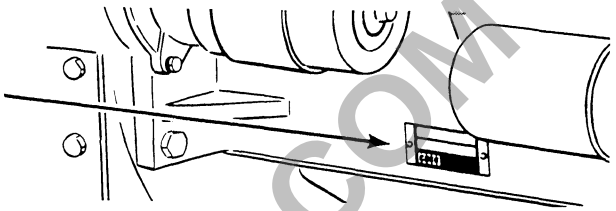
Section 1010

GENERAL ENGINE SPECIFICATIONS 350 CRAWLER

THE MODEL AND ENGINE SERIAL NUMBER IS STAMPED ON A PLATE LOCATED ON THE RIGHT SIDE OF THE ENGINE BELOW THE CRANKING MOTOR.



188 DIESEL ENGINES

General

Type ..... Case Open Chamber, 4 Cylinder, 4 Stroke Cycle, Valve-in-Head
Firing Order 1-3-4-2
Bore ..... 3-13/16 Inches (96.8mm)
Stroke ..... 4-1/8 Inches (104.8mm)
Piston Displacement ..... 188 Cubic In. (3 080.8 cm^3)
Compression Ratio ..... 17.5 to 1
No Load Governed Speed ..... 2150 RPM
Rated Engine Speed ..... 2000 RPM
Engine Idling Speed ..... 700 to 750 RPM
*Valve Tappet Clearance (Exhaust) ..... (Hot and Cold) .014 Inch (0.356mm)
(Intake) ..... (Hot and Cold) .012 Inch (0.305mm)
*Hot Settings Are Made After the Engine Has Operated At Thermostat Controlled Temperature For At Least Fifteen Minutes.

Piston and Connecting Rods

Rings per Piston 3
Number of Compression Rings 2
Number of Oil Rings 1
Type Pins ..... Full Floating Type
Tpye Bearing ..... Replaceable Precision, Steel Back, Copper-Lead Alloy Liners

Main Bearings

Number of Bearings 5
Type Bearings ..... Replaceable Precision Steel Back, Copper-Lead Alloy Liners

Engine Lubricating System

Crankcase Capacity (Without Filter) ..... 6 U.S. Quarts (5.7 Litres)
(With Filter Change) ..... 7 U.S. Quarts (6.6 Litres)
Oil Pressure ..... 50 to 70 PSI (345 to 483 kPa) Eng. Warm and Operating at Rated Eng. Speed
Type System ..... Pressure and Spray Circulation
Oil Pump ..... Gear Type
Oil Filter ..... Full Flow Spin on Type

Fuel System

Fuel Injection Pump ..... Roosa-Master
Pump Timing ..... 8 Degrees Before Top Dead Center
Fuel Injectors (Prior Eng. SN 2726393) ..... Pencil Type (Opening Press. 2800 PSI) (19 306 kPa)
Fuel Injectors (Start'g W/Eng. SN 2726393) .. Pencil Type (Opening Press. 3200 PSI) (22 064 kPa)
Fuel Transfer Pump ..... Vane Type, Integral Part of Injection Pump
Governor ..... Variable Speed, Fly-Weight Centrifugal Type, Integral Part of Injection Pump
Fuel Filters (Prior Eng. SN 2718490) ..... Replaceable Element Type
Fuel Filters (Starting W/Eng. SN 2718490) ..... Full Flow Spin on Type

Rac 9-77885
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RUN-IN-INSTRUCTIONS

Engine Lubrication

When the engine rebuild is complete, fill the engine crankcase with Case HDM oil and install new engine oil filter. **NOTE:** If Case HDM oil is not used, use only a Series 3 DS or CD Service Classification oil that has the proper viscosity rating for prevailing air temperature. Refer to vehicle Operators Manual.

After the first 20 hours of operation, change the engine oil while the engine is hot and replace the the engine oil filter. DO NOT DRAIN OIL UNTIL THE ENGINE HAS BEEN OPERATED 20 HOURS.

Change the engine oil and filter at the recommended intervals thereafter as outlined in the Operator's Manual.

Break-In Procedure for Rebuilt Engines (With a Dynamometer)

The following procedure must be implemented when using a PTO dynamometer to break-in the engine. The dynamometer will insure control of the engine load at each speed and will eliminate over stressing new parts during break-in.

During the break-in, continually check the oil pressure, coolant level, and coolant temperature.

STEP	TIME	ENGINE SPEED	DYNAMOMETER SCALE LOAD*
1	**10 Minutes	1000 RPM	None
2	**10 Minutes	1800 RPM	None
3	20 Minutes	1800 RPM	1/3
4	20 Minutes	1800 RPM	1/2
5	***30 Minutes	100 RPM below rated speed	3/4
6	Retorque the cylinder head bolts using the procedure described in Section 2015 of this service manual.		

*Based upon normal dynamometer scale load at rated speed for the particular vehicle model. Reduce this scale load as indicated.

**The most ideal break-in procedure would be to constantly vary the throttle between 750 to 1000 RPM for the first 10 minutes and from 1000 RPM to 1800 RPM for the next 10 minutes. The purpose of this changing RPM is to vary the lubrication and coolant flow.

***30 minutes at 3/4 load is a minimum amount of time the engine should be run. It is recommended that whenever possible the engine (especially turbocharged diesels) should be run for four (4) hours or more at the above speed and load before checking the full engine horsepower or before using the engine for heavy field work.

Break-In Procedure for Rebuilt Engines (Without a Dynamometer)

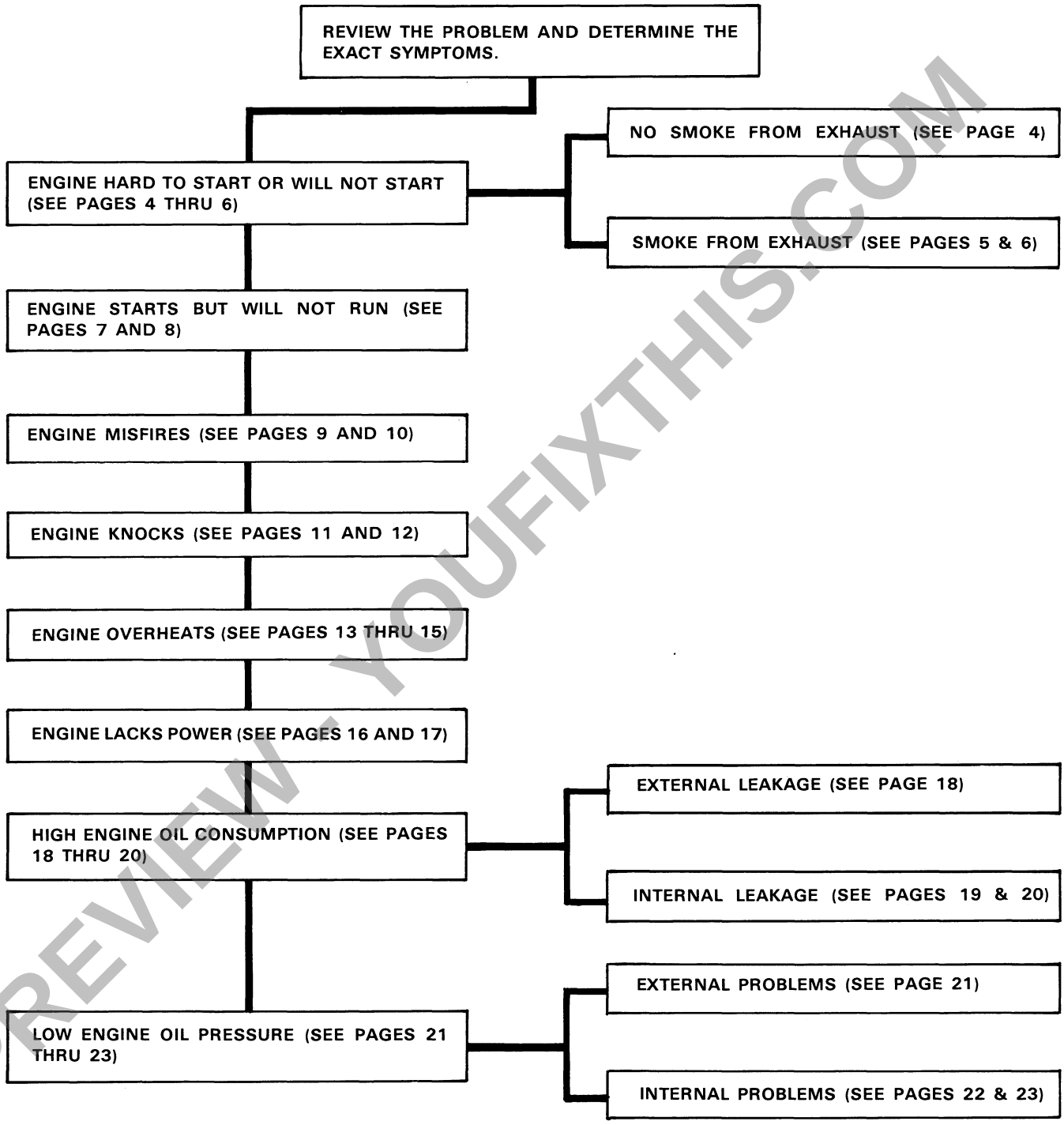
STEP	TIME	ENGINE SPEED	LOAD
1	*10 Minutes	1000 RPM	None
2	*10 Minutes	1800 RPM	None
3	30 Minutes	2/3 Rated RPM	Light Load
4	1 Hour	Full RPM (not over 2000 RPM)	80 to 90%
5	Retorque the cylinder head bolts using the procedure described in Section 2015 of this service manual.		

*If engine must then run at or near full load to operate the machine - for first hour remove load and run at high idle for a few minutes at 15 minute intervals.

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ENGINE DIAGNOSIS CHART



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SPECIAL TORQUES

Engine

	U.S. Value	Metric Value
Camshaft nut	80 to 90 ft. lbs.	109 to 122 Nm
Camshaft thrust plate mounting bolt	17 to 20 ft. lbs.	23 to 27 Nm
Connecting rod nuts	45 to 50 ft. lbs.	61 to 68 Nm
Crankshaft nut	125 to 135 ft. lbs.	169 to 183 Nm
Crankshaft pulley bolt	54 to 64 ft. lbs.	73 to 87 Nm
Cylinder head studs w/flange nuts (1/2")	90 to 100 ft .lbs.	122 to 136 Nm
Cylinder head cover stud nuts (3/8")	4 to 6 ft. lbs.	5 to 8 Nm
Cylinder head bolts (Gr. 8, 12 pt. hd.)	105 to 115 ft. lbs.	142 to 156 Nm
Cylinder head stud nuts (1/2")	95 to 105 ft. lbs.	129 to 142 Nm
Engine oil filter	Install until gasket contacts filter head, then hand tighten 1/2 turn. Loosen filter approximately 1 full turn and retighten until gasket contact is made, then hand tighten an additional 1/2 to 3/4 turn.	
Fan mounting bolts	35 to 42 ft. lbs.	48 to 57 Nm
Fuel pump drive gear nut	40 to 50 ft. lbs.	54 to 68 Nm
Flywheel to crankshaft bolt	65 to 70 ft. lbs.	88 to 95 Nm
Idler gear journal mounting bolts	35 to 42 ft. lbs.	48 to 57 Nm
Intake manifold (Aluminum) stud nuts	30 to 35 ft. lbs.	41 to 48 Nm
Intake and Exhaust Manifold stud nuts	25 to 30 ft. lbs.	34 to 41 Nm
Main bearing cap bolts	90 to 100 ft. lbs.	122 to 136 Nm
Oil pan capscrews (stamped steel)	10 to 12 ft. lbs.	14 to 16 Nm
Oil pan capscrews (cast iron)	24 to 28 ft. lbs.	33 to 38 Nm
Oil pan to seal retainer	15 to 20 ft. lbs.	20 to 27 Nm
Oil pan drain plug	29 to 31 ft. lbs.	39 to 42 Nm
Oil pump cover capscrews	6 to 8 ft. lbs.	8 to 11 Nm
Oil seal retainer bolts (Grade 8)	12 to 15 ft. lbs.	16 to 20 Nm
Oil pump suction tube nut	95 to 105 ft. lbs.	129 to 142 Nm
Rocker arm bracket bolts	25 to 30 ft. lbs.	34 to 41 Nm
Timing gear housing bolts	25 to 30 ft. lbs.	34 to 41 Nm
Water pump mounting bolts	25 to 30 ft. lbs.	34 to 41 Nm
Water pump body-to-cyl. mounting bolts	35 to 42 ft. lbs.	48 to 57 Nm

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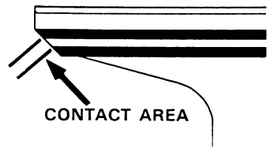
MAINTENANCE CHART

INTERVAL	SERVICE	INSTRUCTIONS
Run-In Period After First 20 Hours	Drain and refill engine crankcase	
	Change engine oil filter.	
	Check for belt tension.	Sections 8016 & 8017
Run-In Period After First 100 Hours	Drain and refill hydraulic reservoir.	
	Change hydraulic oil filter.	Section 4011
Every 10 Hours or Daily, Whichever Occurs First	Check engine oil level.	
	Check hydraulic oil level.	Section 4011
	Empty dust cup and clean.	
	Check radiator coolant level.	
	Check fuel sediment bowls for water or sediment. If found, drain bowls, 1st stage filter and fuel tank.	
	Grease mounted equipment pivot points.	
	Grease nonsealed front idlers.	
	Grease nonsealed track carrier rollers.	
	Grease nonsealed track rollers	
	Check track tension, adjust as required.	Section 5010
	Check under machine for leaks.	
	Check machine for broken, loose or missing parts.	
Every 50 Hours	Grease universal joints.	
	Grease brake pedal.	
	Grease steering levers.	
	Grease brake cross shaft.	
	Check power shuttle transmission oil level.	

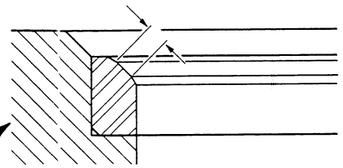
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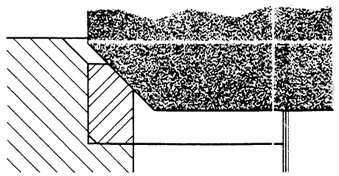
SEAT CONTACT AREA ON VALVE TOO NARROW



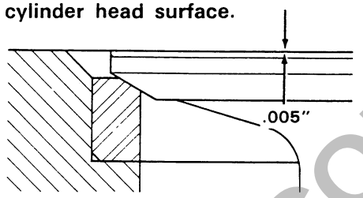
If valve contact area on seat looks like this (previously ground seat).



→ Use a 45° stone to increase contact area.

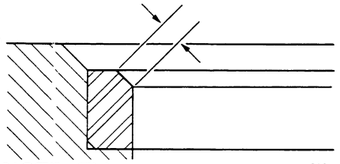


→ Check that valve head has not receded more than .005" below cylinder head surface.



→ If valve head recedes or protrudes more than .005", refer to Steps 65 and 66.

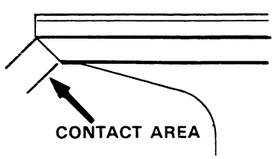
If valve contact area on seat looks like this



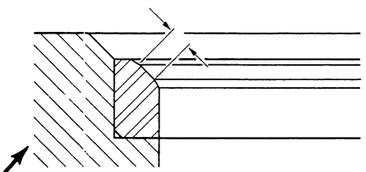
→ The valve and valve seat must be replaced since additional grinding will not alter the lower contact point.

NOTE: This contact pattern will also be found on intake valves without replaceable seats.

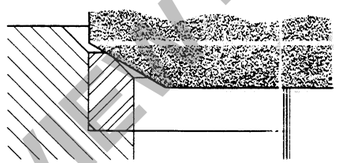
SEAT CONTACT AREA ON VALVE TOO WIDE



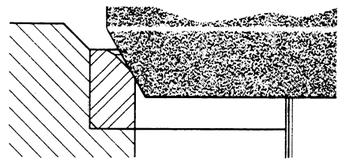
If valve contact area on seat looks like this (previously ground seat).



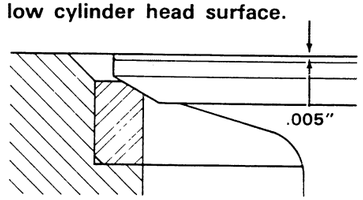
→ Use a 30° narrowing stone to lower upper contact area.



→ Use a 60° narrowing stone to raise lower contact area.

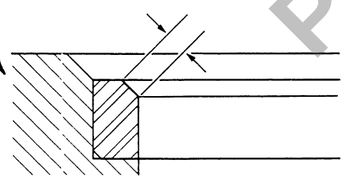


→ Check that valve head has not receded more than .005" below cylinder head surface.

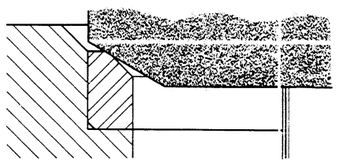


→ If valve head recede or protrudes more tha .005", refer to Steps 6 and 66.

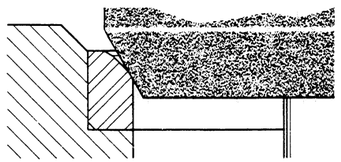
If valve contact area on seat looks like this



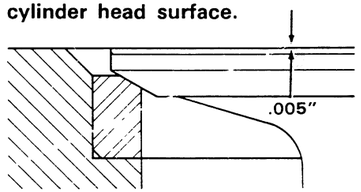
→ Use a 30° narrowing stone to lower upper contact area.



→ Use a 60° narrowing stone to raise lower contact area.



→ Check that valve head has not receded more than .005" below cylinder head surface.



→ If valve head recedes or protrudes more thar .005", refer to Steps 6 and 66.

NOTE: This contact pattern will also be found on intake valves without replaceable seats.

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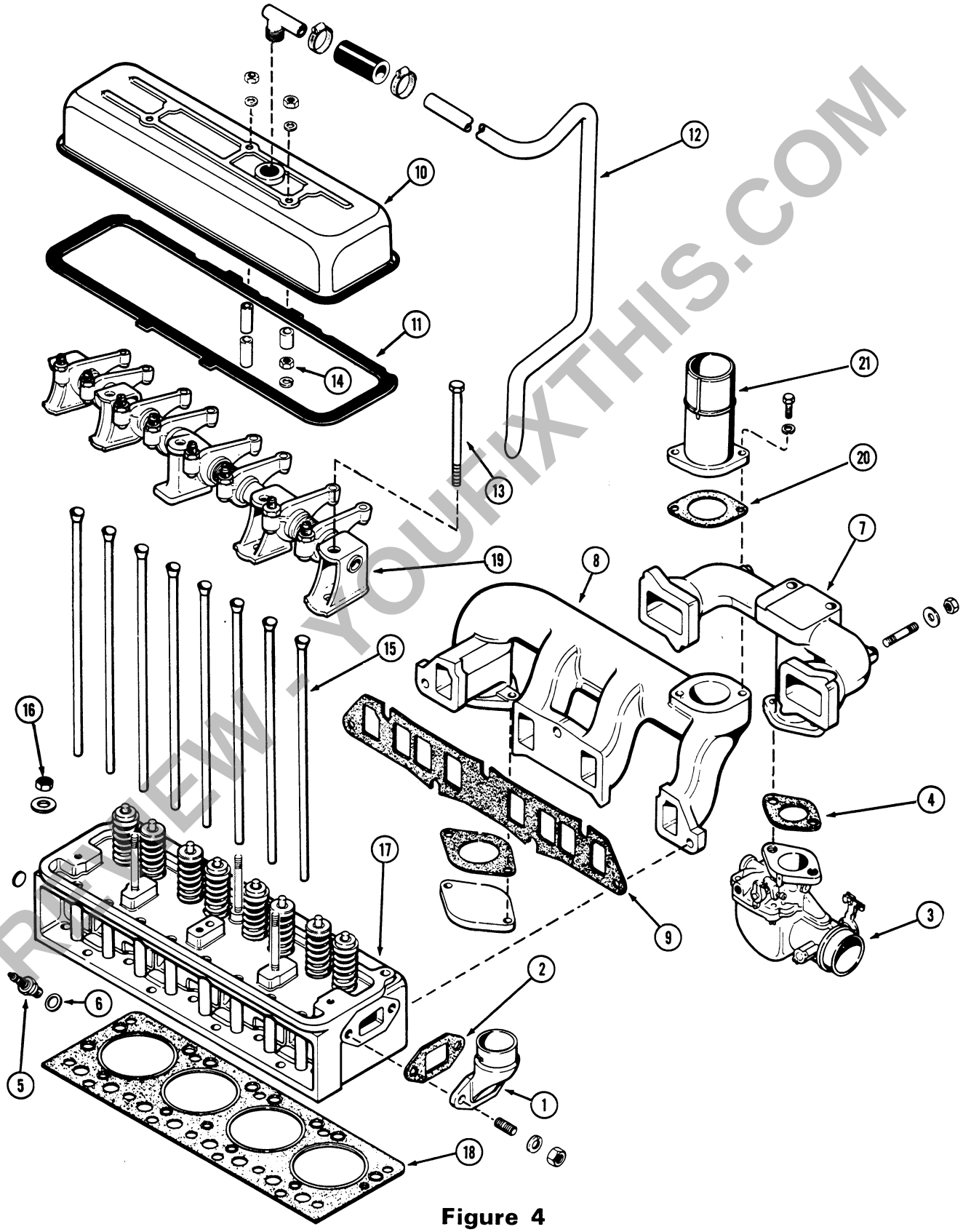


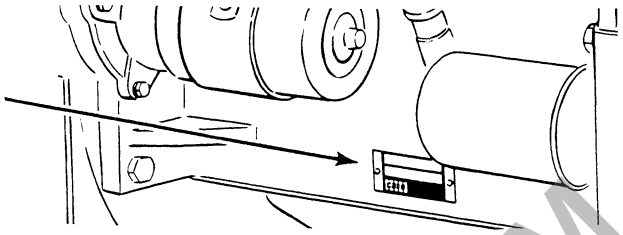
Figure 4

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GENERAL ENGINE SPECIFICATIONS
310 CRAWLER

THE MODEL AND ENGINE SERIAL NUMBER IS STAMPED ON A PLATE LOCATED ON THE RIGHT SIDE OF THE ENGINE BELOW THE CRANKING MOTOR.



188 DIESEL ENGINES

General

Type ..... Case Open Chamber, 4 Cylinder, 4 Stroke Cycle, Valve-in-Head
Firing Order 1-3-4-2
Bore ..... 3-13/16 Inches (96.8mm)
Stroke ..... 4-1/8 Inches (104.8mm)
Piston Displacement ..... 188 Cubic Inches (3 080.8 cm^3)
Compression Ratio ..... 17.5 to 1
No Load Governed Speed ..... 2015 RPM
Rated Engine Speed ..... 1850 RPM
Engine Idling Speed ..... 575 to 675 RPM
*Valve Tappet Clearance (Exhaust) ..... (Hot and Cold) .014 Inch (0.356mm)
(Intake) ..... (Hot and Cold) .012 Inch (0.305mm)
*Hot Settings Are Made After the Engine Has Operated At Thermostat Controlled Temperature For At Least Fifteen Minutes.

Piston and Connecting Rods

Rings per Piston 3
Number of Compression Rings 2
Number of Oil Rings 1
Type Pins ..... Full Floating Type
Type Bearings ..... Replaceable Precison, Steel Back, Copper-Lead Alloy Liners

Main Bearings

Number of Bearings 5
Type Bearings ..... Replaceable Precision Steel Back, Copper-Lead Alloy Liners

Engine Lubricating System

Crankcase Capacity (Without Filter) ..... 5 U.S. Quarts (4.7 Litres)
(With Filter Change) ..... 6 U.S. Quarts (5.7 Litres)
Oil Pressure ..... 50 to 70 PSI (345 to 483 kPa) Eng. Warm and Operating at Rated Eng. Speed
Type System ..... Pressure and Spray Circulation
Oil Pump ..... Gear Type
Oil Filter ..... Full Flow Spin on Type

Fuel System

Fuel Injection Pump ..... Roosa-Master
Pump Timing ..... 8 Degrees Before Top Dead Center
Fuel Injectors (Prior Eng. SN 2726393) ..... Pencil Type (Opening Press. 2800 PSI (19 306 kPa)
Fuel Injectors (Start'g W/Eng. SN 2726393) .. Pencil Type (Opening Press. 3200 PSI) (22 064 kPa)
Fuel Transfer Pump ..... Vane Type, Integral Part of Injection Pump
Governor ..... Variable Speed, Fly-Weight Centrifugal Type, Integral Part of Injection Pump
Fuel Filters (Prior Eng. SN 2718490) ..... Replaceable Element Type
Fuel Filters (Starting W/Eng. SN 2718490) ..... Full Flow Spin on Type

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Section 2002

ENGINE TUNE-UP

188 and 207 Diesel Engines

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CASE CORPORATION

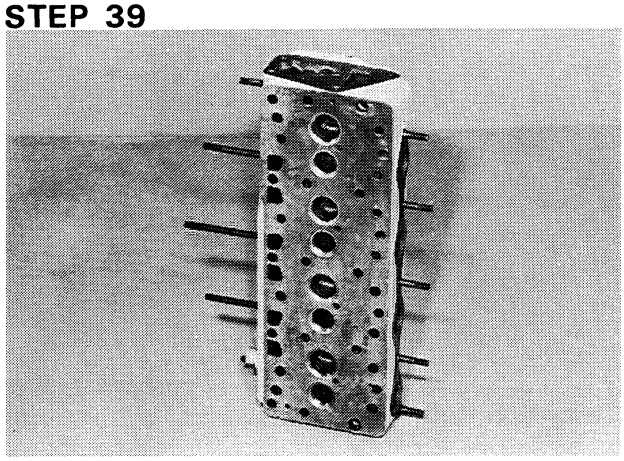
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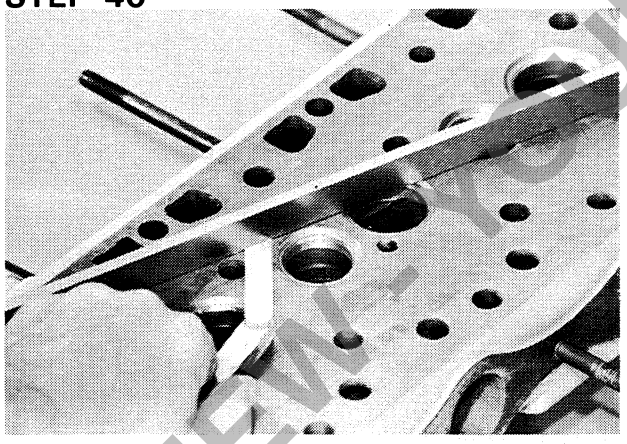
Cylinder Head Inspection

STEP 39



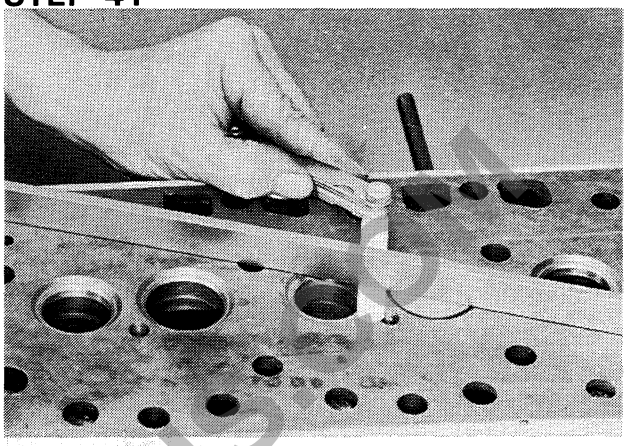
Wash, clean and inspect cylinder head. Use rotary wire brush to clean around and down into the valve ports. Clean carefully all machined surface areas with emery cloth, removing all gasket material, carbon and rust from cylinder head.

STEP 40



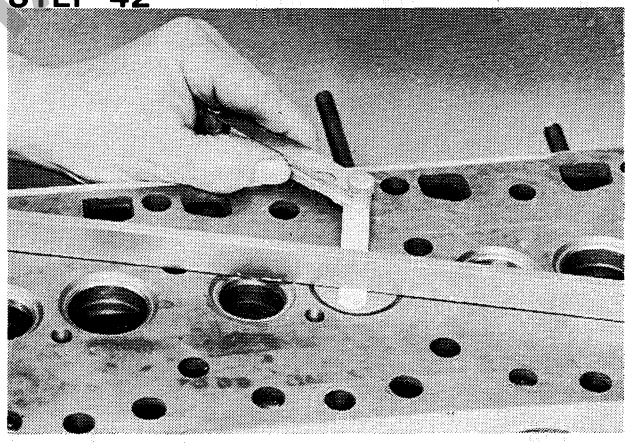
Lay a straight edge across the bottom of the cylinder head from corner to corner. Try to get a .006" feeler gauge under the straight edge. The maximum limit for head warpage is .006". If warpage is greater than .006", the cylinder head must be replaced or resurfaced. A minimum head thickness of 3.968" must be maintained if cylinder head is resurfaced.

STEP 41



IMPORTANT: If the cylinder head has been resurfaced, the valve protrusion must be checked so as to prevent piston and valve contact. Refer to Steps 65 and 66.

STEP 42



IMPORTANT: If the cylinder head has been resurfaced, the valve recession must be checked also. Refer to Steps 65 and 66.

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SPECIFICATIONS (Cont'd)

Crankshaft (Continued)

		Maximum Limit Including Wear
Grind to:		
.010″ O.D. undersize, (201G, 188G)	2.8630 to 2.8640	
.020″ O.D. undersize, (201G, 188G)	2.8530 to 2.8540	
.030″ O.D. undersize, (201G, 188G)	2.8430 to 2.8440	
.010″ O.D. undersize, (159G, 148G)	2.6130 to 2.6140	
.020″ O.D. undersize, (159G, 148G)	2.6030 to 2.6040	
.030″ O.D. undersize, (159G, 148G)	2.5930 to 2.5940	
Main journal bore I.D. w/o liners (201G, 188G)	3.066 to 3.067	
(159G, 148G)	2.816 to 2.817	
Main journal width between cheeks:		
2nd (159G, 148G)	1.499 to 1.502	
2nd (201G, 188G)	1.3740 to 1.3770	
3rd	1.745 to 1.755	
Connecting rod journal width between cheeks	1.3105 to 1.3145	

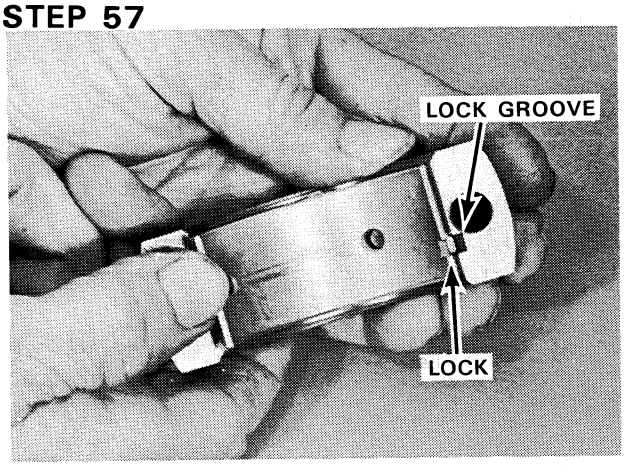
Camshaft

Type	Parabolic	
Bushings (201G, 188G)	4, Replaceable	
Bushings (159G, 148G)	3, Replaceable	
Bushing lubrication:		
Front bushing	Pressure lubricated from oil pump.	
Intermediate bushing	Gravity flow lubricated	
Oil clearance	.002 to .005	.007
I.D. of bushing installed	1.752 to 1.753	
Bushing width:		
1st (front) (159G, 148G)	1.307 to 1.317	
1st (front) (201G, 188G)	1.213 to 1.223	
2nd (159G, 148G)	.713 to .723	
2nd, & 3rd. (201G, 188G)	.490 to .500	
3rd (rear) (148G, 159G)	1.177 to 1.197	
4th (rear) (201G, 188G)	1.213 to 1.223	
O.D. of each bearing surface	1.749 to 1.750	.004
Thrust plate thickness	.149 to .147	

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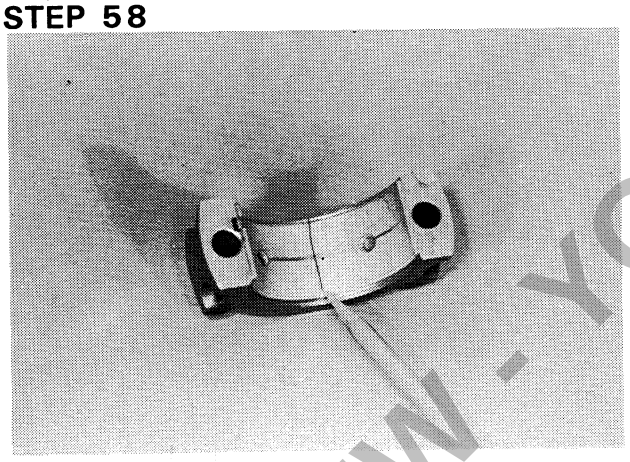
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STEP 57



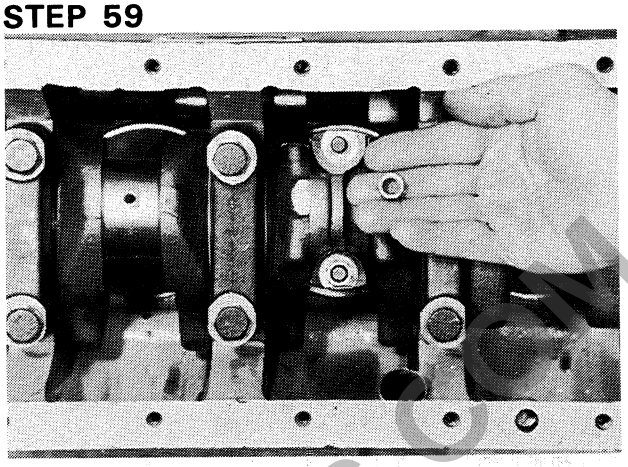
Install bearing liners into connecting rod bearing caps. *NOTE:* Make sure liner lock aligns with lock groove in bearing cap. Use a sliding movement when installing liners; never press on center of liners.

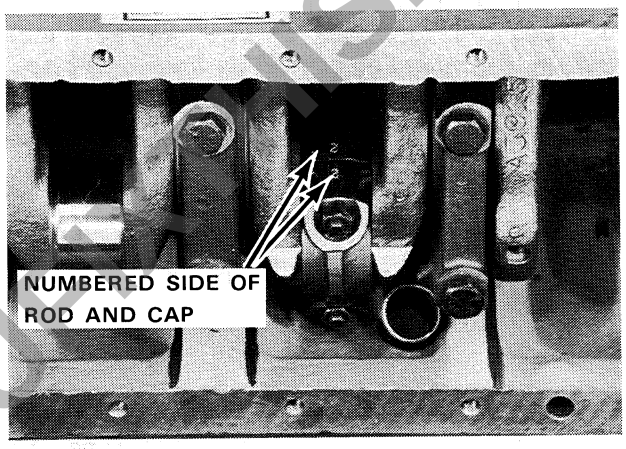
STEP 58



Clean connecting rod journals and bearing liners. Place a piece of plasti gauge on connecting rod liner.

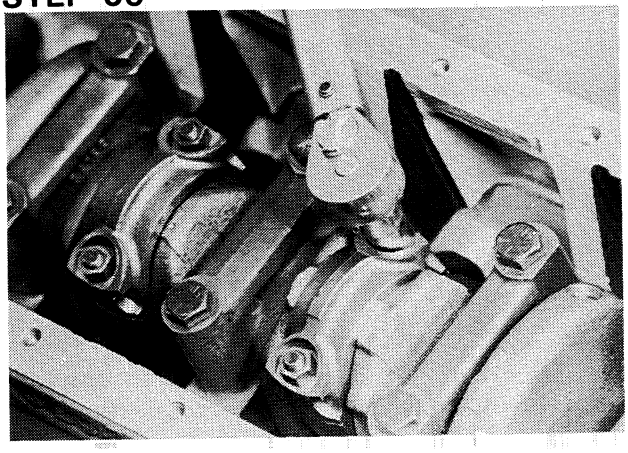
STEP 59





Install connecting rod cap with plasti gauge on connecting rod. Retain in place with mounting nuts. *NOTE:* Make sure the number on the bearing cap matches the number on the connecting rods.

STEP 60



Torque connecting rod bearing cap mounting nuts 45 to 50 ft. lbs.

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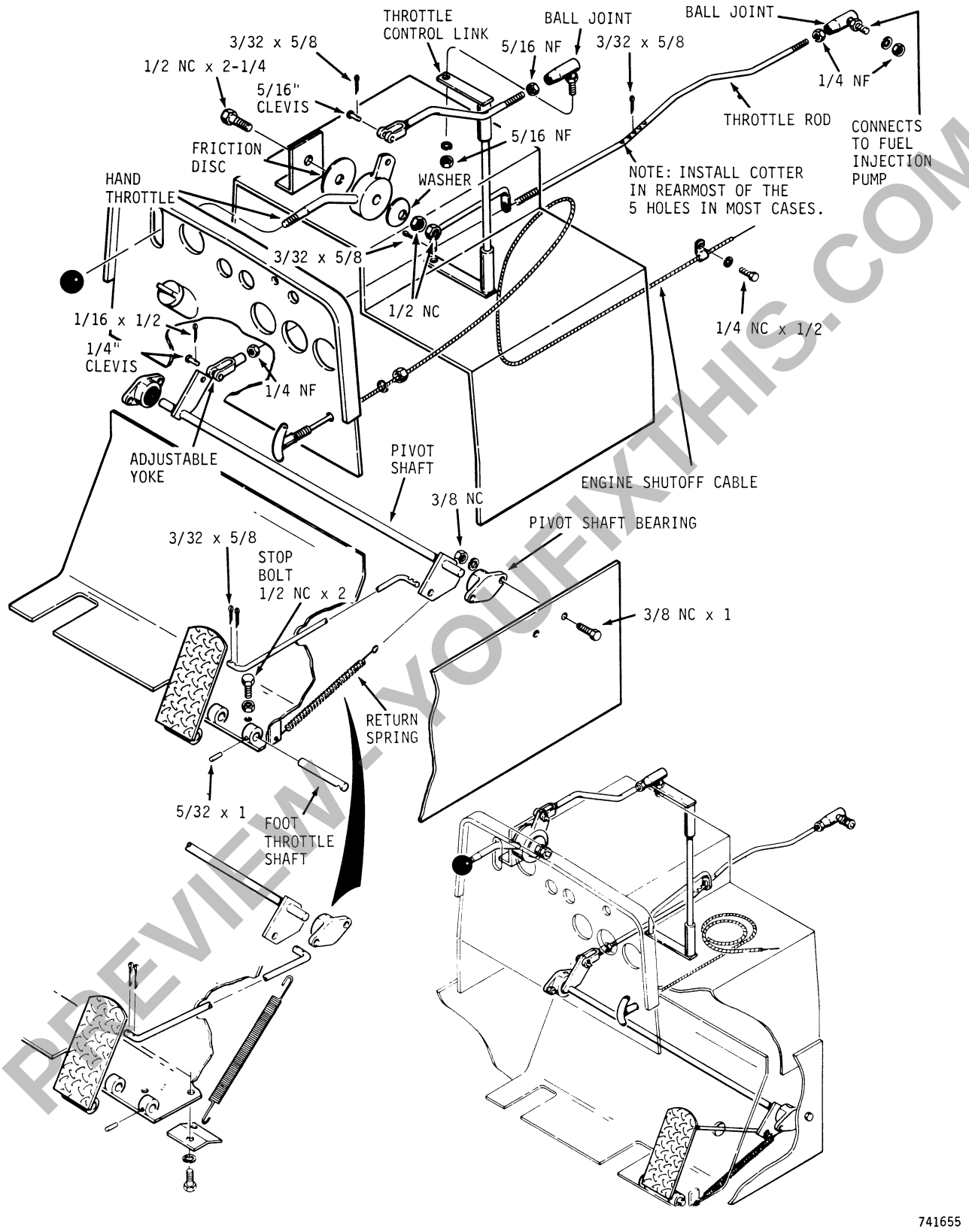


Figure 3 - Engine Controls on Diesel Engine Models

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MAGNETIC FUEL SHUT-OFF SOLENOID

(Refer to Figure 8)

Checking Operation

To check the operation of the Solenoid for the Main Jet Assembly:

1. Disconnect the solenoid lead wire on the ignition switch side of the ballast resistor.
2. Remove the solenoid from the carburetor.
3. Connect the lead wire to the ignition switch and ground the solenoid assembly.
4. When ignition key is turned to "ON" position, the main jet in shut-off assembly must be drawn and held against the main jet adjusting screw with a decided "snap" or "click".
5. When ignition key is turned to "OFF" position, the main jet in the shut-off assembly must be released and forced by spring pressure against its seat in the assembly with a decided "snap" or "click". If action is sluggish in Nos. 4 and 5, remove and clean parts as described below and re-check - if still sluggish, replace complete assembly.

Disassembly and Cleaning

1. Remove the main jet adjusting screw (1), spring (3) and main jet (4) from the solenoid body (5). Remove "O" ring (2) from adjusting screw.
2. Clean the main jet adjusting screw and jet by submerging in a solvent such as Bendix Speed Clene.

   CAUTION: Clean the solenoid body of the assembly by carefully submerging the body partially (do not let wire or plastic insulation contact solvent) into a solvent such as Bendix Speed Clene - The body need only be submerged enough to flush out the inner bore and seats.

   After cleaning parts - blow dry with compressed air.

Inspection and Assembly

1. Inspect seat on both ends of jet - if nicked or scored - replace jet. Install jet (4) in solenoid body (5).
2. Inspect spring (3) to meet the following specifications:

Free length	.6875"
I.D.	.223"
Wire diameter	.012"
No. of coils	10

3. Install spring (3) in solenoid body (5).
4. Install new "O" ring (2) on adjusting screw (1) and install screw in solenoid body.
5. Install main jet assembly in carburetor with a new gasket (6) and re-adjust as described on Page 12.

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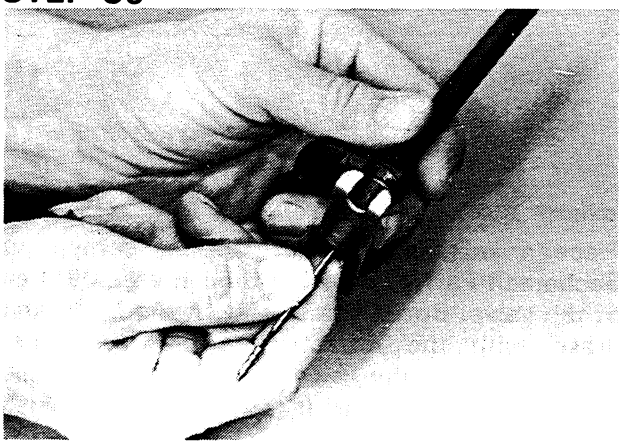
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SERVICING INJECTORS (Continued)

Assembly

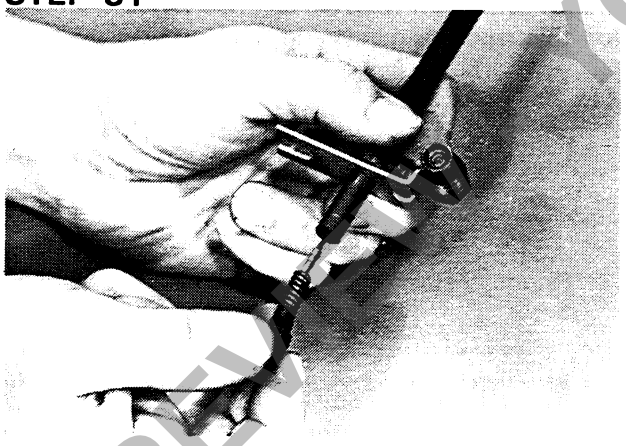
Wash and flush all parts thoroughly before assembly. Wet all injector parts and hands with clean fuel during assembly.

STEP 30



Handle the valve by its' shank and slide it partially into the body. Install the locating plate on the body before assembling the pressure adjusting screw and locknut.

STEP 31



Assemble the spring and seat (on injector A37836 assemble spring, ball washer and upper spring seat) on the lift and pressure adjusting screw assembly. Tilt the injector body and with the spring seat contacting the valve top, push the valve and spring components into the body. Exercise care not to dislodge the spring seat during this assembly. Thread the pressure adjusting screw into the body by hand until the spring is compressed sufficiently to hold all parts in place.

STEP 32



Install a new compression seal.

STEP 33

CARBON SEAL
TOOL A42449



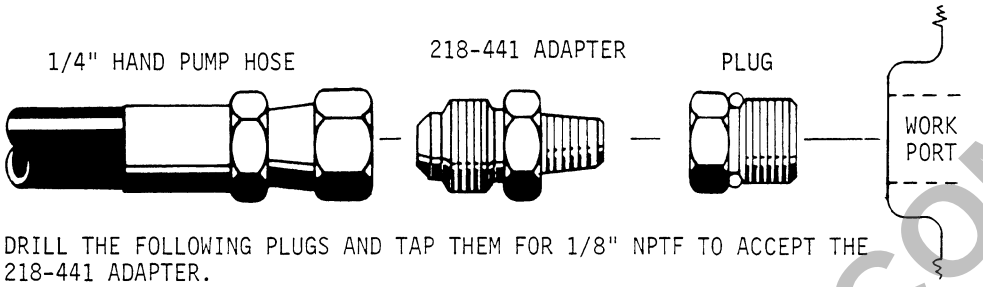


Install a new carbon dam seal using the carbon seal tool, Case Part No. A42449.

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Adapters Required to Connect Hand Pump to Control Valve Ports*



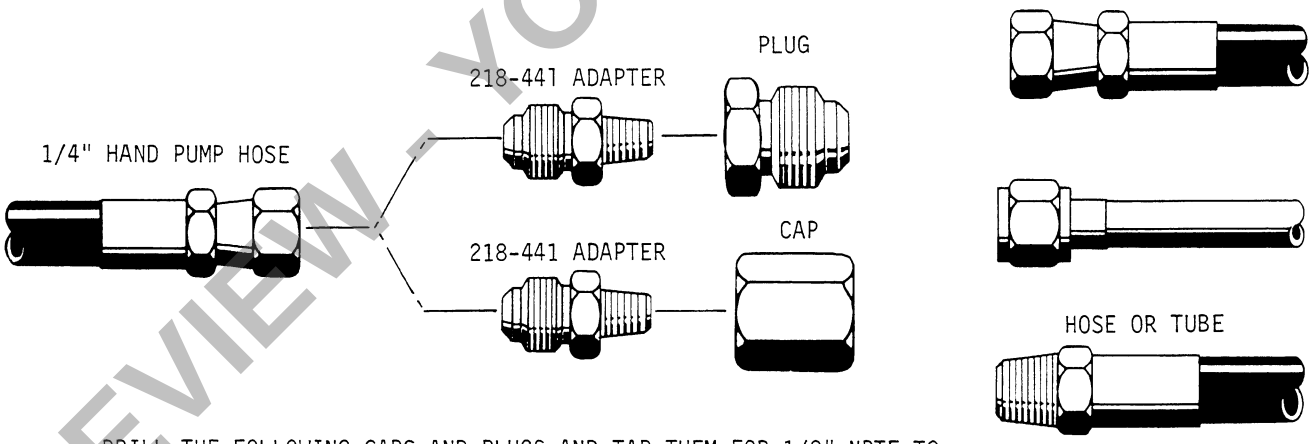
DRILL THE FOLLOWING PLUGS AND TAP THEM FOR 1/8" NPTF TO ACCEPT THE 218-441 ADAPTER.

CASE PART NO.	CONTROL VALVE PORT STRAIGHT THREAD WITH O-RING
218-5155 PLUG	9/16" - 18 (3/8" TUBE)
218-5156 PLUG	3/4" - 16 (1/2" TUBE)
218-5157 PLUG	7/8" - 14 (5/8" TUBE)
218-5158 PLUG	1-1/16" - 12 (3/4" TUBE)
218-5159 PLUG	1-3/16" - 12 (7/8" TUBE)
218-5160 PLUG	1-5/16" - 12 (1" TUBE)
218-441 ADAPTOR	USE IN EACH PLUG

731195

Figure 21

Adapters Required to Connect Hand Pump to Hoses and Tubes*



DRILL THE FOLLOWING CAPS AND PLUGS AND TAP THEM FOR 1/8" NPTF TO ACCEPT THE 218-441 ADAPTER.

QTY.	CASE NO.		QTY.	CASE NO.	
1	218-774	3/8" TUBE PLUG	1	218-754	3/8" TUBE CAP
1	218-775	1/2" TUBE PLUG	1	218-755	1/2" TUBE CAP
1	218-776	5/8" TUBE PLUG	1	218-756	5/8" TUBE CAP
1	218-777	3/4" TUBE PLUG	1	218-335	3/4" TUBE CAP
1	218-778	7/8" TUBE PLUG	1	218-757	7/8" TUBE CAP
1	218-779	1" TUBE PLUG	1	218-758	1" TUBE CAP
			12	218-752	1/4" TUBE CAP

***NOTE:** ALL FITTINGS AND ADAPTERS LISTED ARE NOT REQUIRED FOR THIS MACHINE. PORTS AND HOSE OR TUBE THREADS WILL DETERMINE PARTS REQUIRED.

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Figure 22

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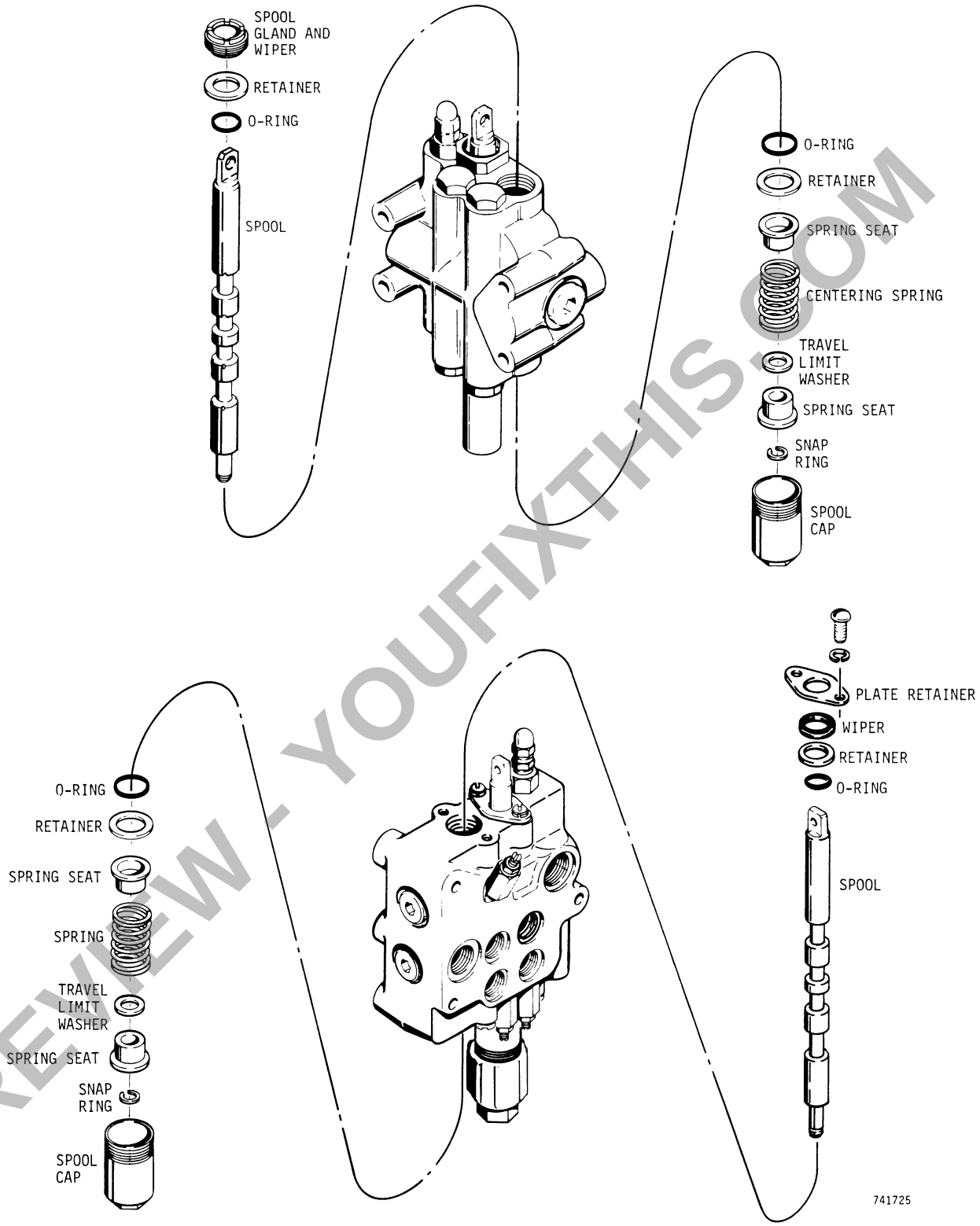


Figure 32 - Exploded Views of Three Position Spools and Seals

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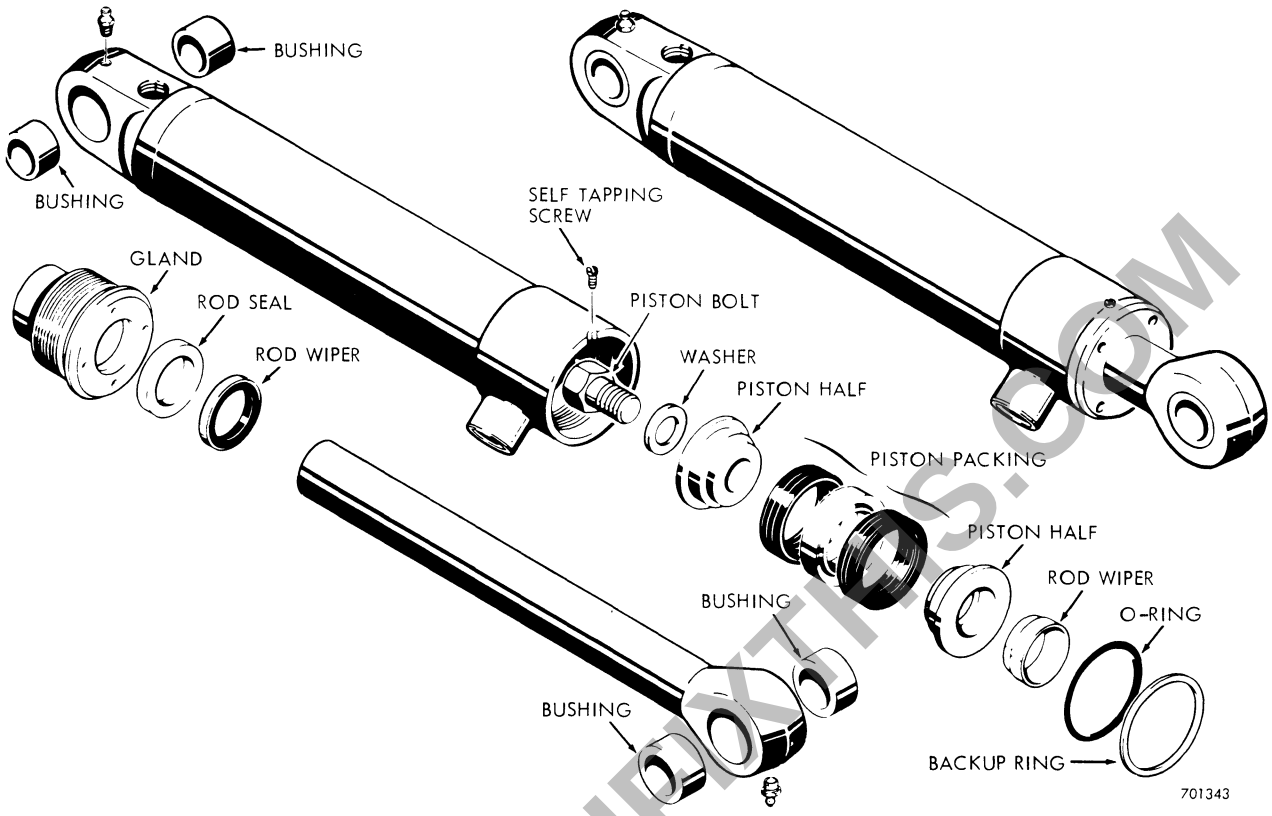


Figure 8 - Exploded View of Typical Cylinder without Center Bearing

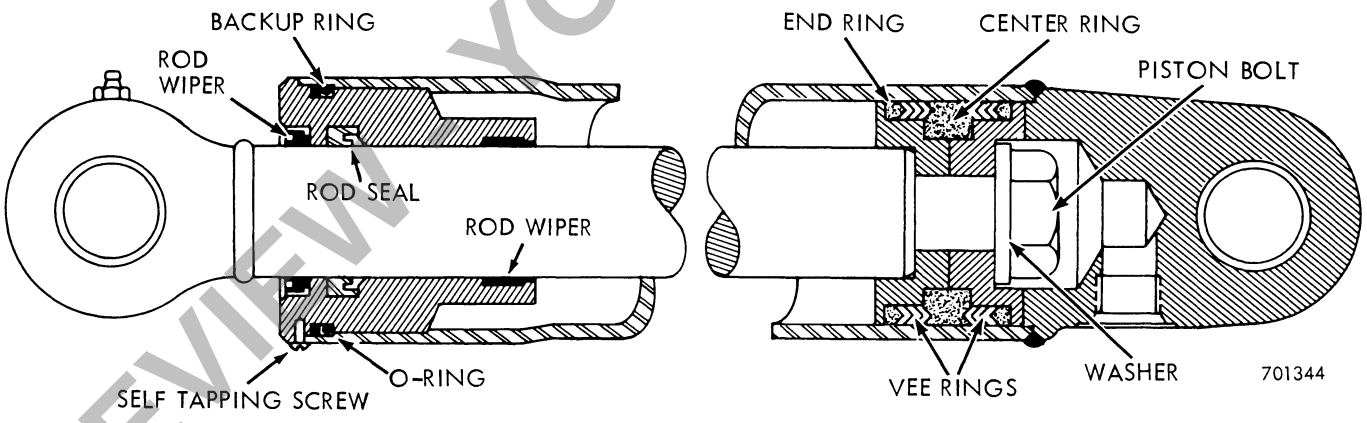


Figure 9 - Section View of Typical Cylinder without Center Bearing

Assembly

1. Refer to page 4057-5 to identify gland style and assemble gland as illustrated.

   NOTE: The U-cup rod seal may be very difficult to get seated in the groove. Use as much care as possible not to cut the seal lips.

2. Lubricate the piston rod and gland bore with hydraulic oil and install gland on piston rod. If necessary the gland may be driven onto the rod with a soft hammer.

3. Lubricate the vee rings in hydraulic oil. Position an end ring and three vee rings on each piston half. The vee of the rings must point to the center of the piston.

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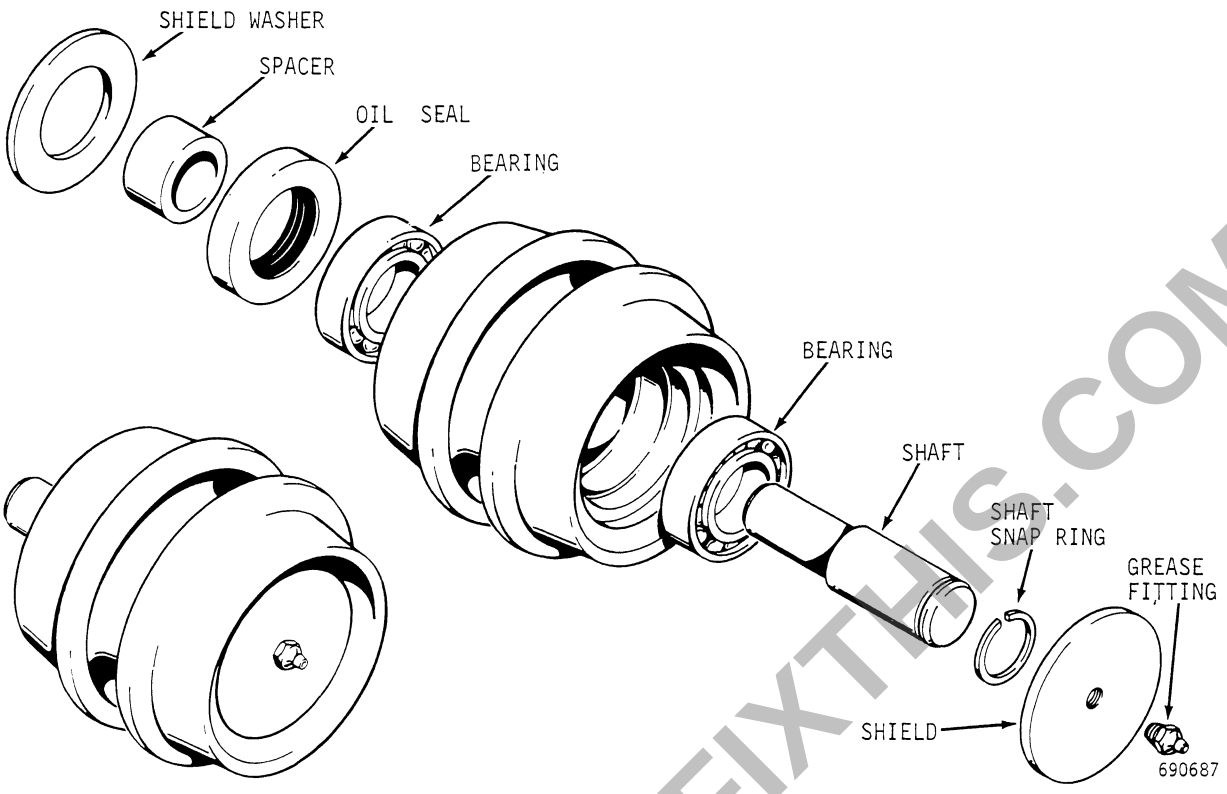


Figure 53 - Exploded View of Carrier Rollers (Models 350 and 310G After S/N 3039619)

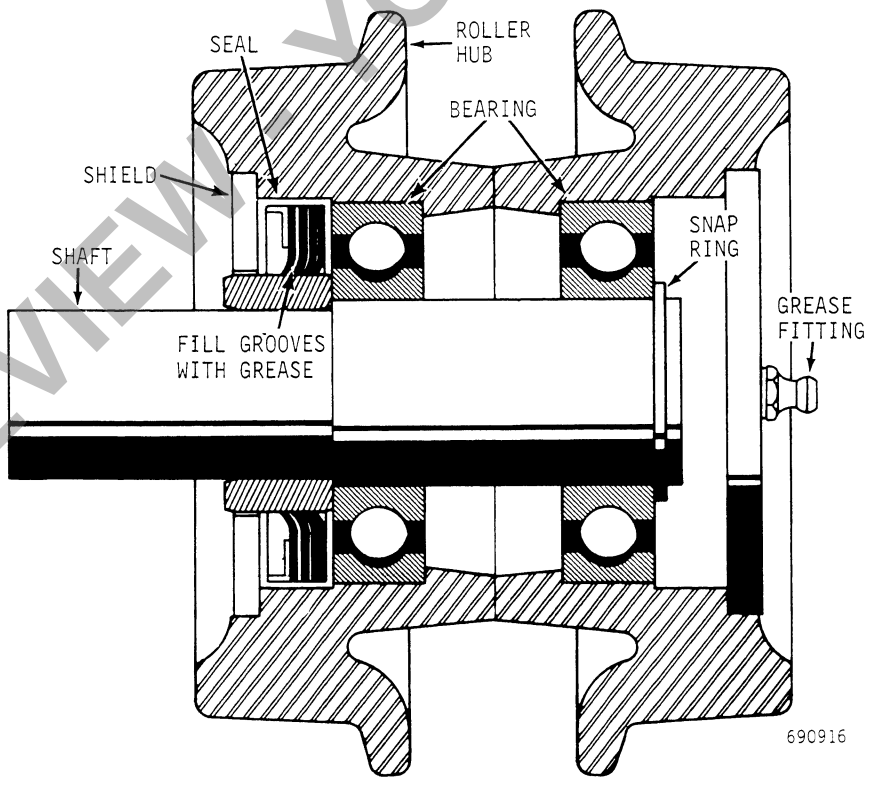


Figure 54 - Cross Section of Carrier Rollers (Models 350 and 310G After S/N 3039619)

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tion of the "O"ring to aid in installing the piston, Figure 61.

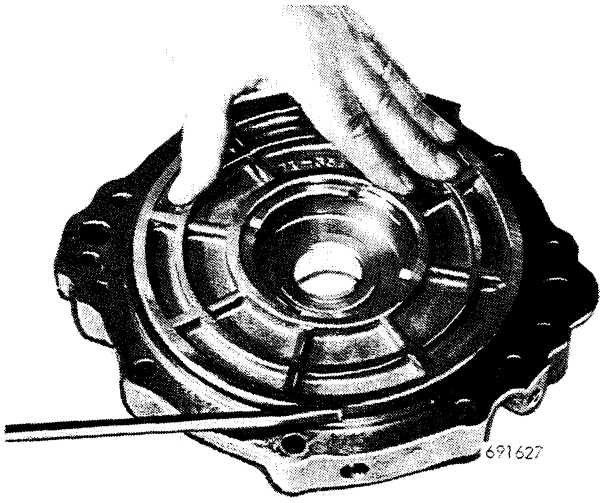


Figure 61

48. Lower front adapter and piston assembly over input shaft and squarely onto the shuttle case. When the pilot diameter on the front adapter enters the shuttle case align bolt holes and check the gap between the adapter and housing to assure squareness.

49. Install the four cap screws in the adapter, Figure 62, and tighten evenly to prevent binding. When the adapter is properly seated torque the cap screws evenly to 27-37 foot-pounds.

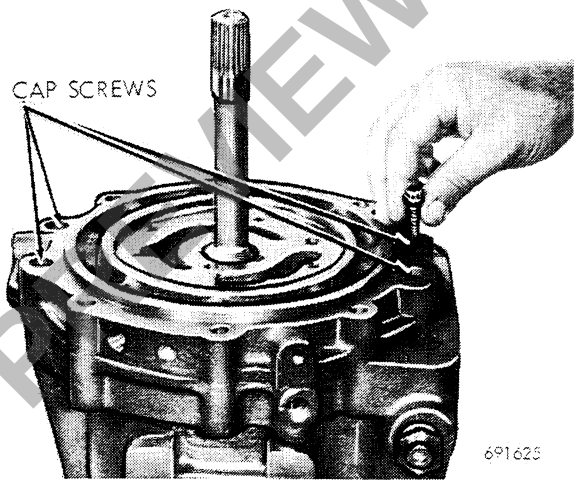


Figure 62

50. Position pump seal in gear housing with lip of seal to rear of housing. Using a suitable tool press the seal into the housing until the seal bottoms, Figure 63. The seal should extend out of the housing approximately 3/16 of an inch when seated.

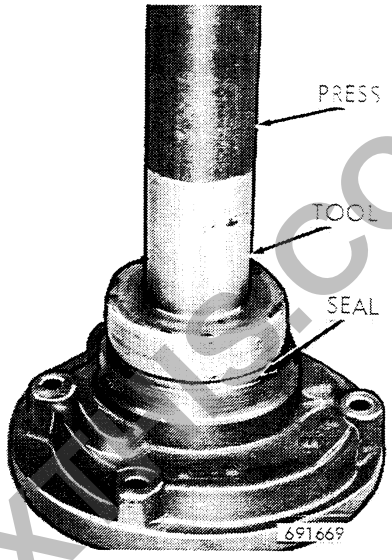


Figure 63

51. Invert the housing and install the pump gears, Figure 64. Align marks made on gear faces during disassembly.

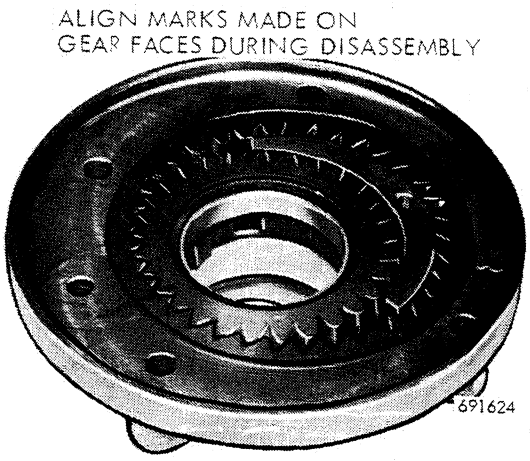


Figure 64

52. Position the converter support on the gear housing and install the flat head screw, Figure 65. Torque the screw to 25-35 inch-pounds. Then check pump gears for freedom of rotation. Thoroughly lubricate the pump with Case TCH Fluid.

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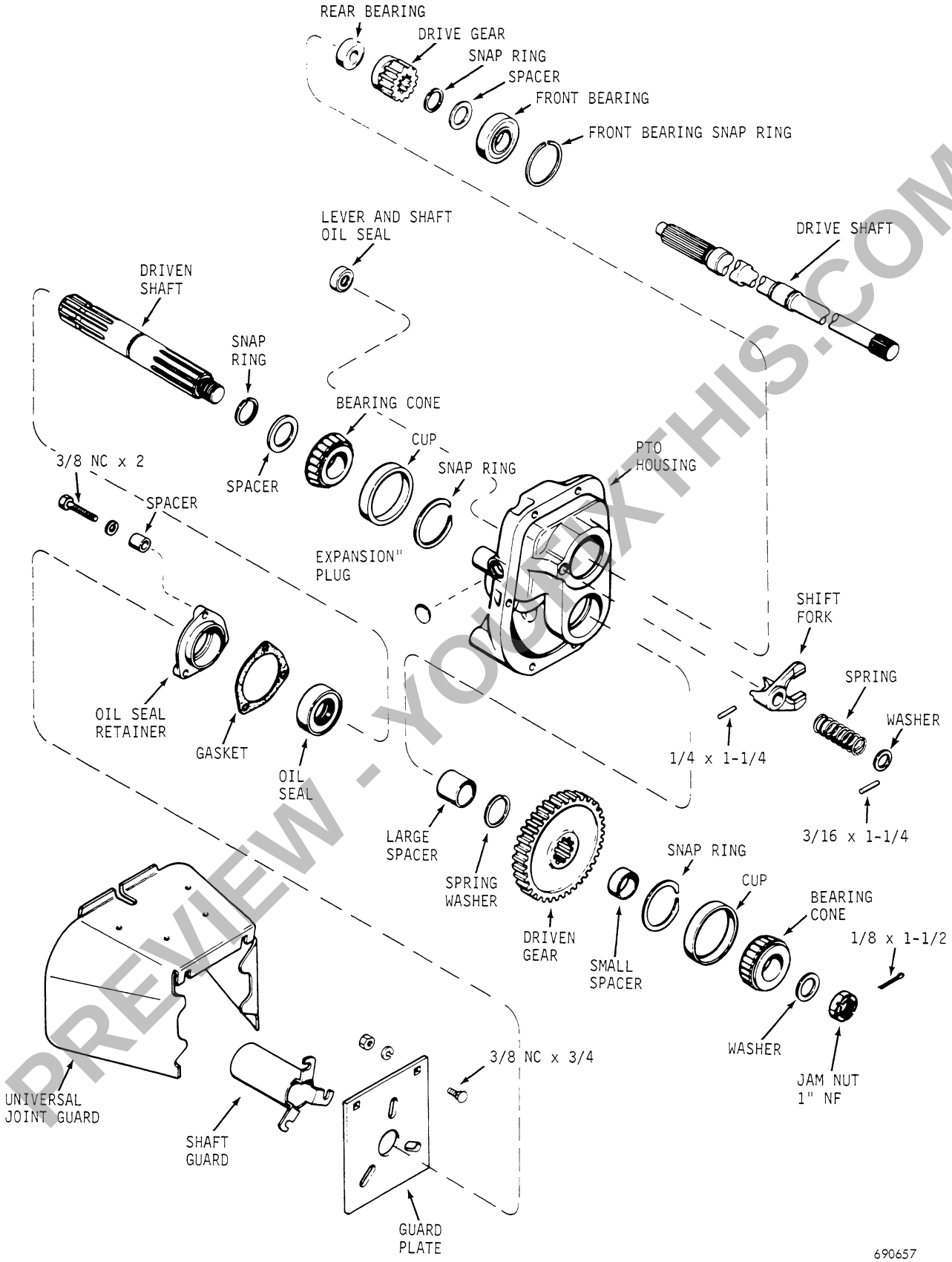


Figure 1 - PTO Assembly

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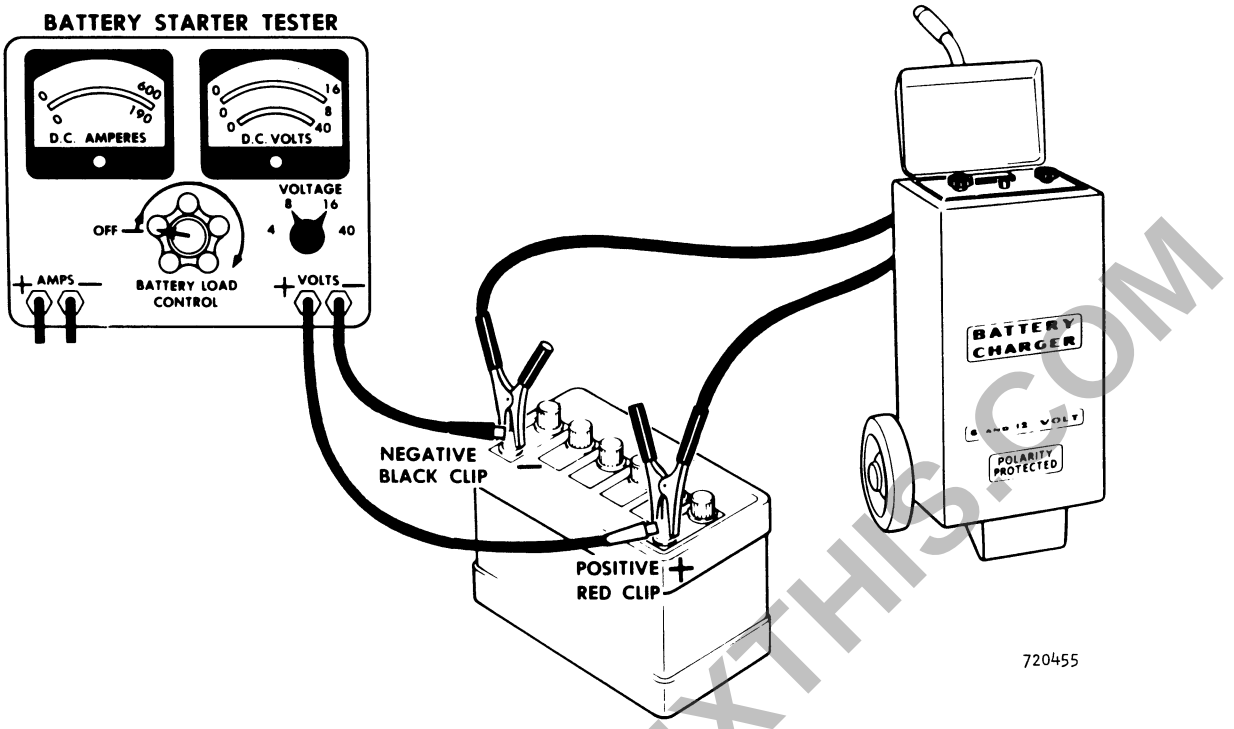


Figure 6 - Cell Test, Soft Top Batteries and Exposed Cell Connectors

b. If the cell readings are within .1 volt and the total voltage is within the limits specified in step 5, the battery is discharged and is in need of recharging.

Hard Top Battery

This test is performed using the cadmium probes and a suitable battery-starter tester, Figure 8. Connect the voltmeter leads to the terminals in the end of the handle, observing polarity color code. Set voltmeter switch to 4 volts and remove the filler vent caps from the battery.

1. Place positive probe in cell No. 1 and negative probe in cell No. 2, Figure 7. Record exact reading.

2. Place positive probe in cell No. 2 and negative probe in cell No. 3. Record the exact reading. If testing a 6-volt battery, proceed to step 6.

3. Place positive probe in cell No. 3 and negative probe in cell No. 4. Record the exact reading.

4. Place positive probe in cell No. 4 and negative probe in cell No. 5. Record the exact reading.

5. Place positive probe in cell No. 5 and negative probe in cell No. 6. Record the exact reading.

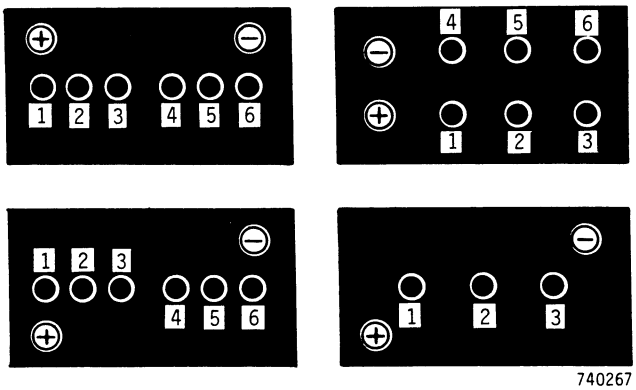


Figure 7 - Battery Cell Sequence

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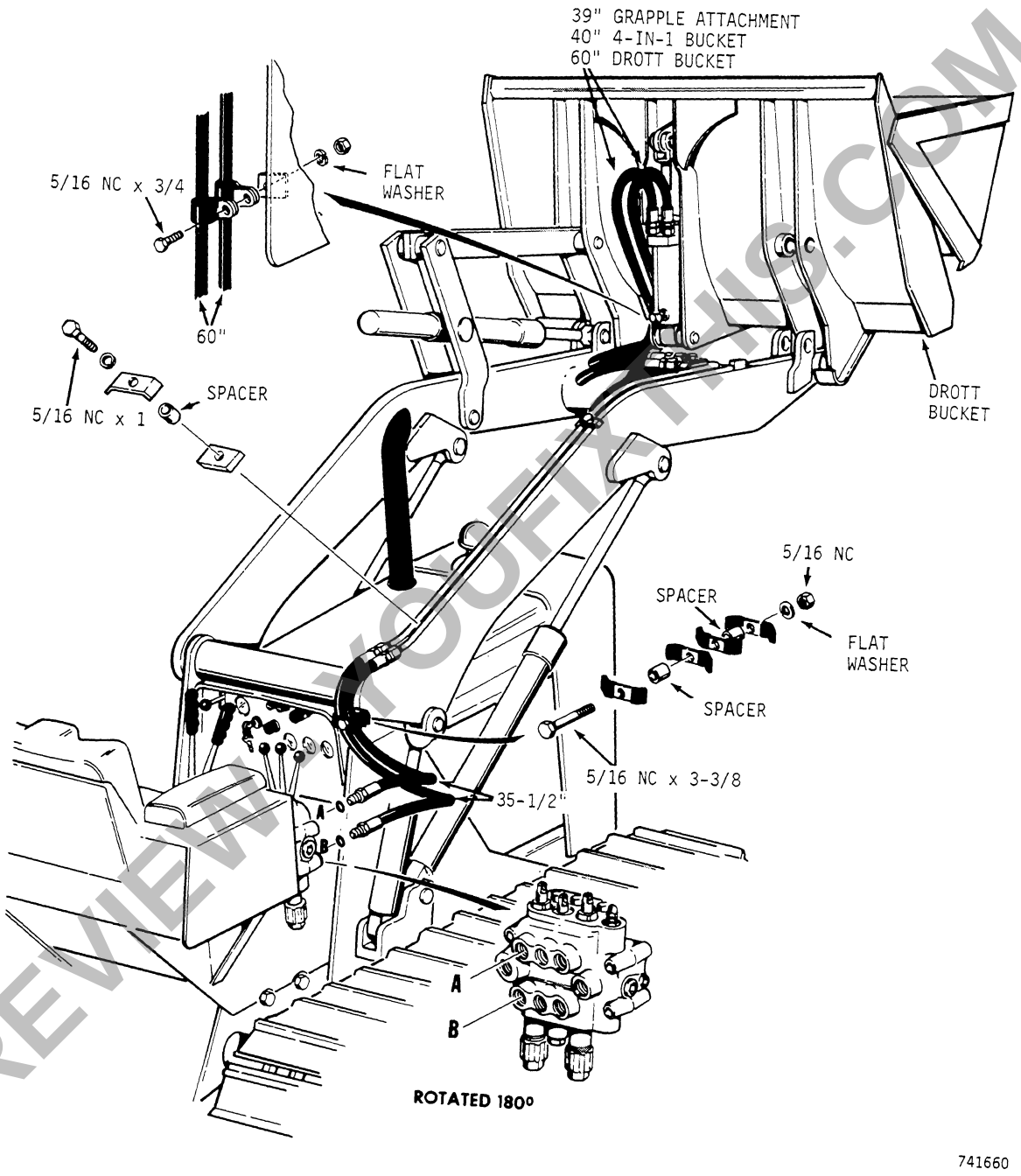


Figure 9 - Drott 4-In-1 Bucket Cylinder Hydraulics

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SERVICING

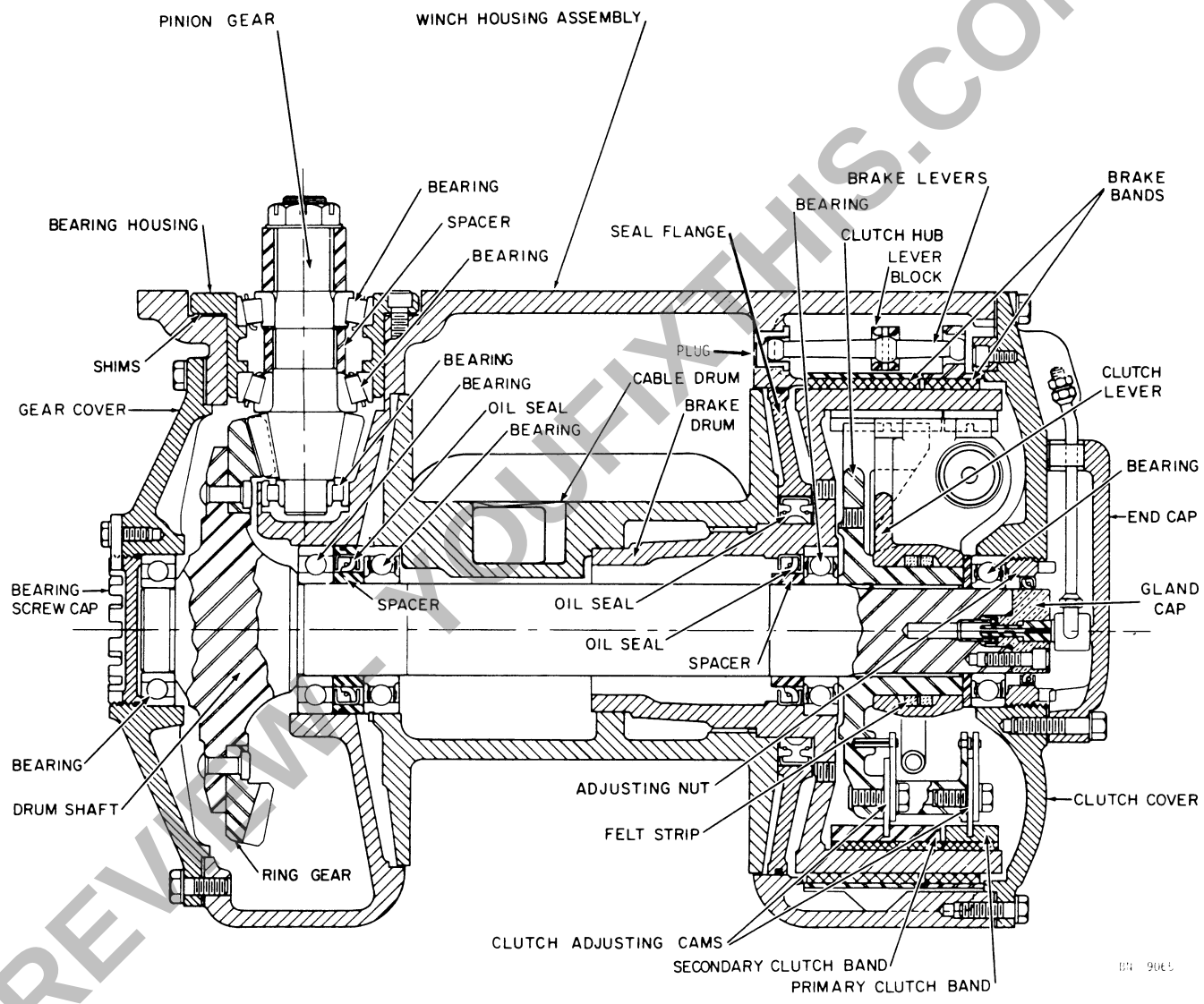


Figure 16 - Cross Section of Model 9 Winch

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4. Remove the klik pins from the two anchor pins that secure the anchor straps to the backhoe mounting frame.

5. Drive out the anchor pins.

6. Disconnect the dipper light, if so equipped, at the socket on the rear of the crawler.

7. Start the engine. With the stabilizers, raise the backhoe high enough so the studs in the lower mounting frame clear the lower support arms on the crawler. This is a distance of approximately 2 inches.

8. Drive the tractor forward to separate the backhoe and the crawler. Shut off the engine and uncouple the hoses:

   a. Uncouple the pressure and return hoses at the "quick disconnect" couplings.

   b. On the crawler, join the return hose and pressure hose to each other at the "quick disconnect" couplings.

   c. On the backhoe, join the return and pressure hoses to each other at the "quick disconnect" couplings.

9. Drive the crawler away.

Coupling Backhoe to Crawler

1. Line up the tractor with the backhoe up close to the backhoe mounting frame.

2. Stop the engine and reconnect the hydraulic lines. Be sure the "quick disconnect" couplings are fully engaged.

3. Very carefully back the tractor into the backhoe. Adjust the height of the backhoe with the stabilizers, if necessary. Lower the backhoe onto the lower support arms.

4. Install the anchor pins from the outboard side of the tractor toward the center. Drive the pins in place by striking the hammer block on each pin. When the pins are in place, install the klik pins.

5. Tighten the hex. nuts on the tension rods as follows:

   a. Tighten the jam (lower) nut finger tight.

   b. Torque the top nut to 450-550 foot-pounds.

6. Connect the dipper light.

7. Raise the stabilizers. The crawler is now ready to drive away.

DISASSEMBLING THE BACKHOE

Bucket Removal

1. Lower the bucket to the ground. The bottom of the bucket should be flat on the ground.

2. Remove the snap rings that retain the two mounting pins. Keep all parts in a box or in the bucket. Drive out pins.

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