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MODEL 330 AND 340
PAY® HAULERS

FORM

OM-330/340-2

JUNE, 1976

(Supersedes Form OM-330/340-1)

Printed in United States of America

(0376)

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SECTION INDEX

This manual covers the instructions for operation, lubrication, adjustments and maintenance for normal daily care. These instructions are divided into nine sections to simplify your reference to the information most important to you.

This manual has been prepared to help you operate and maintain your machine with utmost efficiency and safety. Read this manual thoroughly and learn your machine before you attempt to operate it.

SECTION 1 — INTRODUCTION

This section discusses generally the use of this manual, serial numbers and how to ship or store this machine.

SECTION 2 — BEFORE STARTING THE NEW MACHINE

This section outlines the special procedures necessary to insure proper "break-in" and care of a new machine.

SECTION 3 — INSTRUMENTS AND CONTROLS

The text and illustrations on instruments and controls in this section are designed to tell you "where it is, what it does, and how to use it." Read this section carefully.

SECTION 4 — PREPARING FOR EACH DAY'S WORK

This illustrates the few simple preparations before each day's work to assure a work day free of "down time."

SECTION 5 — OPERATING THE MACHINE

This section outlines and illustrates the step-by-step procedures for starting, operating and stopping the machine.

SECTION 6 — OPERATING TECHNIQUES

A few operating suggestions and techniques are discussed with simple ideas to help ease the work and lengthen the useful life of your machine.

SECTION 7 — SCHEDULED MAINTENANCE

A complete scheduled maintenance procedure is outlined here — one that assures less down-time and expense, and more profit and work from your machine. Read and use this section.

SECTION 8 — MAINTENANCE

Many of the maintenance and adjustment procedures outlined in Section 7 need clear explanation. This section is devoted to explaining the "how to do" in an easy style to help you "do it yourself" and get it right.

SECTION 9 — SPECIFICATIONS AND CAPACITIES

This section covers the capacities, general dimensions and weights, speeds and torques.

INTRODUCTION

GENERAL

The Model 330 and 340 PAY haulers are all wheel drive, rear dumping vehicles. These units are powered by an International DT-817 Series "C," turbocharged and intercooled diesel engine, a single stage torque converter, and a twelve speed powershift transmission. These units are equipped with a full time hydraulic steering and dump body hydraulic system and an air over hydraulic, axle by axle braking system. For more detailed information refer to "SPECIFICATIONS" in Section 9.

Any cross references in this manual are to a specific section of the manual.

Some illustrations are of general application of this model and may not show your machine accurately in all details.

Throughout this manual the use of the terms "left," "right," "front" and "rear" must be understood to avoid confusion when following instructions. "Left" and "right" indicate the left and right sides of the machine when facing forward in the operator's seat.

Fig. 1 — Model 330 PAYhauler - Left Front View.

Fig. 1A — Model 340 PAYhauler - Left Front View.

INTRODUCTION

SERIAL NUMBERS

The engine and chassis serial numbers are stamped on a number plate located on the cab door (Fig. 2).

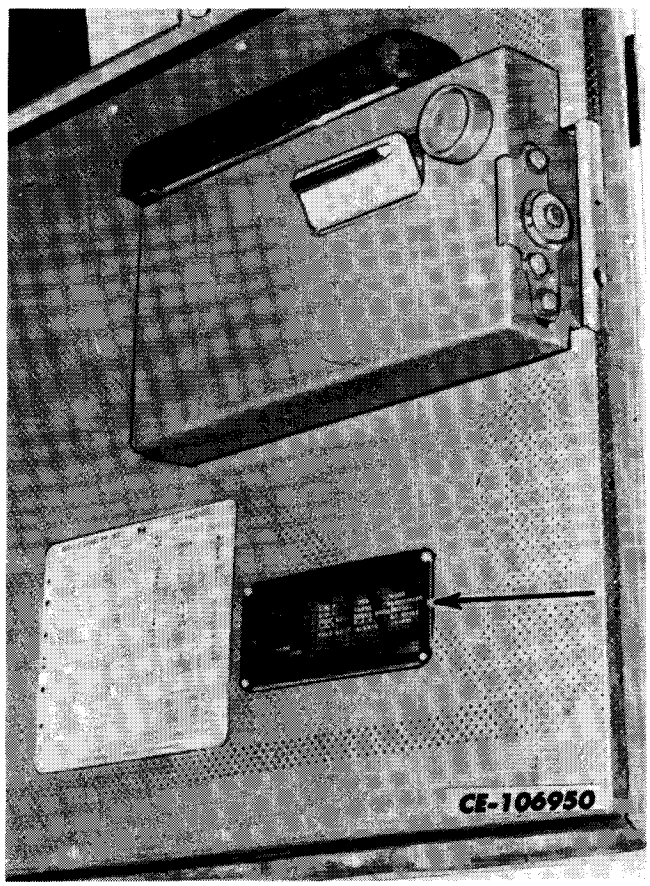


Fig. 2. Serial Number Plate

For convenience, this plate also lists the serial numbers of the transmission, differential and torque converter.

The engine serial number is also stamped on a pad on the right hand side of the engine crankcase below the rear exhaust manifold.

The chassis serial number is also stamped on the LH side outer surface of the front bumper end plate.

All other components having serial numbers are each equipped with a separate serial number plate. Use serial numbers when requesting information or ordering parts. For ready reference, write these serial numbers in the spaces provided.

Engine Serial Number_____

Chassis Serial Number_____

MACHINE TRANSPORT

SHIPPING INSTRUCTIONS

NOTE: *When transporting this machine on a high speed carrier, seal the intake and exhaust pipe openings to prevent turbocharger damage.*

Machines must be empty during transit and the electrical system master switch in the "OFF" position.

Truck

When shipping this machine by truck the state and local regulations may vary. Contact the state and/or local authorities for the proper shipping and loading instructions.

Railroad Flatcar

The loading rules and specifications published by the Association of American Railroads must be followed when shipping this machine on open top railroad cars. Check the manual entitled "Rules Governing the Loading of Commodities on Open Top Cars" at the nearest Railroad Freight Agency.

Driving

If this machine is to be highway driven from one job site to another, contact the state and/or local authorities for roading regulations. Leave the outer tires on the machine if at all possible. If the regulations require that the outer tires be removed, refer to "Tire and Rim Removal" in this section. Readjust tire pressures, refer to "In-Transit Tire Inflation Pressures" under "MOVING A DISABLED MACHINE" in this section.

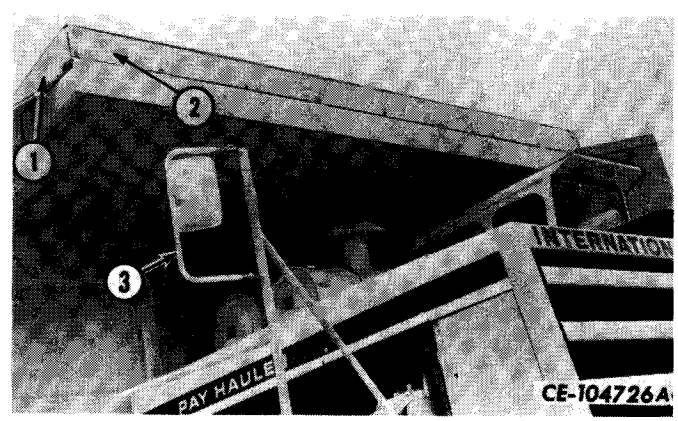


Fig. 3. Canopy Rock Fence and RH Mirror

1. RH Canopy Rock Fence Channel
2. Canopy Rock Fence Angle
3. RH Rear View Mirror

Preparation

1. Remove the canopy rock fence channels (1, Fig. 3) and the rock fence angle (2, Fig. 3) to reduce the overall height of the machine.

Reduce the overall machine width to 3.66m (12 ft.) as follows:

2. Remove the RH (3, Fig. 3) and LH (7, Fig. 4) rear view mirrors.

3. Remove the body fenders (3, Fig. 4).

4. Remove the rear mud guards (4, Fig. 4).

5. Remove the angles (2, Fig. 4) and the extensions (1, Fig. 4) from both sides of the machine.

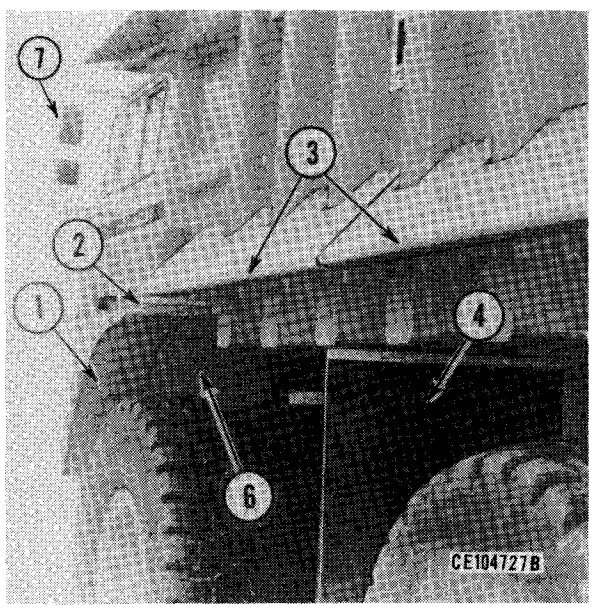


Fig. 4. Fenders, Mudguards, Extensions and LH Mirror

1. LH Fender Extension
2. LH Fender Angle
3. Body Fenders
4. Rear Mud Guards
6. LH Front Fender Assembly
7. LH Rear View Mirror

6. Remove the outer tires and rims as follows:

The following instructions cover the removal of the outer tire and rim assembly from one of the drive wheels. The same instructions apply for the three remaining wheels.

CAUTION! Install blocking to prevent the machine from rolling forward or backward.

a. Apply the parking brake. Raise the axle enough so that the inner tire is off the ground. Support the axle with blocks.

b. Completely deflate inner and outer tires.

CAUTION! Deflate both tires completely before loosening rim clamps.

c. Remove the wheel rim clamp nuts (A, Fig. 5) and the wheel rim clamps (B, Fig. 5). Remove the tire valve cap and the support (E, Fig. 5).

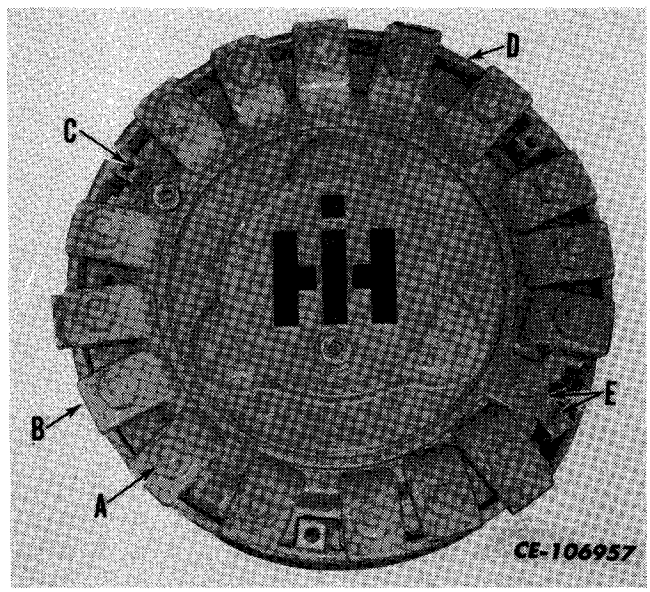


Fig. 5. Outer Tire and Rim Clamps and Nuts

A. Clamp Nut
B. Clamp
C. Cork
D. Wedge Band
E. Valve Cap and Support

NOTE: *Place 8 of the nuts and 11 of the clamps in a carton. These parts are to be reused when the outer tire and rim is to be reinstalled.*

d. Place a fiber hoist sling around the perimeter of the outer tire. Remove the three corks (C, Fig. 5) from the wedge band (D, Fig. 5). Replace the corks with three 5/8-11 UNC bolts with a minimum thread length of three inches. Tighten these bolts until the wedge band unseats then remove the wedge band. Remove the outer tire and rim.

e. Install the shipping spacer (A, Fig. 6) so this spacer butts against the dual wheel spacer (B, Fig. 6) as shown.

INTRODUCTION

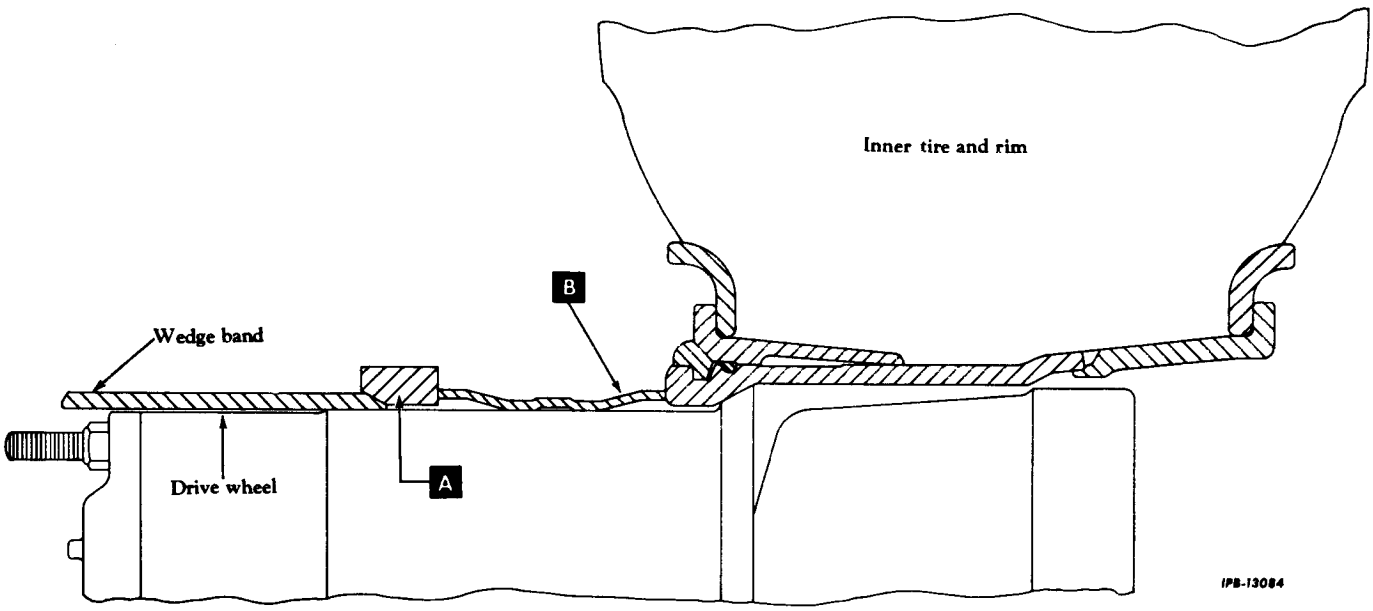


Fig. 6. Shipping Spacer Installation

A. Shipping Spacer
B. Wheel Rim Spacer

f. Remove the three bolts from the wedge band and install the corks. Install the wedge band with the cut out section in alignment with the valve slot on the drive wheel.

g. Position the three special shipping clamps at point A (Fig. 7) and five standard rim clamps at point B (Fig. 7).

h. Install the nuts on the studs and tighten each nut in sequence shown in Fig. 7.

i. Inflate the remaining tire. Refer to "In-Transit Tire Inflation Pressures" in this section for the proper inflation pressure.

j. Remove the blocks and lower the axle.

MOVING A DISABLED MACHINE

Towing

NOTE: *The machine must be towed at low speed.*

When towing the machine:

a. Pressure in the air tanks must be available for braking. Refer to "INSTRUMENTS AND CONTROLS" in Section 3. If air pressure is not available, use a tow bar.

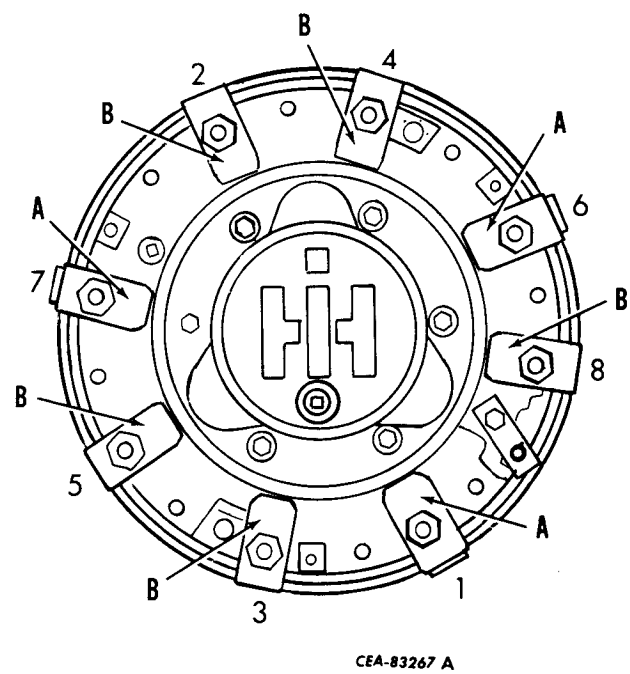


Fig. 7. Clamp Installation and Torquing Sequence

A. Shipping Rim Clamp
B. Standard Rim Clamp

b. Batteries should be fully charged for auxiliary steering. Refer to "DRIVING THE MACHINE" in Section 5.

c. Drive shafts should be disconnected from the differentials. (Support the drive shaft journals to prevent damage while in tow.)

NOTE: *If the machine is to be towed on improved, hard-surfaced roads, readjust tire pressures. Refer to "In-Transit Tire Inflation Pressures" in this section.*

In-Transit Tire Inflation Pressures

Check inflation pressures when tires are cold. Cold inflation pressures are not to be less than those shown in the following chart.

Do not reduce inflation pressures by "bleeding" tires during transit. Pressure build-up in tires during transit is normal.

If the above precautions are not observed the tires may build up excessive heat and fail prematurely.

When the machine arrives at the job site, allow the tires to thoroughly cool. Inflate to normal operating pressures. Refer to "SPECIFICATIONS" in Section 9.

MODEL 330

Roading Condition	Tire Size	Ply Rating	Position	Recommended Highway Inflation (Machine Empty)		Maximum Speed			
						KM/H		MPH	
				kPa	psi	Standard Tread Depth Tires	Extra Skid Depth Tires	Standard Tread Depth Tires	Extra Skid Depth Tires
8 Tires Installed	18:00 x 25 in.	20	Front Rear	276 276	40 40	40 (See NOTE 1)	32 (See NOTE 2)	25 (See NOTE 1)	20 (See NOTE 2)
	18:00 x 25 in.	24	Front Rear	276 276	40 40	40 (See NOTE 1)	32 (See NOTE 2)	25 (See NOTE 1)	20 (See NOTE 2)
4 Tires Installed	18:00 x 25 in.	20	Front Rear	483 276	70 40	16 (See NOTE 4)	23 (See NOTE 3)	10 (See NOTE 4)	14 (See NOTE 3)
	18:00 x 25 in.	24	Front Rear	552 276	80 40	16 (See NOTE 4)	23 (See NOTE 3)	10 (See NOTE 4)	14 (See NOTE 3)

MODEL 340

Roading Condition	Tire Size	Ply Rating	Position	Recommended Highway Inflation (Machine Empty)		Maximum Speed			
						KM/H		MPH	
				kPa	psi	Standard Tread Depth Tires	Extra Skid Depth Tires	Standard Tread Depth Tires	Extra Skid Depth Tires
8 Tires Installed	18:00 x 25 in.	24	Front Rear	276 276	40 40	40 (See NOTE 1)	32 (See NOTE 2)	25 (See NOTE 1)	20 (See NOTE 2)
	18:00 x 25 in.	28	Front Rear	552 345	80 50	40 (See NOTE 1)	40 (See NOTE 2)	25 (See NOTE 1)	25 (See NOTE 2)
4 Tires Installed	18:00 x 25 in.	24	Front Rear	552 345	80 50	16 (See NOTE 4)	23 (See NOTE 3)	10 (See NOTE 4)	14 (See NOTE 3)
	18:00 x 25 in.	28	Front Rear	552 345	80 50	32 (See NOTE 2)	23 (See NOTE 3)	20 (See NOTE 2)	14 (See NOTE 3)

NOTE 1: *After each 80 kilometers (50 miles) or two hours of sustained driving, whichever comes first, stop the machine for a minimum of 30 minutes to allow the tires to cool.*

NOTE 2: *After each 32 kilometers (20 miles) or one hour of sustained driving, whichever comes first, stop the machine for a minimum of 30 minutes to allow the tires to cool.*

NOTE 3: *After each 22 kilometers (14 miles) or one hour of sustained driving, whichever comes first, stop the machine for a minimum of 30 minutes to allow the tires to cool.*

NOTE 4: *After each 29 kilometers (18 miles) or one hour of sustained driving, whichever comes first, stop the machine for a minimum of 30 minutes to allow the tires to cool.*

INTRODUCTION

MACHINE STORAGE

PREPARING FOR STORAGE

When the machine is not to be used for a period of time, store it in a dry and protected place. Leaving equipment outdoors exposed to the elements will materially shorten its life.

Follow the procedure below when the machine is placed in storage for 30 days or more. The machine must be lubricated every six months. Use caution when starting an engine that has been in storage. Refer to the instructions under "PREPARING FOR OPERATION" in this section.

1. Wash or clean the machine thoroughly.

2. Lubricate all points of the machine as outlined in the "SERVICE GUIDE" in Section 7.

3. Service the transmission as follows:

   a. Operate the machine until the transmission oil temperature reaches +150° F (converter oil temperature gauge pointer is one-third of the way into the "RUN" area).

   b. Stop the engine.

   c. Drain the transmission then install the drain plug.

   d. Fill the transmission to operating level with a commercial preservative oil which meets government specifications MIL-L-21260, Grade-1.

   e. Operate the machine for at least five minutes at a minimum of 1000 engine rpm. During this time move the machine to the storage location.

   f. Apply the service brakes and shift through all gear ranges to energize the clutches. Operate the machine for approximately TEN SECONDS alternately in sixth gear stall and in neutral at high idle until the oil temperature is 225° F (converter oil temperature gauge pointer is three-fourths of the way into the "RUN" area). Stop the engine.

   g. As soon as the transmission is cool enough to touch, remove the transmission breather and seal the opening so that a vacuum will form in the transmission as it cools.

4. Lower the dump body completely.

5. If the cooling system will be exposed to freezing temperatures and water only was used during operation, drain and refill the cooling system with an antifreeze solution. Refer to "COOLING SYSTEM" in Section 8.

6. Service the engine as follows:

   a. Clean and remove the valve covers.

   b. Flush the valves, rocker arms, and pushrods with Grade-30 lubricating oil. (Remove any rust before lubricating.)

   c. Remove the injection nozzles. Spray about one ounce of Grade-30 lubricating oil into each cylinder. Crank the engine two or three revolutions. Clean the nozzle seats and install the injection nozzles.

   d. Coat the inside of the valve housing covers with Grade-30 lubricating oil.

   e. Install the valve covers.

7. Service the air cleaner. Refer to "AIR CLEANING SYSTEM" in Section 8.

8. Drain water from the fuel tanks. Refer to "FUEL SYSTEM" in Section 8.

   NOTE: *Be sure each tank contains a minimum of 38 litres (10 gallons) of approved diesel fuel.*

9. Remove the air intake cap and the hydraulic reservoir breather; seal the openings.

10. Seal the engine crankcase breather tube, exhaust outlet, electrical components, and the fuel tank vent lines to prevent dirt and moisture from entering.

11. Remove the batteries and store them in a cool dry place (0° to +10° C/+32° to +50° F). Batteries must be fully charged at the time of storage. Check batteries at least once a month for water level and specific gravity. Never allow stored batteries to run down below 3/4 full charge.

12. Open all air tank drain valves. Refer to "AIR PRESSURE SYSTEM" in Section 8.

13. Coat all machined, unpainted surfaces with chassis grease to prevent rust.

14. If it is desirable to leave the tires on the machine, jack the machine up and place it on blocks leaving the tires in suspension. Deflate and cover the tires.

PREPARING FOR OPERATION

1. If the machine was jacked up, uncover and inflate tires. Check inflation pressure. Refer to "SPECIFICATIONS" in Section 9. Remove the blocks and lower the machine to the ground.

2. Remove chassis grease from machined, unpainted surfaces.

3. Close all air tank drain valves. Refer to "AIR PRESSURE SYSTEM" in Section 8.

4. Install fully charged batteries. Refer to "ELECTRICAL SYSTEM" in Section 8.

5. Remove seals from engine crankcase breather tube, exhaust outlet, electrical components and the fuel tank vent lines.

6. Remove seals and install the air intake cap and hydraulic reservoir breather.

7. Drain water from the fuel tanks and fill with an approved diesel fuel. Refer to "FUEL SYSTEM" in Section 8.

8. Replace primary and final fuel filters.

9. Check the cooling system for leaks and loose connections and coolant level. Refer to "COOLING SYSTEM" in Section 8.

10. Remove the seal and install the transmission breather.

11. Service the engine as follows:

a. Remove the valve covers.

b. Flush the valves and the valve operating mechanism with a mixture of one-half kerosene and one-half Grade-10 lubricating oil.

c. Drain the crankcase and fill with specified lubricating oil. Refer to "LUBRICANT SPECIFICATIONS AND CAPACITIES" in Section 7. Replace lubricating oil filter elements. Refer to "ENGINE LUBRICATING OIL FILTERS" in Section 8.

d. Before starting the engine, prime the turbocharger. Refer to "TURBOCHARGER" in Section 8.

e. Start the engine.

CAUTION! Before starting the engine, be sure the area is adequately ventilated to avoid danger from exhaust gas. Do not accelerate the engine rapidly or operate it at high speed immediately after starting.

NOTE: *When starting the engine, allow the engine to run at part throttle for approximately five minutes to allow thorough distribution of the lubricating oil. DO NOT place the machine under load until normal oil pressure and temperature is reached.*

f. Observe to see if any valves are sticking. If so, pour a small quantity of diesel fuel, dry-cleaning solvent, or kerosene on the valve stems until loose.

g. Stop the engine.

h. Install the valve covers.

12. Service the transmission as follows:

a. Start the engine.

NOTE: *Operation of the transmission or converter containing preservative oil must be limited to the length of time required to bring the oil temperature up to +150° F.*

b. Stop the engine.

c. Drain the preservative oil from the transmission and install the drain plug.

d. Replace the transmission oil filter element. Refer to "TRANSMISSION OIL FILTER" in Section 8.

e. Fill the transmission to operating level with oil. Refer to "LUBRICANT SPECIFICATIONS AND CAPACITIES" in Section 7.

INITIAL SERVICE PROCEDURE

1. Check the belt tension. Refer to "BELTS" in Section 8.

2. Check coolant level. Refer to "COOLING SYSTEM" in Section 8.

3. Check the battery liquid level. Refer to the "ELECTRICAL SYSTEM" in Section 8.

4. Be sure the battery terminals are clean and the battery cables are fastened securely to the correct terminals. Refer to "ELECTRICAL SYSTEM," in Section 8.

5. ALTERNATOR (STANDARD): Be sure the terminals on the back of the alternator are clean and the cables are fastened securely to the proper terminals as follows (Fig. 1):

   a. The black cable is connected to the "GRD" (ground) screw (1).

   b. The red cable is connected to the "BAT" (battery) terminal (2).

   c. The "FIELD" connector is fully depressed and locked into the alternator receptacle (3).

   d. No cables are connected to the "R" (relay) terminal (4).

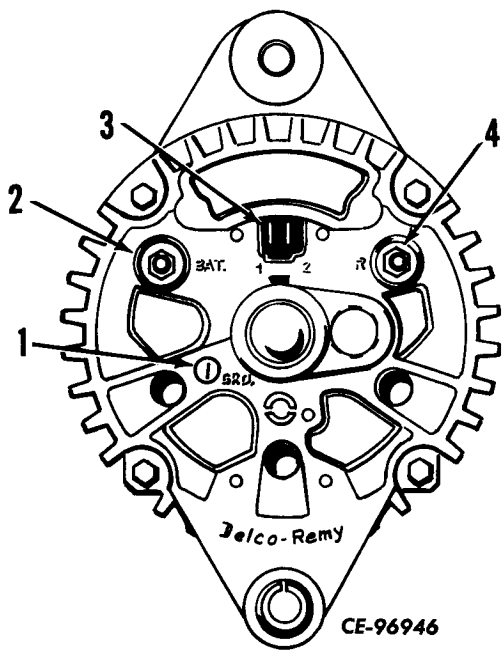


Fig. 1. Alternator (Standard)

1. Ground Screw
2. Battery Terminal
3. Field Connector Receptical
4. Relay Terminal

5. ALTERNATOR w/INTEGRAL REGULATOR (if equipped): Be sure the terminals on the alternator are clean and the cables are fastened securely to the proper terminals as follows (Fig. 2):

   a. Output terminal (1) on alternator to cranking motor solenoid terminal "B."

   b. Ground screw (2) on alternator to cranking motor frame bolt.

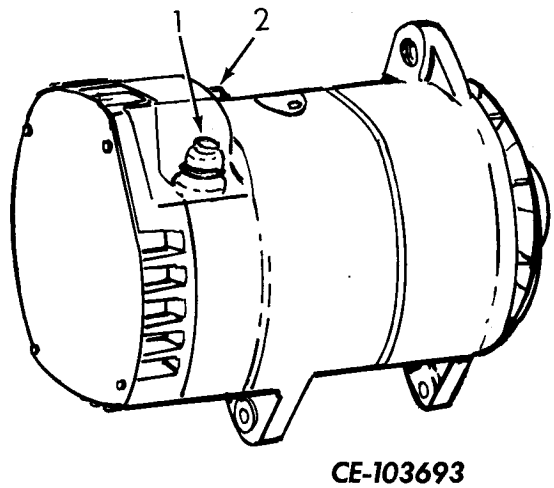


Fig. 2. Alternator w/Integral Regulator (If Equipped)

1. Output Terminal
2. Ground Screw

6. Install the outer tires and rims as follows:

   NOTE: *The following instructions cover the installation of the outer tire and rim assembly on one of the drive wheels. The same instructions apply for the three remaining wheels.*

   CAUTION! Install blocking to prevent the machine from rolling forward or backward.

   a. Apply the parking brake. Raise the axle enough so the tire is off the ground. Support the axle on blocks.

   b. Completely deflate the tire.

   CAUTION! Deflate tire completely before loosening rim clamps.

   c. Remove the three special shipping clamps (A, Fig. 3) and the five standard rim clamps (B, Fig. 3).

BEFORE STARTING THE NEW MACHINE

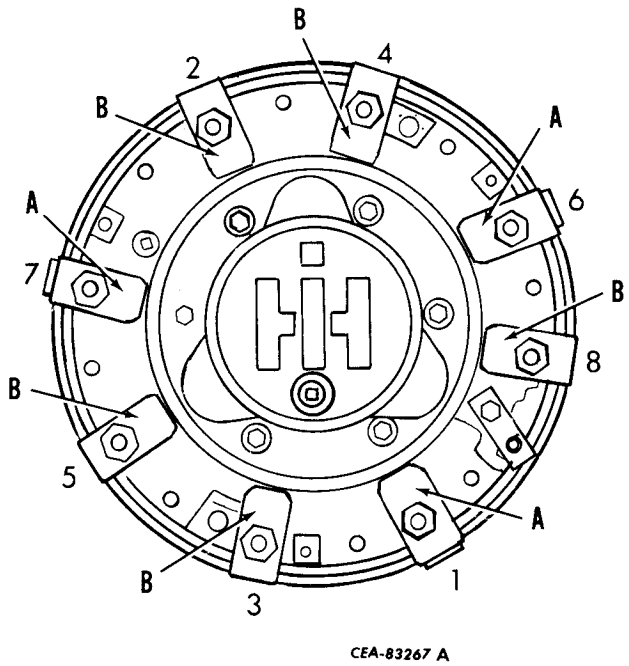


Fig. 3. Clamp Removal

A. Shipping Rim Clamp
B. Standard Rim Clamp

d. Remove the three corks from the wedge band and replace with three 5/8" NC bolts with a minimum thread length of three inches. Tighten these bolts until the wedge band unseats then remove the wedge band. Remove the shipping spacer (A, Fig. 4).

NOTE: *The drive wheel mounting surface and the standard wheel rim spacer surfaces must be clean (free of obstructions) to permit proper tire and rim installation.*

e. Install the outer tire and rim using a fiber hoist sling so that the outer tire valve lines up with the tire valve slot on the drive wheel. Push the tire on all the way.

f. Remove the three bolts from the wedge band. Install the wedge band with the cut out section in alignment with the tire valve slot on the drive wheel. Adjust the position of the tire, if necessary, to prevent any binding between the tire and the wedge band. Push the wedge band in as far as possible.

g. Install all rim clamps and tighten the nuts. Refer to "TIRES AND RIMS" in Section 8.

h. Install the inner tire valve stem support and valve cap.

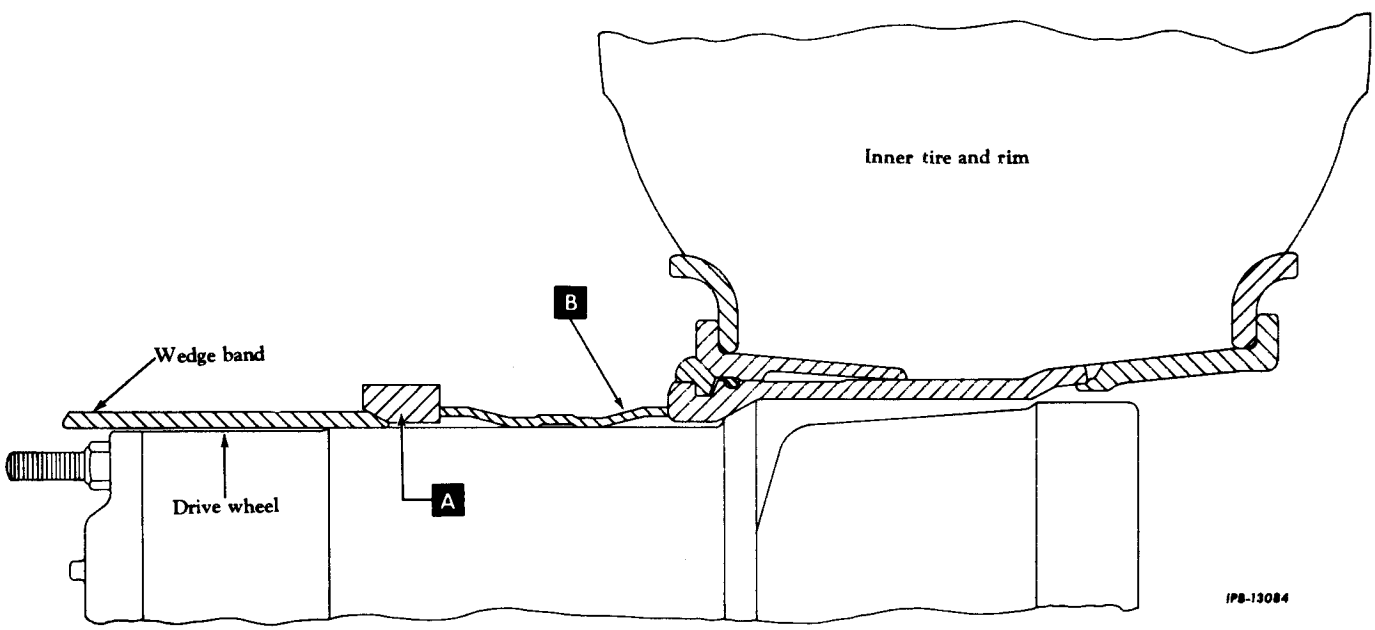


Fig. 4. Shipping Spacer Removal

A. Shipping Spacer
B. Wheel Rim Spacer

i. Inflate tires. Refer to "SPECIFICATIONS in Section 9 for inflation pressure.

j. Remove the hoist sling from the tire. Remove the blocks and lower the axle.

NOTE: *Place the 12 special rim clamps (three for each wheel) and the four shipping spacers in a carton to be kept with the machine to be used when shipping the machine.*

7. Install the extensions (1, Fig. 5) and the angle (2, Fig. 5).

8. Install the rear mud guards (4, Fig. 5).

9. Install the body fenders (3, Fig. 5).

10. Install the RH (3, Fig. 6) and LH (7, Fig. 5) rear view mirrors.

11. Install the canopy rock fence channels (1, Fig. 6) and the rock fence angle (2, Fig. 6).

12. Check the lubricant levels in the different components. Refer to "LUBRICATION WHEN SHIPPED" in this section.

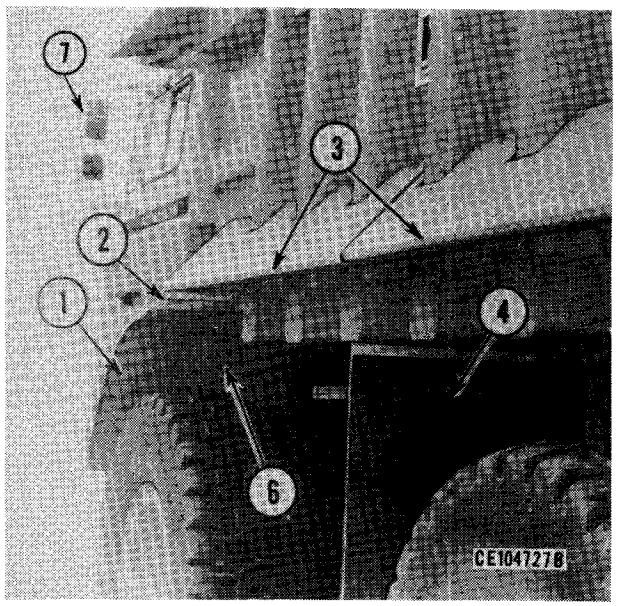


Fig. 5. Fenders, Extensions, Mud Guards, and LH Mirror

1. LH Fender Extension
2. LH Fender Angle
3. Body Fenders
4. Rear Mud Guards
6. LH Front Fender Assembly
7. LH Rear View Mirror

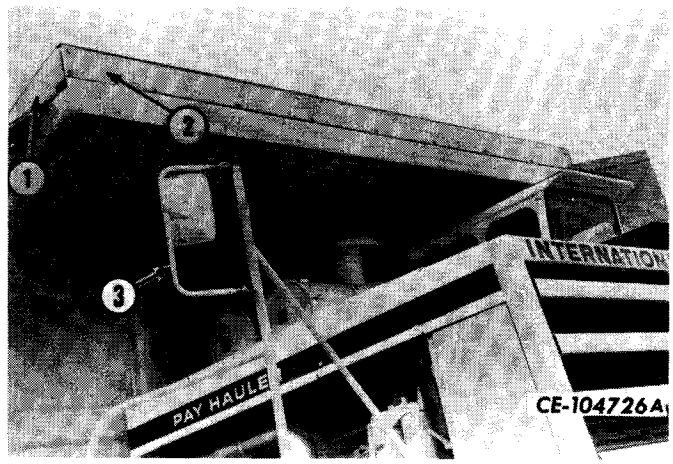


Fig. 6. Canopy Rock Fence and RH Mirror

1. RH Canopy Rock Fence Channel
2. Canopy Rock Fence Angle
3. RH Rear View Mirror

13. Check spring leaf alignment (Fig. 7) and the torques of the spring cover nuts. Proceed as follows:

a. Check spring leaf alignments.

b. Check spring pack parallelism with the frame hangers.

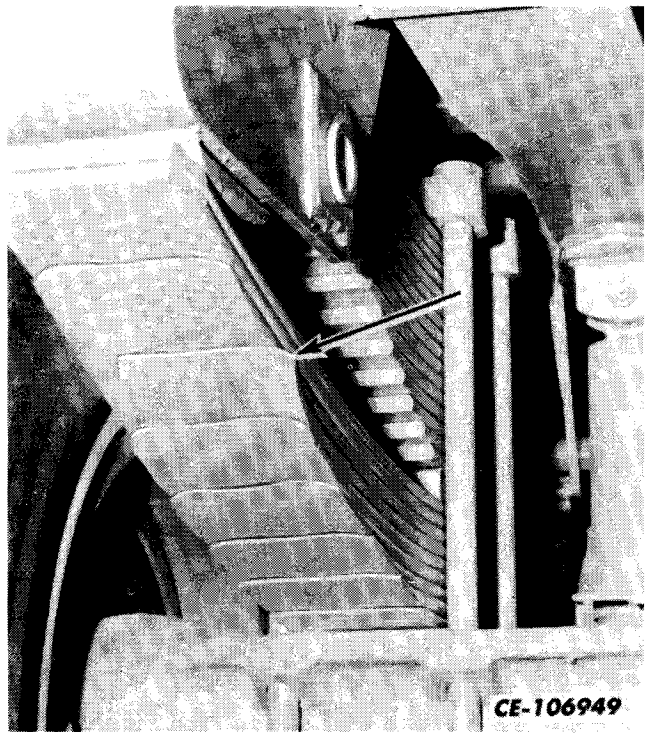


Fig. 7. Spring Leaf Misalignment (Rear Spring Shown)

BEFORE STARTING THE NEW MACHINE

c. If realignment is required, relieve weight from the spring by jacking up the frame so that the main leaf spring ends are free from the pads, but not so high that the hangers start to lift the springs. Loosen the nuts until all remaining tension is relieved. Align leaves with a brass or rubber mallet equalizing the clearance between the main leaf and hangers at both ends.

d. Tighten the spring cover nuts.

14. Operate a new machine for the first 20 to 30 hours at wide open throttle with light loads.

LUBRICATION WHEN SHIPPED

This machine has been lubricated at the factory for operation in an air temperature range of -23° C to +32° C (-10° F to +90° F). If the machine is to be operated above or below this range, change to the correct lubricants. Unless an exception is shown below, all lubricants can be used (within above temperature range) until regular scheduled (normal) change interval occurs. Refer to "SERVICE GUIDES" in Section 7 for the scheduled (normal) change intervals and to "LUBRICANT SPECIFICATIONS AND CAPACITIES" for the proper oil grades and various air temperatures.

COMPARTMENT	LUBRICANT
Crankcase	EO (%)
Hydraulic Reservoir.....	EO (+)
Transmission and Transfer Case	EO (#)
Differential (Front).....	MPL
Differential (Rear)	MPL
Wheel Planetaries	MPL

(%) After the initial 100 hours of operation, change the crankcase oil. Thereafter, change the oil and the filter at the intervals specified in the "SERVICE GUIDE" in Section 7.

(+) After the initial 50 hours of operation, clean the suction filter and the return line filter. Thereafter, service these filters at the intervals specified in the "SERVICE GUIDES" in Section 7.

(#) After the initial 50 hours of operation, change the transmission oil and the transmission oil filter elements. Thereafter, change the oil and the filter elements at the intervals specified in the "SERVICE GUIDES" in Section 7.

EXPORT ONLY: The transmission is filled with a preservative type oil. Operation of this transmission with this oil must not exceed 40 kilometers (25 miles). Before placing this machine into service, drain the preservative oil and replace with the proper oil for regular operation. For proper procedure, refer to "PREPARING FOR OPERATION" in Section 1.

INSTRUMENTS AND CONTROLS

This section covers the location and function of the various instruments and controls of this machine. In the case of controls, more detailed information regarding operation can be found in Section 5. Regardless of previous experience as an operator, you must be thoroughly familiar with the location and use of all instruments and controls before operating this machine.

Each reference number in the illustrations of this section has a corresponding reference number and explanation in the text.

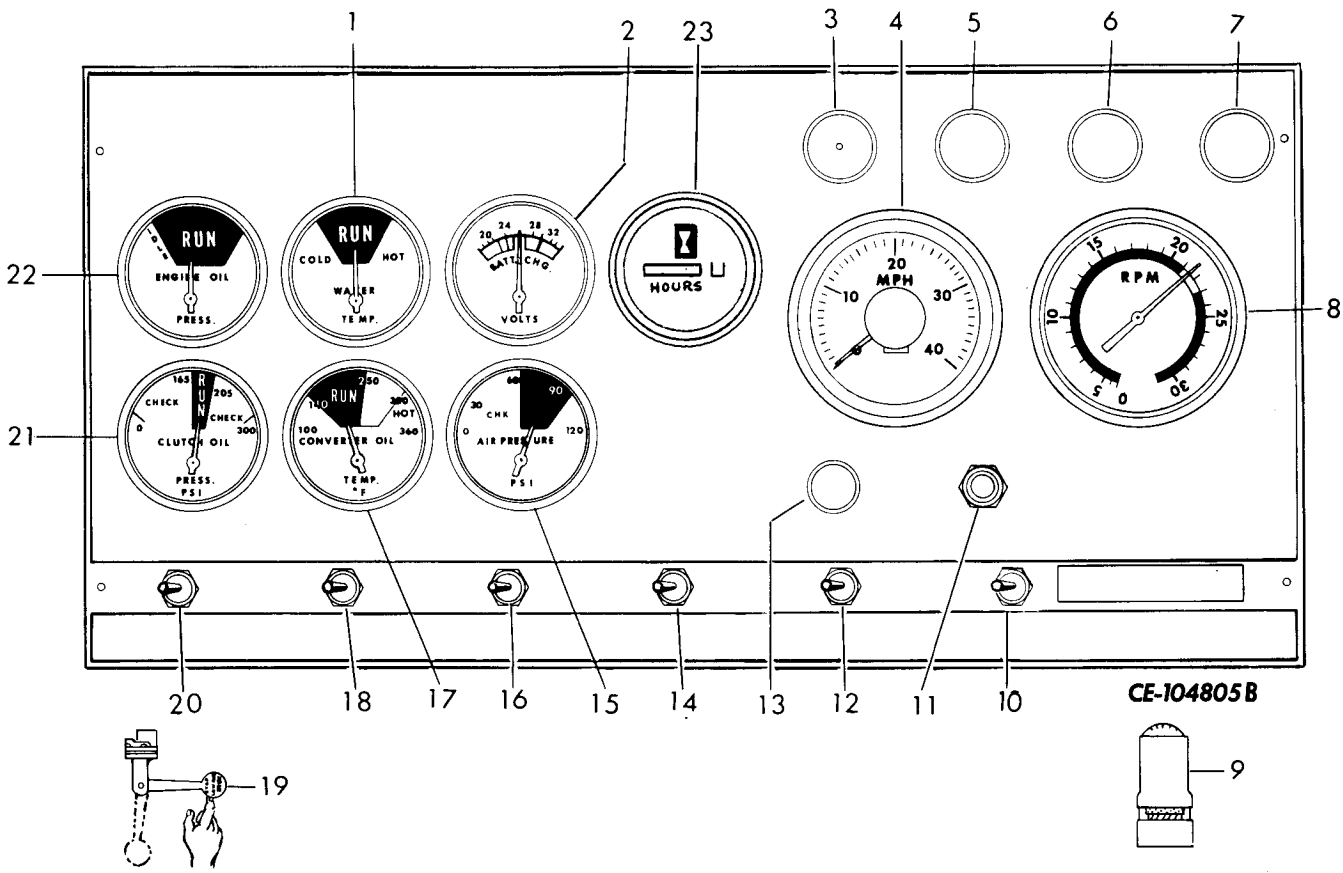


Fig. 1. Instrument and Controls

Check all instruments immediately after starting, again upon reaching operating temperatures and at frequent intervals during operation. The values or ranges shown in the legend are with normal operating temperature and engine at high idle speed. Each instrument must register within the range specified for safe, correct operation. If they do not, stop the engine; locate and correct the cause immediately.

INSTRUMENTS AND CONTROLS

Legend for Fig. 1

1. Engine Coolant Temperature Gauge ("RUN" range)
2. Voltmeter (second "GREEN" range)
3. High Beam Indicator Light
4. Speedometer
5. Down Shift Warning Light (must be "ON)
6. Half Air Brake Warning Light (must be "OFF")
7. Parking Brake Warning Light (must be "ON" when parking brake is applied)
8. Tachometer
9. Air Cleaner Service Indicator (must not show full "RED")
10. Air Conditioner and Heater "On-Off' Switch
11. Starting Switch Button
12. Fan Speed Switch
13. Cigarette Lighter
14. Bulb Check Switch
15. Air Pressure Gauge ("RUN" range)
16. Accessories Switch
17. Torque Converter Oil Temperature Gauge ("RUN" range)
18. Light Switch
19. Low Air Pressure Indicator (must be "UP")
20. Dimmer Switch
21. Transmission Clutch Oil Pressure Gauge ("RUN" range)
22. Engine Oil Pressure Gauge ("RUN" range)
23. Hourmeter

1. ENGINE COOLANT TEMPERATURE GAUGE

This gauge shows the temperature of the coolant circulating through the engine. After the engine has operated a sufficient length of time, the pointer of the gauge must be in the "RUN" range and should remain there during regular operation.

2. VOLTMETER

The voltmeter indicates the condition of the batteries. At low idle speed, the gauge pointer should be within the first green area, which indicates a good battery charge. If the voltage drops below the first green area, the batteries should be checked. With the engine operating above low idle speed, the gauge pointer should be within the second green area, which is the normal operating range. If the voltage drops below or exceeds the second green area, the batteries and/or voltage regulator or alternator with integral regulator (if equipped) should be checked.

3. HIGH BEAM INDICATOR LIGHT

This light will be on when the headlights are on "high-beam" (four headlights on).

NOTE: *If the light is not on when the headlights are on "high-beam", the bulb may be burned out. For bulb replacement, refer to "ELECTRICAL SYSTEM" in Section 8.*

4. SPEEDOMETER

The speedometer indicates the machine's speed in miles per hour.

5. DOWN SHIFT WARNING LIGHT

This light will be on when the machine speed is sufficiently reduced to allow down shifting without machine damage. Do not down shift when the light is out.

6. HALF AIR BRAKE WARNING LIGHT

This light will be on if the air pressure is lost in either the front or rear brake systems. Stop the machine and check for cause.

NOTE: *Periodically check to make sure the bulb is not burned out. This can be checked by the bulb check switch (14).*

7. PARKING BRAKE WARNING LIGHT

This light will be on if the parking brake is applied when the electrical master switch is turned on.

8. TACHOMETER

The tachometer indicates the engine crankshaft speed in hundreds of rpm.

9. AIR CLEANER SERVICE INDICATOR (Fig. 2)

The green signal band telescopes the red signal band. The green band is actuated directly by a pressure drop (vacuum) between the air cleaners and the engine. After starting the engine, the green band may rise sufficiently to expose part of the red band. THIS MUST NOT BE MISTAKEN AS A SIGNAL FOR ELEMENT SERVICE. During operation, the green band will gradually rise in the window as dirt accumulates in the filter element. When the filter element reaches the maximum allowable restriction, the green band rises out of view and automatically locks in this position. The red band will remain fully exposed even after stopping the engine. When this happens, filter element service is required. For air cleaner service instructions, refer to "AIR CLEANING SYSTEM" in Section 8.

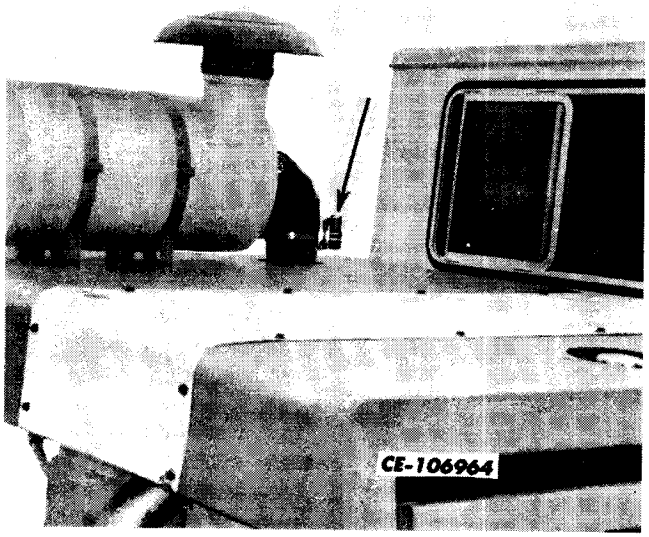


Fig. 2. Air Cleaner Service Indicator

10. AIR CONDITIONER AND HEATER ON-OFF SWITCH

This switch has three positions. Move the lever to the left to turn on the heater; right to turn on the air conditioner (if equipped); center to turn off either system.

11. STARTING SWITCH BUTTON

Press the button to crank the engine after locking the transmission in neutral and placing the master switch in the "ON" position.

12. FAN SPEED SWITCH

This switch controls the speed of the fan circulating air inside the cab. When the switch is to the left, the fan is at low speed. Move the switch to the center position for medium fan speed and to the right for high fan speed.

13. CIGARETTE LIGHTER

Push the knob in all the way. The lighter will automatically return when ready for use.

14. BULB CHECK SWITCH

This switch is used for a safety check of the warning lights. With the electrical master switch in the "ON" position, move the check switch to the right. The Half air warning light should illuminate. If the warning light fails to illuminate, replace the bulb, refer to "ELECTRICAL SYSTEM" in Section 8.

15. AIR PRESSURE GAUGE

This gauge shows the pressure available in the air tanks. Normally, the gauge must show 120-125 psi for safe operation of the machine.

16. ACCESSORIES SWITCH

This switch controls the dome light and the windshield washer. The switch has three positions. Move the lever to the: left to turn on the dome light; right to turn on the washer; center for "OFF."

17. TORQUE CONVERTER OIL TEMPERATURE GAUGE

This gauge registers the temperature of the fluid in the torque converter. After the engine has operated sufficiently to reach a stabilized torque converter temperature, check the gauge. The gauge must register in the "RUN" area. If the gauge registers outside of the "RUN" area, make the checks as follows:

a. Be sure the transmission clutch oil pressure gauge is registering the correct pressure.

b. Stop the engine. Check the oil level in the transmission (refer to Section 7 for the correct level checking procedure).

c. Service the transmission filters. For filter servicing procedures, refer to "TRANSMISSION OIL FILTER" in Section 8.

18. LIGHT SWITCH

This switch has two positions. Move the lever to the right to turn on the headlights and instrument panel lights. Move the lever to the left to turn off the lights.

19. LOW AIR PRESSURE INDICATOR (Figs. 3 and 4)

This indicator swings down when pressure in the air reservoir tanks drops below 60 psi ("low air pressure position" shown in Fig. 4).

Operate the engine with the transmission in neutral (N). When air pressure, as shown on the air pressure gauge (15) reaches 65 psi, manually place the arm in the "Reset" position shown in Fig. 4.

CAUTION! Do not drive the machine while the signal is in the "Low Air Pressure Position." Build up air pressure to a minimum of 120 psi before starting to drive.

INSTRUMENTS AND CONTROLS

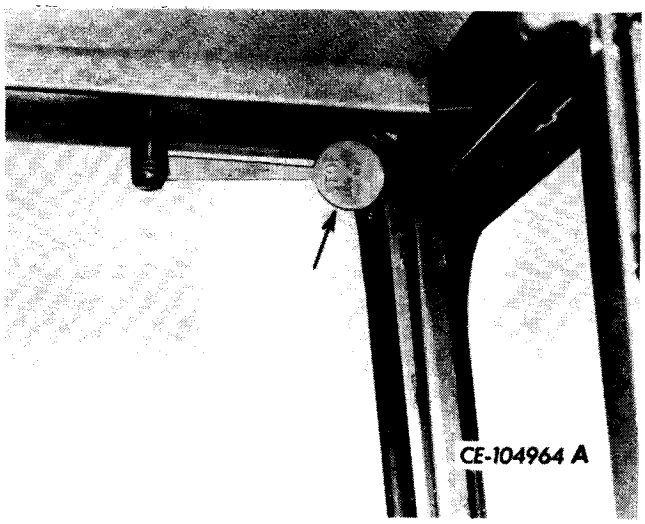


Fig. 3. Low Air Pressure Indicator

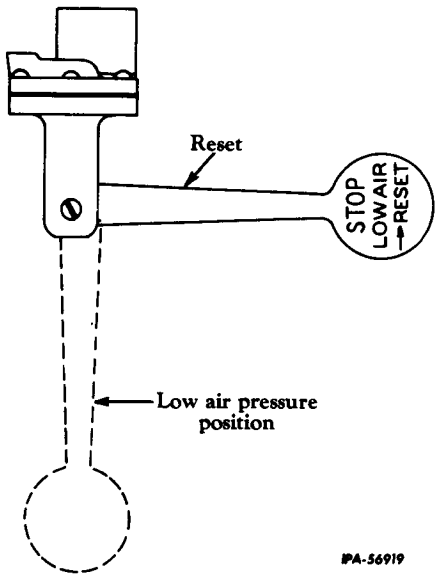


Fig. 4. Low Air Pressure Indicator

20. DIMMER SWITCH

This switch has two positions. Move the lever to the right for "low beam" or to the left for "high beam."

21. TRANSMISSION CLUTCH OIL PRESSURE GAUGE

This gauge registers the oil pressure of the transmission and converter hydraulic system. After the engine has operated a sufficient length of time, the pointer must be in the "RUN" range. If the gauge registers outside of the "RUN" range stop the engine and service the transmission filter. Refer to "TRANSMISSION OIL FILTERS" in Section 8. After servicing the filter, if the gauge still registers outside of the "RUN" range, stop the engine and consult your Pay Line distributor.

22. ENGINE OIL PRESSURE GAUGE

This gauge shows the pressure at which the lubricating oil is circulating through the engine. This gauge must register in the "IDLE" range immediately upon starting. When the engine is operated at full load speed, the pointer must be in the "RUN" range. Stop the engine immediately and investigate cause if little or no pressure is indicated.

23. HOURMETER

The hourmeter indicates when to perform the recommended maintenance and lubrication operations. The intervals in this manual are given in service hours, so daily readings will tell you when to service the machine. Rely on the hourmeter and not the clock to measure service intervals.

24. NOT USED

25. HOIST CONTROL LEVER

This lever controls the raising and lowering of the dump body. Refer to "DUMP BODY OPERATION" in Section 5.

26. LOUVERS

The louvers direct the air flow inside the cab as desired.

27. TEMPERATURE CONTROL LEVER

If cooler temperature is desired, move the lever down. If warmer temperature is desired, move the lever up.

28. AIR CONTROL LEVER

This lever is used to control the cooling or heating of fresh air or recirculated inside air. For maximum cooling or heating, set this lever to "Recirc" position.

29. HORN BUTTON

To sound horn, press the horn button.

30. WINDSHIELD WIPER CONTROL KNOB

This knob turns the wiper on and off and also controls the wiper speed. Pull the knob out to start the wiper and push it in to stop. For "high" speed, turn the knob clockwise or for "low" speed turn counterclockwise.

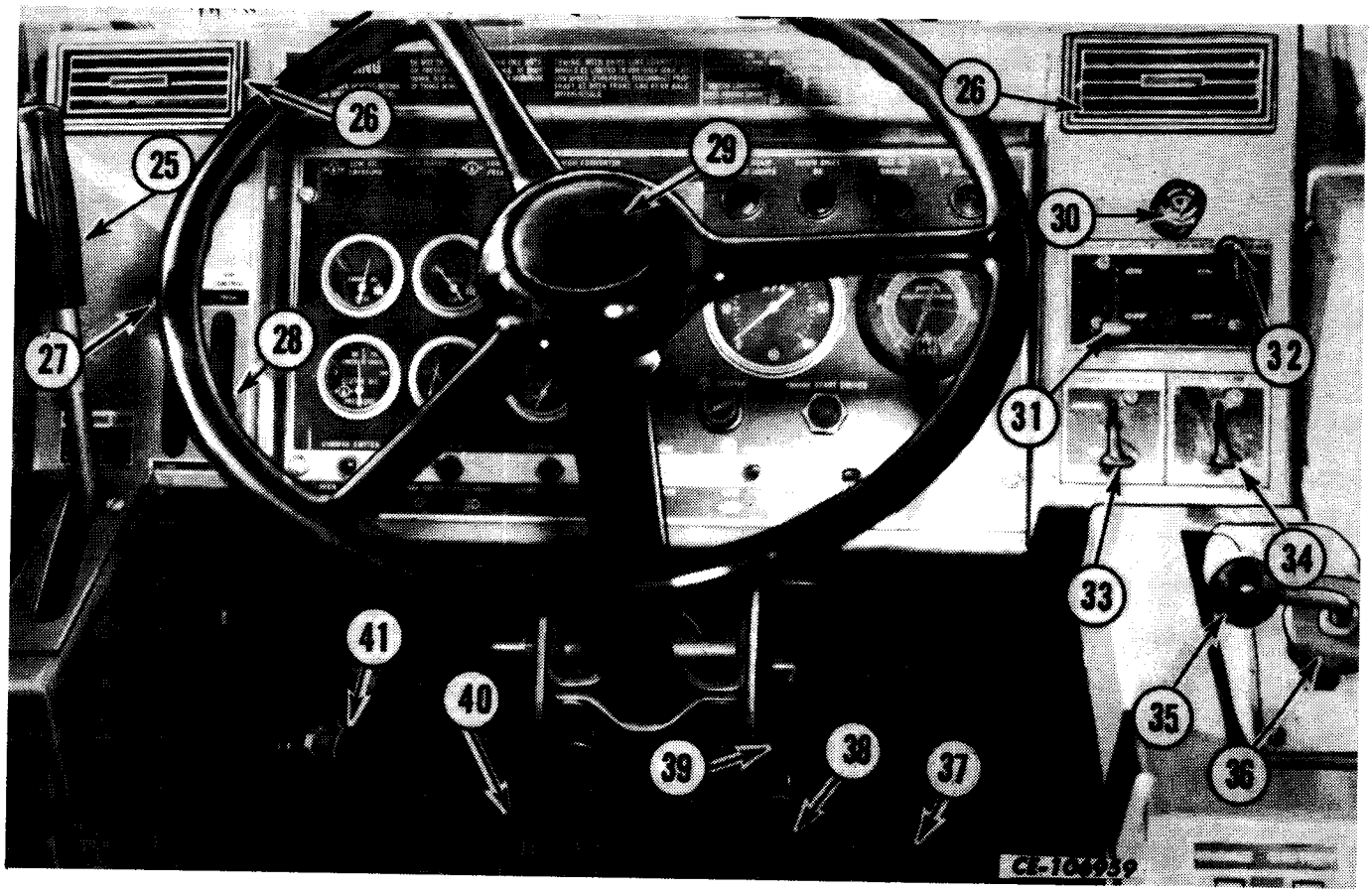


Fig. 5. Controls

25. Hoist Control Lever
26. Louver
27. Temperature Control Lever
28. Air Control Lever
29. Horn Button
30. Windshield Wiper Control Knob
31. Dump Brake Lever
32. Parking Brake Lever
33. Front Wheel Slip Brake Lever (if equipped)
33. Operator Controlled Interaxle Differential Lever (if equipped)
34. Front Wheel Brake Limiting Lever
35. Transmission Shift Lever
36. Transmission Neutral Lock
37. Accelerator Pedal
38. Brake Pedal
39. Steering Column Adjustment Lever
40. Retarder Control Pedal
41. Automatic Brake Apply Release Button (if equipped)

31. DUMP BRAKE LEVER

Use this brake lever only to hold the machine stationary while loading or dumping. Place the brake lever in the "ON" position to hold the machine in place. Before moving the machine, move the brake lever to the "OFF" position.

CAUTION! Never move the lever to the "ON" position while the machine is moving.

32. PARKING BRAKE LEVER

The parking brake is to be used only for parking the machine. The lever, as shown in the Fig. is in the "ON" position. To release the parking brake, move the lever to the "OFF" position.

33. FRONT WHEEL SLIP BRAKE LEVER (If Equipped)

This lever is used only to partially apply both front brakes simultaneously when operating in wet or soft material. For additional information refer to "DRIVING THE MACHINE" in Section 5.

INSTRUMENTS AND CONTROLS

33. OPERATOR CONTROLLED INTERAXLE DIFFERENTIAL LEVER (If Equipped)

This lever is used only to effectively link the front and rear drive axles together insuring equal distribution of torque when the machine is immobilized due to slippery conditions. For additional information, refer to "DRIVING THE MACHINE" in Section 5.

34. FRONT WHEEL BRAKE LIMITING LEVER

This lever, when in the "SLIPPERY ROAD" position, applies approximately one-half of the braking effort to the front brakes when brake pedal pressure is applied while traveling on slippery ground or loose material. Under normal conditions, place the lever in the "DRY ROAD" position. For additional information, refer to "DRIVING THE MACHINE" in Section 5.

35. TRANSMISSION SHIFT LEVER

The lever is used to select any one of the transmission gear ranges. For additional information, refer to "DRIVING THE MACHINE" in Section 5.

NOTE: *When the shift lever is placed in reverse (R), the back-up horn should automatically sound and the back-up light should be on.*

36. TRANSMISSION NEUTRAL LOCK

This control is used to lock the transmission shift lever in neutral (N). In order to shift out of neutral, pull up on the lock. When shifting into neutral, the lock will automatically engage.

37. ACCELERATOR PEDAL

Depress this pedal to increase the engine speed; release the pedal to decrease the engine speed.

38. BRAKE PEDAL

Depress the brake pedal according to the machine's speed and the road conditions then slowly release the pedal as the machine's speed decreases. When the machine comes to a complete stop, there should only be enough pressure to hold it stationary.

NOTE: *Gradually increasing pressure on the brake pedal as the machine loses speed will result in a very rough stop.*

CAUTION! Do not "FAN" the brakes by repeatedly depressing and releasing the brake pedal. This can reduce the air pressure too low for effective braking.

39. STEERING COLUMN ADJUSTMENT LEVER

This lever is used to adjust the steering wheel. Move the lever to position A (Fig. 6) to adjust the steering column fore or aft. When the desired position is obtained move the lever to position B (Fig. 6) to lock the steering column in position.

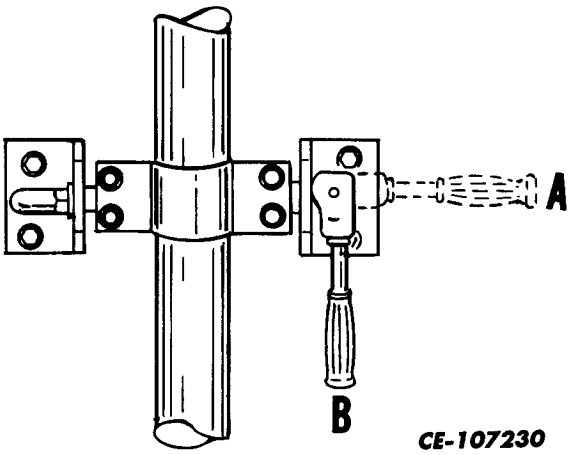


Fig. 6. Steering Column Adjustment Lever

A. Released Position
B. Locked Position

40. RETARDER CONTROL PEDAL

This pedal actuates a hydraulic retarder in the torque converter. The retarder acts as a brake to reduce machine speed when in any gear. For additional information, refer to "DRIVING THE MACHINE" in Section 5.

NOTE: *Never shift gears with this pedal depressed.*

41. AUTOMATIC BRAKE APPLY RELEASE BUTTON (If Equipped)

This button is used to release the service brakes when the brakes are applied automatically due to a main air pressure drop below 310 kPa (45 psi). Press and hold this button to release the brakes enabling the machine to be moved.

42. ENGINE STOP LEVER

Move this lever down to the "OFF" position to stop the engine. This lever must be in the "ON" position before starting the engine.

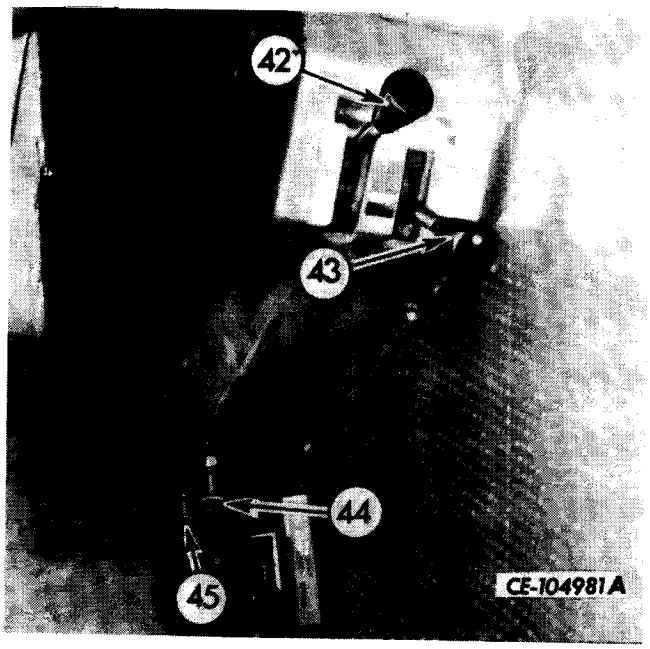


Fig. 7. Controls

42. Engine Stop Lever
43. Electrical System Master Switch Lever
44. Ether Injector Knob (if equipped)
45. Service Compartment Door Release Knob

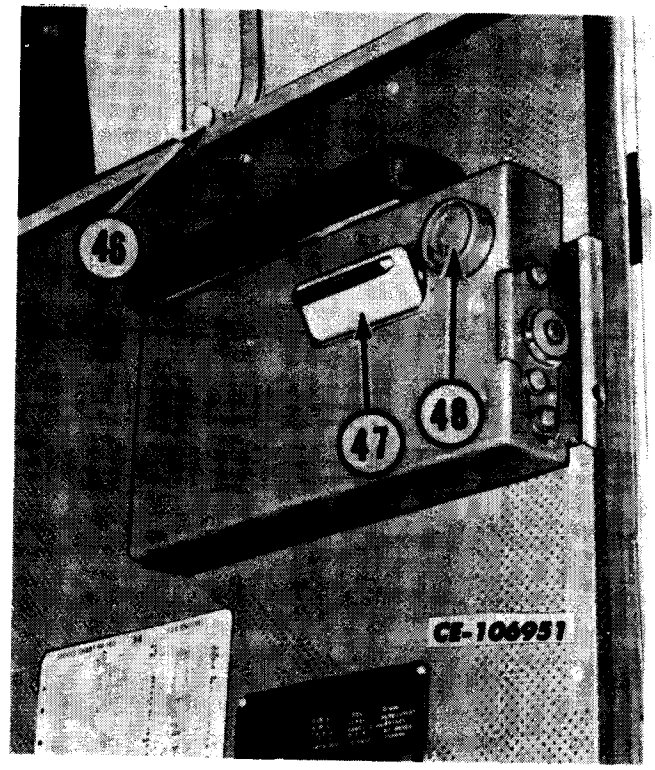


Fig. 8. Cab Door

46. Sliding Window Lock
47. Ash Tray
48. Door Release Button

43. ELECTRICAL SYSTEM MASTER SWITCH LEVER

Move this lever down to the "OFF" position to cut-out the electrical system.

NOTE: *Keep the lever in the "ON" position while the engine is running.*

44. ETHER INJECTOR KNOB (If Equipped)

The ether injector is a cold weather starting aid. For additional information, refer to "STARTING THE ENGINE" in Section 5.

45. SERVICE COMPARTMENT DOOR RELEASE KNOB

To release the service door on the front of the cab, pull this knob out.

46. SLIDING WINDOW LOCK

This lock holds the window in any open position. Tighten the knob to lock the window in position. Loosen the knob to move the window.

47. ASH TRAY

The ash tray is located in the cab door for the operator's convenience. To remove the ash tray, open the ash tray and press down on the metal tab located in the center. Continue pulling until ash tray is free. To reinstall, place the bottom of the ash tray on the guide bar and push up until fully closed.

48. DOOR RELEASE BUTTON

This button is used to release the door latch and open the door. To open the door, push the button in. The button will automatically return.

SEAT ADJUSTMENT (Fig. 9)

For operator's convenience in reaching the controls and improved operating visibility, the operator's seat can be adjusted to various positions.

Move the lever, located on the right hand side of the seat, forward and hold it while sliding the seat back and forth. When the seat engages the slide rail notch in the desired position, release the lever.

INSTRUMENTS AND CONTROLS

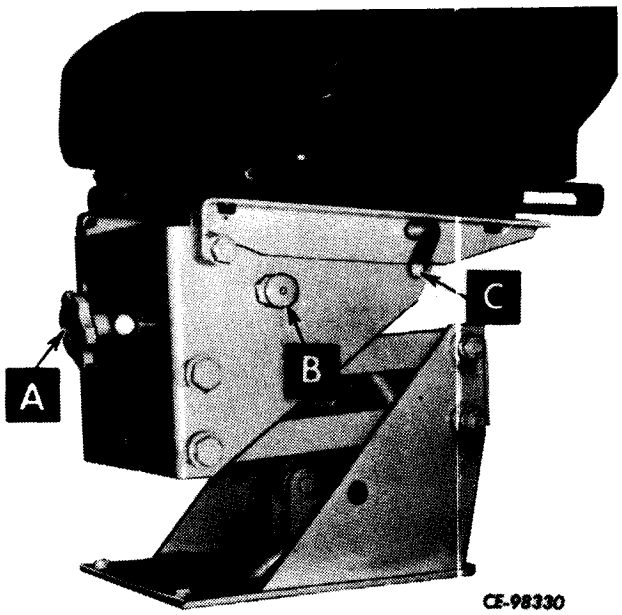


Fig. 9. Seat Adjustment

A. Height Adjustment Knob
B. Suspension Adjustment Button
C. Tilt Adjustment Lever

Turn the knob (A) to raise or lower the seat to the desired height.

Push the button (B) for a "hard" ride; pull the button for a "soft" ride.

Pull up and hold lever (C) and tilt the seat to the desired position which will provide the most comfortable angle of tilt; then release the lever.

NOTE: *If desired, the seat may be lifted against the steering wheel.*

AUXILIARY STEERING SWITCH BUTTON (Fig. 10)

This button is to be used only when there is a loss of the normal power steering. Pressing and holding this button down energizes the solenoid on a supplemental pump, which provides power for auxiliary steering. Check operation weekly.

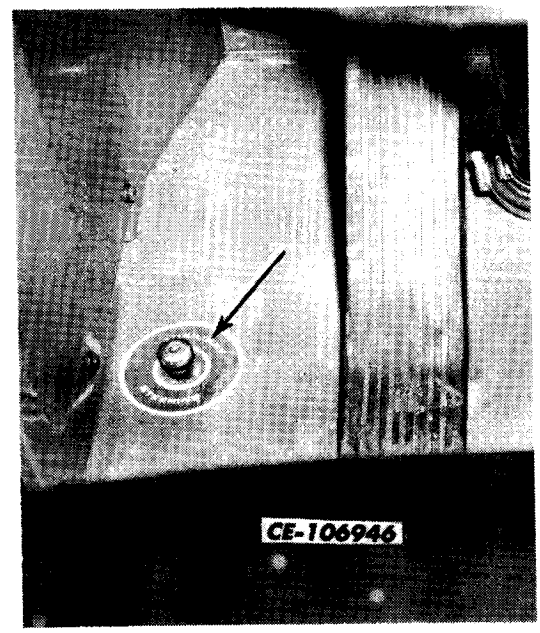


Fig. 10. Auxiliary Steering Switch Button

SUN VISOR (Fig. 11)

There are three adjustment knobs on the sun visor. Knob (A) provides positioning at the windshield or to the RH window; knob (B) provides extension of the visor; knob (C) allows the visor to be tilted.

SEAT BELT (Not Illustrated)

The seat belt is for the operator's safety and should be worn at all times while operating the machine. Before fastening the seat belt, the operator's seat should be adjusted to the desired driving position. Seat belts must be worn across the pelvic region (hip bone) and adjusted snugly. Never adjust a seat belt across the abdomen. For additional information, refer to Section 8.

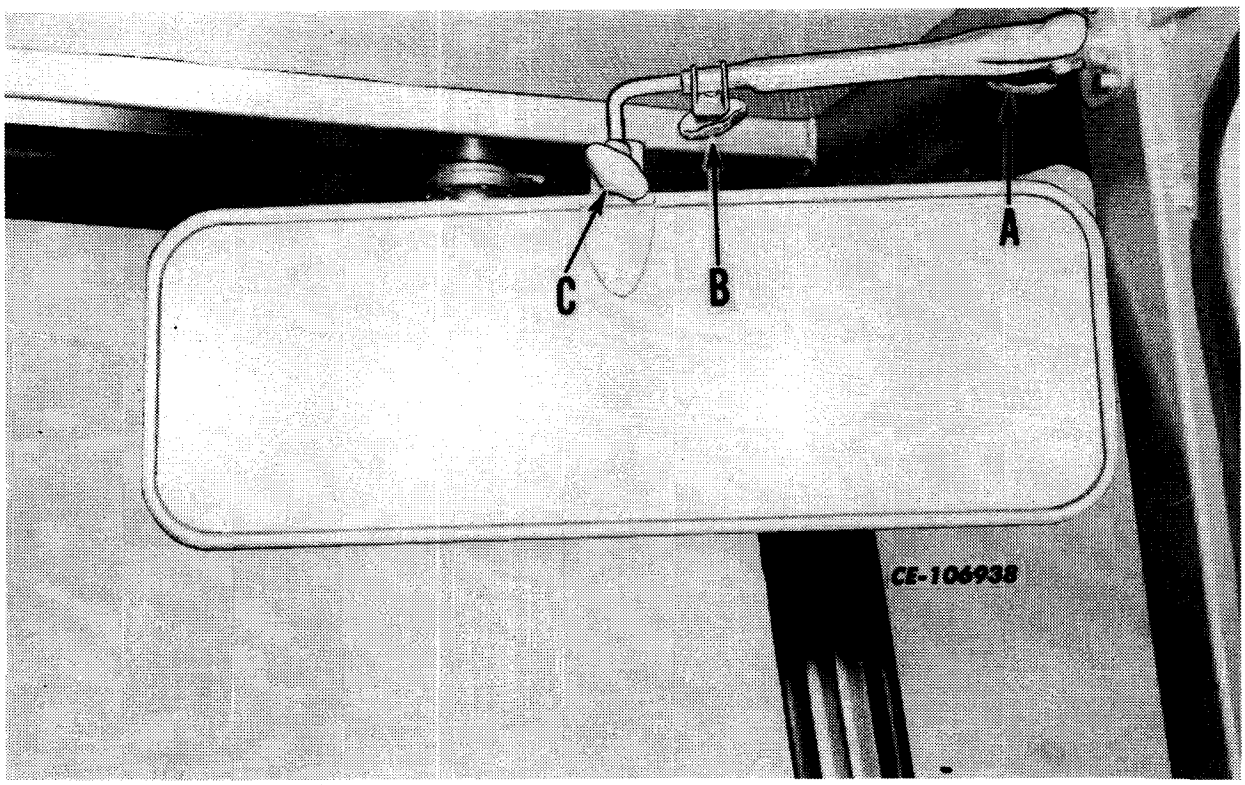


Fig. 11. Sun Visor

A. Arm Position Knob
B. Arm Extension Knob
C. Visor Tilt Knob

PREPARING FOR EACH DAY'S WORK

Step numbers correspond with the same number shown on the illustration.

1. Check level of coolant in radiator. Correct level should be 25mm (1 in.) above baffle; if low, add coolant.

NOTE: *Check coolant level before starting the engine.*

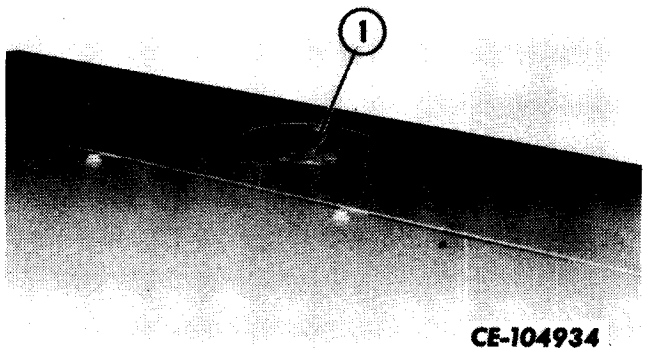


Fig. 1

2. Air cleaner weather caps (Fig. 2). Loosen the clamp screws and remove the caps by twisting and pulling upward. Clean the screens with compressed air or wash in clean hot water preferably containing a small amount of non-sudsing detergent.

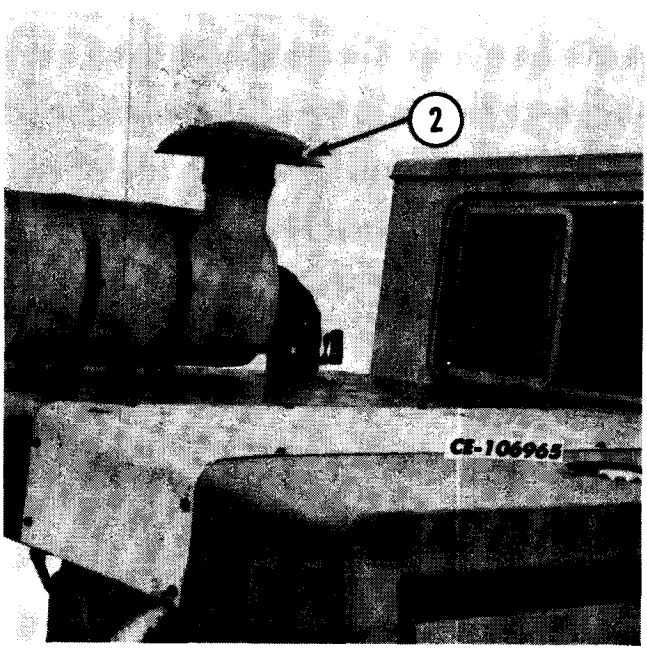


Fig. 2

3. Be sure fuel tanks are full (LH shown in Fig. 3). Fill the tanks at the end of each day's operation to reduce condensation of moisture.

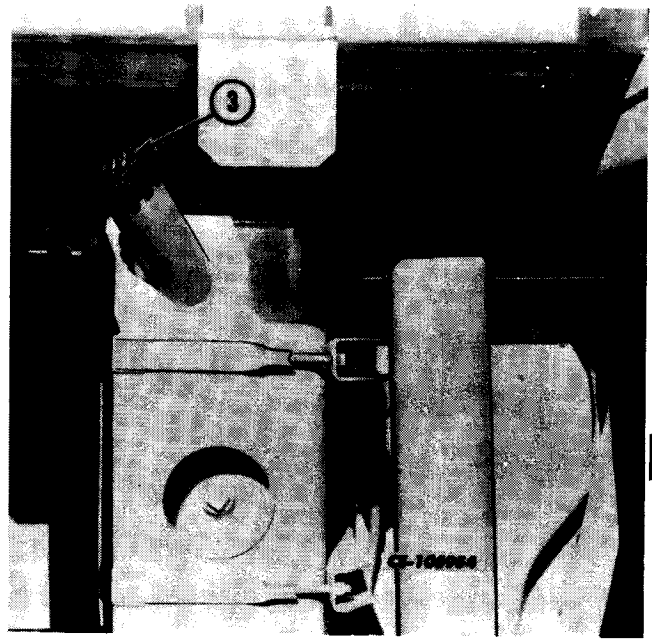


Fig. 3

4. Keep the front and the rear differential vent tubes and front axle convel joint vent tubes (if equipped) (rear differential shown in Fig. 4) free of any obstruction.

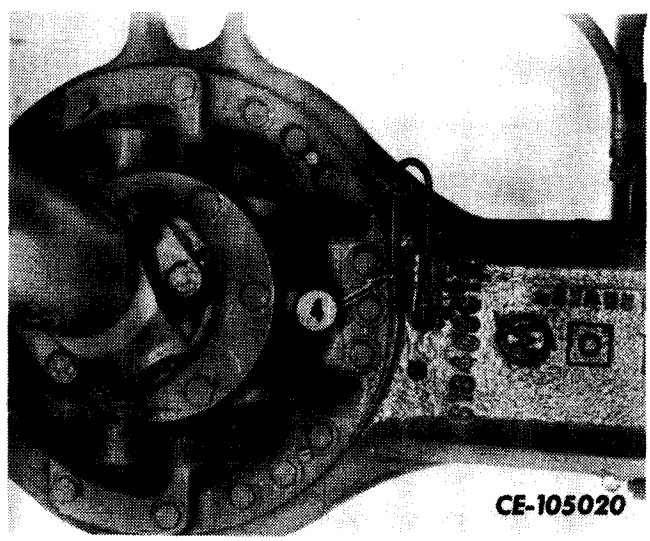


Fig. 4

PREPARING FOR EACH DAY'S WORK

CAUTION! Never open the air tank drain valves more than the prescribed amount.

5. Open the single and dual air tank drain valves (Fig. 5 and 6) and if equipped, the automatic brake apply air tank drain valves, located above the rear axle, a maximum of two turns. Drain accumulated water, then close the valves.

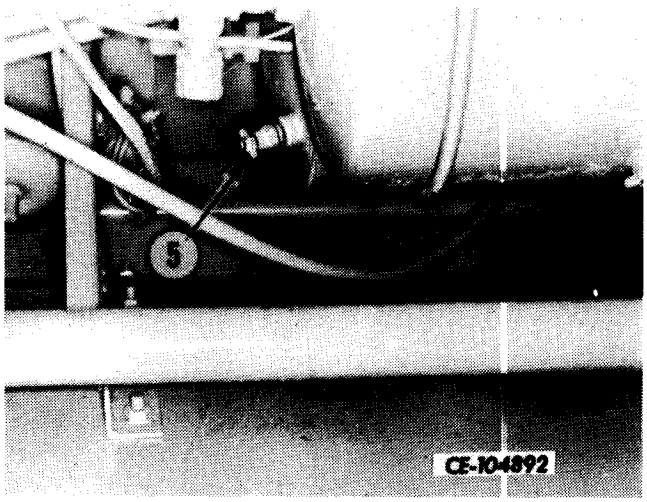


Fig. 5

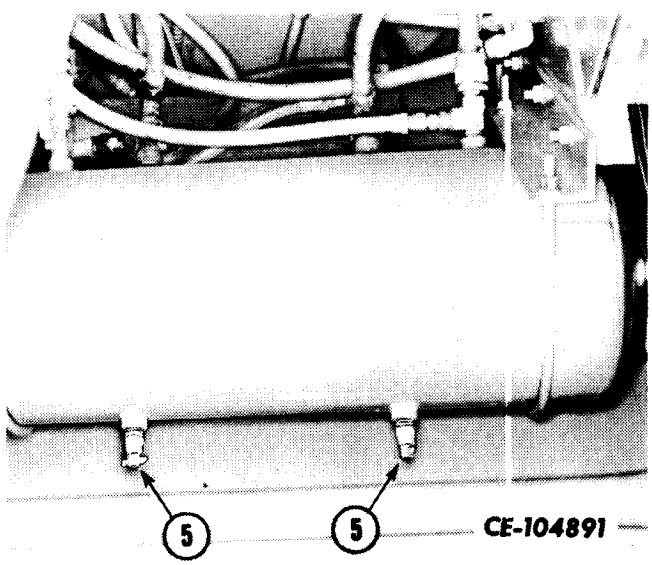


Fig. 6

NOTE: *It is especially important that the air tanks are thoroughly drained of water in cold weather.*

6. Check for any objects lodged between the front dual tires. To remove any objects that cannot be removed by hand, use the rock ejector bars as shown in Fig. 7.

TO REMOVE ROCKS FROM BETWEEN FRONT TIRES . . .

1. Remove bars from rear axle location and hang in front axle position as shown.
2. Hold wheels in a straight position, drive truck backwards until rocks are removed.
3. Return bars to rear axle position.

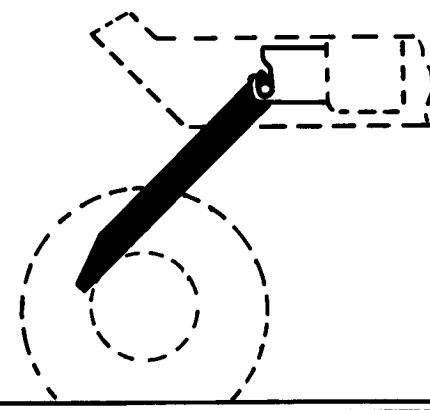


Fig. 7

Perform each of the 10 hour lubrication requirements shown on the "SERVICE GUIDE" in Section 7.

LOOK FOR LEAKS AND DETERMINE THEIR SOURCE SO THAT THEY CAN BE CORRECTED.

CHECK HEADLIGHTS FOR OPERATION. ALSO CHECK TAILLIGHT, STOPLIGHT AND BACK-UP LIGHT. CLEAN ALL GLASS; WINDOWS, WINDSHIELD, INSTRUMENTS AND SIDE VIEW MIRROR.

CHECK TIRES FOR CUTS, TREAD WEAR, PROPER INFLATION.

WORK SAFELY — FOLLOW THESE RULES

This symbol is used to call your attention to instructions concerning your personal safety. Be sure to observe and follow these instructions, and be certain anyone operating this machine is aware of these safety rules.

A CAREFUL OPERATOR IS THE BEST INSURANCE AGAINST AN ACCIDENT.

CAUTIONS

Before starting or operating this machine read the following general precautions. These are listed here to help you protect the machine and to remind you of protection for yourself and those around you. Sound judgment and observance of these rules will help make your job a safer one.

To prevent any possible damage to the alternator and/or the voltage regulator, keep the electrical system master switch "ON" while the engine is running. Turn the switch "OFF" only when the engine is shut down at the end of each day or when the operator leaves the machine unattended.

Do not place the machine under load without the proper engine oil pressure and operating temperature. After starting the engine, allow it to run at low idle for 5 to 10 minutes for thorough distribution of the lubricating oil.

Before shutting down the engine, run at half-speed or less for at least four minutes to avoid afterboil.

Never pour cold coolant into the radiator if the engine is very hot unless conditions make it absolutely necessary. Under such conditions, start the engine and let it idle while slowly pouring the coolant into the radiator.

Fill the fuel tanks at the end of each day's work to reduce moisture condensation in the tanks.

Bring the machine to a complete stop before shifting from forward to reverse gear or from reverse to first gear.

Never shift the transmission into neutral (N) when going downhill. The machine may go out of control or the transmission, converter or engine may be damaged when the transmission is again placed in gear.

CAUTION! For personal protection, observe the following safety precautions.

Provide proper ventilation when operating the engine in a closed building.

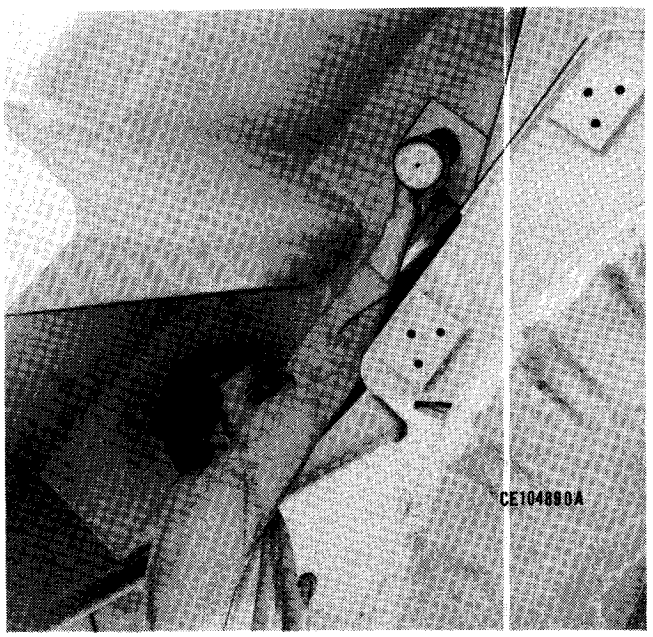
BEFORE STARTING THE ENGINE OR BEGINNING TO MOVE THE MACHINE, GIVE A COUPLE OF SHORT BLASTS ON THE HORN. BE SURE THE AREA IS CLEAR OF PERSONNEL AND OBSTRUCTIONS.

BEFORE DRIVING THE MACHINE, FASTEN THE SEAT BELT.

WHENEVER IT BECOMES NECESSARY TO ADJUST, REPAIR OR LUBRICATE UNDER THE DUMP BODY RAISE THE BODY TO ITS FULL ELEVATED POSITION. REMOVE THE TOW PIN FROM THE FRONT BUMPER AND INSERT IT INTO THE HOLES PROVIDED IN THE REAR OF THE FRAME AND BODY TO SECURE THE BODY IN THE RAISED POSITION. A PIN OF THE SAME DIAMETER, LENGTH AND MATERIAL AS THE TOW PIN MUST BE INSERTED IN THE HOLES PROVIDED ON THE OPPOSITE SIDE OF THE TRUCK. STOP THE ENGINE.

CAUTION! The body must be secured in the manner described. Do not rely on the pressure of the hydraulic system to keep the body in a raised position.

OPERATING THE MACHINE



Use a commercial solvent or kerosene unless otherwise specified for cleaning parts. Never operate the engine when cleaning or lubricating.

If it is necessary to make any checks with the engine running, use two men. One man must remain in the operator's compartment to safeguard the second man making checks or adjustments. As an added precaution, when making checks with the engine running, lock the transmission in neutral and apply the parking brake.

When leaving the machine unattended, place the transmission lever in neutral and lock it, apply the parking brake, shut-off the engine, close and lock windows, shut off electrical system master switch, and lock cab door.

Keep the windshield, window glass and side view mirror clean.

Do not drive the machine without sufficient air pressure for proper braking.

Do not pump the brakes. You may reduce air pressure too low for good braking.

Never allow anyone to work on the machine while it is moving.

Never haul passengers outside of the cab.

Drive at a reasonable speed and maintain sufficient distance between your machine and other vehicles, according to the condition of the road and load.

On haul roads and in pits, give the right-of-way to loaded machines.

Keep your machine as close to the side of the road as safely possible.

Avoid pulling the machine into a loading position while the shovel is swinging or a load is suspended over the loading area. This is dangerous to both the machine and the operator as a rock may fall from the shovel onto the machine.

Don't enter or leave the cab while the machine is being loaded. This invites disaster from falling rocks and dirt.

Avoid shovel overflow and hitting sharp rocks. Watch for soft edges, holes, etc., when backing up to dump.

Never leave the seat to gain better visibility while backing up. A "spotter" or second person must direct the operator.

Watch out for the clean-up dozer.

Slow down when traveling in congested areas.

OPERATOR'S WARNINGS IN CONNECTION WITH BRITISH COLUMBIA BRAKE, GEAR RANGE AND DOWNGRADE CERTIFICATION

It is hereby *certified* that the following chart is the *maximum* design service brake capability of this vehicle when operated in the appropriate gear range and speed for the slope indicated. UNDER NO CIRCUMSTANCES SHOULD THIS VEHICLE EVER OPERATE BEYOND THE RANGES SHOWN IN THE CHART BELOW.

Transmission Gear Range			Ground Speed		Percent Downgrade	
2 Speed	3 Speed	4 Speed (Or More)	KM/H	MPH	Empty	Loaded (Rated Load)
1	1	1	0-8	0-5	29-35	12-19
	2	2	8-16	5-10	21-29	9-12
2	3	3	16-24	10-15	14-21	6-9
		4	24-32	15-20	0-14	0-6

Certification made pursuant to Rule 263 (f) (i) of the Mines Regulation Act (R.S. 1960, C.242, S.1 (am)) 1967, C.25, S.1. Failure to meet all manufacturers specifications and the requirements of the Act will invalidate the above chart.

CAUTION! PLAN AHEAD . . .

1. The above chart does not insure safe operation. Read the following cautionary statements carefully.

2. Change to proper gear range before operating on any grade, to enable the service brakes to provide adequate control.

3. Maximum rated load capacity is the rated cubic yardage listed in the manufacturers' specifications and considering 1780 kg/m^3 (3000 lbs/cu yd) material.

4. The above chart and data is based upon ideal and optimum operating conditions. Anyone of the following factors, either singularly or in combination, will change the values above:

   a. Type of soil.
   b. Ground surface condition.
   c. Vehicle load distribution.
   d. Travel with respect to axis of grade.
   e. Type and condition of tires.
   f. Brake condition.
   g. Operator training, experience, skill and physical condition.

5. Proper use of the retarder is very important. Be familiar with its operation.

OPERATING THE MACHINE

STARTING THE ENGINE

Step numbers correspond with the numbers shown in Fig. 1.

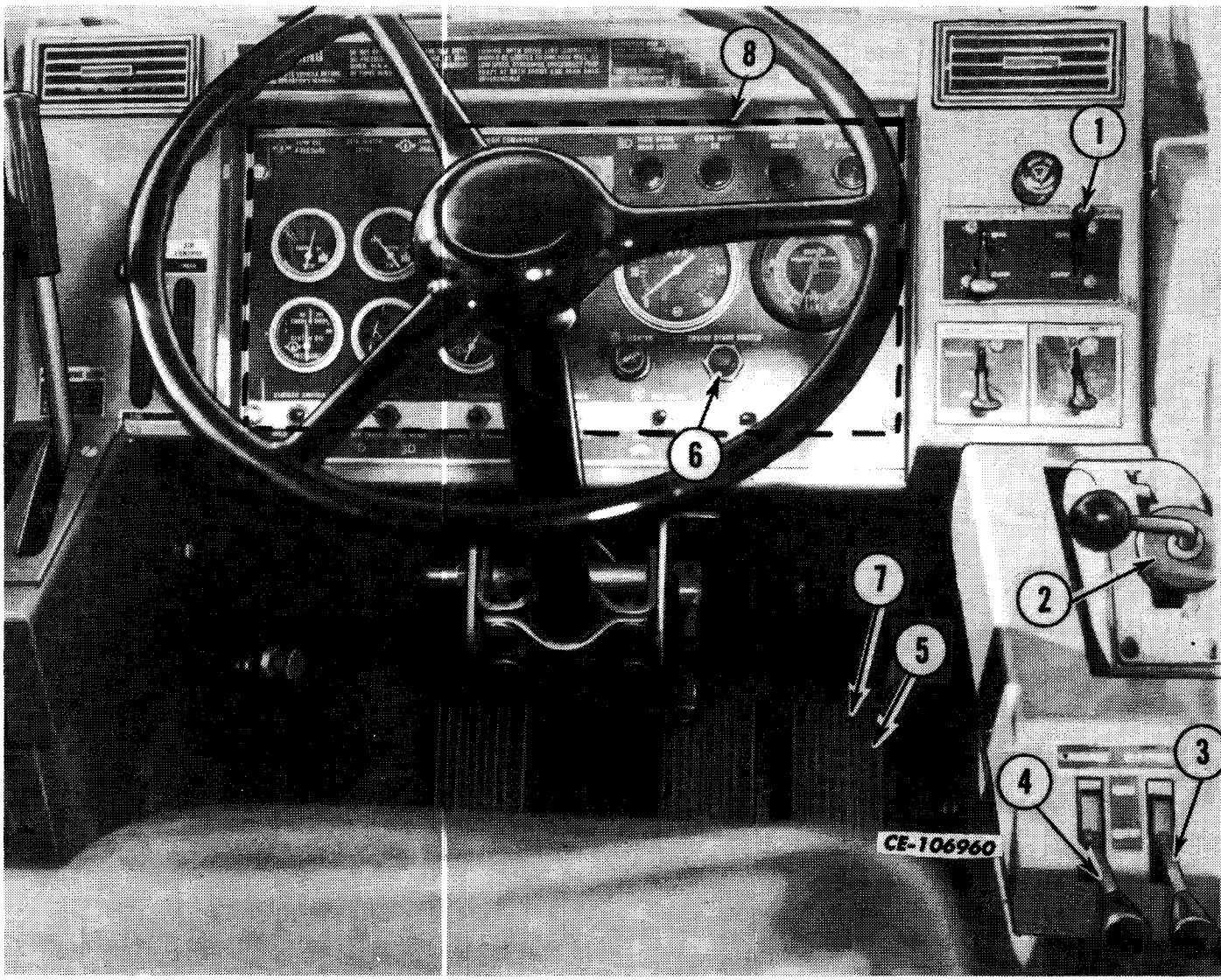


Fig. 1. Starting the Engine

NOTE: *The turbocharger must be primed when the engine has been idle for 30 days or more. Refer to "TURBOCHARGER" in Section 8.*

1. Be sure the parking brake lever is 'ON."

2. Be sure the transmission shift lever is locked in neutral.

3. Move the electrical system master switch lever to the "ON" position.

4. Move the engine stop lever up to the "ON" position.

5. Depress the accelerator pedal to the one-half engine speed position at temperatures above +10° C (+50° F) or to the full speed position at temperatures below +10° C (+50° F).

6. Crank engine as follows:

   a. NORMAL START: Press the starting switch button (located on the lower right of the instrument panel) and release it the instant the engine starts.

NOTE: *To avoid possible damage to the cranking motor, release the button as soon as the engine starts. Never press the button while the engine is running.*

b. USING ETHER INJECTOR:

CAUTION! The ether injector should be used only for starting the engine. Misuse of the ether injector while the engine is running can result in serious damage to the engine.

NOTE: *The ether injector should be used only when the air temperature is below freezing.*

Depress the accelerator pedal to the full speed position. Pull out the ether injector knob and hold for 2 to 3 seconds to fill the ether chamber of the ether starting valve with a measured amount of ether. Simultaneously engage the cranking motor as instructed under "Normal Start" and push in the ether injector knob allowing 2 to 3 seconds for the ether to enter the engine. If the temperature is below zero it may be necessary to inject additional ether.

NOTE: *If the engine does not start with a maximum of two ether injections, determine and correct the cause before attempting again to start the engine.*

NOTE: *Crank engine for 30 seconds at a time, if engine does not start, allow cranking motor to cool two or three minutes before cranking again.*

If the engine will not start or runs roughly, it may be due to one of the following:

a. Air may be in the fuel system. Refer to "FUEL SYSTEM" in Section 8.

b. Ether injector is not functioning correctly. Refer to "ETHER INJECTOR" in Section 8.

7. Immediately after the engine starts, release the accelerator pedal.

CAUTION! Check the engine oil pressure gauge and if no oil pressure is indicated, immediately stop the engine.

8. Check all instruments for proper operation. Refer to "INSTRUMENTS AND CONTROLS" in Section 3.

DRIVING THE MACHINE

Step numbers correspond with the same number shown on Fig. 2.

NOTE: *Before operating, check all instruments. Refer to "INSTRUMENTS AND CONTROLS" in Section 3.*

1. Depress the brake pedal.
2. Release the parking brake.
3. Release the transmission neutral lock, and move the transmission shift lever into first (1) gear.
4. Release the brake pedal and gradually depress the accelerator pedal until it is fully depressed.

SHIFTING THE TRANSMISSION

The transmission has six forward gear ranges, neutral and one reverse gear range which are manually selected with the transmission shift lever.

NOTE: *Always bring the machine to a complete stop before shifting into reverse; the engine must be operating at "low idle."*

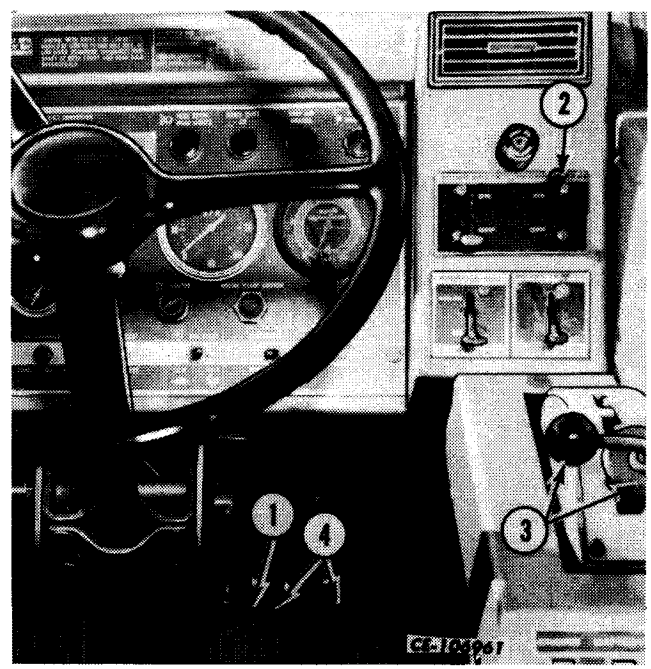


Fig. 2. Driving the Machine

OPERATING THE MACHINE

Each of the gears has two ranges; converter drive or "Low Range" and direct drive "High Range." After shifting into any gear the power train starts in converter drive which provides the power for a higher load resistance. As the load resistance lessens and at a predetermined torque converter turbine rpm, the automatic lock-up clutch within the torque converter, engages providing an efficient, direct engine to transmission drive allowing the engine to operate at a lower engine speed without loss of machine speed.

NOTE: *High range must be obtained in all gears for proper machine operation.*

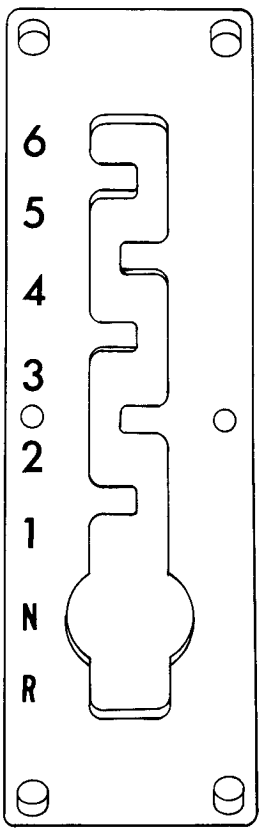


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Fig. 3. Shift Plate

Up-Shifting

1. Continue in first gear until the machine is no longer picking up speed in high range of the automatic lock-up clutch without overspeeding the engine or until the tachometer indicates the full load speed in high range. Shift the transmission shift lever into second (2) gear at full throttle. The outer gear ranges are obtained in the same manner.

2. Use the accelerator pedal to control machine speed once the machine is operating in the proper gear.

Down-Shifting

Down-shift to the next lower gear when the machine is sufficiently reduced and the down-shift warning light goes on.

NOTE: *To down-shift when the warning light is off will seriously damage the transmission and/or the engine.*

Converter Overheating (Fig. 4)

If the torque converter oil temperature gauge registers out of the "RUN" area of the dial, the machine is not in proper gear range. Down-shift into the next lower gear range. The temperature should reduce; if not, down-shift again. If the converter temperature remains out of the "RUN" area in first gear, stop the machine, shift into neutral (N) and run the engine at 1000 rpm until the gauge pointer goes into the "RUN" area. If the pointer remains out of the "RUN" area, stop the engine and determine the cause of the problem.

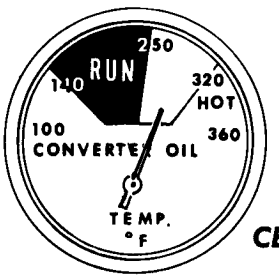

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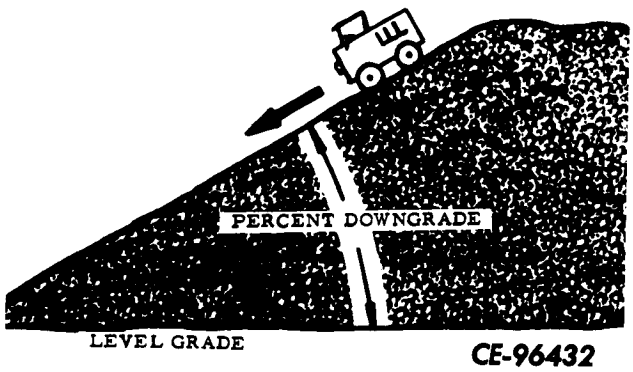
Fig. 4. Converter Overheating

DOWNGRADE OPERATION

The percentage of grade limits under retarder control versus gear range is shown below.

CAUTION! Proper selection of a gear range for downgrade retarding is very important.

DOWNGRADE AND GEAR RANGE RETARDER CHART		
	PERCENT OF DOWNGRADE	
GEAR	EMPTY	LOADED
1st	29-40	12-19
2nd	21-29	9-12
3rd	14-21	6-9
4th	10-14	4-6
5th	0-10	0-4
6th	——	——



1. Reduce vehicle speed by means of downshifting at correct downshift speed into the proper gear range shown on the chart BEFORE entering a downgrade so the retarder has adequate control without use of the service brakes.

2. When starting on the downgrade, RELEASE THE ACCELERATOR PEDAL and depress the retarder control pedal as required, until proper vehicle speed in maintained.

NOTE: *Approximately five seconds is required after initially applying the retarding to obtain a retrading effect.*

3. As the machine nears the bottom of the grade and the retarder is no longer required, gradually release the retarder control pedal.

4. Accelerate the engine after the retainer is fully released.

5. At wide open throttle, up-shift progressively to the desired gear range.

NOTE: *Selection of an improper gear range for a downgrade can cause engine overspeed or excessive torque converter oil temperature. Avoid operating continuously with the oil temperature gauge registering in the upper portion of the yellow zone.*

Selection of the retard gear range must be such that a downshift is not required for the entire retard cycle.

OPERATING IN WET OR SOFT MATERIAL

Front Wheel Slip Brake Lever (If Equipped) (A, Fig. 5)

When one or both of the front wheels has lost traction, move and hold the lever in the "APPLIED" position. This position will partially apply both front brakes simultaneously.

CAUTION! Use this brake at low machine speed.

Release the lever once traction has been restored. The lever will automatically return to the "OFF" position.

Operator Controlled Interaxle Differential (If Equipped) (A, Fig. 5)

When the machine is immobilized due to wet or soft material or slippery conditions, move and hold the lever in the "LOCK" position before attempting to move the vehicle. This position effectively links the front and rear axles together insuring equal distribution of torque.

CAUTION! Use this feature in first or reverse gear only.

Fig. 5. Front Wheel Brake Limiting and Operator Controlled Interaxle Differential Controls

Release the lever once the machine is in motion. The lever should automatically return to the "UNLOCK" position.

NOTE: *Be sure the lever returns to the "UNLOCK" position as a clutch failure may result if the machine is operated at high speeds with the differential clutch engaged. If the lever is in the "LOCK" or "APPLIED" position and the machine still does not move, another method of freeing the machine should be used.*

OPERATING THE MACHINE

Front Wheel Brake Limiting Lever (B, Fig. 5)

When approaching wet or soft material, move the lever to the "SLIPPERY ROAD" position. This position supplies approximately one-half of the braking effort to the front brakes when the brake pedal is applied. This helps prevent a skid and the possibility of getting stuck.

Move the lever back to the "DRY LOAD" position when operating under normal conditions.

STEERING

Steering is done with hydraulic power. Turn the steering wheel until reaching the desired angle of turn. Hydraulic power holds the angle of turn until the steering wheel is again turned.

Auxiliary Steering

> **NOTE:** *Auxiliary steering provides reduced performance in case of engine or transmission failure. Hydraulic system must be functional for the auxiliary power system to be effective. Use the auxiliary steering switch button ONLY when there is a loss of normal power steering; it will not supplement normal steering. Be sure the batteries are fully charged.*

The auxiliary steering system should be activated once a week to insure that this system is operational.

1. Depress and hold the button with engine "OFF".

2. Turn the steering wheel until the front wheels have reached the desired angle of turn; then release the button. (This applies also if the truck is being towed for any reason.)

DUMP BODY OPERATION

1. Shift the transmission into neutral and apply the neutral lock.

2. Apply the dump brake while loading.

3. When dumping apply the brake pedal or place the dump brake valve lever in the "ON" position.

4. Operate the dump body as described under "HOIST CONTROL LEVER POSITIONS" in this section.

5. Before moving the machine, release the parking brake and the dump brake valve lever.

HOIST CONTROL LEVER POSITIONS

Raise

1. Accelerate the engine to wide open throttle.

2. Pull and hold the lever to "RAISE" until the body nears its full damp position.

3. As the body reaches the fully raised position, decelerate the engine and release the lever. The lever will return automatically to "HOLD."

Hold

To stop the body at any height when in "RAISE" or "LOWER," release the lever; the lever will return automatically to "HOLD."

Lower

Place the lever in "LOWER." When the body is most of the way down, move the lever to "FLOAT." The weight of the body will bring the body down onto the frame. Be sure the body is down on the frame before moving the machine.

Float

A slight resistance is felt when moving the lever from "LOWER" to "FLOAT." Keep the lever in "FLOAT" during normal operation.

A detent feature in the "FLOAT" position locks the lever and a return to "HOLD" must be done manually.

STOPPING THE MACHINE

Step numbers correspond with the numbers shown in Fig. 6

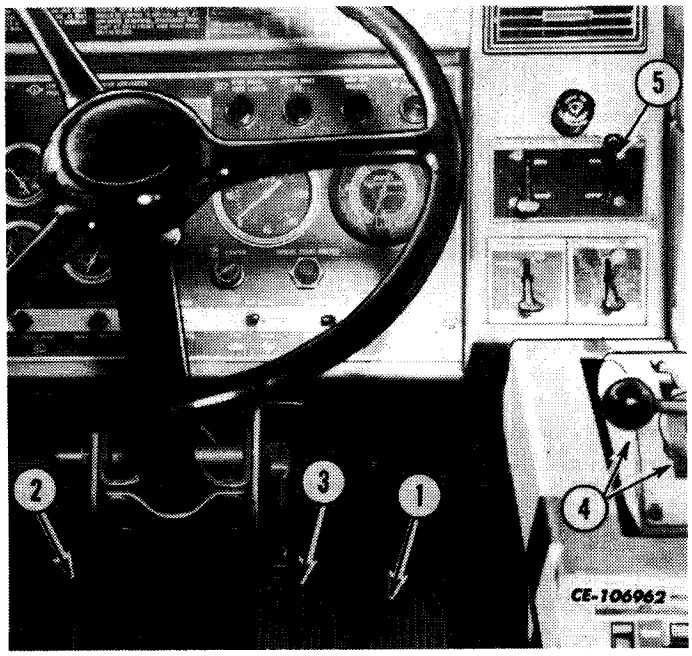


Fig. 6. Stopping the Machine

1. Fully release the accelerator pedal.

2. Fully depress the retarder control pedal. Slowly release it as the machine slows down.

3. Apply the brake pedal until the machine comes to a complete stop.

CAUTION! Do not "FAN" the brakes by repeatedly depressing and releasing the brake pedal. This can reduce the air pressure too low for braking.

4. Shift and lock the transmission in neutral (N).

   NOTE: *The transmission can remain in gear if the machine has been brought to a temporary stop.*

5. Apply the parking brake.

PARKING

A few "DO" suggestions to protect both lives and equipment when parking.

DO park machine in area free of grease or fuel puddles which causes tire deterioration.

DO completely lower the dump body.

DO park machine on level ground, if at all possible:

a. To avoid unexpected movement.

b. To obtain accurate coolant, lubricant and fuel level checks.

DO park on level ground when possible. If necessary to park on slope, park at a right angle, then secure with blocks (front and rear), Fig. 7.

NOTE: *Parking on a steep slope is not recommended.*

NOTE: *Use the parking brake and not the dump brake when parking the vehicle.*

CAUTION! Never leave machine unattended while the engine is running.

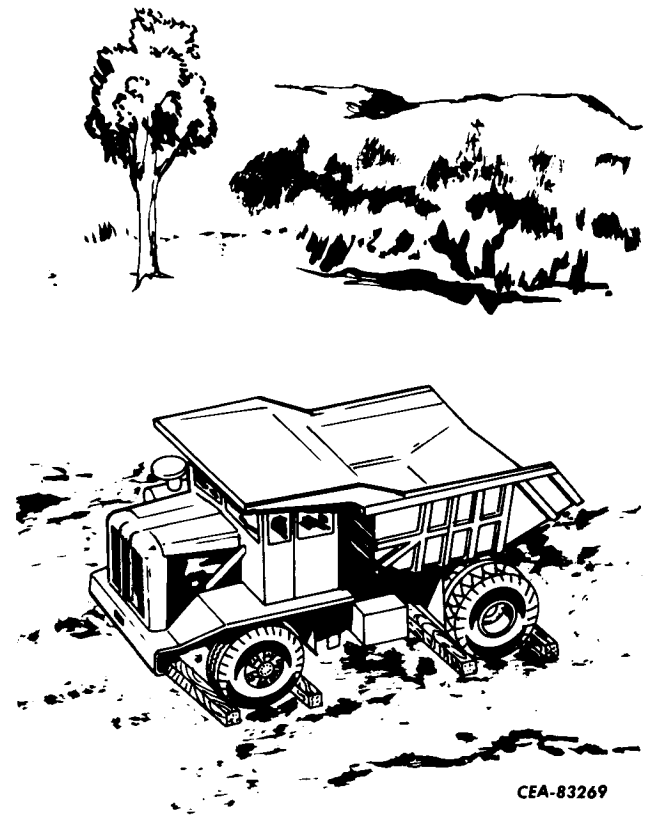


Fig. 7. Parking on a Slope

OPERATING THE MACHINE

STOPPING THE ENGINE

Step numbers correspond with the numbers shown on Fig. 8.

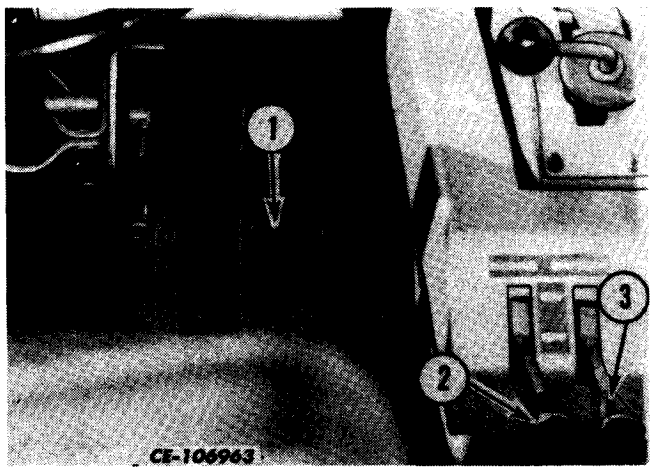


Fig. 8. Stopping the Engine

1. Operate the engine at half throttle (no load) for three to five minutes, then decelerate to low idle.

   NOTE: *Serious damage can result to the engine if the above step is neglected.*

2. Move the engine stop lever down to the "OFF" position.

3. When the engine has stopped, move the electrical system master switch lever down to the "OFF" position.

   NOTE: *When the machine is shut down at the end of each day and is left unattended, lock the cab door.*

LOADING

Loaders, shovels or draglines are most frequently used for loading. The smaller degree of bucket travel (example shown in Fig. 1 or 2), the lesser loading time required. Proper placement of machine to be loaded, usually done by a "spotter," contributes to efficiency.

CAUTION! Keep waiting machine beyond the reach of the bucket. Be alert for the clean-up dozer, if used, before moving a loaded machine or a waiting machine.

When you are signalled that your machine is loaded, start for the haul road right away.

Fig. 1 or 2 shows two practical loading cycles.

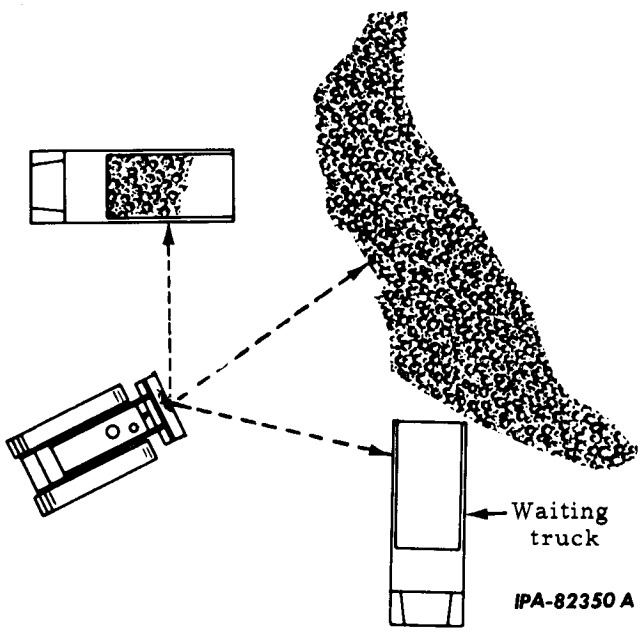


Fig. 1. Loading in Open Area

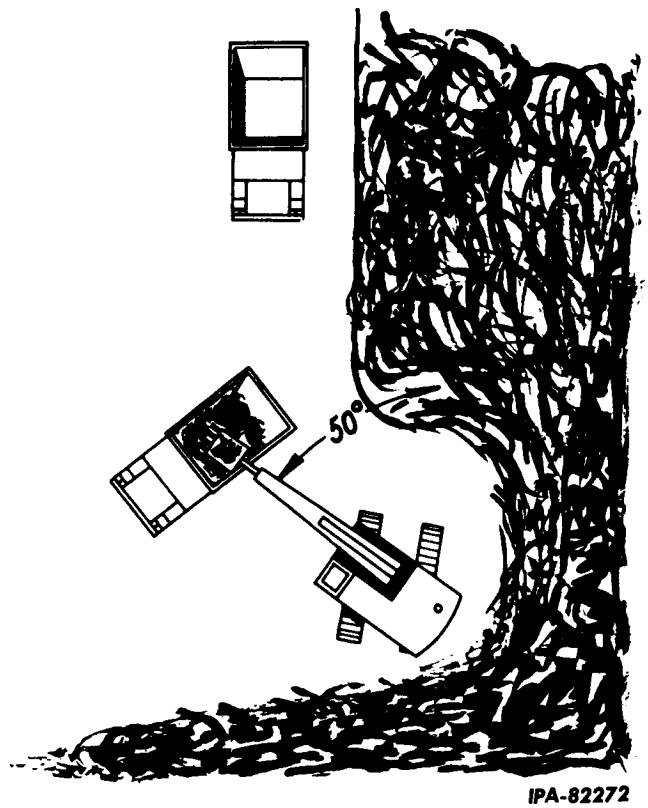


Fig. 2. Semi-Circular Loading

HAULING

Start in low gear when leaving the loading area. Accelerate to gain momentum according to conditions in the loading area and on the haul road (Fig. 3). Up-shift progressively to the proper gear range.

Fig. 3. Traveling the Haul Load

OPERATING TECHNIQUES

DUMPING

Dumping operation depends upon the type of material being hauled. For instance, sand, gypsum or loose dirt is dumped over a spoil bank or piled into large mounds. A "spotter" usually directs the machine to the dumping area (Fig. 4).

CAUTION! The "spotter" is needed with a machine of this size. While backing up to dump, watch the "spotter" at all times. Follow his directions. Never leave the seat to gain better visibility while backing up. This will result in disaster if the machine should go out of control.

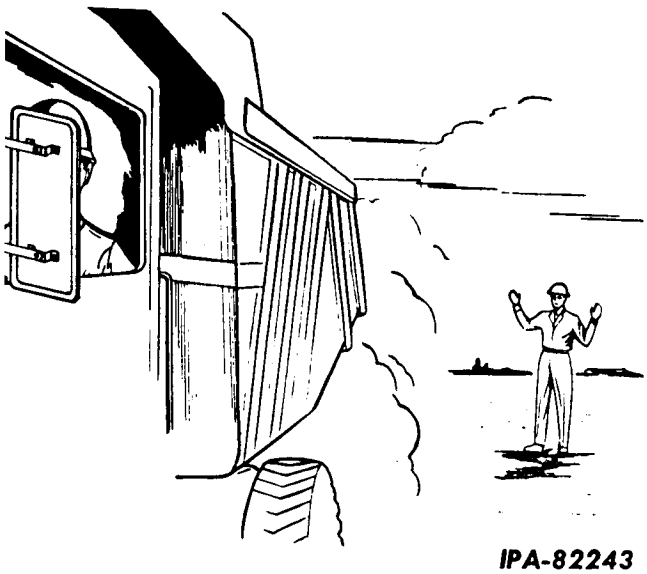


Fig. 4. Spotter Directing Operator

NOTE: *Before raising the dump body, be sure the rear wheels are level (Fig. 5) to avoid torsional strain on the body hinge pins, frame and hoist cylinders.*

NOTE: *Never "jump" the machine when dumping (Fig. 6). The shock of bounding the rear tires off a stop-block, or shaking the dump body when raised, places too much strain on the machine.*

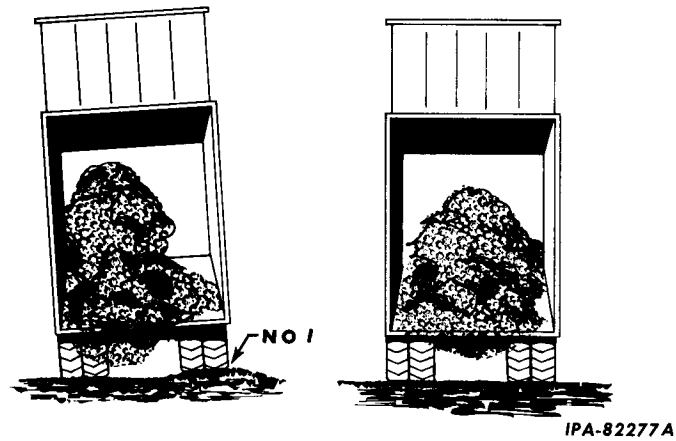


Fig. 5. Correct Wheel Level Position

Fig. 6. "Jumping" the Machine

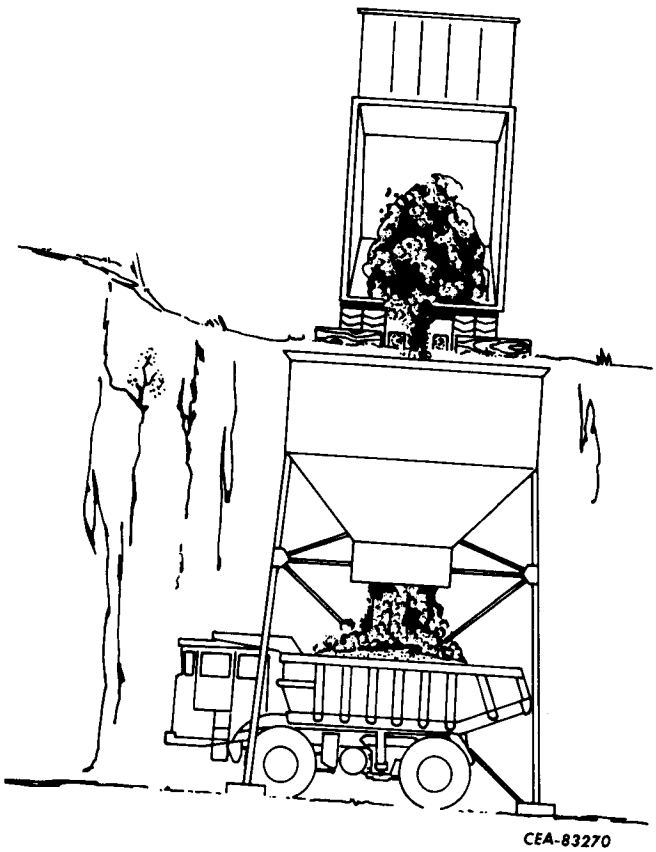


Fig. 7. Dumping into Hopper

Ore, limestone and similar materials are usually dumped into a hopper or crusher. Avoid hitting the protecting rail at the hopper, to avoid excess tire wear. Avoid rubbing the inside duals (Fig. 7).

When dumping dirt or rock from a borrow pit into a fill area, the load is usually dumped in a string. Pull past the preceding load, turn in line with the string, back up until within a few feet of the previous load (Fig. 8).

Fig. 8. "String" Dumping

SCHEDULED MAINTENANCE

Scheduled maintenance is the normal maintenance necessary to provide proper and efficient equipment operation.

To protect your investment and prolong the service life of your equipment, follow the scheduled maintenance listed on the "SCHEDULED MAINTENANCE GUIDE."

SCHEDULED MAINTENANCE GUIDE

△ Every 10 Hours of Operation

Air cleaner weather caps	Remove and clean. Refer to "AIR CLEANING SYSTEM" in Section 8.
Front and rear differential vent tubes	Check for obstructions.
Fuel tanks	Fill.
Glass surfaces (windshield, windows and instruments)	Clean.
Tires	Inspect for damage.
Scheduled service	Refer to "SERVICE GUIDE" in this section.

○ Every 50 Hours of Operation

Brake drums and service brake power clusters	Remove mud and dirt accumulation.
Cab air filter	Clean, refer to "AIR CLEANING SYSTEM" in Section 8.
Transmission shift lever	Shift through all gear ranges. Check for positive gear engagement in each range. If excess bind or looseness exists, consult your Pay Line distributor.
Wheel rim clamp nuts **	Check torques. Refer to "TIRES AND RIMS" in Section 8.
Scheduled service	Refer to "SERVICE GUIDE" in this section.

Every 100 Hours of Operation

Air cleaner hose connections and clamps	Inspect for and correct loose fits or damage.
Air conditioning (if equipped)	Check for cracked or damaged hoses and hose connections.
Air system	Check for and correct leaks. Refer to "AIR PRESSURE SYSTEM" in Section 8.
Engine cylinder head nuts ††	Check torques. Consult your Pay Line distributor.
Front axle and rear axle spring cover nuts ††	Check torques.
Fuel system	Check for and correct leaks.
Hydraulic system (steering, hoist, brakes)	Check for and correct leaks.
Parking brake	Check for correct adjustment. Refer to "BRAKES" in Section 8.
Radiator and connections	Check for and correct leaks.
Radiator core	Clean. Refer to "COOLING SYSTEM" in Section 8.

SCHEDULED MAINTENANCE

Service brake power cluster breathers	Clean. Refer to "BRAKES" in Section 8.
Transmission and torque converter hoses	Check for and correct leaks.
Windshield washer jar	Check level.
Scheduled service	Refer to "SERVICE GUIDE" in this section.

Every 200 Hours of Operation

Alternator, fan, air compressor and refrigerant compressor belts	Check tension. Refer to "BELTS" in Section 8.
Seat suspension nuts and bolts	Check and tighten loose nuts and bolts.
Scheduled service	Refer to "SERVICE GUIDE" in this section.

Every 250 Hours of Operation

Scheduled service	Refer to "SERVICE GUIDE" in this section.

Every 500 Hours of Operation

Door hinges	Apply a few drops of Grade-10 engine oil to the pivot pins.
Door striker plate and hitch	Lubricate with a grease stick.
Front axle and rear axle spring cover nuts	Check torques.
Fuel tank vent pipes	Keep free of obstructions.
Turbocharger	Check cap screws, hold down nuts, air connections and oil connections for tightness. Condition of hoses and oil lines must be checked; replace where necessary.
Wiring	Check for and repair worn, cracked or frayed insulation, broken wires, loose or corroded connections.
Service brakes	Check operation. Refer to "BRAKES" in Section 8.
Scheduled service	Refer to "SERVICE GUIDE" in this section.

Every 1000 Hours of Operation

Air conditioning refrigerant level	Check. Refer to "AIR CONDITIONING" in Section 8.
Cooling system	Clean. Refer to "COOLING SYSTEM" in Section 8.
Hydraulic reservoir breather	Clean. Refer to "HYDRAULIC SYSTEM" in Section 8.
Windshield wiper blade	Replace when blade begins to streak.
Scheduled service	Refer to "SERVICE GUIDE" in this section.

Every 2000 Hours of Operation

Service brakes	Inspect the two front and one rear brake for external leakage. Disassemble and inspect all internal brake components of the remaining rear brake. Consult your Pay Line distributor.

Service brake power clusters ..... Rebuild each master cylinder. Consult your Pay Line distributor.

Scheduled service ..... Refer to "SERVICE GUIDE" in this section.

Every 5000 Hours of Operation

Scheduled service ..... Refer to "SERVICE GUIDE" in this section.

Periodic

Air cleaner elements ..... Change when the air cleaner service indicator shows all red.

Parking brake ..... Inspect brake. Refer to "BRAKES" in Section 8.

** This is only necessary for the first 250 hours of operation.

†† This is necessary after the first 100 hours of operation. Thereafter, check the nut torques as indicated in this guide.

LUBRICATION

For information about the lubrication of a new machine, refer to "LUBRICATION WHEN SHIPPED" in Section 2.

The life and performance of a machine depends on the care that it is given, and proper lubrication is an important maintenance service for your machine.

Thorough lubrication service performed at definite intervals will aid greatly in prolonging the life of the machine and in reducing operating expense.

The type of work being done, load, ground and weather conditions are all factors to consider in frequency of lubrication. The scheduled intervals between lubrication periods shown on the "SERVICE GUIDES" are approximate, being based on average operating conditions. It may be necessary to lubricate after shorter working periods under severe operating conditions such as extremely dusty conditions, low engine temperatures, intermittent operation, excessively heavy loads with high oil temperatures, or when diesel fuel with a high sulphur content is used. However, the time intervals between lubrication periods must never exceed those indicated in this manual.

SELECTION OF LUBRICANTS

The selection of the proper type (specification) and grade (weight or viscosity) of lubricant is not guess work. Many tests have been made to determine the correct lubricants for this machine. For detailed information regarding lubricants, refer to "LUBRICANT SPECIFICATIONS AND CAPACITIES" in this section.

Lubricant Viscosities

During cold weather, base the selection of a crankcase lubricating oil viscosity on the lowest anticipated temperature for the day to make starting easier. For hot weather operation, base the selection on the highest anticipated temperature. Refer to the "LUBRICANT SPECIFICATIONS AND CAPACITIES CHART" in this section.

PRECAUTIONS

After changing engine oil, operate the engine at low idle, without load, for at least five to ten minutes. This will allow the oil to work into the bearings and onto the cylinder walls.

LUBRICANT SPECIFICATIONS AND CAPACITIES

It is not the policy of the International Harvester Company to approve lubricants or to guarantee oil performance in service. The responsibility for the quality of the lubricant must remain with the supplier of the lubricant. When in doubt, consult your Pay Line distributor.

The lubricants specified for this machine are shown in the "LUBRICANT SPECIFICATIONS AND CAPACITIES CHART" in this section.

SCHEDULED MAINTENANCE

LUBRICANT SPECIFICATIONS AND CAPACITIES CHART				
		ANTICIPATED AIR TEMPERATURES		
LUBRICATION POINT	**CAPACITY**	**+49° C to -7° C (+120° F to +20° F)**	**+21° C to -23° C (+70° F to -10° F)**	**-12° C to -34° C (+10° F to -30° F)**
Crankcase w/Filters	30.3 litres (32 qts)	SAE-30	SAE-10W	SAE-10W diluted w/10% kerosene
		I.H. No. 1 Engine Oil or API CD/CC, CD, CE or MIL-L-2104C or MIL-L-45199B Oil		
Hydraulic Reservoir	151.4 litres (160 qts)	SAE-10W	SAE-10W	SAE-5W-20 or 5W-30
		I.H. No. 1 Engine Oil or API CC, DC/CC, CD, CE, CF, CC/SE or MIL-L-2104B or C or MIL-L-46152 Oil or I.H. Hy-Tran Fluid for all temperatures.		
Transmission	56.8 litres (60 qts)	SAE-10W	SAE-10W	SAE-5W-20 or 5W-30
		I.H. No. 1 Engine Oil or API CC, CD/CC, CD, CE, CF, CC/SE or MIL-L-2104B or C or MIL-L-46152 Oil or Allison Type C-2 or I.H. Hy-Tran Fluid for all temperatures.		
Convel Joints (each) Differential (front) Differential (rear) Wheel Planetaries (each)	0.9 litres (1 qt) 5.7 litres (6 qts) 6.6 litres (7 qts) 8.5 litres (9 qts)	SAE-85W-140	SAE-80W-90 or 85W-140	SAE-80W-90 @
		I.H. 135 H EP Gear Lubricant or API-GL-5 Gea Lubricant or MIL-L-2105C Gear Lubricant.		
Service Brake Power Clusters (each)	Fill as Instructed	I.H. Super Heavy Duty or SAE-J1703e Brake Fluid.		
All Lubrication Fittings EXCEPT King Pins	Fill as Instructed	I.H. Super Grease or I.H. 251 HEP Grease.	I.H. Super Grease or I.H. 251 H EP or MIL-G-10924C Grease.	
King Pin Lubrication Fittings (each)	Fill as Instructed	I.H. Super Grease or Lithium base grease with 3% micro-size molybdenum disulfide or MIL-G-10924C with 3% micro-size molybdenum disulfide.		

@ — Channel point must not exceed -34° C (-30° F) when used below -23° C (-10° F).

SERVICE GUIDE

NOTE: *Points of service are individually explained under "SERVICE POINTS." They are identified by item numbers corresponding with those listed in the chart below and the machine diagram. Always use clean lubricators and containers. Wipe dirt from fittings before fresh grease is added. Use the hourmeter to determine service intervals.*

SERVICE INTERVAL	ITEM NO.	POINT OF SERVICE	LUBRICANT	REMARK
Every 10 Hours △	1	Radiator Coolant Level	———	Check
	7	Air System Tanks	———	Drain Water
	10	Steering Cylinders	MPG	Grease
	12	King Pins	MPG	Grease
	16	Engine Primary Fuel Filter	———	Check
	26	Crankcase Oil Level	EO	Check
	33	Tie Rod	MPG	Grease
	37	Servo Cylinder	MPG	Grease
Every 50 Hours ○	5	Transmission Oil Filter	———	Change (Initial Only)
	15	Tire Inflation	———	Check
	17	Fuel Tanks	———	Drain Water
	25	Hydraulic Reservoir Oil Level	EO	Check
	28	Air Cleaner Dust Unloader Valve	———	Squeeze *
	31	Drive Shafts	MPG	Grease
	35	Hoist Cylinder Bearings	MPG	Grease
Every 100 Hours	11	Front Axle Inboard Bearing	MPG	Grease
	13	Wheel Planetary Oil Level	MPL	Check
	14	Service Brake Power Clusters	———	Check
	18	Transmission Oil Level	EO	Check
	20	Radius Rods	MPG	Grease
	21	Differential Oil Level (Rear)	MPL	Check
	29	Batteries	———	Check
	32	Front Axle Joint Oil Level	MPL	Check
	36	Differential Oil Level (Front)	MPL	Check
Every 200 Hours	6	Engine Lubricating Oil Filters	———	Change
	27	Crankcase Oil	EO	Change
Every 250 Hours	5	Transmission Oil Filter	———	Change **
Every 500 Hours □	2	Fan Hub	MPG	Grease
	8	Converter Scavenge Line Screen	———	Clean
	9	Converter Breather	———	Clean
	19	Transmission Oil	EO	Change
	22	Fan Idler Hub	MPG	Grease
	23	Hydraulic Return Line Filter	———	Clean or Change
	24	Hydraulic Suction Screen	———	Clean
	34	Transmission Sump Screen	———	Clean

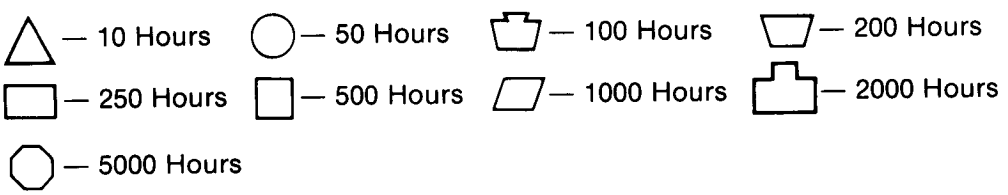
SCHEDULED MAINTENANCE

SERVICE INTERVAL	ITEM NO.	POINT OF SERVICE	LUBRI-CANT	REMARK
Every 1000 Hours	1	Radiator Coolant	———	Change
	4	Engine Final Fuel Filter	———	Change
	13	Wheel Planetary Oil	MPL	Change
	21	Differential Oil (Rear)	MPL	Change
	23	Hydraulic Return Line Filter	———	Change
	25	Hydraulic Reservoir Oil	EO	Change
	32	Front Axle Joint Oil	MPL	Change
	36	Differential Oil (Front)	MPL	Change
Every 2000 Hours	3	Engine Valves	———	Adjust
Every 5000 Hours	30	Cranking Motor	EO	Lubricate
As Required	38	Control Cables	———	Lubricate

* Change the air cleaner elements when the service indicator shows all red.
** Change also dependent on transmission clutch oil pressure gauge reading.

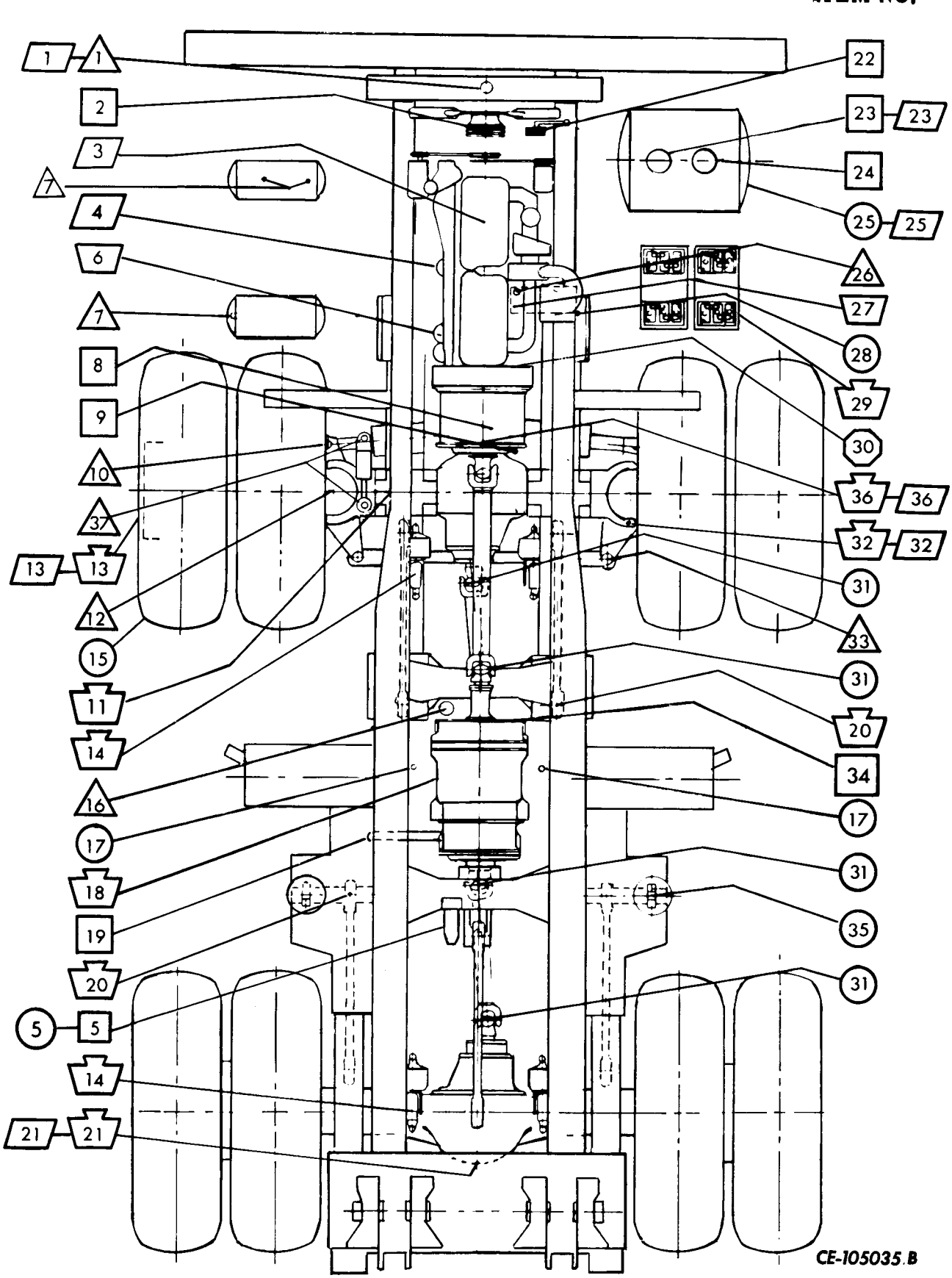
LUBRICANT KEY: EO — Engine Oil
MPL — Multi-Purpose Type Gear Lubricant
BF — Brake Fluid
MPG — Multi-Purpose Grease

The symbols around the item numbers indicate he intervals between service.



NOTE: *Intervals of time between services are based on average operating conditions. Under unusually severe conditions of operation, reduce the interval of time between services.*

SERVICE GUIDE



SCHEDULED MAINTENANCE

SERVICE POINTS

ITEM 1 — RADIATOR COOLANT

Checking Level

Refer to "COOLING SYSTEM" in Section 8.

Changing Coolant

Drain, clean, and refill. Refer to "COOLING SYSTEM" in Section 8.

ITEM 2 — FAN HUB (B, Fig. 1)

Using a hand lubricator, slowly apply lubricant through the fitting until clean lubricant appears at the front of the fan hub. DO NOT OVER LUBRICATE. Remove any excess lubricant from hub.

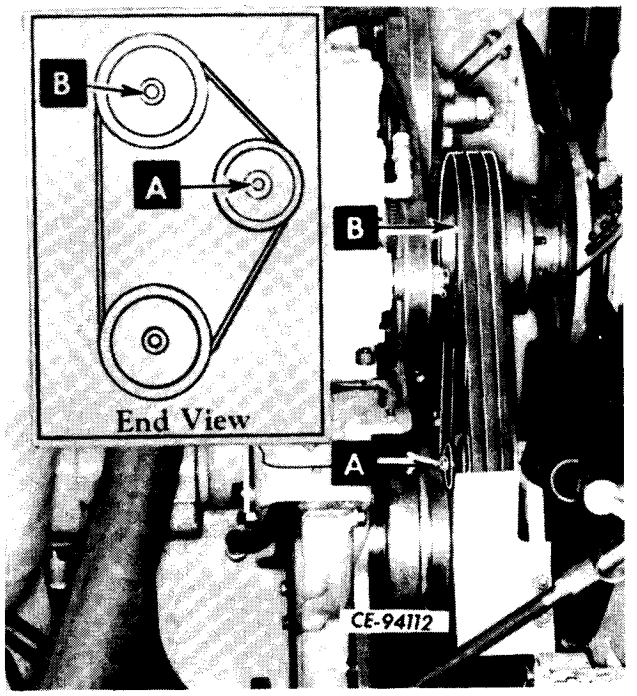


Fig. 1

A. Fan Idler Hub
B. Fan Hub

ITEM 3 — ENGINE VALVES

Check clearance. Refer to "ENGINE VALVE CLEARANCE ADJUSTMENTS" in Section 8.

ITEM 4 — ENGINE FINAL FUEL FILTER

Replace the filter every 1000 hours, or if after replacing the primary fuel filter loss of power still persists. Refer to "FUEL SYSTEM" in Section 8.

ITEM 5 — TRANSMISSION OIL FILTER

Change the element. Refer to "TRANSMISSION OIL FILTER" in Section 8.

ITEM 6 — ENGINE LUBRICATING OIL FILTERS

Change the filters. Refer to "ENGINE LUBRICATING OIL FILTERS" in Section 8.

ITEM 7 — AIR SYSTEM TANKS

Drain water. Refer to "AIR PRESSURE SYSTEM" in Section 8.

ITEM 8 — TORQUE CONVERTER SCAVENGE LINE SCREEN (Fig. 2)

Clean. Refer to "TORQUE CONVERTER SCAVENGE LINE SCREEN" in Section 8.

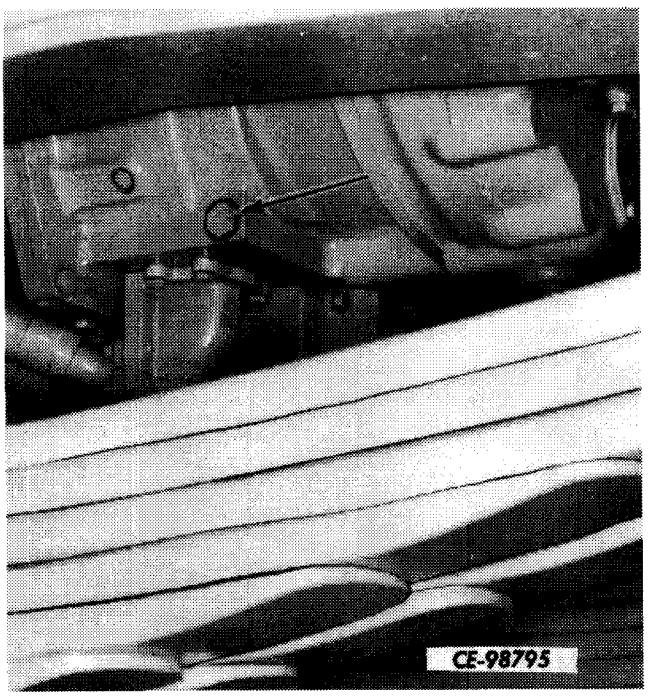


Fig. 2

ITEM 9 — TORQUE CONVERTER BREATHER (Fig. 3)

Clean. Refer to "TORQUE CONVERTER BREATHER" in Section 8.

ITEM 10 — STEERING CYLINDERS (Fig. 4)

(Two fittings on each cylinder.) Apply lubricant at each fitting until clean lubricant appears.

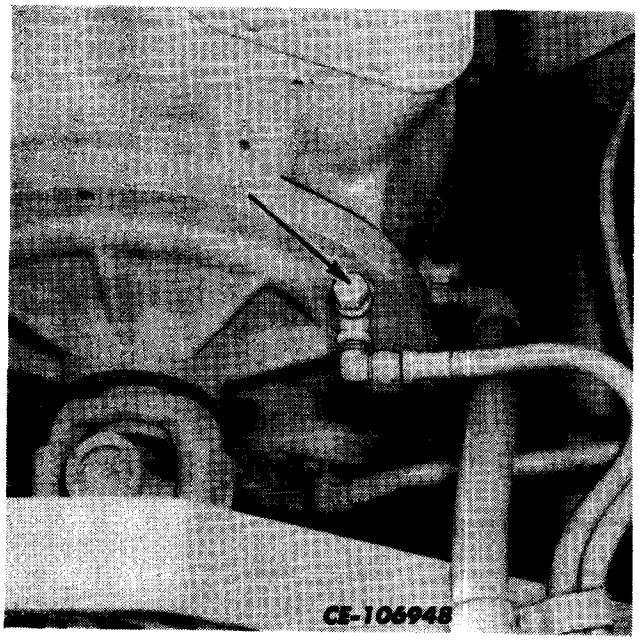


Fig. 3

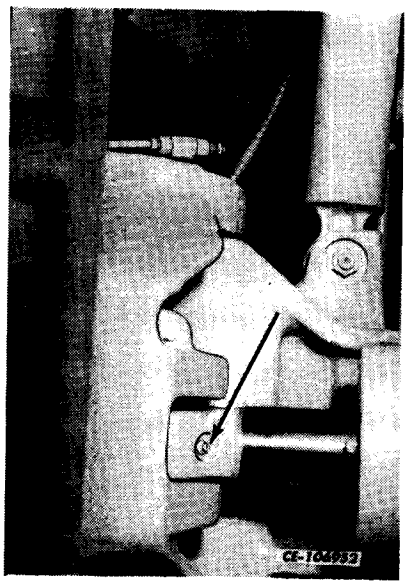


Fig. 4

ITEM 11 — FRONT AXLE INBOARD BEARING

(One fitting on each side.) Apply lubricant at each fitting until clean lubricant appears.

ITEM 12 — KING PINS

(Two fittings on each side.) Apply lubricant at each fitting until clean lubricant appears. Refer to "LUBRICANT SPECIFICATIONS AND CAPACITIES CHART" in this section for grade of lubricant specified.

ITEM 13 — FRONT AND REAR WHEEL PLANETARY OIL (Fig. 5)

NOTE: *Each of the wheels has its own lubricant reservoir and must be drained and refilled or checked separately. The following procedures are the same for each wheel.*

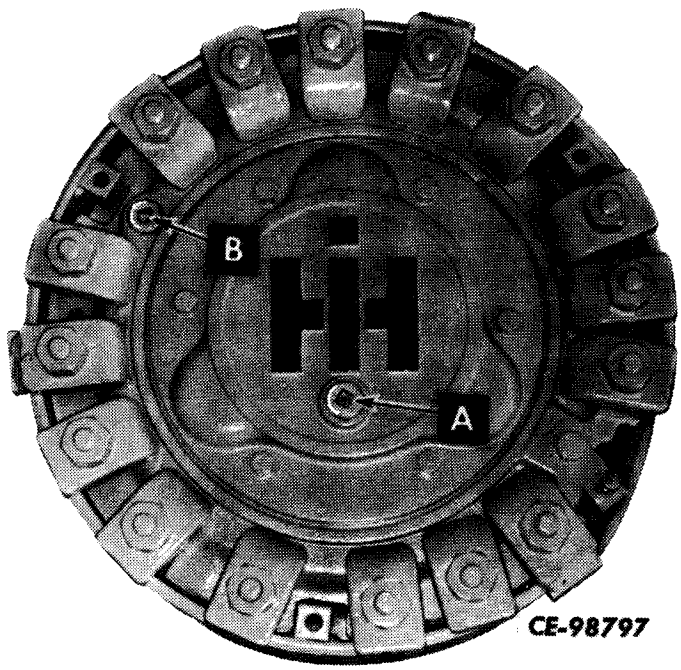


Fig. 5. Wheel Planetary

A. Level Plug
B. Filler and Drain Plug

Checking Oil Level

1. When the lubricant is at operating temperature, park the machine on level ground. Position one wheel so that the "IH" monogram is in the upright position, stop the engine, and apply the parking brake.

2. Remove the level plug (A). If lubricant level is low (below the level plug), remove filler and drain plug (B). Add lubricant through filler and drain plug opening until lubricant starts to flow from the level plug opening. Refer to "LUBRICANT SPECIFICATIONS AND CAPACITIES CHART" in this section for the grade of lubricant specified.

3. Install both plugs.

SCHEDULED MAINTENANCE

Changing the Oil

1. When the lubricant is at operating temperature, park the machine on level ground, position one wheel so that the drain plug (A) is at the highest point, stop the engine, and apply the parking brake.

2. Remove the drain plug (B) and replace with a one inch NPT threaded pipe long enough to carry the draining lubricant away from the tire.

3. Move the machine so the drain is at the lowest point. Remove the level plug (A) to shorten the draining time. Completely drain the planetary. (Remove the drain pipe.)

4. Move the machine so the "IH" monogram is in the upright position.

5. Fill the planetary through the filler and drain plug opening (B). Refer to the "LUBRICATION SPECIFICATIONS AND CAPACITIES CHART" in this section for the quantity and grade of lubricant specified.

6. Install both plugs.

ITEM 14 — SERVICE BRAKE POWER CLUSTERS

Check fluid level. Refer to "BRAKES" in Section 8.

ITEM 15 — TIRE INFLATION

Check inflation pressure. Refer to "TIRES AND RIMS" in Section 8.

ITEM 16 — ENGINE PRIMARY FUEL FILTER

Replace filter upon loss of engine power or misfiring. Refer to "FUEL SYSTEM" in Section 8.

ITEM 17 — FUEL TANKS

Drain water. Refer to "FUEL SYSTEM" in Section 8.

ITEM 18 — TRANSMISSION OIL

Checking Oil Level

1. With the machine on level ground, apply the parking brake and start the engine. With the engine operating at 1000 rpm and the transmission in neutral, check the oil level. The oil level should stabilize in the center of low oil level sight gauge (2, Fig. 6).

2. If the oil level is below the center of the low oil level sight gauge, remove the filler plug (Fig. 7), and add oil through the filler tube until oil appears in the center of the low oil level sight gauge. Refer to the "LUBRICANT SPECIFICATIONS AND CAPACITIES CHART" in this section for the grade of lubricant specified. Reinstall the filler plug.

CAUTION! Be sure the area in front of the machine is clear of personnel and obstructions as the vehicle may move forward during this check.

3. Decrease the engine speed to low idle and apply the service brakes. Operate the machine for approximately TEN SECONDS alternately in sixth gear stall and in neutral at high idle until the transmission is a minimum of 150 degrees F. Decrease the engine speed to low idle and place the transmission shift lever in neutral.

CAUTION! If the machine starts to move forward, fully release the accelerator pedal. Do not hold the machine in this stall condition for more than ten seconds.

4. With the engine running at low idle and the transmission in neutral, again check the oil level. The oil level should stabilize in the center of high oil level sight gauge (1, Fig. 6).

5. If the oil level is above the center of the high oil level sight gauge, drain excess oil at the drain plug (Fig. 8).

NOTE: *Do NOT operate the machine with the oil level above the high oil level sight gauge or below the low oil level sight gauge.*

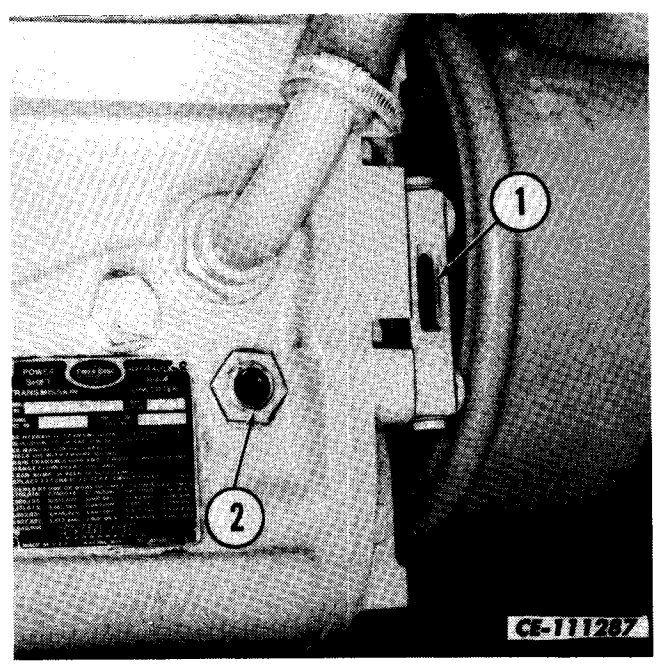


Fig. 6. Transmission Oil Level Sight Gauges

1. High Oil Level Sight Gauge
2. Low Oil Level Sight Gauge

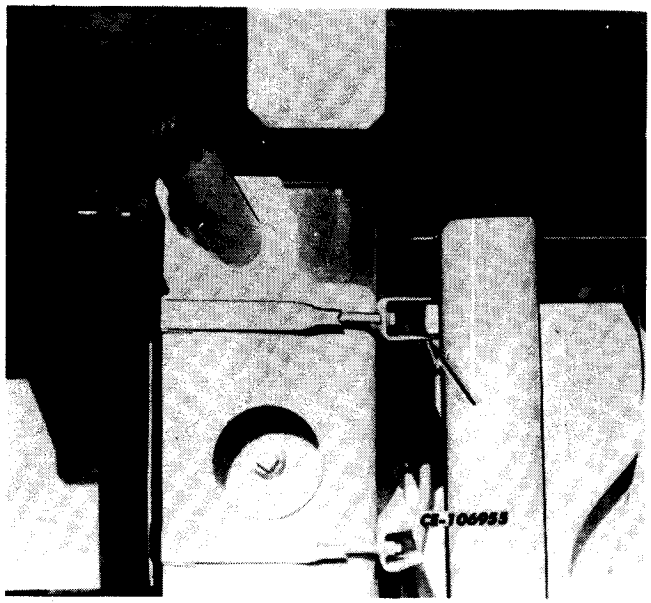


Fig. 7

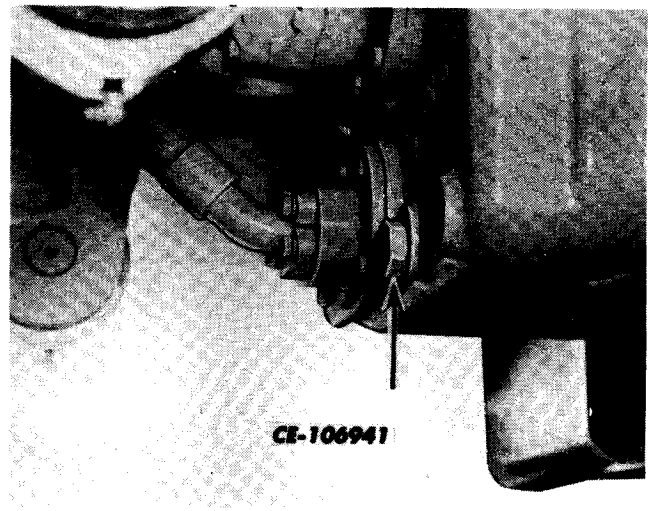


Fig. 8

ITEM 19 — TRANSMISSION OIL

Changing Oil

1. Place the machine on level ground and apply the parking brake.

2. Remove the drain plug (Fig. 8) immediately after operation while the lubricant is still warm.

3. After lubricant has drained, service the following:

   a. Torque converter scavenge line screen. Refer to "TORQUE CONVERTER SCAVENGE LINE SCREEN" in Section 8.

   b. Transmission oil filter elements. Refer to "TRANSMISSION OIL FILTER" in Section 8.

   c. Transmission sump strainer. Refer to "TRANSMISSION SUMP STRAINER" in Section 8.

   NOTE: *Check the condition of the "O" ring on the drain plug. Replace this ring, if worn, before reinstalling the drain plug.*

4. Install the drain plug.

5. Remove the filler plug (Fig. 7) and add oil through the filler tube until oil appears in the center of high oil level sight gauge (1, Fig. 6). Refer to the "LUBRICANT SPECIFICATIONS AND CAPACITIES CHART" in this section for the grade of lubricant specified.

6. Check the oil level as described in Item 18 in this section.

ITEM 20 — RADIUS RODS

Front

(Three rods; two fittings on each rod.) Apply lubricant at each fitting until clean lubricant appears.

Rear

(Three rods; two fittings on each rod.) Apply lubricant at each fitting until clean lubricant appears.

ITEM 21 — REAR DIFFERENTIAL OIL

Checking Oil Level

1. While the lubricant is at operating temperature, park the machine on level ground, stop the engine, and apply the parking brake.

2. Remove the filler and level plug (A, Fig. 9). If the lubricant level is low (below the level plug) add lubricant. Refer to "LUBRICANT SPECIFICATIONS AND CAPACITIES CHART" in this section for the grade of lubricant specified.

3. Install the filler and level plug.

   NOTE: *After checking the level, check to be sure the plastic differential breather tube is not clogged. If clogged, remove the tube and blow out with compressed air. Reinstall the tube.*

Changing the Oil

1. While the lubricant is at operating temperature, park the machine on level ground, stop the engine, and apply the parking brake.

SCHEDULED MAINTENANCE

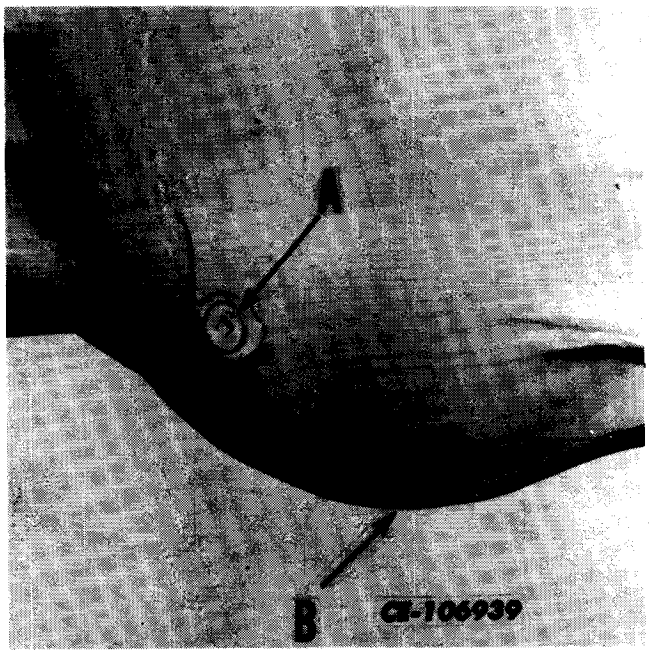


Fig. 9

A. Filler and Level Plug
B. Drain Plug

2. Remove the filler and level plug (A, Fig. 9) and the drain plug (B). Remove any metallic particles that may be present on the drain plug.

3. Install the drain plug after all oil is drained.

4. Fill the differential with fresh lubricant to the bottom of the filler and level plug hole. Refer to "LUBRICANT SPECIFICATIONS AND CAPACITIES CHART" in this section for the quantity and grade of lubricant specified.

5. Install the filler and level plug.

ITEM 22 — FAN IDLER HUB (A, Fig. 1)

Using a hand lubricator, slowly apply lubricant through the fitting until clean lubricant appears at the front of the fan idler hub. DO NOT OVER LUBRICATE.

Remove any excess lubricant from the hub.

ITEM 23 — HYDRAULIC RETURN LINE FILTER

Clean or replace. Refer to "HYDRAULIC SYSTEM" in Section 8.

ITEM 24 — HYDRAULIC SUCTION SCREEN

Clean. Refer to "HYDRAULIC SYSTEM" in Section 8.

ITEM 25 — HYDRAULIC RESERVOIR OIL

Checking Oil Level (Fig. 10)

NOTE: *The dump body must be completely lowered; the machine on level ground and the hoist control lever in "FLOAT."*

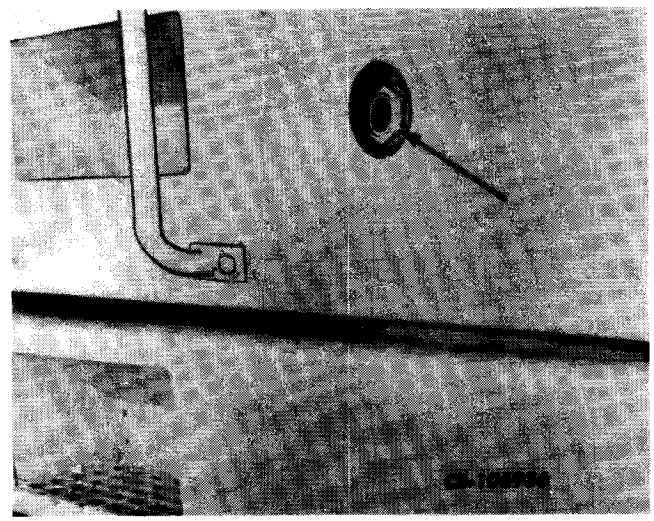


Fig. 10. Hydraulic Reservoir Sight Gauge

Check the sight level gauge. If no oil appears in the window, remove the filler cap located on the top of the reservoir. Add oil until gauge is approximately half-filled with oil. Refer to "LUBRICANT SPECIFICATIONS AND CAPACITIES CHART" in this section for the grade of lubricant specified. Install the filler cap.

CAUTION! Always loosen the filler cap slowly to relieve pressure in the system.

Changing the Oil

Drain, clean and refill the hydraulic reservoir. Refer to "HYDRAULIC SYSTEM" in Section 8.

ITEM 26 — CRANKCASE OIL LEVEL (Fig. 11)

Checking Oil Level

This gauge has "L" and "H" marks on the "ENGINE RUNNING" and the "ENGINE STOPPED" sides of the gauge.

NOTE: *Use the correct side of the gauge.*

Before checking the crankcase oil level while the engine is running, loosen the oil filler cap to vent the crankcase, thereby relieving crankcase pressure to provide an accurate reading.

Before checking the crankcase oil level with the engine stopped, allow enough time for the oil to drain back into the crankcase to provide an accurate reading.

1. Loosen the "T" handle of the gauge (A) remove the gauge and wipe it clean.

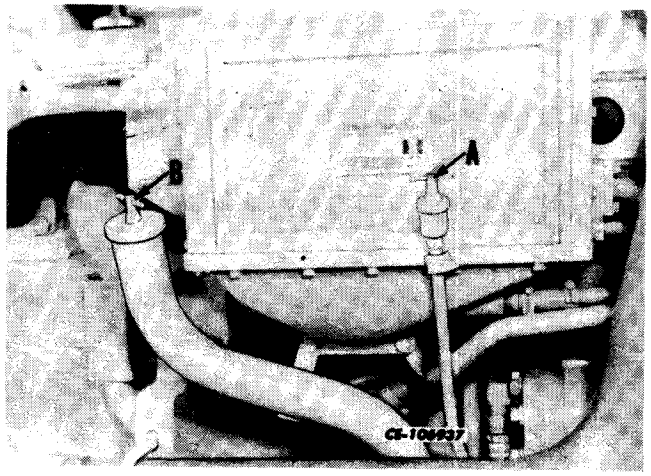


Fig. 11

A. Crankcase Oil Level Gauge
B. Crankcase Filler Cap

2. Insert the gauge completely, but do not tighten.

3. Remove the gauge and check the oil level. If level is at or below the "L" mark, loosen the "T" handle on the filler cap (B) remove cap and add oil to bring the level up to the "H" mark on the oil level gauge. Refer to "LUBRICANT SPECIFICATIONS AND CAPACITIES CHART" in this section for the grade of lubricant specified.

4. Install and secure oil level gauge and filler cap.

NOTE: *Never run the engine if the level of the oil is above the "H" mark or at or below the "L" mark on the oil level gauge.*

ITEM 27 — CRANKCASE OIL (Fig. 11)

1. After reaching operating temperature stop the engine and apply the parking brake.

2. Remove the crankcase drain plugs (Fig. 12). After all lubricant has drained, install and tighten all drain plugs.

3. Loosen the "T" handle of the oil filler cap and remove the cap. Fill the crankcase with the quantity and grade oil specified on the "LUBRICANT SPECIFICATIONS AND CAPACITIES CHART" in this section.

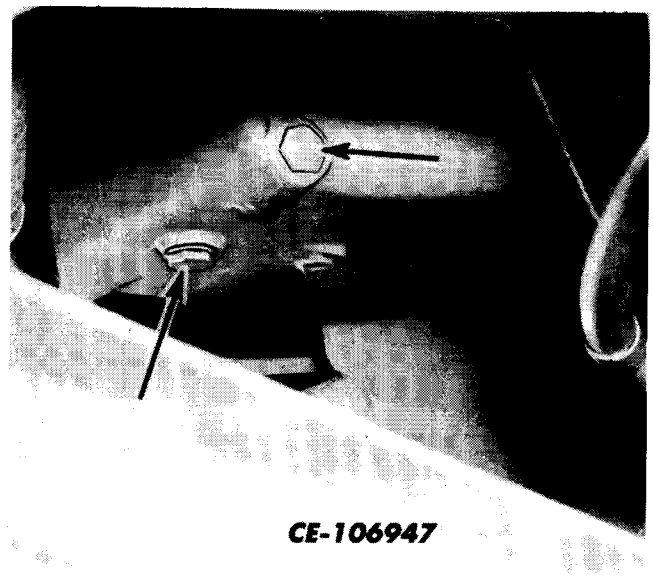


Fig. 12

4. Reinstall and secure the filler cap.

5. Operate the engine at low idle for 5 to 10 minutes, do not operate under load until normal oil pressure and temperature are reached. During warm-up, check the filters for leaks.

ITEM 28 — AIR CLEANER DUST UNLOADER VALVE

Check for restrictions and clean if necessary. Refer to "AIR CLEANING SYSTEM" in Section 8.

ITEM 29 — BATTERIES

Check liquid level; terminal tightness and clean batteries. Refer to "ELECTRICAL SYSTEM" in Section 8.

NOTE: *When the ambient temperature is continuously +32° C (+90° F) or higher, the liquid level must be checked every 50 hours.*

ITEM 30 — CRANKING MOTOR

Lubricate. Refer to "ELECTRICAL SYSTEM" in Section 8.

ITEM 31 — DRIVE SHAFTS

Transfer Case to Front Differential

(Three fittings.) Apply the lubricant at each cross journal fitting until clean lubricant appears at all journal cross bearing seals. Apply the lubricant at the slip joint fitting until clean lubricant appears at the splines.

SCHEDULED MAINTENANCE

Transfer Case to Rear Differential

(Three fittings.) Apply the lubricant at each cross journal fitting until clean lubricant appears at all journal cross bearing seals. Apply the lubricant at the slip joint fitting until clean lubricant appears at the splines.

Torque Converter to Transmission

CAUTION! The dump body must be secured in the manner described in Section 5.

(Two fittings.) Apply the lubricant at each cross journal fitting until clean lubricant appears at all journal cross bearing seals.

ITEM 32 — FRONT AXLE JOINT OIL (Fig. 13)

Checking Oil Level

1. When the lubricant is at operating temperature, park the machine on level ground, stop the engine, and apply the parking brake.

2. Remove the oil level and filler plug. If oil level is low (below the level plug) add lubricant. Refer to "LUBRICANT SPECIFICATIONS AND CAPACITIES CHART" in this section.

3. Install oil level and drain plug.

4. Check the opposite axle joint in the same manner.

NOTE: *After checking the level, check to be sure the breather pipe extension tube is not clogged. If clogged, remove the tube and blow out with compressed air. Reinstall the tube.*

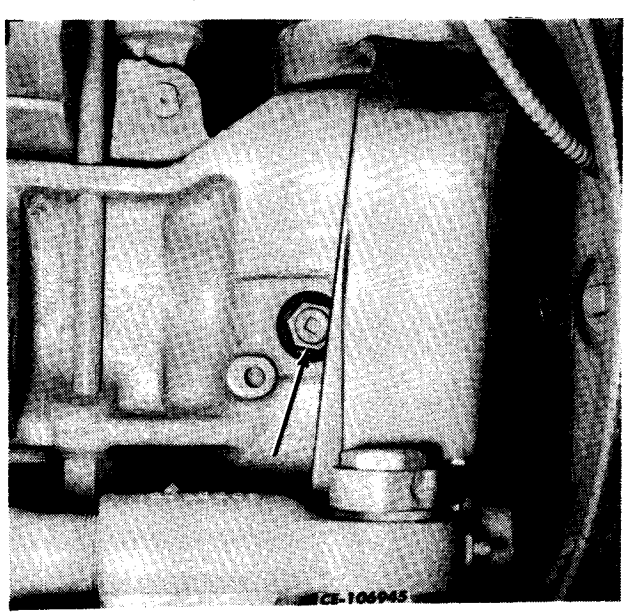


Fig. 13

Changing the Oil

1. When lubricant is at operating temperature, park the machine on level ground, stop the engine, and apply the parking brake.

2. Remove the oil level and filler plug. Using a piece of hose syphon out the lubricant.

3. Fill the axle joint housing with the quantity and grade oil specified on the "LUBRICANT SPECIFICATIONS AND CAPACITIES CHART" in this section.

4. Install the oil level and drain plug.

5. Change the oil in the opposite axle joint in the same manner.

ITEM 33 — TIE ROD

(One fitting on each side.) Apply lubricant at each fitting until clean lubricant appears.

ITEM 34 — TRANSMISSION SUMP SCREEN

Clean. Refer to "TRANSMISSION SUMP SCREEN" in Section 8.

ITEM 35 — HOIST CYLINDER BEARINGS

(Upper and lower fittings.) Apply lubricant at each fitting until clean lubricant appears.

ITEM 36 — FRONT DIFFERENTIAL OIL

Checking Oil Level

1. While lubricant is at operating temperature, park the machine on level ground, stop the engine, and apply the parking brake.

2. Remove the filler and level plug (A, Fig. 14). If the lubricant level is low (below the level plug) add lubricant. Refer to "LUBRICANT SPECIFICATIONS AND CAPACITIES CHART" in this section for the grade of lubricant specified.

3. Install the filler and level plug.

NOTE: *After checking the level, check to be sure the plastic differential breather tube is not clogged. If clogged, remove the tube and blow out with compressed air. Reinstall the tube.*

Changing the Oil

1. While the lubricant is at operating temperature, park the machine on level ground, stop the engine, and apply the parking brake.

2. Remove the filler and level plug (A, Fig. 14) and the drain plug (B). Remove any metallic particles that may be present on the drain plug.

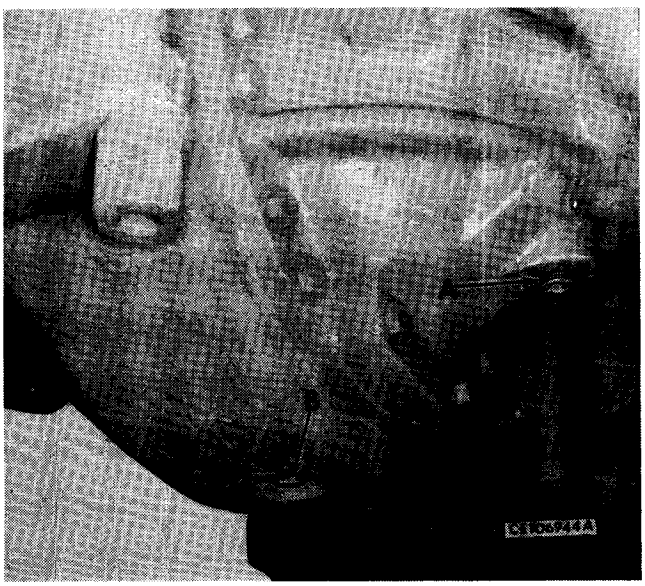


Fig. 14

A. Filler and Level Plug
B. Drain Plug

3. Install the drain plug after all oil is drained.

4. Fill the differential with fresh lubricant to the bottom of the filler and level plug hole. Refer to the "LUBRICANT SPECIFICATIONS AND CAPACITIES CHART" in this section for the quantity and grade of lubricant specified.

5. Install the filler and level plug.

ITEM 37 — SERVO CYLINDER (Fig. 15)

(Two fittings.) Apply the lubricant at each fitting until clean lubricant appears.

ITEM 38 — CONTROL CABLES (Not Illustrated)

The cable shafts are to be lubricated with a thin layer of a pre-mixed solution of 65% ethylene glycol and 35% water.

Fig. 15

PREPARATIONS FOR HOT OR COLD WEATHER

Proper maintenance and mechanical efficiency are assured during seasonal air temperature changes, when these instructions are followed.

FUEL SYSTEM

Refer to "FUEL SYSTEM" in this section for the diesel fuel which will give the most satisfactory performance for your International engine.

LUBRICATION

Lubricate the machine. Use the lubricants specified in the "LUBRICANT SPECIFICATIONS AND CAPACITIES CHART" in Section 7.

COOLING SYSTEM

Prepare the cooling system as follows:

1. Check the entire system for leaks.

2. Inspect the condition of all hoses and replace the hoses and hose clamps where necessary.

3. Check the operation of the thermostat by observing the engine coolant temperature.

4. Drain, clean and refill cooling system. For these procedures, refer to "COOLING SYSTEM" in this section.

5. Check the tension and condition of the alternator and fan belts and adjust or replace if necessary. For these procedures, refer to "BELTS" in this section.

6. Remove all bugs and dirt from the radiator core using air or water under pressure. Direct the flow through the core, opposite the normal direction of air flow.

7. Clean the radiator and outside of core.

ELECTRICAL SYSTEM

Remove all corrosion from battery terminals and cables. Repair or replace all wires which have worn, cracked or frayed insulation; also broken or loose wires. Service the batteries. Refer to "ELECTRICAL SYSTEM" in this section.

AIR CLEANING SYSTEM

AIR CLEANER

This machine is equipped with a "dry-type" air cleaner (Fig. 1) with replaceable filter elements. Detailed service procedures for the air cleaner can be found in the following test.

Precautions

As a precaution against dirt entering the engine:

All connections between the air cleaner and the engine must be tight.

Never operate the engine unless a filter element is in place and the dust unloader valve is installed.

Never remove the element from the air cleaner while the engine is running.

Dust Unloader Valve (11, Fig. 1)

The valve automatically discharges the accumulated dirt in the air cleaner body.

At the interval specified on the "SERVICE GUIDE," squeeze or remove the valve to be sure it is open and contains no obstructions.

OUTER FILTER ELEMENT SERVICE

The outer element must be serviced whenever indicated by the air cleaner service indicator. Refer to "AIR CLEANER SERVICE INDICATOR" in Section 3.

The element can be cleaned by either of two methods: washing or compressed air.

Washing is the preferred method as it removes more dust and soot. Washing results in better element performance and longer intervals between required element service. It is suggested that spare elements be available for use while the serviced element is drying. This will reduce unit downtime to only a few minutes and will allow sufficient time to service the restricted element properly.

NOTE: *The element must be replaced after six washings.*

Cleaning the element with compressed air is not considered an entirely satisfactory method. Some dust will remain in the element causing more frequent servicing of the element. Use this method only as a temporary measure until sufficient time is available to clean the element by washing.

MAINTENANCE

NOTE: *After cleaning, if an element is to be stored for later use, place it in a plastic bag and store in an element shipping container to protect against dirt and damage.*

Removal (Fig. 1)

1. Stop the engine. Wipe off any dust accumulation from the cover (2) and remove the cover.

2. Remove nut (3) and seal (4).

3. Remove the outer element (5). Be careful not to dislodge dust from the dirty element on to element (8).

4. Check the condition of the gasket on the end of the outer element. If the gasket is damaged or missing, replace the element.

5. Wipe the inside of the body (9) with a clean, damp cloth. A small amount of non-sudsing detergent added to the water will facilitate the removal of soot.

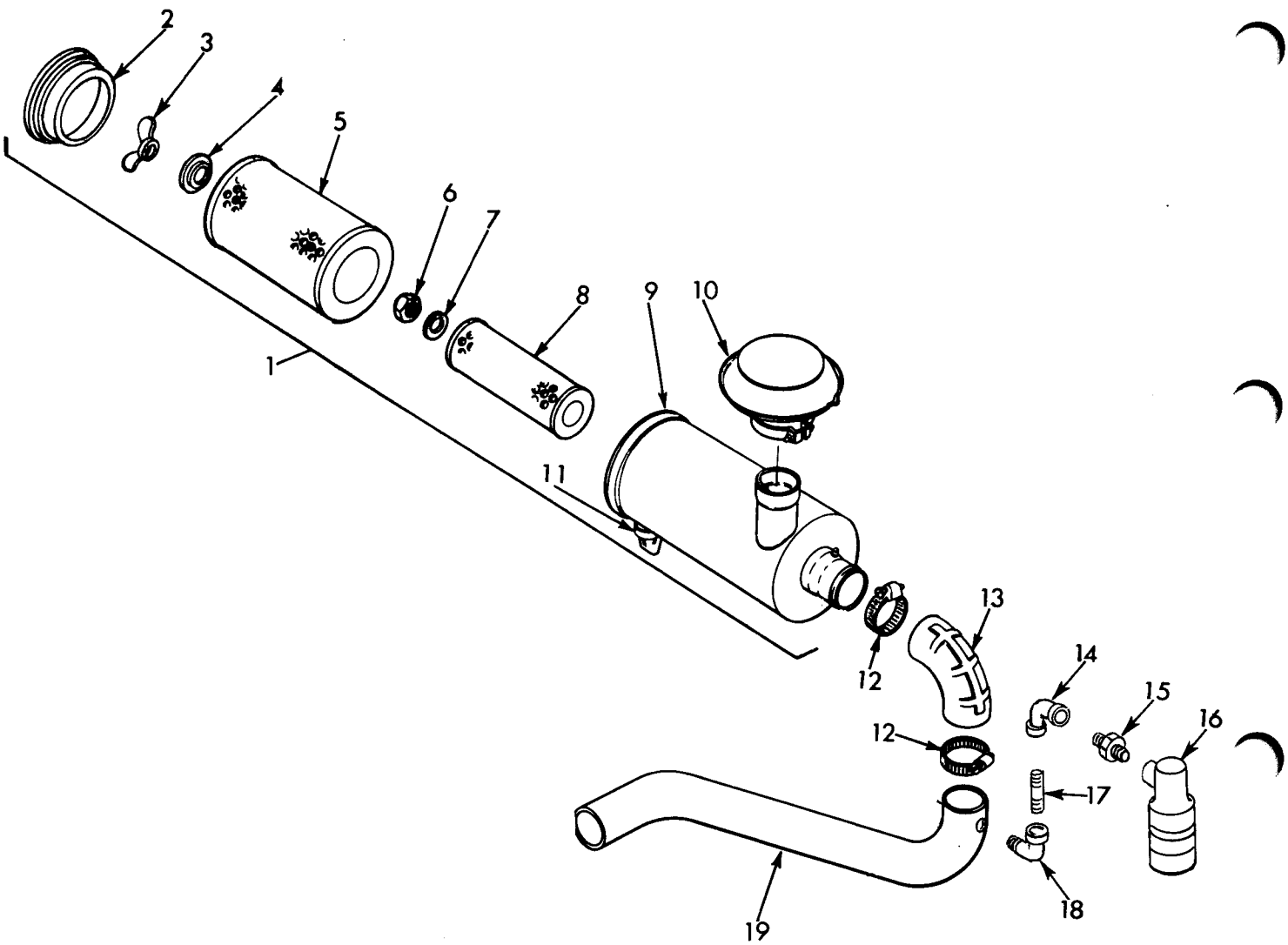


Fig. 1. Exploded View of Air Cleaner

1. Air Cleaner Assembly
2. Element Cover
3. Wing Nut
4. Seal
5. Outer Element
6. Nut
7. Washer
8. Inner Element
9. Body
10. Weather Cap
11. Dust Unloader
12. Clamp
13. Elbow
14. Elbow
15. Safety Filter
16. Service Indicator
17. Nipple
18. Elbow
19. Tube

Washing

NOTE: *Never wash elements in fuel oil, gas or solvent. DO NOT OIL ELEMENTS. Do not attempt to take elements apart. Do not tap the element against a hard surface; this will damage the element.*

1. Tap the side or end of the element against the palm of your hand to remove loose dust.

2. Wash the element in clean, warm water +21° C to +38° C (+70° F to +100° F). A small amount of non-sudsing detergent added to the water will facilitate the removal of soot.

3. Rinse the element in clear water (if a hose is used, do not exceed 275 kPa (40 psi). Shake the element carefully to remove water.

NOTE: *Do not use compressed air to speed the drying of the element; the air pressure will rupture the wet element.*

4. Lay the element on its side and allow it to air dry before reinstalling. Overnight drying is usually sufficient. When drying the element protect it from dirt and/or freezing.

NOTE: *If no spare element is available, the wet element, after excess water has been shaken out, may be installed in the air cleaner and the engine operated at low idle for 10 minutes before operating.*

5. Inspect for damage. Refer to "INSPECTION" in this section.

Compressed Air

An element cleaning tool (IH Part No. 407 073 R1, Fig. 2) for use with compressed air, is available from your Pay Line distributor, and will do a faster and more efficient job of removing dust than a regular air gun or nozzle.

NOTE: *Do not tap the element against a hard surface; this will damage the element.*

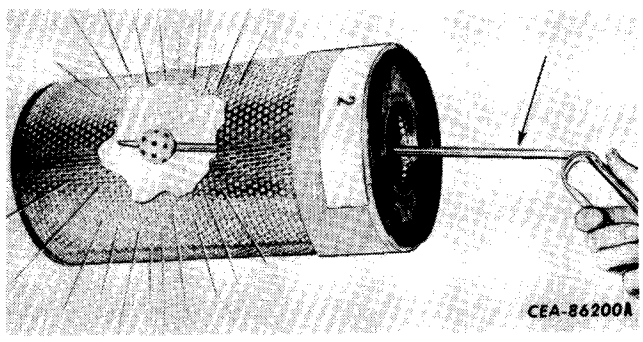


Fig. 2. Using Element Cleaning Tool

1. Carefully tap the side or the end of the element against the palm of your hand to remove loose dust.

2. Direct clean, dry compressed air up and down the pleats on the "clean side" (inside) of the element. Always direct the compressed air opposite the normal operating air flow through the element.

NOTE: *Air pressure at the nozzle must not exceed 689 kPa (100 psi). Keep a reasonable distance between the air nozzle and the element.*

3. Inspect the element for damage. Refer to text "INSPECTION" which follows.

Inspection

1. Inspect the filter element for leaks or damage by placing a bright light inside the element. Inspection of the element on the outside will disclose any holes where concentrated light shines through. The slightest rupture requires replacement of the filter element.

2. Inspect the contact surfaces of the air cleaner body. If faulty or damaged surfaces are noted, correct these conditions immediately.

3. Inspect the element retaining wing bolt gasket. If faulty or damaged, replace the gasket.

Installation (Fig. 1)

1. Insert the open end of the element (5) into the body (9).

NOTE: *Check that the rubber-metal washer (4) is in good condition and installed in the correct position (the rubber surface should be facing the element (5).*

2. Secure the element (5) to the body (9) with the nut (3).

3. Install and secure the cover (2). The cover must fit into position smoothly without force. If it does not, check that the element (5) is properly installed.

4. Inspect and tighten all air cleaner and air indicator connections after the element has been installed before resuming operation.

5. Reset the air cleaner service indicator.

6. Start the engine. If the air cleaner service indicator continues to show air flow restriction, replace the outer filter element or both the outer and inner filter elements.

MAINTENANCE

INNER FILTER ELEMENT SERVICE

Replace the inner element with every third servicing of the outer element or when plugged, as shown by the service indicator.

Removal (Fig. 1)

1. Remove and service the outer element (5) as described under "OUTER FILTER ELEMENT SERVICE" in this section.

2. Remove nut (6), washer (7) and element (8). Discard the element.

3. Clean the inside of body (9) with a damp cloth. A small amount of non-sudsing detergent added to the water will facilitate the removal of soot.

Installation (Fig. 1)

1. Insert the open end of the new inner element (8) into the air cleaner body (9).

2. Install the washer (7) and nut (6).

3. Install the outer element (5) as described under "OUTER FILTER ELEMENT SERVICE" in this section.

AIR CLEANER SERVICE INDICATOR (Fig. 3)

The air cleaner service indicator signals when air filter element service is required. A complete description of indicator operation can be found in Section 3. After servicing the element, press the reset button (1) to reset the indicator.

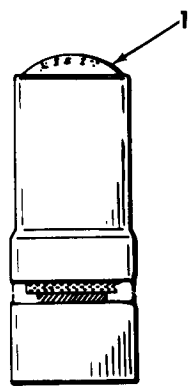


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Fig. 3. Air Cleaner Service Indicator

SAFETY FILTER (Fig. 1)

If the air cleaner service indicator becomes damaged, the safety filter (15) will prevent unfiltered air from entering the engine through the damaged indicator. If a leak occurs, this filter will plug up with continued operation. Plugging of this filter will be indicated by loss of indicator operation. This can be checked as follows:

Filter Check

Remove the weather cap (10) and start the engine; operate at low idle. Gradually seal off the air intake opening with a flat piece of cardboard until it is almost completely covered. If the green signal band of the air cleaner service indicator fails to rise and lock in position, the safety filter is plugged. Once detected, the leak must be located and corrected immediately and the filter replaced to regain the full advantage of the service indicator.

Filter Replacement

1. Unscrew indicator (16) from filter (15).
2. Remove and discard the filter (15).
3. Install a new filter in elbow (14).
4. Reinstall the indicator (16).

WEATHER CAP

The dome of the weather cap services as a rain shield; and the screen prevents chaff and coarse dirt from getting into the air cleaner. Keep this screen clean from all chaff, oil or dust. Clogged holes in the screen will reduce the power of the engine by restricting the flow of air.

To remove the cap, loosen the screw which secures the cap to the air cleaner body. Use compressed air, if available, to clean the screen. If compressed air is not available, wash in clean, hot water or preferably water containing a small amount of non-sudsing detergent.

CRANKCASE BREATHER

The crankcase breather is located to the rear of the RH side of the crankcase. Replace the filtering element with a new one at the time of a major overhaul.

CAB AIR FILTER (Fig. 4)

The cab air filter (2) (located inside the service compartment) cleans the air entering the operator's compartment. At the interval specified on the "SCHEDULED MAINTENANCE," clean the filter as described in the following steps.

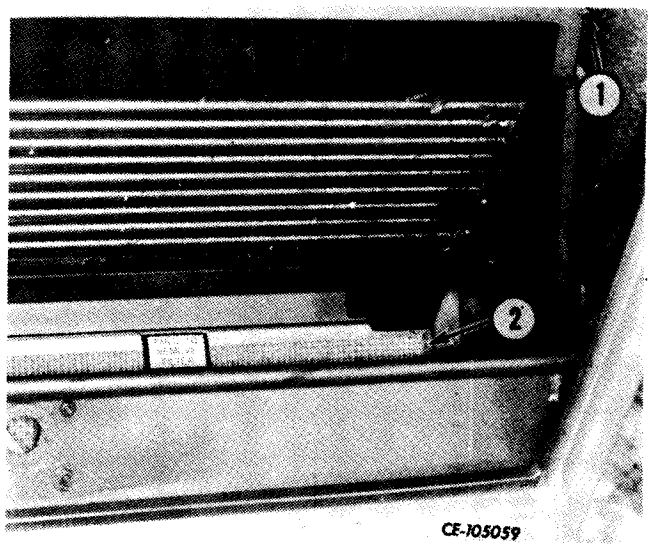

Fig. 4. Cab Air Filter

1. Internal Door
2. Filter

1. Open the service compartment door located on the front of the cab.
2. Open the internal door (1).
3. Remove the filter (2).
4. Tap the side of the filter against the palm of your hand to remove loose dust.
5. Wash the filter in clean warm water with a small amount of non-sudsing detergent.
6. Rinse the filter in clean water. Shake the element carefully to remove excessive water.

   NOTE: *Do not use compressed air to speed the drying of the element; the air pressure will rupture the wet filter.*

7. Lay the element on its side and allow it to air dry before reinstalling.
8. Reinstall the filter and close the access doors.

AIR CONDITIONING (If Equipped)

OFF-SEASON CARE

It is most important in the off-season to operate the system. Do not remove the belt or make any adjustments other than to turn off the air conditioner.

The system should be operated for five to ten minutes each week. This operation will keep the compressor seal from drying out.

CHECKING REFRIGERANT LEVEL

A sight glass is located under the cab just in front of the air tanks (Fig. 5). To check the refrigerant level in the system, remove the plastic cap and observe the sight glass while the system is operating.

If no bubbles can be seen in the liquid refrigerant flowing through the sight glass (A, Fig. 6), the refrigerant supply is adequate.

Bubbles or foam showing in the sight glass indicates that the refrigerant supply is low (B, Fig. 6); consult your Pay Line distributor. Reinstall the plastic cap.

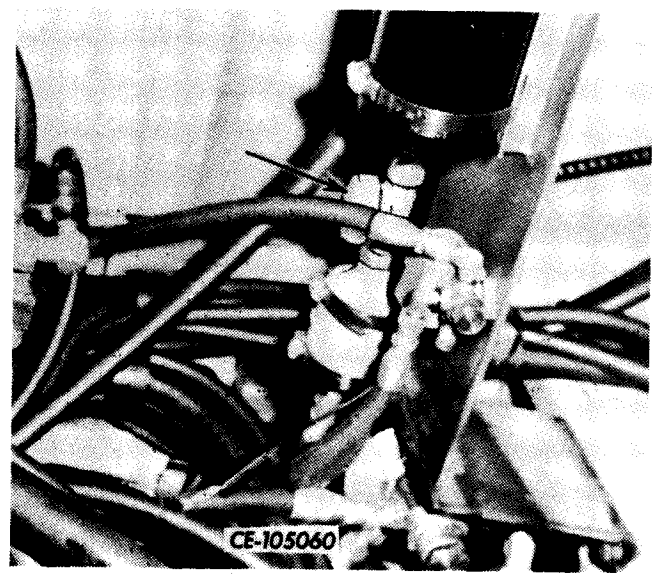

Fig. 5. Refrigerant Sight Glass

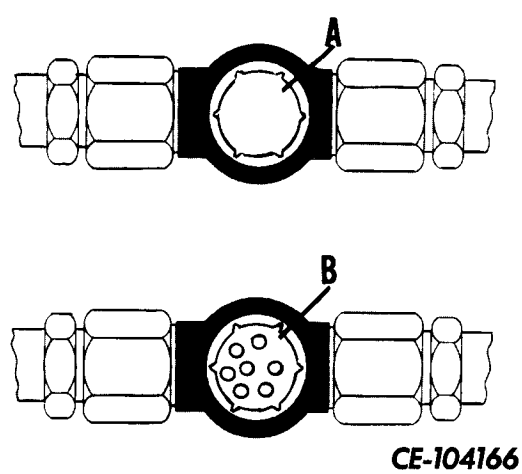

Fig. 6. Checking Refrigerant Level

A. Adequate Refrigerant Supply
B. Inadequate Refrigerant Supply

MAINTENANCE

AIR PRESSURE SYSTEM

The air compressor governor is factory set to maintain a minimum pressure of 827 kPa (120 psi) and a maximum pressure of 862 kPa (125 psi) in the air system. The air tank safety valve is factory set to open at 1034 kPa (150 psi) if the air compressor governor does not cut out when reaching maximum pressure.

If the governor and/or the safety valve fails to operate properly, consult your Pay Line distributor.

DRAINING WATER FROM THE AIR TANKS (Figs. 7 and 8)

CAUTION! Install adequate blocking in front of and behind the tires. Be sure there is an adequate supply of pressure in the air system.

CAUTION! Never open the air tank drain valves more than the prescribed amount.

Open the two drain valves on the dual tank (Fig. 7), the one drain valve on the single tank (Fig. 8) and if equipped, the two drain valves on the automatic brake apply tank, located above the rear axle, a maximum of two turns. Drain accumulated water from the tanks and then close the valves.

NOTE: *It is especially important that the air tanks are thoroughly drained of water in cold weather.*

AIR LINES

Inspect all hoses to be sure they are not deteriorating.

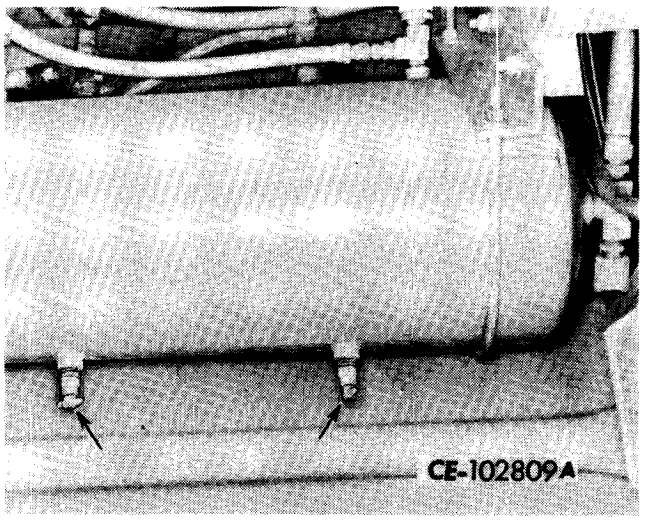

Fig. 7. Dual Air Tank Drains

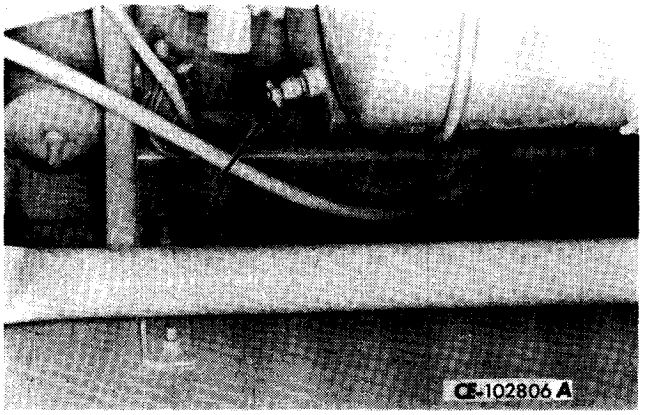

Fig. 8. Single Air Tank Drain

1. Coat all air system hose connections with soapsuds to check for leakage.

2. Apply the brakes while checking those hose assemblies that lead from the brake valve to the brake power clusters.

3. Continue applying the brakes until the check has been completed.

NO LEAKAGE IS PERMISSIBLE.

BELTS

Prior to installing the new belts, make sure all pulley grooves are clean and not worn. If a pulley is damaged or the grooves are worn, it should be replaced.

All pulley supporting bearings, shafts, and brackets, must be in working order.

When replacing belts and pulleys, pulley alignment must be checked with belts tensioned and brackets securely clamped. A misalignment that can be detected by the naked eye is detrimental to belt performance.

Belts on new machines and replacement belts lose their tension as they seat into the pulley grooves. Check and adjust tension of new belts at 20 hour intervals until tension is stabilized and thereafter, every 200 hours. If the tension falls below a required minimum, the belt slips, damaging the belt and pulley grooves.

NOTE: *When operating in abrasive type conditions, check the belts every 100 hours.*

TENSION

The tension applied to a new belt (initial installaton only) is different than the retension applied to a used belt (one that has been run five minutes or longer).

Alternator, Air Compressor and Refrigerant Compressor (If Equipped) Belts

Belt tensions are to be measured by means of a "Gates KRIKIT Gauge" to insure correct tensions. This gauge may be obtained from:

Gates Rubber Company
999 South Broadway
Denver, Colorado 80217

The correct belt tensions measured with a "Gates KRIKIT Gauge" are shown in the following chart.

BELT TENSION CHART

Condition	Alternator	Air Compressor	Refrigerant Compressor (If Equipped)
New Belt Installation	70 to 75 lbs	95 to 100 lbs	95 to 100 lbs
New Machine Upon Delivery 1 Hour After Belt Replacement After 10 Hours of Operation After 50 Hours of Operation At Intervals of 200 Hours	60 to 65 lbs	80 to 85 lbs	80 to 85 lbs
Minimum Permissible Tension	45 lbs	60 lbs	60 lbs

NOTE: *Do not allow belt tensions to fall below the specified "Minimum Permissible Tension" values. Check the belt tension more often if necessary.*

In emergency cases only when a Gates belt tension gauge is not available and the machine must be operated, belt tensions may be checked by "Deflection" Method."

The use of "Fishook Scale and Straight Edge" is preferred over the unreliable "Thumb Method." The required belt deflections under 111 N (25 lbs) deflecting force are shown in the following chart.

NOTE: *Do not allow belt deflections to exceed "Maximum Permissible Deflecton" values. Check belt deflection more often if necessary.*

Belt tension should be checked at a point midway between the alternator, air compressor or refrigerant compressor pulley and the drive pulley.

BELT DEFLECTION CHART

Condition	Alternator	Air Compressor	Refrigerant Compressor (If Equipped)
New Belt Installation	22 mm (7/8 in.)	19 mm (3/4 in.)	17 mm (11/16 in.)
New Machine Upon Delivery 1 Hour After Belt Replacement After 10 Hours of Operation After 50 Hours of Operation At Intervals of 200 Hours	23 mm (29/32 in.)	21 mm (13/16 in.)	23 mm (29/32 in.)
Maximum Permissible Tension	25 mm (1 in.)	22 mm (7/8 in.)	21 mm (13/16 in.)

MAINTENANCE

Using "Gates KRIKIT Gauge" (Fig. 9)

1. There are several ways to hold the gauge while testing belt tension.

a. By holding the rubber loop (2) with the ends of the thumb and index fingers directly on the raised pressure pad (3). (Insert A, Fig. 10.)

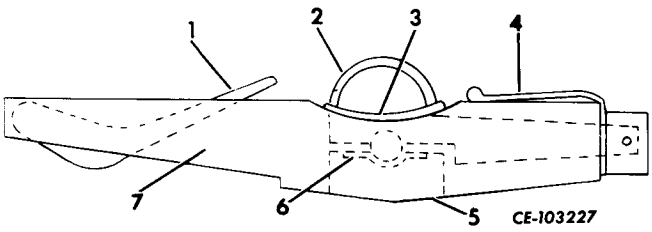

Fig. 9. Gates KRIKIT Gauge

1. Indicator Arm
2. Rubber Finger Loop
3. Pressure Pad
4. Pocket Clip
5. Positioning Flange
6. Tension Spring
7. Body

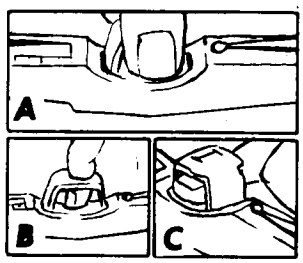

Fig. 10. Holding the Gauge

b. By slipping the index finger between the rubber loop (2) and pressure pad (3). (Insert B, Fig. 10.)

c. By inserting the index finger through top of the rubber loop (2). (Insert C, Fig. 10.)

NOTE: *DO NOT touch the gauge with any other finger while testing the belt, as this will cause the gauge to read inaccurately.*

2. Position the gauge in the center of the belt between the two pulleys. The flange (5) should be flat against the top edge of the belt. Make sure the indicator arm (1) is below the scale on top of the body (7). (Fig. 11.)

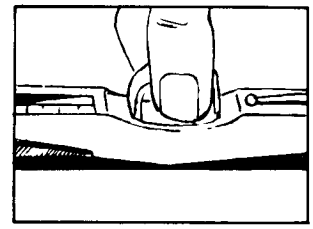

Fig. 11. Positioning the Gauge

3. Very slowly press on the pressure pad (3) at a right angle to the belt surface until you hear or feel the click release of the tension spring (6). DO NOT PRESS ANY MORE as soon as the spring clicks the indicator arm (1) shows the correct reading. (Fig. 12.)

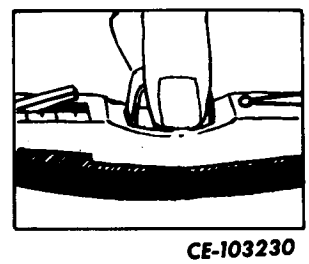

Fig. 12. Pressing for Reading

4. The correct tension reading is read at the point where the top of the indicator arm crosses the numbered scale on the top of the gauge body, as shown in Fig. 13.

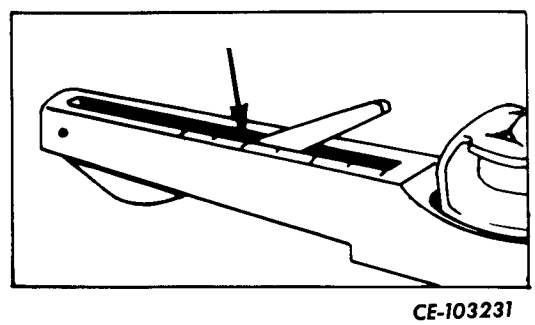

Fig. 13. Reading Belt Tension Gauge

NOTE: *Before adjusting belt tension, check the tension several times. Use an average of the readings.*

Fan Belts

1. Release the air pressure from the air tanks by opening the drain valves on each tank a maximum of two turns.

CAUTION! Block or hold the Pay hauler by means other than the brakes whenever the air system is to be drained.

2. Measure dimension A (Fig. 17). If this dimension is less than 358 ± 2.5 mm (14.1 ± 0.1 in.), adjust the belts.

3. If the dimension is 358 ± 2.5 mm (14.1 ± 0.1 in.), close the air tank drain valves and remove the blocking.

ADJUSTMENT

Air Compressor Belt (Fig. 14)

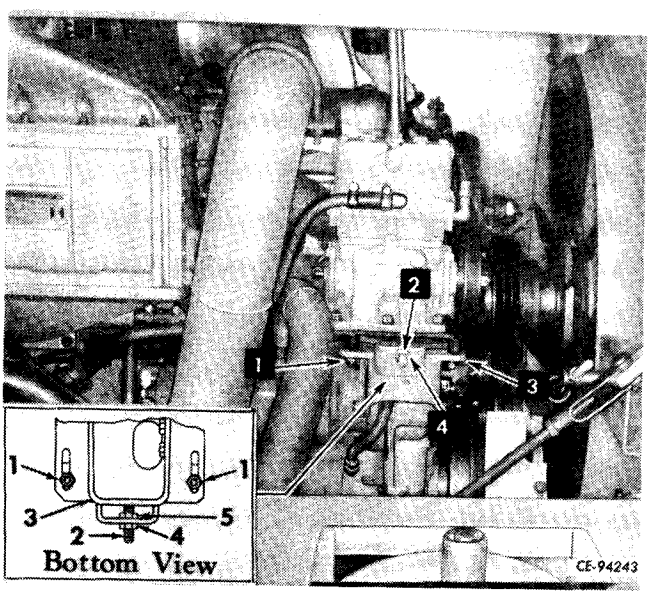

Fig. 14. Air Compressor Belt Adjustment and Replacement

1. Stud Nut
2. Adjusting Strap
3. Air Compressor Mounting Plate
4. Locking Nut
5. Locking Nut

1. Loosen the four nuts (1).
2. To tighten the belt:
   a. Back-off on nut (4).
   b. Draw-up on nut (5) until obtaining the specified belt tension.
   c. Draw-up on nut (4).
3. To loosen the belt:
   a. Back-off on nut (5) until obtaining the specified belt tension.
   b. Draw-up on nut (4).
4. Tighten the four nuts (1).
5. Check the air compressor pulley and drive pulley alignment by sighting down the air compressor belt, or by using a straight-edge.

Alternator Belt (Fig. 15)

1. Loosen the alternator mounting nuts (B) and the alternator brace cap screw (A).

2. Move the alternator away or towards the engine as required, until the correct tension is obtained.

3. Tighten the cap screw (A) and nuts (B).

NOTE: *When using a pry bar on the alternator to adjust belt tension, DO NOT APPLY EXCESSIVE TENSION, as alternator damage will result.*

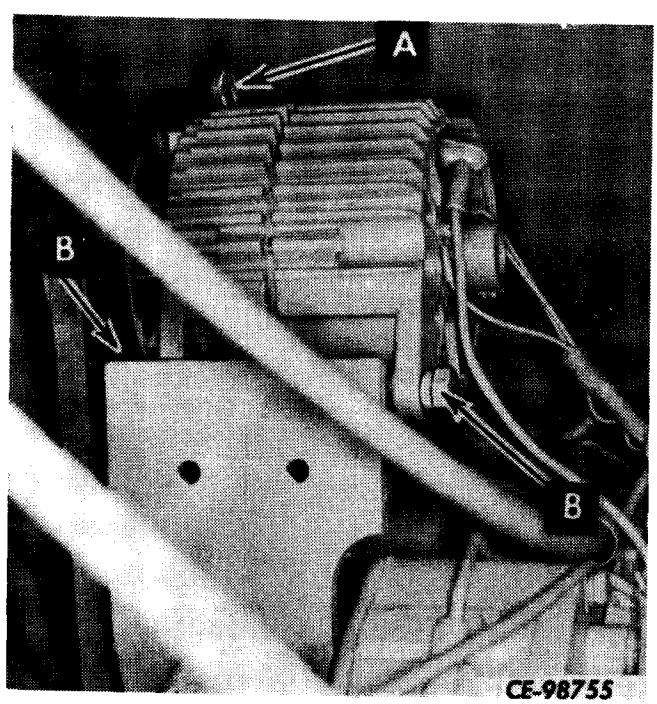

Fig. 15. Alternator Belt Adjustment and Replacement

A. Brace Cap Screw
B. Mounting Nut

MAINTENANCE

Refrigerant Compressor Belt (If Equipped) (Fig. 16)

1. Loosen the compressor bracket mounting bolt (1) and the compressor brace mounting bolts (2).

2. Move the compressor away or towards the engine as required, until the correct tension is obtained.

3. Tighten the mounting bolts.

Fan Belts (Fig. 17)

1. Loosen lock nut (2) and turn adjusting nut (1) to obtain 358 ± 2.5 mm (14.1 ± 0.1 in.) at dimension A. Tighten lock nut (2).

2. Close air tank drain valves and remove blocking.

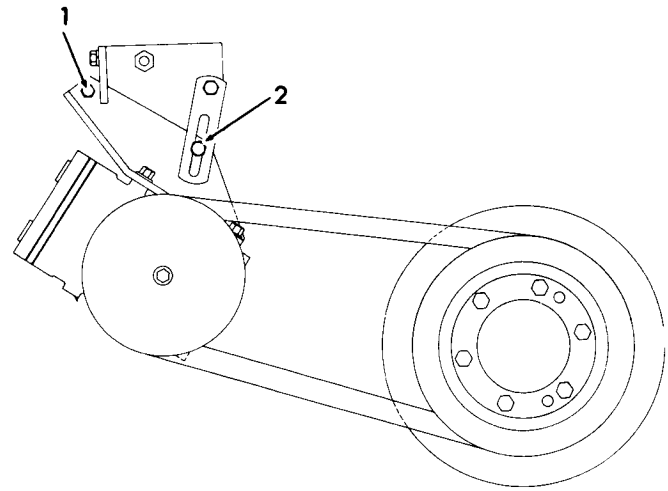

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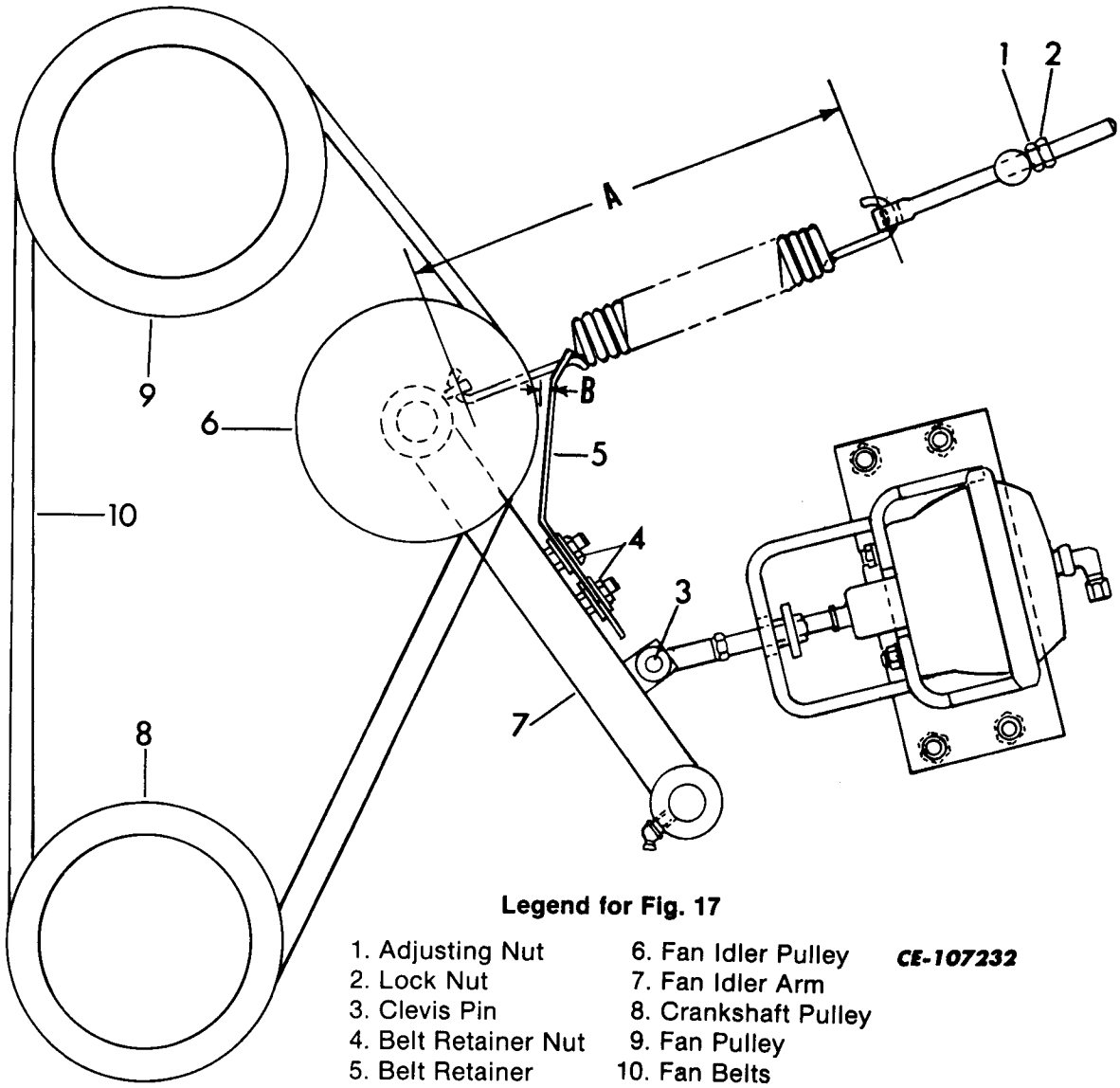
Fig. 16. Refrigerant Compressor Belt Adjustment and Replacement (If Equipped)

1. Bracket Mounting Bolt
2. Brace Mounting Bolt

REPLACEMENT

Replace badly worn, greasy or cracked belts immediately. These conditions prevent proper belt function.



Legend for Fig. 17

1. Adjusting Nut
2. Lock Nut
3. Clevis Pin
4. Belt Retainer Nut
5. Belt Retainer
6. Fan Idler Pulley
7. Fan Idler Arm
8. Crankshaft Pulley
9. Fan Pulley
10. Fan Belts

CE-107232

Fig. 17. Fan Belt Adjustment and Replacement

When replacing a belt, always check the condition of the remaining belts, and if necessary, replace them at the same time.

Alternator Belt (Fig. 15)

CAUTION! Place the electrical system master switch in the "Off" position.

1. Loosen the alternator mounting nuts (B) and the alternator brace cap screw (A). Move the alternator towards the engine.

2. Remove the belt from the alternator pulley and the drive pulley. Replace with a new belt.

3. Adjust belt tension. Refer to "ADJUSTMENT," "ALTERNATOR BELT" in this section.

Air Compressor Belt (Fig. 14)

1. Remove the alternator belt. Refer to "REPLACEMENT," "ALTERNATOR BELT" in this section.

2. Loosen the four stud nuts (1).

3. Back-off all the way on nut (5) and push the air compressor towards the engine.

4. Remove the belt from the air compressor pulley and the drive pulley. Replace with a new belt.

5. Reinstall the alternator belt.

6. Adjust both belt tensions. Refer to "ADJUSTMENT" in this section.

Refrigerant Compressor Belt (If Equipped) (Fig. 16)

1. Remove the fan belts. Refer to "REPLACEMENT," "FAN BELTS" in this section.

2. Loosen the compressor bracket mounting bolt (1) and the compressor brace mounting bolts (2). Move the compressor in towards the engine.

3. Remove the belt from the refrigerant compressor pulley and the crankshaft pulley. Replace with a new belt.

4. Adjust the belt tension. Refer to "ADJUSTMENT," "REFRIGERANT COMPRESSOR BELT" in this section.

5. Install and adjust fan belts. Refer to "REPLACEMENT," "FAN BELTS" in this section.

Fan Belts (Fig. 17)

1. Release the air pressure from the air tanks by opening the drain valves on each tank.

CAUTION! Block or hold the Pay hauler by means other than the brakes whenever the air system is to be drained.

2. Loosen lock nut (2) and back off adjusting nut (1) to loosen belt tension. Remove clevis pin (3).

3. Loosen nuts (4) and slide belt retainer (5) away from fan idler pulley (6).

4. Move the fan idler arm (7) toward the engine and work the fan belts (10) off of the fan idler pulley (6), and then the crankshaft pulley (8) and the fan pulley (9).

5. Install the new belts on the fan drive pulley. Move the fan idler arm toward the engine and install the belts on the crankshaft and fan idler pulleys.

NOTE: *Be sure the belts are properly positioned in the pulley grooves.*

6. Adjust belt tension. Refer to "ADJUSTMENT," "FAN BELTS" in this section.

7. Slide the belt retainer (5) toward the fan idler pulley (6) leaving a 6 mm (.2 in.) gap at point B.

BRAKES

SERVICE BRAKES

This machine is equipped with self-adjusting air over hydraulic brakes.

The brake system is divided into two separate circuits, each having its own air and hydraulic supply. One circuit operates the front brakes and the second operates the rear brakes. In the event of a failure in one circuit, the braking system still retains braking effort in the remaining circuit.

When the brake pedal is applied, air pressure in the service brake power cluster air chamber forces a piston in the service brake power cluster hydraulic (master) cylinder to pressurize brake fluid to the wheel cylinders. This pressurized fluid forces plungers to expand the brake shoes against the brake drum.

CAUTION! Trapped air in the hydraulic brake lines between the service brake power cluster and the wheel cylinders reduces braking effectiveness. Bleed the brakes.

As the brake linings wear, through brake application, a pawl in the brake spider resets an adjusting sleeve to maintain a normal clearance of 8 to 10 mm (.030 to .040 in.) between the brake lining and drum and stroke indicator length of 45 to 54 mm (1-3/4 to 2-1/8 in.) at 862 kPa (125 psi) air pressure.

Checking Fluid Level and Servicing Breather

NOTE: *Each brake has its own service brake power cluster and is checked independently of the others. The procedure is the same for all four power clusters.*

1. Raise the dump body to its fully elevated position.

CAUTION! The dump body must be secured in the manner described in Section 5.

2. Clean the area around filler cap (1, Fig. 18), and remove the cap.

3. Check the fluid level. The correct level is 19 mm (3/4 in.) from the top of the filler neck. If necessary, add fluid. Refer to "LUBRICANT SPECIFICATIONS AND CAPACITIES CHART" in Section 7.

4. If necessary, unplug the vent holes in the filler cap. Install the cap.

5. Service air chamber breather (4, Fig. 18), as follows:

a. Remove the wing nut on top of the breather and remove the element hood.

b. Remove the element and service it like an air cleaner element as described in this section.

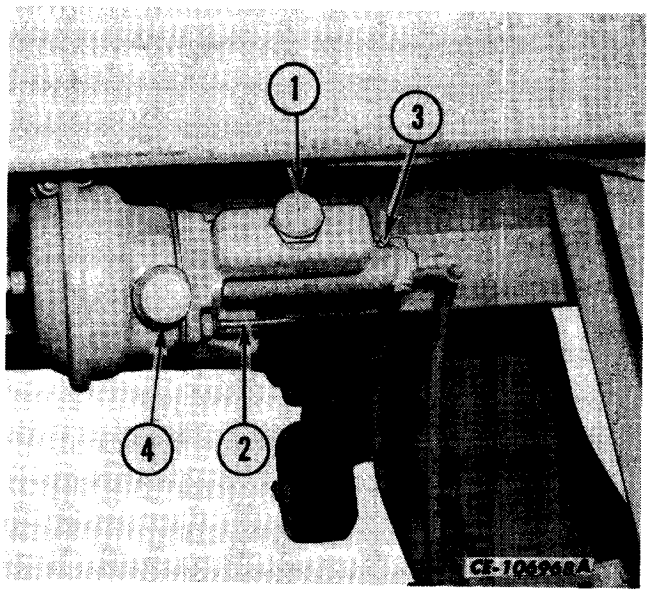


Fig. 18. Service Brake Power Cluster

1. Filler Cap
2. Stroke Indicator
3. Bleeder Screw
4. Breather

c. Install the element and hood on the power cluster and secure with the wing nut.

6. If the fluid level is low, check for and correct leaks at the power cluster, hydraulic lines and wheel cylinder. Fluid blowing out of the filler cap is caused by a restricted air chamber breather or a defective master cylinder primary cup. Leakage between the air chamber and master cylinder is caused by a defective master cylinder secondary cup.

7. If the fluid is low, air may have entered into the hydraulic brake lines. If so, bleed the brakes as described in this section.

Checking Operation

NOTE: *The self-adjusting feature of the service brakes does not eliminate the need for periodic inspection of the brakes.*

NOTE: *When checking brake operation, the machine should be parked on level ground and the brakes should be cool enough to permit skin contact.*

1. Start the engine. Build up air system pressure to 120 psi.

2. Check that the half air brake warning light on the instrument panel is OFF. Using the bulb check switch, insure that the warning light is operating. If the warning light remains ON, there is a loss of air in the system. This loss of air must be corrected before further checking of the brakes can be made.

3. After being assured that the air system is satisfactory, fully depress the service brake pedal and release the parking brake.

CAUTION! Be sure the area in front of the machine is clear of personnel and obstructions as the vehicle may move forward during this test.

4. Place the transmission shift lever in second (2) gear and depress the engine accelerator pedal until it is fully applied.

CAUTION! If the machine starts to move forward, fully release the accelerator pedal. Do not hold the machine in this stall condition for more than ten seconds.

5. If the service brakes hold the machine stationary in this second speed stall condition, the brake system is satisfactory.

6. If the service brakes do not hold the machine stationary in this second speed stall conditon, release the accelerator pedal, place the transmission shift lever in neutral and apply the parking brake.

7. Check the four power cluster fluid levels and service the breather as described in this section.

8. Start the engine. Build up air system pressure to 120 psi and stop the engine. Apply the dump brake valve.

9. Measure the length of the four power cluster stroke indicators (2, Fig. 18). The length of each stroke indicator should be less than 60 mm (2-3/8 in.) with the brakes applied. If the length of an indicator exceeds this dimension, the brake requires a manual adjustment. Refer to "ADJUSTING THE BRAKES" in this section for correct procedure.

10. Check for grease or oil on the brake linings as this reduces braking effectiveness. If necessary, reline the brakes. Consult your Pay Line distributor.

11. Check the air pressure gauge and sending unit operation. Consult your Pay Line distributor.

12. Adjust the air governor. Consult your Pay Line distributor.

13. After correcting the deficiencies of the service brake system, recheck the system by repeating Steps 3 through 5.

MAINTENANCE

Adjusting the Brakes

1. Apply the parking brake and block the wheels.

2. With an adjusting spoon or screwdriver, turn the star wheel, one shoe at a time until the brake shoe lining moves out against the drum.

3. Back off the star wheel eight notches or clicks of the detent. This will allow proper running clearance.

4. Repeat above adjustment to each wheel.

5. Recheck brake operation as described in this section.

Bleeding the Brakes

CAUTION! Install blocking in front of and behind the tires before bleeding the brakes.

NOTE: *Bleeding the system of air is a two-man operation. Each brake has its own hydraulic lines and master cylinder and is bled independently of the others. The following describes the method of bleeding air from one brake. This procedure for all the brakes is the same.*

1. Check the power cluster fluid level as described in this section.

2. Be sure there is 15 to 20 psi of air pressure in the air tanks.

NOTE: *If available, attach a bleeder hose to the bleeder screw to direct the fluid away from the brake lining and your eyes.*

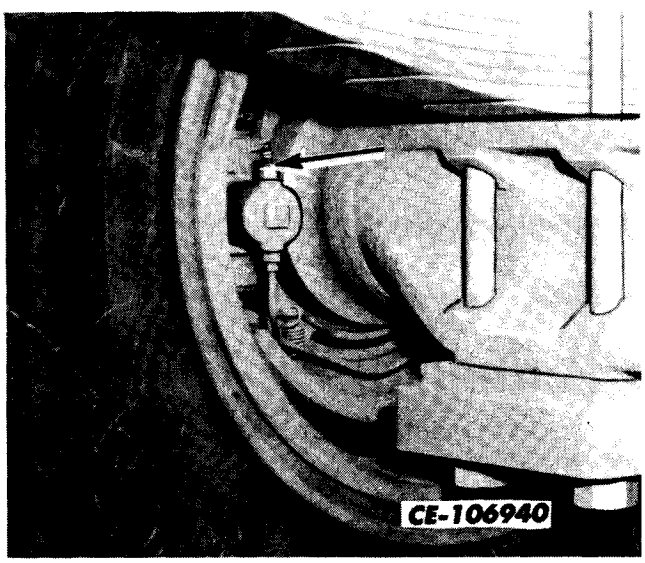


Fig. 19. Wheel Cylinder Bleeder Screw (Rear)

CAUTION! Be careful not to splash brake fluid into your eyes.

3. Open bleeder screw (3, Fig. 18) on the power cluster. Depress and hold the brake pedal until clean, air free, fluid appears then close the bleeder screw and release the brake pedal.

4. Open the bleeder screw (Fig. 19 or 20) on the wheel cylinder. Depress and hold the brake pedal until clean, air free, fluid appears then close the bleeder screw and release the brake pedal.

5. Recheck the fluid level as described in this section.

PARKING BRAKE

This machine is equipped with a spring type air operated parking brake. When the parking brake lever is moved to the "OFF" position, air pressure is applied to the actuator, overcoming the spring tension thereby releasing the parking brake.

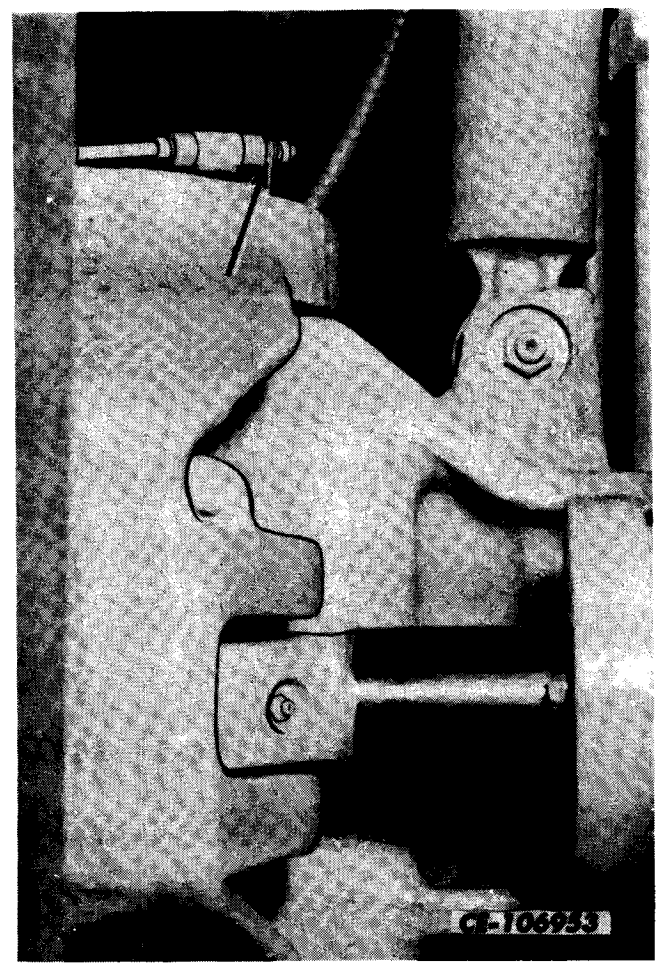


Fig. 20. Wheel Cylinder Bleeder Screw (Front)

Inspecting the Brake

CAUTION! Install blocking in front of and behind the tires before inspecting the parking brake.

Remove the eight cap screws securing the brake drum to the transmission output flange. Slide the drum back over the drive shaft and inspect the condition of the brake linings. The linings must be free of grease or oil. Linings that are worn to the rivet heads, burned, glazed, cracked or having pieces broken off are unfit for operation. Check the brake adjusting screw assembly to be sure the star wheel turns freely. If service is necessary consult your Pay Line distributor.

Adjusting the Brake

CAUTION! Install blocking in front of and behind the tires before adjusting the parking brake.

Wear on the parking brake shoe linings can be compensated for by turning the adjusting screw star wheel at the top of the brake. When the linings wear to a point where the brake will not hold, adjust the brake as described below.

1. Move the machine so one of the holes (Fig. 21) in the brake drum is in line with the adjusting screw star wheel.

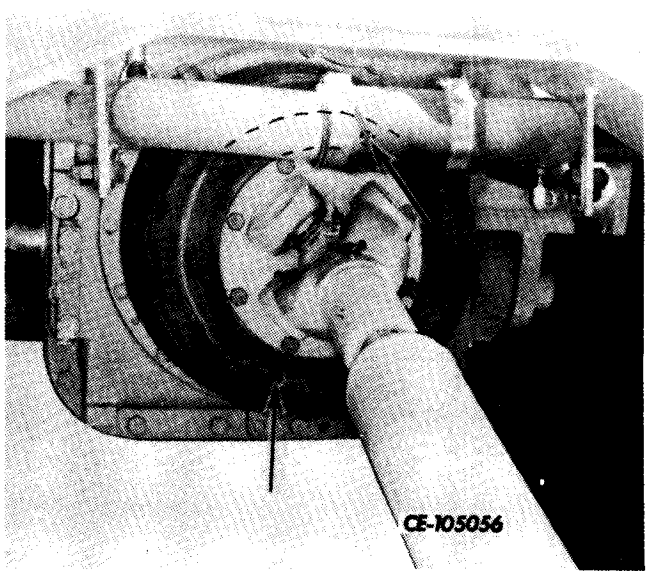


Fig. 21. Aligning the Brake Drum Hole

2. With the parking brake lever in the "OFF" position, disconnect the linkage at the brake lever arm by removing the cotter pin and pin.

3. Insert a screwdriver, or similar tool, through the brake drum hole (Fig. 21). Turn the adjusting screw star wheel until the brake linings are tight against the brake drum.

4. Turn the adjusting screw star wheel in the opposite direction until there is approximately 3 mm (0.010 in.) clearance between the linings and brake drum surfaces. This clearance can be checked by inserting a feeler gauge between linings and drum from the lever arm side of the brake.

5. With the parking brake lever released, reconnect the brake linkage to the brake lever arm.

COOLING SYSTEM

The cooling system operates under pressure which is controlled by the pressure relief valve.

Circulation is controlled by thermostats which bypass coolant flow from the radiator until the engine reaches operating temperature.

CARE OF THE SYSTEM

Proper cooling is assured only when the system is sealed; the radiator cap gasket is in good condition; the pressure relief valve and thermostats are operating properly; the system is free of coolant and air flow restrictions; and the system is filled to the proper level.

To keep the system internally free of rust and sludge, add "IH cooling system conditioner" to the water during warm weather operation or use IH Premium anti-freeze during cold weather operation. Use softened or rain water when possible; these provide the greatest protection against scale accumulations.

Drain and thoroughly flush the system at least twice a year. The appearance of rust or sludge in the system indicates the rust and sludge inhibitor additives are weakened and must be replaced. Refer to "CLEANING THE SYSTEM" in this section.

CHECKING COOLANT LEVEL

1. Remove radiator cap. Use CAUTION: Refer to "RADIATOR CAP" in this section.

2. Check coolant level. The correct level is one inch above the radiator baffle.

3. Add coolant, if needed. Refer to "FILLING THE SYSTEM" in this section.

4. Install the radiator cap.

MAINTENANCE

DRAINING THE SYSTEM

1. Run the engine until it reaches operating temperature; then stop the engine.

2. Remove the radiator cap. Use CAUTION: Refer to "RADIATOR CAP" in this section.

3. Open the radiator drain valve (Fig. 22).

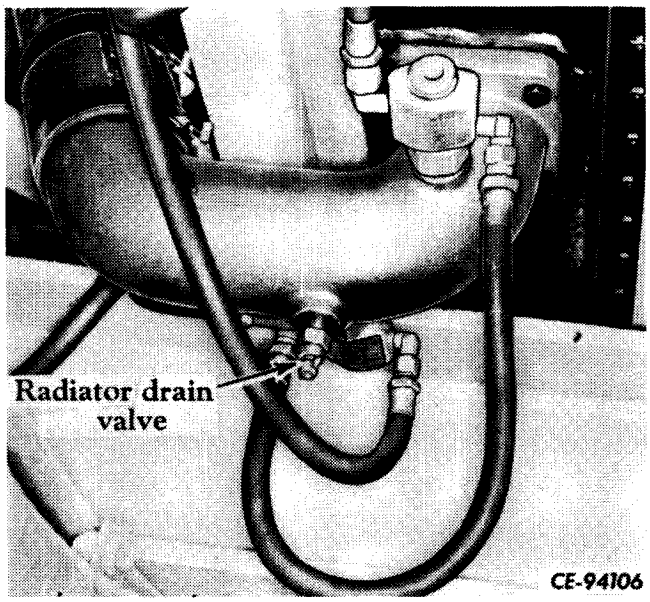


Fig. 22. Radiator Drain Valve

4. Open the crankcase drain.

5. Reach below and behind the water pump housing (B, Fig. 23) and open the torque converter oil cooler drain valve (C, Fig. 23).

6. Open the intercooler drain valve.

7. Allow the system to drain completely; do not let drain outlets plug up during draining.

8. Close the drain valves.

FILLING THE SYSTEM

Do not add cold coolant into the radiator of an overheated engine unless absolutely necessary. However, if necessary:

Remove the radiator cap carefully, refer to "RADIATOR CAP" in this section.

Coolant must be added to radiator slowly with engine running at low idle speed.

1. Be sure the drain valves are closed.

2. Open the water pump inlet elbow vent valve (A, Fig. 23) and the vent plug on the intercooler.

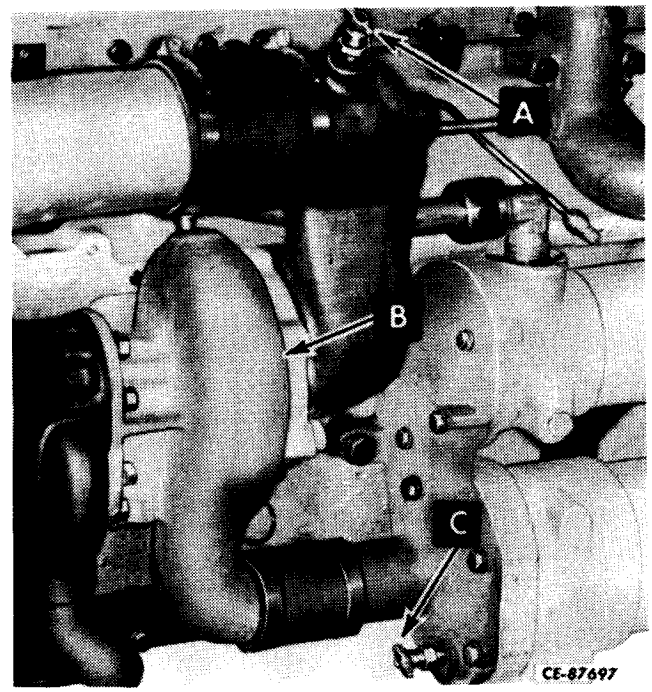


Fig. 23. Drain and Vent Points

A. Water Pump Vent Valve
B. Water Pump Housing
C. Oil Cooler Drain Valve

NOTE: *Fill the cooling system slowly, this allows more air to escape and the system to be filled to maximum capacity. Install "IH cooling system conditioner" (for warm weather operation) or "IH Premium anti-freeze (for cold weather — consistently at or below 0° C (+32° F) according to the instructions printed on the container. Refer to "ANTI-FREEZE" in this section.*

NOTE: *Use only a corrosion inhibitor that is compatible with aluminum. DO NOT use inhibitor labeled as "acid neutralizers."*

3. Fill the cooling system until a continuous flow of coolant is noted at the water pump inlet elbow vent valve (A, Fig. 23). Close this valve.

4. Continue to add coolant to the cooling system until a continuous flow of coolant is noted at the intercooler vent plug. Close this plug.

5. Fill the cooling system until the coolant reaches the radiator baffle. Wait a few minutes to allow for the escape of air; then add coolant as needed.

6. Start and run the engine until the normal operating temperature is reached; adding coolant when needed to keep proper level of 25 mm (1 in.) above baffle.

7. After all air is removed and level remains fixed, install the radiator cap.

CLEANING THE SYSTEM

1. Drain the system. Refer to "DRAINING THE SYSTEM" in this section.

2. Close the radiator and engine drains.

3. Fill the system with clean water (refer to "FILLING THE SYSTEM" in this section) and add a flushing compound that is compatible with aluminum. Flush the system in accordance with the instructions furnished with the compound.

4. After flushing, rinsing, and completely draining the system, refill with clean coolant. Refer to "FILLING THE SYSTEM" in this section.

ANTI-FREEZE

IH Premium anti-freeze (permanent type) is the recommended solution for this machine. DO NOT use methanol or alcohol as an anti-freeze.

NOTE: *Do not mix brands of anti-freeze solutions. Mixed solutions make it impossible to determine the protection against freezing*

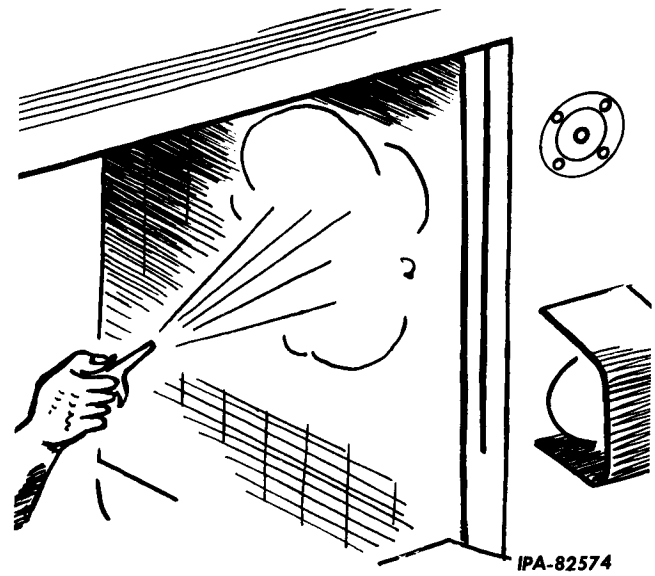
Check the solution frequently and at normal operating temperature, to be sure the cooling system has sufficient protection against freezing.

The following table shows the percentage of anti-freeze solution required for the various temperatures.

Approximate Freezing Point		USE IN COOLING SYSTEM
		IH Premium
°F	°C	(Ethylene Glycol-Permanent Type)
+20°	- 7°	16%
+10°	-12°	25%
0°	-18°	33-1/3%
-10°	-23°	40%
-20°	-29°	45%
-30°	-34°	50%
-40°	-40°	54%
-50°	-46°	58%
-60°	-50°	62%
-70°	-57°	65%

CLEANING THE RADIATOR

Minor internal sludge accumulations will be removed when flushing the cooling system.



When internal accumulations are found that cannot be removed by normal flushing methods, consult your Pay Line distributor.

Start and run the engine until the radiator shutters (if equipped) are fully open; then stop the engine. Remove all bugs and dirt from the radiator core using air or water under pressure. Direct the flow through the core, opposite the normal direction of air flow.

RADIATOR CAP (Fig. 24)

The radiator cap seals the coolant filler opening of the radiator. Positive sealing requires a cap gasket and its contacting surfaces in good condition, and a properly tightened cap.

To remove the cap (4), unscrew the handle (2) slowly until all pressure is relieved, and the clamp (3) clears the slots in the radiator filler neck.

When installing the cap (4), the gasket and contacting surfaces must be clean; then tighten the handle (2), by hand, until snug.

RADIATOR PRESSURE RELIEF VALVE (Fig. 24)

The pressure relief valve keeps the pressure of the coolant at approximately 41 to 55 kPa (6-8 psi).

The valve is located on the LH rear surface of the radiator top tank. Excess pressure and coolant released by the valve are discharged through the overflow pipe.

Replacing the Valve

Do not attempt to repair a faulty valve (7); replace it as follows:

1. Disconnect the overflow hose from the connector (9).

2. Remove the four cap screws securing the valve housing (8) to the radiator, and remove the valve (7).

NOTE: *When replacing the valve (7), replacement of the two gaskets (6) is also recommended.*

3. Assemble and secure the new valve, gaskets (6) and housing (8) on the radiator.

4. Reconnect the overflow hose.

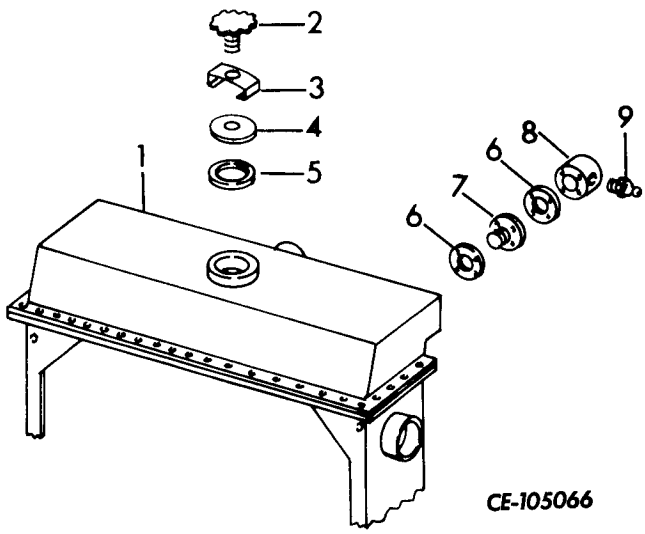


Fig. 24. Radiator Cap and Relief Valve

1. Radiator
2. Clamp Handle
3. Cap Clamp
4. Radiator Cap
5. Cap Gasket
6. Valve Gasket
7. Relief Valve
8. Valve Housing
9. Connector

THERMOSTATS

A thermostat has two functions; gain rapid engine warm-up; control coolant temperature. The thermostats are the nonadjustable type.

NOTE: *Use only a permanent type anti-freeze in this engine.*

Removal (Fig. 25)

Engine overheating is sometimes due to faulty thermostat. Remove and check the thermostat as follows:

1. Drain the cooling system to a level below the housing (4). Refer to "DRAINING THE SYSTEM" in this section.

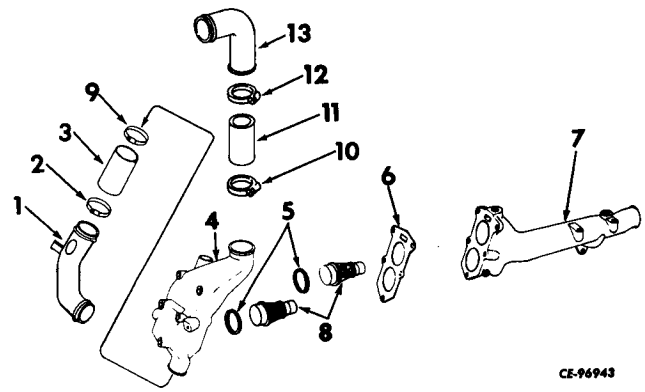


Fig. 25. Thermostats and Housing

1. Thermostat By-Pass Pipe
2. Thermostat By-Pass Hose Clamp
3. Thermostat By-Pass Hose
4. Thermostat Housing
5. Thermostat Seal
6. Thermostat Housing Gasket
7. Front Water Manifold
8. Thermostat
9. Thermostat By-Pass Hose Clamp
10. Radiator Inlet Hose Clamp
11. Radiator Inlet Clamp
12. Radiator Inlet Hose Clamp
13. Radiator Inlet Tube

2. Loosen clamps (10 and 12), then remove radiator inlet hose (11) from housing (4).

3. Loosen clamps (2 and 9), then remove hose (3) from housing (4).

4. Remove the cap screw securing the alternator brace to the housing (4) and swing the brace up and away from the housing.

NOTE: *It may be necessary to loosen the alternator brace cap screw to move the brace away from the housing.*

5. Remove the five cap screws securing the housing (4) to the manifold (7) and lift off the housing with gasket (6). Discard the gasket.

6. Remove the thermostats (8) from the manifold (7).

Checking (Fig. 26)

1. Clean the thermostats. Replace the thermostats if coated with scale as this will not allow proper operation.

2. Check the thermostat as follows:

a. Suspend the thermostat and a thermometer in a container of water.

NOTE: *Do not allow either one to contact the container sides or bottom.*

b. Heat water and carefully note temperature when thermostat starts to open (approx. +77°C/+180°F) and when fully open (approx. +91°C/+195°F).

c. If thermostat does not function as described, replace it.

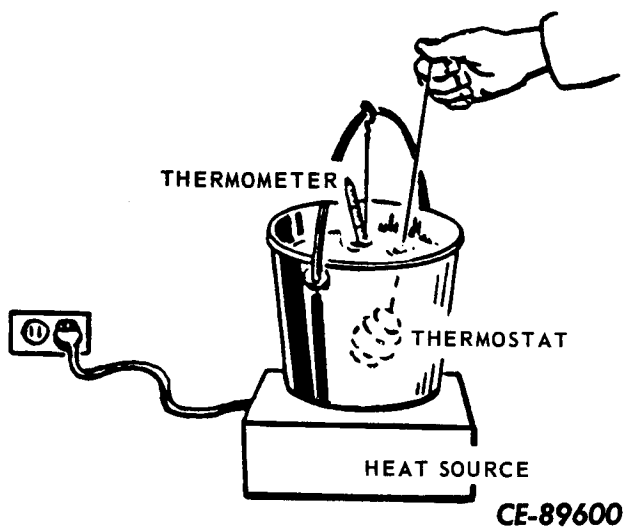


Fig. 26. Checking the Thermostat

Installation (Fig. 25)

1. Clean the thermostat housing removing all scale and rust.

2. Clean the gasket surface of the housing (4) and manifold (7) to assure proper sealing when reassembled.

3. Apply sealer to the gasket surface of the housing (4) and manifold (7).

4. Install a new gasket (6) on the manifold (7) and install the thermostat (8).

5. Check the condition of the seals (5), located in the housing (4). Replace with new if worn or damaged.

6. Install and secure the housing (4) onto the manifold (7) with the five cap screws previously removed.

7. Secure the alternator brace to the housing (4) with the cap screw.

8. Check the alternator belt tension. Refer to "ALTERNATOR BELT" in this section.

9. Install and secure hoses (3 and 11) to housing (4).

10. Fill the cooling system. Refer to "FILLING THE SYSTEM" in this section.

ENGINE OIL COOLER

The oil cooler is mounted on the left side of the crankcase and connected to the cooling system.

The cooler has two functions: gain rapid engine oil warm-up; control engine oil temperature during operation.

TRANSMISSION OIL COOLER

The oil cooler is mounted on the left side of the crankcase below the engine oil cooler and connected to the cooling system. The cooler has two functions: gain rapid transmission oil warm-up; control transmission oil temperature during operation.

WATER PUMP

No lubrication of the pump is required as the bearings are of the permanently sealed type and are packed with special lubricant at the factory for the life of the bearing.

The water pump requires no attention other than bearing replacement when they show excessive looseness of if a water leak develops which indicates that a damaged or badly worn seal needs replacement.

ELECTRICAL SYSTEM

PRECAUTIONS

The electrical generating system now incorporates a direct diode rectified alternator which requires special handling.

Before working on any part of the electrical system, turn the electrical system master or ignition switch to the "OFF" position.

All terminals must be clean and fastened securely. Never paint electrical connections. Repair or replace all broken wires immediately.

MAINTENANCE

CAUTION! When installing batteries, be sure to connect the ground cable to the negative terminal. When connecting a booster battery or battery charger, make certain to connect the negative terminal to the negative terminal and the positive terminal to the positive terminal. Do not short across or ground any terminals of alternator or regulator. Do not attempt to polarize the alternator. Never operate the alternator on an open circuit. Do not connect any cable to the "R" terminal on the alternator. Failure to observe these precautions will result in severe damage to the harness and alternator.

IMPORTANT: *If for any reason the machine must operate without batteries, it is absolutely imperative to disconnect the field connector and the battery terminal from the alternator prior to starting the machine. Make sure these two live terminals are wrapped individually with electrical grade tape while operating in this manner.*

REGULATOR (Standard)

The regulator is adjusted and sealed by the manufacturer. If the regulator fails to operate properly, consult your Pay Line distributor.

ALTERNATOR (Standard)

The alternator requires no lubrication since it is a lifetime lubricated unit. If the alternator fails to operate properly, consult your Pay Line distributor.

ALTERNATOR w/an INTEGRAL REGULATOR (If Equipped)

The alternator incorporates a built in transistorized voltage regulator. The alternator requires no lubrication since its bearings are factory lubricated for life. The integral regulator is sealed by the manufacturer.

If the alternator fails to operate properly, consult your Pay Line distributor.

When to Adjust the Integral Regulator

1. If the battery uses too much water at normal setting (position "2" on the cap aligned with the arrow) reduce the voltage setting by aligning position "LO" on the cap (2, Fig. 25) with the arrow.

2. If the battery is consistently under charged at the normal setting (position "2" on the cap aligned with the arrow), increase the voltage setting by aligning the "3" position on the cap with the arrow. If further increase is desired, align "HI" position on cap with arrow.

NOTE: *If either of the conditions in Steps 1 and/or 2 persists after making the adjustments; consult your Pay Line distributor.*

Adjustment

1. To adjust the integral regulator setting remove voltage adjustment cap (1, Fig. 27) from alternator.

2. Position the cap until the desired setting is aligned with the arrow on the alternator. Refer to Steps 1 and 2 under "When to Adjust the Integral Regulator" for the desired setting.

3. Reinstall the cap in the alternator.

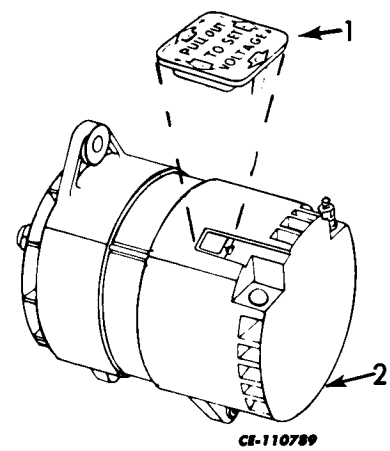


Fig. 27. Integral Regulator Voltage Adjustment

1. Voltage Adjustment Cap
2. Alternator

CRANKING MOTOR

The cranking motor must be lubricated every 5000 hours under normal starting conditions, or sooner, should it become necessary to remove the motor in the process of engine servicing.

NOTE: *Tag all disconnected cables for ease of correct installation.*

1. Disconnect all electrical cables and remove cranking motor.

2. Clean outer surfaces.

3. Saturate all wicks and lightly lubricate the splines underneath the clutch housing with Grade-10 engine oil.

4. Install the cranking motor and connect all electrical cables. Refer to "SPECIAL TORQUES" in Section 9.

If the cranking motor fails to operate properly, consult your Pay Line distributor.

FUSES

The electrical circuits are protected by fuses which are located in a fuse panel inside the service compartment. If a short circuit occurs, the fuse will burn out and break the circuit, preventing damage to the electrical system.

It is important to use the same capacity fuse for replacement. If a fuse continually burns out, check the electrical wiring for short circuits.

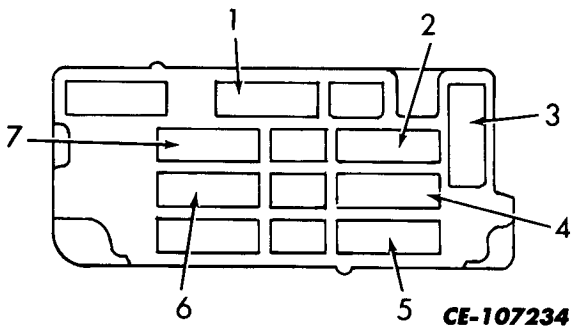


Fig. 28. Fuse Panel

1. Taillight and Stoplight, Horn, Heater and Air Conditoning (if equipped) Circuits Fuse (25 amp)
2. Instrument Panel Circuit Fuse (10 amp)
3. Regulator Circuit Fuse (5 amp)
4. Starting Circuit Fuse (5 amp)
5. Domelight and Windshield Washer Circuit Fuse (5 amp)
6. Shift Circuit Fuse (15 amp)
7. Cigarette Lighter Circuit Fuse (15 amp)

CIRCUIT BREAKER

The lighting circuit is also protected by a circuit breaker. In the event of a "short circuit" or "ground," the circuit breaker will open before damage occurs, and will continue to open and close until the trouble clears or is corrected. The circuit breaker will then return and stay in its normal closed position. It is important to use the same capacity circuit breaker for replacement.

BULB REPLACEMENT

Refer to the following procedures for bulb access:

Instrument Lights

Open the service compartment door and pull the socket out of the gauge. Depress and twist bulb 1/4 turn counterclockwise.

Warning Lights

Open the service compartment door, squeeze sides of socket and pull out of the panel. Depress and twist the bulb 1/4 turn counterclockwise.

LAMP REPLACEMENT

Tail, Backup, Stop and Head Lights

Pull on the rubber lamp retainer to remove the retainer and lamp. Position the new lamp in the retainer with the lug on the rim of the lamp in the slot provided. Install the retainer and lamp in the housing with the lug to the right side of the housing as viewed from the front of the machine.

STORAGE BATTERIES

CAUTION! Batteries give off highly inflammable gas. Never allow sparks or open flame near the batteries. Avoid spilling any electrolyte on hand or clothing.

Maintenance

Proper battery maintenance will assure maximum service. Following are a few simple rules:

—Keep battery cable terminals clean and tight.

—Keep filler cap vent holes unplugged.

—Replace worn, cracked, broken or corroded cables.

—Keep batteries fastened securely in frame.

NOTE: *Excessive tightening can warp or crack battery case.*

—Maintain the correct battery liquid level. Refer to "Liquid Level."

—Keep the batteries clean. Refer to "CLEANING THE BATTERIES."

Cleaning the Batteries

If the top of a battery is dirty, it may be cleaned with a brush dipped in ammonia or soda solution. The vent plugs must be tightened and sealed to prevent any solution from getting into the battery cells. After the foaming stops, flush off the battery with clean water and unseal the vent plugs. Brighten the terminal contact surfaces with steel wool or a stiff brush.

Liquid Level

The electrolyte in each cell must be at the proper level (6 to 13mm — 1/4 to 1/2 in. above the plates) at all times to prevent battery failure. Check the level of the electrolyte. When the electrolyte is below this level, pure distilled water must be added. Never use hydrant water or any water which has been in a metal container. Acid or electrolyte must never be added except by a skilled batteryman. Under no circumstances add any special battery "dopes," solutions or powders.

It is especially important to keep the batteries at full charge for cold weather operaton. Add distilled water to the batteries in freezing temperatures only when the engine is to operate for several hours, to thoroughly mix the water and the electrolyte, or damage to the batteries will result from the water freezing.

ENGINE LUBRICATING OIL FILTERS

CHANGING THE FILTERS (Fig. 29)

The lubricating oil filters are a spin-on type filter. These filters cannot be cleaned and should not be disturbed except when it becomes necessary to replace them.

Replacement

1. After reaching operating temperature, stop the engine and drain the crankcase.

2. Clean the outside of the filters to prevent dirt from entering the system while servicing.

3. Remove the spin-on filters by turning them counterclockwise. Discard the filters.

4. Install new filters by applying a little engine oil to the gasket and thread the filters on by hand by turning them clockwise. Tighten filters one full turn after the filter gasket contacts the filter header.

5. Reinstall and tighten the crankcase drain plug.

6. Fill the crankcase with fresh oil. Refer to the "LUBRICANT SPECIFICATIONS AND CAPACITIES CHART" in Section 7 for quantity and grade of oil specified.

7. Operate the engine at low idle for 5 to 10 minutes, do not operate under load until normal oil pressure and temperature are reached. During warm-up check the filters for leaks.

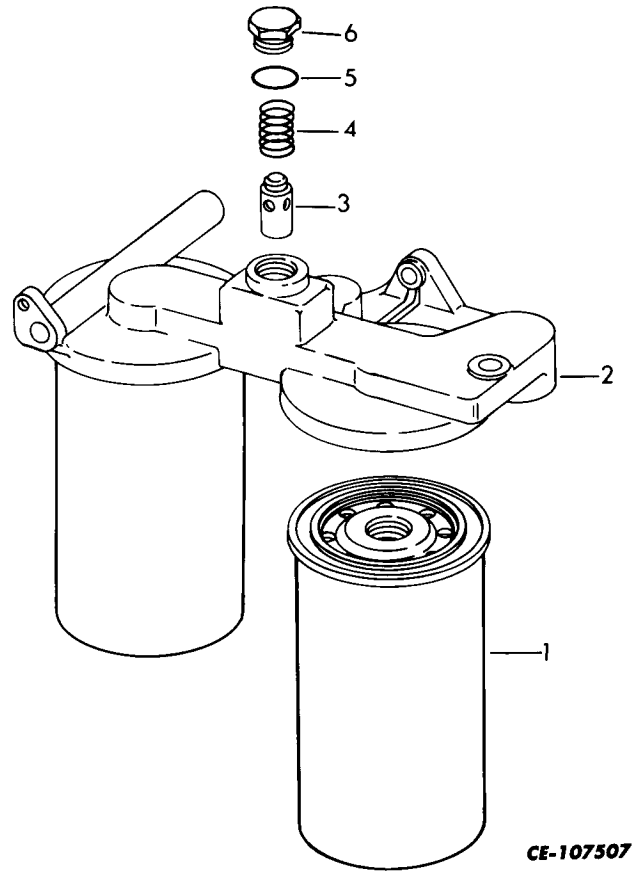


Fig. 29. Spin-On Filters

1. Lubricating Oil Filter
2. Lubricating Oil Filter Header
3. Valve
4. Spring
5. Gasket
6. Valve Nut

ENGINE VALVE CLEARANCE ADJUSTMENTS

Following this simplified procedure, all valves can be adjusted quickly and accurately. Note that the engine need not be cranked six times to position the piston of each cylinder on TDC. All valves are adjusted by cranking the engine only twice.

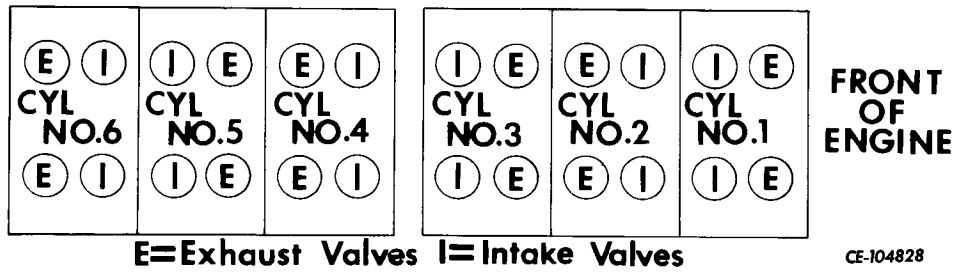


Fig. 30. Valve Arrangement

CAUTION! Before making any adjustments place the electrical system master switch in the "OFF" position.

NOTE: *Valve lash is adjusted with engine cold. The valves can be adjusted with the engine "hot," but the workmanship usually suffers due to the heat.*

1. Remove the cover and gasket from both cylinder heads. Turn the crankshaft until the number one piston is on the compression stroke and the timing pointer on the front cover is in line with the TDC mark on the vibration damper. Fig. 30 shows the numbering sequence of the valves. Refer to "HAND CRANKING" in this section.

NOTE: *Be sure that the number one piston is on the compression stroke by turning both push rods by hand to determine that both intake and exhaust valves are closed. Valves are closed when push rods are loose and can be turned easily.*

2. Before adjusting the valve clearance, the valve bridge must be adjusted. Adjust the intake and exhaust valve bridges of the No. 1 cylinder as follows:

a. Loosen the valve bridge adjusting screw lock nut and back-off screw (1, Fig. 31) until clearance is noted between the valve stem and the adjusting screw.

b. Place feeler gauges of the same thickness (approximately 0.25mm/0.010 in.) between both valve stems and bridge.

c. Turn down on the valve bridge adjusting screw until equal drag is felt on both feeler gauges.

d. Lock the adjusting screw in this position with the lock nut and recheck the clearance.

e. Adjust all the remaining valve bridges in the same manner.

3. In this position adjust the intake valves (as described in Steps 5, 6, and 7 below) for cylinders 1, 2 and 4; and the exhaust valves for cylinders 1, 3 and 5.

4. Rotate the crankshaft one full revolution until the No. 6 cylinder is at TDC (compression). In this position adjust the intake valves (as described in Steps 5, 6 and 7 below) for cylinders 3, 5 and 6; and the exhaust valves for cylinders 2, 4 and 6.

5. Loosen the intake and exhaust valve adjusting screw lock nuts and bottom the adjusting screws to force out any excess oil in the push rod sockets; then back them out again.

6. Insert feeler gauges of the specified thickness (refer to "SPECIFICATIONS" in Section 9) between the valve stems and the valve bridge (Fig. 31). (Example: Both intake valves on the No. 1 cylinder.)

7. Turn down the valve lever adjusting screw until equal drag is felt on both feeler gauges. Tighten the lock nut and recheck the clearance.

8. Using the new gaskets, install the valve covers.

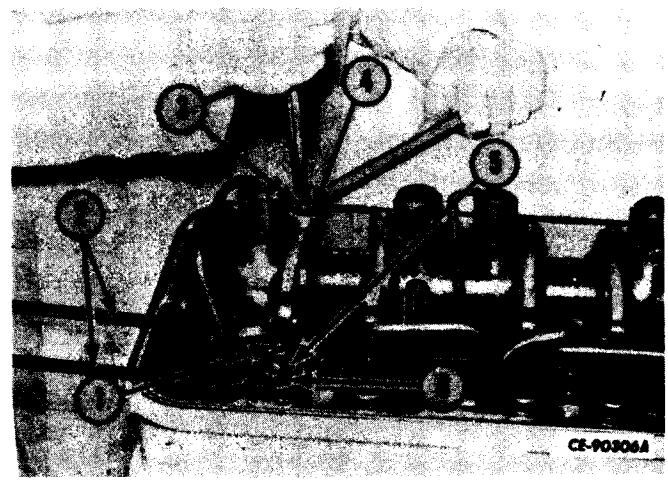


Fig. 31. Adjusting Valve Lash

1. Valve Bridge Adjusting Screw
2. Feeler Gauges
3. Valve Lever Adjusting Screw
4. Locknut
5. Valve Bridge
6. Valve Stem

ETHER INJECTOR (If Equipped) (Fig. 32)

CAUTION! Observe the precautions printed on the container when using or storing this fluid and when discarding the empty containers.

NOTE: *Improper starting fluids can cause valve seizure and severe damage to the engine. Consult your Pay Line distributor for the recommended starting fluid to be used.*

NOTE: *The ether starting valve inlet must be sealed against the entry of dirt at all times by having a fluid container installed or by installing the dust cap provided with the valve.*

INSPECTION AND CLEANING

Make certain that ether is available under pressure. To do so, remove the ether container and check if a good spray is obtained. If not, replace with a new container. If a good spray was obtained, reinstall the container and test the ether injector connections as follows:

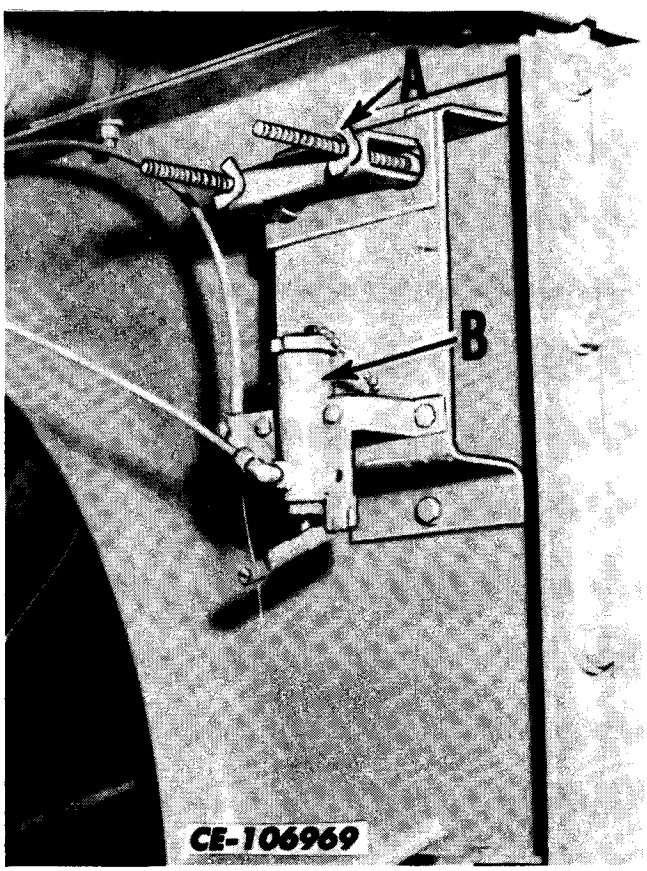


Fig. 32. Ether Starting Valve

A. Wing Nut
B. Starting Valve

a. Disconnect the ether tube at the spray nozzles and remove the spray nozzles.

b. Reconnect the nozzles to the ether tubes.

c. Pull out the ether injector knob and hold for 2 to 3 seconds to fill the ether chamber of the ether starting valve. Push in the knob allowing 2 to 3 seconds for the ether to appear and observe the spray at the nozzles.

d. Dribbling or no spray indicates a blocked spray nozzle or lack of ether pressure.

Clean or replace the spray nozzles and/or ether tubes.

CHANGING THE FLUID CONTAINER

1. Loosen wing nuts (A) until the container can be removed.

2. Unscrew and discard the container from the ether starting valve (B).

3. Install the new container into the valve.

4. Secure the container in place with the wing nuts.

FUEL SYSTEM

GENERAL

If a large stationary fuel storage tank is used, use a pump to remove fuel rather than a faucet. Provide a space of at least 76mm (3 in.) between the bottom of the pump suction pipe and the bottom of the storage tank for settling of sediment and water.

Locate a drain at the opposite end of the tank. Drain off the sediment and water regularly.

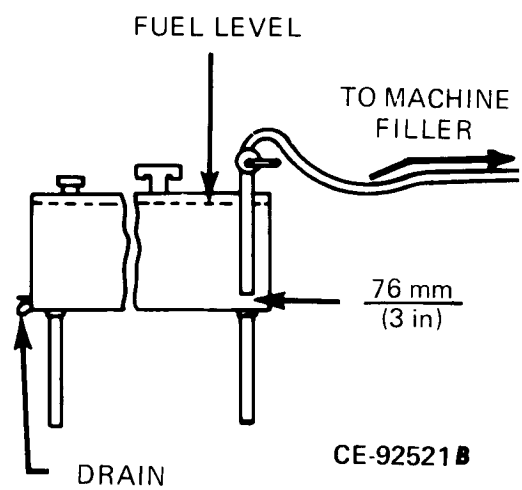


Fig. 33. Fuel Storage Tank

Do not use the last 76mm (3 in.) of fuel in the supply tank; collect it in a container and allow it to settle. In this manner the sediment and foreign material can be separated from the fuel and disposed of with little or no loss of fuel.

NOTE: *Diesel fuel storage tanks and supply lines must never be galvanized, despite the fact that the zinc coating will reduce rust formation. Diesel fuel oil reacts chemically with zinc to form powdery flakes. These flakes can chip off causing damage to the fuel injection pump.*

Drain water from the fuel tanks at the interval specified in the "SERVICE GUIDE" in Section 7 as follows:

FUEL TANKS

1. Open the fuel tank drain valves (Fig. 34) and drain off any accumulated water.

2. Close the valves when clean diesel fuel begins to flow.

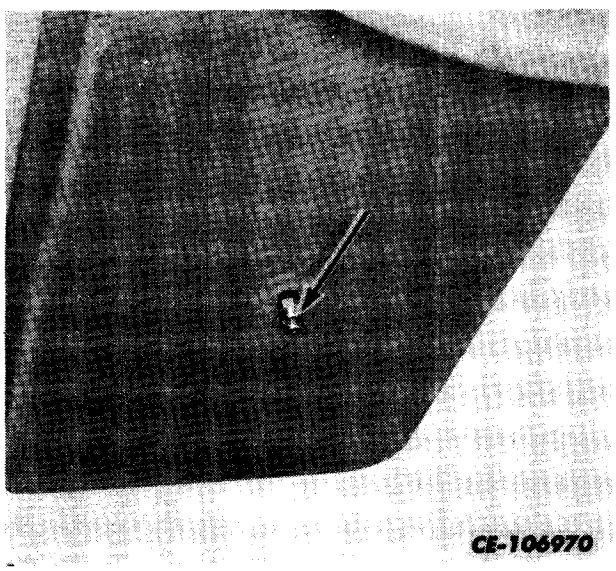


Fig. 34. Fuel Tank Drains

FUEL INJECTION PUMP

DO NOT ATTEMPT TO ADJUST THE FUEL INJECTION PUMP.

Unsatisfactory operation of the engine may not be due to the fuel injection pump. If unsatisfactory operation persists after servicing the filters, consult your Pay Line distributor to service the fuel injection pump. Special equipment and knowledge are required for proper injection pump service; these are available at your Pay Line distributor.

DIESEL FUEL SPECIFICATION

The following table shows the diesel fuels recommended for use in International diesel engines:

DIESEL FUEL SPECIFICATIONS

Type of Operation	Preferred Specifications (*)
Normal Service Above -12°C (+10°F)	ASTM D-975 Grade 2-D ASTM D-396 Grade 2
Below -12°C (+10°F) or Extended Idling	ASTM D-975 Grade 1-D ASTM D-396 Grade 1

(*) ASTM refers to American Society for Testing and Materials. The D-396 fuels must also meet the cetane number and sulfur requirements of the D-975 specifications.

Optionally, the equivalent grades of recognized Federal Government specifications may be used — latest revisions of VV-F-800a.

FUEL FILTERS

The primary and final fuel filters are spin-on type filters. These filters cannot be cleaned and should not be disturbed except when it becomes necessary to replace them.

The primary filter is the first in the system to filter the fuel as it comes from the tank. The final filter will last longer than the primary filter if proper service is given to the primary filter.

When to Replace the Filters

When the engine is misfiring or a loss of power is evident, replace the primary fuel filter. If the symptoms still persist, replace the final fuel filter.

Replacing the Fuel Filters

Be careful not to allow dirt, water or other foreign material to get on the new filter. Keep new filters in the original package until ready for installaton.

1. Clean the filter header and surrounding area to prevent dirt or foreign material from entering the system.

MAINTENANCE

2. PRIMARY FILTER ONLY: To prevent fuel from flowing from filter header (1, Fig. 35) when the filter is removed, disconnect and cap crossover tube to filter header hose (2) at the header.

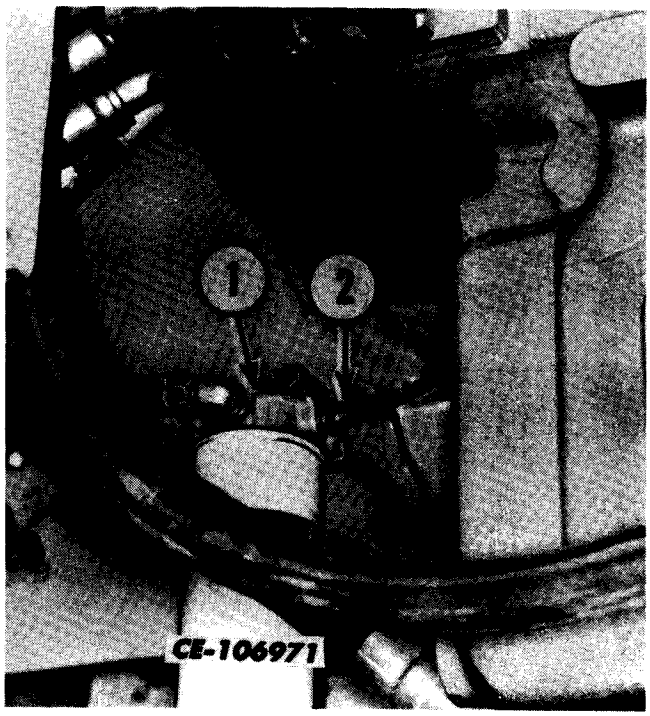


Fig. 35. Primary Fuel Filter

1. Filter Header
2. Crossover Tube to Filter Header Hose

3. Remove the primary or final fuel filter from the filter header by turning counterclockwise. A filter removal wrench can be used if unable to turn the filter by hand. Discard the fuel filter.

4. Apply a light coating of clean fuel oil to the seal surface on the new filter.

5. Install, but do not "spin," the new filter, turning it until the seal just contacts the filter header.

6. Make aligning marks on the filter and the filter header; give the filter an additional 1/4 to 1/2 turn.

NOTE: *Do not over-tighten the filter or use any tool for installation.*

7. PRIMARY FILTER ONLY: Reconnect the crossover tube to header hose.

8. Vent the fuel system. Refer to "PRIMING AND VENTING THE SYSTEM" in this section.

PRIMING AND VENTING THE SYSTEM

All air must be eliminated from the fuel lines before the engine will operate properly. All fuel line connections must be tight to prevent leakage and to prevent air from entering the system. The system must be vented when:

Before starting an engine which has not been operated for an extended period of time.

An engine, in operation, runs out of fuel.

Fuel filters have been replaced.

Fuel piping has been disconnected or loosened.

Vent the system as follows:

1. Fill the fuel tanks.

2. Unlock the plunger of hand priming pump (1, Fig. 36) by rotating counterclockwise.

3. Open vent (2, Fig. 36) on the final filter.

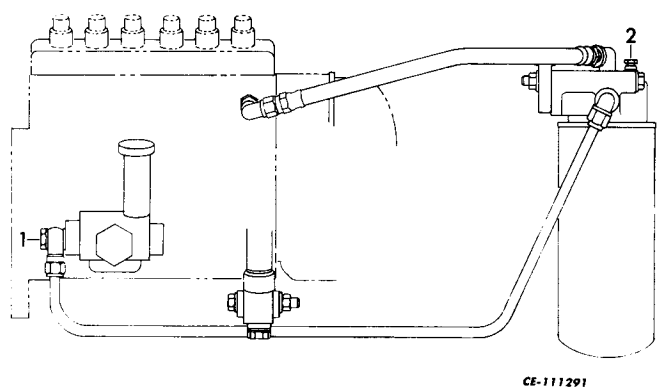


Fig. 36. Priming and Venting Points

1. Hand Priming Pump
2. Final Filter Vent

4. Pump fuel into the system using the pump plunger until a stream of fuel comes out of the final filter vent.

5. Close the vent on the final filter.

6. Lock the priming pump plunger by pressing in and rotating clockwise until tight.

CAUTION! If priming pump plunger is not tight, it will back out due to vibration during operation and it will literally blow out.

7. Start the engine. With engine at low idle, reopen vent on final filter and allow fuel to flow until free of air bubbles.

HAND CRANKING

CAUTION! Whenever hand cranking the engine be sure the engine is cold. Never hand crank a warm or hot engine.

This procedure is used only for adjusting the valves.

1. Place the electrical master switch in the "OFF" position.

2. Lock the transmission shift lever in neutral (N).

3. Install blocking behind the accelerator pedal to be sure the fuel supply is shut off.

4. Position a 1-5/8 in. wrench on the accessory drive nut (A, Fig. 37) and turn clockwise only as required.

5. After adjustments have been completed remove the wrench.

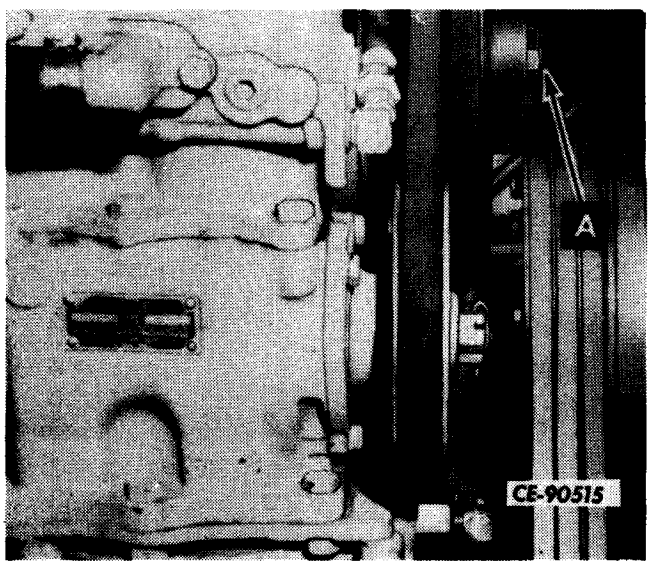


Fig. 37. Accessory Drive Nut

HYDRAULIC SYSTEM

NOTE: *Before removing any components from the hydraulic reservoir, wipe off the top surface of the reservoir using clean kerosene or a commercial cleaning solvent.*

DRAINING THE RESERVOIR (Fig. 38)

1. Start the engine and operate the dump body to warm the oil.

2. Lower the dump body onto the frame, stop the engine and apply the parking brake.

3. Loosen the filler cap (16).

CAUTION! Always loosen the filler cap slowly to relieve pressure in the system.

4. Remove the reservoir drain plug (23) and allow the reservoir to drain.

SERVICING THE RETURN LINE FILTER (Fig. 38)

Removal

1. Drain the reservoir as described in this section.

2. Remove the eight cap screws and washers from cover (1). Remove cover and filter assembly.

NOTE: *Cover the filter opening on the reservoir with a piece of cardboard or heavy paper. Tape the edge of the covering to prevent dirt from getting into reservoir.*

3. Separate the cover (1) from the base assembly by removing nut (13) flat washer (12) and shim (11).

4. Remove return element (4) from base assembly (8).

5. Wash the element (4) in commercial cleaning solvent, dry thoroughly.

NOTE: *If the element shows any signs of deterioration or remains plugged after cleaning; replace it.*

Installation

1. Replace "O" rings (2) and (3) when the "O" rings show signs of wear or deterioration.

2. Install the return line filter element (4) onto the base assembly (8).

3. Secure the cover (1) to the base assembly (8) with hardware removed in Step 2 in "REMOVAL."

4. Remove the protective covering from the reservoir.

5. Install the cover and filter assembly into the reservoir and secure with eight cap screws and washers.

SERVICING THE SUCTION SCREEN (Fig. 38)

Removal

1. Refer to Steps 1 and 2 of "REMOVAL" under "SERVICING THE TURN LINE FILTER."

2. Remove shroud (14) loosen nut (17), remove washer (18) and the spring (19).

MAINTENANCE

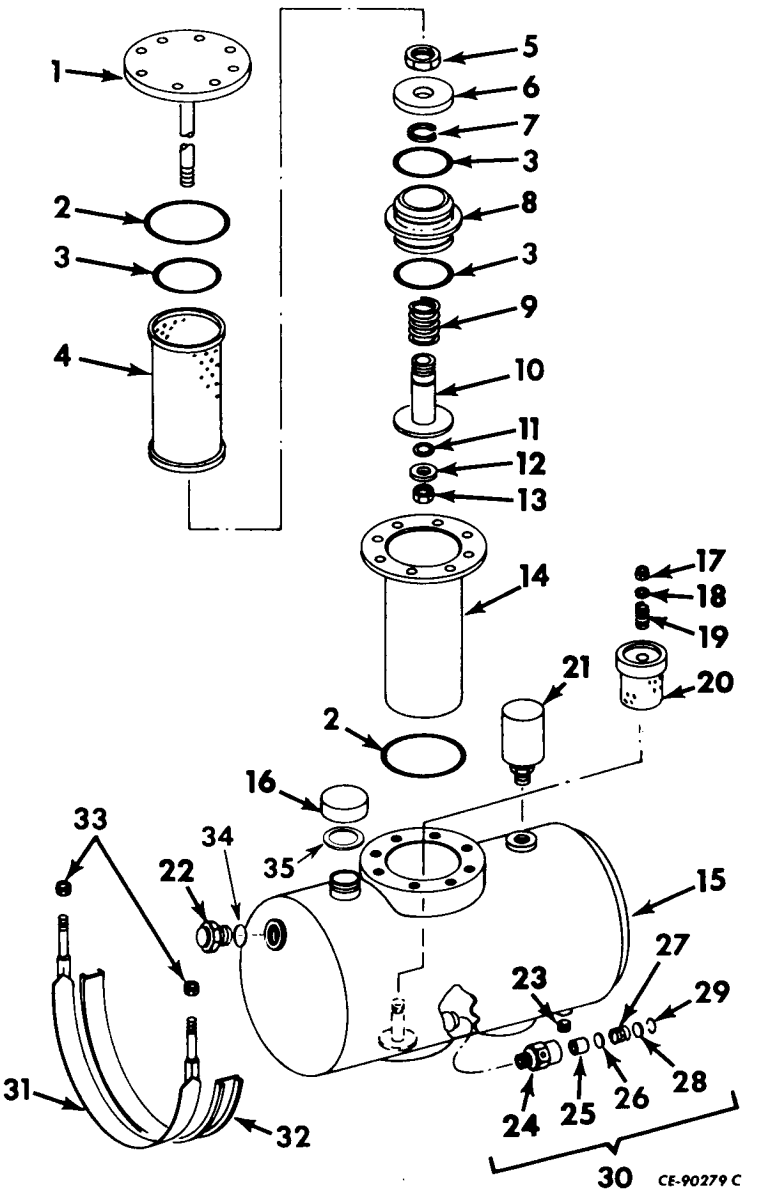


Fig. 38. Hydraulic Reservoir Filters

1. Filter Cover
2. "O" Ring
3. "O" Ring
4. Return Filter Element
5. Nut
6. Filter Trap Cover
7. Snap Ring
8. Filter Base
9. Spring
10. Filter Trap
11. Shim
12. Washer
13. Nut
14. Shroud
15. Reservoir
16. Filler Cap
17. Nut
18. Washer
19. Spring
20. Magnetic Suction Strainer
21. Breather
22. Sight Gauge
23. Drain Plug
24. Housing
25. Poppet
26. Spacer
27. Spring
28. Washer
29. Snap Ring
30. Surge Valve
31. Mounting Strap
32. Chaffing Strip
33. Nut
34. "O" Ring
35. Gasket

3. Remove strainer (20) from the reservoir.

4. Clean the strainer (20) in diesel fuel or kerosene and dry thoroughly. Remove any metallic particles that may be present.

NOTE: *If the strainer shows any signs of deterioration or remains plugged after cleaning; replace it.*

Installation

1. Install the strainer (20) and the spring (19) on the filter rod in the reservoir.

2. Secure with the nut (17) and the washer (18).

3. Install shroud (14).

4. Refer to Step 5 of "INSTALLATION" under "SERVICING THE RETURN LINE FILTER."

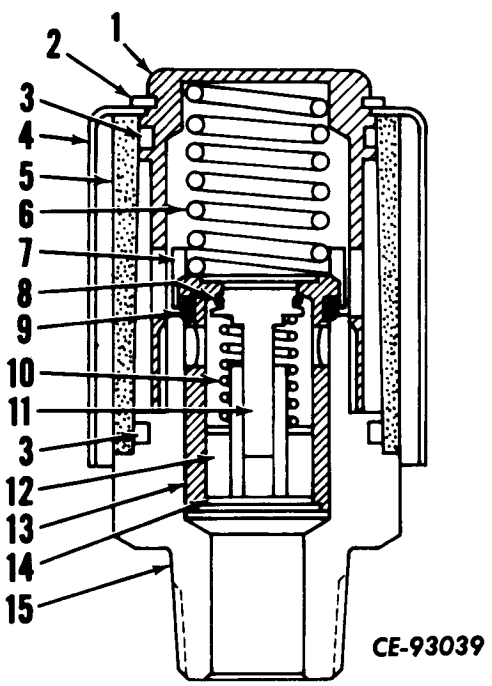


Fig. 39. Hydraulic Reservoir Breather

1. Cap
2. Ring Lock
3. Seal Filter
4. Cover
5. Filter
6. Spring
7. Retainer
8. Seal Poppet
9. Seal Sleeve
10. Spring Poppet
11. Poppet
12. Guide
13. Sleeve
14. Ring Lock
15. Body

SERVICING THE HYDRAULIC RESERVOIR BREATHER (Fig. 39)

CAUTION! Always loosen the filler cap slowly to relieve pressure in the system.

1. Remove filler cap (16, Fig. 38) on the reservoir.

2. Remove the lock ring (2) and cover (4).

3. Remove the filter (5) and clean in a suitable solvent. Dry thoroughly.

4. Check the seal rings (3) for wear or deterioration. Replace them if necessary.

5. Replace the filter (5) and cover (4). Secure with ring (2).

6. Reinstall the filler cap (16, Fig. 38).

FILLING THE RESERVOIR (Fig. 38)

NOTE: *Always use clean oil from a clean container. Correct all leaks.*

1. Install the reservoir drain plug (23).

2. Fill the reservoir. Refer to the "LUBRICANT SPECIFICATIONS AND CAPACITIES CHART" in Section 7 for quantity and grade oil specified.

3. Install the filler cap.

4. Start the engine and operate at about 1000 rpm.

5. Vent the hoist and steering systems. Refer to "VENTING THE SYSTEMS" in this section.

NOTE: *The dump body must be completely lowered; the machine on level ground and the hoist control lever in "FLOAT."*

6. Check the oil level at the sight gauge on the side of the reservoir and if necessary, add oil.

VENTING THE SYSTEMS

The hydraulic system will have to be vented of air if:

a. The system has been drained and filled.

b. Hydraulic lines have been disconnected or tightened after noting hydraulic leaks.

c. The hydraulic system has been operated with excessively low oil level.

d. HOIST SYSTEM ONLY: The system does not respond properly and has a high rate of "drift" along with a "spongy" reaction when the hoist control lever has been moved from the "HOLD" to the "RAISE" or to the "LOWER" position; or there is a "jerky" motion during the upstroke of the hoist cylinders.

e. STEERING SYSTEM ONLY: The system does not respond properly, such as "spongy" steering.

Hoist System (Fig. 40)

CAUTION! Be sure the dump body is completely lowered to the frame.

1. Start and run the engine at 1000 to 1500 rpm.

2. Loosen both bleeder valves to allow air to escape while the dump body is still in the "lowered" position.

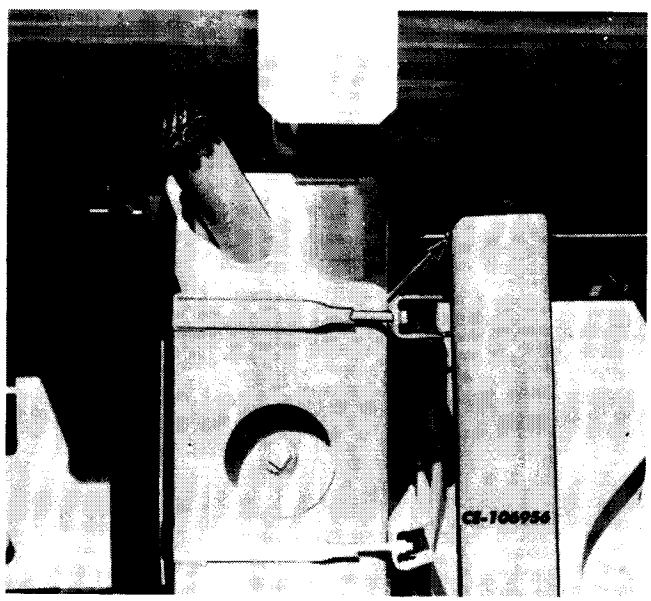


Fig. 40. Hoist Cylinder Bleeder Valve

3. Raise, then lower the dump body, repeating this cycle several times, until all air has been vented from both hoist cylinders; then tighten both bleeder valves.

4. Clean off any vented oil from the hoist cylinders and the surrounding components.

Steering System (Figs. 41, 42 and 43)

NOTE: *Venting the steering system is a two-man operation. The first man remains in the cab to turn the steering wheel; the second man works at the vent points. In the following procedure the bleeder valves referred to are of the screw type and the plugs are of the quick disconnect type.*

CAUTION! Apply the parking brake and install blocking in front of and behind the rear tires before venting the system.

Fig. 41. Remote Control Steering Pump Bleeder Plug

A hydraulic bleeder hose, PLT-850, is available as a service tool and is described in Service Tool Manual, ISS-1531.

1. Start and operate the engine at 1000 to 1500 rpm.

2. Connect bleeder hose to plug (Fig. 41) on the remote control steering pump. Turn the steering wheel two turns in each direction. When all air has escaped disconnect hose.

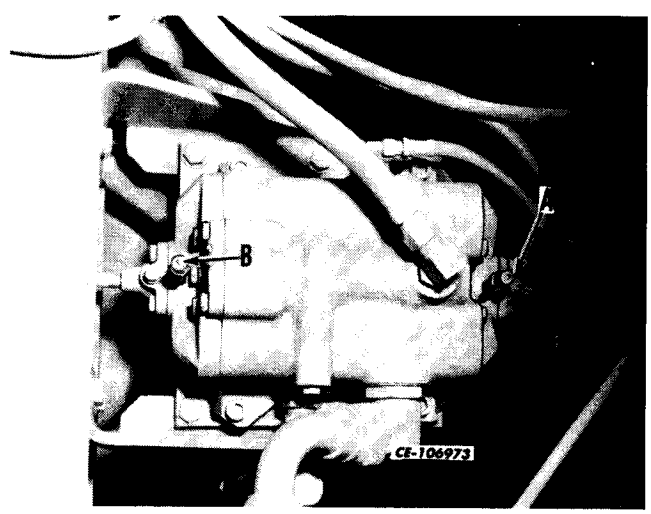


Fig. 42. Steering Valve

A. LH Bleeder Plug
B. RH Bleeder Plug

3. Remove the rubber cap and connect bleeder hose to plug (A, Fig. 42) on the steering valve. Turn the steering wheel to the right from 6 to 12 turns until all air has escaped. Disconnect the hose while still turning the steering wheel to the right. Install the cap.

4. Loosen bleeder valve (A, Fig. 43) on the servo cylinder. Turn the steering wheel to the right 6 to 12 turns until all air has escaped. Tighten the valve while still turning the steering wheel to the right.

5. Remove the rubber cap and connect bleeder hose to plug (B, Fig. 42) on the steering valve. Turn the steering wheel to the left from 6 to 12 turns until all air has escaped. Disconnect the hose while still turning the steering wheel to the left. Install the cap.

6. Loosen bleeder valve (B, Fig. 43) on the servo cylinder. Turn the steering wheel to the left from 6 to 12 turns until all air has escaped. Tighten the bleeder valve while still turning the wheel to the left.

NOTE: *Repeat all of the preceding steps if the system has not been completely vented of air.*

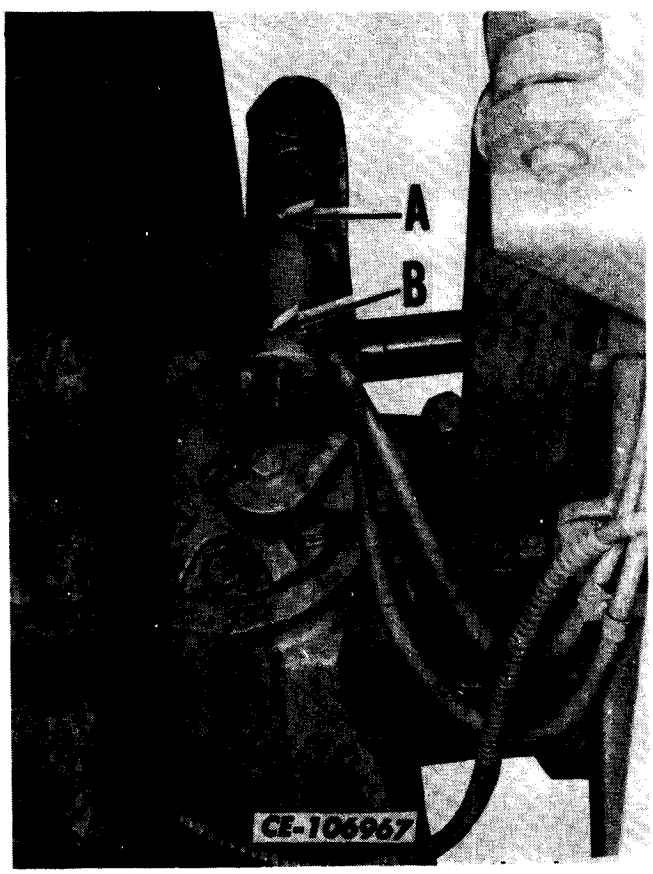


Fig. 43. Servo Cylinder

A. Rear Bleeder Valve
B. Front Bleeder Valve

SEAT BELTS

CAUTION! Do not bleach or re-dye color or webbing as same may cause a severe loss of tensile strength.

Keep belts flat to avoid twisting and roping when not being used. Do not place heavy or sharp objects on the belts.

The entire seat belt assembly should be inspected periodically for corrosion, wear, fraying or weak spots. The seat belt mounting bolts should also be periodically inspected for looseness.

TIRES AND RIMS

Avoid parking the machine in puddles of oil, gasoline or grease.

Check inflation pressures with an accurate tire pressure gauge when the tires are cool. Refer to "SPECIFICATIONS" in Section 9. Install the valve caps.

Never vent built-up pressure in a tire, such as encountered on extremely hot days. Pressure built up on hot days actually protects the tires by avoiding excessive side wall flexing and heat which are detrimental to tire life. Venting tires will also result in underinflation when the tire cools.

If this machine is to be driven on the highway, refer to "SHIPPING INSTRUCTIONS" in Section 1.

Wheel rim components should be checked to assure no damage or cracks are present. Damaged parts are to be replaced, NOT repaired.

CAUTION! Never inflate a tire that has gone flat without inspecting the tire, rim, and wheel for damage. Be sure all components are properly assembled. Inflate the tire to 34 kPa (5 psi) and check that all components are properly seated. Never stand directly in front of a tire and rim assembly while inflating. Use a clip on chuck with a hose long enough to allow the person inflating the tire to stand to the side.

UNDER INFLATION

Too little air pressure increases deflection, causes the tire to wipe and scuff over the road, results in extra strain on the tire, and increases the chances for bruising.

PROPER INFLATION

Maintaining the proper air pressure provides maximum road contact and results in increased tire life.

OVER INFLATION

Over inflation reduces tire deflection and tire contact area, causing the tire to ride on the crown, and results in rapid wear in the center of the tread.

MATCHING DUALS

The dual tires must always be matched. Improper matching of duals causes an uneven load distribution and an overload on the larger of the two tires. One tire should not exceed the other by more than 13mm (1/2 in.) in diameter, or 38mm (1-1/2 in.) in circumference. The most accurate method for measuring the circumference of the duals is to use a steel tape.

WHEEL RIM CLAMP NUTS (Fig. 44)

Check the nut torques every 50 hours for the first 250 hours, following their loosening or removal, until they take a "set." Refer to "SPECIAL TORQUES" in Section 9.

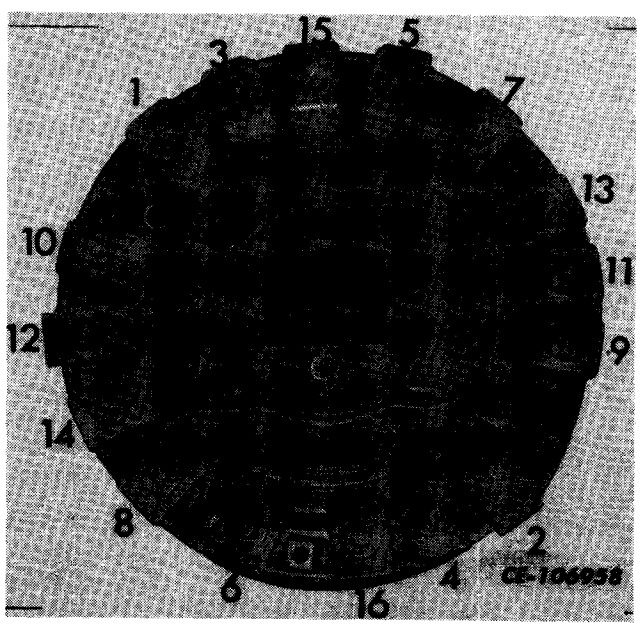


Fig. 44. Wheel Rim Clamp Torquing Sequence

TRANSMISSION OIL FILTER

CHANGING THE FILTER ELEMENT (Fig. 46)

NOTE: *Change the filter (Fig. 45) at the scheduled interval shown in the "SERVICE GUIDE" in Section 7.*

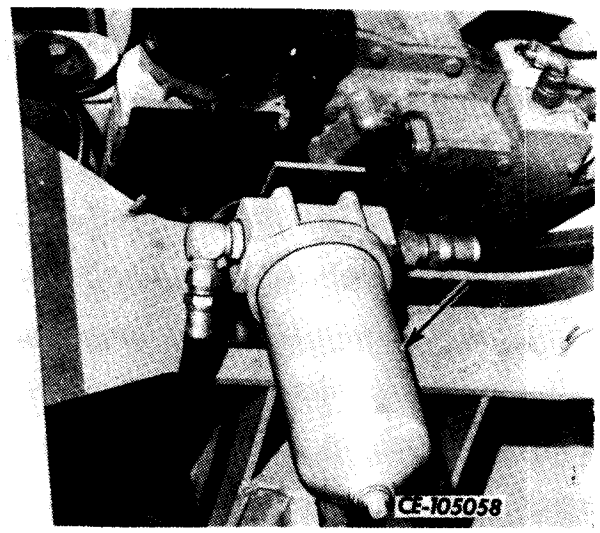


Fig. 45. Transmission Oil Filter

Removal

1. After reaching operating temperatures, park the machine on level ground.

2. Raise the dump body. Stop the engine and apply the parking brake.

CAUTION! The dump body must be secured in the manner described in Section 5.

3. Remove all outside dirt from the filter case and base.

4. Loosen the bolt (7). Allow the oil to drain from the body.

5. Unscrew the bolt (7); remove the gasket (6), body (5), spring (4) and element (3). Discard the element.

6. Place the spring (4), body (5) and bolt (7) in a kerosene bath. Wash out any accumulated sludge in the body. Dry the parts thoroughly.

7. Check the condition of the gasket (6) and the "O" ring (2) in the base (1). Replace the gasket and/or the "O" ring if they show wear or deterioration.

8. Wash the underside of the base (1) with clean kerosene or solvent.

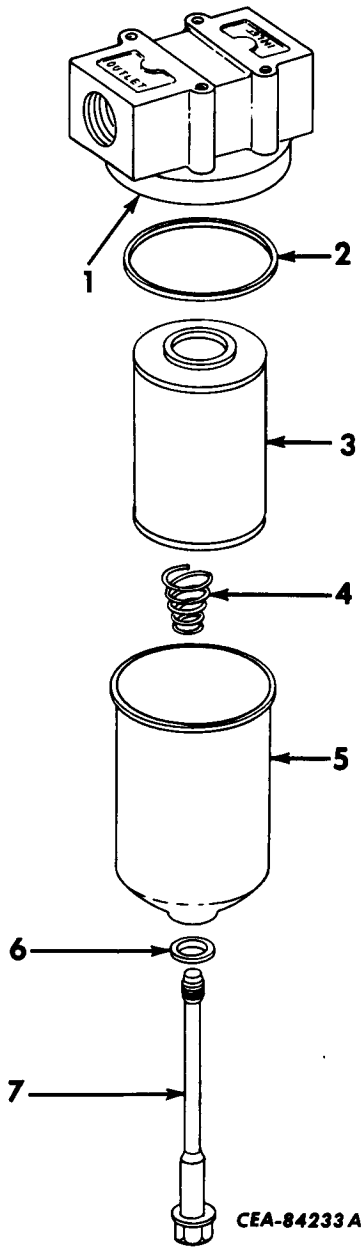


Fig. 46. Transmission Oil Filter Disassembled

1. Base
2. "O" Ring
3. Element
4. Spring
5. Body
6. Basket
7. Bolt

Installation

1. Preassemble the following parts in the order given:

   a. Insert the bolt (7), with gasket (6) through the body (5).

   b. Install the spring (4) over the bolt (7).

   c. Install the element (3) over the bolt (7) down to the spring (4).

2. Position the preassembled parts so the body (5) seats squarely to the base (1). Tighten the bolt (7). Refer to "SPECIAL TORQUES" in Section 9.

3. Start the engine and let it idle for approximately five minutes. During this time, check the filters for leaks; correct all leaks.

4. Check the transmission oil level as described under "SERVICE POINTS" in Section 7.

TRANSMISSION SUMP SCREEN

SERVICING THE SCREEN (Fig. 48)

NOTE: *Disconnected lines must be capped with the correct size plastic cap. If caps are not available, use tape or rubber stoppers. Openings must never be plugged with rags as this could introduce foreign material into the system.*

1. Disconnect transmission tor torque converter sump hose at transmission (Fig. 47).

2. Remove sump screen cover (9) from transmission housing and remove sump screen shroud (3) and sump screen (5) from cover (7).

3. Wash sump screen and shroud thoroughly in a commercial cleaning solvent or clean kerosene. Dry sump screen and shroud thoroughly using low pressure compressed air.

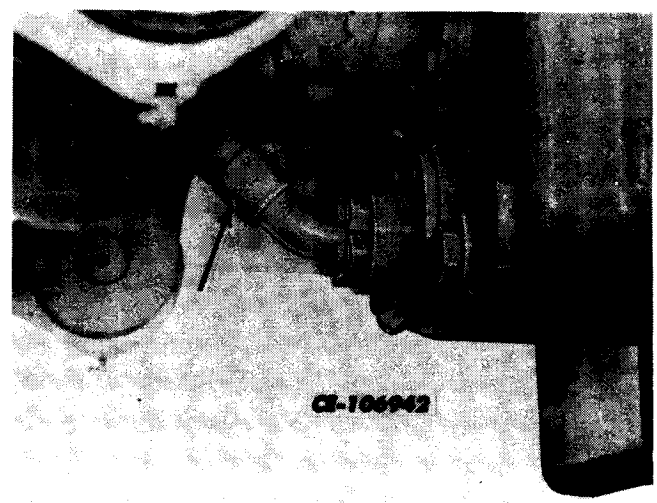


Fig. 47. Transmission Sump Hose Disconnect Point

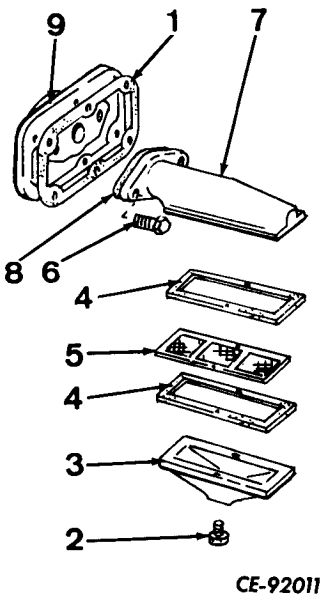


Fig. 48. Transmission Sump Screen

1. Cover Gasket
2. Cap Screw
3. Suction Shroud
4. Shroud Gasket
5. Sump Screen
6. Cap Screw
7. Screen Housing
8. Housing Gasket
9. Sump Screen Cover

4. Remove filler cap. Slowly pour a commercial cleaning solvent or clean kerosene into the filler neck to flush the transmission case.

5. Using new gaskets (4) install the sump screen shroud (3) and sump screen (5) to the sump screen housing (7). Using a new gasket (1) install the sump screen cover (9) into the transmission housing.

6. Connect transmission to torque converter sump hose.

TORQUE CONVERTER BREATHER

SERVICING THE BREATHER

CAUTION! The dump body must be secured in the manner described in Section 5.

1. Unscrew breather.

2. Wash in a commercial cleaning solvent. Dry thoroughly.

3. Reinstall breather.

TORQUE CONVERTER SCAVENGE LINE SCREEN

SERVICING THE SCREEN

1. Loosen the cap from the RH side of the torque converter housing.

2. Remove the cap and the screen. Wash these parts thoroughly in a commercial cleaning solvent or clean kerosene. Dry these parts thoroughly, then reassemble them.

3. Check the condition of the "O" ring. Replace it if it shows any sign of wear.

4. Install and secure the screen and cap to the torque converter housing.

TURBOCHARGER

PRECAUTIONS

As a precaution against dirt getting into the engine, frequently inspect the flexible rubber hose connections clamped to the turbocharger compressor housing. If signs of deterioration are evident, replace immediately.

To eliminate undue strain on the rubber hose connections, insure that pipes are properly aligned.

PRIMING THE TURBOCHARGER

The turbocharger must be primed when the engine has been idle for 30 days or more. Prime the turbocharger as follows:

1. Be sure the parking brake is applied.

2. Be sure the transmission shift lever is locked in neutral.

3. Be sure the engine stop lever is in the "OFF" position.

4. Move the electrical system master switch lever to the "ON" position.

5. Crank the engine by pressing the starting switch button until an oil pressure reading is indicated on the engine oil pressure gauge. This should provide an adequate amount of oil to lubricate the turbocharger.

NOTE: *Cranking the engine should be limited to 30 second intervals as outlined under "STARTING THE ENGINE" in Section 5.*

SPECIFICATIONS AND CAPACITIES

CAPACITIES

	Model 330	Model 340
CHASSIS		
Air conditioning system refrigerant (if equipped)	2.7 kg (6 lbs)	2.7 kg (6 lbs)
Cooling system	98.4 litres (104 qts)	98.4 litres (104 qts)
Crankcase w/filters	30.3 litres (32 qts)	30.3 litres (32 qts)
Differentials:		
Front	5.7 litres (6 qts)	5.7 litres (6 qts)
Rear	6.6 litres (79 qts)	6.6 litres (7 qts)
Fuel tanks (2)	514.8 litres (136 gals)	514.8 litres (136 gals)
Hydraulic reservoir	151.4 litres (160 qts)	151.4 litres (160 qts)
Transmission	56.8 litres (60 qts)	56.8 litres (60 qts)
Wheel planetaries (each)	8.5 litres (9 qts)	8.5 litres (9 qts)
Front axle convel joints (2) (each)	0.9 litre (1 qt)	0.9 litre (1 qt)
BODY		
SAE (Struck)	18.3m³ (24 cu yds)	36.1m³ (26.6 cu yds)
Heaped (SAE)	23.7m³ (31 cu yds)	31.2m³ (33.6 cu yds)
Payload	27.3 Mg (30 ton)	36.3 Mg (40 ton)

SPECIFICATIONS

ENGINE

Make	International
Model	DT-817 Series C
Type	Turbocharge, Intercooled, Diesel, 4 cycle
No. of cylinders	6
Bore	137mm (5-3/8 in)
Stroke	152mm (6 in)
Displacement	13.4 litres (817 cu in)
Engine speeds:	
Full load (Governed)	2200 ± 50 rpm
Low idle	700 ± 25 rpm
Valve clearance:	
Intake (cold)	0.51mm (.020 in)
Exhaust (cold)	0.79mm (.031 in)
Alternator belt tension:	
New belt (initial installation only)	311 t 334 N (70 to 75 lbs)
Used belt	267 to 289 N (60 to 65 lbs)
Air compressor belt tension:	
New belt (initial installation only)	423 to 445 N (95 to 100 lbs)
Used belt	356 to 378 N (80 to 85 lbs)
Refrigerant compressor belt tension:	
New belt (initial installation only)	423 to 445 N (95 to 100 lbs)
Used belt	356 to 378 N (80 to 85 lbs)

TORQUE CONVERTER

Type	Single stage with retarder and lock-up. Lock-up automatic in all gear ranges.

SPECIFICATIONS AND CAPACITIES

	Model 330	Model 340
TRANSMISSION		
Type	Power shift, countershaft, constant mesh	
No. of speeds:		
Forward w/Lock-up	6 selective, 12 with lock-up	
Reverse w/Lock-up	1 selective, 2 with lock-up	
AXLES		
Front	Steering drive planetary, full floating, double reduction	
Rear	Planetary, full floating, double reduction	
BRAKES		
Service:		
Type	Drum and shoe, self adjusting	
Operation	Axle by axle, wedge, air over hydraulic	
Parking:		
Type	Drum and shoe	
Operation	Air control valve, actuator and control rod	
TIRES		
Type	Tubeless	
Size:		
Standard	18.00" x 25"-20 ply	18.00" x 25"-20 ply
Optional	18.00" x 25"-24 ply	18.00" x 25"-28 ply
Optional	18.00" x 25"-S-Load range	18.00" x 25"-24 ply
Inflation pressure	*	
AIR CONDITIONING SYSTEM (If Equipped)		
Cooling capacity	7032 N (24000 BTU/hr)	
Air flow circulation	11.3m³/m (400 cfm)	
ELECTRICAL SYSTEM		
System voltage	24 negative ground	
Batteries	Four-6 Volt	
Alternator:		
Standard	30 amp	
w/Integral regulator (if equipped)	50 amp	
Fuses:		
Taillight and stoplight, horn, heater and air conditioning (if equipped) circuit	25 amp	
Instrument panel circuit	10 amp	
Regulator, starting, dome light and windshield washer circuit	5 amp	
Shift and cigarette lighter circuit	15 amp	

* Consult your tire manufacturer's dealer or representative for inflation recommendations.

SPECIFICATIONS AND CAPACITIES

	Model 330	Model 340
HYDRAULIC SYSTEM		
Hoist cylinders:		
No. of cylinders	2	
Type	3 stae double acting	
Steering cylinders:		
No. of cylinders	2	
Type	Double acting	
Hoist and steering pump:		
Type	Double element gear	
WEIGHTS (Approx.)		
Chassis	21,047 kg (46,400 lbs)	21,273 kg (46,900 lbs)
Body	6,622 kg (14,600 lbs)	7,031 kg (15,500 lbs)
Total	27,669 kg (61,000 lbs)	28,304 kg (62,400 lbs)
Distribution (less payload):		
Front axle	16,239 kg (35,800 lbs)	16,148 kg (35,600 lbs)
Rear axle	4,808 kg (10,600 lbs)	5,126 kg (11,300 lbs)
Gross w/rated payload	60,327 kg (133,000 lbs)	64,592 kg (142,400 lbs)
Distribution (with payload):		
Front axle	30,164 kg (66,500 lbs)	32,295 kg (71,200 lbs)
Rear axle	30,164 kg (66,500 lbs)	32,295 kg (71,200 lbs)
DIMENSIONS		
Wheel base	3.27m (10 ft 10 in)	
Over-all length	7.98m (26 ft 2 in)	
Over-all height (empty)	3.66m (12 ft 0 in)	
Over-all width	4.04m (13 ft 3 in)	
Shipping width (outer tire removed)	3.66m (12 ft 0 in)	
Loading height (empty)	3.27m (10 ft 10 in)	3.45m (11 ft 4 in)
Dump angle	70 degrees	
Clearance under front and rear axles	0.46m (1 ft 6 in)	
Turning circle (SAE)	18.14m (59 ft 6 in)	
Clearance circle (SAE)	21.18m (69 ft 6 in)	
Track (front and rear axle)	2.95m (9 ft 8 in)	

SPECIAL TORQUES

A torque value to a tolerance of plus or minus 5% of the value shown should be achieved for satisfactory application.

Battery hold down nuts	16 N·m (12 ft-lbs)
Cranking motor mounting bolts	142-163 N·m (105-120 ft-lbs)
Seat suspension shoulder bolts	20-27 N·m (15-20 ft-lbs)
Seat suspension pivot arm nuts	68-75 N·m (50-55 ft-lbs)
Tire valves (*)	22 N·m (16 ft-lbs)
Transmission oil filter retaining bolt	75 N·m (55 ft-lbs)
Wheel rim clamp nuts	380 N·m (280 ft-lbs)

(*) Lubricate threads with oil before using.

SPECIFICATIONS AND CAPACITIES

TORQUE VALUES FOR STANDARD FASTENERS

This chart provides tightening torque for general purpose applications using original equipment standard hardware as listed in the Parts Catalog for the machine involved. DO NOT SUBSTITUTE. Original equipment standard hardware is defined as IH Type 8, coarse thread bolts and nuts and thru hardened flat washers (Rockwell "C" 38-45) all phosphate coated and assembled without supplemental lubricaton (as received condition).

The torques shown below apply to the following:

1. Phosphate coated bolts used in tapped holes in steel or gray iron.

2. Phosphate coated bolts used with phosphate coated prevailing torque nuts (nuts with distorted threads or plastic inserts).

3. Phosphate coated bolts used with copper plated weld nuts.

Markings on bolt heads or nuts indicate material grade *ONLY* and are *NOT* to be used to determine required torque.

NOMINAL THREAD DIAMETER	STANDARD TORQUE ±10%	
	FOOT LBS.	NEWTON METERS
1/4	7	10
5/16	14	19
3/8	24	32
7/16	38	51
1/2	60	80
9/16	80	110
5/8	115	155
3/4	200	270
7/8	320	440
1	480	650
1-1/8	590	800
1-1/4	830	1100
1-3/8	1100	1500
1-1/2	1400	1900
1-3/4	2300	3100
2	3400	4600

TORQUE VALUES FOR HOSE CLAMPS

The following chart provides the tightening torques for hose clamps used in all rubber applicatons (radiator, air cleaner, operating lever boots, hydraulic system, etc.).

CLAMP TYPE & SIZE	TORQUE PLUS OR MINUS 5 IN-LBS (0.6 N·m)			
	RADIATOR, AIR CLEANER, BOOTS, ETC.		HYDRAULIC SYSTEM	
	INCH LBS.	NEWTON METERS	INCH LBS.	NEWTON METERS
"T" Bolt (Any Diameter)	60	7	45	5
Worm Drive — 1-3/4" Open Diameter & Under	25	3	45	5
Worm Drive — Over 1-3/4" Open Diameter	45	5	45	5

TORQUE VALUES FOR SPLIT FLANGE CONNECTIONS

The following chart provides the tightening torques for split flange connections used in hydraulic systems. Split flanges and fitting shoulders should fit squarely. Install all bolts, finger tight and then torque evenly.

NOTE: *Overtorquing bolts will damage the flanges and/or bolts, which may cause leakage.*

FLANGE SIZE IN INCHES*	BOLT SIZE IN INCHES	BOLT TORQUES	
		FOOT LBS.	NEWTON METERS
1/2	5/16	15-18	20-24
3/4	3/8	22-27	30-37
1	3/8	27-35	37-47
1-1/4	7/16	35-45	47-61
1-1/2	1/2	46-58	62-79
2	1/2	55-65	75-88
2-1/2	1/2	79-91	107-123
3	5/8	138-150	187-203
3-1/2	5/8	105-115	142-156

* Inside diameter of hydraulic tube or hose fitting.

Specifications Subject to Change Without Notice.