

1150 CRAWLER

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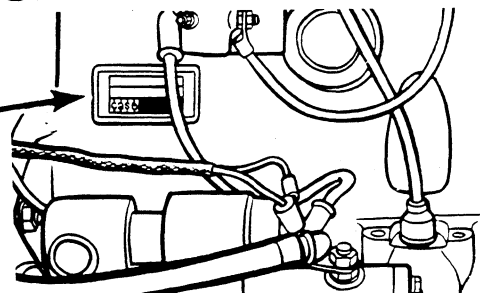
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Section 1010

GENERAL ENGINE SPECIFICATIONS 1150 CRAWLERS

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



DIESEL ENGINES

General

Type	6 Cylinder, 4 Stroke Cycle, Valve-in-Head.
Firing Order	1-5-3-6-2-4
Bore	4-1/8 Inches
Stroke	5 Inches
Piston Displacement	401 Cubic Inches
Compression Ratio	16.5 to 1
No Load Governed Speed	(Dozer) 1990 RPM (Loader) 2060 RPM
Rated Engine Speed	(Dozer) 1850 RPM (Loader) 1900 RPM
Engine Idling Speed	725 to 775 RPM
*Valve Tappet Clearance (Exhaust)	(Hot) .020 Inch
(Intake)	(Cold) .025 Inch (Hot and Cold) .015 Inch

*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 Bearing	Replaceable Precision, Steel Back, Copper-Lead Alloy Liners

Main Bearings

Number of Bearings	7
Type Bearings	Replaceable Precision Steel Back, Copper-Lead Alloy Liners

Engine Lubricating System

Crankcase Capacity	14 Qts.
with Filter Change	15 Qts.
Oil Pressure	45 to 55 Pounds with Engine Warm and Operating at Rated Engine Speed
Type System	Pressure and Spray Circulation
Oil Pump	Gear Type
Oil Filter	Full Flow Spin on Type

Fuel System

Fuel Injection Pump	Robert Bosch, Type PES Multiple Plunger
Pump Timing	29 Degrees Before Top Dead Center (Port Closing)
Fuel Injectors (Prior to Engine SN 2504221)	Pencil Type (Opening Pressure 2800 PSI)
(Starting With Engine SN 2504221)	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

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GENERAL TORQUE SPECIFICATION TABLE (Revised 7-72)

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				Torque				
Bolt Size		Foot Pounds		Meter Kilograms		Foot Pounds		Meter Kilograms		
Inches	Millimeters	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
1/4	6.35	9	11	1.2	1.5	12	15	1.7	2.1	
5/16	7.94	17	20.5	2.4	2.8	24	29	2.3	4.0	
3/8	9.53	35	42	4.8	5.8	45	54	6.2	7.5	
7/16	11.11	54	64	7.5	8.9	70	84	9.7	11.6	
1/2	12.70	80	96	11.1	13.3	110	132	15.2	18.3	
9/16	14.29	110	132	15.2	18.3	160	192	22.1	26.6	
5/8	15.88	150	180	20.7	24.9	220	264	30.4	36.5	
3/4	19.05	270	324	37.3	44.8	380	456	52.6	63.1	
7/8	22.23	400	480	55.3	66.4	600	720	83.0	99.6	
1	25.40	580	696	80.2	96.3	900	1080	124.5	149.4	
1-1/8	25.58	800	880	110.6	121.7	1280	1440	177.0	199.2	
1-1/4	31.75	1120	1240	154.9	171.5	1820	2000	251.7	276.6	
1-3/8	34.93	1460	1680	201.9	232.3	2380	2720	329.2	376.2	
1-1/2	38.10	1940	2200	268.3	304.3	3160	3560	437.0	492.3	
						★ Thick nuts must be used with Grade 8 bolts				

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.

SECTION

CC

SPECIFICATIONS FOR

CASE A401 DIESEL

ENGINES

INTRODUCTION

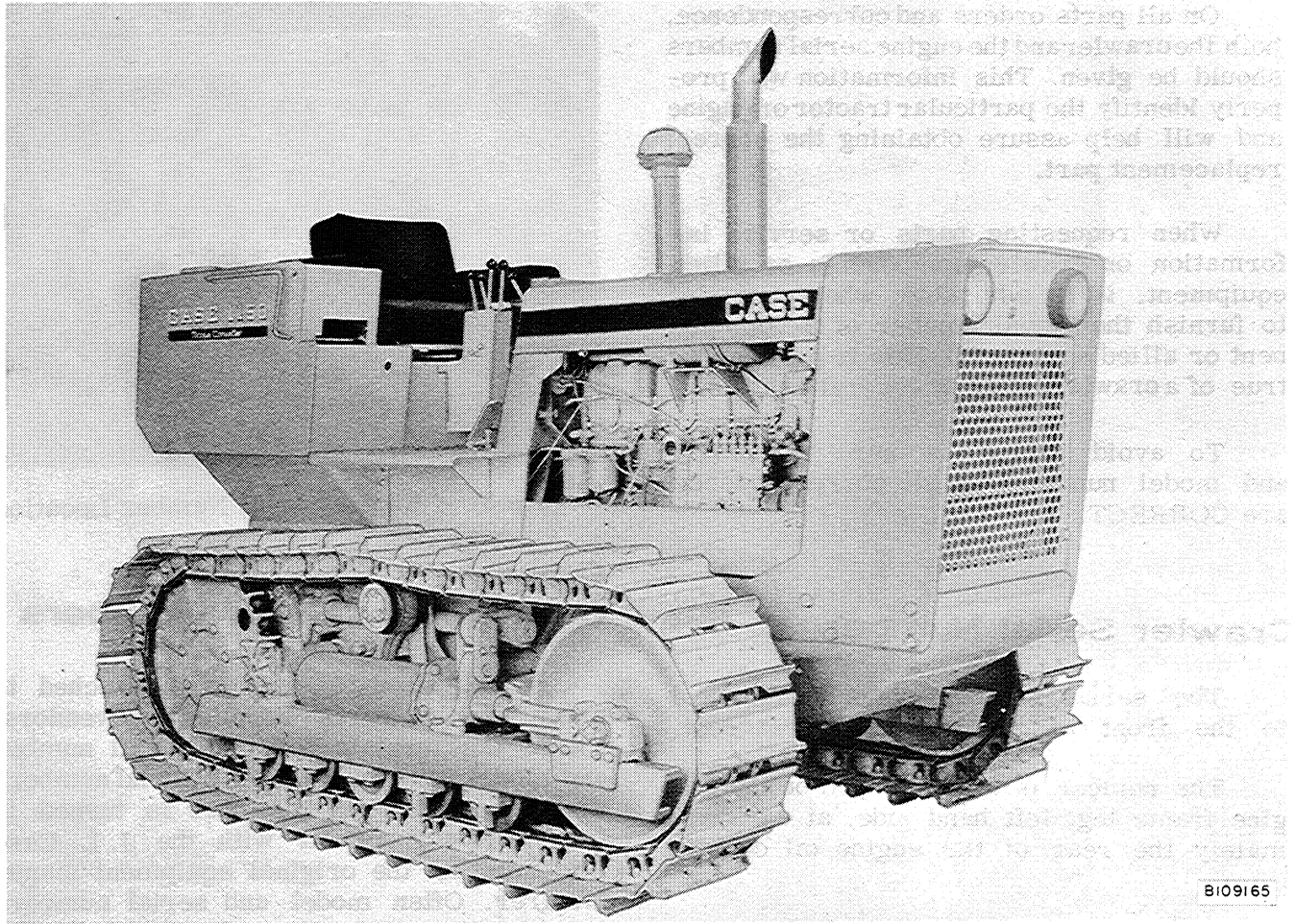


Figure 1 - Model 1150 Crawler

The Model 1150 Crawler is a powerful diesel-powered unit engineered and built to high J. I. Case Company standards. A wide variety of rugged, versatile attachments are available as optional equipment that adapt the Model 1150 Crawler for use in literally hundreds of applications.

The illustrations, photos, and informative text contained in this manual will enable the mechanic to disassemble, ser-

vice, and adjust the engine, basic crawler, crawler components, and allied equipment.

The J. I. Case Company continually strives to improve the performance dependability and serviceability of its machines through better engineering and manufacturing methods. Therefore, the right is reserved to change specifications, given in this manual, without notice or without incurring any obligation relating to such changes.

*A Clean, Well Equipped Service Shop
Builds Customer Confidence
and Volume Sales.*

SERIAL NUMBERS

On all parts orders and correspondence, both the crawler and the engine serial numbers should be given. This information will properly identify the particular tractor or engine and will help assure obtaining the correct replacement part.

When requesting parts or service information on crawler components or allied equipment, it is advisable, when possible, to furnish the serial number of the component or allied equipment. This is particularly true of a crawler which is several years old.

To avoid delays, be sure the serial and model numbers on all correspondence are CORRECT.

Crawler Serial Number

The serial number plate is fastened to the front of the left hand arm rest.

The number is also stamped on the engine frame leg, left hand side, at approximately the rear of the engine oil cooler.



Figure 2 - Crawler Serial Number Plate

Engine Serial Number

The engine serial number plate is fastened to the lower right side of the engine block.

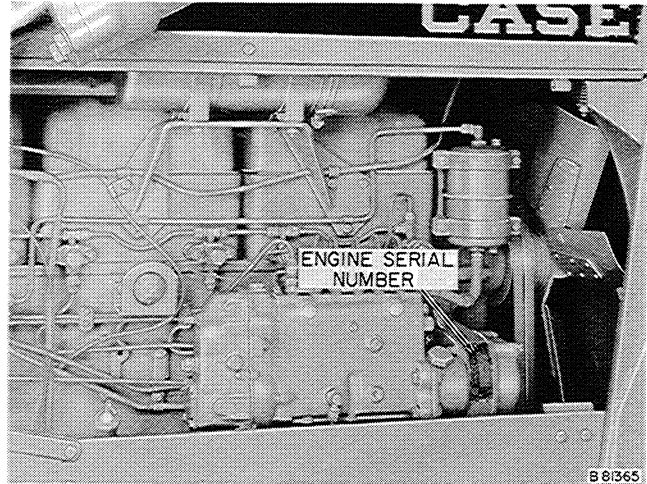


Figure 3 - Engine Serial Number Location

Other Components Serial Numbers

Serial number tags are attached to many of the parts supplied by vendors. These tags contain both the serial number and model number of the unit. Serial numbers are required when the part is turned in for warranty credit with the J. I. Case Company or the original equipment manufacturer. Often model and serial numbers are necessary to obtain the proper parts.

Internal changes made by the vendor are recorded against the unit's model and serial number making it necessary that these numbers be available for parts identification. Always list both the model and serial numbers in correspondence. Following are vendor items which have serial number plates:

1. Fuel Injection Pump
2. Starter Motor
3. Generator
4. Hydraulic Equipment Pump
5. Torque Converter Pump
6. Hydraulic Equipment Valve
7. Transmission Control Valve

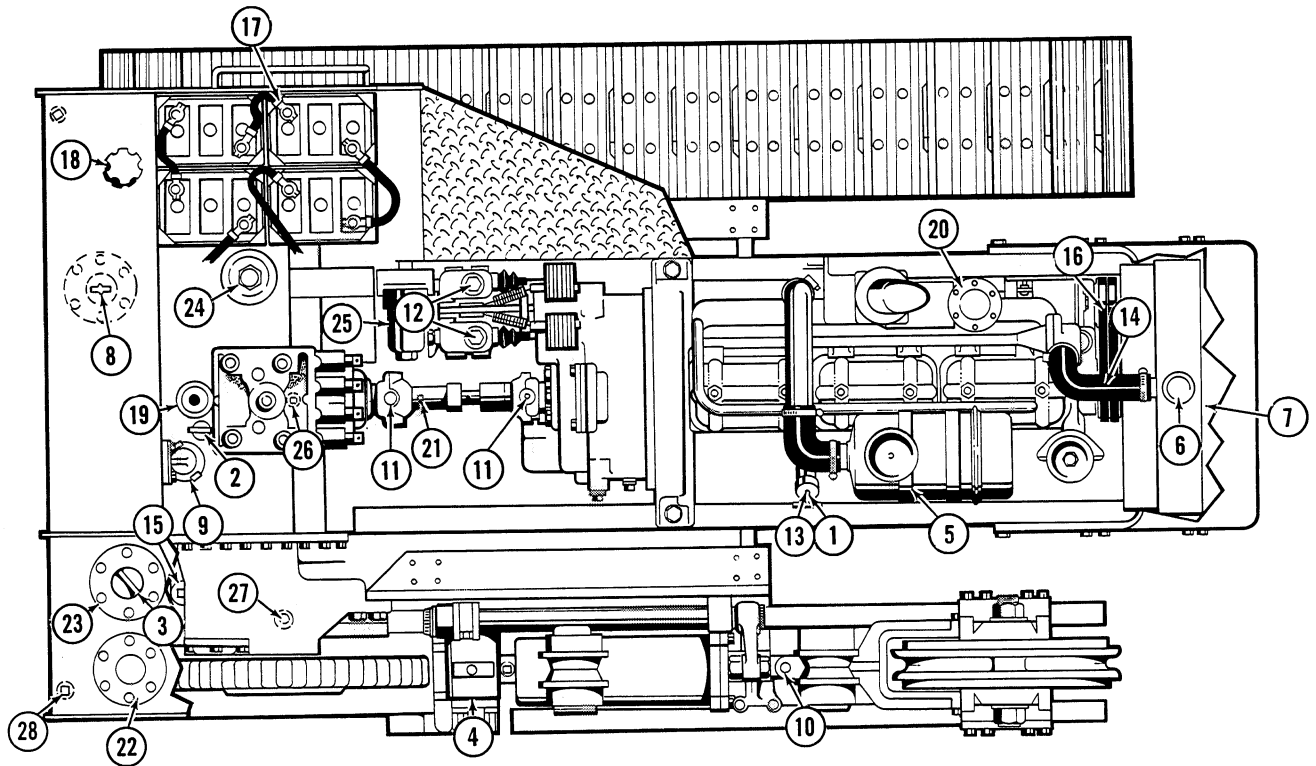
NOTE

Serial number locations of the torque converter, transmission, and allied equipment are shown in the individual sections of this manual that describe each piece of equipment.

The 28 items in the list above require attention at regular intervals if the crawler is to perform to its outstanding capabilities.

When the crawler is brought in for

servicing, it is likely that one or more of these 28 maintenance operations is due or past due. The need and importance of these operations should be made clear to the customer in terms of money saved, reduced "down time", and better performance.



BN43065

Figure 5 - Regular Maintenance Items--See Opposite Page

Engine Oil Recommendations

SAE VISCOSITY

Average Daytime Air Temperature

SAE 30 (SERVICE DS)	Above 80° F.
SAE 20-W (SERVICE DS)	From 80° F. to 32° F.
SAE 10-W (SERVICE DS)	From 32° F. to -20° F.
SAE 5W-20 (SERVICE DS)	-20° F. and below

It is extremely important that a stable, high quality engine lubricating oil be selected for use in the Case Diesel Engine. It is also extremely important that the correct weight (SAE Viscosity Rating) of oil be selected for the prevailing air temperature.

Using lubricating oils of the recommended SAE Viscosity Rating assures you that the oil will remain fluid or free flowing within the specified temperature ranges.

The use of either heavier or lighter body oils than recommended may seriously affect engine lubrication and performance. Too light an oil used during warm temperatures may result in high oil consumption and is apt to cause increased engine wear. Using too heavy an oil during cold weather will affect starting, and may result in a poor rate of lubricant distribution, causing increased wear. Stay with one brand of oil once selected. Do not mix brands.

Maintenance Schedule

ITEM 1 - CHECKING CRANKCASE OIL LEVEL

The oil level should be checked daily by the operator and every time the crawler is brought in for servicing.

DO NOT OVERFILL THE CRANKCASE. Add oil that meets the specifications set forth on page 11.

NOTE!

If the Crawler is to operate under a heavy, constant load during extremely cold weather, it is advisable to use SAE 10-W oil. It may therefore be necessary to drain the oil while it is still hot and preheat it to approximately 100° F., before pouring it back into the crankcase, just prior to starting.

ITEM 2 - CHECKING TRANSMISSION OIL LEVEL

The oil level gauge is located on top of the transmission and should be checked daily by the operator and every time the crawler is brought in for servicing. Add Case Hi-Lo TCH oil if necessary.

ITEM 3 - CHECKING HYDRAULIC OIL LEVEL

The hydraulic reservoir is located behind the operator on the right rear side of the Crawler. The oil level dipstick is attached to the tank cap. The oil level should be checked after the system has warmed up. All hydraulic cylinders on front mounted equipment, must be retracted. The Backhoe, if used, must be in transport position.

To check oil level, remove the dipstick by turning cap counterclockwise. The oil level should be to the mark on the dipstick. If necessary, add oil to bring level to the mark on the dipstick. DO NOT OVERFILL!

During cold weather the Crawler engine should be operated for 10 - 15 minutes to

allow the hydraulic oil to "warm up" before checking the level or operating the system.

ITEM 4 - LUBRICATING PIVOT AXLE

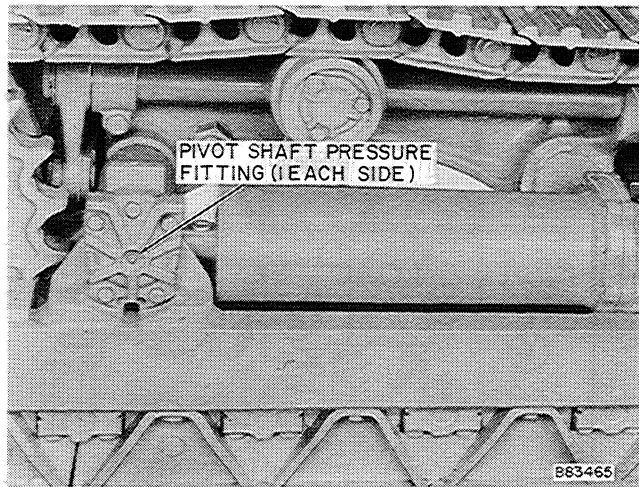


Figure 6 - Pivot Axle Lubrication Point

The pivot axle is lubricated by a pressure fitting located in the end cap on each side of the crawler. Lubricate until clean grease can be seen around the pivot axle.

ITEM 5 - AIR CLEANER

For further information on air cleaner servicing, refer to Section IV.

ITEM 6 - COOLING SYSTEM

For further information on cooling system maintenance, see Section III.

ITEM 7 - RADIATOR

For further information on radiator maintenance and cleaning, see Section III.

ITEM 8 - FUEL TANK WATER TRAP

For further information on the engine fuel system, see Section II.

ITEM 9 - FUEL SEDIMENT BOWL

For further information on the engine fuel system, see Section II.

ITEM 10 - ADJUSTING TRACK TENSION

Track tension adjustment is described in Section VIII.

ITEM 11 - UNIVERSAL JOINT LUBRICATION

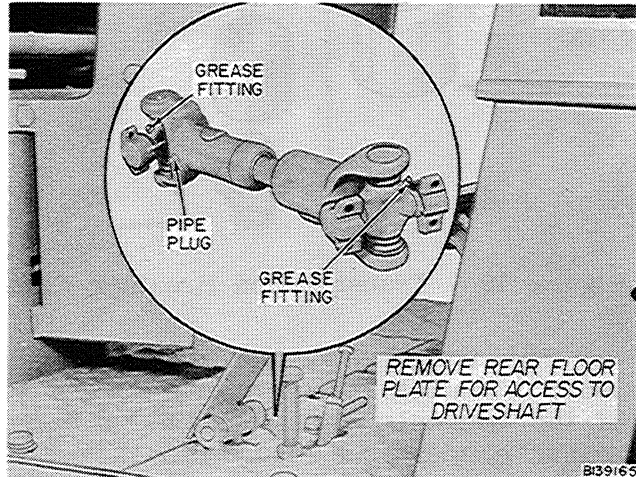


Figure 7 - Universal Joint Lubrication Points

Every 120 hours lubricate as follows:

1. Remove the rear floor board;
2. Turn the driveshaft until the pressure fittings are in the right position.
3. Lubricate until clean grease appears around the seals. Do not use a high pressure gun.
4. Replace the floor board.

ITEM 12 - BRAKE MASTER CYLINDERS

Brake fluid level in the master cylinders should be checked after each 120 hours of operation. The master cylinders are located under the rear floor plate on the left side of the Crawler. Remove the rear floor plate for access to the master cylinders. Fluid level should be even with the bottom lip of the filler cap opening. Use a brake fluid meeting SAE 70 RI specifications.

ITEM 13 - CHANGING CRANKCASE OIL

The engine crankcase should be drained and refilled with new oil every 120 hours or

TWICE A MONTH. Oil specifications are given on page 11.

If the engine service is severe — frequent stopping and starting, low operating temperature — the crankcase should be drained more often to prevent the formation of sludge or harmful deposits in the engine.

When just the crankcase is drained, always refill with 13 measured quarts of oil. Do not refill using the dipstick as a guide. When the crankcase is drained and the oil filter element replaced, pour in 15 measured quarts, operate the engine for a few minutes to fill the filter body and check for leaks. Then check the oil level with the dipstick. Be sure to allow sufficient time for the oil to run down off the engine parts.

By following the above procedure, you will prevent overfilling or underfilling the crankcase; either of which can be detrimental to the engine service life.

ITEM 14 - FAN SHAFT BEARING



Figure 8 - Lubricating Fan Shaft Bearing

The fan shaft bearing is lubricated by a grease fitting on the water pump housing. Two strokes of No. 1 Lithium "soap-base" grease from a pressure gun every 120 hours is sufficient. Use No. 1 grease only.

ITEM 15 - CHECKING FINAL DRIVES OIL LEVEL

Check the final drives oil level every

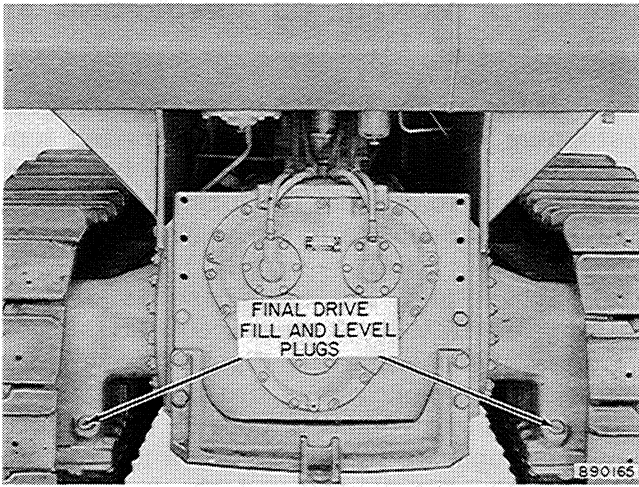


Figure 9 - Location of Final Drives Plugs

120 hours. With the Crawler on level ground, remove the oil level plug located on each final drive housing, see Figure 9, and inspect the oil level. The oil level must be even with the plug.

If it is necessary to add oil, pour the SAE #90 mild type extreme pressure gear lubricant into the filler opening until the oil is even with the level plug opening. THE OIL MUST BE ADDED SLOWLY TO INSURE THE PROPER OIL LEVEL IS REACHED.

ITEM 16 - FAN BELT TENSION

Properly adjusted Vee belts can be depressed 1/2 inch midway between the generator pulley and the fan pulley. To tighten the belts, loosen the generator mounting bolt at the adjusting strap and swing the generator further away from the engine.

For further information, see Section III.

ITEM 17 - BATTERIES

For information on battery care and maintenance, see Section V.

ITEM 18 - FUEL TANK STRAINER

For information on the engine fuel system, see Section II.

ITEM 19

TRANSMISSION BREATHER FILTER

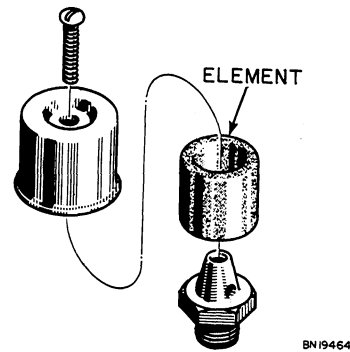


Figure 10 - Transmission Breather Filter

The transmission breather filter is located beneath the operator's seat on top of the transmission. It contains an "edge-wound" element, see Figure 10.

The transmission breather filter element should be removed, cleaned, and inspected after each 120 hours of operation. The element is readily cleaned by soaking in solvent and back blowing with compressed air.

ITEM 20 - ENGINE OIL FILTER

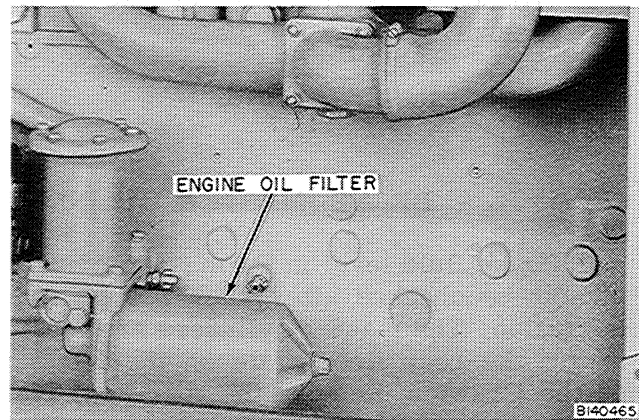


Figure 11 - Changing Engine Oil Filter

Change the engine oil filter after the first 20 hours of operation and each 240 hours thereafter. To change the filter:

1. Loosen the hex, head bolt on the filter shell until the shell and element can be lifted off the base together.

2. Pull the contaminated element out of the shell, and flush the shell and filter base with clean diesel fuel.
3. Install a new Case Filter Element on the bolt. Be sure the element is installed as shown in Figure 11. Be careful not to push the rubber grommet seal out of the element.
4. Install the new gasket provided with the element.
5. Position the shell and element on the base and tighten the bolt just enough to form a seal. **DO NOT OVERTIGHTEN.**
6. Operate the engine and check for leakage.

If leakage is observed between the shell and bolt head, a new gasket must be installed.

You cannot determine the condition of an oil filter element by its appearance. While an element may not appear to be excessively dirty, it may be completely contaminated with extremely fine particles of abrasive material. **CHANGE THE OIL FILTER AT THE RECOMMENDED TIME INTERVALS.**

ITEM 21 LUBRICATING SPLINE ON DRIVESHAFT

Every 600 hours, the pipe plug on the driveshaft should be removed and the opening filled with Lithium "soap-base" grease. See Figure 7.

ITEM 22 HYDRAULIC OIL FILTER (RETURN)

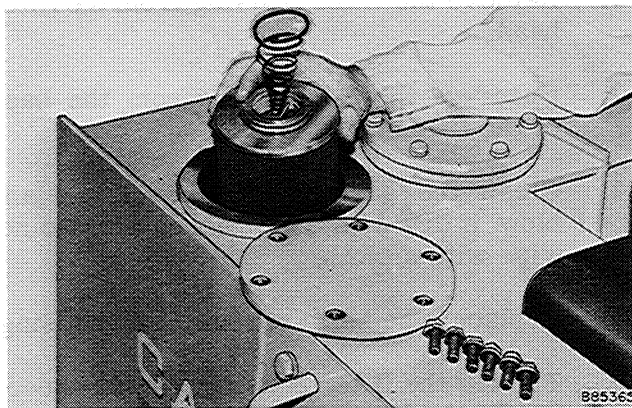


Figure 12 - Return Line Filter

A hydraulic filter is located in the return line between the equipment control valve and the hydraulic reservoir. This filter contains a 40-micron throw-away element of paper which will filter out particles as small as 40/1000 of a millimeter.

1. Remove the round bolt on cover (without the screw on cap) on top of the hydraulic reservoir.
2. Pull out the filter assembly.
3. Remove the retaining spring and relief valve assembly and clean in solvent. Discard the paper element.
4. Install the retaining spring and relief valve assembly in a new element.
5. Place the filter into position and install the cover. Use a new gasket under the cover if the old gasket was damaged.

ITEM 23 HYDRAULIC OIL FILTER (SUCTION)

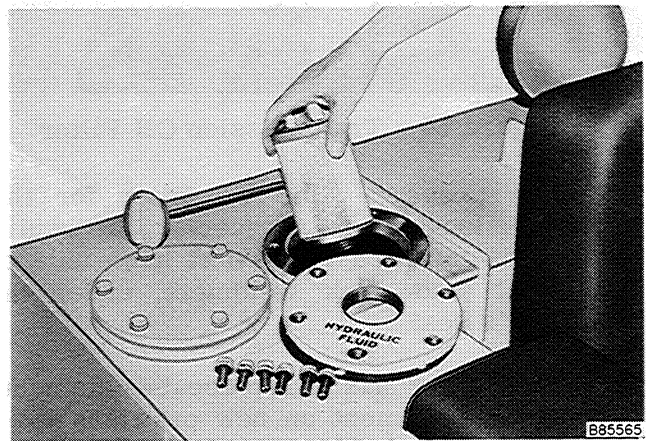


Figure 13 - Suction Line Filter

A suction line filter (or screen) is located in the bottom of the hydraulic tank. The element is reusable.

This filter has a 200 wire mesh metal screen element which is non-corrosive and non-toxic.

1. When the hydraulic oil is well below normal operating temperature, remove the access cover (with screw on cap) on top of the hydraulic tank.

2. Reach into the reservoir and unscrew the element. Note where the suction line joins the front end of the hydraulic tank—the filter is located at this point.
3. Clean the element with commercial solvent and blow dry with compressed air. Do not wipe with a cloth.
4. Replace the filter in the reservoir and install the cover.

ITEM 24
TRANSMISSION FILTER (PRESSURE)

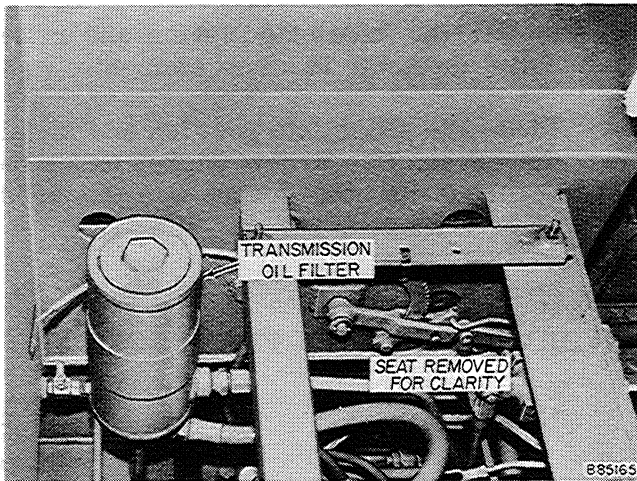


Figure 14 - Transmission Oil Filter

The pressure line oil filter for the transmission-torque converter hydraulic system is mounted to the left hand side of the seat and tank weldment, under the operator's seat.

This filter has a replaceable element. Replace the element on new crawlers after the first 100 hours operation and every 600 hours thereafter.

To change the filter element:

1. Remove the filter cover.
2. Remove and discard the old element. Drain and flush out the filter body with clean diesel fuel before installing the new element.
3. Install the new element.
4. Check the condition of the "O" ring.

and backup washer in the cover. Replace if necessary.

5. Replace the cover and check for leaks.

ITEM 25
TRANSMISSION FILTER (SUCTION)

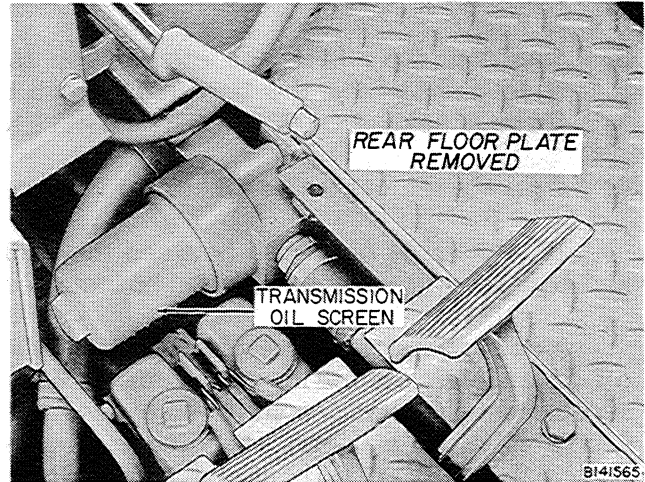


Figure 15 - Transmission Filter Screen

The transmission oil screen is located under the rear floor board on the left hand side of the crawler. Its function is to filter oil for the transmission-torque converter hydraulic system just before it is received by the charging pump. It has a reusable screen element.

Remove and clean this screen every 600 hours of operation as follows:

1. Remove the rear floor board.
2. Remove the filter housing from the filter head.
3. Unscrew the oil screen from the base of the filter housing.
4. Clean the screen with diesel fuel and blow it dry with compressed air. Do not wipe with a cloth.
5. Replace the oil screen and housing.
6. Tighten the filter housing. Do not exceed 90 ft. lbs. torque. Start the engine and check for leaks.

ITEM 26 - CHANGING TRANSMISSION OIL

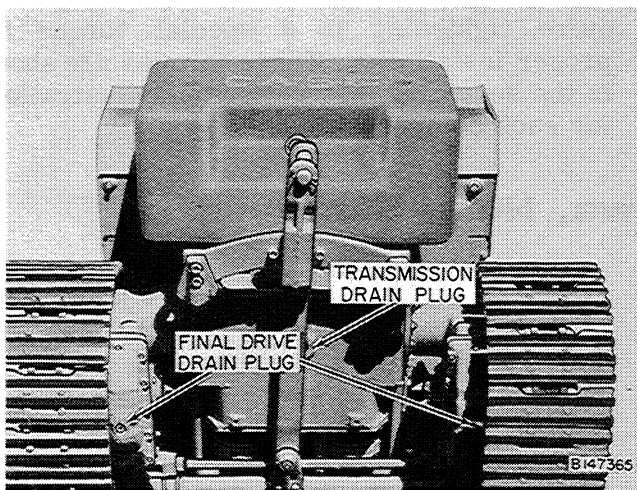


Figure 16
Transmission and Final Drives Drain Plugs

After each 1200 hours or at least once a year, the transmission and torque converter hydraulic system should be drained, and the system refilled with a new supply of Case Hi-Lo TCH Oil. To do this:

1. Remove the transmission oil level gauge to provide an air inlet for faster drainage.
2. Position a drain pan to receive the oil from the transmission drain plug.
3. Remove the transmission drain plug and allow the system to drain completely.
4. Remove the filter element (See Item 24).
5. Clean the filter body and install a new filter element.

6. Replace and tighten the transmission drain plug.
7. Clean the transmission oil screen (see Item 25).
8. Refill with Case Hi-Lo TCH Oil until the level of the oil reaches the mark on the dipstick.
9. Replace the dipstick and the cap on the filler tube.

ITEM 27 CHANGING FINAL DRIVES LUBRICANT

Drain the final drives after every 1200 hours operation or twice a year, whichever occurs first. See Figure 16 for the location of the drain plugs.

After the oil has been completely drained, replace the drain plugs, and refill with the proper lubricant as described under item 15, "Checking Final Drives Oil Level".

ITEM 28 - CHANGING HYDRAULIC OIL

After the first 120 hours operation, drain the factory installed hydraulic oil. Then every 1200 hours thereafter, drain the hydraulic oil and replace it with 14 U.S. gallons of clean Case Hi-Lo TCH oil.

The reservoir is drained by removing the plug on the underside of the reservoir. Loosen or remove the top cover to balance air pressure.

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Good Service
At A Profit*

GENERAL DESCRIPTION

Specifications

Type of System Pressurized, thermostat controlled, continuous bypass type; forced circulation
Coolant capacity 13 U.S. gallons
System pressure 7 psi or 15 psi, depending on radiator cap
Thermostat temperature control Starts to open at 180° F., completely open at 204° F.

Circulation

Coolant is circulated through the crawler's 13 gallon capacity cooling system by an impeller type pump which is driven off the engine crankshaft by means of Vee belts.

From the top of the radiator, the coolant circulates through the radiator and down into a distributor gallery in the engine block. It then passes the entire length of the cylinder sleeves into the cylinder heads. Here it enters the water manifold and travels back to the top of the radiator to be cooled and recirculated.

Thermostat

A thermostat and bypass hose are located in the cooling system to control temperature and circulation of the coolant. The thermostat housing is at the front of the engine block and is joined to the radiator by the inlet hose.

When the coolant is below 180° F., the thermostat is closed and blocks the coolant flow to the radiator. The coolant then must flow through the bypass hose and be recirculated through the engine until it reaches a temperature of 180° F.

At this temperature, the thermostat starts to open and allows coolant to flow through the radiator. At 204° F. the thermostat is completely open.

When the thermostat is fully open, the bypass is closed and the coolant must pass into the radiator.

Radiator

The radiator is the copper tube and fin type in which the coolant enters at the top, passes through the tubes and is returned to the water pump from the bottom hose outlet. It is capable of handling 50 gallons of coolant per minute.

The radiator cap is a spring loaded, pressure type cap which pressurizes the cooling system to 7 psi or 15 psi, depending on the model. At these pressures, water must be heated to 230° F. (7 psi cap) or 240° F. (15 psi) before it boils. By raising the boiling temperature, losses of coolant by surging, evaporation, or boiling away are reduced.

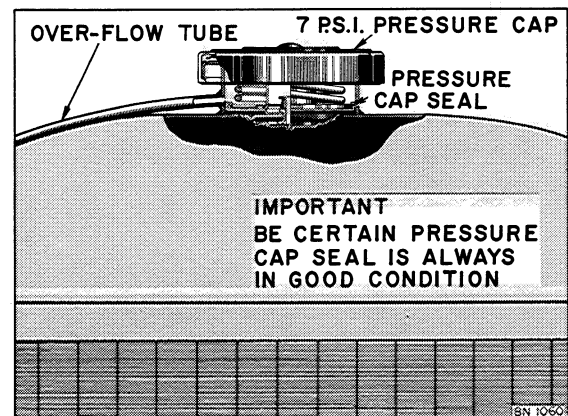


Figure 1 - Pressure Cap

Incorporated within the radiator is a transmission-torque converter oil cooler. This cooler contains tubing for cooling the oil. These tubes are completely submerged in coolant. Oil from the torque converter enters the cooler, flows the length of the radiator, and emerges out the other side at a lowered temperature. The oil then flows back to the transmission.

Fan

A large fan moves air past the radiator tubes and dissipates excess heat. Depending on attachments and time of production, the fan may be a pusher type with sandblast radiator or a suction type. The pusher type blows air away from the operator; the suction type draws air through the radiator and blows it back over the engine block.

Engine Oil Cooler

The crawler employs a heat exchanger to cool the engine lubricating oil. Located on the left hand side of the engine block,

the cooler is designed so that oil passes through tubing surrounded by coolant from the cooling system. The oil is cooled and able to absorb engine heat, on its next cycle, from engine parts not reached by other coolant.

Servicing procedures relating to the engine oil cooler are covered in Section II.

Water Pump

An impeller type water pump circulates coolant throughout the engine block. The water pump is driven off the crankshaft by means of Vee belts. The water pump is located just behind the fan at the forward end of the engine block.

DRAINING AND FILLING THE COOLING SYSTEM

1. Drive the crawler onto a level surface. Remove the radiator cap.

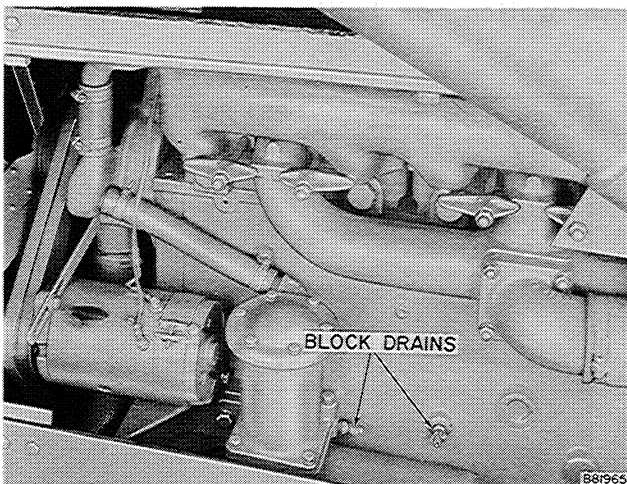


Figure 2 - Drain Cock Locations

2. Open the drain cock on the bottom of the radiator and allow the coolant to drain into a clean container, if it is to be reused.
3. Open the cylinder block drain cocks located on the left side of the engine block.
4. When the system has drained completely

through both openings, close the drain cocks.

5. Fill the cooling system until the coolant reaches a level of two inches below the bottom of the radiator neck.
6. Run the engine approximately five minutes to bleed air out of the system. Re-check coolant level and add coolant, if necessary.

NOTE: If engine overheats or throws water out the overflow pipe after filling and bleeding, air may still be trapped in the system. Remove the radiator cap, open the block drain and let coolant out until a steady stream runs out. Add coolant slowly as coolant level drops. This procedure can be repeated, if necessary.

Anti-Freeze

Use a reliable brand of anti-freeze. USE ONLY A PERMANENT TYPE ANTI-FREEZE OF ETHYLENE GLYCOL BASE.

Do not use, under any circumstances, an anti-freeze of unknown composition. Do not use corrosive solutions such as salt

CLEANING THE COOLING SYSTEM

It is recommended that the cooling system be cleaned at least twice a year.

Where hard water is used, the system should be cleaned more often.

The two best times to clean the system are at the beginning of cold weather (before adding anti-freeze) and again when the anti-freeze is drained for warm weather operation.

IMPORTANT!

Crawler engines regularly create temperatures 40 times hotter than the hottest summer day. Anything which disrupts coolant flow to an engine immediately creates heat to do severe damage to parts.

Although crawler engines run hot (180° to 204°), close and continuing control of this heat is vital for longer, more trouble-free engine life.

Cleaning Materials

There are many good commercial cleaners on the market for cleaning radiators. These cleaners vary in concentration and chemical composition.

FOLLOW THE MANUFACTURER'S INSTRUCTIONS CAREFULLY. After the cleaning solution has been in the cooling system the prescribed length of time, drain and flush the system with fresh water.

Reverse Flushing

If the radiator tubes become blocked, or if the coolant is badly discolored and perhaps contains particles of rust or sludge, use a reverse flushing gun for the best cleaning job. Instructions for this unit are given with it; if you no longer have them, follow this procedure:

1. Remove radiator cap. Open radiator and engine block drains. Close drains and add water and commercial cleaner.

2. Operate engine according to manufacturer's directions for the commercial cleaner being used.
3. Stop engine and drain system.

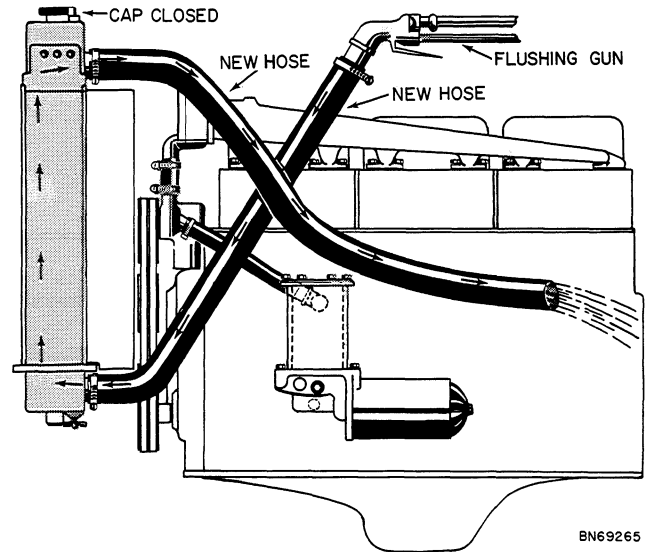


Figure 3 - Reverse Flushing the Radiator

4. Reverse flush the radiator as follows:
 - a. Remove both upper and lower hoses. Attach length of hose to upper radiator pipe to direct overflowing water below engine.
 - b. Install radiator cap.
 - c. Attach flushing gun through a hose to lower radiator connection.
 - d. Turn on water and let it fill the radiator.
 - e. Apply air pressure gradually, to avoid radiator damage.
 - f. Shut off the air, again fill the radiator with water and apply air pressure—repeat until the flushing stream runs out clear.
 - g. Remove hoses.

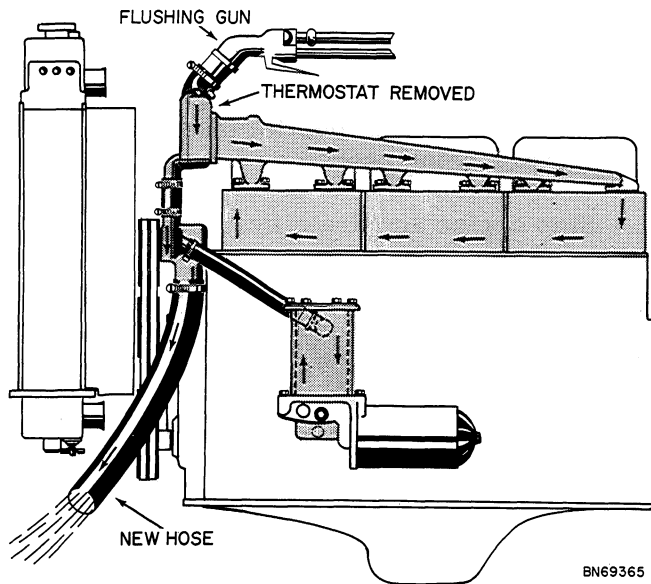


Figure 4 - Reverse Flushing the Engine Block

5. Reverse flush the engine block as follows:
 - a. Remove the thermostat.
 - b. Attach a length of hose to water outlet (upper opening).

- c. Attach a short length of hose to lower coolant connection.
- d. Insert flushing gun into upper hose and run water. Allow to run until clear, then apply air. Alternate air and water until water again runs clear.
- e. Remove hoses. Drain system completely. Replace thermostat, close all drains, install hoses, and fill system with water and rust inhibitor or anti-freeze. Run engine for 10 minutes and check for leaks.

Cleaning Exterior of Radiator

The best method of cleaning the radiator fins is with compressed air. Blow in the opposite direction of normal air flow. A cleaning solvent, such as petroleum spirits, can be used in conjunction with the compressed air if desired. Be sure to provide adequate ventilation if a cleaning solvent is used.

RADIATOR

Removing Shroud and Radiator

1. Remove the latch bolts at each corner of the hood and lift the hood clear of the muffler and air cleaner stacks.
2. Remove the radiator grille.
3. Drain the radiator as follows:
 - a. Carefully and slowly remove the pressure cap.
 - b. Open the drain cocks under the radiator and on the left hand side of the engine block (see page 2).
 - c. Allow all the coolant to drain out.
4. Remove the shroud as follows:
 - a. Remove the sealed beam headlights from the rubber mountings and disconnect.
 - b. On dozer models, disconnect the hydraulic lines and remove the lift cylinders.
5. Remove the capscrew and washer on each side which secures the two radiator mounting straps to the shroud.
6. Attach a hoist to the shroud.
7. Remove the five capscrews and four washers on each side that mount the shroud to the engine frame.
8. Carefully lift the shroud away from the crawler.

IMPORTANT

The shroud also can be tilted forward for radiator removal. Remove four of the five capscrews on each side, leaving either lower front or upper front capscrew in place. Loosen remaining capscrews, then pivot the shroud forward enough to remove radiator. The shroud is very heavy—use hoist or two men when pivoting.

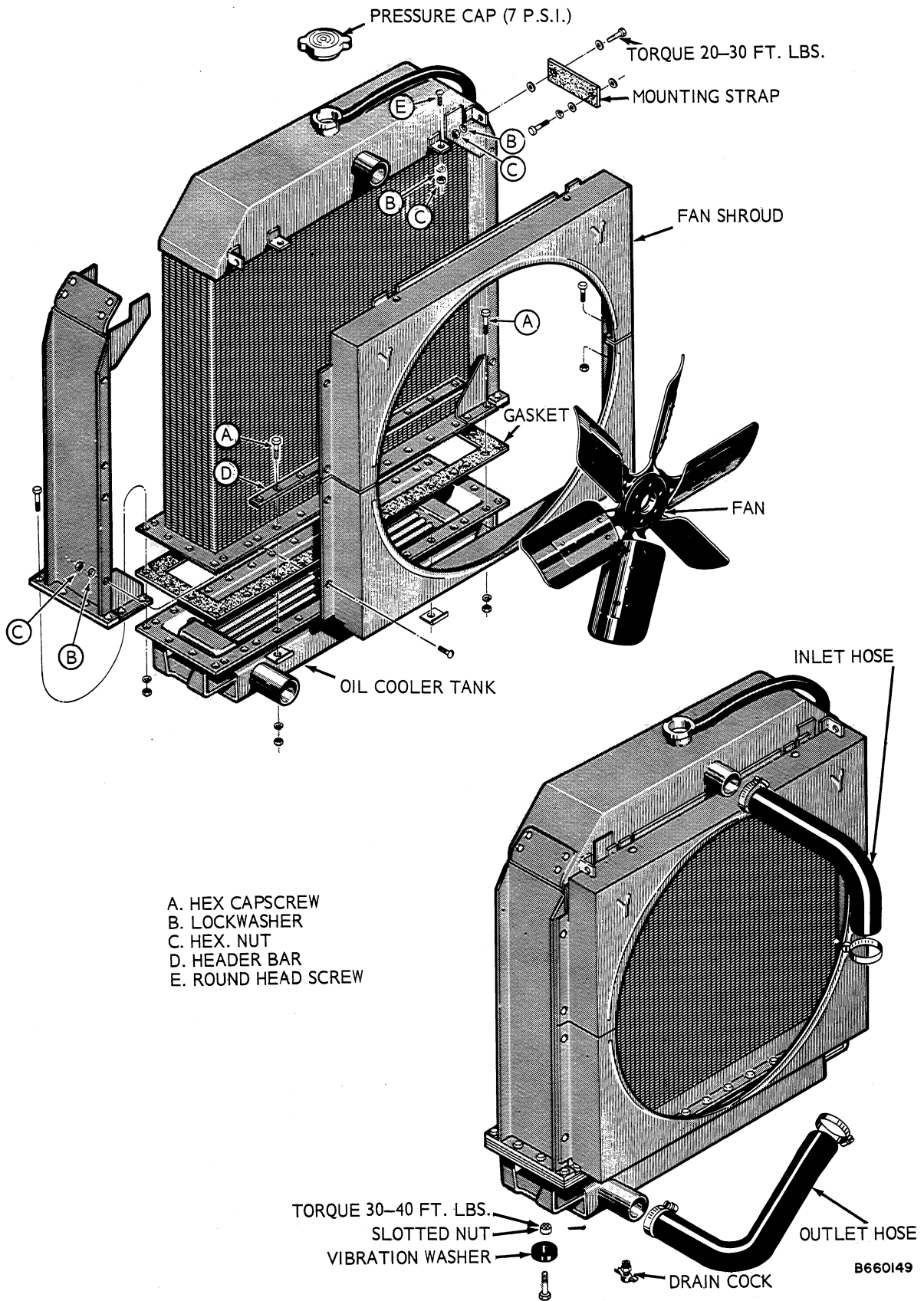


Figure 5 - Exploded View of Radiator

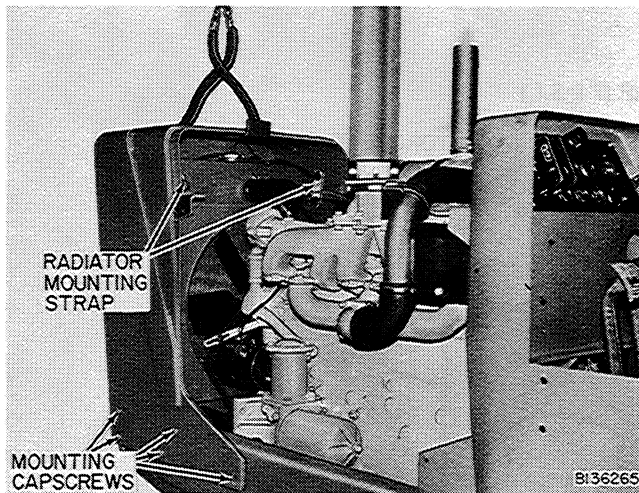


Figure 6 - Removing the Shroud

5. Disconnect the radiator inlet and outlet hoses.
6. Disconnect the short oil cooler hoses from the tubes to the transmission hydraulic system.
7. Remove the cotter pin, slotted nut, capscREW, and fiber washer by which each corner of the radiator is mounted to the engine frame.
8. Remove the radiator, taking care not to damage the fan blade or the radiator core.

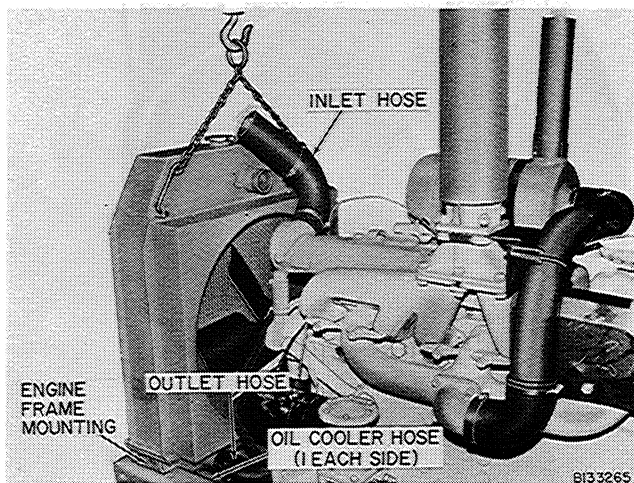


Figure 7 - Removing the Radiator

Inspection and Repair

Repairs to the radiator core, as well as the oil cooler, should be performed by a qualified radiator repair shop. The shop

will have the necessary equipment to properly test the radiator and cooler under actual operating pressures.

Installing Shroud and Radiator

1. Place a fiber washer over the radiator mounting holes on the engine frame.
2. Install the radiator on the washers and tighten the slotted nuts finger tight temporarily.
3. Tilt the radiator forward slightly on its mounting and install the upper and lower hoses. Tighten hose clamps securely.
4. Install the oil cooler hoses. Tighten hose clamps securely.
5. Tighten slotted nuts installed in step 2 to 30-40 ft. lbs. torque and secure with cotter pin.
6. Install the shroud:
 - a. Attach a hoist to the shroud and carefully lift onto engine frame.
 - b. Install five mounting capscrews, nuts, and four washers on each side. Torque the 3/4" capscrews 290-300 foot lbs. Torque the 1" capscrews 660-680 ft. lbs.
 - c. Attach the radiator mounting straps to the shroud. Torque to 20-30 ft. lbs.
 - d. On dozer models, install the lift cylinders and connect the hydraulic lines.
 - e. Connect the headlight wire. Replace headlights in rubber mountings.
 - f. Install the grille.
7. Fill the cooling system. Run the engine approximately five minutes to bleed air out of the system. Check for leaks. Recheck coolant level and add more, if necessary.
8. Install the hood.

CHECKING AND REPLACING THE THERMOSTAT

Maintaining correct coolant temperature depends largely on proper functioning of the thermostat. If the engine is slow to warm up or continually overheats, remove and check the thermostat.

NOTE: With a properly functioning pressure cap, engine temperature can safely reach 230° F. (7 psi cap) or 240° F. (15 psi cap).

Removal

1. Drain the cooling system. See page 2.
2. Remove the hood.
3. Remove the upper radiator hose and the bypass hose. Remove the thermostat housing. The thermostat is located between the coolant manifold and thermostat housing.

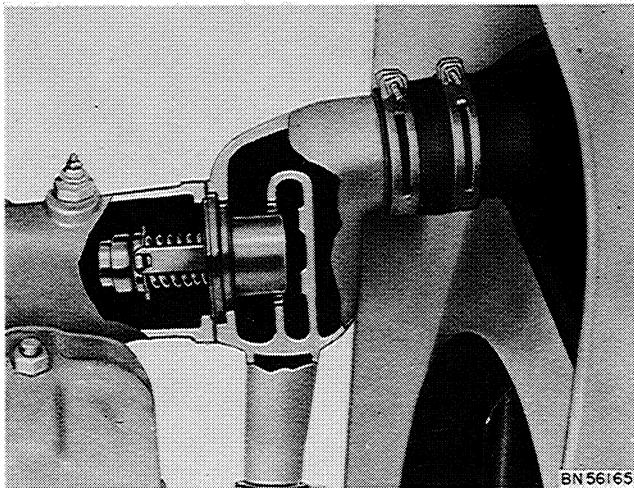


Figure 8 - Removing the Thermostat

Testing the Thermostat

1. Before testing, clean the thermostat thoroughly and examine the spring for distortion. If the butterfly can be pushed off its seat easily or does not seat properly, replace thermostat. Be sure the bleed hole in butterfly is open.

2. Heat a container of water to approximately 180° F. Put a thermometer into the container. Dip the thermostat into the water, but do not allow it to touch bottom.

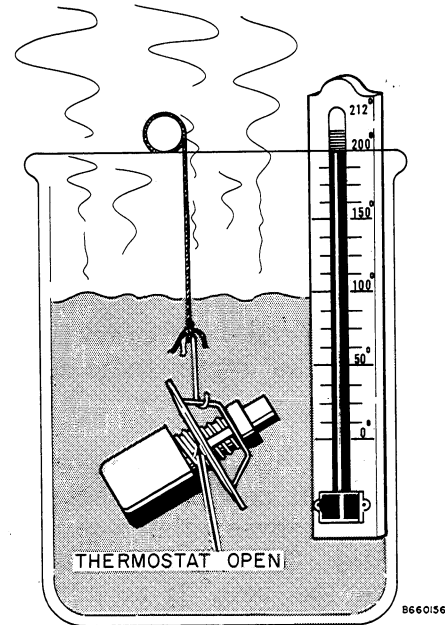


Figure 9 - Testing the Thermostat

3. If the thermostat does not begin to open at the specified temperature, replace the thermostat.
4. Heat the water to approximately 204° and suspend the thermostat in the same way. If the butterfly is not completely open at the specified temperature replace the thermostat. Do not attempt to repair or adjust any thermostat.

Installation

1. Install new thermostat with same heat range as the original (180° F. to 204° F.)
2. Install the thermostat housing with a new gasket on the coolant manifold. Place a thin film of sealing compound on the gasket. Be sure to remove all old gasket material before installing new gasket.
3. Make sure all connections are tight and add coolant. Start the engine and check operating temperature.

FAN

The loader model is equipped with a pusher type fan that blows air through the radiator away from the engine and the operator.

All other models are equipped with the standard suction type fan which draws air through the radiator and blows it back over the engine.

Replacement

1. Use only J.I. Case fans specified for the crawler.
2. The fan is easily removed by removing the four hex. head capscrews and washers that mount the fan to the pulley assembly.

FAN BELTS

The crawler's two fan belts do yeoman service, but they will not perform indefinitely.

Examine carefully for cracking, fraying, or glazing. These signs indicate need for replacement.

Also check belt tension. A properly adjusted fan belt can be deflected 1/2" by hand pressure between the generator pulley and fan pulley. If there is more than 1/2" play, tighten the belt. If no adjustment is left in the generator mounting strap, it indicates the belts are stretched and should be replaced.

Installation

1. Loosen the generator mounting bolts and swing the generator inward.
2. Slip the new Vee belts over the fan onto the fan pulley, then onto the lower drive pulley and the generator pulley.
3. Adjust belts for proper deflection.

IMPORTANT !

The two fan belts are a matched set. Do not replace the belts individually. Always use a matched set.

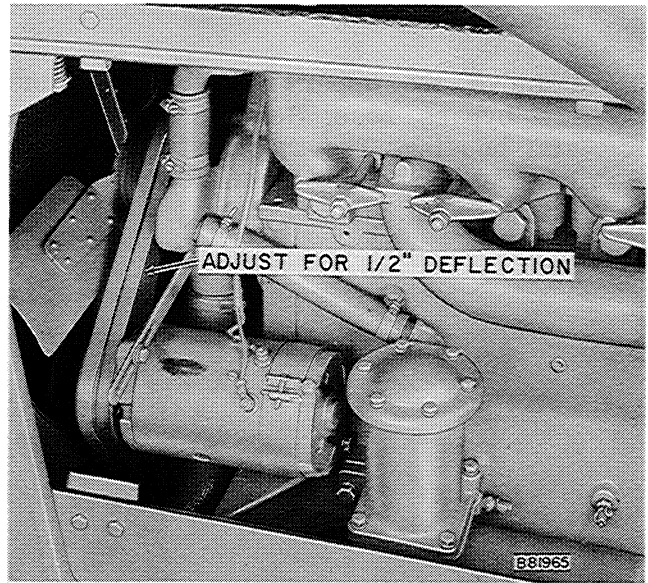


Figure 10 - Fan Belt Adjustment

WATER PUMP

Removal

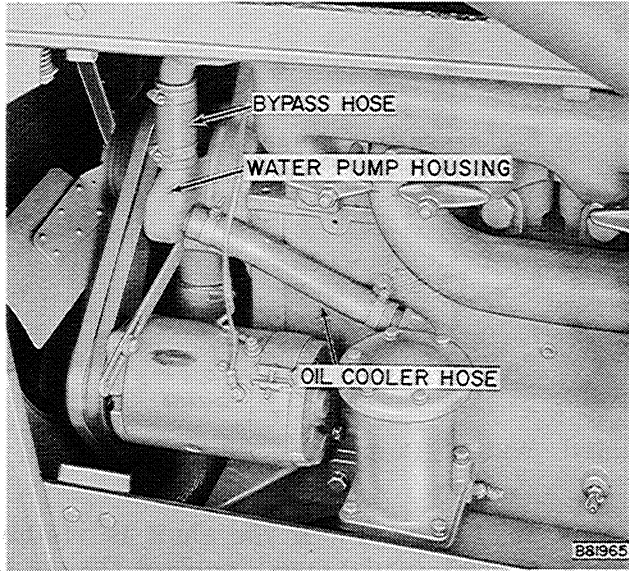


Figure 11 - Removing Water Pump

1. Drain the radiator and engine block. Page 2.
2. Loosen the clamps on the water bypass hose and also on the lower radiator hose.
3. Remove the generator mounting strap from the water pump.
4. Remove the four capscrews and then the fan.
5. Take out the three pump mounting capscrews and studs and carefully pull the pump forward and off.

NOTE

1. A new gasket seal must be installed whenever the pump is removed.
2. The fan shaft must be removed from the pump body to replace the water pump seal.
3. The water pump seal must always be replaced if the pump is disassembled.

Disassembly

1. Loosen and remove the fan pulley retaining nut.
2. Pull the fan pulley from the water pump shaft, using care not to damage or lose the fan pulley key. If the key did not come off with the pulley, it now can be removed.

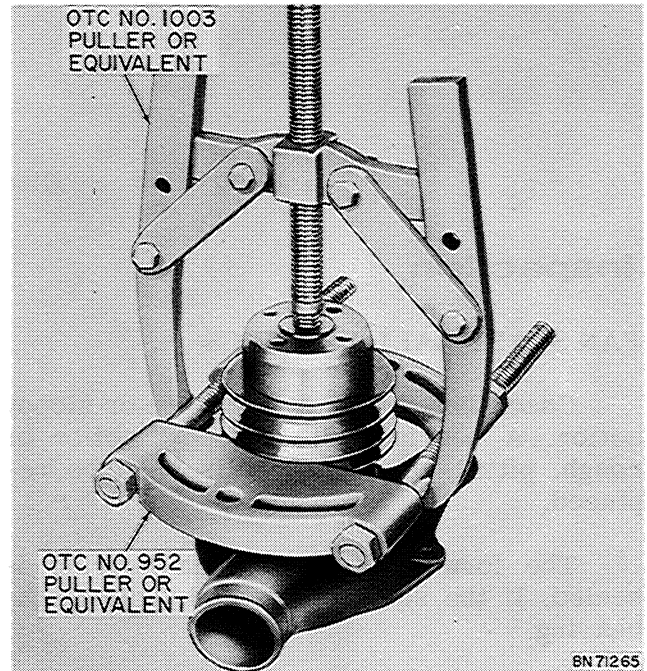


Figure 12 - Removing Fan Pulley

3. Remove the bearing retaining snap ring from the water pump housing.
4. Place the water pump in a press and press out the water pump shaft. Press on the fan end of the shaft.
5. Pull the two bearings and spacer from the pump body.
6. Remove and discard the water pump seal.
7. Place the water pump shaft in a press and remove the impeller.
8. Remove the seat assembly from the impeller using a suitable puller or drive out.



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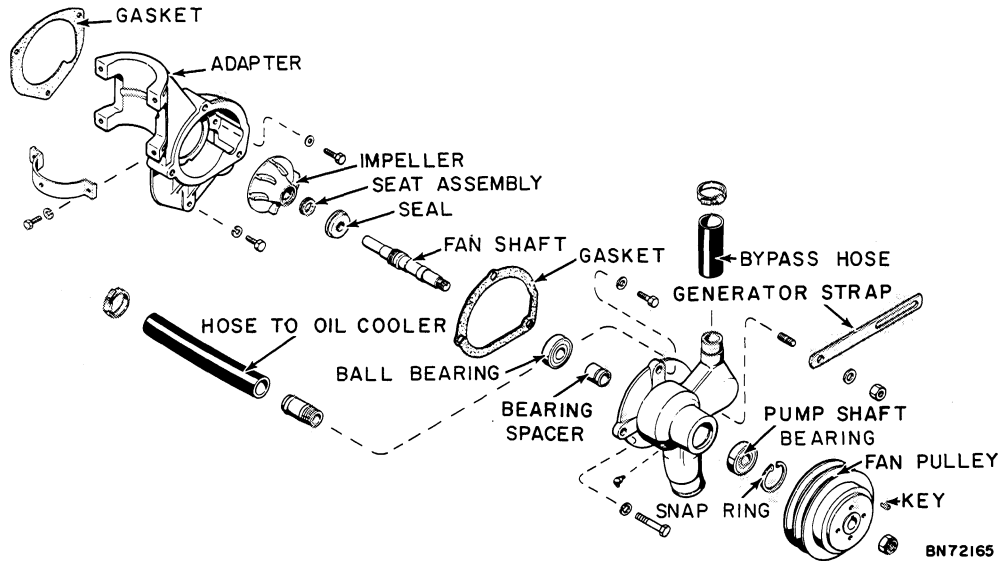


Figure 13 - Disassembled Water Pump

Inspection

FAN SHAFT BALL BEARINGS

Check both bearings for loose or sloppy action. A bearing with "sloppy" action or rough, pitted, or burned balls must be replaced.

The forward side of each bearing is sealed. If the seal is damaged, replace the bearing.

Inspect the spacer and replace if it has rough corners or edges or is damaged in any way.

FAN SHAFT

Check the fan shaft against the dimen-

sions in Figure 14. If the shaft is visibly worn, scored, or damaged, replace the shaft.

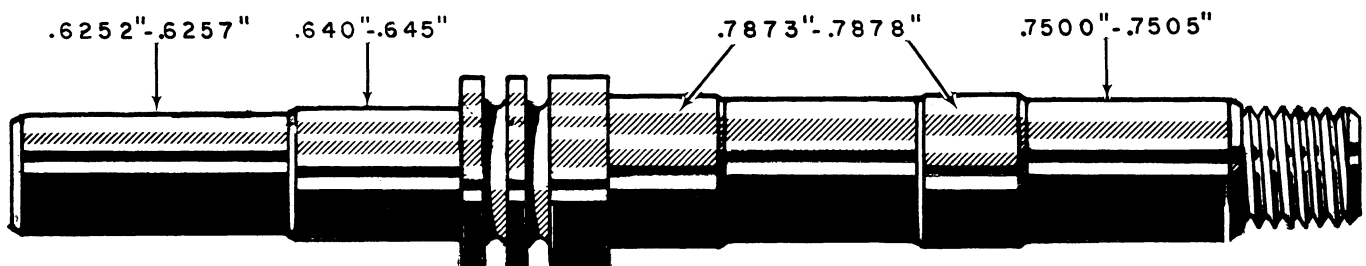
WATER PUMP SEAL

The water pump seal is a press fit in the pump body. The seal is stationary and the fan shaft turns in the bore of the seal. Spring pressure holds the contacting surface of the seal against the seat assembly in the impeller.

Replace the seal when disassembling. A worn or damaged seal will be indicated by leakage at the relief hole in the pump body.

IMPORTANT!

This hole is provided principally to



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Figure 14 - Fan Shaft Dimensions

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