SERVICE MANUAL

Excavator

980B

9-66739

1. Trim along dashed line.
2. Slide into pocket on Binder Spine.

TYPE 1-4

SERVICE MANUAL

Excavator

980B

9-66739

1. Trim along dashed line.
2. Slide into pocket on Binder Spine.

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Excavator

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TYPE 1-4

SERVICE MANUAL

Excavator

980B

9-66739

1. Trim along dashed line.
2. Slide into pocket on Binder Spine.

TYPE 1-4

Connecting Rod

	Decimal System	Metric System
Bushing	Replaceable	
Bushing I.D. installed (ream to size)	1.8004 to 1.8008″	45.7302 to 45.7403mm
Maximum limit including wear	1.8018″	45.7657mm
Bushing out of round including wear	.0015″	.0377mm
Bearing liners	Replaceable	
Bearing liner width	1.586 to 1.596″	40.284 to 40.538mm
Journal I.D. without bearing liners	3.1503 to 3.1513″	80.0176 to 80.0426mm
Bearing oil clearance including wear	.0013 to .005″	.0326 to .127mm
Undersize bearings for service	.002,.010,.020,.030″	.051,.254,.508,.762mm
Side clearance	.007 to .016″	.178 to .406mm
Cap bolts	12 point flange head	

Crankshaft

Type	Balanced	
Main bearing liners	Replaceable	
End play, No. 5 main bearing cap including wear	.003 to .020″	.076 to .508mm
Thrust bearings std. thickness including wear	.147 to .157″	3.734 to 3.988mm
Thrust bearings oversize thickness for service including wear	.153 to .163″	3.886 to 4.140mm
Connecting rod journal std. O.D.	2.998 to 2.999″	76.149 to 76.175mm
.010″ (.254mm) O.D. undersize, grind to	2.988 to 2.989″	75.895 to 75.921mm
.020″ (.508mm) O.D. undersize, grind to	2.978 to 2.979″	75.641 to 75.667mm
.030″ (.762mm) O.D. undersize, grind to	2.968 to 2.969″	75.387 to 75.413mm
Connecting rod journal maximum taper including wear	.0015″	.0377mm
Journals out of round	.0005″	.0127mm
Main bearing liner width 1st, 3rd, 5th and 7th	2.1515 to 2.1615″	54.6477 to 54.9017mm
Main bearing liner width 2nd, 4th and 6th	1.214 to 1.224″	30.836 to 31.09mm
Undersize main bearing liners for service	.002,.010,.020,.030″	.051,.254,.508,.762mm
Main bearing oil clearance including wear	.0016 to .006″	.0402 to .152mm
Main bearing journal std. O.D.	3.498 to 3.499″	88.849 to 88.875mm
.010″ (.254mm) O.D. undersize, grind to	3.488 to 3.489″	88.595 to 88.621mm
.020″ (.508mm) O.D. undersize, grind to	3.478 to 3.479″	88.341 to 88.367mm
.030″ (.762mm) O.D. undersize, grind to	3.468 to 3.469″	88.087 to 88.113mm
Main journal bore I.D. without liners	3.691 to 3.692″	93.751 to 93.777mm

NOTE: The 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.

U.S. AND METRIC TORQUE SPECIFICATIONS

Grade 5 Bolts, Nuts and Studs (Dry Threads)

Thread size	Ft-lbs	N m	Thread size	Ft-lbs	N m
1/4"-20 NC	5-10	7-13	3/4"-10 NC	235-285	319-386
1/4"-28 NF	10-15	13-20	3/4"-16 NF	270-330	366-447
5/16"-18 NC	15-20	20-27	7/8"-9 NC	360-440	488-597
5/16"-24 NF	15-20	20-27	7/8"-14 NF	395-490	536-664
3/8"-16 NC	25-35	34-47	1"-8 NC	520-640	705-867
3/8"-24 NF	30-40	41-54	1"-12 NF	575-705	780-955
7/16"-14 NC	45-55	61-74	1-1/8"-7 NC	720-820	976-1111
7/16"-20 NF	50-60	68-81	1-1/8"-12 NF	790-970	1071-1315
1/2"-13 NC	65-85	88-115	1-1/4"-7 NC	1010-1240	1370-1681
1/2"-20 NF	80-100	109-135	1-1/4"-12 NF	1115-1365	1512-1850
9/16"-12 NC	100-120	135-163	1-3/8"-6 NC	1315-1610	1783-2182
9/16"-18 NF	110-130	149-176	1-3/8"-12 NF	1510-1850	2047-2508
5/8"-11 NC	135-165	183-223	1-1/2"-6 NC	1745-2135	2366-2894
5/8"-18 NF	160-200	216-271	1-1/2"-12 NF	1880-2420	2549-3281

Grade 8 Bolts, Nuts and Studs (Dry Threads)

Thread size	Ft-lbs	N m	Thread size	Ft-lbs	N m
1/4"-20 NC	10-15	13-20	3/4"-10 NC	340-420	461-569
1/4"-28 NF	15-20	20-27	3/4"-16 NF	380-460	515-623
5/16"-18 NC	20-30	27-40	7/8"-9 NC	540-660	732-894
5/16"-24 NF	25-30	34-40	7/8"-14 NF	595-725	807-982
3/8"-16 NC	40-50	54-67	1"-8 NC	810-990	1098-1342
3/8"-24 NF	45-55	61-74	1"-12" NF	900-1100	1220-1491
7/16"-14 NC	60-80	82-102	1-1/8"-7 NC	1150-1400	1559-1898
7/16"-20 NF	70-90	95-122	1-1/8"-12 NF	1295-1585	1756-2148
1/2"-13 NC	100-120	136-162	1-1/4"-7 NC	1640-2000	2224-2711
1/2"-20 NF	110-130	149-176	1-1/4"-12 NF	1800-2200	2440-2982
9/16"-12 NC	135-165	183-223	1-3/8"-6 NC	2140-2620	2901-3552
9/16"-18 NF	155-190	210-257	1-3/8"-12 NF	2450-3000	3322-4067
5/8"-11 NC	200-240	271-325	1-1/2"-6 NC	2845-3475	3857-4711
5/8"-18 NF	215-265	292-359	1-1/2"-12 NF	3200-3900	4339-4880

Figure 1

CAUTION: Main boom weighs approximately 3450 lbs. (1565 kg) hoist cylinder weighs 700 lbs. (320 kg) and crowd cylinder weighs 665 lbs. (300 kg). Use appropriate hoist to remove these items or personal injury could result.

CAUTION: Dipperstick weighs approximately 1550 lbs. (700 kg) and tool cylinder weighs approximately 460 lbs. (208 kg). Use a hoist capable of lifting these items as personal injury could result.

WARNING: When testing or adjusting fuel injectors, do not place your hands or arms in front of the injector nozzle.

In the event the skin is punctured from the discharge of an injector, apply the following first aid immediately, then have the injury examined by a physician as quickly as possible.

Wash the injured part with boric acid solution, support the injured finger or hand with a splint or sling so the injured part will remain absolutely at rest until a physician can examine it.

CAUTION: Before removing leveler cylinders support turntable under both sides to prevent turntable from shifting and causing an unbalanced situation and possible personal injury.

CAUTION: Do not try to replace pump without using a hoist. Pump is heavy and could cause personal injury if not properly handled.

CAUTION: Do not try to remove pump without using a hoist. Pump is heavy and could cause personal injury if not properly handled.

CAUTION: The swing motor is heavy and awkward to handle. Use care when handling the motor to prevent personal injury and damage to the motor.

CAUTION: Do not place fingers around or near the edge of the housing bore when installing housing. Possible personal injury could occur.

ENGINE MISFIRES

LOW AND HIGH RPM (Cont'd)

12. Valves Damaged

Damaged valves are caused by wear, improper grinding, hitting the pistons, wrong adjustment, loose seat, or broken valve spring. Defective valves can usually be heard through the intake or exhaust manifold. A low reading compression test usually indicates defective valves.

13. Valve Spring Worn (High RPM)

Weak valve springs will allow the valves to float at high speed. Broken valve springs will not close valve completely and valve could hit the piston doing internal engine damage. Always check and test valve springs when doing a valve job. Close coils on spring should be assembled against the the cylinder head.

14. Operating Temperature Low

The engine was designed for and will only develop full horsepower within its correct operating temperature range. Low operating temperature can result from a malfunctioning thermostat. Do not remove thermostat during the summer. Maintain 50% of permanent anti-freeze all year for more efficient operation.

15. Engine Preignition

Preignition is the igniting of the fuel before the normal ignition occurs. This causes wild pinging, severe knock, and power loss. High temperature and pressure from preignition usually burns a hole through the center of the piston. The following are causes of preignition:

A. Carbon deposits that remain incandescent.
B. Valves operating at higher than normal temperature because of excessive guide clearance or improper seal with valve seats.
C. Hot spots caused by an inefficient or damaged cooling system.
D. Nozzles set at wrong cracking pressure.
E. Detonation or conditions leading to it.
F. Sharp edges in combustion chamber.
G. Wrong or contaminated fuel.

16. Valves Sticking

Sticking valves can be caused by improper replacement of valve guides, no lubrication, rust vapors, bent valves, or carbon. A sticking valve will cause an engine miss and the valve could also hit the piston causing internal damage.

17. Bent Connecting Rod

A bent connecting rod will cause piston slap from scoring due to misalignment. The engine will run rough because of imcomplete combustion and emit white exhaust smoke from the bad cylinder. Remove engine oil pan and inspect connecting rods for alignment. A comparison of piston heights at Top Dead Center with cylinder heads removed may quickly indicate a bent rod condition. A difference of .020 inch in connecting rod can cause a noticeable miss at low RPM and cold engine conditions.

18. Turbo-Charger Malfunction

A malfunctioning turbo-charger will not supply the required compressed or supercharged air into the intake manifold. The engine will smoke from the rich mixture and a noticeable loss of power will result. Remove intake hose and inspect turbo for wear, lubrication, and determine if compressor wheel will turn freely.

19. Tune-up Specifications Incorrect

Check engine and unit serial number plates for correct specifications when performing engine tune-up.

20. Engine Detonation

Detonation is an explosion or uncontrolled burning of the fuel charge. This sudden release of energy will usually break piston ring lands and cause burning down the sides of the piston. Also, a power loss will be noticeable because the engine cannot absorb the sudden release of energy for even power to the crankshaft. Causes for detonation are:

A. Lean fuel mixtures.
B. Wrong fuel.
C. Timing incorrect.
D. Lugging engine.
E. Excessive carbon deposit on pistons and cylinder heads.
F. Defective injection pump.
G. Deficiencies in cooling system which offsets cylinder head cooling.

HIGH ENGINE OIL CONSUMPTION

INTERNAL LEAKAGE (Cont'd)

11. Engine Oil Too Light

Using engine oil that is too light will aggravate all oil consumption areas because of additional oil flow and leakage of the lighter oil. Light engine oil will give lower than normal oil pressure readings. Check for proper weight oil and change oil if required.

12. Piston Rings Not Seated

Most piston rings will seat in the first few hours of operation. If engine continues to use oil, it is usually a problem other than piston rings. Items that can cause rings not to seat are: out-of-round sleeve, warped sleeve, improper deglazing of sleeves, rings installed wrong, or improper break-in procedure. Do not add abrasives to intake system to seat rings. If it is suspected that rings are not seated, tear down engine and inspect.

13. Valve Guide Seals Worn

Worn valve guide seals allow oil to enter the engine through the valve guides. Gravity, inertia, and air pressure differences all act to force oil through the intake and exhaust valve guides and into the combustion chamber. Remove rocker arm assemblies and valve springs and inspect or replace valve guide seals.

14. Engine Oil Pressure Too High

High oil pressure will cause additional oil throw-off from connecting rod bearings for lubrication of cylinder walls. This additional oil may be more oil than worn piston rings can control. High oil pressure will cause excessive oil in all areas and can cause oil consumption. Remove engine oil pan and adjust oil pump relief valve.

15. Piston Ring Installation Faulty or Broken Rings

Many times piston rings are installed wrong, upside down, wrong size, or expanders are cut off on three piece oil rings and overlapping the expander. Be sure to carefully read the instructions before installing piston rings. Damaged rings can cause scoring of the pistons and sleeves and cause the engine to use oil.

16. Cylinder Head Gasket Damaged

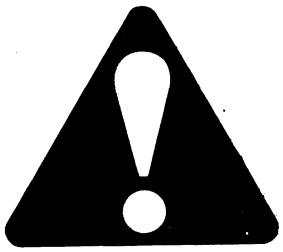
A cylinder head gasket can be damaged or installed wrong allowing lubricating oil to enter the combustion chamber and to be burned in the engine. Remove cylinder head and check gasket if all other tests check out alright.

17. Oil Leakage Past Valve Guides And Valve Stems.

Excessive valve stem-to-guide clearance can cause high oil consumption. A heavy carbon build-up on valve stems and face is the result of excessive oil leakage past valve guides, also a noticeable loss of engine power could result. In many cases, teflon valve seals will restore engine oil economy without the necessity of a complete engine overhaul. This is particularly true where the engine has low hours and the piston rings are in good condition, yet there has been a record of poor oil economy from the start. Refer to Page 24 for Installation of Teflon Valve Seals.

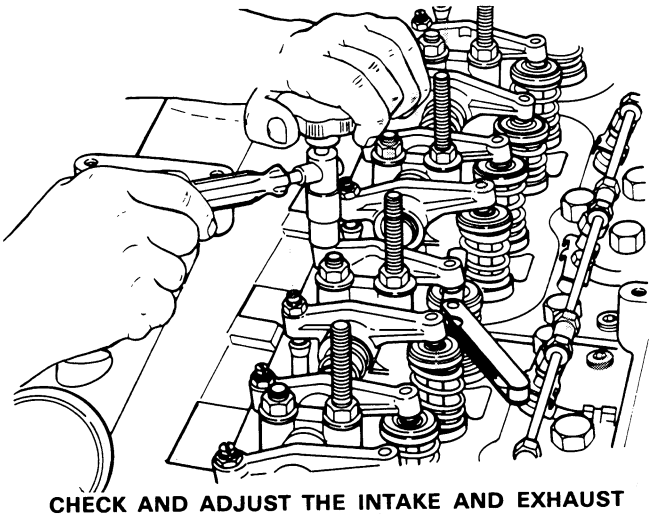
ENGINE TUNEUP

A COMPLETE ENGINE TUNEUP INCLUDES THE PERFORMING OF THE FOLLOWING ITEMS:



THIS SAFETY ALERT SYMBOL INDICATES IMPORTANT SAFETY MESSAGES IN THIS MANUAL. WHEN YOU SEE THIS SYMBOL, CAREFULLY READ THE MESSAGE THAT FOLLOWS AND BE ALERT TO THE POSSIBILITY OF PERSONAL INJURY.

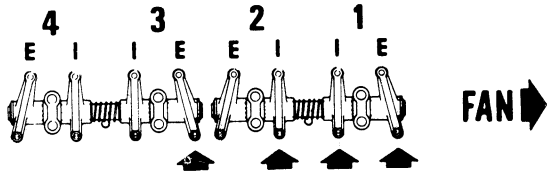
STEP 33



CHECK AND ADJUST THE INTAKE AND EXHAUST VALVES AS POINTED OUT BY THE ARROWS BELOW.

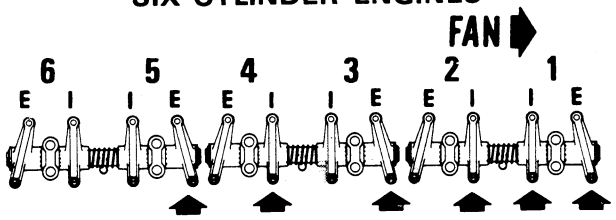
TAPPET CLEARANCE HOT - INTAKE VALVES .015"
EXHAUST VALVES .020"

FOUR CYLINDER ENGINES



NO. 1 TDC COMPRESSION STROKE

SIX CYLINDER ENGINES



NO. 1 TDC COMPRESSION STROKE

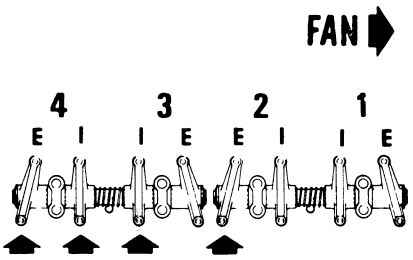
STEP 34

CRANK THE ENGINE ONE COMPLETE REVOLUTION AND ALIGN THE TIMING POINTER WITH THE TDC MARK ON CRANKSHAFT PULLEY.

CHECK AND ADJUST THE INTAKE AND EXHAUST VALVES AS POINTED OUT BY THE ARROWS BELOW.

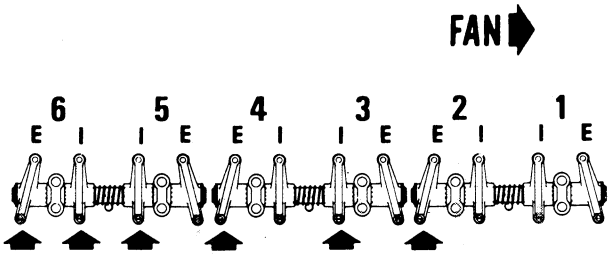
TAPPET CLEARANCE HOT - INTAKE VALVES .015"
EXHAUST VALVES .020"

FOUR CYLINDER ENGINES



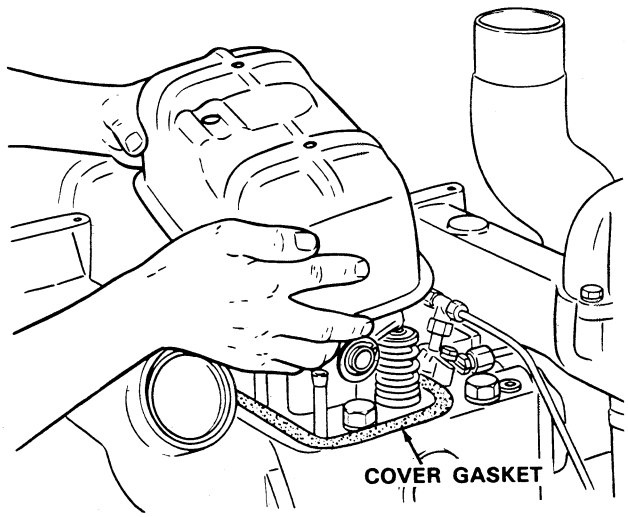
NO. 4 TDC COMPRESSION STROKE

SIX CYLINDER ENGINES



NO. 6 TDC COMPRESSION STROKE

STEP 35



AFTER TAPPET ADJUSTMENT, INSTALL VALVE COVERS AND GASKETS.

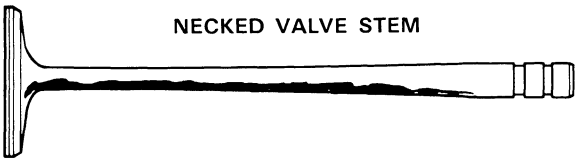
Valves and Valve Seats Inspection

STEP 25

CLEAN VALVES WITH A FINE POWER DRIVEN WIRE BRUSH, BEING CAREFUL NOT TO SCRATCH VALVE STEMS

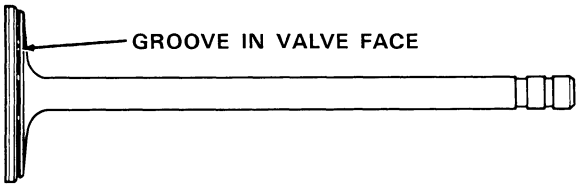
STEP 26

INSPECT THE VALVES FOR THE FOLLOWING CONDITIONS



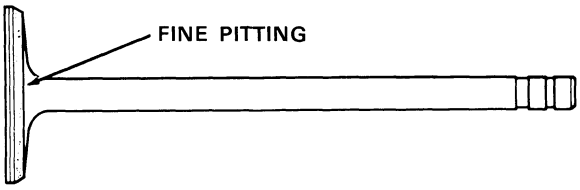
NOTE: REPLACE VALVE IF THIS CONDITION EXISTS

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



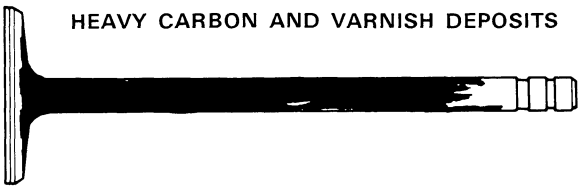
NOTE: REFACE OR REPLACE VALVE IF THIS CONDITION EXISTS

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



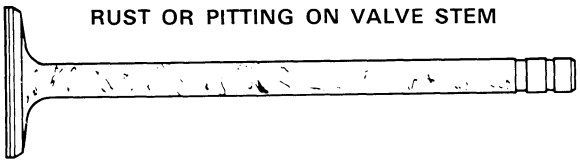
NOTE: THIS IS A NORMAL CONDITION

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



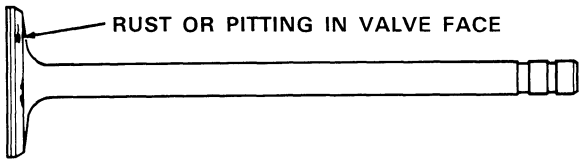
NOTE: CLEAN AND REFACE VALVES IF THIS CONDITION EXISTS OR REPLACE VALVES

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



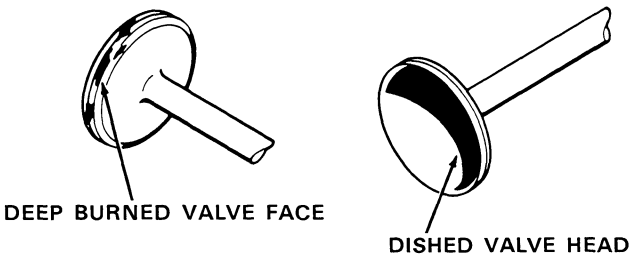
NOTE: REPLACE VALVE IF THIS CONDITON EXISTS

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



NOTE: REFACE OR REPLACE VALVE IF THIS CONDITION EXISTS

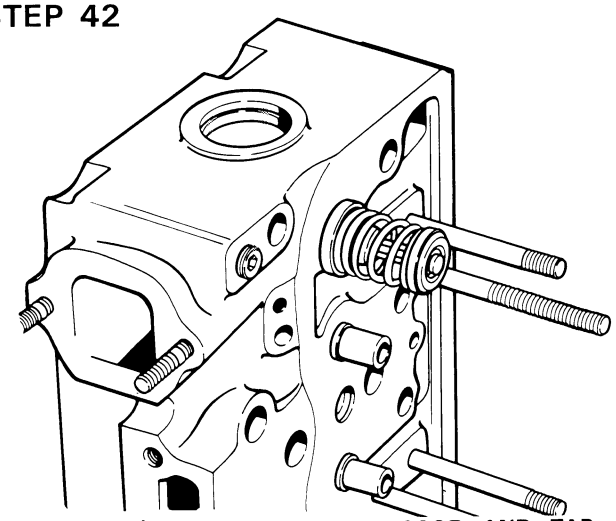
This condition can be caused by using poor quality engine oil or fuel.



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

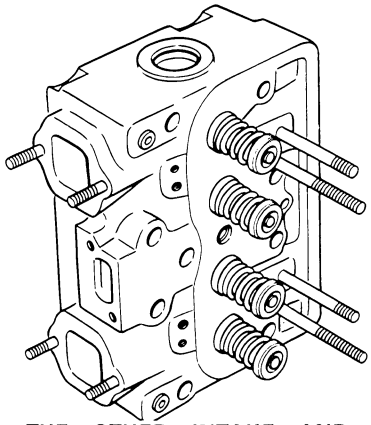
These conditions are usually caused by running the engine under excessive loads at high engine temperature, grinding valve face too thin or improper valve grinding.

STEP 42



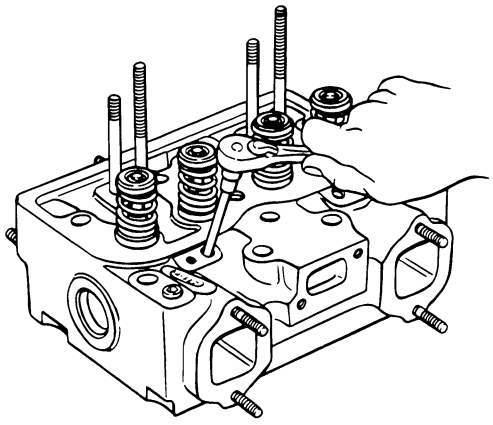
REMOVE THE SPRING COMPRESSOR AND TAP VALVE STEM TO SEAT KEEPERS.

STEP 43



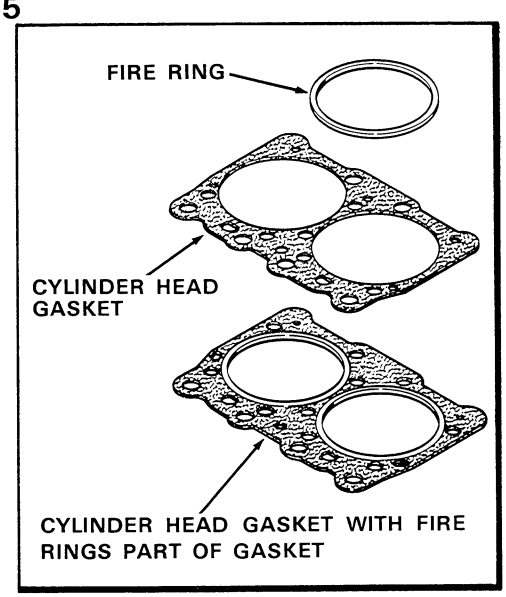
INSTALL THE OTHER INTAKE AND EXHAUST VALVES, FOLLOWING THE PRECEDING PROCEDURE

STEP 44

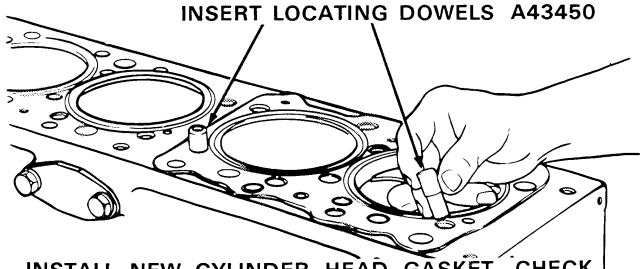


NOTE: BEFORE INSTALLING CYLINDER HEADS ON BLOCK, CLEAN THE INJECTOR BORES USING A43277 REAMER

STEP 45

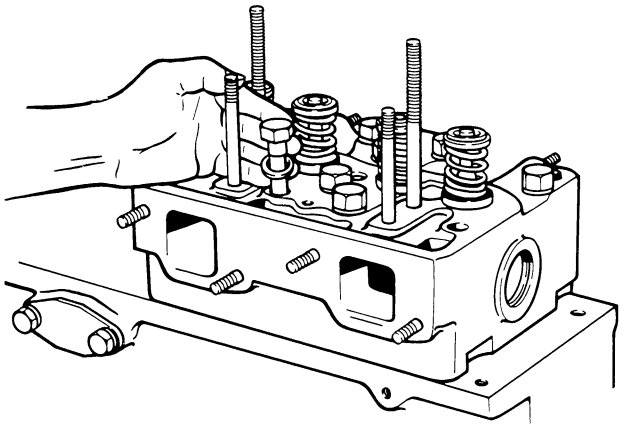


CYLINDER HEAD GASKET WITH FIRE RINGS PART OF GASKET



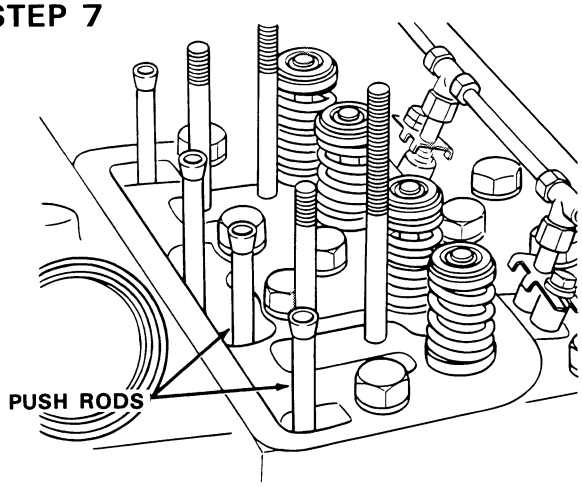
INSTALL NEW CYLINDER HEAD GASKET, CHECK THAT ALL GASKET HOLES ALIGN WITH BLOCK HOLES
NOTE: REFER TO SECTION 2025, SLEEVE PROTRUSION, IF YOU ARE EXPERIENCING HEAD GASKET LEAKAGE PROBLEMS

STEP 46



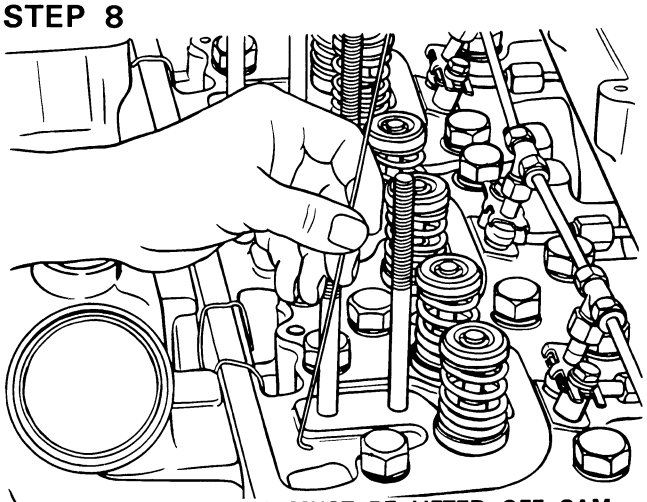
PLACE CYLINDER HEAD ON ENGINE BLOCK AND INSTALL CYLINDER HEAD BOLTS, FINGER TIGHT ONLY, AND WASHERS.

STEP 7

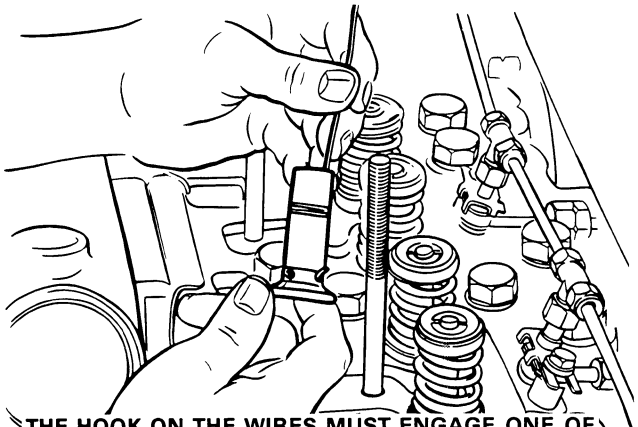


REMOVE THE PUSH RODS FROM THE CYLINDER HEADS.

STEP 8

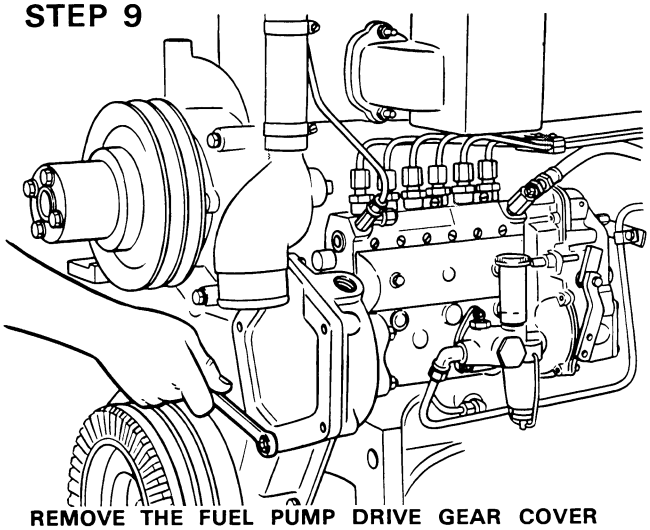


THE VALVE LIFTERS MUST BE LIFTED OFF CAM LOBES AND RETAINED IN PLACE IN ORDER TO REMOVE THE CAMSHAFT. CUT SOME LIGHT WIRE INTO PIECES ABOUT 18" LONG. BEND A SMALL HOOK ON ONE END OF EACH WIRE. INSERT THE WIRES INTO THE PUSH ROD HOLES.



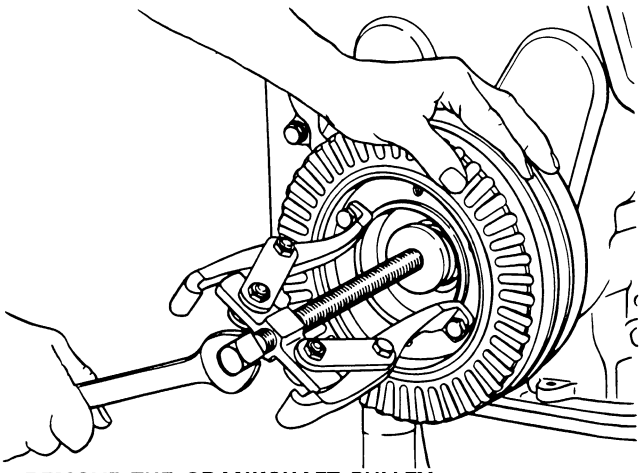
THE HOOK ON THE WIRES MUST ENGAGE ONE OF THE HOLES IN THE LIFTERS. AFTER THE WIRE HAS ENGAGED THE LIFTER, PULL THE LIFTER UP TO WHERE THE HEAD ON LIFTER CONTACTS BLOCK, THEN BEND THE WIRE OVER CYLINDER HEAD, RETAINING LIFTER IN PLACE.

STEP 9



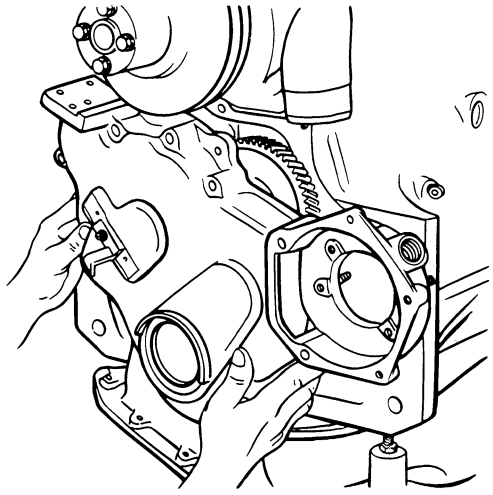
REMOVE THE FUEL PUMP DRIVE GEAR COVER AND REMOVE THE FUEL PUMP, REFER TO SECTION 3012 FOR REMOVAL OF FUEL INJECTOR PUMP.

STEP 10



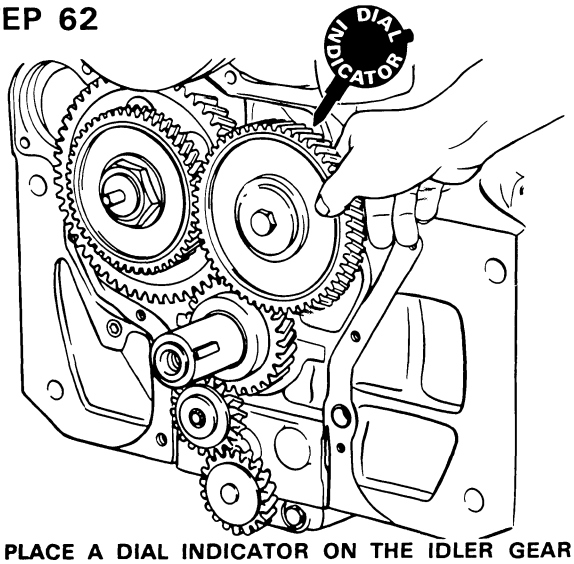
REMOVE THE CRANKSHAFT PULLEY.

STEP 11



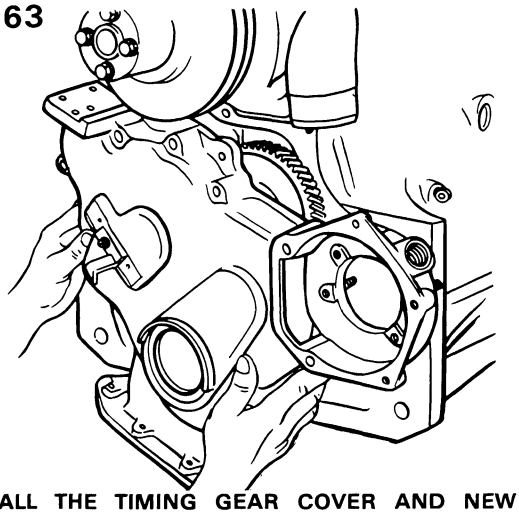
REMOVE THE TIMING GEAR COVER.

STEP 62



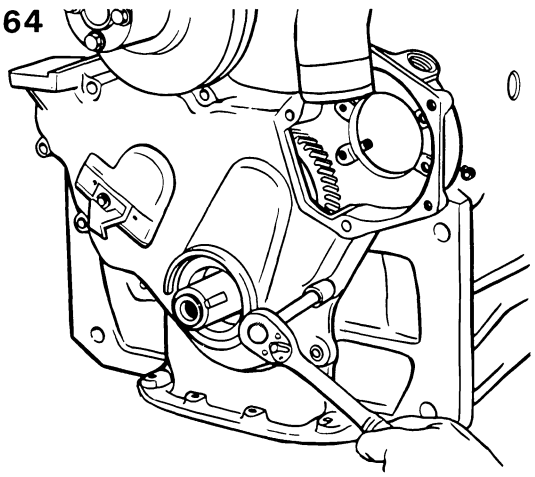
PLACE A DIAL INDICATOR ON THE IDLER GEAR AND CHECK BACKLASH BETWEEN IDLER GEAR AND IDLER DRIVE GEAR. BACKLASH MUST BE .003" TO .010". REPLACE THE GEARS IF BACKLASH EXCEEDS .010".

STEP 63



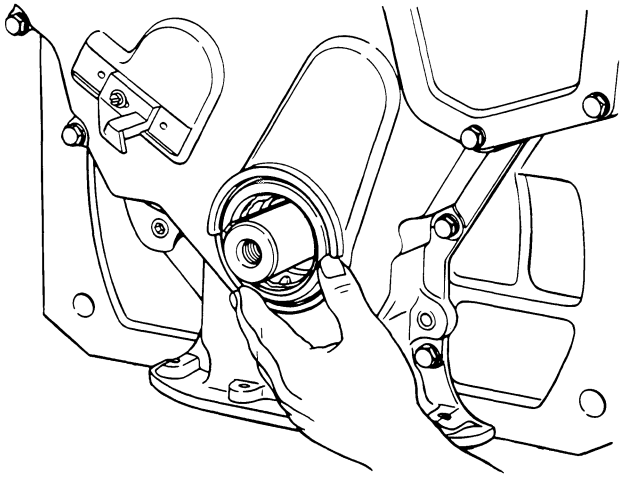
INSTALL THE TIMING GEAR COVER AND NEW COVER GASKET.

STEP 64



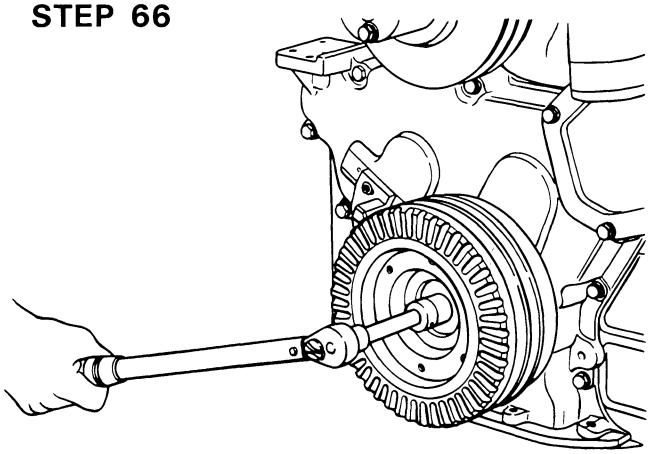
TORQUE TIMING COVER RETAINING BOLTS 35 TO 42 FT. LBS.

STEP 65



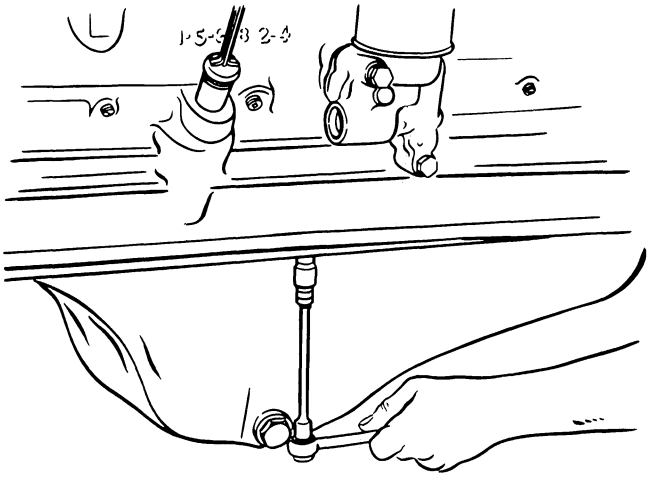
INSTALL A NEW FRONT OIL SEAL, REFER TO SECTION 2012 FOR SEAL REPLACEMENT.

STEP 66



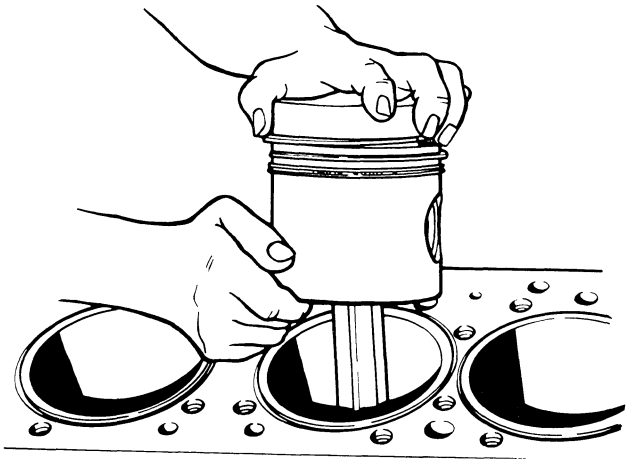
INSTALL THE CRANKSHAFT PULLEY AND TORQUE RETAINING BOLT 100 TO 110 FT. LBS.

STEP 67



INSTALL ENGINE OIL PAN AND NEW GASKET. APPLY #2 PERMATEX ON BOTH SIDES OF GASKET AT THE FRONT AND REAR PORTIONS ONLY. TORQUE RETAINING BOLTS 13 TO 17 FT. LBS.

STEP 10



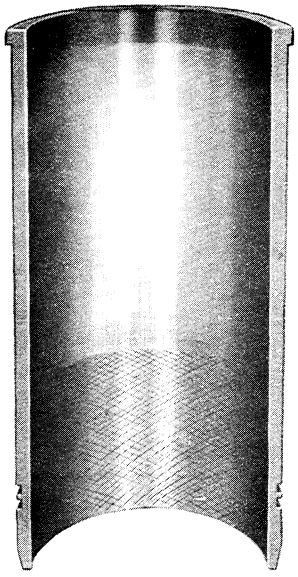
REMOVE THE PISTONS FROM THE ENGINE BLOCK.

Cylinder Sleeve Inspection

STEP 11

INSPECT THE CYLINDER SLEEVES FOR THE FOLLOWING CONDITIONS.

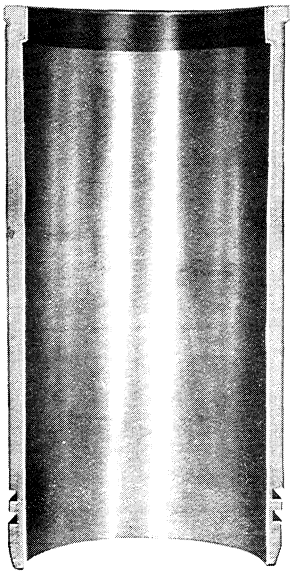
Normal Wear



A SMOOTH SHINY SURFACE BETWEEN THE UPPER AND LOWER LIMITS OF THE RING TRAVEL INDICATES NORMAL WEAR. THERE WILL ALWAYS BE SLIGHT WEAR PRESENT DUE TO COMBUSTION PRESSURE FORCING THE TOP RING OUTWARD AGAINST THE CYLINDER SLEEVE.

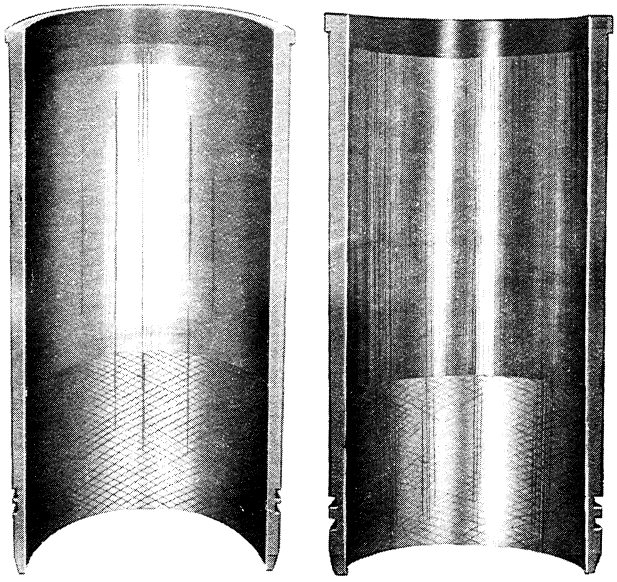
NORMAL WEAR INDICATES SATISFACTORY SLEEVE CONDITIONS AND THE SLEEVE NEED NOT BE REPLACED.

Worn Out Sleeve



A SMOOTH SHINY SURFACE THE COMPLETE LENGTH OF THE CYLINDER SLEEVE INDICATES A WORN OUT SLEEVE DUE TO NORMAL WEAR AND IT SHOULD BE REPLACED.

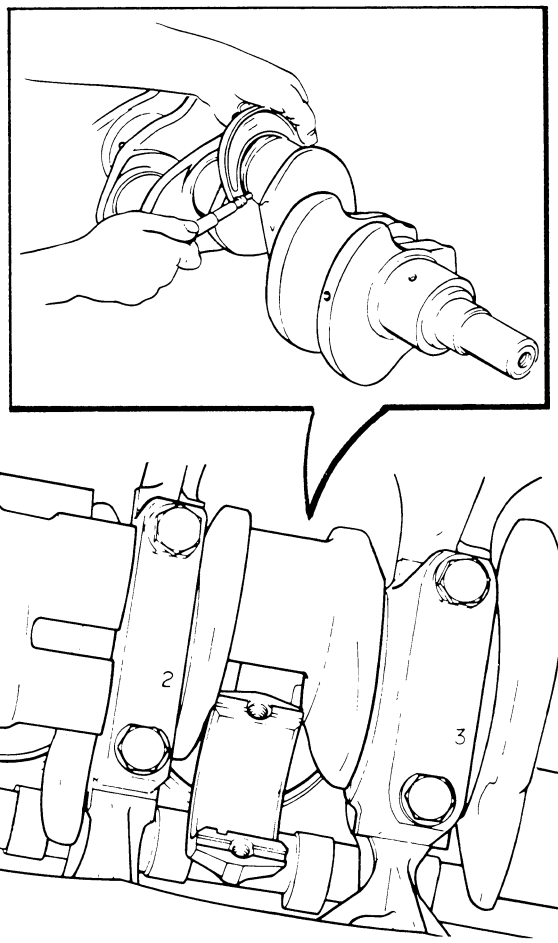
Scuffed Cylinder Walls



HEAVY VERTICAL LINES FRINGED BY A DISCOLORED BAND CAUSED BY METAL TRANSFERRING FROM ONE SPOT TO ANOTHER INDICATES SCUFFED CYLINDER WALLS. THE VERTICAL SCUFF MARKS ARE CAUSED BY METAL COMING IN CONTACT WITH THE PISTON. THE SCUFFING MAY BE IN ONE PARTICULAR AREA OR IT MAY OCCUR THE ENTIRE LENGTH OF THE PISTON TRAVEL.

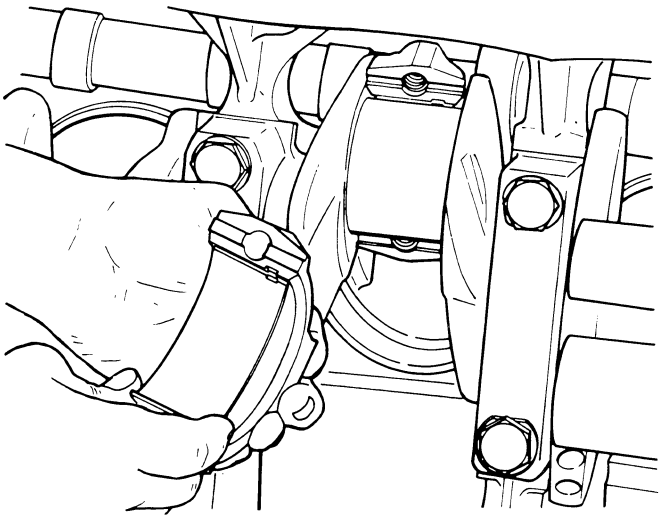
IF THIS CONDITION EXISTS, REPLACE THE CYLINDER SLEEVE.

STEP 51



Recheck the rod journals, 90 degrees from the first measurements for out of roundness. If out of roundness exceeds 0.0005", the journals must be refinished.

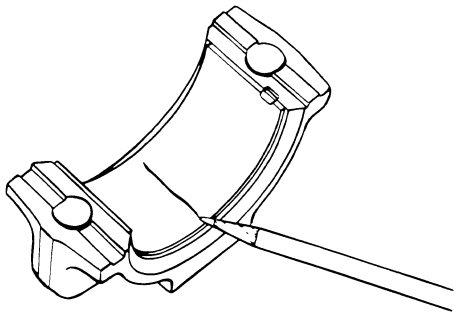
STEP 52



NOTE: WHEN INSTALLING LINERS MAKE SURE LINER LOCKS LINE UP. USE A SLIDING TYPE MOVEMENT WHEN INSTALLING LINERS, NEVER PRESS ON CENTER OF LINERS.

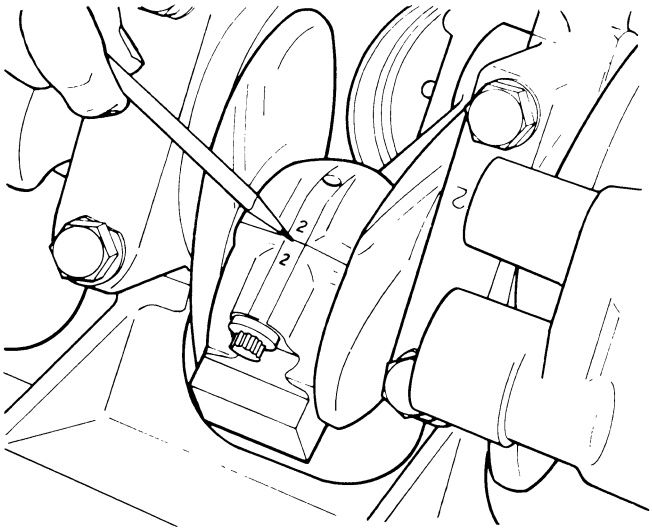
Rac 9-76176

STEP 53



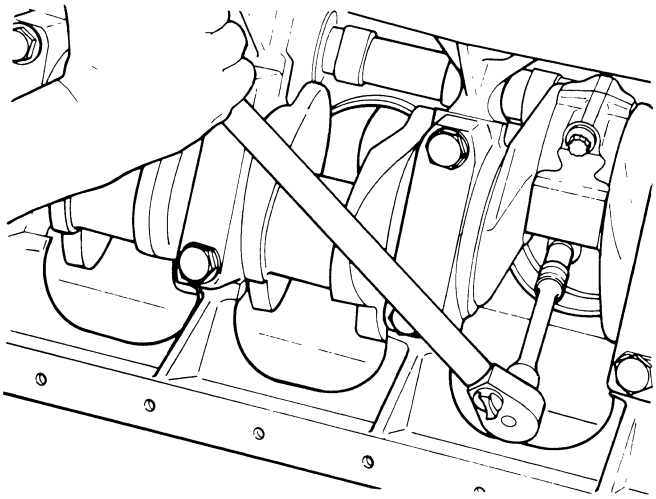
CLEAN THE CONNECTING ROD JOURNALS AND THE ROD BEARING SHELLS. PLACE A PIECE OF PLASTIC GAUGE ON THE BEARING CAP.

STEP 54



NOTE: WHEN INSTALLING BEARING CAPS MAKE SURE THE NUMBER ON THE CAP MATCHES THE NUMBER ON THE CONNECTING RODS.

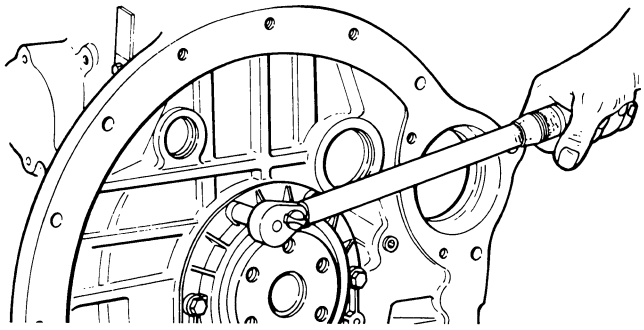
STEP 55



Tighten the connecting rod cap bolts 95 to 105 ft. lbs.

NOTE: *Add lubrication to threads and under bolt heads with 30W oil.*

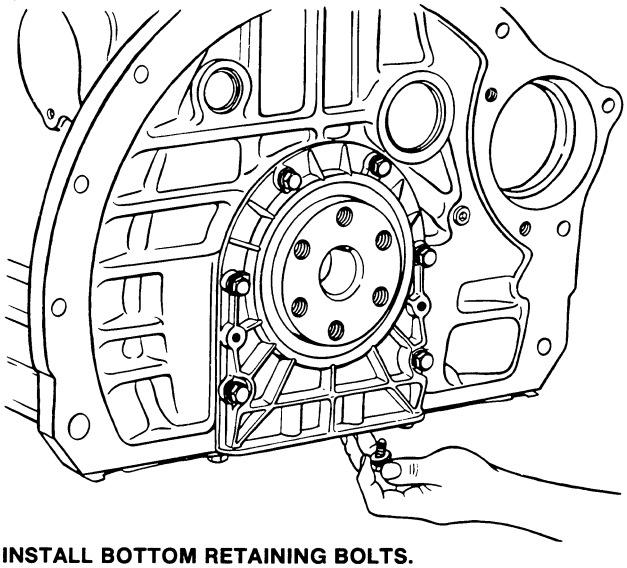
STEP 11



TIGHTEN THE REAR RETAINING BOLTS 35 TO 42 FT. LBS.

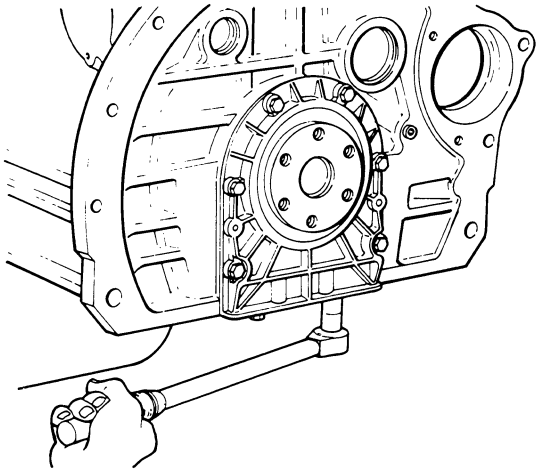
NOTE: AFTER ASSEMBLY OF REAR SEAL RETAINER TO THE REAR OF THE ENGINE BLOCK. TRIM THE SEAL RETAINER GASKETOFF FLUSH WITH THE CYLINDER BLOCK AND BOTTOM FLANGE OF THE SEAL RETAINER.PUT A BED OF PERMATEX #2 ALONG THE TRIMMED GASKET EDGE PRIOR TO ASSEMBLY OF THE OIL PAN.

STEP 12



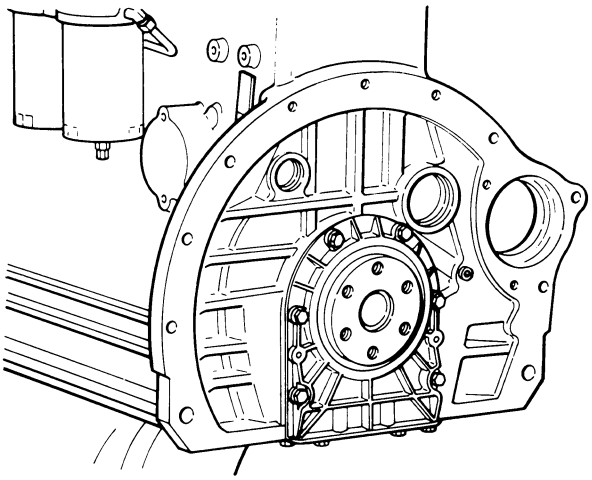
INSTALL BOTTOM RETAINING BOLTS.

STEP 13



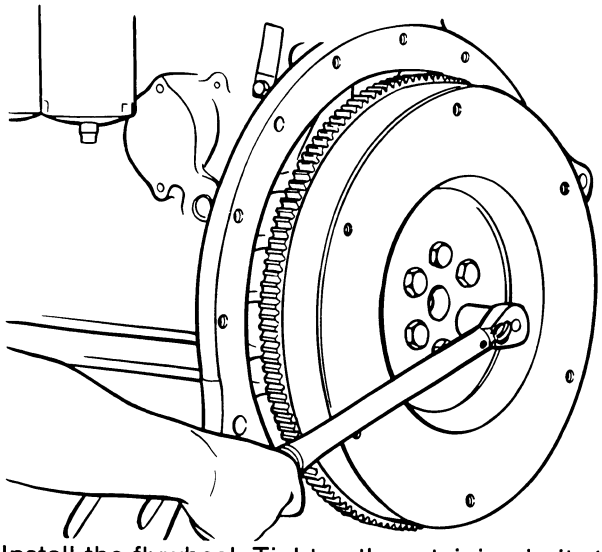
TORQUE BOTTOM RETAINING BOLTS 25 TO 30 FT. LBS.

STEP 14



NEW SEAL AND SEAL CARRIER INSTALLED.

STEP 15



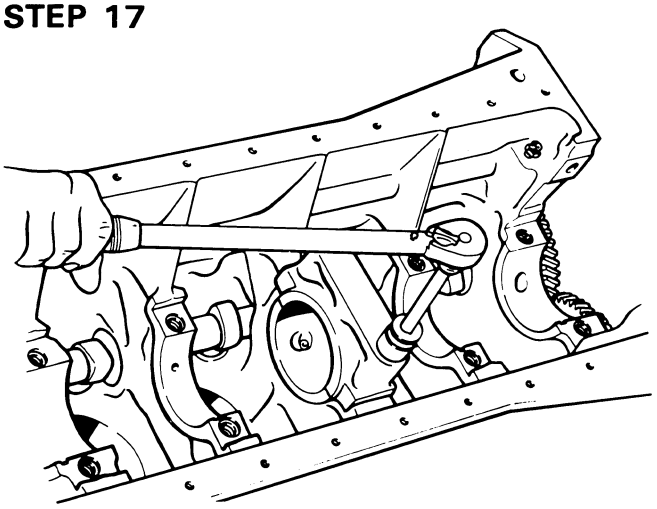
Install the flywheel. Tighten the retaining bolts to the following torques:

Without hardened washers - 180 to 190 ft. lbs. (244 to 258 Nm) (24.4 to 25.8 kgm).

With hardened washers - 230 to 250 ft. lbs. (312 to 339 Nm) (31.2 to 33.9 kgm).

Main Bearing Cap Replacement

STEP 17



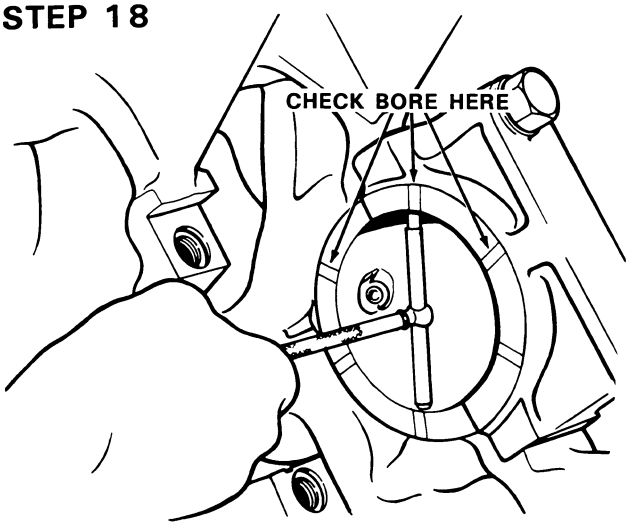
Install the bolt in the bearing cap. Tighten the bolt to the following torque.

Without hardened washers - 145 to 155 ft. lbs. (197 to 210 Nm) (19.7 to 21.0 kgm).

With hardened washers - 195 to 215 ft. lbs. (264 to 292 Nm) (26.4 to 29.2 kgm).

NOTE: *Add lubrication to threads and under bolt heads with 30W oil.*

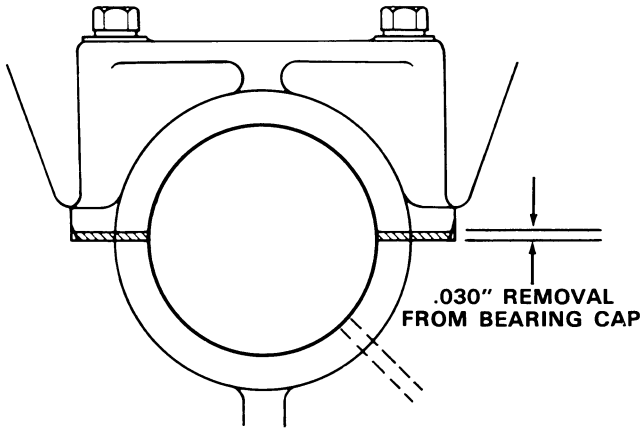
STEP 18



CHECK BORE DIAMETER AT THREE ANGULAR LOCATIONS INDICATED. ALL MUST BE WITHIN TOLERANCE, 3.692/3.691" ON 336B AND 504B ENGINES OR 3.192/3.191" ON 267B, 301B, 401B AND 451B ENGINES.

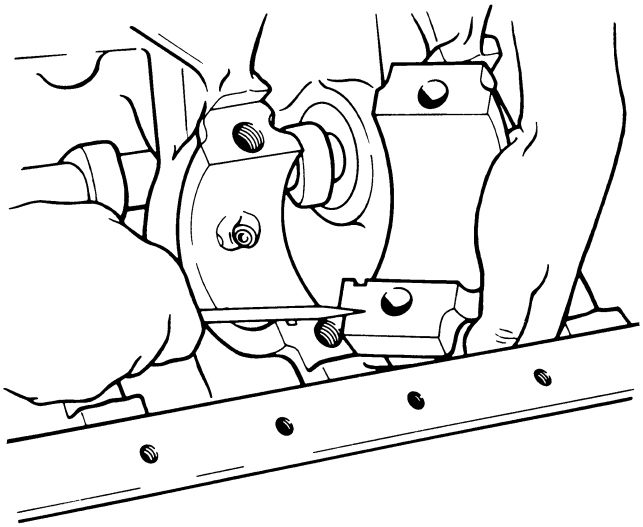
ONE OF THE THREE ABOVE DIMENSIONS CAN BE UP TO .0005" OVER THE SPECIFIED DIMENSIONS AND NOT REQUIRE REBORING.

STEP 19



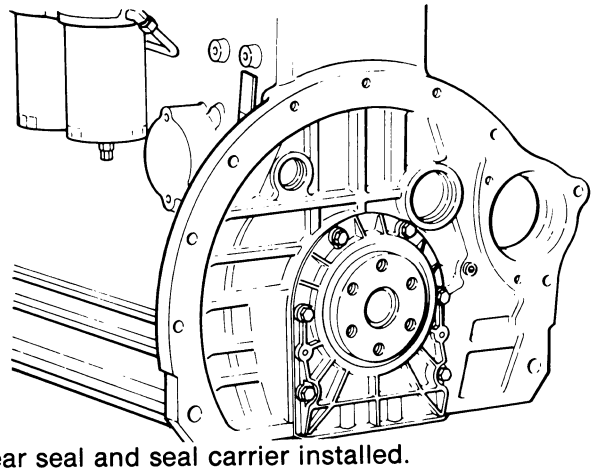
IF VERTICAL DIMENSION IS OUT OF TOLERANCE OR CAP IS SHIFTED SIDE-WISE: REWORK CAP BY REMOVING .030 STOCK FROM MATING SURFACE AND THEN BORE OUT TO MEET TOLERANCE AS SPECIFIED IN STEP 18.

STEP 20



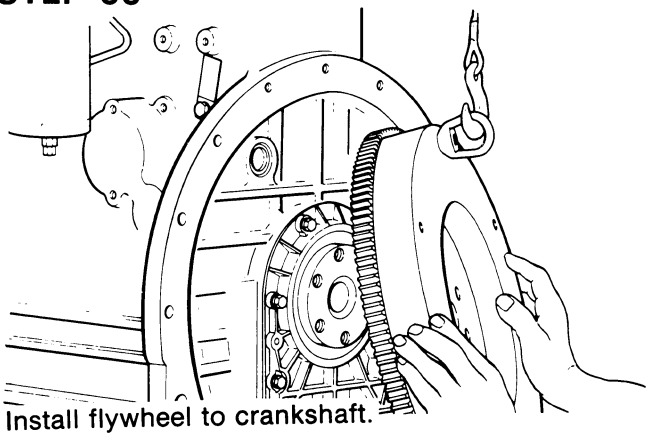
NOTE: BE SURE TO MACHINE NEW MOUNTING SURFACE FLAT, SO THAT CAP WILL SET SOLID WITHOUT WOBBLING IN BLOCK.

STEP 65



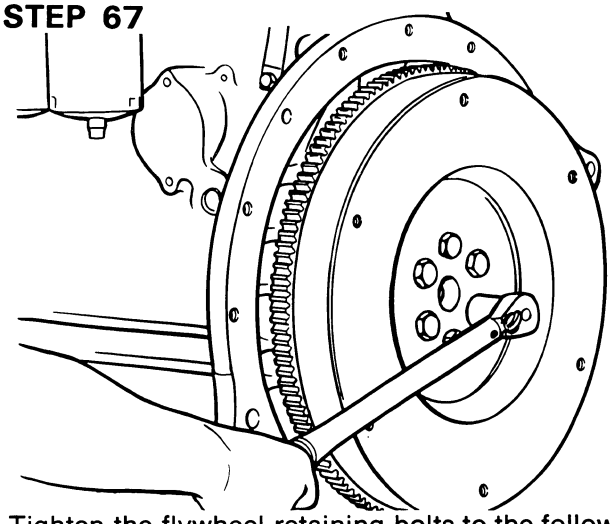
Rear seal and seal carrier installed.

STEP 66



Install flywheel to crankshaft.

STEP 67

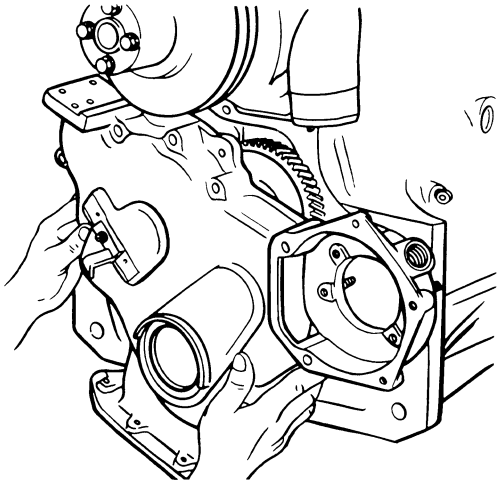


Tighten the flywheel retaining bolts to the following torques:

Without hardened washers - 180 to 190 ft. lbs. (244 to 258 Nm)(24.4 to 25.8 kgm).

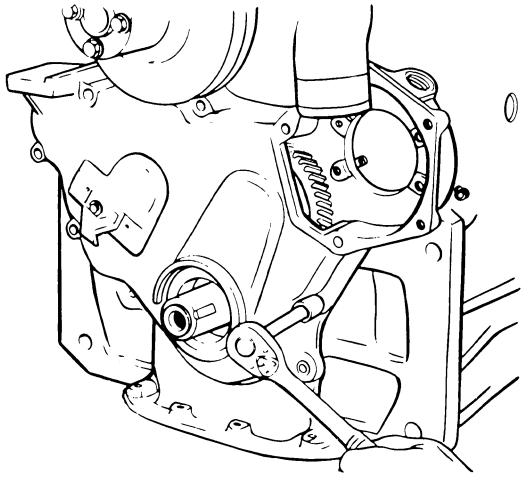
With hardened washers - 230 to 250 ft. lbs. (312 to 339 Nm)(31.2 to 33.9 kgm).

STEP 68



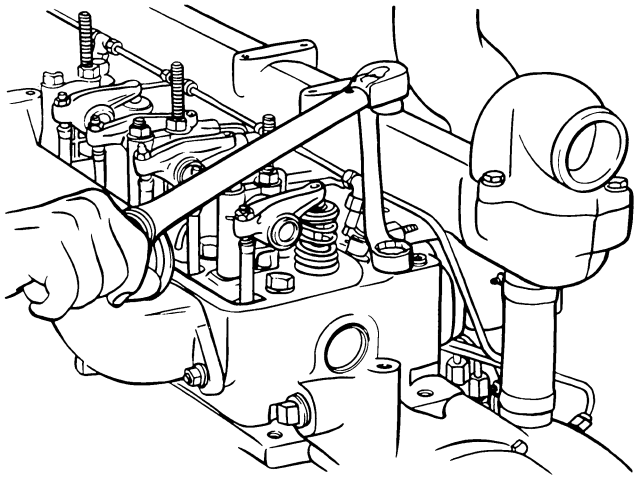
Install the timing gear cover.

STEP 69



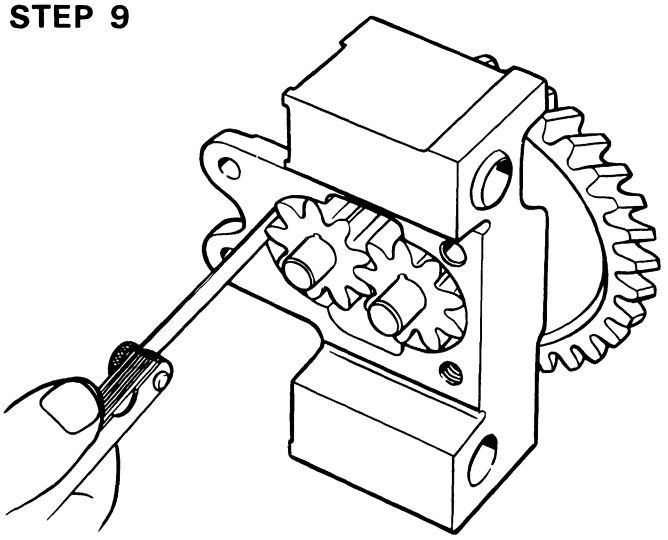
Torque timing gear cover retaining bolts 35 to 42 ft. lbs.

STEP 70



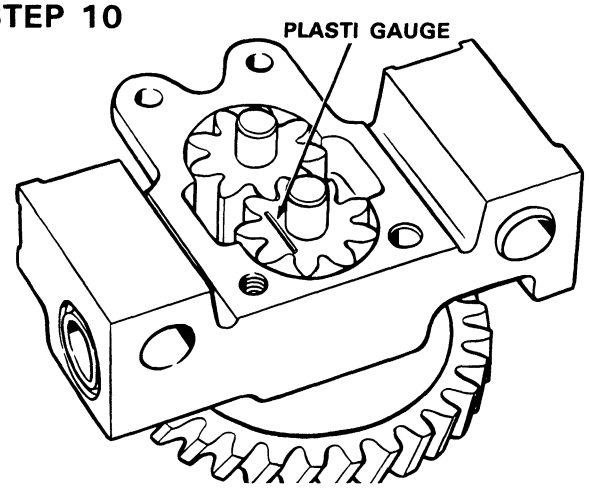
Install the cylinder heads and manifolds, refer to Section 2015 for installation procedure.

STEP 9



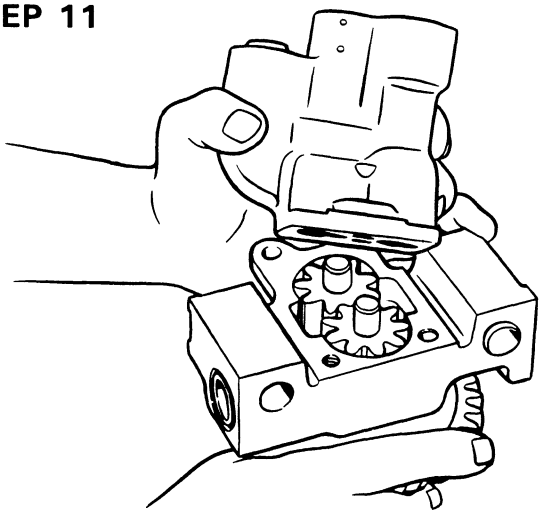
WITH A FEELER GAUGE, CHECK PUMP GEARS TO BODY RADIAL CLEARANCE. IF CLEARANCE IS GREATER THAN .009", THE PUMP MUST BE REPLACED.

STEP 10



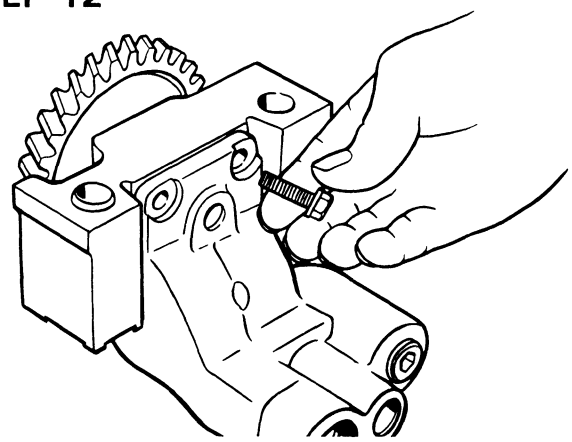
PLACE A PIECE OF PLASTIC GAUGE ON ONE OF THE PUMP GEARS.

STEP 11



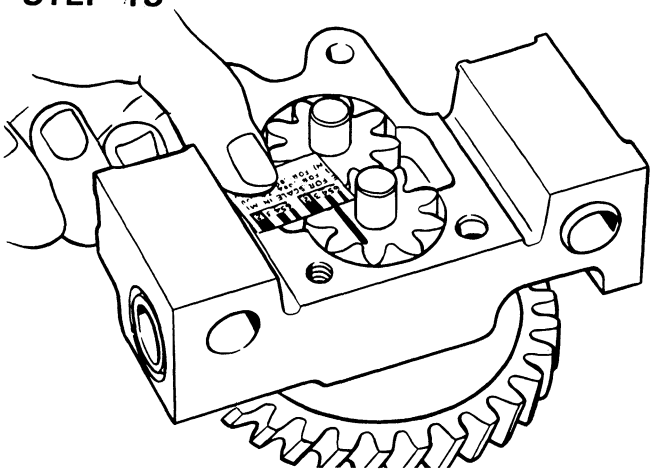
PLACE THE PUMP COVER ON PUMP BODY.

STEP 12



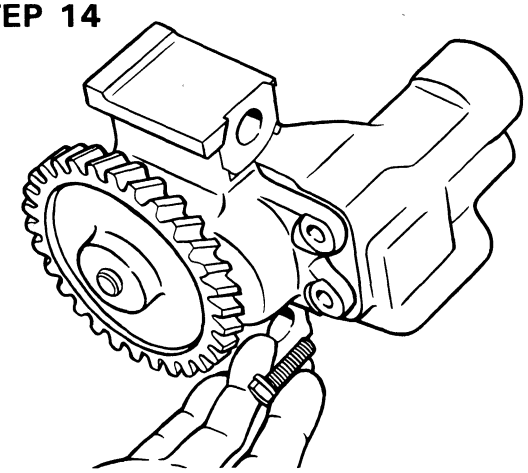
INSTALL THE COVER RETAINING BOLTS AND TIGHTEN GRADE 5 BOLTS 17 TO 20 FT. LBS. (23 tO 27 Nm)(2.3 TO 2.7 kgm) AND GRADE 8 BOLTS 24 TO 29 FT. LBS. (33 TO 39 Nm)(3.3 TO 3.9 kgm).

STEP 13



REMOVE PUMP COVER AND CHECK GEAR TO COVER CLEARANCE. IF CLEARANCE EXCEEDS .008", THE PUMP MUST BE REPLACED.

STEP 14



REINSTALL THE PUMP COVER AND TIGHTEN THE GRADE 5 BOLTS 17 TO 20 FT. LBS. (23 TO 27 Nm)(2.3 TO 2.7 kgm) AND GRADE 8 BOLTS 24 TO 29 FT. LBS. (33 TO 39 Nm)(3.3 TO 3.9 kgm).

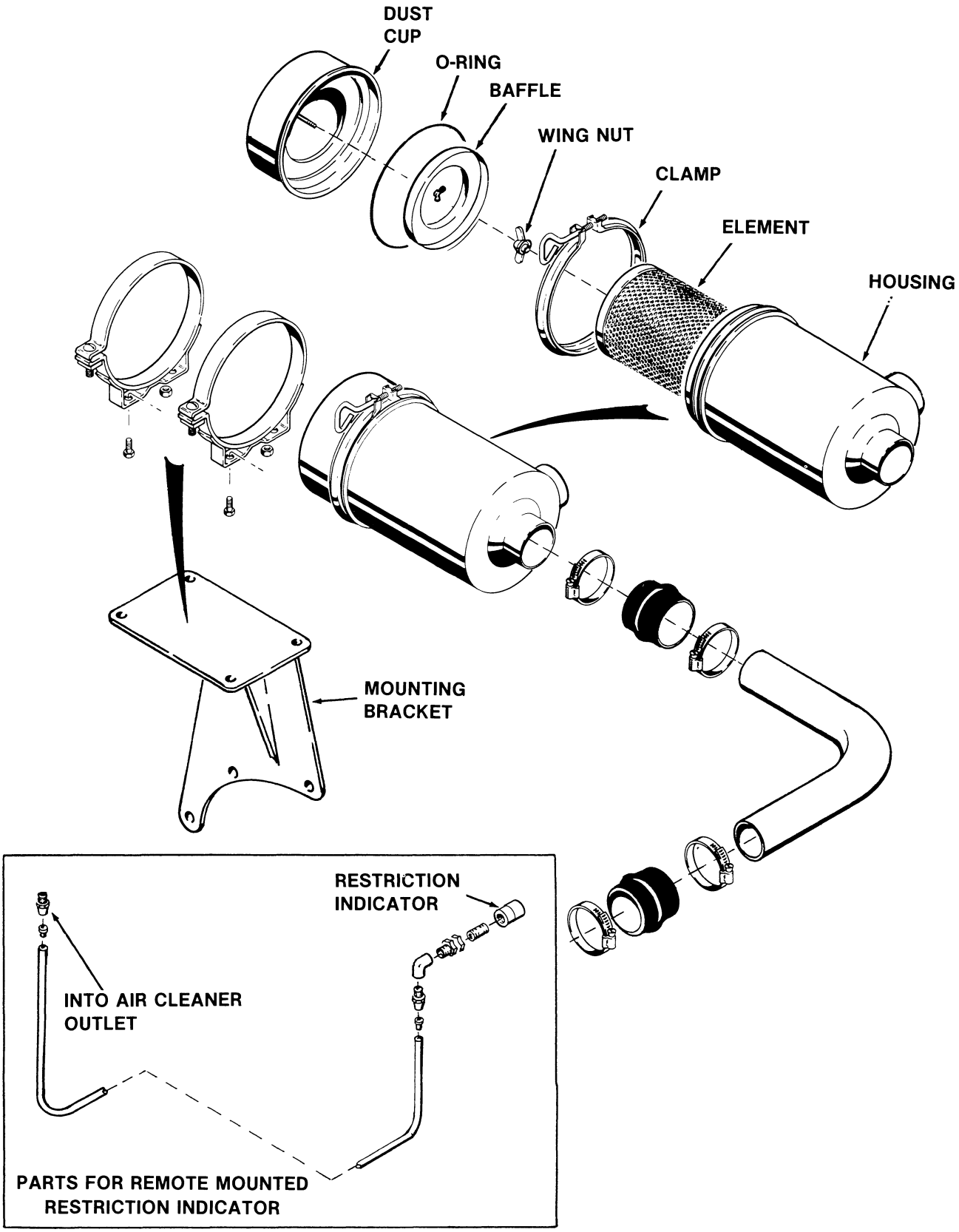
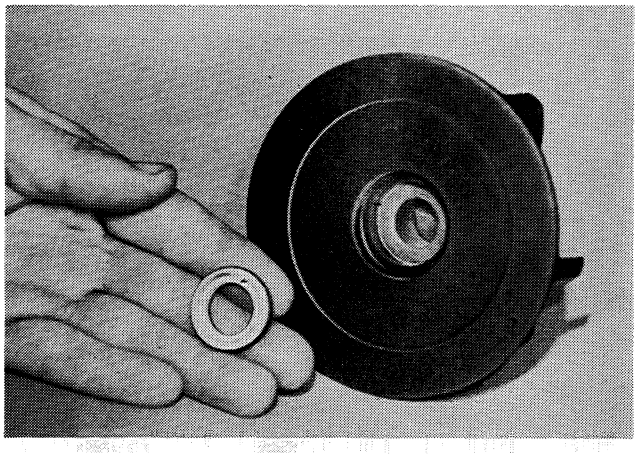


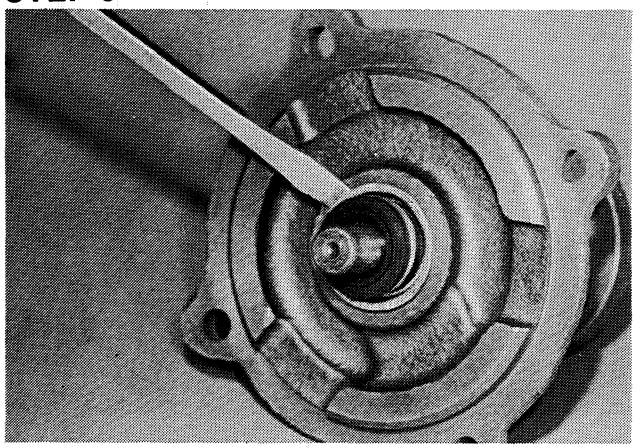
Figure 2. Air Cleaner - Machines After PIN 6204050

STEP 8



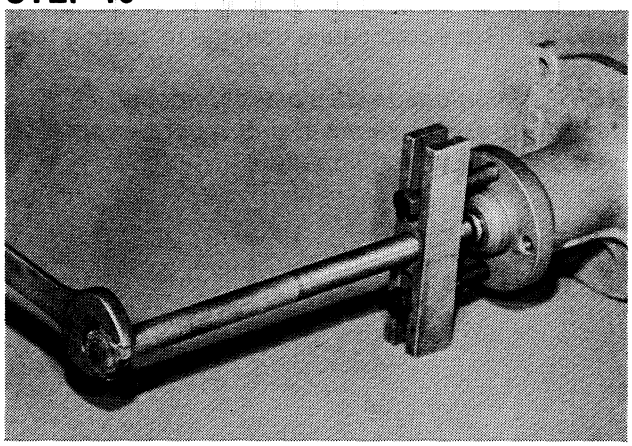
Remove seat assembly from impeller.

STEP 9



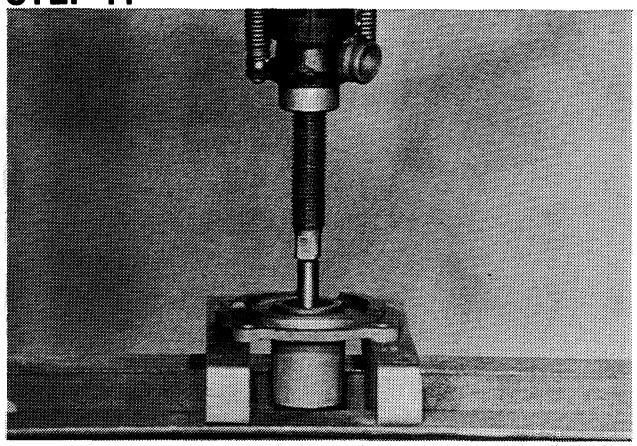
Remove seal assembly from housing.

STEP 10



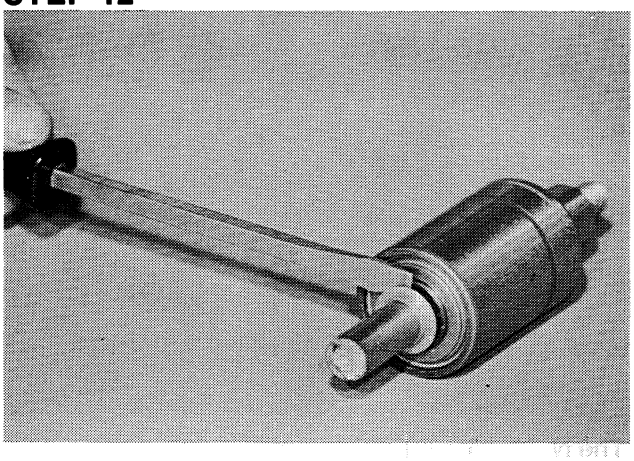
Remove fan and pulley hub (if equipped) from shaft using a suitable puller.

STEP 11



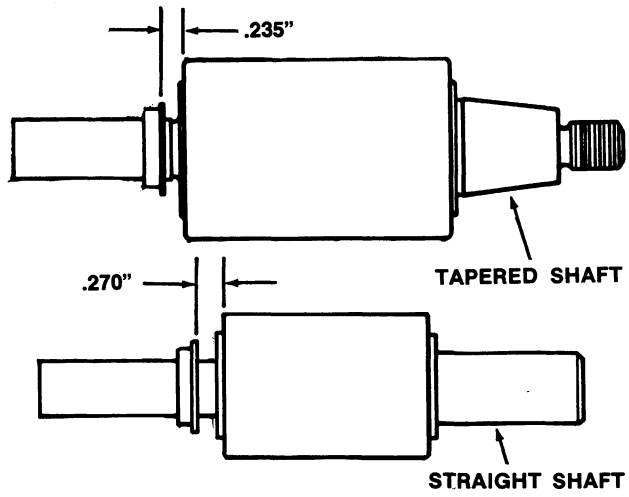
Press pump shaft bearing out of housing.

STEP 12



Remove slinger from bearing shaft if replacement is necessary.

STEP 13



Install a new slinger on bearing shaft to the dimensions shown.

CAUSES OF PREMATURE TURBOCHARGER FAILURE

Certain operating and maintenance conditions can arise which could cause premature turbocharger failure. **NOTE:** The total solution to the problem is not in repairing the failure, but in determining the cause. Replacing a damaged turbocharger without determining the cause will frequently result in a repeat failure.

Lack of Lubricating Oil

This type of failure can occur when the amount of oil being supplied to the turbocharger is insufficient to lubricate or cool bearing and journal surfaces.

Operating temperatures affect the volume of oil required by the turbocharger. As turbocharger speed or engine load increases, the need for lubricating oil increases. **NOTE:** Insufficient oil for periods as short as five seconds can cause failure. This is why it is necessary to prime the turbocharger as part of the everyday operating procedure. **IMPORTANT:** It is very important that adequate lubrication reaches the turbocharger bearings and throughout the engine before operating the engine at rated speed.

Priming The Turbocharger

1. Place the transmission range shift lever in "N" Neutral position.

2. Set the throttle lever not more than 1/3 open position (1000 RPM).

3. Push in the fuel shutoff control. Press starter button until engine starts. **IMPORTANT:** Do not increase throttle or apply load until normal oil pressure shows on the engine oil pressure gauge, assuring proper lubrication to the turbocharger.

   IMPORTANT: In very cold weather, at oil filter change or when the tractor has been idle for several weeks or more, proceed as follows to prime the turbocharger.

Pull out the fuel shutoff control, press the start button and hold. Allow the engine to crank until the engine oil pressure gauge pointer reaches the green zone. **Do not exceed 30 seconds cranking time.**

Push in the fuel shutoff control and press the start button. Run the engine (about 2 min. max.) at 1000 RPM until normal engine oil pressure shows on the engine oil pressure gauge assuring proper lubrication to the turbocharger.

4. If the engine fires and stops, wait for the starting motor to stop spinning before attempting another start.
5. Do not use the starting motor longer than 30 seconds without interruption. Wait at least 3 minutes between crankings so batteries can recuperate and the starting motor can cool.
6. Should the engine kill when operating under load, immediately restart the engine to prevent over-heating caused by stopping the flow of oil for turbocharger, cooling and lubrication.

Foreign Material or Dirt in the Lubricating System.

Operating the engine with contaminated oil will cause damage to the turbocharger bearings if the particles are of sufficient quantity. If the particles are large enough, they can clog the internal oil passages and starve the bearings. This is another reason why it is important to change the engine crankcase oil and oil filters at regular specified intervals.

Foreign Material in Exhaust or Air Intake Systems.

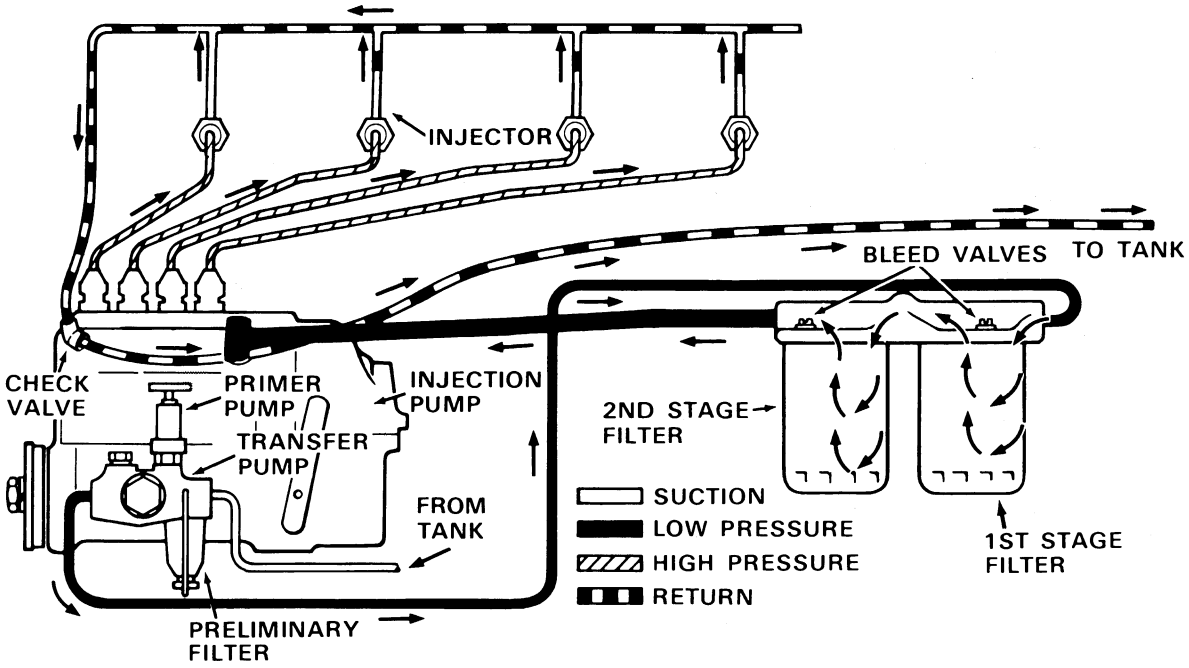
The rotating parts of the turbocharger can be damaged by particles introduced through the air intake, which makes proper maintenance of the air cleaner system very important.

High Exhaust Temperature

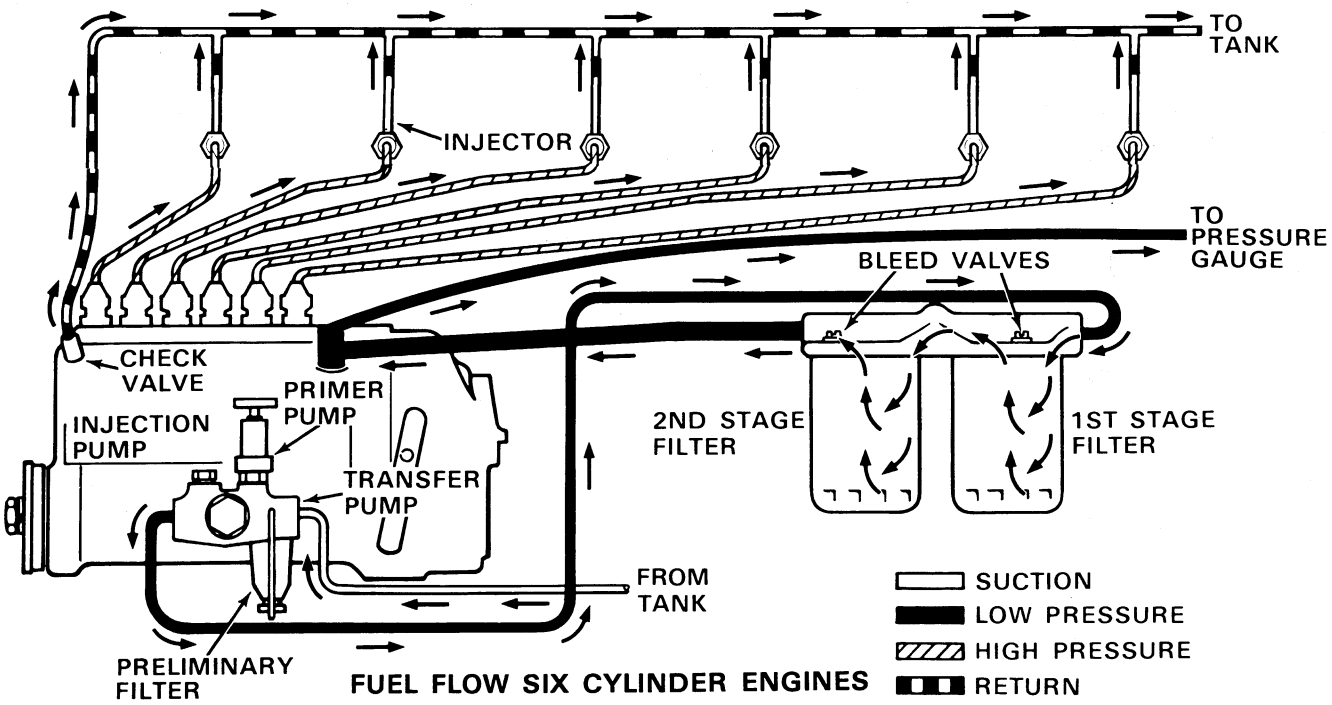
Excessive temperature in the exhaust system will cause lubricating oil to coke in the center housing drain annulus at the turbine end. Oil leakage, carbon deposits and eventual damage to the back of the turbine wheel will result. High exhaust temperature can also erode the turbine housing creating pitting and deposits on the turbine wheel.

High exhaust temperature can be caused by the turbocharger itself. Carbon build up on the turbine wheel, if severe, will slow the rotating assembly, reducing the amount of inlet air.

FUEL SYSTEM FLOW



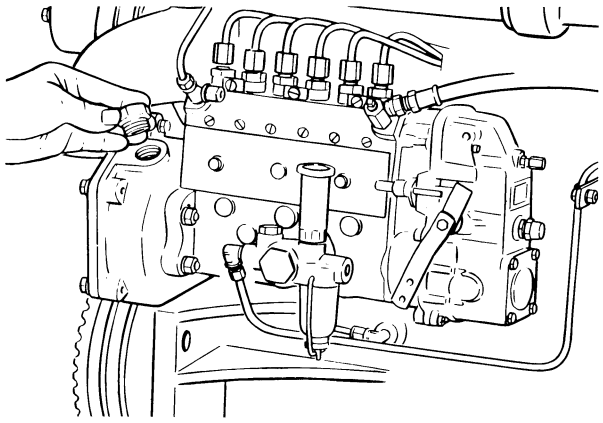
FUEL FLOW FOUR CYLINDER ENGINES



FUEL FLOW SIX CYLINDER ENGINES

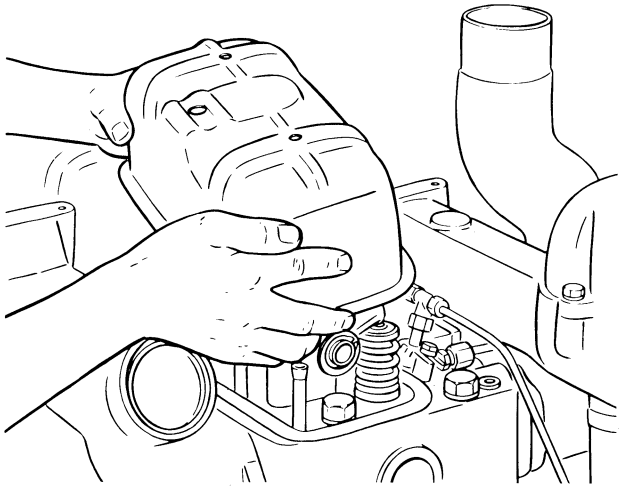
Figure 2

STEP 34



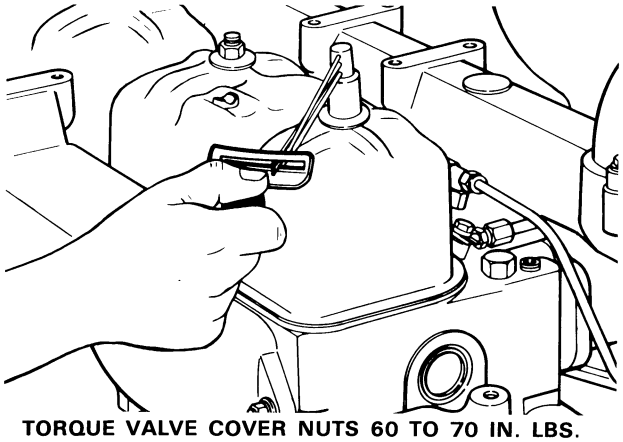
INSTALL PLUG IN TIMING GEAR COVER.

STEP 35



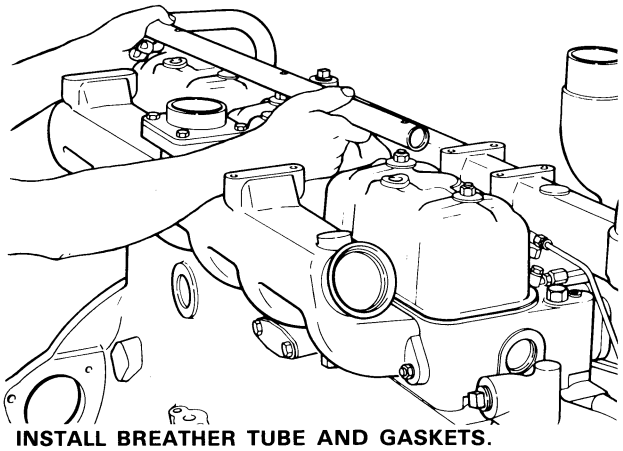
INSTALL VALVE COVER AND GASKET.

STEP 36



TORQUE VALVE COVER NUTS 60 TO 70 IN. LBS.

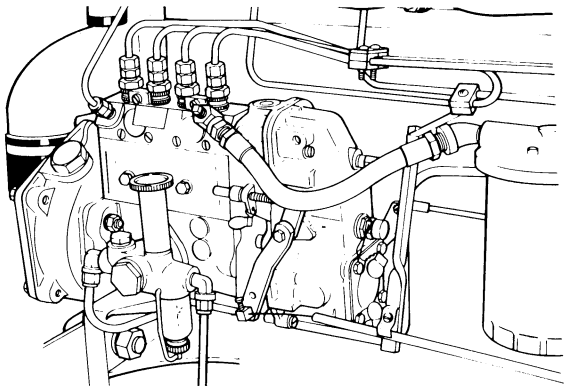
STEP 37



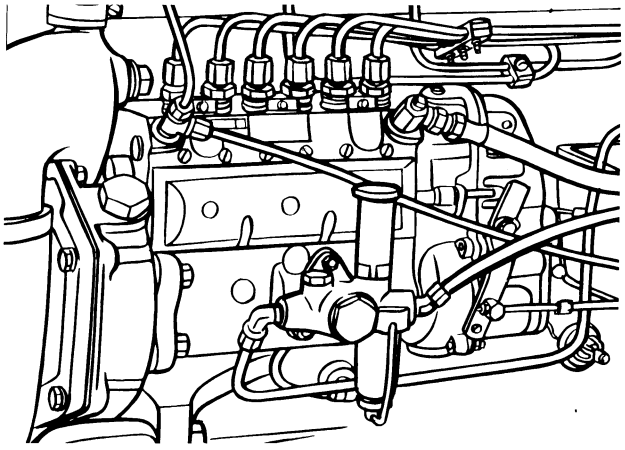
INSTALL BREATHER TUBE AND GASKETS.

STEP 38

BLEED THE FUEL SYSTEM. REFER TO FUEL FILTER SECTION OF THIS MANUAL. START ENGINE AND CAREFULLY CHECK FOR LEAKS.

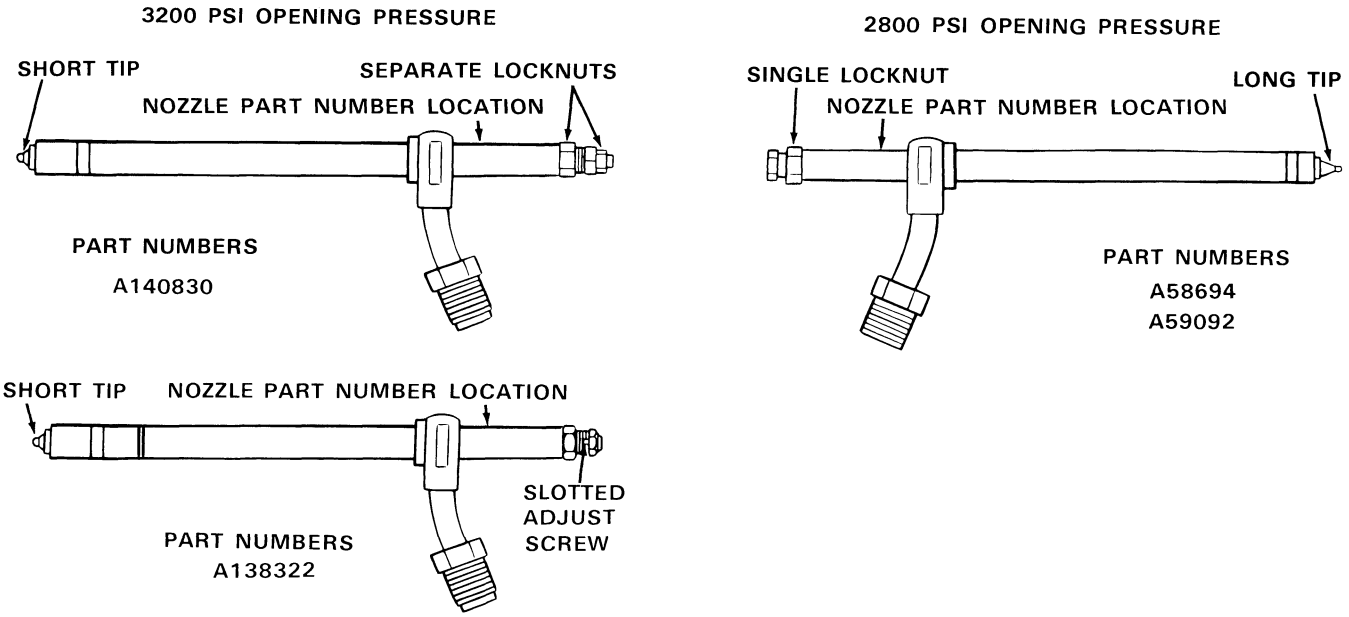


FOUR CYLINDER ENGINE



SIX CYLINDER ENGINE

NOZZLE IDENTIFICATION



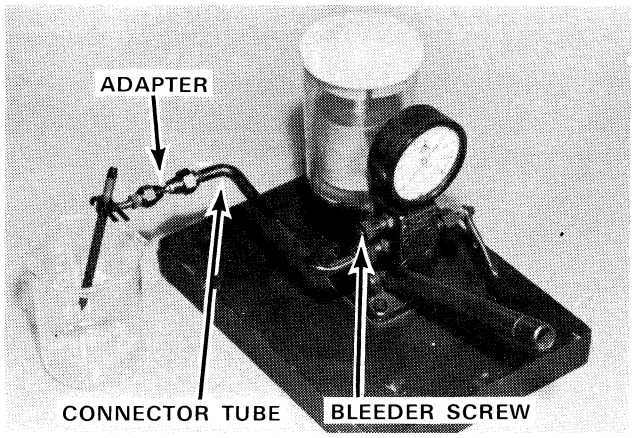
APPLICATION

Part Numbers		Color	"B" ENGINE APPLICATION	
Case	Roosa Master	Code Band	Natural Aspirated	Turbocharged
A58694	18084	No Color	267,301,401,451	336,451,504
A59092	18366	White	336,504	
A138322	19745, 20345	Red		336,451,504
	19790, 20347	Blue	267,301,401,451	
	20016, 20349	Red & White		451,504
	20668	Red		336,451,504
	20670	Blue	301,401,451	
	20672	Red & White		451,504
A140830	19792, 20346	Yellow & Blue	336,504	
	20669	Blue & Yellow	336,504	

SPECIFICATIONS

	U.S. Value	Metric Value
No. of orifices	4	
Valve Lift	.0135" or 3/4 turn off valve seat	.355 mm
Maximum opening pressure between cylinders	100 PSI	689.5 kPa
Nozzle leak off rate	Injector tip must be visually dry after 5 seconds at 400 to 500 PSI below opening pressure	2 758 to 3 448 kPa below opening pressure.

INJECTOR TEST STAND



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

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

The test stand is used to perform the following checks:

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

2. Check the injector assembly for fuel leakage.

3. Check and adjust the injector leak-off.

4. Accurately check the injector spray pattern.

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

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

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

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

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

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

Preparing Test Stand

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

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

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

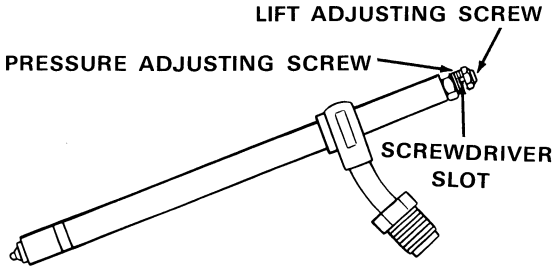
4. Operate the hand lever slowly until clean fuel flows from the adapter.

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

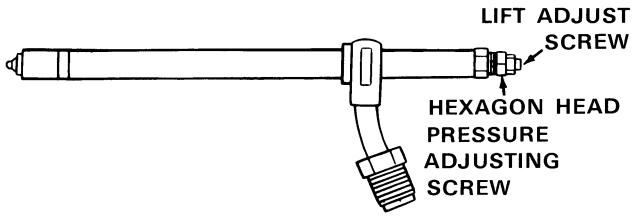
INJECTOR ADJUSTMENTS

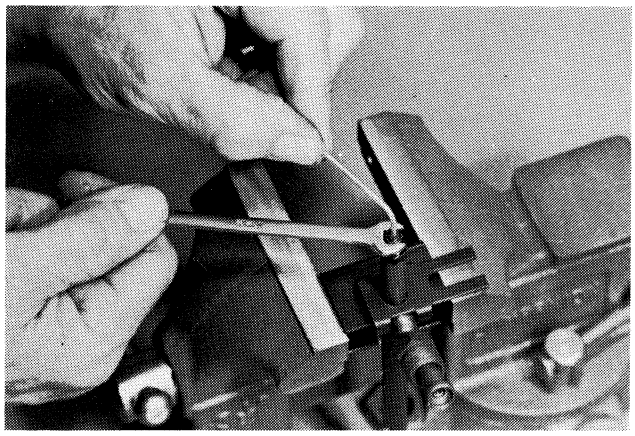
Adjusting Opening Pressure

If injector is equipped with a screwdriver slot in the pressure adjusting screw, use the following steps 1. thru 4. to adjust opening pressure.

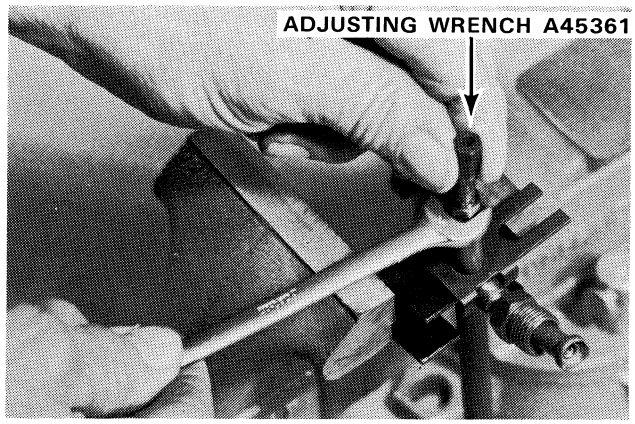


If injector is equipped with a hexagon head pressure adjusting screw, use the following steps 5. thru 7. to adjust opening pressure.

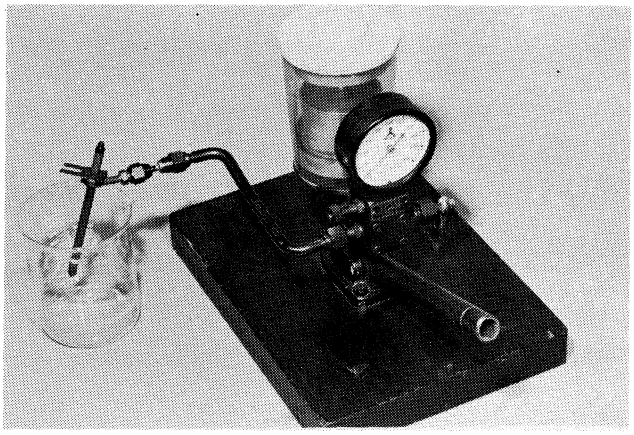




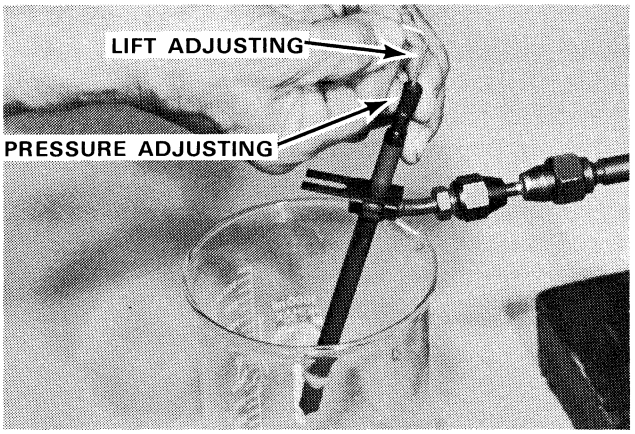
1. Secure the injector in holding tool, Bacharach Part No. 66-0147 in a vise. Loosen and remove lift adjusting screw locknut.



2. Loosen the pressure adjusting screw locknut.



3. Connect the injector, with the tip downward onto the test stand, Case Part No. M20322. The tip should always be enclosed in a receptacle, preferably transparent, to contain the spray.



4. Using adjusting wrench, Case Part No. A45361 to hold pressure adjusting screw, back out lift adjusting screw one full turn with allen wrench. While pumping fuel through the injector, note the opening pressure. Turn the pressure adjusting screw while holding the lift adjusting screw, clockwise to increase opening pressure or counterclockwise to decrease the opening pressure. After each turn of the pressure adjusting screw, gently bottom the lift adjusting screw and then back it out one full turn. This will prevent bottoming of the valve when the pressure adjusting screw is turned. Tighten the pressure adjusting screw locknut slightly to hold the setting but do not torque at this time. Proceed to set valve lift.

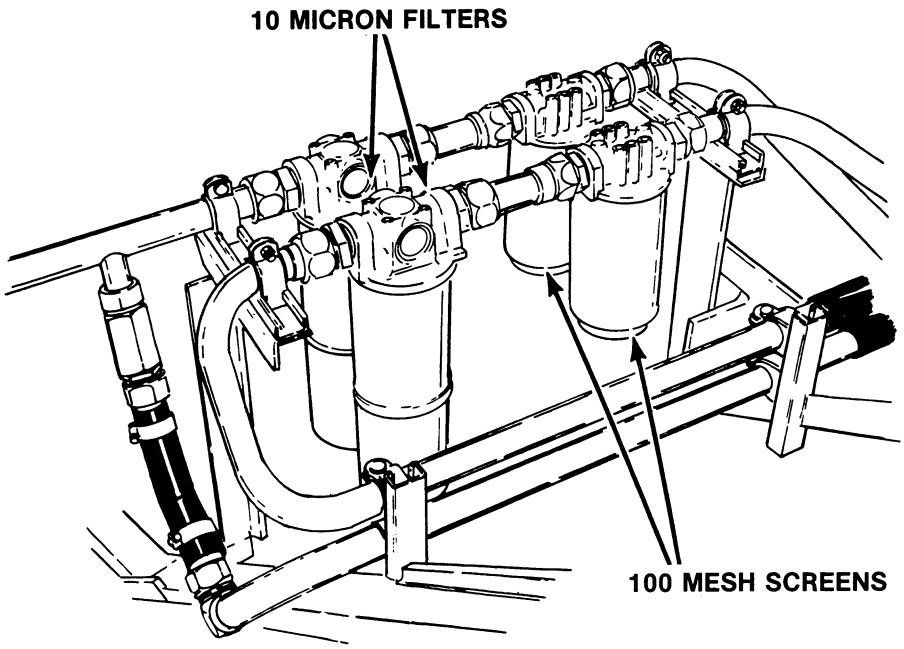


Figure 4. Inline Filters After PIN 6204050

100 Mesh Screens

1. Remove the center post, housing, back-up washer, gasket and filter element.

2. Discard old seals. Clean filter element and parts in non-flammable solvent, blow dry with compressed air. Install new seals and reassemble.

NOTE: Torque for Fig. 6 assembly is 40 lb-ft (54 Nm) maximum.

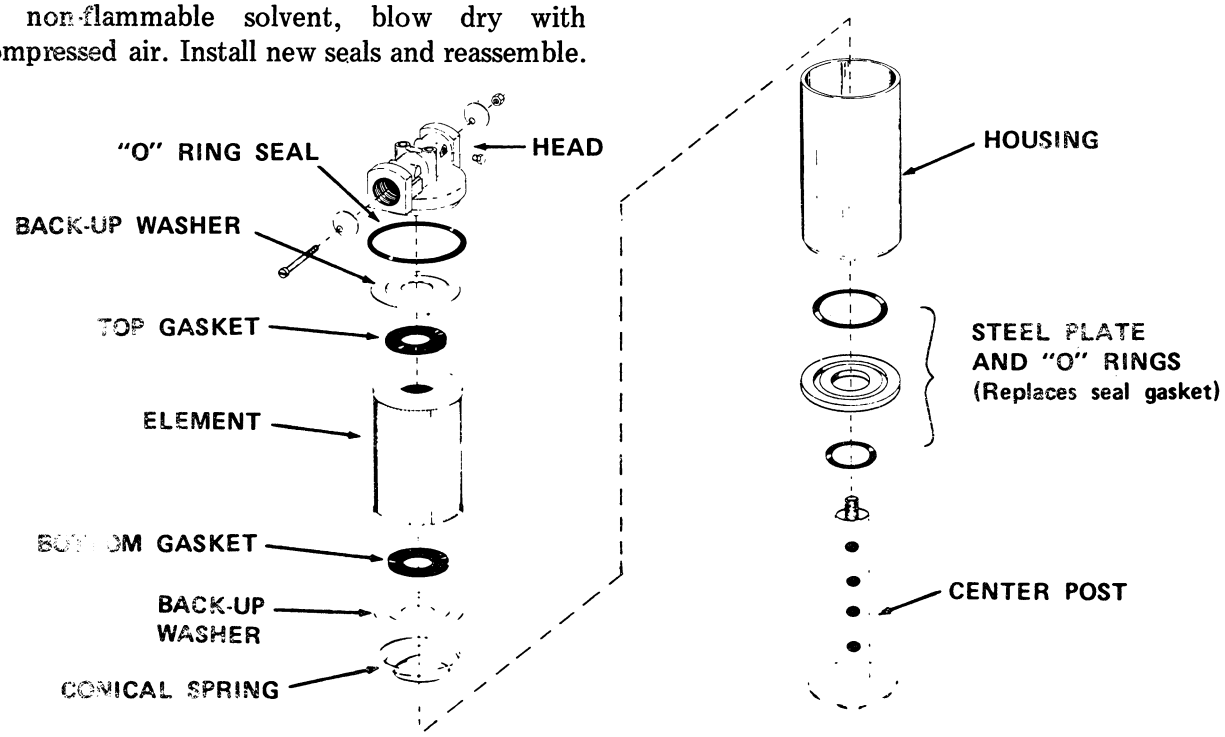


Figure 6. Filter Assembly S 613014

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Control Valves (Con't.)

PROBLEM	POSSIBLE CAUSE	REMEDY
Control lever in Neutral; cylinders drift	Spool or relief valve leakage	Replace the defective part(s)
Spool will not stay in float	Broken springs or missing parts	Remove control valve and repair as required

Hoses and Fittings

PROBLEM	POSSIBLE CAUSE	REMEDY
Hose cover separated from wire braid	Hose twisted	Install hose properly; connect at swivel fitting last and make sure hose does not twist when fitting is tightened
Fitting pulled from hose or burst hose	Hose twisted	Same as above
	Improperly adjusted or faulty secondary relief valve	Adjust relief valve as instructed in this section. If valve cannot be adjusted, replace valve
Damaged threads	Over torqued	Torque to specifications, Section 1051

NOTE: One full revolution of the adjusting screw will adjust pressure approximately 400-500 psi (2 750 + 3 450 kPa).

6. Return sensing lines to normal routing.

7. Perform a final operational check as follows:

   a. Engage hoist control for "hoist up" and crack main relief valve - the pressure gauge should read 3000-3200 psi.

   b. Slowly engage crowd control. At 1900 to 2100 psi, the hoist pressures should drop down and crowd should climb (quite rapidly) and reach a "searching balance" - e.g. 2300 psi (hoist) and 2700 psi (crowd).

   c. Repeat above procedure, except engage the crowd control first.

Special Adjustment of Power Sensing Valve for High Altitude Operation

Engine performance may be considerably below rated listing when operating in high altitudes. The power sensing valve can be used as a "compensator" to limit either one or both main circuits below the recommended operating pressure to lessen the load on the engine. Simply adjust the power sensing relief cartridges below the recommended setting (2500 psi) as required to obtain efficient operation.

Swing Inline Relief Valve

General

There are two separate cartridges inside the inline relief valve. The front cartridge (toward front of turntable) controls swing to the left; and the rear cartridge (toward rear of turntable) controls swing to the right. See Figure 2.

Pressure Check

To check the swing inline relief valve cartridges for correct pressure setting, follow this procedure.

1. Attach pressure gauge capable of at least 3000 psi to the quick disconnect fittings in the pressure line from the No. 2 section of the main pump.

2. Set house brake.

   NOTE: Make sure brake is properly adjusted.

3. Start engine and warm the hydraulic oil.

4. Set engine at high idle.

5. Activate swing left control and check reading on gauge. Then activate swing right control and check reading on gauge. Both readings should be 1500 psi. If high or low adjust to proper settings.

Adjusting the Swing Inline Reliefs

1. Set engine at high idle, be sure house brake is set, and loosen the jam nut holding the adjusting screw to be adjusted. See Figure 13.

   NOTE: Remember that the relief cartridge toward the rear of the turntable controls the swing to the right and the cartridge toward the front of the turntable controls the swing to the left.

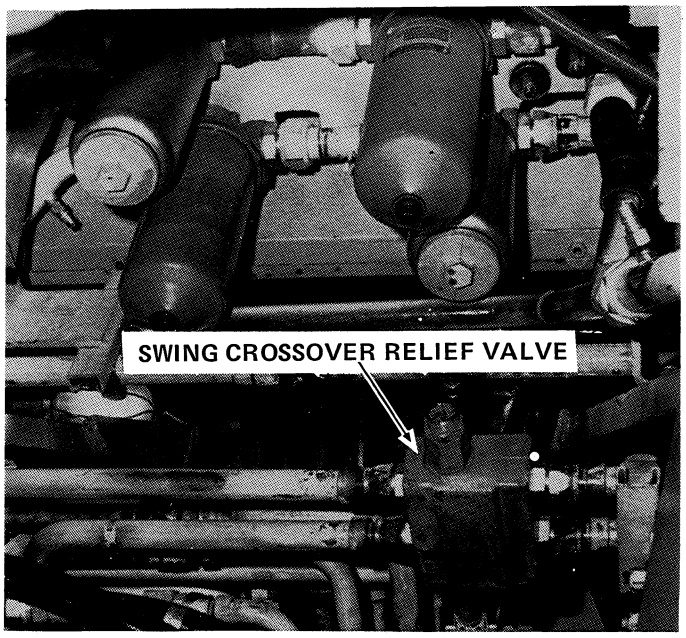

Figure 13. Swing Inline Relief Valve

2. Activate the swing control for the particular rotation of swing to be adjusted.

3. Turn the adjustment screw, with a screwdriver, clockwise to increase pressure; counterclockwise to decrease pressure. Adjust one cartridge completely before adjusting the other.

Pump No. 2 Test Procedure

Preliminary Checks

Before connecting the flowmeter into the No. 2 pump circuit perform the preliminary checks as outlined under Pump No. 1 Test Procedures on page 4202-24.

Flowmeter Installation

The flowmeter should be installed between the pump and control valves as shown in Figure 22.

To install the flowmeter follow the procedure listed on page 4202-28.

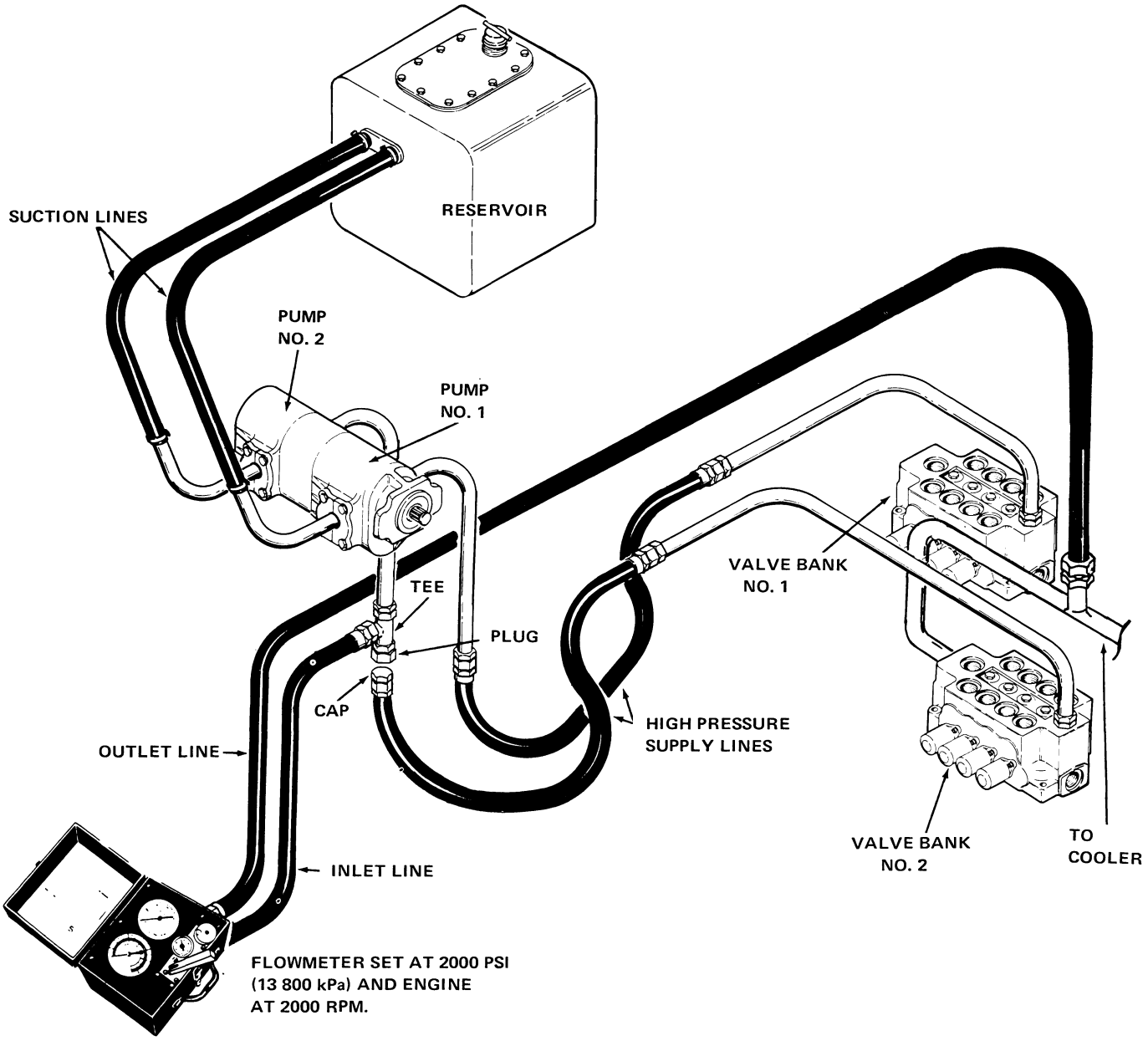

Figure 22. Installation of Flowmeter - (Pump No. 2)

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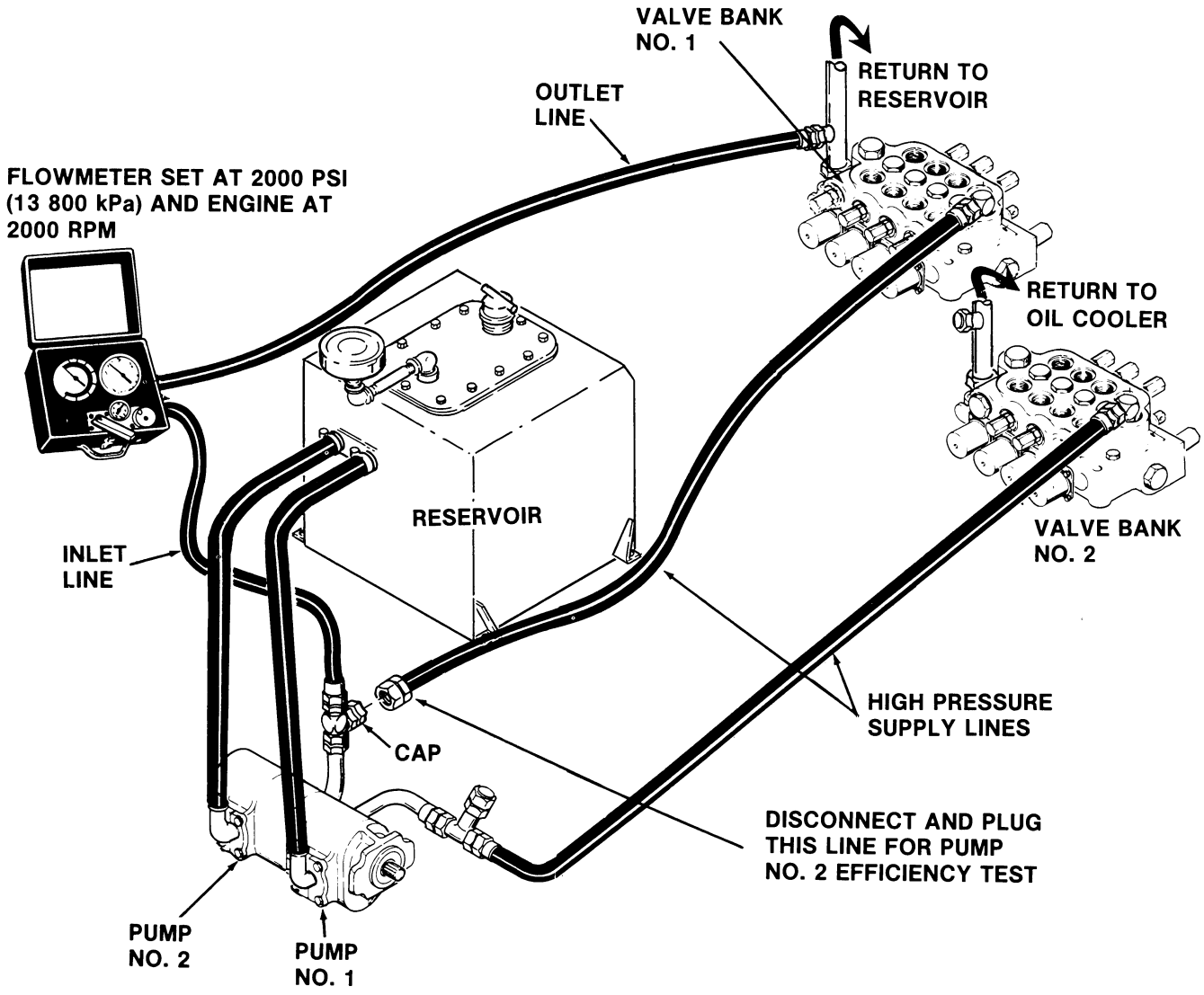

Figure 12. Installation of Flowmeter (Pump No. 2) - After PIN 6204050

3. Replace if there is damage to shaft splines.

4. Also inspect the shaft connector and replace if damaged or worn.

Thrust Plates

1. The thrust plates seal the gear sections at the sides of the gears. Wear here will allow internal leakage of oil from the high pressure side back to the low pressure side of the pump.

2. .002" is the maximum wear allowable. Figure 9. Replace thrust plates if they are scored, eroded, or pitted.

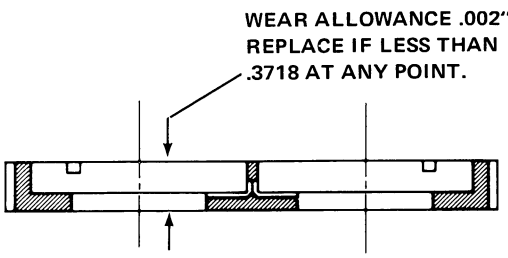

Figure 9.

3. Check the center of the thrust plates where the gears mesh. Erosion here indicates oil contamination.

4. Pitted thrust plates indicate cavitation or oil aeration.

5. Discolored thrust plates indicate overheating, possibly from insufficient oil.

Bearings

1. If bearings require replacement, use a small keyhole type hack saw to cut through the bearing opposite the oil groove. Be sure the saw cuts completely through the bearing shell, but cuts as little as possible into the aluminum bore.

2. After the cut is made, grip the bearing with vise-grip pliers and remove it with a twisting motion. Take care not to damage the bores. After the bearings have been removed, wash all of the parts thoroughly in non-flammable solvent. Press in the new shaft bearings. They should protrude above the surface .220/.230 inch (5.590/5.840 mm).

Seals and Gaskets

1. Replace all seals whenever disassembling pump. A seal kit is available. Refer to the parts manual.

Plug

1. Make sure plug is installed on the high pressure (outlet) side of the shaft end cover.

Identifying Causes of Pump Failure

Wear Caused by Fine Particles

Particular attention should be paid to the following information if the pump has a short service life. Any or all causes may be found in a pump that has had a long service life.

The particles that cause abrasive wear are usually not visible to the human eye. The filter used on this machine removes particles over 25 micron in size. A micron equals 1/1000 millimeter or .0000394 inches. Improper service procedures and failure to follow the prescribed maintenance schedule can be the cause of abrasive wear.

Thrust Plates

A narrow band with a sandblasted appearance will be evident around the bores in the thrust plate. The edges of the lubrication slots will be rounded and the ends enlarged.

Gears

A sandblasted appearance will be evident at the base of the teeth at each end. The bearing surface will have a dull finish as if sanded with fine sandpaper. A groove in seal lip area of the driveshaft may also be apparent.

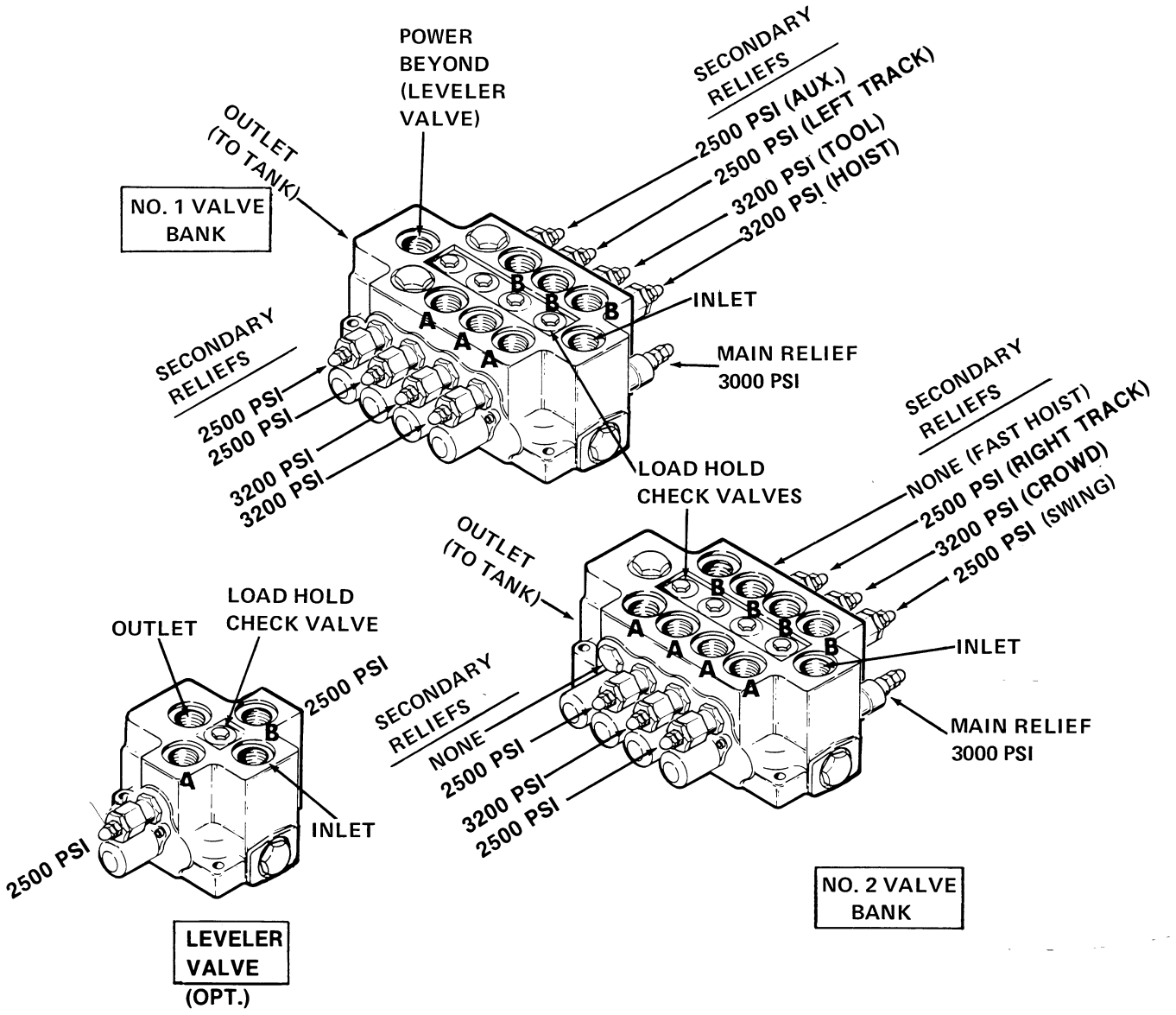

Figure 1. Control Valves - Husco

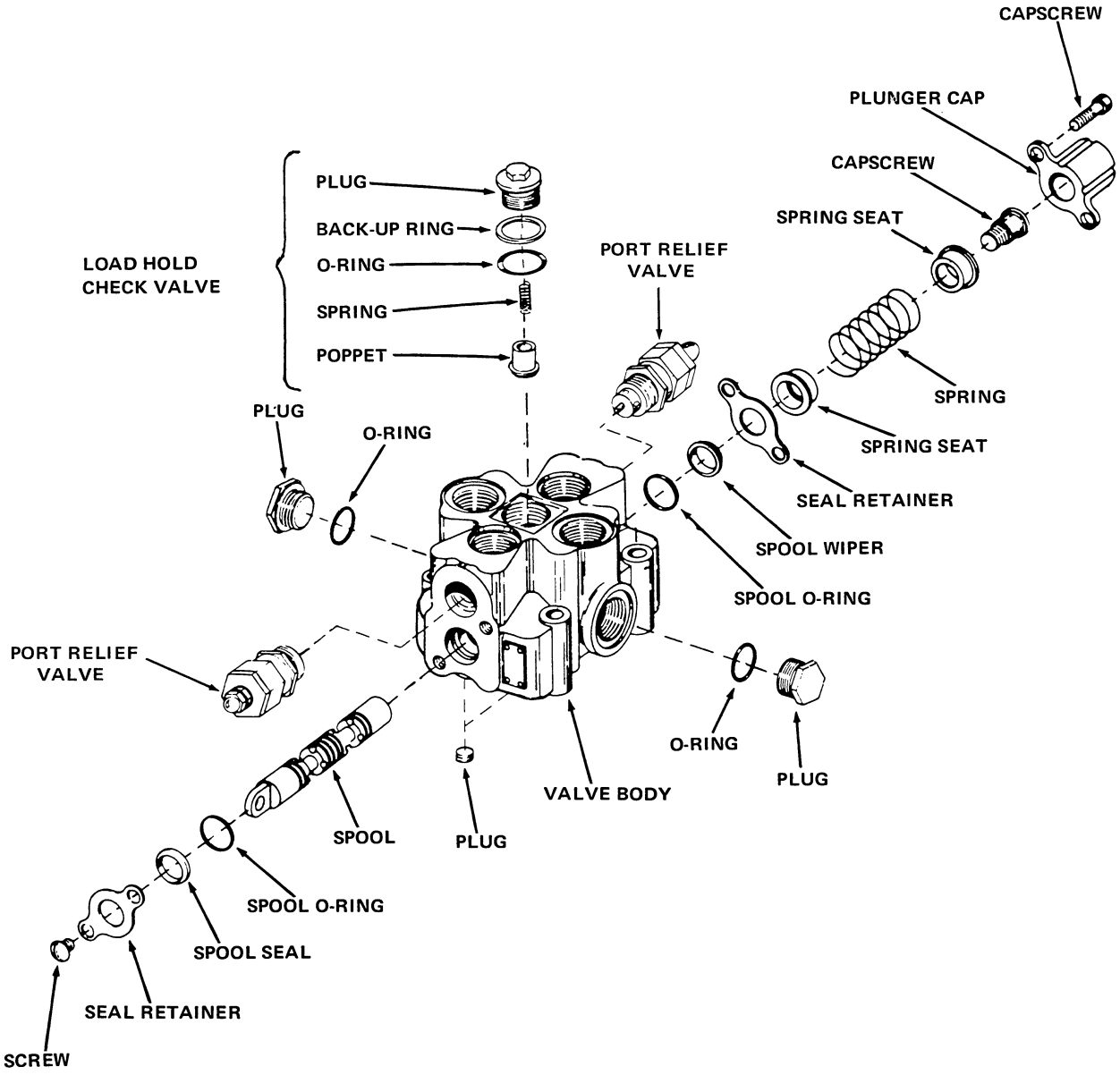

Figure 12. Leveler Valve Exploded View

Main system pressure P1 is sensed on the back side of the main poppet when the pilot poppet is seated and the vent line is closed. When main system pressure is sufficient to open either the pilot poppet or the relief piston in the power sensing valve, oil behind the main poppet will be vented to tank. Pressure P1 acting on the outside of the main poppet will unseat the poppet and allow oil from pump passage P1 to enter tank passage P2.

Secondary Relief Valves

Each of the work ports of the 4-spool valves, except Fast Hoist section, have either a high or low pressure secondary relief valve. Refer to Figure 1 for pressure settings. High pressure means that the secondary valve pressure is set above main relief pressure. Low pressure means that the secondary relief is set below main relief pressure.

The purpose of the high pressure secondary relief valve is to protect the work circuit from shock loads or buildup of excessive pressures when the spool is in neutral. An external force or load on the circuit will cause pressure buildup on the oil locked in the work circuit. Because the main relief is blocked out of the circuit when the valve spool is in neutral, allowance must be made to relieve excessive pressure in the cylinder or motor circuit. The excessive pressure created in the circuit is relieved by the high pressure secondary relief.

The purpose of the low pressure secondary relief valve is to maintain working pressures in a hydraulic circuit below the pressure setting of the main relief. Left track, right track and swing functions have low pressure secondary reliefs. Working pressure in these circuits is controlled by the secondary reliefs, not by the main reliefs.

Operation as a High or Low Pressure Relief:

The operation of the secondary relief valve is similar to the main relief valve. It is pilot operated, which means a spear shaped pilot poppet controls the pressure at which the valve opens and permits the gradual opening of the relief valve. Note that the main poppet has a small sensing tube through it. This permits the same pressure to be maintained on both sides of the poppet during normal operation and helps control the gradual opening of the relief valve when pressures reach the specified setting.

1. Figure 9. When pressure in the working circuit is below the setting on the relief valve, the spear shaped pilot poppet and the main poppet are positioned on their seat.

2. Figure 10. When pressure reaches the setting on the relief valve, the spear shaped pilot plunger is forced back off its seat, compressing the adjustment spring. When this happens, a partial drop in pressure occurs in the area between the main poppet and the spear shaped pilot plunger, due to the flow of oil through the orifice in the sensing tube.

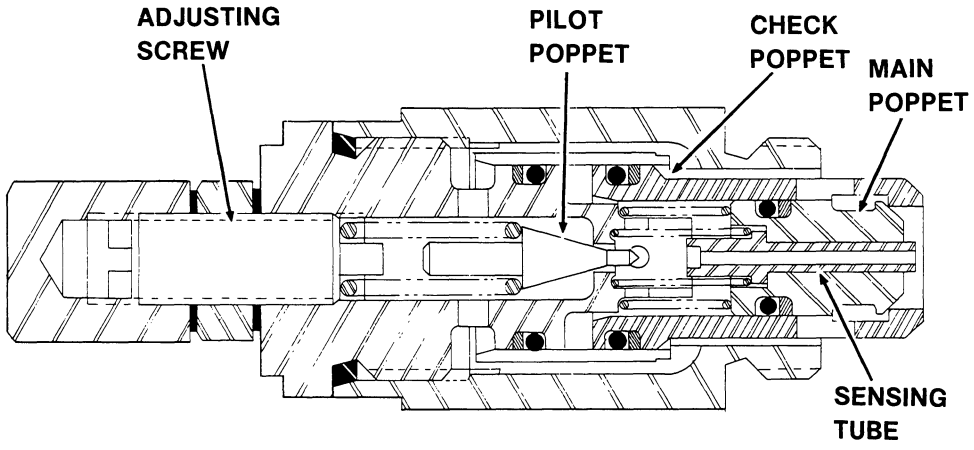

Figure 8. Secondary Relief Valve - Cross Section View

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Installation and Run-In

1. Install motor in place over house brake using four capscrews and washers.
2. Fill ports with Case TCH Fluid before connecting hydraulic lines.
3. Connect hydraulic lines.
4. Start engine and set at low speed. Rotate turntable in both directions for a total of five minutes.
5. Check gear housing constantly for rapid heat build-up, which would indicate a loss of efficiency and shorten motor life. Remove and examine motor for cause of heat build-up.
6. If run-in proves satisfactory, unit may be placed into full operation.

SWING INLINE RELIEF VALVE

Removal

1. Set the house brake.
2. Relieve line pressure by cycling swing control with engine shutoff.
3. Remove lines from valve. Plug ports in valve, and cap fittings on lines. Mark the lines and ports for ease of re-assembly.
4. Take valve to clean work area for replacement of o-rings.

Disassembly

1. The cartridge parts are not serviced separately on this valve. The only replacement parts are the two o-rings and two back up rings indicated in Figure 14.
2. To reach the rings for replacement, simply unscrew the cartridge shell from the valve housing and pull the entire assembly out. If replacing one or more of the o-rings or back up rings, replace them all.

Assembly

1. When placing the cartridge back into the housing, a light film of oil will help prevent curling or bending the o-rings and back up rings.
2. After cartridges have been installed, valve is ready to be replaced on machine.

Installation

1. Remove plugs from ports of valve, and caps from fittings on lines. Checking match marks, re-attach lines to proper ports of valve.
2. Check and adjust valve pressure settings (See Section 4202).

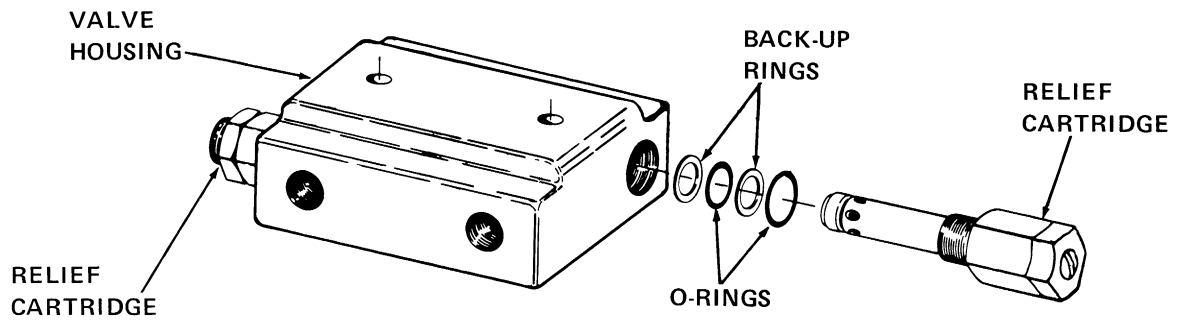

Figure 14. Swing Relief Cartridge

Troubleshooting - Hoist Cylinder Circuit

PROBLEM	POSSIBLE CAUSE	REMEDY
Boom will not raise (fast hoist not activated)	Inoperative hoist cylinder	See troubleshooting chart for cylinders in Section 4202
	Inoperative control valve	See troubleshooting chart for valves, in Section 4202
	Main relief valve setting set too low	Check and adjust as instructed in Section 2402.
	Control linkage improperly adjusted	Check adjustment as instructed in Section 4202
Boom will not raise (when fast hoist and hoist are activated)	Pump failure	See troubleshooting chart and flowmeter check in Section 4202
	Low hydraulic oil	Check and fill with Case TCH fluid
	Note: The above causes will affect all circuits	
Boom will not fast hoist	Inoperative control valve	See troubleshooting chart for valves in Section 4202
	Inoperative monoblock valve (hydraulic portion)	Check and repair or replace monoblock valve
	Inoperative monoblock valve (electrical portion)	See Fast Hoist Circuit trouble-shooting in Section 8002
	Electrical problem	See Fast Hoist Circuit trouble-shooting in Section 8002
Boom raises slowly	Control linkage improperly adjusted	Check adjustments as instructed in Section 4202
	Leakage in hydraulic circuit	Check with flowmeter as instructed in Section 4202
	Malfunction in hoist cylinder	See troubleshooting chart for cylinders in Section 4202
Boom will not lower	Inoperative hoist cylinder	See troubleshooting chart for cylinders in Section 4202
	Control linkage improperly adjusted.	Check adjustment as instructed in Section 4202

Troubleshooting - Tool Cylinder Circuit (Con't.)

PROBLEM	POSSIBLE CAUSE	REMEDY
Bucket will not curl out	Inoperative tool cylinder	See troubleshooting chart for cylinders in Section 4202
	Inoperative control valve	See troubleshooting chart
	Control linkage improperly adjusted	Check adjustment as instructed in Section 4202
Bucket moves slowly	Leakage in hydraulic circuit	Check with flowmeter as instructed in Section 4202
	Malfunction in tool cylinder	See troubleshooting chart for cylinders in Section 4202
	Control linkage improperly adjusted	Check adjustment as instructed in Section 4202
Bucket moves in either direction	Load hold valve spring broken or valve is stuck off its seat	Check and repair load hold check valve

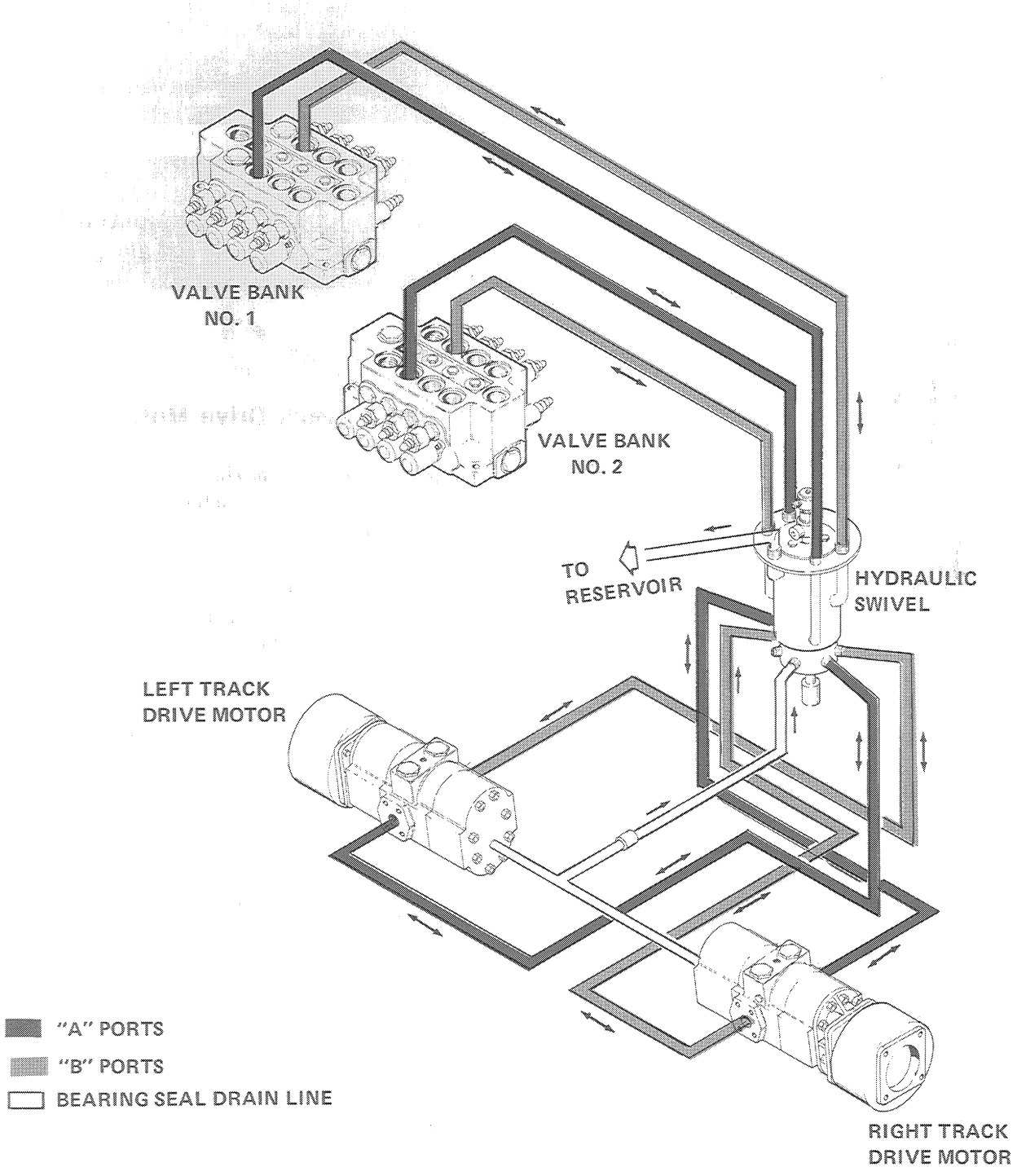

Figure 1. Track Drive Motor Circuits

13. Remove the spline coupling.

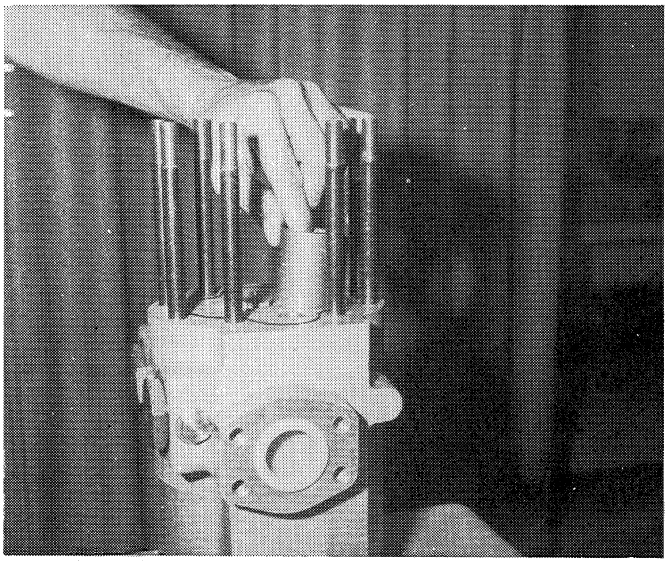

Figure 18. Removing Splined Coupling

14. To disassemble the rear section, it will be necessary to reverse its position (rear end up).

15. Remove the eight nuts and washers from rear body.

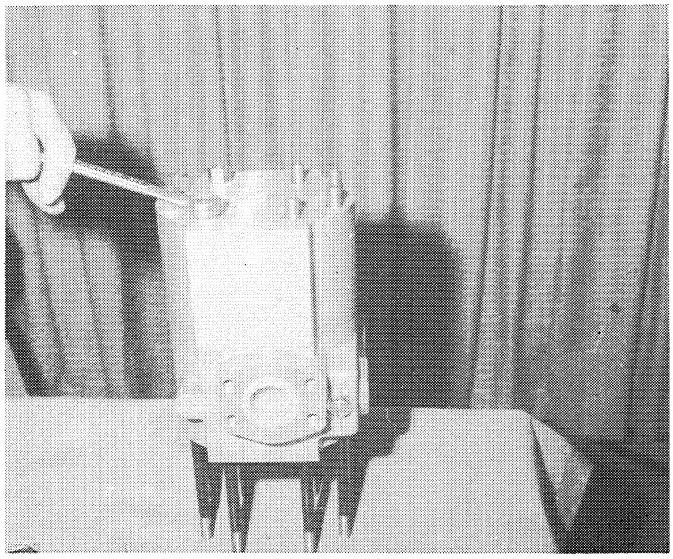

Figure 19. Removing Nuts and Washers

16. Remove stud bolts only IF they require replacement.

17. Remove the valve body by tapping lightly on the plugs with a soft hammer.

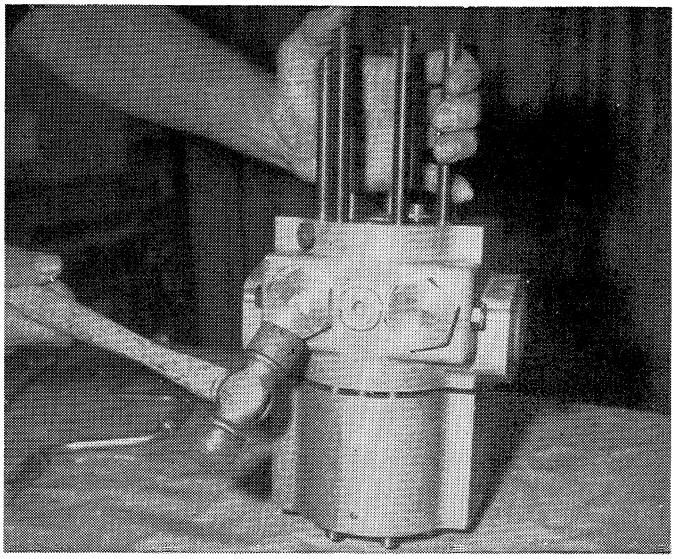

Figure 20. Removing Valve Body

18. Remove the body o-ring.

19. To disassemble the rear motor section, repeat steps 6 thru 11. Keep rear motor parts separate from the front motor parts.

20. To disassemble the valves from the valve body, remove the o-ring plug.

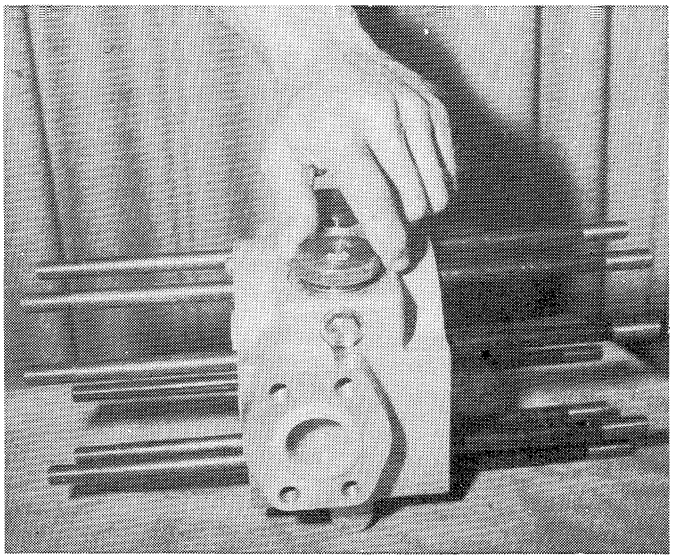

Figure 21. Removing O-ring Plug

21. Remove the spring and piston.

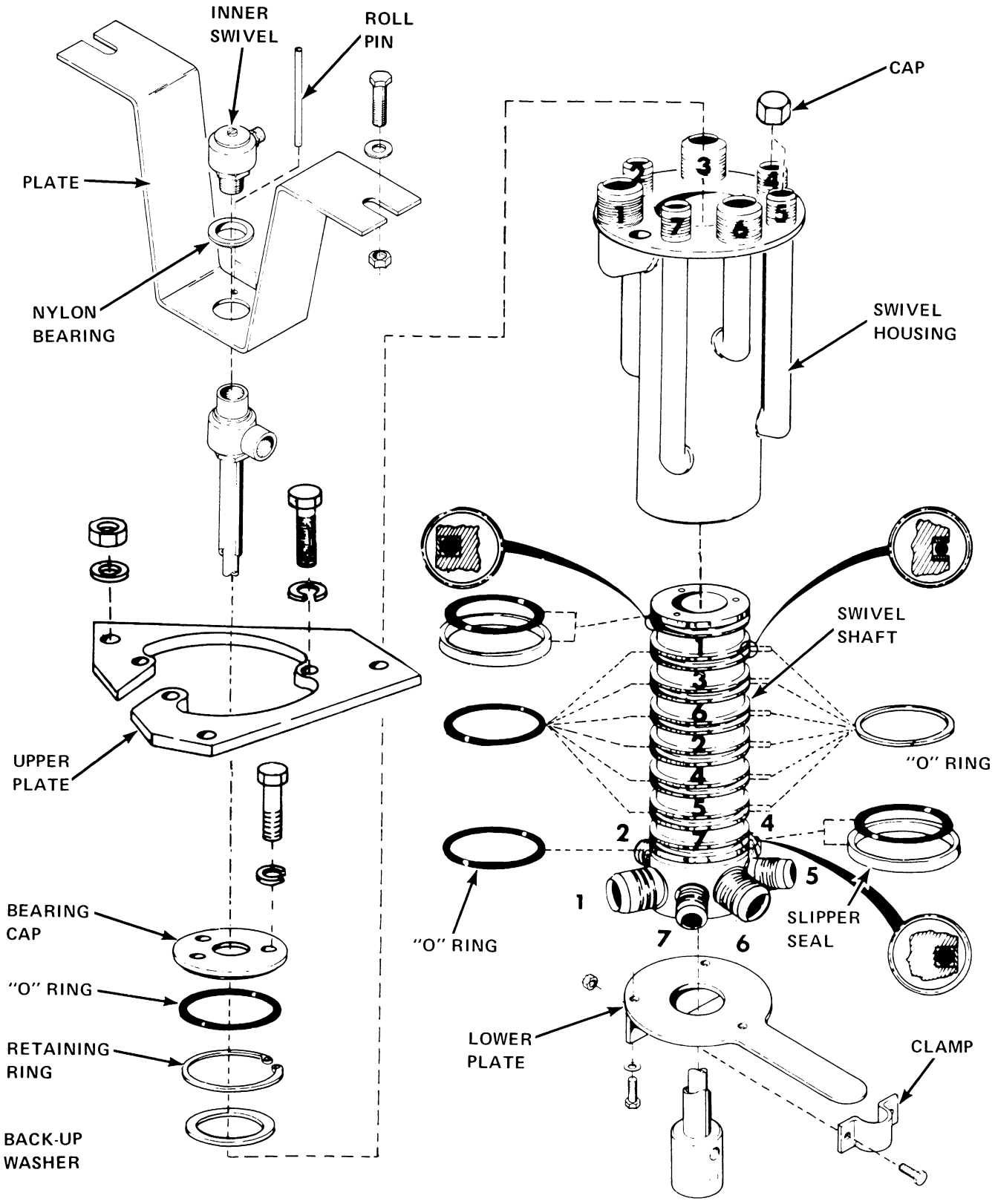

Figure 47. Center Swivel Assembly, Exploded View

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Assembly

1. Install new piston seal and retaining washer onto rod and piston assembly. See Figure 9 for proper assembly.

2. Replace retaining ring onto piston rod assembly.

3. Install new felt wiper ring.

4. Coat wiper ring and piston seal with a light coat of hydraulic oil and insert piston rod assembly into cylinder tube.

Installation

1. Mount the cylinder on unit using correct mounting hardware.

2. Connect hydraulic line to leveler cylinder. Torque fittings to specifications page 4290-3.

NOTE: Be sure grease fittings are installed in their original position. They must not be hidden or hard to get at.

CAUTION: Cylinders used on this machine are heavy and may be awkward to handle. Use suitable lifting equipment (a hoist is recommended).

3. Lubricate cylinder grease fittings with moly-disulfide grease.

4. Check hydraulic reservoir oil level and add Case TCH Fluid as required.

5. Remove supports from under turntable.

6. Start the engine and operate the cylinder(s) through several complete cycles to bleed air. Check for leaks. Operate cylinders slowly and do not bottom out the cylinders. After the circuit is filled with oil, the cylinders may be operated normally.

Determining the Time to Turn Pins and Bushings

There are basic guides to determine when the pins and bushings should be turned.

1. EXTERNAL BUSHING WEAR. The amount of wear can be measured in any of the ways shown in Figures 7, 8 and 9.

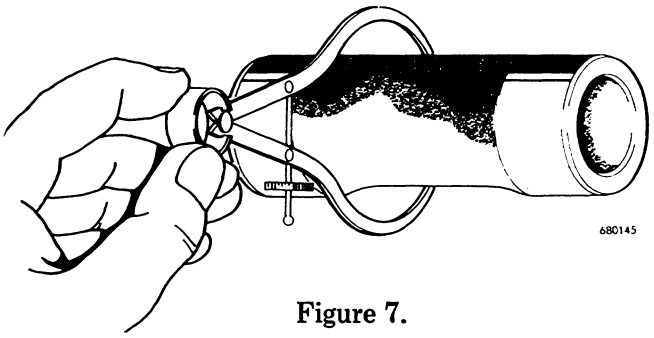

Figure 7.

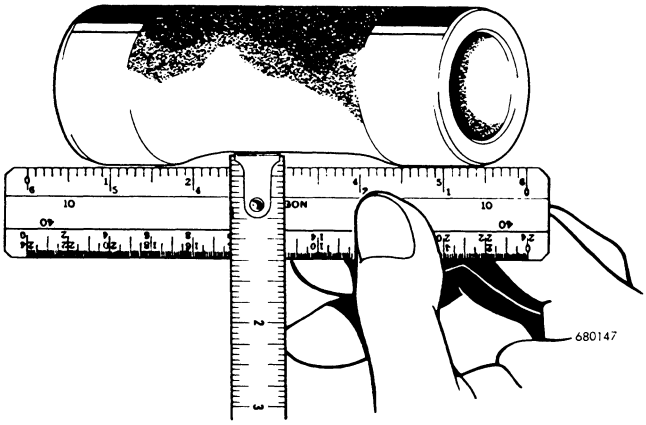

Figure 8

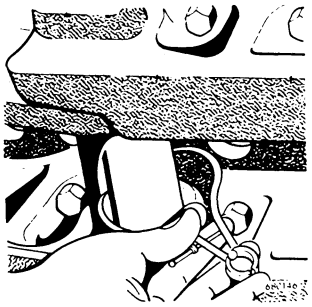

Figure 9

2. INTERNAL PIN AND BUSHING WEAR. Pull the track tight with the track adjustment cylinder and measure across four track links (five pins) as shown in Figure 10. If the measurement is more than what is shown in the specifications chart on page 5306-9, the average amount of internal wear exceeds the limit and the pins and bushings should be turned.

NOTE: The master pin should not be in the section of track being measured.

Pins and bushings must be turned before the bushing wears through and the pin is destroyed, or before the bushing becomes thin enough to allow it to crack in service.

Do not allow pins and bushings to be run to destruction. This will cause rapid wear on other parts in the track system — idler, sprockets, rollers, etc. In addition, the track may tend to "wander" or jump the sprocket wheels.

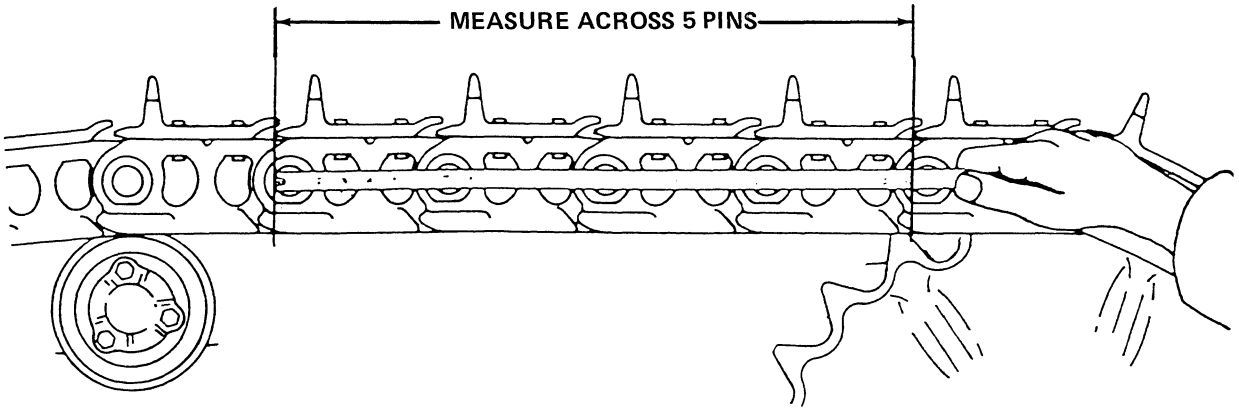

Figure 10. Measuring Internal Pin and Bushing Wear.

Installation

NOTE: There is no alignment procedure to be followed for the idler wheel. Once it is assembled and installed in the track frame, the idler assembly will fall within specifications.

1. Using a hoist lift the idler into place and slide it back until it makes contact with adjusting cylinder.
2. Reconnect the track and adjust to proper tension. See track tension adjustment.

TRACK ADJUSTMENT CYLINDER

The adjustment cylinder consists of a cylinder tube, piston and seal. A special adapter and grease fitting are installed on the end of the cylinder tube. When grease is added to the cylinder through the grease fitting, the cylinder expands and exerts greater force on the idler spring. A ball check assembly in the grease fitting prevents the grease from escaping. Grease is released from the cylinder by loosening the special adapter about three or four turns.

CAUTION: Slowly loosen the adapter to allow grease to escape. Very high pressures exist in the adjustment cylinder when under tension. The adapter fitting could fly loose and cause personal injury.

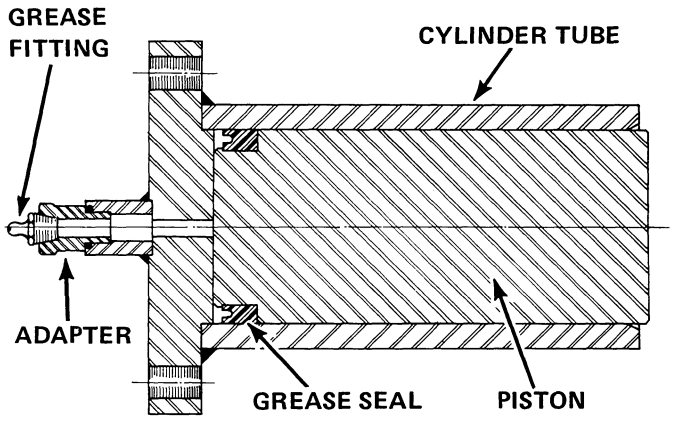

Figure 24. Track Adjustment Cylinder

Removal

1. Jack and support the track frame. Break the track. See Track Removal, page 5306-14.
2. Remove the idler assembly. See Idler Wheel Assembly, page 5306-17.
3. With the idler assembly removed, loosen and remove the two capscrews holding the cylinder to the frame. Use the access hole provided for the track adjustment grease fitting to reach the capscrews.
4. Pull the cylinder out through the top of the frame, after working it to the front.

Disassembly

1. Using grease gun, extend piston until it extends from end of cylinder. Remove piston from cylinder.
2. If seal does not come with piston (it should), remove it by hand.
3. Loosen the adapter at the rear of the cylinder that holds the grease fitting. Remove the o-ring.

Inspection

1. Clean all parts thoroughly.
2. To inspect the cylinder tube, use a light and check for scoring or signs of excessive wear.
3. Inspect the piston for damage, such as scoring or grooves, caused by dirt particles. Remove minor imperfections using emery cloth in a rotary motion.

Assembly

1. Install a new o-ring behind the adapter for mounting the grease fitting. See Figure 24.
2. Smear grease around the lip of the seal. Make sure it has adequate lubrication to prevent damage when it is installed in the cylinder.

6. When cover has been loosened from gear case, lift cover over output shaft. Remove second intermediate shaft bearing from cover. The bearing should be removed before cover is installed back on gear case.

7. Lift the output shaft from the gear case. Now lift the two intermediate gear assemblies straight up. When the bearings are free of the gear case, lift up the second intermediate assembly. Then lift the first intermediate assembly. Lift the input shaft from gear case.

8. Gear sub-assemblies can be disassembled. Remove snap rings from shaft. Use a bearing puller to remove bearings and race from shaft. Slide gears off the shaft.

   Second intermediate shaft bearings will remain in gear case and cover. Use a puller to remove these bearings.

   NOTE: All bearings and races are matched sets. If the bearing set must be separated for reassembly, MAKE SURE that the bearing and race are assembled back together.

Cleaning and Inspection

Thoroughly clean all parts in non-flammable solvent.

Inspect all bearings for wear, nicks, or scratches. Check bearing races for worn spots or nicks.

Inspect gears for chipped teeth, cracks or wear.

Assembly

For easiest reassembly of the final drive gearbox, the following components should be subassembled first.

a. Input shaft mounting flange and oil seal.

b. Input shaft and bearings.

c. First intermediate shaft, gears, and bearings.

d. Second intermediate shaft, gears, and bearings.

e. Output shaft, gear, and bearings.

f. Output shaft bearing cover and oil seal.

Final Reassembly

1. Turn gear case, cover side down. Install filler and drain plugs in gear case. (See Figure 5).

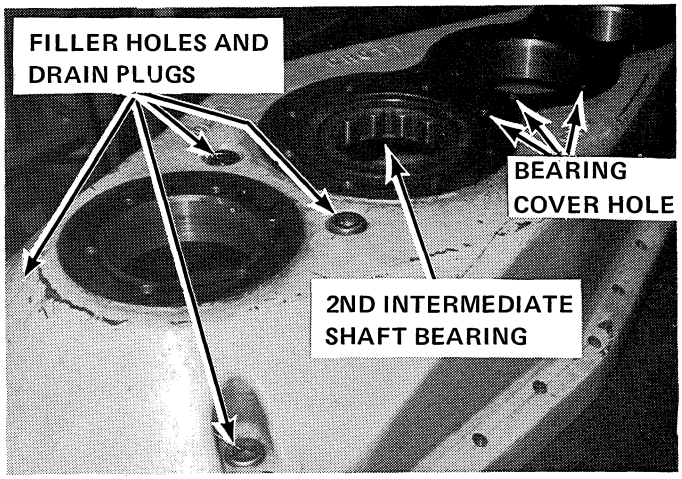

Figure 5. 2nd Intermediate Shaft Bearing Installed

2. Install second intermediate shaft bearing in gear case. (See Figure 5).

   NOTE: The bearing and bearing race are a matched set. When changing bearings on the second intermediate shaft, do not interchange the bearing and bearing race.

3. Spread a bead of red Loctite (Case No. B17427) around the gear case bearing cover holes. (See Figure 5).

4. Mount the three bearing covers to the gear case. Torque the capscrews to 42 lb-ft (57 Nm).

   NOTE: The bearing cover capscrews must be tightened before the brake mounting flange can be installed.

5. Mount the brake mounting flange to the gear case. Torque capscrews to 90 lbs-ft (122 Nm).

6. Turn gear case over so that cover side is up. Level the gear case by placing a small wood block under the output shaft bearing cover.

7. Place input shaft assembly into gear case (See Figure 6).

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PROBLEM	POSSIBLE CAUSE	REMEDY
Starter not operating or fails to operate properly (Con't.)	High resistance in starting or ground circuits	Test circuits. For procedures and specifications, see page 8002-9.
	Worn pinion or flywheel ring gear teeth	Remove starter and inspect teeth
	Loose starter mounting	Inspect and tighten
	Worn brushes or faulty armature or field coil or other defect in starter	If starter fails no-load test, Section 8015, disassembly starter. Test and inspect as described on pages 8015-3 and 8015-4. Repair or replace faulty component.
	Open, grounded or shorted windings in starter motor solenoid	Check solenoid, Section 8015. Replace solenoid if required.
	Defective starting circuit magnetic switch	Make checks described on page 8015. Replace solenoid if required.
	Defective 15 amp circuit breaker.	Check continuity through circuit breaker "D" and replace if necessary.

TROUBLESHOOTING - CHARGING CIRCUIT

General Description

The alternator charging system includes the batteries, alternator, voltage regulator, dual voltage charge control unit, ammeter, oil pressure switch and related wiring. Its purpose is to provide power for operation of the machine's electrical components and maintain a full charge on the batteries. The components are connected as shown in Figure 9.

The batteries are connected in series as shown in figure 8. Battery No. 1 is used for starting plus the electrical load. Battery No. 2 is used for starting only.

The "A" terminal of the dual voltage charge control unit is connected to the alternator output terminal. Terminal "A" is connected to the 12 volt post of Battery No. 1; terminal "2" is connected to the 24 volt post of Battery No. 2.

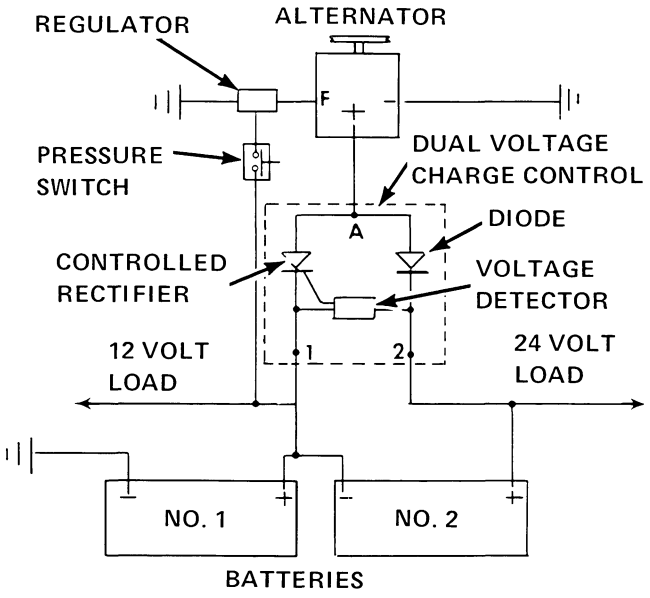


Figure 9. The Charging System

PROBLEM	POSSIBLE CAUSE	REMEDY
Fast hoist inoperative	Circuit breaker "E" tripped or defective.	Reset or replace
	Loose connections or faulty wiring	Use wiring diagram and check out circuit.
	Defective solenoid.	Check current draw - if more than 1.5 amperes, replace solenoid.
	Faulty hydraulic circuit	Refer to Fast Hoist Hydraulics, Section 4211.

TROUBLESHOOTING THE LIGHTS AND INSTRUMENT CIRCUITS

Lighting Circuits

Instrument panel lights and dome light are protected by circuit breaker "C". If all three lights fail to come on (with ignition switch on), check the circuit breaker. Check for a burned out bulb if only one light fails to come on.

Engine Gauges

Power to the engine gauges comes across the engine pressure switch through circuit breaker "A". With engine running, the circuit is completed through the sending units to ground and provides a constant indication of engine temperature and pressure on the corresponding gauge.

If both gauges are inoperative, check the circuit breaker. If only one gauge is malfunctioning, suspect the sending unit. Make sure all connections at the gauge and sending unit are clean and tight.

Hourmeter

With engine running, a circuit is completed through the hourmeter to ground and registers total engine operating time. The hourmeter receives power through the engine pressure switch and circuit breaker "A";

Fuel Gauge

With engine running, power is available to the fuel gauge and through the sending unit to ground. The circuit is protected by circuit breaker "A".

TROUBLESHOOTING THE CHARGING CIRCUIT

The following checks are listed in ease of performing and as near as possible in the order of malfunction occurrence.

CHECK	DETAILED INSTRUCTIONS
Visual check	1. Check for damaged wiring, loose and corroded terminal and harness plug connection. Repair as required. 2. Check fan belt condition and tension. Adjust or replace belt as required.
Check condition of battery	1. Clean battery top to eliminate voltage loss. 2. Check for battery case damage that would result in fluid loss or admission of dirt into cell(s). 3. Before continuing troubleshooting, install a battery post adapter, Figure 7, on the negative battery post. Then attach cable to adapter. Test equipment will be connected to the adapter later in the procedure.
Check voltage at alternator	1. Connect voltmeter negative lead to the alternator frame. Connect voltmeter positive lead to the alternator Bat terminal; battery voltage should be indicated. 2. Turn key switch on and check voltage at the alternator Bat and No. 1 and No. 2 terminals. a. Voltage at the Bat terminal should be battery voltage to about ½ volt less than battery voltage. b. Voltage at terminal No. 1 should be about 2½ volts to 3 volts less than battery voltage. c. Voltage at terminal No. 2 should be battery voltage to about ½ volt less than battery voltage.
Check alternator output	1. Refer to Section 8016 for instructions. If necessary remove alternator for repair. Continue trouble-shooting procedure.

CARE AND MAINTENANCE

A battery can be considered a perishable item, therefore it is only natural to assume that proper care and maintenance will aid in obtaining maximum service life.

NOTE: A check sheet will be found on the last page for use in battery inspections. Extra copies can be easily reproduced on any office duplicator.

Electrolyte Level

The electrolyte level should be checked at regular intervals. Extensive use in hot weather will require more frequent checks because of a more rapid water loss. If the electrolyte level is low, add colorless, odorless drinking water to each cell until the fluid level rises to the split ring at the bottom of the cell opening. Overfilling serves no useful purpose and will result in poor performance, short life and excessive corrosion around the battery.

CAUTION: Add water only, not electrolyte, when servicing the battery.

Maintain the electrolyte level above the plates at all times to prevent permanent damage which will result in reduced performance and service life.

Water Usage

Excessive water usage indicates high battery temperature and/or high voltage regulator setting.

No appreciable water use over a period of time indicates an undercharged battery. Poor cable connections or a too low voltage regulator setting may be the cause.

Cleaning

The battery should be inspected periodically for dirt and corrosion, and damage. Dirt, combined with electrolyte or moisture on the top of the battery usually results in a continuous battery discharge because this foreign material produces a path for battery current to follow. Due to the higher voltage involved, 12-volt batteries are more susceptible to energy losses of this nature than 6 volt batteries.

Clean the battery and battery cables with soda or ammonia and water and flush with clear water. It is recommended that the battery be removed and the battery carrier cleaned at the same time. After the battery and cables have dried, thoroughly coat the battery terminals and cables with grease to reduce terminal corrosion.

NOTE: A soft felt washer placed between the battery cable and the top of the battery and saturated with oil will greatly reduce the chances of terminal corrosion.

BATTERY TESTS

Specific Gravity Check

A hydrometer is used to check the specific gravity (weight) of the battery electrolyte. The specific gravity of the electrolyte indicates the approximate state of charge of the battery. Hydrometers are calibrated to give the true reading when the electrolyte temperature is 80° F. Therefore, to obtain a correct specific gravity reading, the temperature of the electrolyte must be known. Some hydrometers contain a thermometer while others do not. A separate thermometer is required to check electrolyte temperature if the hydrometer is not so equipped.

NOTE: If water must be added to check specific gravity, fast charge battery for 30 minutes or false readings will be obtained.

1. Remove electrolyte from one cell with the hydrometer. Observe and record the hydrometer reading.

2. Note the electrolyte temperature. Refer to Figure 2 and add or substract four (.004) specific gravity points for each 10° above or below 80° F. The corrected reading will be a true indication of cell condition.

worn bearings, bent armature shaft or loose pole shoes allowing armature to drag.

b. Shorted armature. This can be further checked on a growler after disassembly.

c. Grounded armature or fields. Check further after disassembly.

3. Failure to operate with high current draw indicates:

a. A direct ground in the field terminal or fields.

b. "Frozen" bearings (this should have been determined by turning the armature by hand).

4. Failure to operate and no current draw indicates:

a. Open field circuit. This can be checked after disassembly by inspecting internal connections and checking circuit with a test lamp. Page 8015-7.

b. Open armature coils. Inspect the commutator for badly burned bars after disassembly.

c. Broken brush springs, worn brushes, high insulation between the commutator bars or other causes which would prevent good contact between the brushes and commutator.

5. Low no-load speed and low current draw indicates:

a. High internal resistance due to poor connections, defective leads, dirty commutator and causes listed under No. 4.

6. High free speed and high current draw indicates shorted fields. If shorted fields are suspected, replace the field coil assembly and check for improved performance.

Servicing the Starter

Removal

1. Disconnect the battery ground (-) cable from the batteries at the rear of the vehicle.

2. Disconnect wires and cables attached to the starter.

3. Remove starter mounting bolts and lockwashers, then pull the starter forward from the engine.

Disassembly

Refer to Figure 2.

1. Note the relative position of the solenoid, shift lever housing, and pinion housing so the starter can be reassembled in the same manner.

2. Disconnect the field coil connector from the solenoid motor terminal and the lead from the solenoid ground terminal to the end frame.

3. Remove brush inspection plates. Remove the brush lead screws. This will disconnect the field leads from the brush holders.

4. Remove the attaching bolts and separate the commutator end frame from the field frame.

5. Separate the pinion housing from the shift lever housing by removing attaching bolts.

6. Separate the shift lever housing from the field frame by removing five bolts and lockwashers. Pull them apart.

7. Remove the armature and starter drive:

a. Remove the shift lever shaft.

b. Remove locknut on solenoid plunger.

NOTE: Whenever the locknut is disturbed, the pinion clearance must be adjusted, page 8015-8.

The oil pressure switch closes at 3-6 psi. If the switch fails to close the charging circuit will be inoperative and result in discharged batteries.

CHARGING SYSTEM TESTS

The six tests on pages 8016-4 to 8016-10 are designed as a complete checkout of the charging system. The alternator and regulator remain on the vehicle while testing so as to use circuit conductors and accessories that are a permanent part of the charging system. This results in more accurate problem identification.

Preliminary Checks

Before testing the charging system check the following:

a. Battery: The battery should be at least 75% of full charge. Refer to Specific Gravity Check in Section 8014.

b. Connections: All connections of charging system components should be tight and free of corrosion or other foreign matter that would cause a poor connection.

c. Drive belt: The drive belt should be free of grease or oil which may cause slippage under load. Check for proper belt tension page 8016-16.

Test Equipment

NOTE: The following test equipment, except the test lamps, are self contained in Sun Electric's Volt-Ampere Tester, model VAT-26 and Snap-On's Heavy Duty A.V.R. Tester, model MT 540C. The following test illustrations will show individual component hookups but tests may be performed using the self contained test equipment making connections as instructed and according to the test equipment manufacturer's instructions.

The following test equipment will be needed to test the charging system.

a. D.C. Voltmeter, 0-40 volt scale.

b. D.C. Ammeter, 0-100 amp scale.

c. Field Rheostat, 0-50 ohms resistance, 50 watt capacity.

d. 1/4 Ohm, 25 watt Resistor, Sun Electric RES-1 or equivalent with leads for connection in the alternator output circuit.

e. Carbon Pile, Sun Electric Y-20 or equivalent capable of 0-600 ampere load, knob controlled.

f. 12 Volt Test Lamp using a number 57 bulb.

g. 110 Volt A.C. Test Lamp, using 15-25 Watt lamp.

h. Ohmmeter, Simpson 260 or equivalent.

i. Assortment of jumper leads of various lengths. Leads should be made from No. 10 wire.

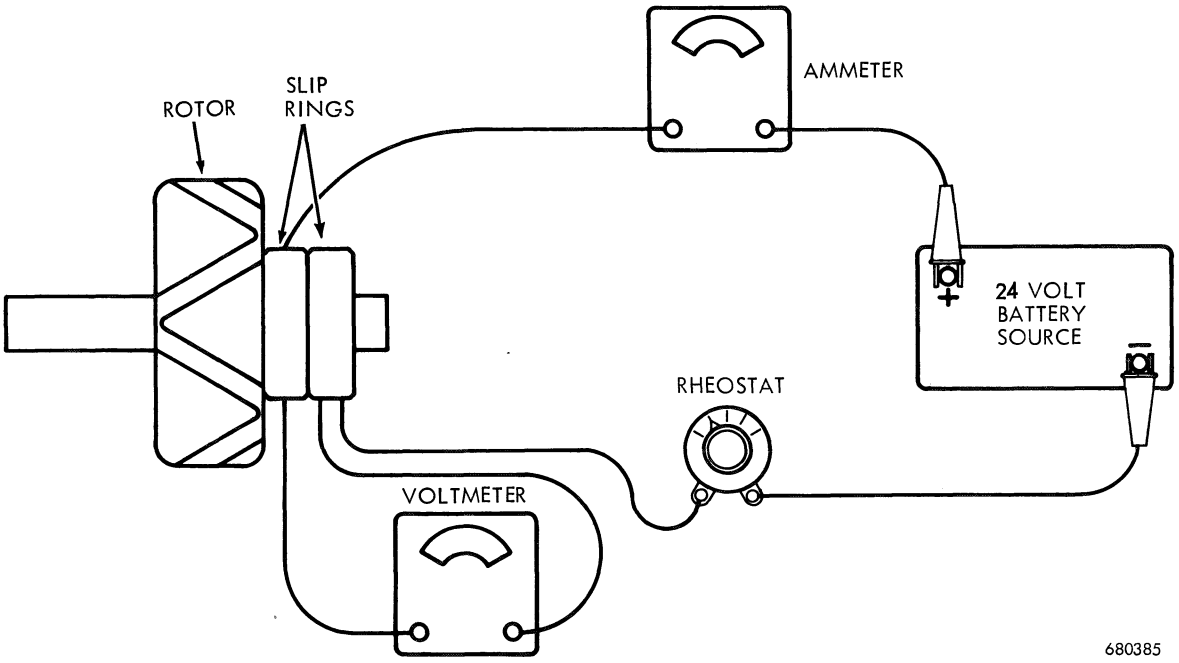


Figure 10 - Rotor Current Draw Test

below the specified amperage, replace the rotor.

Winding Resistance Test

1. Place ohmmeter test lead on each slip ring and note ohmmeter reading. The ohmmeter should indicate between 11.0 and 14.0 ohms at 70° to 80° F. If the reading is not as specified, replace the rotor.

Grounded Slip Ring or Winding

1. Place one lead of the 110 Volt A.C. test lamp to the rotor shaft; place the other test lead on the side of either slip ring.

2. If test lamp lights, rotor winding or slip rings are grounded. Check the slip rings and slip ring leads for short circuit. Replace slip ring assembly if necessary. If the slip rings and slip ring leads are not defective the rotor is defective and must be replaced.

Testing Rectifier Diodes

Diodes may be tested with a 12 volt test lamp, ohmmeter or commercial diode tester. If a commercial tester is available, test the diodes according to the equipment manufacturer's instructions.

1. Unsolder the stator leads from the diode terminals.

CAUTION: When unsoldering or soldering diodes, grasp the diode terminal with pliers below the soldered connection to prevent heat damage to the diode.

2. To check diodes with a 12 volt test lamp:

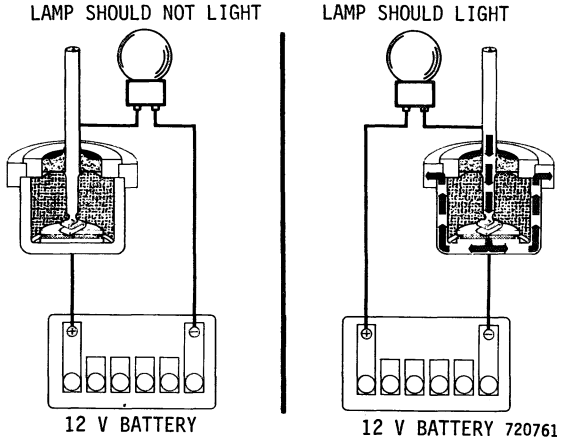
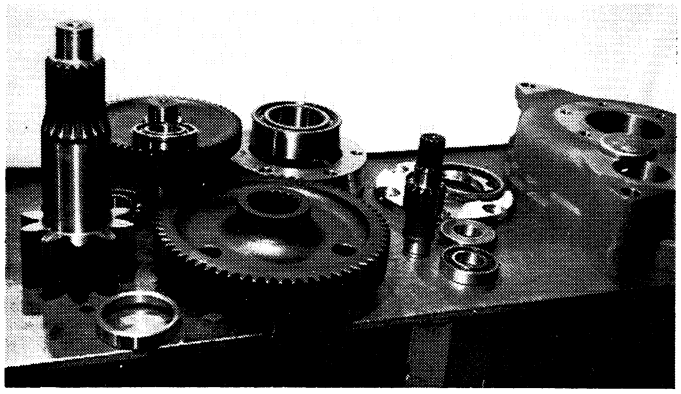


Figure 11 - Positive Diode Check

a. Connect a 12 volt battery and the test lamp to each positive diode (red part no.) as illustrated in Figure 11. The lamp should light in one direction only. If the lamp fails to light or

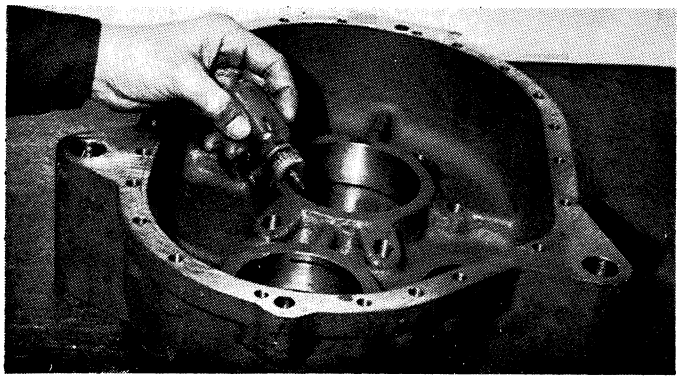
Assembly Sequence

STEP 1



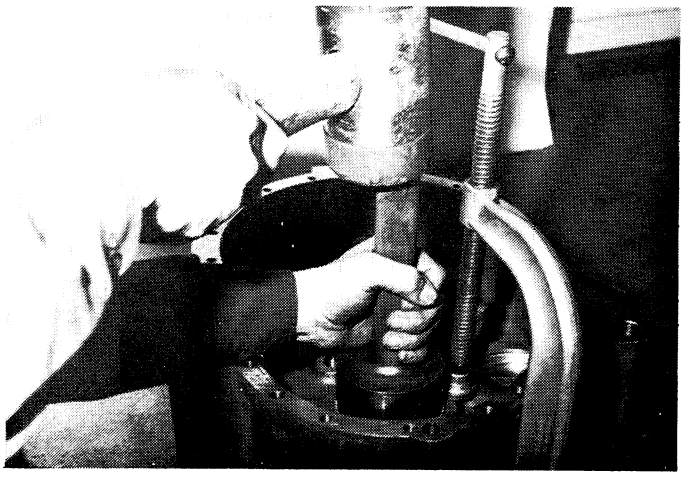
Make sure all parts are clean and do not have damage. Assemble the parts on a clean work bench.

STEP 2



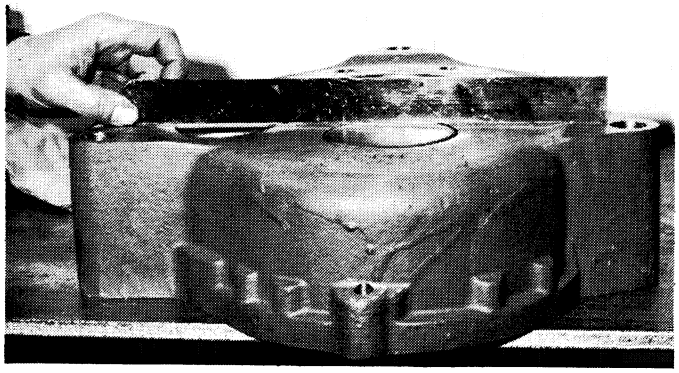
Apply red Loctite (Case Part No. B17427) to bearing bores in bottom of gear case (cup plug installation only). **If expansion plugs are being used, see page 9210-12.**

STEP 3



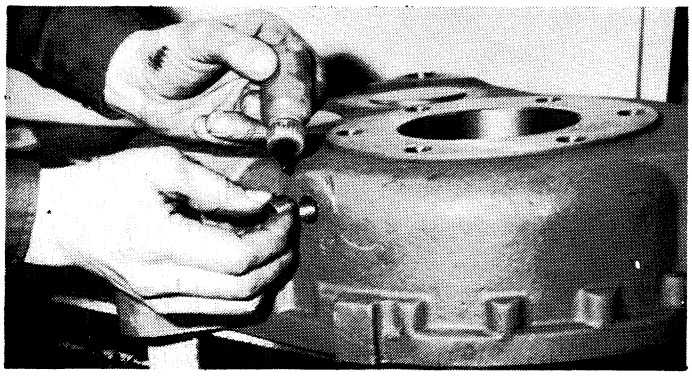
Install cup plugs. Use hammer and special tool. Use a C-clamp to hold the gear case in position.

STEP 4



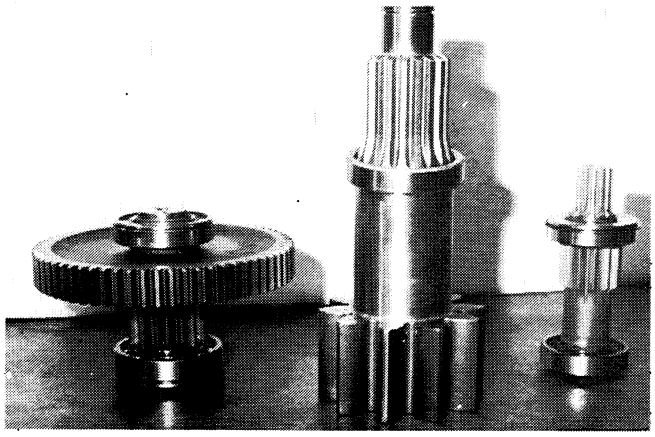
Turn the gear case over and check that the cup plugs are a minimum of 3/16 inch (5 mm) below the mounting surface of the gearbox.

STEP 5

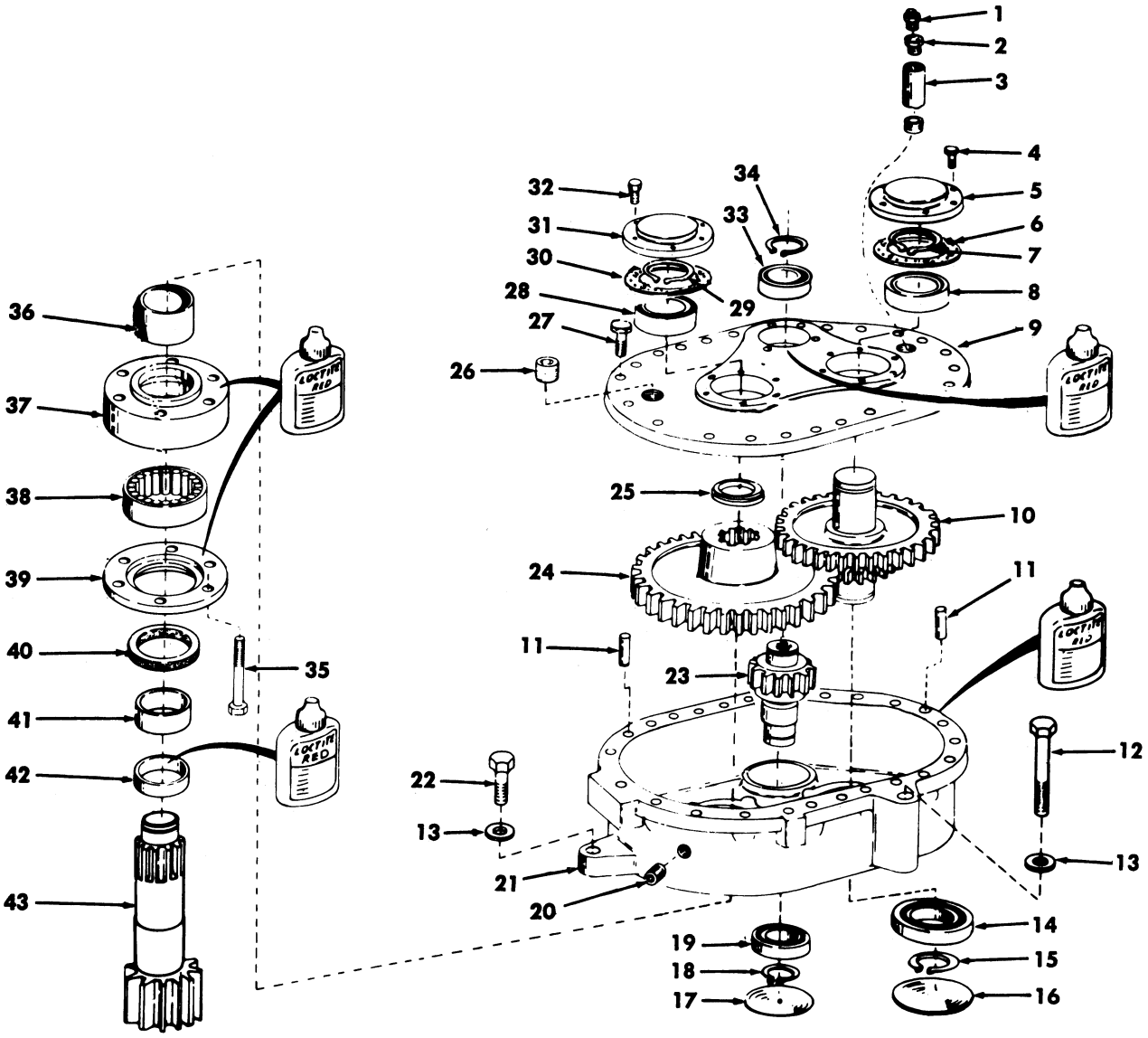


Apply red Loctite (Case Part No. B17427) to drain plug. Install plug in gear case.

STEP 6



Install the bearings on the input shaft and the intermediate gear. Use a bearing driver that fits the inner race of the bearing. DO NOT hit on the outer race of the bearing.



1. Breather
2. Connector
3. Nipple
4. Bolt
5. Bearing Cover
6. Gasket
7. Retaining Ring
8. Bearing
9. Cover
10. Gear (Intermediate)
11. Dowel
12. Bolt
13. Washer
14. Bearing
15. Retaining Ring
16. Cup Plug
17. Cup Plug
18. Retaining Ring
19. Bearing
20. Plug
21. Gear Case
22. Bolt
23. Input Pinion and Shaft
24. Drive Gear (Output)
25. Spacer
26. Plug
27. Bolt
28. Bearing
29. Retaining Ring
30. Gasket
31. Bearing Cover
32. Bolt
33. Bearing
34. Retaining Ring
35. Bolt
36. Spacer
37. Bearing Retainer
38. Roller Bearing
39. Oil Seal Retainer
40. Oil Seal
41. Ring
42. Output Shaft and Pinion

Figure 1. Swing Gearbox

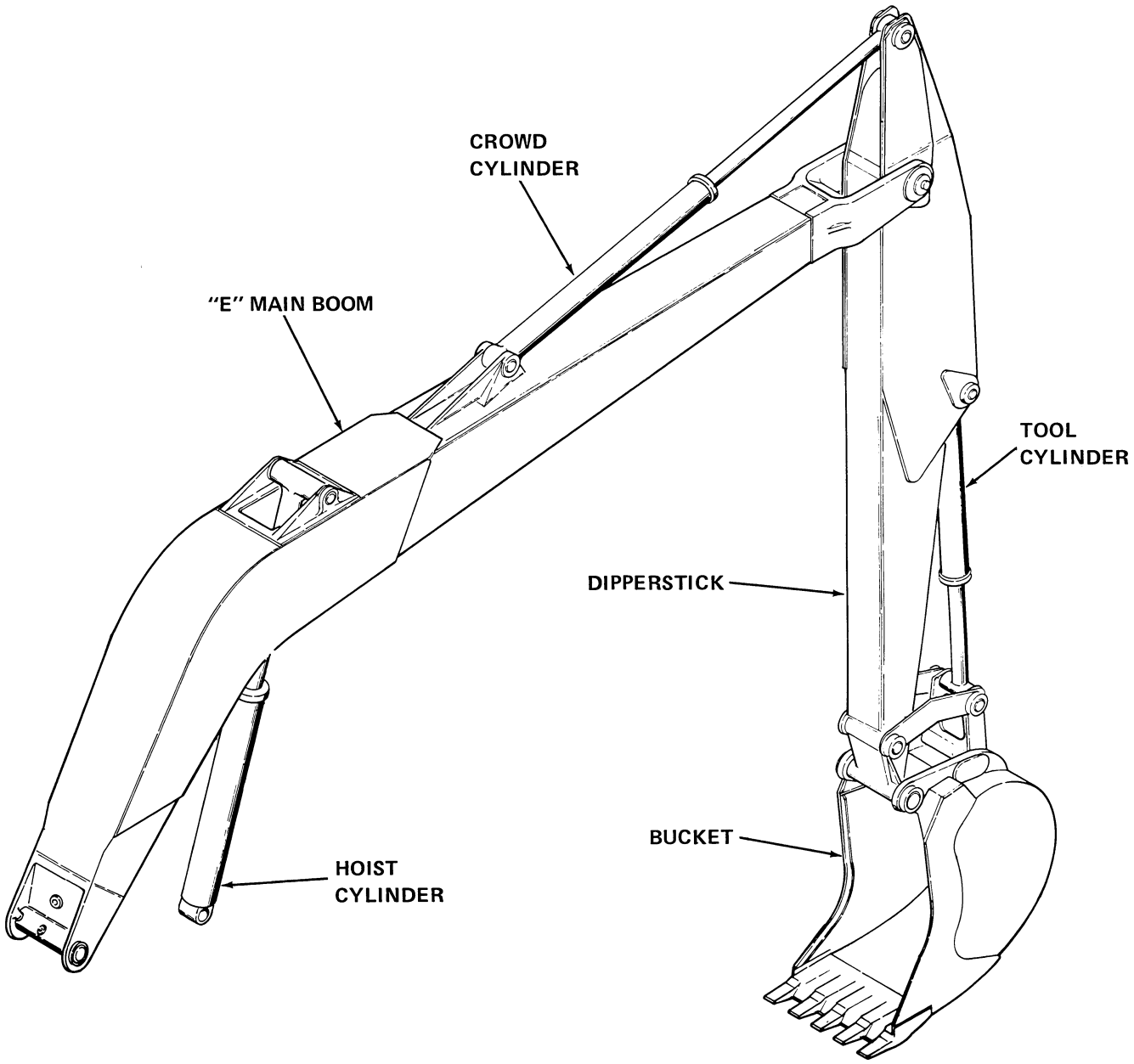


Figure 1. Boom Assembly

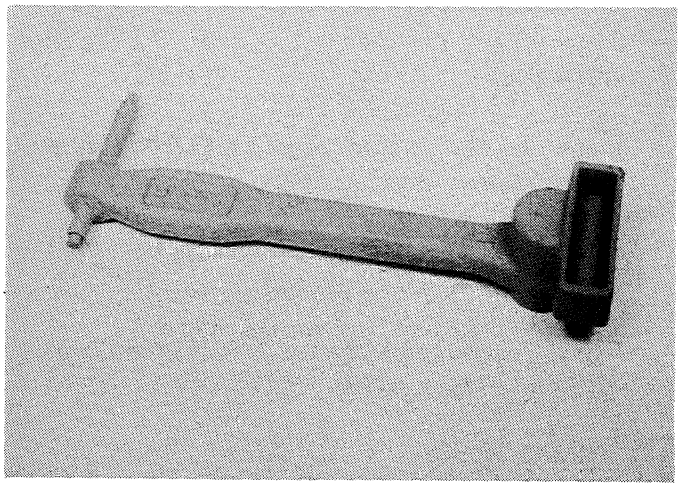


Figure 10. Special Tool (No. S 204646)

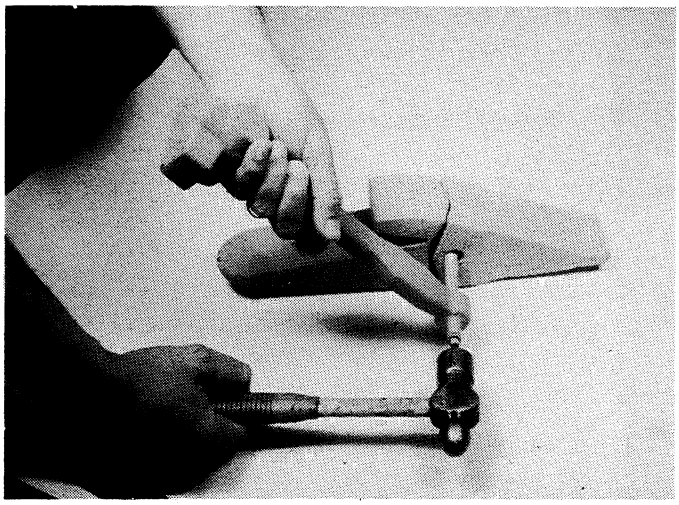


Figure 11. Removing Roll Pin

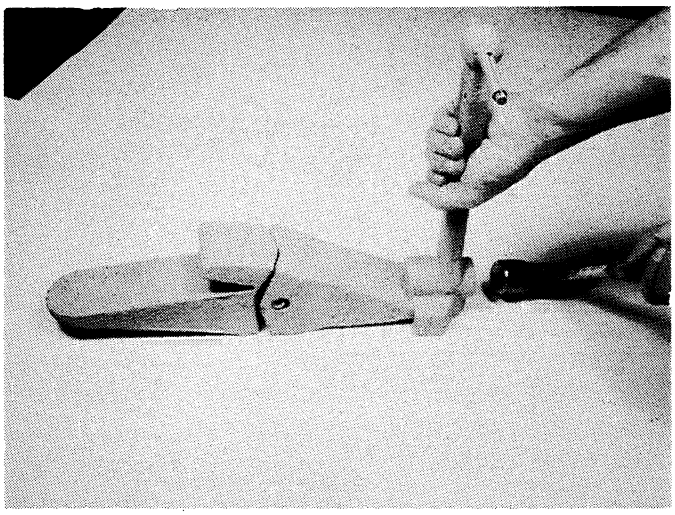


Figure 12. Replacing Tooth

Tooth Assembly Replacement for Cast Cutting Edge

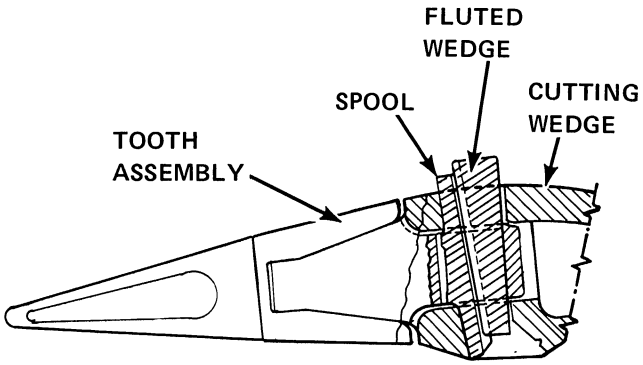


Figure 13. Removing Tooth

1. Drive the fluted wedge out of tooth and cutting edge.

2. Remove the spool and pull tooth assembly from cutting edge.

3. Clean the new tooth assembly and cutting edge mating surfaces.

4. Install new tooth into cutting edge. Install spool into forward position with large lug at the bottom.

5. Install wedge in rear position and drive in, being careful not to drive wedge to a point of refusal.

IMPORTANT: Check tightness of wedge at regular intervals to assure positive engagement. Loose keys can lead to premature adapter failure. Do not overdrive wedge by driving to point of refusal. Use next oversized wedge when key can be driven below top face of the lip.

Replacing Only Tooth Tip

1. Drive out pin from tip and adapter. See Figure 4.

2. Slide off tooth tip and remove pin lock from the adapter.

3. Install pin lock into adapter and slide on tooth tip.

4. Drive in pin to secure tip to the adapter.

GENERAL

The machine upperstructure revolves on a large bearing and ring gear. The outer face of the bearing is fastened to the turntable; the inner race is bolted to the leveler assembly or to the weldring on the carbody.

Turntable rotation is powered by a hydraulic swing motor working through a gear reducer. The output pinion of the gearbox protrudes through a hole in the turntable and meshes with the teeth of the ring gear. As the gearbox output pinion rotates, it walks around the ring gear and causes the turntable to rotate.

A mechanically applied, spring released disc type brake mounts between the gearbox and swing motor. This brake serves as a holding brake during travel or shutdown. It is not designed to stop turntable rotation. However, in an emergency, the brake may be used to stop a drifting or coasting turntable.

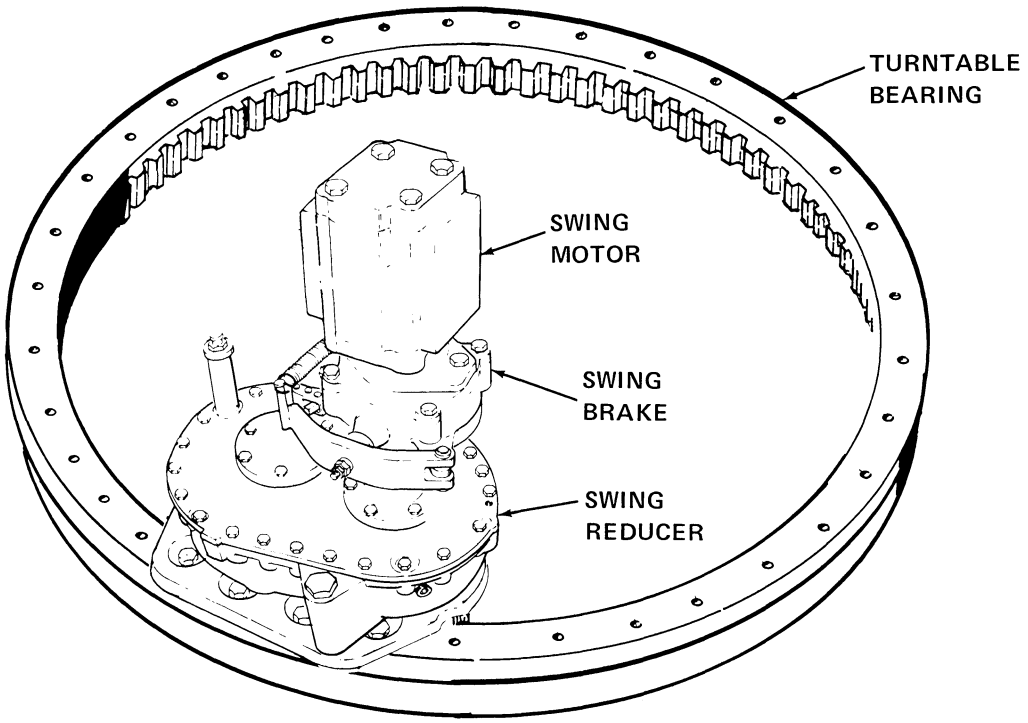


Figure 3. Swing Assembly

SWING GEARBOX

The gearbox contains three sets of gears - Input, Intermediate and Output. The input pinion receives driving torque from the swing motor through the brake coupling and connecting stud. Torque is then transmitted through the intermediate gear cluster to the output gear and pinion. The output pinion meshes with the turntable ring gear.

The oil level in the swing gearbox should be checked weekly. Oil level should be to the top of gearbox at all times. If low, add Case FDL final drive fluid.