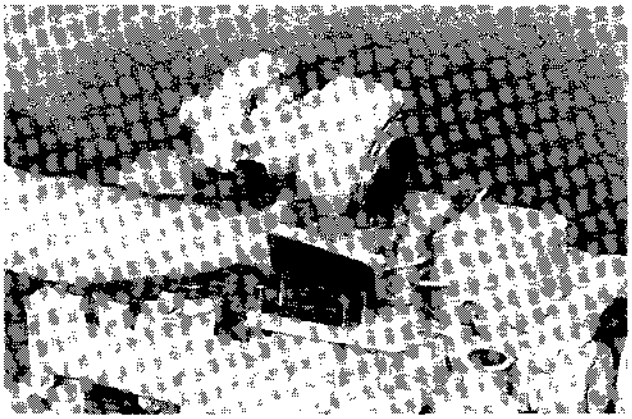
Installation

STEP 92



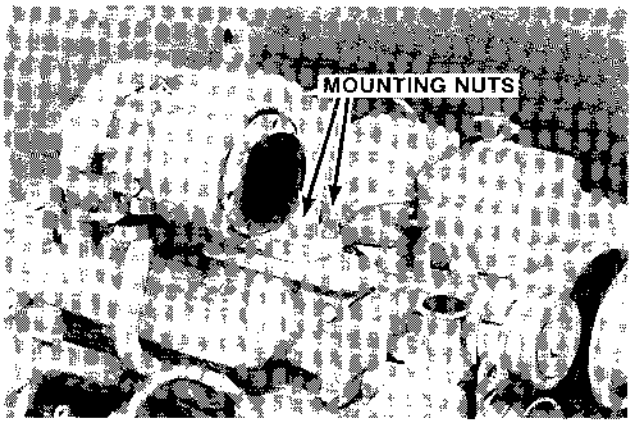
Install a new gasket on the exhaust manifold.

STEP 93



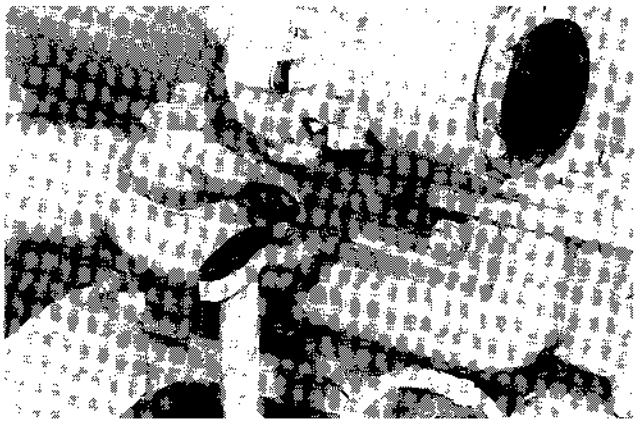
Install the turbocharger on the exhaust manifold.

STEP 94



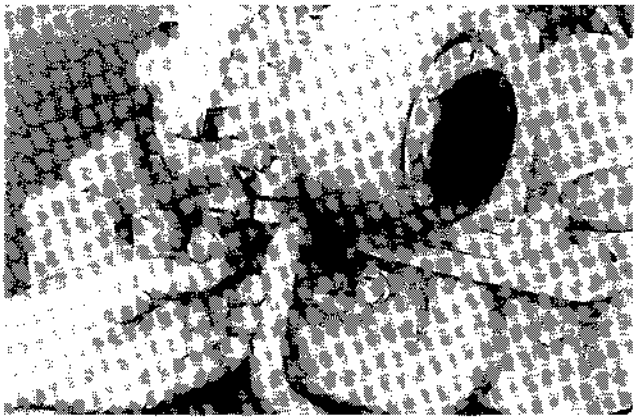
Install the turbocharger mounting nuts and tighten to a torque of 24 lb ft (32 Nm)(3.2 kgm).

STEP 95



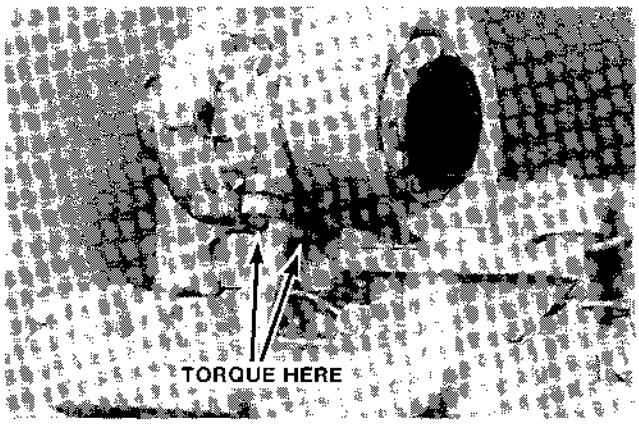
Install a new gasket on the oil drain tube.

STEP 96



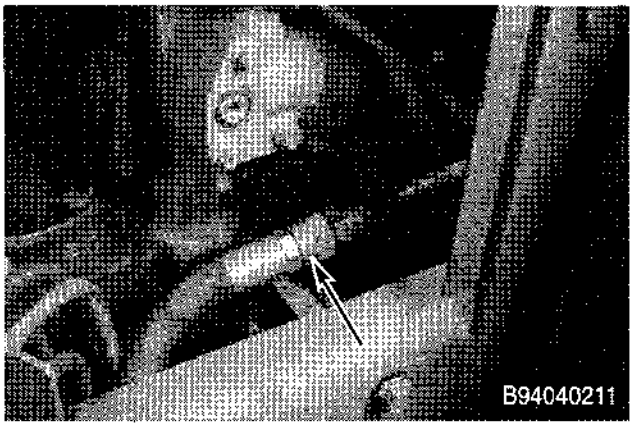
Install the oil drain tube bolts.

STEP 97

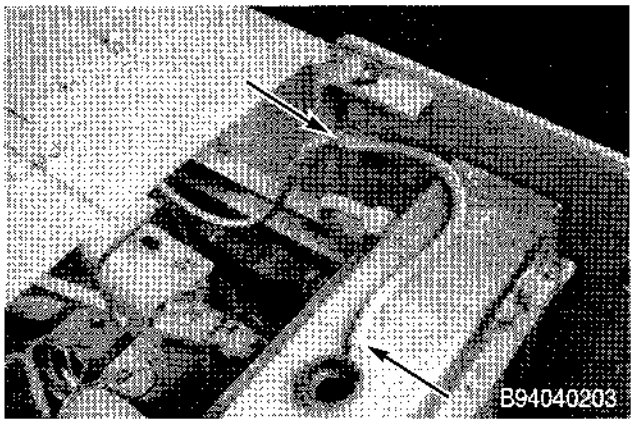


Tighten the oil drain tube bolts to a torque of 18 lb ft (24 Nm)(2.4 kgm).

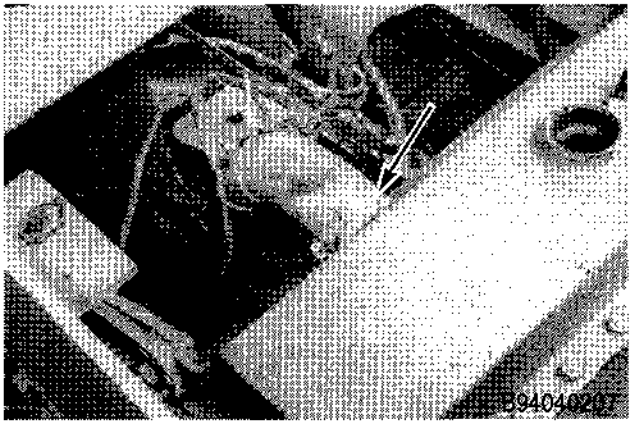
9. Disconnect the oil cooler hose from the top oil cooler tube below the water pump.



10. Disconnect the clamp and the top radiator support from the left-hand side of the machine. Disconnect the top radiator support from the right-hand side of the machine. Disconnect the coolant reservoir hose from the radiator.

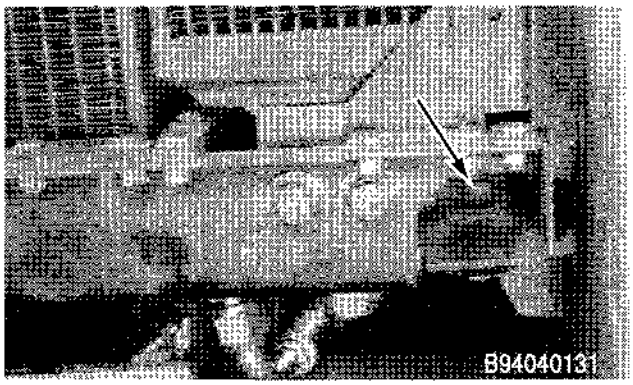


11. Disconnect the top radiator hose from the radiator. Disconnect the bottom radiator hose from the water pump.



12. Connect acceptable lifting equipment to the radiator.

13. Remove the nuts, flat washers, and bolts that fasten the radiator to the bottom radiator mounts. Remove the radiator from the machine.



Installation

Installation is the reverse sequence of removal.

1. Tighten the nuts that fasten the radiator to the radiator mounts to the torque specification shown on page 2.

2. Close the drain valve on the radiator. Fill the radiator with coolant and fill the coolant reservoir to the FULL mark. The coolant must be at least 50% ethylene glycol.

3. Start the engine and run the engine at low idle. Check for leaks. Stop the engine. Add additional coolant as necessary.

Valve Springs

Free Length ..... 55.63 mm
Total Coils 7.25
Wire Diameter ..... 4.830 to 4.930 mm
Compressed to 38.53 mm ..... (Valve Open) 785 to 839 N
  Maximum Service Limit ..... 765 N
Compressed to 49.25 mm ..... (Valve Closed) 285 to 321 N
  Minimum Service Limit ..... 270 N

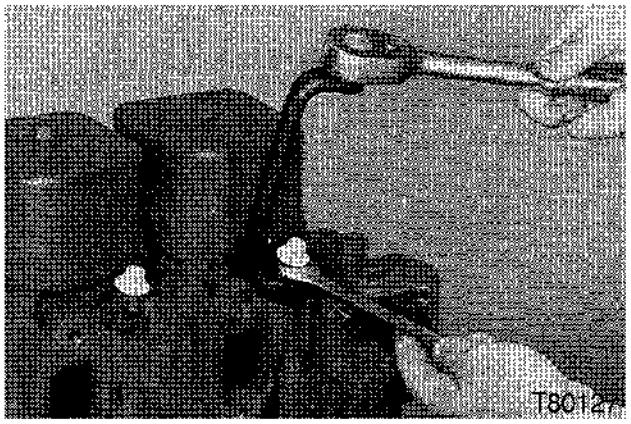
Valve Seat Installation Dimensions

Exhaust Seat
  Diameter of Insert ..... 43.713 to 43.73 mm
  Machine Insert Bore to ..... 43.647 to 43.669 mm
  Depth of Bore ..... 10.10 to 10.30 mm
  Press Fit ..... 0.05 to 0.092 mm
Intake Seat
  Diameter of Insert ..... 47.063 to 47.089 mm
  Machine Bore to ..... 46.987 to 47.013 mm
  Depth of Bore ..... 10.30 to 10.50 mm
  Press Fit ..... 0.05 to 0.102 mm

Valve Guide Installation Dimensions

11 mm Valve Guide Installation Dimensions
  Valve Guide OD ..... 11.150 to 11.163 mm
  Machine Guide Bore to ..... 11.112 to 11.138 mm
  Press Fit ..... 0.012 to 0.051 mm
  Installed Height (above top of valve guide boss on head) ..... 11.25 to 11.75 mm
  Guide Installed ID ..... 8.19 to 8.39 mm
14 mm Valve Guide Installation Dimensions
  Valve Guide OD ..... 14.026 to 14.038 mm
  Machine Guide Bore to ..... 13.987 to 14.013 mm
  Press Fit ..... .013 to .051 mm
  Installed Height (above top of valve guide boss on head) ..... 11.25 to 11.75 mm
  Guide Installed ID ..... 8.19 to 8.39 mm

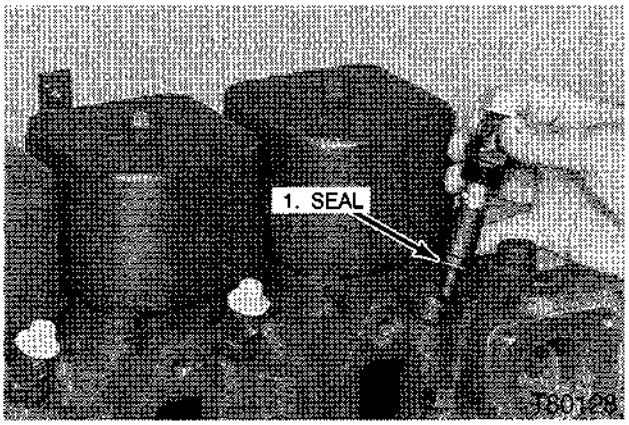
STEP 13



Loosen the nut on the injectors.

NOTE: *The injector must not rotate in the bore of the cylinder head. This will damage the cylinder head.*

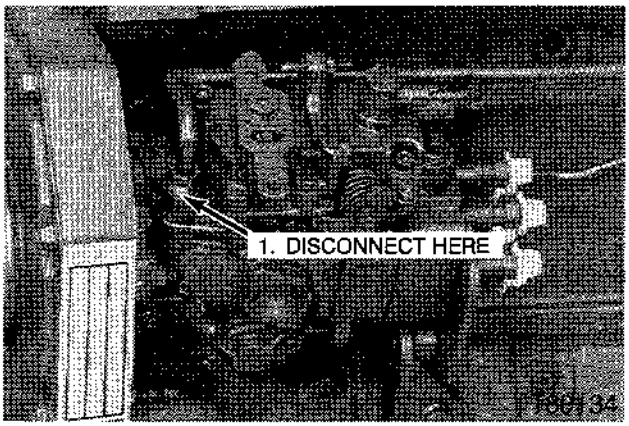
STEP 14



Remove the injectors from the cylinder head.

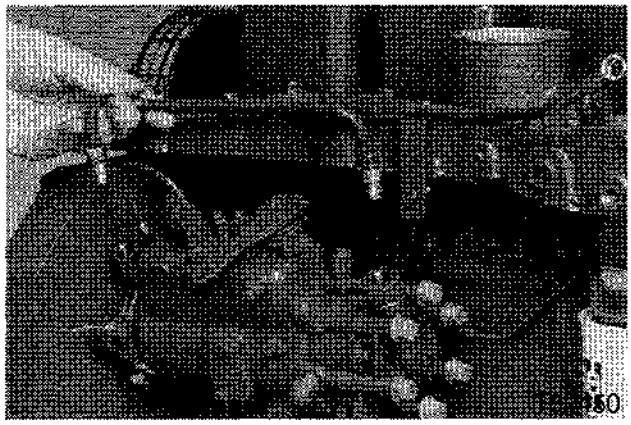
NOTE: *Make sure the injector seal is removed from the cylinder head.*

STEP 15 BOSCH INJECTION PUMP



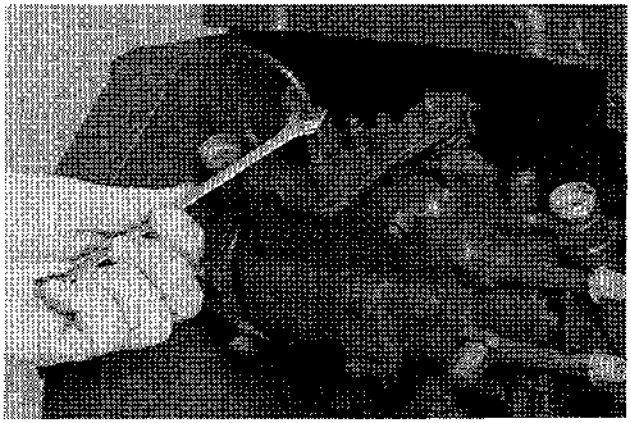
Disconnect the injection pump inlet line and remove the inlet line.

STEP 16 CAV INJECTION PUMP



Disconnect the injection pump inlet line and remove the inlet line.

STEP 17 CAV INJECTION PUMP



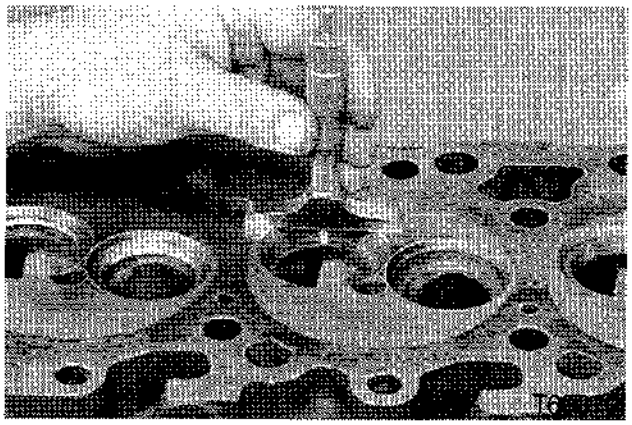
Disconnect the leak off line.

STEP 18

Disconnect and remove the fuel line.

VALVE SEAT INSTALLATION

STEP 50



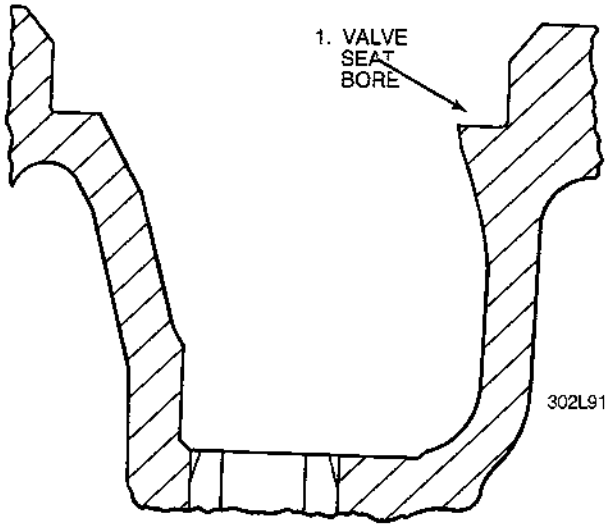
Machine the cylinder head to the following specifications for valve seats.

Exhaust Valve Seat Specifications:

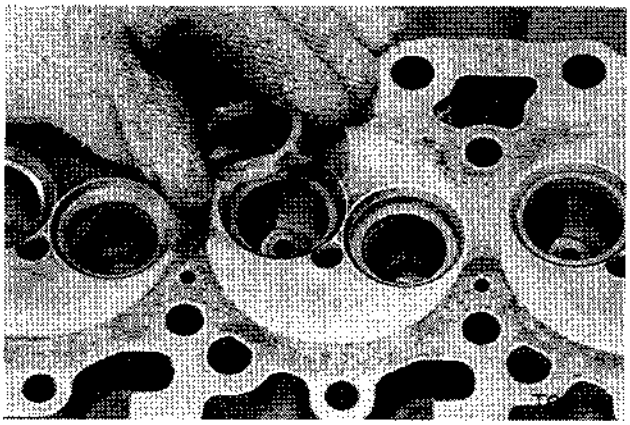
Diameter of Valve Seat ..... 43.713 to 43.739 mm
Diameter of Bore ..... 43.647 to 43.663 mm
Depth of Bore ..... 10.10 to 10.30 mm
Press Fit ..... 0.05 to 0.092 mm

Intake Valve Seat Specifications:

Diameter of Valve Seat ..... 47.063 to 47.089 mm
Diameter of Bore ..... 46.987 to 47.013 mm
Depth of Bore ..... 10.30 to 10.50 mm
Press Fit ..... 0.05 to 0.102 mm



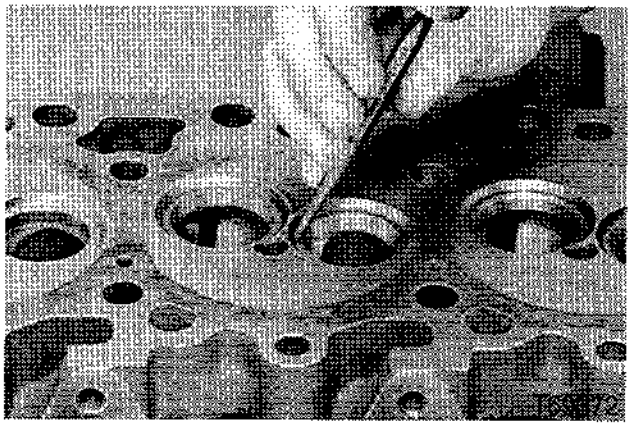
STEP 51



Clean the recessed area in the cylinder head. Put the new valve seats in dry ice for a minimum of one hour to shrink the valve seats for easy installation. Use a driver and install the valve seats.

> ***Always wear gloves to prevent frostbite to your hands when handling frozen parts.***
> SM118A

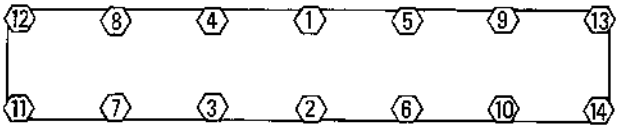
STEP 52



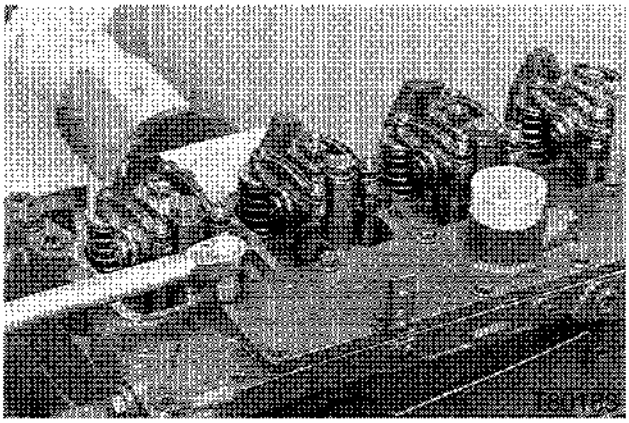
Use a center punch and stake the valve seats in three positions. Grind the valve seats to the correct angle.

STEP 88

BOLT TORQUE SEQUENCE

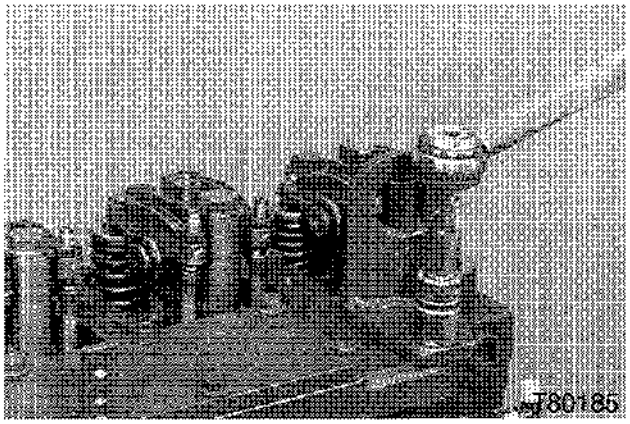


297L91



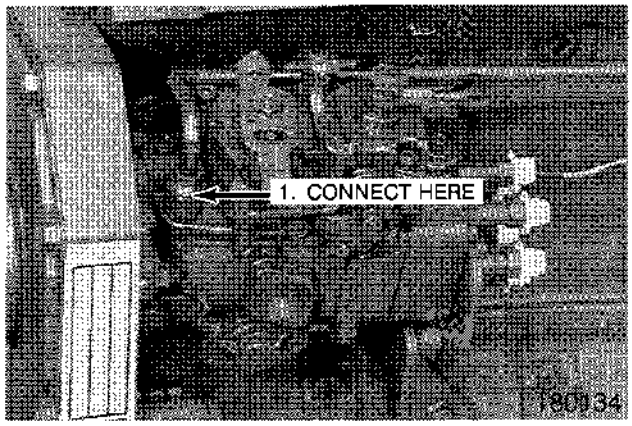
Install the intake manifold bolts and tighten to a torque of 21 to 27 Nm, following the torque sequence shown in the inset.

STEP 89



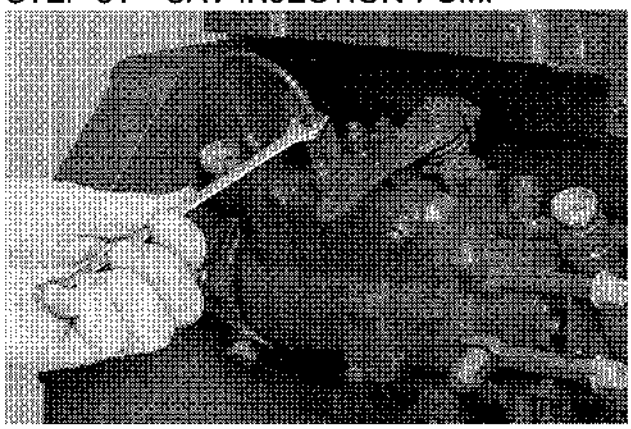
Install the rear lift bracket bolts and tighten to a torque of 71 to 83 Nm.

STEP 90 BOSCH INJECTION PUMP



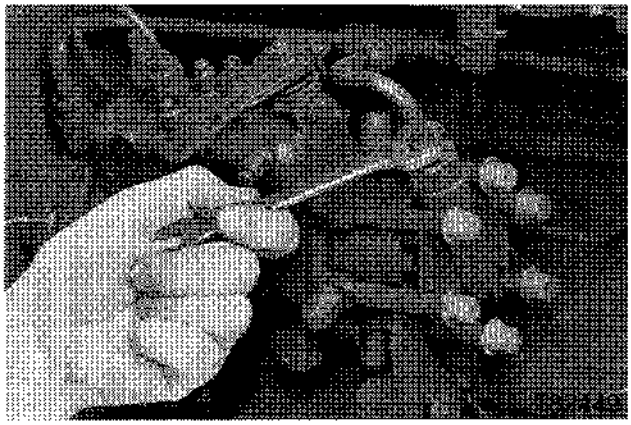
Install the injection pump inlet line and tighten the inlet tube nut.

STEP 91 CAV INJECTION PUMP



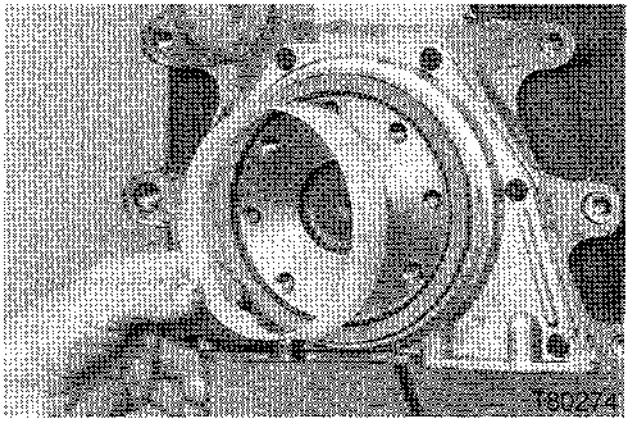
Connect and tighten the leak off line.

STEP 92 CAV INJECTION PUMP



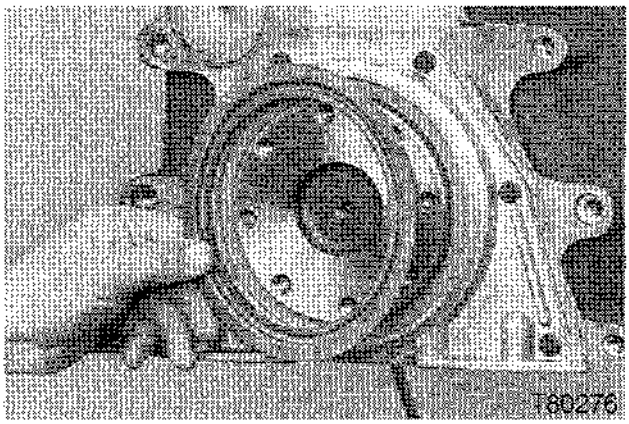
Install the injection pump inlet line and tighten the inlet line.

STEP 31



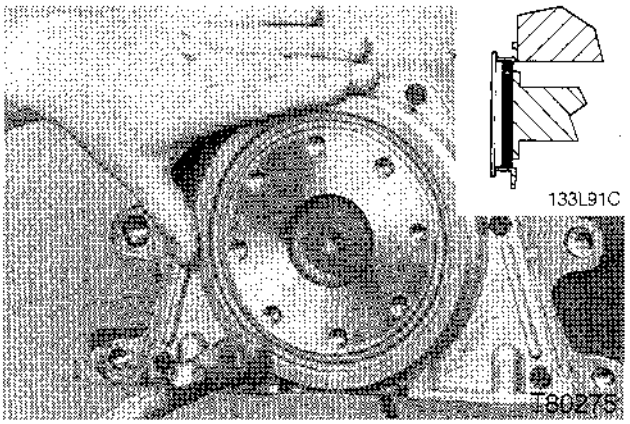
Remove the protective sleeve.

STEP 32



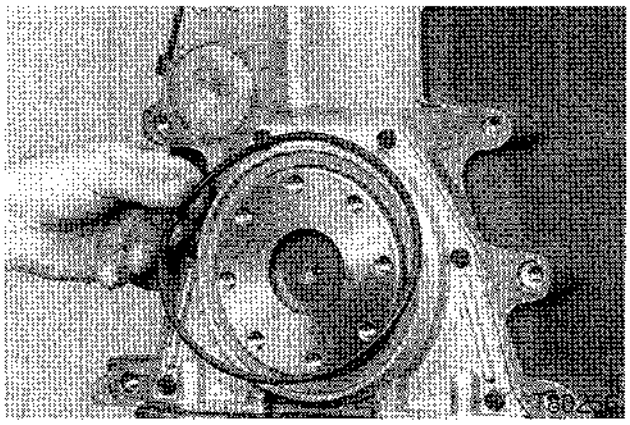
Install the seal installation tool with the small diameter toward the seal.

STEP 33



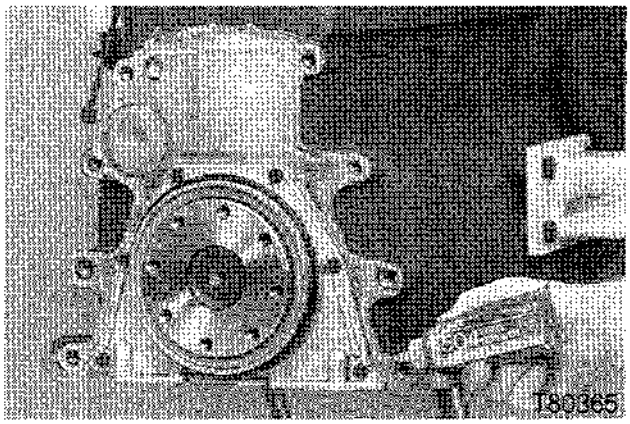
Push the seal into the seal carrier until the outside diameter of the seal installation tool makes contact with the seal carrier. Remove the installation tool.

STEP 34



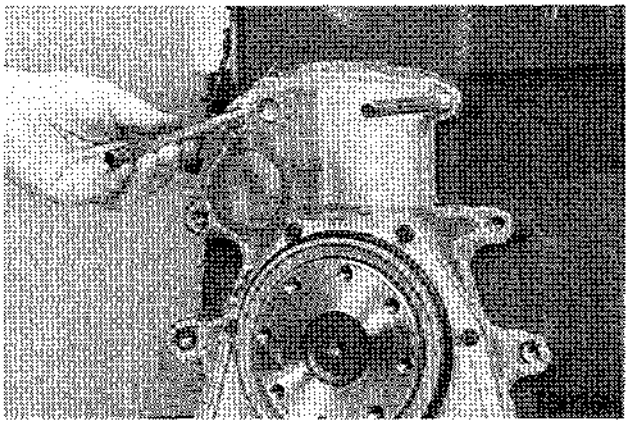
Install a new o-ring on the rear seal carrier.

STEP 35



Apply Loctite 515 to the sealing surface of the engine block.

STEP 36



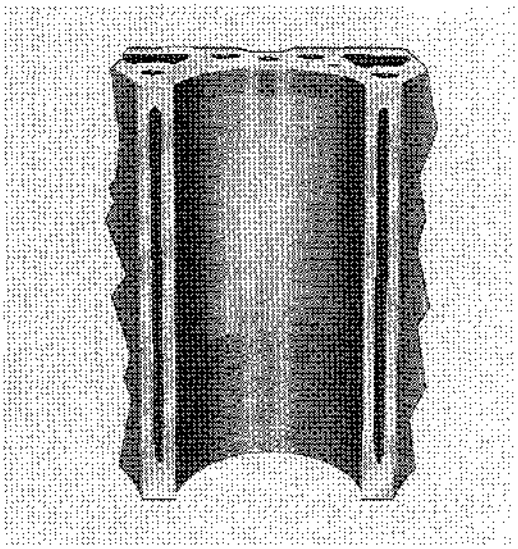
Install two guide bolts in the engine block.

Cylinder Wall Inspection

STEP 93

Inspect the cylinder walls for the following conditions.

Normal Wear

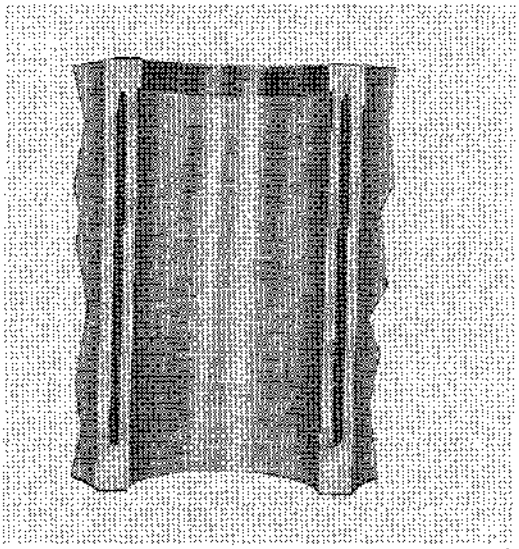


10766CDC

A smooth surface with some of the cross-hatch pattern showing between the upper and lower limits of the ring movement area shows normal wear. There will always be a small amount of wear present because of combustion pressure moving the top ring against the cylinder wall.

Normal wear shows acceptable cylinder wall conditions. See Steps 94 and 95 to measure the cylinder bore for tapes and out-of-round.

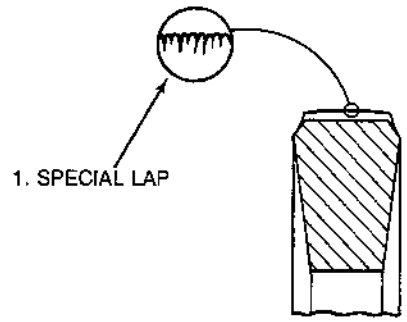
Worn Cylinder Wall



2319CDC

A smooth surface between the upper and lower limits of the ring movement area shows a worn cylinder wall. See Steps 94 and 95 to measure the cylinder bore for out-of-round and taper.

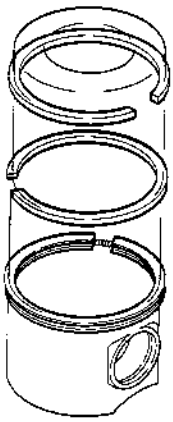
STEP 130



358L91

The first compression ring, in a replacement set of rings, must have a special lap design on the surface that contacts the cylinder wall.

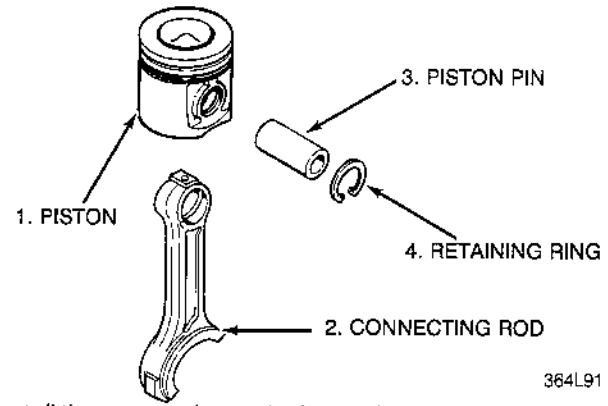
STEP 131



137L91

Rotate the piston rings so that the ring ends are separated by 120 degrees.

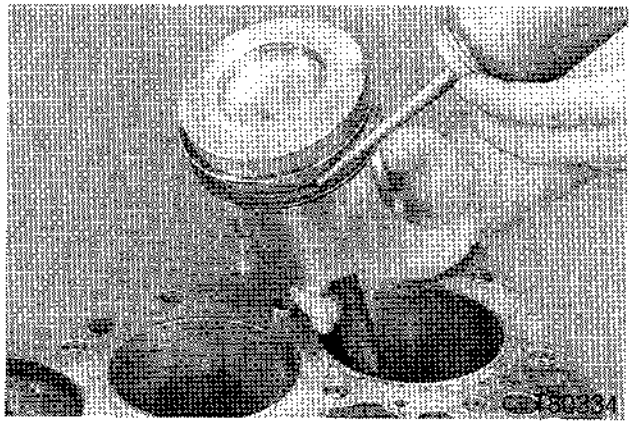
STEP 132



364L91

Install the connecting rod, piston pin and retaining rings in the piston.

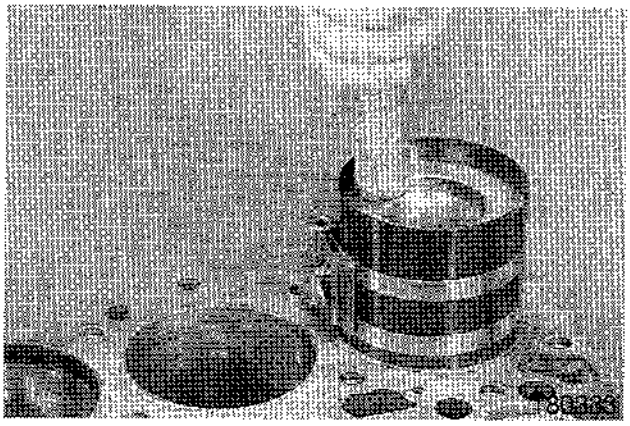
STEP 133



Apply lubrication to the pistons, piston rings and cylinder walls, using clean engine oil.

NOTE: *Install the pistons in the correct bore.*

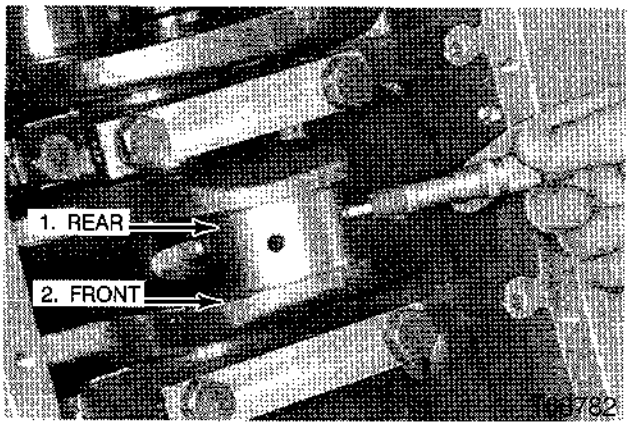
STEP 134



Install a ring compressor on the piston and carefully install the piston in the cylinder.

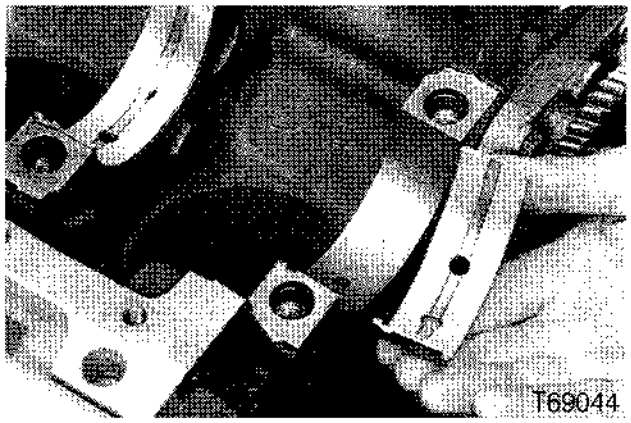
IMPORTANT: *Make sure that the arrow on top of the piston is toward the front of the engine.*

STEP 135



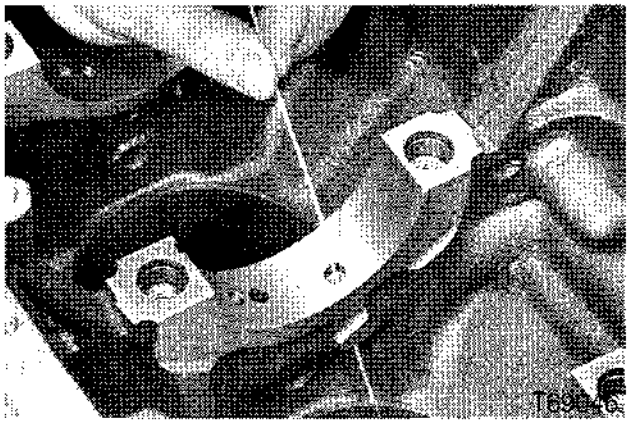
Measure the connecting rod journals on the crankshaft. Measure the front and rear of each journal, checking for taper. If the taper is more than 0.013 mm, reconditioning of the journals must be done.

STEP 191



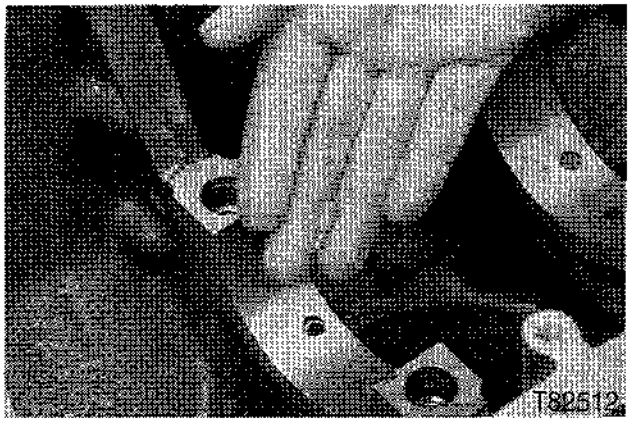
Remove the main bearing liners from the engine.

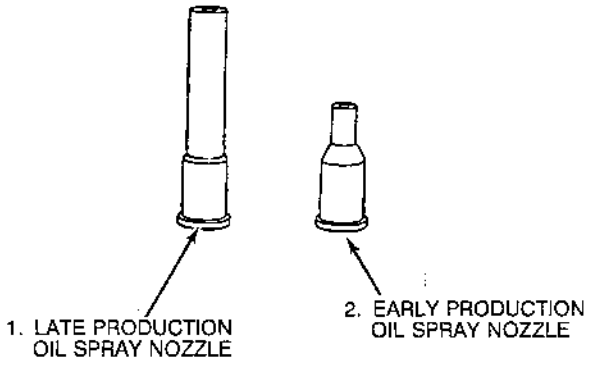
STEP 192



Clean the oil spray nozzle with a small wire. If the nozzle is damaged it must be replaced.

STEP 193

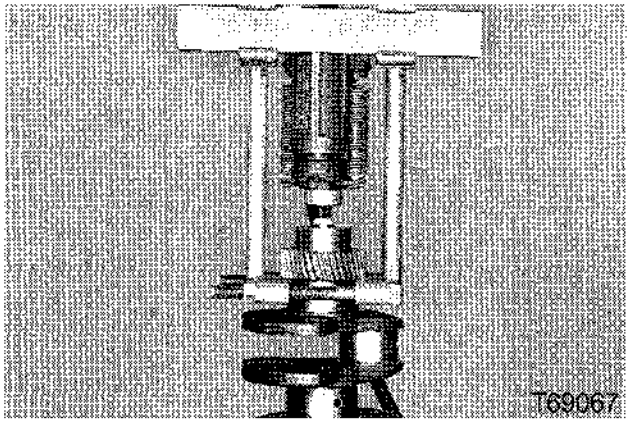




Remove the oil spray nozzle from the bearing carrier.

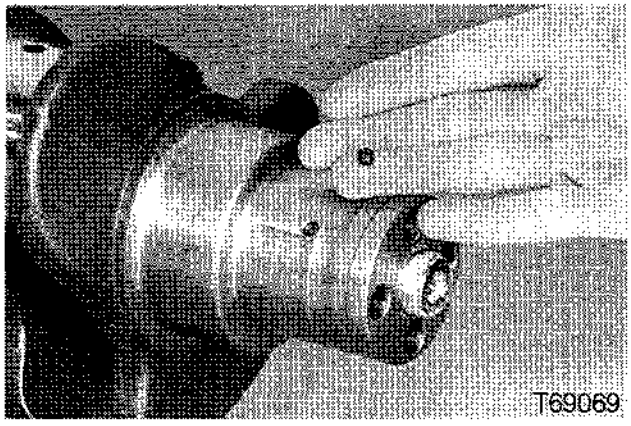
Crankshaft Gear Removal

STEP 194



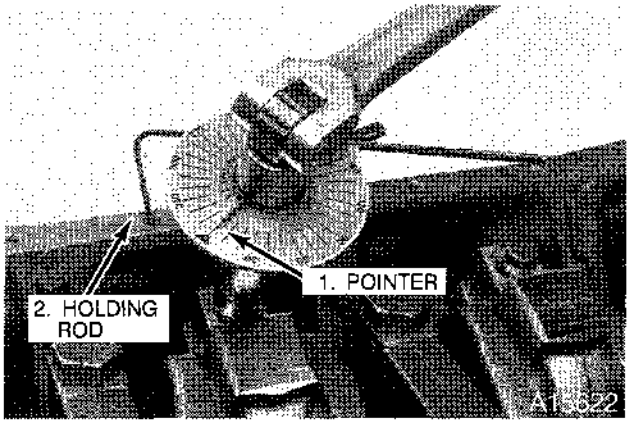
Pull the gear off the crankshaft.

STEP 195



Remove the pin from the crankshaft if the pin has been damaged.

STEP 245

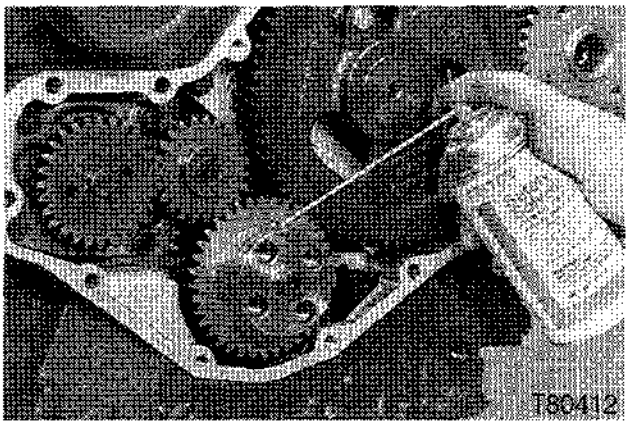


Install the torque angle gauge. Position and lock the holding rod. Turn the pointer to 60 degrees. Tighten the bolt until the pointer is at 0 degrees.

STEP 246

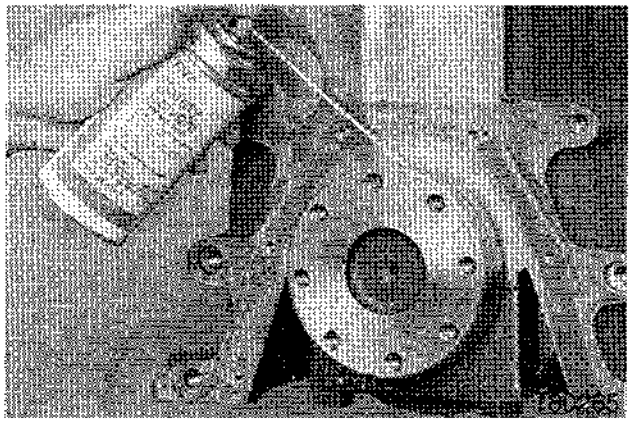
Install the cylinder head. See Section 2415 for installing the cylinder head.

STEP 247



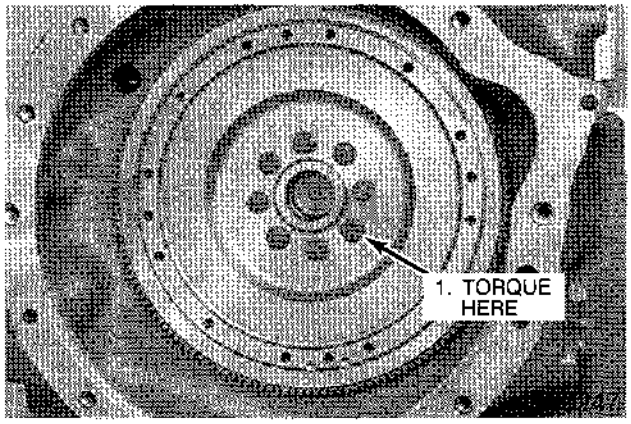
Clean the front crankshaft seal surface of all foreign material, using Loctite safety solvent. See seal installation in this section for installing the front crankshaft seal and the crankshaft pulley.

STEP 248



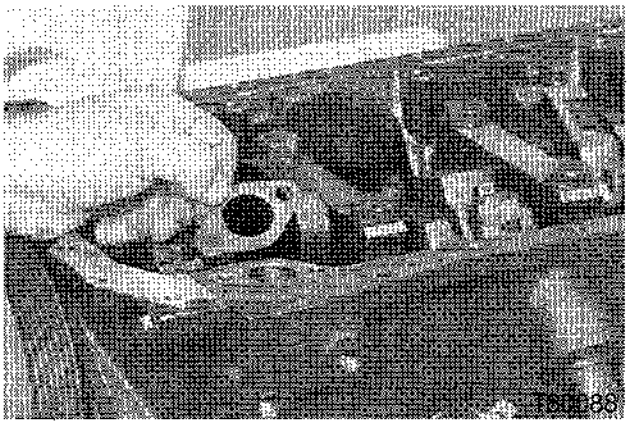
Clean the rear crankshaft seal surface of all foreign material, using Loctite safety solvent. See seal installation in this section for installing the rear crankshaft seal and the flywheel housing.

STEP 249



Install the flywheel and flywheel bolts. Tighten the bolts to a torque of 54 to 66 Nm.

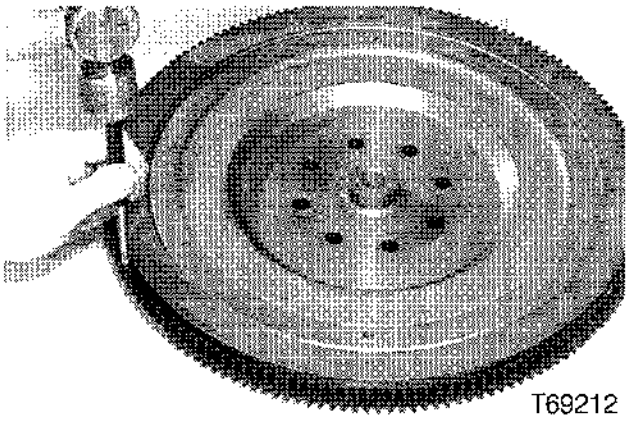
STEP 250



Install a new oil inlet tube gasket. See Section 2445 for oil inlet tube installation.

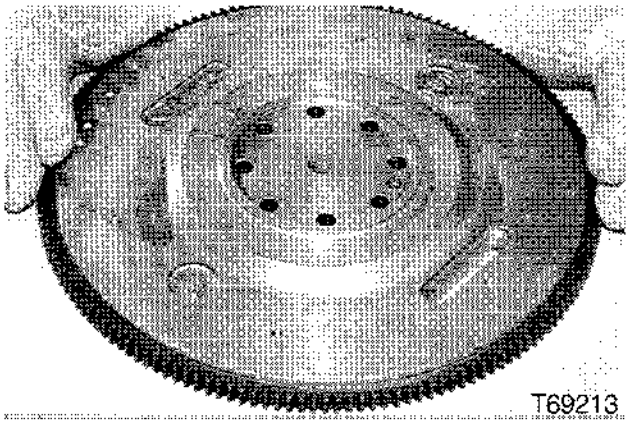
Ring Gear Removal and Installation

STEP 304



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

STEP 305

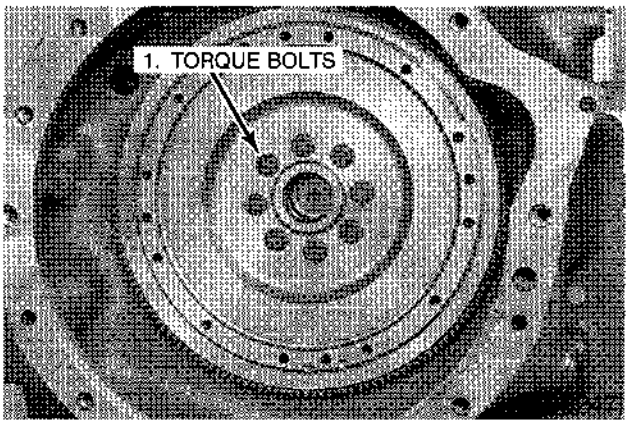


Heat the new ring gear, 400 to 450°F (204 to 232°C), in oil or in an oven. Do not use a torch to heat the ring gear.

Install the ring gear on the flywheel.

> ⚠ *Always wear heat protective gloves to prevent burning your hands when handling heated parts.* SM121A

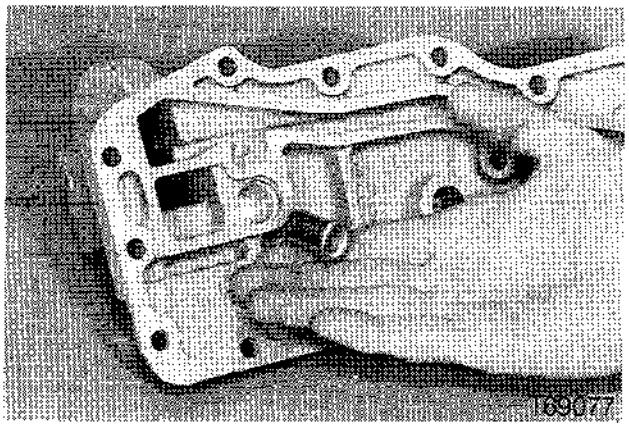
STEP 306



Install the flywheel bolts and the the flywheel. Tighten the retaining bolts to a torque of 130 to 144 Nm.

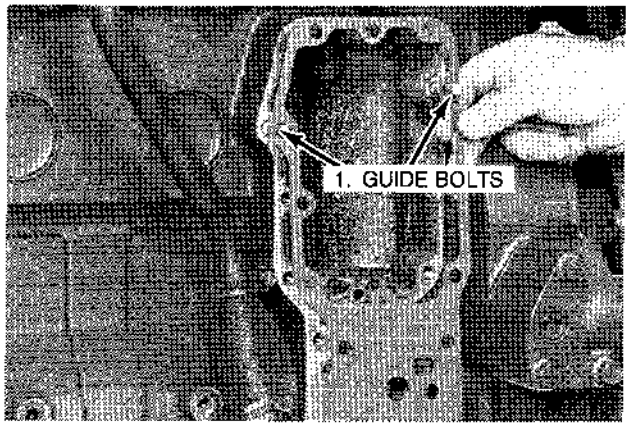
Oil Cooler and Filter Housing Installation

STEP 25



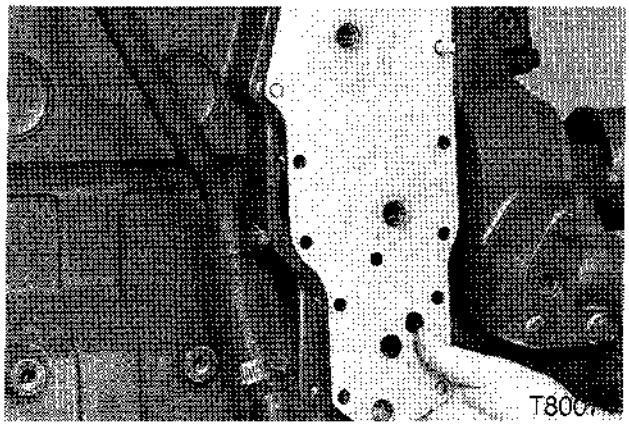
Install the cold oil relief valve in the oil filter head.

STEP 26



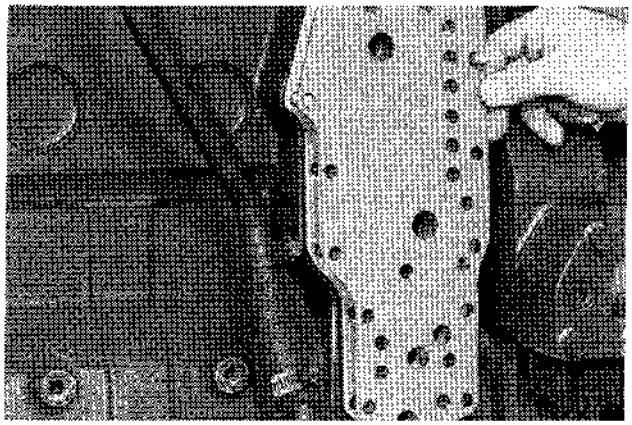
Install two guide bolts, 8M x 1.25 x 75 and a new oil cooler gasket.

STEP 27



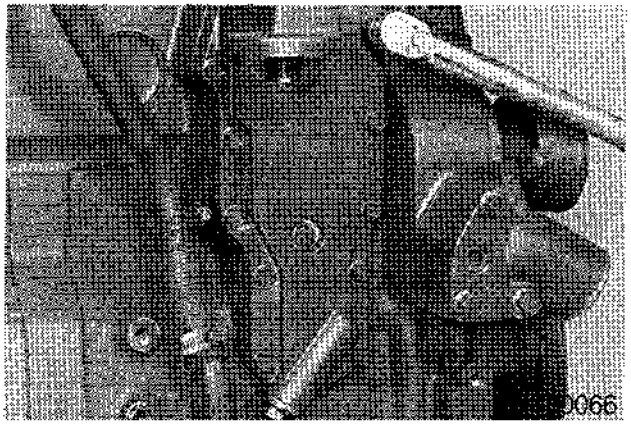
Install the oil cooler.

STEP 28



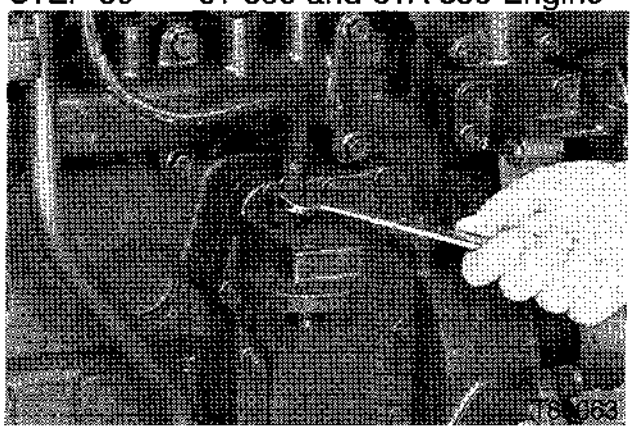
Install a new filter head gasket.

STEP 29



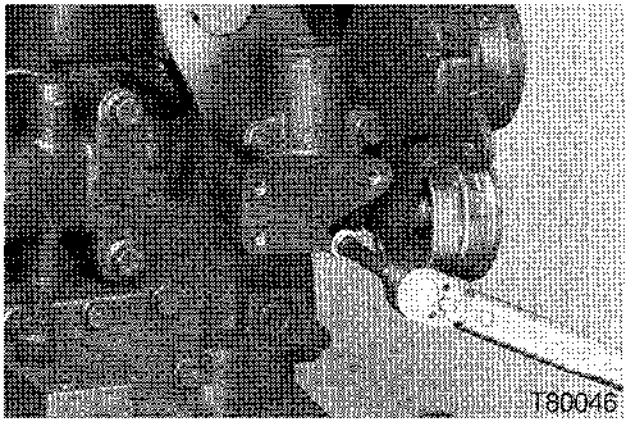
Install the oil filter head and the filter head bolts. Tighten the bolts to a torque of 21 to 27 Nm.

STEP 30 6T-590 and 6TA-590 Engine



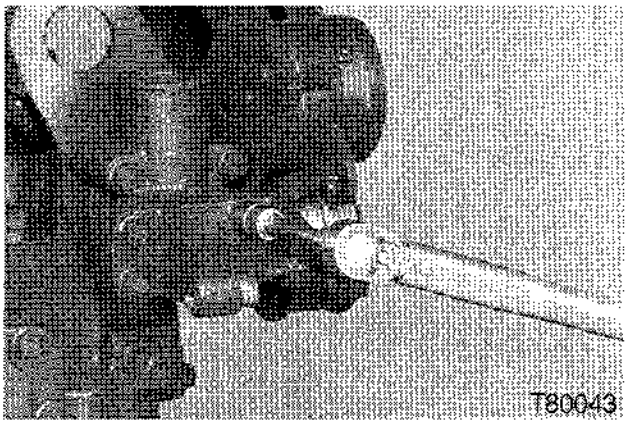
Connect and tighten the turbocharger pressure tube.

STEP 14



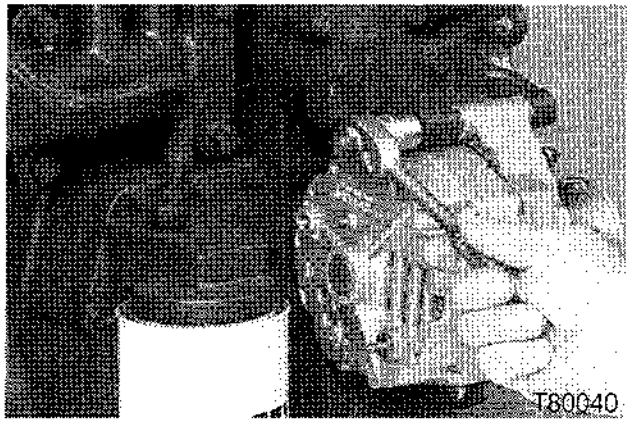
Install the thermostat housing assembly. Tighten the bolts to a torque of 21 to 27 Nm.

STEP 15



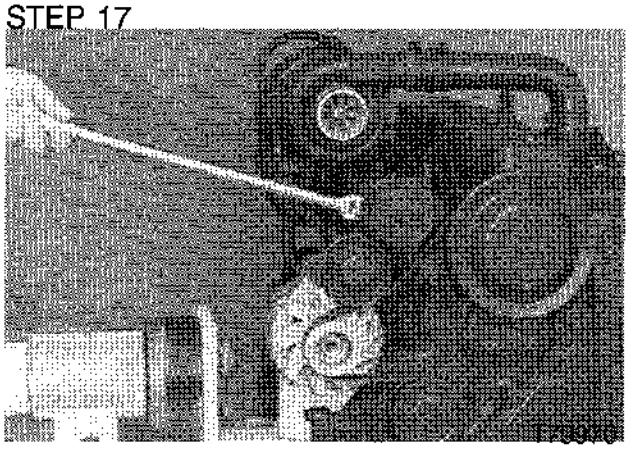
Install the alternator bracket and tighten the bolts to a torque of 21 to 27 Nm.

STEP 16



Install the alternator and tighten the bolts.

STEP 17



Lift the belt tensioner pulley and install the fan belt.

IMPORTANT: *See Step 25 through 27 to remove the air from the cooling system.*

Section

2465

TURBOCHARGER

Written In *Clear And Simple English*

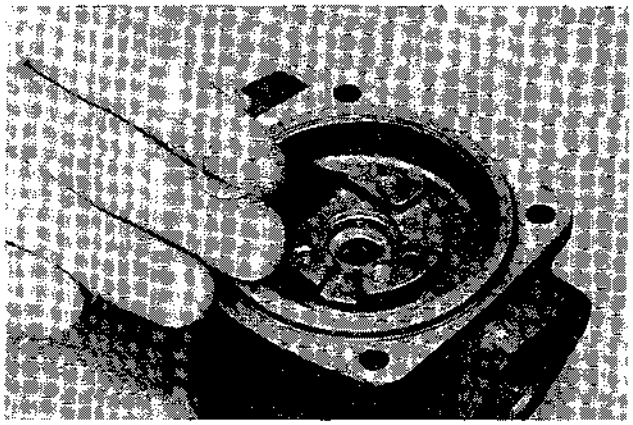
IMPORTANT: *This Turbocharger was made using the Metric Measurement system. All measurements and checks must be made with metric tools to make sure of an accurate reading when inspecting parts.*

CASE CORPORATION

Rac 8-26110

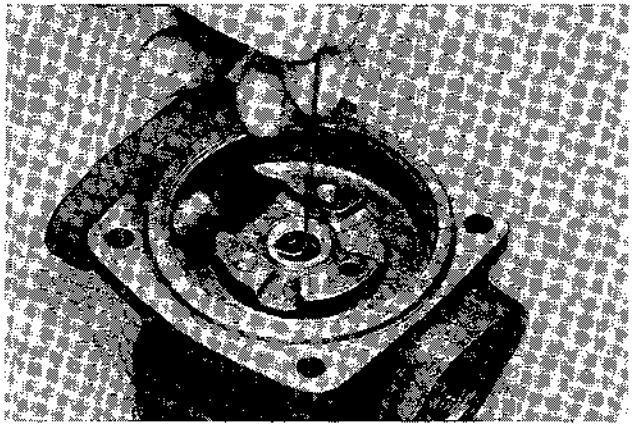
Printed in U.S.A.
October, 1984

STEP 43



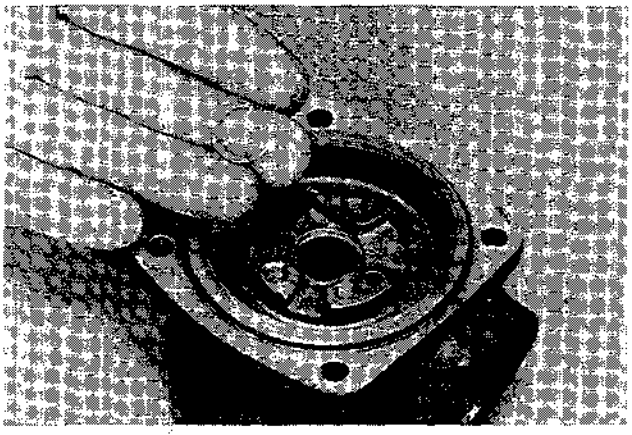
Remove the outer bearing retaining ring.

STEP 44



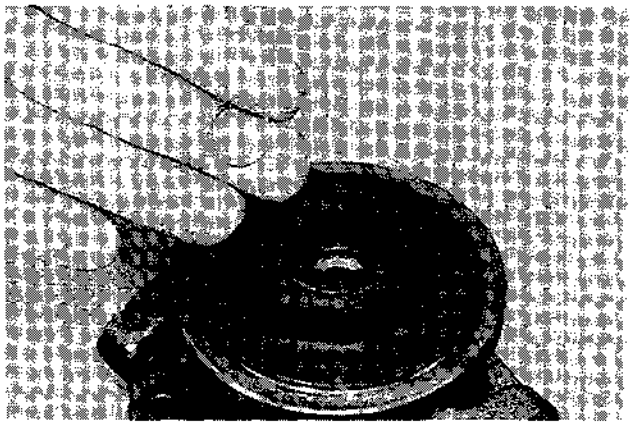
Use a wire hook and pull the bearing from the center housing.

STEP 45



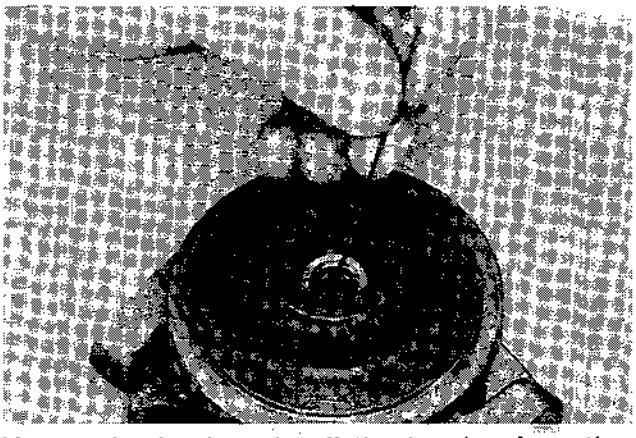
Remove inner bearing retaining ring.

STEP 46



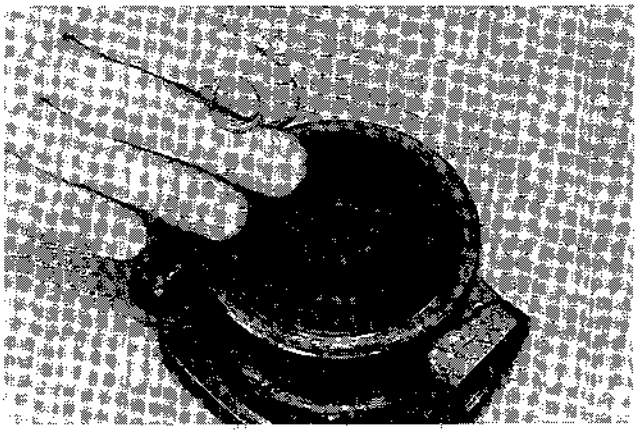
Turn the center housing over and remove the outer bearing retaining ring.

STEP 47



Use a wire hook and pull the bearing from the center housing.

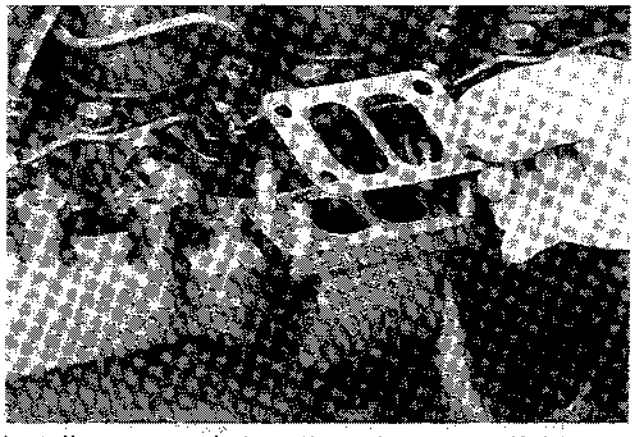
STEP 48



Remove the inner bearing retaining ring.

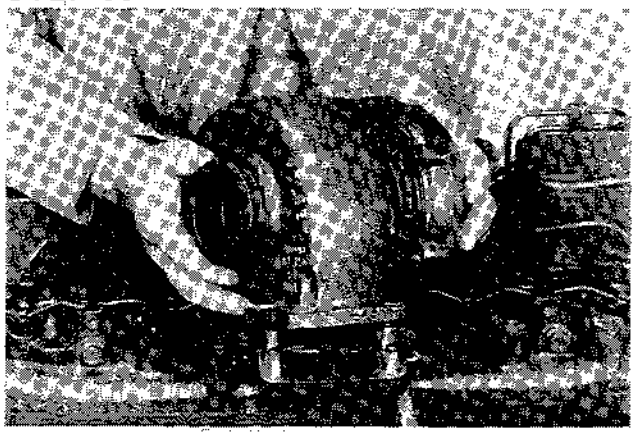
Installation

STEP 92



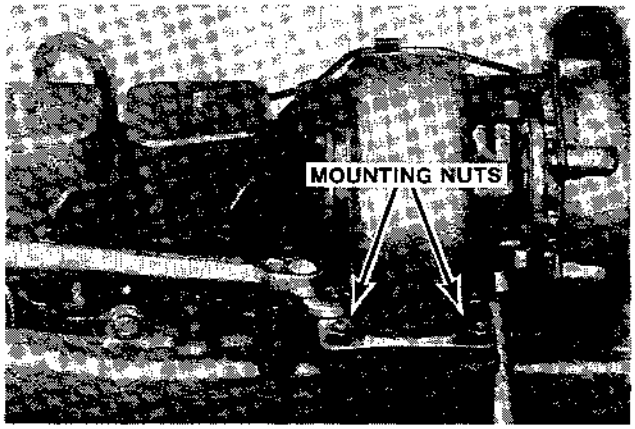
Install a new gasket on the exhaust manifold.

STEP 93



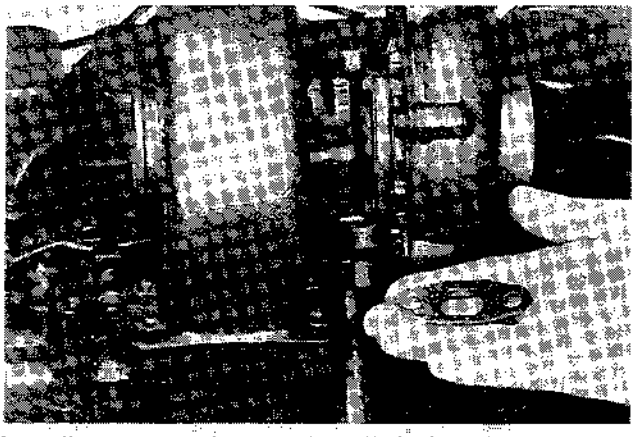
Install the turbocharger on the exhaust manifold.

STEP 94



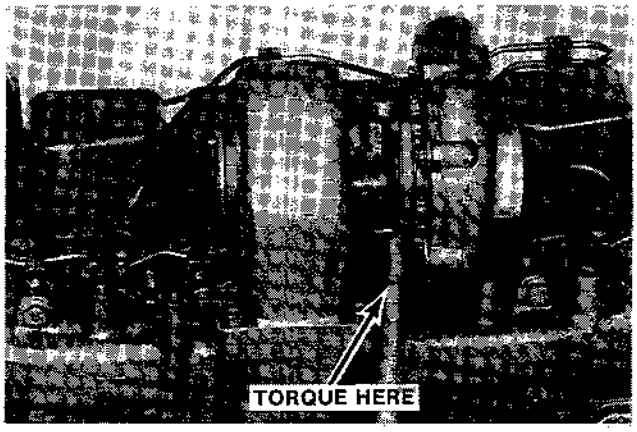
Install the turbocharger mounting nuts and tighten to a torque of 24 lb ft (32 Nm)(3.2 kgm).

STEP 95



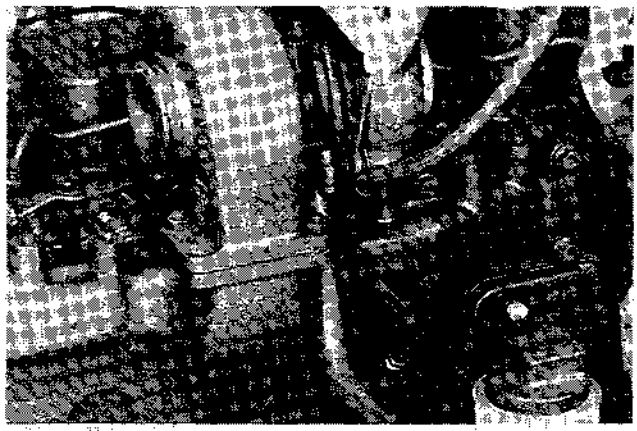
Install a new gasket on the oil drain tube.

STEP 96



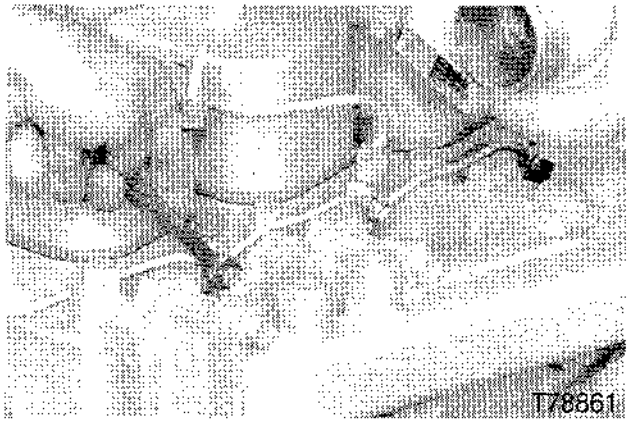
Install the oil drain tube bolts and tighten the bolts to a torque of 18 lb ft (24 Nm)(2.4 kgm).

STEP 97



Install and tighten the bolt for the oil supply tube clamp.

STEP 5

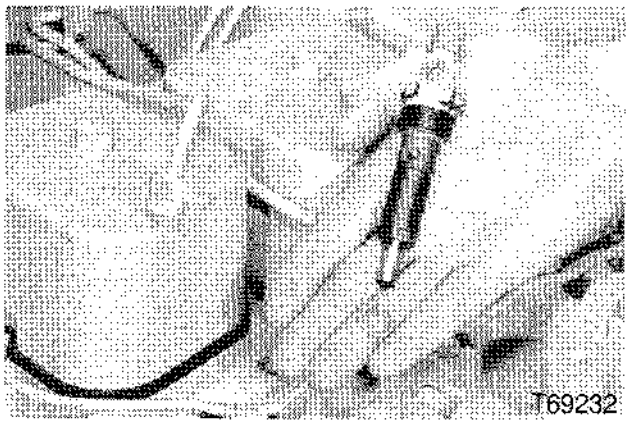


Remove the leak off bolt.

STEP 6

Install the special wrench and a wrench on the flat surface of the injector. Loosen the injector.

STEP 7



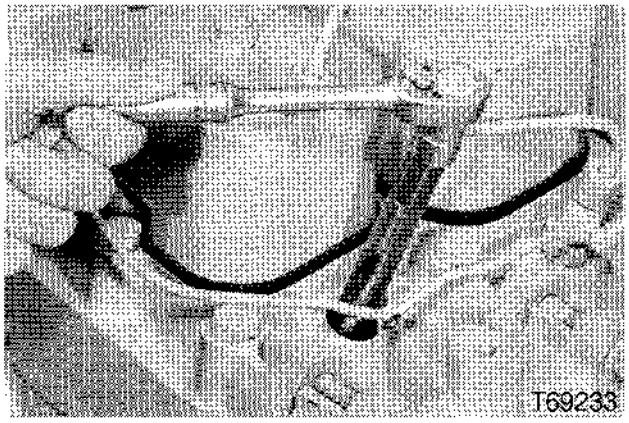
Remove the fuel injector from the engine. Remove and discard the sealing washer.

STEP 8

Repeat Steps 4 through 7 to remove the remaining injectors.

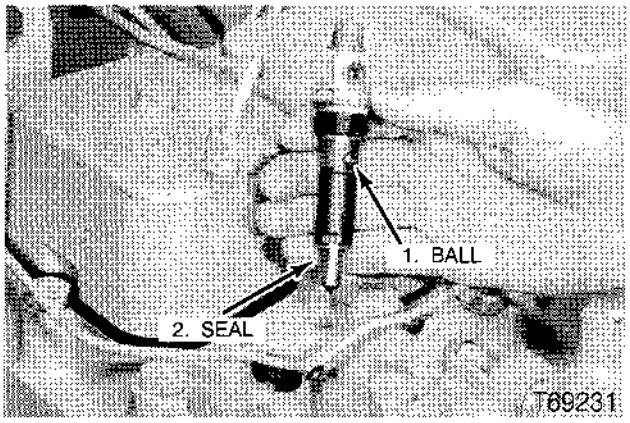
Installation

STEP 9



Use the injector bore cleaning tool, see Special Tools page for correct size cleaning tool, to clean the injector bore. Use compressed air to clean the injector bore.

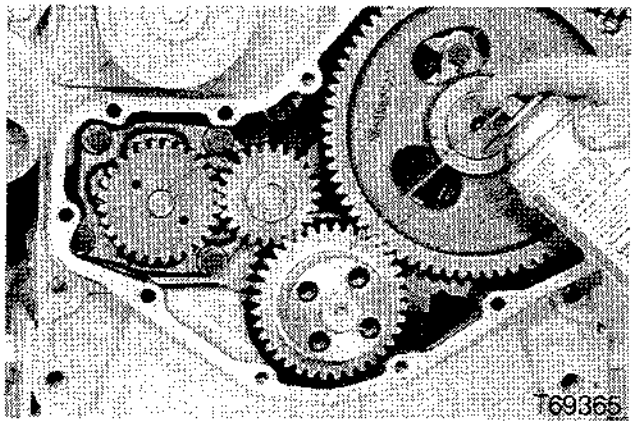
STEP 10



Install a new seal on the injector and install the injector in the cylinder head bore. The ball in the injector must align with the slot in the cylinder head bore.

NOTE: *Use only a 7 mm seal with a 7 mm injector and a 9 mm seal with a 9 mm injector.*

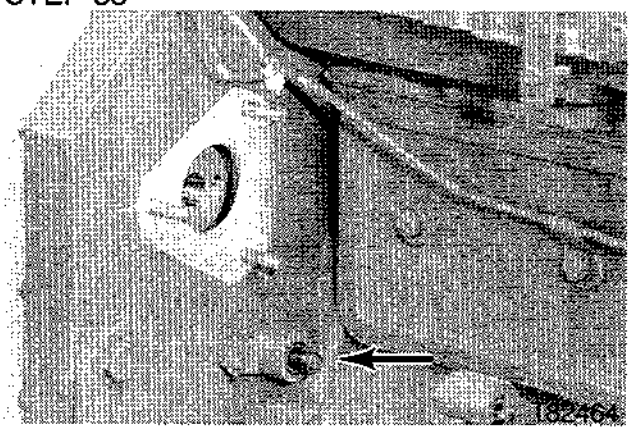
STEP 34



Clean the crankshaft seal surface with loctite safety solvent. Refer to Section 2425 in the Service Manual to install the front cover and the oil seal.

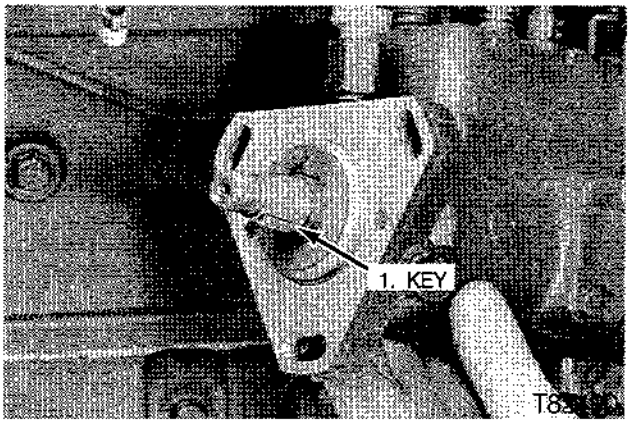
INJECTION PUMP TIMING

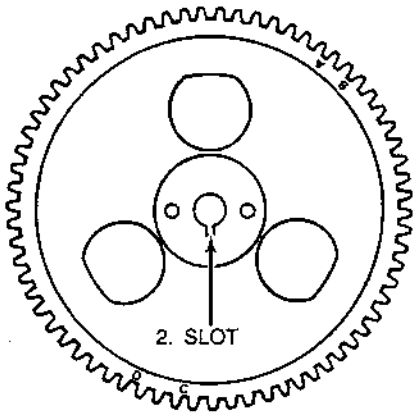
STEP 35



Make sure the locking pin is engaged in the camshaft gear.

STEP 36





TG3414

If the pump shaft is not in the locked position, rotate the shaft clockwise until the key in pump shaft and the slot in the drive gear are aligned.

SPECIFICATIONS

Filter Replacement (First and Second Stage)	Every 500 hours or when loss of engine power occurs
First Stage Filter	Full Flow, turn on type
Second Stage Filter	Full Flow, turn on type
Fuel System Operating Pressure	5 to 7 PSI (34.475 to 48.265 kPa) (3.448 to 4.827 Bar)

For Acceptable Number Two Diesel Fuel

A.P.I. Gravity (Min)	30
OPour Point (Max)	10°F (5°C) below ambient operating temperature.
Distillation (90% Point)	540 to 625°F (282 to 329°C)
Flash Point (Min)	125° (52°C) or legal
Kinematic Viscosity Centistokes	
At 100°F (38°C)	2.0 to 4.3 Seconds*
Cetane Number (Min)	40 (45 to 55 For Cold Temperature or High Altitude Use).
Water and Sediment Volume (Max)	0.05%
Ash Weight (Max)	0.01°
Sulphur Weight (Max)	0.5°
Carbon Residue or 10° Residuum (Max)	0.2°
Corrosion, Copper Strip, 3 hours at 212°F (100°C)	Number 3

(* 32 to 40 Saybolt Universal Seconds)

FUEL SYSTEM

Filter Removal and Installation

NOTE: *At the first filter change and each filter change after that, always install filter kit, Case Part Number A77470.*

1. Clean the filter head, elements and the engine area next to the filters.

2. Remove the drain plug from the first stage filter.

3. To remove the filters, use a clamp type filter wrench.

4. Put a small amount of clean oil or grease on the seals of the new filters. Install the filters. Turn the filters clockwise until the seal comes in contact with the filter head. Use your hand to tighten the filter one half of a turn. To get the correct seal, loosen the filters and again tighten one half to three fourths of a turn after the seal comes in contact with the filter head.

NOTE: *When the filters are too tight, you can cause damage to the gaskets and filters.*

5. Make sure there is fuel in the fuel tank.

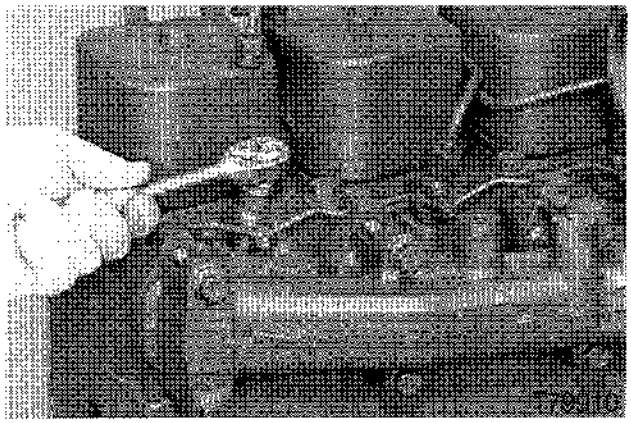
6. Loose the air removal screw above the filter head. Actuate the hand primer pump. Close the air removal screw when clear fuel with no air bubbles flows from the screw.

7. The ignition switch must be turned to the ON position to energize the fuel shutoff solenoid. Do not turn the engine over until Step 8 is completed.

8. Loosen the air removal screw on the fuel injection pump. Actuate the hand primer pump, close the air removal screw when clear fuel with no air bubbles flows from the screw. Actuate the hand primer pump five more times to finish the air removal.

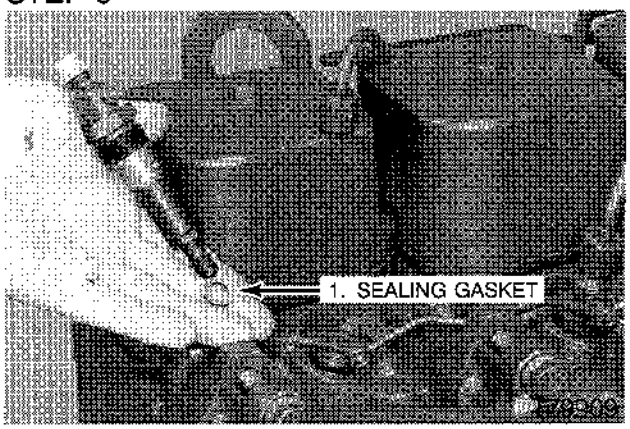
INSTALLING INJECTORS

STEP 8



Install a injector bore cleaning tool. Turn the tool clockwise. Use a ratchet wrench. Clean the bore with air under pressure or turn the engine over to remove the particles.

STEP 9

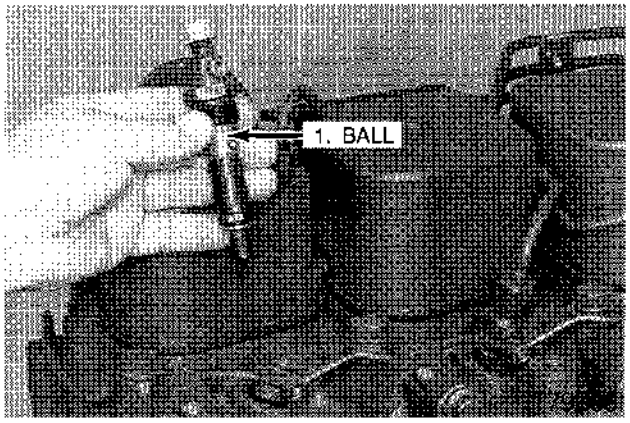


Install a new sealing gasket on the injector. Put a small amount of white grease or light oil on the gasket to keep the gasket in position.

IMPORTANT: *Do not add lubrication to the complete nozzle assembly or nozzle bore. The lubrication will become hard during operation of the engine. The injector will be difficult to remove from the cylinder head.*

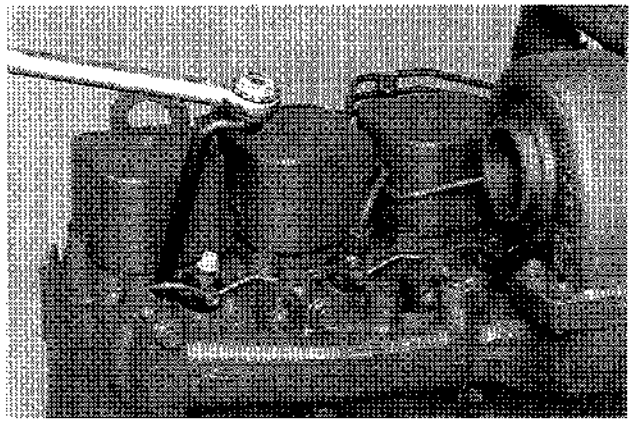
NOTE: *Use only a 7 mm sealing gasket with a 7 mm injector and a 9 mm sealing gasket with a 9 mm injector.*

STEP 10



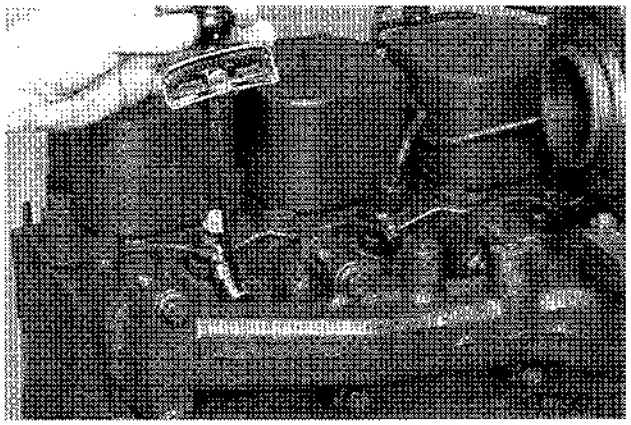
Install the injector in the cylinder head bore. The ball in the injector must align with the slot in the cylinder head bore.

STEP 11



Tighten the injector retaining nut to a torque of 55 to 60 Nm.

STEP 12

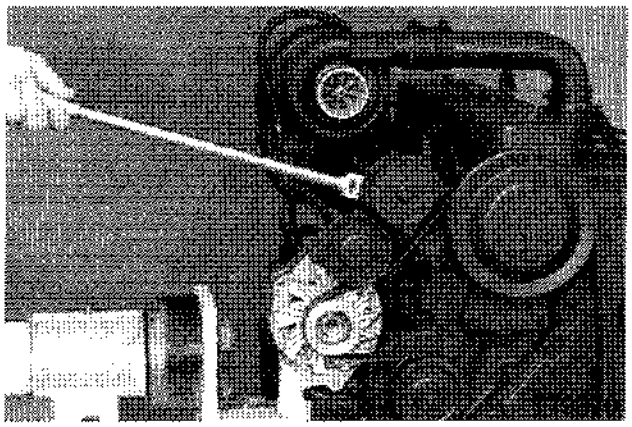


Install the gasket and the leak off bolt. Tighten the leak off bolt to a torque of 7 to 9 Nm.

NOTE: *Make sure the top of the gasket does not touch the leak off line.*

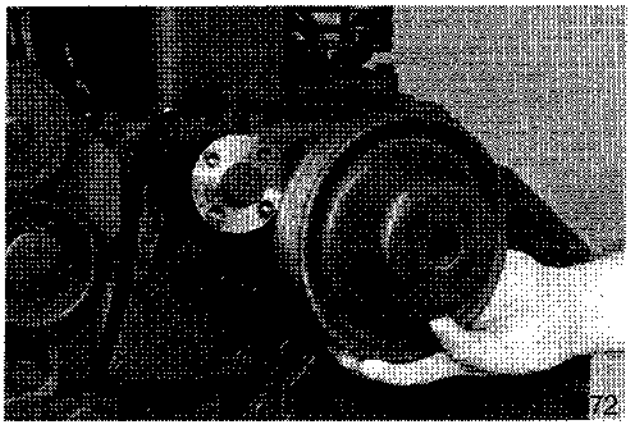
Injection Pump Gear Removal

STEP 32



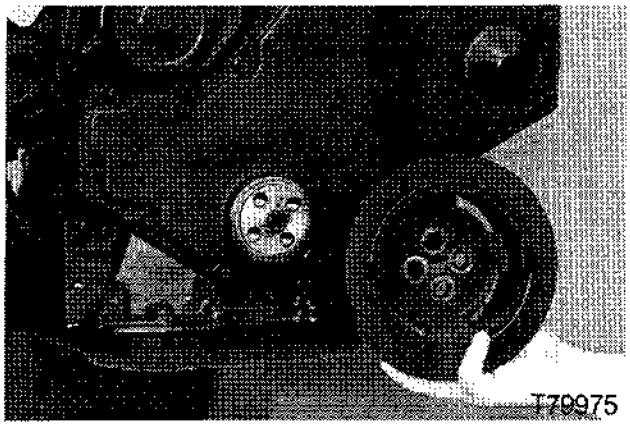
Lift the belt tensioner and remove the fan belt.

STEP 33



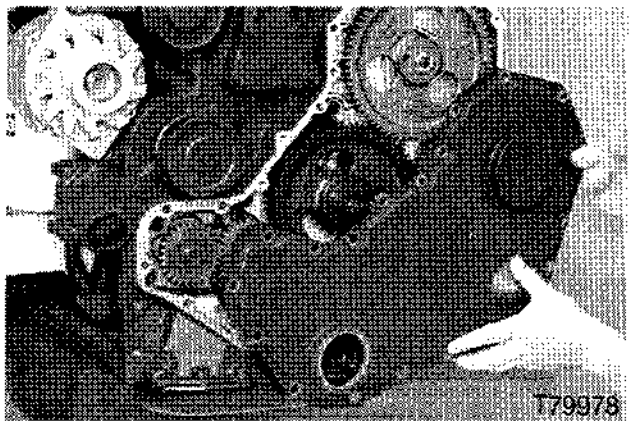
Remove the pulley bolts and the fan pulley.

STEP 34



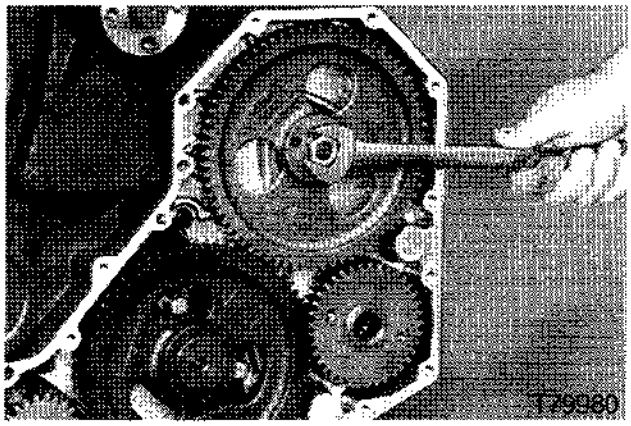
Remove the bolts and the crankshaft pulley.

STEP 35



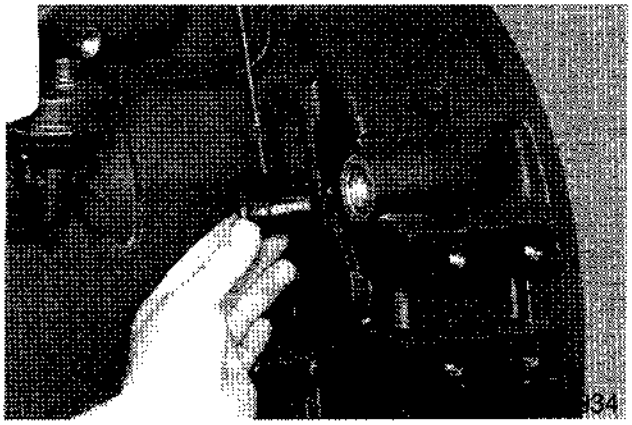
Remove the bolts and the front cover.

STEP 36



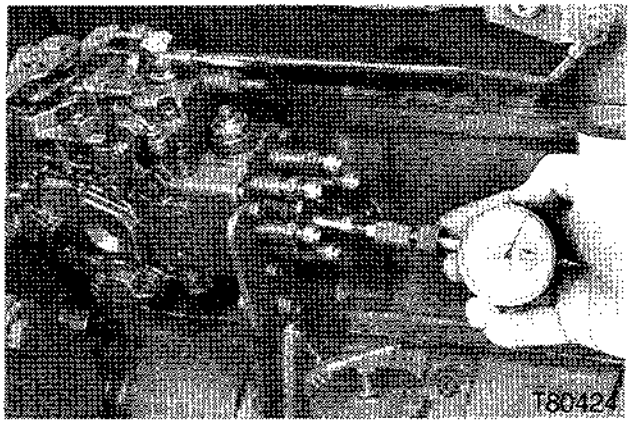
Loosen the nut on the injection pump shaft.

STEP 37



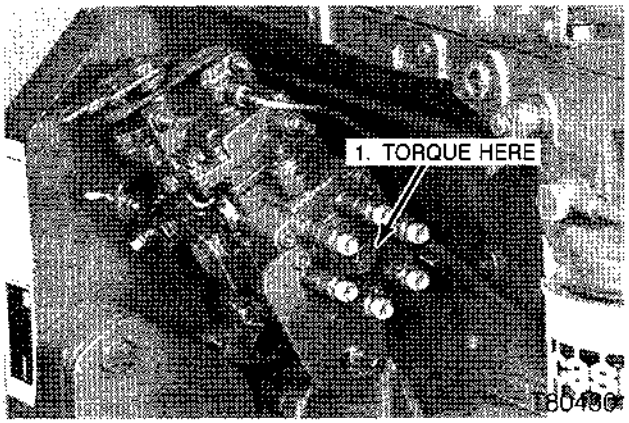
Remove the plug from the flywheel housing.

STEP 86



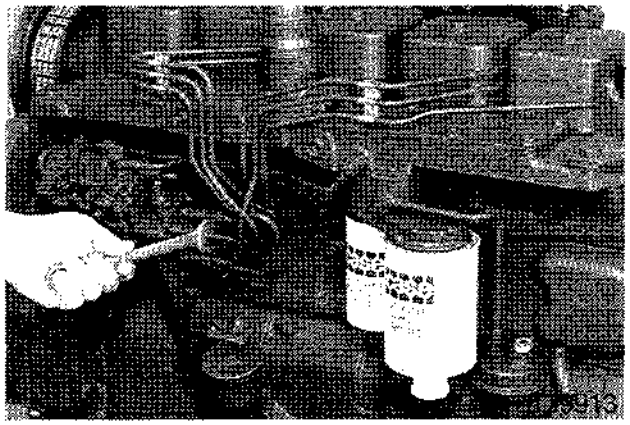
Remove the dial indicator from the injection pump.

STEP 87



Install the injection pump plug and tighten to a torque of 8 to 10 Nm.

STEP 88

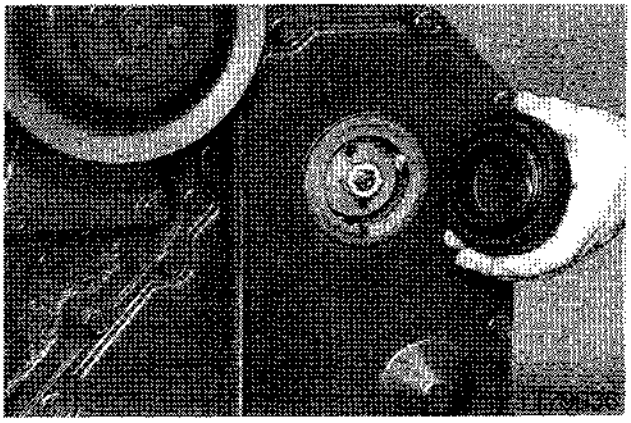


Connect and tighten injection lines to the injection pump and fuel injectors.

STEP 89

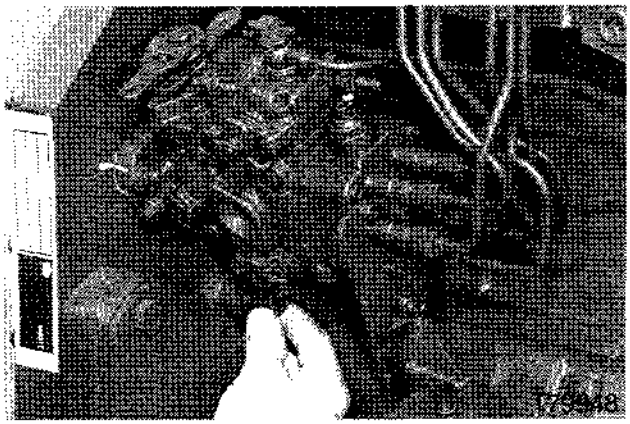
Install and tighten the injector line bracket.

STEP 90



Install the front cover.

STEP 91



Pull the lock pin out of the camshaft gear.

(11) Normally Closed Brake Relay

Check Points	Good Reading	Possible Cause of Bad Reading
Terminal for wire 0 to ground.	Continuity	Bad ground circuit.

NOTE: *Put the key switch in the ON position. Put the neutral lock/parking brake control lever in the ENGINE START/ PARKING BRAKE APPLIED position. On the 650G and 850G put the master disconnect switch in the ON position.*

Terminal for wire 21N to ground.	12 volts 550G and 650G 24 volts 850G	Neutral start switch not adjusted correctly. Bad wire between the normally closed brake relay and the neutral start switch (24). Bad neutral start switch (24).
Terminal for wire 12 to ground.	12 volts 550G and 650G 24 volts 850G	Bad wire between the normally closed brake relay and the key switch (13). Bad key switch (13).
Terminal for wire 52 to ground. (Do check for wire 12 first)	0 volts	Bad normally closed brake relay. Bad parking brake solenoid.

NOTE: *Put the neutral lock/parking brake control lever in the RUN position.*

Terminal for wire 21N to ground.	0 volts	Neutral start switch not adjusted correctly. Bad neutral start switch (24).
Terminal for wire 52 to ground. (Do check with relay installed)	12 volts 550G and 650G 24 volts 850G	Bad normally closed brake relay.

(12) Brake Solenoid

Check Points	Good Reading	Possible Cause of Bad Reading

NOTE: *Disconnect the harness connector at the brake solenoid.*

Check between the connector cavities of the connector to the solenoid.	Continuity 29.5 to 39.5 ohms at 70˚F	Bad ground circuit. Bad parking brake solenoid.

NOTE: *Put the key switch in the ON position. Put the neutral lock/parking brake control lever in the RUN position.*

Terminal for wire 52 to ground.	12 volts 550G and 650G 24 volts 850G	Bad wire between the brake solenoid and the normally closed brake relay (11). Bad normally closed brake relay (11).

NOTE: *If the readings are good, replace the brake solenoid.*

(54) Front Windshield Wiper Motor

NOTE: *Put the master disconnect switch in the ON position. Put the key switch in the ON position.*

Check Points	Good Reading	Possible Cause of Bad Reading
Terminal P to ground.	12 volts 650G 24 volts 850G	Bad 15 amp circuit breaker. Bad Orange 19B wire.

NOTE: *Turn the wiper/washer switch to HIGH.*

Terminal H to ground.	12 volts 650G 24 volts 850G	Bad wiper/washer switch. Bad Orange/White 63H wire.

NOTE: *Turn the wiper/washer switch to LOW.*

Terminal L to ground.	12 volts 650G 24 volts 850G	Bad wiper/washer switch. Bad Orange/White 63L wire.

NOTE: *Turn the disconnect switch to OFF. Put the wiper/washer switch to OFF. Disconnect the connector from the wiper motor. Test at the connections on the disconnected connector.*

Terminal L to Terminal S.	Continuity	Bad wiper/washer switch. Bad Orange/White 63H or 64H wire.
Terminal X to ground.	Continuity	Bad ground. Bad Black wire.

NOTE: *If the tests are good and wiper motor does not work, repair or replace the wiper motor.*

(55) Front Windshield Washer Pump

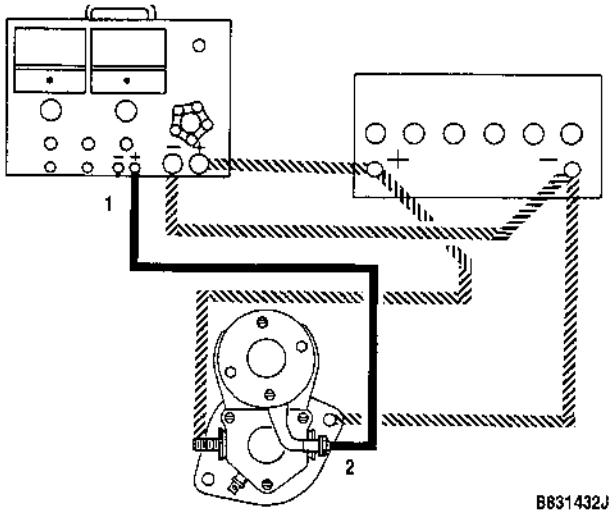
Check Points	Good Reading	Possible Cause of Bad Reading
Terminal for Black wire to ground.	Continuity	Bad ground. Bad Black wire.

NOTE: *Put the master disconnect switch in the ON position. Put the key switch in the ON position. Put the wiper/washer switch in the wash position.*

Terminal for Orange/White 67 wire to ground.	12 volts 650G 24 volts 850G	Bad wiper/washer switch. Bad Orange/White 67 wire.

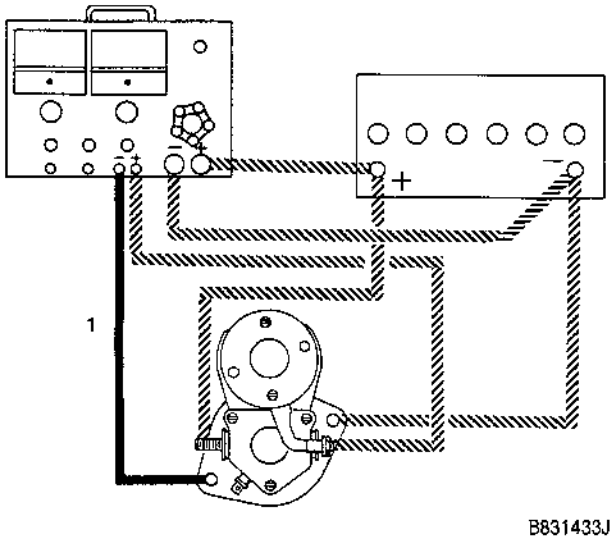
NOTE: *If the tests are good and the washer pump does not work, repair or replace the washer pump.*

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



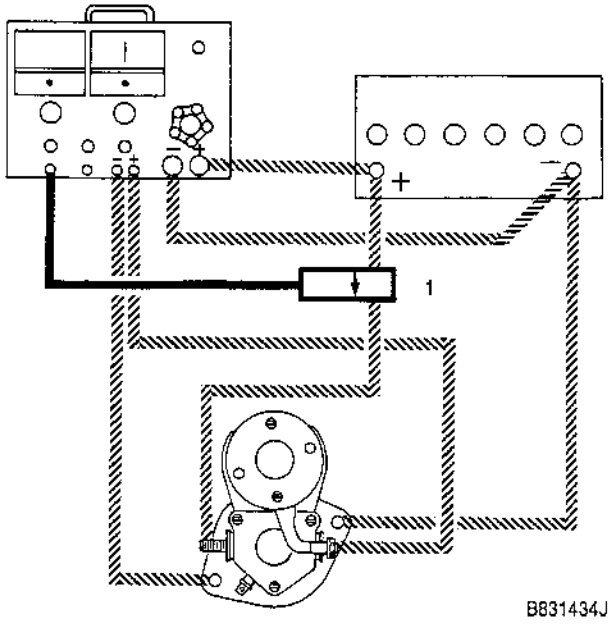
1. *Red Voltmeter Lead*
2. *Motor Terminal*

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



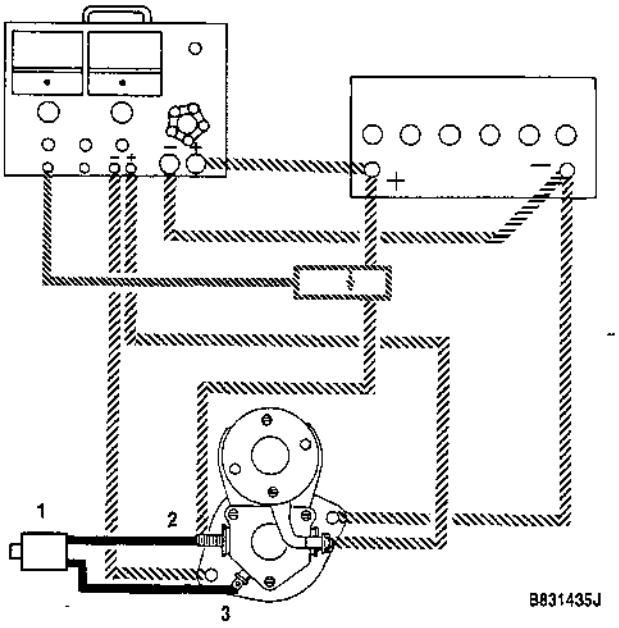
1. *Black Voltmeter Lead*

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



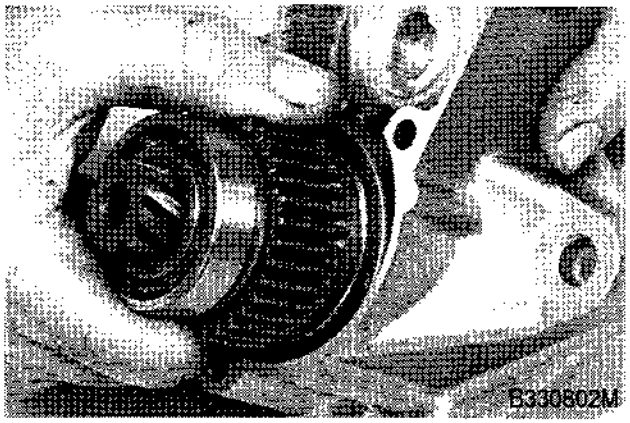
1. *Ammeter Clamp*

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



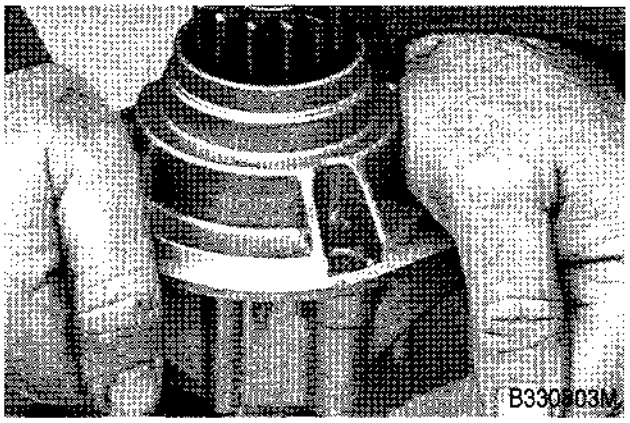
1. *Remote Starter Button*
2. *Battery Terminal*
3. *Switch Terminal*

STEP 35



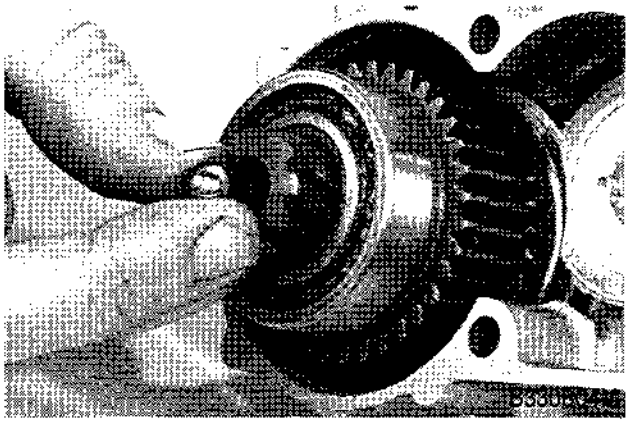
Start the starter drive into the starter drive housing.

STEP 36



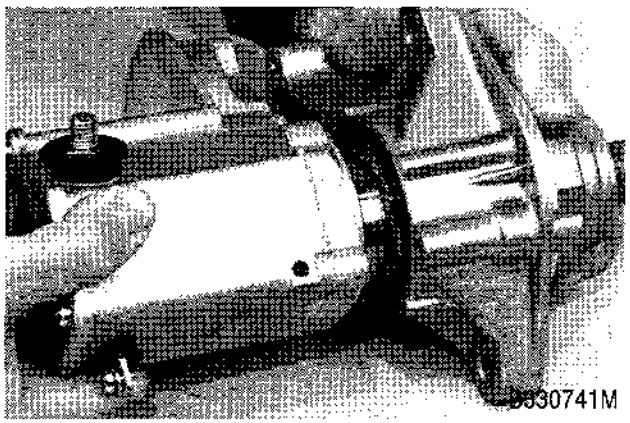
Push down the starter drive housing to push the starter drive all the way into the starter drive housing.

STEP 37



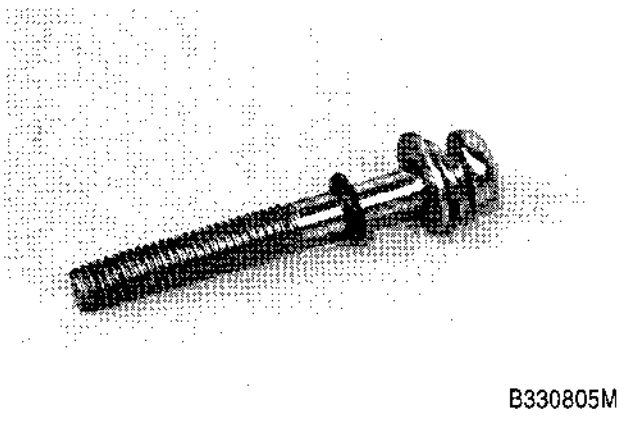
Put a small amount of grease in the hole in the starter drive and install the steel ball in the hole.

STEP 38



Assemble the starter drive housing and starter solenoid.

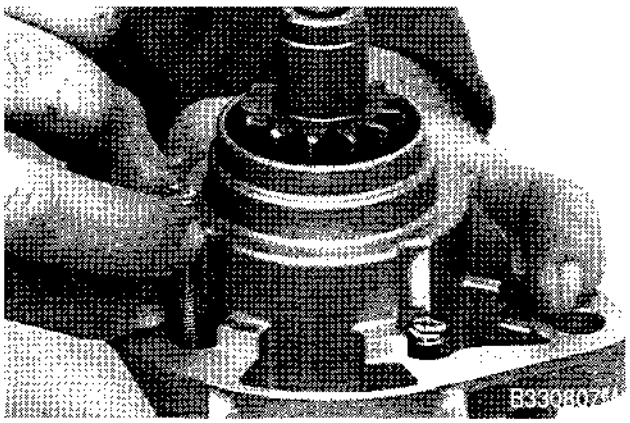
STEP 39



B330805M

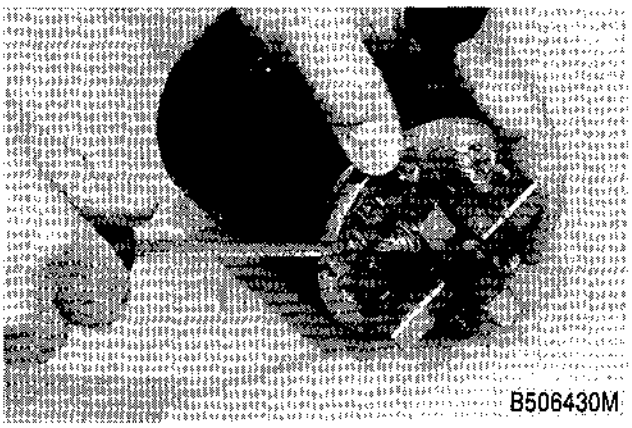
Install a lock washer, flat washer, and O-ring on the screws that hold the starter drive housing. Lubricate the O-rings.

STEP 40



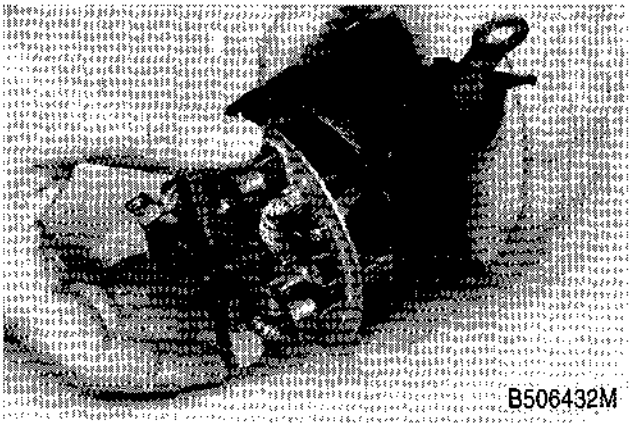
Install the screws in the starter drive housing.

STEP 7



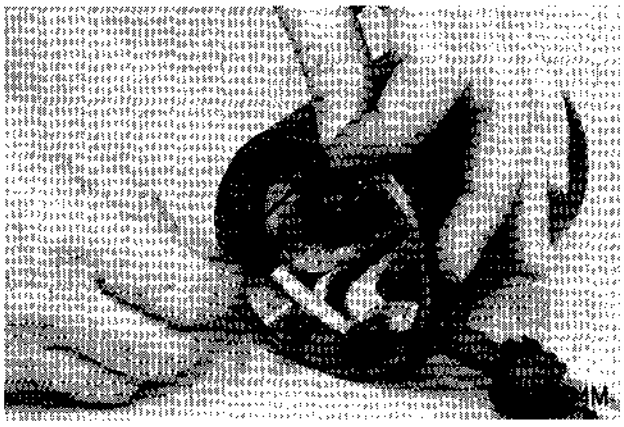
Remove the screws and lock washers that fasten the field coils to the brush holder.

STEP 8



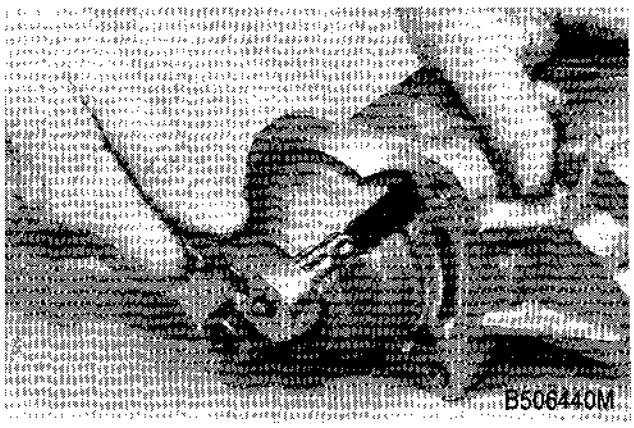
Remove the brush holder.

STEP 9



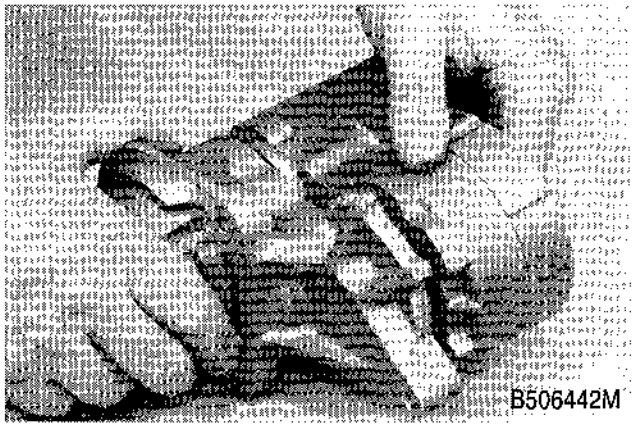
Remove and discard the O-rings from both ends of the field frame.

STEP 10



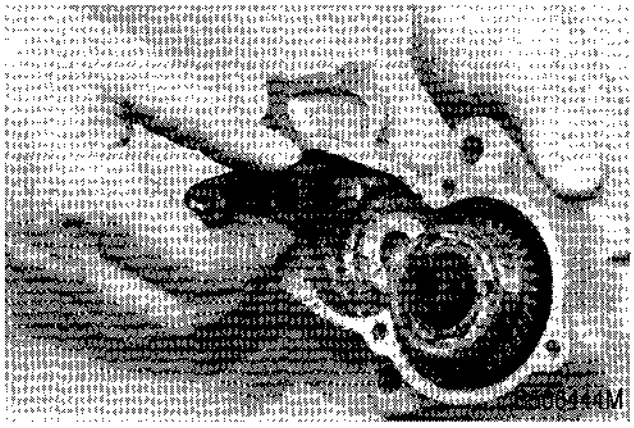
Remove the screws and lock washers from the starter drive housing.

STEP 11



Remove the starter drive housing from the solenoid housing.

STEP 12



Remove the pinion gear.

TABLE OF CONTENTS

CHECKING THE ACCURACY OF THE GAUGES

Engine Oil Pressure Gauge

1. Park the machine on a level surface.

2. Lower the attachments to the floor.

3. Stop the engine and put the neutral start lever in the START position.

4. Remove the cover plate above the instrument panel to get access to the connections at the engine oil pressure gauge.

5. Disconnect the tube from the fittings on the engine oil pressure gauge.

6. Connect a pressure gauge to the tube. The pressure gauge must be accurate in the range of 0 to 80 psi (0 to 552 kPa, 0 to 37 bar).

7. Start and run the engine at full throttle.

8. Look at the pressure gauge. The pressure gauge must indicate a pressure above 45 psi (310 kPa, 3.0 bar). If the pressure gauge does not indicate the correct pressure, check the hose and the tube between the engine and the pressure gauge. If the problem is not found, the problem is in the engine.

9. If the pressure gauge indicated a pressure above 45 psi (310 kPa, 3.0 bar) continue to run the engine until the water temperature gauge is in the green zone.

10. Run the engine at full throttle.

11. Read the pressure gauge. The pressure gauge must indicate 50 to 70 psi (345 to 483 kPa, 3.4 to 4.7 bar). If the pressure gauge does not indicate this pressure, check the hose and the tube between the engine and the pressure gauge. If the problem is not found, the problem is in the engine.

12. If the pressure reading was 50 to 70 psi (345 to 483 kPa, 3.4 to 4.7 bar). Make a record of the reading.

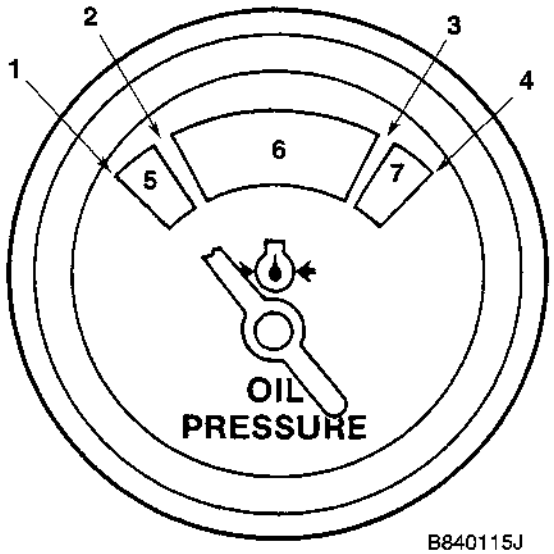
13. Stop the engine.

14. Disconnect the pressure gauge from the tube.

15. Donnect the tube to the fittings on the engine oil pressure gauge.

16. Start and run the engine at full throttle.

17. Make sure the water temperature gauge is in the green zone and read the engine oil pressure gauge. Make a record of the indication.



1. *Zero*
2. *15 psi (103 kPa, 1.0 bar)*
3. *85 psi (586 kPa, 5.7 bar)*
4. *100 psi (690 kPa, 6.8 bar)*
5. *Red*
6. *Green*
7. *Amber*

18. Compare the reading of the pressure gauge in step 12 to the reading of the oil pressure gauge in step 17. The two readings must be approximately the same.

19. If the two readings are not approximately the same, replace the engine oil pressure gauge.

Transmission Oil Pressure Gauge

1. Park the machine on a level surface.

2. Lower the attachments to the floor.

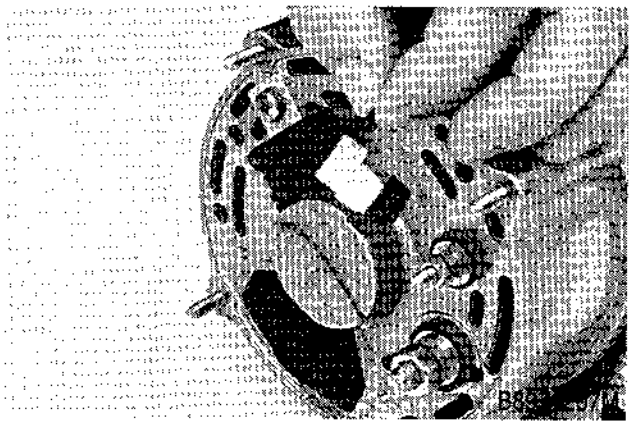
3. Stop the engine and put the neutral start lever in the START position.

4. Remove the cover plate above the instrument panel for access to the back of the transmission oil pressure gauge.

5. Disconnect the hose from the connector on the back of the transmission oil pressure gauge.

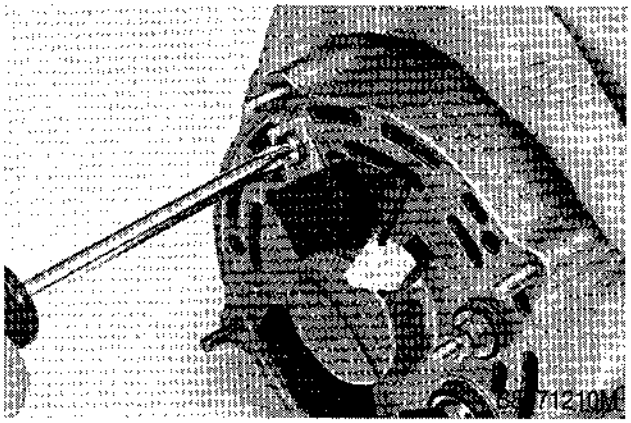
6. Connect a pressure gauge to the hose. The pressure gauge must be accurate in the range of 0 to 400 psi (0 to 2758 kPa, 0 to 27.2 bar).

STEP 7



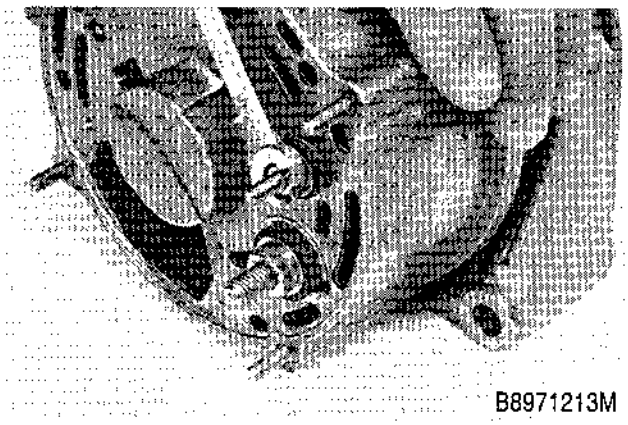
Disconnect the lead for the capacitor.

STEP 8



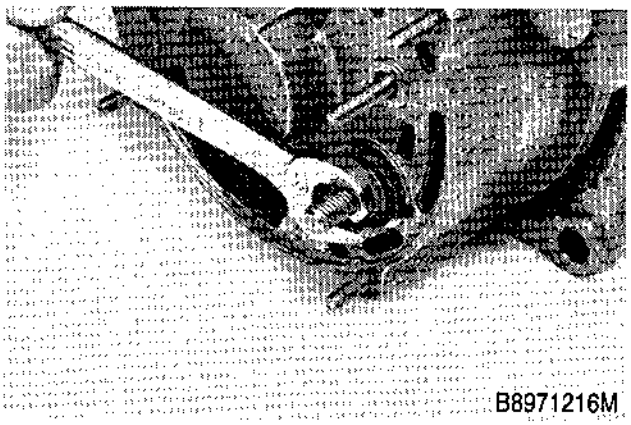
Loosen and remove the screw and remove the capacitor.

STEP 9



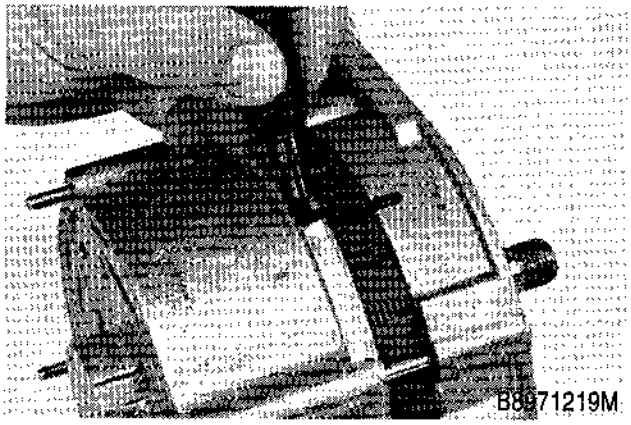
Loosen and remove the nut, flat washer, and fiber washers from the D+ terminal.

STEP 10



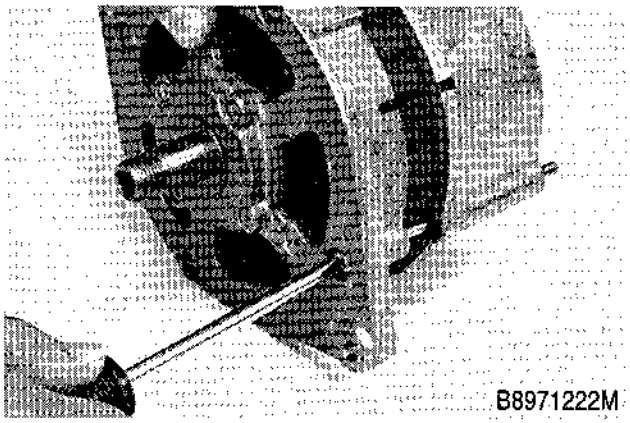
Loosen and remove the nut, flat washer, and fiber washers from the B+ terminal.

STEP 11



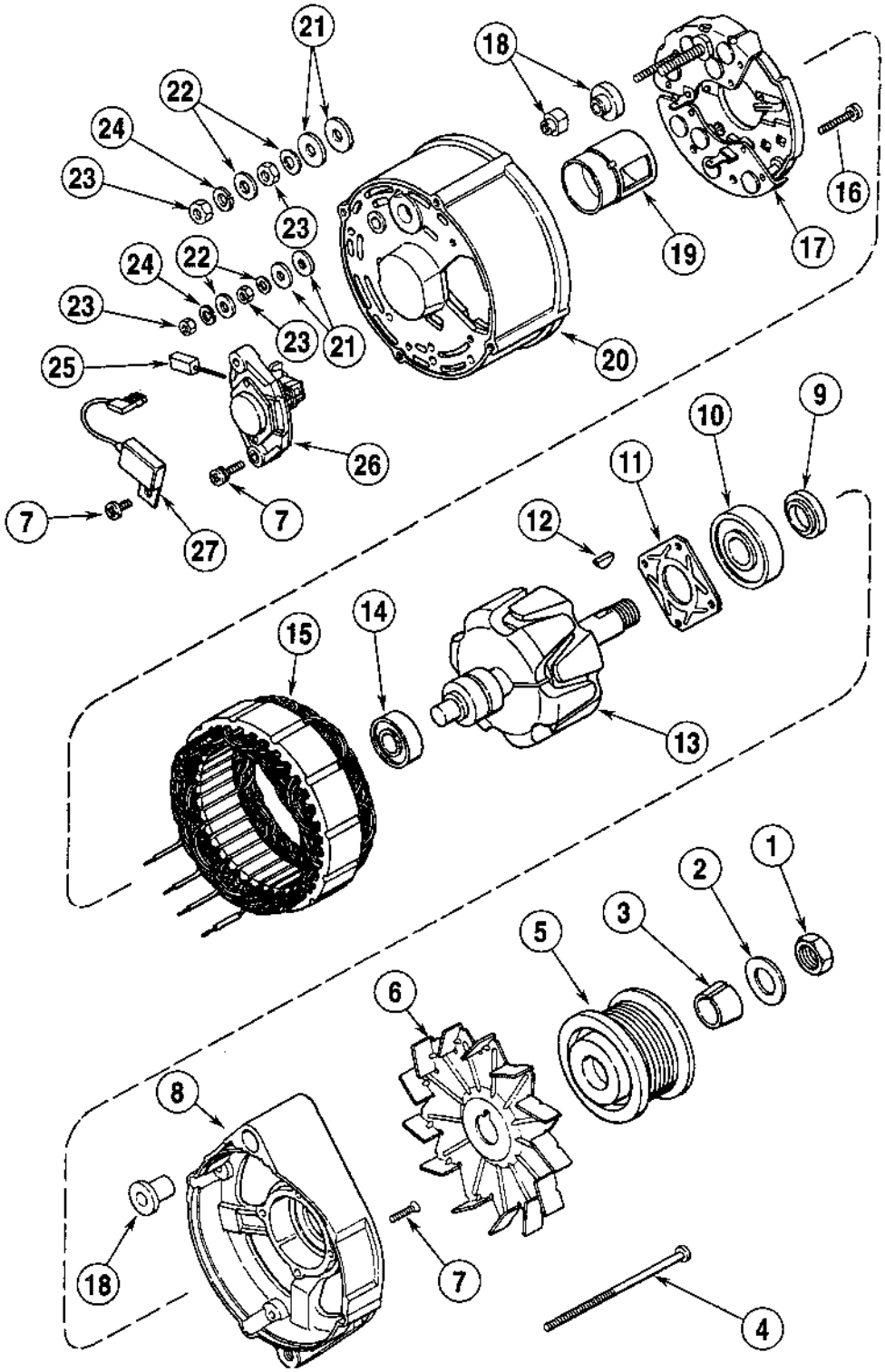
Make an alignment mark on the cover, the stator, and the housing. Loosen and remove the screws that fasten the cover, stator, and housing together.

STEP 12



Loosen and remove the screws that fasten the cover, stator, and housing together.

45 AMPERE AND 95 AMPERE ALTERNATOR



1. *Nut*
2. *Lock Washer*
3. *Spacer*
4. *Screw*
5. *Pulley*
6. *Fan*
7. *Screw*
8. *Cover*
9. *Spacer*
10. *Front Bearing*
11. *Bearing Retainer*
12. *Key*
13. *Rotor*
14. *Rear Bearing*
15. *Stator*
16. *Screw*
17. *Rectifier Bridge*
18. *Insulator*
19. *Shield*
20. *Housing*
21. *Fiber Washer*
22. *Flat Washer*
23. *Nut*
24. *Lock Washer*
25. *Brush*
26. *Voltage Regulator and Brush Holder*
27. *Capacitor*

GLOSSARY OF TERMS

Abrasives	Gritty or abrasive types of soils that accelerate wear on the undercarriage parts. Wear is accelerated with moist abrasives and tight tracks.
Appraisal manual	A Case publication (Form Number BUR 8-17960) that has charts for finding the wear percentage after measuring an undercarriage component.
Back-bending	A pushing together of the track chain parts between the bottom of the sprocket and the rear track roller. This occurs during reverse travel with excessively loose track. The condition is sometimes called Back Jamming.
Bushing	A component of the track link assembly through which the pin of the next assembly passes. The pin of the next assembly then pivots on the bushing.
Carrier roller	The carrier roller guides and supports the upper part of the track chain between the sprocket and idler wheel.
Case Lubricated Track (CLT)	A track chain assembly that is sealed and lubricated with an oil reservoir in each pin. Each link is sealed to keep contamination out and the lubricant in.
Dry joint	This is a CLT track joint that has lost all lubricant. Internal wear begins after loss of lubricant.
Dry turn	A procedure to turn the track pins and bushings without putting new oil in each pin. This reduces the service cost but results in a shorter track life.
External wear	Wear that occurs on the outside surface of track bushings.
Extrudable material	Material that squeezes out from between undercarriage parts instead of lodging and becoming compressed.
Flotation	The ability to stay on the surface of the ground. Correct flotation occurs when the track shoes penetrate fully into the ground without sinking below the surface.
Forward drive side wear	The wear pattern of the sprocket teeth that results from the bushings wearing into the sprocket tooth during forward travel.
Grouser	The metal bars on the track shoes that give traction to the machine.
Hours of use	The number of hours a machine has worked according to the hourmeter.
Idler	The wheel that guides the track chain around the front of the track frame.
Internal wear	The wear between a track pin and bushing. This is also called pitch wear.
Lifetime lubricated	This refers to a part that is filled with lubricant and then sealed. No maintenance is required.

FACTORS CONTROLLING UNDERCARRIAGE WEAR

You can not stop undercarriage wear - even if you have the best design and top quality parts. You can, however, increase the undercarriage life if you understand the causes of wear.

WEAR FACTORS YOU CAN NOT CONTROL

Soil and underfoot conditions can not be controlled. These include abrasive soils, impact, packing and moisture.

Abrasive Soils

Each type of soil a machine works in has a different level of abrasiveness. Generally, the higher the abrasiveness, the higher the wear rate.

Moisture also plays a major roll in the abrasiveness of soils. A sand slurry will be less abrasive than a damp sand, especially if that sand is packing in the sprocket roots and around the bushings. Wet abrasives act like grinding compounds.

Low Abrasiveness

Silts and clays are in this category. When wet, this type soil feels slick and can be easily molded

Moderate Abrasiveness

Silts or clays that contain a low amount of rounded sand particles and enough moisture to stick together are in this catagory.

High Abrasiveness

These soils contain a high amount of sharp, irregular shaped sand particles.

Impact

Impact is best described as the amount of grouser penetration in the ground. The effect of high impact loads can be reduced by reducing the machine speed and by using the smallest track shoes possible.

Low Impact

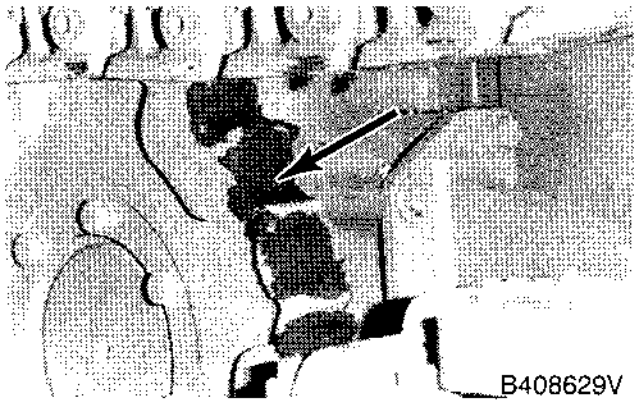
Track shoe grousers will completely penetrate the ground surface with little or no rock or other irregularities.

High Impact

Track shoe grousers will not penetrate the ground surface. Large rock or large irregularities cause high impact loads on the undercarriage system. Rocky terrain causes bending, breaking and chipping of the components. Reduce the machine speed and use the smallest track shoes possible.

Packing

Packing materials are any materials that stick to or pack around the moving components. To maintain correct track tension, the tracks must be adjusted as often as required when working in this type of soil condition.



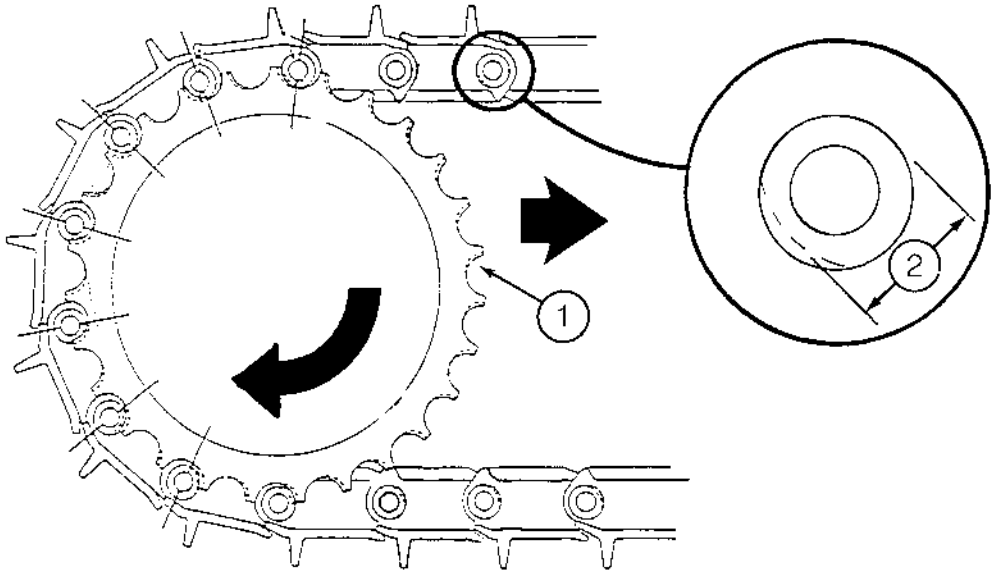
Packing materials cause a mismatch between components, particularly between the chain and sprocket. The packing materials tighten the chain. This causes increased stress and strain on links, pins, bushings, and the contact surfaces between mating parts. For example, as mismatch occurs due to packing in the sprocket root, each track bushing rides higher in the sprocket. This condition causes rapid and severe forward and reverse wear and chain-to-sprocket "jumping" that is indicated by a loud "banging" noise. This results in high impact loads that cause additional wear and cracking.

This packing condition can also stop rollers from turning. When this happens, the track chain slides over that spot on the roller. This sliding causes a flat spot on the roller.

Packing materials increase the abrasive effect of most material by not allowing the material to escape. Wear is then accelerated. The following three pages illustrate what happens as a clean drive sprocket becomes packed with material.

Sprocket Forward Operation Wear (Machine Traveling Forward)

When driving forward, the sprocket teeth contact the bushings at about 6 o'clock. Most of the torque required to move the machine occurs at this point. The bushing does not rotate against the sprocket until leaving the sprocket at about 11 to 12 o'clock. This is normally not a critical wear factor because the torque was transmitted at the 6 o'clock position. It becomes a problem only when track trension is too tight.



B912298J

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

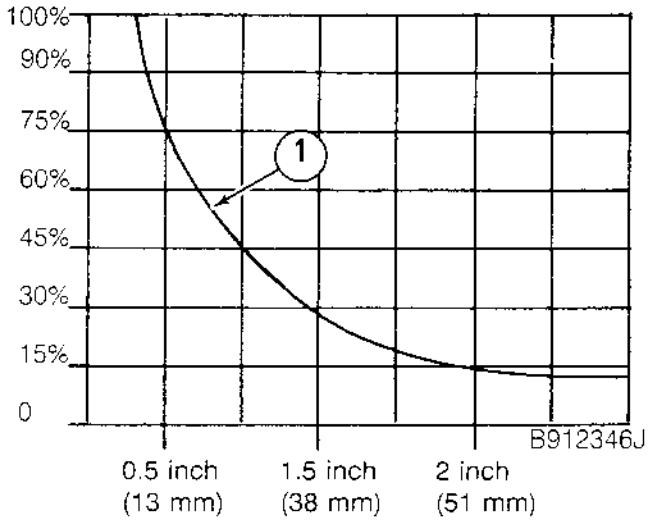
Correct Tension

Correct track adjustment is the most important factor that helps to control undercarriage wear. Track sag of 1-1/2 to 2 inches must be maintained for all Case crawlers.

IMPORTANT: *When operating in packing conditions (mud, snow, etc.) material will stick to the track parts and cause the track tension to be too tight. Check and adjust the track tension often during these conditions.*

The following chart shows track tension (% of tightness). A tight track requires more horsepower to move the machine, increases fuel consumption, and can reduce bushing and sprocket life up to 2.5 to 3 times.

Track Sag Adjustment Chart

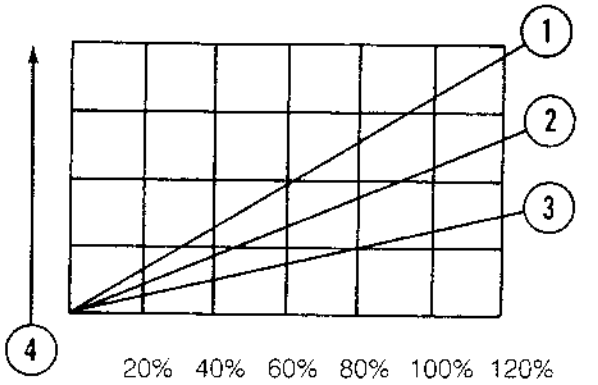


1 Track Tension (Percent Tight)

Bushing and Sprocket Wear Chart

The tighter you have the tracks, the faster the wear. The following chart illustrates the relationship between wear rate and track sag.

NOTE: *It is recommended that you turn the pins and bushings at the 100% wear limit.*



1. 1.5 to 2 inch (38 to 51 mm) Track Sag
2. 1 inch (25 mm) Track Sag
3. 0.5 inch (13 mm) Track Sag
4. Hours of Useful Track Life

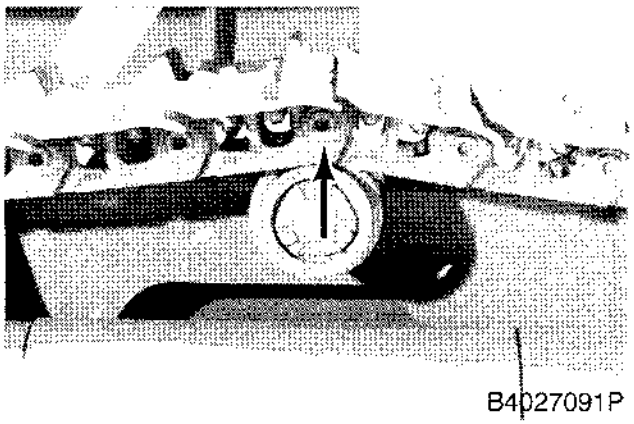
NOTE: *120% Wear is Running the Track to Destruction.*

Procedure to Adjust the Track

1. Park the machine on a level surface and do not clean the tracks.

2. Drive the machine forward the length of the track. Do not use the brakes to stop the machine.

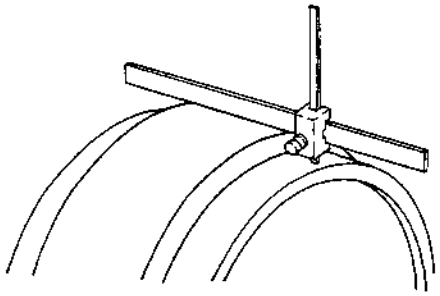
3. Stop the machine so that a track pin is over the front carrier roller.



IDLER WEAR

The only wear measured on the idler is the tread wear. This wear is normal and is caused by the track links moving around the idler.

Use the depth gauge to measure tread wear as shown. Make sure that the treads are clean. Measure at the center of the treads because this is the area of the most wear. Record the measurements on the Track Component Appraisal Form. See the chart on page 22 to find the percent of wear.



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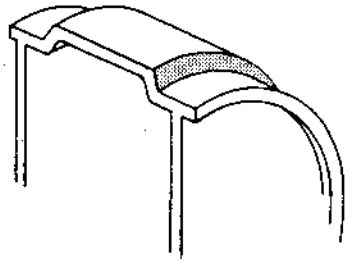
Shown below is wear on the side of the flange. This wear is caused by side hill operation, extended track pitch which makes the track flexible and the carrier roller not aligned with the track. Check the idler alignment according to instructions in Section 5508.



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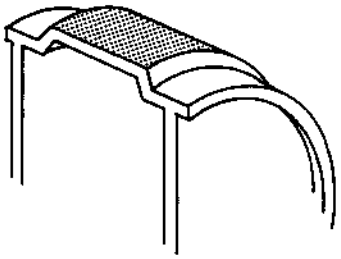
Wear on the OD of the flange is caused by packing between the track links and packing behind the idler roller. This wear is of little importance except when measuring tread wear.



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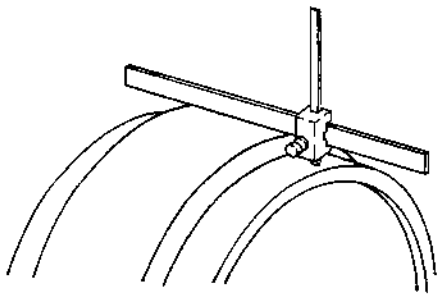
WEAR CHART FOR IDLER WEAR



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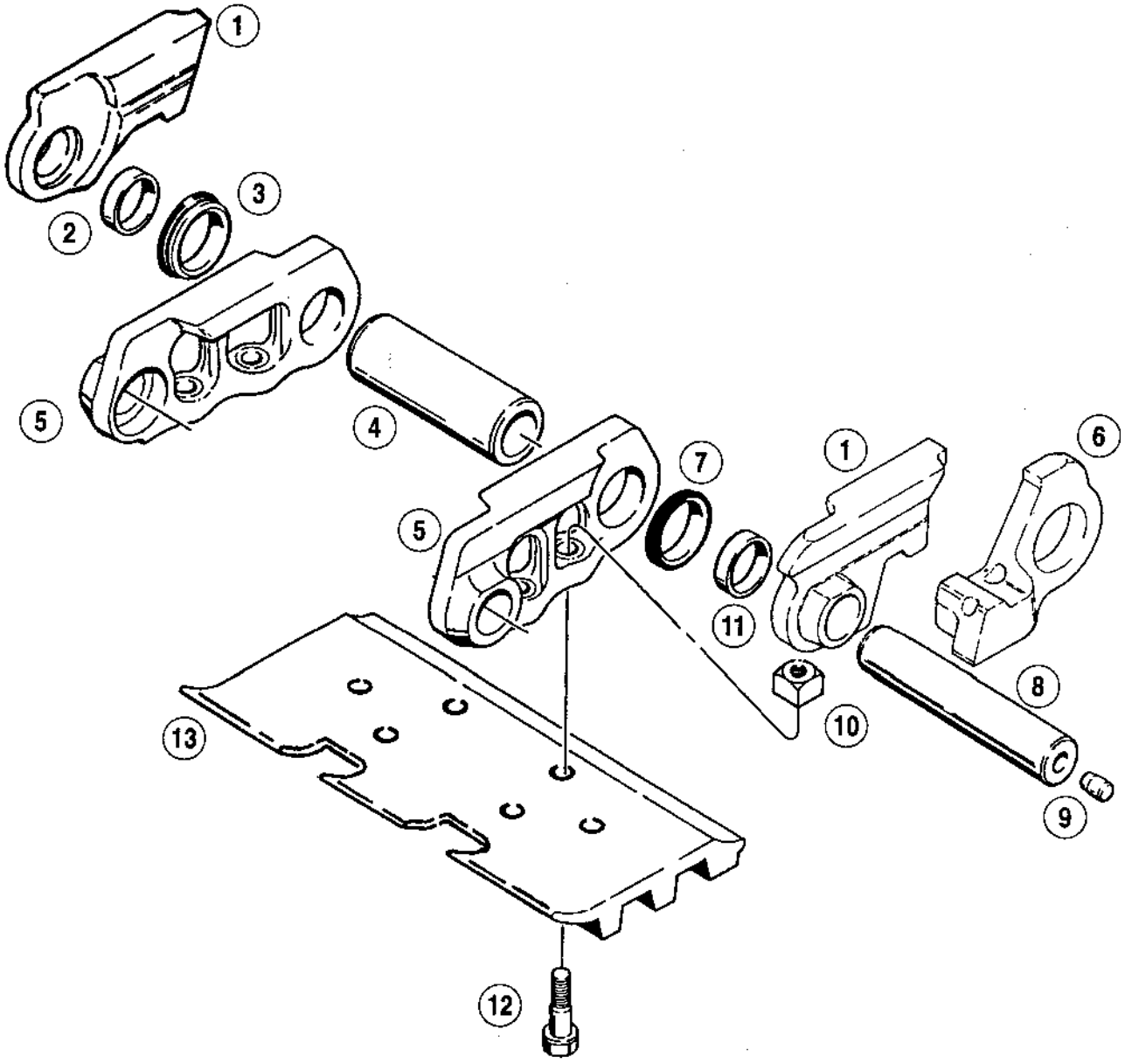
Inch	Percent Worn	(mm)
0.71	0	18.03
0.73	8	18.54
0.75	16	19.05
0.77	23	19.56
0.79	30	20.07
0.81	37	20.57
0.83	44	21.08
0.85	50	21.95
0.87	56	22.10
0.89	62	22.61
0.91	68	23.11
0.93	74	23.62
0.95	80	24.13
0.97	85	24.64
0.99	90	25.15
1.01	95	25.65
1.03	100	26.16

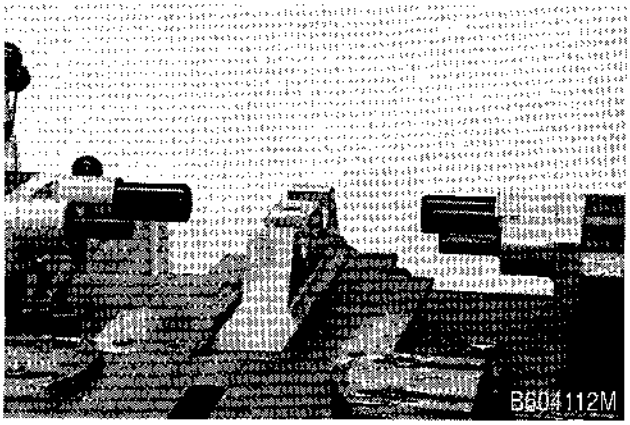


1. *Master Link, Pin Half*
2. *Spacer*
3. *Seal*
4. *Bushing*
5. *Link*
6. *Master Link, Bushing Half*
7. *Seal*
8. *Pin*
9. *Plug*
10. *Nut*
11. *Spacer*
12. *Bolt*
13. *Track Shoe*

ITAL Master Link

DISASSEMBLING THE TRACK CHAIN

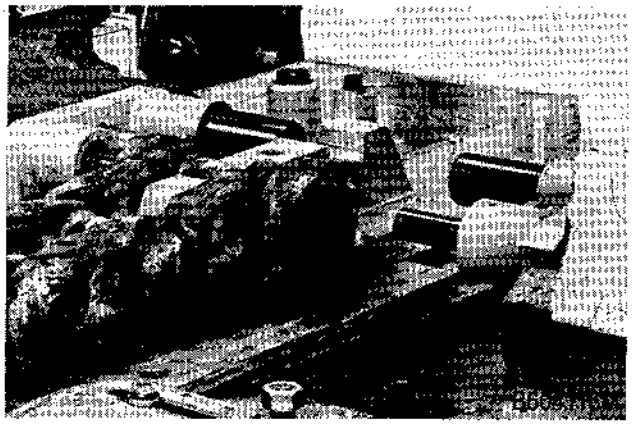
1. Install the carrier and driver needed to disassemble the track chain.



2. Put the track chain on the table so that the track shoe surface is up and the pin half of the master link will be the first link disassembled.

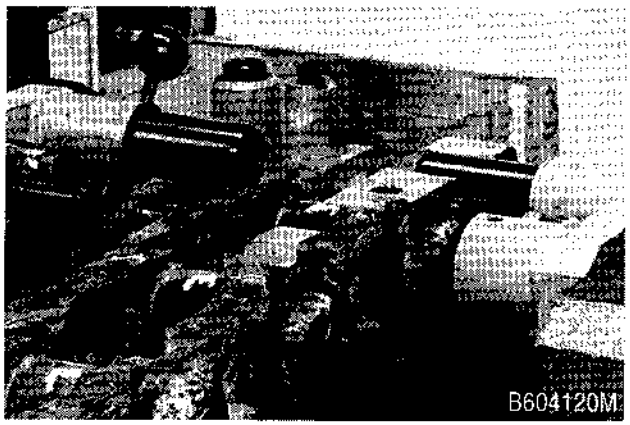
IMPORTANT: *Before pressing a bushing and pin out of the link, make sure that the drivers are aligned with the pin and bushing to prevent damage to the bores in the link.*

3. Put the bushing in the first notch in the carrier and actuate one of the rams to press that pin out of a link.



4. Retract the ram and remove the link from the driver.

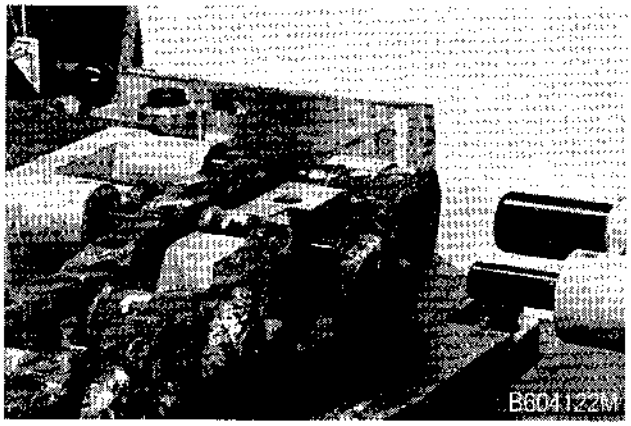
5. Actuate the other ram and press the pin out of the other link.



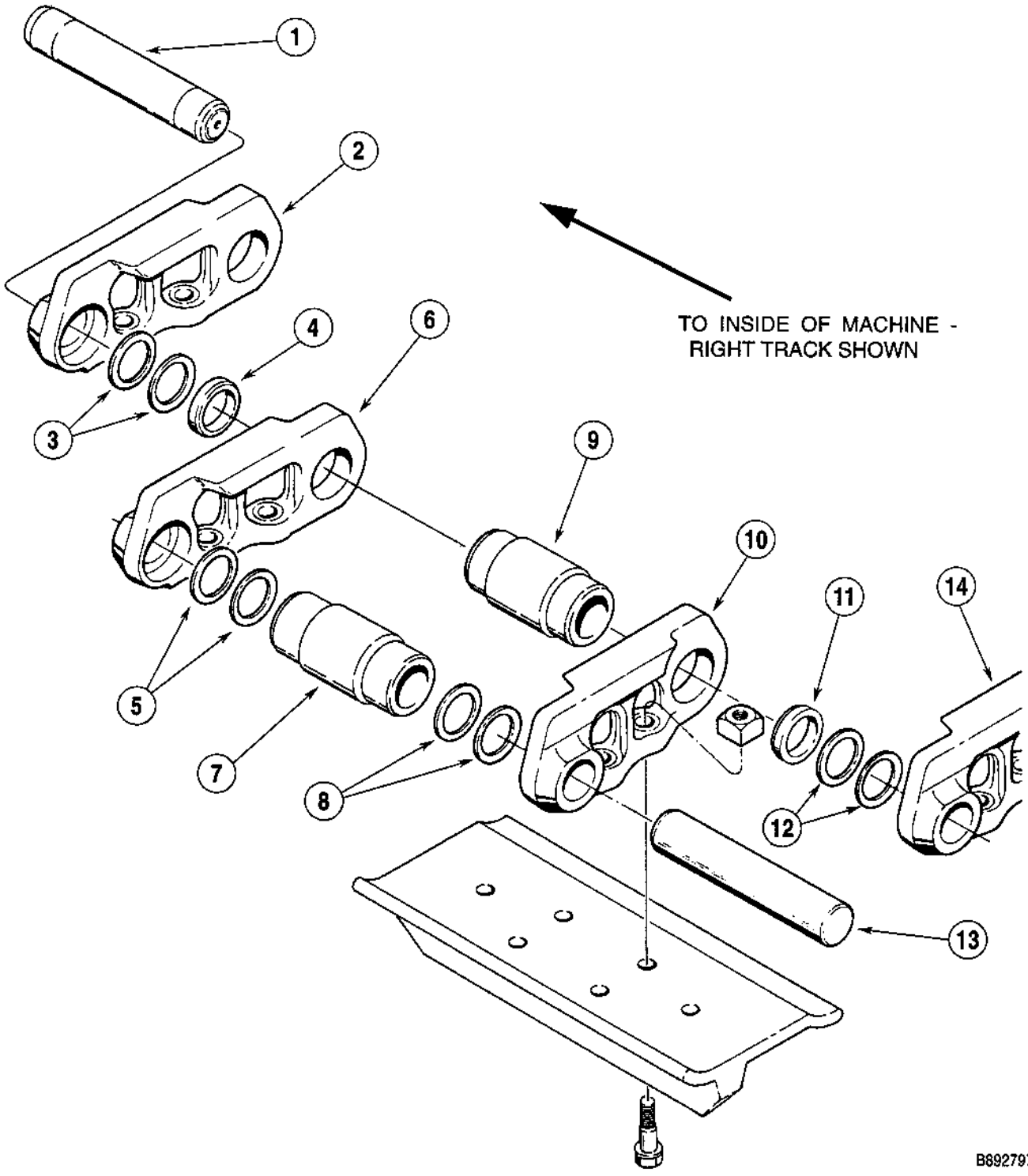
6. Retract the ram and remove the link from the driver and the pin from the bushing.

7. Move the track chain forward one bushing.

8. Actuate one of the rams to press the pin and bushing out of a link.



9. Retract the ram and remove the link from the driver.

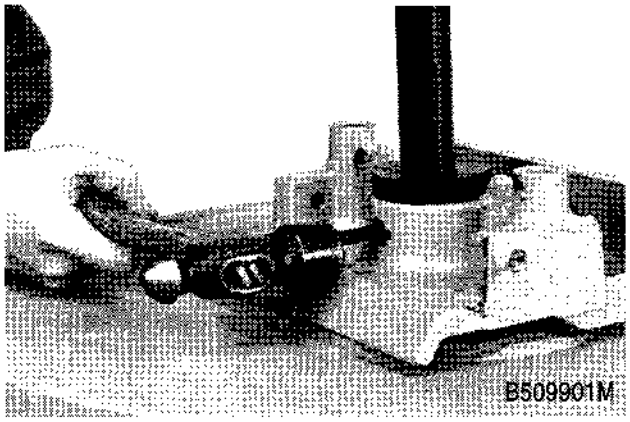


1. *Master Track Pin*
2. *Track Link*
3. *Seals*
4. *Spacer*
5. *Seals*
6. *Track Link*
7. *Bushing*
8. *Seals*
9. *Bushing*
10. *Track Link*
11. *Spacer*
12. *Seals*
13. *Track Pin*
14. *Track Link*

TABLE OF CONTENTS

NOTE: Case Corporation reserves the right to make improvements in design or changes in specifications at any time without incurring any obligation to install them on units previously sold.

STEP 38



Install the large roll pin and then the small roll pin so that the slots in the roll pins are 90 degrees from each other. Make sure the roll pins do not protrude from the idler bracket.

STEP 39

Do the leakage test according to the instructions in this section. Make sure the idler has been assembled correctly and there are no defects in the metal parts that will result in leakage.

STEP 40

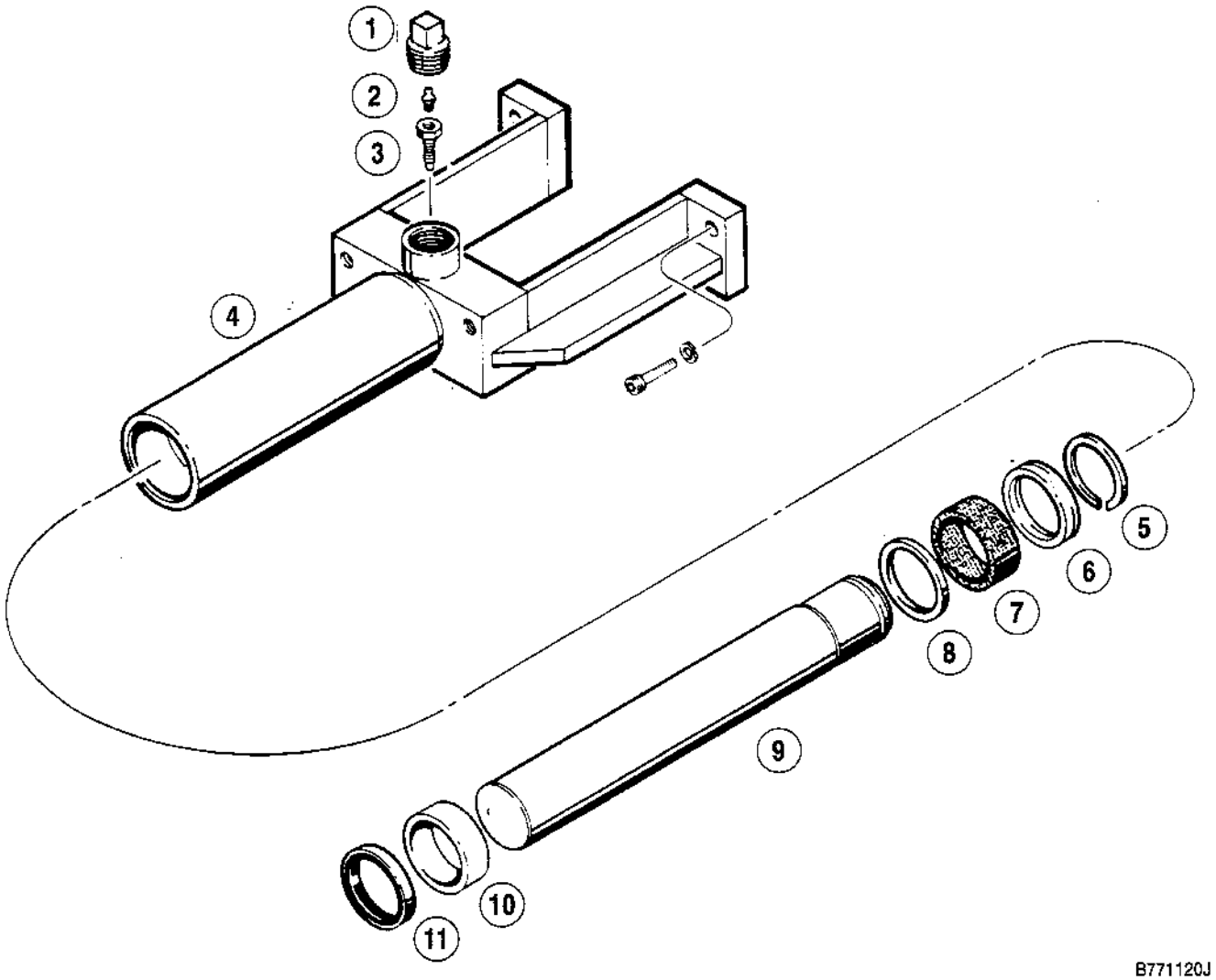
Fill the idler with the amount of oil specified on page 3.

STEP 41

Apply thread sealant to the threads on the plug.

STEP 42

Install and tighten the plug.



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1. *Plug*
2. *Grease Fitting*
3. *Valve*
4. *Track Adjuster*
5. *Snap Ring*
6. *Seal*
7. *Bearing*
8. *Spacer*
9. *Piston*
10. *Bearing*
11. *Piston Rod Wiper*

Section

5510

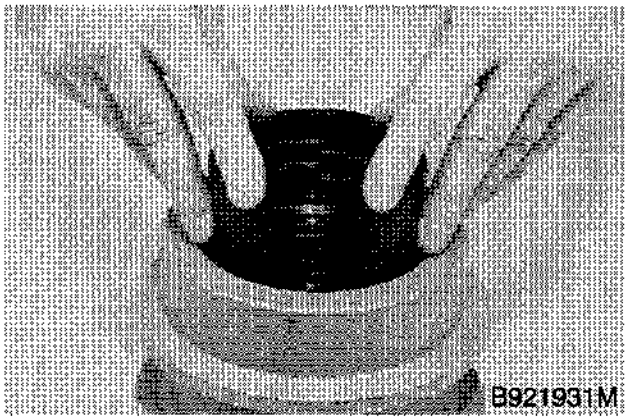
CARRIER ROLLER

CASE CORPORATION

Bur 8-14570

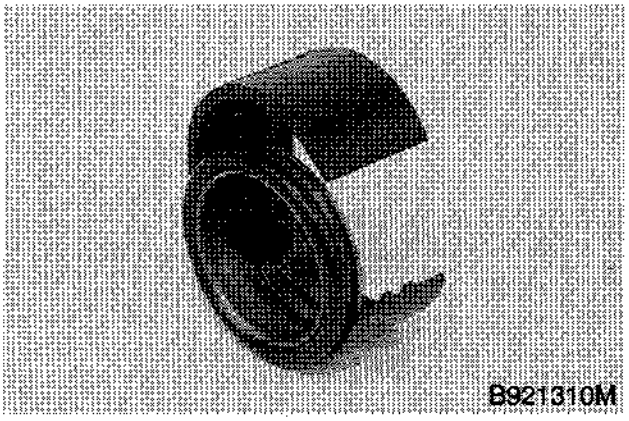
Printed in U.S.A.
Issued February 1990

STEP 31



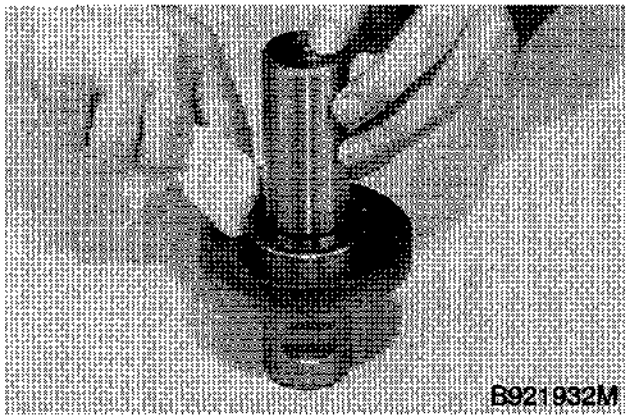
Push down on the seal installing tool CAS-1283 until the rubber ring is seated in the bore of the carrier roller.

STEP 32



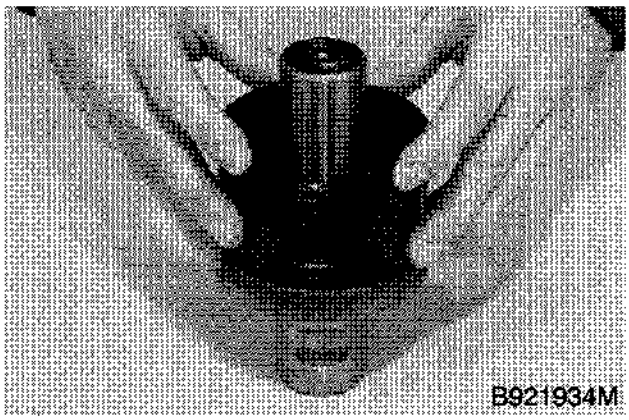
Put the other rubber and metal ring in the seal installing tool CAS-1283 as shown.

STEP 33



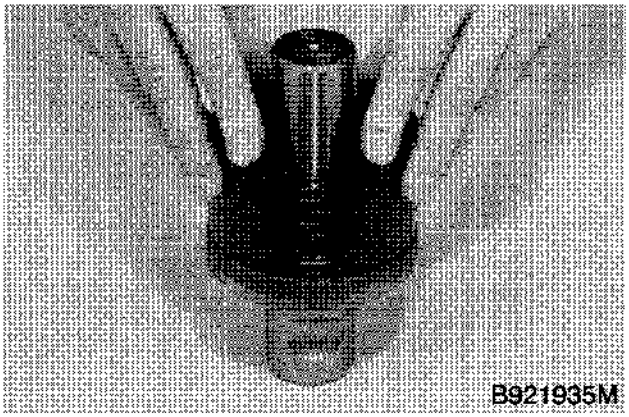
Use a cloth and cleaning solvent to clean the seal bore in the seal retainer.

STEP 34



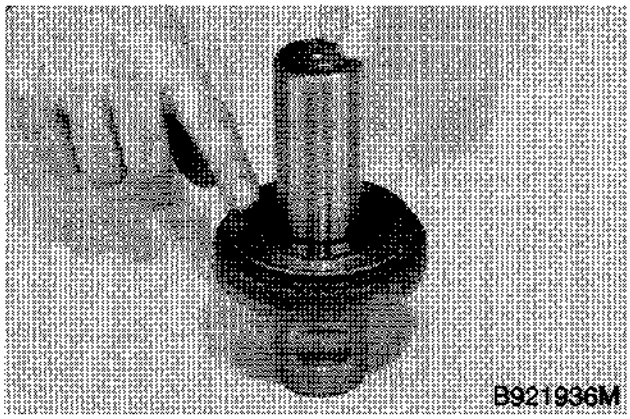
Apply soap and water or a fast drying oil free lubricant on the rubber ring. Start the rubber ring into the seal retainer.

STEP 35

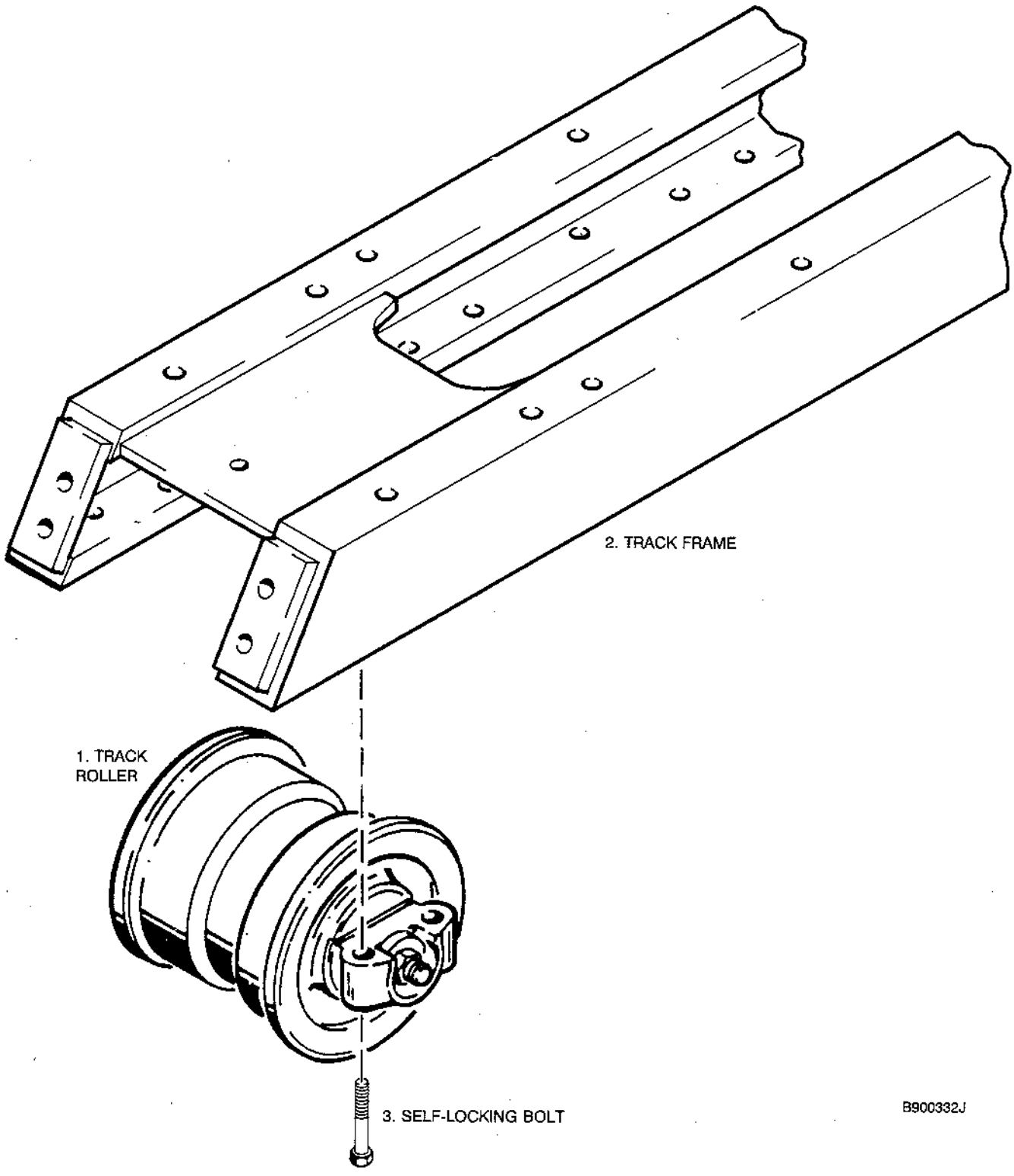


Push down on the seal installing tool CAS-1283 until the rubber seal is seated in the bore of the seal retainer.

STEP 36



Apply a small amount of oil on the sealing face of the metal ring.


2. TRACK FRAME
1. TRACK ROLLER
3. SELF-LOCKING BOLT
B900332J

10. If the machine is equipped with track guards:

a. Apply 242 Loctite to the threads in the holes on the inside of the track frame for the cap screws that hold the track guards in place.

b. As required, hold the track guard in alignment with the track frame and install the hardened washers and cap screws that hold the track guards in place.

c. Tighten the cap screws.

d. Apply 242 Loctite to the threads in the holes on the outside of the track frame for the cap screws that hold the track guards in place.

e. As required, hold the track guard in alignment with the track frame and install the hardened washers and cap screws that hold the track guard in place.

f. Hold the spacers between the track guards and install the bolts.

g. Install and tighten the self-locking nuts for the bolts.

Section

6002

TRANSMISSION SCHEMATIC AND TROUBLESHOOTING

550G, 650G and 850G Crawlers

CASE CORPORATION

Rac 7-60811

Printed in U.S.A.
January, 1994 (Revised July,1995)

CHECKING CHARGING SYSTEM PRESSURE

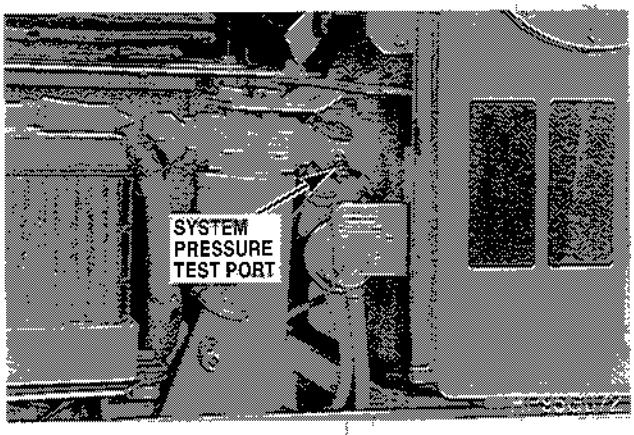
Equipment Required

600 psi (41 bar) Pressure Gauge with Test Hose

Adapter for 1/8 NPT thread from pressure test fitting kit

TEST No. 1 - Pressure Test Procedure

NOTE: *The transmission filter is shown in the 650G and 850G location. In the 550G the pressure test port is rotated 180 degrees due to the location of the filter.*

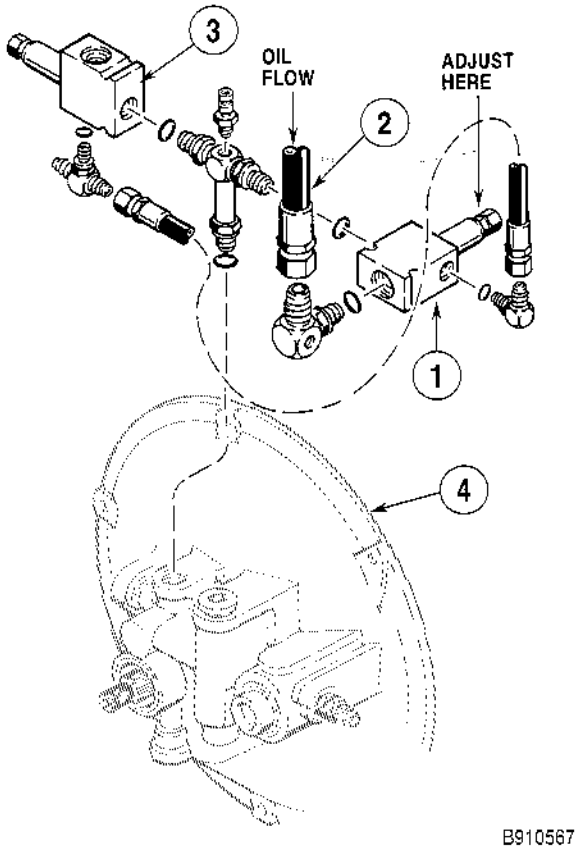


1. Install the adapter and connect the pressure gauge to the test port in the elbow at the outlet of the filter.
2. Make sure the transmission fluid is at an operating temperature with the needle on the transmission temperature gauge in the GREEN ZONE. See the Section 2002 for the Procedure to Heat the Oil.
3. Make sure the Parking Brake is applied and all the transmission controls are in the NEUTRAL position.
4. Start and run the engine at 2200 rpm (r/min).
5. Record on the check sheet (page 21) the reading of the pressure gauge and check that the pressure reading is within the specification on page 3.
6. Stop the engine.

Understanding Results of the Test

1. If the charging system pressure is not as specified, adjust the setting of the system pressure relief valve.
2. If the correct charging system pressure cannot be obtained, check the output of the charge pump and the pressure setting of the charge pump relief valve with a flowmeter.
3. When the charging system pressure is correct to the specified pressure, remove the pressure gauge and the adapter.

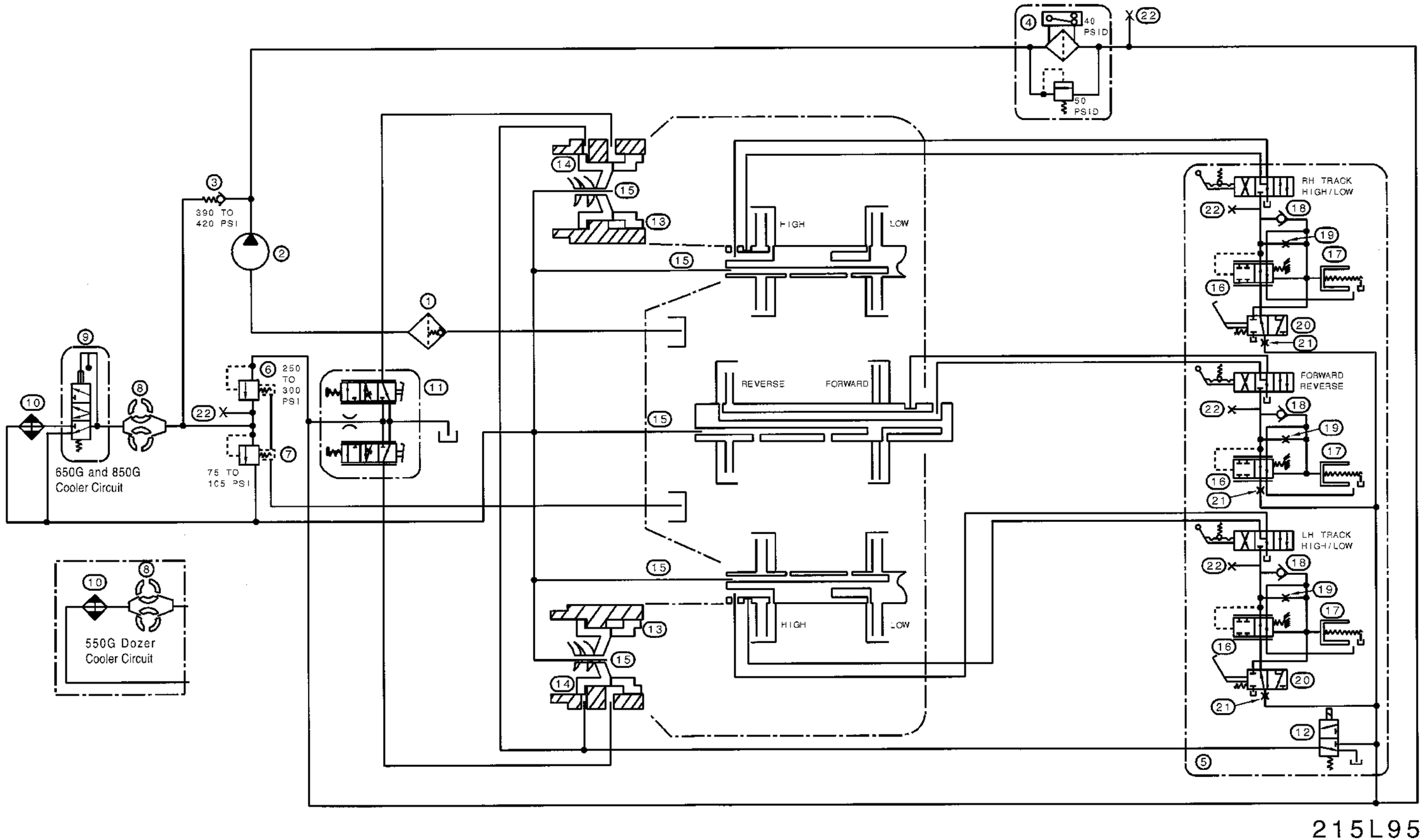
Adjusting the Relief Valve for Charging System Pressure



1. Transmission System Pressure Relief Valve
2. Hose From Transmission Control Valve
3. Torque Converter Inlet Relief Valve
4. Torque Converter and Charge Pump

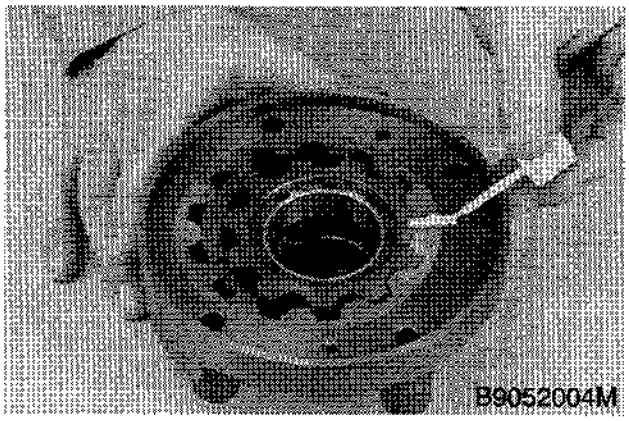
1. Remove the cap on the system pressure relief valve (1) cartridge and loosen the jam nut.
2. Turn the adjusting screw in the relief valve clockwise to increase the pressure or counter clockwise to decrease the pressure setting.
3. Tighten the jam nut and repeat the Pressure Test Procedure until the pressure setting is correct to the specifications on page 3.
4. Install the cap on the relief valve.

TRANSMISSION SYSTEM SCHEMATIC



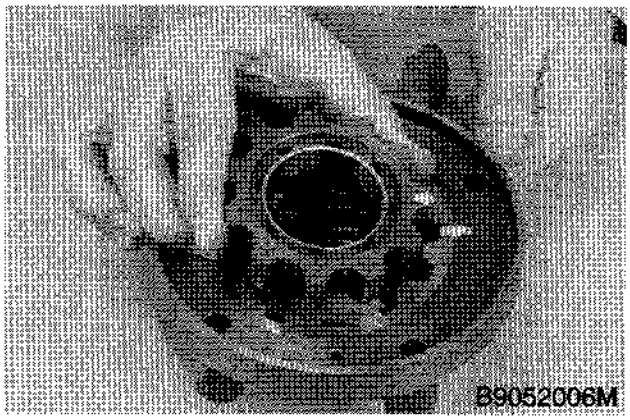
215L95

STEP 24



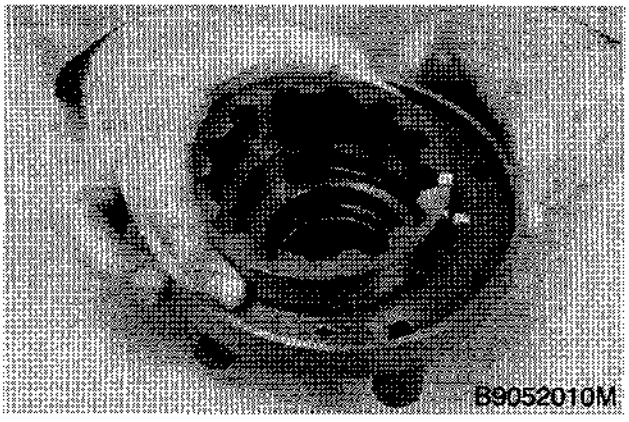
Make a mark on the drive gear, driven gear and body.

STEP 25



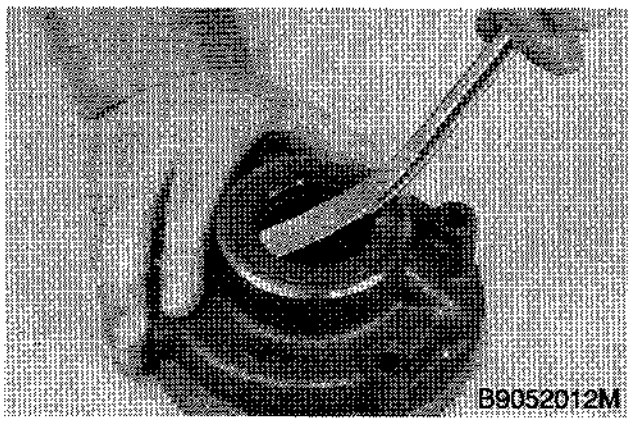
Remove the drive gear.

STEP 26



Remove the driven gear.

STEP 27



Remove and discard the seal from the body.

STEP 28

If necessary, remove the bushings from charging pump body.

Inspection

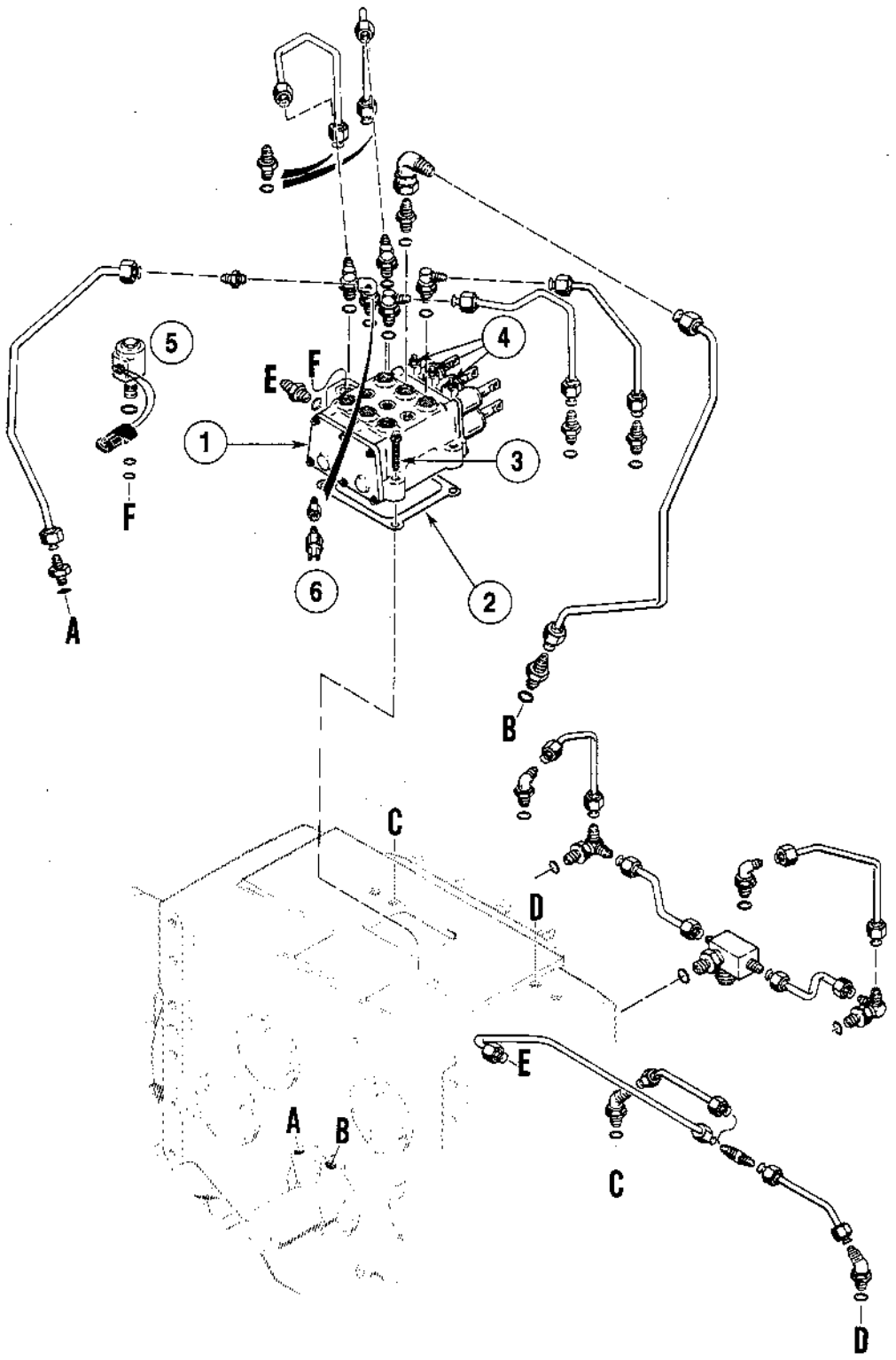
1. Clean all the parts in cleaning solvent. Use compressed air to dry the parts.

2. Only the seal and two bushings are available separately as service parts. If there is damage to any other part of the charging pump, you must install a new assembly.

3. Check the drive gear and the driven gear for wear and damage.

4. Check the body and stator support for pitting, scoring, cracks and wear.

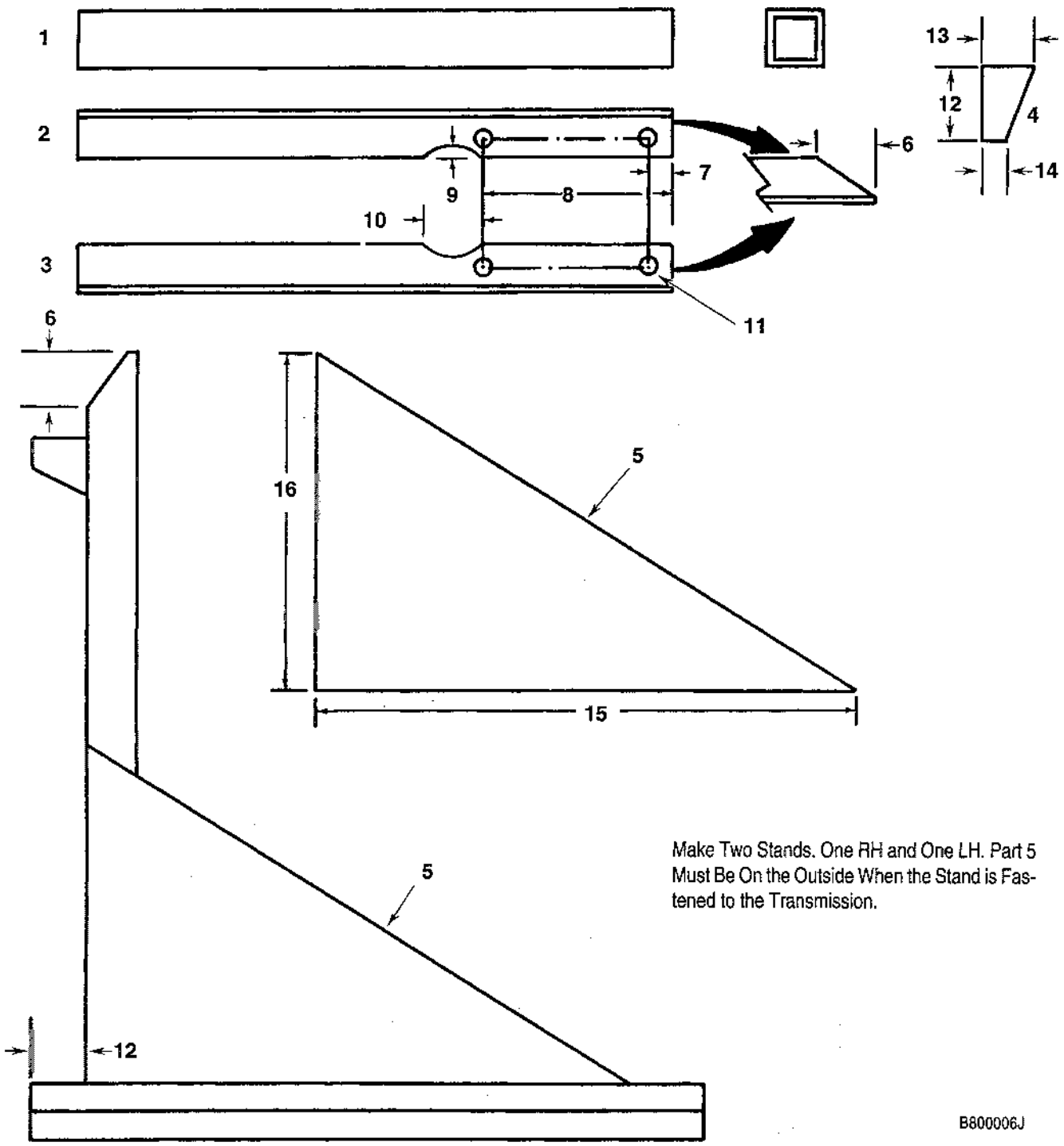
NOTE: *There is only a small amount of clearance between the parts of the charging pump. It is possible for the parts to look good but still be worn enough for the charging pump to be replaced. If troubleshooting shows that there is not enough flow from the charging pump, install a new charging pump.*



B9403191A

1. *Transmission Control Valve*
2. *Gasket*
3. *Ferry Head Screws. Tighten to a Torque of 420 to 480 Pound-Inches (47 to 54 Nm)*
4. *Detent Adjusting Screws*
5. *Brake Solenoid Valve*
6. *Backup Alarm Pressure Switch*

Control Valve Hydraulics



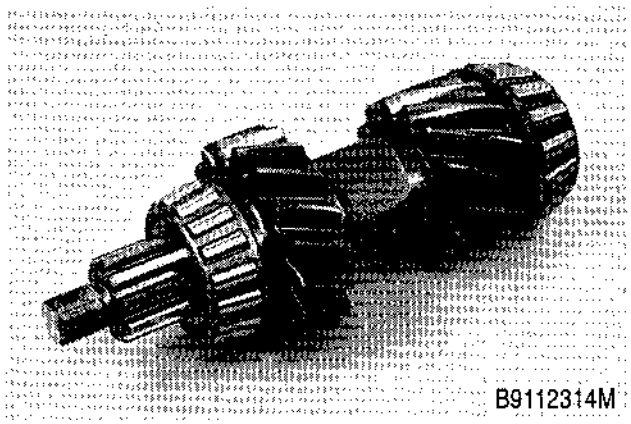
Make Two Stands. One RH and One LH. Part 5 Must Be On the Outside When the Stand is Fastened to the Transmission.

B800006J

1. *Make Two Pieces From 3 Inch (76 mm) x 1/4 Inch (6 mm) Square Tube x 36 Inches (914 mm) Long*
2. *Make From 2-1/2 Inch (63.5 mm) x 1/4 Inch (6 mm) Angle Iron 36 Inches (914 mm) Long*
3. *Make From 2-1/2 Inch (63.5 mm) x 1/4 Inch (6 mm) Angle Iron 36 Inches (914 mm) Long*
4. *Make Two Pieces 1/4 Inch (6 mm) Thick*
5. *Make Two Pieces 1/4 Inch (6 mm) Thick*
6. *3 Inches (76 mm)*
7. *1-1/4 Inch (32 mm)*
8. *10 Inches (254 mm)*
9. *1/2 Inch (13 mm)*
10. *3 Inches (76 mm)*
11. *7/8 Inch (22 mm)*
12. *4 Inches (101.6 mm)*
13. *3 Inches (76 mm)*
14. *1-1/4 Inch (32 mm)*
15. *29 Inches (736 mm)*
16. *18 Inches (457 mm)*

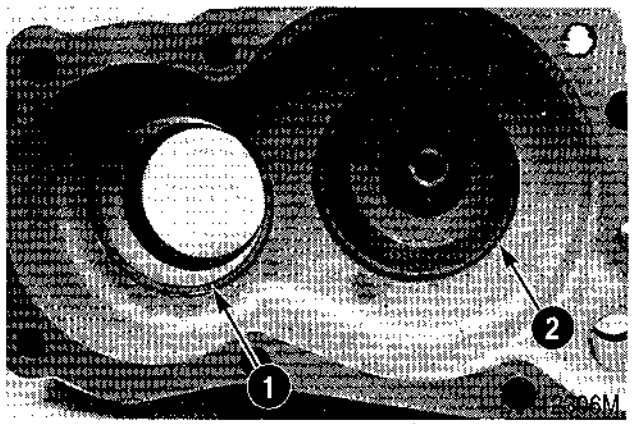
Support Stand. Make the stand from steel to the dimensions shown. Shown in use in step 1.

STEP 41



Inspect the input shaft gears and bearings. Replace worn or damaged parts.

STEP 42



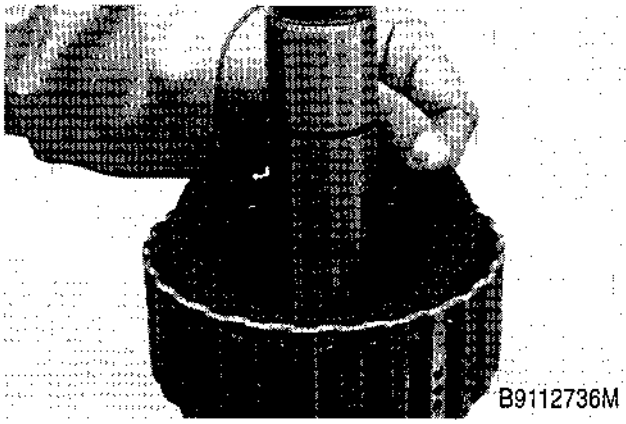
1. Input Shaft Cup *2. Main Shaft Cup*

Inspect the range housing bearing cups. Replace the cups when the matching bearings are being replaced.

Use an acceptable puller to remove the bearing cups from the housing.

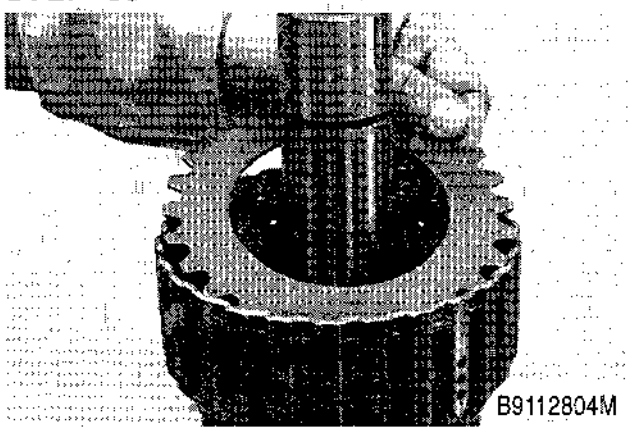
Also remove the shims, spacer, and snap ring when replacing the input shaft cup.

STEP 79



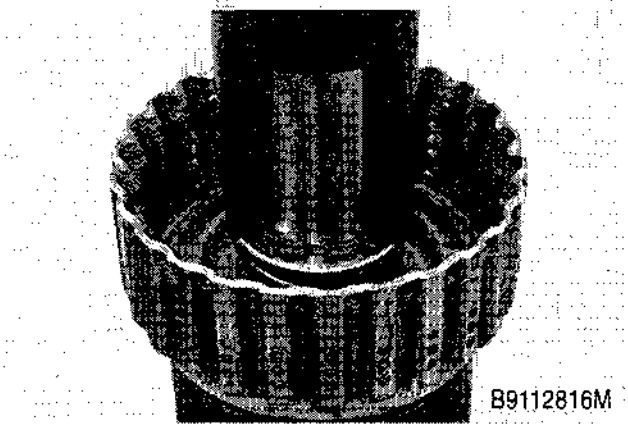
Remove a friction disc.

STEP 80



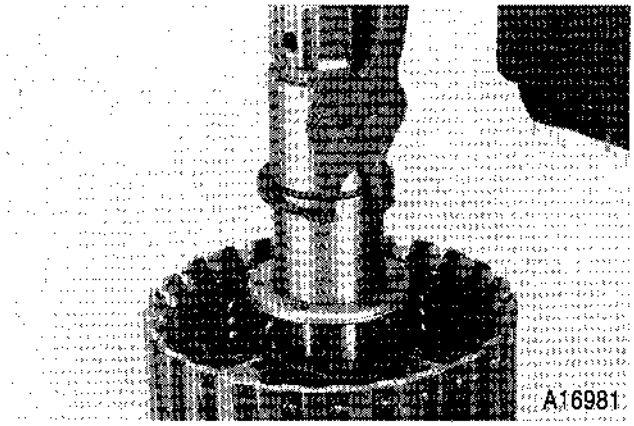
Remove a metal disc. Remove the remainder of the friction discs and metal discs.

STEP 81



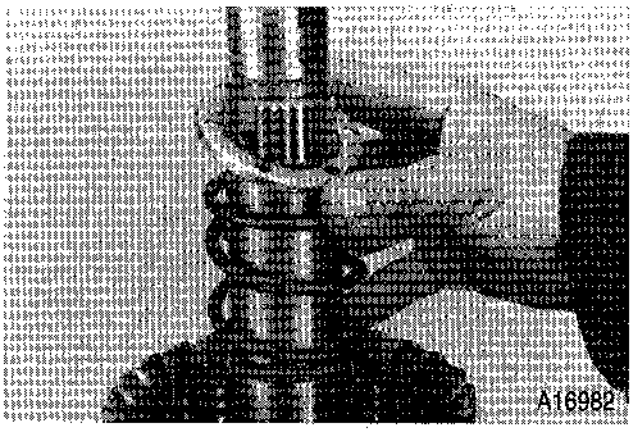
Put the shaft assembly in a press. Use the CAS-1992 spring compressor and the CAS-2230 end cap to compress the spring. Remove the snap ring from the groove and carefully release the spring tension.

STEP 82



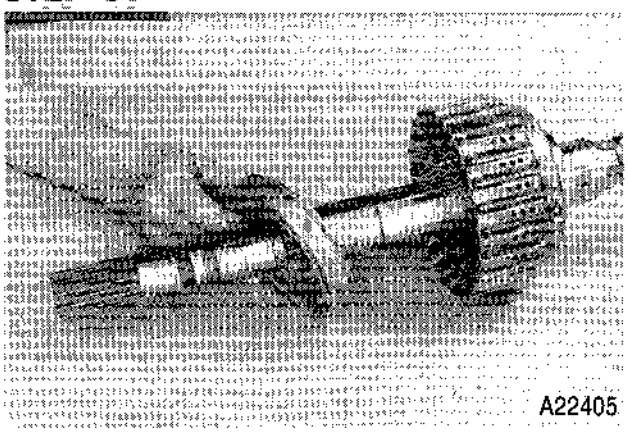
Remove the snap ring. Be careful so that you do not scratch the surface of the shaft.

STEP 83



Remove the spring seat and spring.

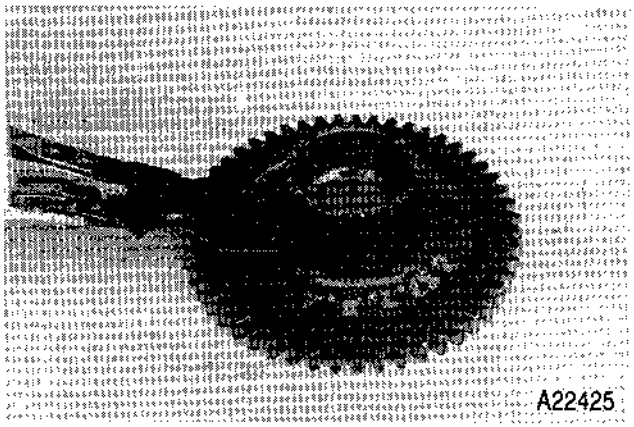
STEP 84



With the open end of the clutch housing facing down, tap the end of the shaft on a wood block to remove the piston from the clutch housing.

NOTE: *Keep the piston with the housing. The pistons on this shaft are not interchangeable.*

STEP 113

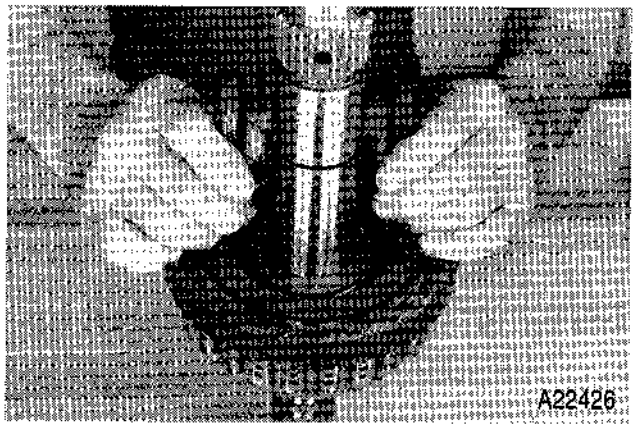


Place tool CAS-2229-6 over the seal. Tighten tool to compress the seal into the groove. After waiting for three minutes, loosen the tool. Rotate the tool about 1/4 turn around the gear and tighten the tool again. Repeat this process until the seal is compressed into the groove all around the gear.

STEP 114

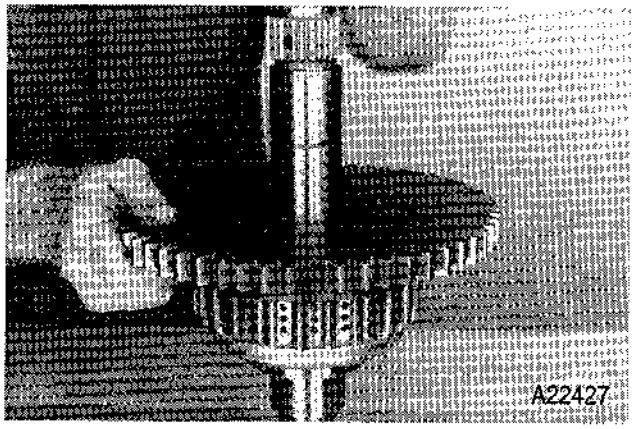
Repeat steps 111 through 113 to install a new seal on the forward gear.

STEP 115



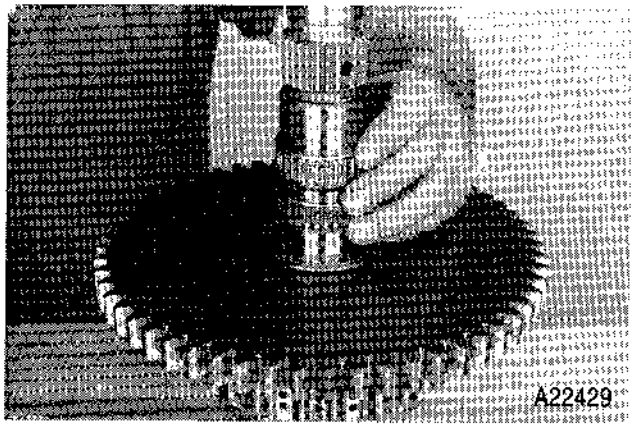
Install the first thrust washer. Align the teeth of the six clutch friction discs.

STEP 116



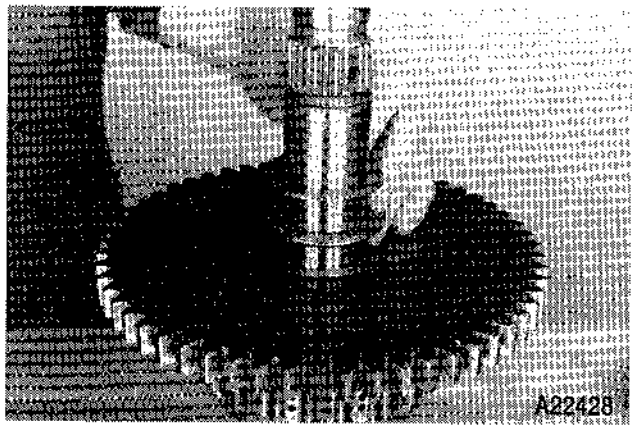
Install the reverse gear, turning and shaking the assembly as needed to make sure that the gear teeth engage the teeth on all six clutch friction discs.

STEP 117

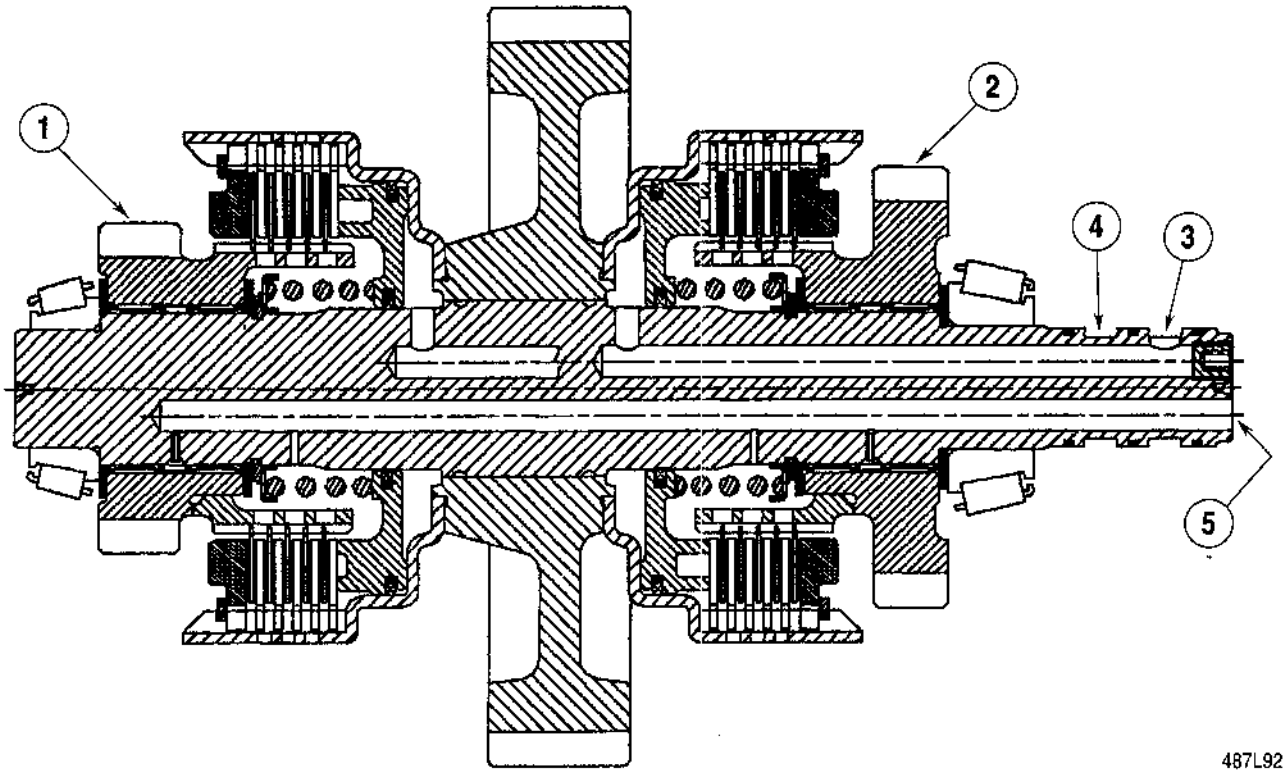


Install the two needle bearings down into the gear.

STEP 118

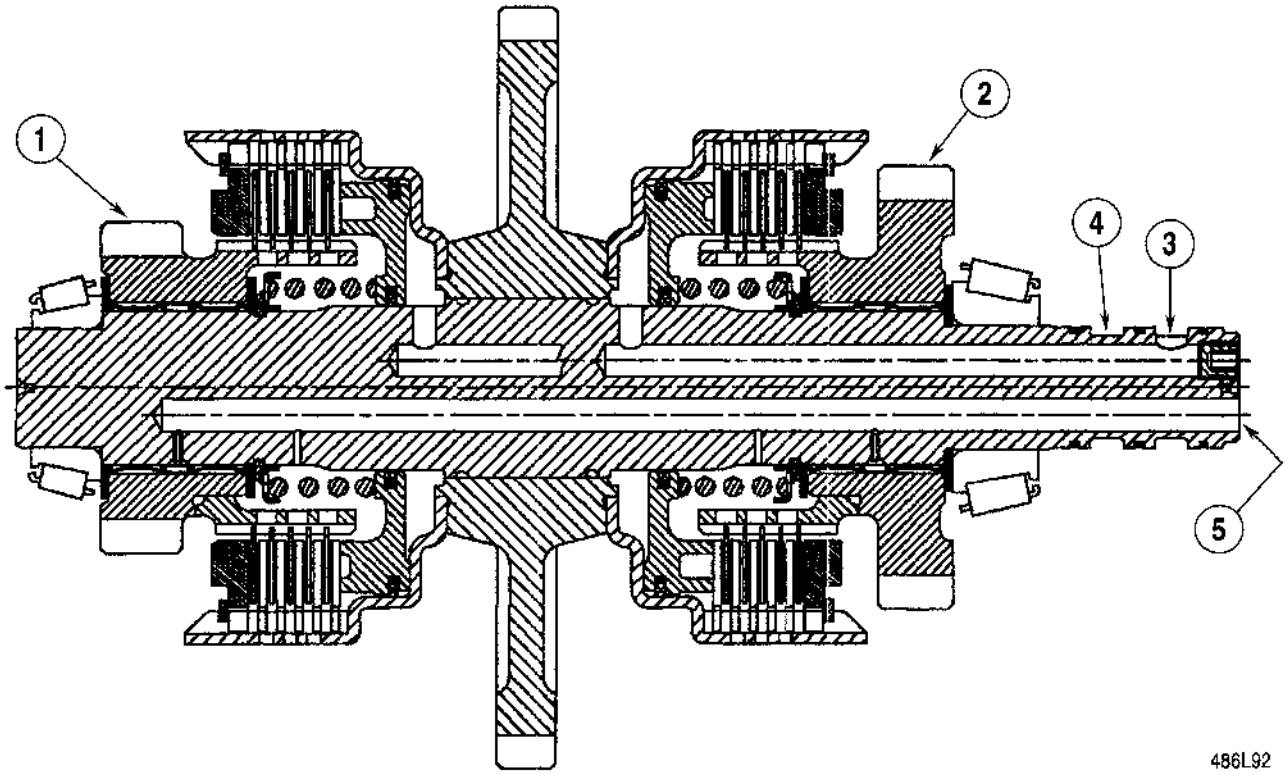


Install the thrust bearing with the roller side up. Install the second thrust washer.



1. *Low Gear*
2. *High Gear*
3. *High Speed Clutch Oil Passage*
4. *Low Speed Clutch Oil Passage*
5. *Clutch and Bearing Lubrication*

Right Hand Track Speed Shaft



1. *Low Gear*
2. *High Gear*
3. *High Speed Clutch Oil Passage*
4. *Low Speed Clutch Oil Passage*
5. *Clutch and Bearing Lubrication*

Left Hand Track Speed Shaft

NOTE: *After taking the measurements, loosen the two retainer bolts and continue with the next shaft.*

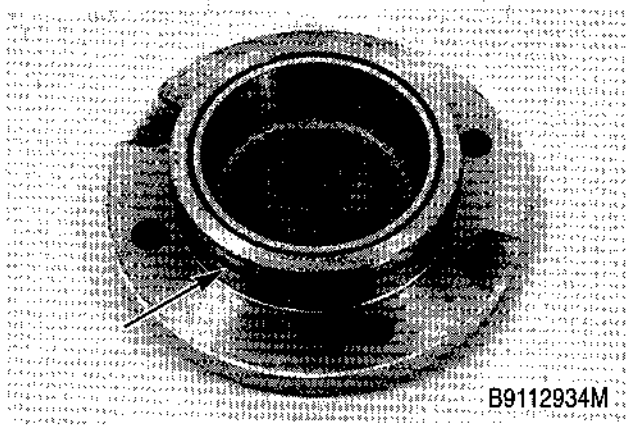
Take the average measurement for each retainer and add the appropriate acro-set constant.

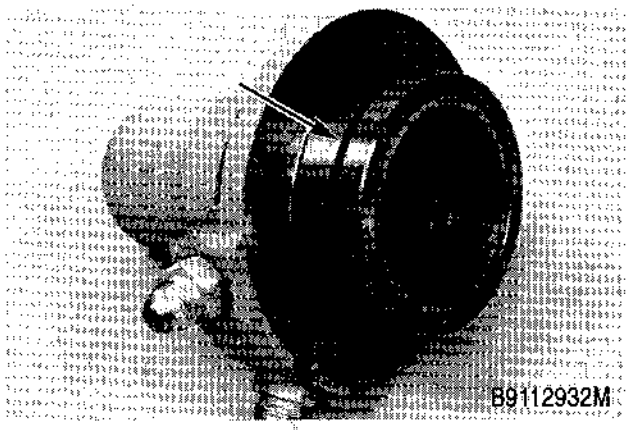
For the main shaft and track speed shafts the acro-set constant is 0.016 inch (0.41 mm).

For the pinion shafts the acro-set constant is 0.014 inch (0.36 mm).

The average gap measurement plus the acro-set constant is the final shim pack dimension for the bearing retainers.

STEP 222


B9112934M

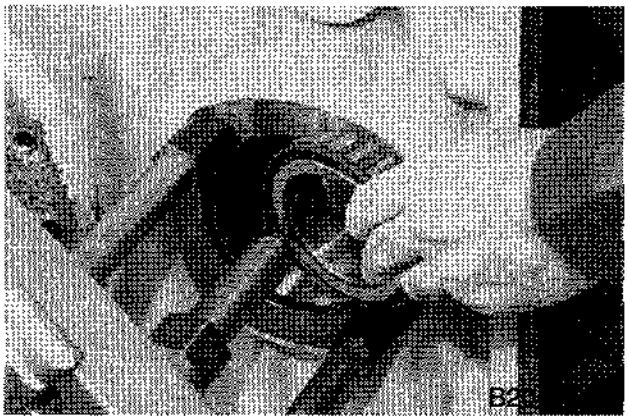

B9112932M

Install a new O-ring in the groove in each bearing retainer. Apply Lubriplate grease on the O-rings. Install the bearing retainer and shim pack for each shaft. Tighten the bolts to 30 to 40 lb ft (40 to 54 Nm).

STEP 223

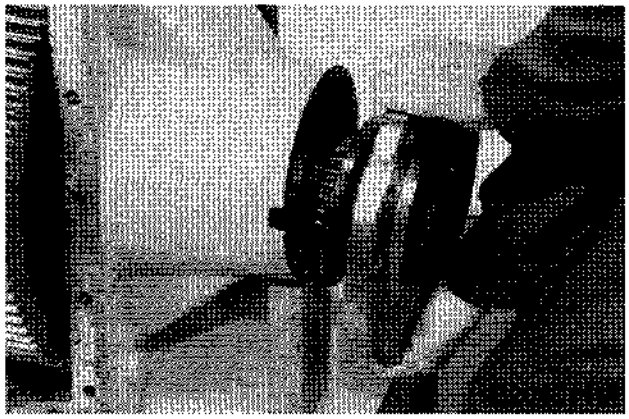
Apply air pressure to the special air hose assembly. Turn the input shaft. If the pinion shafts do not turn easily, repeat the end play adjustment procedure. When the adjustment is correct, remove the air pressure and disconnect the special air hose assembly.

STEP 20



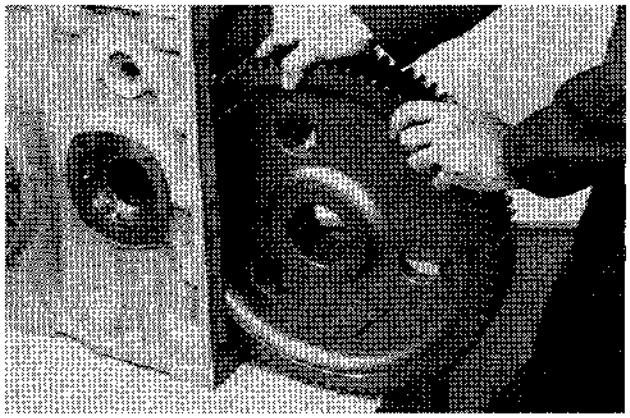
Remove the bearing and tool from the housing.

STEP 21



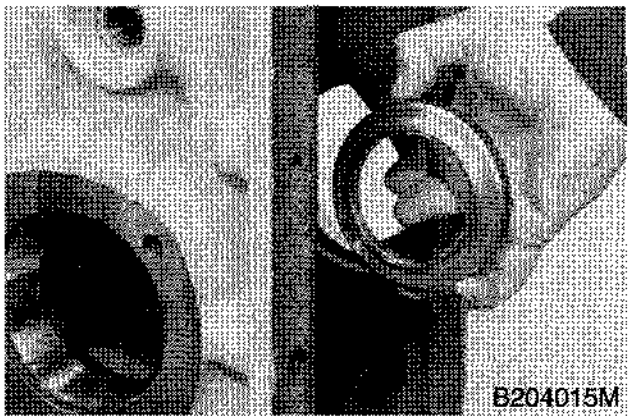
Remove the sprocket shaft from the housing.

STEP 22



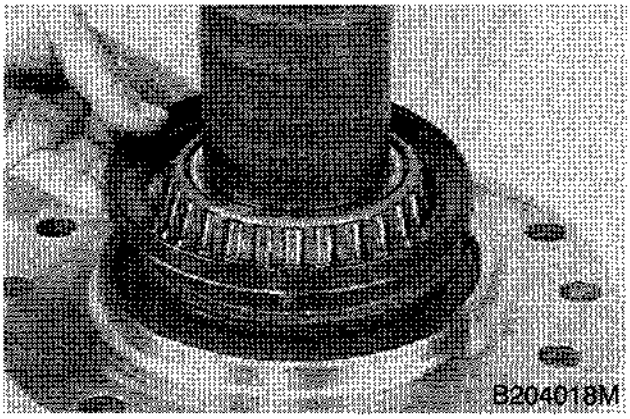
Carefully remove the bull gear from the housing.

STEP 23



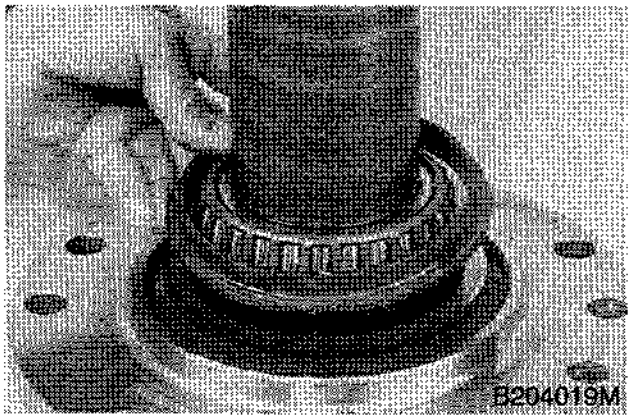
Remove the spacer from the inside bore of the housing.

STEP 24



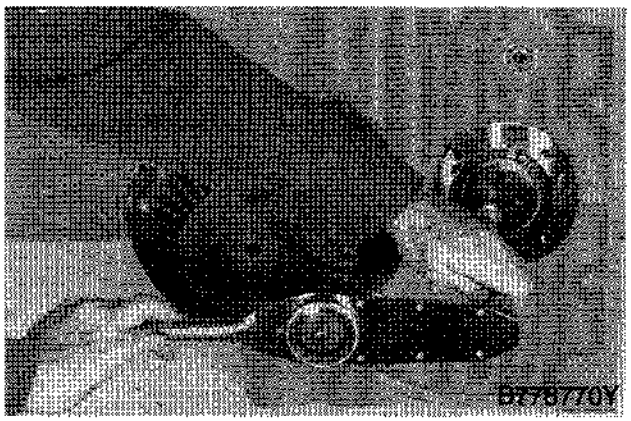
Remove the top rubber ring.

STEP 25



Remove the top metal ring.

STEP 70

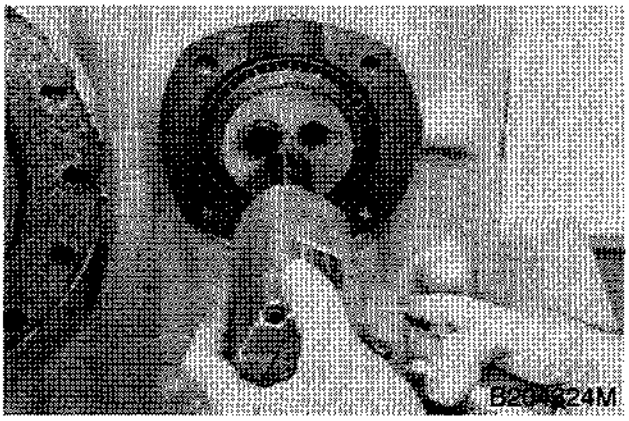


Use a pound-inch torque wrench and turn the sprocket shaft to check the rotating torque of the sprocket shaft. The rotating torque must be 35 to 40 pound-inches (4 to 4.5 Nm).

STEP 71

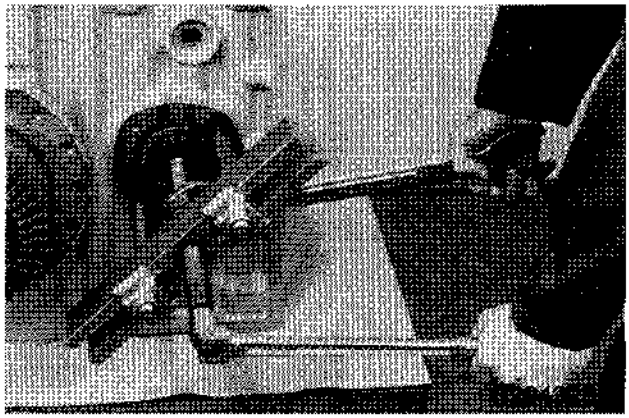
If the rotating torque is not correct, remove shims to increase the rotating torque or add shims to decrease the rotating torque. If shims are to be added, the sprocket shaft must be moved out of the inner bearing a small amount. After adding or removing shims, check the rotating torque again.

STEP 72



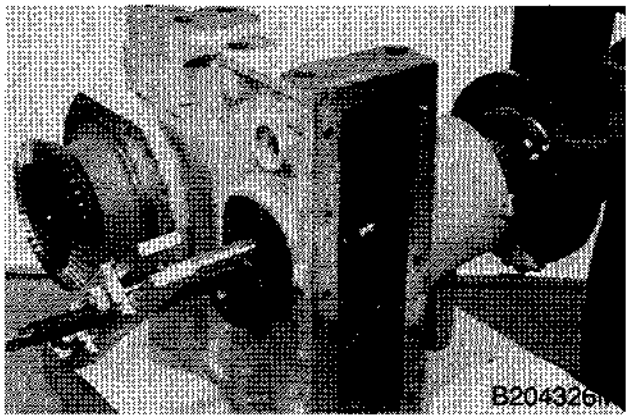
When the rotating torque is correct, loosen and remove the cap screws, retainer and shims.

STEP 73



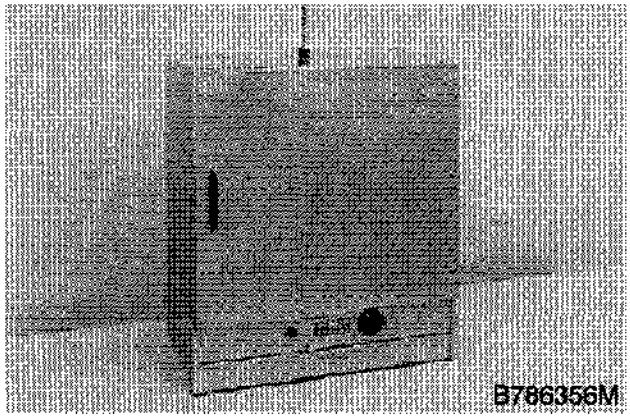
Remove the sprocket shaft from the inner bearing.

STEP 74

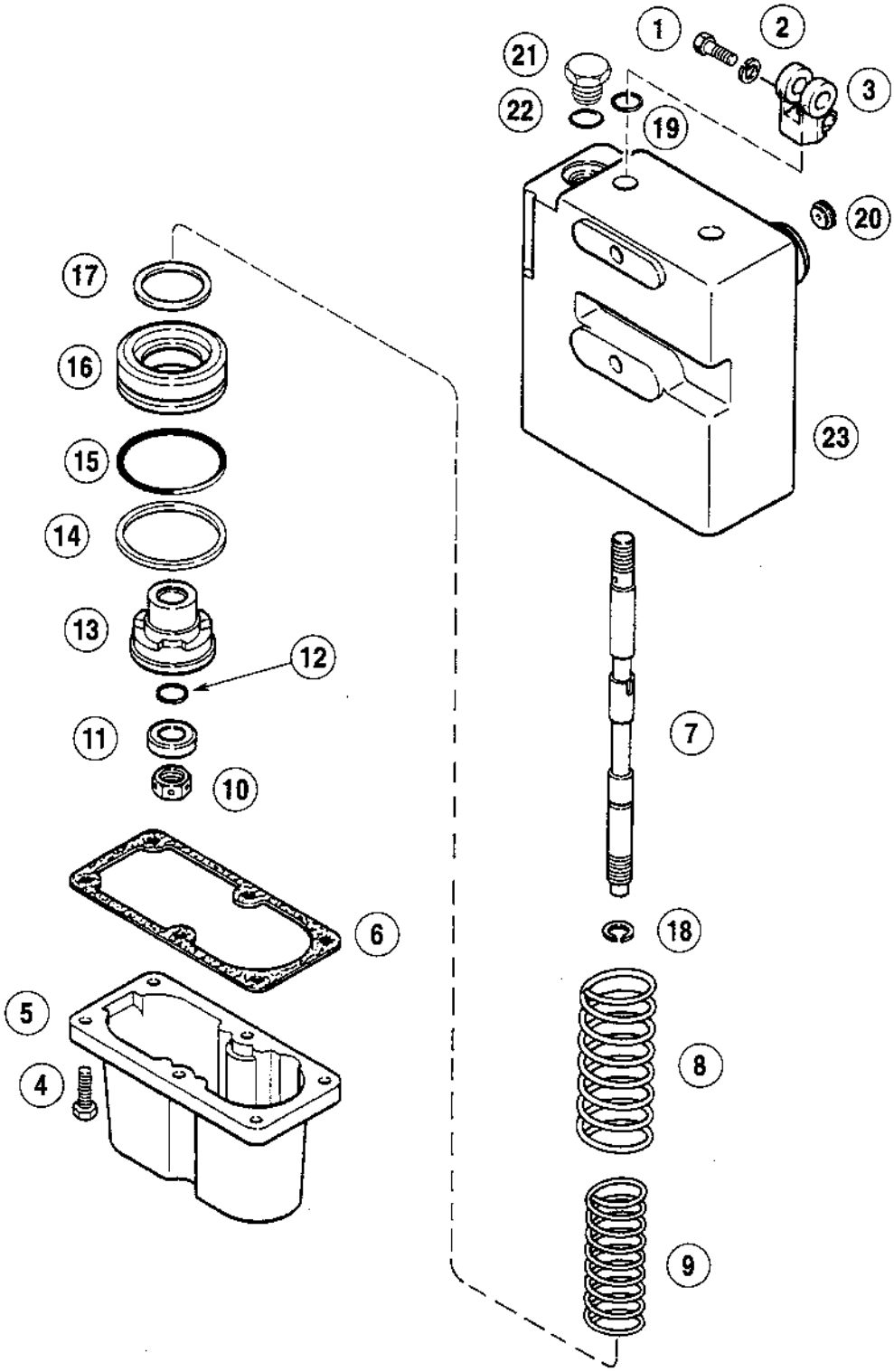


Remove the sprocket shaft, bearing and tool from the housing.

STEP 75



Clean the bearing in cleaning solvent. Dry the bearing and put the bearing in the oven. Heat the bearing to 250°F (121°C).

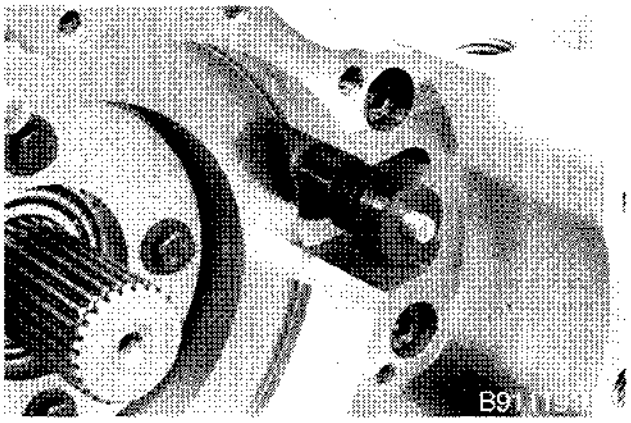


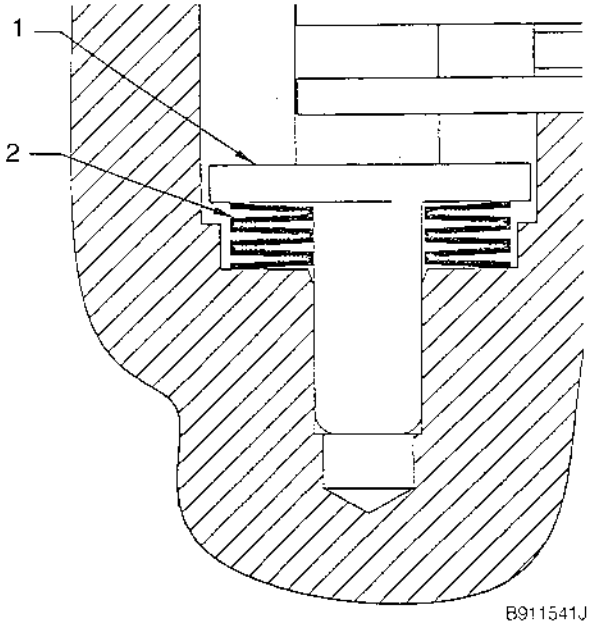
B9403190A

1. Cap Screw
2. Lock Washer
3. Yoke
4. Cap Screw
5. End Cover
6. Gasket
7. Spool
8. Outer Spring
9. Inner Spring
10. Lock Nut
11. Retainer
12. O-ring
13. Small Piston
14. Backup Ring
15. Seal
16. Large Piston
17. Spring Seat
18 Snap Ring
19. O-ring
20. Restrictor
21. Plug
22. O-ring
23. Body

INSTALLATION

STEP 32



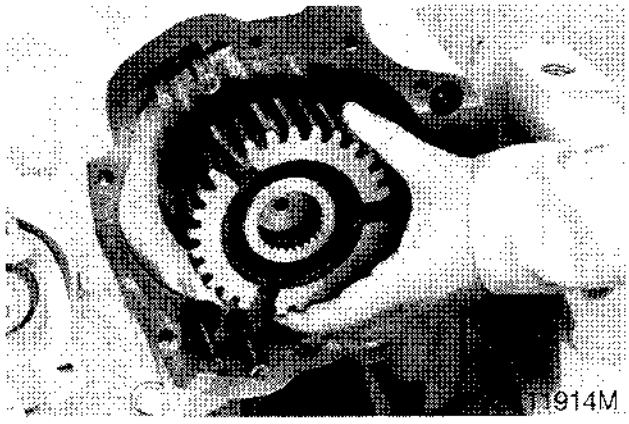


B911541J

1. Hardened Washer
2. Six Belleville Springs

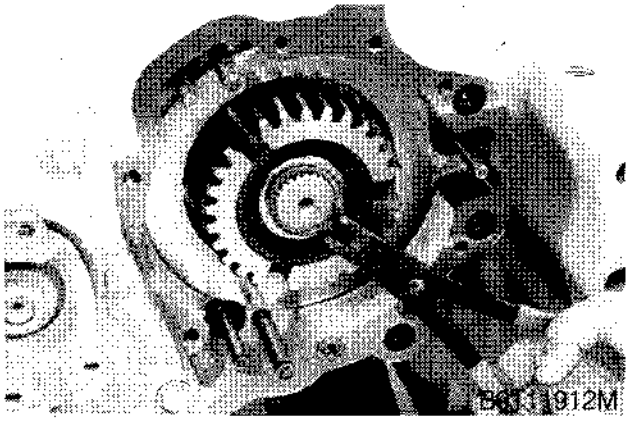
Install the six belleville springs and hardened washer on each pin in the brake as shown above.

STEP 33



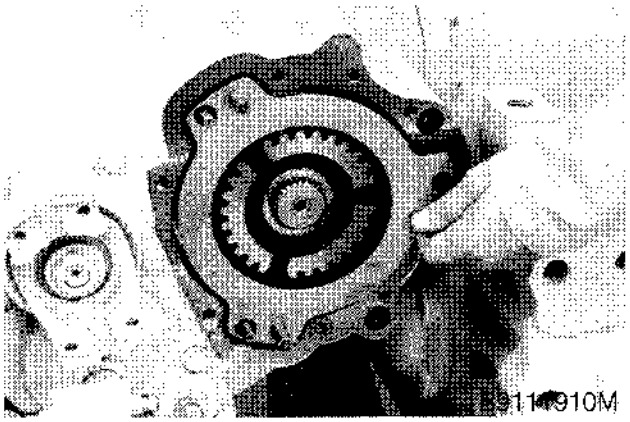
Install the hub.

STEP 34



Install the snap ring.

STEP 35



Install a metal disc.

Section

8002

HYDRAULIC SCHEMATIC AND TROUBLESHOOTING

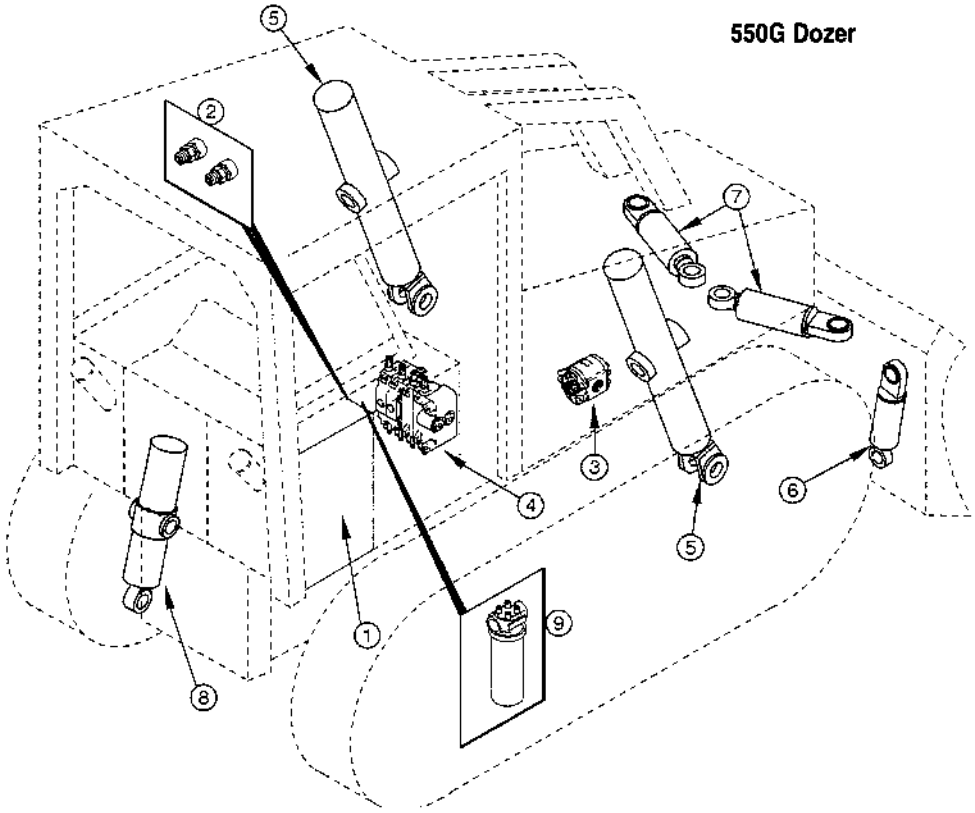
550G, 650G and 850G Crawlers

CASE CORPORATION

Printed in U.S.A.
Rac 7-60701 February, 1994 (Revised July, 1995)

HYDRAULIC SYSTEM COMPONENT LOCATIONS

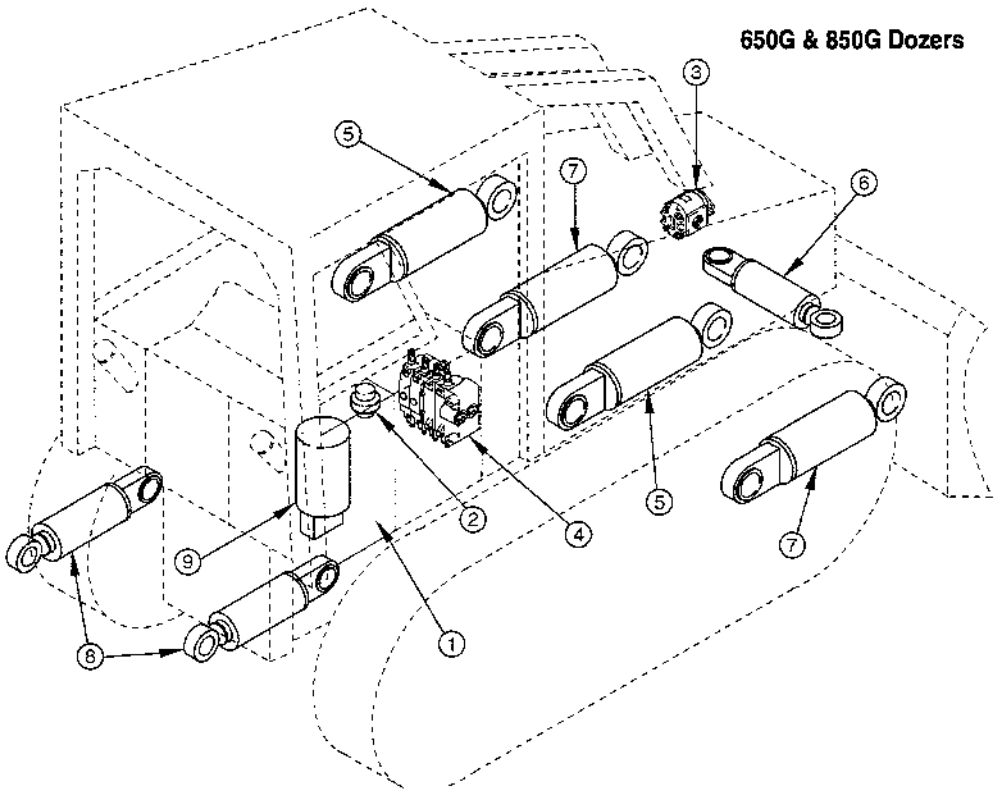
550G Dozer



557L95

1. Hydraulic Reservoir
2. Breather Assembly - 650G and 850G
   Vacuum and Pressure Reliefs - 550G
3. Hydraulic System Pump
4. Hydraulic System Control Valve
5. Dozer Lift Cylinders
6. Dozer Tilt Cylinder
7. Dozer Angle Cylinders
8. Ripper Lift Cylinder(s)
9. Hydraulic System Return Filter

650G & 850G Dozers



1010L93

Section

8003

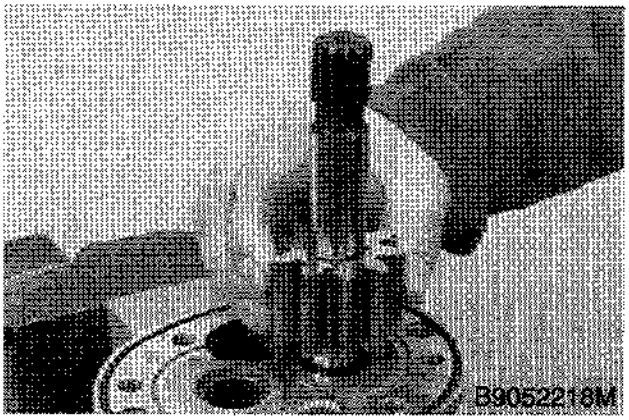
CLEANING THE HYDRAULIC SYSTEM

CASE CORPORATION

Bur 8-14710

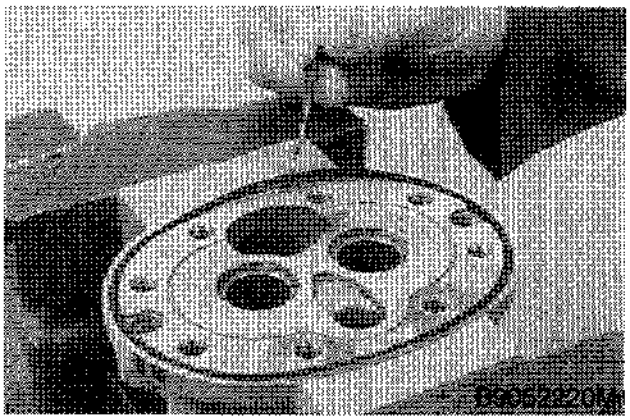
Printed in U.S.A.
Issued February 1990

STEP 7



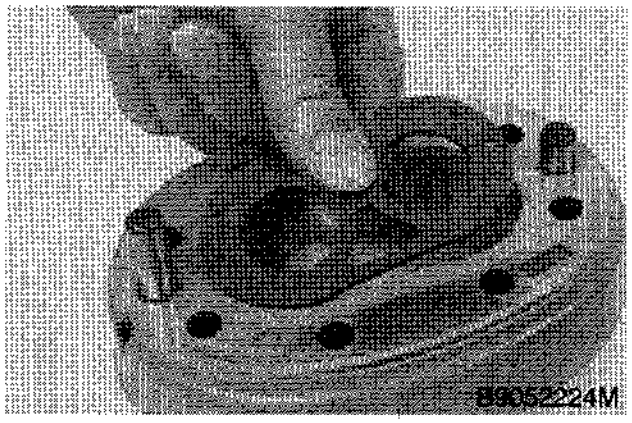
Remove the drive gear from the port end cover.

STEP 8



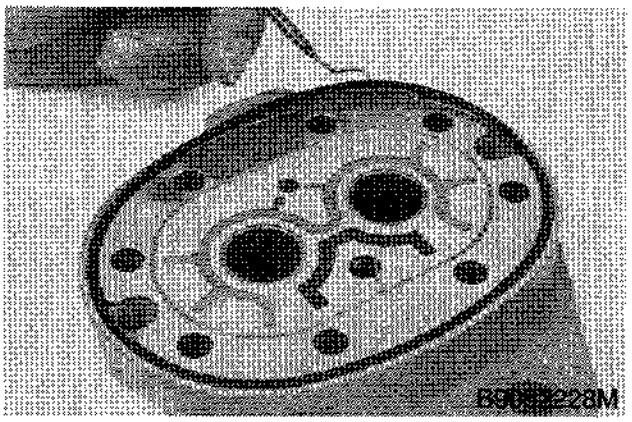
Remove the O-ring from the port end cover.

STEP 9



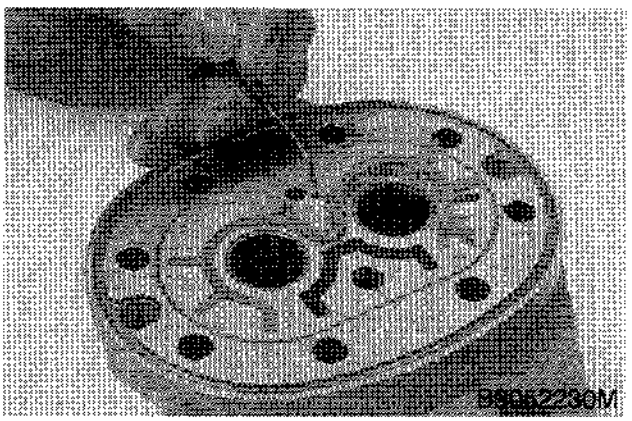
Remove the wear plate from the gear housing.

STEP 10



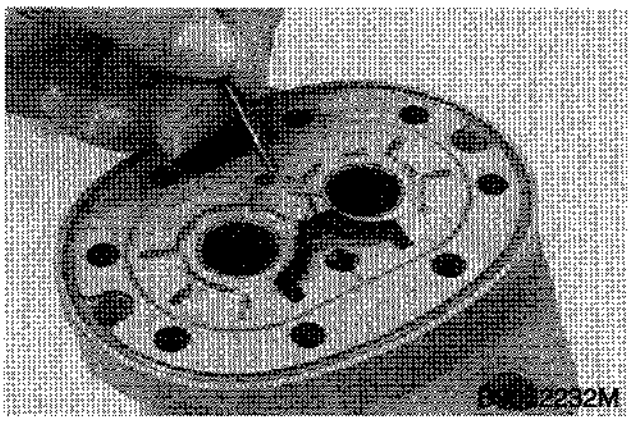
Remove the O-ring from the drive end cover.

STEP 11



Remove the pressure seal from the drive end cover.

STEP 12



Remove the bearing seal from the drive end cover.

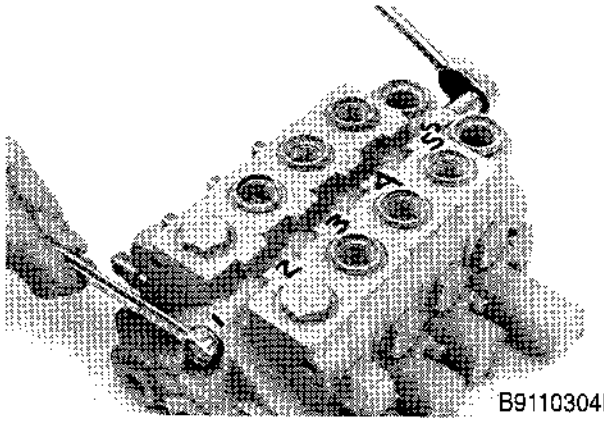
VALVE SECTION

Disassembly

STEP 1
Clean the outside of the control valve and put the control valve on a clean bench.

STEP 2
Write numbers on each section of the control valve.

STEP 3

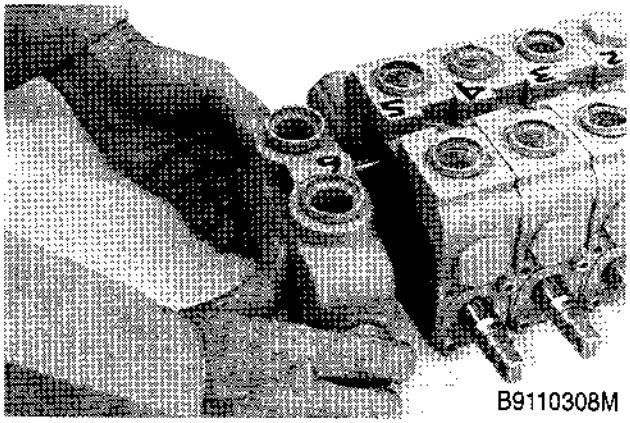


B9110304M

Remove the nuts from the bolts that fasten the sections together.

NOTE: *For assembly, tighten the nuts 346 to 422 pound-inches (39 to 47 Nm).*

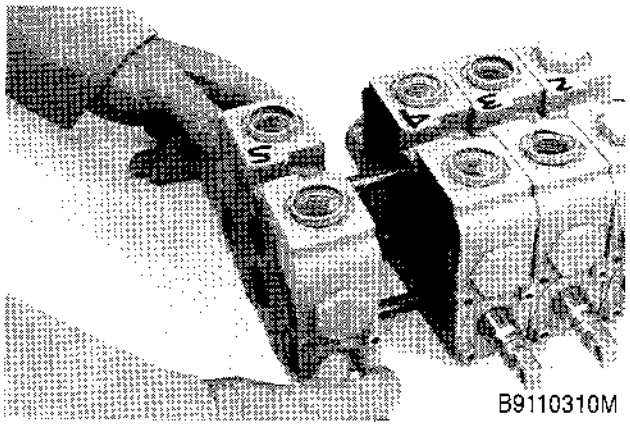
STEP 4



B9110308M

Remove the inlet/outlet section from the bolts.

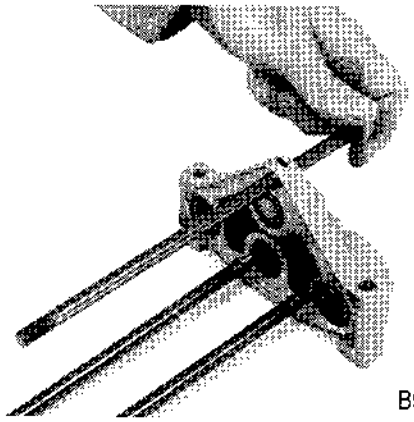
STEP 5



B9110310M

Remove the other sections.

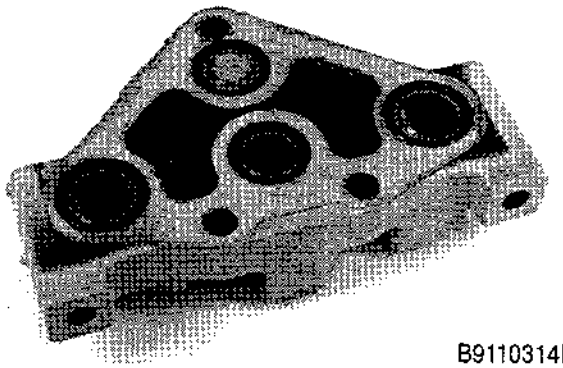
STEP 6



B9110312M

Remove the bolts from the end cover.

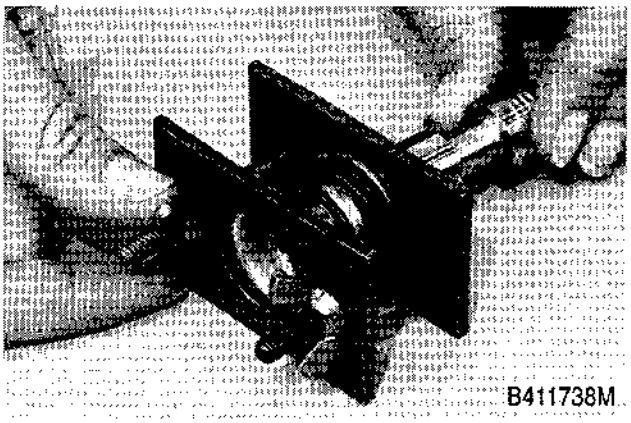
STEP 7



B9110314M

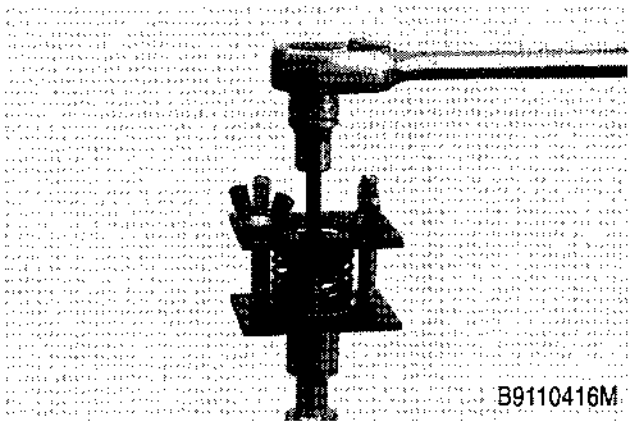
For assembly, replace the O-rings in all sections. Make sure all surfaces and O-rings are free of oil or grease.

STEP 49



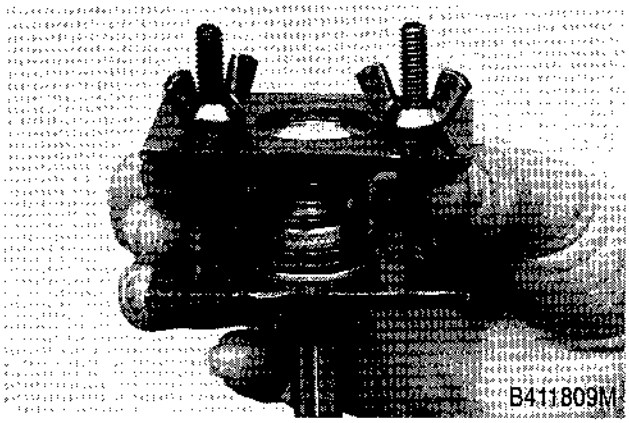
Put the spring compressor tool shown on page 3 on the spool.

STEP 50



Fasten the spool in a vise with soft jaws. Remove the screw.

STEP 51



Remove the spring and spring seats from the spool.

STEP 52

Loosen the nuts on the bolts for the spring compressor tool so that the spring can be released. Separate the spring and spring seats.

Assembly

NOTE: *Inspect all parts for wear and damage. See page 23.*

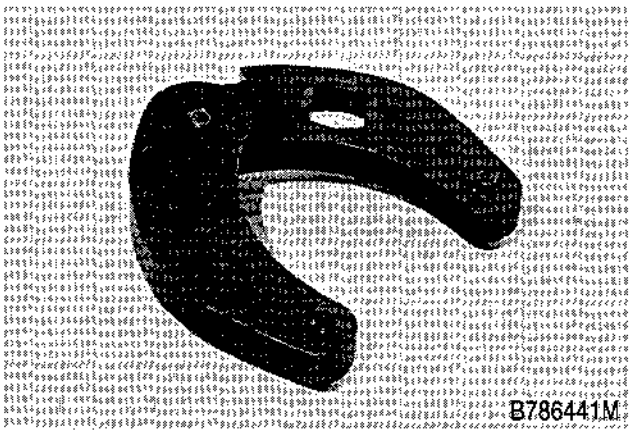
For assembly, do the reverse of disassembly.

SPECIFICATIONS

Torque for all glands ..... 100 to 400 pound-feet (135 to 542 Nm)

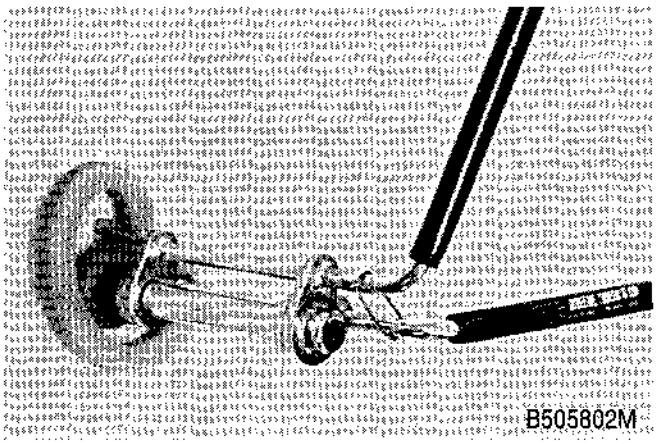
	Torque for piston cap screws with blue Loctite 242 on threads	Approximate Weight
Dozer lift cylinder	200 to 220 pound-feet (271 to 298 Nm)	62 pounds (28 kg)
Dozer tilt cylinder	825 to 970 pound-feet (1118 to 1314 Nm)	57 pounds (26 kg)
Angle cylinder	1000 to 1200 pound-feet (1355 to 1626 Nm)	74 pounds (33 kg)
Ripper cylinder	475 to 525 pound-feet (644 to 711 Nm)	36 pounds (16 kg)

SPECIAL TOOLS



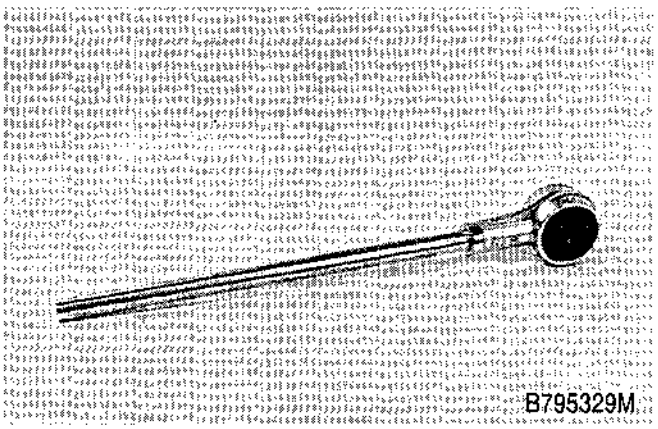
CAS-1456 Gland Wrench

This tool is used to remove and install the gland on Case cylinders. The tool is first used on page 4.



1. CAS-1660 For 1-1/4 and 1-1/2 Inch (32 and 38 mm) Rods
2. CAS-1758 For 2 Inch (51 mm) Rods

This tool is used to install the wide seal in the glands of the cylinders. The tool is first used on page 6.



CAS-1039 Torque Multiplier

This tool is used to loosen and tighten the piston cap screw. The tool is first used on page 4.

15. Install the cap screw (6). Tighten the cap screw (6) to 475 to 525 pound-feet (644 to 711 Nm). A torque multiplier can be used to help tighten the cap screw (9).

16. Install a new wear ring (8) in each groove on the outside end of the piston (5).

17. Install a new backup ring (10) in the center groove on the outside of the piston (5).

18. Install a new seal (9) on top of the backup ring (10) on the outside of the piston (5).

19. Fasten the tube (1) in a vise or other holding equipment.

20. Lubricate the inside of the tube (1) and the piston (5) with clean oil.

21. Push the piston (5) straight into the tube (1).

22. Lubricate the O-ring (11) on the gland (3) with clean oil.

23. When the piston (5) is in the smooth part of the tube (1), start the gland (3) into the tube (1).

24. Tighten the gland (3) to 100 to 400 pound-feet (135 to 542 Nm). If the lock screw (2) holes become aligned in this torque range, install the lock screw (2). Tighten the lock screw (2) to 20 pound-inches (2.3 Nm). If the lock screw (2) holes are not aligned, do steps 25 through 28.

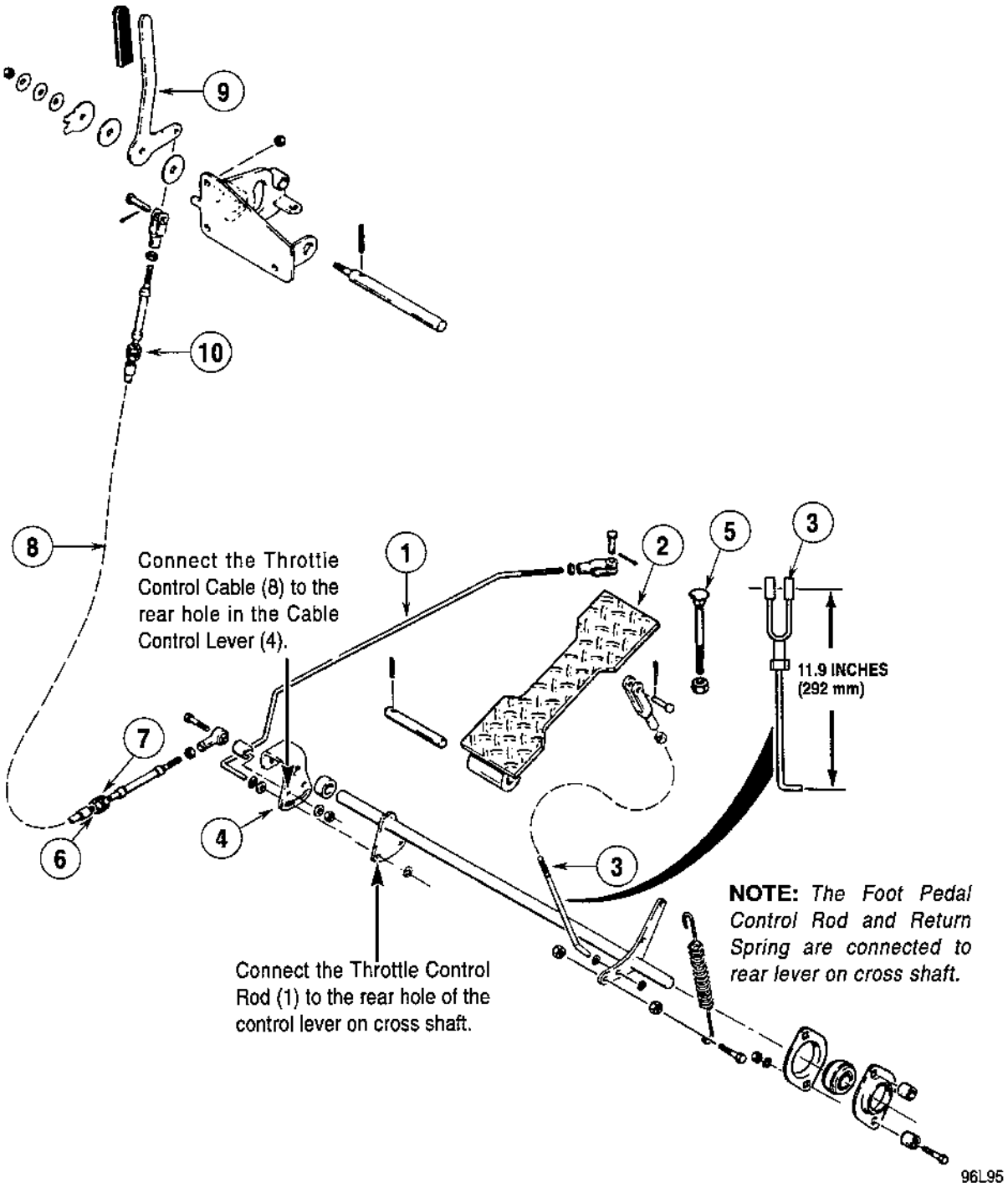
25. Tighten the gland (3) to 100 to 400 pound-feet (135 to 542 Nm).

26. Use a No. 26 drill and drill a hole half in the gland (3) and half in the tube (1). Drill to a depth of 7/16 inch (11 mm). Do not drill in line with a hole in the gland (3) for the gland wrench.

27. Install the lock screw (2). Tighten the lock screw (2) to 20 pound-inches (2.3 Nm).

28. If the hoses were removed with the cylinder, install new O-rings, if equipped, on the hose fittings. Lubricate the O-rings with clean oil. Install the hoses.

Exploded View of Decelerator Linkage



1. Throttle Control Rod
2. Foot Pedal - Notched
3. Foot Pedal Control Rod
4. Cable Control Lever
5. Stop Bolt
6. Jam Nut
7. Jam Nut
8. Throttle Control Cable
9. Throttle Hand Lever
10. Jam Nuts for Top Mounting Bracket