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1370 TRACTOR PRIOR TO SN8727601

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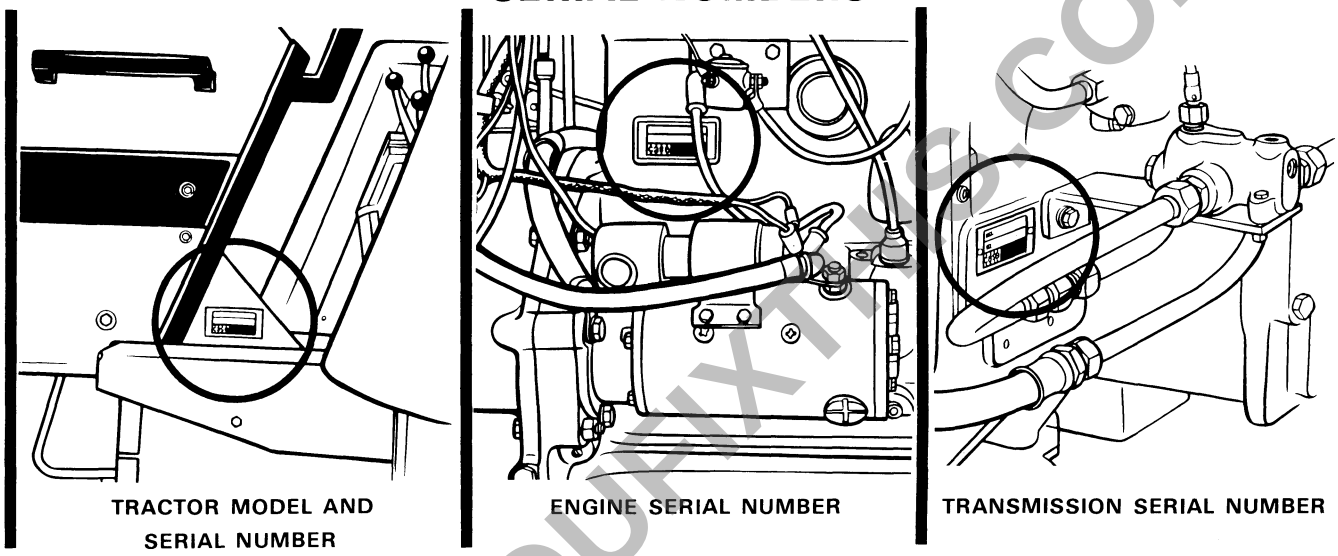
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Section 11

GENERAL SPECIFICATIONS 1270 AND 1370 TRACTORS

SERIAL NUMBERS



TRACTOR MODEL AND SERIAL NUMBER

ENGINE SERIAL NUMBER

TRANSMISSION SERIAL NUMBER

DIESEL ENGINES

General

Type	6 cylinder, 4 stroke cycle, valve-in-head turbo-charged
Firing order	1-5-3-6-2-4
Bore (1270)	4-3/8 Inches
(1370)	4-5/8 Inches
Stroke	5 Inches
Piston displacement (1270)	451 Cubic Inches
(1370)	504 Cubic Inches
Compression ratio	16.5 to 1
Cylinder sleeves	Removable wet type
No load governed speed	2240 to 2280 RPM
Rated engine speed	2100 RPM
Engine idling speed	725 to 775 RPM
*Valve tappet clearance (exhaust)	(HOT) .020 Inch
	(COLD) .025 Inch
(intake)	(Hot and Cold) .015 Inch

*Hot settings are made after the engine has operated at thermostat controlled temperature for at least fifteen minutes.

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Section

13

LUBRICATION
1270 AND 1370 TRACTORS

RECOMMENDED LUBRICANTS AND APPROXIMATE CAPACITIES GIVEN IN U.S. AND METRIC MEASURE

1270 TRACTOR

LUBRICATION POINTS	APPROXIMATE CAPACITIES	PREVAILING AIR TEMPERATURE RANGES		
Engine Crankcase w/o filters	15 Qts. (14.2 Liters)	DIESEL ENGINES		
		32°F. (0°C.) and Above	10°F. (-12°C.) to 55°F.(13°C.)	Use Only Below 40°F.(4°C.)
Engine Crankcase w/filters	17 Qts. (16.1 Liters)	SAE 30	SAE 20W	SAE 10W
Transmission Hyd. System	120 Qts. (113.6 Liters)	USE CASE TFD FLUID		
All Pressure Fittings	As Many Strokes As Required	Use a Good No. 2 Gun Grease (Lithium Base)		
Fuel Tank	80 Gal. (302.9 Liters)	Diesel Use a Good Grade Number 2 Diesel Fuel		
Cooling System	41 Qts. (38.8 Liters)	Use a Top Brand "High Boiling Point" Type Anti-Freeze in Cold Weather		

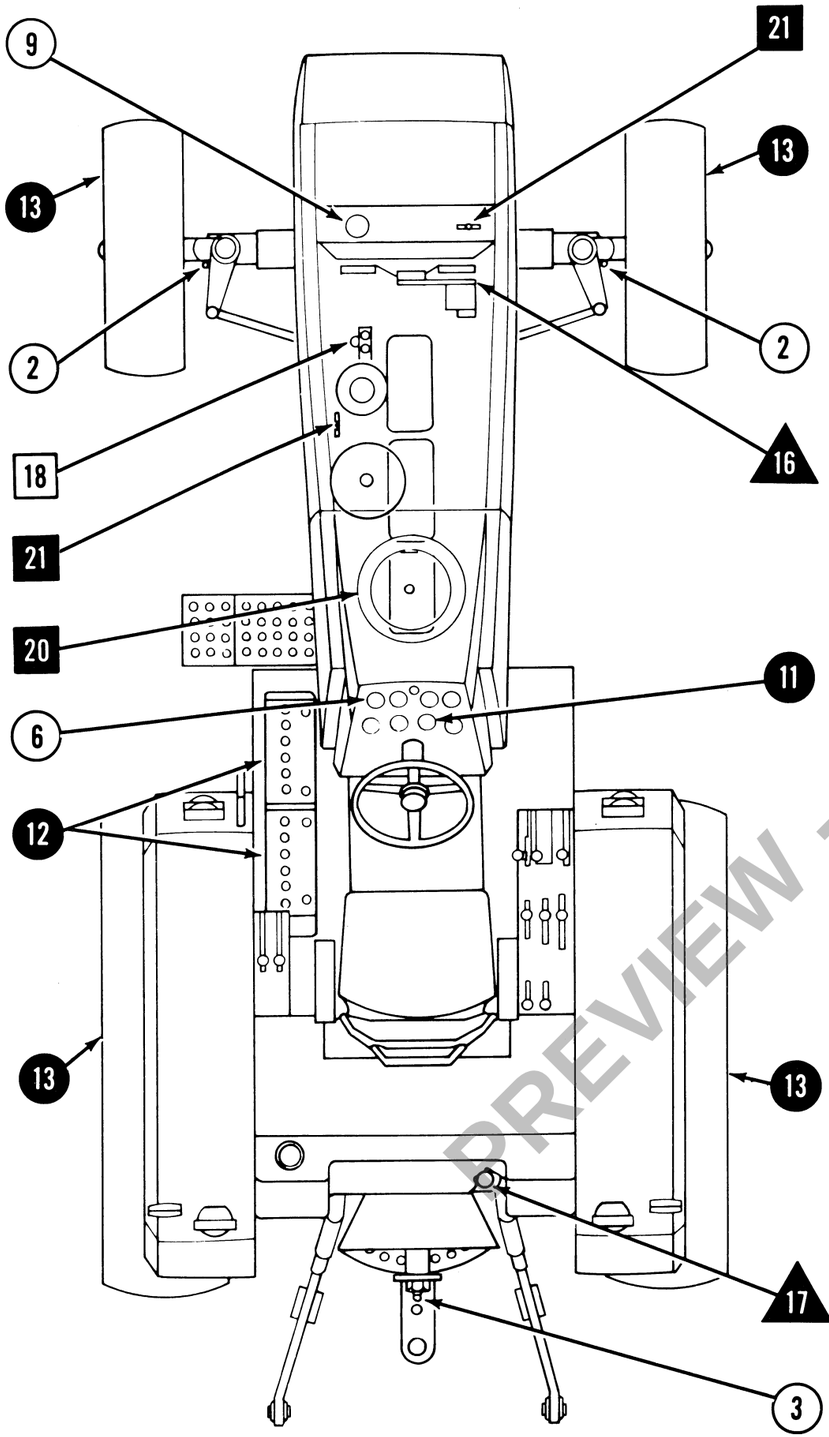
1370 TRACTOR

LUBRICATION POINTS	APPROXIMATE CAPACITIES	PREVAILING AIR TEMPERATURE RANGES		
Engine Crankcase w/o filters	15 Qts. (14.2 Liters)	DIESEL ENGINES		
		32°F. (0°C.) and Above	10°F. (-12°C.) to 55°F.(13°C.)	Use Only Below 40°F.(4°C.)
Engine Crankcase w/filters	17 Qts. (16.1 Liters)	SAE 30	SAE 20W	SAE 10W
Transmission Hyd. System	120 Qts. (113.6 Liters)	USE CASE TFD FLUID		
All Pressure Fittings	As Many Strokes As Required	Use a Good No. 2 Gun Grease (Lithium Base)		
Fuel Tank	80 Gal. (302.9 Liters)	Diesel Use a Good Grade Number 2 Diesel Fuel		
Cooling System	42 Qts. (39.7 Liters)	Use a Top Brand "High Boiling Point" Type Anti-Freeze in Cold Weather		

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REF. NO.	SERVICE POINTS	NO. OF POINTS	GREASE	DRAIN	CHECK	CLEAN	CHANGE OIL (Few Drops)	FREQUENCY
1	Front Axle Pivot	2	▒					○ 10 HOURS
2	King Pins	2	▒					
3	Drawbar Roller	1	▒					
4	Engine Crankcase Oil Level	1			▒			
5	Transmission Oil Level	1			▒			
6	Fuel Tank Level	1			▒			
7	Air Cleaner Restriction Indicator	1			▒			
8	Fuel Tank Water Trap	1		▒				
9	Radiator Coolant Level	1			▒			
10	Air Cleaner Pre-Cleaner	1			▒			
11	Transmission Filter Pressure	1			▒			
12	Battery Water Level	2			▒			● 50 HOURS
13	Tire Pressure	4			▒			
14	Engine Crankcase Oil	1		▒			▒	⬡ 100 HOURS
15	Engine Oil Filters	2		▒			▒	△ 200 HOURS
16	Fan Belt and Compressor Belt	2			▒			▲ 250 HOURS
17	Transmission - Hyd. Oil Breather	1				▒		
18	Fuel Filters	3		▒		▒	▒	□ 500 HOURS
19	Fuel Tank Fuel Filter	1		▒			▒	
20	Air Cleaner	1				▒	▒	■ 1000 HOURS
21	Cooling System	3		▒			▒	
22	Transmission - Hydraulic Oil	2		▒			▒	
23	Front Wheel Bearings	2	▒			▒	▒	

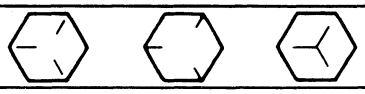
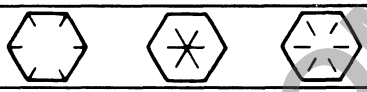
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GENERAL TORQUE SPECIFICATION TABLE (Revised 6-67)

USE THE FOLLOWING TORQUES WHEN SPECIAL TORQUES ARE NOT GIVEN

NOTE: These values apply to fasteners as received from supplier, dry, or when lubricated with normal engine oil. They do not apply if special graphited or moly-disulphide greases or other extreme pressure lubricants are used. This applies to both UNF and UNC threads.

SAE Grade No.	5		8 *	
Bolt head identification marks as per grade Note: Manufacturing Marks Will Vary				
	Torque Foot Pounds		Torque Foot Pounds	
Bolt Size	Min.	Max.	Min.	Max.
1 4"	9	11	12	15
5 16	17	20.5	24	29
3 8	35	42	45	54
7 16	54	64	70	84
1 2	80	96	110	132
9 16	110	132	160	192
5 8	150	180	220	264
3 4	270	324	380	456
7 8	400	480	600	720
1"	580	696	900	1080
1-1 8	800	880	1280	1440
1-1 4	1120	1240	1820	2000
1-3 8	1460	1680	2380	2720
1-1 2	1940	2200	3160	3560
* Thick nuts must be used with Grade 8 bolts				

Special Torques

ENGINE

Cylinder head bolts ..... 200-210 ft. lbs.

Intake and exhaust manifold stud nut ..... 25-30 ft. lbs.

Rocker arm bracket stud nut and bolt ..... 40-45 ft. lbs.

Cylinder head cover stud nut ..... 60-70 in. lbs.

Camshaft nut ..... 95-105 ft. lbs.

Connecting rod bolts ..... 95-105 ft. lbs.

Crankshaft pulley bolt ..... 100-110 ft. lbs.

Flywheel to crankshaft bolts ..... 180-190 ft. lbs.

Main bearing cap bolts ..... 145-155 ft. lbs.

Oil pump suction tube nut ..... 95-105 ft. lbs.

Oil pan capscrews ..... 35-40 ft. lbs.

Oil pan long bolts (rear) ..... 15-20 ft. lbs.

Oil pan drain plug ..... 18-20 ft. lbs.

Balancer mounting bolts ..... 110 to 132 ft. lbs.

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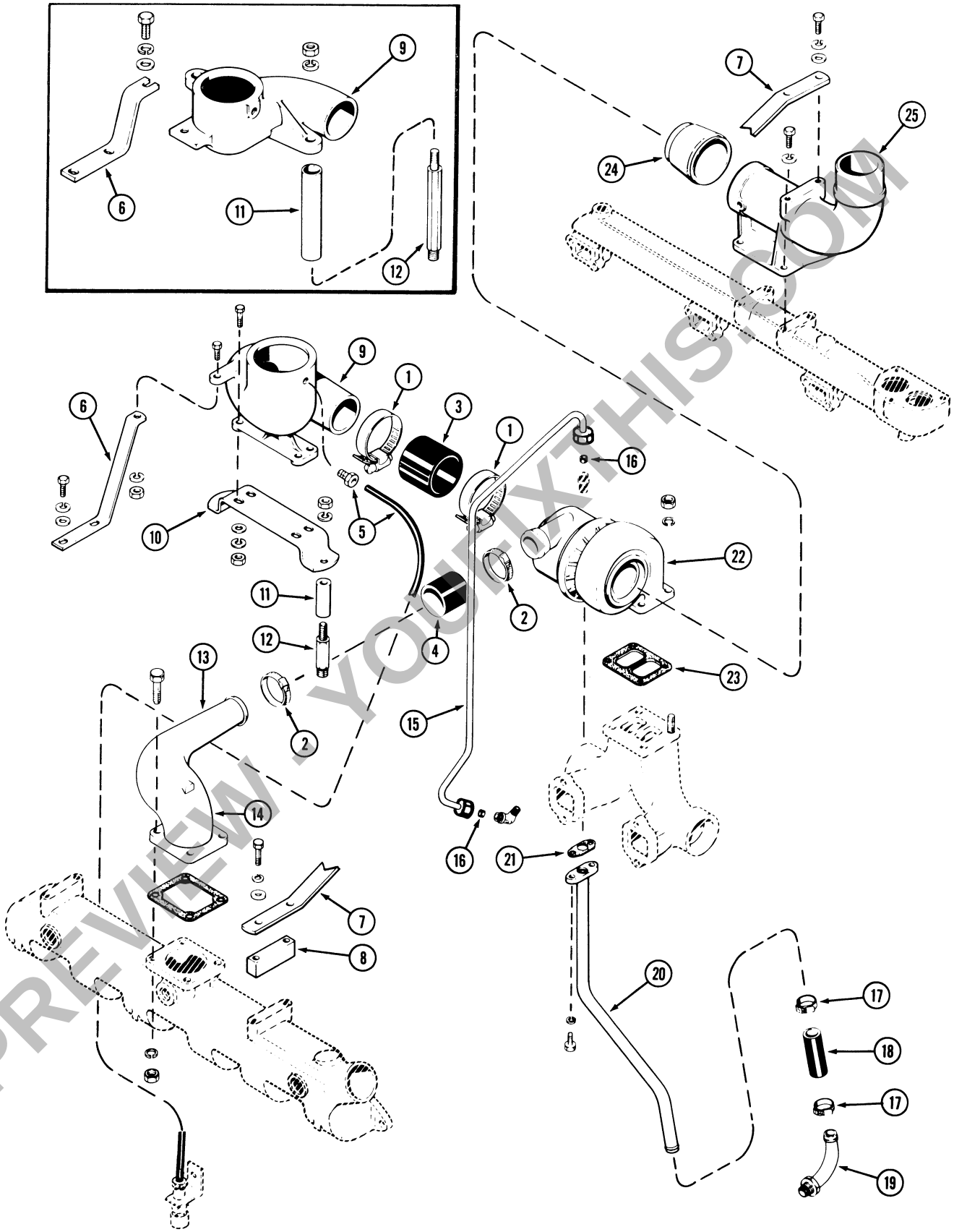


Figure 4

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TURBO CHARGER SYSTEM

451BDT Engine

(Refer to Figure 5)

Installation

1. Install the jackscrews (12) with Bakerseal applied to the pipe thread and tighten. Install the spacers (11), mounting bracket (10). Torque the retaining nuts 80 to 96 ft. lbs.

2. Install the air cleaner support elbow (9) and brace (6). Torque the retaining bolts and nuts 35 to 42 ft. lbs. Connect the air restriction indicator hose (5) to the support elbow (9).

3. Install the intake elbow (13) with a new gasket (14) and torque the nuts 35 to 42 ft. lbs.

4. Install the air cleaner assembly and torque the retaining nut 54 to 64 ft. lbs. **NOTE:** Install air cleaner with the Vacuator on the starter side of the engine, if equipped.

5. Install the turbocharger (22) and a new gasket (23) with retaining nuts finger tight. Install the exhaust elbow (25), coupler (24), spacer (8), brace (7) with retaining bolts finger tight.

6. IMPORTANT Align the turbocharger coupler and exhaust elbow so that the coupler is free to rotate 360^0. Torque the exhaust elbow and brace retaining bolts and the turbocharger retaining nuts 35 to 42 ft. lbs. **NOTE** Recheck that the coupler (24) rotates 360^0, without binding.

7. Install the turbo oil drain tube (20), new gasket (21) with retaining bolts and torque 35 to 42 ft. lbs. Install the drain tube elbow (19) with the hose end in a vertical position. Install new hose clamps (17) and hose (18). Position the clamps and tighten securely.

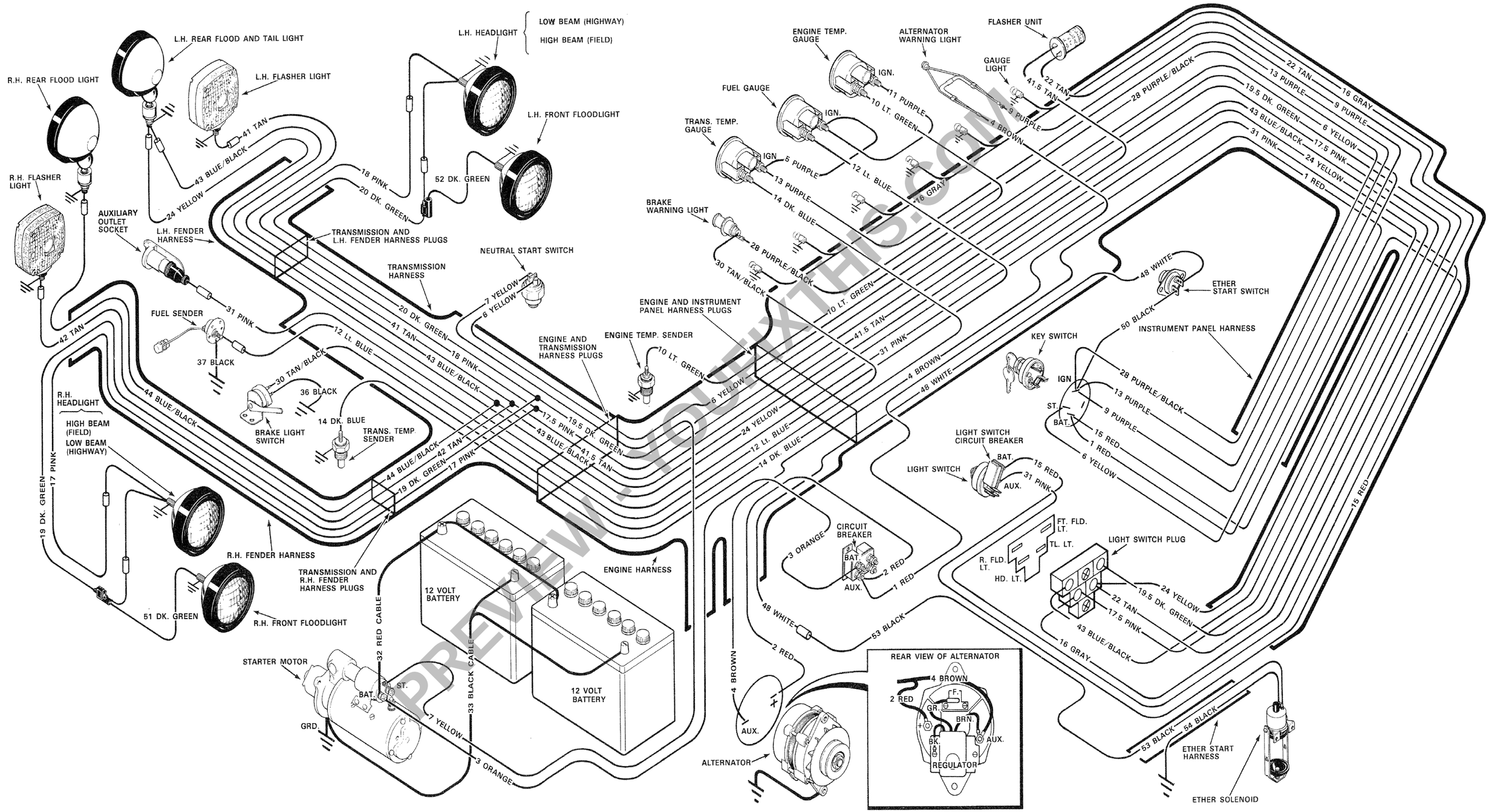
8. Install the turbo oil supply line (15) with new sleeves (16).

9. Install new hose clamps (2) with hose (4), new hose clamps (1) with hose (3). Position the clamps and tighten securely.

10. **IMPORTANT:** The turbo charger must be primed prior to starting the engine. Pull the engine stop control out to the stop position. Turn the key switch to start and crank the engine until the engine oil pressure gauge reaches the green zone or a maximum of 30 seconds. Wait for one minute - then push the stop control all the way in. Start the engine and run for 5 minutes at 1000 RPM. This will assure that adequate lubrication has reached the turbocharger bearings.

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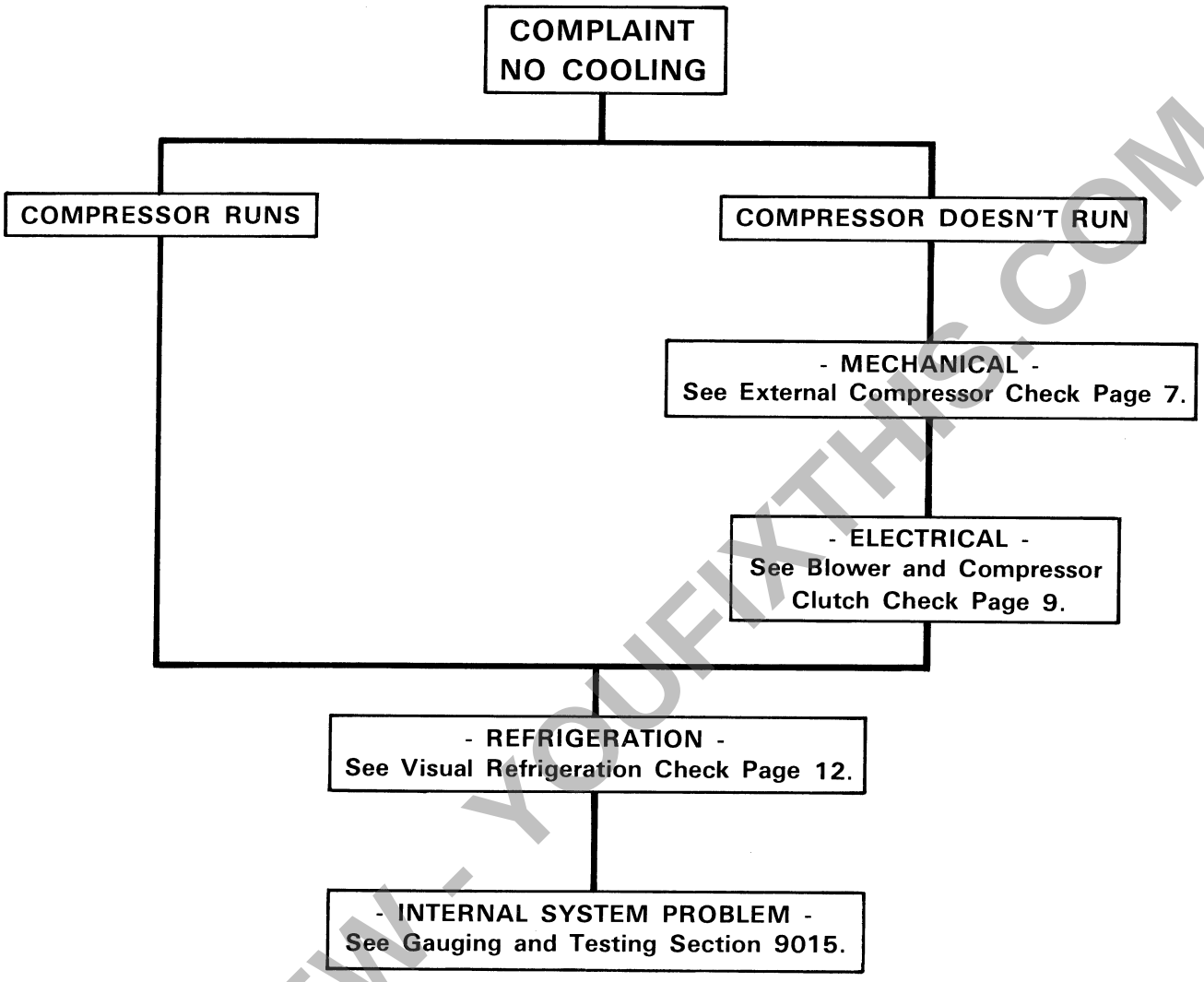


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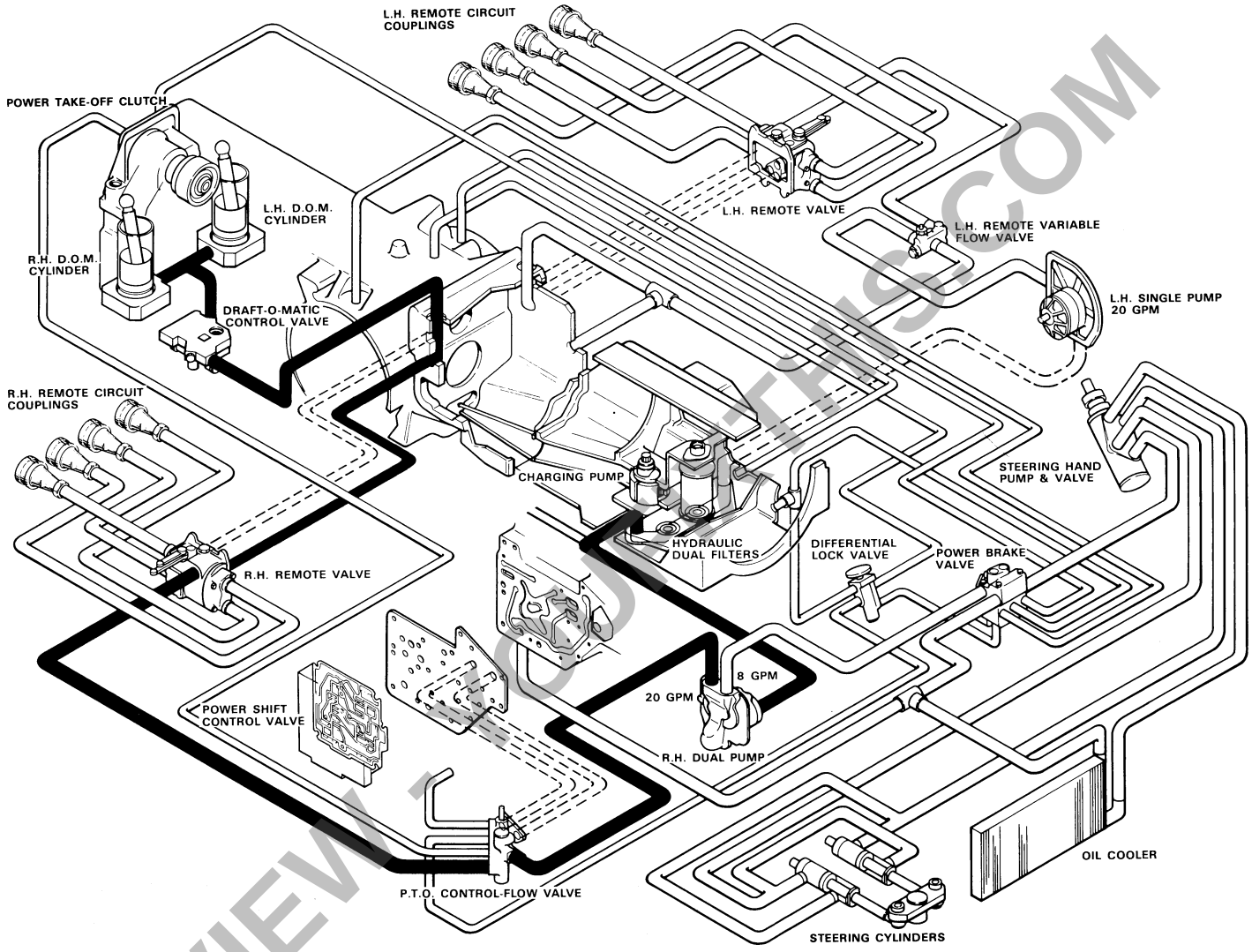
TROUBLE SHOOTING CUSTOMER COMPLAINTS



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 OR DEATH.

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REFER TO SECTION 142 FOR COLOR FLOW OF DRAFT-O-MATIC CIRCUIT.

Figure 1

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Piston and Connecting Rods

Rings per piston 3
Number of compression rings 2
Number of oil rings 1
Type of pins ..... Full Floating
Type of bearings ..... Replaceable precision, steel back, aluminum or copper-lead alloy liners

Main Bearings

Number of bearings 7
Type of bearings ..... Replaceable precision, steel back, aluminum or copper-lead alloy liners

Engine Lubricating System

Oil pressure ..... 45 to 60 lbs. with engine warm and operating at rated engine speed
Type of system ..... Pressure and spray circulation
Oil pump ..... Gear type
Oil filter ..... Full flow spin on type
Oil capacity ..... With filter, 17 U.S. Quarts (16.1 liters)
Without filter, 15 U.S. Quarts (14.2 liters)

Fuel System

Fuel injection pump ..... Robert Bosch, Type PES (multiple plunger)
Pump timing ..... 30 Degrees Before Top Dead Center (Port Closing)
Fuel injectors ..... Pencil type (opening pressure 3200 PSI)
Fuel transfer pump ..... Plunger type, Integral part of injection pump
Governor ..... Variable speed, fly-weight centrifugal type,
Integral part of injection pump.
1st stage fuel filter ..... Full flow spin on type
2nd stage fuel filter ..... Full flow spin on type
Fuel tank water trap and drain ..... Located in base of fuel tank
Fuel tank capacity ..... 80 U.S. Gallons (302.8 liters)
Fuel level gauge ..... Electric, located on instrument panel
Hand primer pump ..... Located on top of fuel transfer pump
Fuel tank fuel filter ..... Located in fuel shut-off valve in base of fuel tank
Preliminary fuel filter ..... Located at the bottom of the fuel transfer pump

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REFACING INTAKE AND EXHAUST VALVES

Before refacing the valves, they should be wire brushed, cleaned and inspected. A 44° angle is the correct valve face grinding angle. Set the refacing machine protractor at this angle. Be sure the chuck of the machine is clean before installing the valve. Dress the grinding wheel before starting to reface the valves. Take only light cuts as the valve is refaced. The last cut must be very fine so the valve face will have a polished finish.

IMPORTANT - Replace any valve that has a thin edge or margin, Figure 24. If the margin on the ground valve is less than half the margin on a new valve, replace the valve.

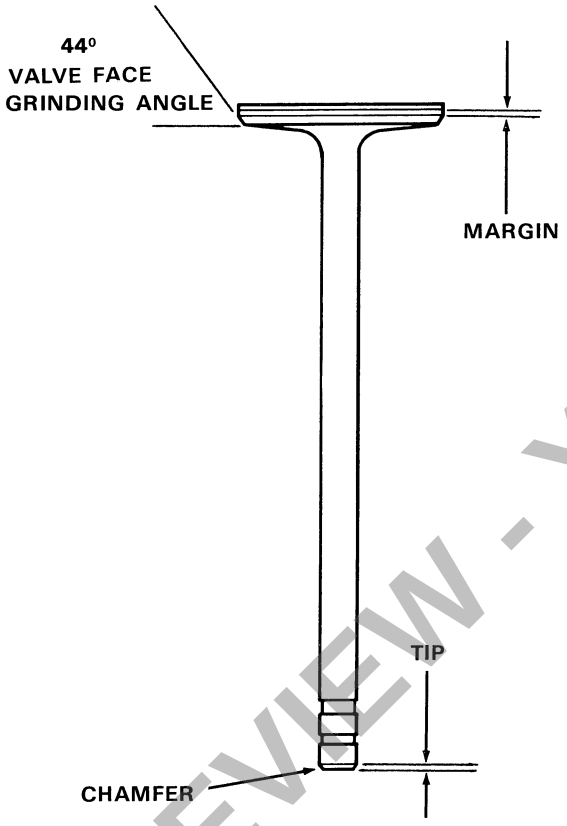


Figure 24

The tip end of the valve should be checked for roughness or wear. Usually this can be removed with some very light cuts against the side of the grinding wheel and will square up the end. Never grind off the valve stem end beyond the chamfer.

Correct refacing of intake and exhaust valves and valve seats will provide a 1° interference angle. This angle is important since it aids in cutting carbon and helps seat the valves.

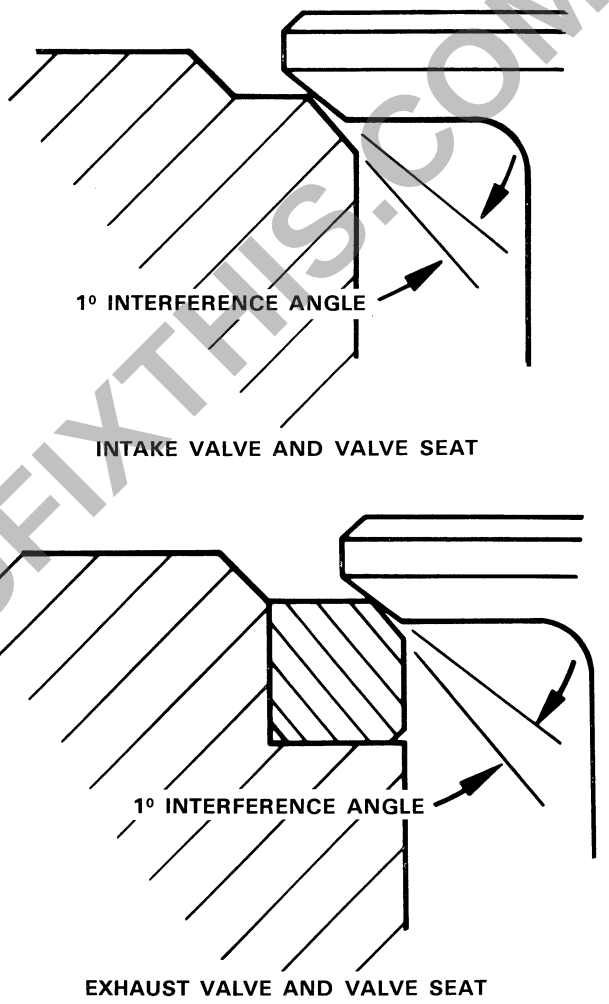


Figure 25

When the top edge of the contact area is too high or low on the valve face, the seat contact area must be moved. This is done by using the narrowing stones. Refer to Page 21. The contact area width should never exceed the specified dimensions.

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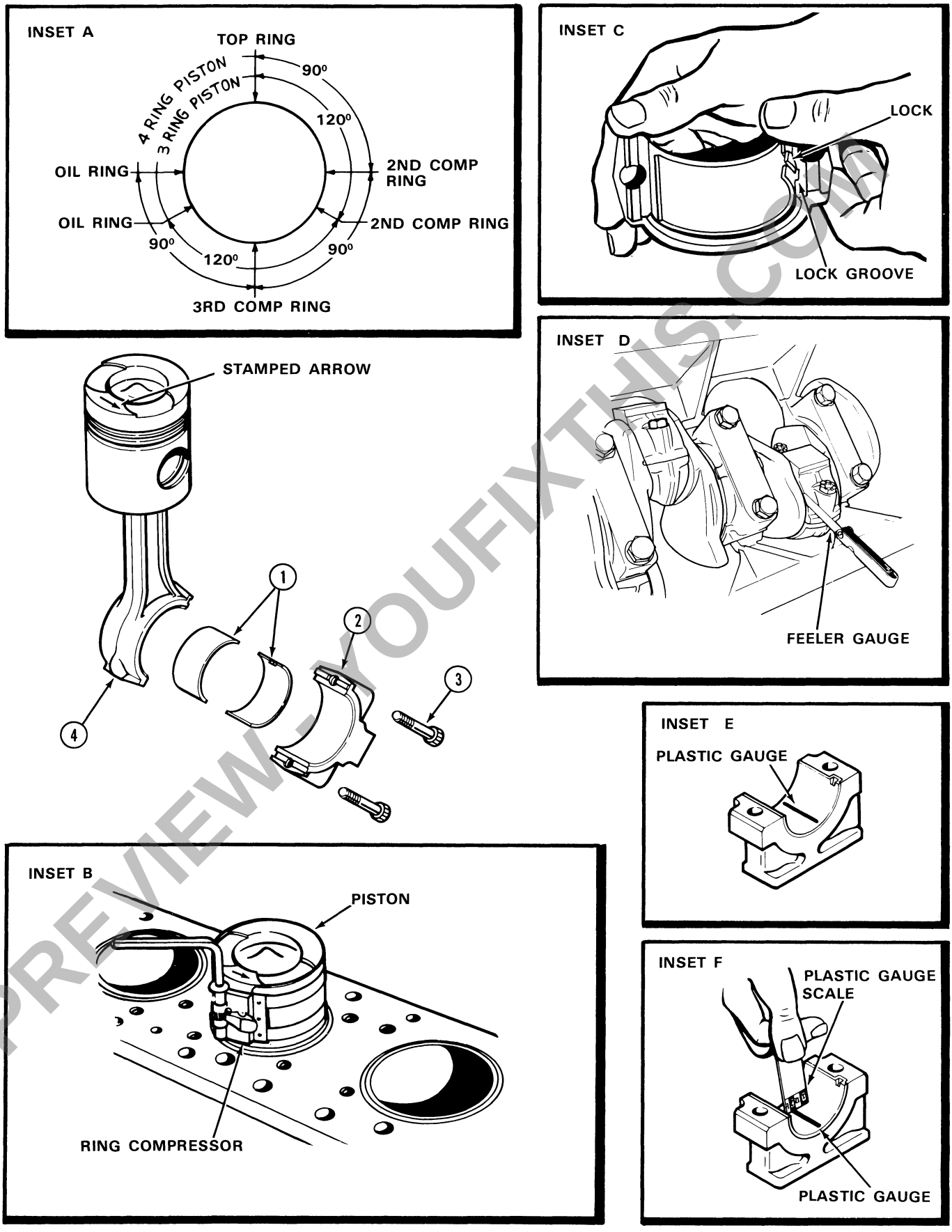


Figure 22

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DUAL ENGINE OIL FILTERS AND HEAT EXCHANGER (Cont'd)

(Refer to Figure 5)

Assembly and Installation

1. Install the relief valve (9) and the relief valve spring (8) into the filter manifold (2). Coat I.D. of bore with Gasola or equivalent and press a new plug (7) into the filter manifold as shown in Inset B.

2. If it was necessary to remove plug (10), refer to Inset C for installation. Install the filter manifold (2) with mounting bolts (6) and new "O" ring (5). Torque the mounting bolts 80 to 96 ft. lbs.

3. Apply a coat of clean oil to the gasket of the new Case filters. Install the filters by turning in a clockwise direction, until gasket contact is made, hand tighten 3/8 of a turn. Loosen the filter approximately one full turn. Retighten, turning clockwise until gasket contact is made. Hand tighten 3/8 to 1/2 of a turn to obtain the proper seal. **NOTE:** Install the oil pan drain plug with gasket and torque 29 to 31 ft. lbs. Insert tube (18) into connector (17). Do not tighten connector at this time. Using new gasket (16) connect tube (15) to engine block with bolts & lockwashers (14). Torque bolts 80 to 96 ft. lbs. Install hoses (12), and clamps (11) on the tubes (15 & 18) and the heat exchanger (13). Attach heat exchanger to filter manifold with nuts and lockwashers (4) using new gaskets (6). After correct position of heat exchanger to filter manifold has been established, tighten connector (17) and clamps (11).

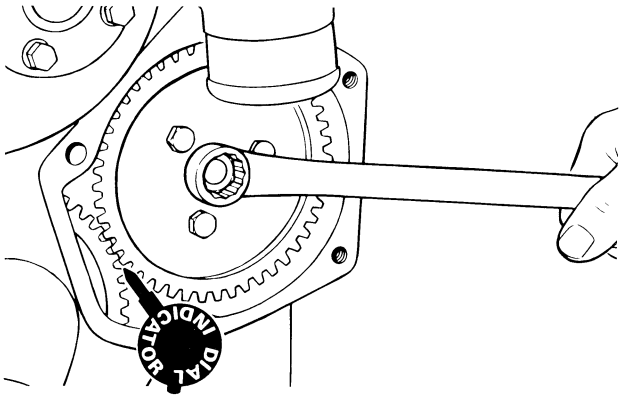
4. Add new engine oil to the crankcase. On 1270 and 1370 Tractors, add 22 Quarts of oil and 17 Quarts of oil for 1175 Tractors. Close the drain valves on the engine block, radiator and heat exchanger. Refill cooling system.

5. Make certain the tractor is on level ground to assure accurate level check. Start the engine and check for leaks. Shut the engine off and let stand for several minutes to allow the oil to drain back to the oil pan. Check the oil level with the dipstick. Add oil if necessary. **IMPORTANT:** Pull the stop control all the way out. Turn the key switch to start and crank the engine until the engine oil pressure gauge pointer reaches the green zone or a maximum of 30 seconds. Wait one minute, push the stop control in. Start the engine and run 5 minutes at approximately 1000 RPM. This will assure that adequate lubrication has reached the turbocharger bearings.

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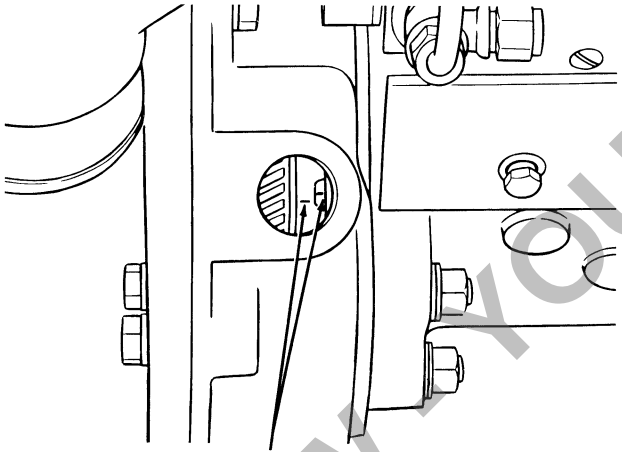
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STEP 28



CHECK PUMP GEAR TO IDLER GEAR BACKLASH USING DIAL INDICATOR. MAXIMUM BACKLASH .012 INCH

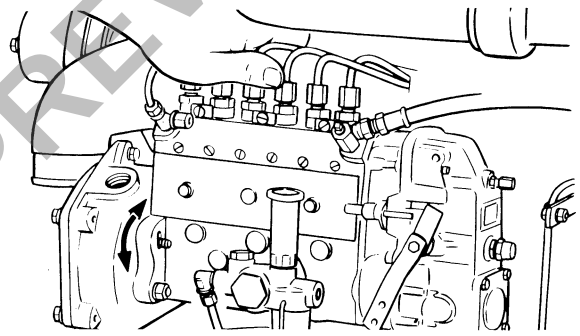
STEP 29



TIMING MARKS NOT ALIGNED

NOTE: IF TIMING MARKS ARE NOT ALIGNED , PROCEED TO NEXT STEP. IF MARKS ARE ALIGNED PROCEED TO STEP 31.

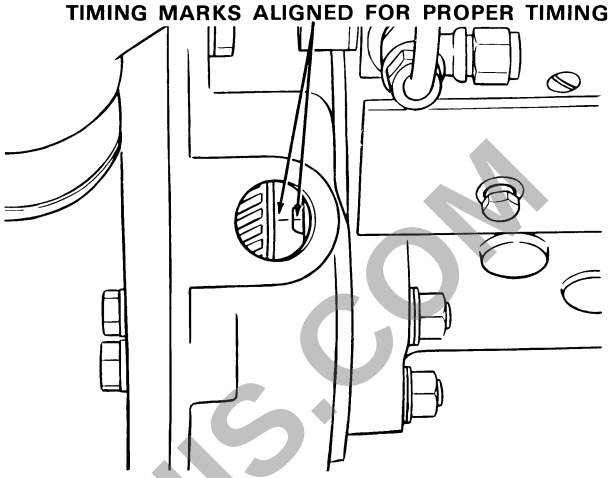
STEP 30



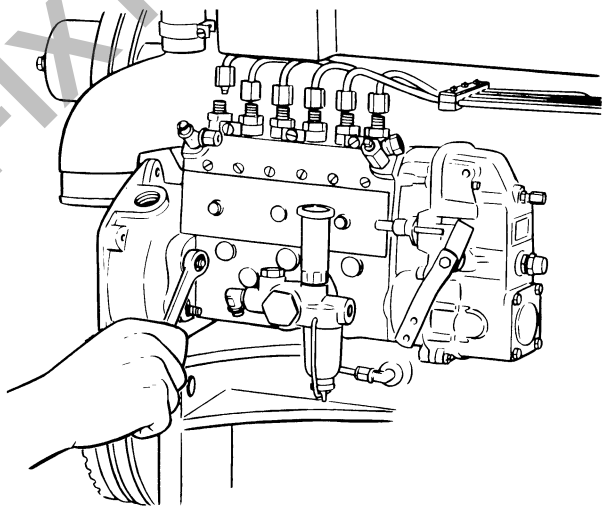
LOOSEN PUMP MOUNTING NUTS. MOVE PUMP TOWARD OR AWAY FROM ENGINE UNTIL TIMING MARKS ARE ALIGNED.

STEP 31

TIMING MARKS ALIGNED FOR PROPER TIMING.

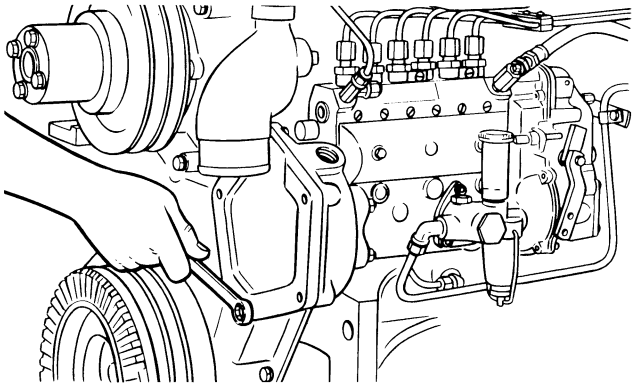


STEP 32



TORQUE PUMP MOUNTING NUTS 35 TO 42 FT. LBS.

STEP 33



INSTALL GEAR COVER AND NEW GASKET. TORQUE 3/8 IN. BOLTS 35 TO 42 FT. LBS. TORQUE 5/16 IN. BOLTS 17 TO 20 FT. LBS.

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CONTROL VALVE

(Refer to Figure 7)

To facilitate assembly or disassembly of control valve, the valve may be held in a vise. **NOTE:** Before assembling valve, inspect all machined surfaces for nicks, burrs and excessive wear. Replace all parts having excessive wear or deep grooves. Replace all "O" rings and seal rings during assembly.

1. Control valve spool.
2. Valve spool end. Install into valve body and thread into valve spool (1).
3. Spring retaining washer (2).
4. Spool retaining snap ring (2).
5. Spool return spring.

Free Length	6.36″	Wire Dia.	.090″
Spring O.D.	1.16″	Compressed to	4.05″
No. of Coils	14	Spring Rate	13.5-16.5 lbs.

6. Flow control spring.

Free Length	1.391″	Wire Dia.	.055″
Spring O.D.	.563″	Compressed to	.875″
No. of Coils	8	Spring Rate	7.2 - 8.8 lbs.

7. Flow control piston. Install with metering hole facing inside of valve body.
8. Check valve plug "O" ring. Install onto valve plug (9).
9. Check valve plug.
10. Throttle spool "O" ring. Install onto spool (11).
11. Throttle spool. See Inset A.
12. Throttle spool retaining roll pin. See Inset A.
13. Load check ball seat. See Inset B.
14. Load check ball (7/16″ dia.). See Inset B.
15. Check valve pressure spring. See Inset B.

Free Length	1.250″	Wire Dia.	.0475″
Spring O.D.	.623″	Compressed to	.750″
No. of Coils	7	Spring Rate	7.7-9.4 lbs.

16. Check valve plug "O" ring. Install onto valve plug (17).
17. Check valve plug. See Inset B.
19. Internal snap ring. See Inset B.
19. Lowering piston ball (1/2″ dia.).
20. Lock nut (#10 N.F. hex.). Install onto screw (21).
21. Set screw (#10 x 1-1/4″ N.F. slotted headless). Refer to Page 28 for adjustment.
22. Lowering poppet piston.

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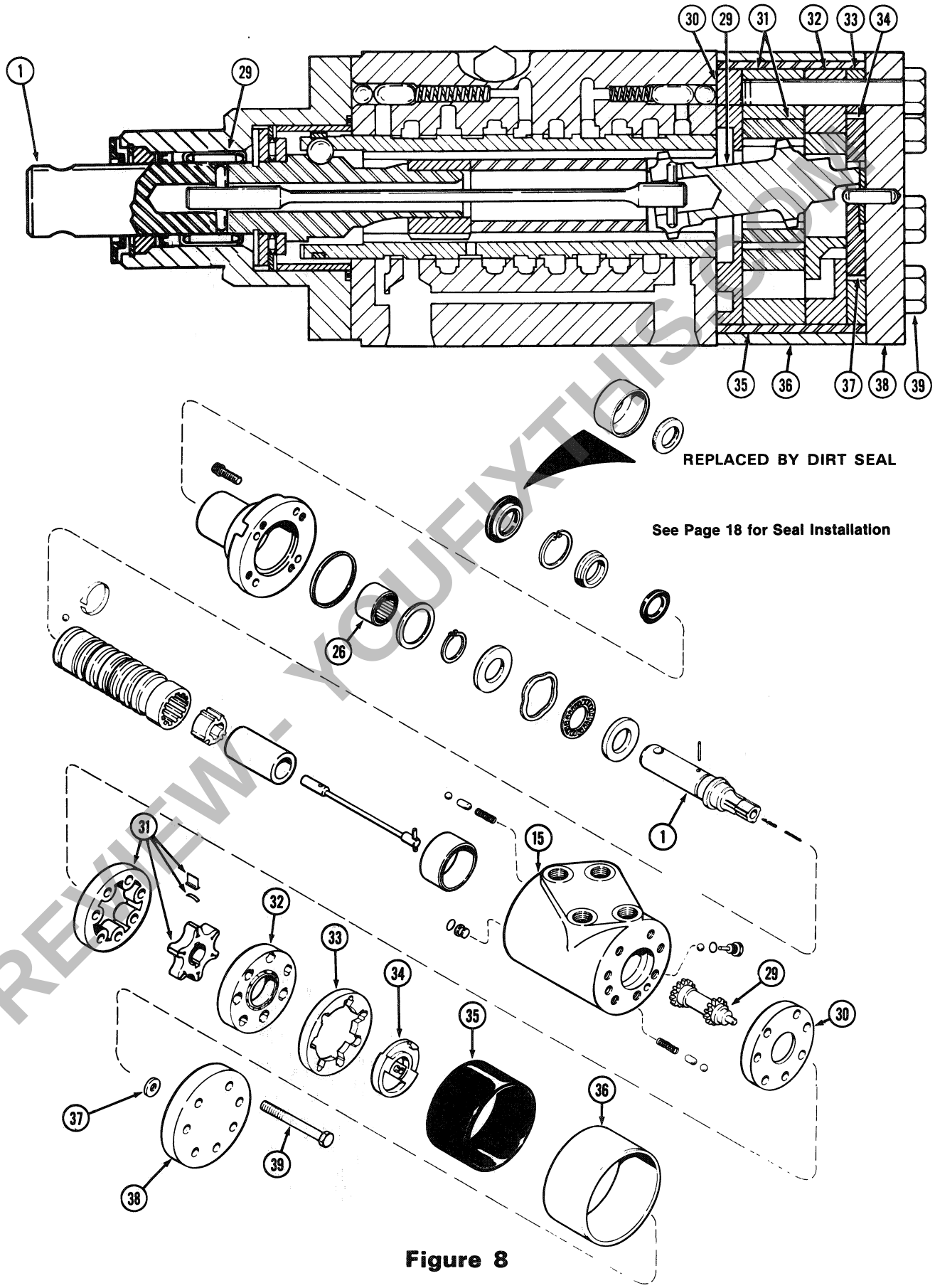


Figure 8

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AXLE HOUSING AND PLANETARY REMOVAL

(Refer to Figure 2)

Drain the transmission oil.

In order to remove other rear axles planetaries or hydraulic brakes, jack up the rear of the tractor and support both sides of the tractor with jack stands under the draft arm mounting brackets.

Remove one or both nubs, wheels and tires from the axle shafts.

Remove two opposite axle housing mounting bolts and install two 5/8 NC x 5" studs (cut off bolts).

Using an overhead lift, wrap a chain around the axle housing and remove the rest of the mounting bolts.

Work the axle housing out from the transmission case, keeping it resting on the removal studs.

IMPORTANT: The axle housing assembly is much heavier at the planetary end then the axle end. Some way of counter-balancing this weight must be used. A counter-balancer handle can be used. It can be made from 1″ x 4′ pipe, welded to a short piece of steel pipe, 4″ I.D. x 5″ long.

By sliding this tool onto the axle and apply downward pressure on the handle, the axle housing can be kept in balance while the axle housing is being removed and installed.

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SPECIFIC GRAVITY CHECK
(Refer to Figures 2 and 3)

A hydrometer is used to test the specific gravity (weight) of the battery electrolyte. The weight of the electrolyte indicates the approximate state of charge of the battery.

NOTE: If water has been recently added to the battery, hydrometer readings will be erroneous.

Hydrometers are calibrated to give the true reading when the electrolyte temperature is 80°F.

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.

Using hydrometer, remove enough electrolyte from one cell to allow float to float freely without touching top or bottom. Hold vertical to prevent float touching sides of barrel, Figure 2.

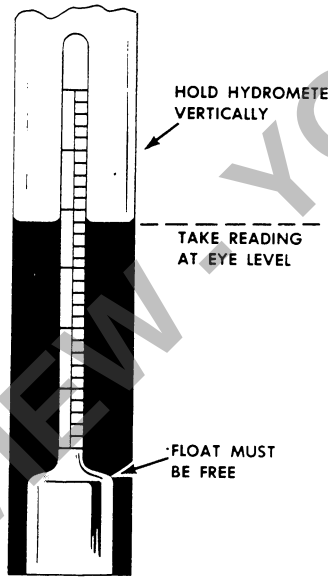


Figure 2

Observe float reading at eye level. Record result.

If the electrolyte temperature is different, a correction must be made to the hydrometer reading. For this reason, electrolyte temperature must be known.

Note electrolyte temperature. Refer to Figure 3. If battery temperature is not at 80°F., add 4 points (.004) specific gravity to float reading for each 10° above 80°F., or subtract 4 points (.004) specific gravity from float reading for each 10° below 80°F.

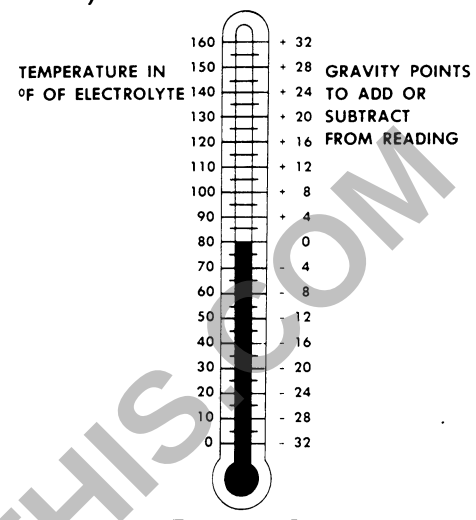


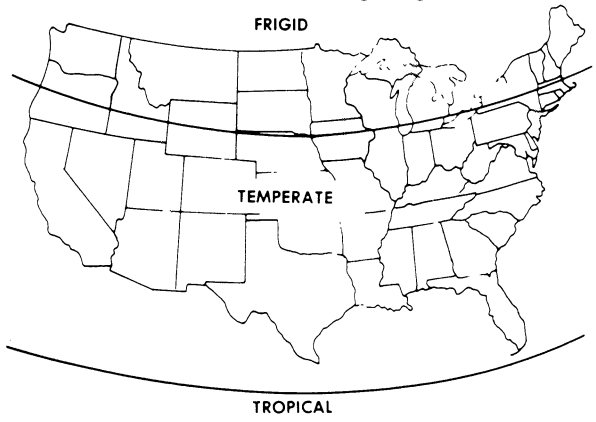
Figure 3

Repeat test on all remaining cells and record test results.

Determine state of charge by comparing final float readings to Specific Gravity Table below.

STATE of CHARGE	SPECIFIC GRAVITY RANGE FOR CLIMATE ZONE (READINGS CORRECTED TO 80° F.)		
	FRIGID	TEMPERATE	TROPICAL
100%	1.270	1.250	1.225
75%	1.230	1.215	1.180
50%	1.180	1.170	1.135
25%	1.130	1.120	1.090
Discharged	1.080	1.070	1.045

CLIMATE ZONES



If the readings are below 1.230 and within 30 points, the battery is probably satisfactory. Recharge and make the Capacity Test.

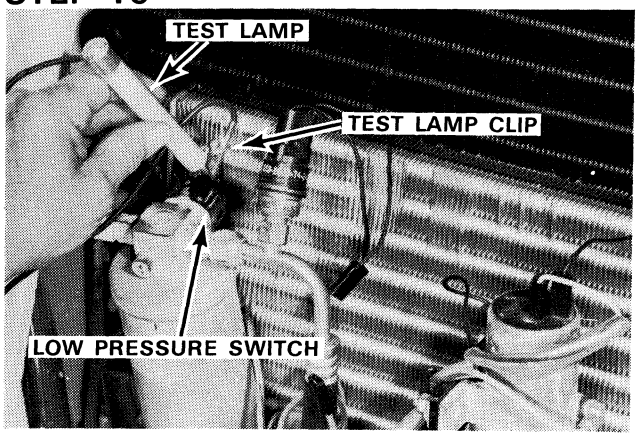
If cell readings are near full charge of 1.260 and within 30 points, make the Capacity Test to locate possible internal defects.

If cell readings are over 1.260, the battery is overcharged. Check the regulator.

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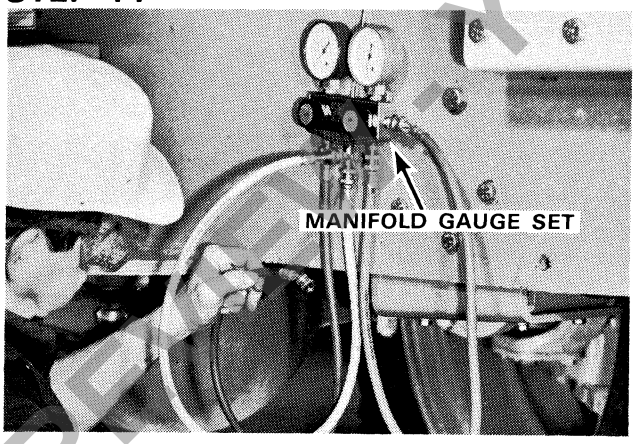
STEP 10



Check the continuity of the low pressure switch. *NOTE:* On two wheel drive tractors the low pressure switch is not part of the receiver-drier, check the switch and boot following the same test procedure outlined for the high pressure switch.

IMPORTANT: If continuity can not be obtained through the low pressure switch, it does not always indicate an inoperative switch. Since system pressure is required to close switch, it will be necessary to determine if there is an adequate charge in the system.

STEP 11

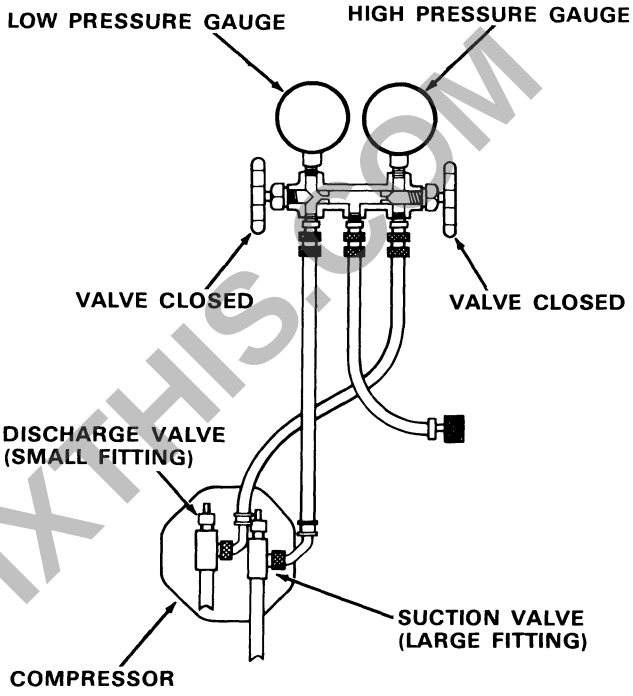


Install a manifold gauge set on the suction and discharge compressor valves.

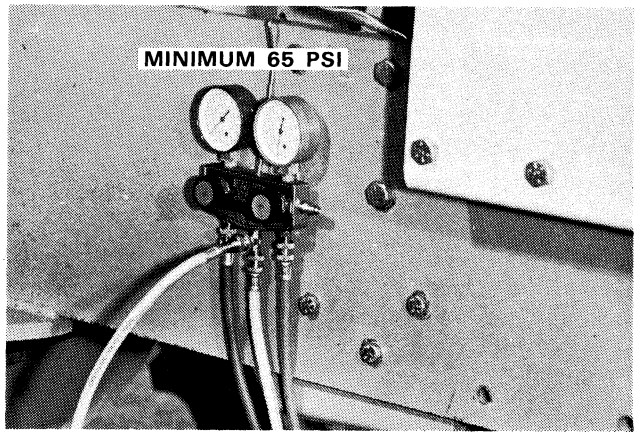
WARNING *Always wear safety goggles when working with liquid refrigerant. Liquid refrigerant in your eyes could cause blindness.*

STEP 11 (Cont.)

CAUTION *Never touch liquid refrigerant, since even a drop on your skin will cause severe and painful frostbite.*



STEP 12



System pressure must be a minimum of 65 PSI when checking low pressure switch continuity. *NOTE:* Due to the temperature-pressure relationship of refrigerant, the ambient temperature must be above 65°-75°F. before system pressure will reach 65 PSI.

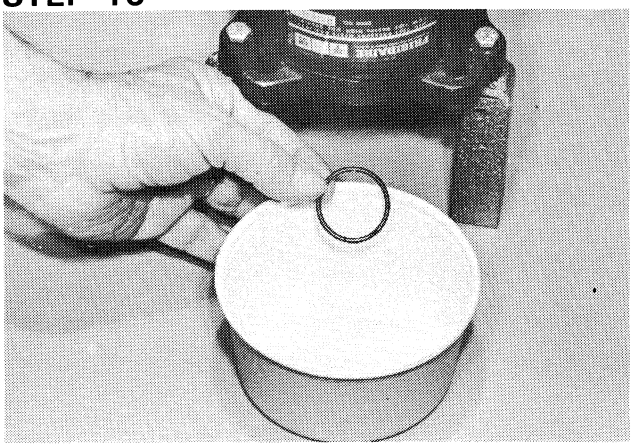
A. Pressure below 65 PSI - a partial refrigerant charge must be added and the low pressure switch retested.

B. Pressure above 65 PSI - low pressure switch defective and it must be replaced.

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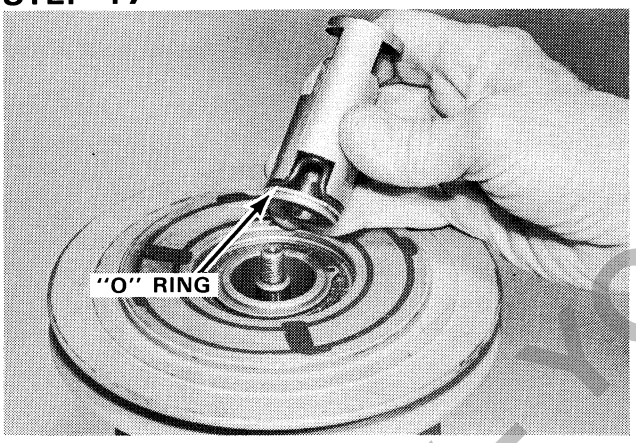
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STEP 16



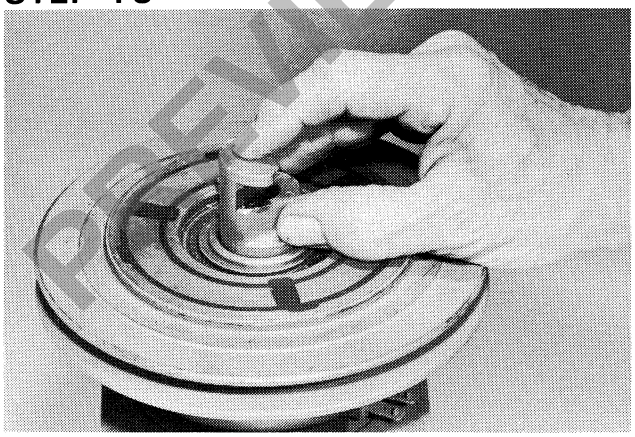
Lubricate new ''O'' ring with clean refrigeration oil.

STEP 17



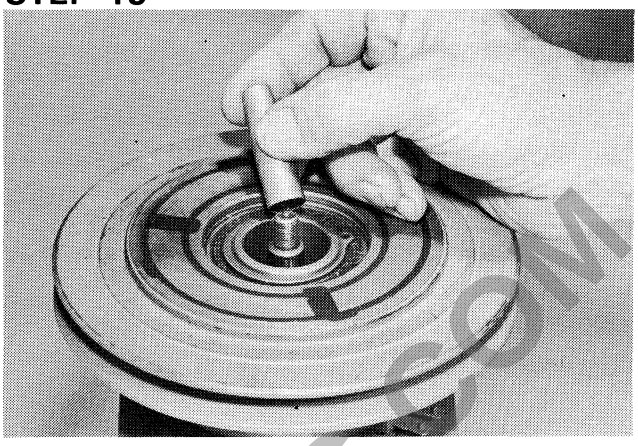
Place ''O'' ring on installation tool (ND-10509) as shown.

STEP 18



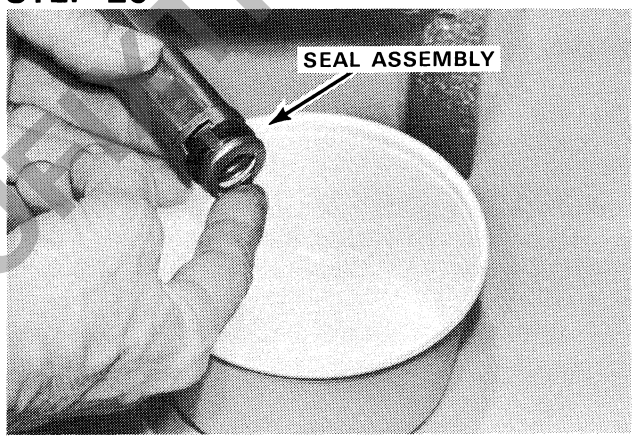
Insert tool in compressor neck until it bottoms. Raise tool slide approximately 1'' and then lower, forcing ''O'' ring into neck groove, rotate tool in both directions to seat ''O'' ring.

STEP 19



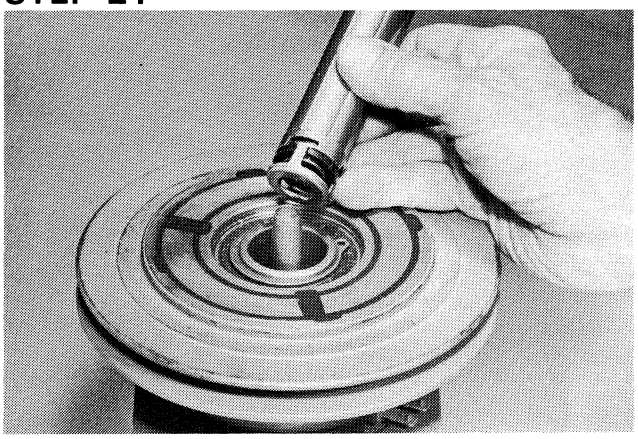
Place shaft seal protector (ND-10514) over compressor shaft.

STEP 20



Carefully mount new seal on seal installer (ND-10503). Coat seal face and internal ''O'' ring with clean refrigerant oil.

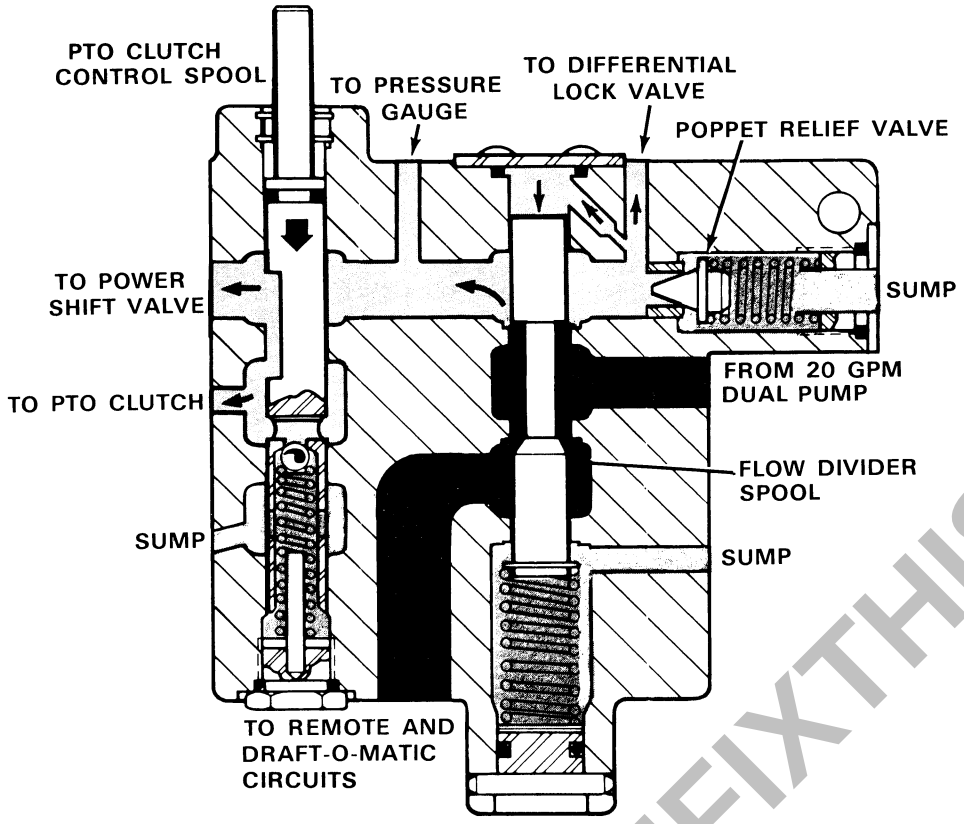
STEP 21



Insert shaft seal, rotating seal assembly clockwise until it has bottomed. Disengage tool by pressing downward and twisting tool counterclockwise.

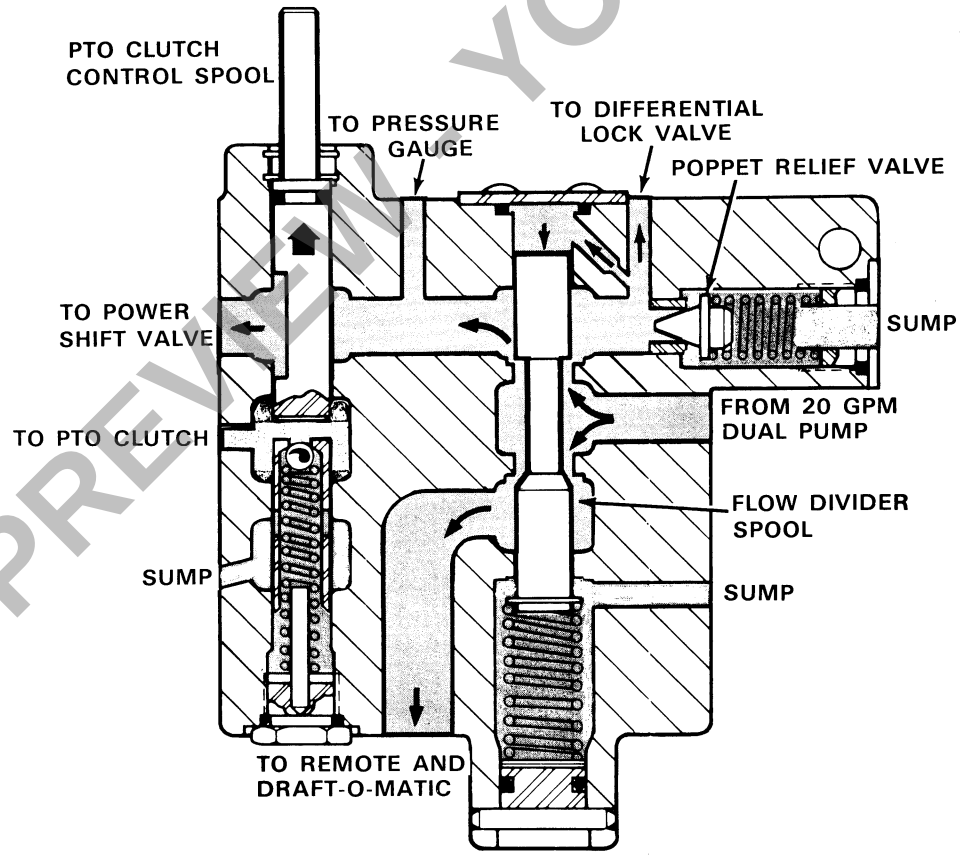
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PTO ENGAGED

Figure 1



PTO DISENGAGED

CLUTCH PRESSURE

HIGH PRESSURE

RETURN TO SUMP

STATIC

Figure 2

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PTO CLUTCH ENGAGED

PTO CLUTCH LUBRICATION - The clutch lube oil is supplied from the charging pump and is directed to the rear cover of the PTO housing. The oil then enters the PTO housing thru the lube cover and flows thru the center of the PTO clutch-piston carrier shaft to the cross drilled holes in the end of the input shaft, which allows the oil to flow into the clutch hub and the clutch plates. The excess oil is returned to sump thru the holes provided in the clutch carrier.

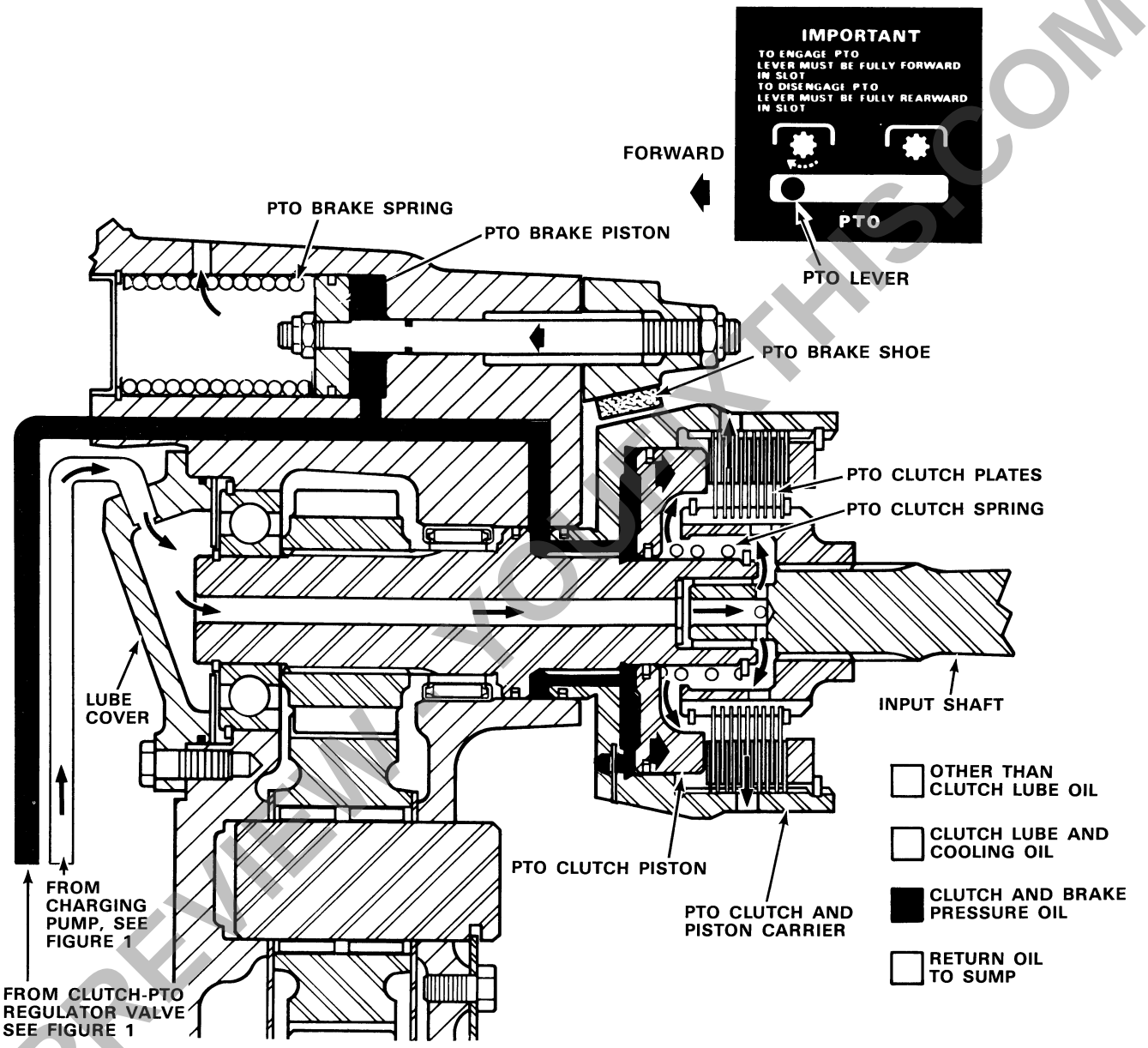


Figure 2

PTO CLUTCH ENGAGED - When the PTO control spool is moved to the engaged position, oil flows from the PTO control spool in the clutch-PTO regulator valve body to the PTO housing, the PTO clutch and the PTO brake cylinder. The pressurized oil moves the PTO brake piston rearward, releasing the PTO brake. The pressurized oil, also moves the PTO clutch piston forward and locks up the PTO clutch plates. This starts the PTO clutch output shaft turning.

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