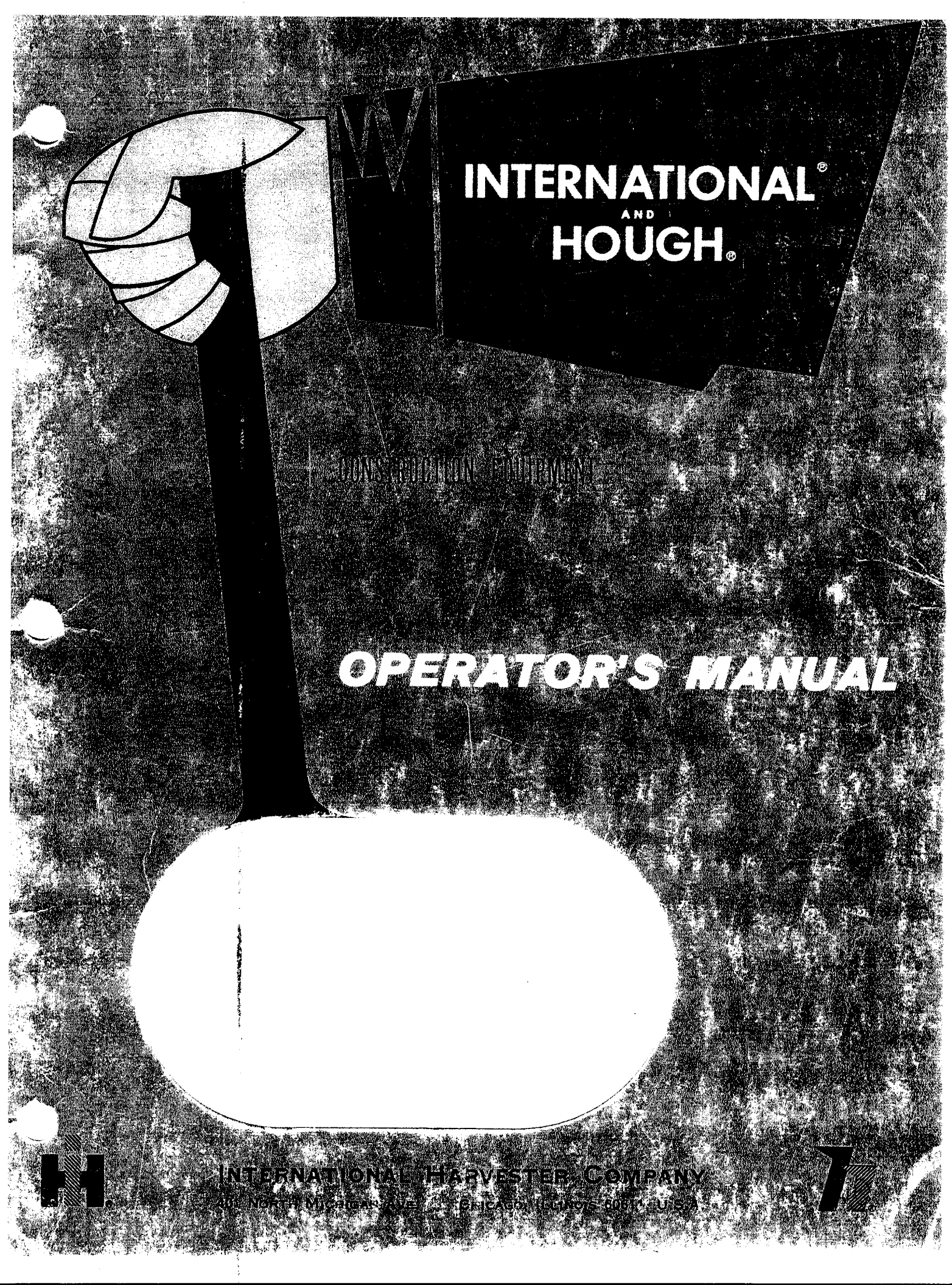


INTERNATIONAL HARVESTER COMPANY
401 North Michigan Ave. Chicago, Illinois 60611 U.S.A.

TECHNICAL PUBLICATIONS

An Operator's Manual and a Parts Catalog are packed and shipped with this machine for customer use. Additional technical publications are available for this machine, at a nominal cost, through your authorized International Construction Equipment distributor or dealer. This material includes Service Manuals and Technical Training Courses.

These additional publications are strongly recommended for the customer who performs his own maintenance and service on this equipment.

It is the policy of International Harvester Company to improve its products whenever it is possible and practical to do so. We reserve the right to make changes or add improvements at any time without incurring any obligation to make such changes on products sold previously.

MODEL H-400B

PAY®LOADER

FORM

OM-H-400B-3

JANUARY, 1972

(Supersedes FORM OM-H-400B-2
Dated January, 1971)

PRINTED IN UNITED STATES OF AMERICA

TO THE OWNER

IT IS THE POLICY OF OUR COMPANY TO IMPROVE ITS PRODUCTS WHEN EVER POSSIBLE AND PRACTICAL TO DO SO. WE RESERVE THE RIGHT TO MAKE CHANGES OR ADD IMPROVEMENTS AT ANY TIME WITHOUT INCURRING ANY OBLIGATION TO MAKE SUCH CHANGES ON MODELS PREVIOUSLY SOLD.

If you should need information not given in this manual, or require the services of a trained mechanic, we urge you to use the extensive facilities offered by our dealers. Dealers are kept informed on the best methods of servicing and are equipped to provide service in the field or in an up-to-date service shop.

Dealers carry ample stock of essential parts.

List below the name of dealers with whom your parts orders should be placed and who should be called upon for any required information concerning proper operating and maintenance procedure.

OUR DEALER IS: _____

_____

When ordering parts, always give the dealer both the name and part number of the part required, and also the SERIAL NUMBER OF THE TRACTOR.

SO THAT YOU MAY HAVE IT BEFORE YOU, WRITE THE TRACTOR, POWER UNIT, TRANSMISSION, HYDRAULIC PUMP AND HYDRAULIC VALVE SERIAL NUMBERS HERE:

TRACTOR SERIAL NO: _____

ENGINE UNIT SERIAL NO: _____

REAR AXLE SERIAL NO: _____

FRONT AXLE SERIAL NO: _____

HYDRAULIC PUMP SERIAL NO: _____

HYDRAULIC VALVE SERIAL NO: _____

POWER TAKE-OFF SERIAL NO: _____

TORQUE CONVERTER SERIAL NO: _____

TRANSMISSION SERIAL NO: _____

_____

MAJOR SECTION CONTENTS

The Major Section Contents is a reference to be used in locating the general area you are interested in. With each section is a brief summary of what they contain. Refer to the specific section for a complete list of items that are covered within each individual section.

SECTION 1 INTRODUCTION

This section discusses the use of the manual, the machine, serial numbers and shipping and storage of the machine.

SECTION 2 INDICATORS & CONTROLS

This section tells you "where it is", "what it does" and "how to use it".

SECTION 3 BEFORE OPERATING THE MACHINE

This section outlines the preliminary checks used before starting the machine.

SECTION 4 OPERATING THE MACHINE

This section outlines the step by step procedure for starting, operating and stopping the machine.

SECTION 5 SCHEDULED MAINTENANCE

This section outlines a complete scheduled maintenance program that will assure less downtime and expense.

SECTION 6 TROUBLE SHOOTING

This section outlines a few problems that might arise and their remedy. These problems can be solved by the operator.

SECTION 7 SPECIFICATIONS AND CAPACITIES

This section covers the specifications, capacities, dimensions, weights and speeds.

SECTION 8 ATTACHMENTS

This section covers all information in regard to the attachments available for this machine.

SAFETY PRECAUTIONS

THE SAFETY BAR OR PINS MUST BE USED TO LOCK THE TWO TRACTOR HALVES WHEN THE TRACTOR IS SERVICED OR TRANSPORTED TO PROTECT PERSONNEL.

Do not try to get on or off the tractor while it is moving.

Do not stand between the front and rear tires of the tractor or the bucket and a front tire or on the bucket while the engine is operating.

Do not service the tractor while the engine is operating. If necessary to make checks with the engine running, always use two men. One must stay at the tractor controls while the other performs the check.

Avoid smoking when refueling or servicing the tractor.

Disconnect the battery ground lead when work is done on the engine or electrical system.

Keep operating controls and hands free of grease, water and mud to ensure positive control lever movement. The deck of the operator's compartment and all ladder rungs must be kept free of oil and grease to lessen the possibility of slipping.

Enter the tractor operator's compartment from the left side. Use the ladder provided to avoid falls and accidental movement of control levers.

Perform a visual and an operational check of the tractor before putting it to work.

Exercise caution and use adequate support equipment when the tractor is separated or heavy pieces are removed.

Do not carry passengers on the tractor.

Do not try to move the tractor before the air pressure gauge registers in the "RUN" area.

Look in the intended direction of travel to be sure personnel and allied equipment do not interfere with the tractor work pattern.

Lower the bucket to ground level and stop the engine before leaving the operator's compartment.

Loosen the hydraulic reservoir filler-dipstick gradually to release reservoir pressure when servicing the hydraulic reservoir.

TABLE OF CONTENTS

INTRODUCTION

SECTION CONTENTS

USE OF MANUAL AND MACHINE

Operation and periodic service instructions for the H-400B PAY® LOADER are contained in this manual. The following information discusses the use of the manual.

The manual is divided into 8 major sections which are listed on Page 1. Each section is divided into specific areas, listed in the section contents. When trying to locate a particular subject, refer to the Major Section Index and determine which section it will be found in, then check the section index. All illustrations are assigned figure numbers for identification.

Example:
1-3 = Section 1, Page 3
(3-Fig. 1-3A = Item 3 on Illustration A in Section 1, Page 3.)

If a page contains more than one illustration, they will be listed alphabetically on the page.
Fig. 1-3A, Fig. 1-3B, etc.

Left and right in this manual indicates the left and right side of the tractor when sitting in the operator's seat facing forward. Front will be the bucket end, and rear will be the engine compartment end. The loader is made by the Hough Division, International Harvester Company, Libertyville, Illinois. Its speed, capacity for work, maneuverability, and fast acting hydraulic system make it a good piece of equipment for loading bulk material from a stockpile into trucks, hoppers and conveyers where large volumes of material are handled. It can be used effectively for such construction jobs as digging and excavating, transporting bulk loads, backdragging and leveling.

Power for the loader is developed by a high-speed, four-cycle, Cummins turbocharged diesel engine. The developed power is coupled to the loader hydraulic system and planetary drive axles by a torque converter and a full reversing, two-speed transmission.

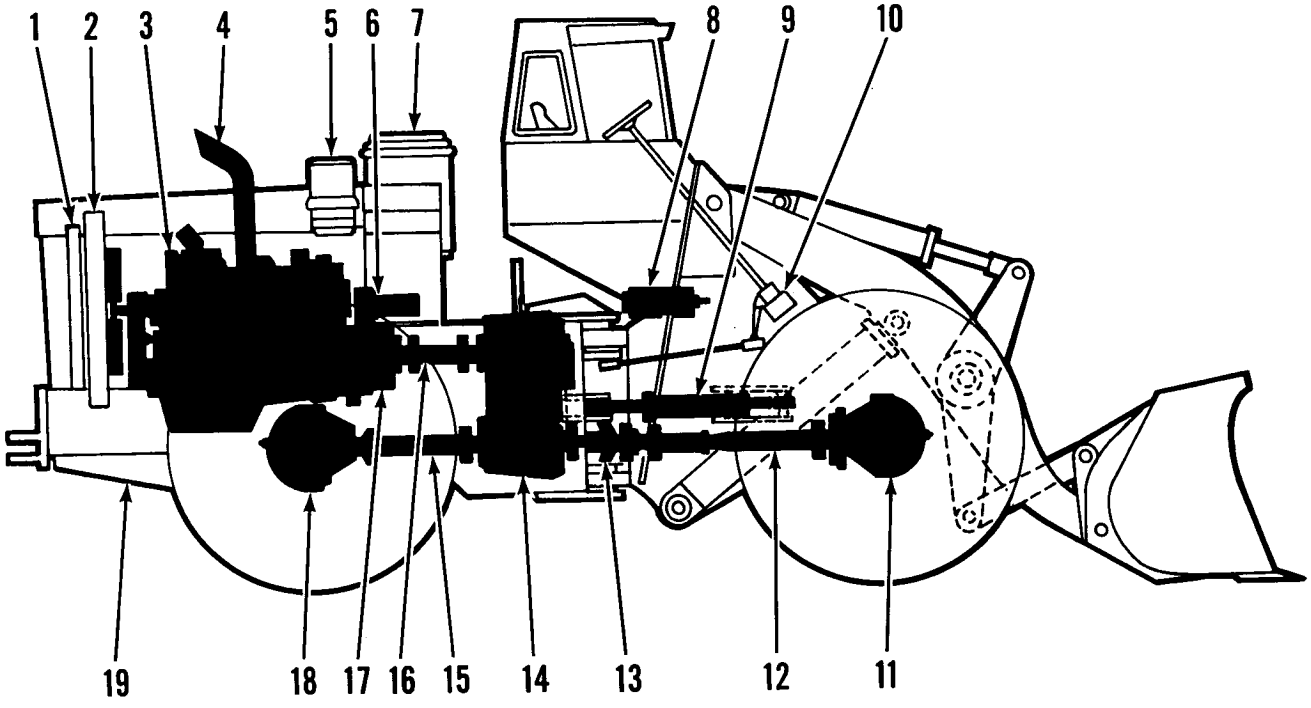
Two vane-type pumps provide hydraulic pressure for the loader steering and the boom and bucket hydraulic circuits. The pumps are driven from a power takeoff on the torque converter housing. The torque converter housing also provides power takeoff for the transmission pump.

The hydraulic system reservoir is a pressure-sealed tank mounted on the front wall of the engine compartment. It is readily accessible from either side of the loader for servicing. The control valve for the loader boom and bucket hydraulic circuits is mounted directly beneath the operator, on the front main frame. The two spools in the valve control all movement of the boom and bucket. The steering control valve is mounted in the front frame and is controlled by connecting linkage to the steering gear. It directs the flow of oil to the steering cylinders. A relief valve within each control valve regulates pressure in each of the hydraulic circuits.

The brake system for the loader is a combination air-over-hydraulic type. Each axle is independent acting with its own air source. The loader has an automatic apply and a warning buzzer which are activated when the air pressure drops below 60 psi. If one system develops a leak, the other system brakes are applied. A general loss of air from the air system will cause both brake systems to apply. The air system is equipped with an automatic moisture ejector which will eject moisture whenever the two chambers within the ejector have unequal pressure. A manual ejector is located in the bottom of the ejector housing. By pushing up on the rod, moisture can be exhausted.

Most satisfactory loader performance can be obtained when operating and maintenance personnel use the unit as required by existing work situations. Being acquainted with normal operation and service requirements will assist personnel in using the loader to best advantage.

There are few rules which must be observed. Neglect of normal operating and service instructions, however, may result in costly downtime and repairs due to accidents and premature failures. The important job done by the operator while working the loader determines, to a large degree, the loader's effectiveness.



CE-89715

POWER TRAIN = ■

1. Oil cooler
2. Radiator
3. Engine
4. Exhaust stack
5. Air cleaner
6. Hydraulic pumps
7. Hydraulic reservoir
8. Hydraulic control valve
9. Steering cylinder
10. Steering gear
11. Front drive axle
12. Front drive shaft
13. Parking brake
14. Transmission
15. Rear lower drive shaft
16. Upper drive shaft
17. Torque converter
18. Rear drive axle
19. Fuel tank

Figure 1-2A Model H-400 PAY® LOADER General Arrangement

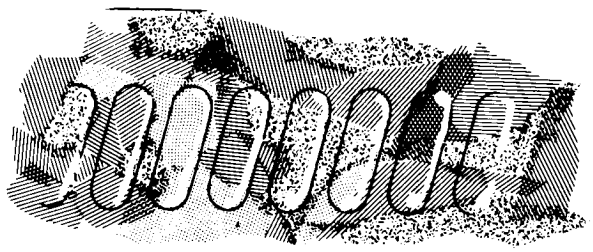
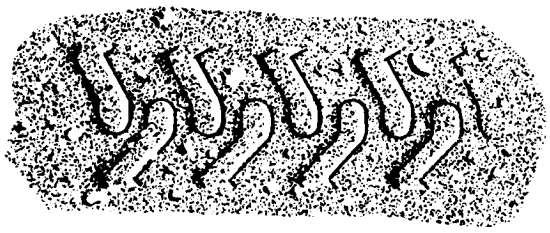
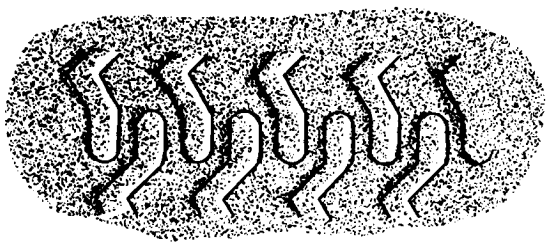
TIRE PATTERNS	GENERAL USE
	**ROCK LUG** For use on blasted sharp rock and poorly maintained gravel roads. This is a special type tire. It is more resistant to cutting and tearing and is longer wearing. The lug design has no "blind" pockets to trap rocks or sharp particles and the tread action tends to squeeze objects out to the sides of the tire.
	**MULTI-PURPOSE GRADER** For use on soft earth with some rock and on well maintained gravel roads. This type tire gives the most traction, fair resistance to cutting and tearing and good flotation for average conditions. It offers best performance for a wider variety of job applications.
	**HIGH FLOTATION** For use on soft earth without rock. The tire design is not a distinct tire type. Its lug design is similar to the multi-purpose grader tire but its cross-section is such that when some penetration in soft footing is made larger tire contact area is made. *CE-89511*

Figure 1-3A Tire Patterns & Their Uses

To obtain full advantage of the loader the correct tire design must be used for the work application and all tires must be properly inflated. Tire tread designs that capture and retain the material being worked reduce loader traction. Tread designs that fill up with the material being worked are unable to provide sufficient traction. The tire tread design should be such that it will grab the material momentarily and then release it. Refer to Figure 1-3A .

Keep all tires equally inflated. Normal tire pressures are listed in Section 7 under Specifications. Both rear tires are filled with a dry ballast material that adds weight to the loader and improves tire traction. Make all tire inflation checks while the tires are cool (before working the loader). Do not remove excess pressure that may develop while the loader is worked.

The inflated pressure used must be relative to the footing and job application. Hard footing or road travel tends to require higher air pressures. Soft footing conditions permit lowering tire pressures to improve flotation and traction.

SERIAL NUMBERS.

Record the tractor-shovel, engine, transmission, and converter serial numbers for service and parts replacement purposes. The tractor-shovel serial number plate (Figure 1-4a) is mounted on the operator's seat support. This number is also stamped into the rear frame on the left rear side.

The engine serial number (Figure 1-4b) is stamped on a plate on the left side of the block on the Cummins engine. The transmission serial number plate (Figure 1-4c) is mounted on the input end of the transmission. The converter serial number plate (Figure 1-4d) is mounted on the top of the housing of the converter power takeoff. Record these numbers in the operator's and parts books that accompany each loader.

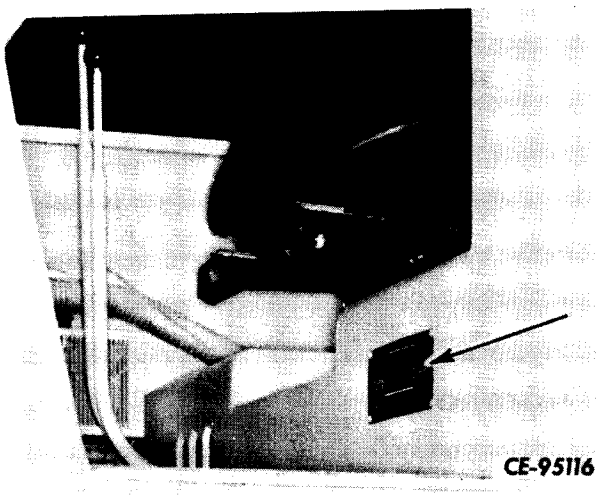


Figure 1-4a Tractor-shovel serial number plate

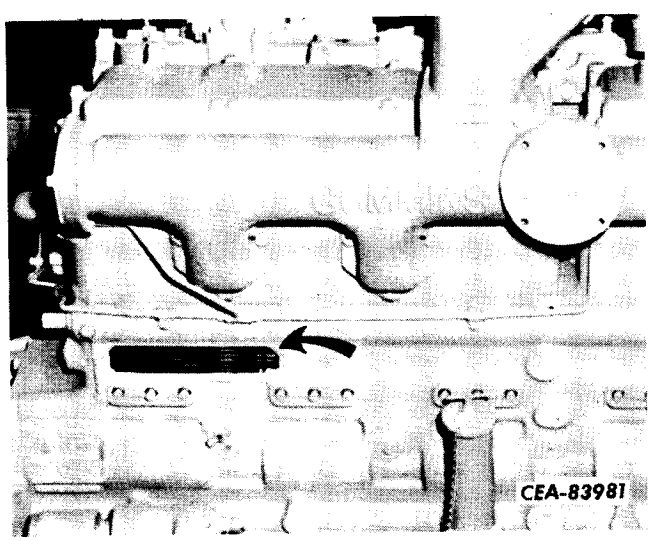


Figure 1-4b Cummins engine serial number plate

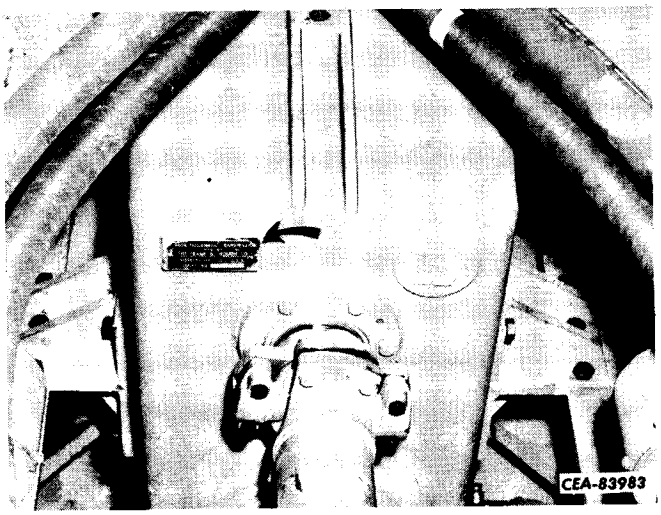


Figure 1-4c Transmission serial number plate

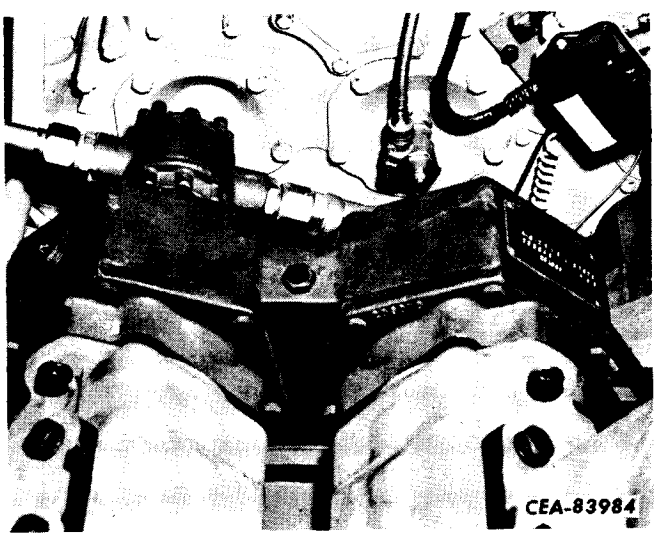


Figure 1-4d Torque converter serial number plate

SHIPPING INSTRUCTIONS

◆ CAUTION: WHEN TRANSPORTING A TRACTOR EQUIPPED WITH A TURBO-CHARGED ENGINE, IT IS IMPORTANT TO SEAL THE AIR INTAKE AND EXHAUST OPENINGS TO PREVENT THE TURBINE FROM "WINDMILLING". FAILURE TO DO SO MAY RESULT IN DAMAGE TO THE TURBINE BEARINGS.

Truck

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

Railroad Flatcar

The loading rules and specifications published by the Association of American Railroads must be followed when shipping this loader 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.

TOWING

Towing articulated units is not recommended.

MACHINE STORAGE

When the loader and/or its equipment 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 loader is placed in storage for 30 days or more. The equipment must be lubricated every six months. Use caution when starting an engine that has been in storage. Refer to the instructions under "PREPARING STORED MACHINE FOR SERVICE" in this section.

Thoroughly wash or clean the loader and its equipment.

Completely lubricate all points of the loader and equipment as outlined in the "Lubrication Diagram", Figure 5-2A.

Drain the fuel from the fuel tank and fuel filters; close the drain valves.

Refill the fuel tank with an approved diesel fuel.

Start and run the engine for about 10 minutes. During this time, the loader must be moved to the storage location.

Block up the bucket to avoid contact with the ground.

Drain the entire cooling system. Install a "RADIATOR DRAINED" tag.

NOTE: If the cooling system will be exposed to freezing temperatures during storage and water only was used during operation, the cooling system must be filled with an anti-freeze solution while at operating temperature and then drained to prevent residual water damage. Refer to the anti-freeze table to select a solution suitable for the lowest temperature that the cooling system will be exposed to during storage.

If anti-freeze solution cannot be used, the residual water retained by capillary attraction inside the cooler tubes must be blown out with dry compressed air through the drain cock on the cooler. DO NOT RELY ONLY ON DRAINING THE WATER.

Clean and remove the valve housing cover; then flush the valves, rocker arms and push rods with Grade-30 lubricating oil. (Remove any rust before lubricating.) Use a paint brush to coat the inside of the valve housing cover with Grade-30 lubricating oil. Reinstall the valve housing cover.

Completely service the air cleaner. Refer to Figure 5-16B.

Plug up the ends of the exhaust pipe and breather pipe. Remove the air cleaner cap and cover the air intake pipe.

Remove the batteries and store them in a cool dry place above freezing (+32°F). The batteries must be fully charged at the time of storage. Check the batteries at lease once a month for water level and specific gravity. Batteries must never be allowed to run down below 3/4 full charge while in storage.

Coat the bucket cutting edge, corners, teeth and connecting pins on the bucket with chassis grease.

Coat the exposed portions of the hydraulic cylinder rods with chassis grease.

PREPARING STORED MACHINE FOR SERVICE

Install fully charged batteries and make the proper cable connections. (Refer to Figure 3-3B.)

Remove the valve housing cover and flush the valve and valve operating mechanism with a mixture of one-half kerosine and one-half Grade-10 oil.

Drain the crankcase and fill with the specified lubricating oil. (Refer to the LUBRICATION CHART in Section 5.)

Be sure the lubricating oil filter has a new element before starting the engine.

Clean the fuel strainer.

Remove the coverings from the exhaust pipe, crankcase breather pipe and air cleaner pipe. Install the air cleaner cap.

Close all cooling system drains and fill the cooling system. Check the cooling system for leaks and loose connections. Remove the "RADIATOR DRAINED" tag.

Replace the primary and final fuel filter elements. Close all fuel drains, fill the fuel tank and fuel filters for quick pick-up of fuel. Prime the turbocharger (refer to Figure 5-30C).

◆ CAUTION: KEEP THE DOORS WIDE OPEN OR MOVE THE LOADER OUTSIDE THE STORAGE ROOM IMMEDIATELY TO AVOID DANGER FROM EXHAUST GAS. DO NOT ACCELERATE THE ENGINE RAPIDLY OR OPERATE IT AT HIGH SPEED IMMEDIATELY AFTER STARTING.

When starting the engine, allow the engine to run at low idle a few minutes to allow thorough distribution of the lubricating oil. The loader must not be placed under load until normal oil pressure and temperature is reached.

After the engine has started, observe if any valves are sticking. If so, pour a small quantity of diesel fuel, dry-cleaning solvent or kerosine on the valve stems until loose.

Install the valve housing cover.

Clean the chassis grease from the exposed portions of the hydraulic cylinder rods.

Prime the turbocharger before starting the engine. (Refer to Section 5, Additional Maintenance.)

INDICATORS & CONTROLS

SECTION CONTENTS

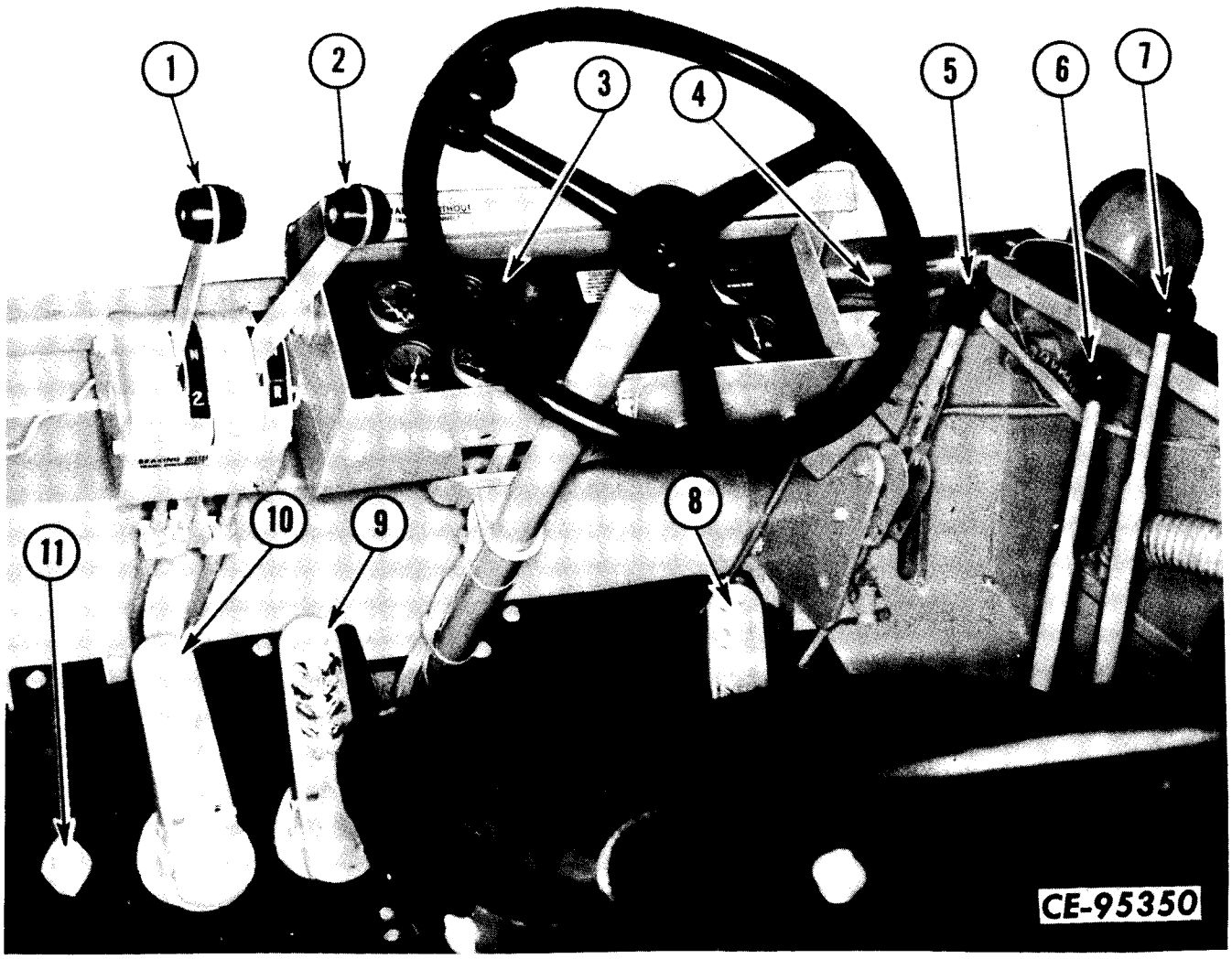


Figure 2-2a Operator's compartment

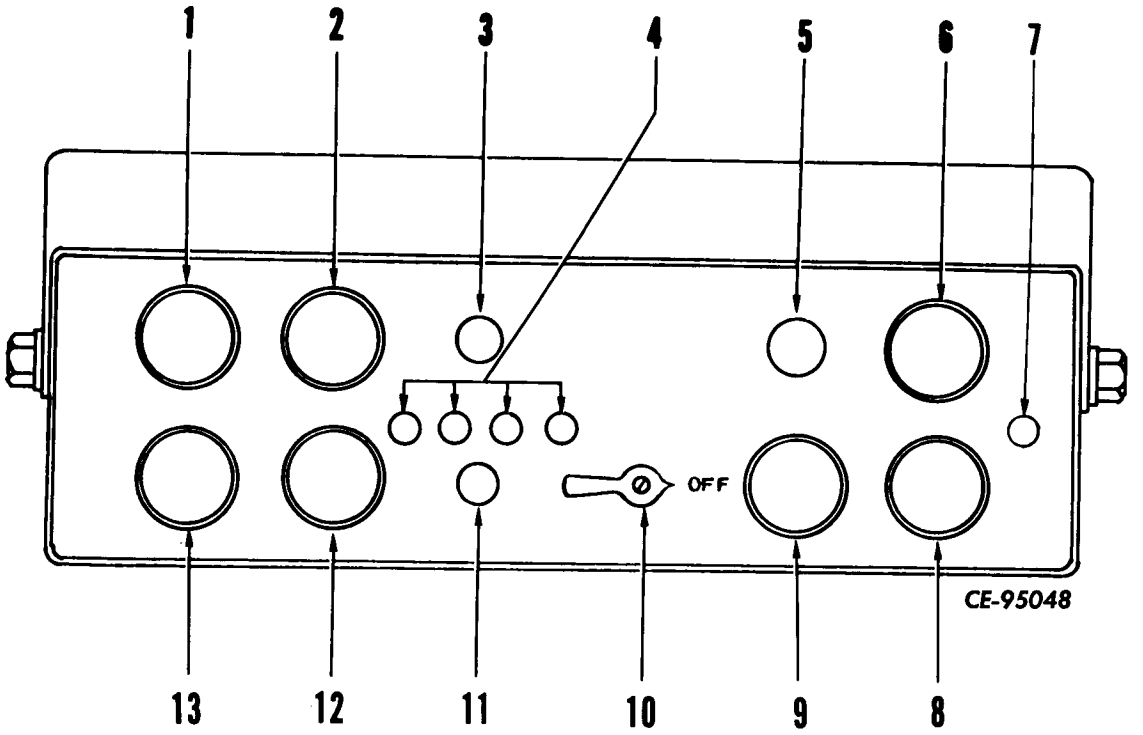
1. Range lever
2. Direction lever
3. Instrument panel
4. Hand throttle
5. Hand brake lever
6. Bucket control lever
7. Boom control lever
8. Accelerator pedal
9. Brake treadle
10. Brake treadle & transmission disconnect
11. Air horn button

GENERAL

This section describes the controls and operation of the tractor. To use the loader to best advantage, the operator must know how each control in the operator's compartment is used while working the loader. This basic knowledge must be acquired before trying to use the loader.

Start the tractor after becoming familiar with the controls and the instrument panel gauges in the operator's compartment. Work the loader slowly at first. This will help establish the coordination needed between controls. Continued practice in coordinating movement of the controls will improve operator skill. Good preliminary training will also reduce down-time due to premature part failures.

All manual controls necessary for loader operation are in the operator's compartment (Figure 2-2a). The gauges and switches are grouped together on the instrument panel (Figure 2-3a) in front of the operator.



1. Engine oil pressure
2. Engine temperature
3. Cold weather starting aid
4. Fuses
5. Parking brake warning
6. Hourmeter
7. Plug button
8. Air pressure
9. Torque converter temperature
10. Main electrical switch
11. Starter button
12. Voltmeter
13. Fuel gauge

Figure 2-3a Instrument panel

INSTRUMENT PANEL.

The gauges on the instrument panel (Figure 2-3a) help indicate performance of the loader hydraulic, compressed air, and electrical systems and of the engine, torque converter and transmission. The most efficient loader operation will be obtained by frequent observation of the instruments. If strange or erratic loader operation is noticed, the gauges can help locate the trouble.

ENGINE OIL PRESSURE GAUGE.

The engine oil pressure gauge (1, Figure 2-3a) is at the extreme left of the top row of gauges.

The engine oil pressure gauge should show pressure upon starting the engine. The pressure shown should be within the "RUN" segment of the gauge. Should the gauge show little or no pressure within a short while after starting, stop the engine and check the crankcase oil level. During starting operation, do not accelerate the engine in an attempt to increase engine oil pressure.

The oil pressure gauge gives some indication of the oil condition once it is at operating temperature. Pressure drops between oil changes may be caused by oil dilution, a clogged crankcase suction strainer or an internal engine oil leak. Always determine the cause of decreased normal engine oil pressure.

ENGINE TEMPERATURE GAUGE.

The engine temperature gauge (2, Figure 2-3a) is mounted to the right of the engine oil pressure gauge.

Normal engine temperature gauge readings should vary between the minimum and maximum of the "RUN" segment. Continuous engine operation below the minimum temperature is harmful to the engine oil. Low coolant temperatures will also cause exhaust smoke and increase the rate of fuel consumption.

Note

In cold weather, it may be necessary to partially close the engine compartment and cover part of the radiator to maintain the minimum coolant temperature.

Overheating indicates the need for mechanical correction. A clogged cooling system or a low coolant level will also cause high operating temperatures. The engine temperature, under full load conditions, should remain below the upper range of the "RUN" segment.

COLD WEATHER STARTING AIDS. (OPTIONAL)

The cold weather starting primer plunger (3, Figure 2-3a) is to the right of the engine temperature gauge, above the row of four fuse-holders.

Pushing down on the cold weather starting primer plunger causes ether vapor to be injected into the engine intake manifold. A check valve circuit will not allow ether vapor to be injected into a warm engine. The starting aid should only be used with a cold engine. Be sure that a can of pressurized ether is in the bracket provided for it. The bracket is located on the left front side of the rear frame.

FUSES.

The group of four fuse-holders (4, Figure 2-3a) provide circuit protection for tractor electrical components. The first fuse on the left protects the rear driving lights, the second fuse is for the tail-lights, the third fuse is for the stop lights and the fourth fuse is for the heater.

There are also two automatic reset circuit breakers mounted under the panel which provide protection for the front main driving lights and the electrically operated gauges.

PARKING BRAKE WARNING LAMP.

The parking brake warning light (5, Figure 2-3a) will glow when the parking brake (and the main electrical switch) are "ON".

HOURMETER.

The hour meter (6, Figure 2-3a) is mounted next to the parking brake warning light in the upper row of gauges.

The dot-and-dashed indicator to the right of the "1/10" indicator revolves when the instrument is operating. Use the hour meter readings to establish service intervals and perform scheduled maintenance operations.

AIR PRESSURE GAUGE.

The air pressure gauge is mounted on the lower right hand corner of the instrument panel.

The tractor wheel brakes and horns are operated by means of compressed air. Available air pressure in the system tanks to apply the wheel brakes and operate the horns is shown on the air pressure gauge. For safe tractor operation, the gauge readings should be between the minimum and maximum indications of the gauge "RUN" segment.

TORQUE CONVERTER TEMPERATURE GAUGE.

The torque converter temperature gauge (9, Figure 2-3a) is just to the left of the air pressure gauge.

The torque converter temperature gauge indicates the temperature of fluid leaving the converter. The gauge will vary during normal operation. If the temperature stays high (near the "CHECK OIL" segment or above "RUN") shift the transmission to a lower speed range and reduce engine speed. Shutdown the engine if the converter fluid temperature remains high. Correct conditions that cause continual high temperature readings before continuing to work the tractor. Always check converter and transmission oil level when the gauge indicates "CHECK OIL".

MAIN ELECTRICAL SWITCH.

The main electrical switch (10, Figure 2-3a) is in the lower central area of the panel.

It is a lever type switch that controls electric current flow to all major electrical circuits including the tractor lighting circuits. In any of its ON positions "IGN." or "LIGHTS", current flows from the batteries through the switch and into the activated electrical circuits. In its "OFF" position, current flow to all electrical circuits is stopped. Turn switch to its "OFF" position before leaving the operator's compartment.

STARTER BUTTON.

The starter button (11, Figure 2-3a) is located to the left of the ignition switch.

It energizes the starter solenoid and motor. Closing this switch completes the battery solenoid circuit so a heavy flow of current passes through the closed solenoid contacts. In this way, a small amount of electric current at the starter button operates an electric motor that requires a high rate of current flow.

VOLTMETER.

The voltmeter (12, Figure 2-3a) is mounted to the right of the fuel gauge in the lower row of gauges. The dial face indicates a green area in the 25.2 to 30.4 volts range, which is a satisfactory operating range. The red segments at each end of the dial are indicative of unsatisfactory conditions.

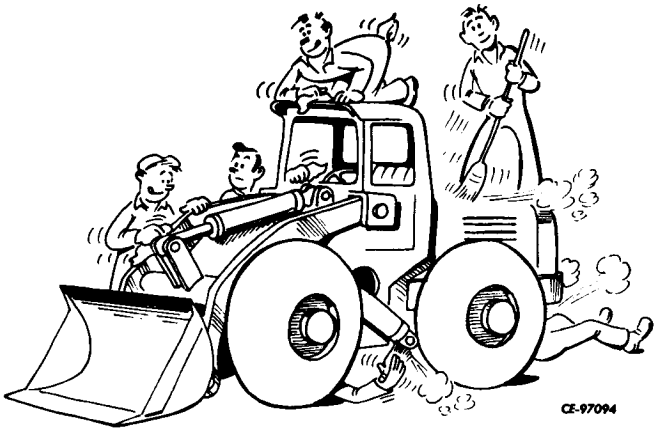
Note

During a starting cycle, the voltage of a fully charged battery may drop to a level of 8-11 volts depending on the ambient temperature of the batteries. However, with the engine running, the voltmeter should indicate within the green segment.

Voltage indications in the red segment at the upper end of the dial with the engine running indicate an overcharge. The cause should be promptly located and corrected. A voltage reading of less than 13 volts with the engine running, indicates either regulator or alternator problems, while a reading below 10 volts indicates a defective battery.

FUEL GAUGE

The fuel gauge (13, Figure 2-3a) is an electrically operated unit for measuring the supply of fuel in the tank. A tank unit, operated by a float, varies the flow of current through the instrument panel unit to give the gauge indications. This gauge is mounted in the lower left corner of the instrument panel.



Keep It Clean

CONTROL PEDALS.

Two brake treadles, an accelerator pedal, and a horn button are mounted on the deck of the operator's compartment.

BRAKE TREADLES.

Both brake treadles (9 and 10, Figure 2-2a) are similar in operation. The left treadle, in addition to applying the wheel brakes, also affects transmission operation by operating a transmission clutch cut-off valve. This shuts off transmission clutch pressure so no power can be transmitted through the drive line.

Pressure on either treadle operates the air control valve under the treadle. Pressure applied to a treadle acts against the regulating spring and diaphragm in the valve. This opens the valve inlet port so pressurized air from the air tank can pass freely through the valve and apply the air cylinders on all brake power assist units in the service brake system. The wheel brakes are applied when the power assist units are activated.

When the pressure exerted by the brake system equals braking load, the diaphragm in the treadle control valve closes the valve inlet port. Compressed air is then trapped between the treadle control valve and the power assist units. Increased pressure on the treadle causes an increase in pressure at the brake shoes.

Partial release of the pressure applied to the treadle opens the control valve exhaust port. This releases some of the air at the power assist units and decreases the pressure applying the wheel brakes. Air escapes through the treadle control valve until the valve diaphragm moves to a balanced position. By completely releasing pressure on the treadle, the valve exhaust port is opened. Compressed air between the power assist units and the treadle control valve is released. The brake shoes are returned to their non-apply position by the brake return springs.

ACCELERATOR PEDAL.

The accelerator pedal (8, Figure 2-2a) is to the far right on the deck of the operator's compartment.

Pressure on the accelerator pedal causes the fuel pump metering valve to open. A pedal return spring closes the pump valve when pressure is released from the pedal.

Fuel flow at the engine fuel injectors determines the amount of available engine power. This flow rate to the injectors is regulated by the pump metering valve which in turn is controlled by pressure on the accelerator pedal.

HORN BUTTON.

The air operated horns are controlled by a button (11, Figure 2-2a) located on the left side of the floorboard in the operator's compartment. When pushed, it opens the horn valve allowing air to flow to the horns. The air then causes the horn diaphragms to vibrate.

FRONT AND REAR WIPERS

The front and rear electric wiper controls are mounted on the wiper motor mounting brackets. The switches have three (3) positions: off, half speed and full speed.

TRANSMISSION CONTROL LEVERS.

The two levers mounted to the left of the steering column control transmission shifts. Speed range shifts are made with the left hand lever (1 Figure 2-2a) on the shift quadrant. The right hand lever (4) controls shifting of the transmission direction clutch assemblies. Shift both levers before accelerating the engine.

SPEED RANGE LEVER.

The transmission is capable of two output speed ratios. These are selected by means of the speed range lever. (See Figure 2-6a) With the speed range lever in the position farthest from the operator, the transmission range selector valve is moved so the low speed range clutch is engaged. This results in high torque output but low transmission output shaft speeds.

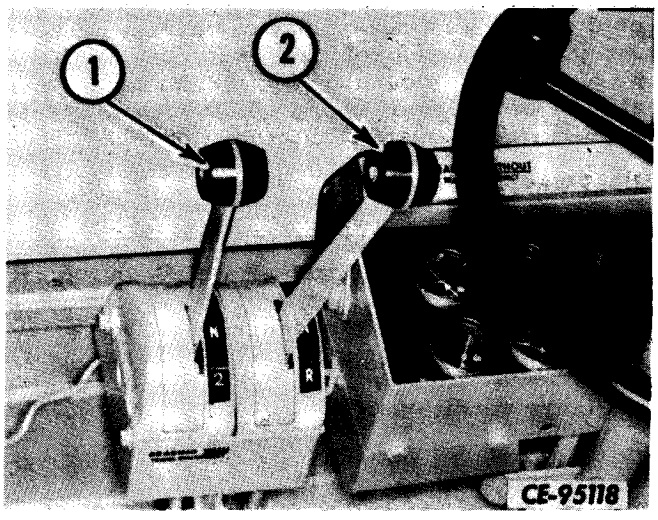


Figure 2-6a Transmission control levers

In the position nearest the operator, the transmission range valve is moved so the high speed range clutch is engaged. In this transmission gear range, the output shaft speed may be increased but available output torque is decreased. Between the two extreme lever positions, the transmission is shifted to neutral.

DIRECTION LEVER.

The other transmission control lever determines the direction of loader travel. In the F position (Figure 2-6a) the transmission shifts so the forward drive clutch pack is engaged to move the loader forward. Behind F position is N position. In this lever position, neither transmission direction clutch pack is engaged so the output shafts do not turn. Behind N position is R position. In this lever position the transmission reverse clutch pack is engaged to drive the output shafts so the loader moves in reverse.

Let up on the accelerator pedal and touch the brake treadle momentarily to make directional shifts. This method of shifting will improve the operator's comfort and extend loader life.

BOOM CONTROL LEVER.

The boom control lever (7, Figure 2-2A) is the lever to the far right of the operator. It is linked to the main hydraulic control valve assembly. Lever movement causes a plunger to move in the control valve. The plunger has three detents that can be distinctly felt.

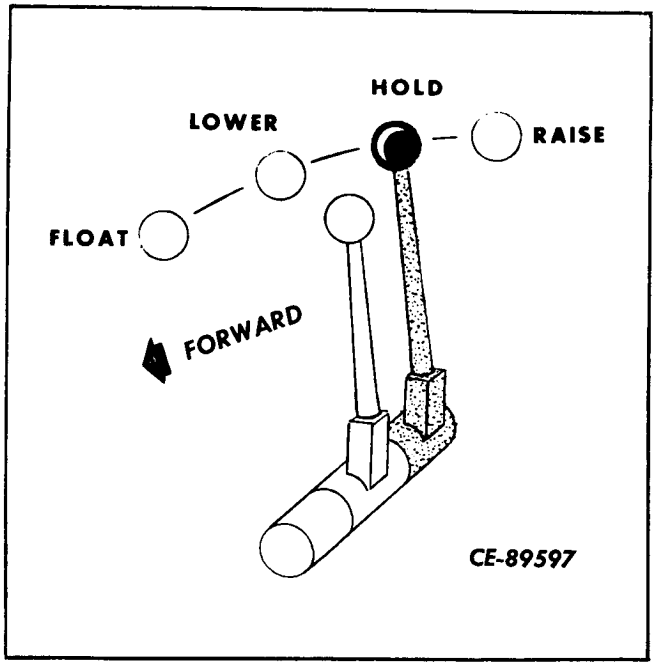


Figure 2-7a Boom control lever

With the lever toward the rear of the operator's compartment, the valve plunger is in raised position. When the engine is operating, the hydraulic oil will raise the boom and bucket until the control valve detent device is released by the automatic boom kick-out control or the control lever is moved to HOLD. (See Figure 2-7a.) The next position forward is HOLD; in this position, boom movement is stopped. The next position forward is LOWER; the boom will move downward under pressure. The lowest forward position of the boom lever is FLOAT. The valve plunger is moved so hydraulic oil flows freely in either direction in the boom circuit.

◆ CAUTION: AVOID OPERATING THE CONTROL LEVERS WHEN THE ENGINE IS NOT RUNNING. THE BOOM ASSEMBLY, IF RAISED, CAN BE LOWERED ANY TIME THE LEVER IS MOVED TO FLOAT OR LOWER.

BUCKET CONTROL LEVER.

The lever to the right of the operator's seat and nearest the operator is the bucket control lever (6, Figure 2-2A). It regulates the bucket operation.

When pulled to the rear, the lever moves the bucket control plunger in the main hydraulic valve so the bucket rolls back. The valve plunger is detented in this position, but will return to the HOLD position automatically when the bucket leveler activates.

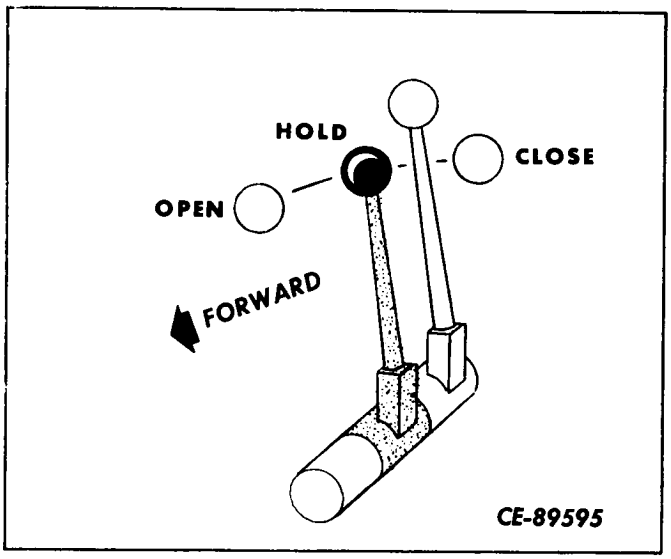


Figure 2-7b Bucket control lever

In the lever's mid-position, the control valve plunger is located so no oil flows in the bucket circuit. This in turn causes the bucket to hold its dumping attitude.

Movement of the lever to its full forward position causes the bucket control valve plunger to move so the bucket tilts forward to dump its load.

HAND BRAKE LEVER.

The lever near the floorboard to the far right of the operator is the hand brake lever (5, figure 2-2a). Pull back on the lever to engage it to prevent the loader from rolling from the parked position. Pull up and push forward on the lever to release it. The cap on top of the lever provides an adjustment of the lever linkage. Turn the cap so that moderate effort is required to apply and release the hand brake lever.

At any time that the hand brake lever is in the engaged position and the main electrical switch is in the ON position the hand brake warning light will glow. This is a visual reminder to the operator to release the hand brake before attempting to move the tractor. With the hand brake in the full release position the light will cease to glow.

OPERATOR'S SEAT CONTROLS.

One seat adjustment lever is attached to the bottom front side of the seat. To adjust the seat forward or backward pull the lever and slide seat in the desired direction. The lever on the left side of the seat pedestal allows the seat to tilt forward or back. Pull up on the tilt lever to adjust the tilt of the seat. The height can be adjusted by removing the two bolts that secure the inner post to the outer post and lining up the holes in both posts at a higher or lower setting. Be sure to replace the two bolts with the heads of the bolts towards the front of the seat.

HAND THROTTLE.

The hand throttle control is attached to the right side of the instrument panel on a support bracket. It is connected through linkage to the accelerator pedal linkage. In its lowest or "down" position, minimum fuel is supplied to the engine. As the control is pulled up, the amount of fuel metered to the engine increases. Push the control down before leaving the operator's compartment. The control may be locked in any position by turning the handle 1/4 turn to the right.

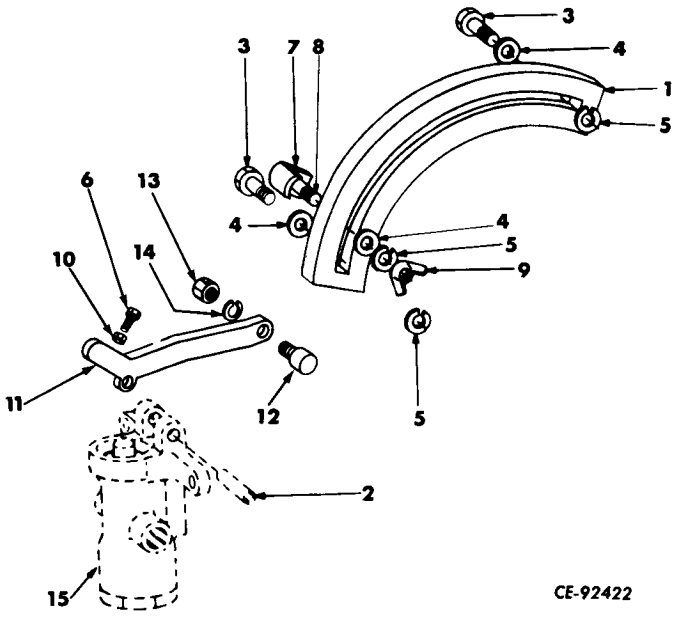


Figure 2-8a Automatic boom kickout control

BOOM KICK-OUT CONTROL.

The tractor's loading boom is equipped with an air operated kick-out control system. The system limits boom travel automatically at a preselected height. Figure 2-8a illustrates the control system and its component parts. The cam surface (1) is fixed to the upper boom end, on the outside of the right boom arm. The system air control valve is mounted on the tractor frame.

In operation, the cam (1, Figure 2-8a) moves with the loader boom. The cam follower (12) on the valve actuating lever (11) follows the cam surface until it contacts the movable cam lobe (7), and actuates the control valve lever (11).

The automatic kick-out is operated by air pressure supplied from the right brake treadle to the air control valve. When the cam hits the air control valve lever, it opens the air valve. Air from the valve actuates a piston in the main hydraulic control valve, which unlocks the balls from the detent boom raise position. The spring in the hydraulic control valve forces the spool into neutral position and halts the raising of the boom.

To pre-set the automatic boom kick-out control, raise the boom to the height at which it is desired to have it stop and place the boom control lever in "HOLD" position.

Loosen the wing-nut (9, Figure 2-8A) and position the cam lobe (7) so that it just touches the cam follower (12). Tighten the wing-nut. On the next cycle, the boom will stop at the position selected.

AUTOMATIC BUCKET POSITIONER.

The automatic bucket positioner (Figure 2-9a) is factory pre-set to keep the bucket in a horizontal or "digging" attitude, with the cutting edge of the bucket parallel to the ground.

The object of the bucket positioner is to cause the bucket to return to its proper digging attitude automatically after its load has been dumped and the tractor is returning to the work area. After dumping, the operator moves the bucket control lever into its detented "close" position. When the bucket reaches its pre-set attitude, it automatically stops, and the bucket lever kicks into its "hold" position.

This is accomplished as follows: (refer to Figure 2-9a). When the cylinder piston moves, it also causes the activating rod (5) to move within its tube. The rod (5) movement causes the actuating arm (8) of the control valve (7) to operate the valve when the actuating arm contacts the shoulder of the rod. Air pressure is then applied to the control valve spool, which forces the spool from its detented position into the "hold" position.

Adjustment of the bucket positioner is made at the activating arm clevis. Turning the clevis clockwise will cause the bucket to position in a more "open" attitude, and turning the clevis counter-clockwise will result in a more "closed" attitude. The type of work being done will to a great extent determine the proper attitude of the bucket.

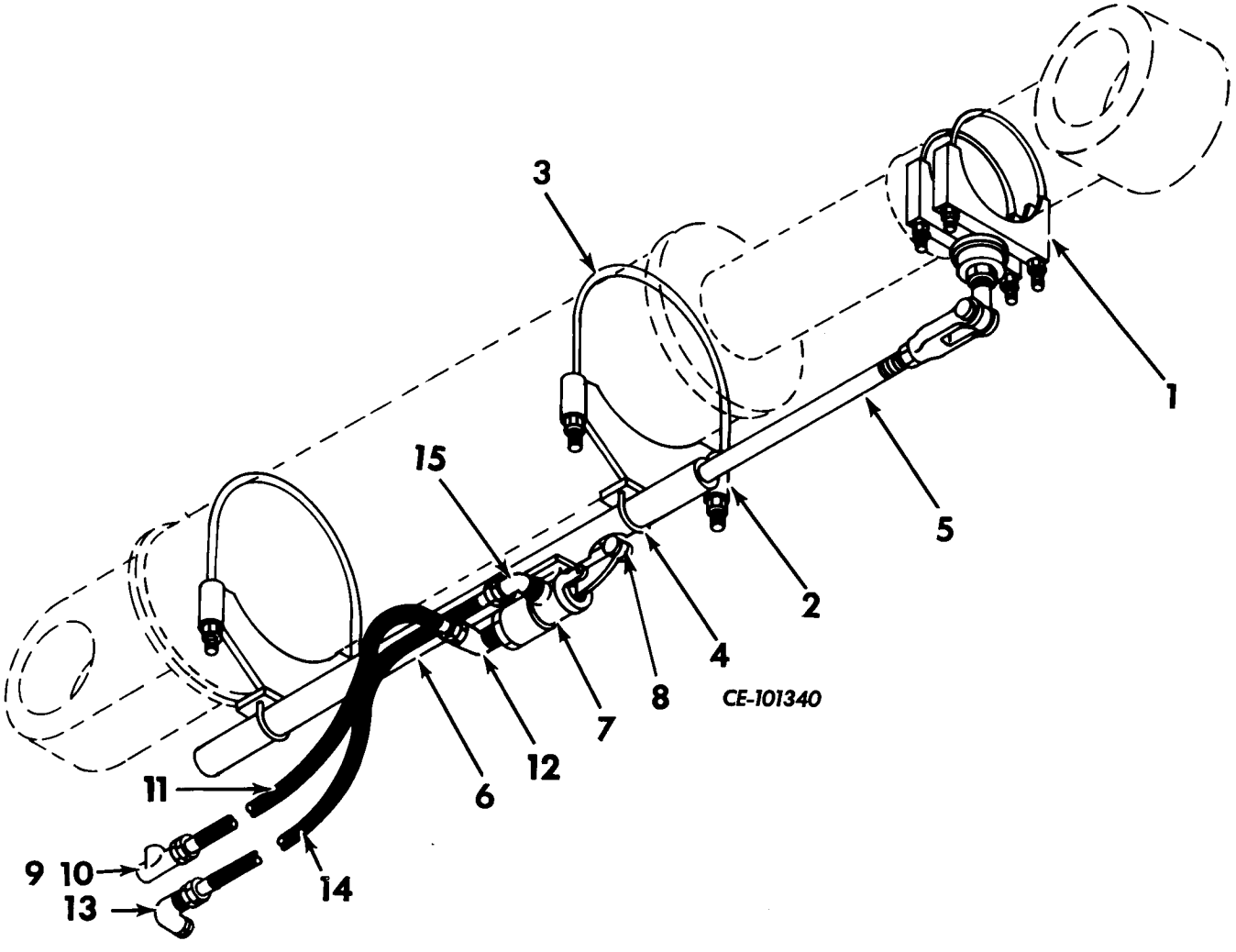


Figure 2-9a Bucket leveler

SAFETY BAR AND PINS.

A bar and two pins (Figure 2-10a) are provided on the right side of the tractor as a safety device. These should be used to lock the two tractor halves when the tractor is serviced or transported.

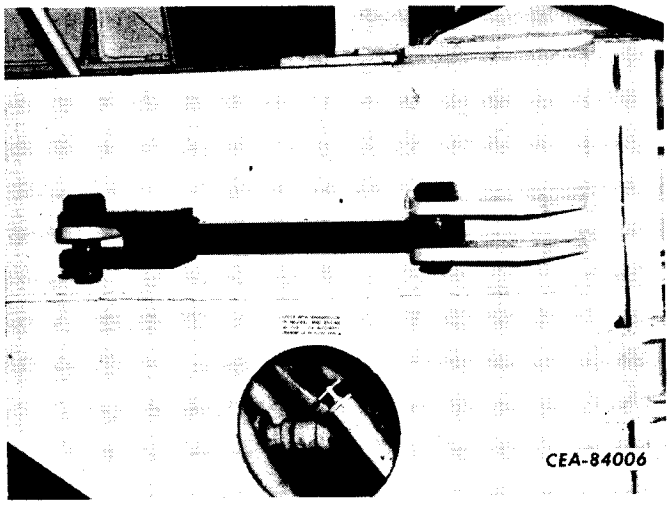


Figure 2-10a Safety bar and pins (Typical illustration)

To lock the tractor halves in straight position, the bar and two pins are used as shown in Figure 2-10b.

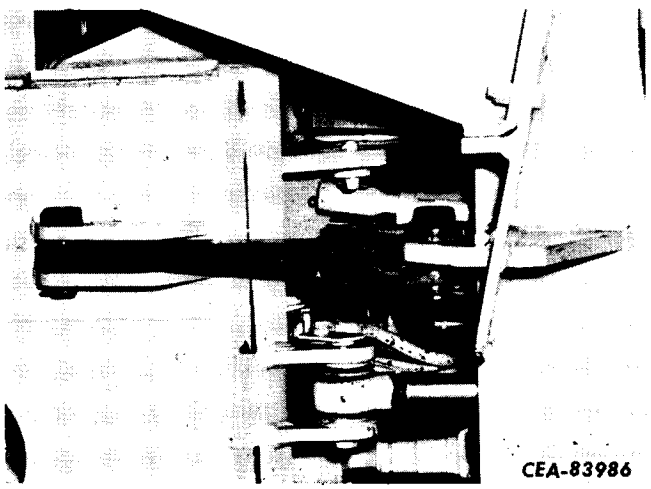


Figure 2-10b Safety bar in straight lock position (Typical illustration)

To lock the tractor in either a full left or full right turn, only one of the pins is used. Turn the tractor to its full turn position and insert the pin in the pin holes on the closed side of the tractor as shown in Figure 2-10c.

Always check that the bar and pins have been replaced in storage position on the right side of the tractor (Figure 2-10a) before operating the tractor.

Broken or lost safety bar and pins should be repaired or replaced immediately to insure that the safety device is always available for use. Do not attempt to service or transport the tractor if the safety bar or pins are broken or missing.

◆ CAUTION: DO NOT ATTEMPT TO SERVICE OR TRANSPORT THE TRACTOR IF THE SAFETY BAR OR PINS ARE BROKEN OR MISSING.

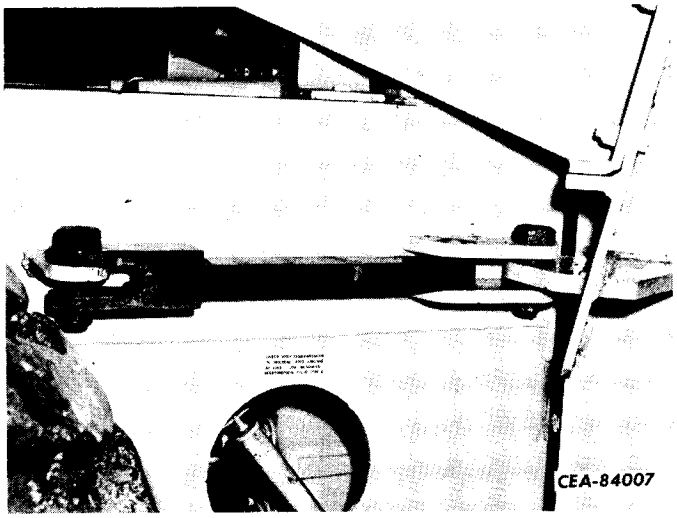


Figure 2-10c Safety pin in full turn lock position (Typical illustration)

SECTION CONTENTS

GENERAL CHECKS

Check that components such as the engine, transmission, drive shafts, pumps, etc., are securely mounted. Operate the control levers to check operation of the control linkage and cables. Check all lines and connections in the cooling, brake, fuel, torque converter, transmission and hydraulic systems.

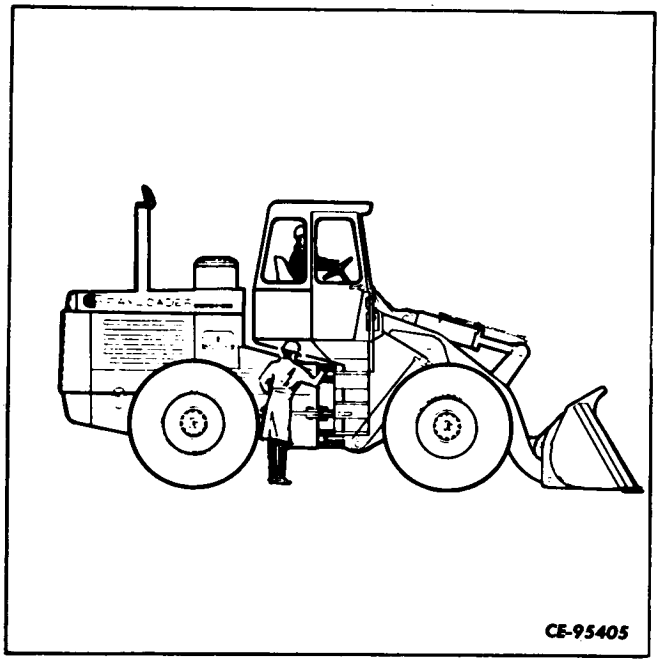


Figure 3-1A Visual inspection

Visually inspect PAY® LOADER for lubricant, air or hydraulic fluid leaks. Correct any leakage before operating PAY® LOADER.

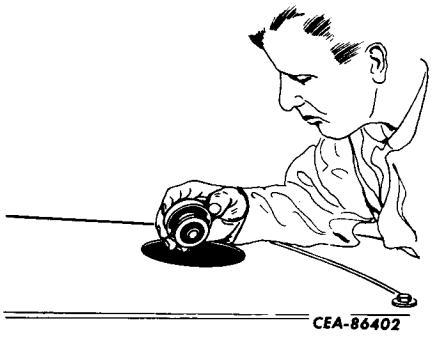


Figure 3-1B Coolant level

CHECK COOLING FLUID LEVEL

Keep the cooling system filled. Check the level after each work shift or at each fuel stop. Make a check of the coolant before starting and recheck it after the engine reaches normal operating temperature. See Figure 3-1b.

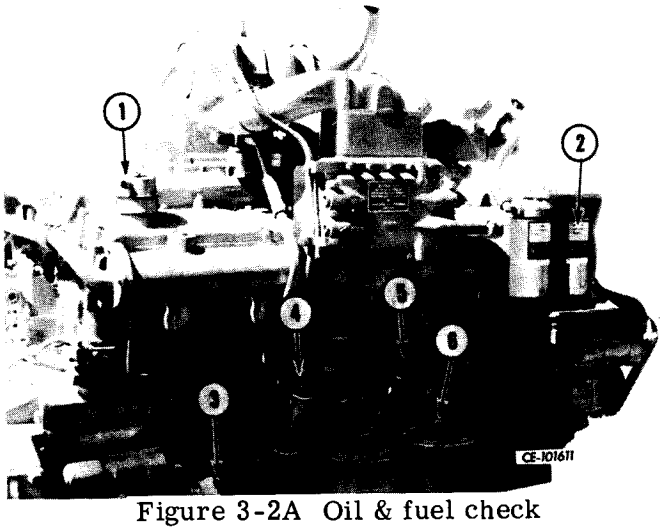


Figure 3-2A Oil & fuel check

1. Crankcase breather
2. Corrosion resistor
3. Starter lube
4. Oil filler tube
5. Oil check
6. Fuel filter

FILL FUEL TANK

The fuel tank filler tube is on the left side of the loader in the engine compartment near the radiator. Keep as much fuel in the fuel tank as possible. At the end of a work shift, fill the tank to keep condensation within the tank to a minimum. Filter all fuel added to the tank.

CHECK ENGINE OIL LEVEL

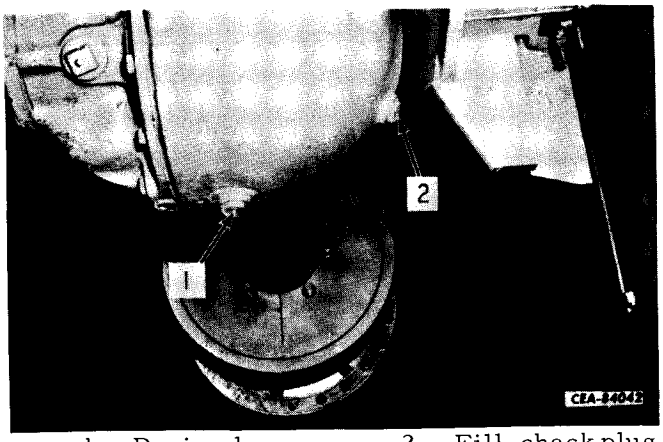
Check the engine oil level with the dipstick located on the left side of the engine. Some dipsticks are equipped with a separate scale on each side. One is to be used when the engine is stopped and the other is for a running check at the idle speed shown on the instruction plate mounted to the inter-cooler. Keep the oil level as near the proper level as possible.

DRAIN WATER FROM FUEL FILTERS

Each fuel filter has a drain plug on the bottom of the housing. If possible, remove the drain plug and permit the fuel to drain until clear fuel appears. This should remove any condensation. When draining, be careful to provide a container to catch the draining fuel which might present a hazard.

CHECK OIL LEVEL IN DIFFERENTIALS

Clean the fill-check plug on each differential and remove the plug. The oil level should be even with the check plug hole. If the level is low, add make-up oil to the level of the check hole. Use the type oil specified in the Lubrication Chart.



1. Drain plug 2. Fill-check plug

Figure 3-2B Rear differential installation

CHECK WHEEL RIMS & MOUNTING STUDS

The working motions of the tractor tend to loosen wheel assembly cap nuts and wear wheel rim clamp rings. Make a visual check periodically to look for evidence of cap nut looseness. Rust streaks starting from the cap nut ball seats are a definite indication of loose mounting. At this time, also check for broken studs, rim damage or improperly seated clamp rings. If left unchecked, loose cap nuts will permit elongation of wheel mounting holes. Eventually the wheel stud will fail. If a broken wheel stud is found, replace it and the stud on each side of it. If several broken studs are found, replace all wheel studs.

CHECK OIL LEVEL IN WHEEL HUBS

Check the wheel hub oil level on level ground. Clean the wheel hubs and move the loader to position each hub as shown in Figure 3-3a.

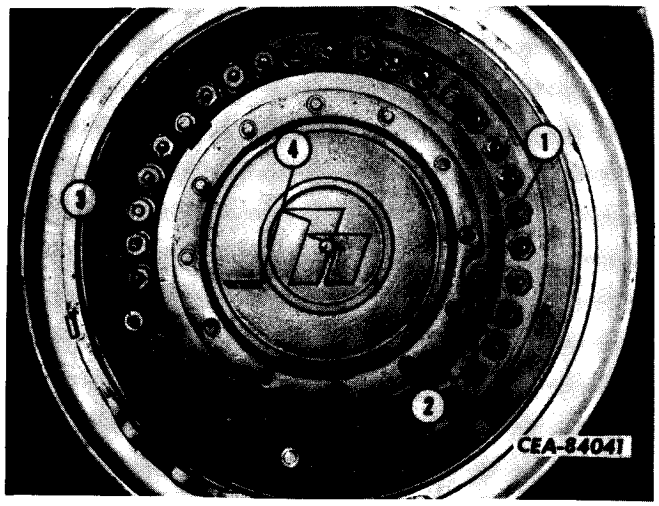


Figure 3-3A Wheel hub

1. Fill-check plug
2. Ballast removal cap
3. Air valve
4. Hub oil level mark

Remove the fill-check plug from the hub cover. Note that the oil level line is horizontal and points to the fill-check plug. The hub oil level should be even with the plug hole. If makeup oil is needed, add it through the fill-check opening until oil flows from the plug hole. Use the type lubricant specified in the Lubrication Chart. Install the plug again in the hub cover and wipe off excess oil.

CHECK BATTERY FLUID & CONNECTIONS

Check that each battery cell is filled with enough fluid to cover the cell plates. Check that batteries are level in the holders and are securely held. The hold-down fasteners should hold the batteries firmly, but not be tight enough to warp or damage either the hold-downs or batteries.

Figure 3-3b shows battery connections made at the left pair of batteries. The right pair of batteries is connected in a similar manner. Connect negative (ground) cables last.

◆ CAUTION: CONNECT BATTERIES ONLY AS SHOWN IN FIGURE 3-3B. FAILURE TO FOLLOW THIS METHOD WILL RESULT IN DAMAGE TO THE LOADER ELECTRICAL SYSTEM.

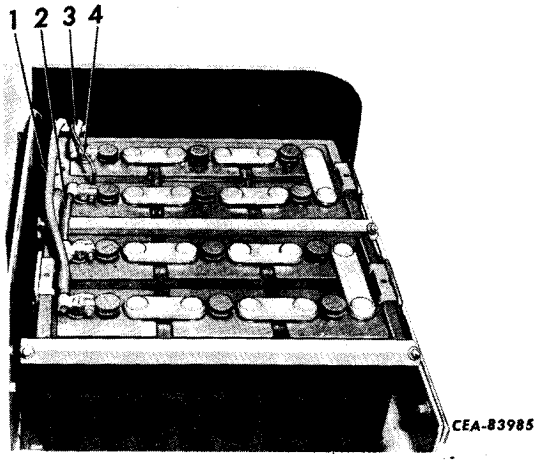


Figure 3-3B Battery cable connections

1. Positive battery cable
2. Interconnecting battery cable
3. Negative battery cable
4. Battery-to-circuit breaker lead

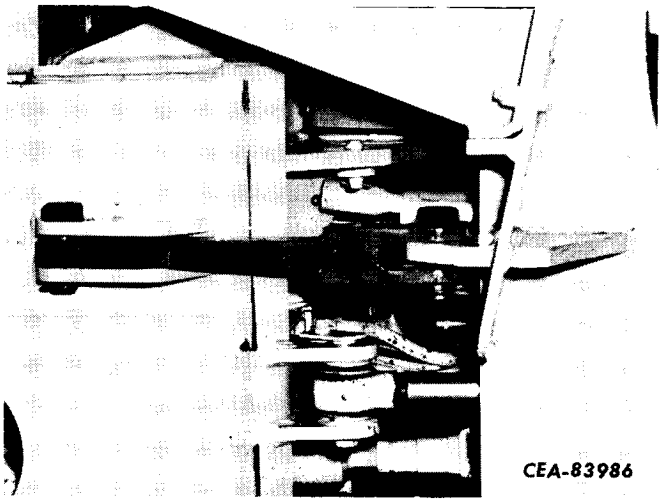


Figure 3-3C Safety bar

THE SAFETY BAR OR PINS MUST BE USED TO LOCK THE TWO TRACTOR HALVES WHEN THE TRACTOR IS SERVICED OR TRANSPORTED TO PROTECT PERSONNEL.

SAFETY PRECAUTIONS.

All industrial units that are designed to handle large work loads are dangerous when they are not used as intended. Operators of such equipment should therefore be careful and acquire safe working habits. They should also be aware of conditions that could be hazardous. Such knowledge will not only help an operator to protect himself against accidents, but will also protect other personnel and equipment. Avoid all safety risks. Safe operation of the loader is, for the most part, an operator responsibility.

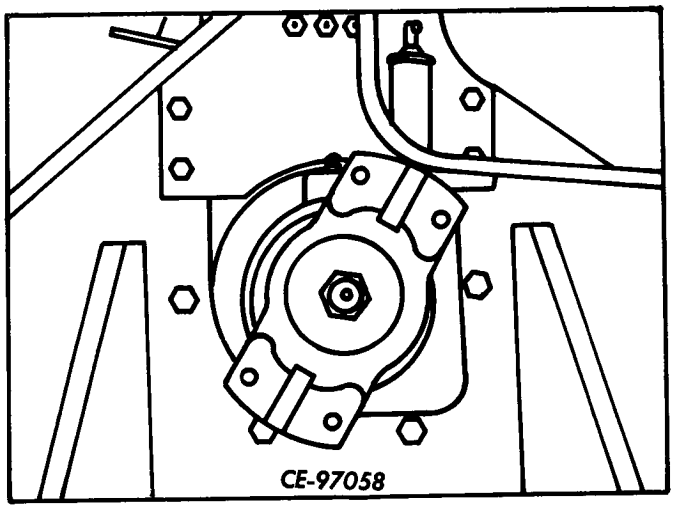


Figure 3-4A Intermediate drive block

CHECK OIL LEVEL IN INTERMEDIATE DRIVE BLOCK

The intermediate drive block is mounted on the front frame assembly in front of the front transmission output. (See Figure **3-4a**.)

Remove the filler tube cap and check the drive block oil level. Keep the drive block filled to the level indicated on the cap dipstick. If makeup oil is needed, use the type specified in the Lubrication Chart.

DRAIN MOISTURE FROM AIR TANKS

The compressed air system should be kept as moisture-free as possible. If the surrounding temperature is cold, the moisture will freeze in the system and make the brakes inoperative.

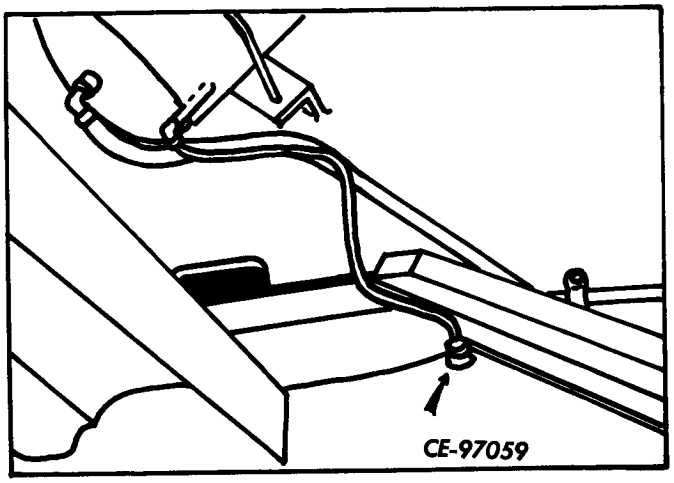


Figure 3-4B Air tank drain valve

Drain moisture from the air tanks by opening the drain valve on each side of the loader at the rear of the front wheel. Keep both valves open until all air and drainage stops.

Drain the air tanks as often as necessary. In dry climates, draining the air tanks once a month may be adequate. In more humid climates, it may be necessary to drain the tanks daily. Local conditions govern service frequency.

CHECK HYDRAULIC OIL LEVEL

Check the hydraulic reservoir oil supply with the engine off and with the bucket resting on the ground. Loosen the filler cap slowly to relieve reservoir pressure. Keep the oil level near the FULL mark on the reservoir dipstick attached to the filler cap. See Figure **3-4c**. Any makeup oil added to the reservoir should be of the same type used at the time of refill. Refer to the Lubrication Chart.

◆ CAUTION: LOOSEN THE RESERVOIR CAP VERY SLOWLY TO RELIEVE ANY PRESSURE BUILD UP. ALSO, IF POSSIBLE LET THE OIL COOL FOR AT LEAST 30 MINUTES OR SO TO LESSEN THE POSSIBILITY OF BEING BURNED BY HOT FLUID.

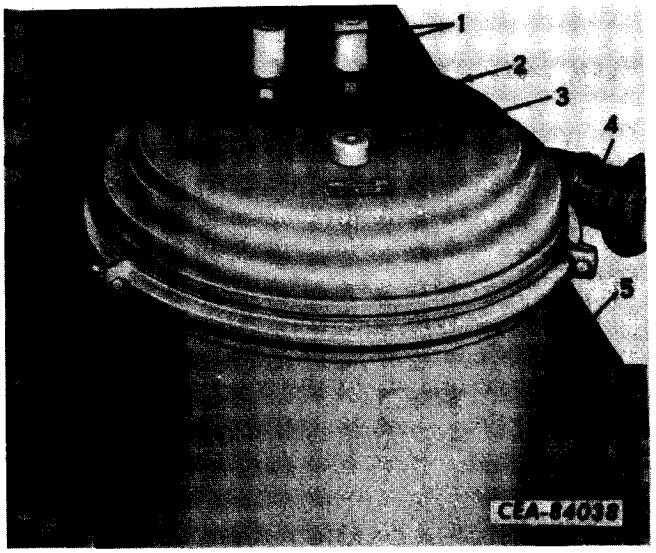


Figure 3-4C Hydraulic reservoir installation

1. Pressure relief valves.
2. Cover.
3. Dipstick.
4. Ring.
5. Reservoir.

CHECK TIRE PRESSURE & TREADS

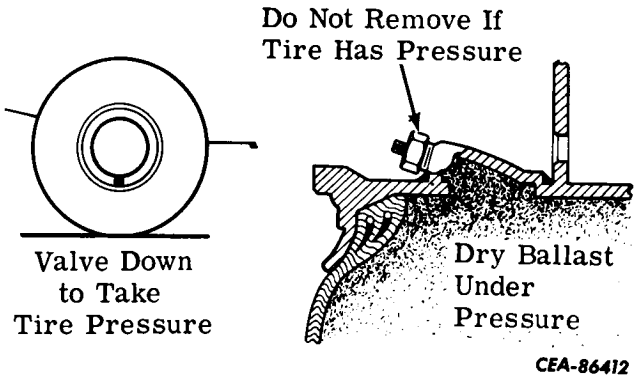


Figure 3-5A Check tire pressure

1. Position valve stem at bottom center of wheel rim.

2. Clear valve stem by applying short blast of air and check pressure with gauge. Refer to Specifications for correct pressure.

3. Connect hose to accessory air chuck to supply air. Start engine and run at high idle when filling tires.

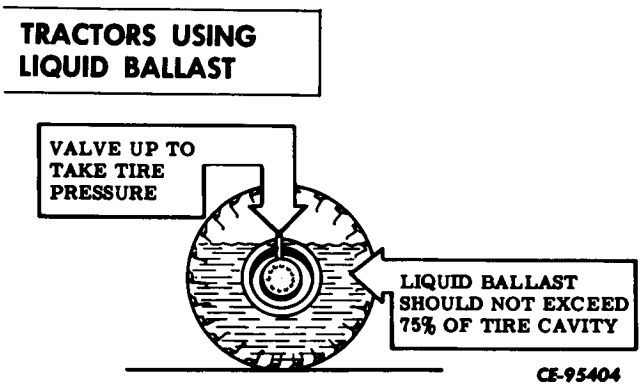


Figure 3-5B Check tire pressure (Liquid Ballast)

1. Position valve stem at top center of wheel rim.

2. Check pressure with a special corrosion-proof gauge.

3. Fill tires with compressed air from the shop or tractor's air compressor. If the tractor is equiped with an accessory air chuck, start engine and run at high idle. Check tires for cuts. If any are found, skive the area around them so they will not catch and hold any material.

NOTE: Drain moisture from air tank before filling tire from the accessory air chuck.

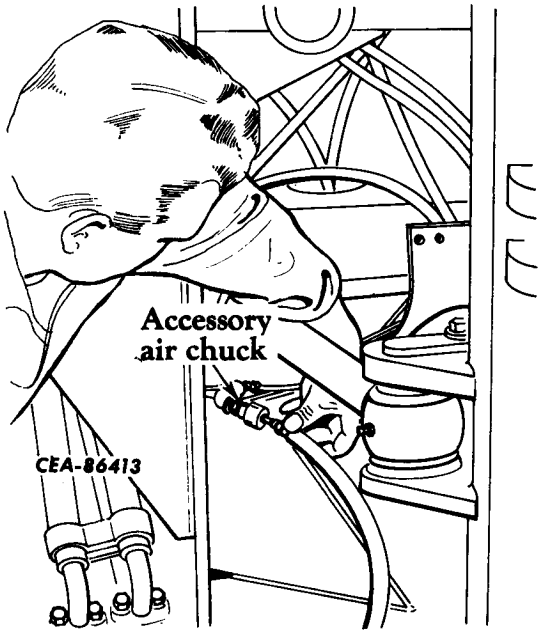


Figure 3-5C Accessory air chuck

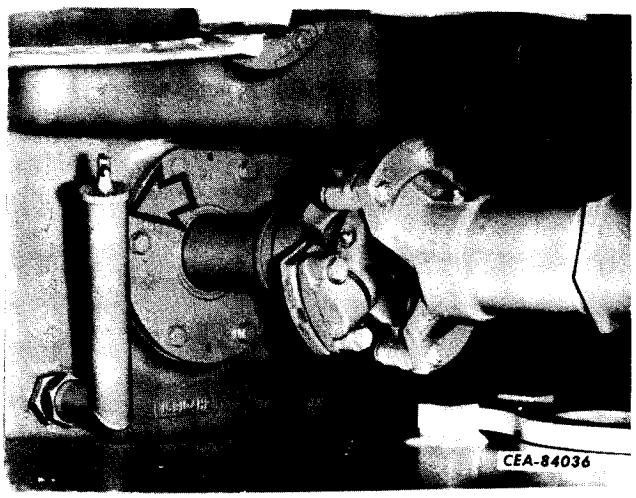


Figure 3-5D Transmission check & filler tube

CHECK TRANSMISSION OIL LEVEL

The transmission dipstick filler tube (Figure 3-5D) is accessible on the right side of the loader next to the transmission forward output shaft. Loosen the dipstick handle and remove the stick. The oil level must show on the dipstick before the engine is started. This is a "cold" check. Once the cold check establishes the presence of oil on the dipstick, start the engine and permit the oil to become warm before making a hot check.

◆ CAUTION: DO NOT ATTEMPT TO CHECK THE TRANSMISSION FLUID LEVEL OR ADD FLUID UNLESS THE TRACTOR HALVES ARE SECURELY LOCKED WITH THE SAFETY BAR AND PINS PROVIDED! USE TWO PERSONS FOR THE NEXT STEP, ONE AT THE CONTROLS OF THE LOADER.

Start the engine. Operate the transmission controls momentarily. Then shift to neutral. Make a second level check with the oil hot and the engine operating at low idle speed. The oil level should not rise above the FULL mark. Drain oil down to FULL mark if the level is above dipstick FULL mark. Replace dipstick, tighten handle and stop engine.

CHECK BUCKET DUMP ADJUSTMENT

When the bucket is stopped suddenly at the end of the "opening" phase, a tremendous shock load is experienced. By limiting the speed of the dumping cycle on the bucket, you protect the complete system. The speed is adjusted at the factory to dump a loaded bucket in approximately 6 seconds at full rpm. The adjustment is made with the adjusting bolt (Item 1, Figure 3-6A) by regulating how far the valve plunger is allowed to travel in the dump attitude. Adjusting the bolt so a gap of 7/16" exists between the bolt head and the plunger linkage with the control in neutral as shown in Figure 3-6A is the factory recommendation.

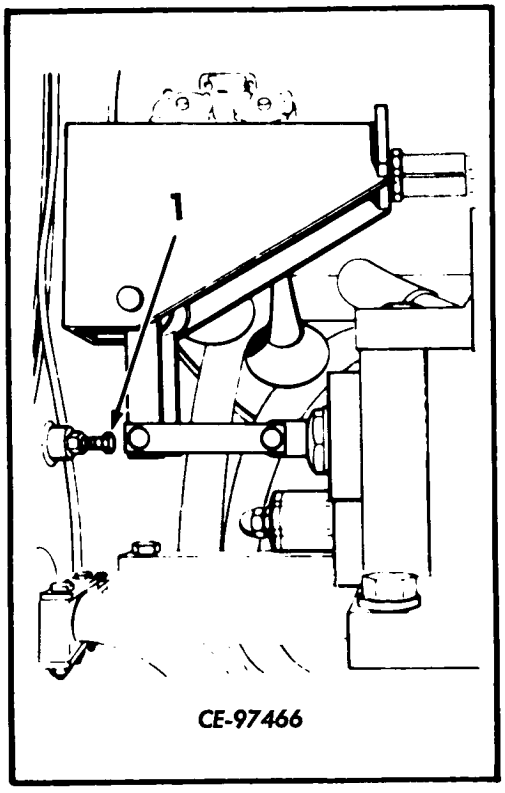
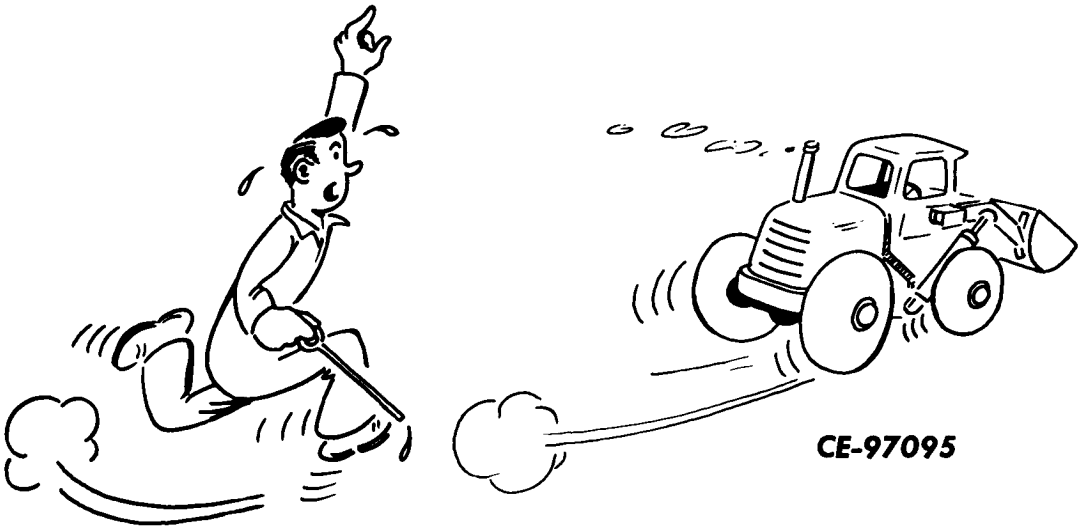


Figure 3-6A Bucket Dump Adjustment



Use two persons to check transmission oil level.

PRIME THE TURBOCHARGER.

Before attempting to start an engine equipped with a turbocharger that has been idle for 30 days or more, prime the turbocharger with oil to assure an adequate supply is on hand. Each time you start the engine, let it run at low idle for a couple of minutes to allow the oil to reach the turbocharger. Refer to Section 5 Additional Maintenance for Priming the Turbocharger.

LUBRICATION POINTS.

Apply grease to all the grease fittings on the machine to be certain nothing is being worked without adequate lubrication. The lubrication points are shown in Figure 3-7A.

Wipe all fittings clean before applying fresh grease. Dirt could be forced into the bearing surfaces otherwise.

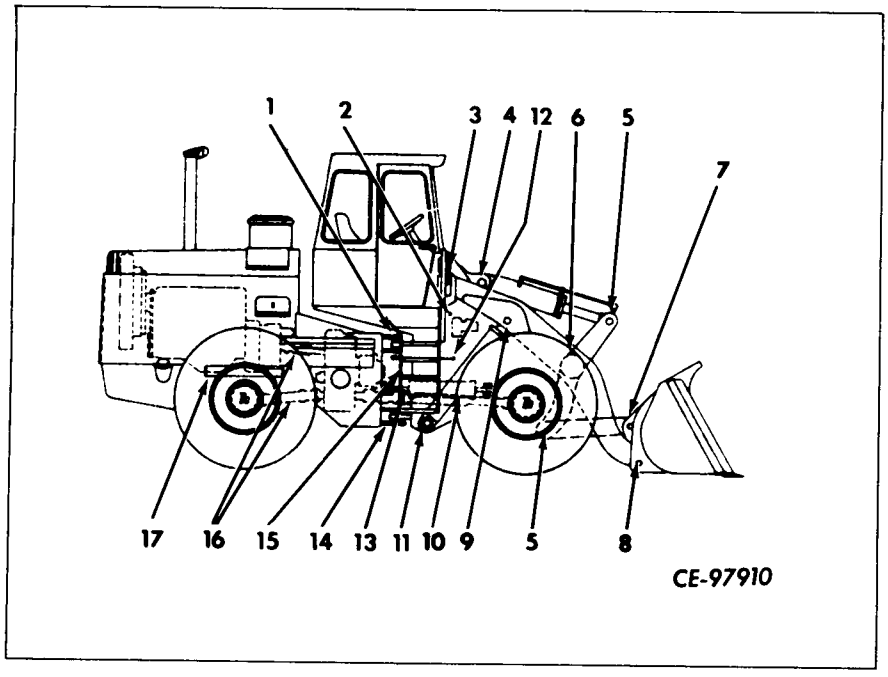


Figure 3-7A Lubrication Points

1. Articulation pivot
2. Accelerator linkage
3. Boom arm pivot
4. Bucket cylinder
5. Bucket cylinder
6. Bellcrank pivot
7. Bucket pivot
8. Boom bucket pivot
9. Boom cylinder
10. Front drive shaft
11. Boom cylinder
12. Drag link
13. Intermediate drive
14. Articulation pivot
15. Steering cylinder
16. Rear drive shafts
17. Bolster

OPERATING THE MACHINE

SECTION CONTENTS

STARTING

Do not start the engine until the dashboard, pedals, and controls are understood. The transmission must be in N position and the bucket must be resting on the ground. Set the hand throttle control for idle speed. Then turn the main electrical switch to ON.

Push the starter button. After the engine begins firing regularly, ease up on the hand throttle and check the gauges. If little or no oil pressure is indicated during engine warm-up, stop the engine. Determine the cause for the low pressure reading and correct it before working the loader. If the engine fails to start within 30 seconds after cranking is started, release the starter button and allow about a 2-minute recovery time. Extended engine cranking periods without allowing for recovery time will damage the cranking motor and rapidly drain the batteries.

Make all outside checks after the engine temperature normalizes. Shut down the engine before making these checks.

Look for leaks at all hose connections, hydraulic fittings, transmission and converter lines, the steering control valve, engine, etc. Lubricate the bucket pivots, steering cylinder pivots, drive shafts, steering control rods, and control linkage pivots as required, and check the transmission, hydraulic reservoir, and fuel tank levels. Drain the compressed air tanks to remove condensation from the air portion of the brake system.

Restart the engine and charge the air system to the minimum pressure indicated by the "RUN" segment of the air pressure gauge before moving the loader. Use only partial engine power and operate in the first transmission speed range until the engine temperature reaches the "RUN" segment of the gauge. Pay particular attention to instrument panel gauges during warmup periods.

COLD WEATHER STARTING AIDS. (OPTIONAL)

The cold weather starting primer plunger (3, Figure 2-3a) is to the right of the engine temperature gauge, above the row of four fuse-holders. (See Section 8.)

OPERATION CHECK.

An operation check performed just prior to starting a work shift requires little effort or time and will not delay work schedules. Such a check will assure the operator and work supervisor that no mechanical difficulties are present to hinder scheduled work.

◆ CAUTION: NO ONE SHOULD BE WORKING OR STANDING NEAR THE TRACTOR WHILE THIS CHECK IS MADE.

Check that the area around the tractor is clear before starting the engine. After starting the engine, apply a brake treadle and idle the engine until the air system is charged (75 to 105 psi).

Accelerate the engine and pull the boom lever back out of neutral into raise position. When the bucket clears the ground by three feet, operate the bucket lever back, our of neutral and forward through neutral to check the operation of the bucket.

Pull back on the bucket control lever to close the bucket and decrease the engine speed. Lower the bucket to ground level and make a check of the hydraulic steering circuit by turning the steering wheel to the extreme end positions of the steering gear.

OPERATING THE PAYLOADER

Terrain, footing conditions, type of materials being worked, and maneuvering space determine the speed at which the loader can be worked. When the bucket is at work, keep the engine speed near full throttle and operate in the first gear transmission range. Use second gear range for traveling purposes. The techniques for using the loader described below are not intended as all inclusive. Each work situation will vary. Loader operation must be altered for each particular application to use the loader to best advantage.

BUCKET LOADING.

With the engine running, lower the boom to ground level and place the boom lever in the "FLOAT" position. The automatic bucket positioner will have properly positioned the bucket so that it is parallel to the ground. In this position, the bucket cutting edge will meet with the least amount of resistance.

Shift the transmission to "low", in "forward" and drive the bucket into the material. Once the bucket enters the material, pull the boom control lever up to "RAISE" and start closing the bucket. Operate the bucket control lever intermittently to "CLOSE" so the boom will raise at a nearly constant rate. Should the bucket penetrate so deeply that the boom cannot raise properly, back away slightly.

It is necessary to operate the bucket control lever intermittently because the bucket hydraulic circuit over-rides the boom circuit. Whenever the bucket circuit is in operation, hydraulic pressure in the boom circuit is cut off.

Digging in hard material can be aided by "wiggling" the bucket edge immediately after penetration. Operate the bucket control lever alternately between its "CLOSE" and "OPEN" positions. This action will loosen the material and improve bucket loading. Coordinated operation of the two hydraulic control levers as the bucket enters the material will yield satisfactory bucket loads.

Shift the boom lever to "HOLD" once the bucket has been filled. Back the loader away from the loading site and lower the bucket to within two feet of ground level. Carry the bucket near the ground to provide better transporting stability.

NOTE

The boom assembly need not be fully raised to load the bucket. Maximum bucket loading will be obtained before the bucket reaches operator eye level.

TRANSPORTING LOADS.

Transport loads close to the ground. If it is necessary to carry the bucket raised in transit, the operator should use increased caution. Perform all steering and shifting as smoothly as possible.

The speed used to transport loads should be relative to the bucket carry position and the type route used. Safety should be considered at all times. Carry the bucket low and closed. Travel slowly anytime a load is carried over rough and/or sloping footing. A loaded bucket should never be transported with the boom fully raised.

Use the lower transmission speed range for bucket loading and the transportation of loads. The higher speed range may be used for making return trips to the loading sites.

DUMPING.

As the dump area is approached, start raising the boom so that the bucket will clear. Decrease forward traveling speed and move forward slowly until the bucket is above the dumping point. Then stop motion by gradually applying the left brake treadle. Control the rate at which the bucket empties by gradually shifting the bucket lever to "OPEN". This will reduce the shock load transfer to the rear axles of the loader caused by the loss of weight from the bucket.

After the bucket empties, move the bucket control lever all the way back into the detented "CLOSE" position. Back the loader away from the dump area, lower the boom and return to the loading site. The bucket will automatically return to its pre-set working position.

DIGGING OR EXCAVATING.

When digging or excavating, level the bucket with the ground. (See Figure 4-3a .) Use the boom control lever to force the bucket cutting edge into the ground as the loader moves forward. If the cutting edge does not penetrate the ground immediately, use the bucket control lever to incline the angle of the cutting edge slightly to give better penetration. When the

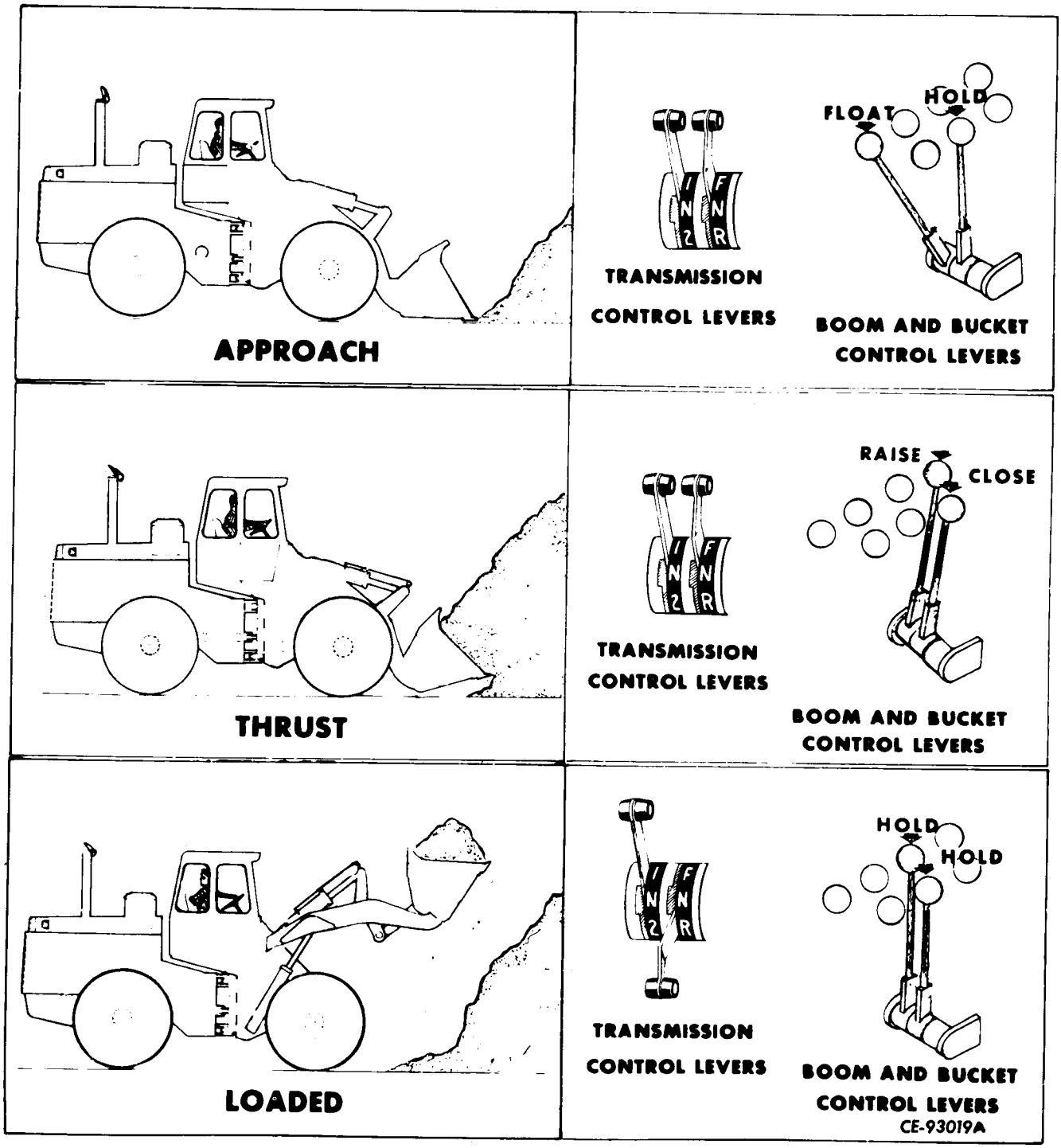


Figure 4-3a Bulk material loading sequence
(Typical illustration)

cutting edge penetrates, use the bucket control lever to adjust the bucket to level position to prevent excessive penetration. Manipulate the boom and bucket control levers slightly to maintain a good grade as the loader moves forward. When maintaining a grade, drive the loader in low gear at about half throttle to make an accurate cut. When the bucket is full, or at the end of the cut, tip the bucket back and raise approximately 12 inches from the ground. Carry the load to the desired dumping area.

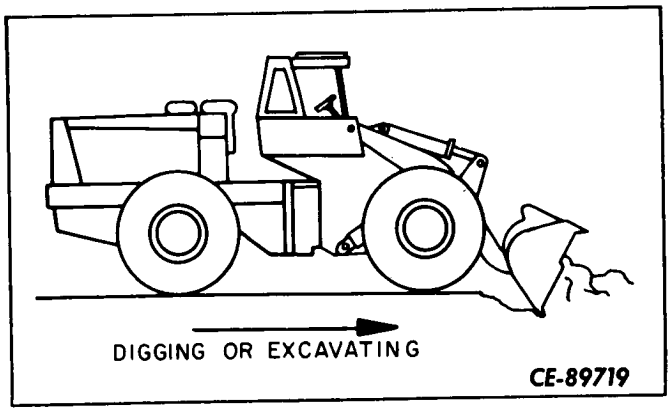


Figure 4-4a Digging or excavating

BACKDRAGGING OR LEVELING.

When backdragging or leveling, keep the bucket cutting edge level with the ground as the loader is moved backward. (See Figure 4-4b.) Lift the bucket off the ground when moving forward to begin a new drag so it will not cut in.

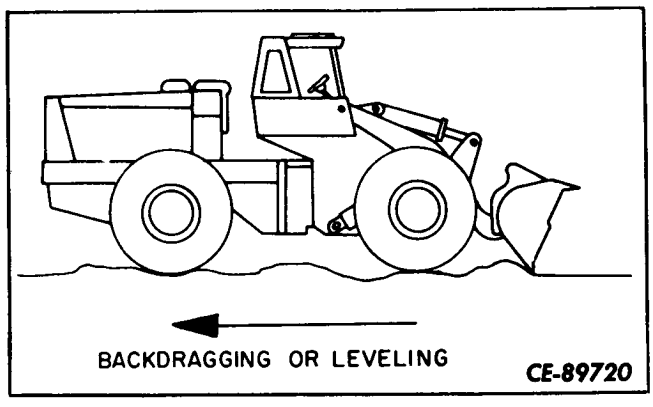


Figure 4-4b Backdragging or leveling

ENGINE SHUTDOWN.

Give the engine a chance to gradually cool before shutting it down. By idling the engine three to five minutes before shutting it down, heat buildup at the engine combustion chambers and bearings will be prevented. The engine lubricating system and the cooling system will carry the heat away before it can do harm.

Avoid long idling periods to prevent incomplete combusion due to low operating temperatures. Excess carbon may form in the combustion chambers and clog injector openings. Raw fuel left behind by incomplete combustion will wash lubricating oil off the cylinder walls and dilute engine oil to the extent that all moving parts in the engine will suffer from poor lubrication.

Stop the engine by turning the main electrical switch to OFF. The bucket assembly should be lowered to the ground and the boom control lever placed in FLOAT position.

If a mechanical failure occurs or the probability of one is indicated in the engine, transmission, final drives, or the hydraulic system, stop the engine as soon as possible. Practically all failures give some warning before the parts "let go" and ruin other components. Be heeding such warning signs as a sudden drop in engine oil pressure, unusual noises, or erratic steering action, etc., the damage caused by failures can be lessened. Never try to work the loader when signs of a failure are present.

SECTION CONTENTS

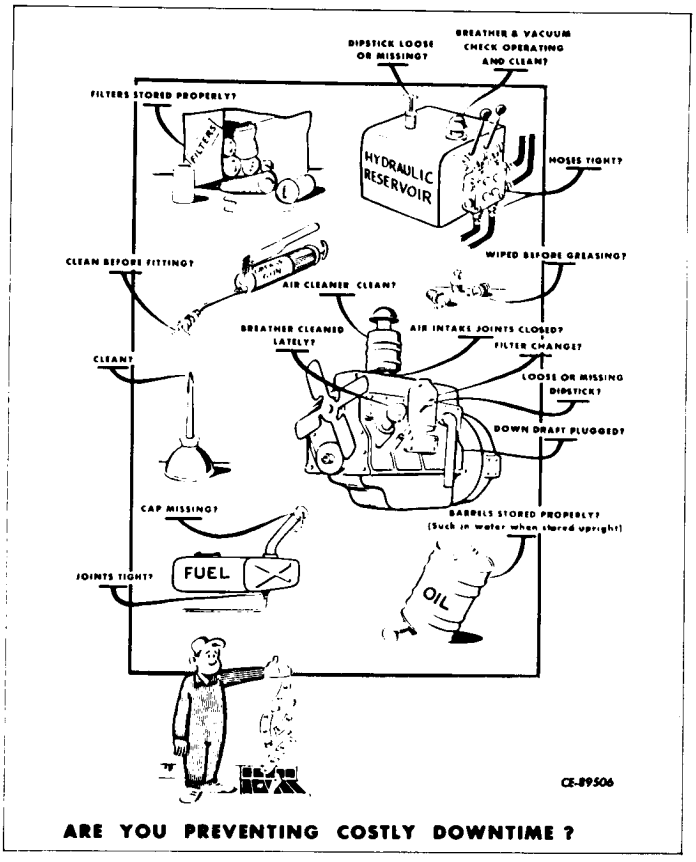


Figure 5-1a

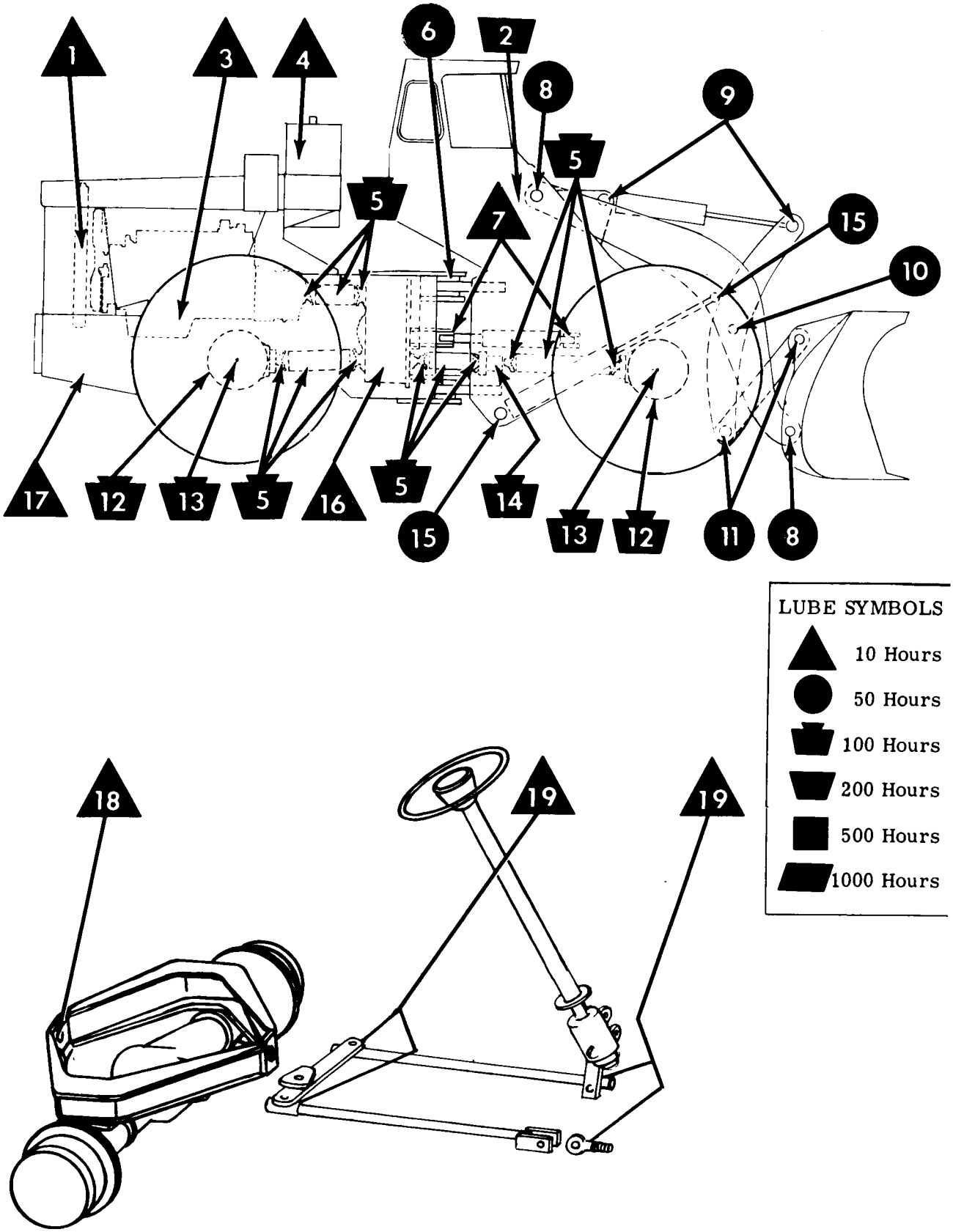
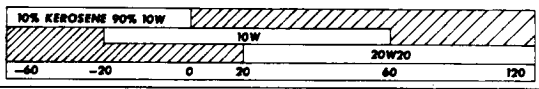


Figure 5-2a Lubrication diagram

LUBRICATION INTERVAL	ITEM NO.	POINT OF LUBRICATION OR REFILL	LUBRICANT SAE	LUBRICANT API	LUBRICANT MILITARY	REMARKS
Every 10 Hours ▲	1	Cooling System Engine & Radiator Above 32°F Below 32°F #	Water and 5% Corrosion Inhibitor Solution Ethylene Glycol		0-A-00548C	Check
	3	Engine Crankcase Oil (See Note 1)	(See Note 1.)			Check
	4	Hydraulic System 	**cc or cd		MIL-L-45199B or MIL-L-2104B	Check
	16	Transmission System	Dexron® Transmission Fluid			Check
	17	Fuel System (See Note 1). Diesel Normal service to 10°F Below 10°F or extended idling	Grade 2D Grade 1D		ASTM D-975	Check
Every 50 Hours ●	N.I.	Batteries	Distilled Water			
	7	Steering Boosters	Multi-Purpose NLGI - Grade 2 Lithium Base		MIL-G-10924 B or I.H. 251 H EP	Lubricate
	18	Axle Cradle				
	19	Drag Links				
	8	Boom Pivots				
	9	Bucket Cylinder				
	10	Bellcrank Pivots				
	11	Bucket Links				
	15	Boom Cylinders				
	6	Upper & Lower Articulation Pivots				
Every 100 Hours ⬟	5	Drive Shafts				
	13	Axle Differentials Above 32°F Below 32°F	140 90	GL-5	IH 135 H EP MIL-L-2105B	Check
	12	Hub Final Drive Above 32°F Below 32°F	140 90			Check
	14	Intermediate Drive Block	90			Lubricate
	N.I.	Hydraulic Brake Fluid	J 1703a	IH Heavy duty brake fluid		Check
Every 200 Hours ▬	2	Brake Treadles	20W		MIL-G-10924	Lubricate

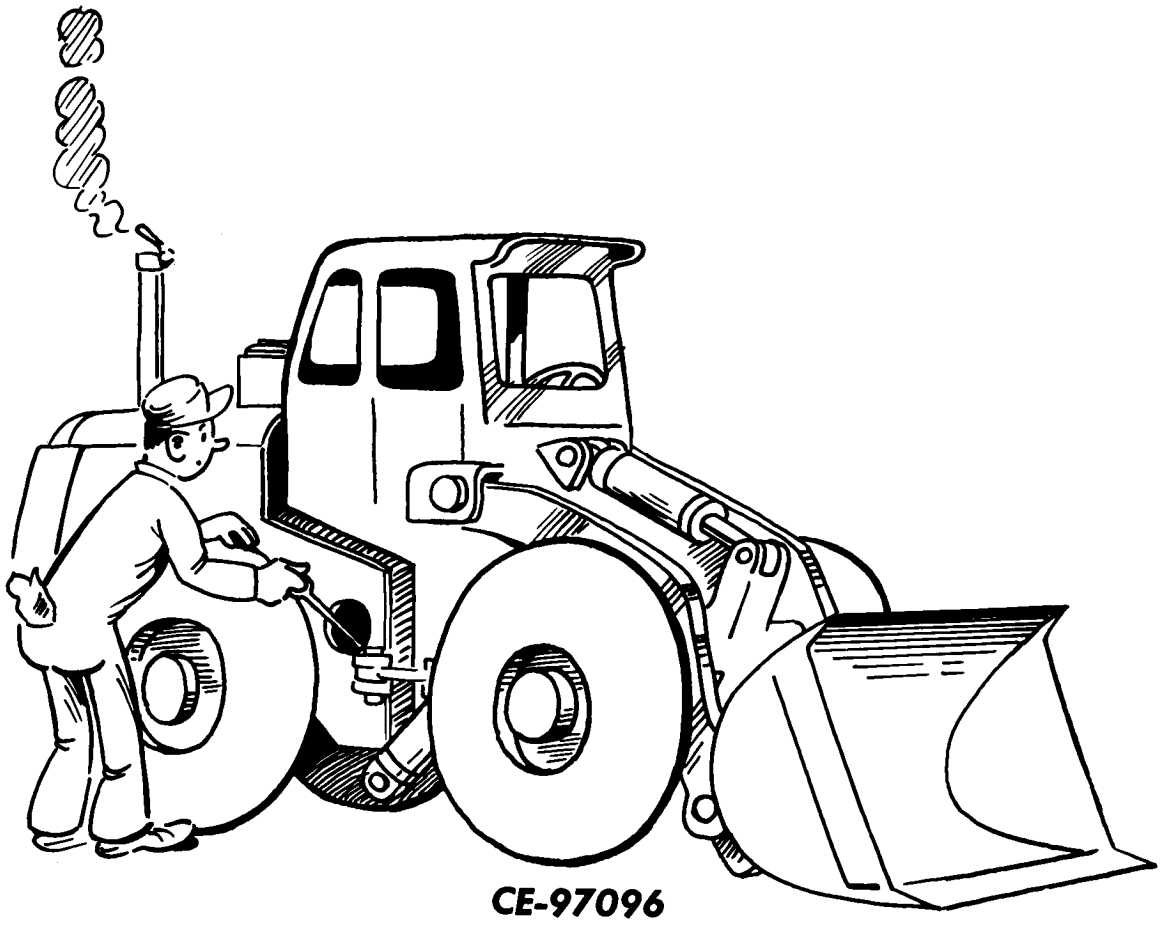
** - MS Wear test sequence
NI - Not Illustrated

NOTE 1: See engine manual for ambient temperature recommendation.
Anti-leak Anti-freeze not recommended for Cummins engines.

MAINTENANCE SCHEDULE

SYSTEM	INTERVALS AND OPERATION
Engine & Transmission	10 Hour: Check alcohol evaporator; Check engine oil level; Service air cleaners; Fill fuel tank; Drain fuel filters; Check cooling fluid level; Check transmission oil
	100 Hour: Initial transmission filter change & clean sump screen; Check and adjust belt tension; Clean air cleaner
	200 Hour: Change engine oil and filter; Clean crankcase breather; Replace corrosion resistor
	500 Hour: Change by-pass filter; Change transmission filter; Bleed and clean fuel system; Change fuel filter; Check fan hub and drive pulleys
	1000 Hour: Clean fuel injectors; Check thermostat; Replace air cleaner elements; Change fuel filters; Check fan hub and drive pulley
Drive Line	10 Hour: Check tire pressure and treads
	100 Hour: Lubricate drive shafts; Check oil level in intermediate drive block; Check oil level in wheel hubs; Check oil level in differentials; Clean axle breathers
	1000 Hour: Change wheel hub oil; Change differential oil; Change intermediate block oil
Brake System	10 Hour: Drain moisture from air tanks
	100 Hour: Check hydraulic brake fluid
	200 Hour: Lubricate brake treadles
	500 Hour: Clean power cluster breather
	1000 Hour: Check parking brake wear
Hydraulic System	10 Hour: Check hydraulic oil level
	100 Hour: Initial hydraulic filter change
	1000 Hour: Change hydraulic filter and oil
Electrical System	50 Hour: Check battery
	200 Hour: Blow dust from alternator; Check stop light switch; Inspect and tighten electrical cables and connections
	500 Hour: Lubricate cranking motor
Other	10 Hour: Check operator's report; Visual check
	50 Hour: Chassis lubrication
	200 Hour: Check steering gear oil level
	500 Hour: Clean engine and tractor

NOTE: Repeat each maintenance operation at the end of the same time interval where it first occurs. Repeat all 10 Hour Operations after every 10 hours of tractor operation.



Preventive Maintenance Pays

MAINTENANCE

GENERAL.

Care of the PAY® LOADER is described in this section. The maintenance schedules suggested are based on hours of normal operation.

A more practical schedule should be developed for each work situation. The type work a unit is doing, the rate at which it is worked and how it is used are variables that will set the pattern for maintenance.

Moving parts in a machine and those in contact with them wear as the machine is used. This normal wearing of parts cannot be stopped but good operation and maintenance will retard it.

Practice a definite system of maintenance that will keep the machine operating to best advantage. To be effective, the maintenance system must be progressive so all servicing will be done in proper sequence when it is needed. Repeat each maintenance operation at the interval shown in the Maintenance Schedule.

Lubricant products used to service the PAY® LOADER should meet the SAE, API and Military Specifications indicated in the LUBRICATION CHART. The specifications will aid the petroleum supplier in furnishing the type product described or its equivalent.

Additional maintenance information for such components as the engine can usually be gotten from the component manufacturer. It is suggested that these "Operation and Maintenance" handbooks be obtained and be used with this manual.

▲ 10 HOUR MAINTENANCE OPERATIONS

CHECK ENGINE OIL LEVEL.

SERVICE AIR CLEANERS.

FILL FUEL TANK.

CHECK TRANSMISSION OIL LEVEL.

CHECK COOLING FLUID LEVEL.

CHECK TIRE PRESSURE AND TREADS.

DRAIN MOISTURE FROM AIR TANKS.

CHECK HYDRAULIC OIL LEVEL.

CHECK ALCOHOL INJECTOR (OPTIONAL).

CHECK FOR COOLANT, FLUID OIL AND FUEL LEAKS.

DRAIN FUEL FILTERS.

CHECK OPERATOR'S REPORT.

CHECK OPERATION OF GAUGES AND METERS.

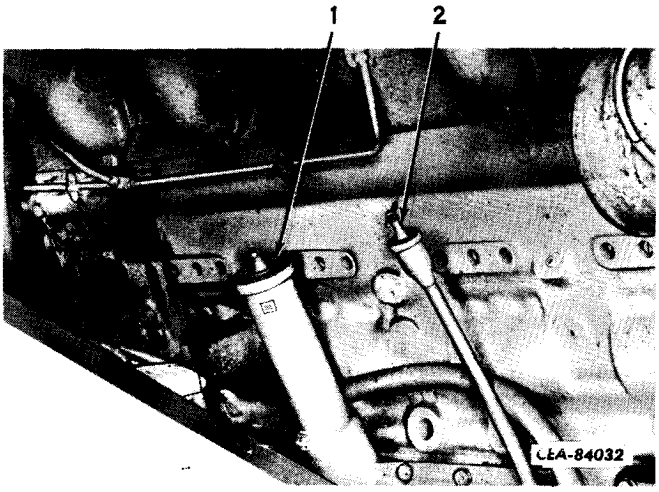


Figure 5-6A Check and Fill

CHECK ENGINE OIL LEVEL.

The engine oil level is checked by using the engine dipstick located on the left side of the engine. (Figure 5-6A Item 2.) You add oil through the fill pipe located next to the dipstick (Figure 5-6A Item 1). Refer to Lubrication Chart for correct type of oil.

The engine oil can be checked with the engine off or running. The dipstick has oil level marks for both type checks. The running check shoud be made with the engine running at 550 rpm.

The crankcase dipstick is marked with high (H) and low (L) level marks so the crankcase oil supply can be estimated. (See Figures 5-6A, Item 2.)

Keep engine oil level as near high level mark as possible. Do not operate with low oil level.

Keep dipstick with the oil pan or engine with which it was originally supplied.

SERVICE AIR CLEANERS.

Engine intake air is filtered by two dry paper-type air cleaners, one on either side of the engine compartment. Clean the cup on each filter base as often as necessary to prevent dust accumulation of more than 1-1/2 inches. Wipe the cups clean and replace them on the filters. Be sure the seals between the cups and filters are positive. Air leakage at this point will decrease the life of the filter elements and engine. Several cup gaskets should be kept on hand so damaged gaskets can be readily replaced. Each air cleaner has a restriction indicator which will indicate a restricted element when the window shows all red. The element should be cleaned when this appears. Push the reset button on the indicator to restore it to service.

Refer to 100 hour maintenance operations for the correct cleaning procedure for the element.

FILL FUEL TANK.

When filling fuel tank always use clean containers for transferring fuel. Be careful to not let any foreign material enter the tank while filling. Be sure the fuel tank filler cap is repositioned securely on the filler neck when finished.

The fuel tank filler tube (Figure 5-7A) is on the left side of the loader in the engine compartment near the radiator. Keep as much fuel in the fuel tank as possible. At the end of a work shift, fill the tank to keep condensation within the tank to a minimum. Filter all fuel added to the tank.

CHECK TRANSMISSION OIL LEVEL.

Use the dipstick provided in the transmission to check the oil level in same. A check of the quantity of oil in the transmission before it is warm, should read above the full mark. After the transmission reaches operating temperature then the dipstick should read at the full mark. When checking the oil level, the dipstick must be seated fully in the filler tube prior to reading so as to obtain an accurate reading.

The transmission dipstick filler tube (Figure 5-7B) is accessible on the right side of the loader next to the transmission forward output shaft. Loosen the dipstick handle and remove the stick. The oil level must show on the dipstick before the loader is worked.

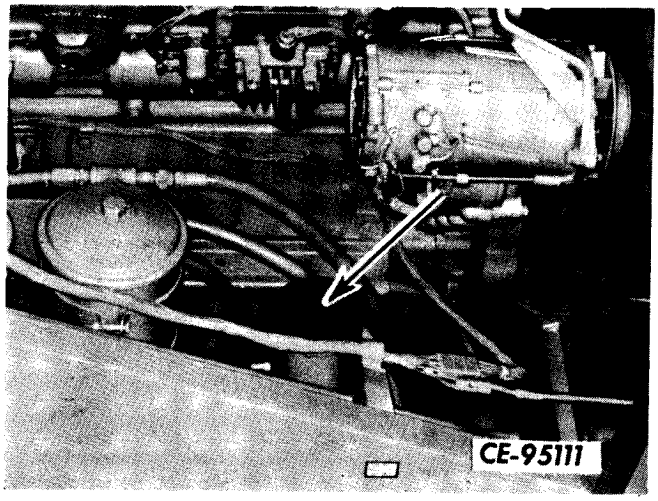


Figure 5-7A Fuel Fill

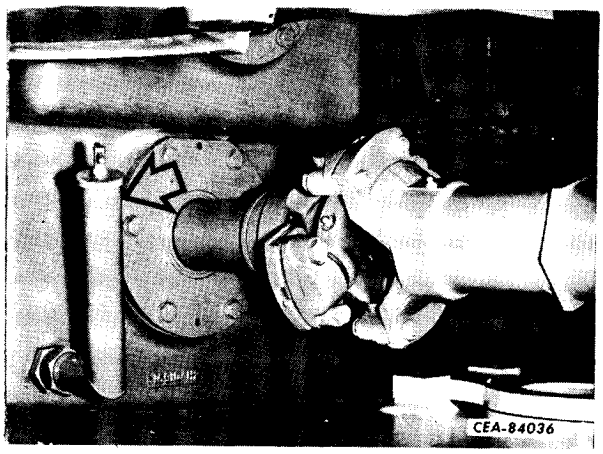
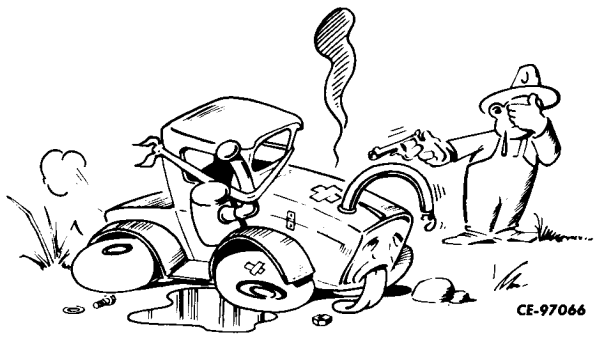


Figure 5-7B Transmission Check



AVOID THIS BY REGULAR PREVENTIVE MAINTENANCE

◆ CAUTION: DO NOT ATTEMPT TO CHECK THE TRANSMISSION FLUID LEVEL OR ADD FLUID UNLESS THE TRACTOR HALVES ARE SECURELY LOCKED WITH THE SAFETY BAR AND PINS PROVIDED! USE TWO PERSONS FOR THIS CHECK, ONE AT THE CONTROLS OF THE LOADER.

Start the engine. Operate the transmission controls momentarily. Then shift to neutral. Make a second level check with the oil hot and the engine operating at low idle speed. The oil level should not rise above the FULL mark. Drain oil down to FULL mark if the level is above dipstick FULL mark. Replace dipstick, tighten handle and stop engine.

CHECK COOLING FLUID LEVEL.

Keep the cooling system filled. Check the level after each work shift or at each fuel stop. Make a check of the coolant before starting and recheck it after the engine reaches normal operating temperature.

CHECK TIRE PRESSURE.

Tire pressures should be checked when the tires are cool. Repair any tire injuries that may be found.

Rear tires on the Model H-400 PAY® LOADER contain a dry-type ballast material. Check the tires as follows:

a. Position the wheel being checked so the valve stem is at the bottom and center of the tire rim.

b. Remove the valve stem cover and apply a short air blast through the valve stem. This will clear the stem and valve seat of ballast material. A small air pocket will also be formed in the ballast.

c. Place an air test gauge squarely on the valve stem and fully depress the valve core. Some time will be required to get a true pressure reading.

Note

If air escapes while making the check, some ballast material will escape with it. However, the loss should be only negligible.

d. Having checked the tire air pressure, clean the stem and valve seat with a second short air blast. When air must be added to the tire, the valve stem must be at its lowest position.

Note

Always replace the tire valve cap after making a tire pressure check.

DRAIN MOISTURE FROM AIR TANKS.

The compressed air system should be kept as moisture-free as possible. If the surrounding temperature is cold, the moisture will freeze in the system and make the brakes inoperative.

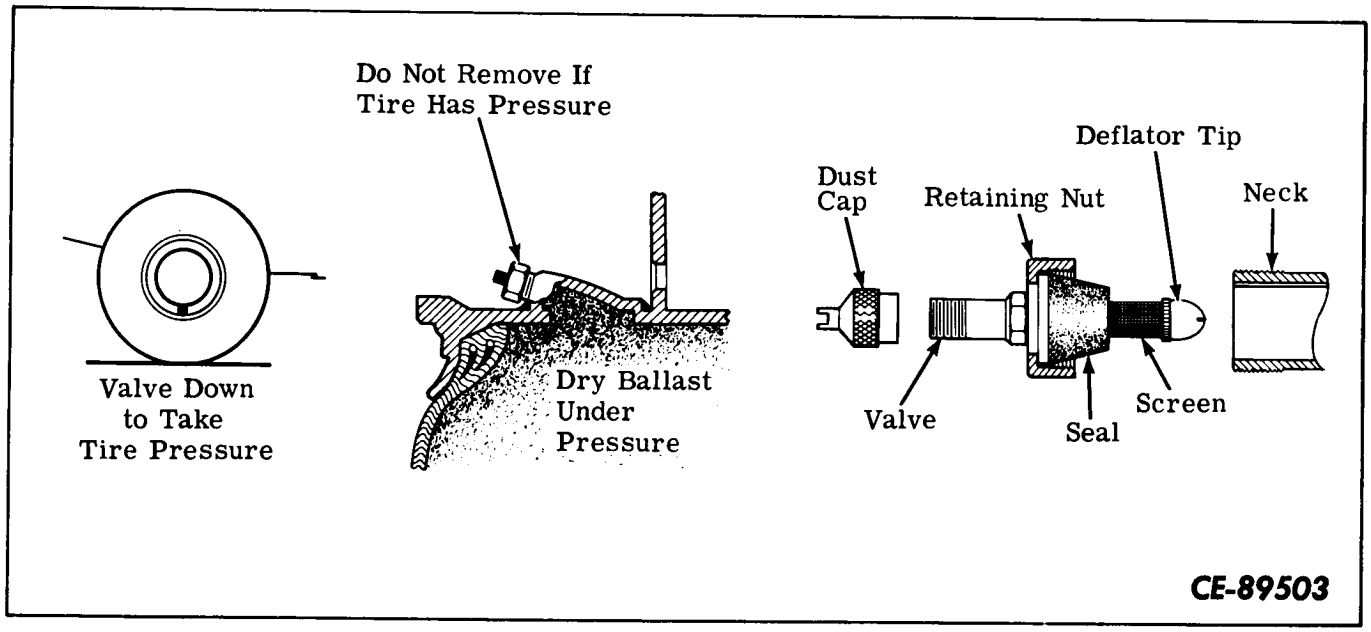


Figure 5-9a Valve stem and manifold assembly

Drain the air tanks as often as necessary. In dry climates, draining the air tanks once a month may be adequate. In more humid climates, it may be necessary to drain the tanks daily. Local conditions govern service frequency.

Drain moisture from the air tanks by opening the drain valve on each side of the loader at the rear of the front wheel. Keep both valves open until all air and drainage stops.

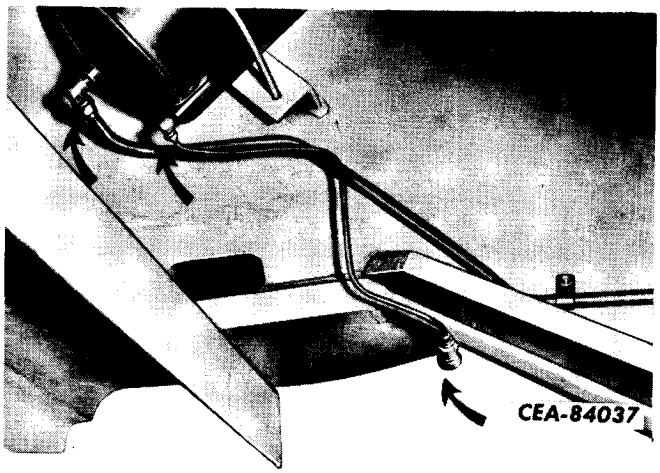
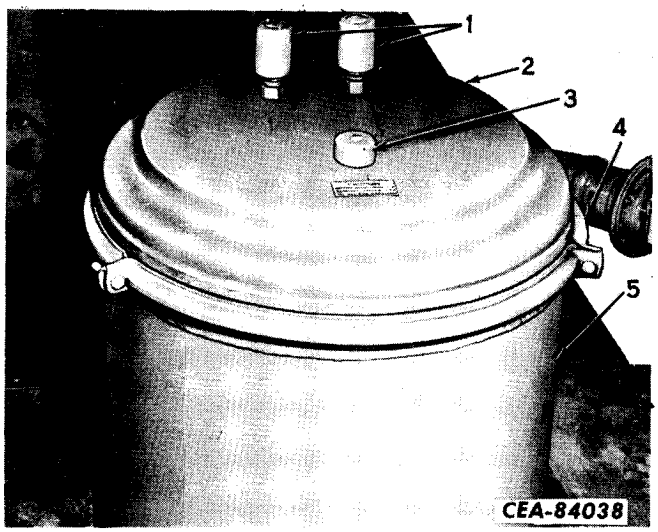


Figure 5-9b Air tank drain valve

CHECK HYDRAULIC OIL LEVEL.

Check the hydraulic reservoir oil supply with the engine off and with the bucket resting on the ground. Loosen the filler cap slowly to relieve reservoir pressure. Keep the oil level near the FULL mark on the reservoir dipstick attached to the filler cap. See Figure 5-9c. Any makeup oil added to the reservoir should be of the same type used at the time of refill. Refer to the Lubrication Chart.



1. Pressure relief valves
2. Cover
3. Dipstick
4. Ring
5. Reservoir

Figure 5-9c Hydraulic reservoir installation

CHECK ALCOHOL INJECTOR (OPTIONAL).

Check the fluid level in the alcohol injector and maintain a level no lower than 1/2 inch from the filler opening. The injector is located on the rear frame, on the right hand front portion, inside of the frame. When the system is maintained properly, moisture problems in the air system are almost eliminated.

CHECK FOR COOLANT, FLUID, OIL AND FUEL LEAKS.

Check below loader for signs of engine coolant, hydraulic oil, transmission fluid, fuel oil and brake fluid leaks.

Keep all line connections in the compressed air-over-hydraulic brake and hydraulic loader systems clean and tight. Correct any leaks that may be found at connections.

A light oil film on control valve spools and the operating rods of loading and steering cylinders is normal.

DRAIN FUEL FILTERS.

Drain any accumulated moisture from the fuel filters before starting the engine. Remove the drain plug from the bottom of the filter housing and replace it when clear fuel appears.

CHECK OPERATOR'S REPORT.

Check the operator's daily reports. Correct such abnormal conditions as:

a. Low engine lube pressure.

b. Low or high torque converter pressure.

c. Erratic or low hydraulic system temperature.

d. Continual low air system pressure reading.

e. Abnormal engine temperature.

f. High operating temperature in specific transmission condition.

g. Continual high torque converter temperature.

h. Lack of or decreased hydraulic response in loading or steering operations.

i. Unusual noises.

j. Excessive engine exhaust smoke.

CHECK OPERATION OF GAUGES AND METERS.

With the engine running, check operation of all gauges and meters. Operate tractor, as necessary, while making this check.

● 50—HOUR MAINTENANCE OPERATIONS

LUBRICATE REAR AXLE BOLSTER

LUBRICATE STEERING CYLINDERS

LUBRICATE LOWER ARTICULATION PIVOT

LUBRICATE UPPER ARTICULATION PIVOT

LUBRICATE STEERING CONTROL ARMS

LUBRICATE ENGINE DRIVE SUPPORT

LUBRICATE BOOM CYLINDERS

LUBRICATE BUCKET CYLINDERS

CHECK BATTERIES

LUBRICATE BUCKET LINKS

◆ CAUTION: ALWAYS WIPE ALL DIRT AND GREASE OFF OF FITTINGS BEFORE SERVICING. USE THE TYPE OF LUBRICANT SPECIFIED IN LUBRICATION CHART. NEVER LUBRICATE THE TRACTOR WHILE IT IS RUNNING. USE A HAND OPERATED GREASE GUN TO PREVENT SEAL DAMAGE.

GENERAL LUBRICATION

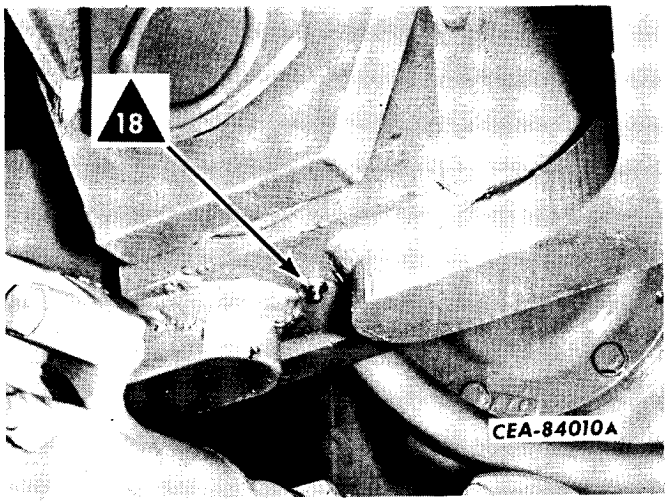


Figure 5-11A Rear Axle Bolster

Lubricate at the two grease fittings located on the bottom of the axle cradle directly beneath the mounting pins.

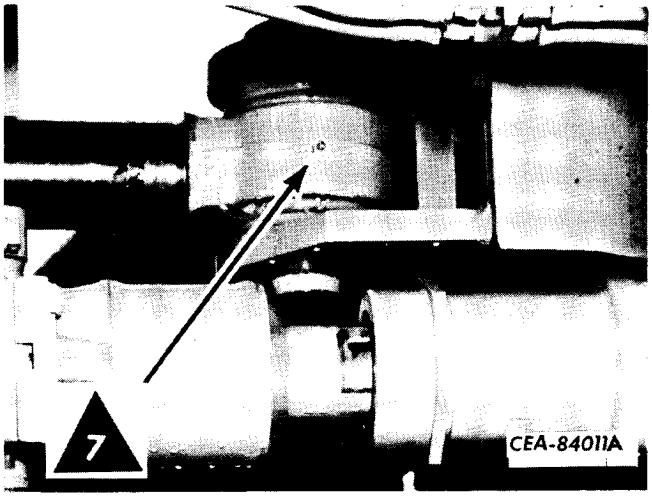


Figure 5-11B Steering Cylinder

Lubricate at the two fittings located one at each end of the steering cylinders.

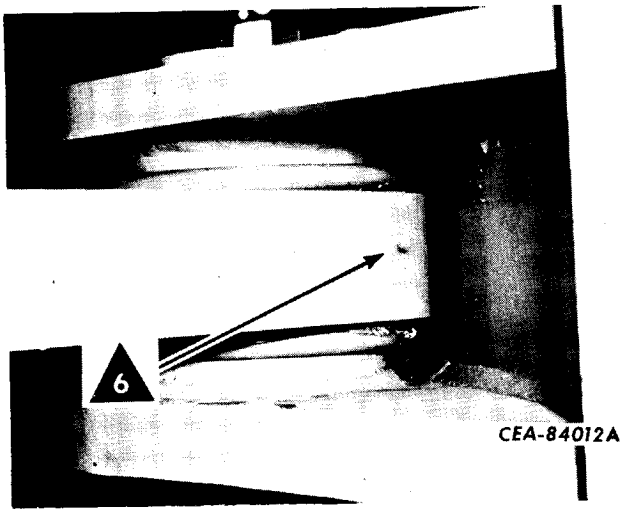


Figure 5-12A Lower Articulation Joint

Lubricate the lower articulation joint at the two fittings provided. One is located at the rear of the front frame portion of the articulation pivot and there is one located in the center, on the upper portion of the pivot pin.

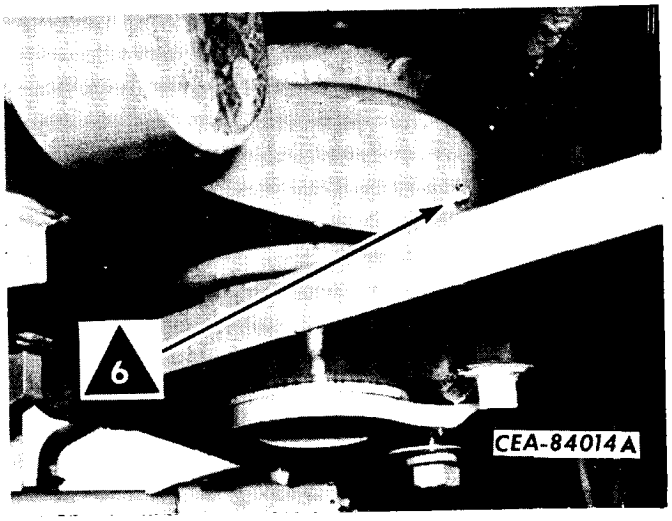


Figure 5-12C Upper Articulation Joint

Lubricate the upper articulation joint at the two fittings provided. One is located at the rear of the front frame portion of the articulation pivot and one is located in the center, on the underside of the pivot pin.

(Note)

Refer to the Lubrication Diagram (Figure 5-2A) for assistance in locating the lubrication points. Remove the plug from the fan hub and insert a grease fitting. Lubricate the fan hub then remove the fitting and reinstall the plug.

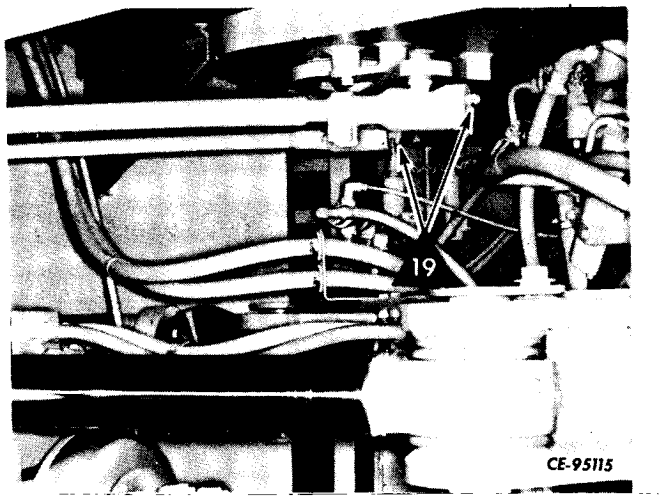


Figure 5-12B Steering Control Arm

Lubricate at the three fittings located one in each end of the drag link and one in the end of the control rod from the pivot point to the steering valve.

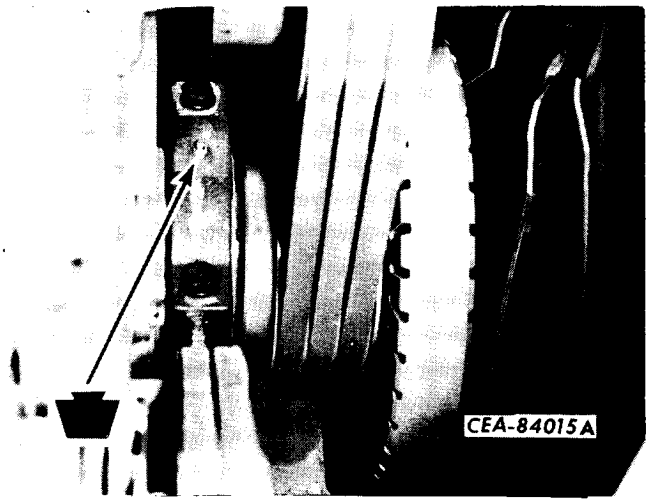


Figure 5-12D Engine Drive Support

Lubricate at the single fitting located on top of the drive support cap at the front of the crankshaft.

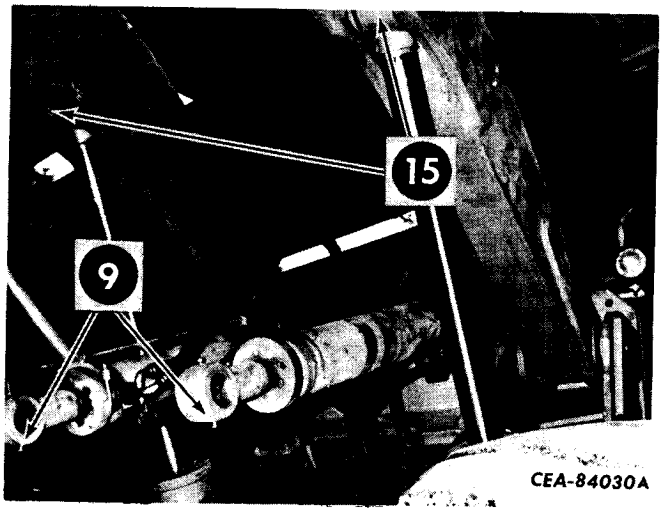


Figure 5-13A Boom and Bucket Cylinders

Lubricate at the two fittings, located one at each end of boom cylinders. Each boom arm has a grease fitting located at each pivot point, one at the frame and one at the bucket.

Lubricate at the two fittings, located one at each end of the bucket cylinders. The front fitting is located on top of the rod end, while the fitting at the rear is on the underside.

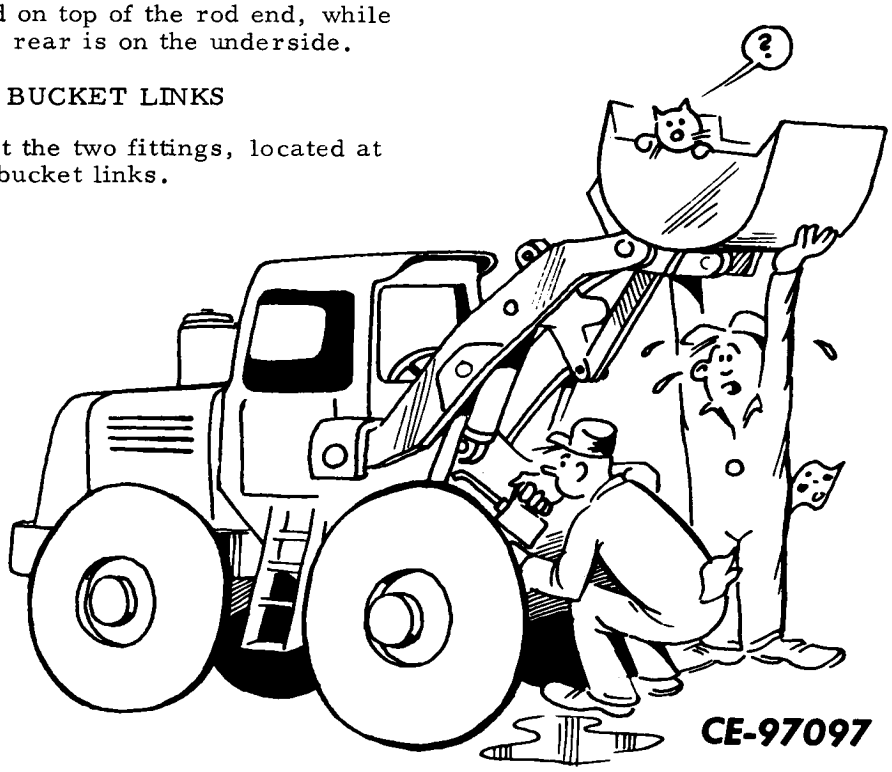
BUCKET LINKS

Lubricate at the two fittings, located at each end of the bucket links.

CHECK BATTERIES

Visually inspect the battery installation on both sides of the loader. Since both battery installations are similar, Figure 3-3b shows only a typical installation. Look for signs of serious battery abuse such as broken and cracked cases and cell covers. Remove corrosion, dirt, and grease from the battery tops and terminals with a soda solution or diluted ammonia water. Flush the battery surfaces clean with water. Check that connections are securely fastened and coat terminals with vaseline.

Check that the fluid level in each battery cell is above the plates to prevent permanent plate damage. If makeup battery fluid is needed, use only fresh distilled water or approved battery water. During cold weather, run the engine while makeup fluid is added so fluid is mixed with the battery electrolyte before it can freeze.



Be sure booms are properly supported when servicing

100-HOUR MAINTENANCE OPERATIONS

LUBRICATE DRIVE SHAFTS.

CHECK OIL LEVEL IN INTERMEDIATE DRIVE BLOCK.

CHECK OIL LEVEL IN WHEEL HUBS.

CHECK OIL LEVEL IN DIFFERENTIALS.

CLEAN DIFFERENTIAL BREATHERS.

CHECK HYDRAULIC FLUID LEVEL IN POWER CLUSTERS.

INITIAL HYDRAULIC SYSTEM FILTER CHANGE.

CHECK MOUNTINGS AND PIN LOCKS.

INITIAL TRANSMISSION FILTER CHANGE AND CLEAN SUMP SCREEN.

CHECK AND ADJUST BELT TENSIONS.

CLEAN ENGINE AIR CLEANERS.

CHECK CENTER HINGE.

LUBRICATE DRIVE SHAFTS.

Apply general purpose chassis grease at all shaft splines and universal joints. Use the type lubricant recommended in the Lubrication Chart. Before applying grease at a fitting, wipe it clean to prevent forcing dirt into the bearing retainers of the universal joints and shaft splines. Use a hand gun to prevent seal damage.

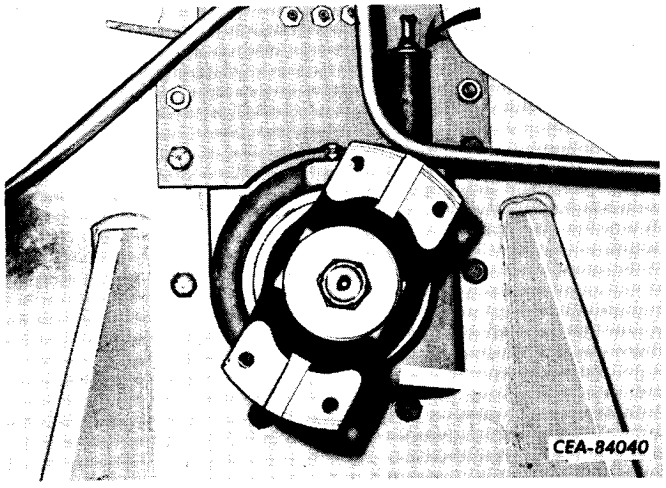


Figure 5-14A Intermediate Drive Block

CHECK OIL LEVEL IN INTERMEDIATE DRIVE BLOCK.

The intermediate drive block is mounted on the front frame assembly in front of the front transmission output. (See Figure 5-14A.) Be sure the breather is clean and will revolve freely.

Remove the filler tube cap and check the drive block oil level. Keep the drive block filled to the level indicated on the cap dipstick. If makeup oil is needed, use the type specified in the Lubrication Chart.

CHECK OIL LEVEL IN WHEEL HUBS.

Check the wheel hub oil level on level ground. Clean the wheel hubs and move the loader to position each hub as shown in Figure 5-14B.

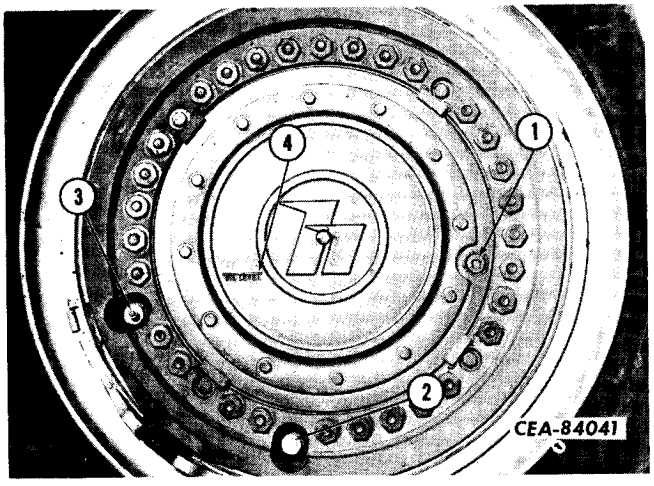


Figure 5-14B Wheel Hub

1. Fill-check plug
2. Ballast removal cap
3. Air valve
4. Hub oil level mark

Remove the fill-check plug from the hub cover. Note that the oil level line is horizontal and points to the fill-check plug. The hub oil level should be even with the plug hole. If makeup oil is needed, add it through the fill-check opening until oil flows from the plug hole. Use the type lubricant specified in the Lubrication Chart. Install the plug again in the hub cover and wipe off excess oil.

◆ CAUTION: DO NOT MISTAKE THE LARGE HEXAGON SHAPED AIR CAPS IN THE RECESSES OF THE OUTER LUG NUT CIRCLE FOR THE DRAIN PLUG.

CHECK OIL LEVEL IN DIFFERENTIALS.

Clean the fill-check plug on each differential and remove the plug. The oil level should be even with the check plug hole. If the level is low, add makeup oil to the level of the check hole. Use the type oil specified in the Lubrication Chart.

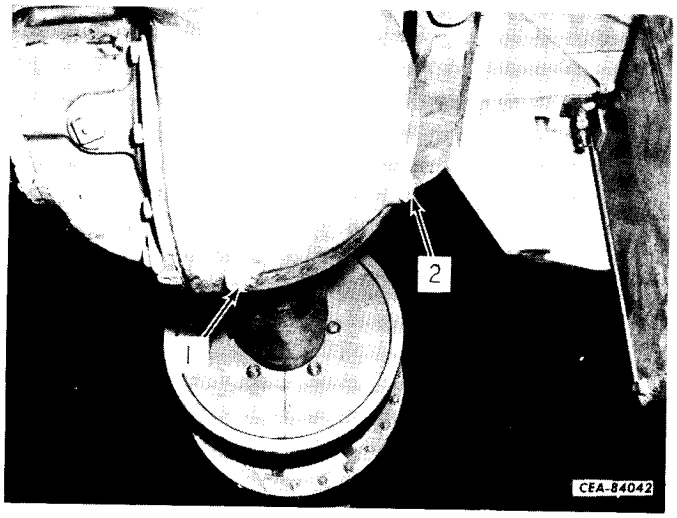


Figure 5-15A Rear Differential Installation

1. Drain plug
2. Fill-check plug

CLEAN DIFFERENTIAL BREATHERS.

The breathers for the differential consist of lengths of copper tubing extending up from the side of each differential housing. Remove and clean thoroughly, inside and out. If the tubes should become plugged, pressure could build up within the differential and cause seal damage.

CHECK HYDRAULIC FLUID LEVEL IN POWER CLUSTERS.

Check hydraulic brake fluid level frequently. Maintain the reservoir level within 1/2 inch to 3/8 inch of filler hole to prevent the possibility of air entering the hydraulic part of the brake system. Clean around the filler hole of the power clusters, then remove the plug. If fluid must be added, use the type hydraulic brake fluid indicated in the Lubrication Chart. Clean the vent hole in the filler cap before reinstalling.

INITIAL HYDRAULIC SYSTEM FILTER CHANGE.

The hydraulic system filters should be replaced at this interval. Any contaminates which might result from the break-in period would be trapped in the elements by this time. Replacing the elements would help assure a clean system. After the initial element change, replace the elements at the 1000 hour service interval.

Service the vacuum pressure relief valve (see Figure 5-15B) at this time. To remove filter, Item 5, remove lock ring Item 2. Remove the cover Item 4. Filter should now be readily accessible. Remove filter and clean in a suitable solvent. At this time also check the seal rings of the assembly for wear or deterioration. Replace them if necessary. Dry the assembly by directing compressed air through it. Be careful not to damage it. Replace the element, cover and retaining ring.

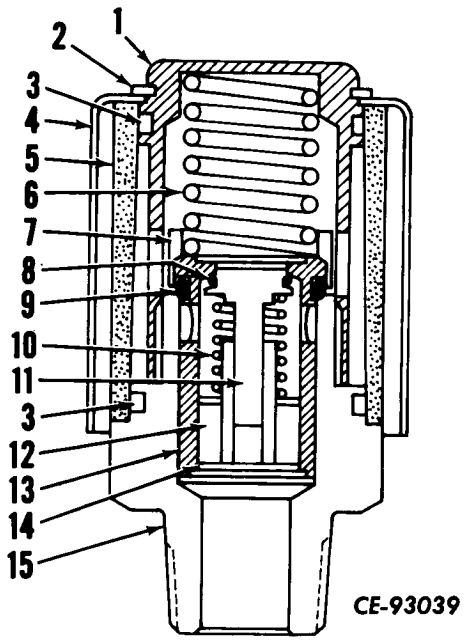


Figure 5-15B Vacuum Pressure Relief Valve

1. Cap
2. Lock ring
3. Filter seal
4. Cover
5. Filter
6. Spring
7. Retainer
8. Poppet seal
9. Sleeve seal
10. Poppet spring
11. Poppet
12. Guide
13. Sleeve
14. Lock ring
15. Body

CHECK MOUNTINGS AND PIN LOCKS.

Check all mounting bolts, boom and bucket pivots, steering cylinder pivots, and rear axle carrier pivots. Occasionally they will become loose. Loose mounting bolts accelerate the wear of supports, brackets, and pivots. Keep all mounting and pivot locks tight and replace broken or worn parts when found.

INITIAL TRANSMISSION FILTER CHANGE.

Replace transmission filter element located to the left side of transmission. Clean sump strainer mounted to plate located on the lower right side of transmission case. Drain all oil into clean container, remove & clean sump screen, replace & tighten, insert new element & seal in filter (refer 500 hr. operations), replace drain plug & fill transmission. If old oil is used, filter first. Run machine, check for leaks & maintain correct oil level.

CHECK AND ADJUST BELT TENSIONS.

Neglect or improper care of the drive belts often leads to cooling problems or bearing failures as well as short belt life. Belts set too tightly cause added strain on the pulley grooves and drive shafts. Loose belts will slip, overheat, and wear quickly. Care of the belts is often overlooked because the undesirable effects do not occur readily.

Check drive belt tension by depressing the belts midway between pulleys as shown in Figure 5-16A. The belt deflection should be equal to the thickness of the belt for each foot of free span.

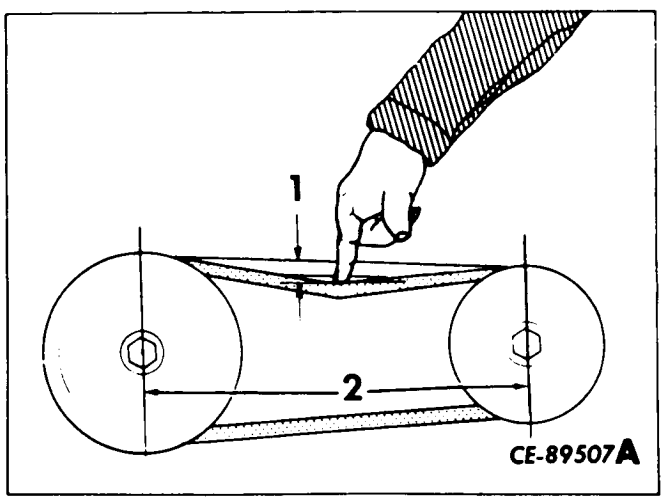


Figure 5-16A Belt Tension Check

1. Deflection
2. Belt free span

Replace belts that are frayed and cannot be properly adjusted. Shorten the distance between pulley centers by loosening the adjusting devices before new belts are installed. Never pry or roll a belt onto a pulley. Both of these methods will decrease belt life. If the engine is not used for long periods (a month or longer), relieve the drive belts of all tension.

Do not tighten a belt beyond the limits arrived at from the Belt Tension Check. When belt squeaking occurs, it is not necessarily caused by loose belts. Belts will often squeak because of the glaze formed by dirt collecting on the belts. Clean the belts by wiping them with hydraulic brake fluid to eliminate the squeaking.

CLEAN ENGINE AIR CLEANERS.

Freedom of air flow through the air cleaners to the engine is indicated by a vacuum gauge on the side of each air cleaner. Service the cleaner elements and tubes when the vacuum gauge indicator shows red. Press the top of the gauge to restore it to service. The indicator shows green when the air cleaner is clean.

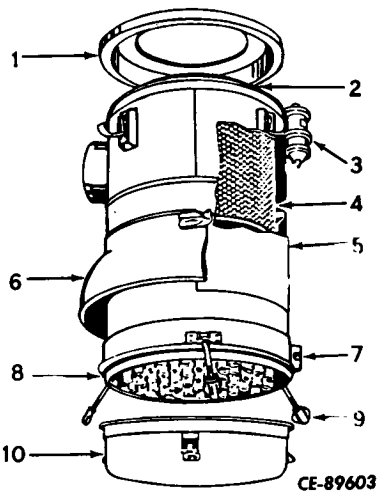


Figure 5-16B Air Cleaner Assembly

1. Cover
2. Cover gasket
3. Vacuum gauge
4. Element
5. Body
6. Shroud
7. Cup retainer band
8. Cup gasket
9. Cup retaining clamps
10. Cup

Before installation, carefully inspect paper for rupture. Reinstall and check element for proper seating. Install cup securely.

The service frequency for the cleaner element should be established according to working conditions. After every 100 hours of operation a new cleaner element should be installed.

CHECK CENTER HINGE.

A. Position base of a dial indicator on front frame and indicate to rear frame. Place indicator as near as possible to pivot shaft bore without touching shaft.

B. Power boom until front tires are raised off ground.

C. Observe dial indicator.

D. Raise boom 1/4 to 1/2 of maximum raised height.

E. Observe dial indicator.

F. Lower boom so bucket (or blade) rests squarely on ground. If unit does not have bucket (or blade), rest boom ends (or push beam if dozer) on blocks.

G. Dial indicator reading of total vertical movement must not exceed .010 inches.

If total vertical movement exceeds .010 inches, readjust center hinge as follows:

CENTER HINGE BUSHING ADJUSTMENT PROCEDURE.

1. Place frames in a straight ahead position and install locking bar between frame halves.

2. Place hydraulic loader linkage in float so weight of bucket rests squarely on ground. If unit does not have bucket, rest boom ends on a block.

3. Stop engine.

NOTE: Pivot shaft cam locks must keep shaft flanges snug against frame stop blocks while making adjustments.

4. Check that front frame tongues are approximately centered between rear frame ears. Item (2) should be the same at both pivot shaft locations. Item (3) does not have to match. If not centered, adjust using the following procedure:

a. Remove upper and lower shaft nut retainer plates.

b. If front frame tongues are too high - loosen upper pivot nut until tongues are centered.

c. If front frame tongues are too low - loosen lower pivot nut then tighten upper pivot nut until front tongues are centered.

NOTE: Check that upper and lower pivot shaft flanges are NOT in contact with rear frame (Item 1). A minimum of 1/16 inch must exist. If spacing of one or both center hinges is incorrect, shims must be installed.

5. Tighten lower pivot nut to 350-400 ft. lbs. torque. (NOTE: Tap pivot shaft solidly while torquing nut to seat shaft.)

6. Loosen lower pivot nut.

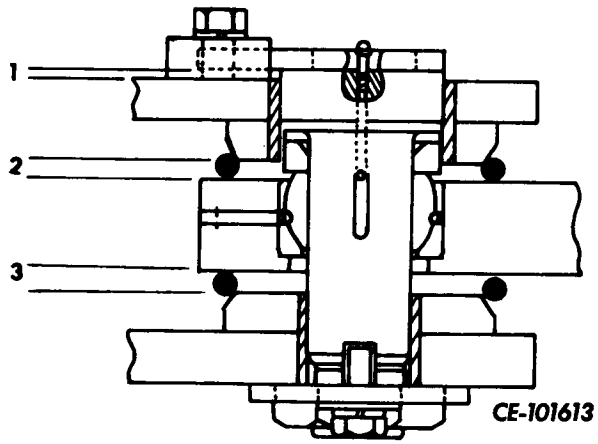


Figure 5-17A

7. Using nut retainer plate as a wrench, retighten nut until it is just snug. DO NOT OVER TIGHTEN.

8. Raise boom (or push beam) to maximum height and then lower in "jerky" increments to assure final mating of component parts.

9. Recheck vertical frame movement as outlined in dial indicator check procedure.

10. If dial indicator reading exceeds .010 inches, repeat steps 7, 8, and 9 above.

11. If dial indicator reading still exceeds .010, determine that the reading is all vertical movement. Movement other than vertical indicates worn parts. Rebuild if necessary. If movement is all vertical, not enough torque was applied to the shaft adjusting (retaining) nut to seat mating components.

NOTE: Failure of mating parts to seat results from binding within the hinge assembly. This binding can occur between the shaft and inner race of the bushing if improper lubrication has allowed galling of these surfaces. (The shaft should fit freely through the bushing.) If the shaft is bound to the inner race, any movement of the shaft will be transmitted to the spherical surface between the inner and outer races of the bushing. Galling of this spherical surface (which is intended only for self-alignment purposes) might cause binding. Also, rust and corrosion between the shaft and rear frame bores might cause binding of the shaft and improper seating of hinge components.

If binding within the hinge assembly will not allow proper seating of components, torque higher than those listed in step 5 must be applied to the lower pivot nut. Refer to the following procedure when increasing torque:

1. Apply a reasonable higher torque to the retaining nut.

2. Apply shock loads per step 8 (above) and/or rap the frame near the shaft, and the top of the shaft, with a heavy hammer to help cause shaft movement (adjustment).

3. Gradually increase the nut tension and applications of shock loads to help cause shaft movement. Too much tension can result in an over-correction and cause thrust bearing damage.

4. By the means of a shim and a feeler gauge, measure the clearance between the shaft locking flange and the main frame to determine how much the shaft has been moved to avoid repeated dial indicator checks.

12. Make final dial indicator check of vertical frame movement as outlined in check procedure "A" through "G."

13. Position flanges of upper lower pivot shafts against stop blocks; rotate lock plate cam clockwise to contact shaft flange and tighten cam screw.

14. Install, line up and secure upper and lower pivot nut retainer plates with hardware previously removed. (NOTE: Two positions are available by turning retainer plate over.) If holes in retainer plate do not line up with tapped holes in frame (in either retainer plate position) loosen nut until retainer plate holes will line up with tapped holes in frame. Because two retainer plate positions are availabe, the amount of nut loosening required will always be less than 30°, "NEVER LOOSEN NUT MORE THAN 30°."

200-HOUR MAINTENANCE OPERATIONS

CHANGE ENGINE OIL.

CHANGE FULL-FLOW OIL FILTER ELEMENTS.

CLEAN CRANKCASE BREATHER.

CHECK STEERING GEAR OIL LEVEL.

REPLACE CORROSION RESISTOR ELEMENTS.

LUBRICATE BRAKE TREADLES.

CLEAN FUEL PUMP SCREEN.

INSPECT AND TIGHTEN CABLES AND CONNECTIONS.

CHECK STOP LIGHT SWITCH.

BLOW DUST FROM ALTERNATOR.

CHANGE ENGINE OIL.

The need for an oil and filter change at this time depends on the filtering efficiency of the engine filters, the condition of the engine, and the type oil used. The oil change frequency is best established by analyzing the drained oil for sludge and dilution. Drain oil from the engine while it is warm so it will drain quickly.

Much of the accumulated sludge will be carried out with the warm oil. Do not flush the crankcase with kerosene.

Allow time for complete drainage and then close the drains. Fill the crankcase through the filler tube to the full mark on the dipstick.

No specific brand of oil is recommended. Use lubricating oils that will meet the quality requirements given in the Lubrication Chart. Refer to the engine manufacturer's Operation and Maintenance Manual for the type oil to use in various ambient temperatures and under adverse working conditions.

CHANGE FULL-FLOW OIL FILTER ELEMENTS.

The full-flow oil filters are located in the forward upper right side of the engine compartment. Remove the case drain plugs and allow the cases to drain.

These three filters are fitted with a removable head that is common to all three filter cases. Remove the used filter elements and wipe the insides of the filter cases with lint-free cloth before installing new filter elements. Replace drain plugs.

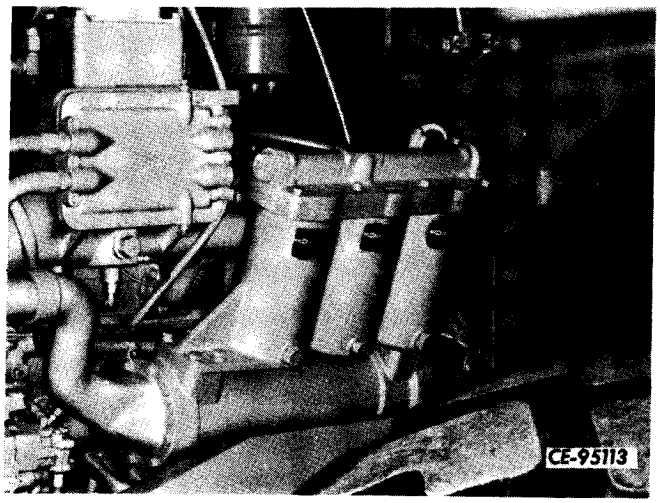


Figure 5-19A Full-Flow Oil Filter

CLEAN CRANKCASE BREATHER.

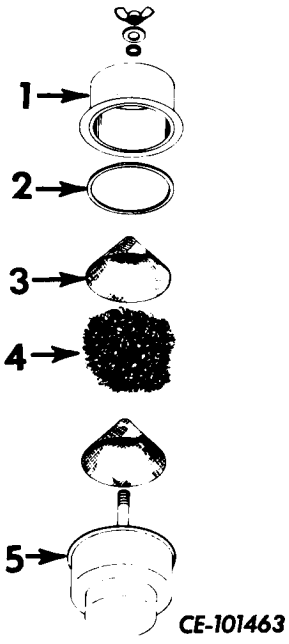


Figure 5-19B Crankcase Breather

1. Cover
2. Gasket
3. Screen
4. Filter
5. Housing

The crankcase breathers (Figure 5-19B) provides positive crankcase ventilation. Harmful vapors that develop in the crankcase are exhausted through the breathers by crankcase pressure before they can condense and contaminate the crankcase oil. Remove the crankcase breather element in each valve cover and wash it in solvent, dry with compressed air and replace.

CHECK STEERING GEAR OIL LEVEL.

Check the oil level in the steering gear every 200 hours. Remove the upper right hand bolt from the right side of the steering gear. The oil level should be at the bottom of this hole. If low, add the recommended lubricant.

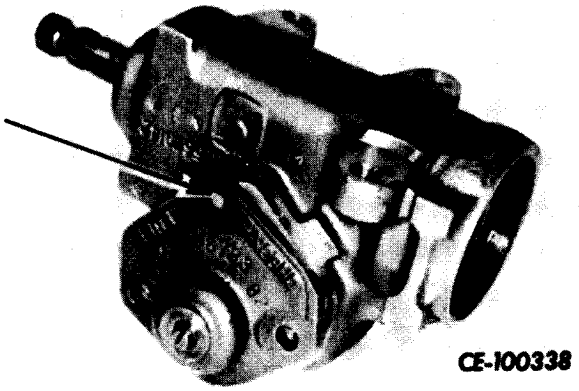


Figure 5-19C Steering Gear Oil Check

REPLACE CORROSION RESISTOR ELEMENTS.

The corrosion resistors are the spin-on, throw-away type. When the interval for service arrives, merely unscrew the element and discard. Screw on new element until it touches the housing, then tighten an additional 1/2 to 3/4

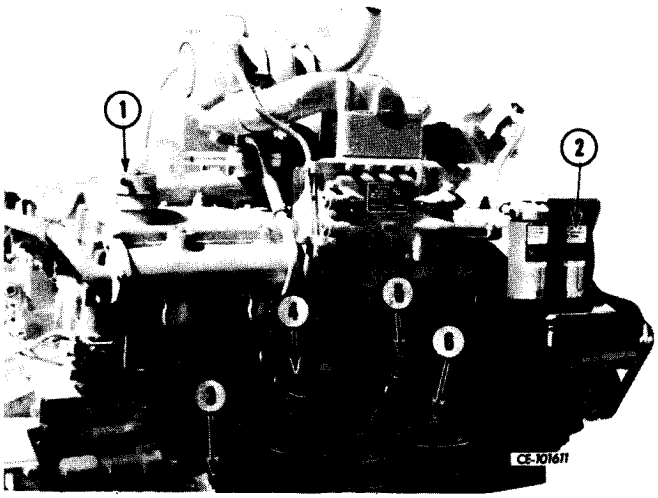


Figure 5-19D Replace Corrosion Resistor Element

1. Crankcase breather
2. Corrosion resistor
3. Starter lube
4. Oil fill tube
5. Oil check
6. Fuel filter

turn using your hands only. Any mechanical device used to tighten the element may distort or damage the element.

LUBRICATE BRAKE TREADLES.

Lift the boot under the treadle away from the mounting plate and lubricate the valve plunger with a few drops of SAE 20 MS oil (MIL-L-2104B). Wipe off excess oil and install the rubber on the mounting plate. Avoid using too much oil because contact with the rubber spring in the top of the valve could cause the spring to deteriorate.

CLEAN FUEL PUMP SCREEN.

At this time the fuel pump screen should be removed and cleaned to insure efficient filtration. For the proper cleaning procedure, refer to the engine manufacturer's manual.

INSPECT & TIGHTEN CABLES & CONNECTIONS.

Check for tight connections on all wires and cables. Check for clean connections, no dirt. Replace wires that show signs of wear.

CHECK STOP LIGHT SWITCH.

Exhaust all air pressure from the compressed air system by making repeated brake application. Maintain pressure on a brake treadle and start the engine. Watch the air pressure gauge on the instrument panel. Before the gauge needle reaches the "RUN" segment, the stop lights should light. Release the brake treadle and build up maximum system pressure before shutting the engine down.

BLOW DUST FROM ALTERNATOR.

Using compressed air, blow the dust and dirt from the alternator exterior and its openings. Keeping the alternator clean will prolong the life of the unit.

■ 500-HOUR MAINTENANCE OPERATIONS

CHANGE BYPASS FILTER ELEMENTS.

CHANGE FUEL FILTER ELEMENTS.

CHANGE TRANSMISSION FILTER ELEMENT.

CHECK FAN HUB AND DRIVE PULLEY.

LUBRICATE CRANKING MOTOR.

BLEED AND CLEAN FUEL SYSTEM.

CLEAN ENGINE AND TRACTOR.

CLEAN POWER CLUSTER BREATHER.

CHANGE BYPASS FILTER ELEMENTS.

The engine is provided with two by-pass filters, located on both sides of the engine compartment at the front compartment bulkhead.

Change the engine by-pass filter elements as follows:

a. Remove the plate in the engine hood covering the two filters.

b. Drain oil from each filter case by opening the case drain.

c. Remove the cover clamp ring and the case cover.

d. Loosen the element hold-down assembly and lift out the used elements.

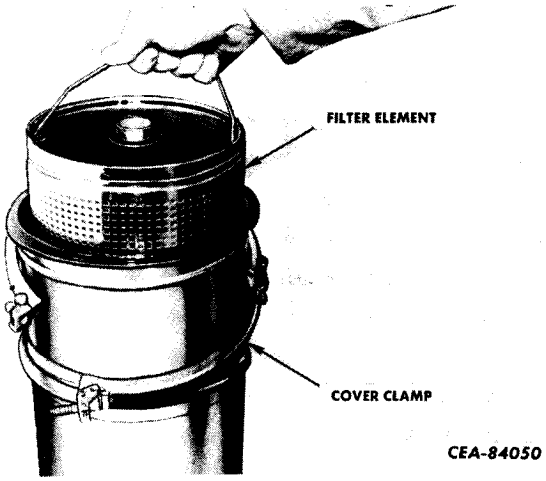


Figure 5-20A Bypass Filter Element and Case

e. Flush the cases with fresh cleaning solvent and wipe clean. Allow enough time for the cases to drain

completely before closing the case drains.

f. Insert a new element in each case and replace the element hold-down. Inspect the hold-down assemblies to be sure the metering hole in each orifice plug is open.

g. Inspect the "O" ring cover seal before positioning it on the housing flange. The seal must be clean and in good condition to prevent oil loss during engine operation.

h. Fill each filter case with the same type oil used in the crankcase.

i. Replace the covers and clamping rings. Tighten the clamping ring cap screws until the ring lugs come together.

j. Loosen the vent plug in each cover and start the engine. Close the vent plugs when oil reaches the vent openings. Shut down the engine and replace the cover plate on the hood.

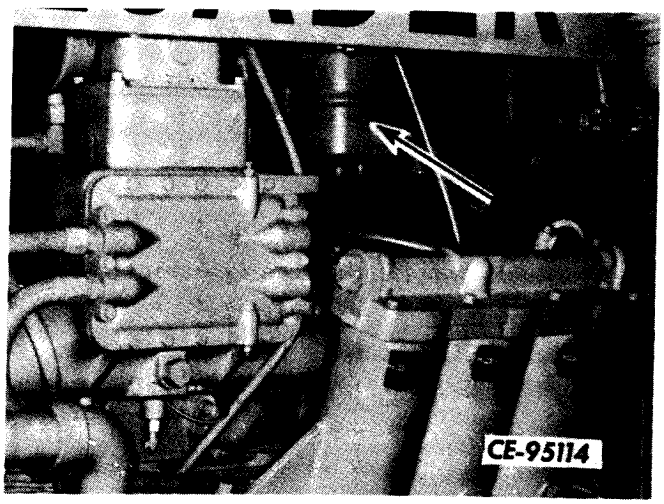


Figure 5-21A Bypass Filter Installation

k. Check the engine oil level at the crankcase dipstick and add oil to bring the level up to the "FULL" mark.

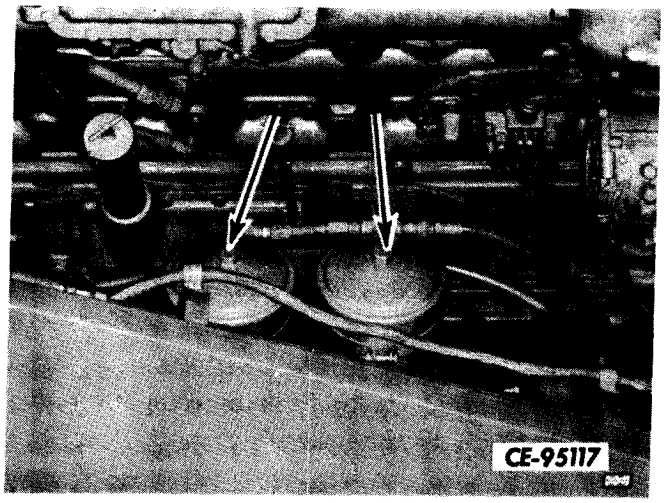


Figure 5-21B. Fuel Filter Installation

CHANGE FUEL FILTER ELEMENTS.

Two fuel filters are located on the lower left side of the engine. Loss of power or engine misfiring may indicate the need for replacing these filter elements.

Change the filtering element contained in each housing when not suitable for further use as follows:

a. Remove drain plug in bottom of each filter case to drain fuel. Wash the filter cases with the draining fuel.

b. Loosen hex head center bolts in top of filter. Remove filter covers and used elements from filter. Remove and discard oil filter head gaskets and used filtering elements.

c. Clean filter cases thoroughly in clean fuel oil. Wipe dry with a lint free cloth and re-install each case drain plug.

d. Install new filtering elements in cases. Fill cases with clean, filtered fuel oil to provide quick fuel pickup for the engine fuel pump.

e. Install new head gaskets and position each filter cover on the filter. Secure covers to filter bodies by tightening center bolts 20 to 25 foot-pounds.

f. Start engine and check for fuel leakage at fuel fittings and cases.

CHANGE TRANSMISSION FILTER ELEMENT.

The transmission filter is mounted on the left side of the rear frame near the transmission.

To change the filter element proceed as follows:

Position a container to catch the oil from the filter when the drain plug is removed from the bottom of the case.

When oil has stopped dripping, remove the four bolts holding the two housings together, and remove the lower housing and the element from the machine.

Discard the element, clean the filter case thoroughly and reassemble using a new element and gasket. Replace the drain plug and add oil as needed to maintain proper level.

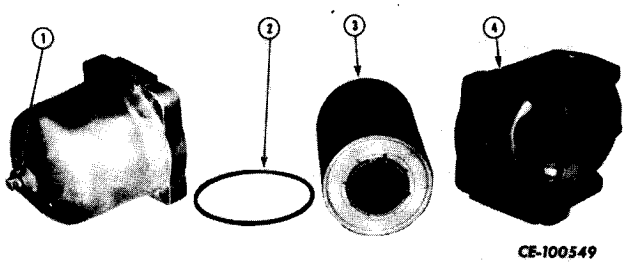


Figure 5-22A Transmission Filter

1. Drain plug
2. "O" ring
3. Element
4. Housing

CHECK FAN HUB AND DRIVE PULLEY.

The fan hub and drive pulley must be securely mounted.

Tighten the fan cap screws and check the drive pulley for looseness or wobble. If necessary, remove the fan and hub and tighten the shaft nut. Tighten the four fan bracket cap screws.

LUBRICATE CRANKING MOTOR.

Use a few drops of clean SAE 30 weight lubricating oil on the cranking motor bearings. Avoid over-oiling which will affect wire windings by damaging wire insulation. Remove the plugs from each end of the cranking motor and saturate each wick and replace the plugs. Refer to Figure 5-19D.

BLEED & CLEAN FUEL SYSTEM.

The complete fuel system should be bled and flushed with clean fuel to remove any accumulation of contaminates within the system.

CLEAN ENGINE & TRACTOR.

At least once a year the tractor should be cleaned completely to remove all accumulated dirt, oil and grease from the exteriors of the frame, engine, transmission, cylinders, axle and all hydraulic connections. Dirt caked over the breathers will cause oil losses and will eventually find its way into the components when

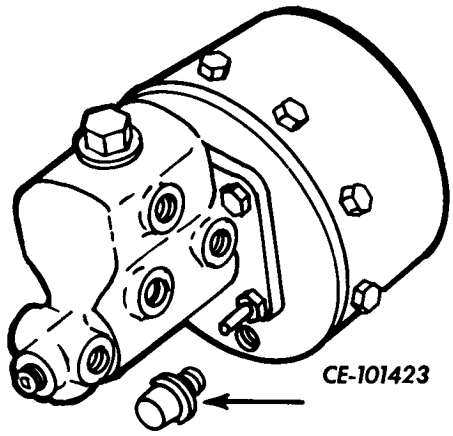


Figure 5-23A Power Cluster Breather

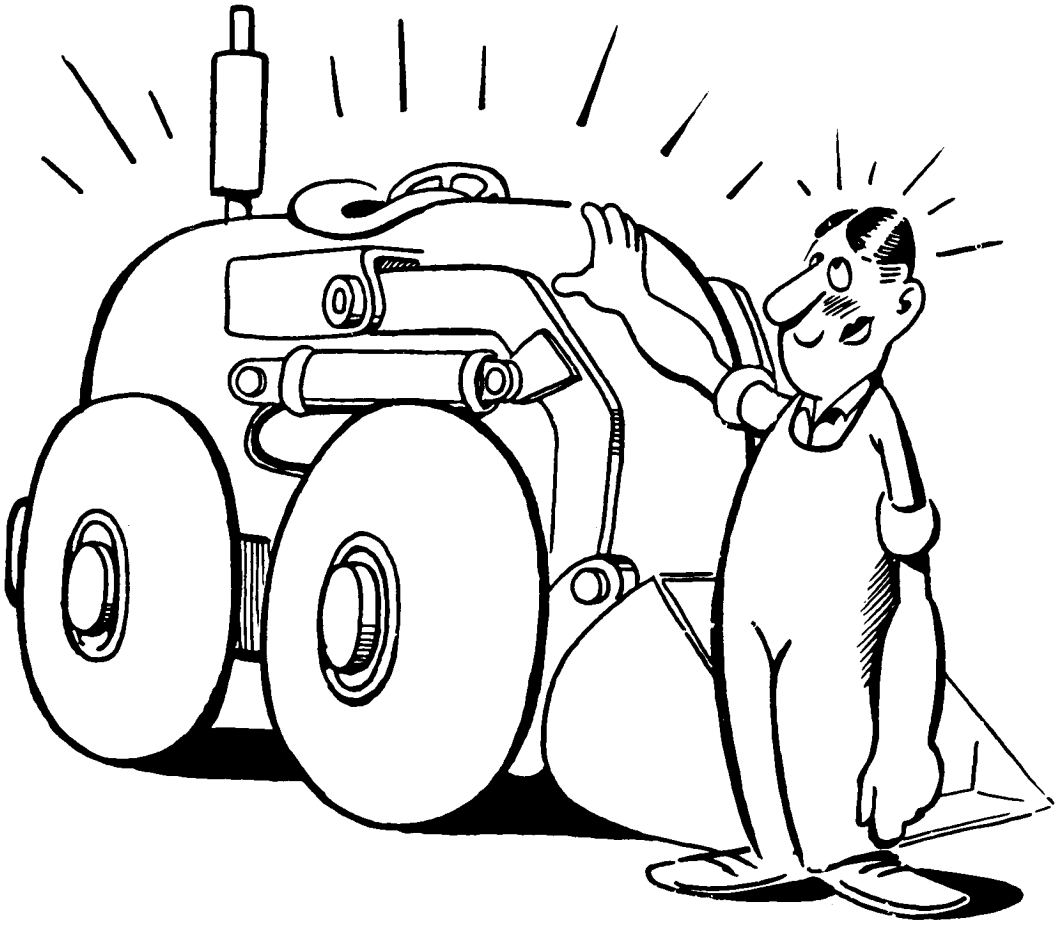
plugs and covers are removed. Use a cleaning agent which will not damage any of the tractor's components, or appearance.

Starting at the injection pump, loosen all lines, filters, etc. Bleed and flush all, remove drain plugs from bottom of the fuel tank, bleed and flush tank. Replace all plugs, lines and filters. Check for leaks.

CLEAN POWER CLUSTER BREATHER.

Each power cluster is equipped with a breather on the cylinder side of the air chamber. The breather should be removed and cleaned or replaced as conditions warrant in order to prevent power cluster damage.

To clean, unscrew the breather and wash in solvent, dry and reinstall on power cluster.



"PREVENTIVE MAINTENANCE PAYS" CE-89602

1000-HOUR MAINTENANCE OPERATIONS

Analyze all previous maintenance records to determine the extent of maintenance required at this time. Excessive oil consumption, low oil pressure at idling speed, sluggish operation of the hydraulic system or transmission, etc. may indicate the need for unit repairs. Repeat the following maintenance at 1000-hour intervals of operation in addition to other service repairs that may be needed.

CLEAN COOLING SYSTEM
CHANGE OIL IN WHEEL HUBS
CHANGE TRANSMISSION OIL
CHANGE OIL IN INTERMEDIATE DRIVE BLOCK
CHANGE OIL IN DIFFERENTIALS
CHANGING HYDRAULIC OIL FILTERS
CLEAN FUEL INJECTORS
CHECK PARKING BRAKE
CHECK THERMOSTAT
REPLACE AIR CLEANER ELEMENT

CLEAN COOLING SYSTEM.

The cooling system removes heat from the engine. To do its work well, it must be kept clean. Scale in the cooling system slows down heat absorption from the engine and heat transfer from the radiator to air.

If rust becomes evident in an originally clean cooling system, clean the system before fresh coolant is added as follows:

a. Clean the radiator core openings as well as possible with a jet of air. Do not damage the radiator cores by pushing objects through the openings.

b. Drain the engine block and radiator. The engine radiator drain is located on a bracket to the front of the fuel tank on the right side of the loader. check that all cooling system connections are tight.

c. Close the drains and add cleaner compound according to the manufacturer's instructions.

Note

Cover the radiator so the thermostat control will open quickly and stay open. Do not allow the fluid to boil.

d. Drain the cleaner compound and fill the system with fresh water. Run the engine at a fast idle for about 5 minutes after the water temperature reaches 180°F. Drain the cooling system again.

After draining the system each time, the engine temperature should be below 200°F. before cold fluid is added. Remove sediment from the radiator cores, the overflow pipe, and radiator pressure cap.

Following the final flushing, replace damaged hose clamps and deteriorated hoses. Then fill the system with fresh coolant solution.

While antifreeze solution (ethylene glycol type) is used in the cooling system, replacement elements for the engine corrosion resistor units are not needed. Drain antifreeze solution from the system in the spring after the danger of freezing weather is past. Flush the system thoroughly before filling it with fresh water and install new filter elements in the corrosion resistor units.

CHANGE OIL IN WHEEL HUBS.

Drain each hub by removing the hub fill-check plug (1, Figure 5-14B) in the outer face of the planet carrier.

Move the loader to position the hub fill-check opening so each hub can be completely drained. Drain one hub at a time. After all oil has drained from the hub, move the loader again until the fill-check opening is positioned as shown in Figure 5-14B. Then add oil to the hub cavity through the opening to the level of the hole. Use the type lubricant recommended in the Lubrication Chart. After filling the hub to the proper level, install the fill-check plug and wipe away excess oil.

CHANGE TRANSMISSION OIL.

The transmission oil should be drained while it is warm.

Proceed as follows:

a. Loosen and remove the filler tube cap.

b. Remove the transmission case drain plug. The case sump capacity is approximately 10 gallons.

Drain the oil from the oil cooler using whatever means the manufacturer has provided. If no drain plug was provided, crack the lines and drain. If a vent plug is located in the top of the cooler, open or remove it. After all oil has been drained from the oil cooler, replace the drain plug or lines you cracked. Leave the vent open to assist in filling the system, then tighten or replace.

Allow sufficient time for complete draining. After the system has drained, disconnect the pump supply line at the transmission and remove the sump strainer from the transmission. Disassemble the strainer and wash it and the drain plug in clean solvent. Dry these parts with filtered compressed air.

Examine the drained oil. If it is heavily contaminated with solids, its color has darkened, gives off a strong odor, or its viscosity has increased appreciably, change the oil more frequently. Metal particles in the drain oil are an indication of worn or failing parts. Examination of the transmission for wear or impending failures may be necessary.

Assemble the sump strainer and install it in the transmission. Use a new gasket under the strainer cover. Then install the transmission drain plug.

Add approximately 10 gallons of Dexron® automatic transmission fluid to the transmission sump. Add the oil through the filler tube.

◆ CAUTION: DO NOT ATTEMPT TO CHECK THE TRANSMISSION FLUID LEVEL OR ADD FLUID UNLESS THE TRACTOR HALVES ARE SECURELY LOCKED WITH THE SAFETY BAR AND PINS PROVIDED. USE TWO PERSONS FOR THE NEXT STEP, ONE AT THE CONTROLS OF THE LOADER.

Start and idle the engine. With the engine still idling, operate the transmission shift levers momentarily through all positions so all cavities in the transmission are charged with oil. After charging the transmission, shift both control levers to NEUTRAL. Add makeup oil as needed to keep the oil level at the dipstick FULL mark. Check the oil level after the oil becomes warm and before securing the dipstick assembly in place.

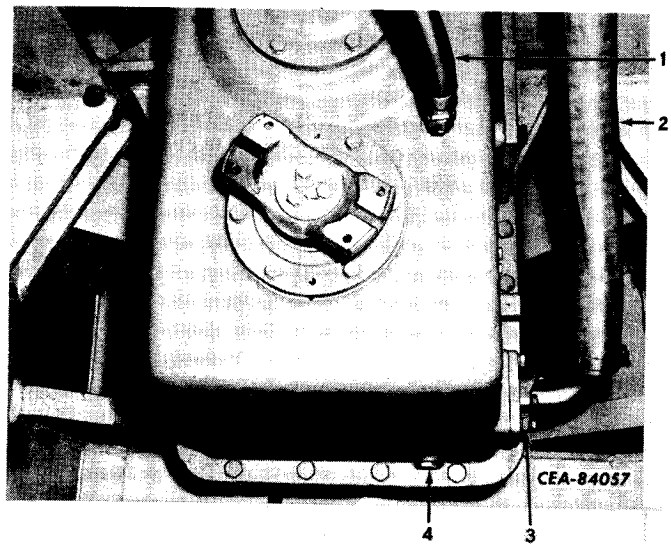


Figure 5-25A Transmission Drain Plug

1. Torque converter hose
2. Pump supply hose
3. Sump strainer cap
4. Transmission case drain plug

CHANGE OIL IN INTERMEDIATE DRIVE BLOCK.

Remove dipstick cap from the intermediate drive block filler tube, see Figure 5-14A. Remove block housing drain plug.

After all oil has drained, install the drain plug and add the type oil specified in the Lubrication Chart. Fill the block to the FULL mark on the dipstick cap before securing the cap in place.

CHANGE OIL IN DIFFERENTIALS.

Drain the differential oil while it is warm. Remove the drain plug (1, Figure 5-15A) and fill-check plug (2) and wash them in cleaning solvent.

After completely draining the differential housing, replace the housing drain plug. Fill the differential cavity through the fill-check hole to the level of the hole. Use the type lubricant indicated in the Lubrication Chart. Replace the fill-check plug.

CHANGING HYDRAULIC OIL FILTERS

After 1000 hours of tractor operation or at least twice a year, the hydraulic system should be completely drained and the reservoir filters replaced.

Drain the reservior and remove the filters as follows:

a. Start the engine and operate the hydraulic control levers several times until the system oil becomes warm. Shutdown the engine.

b. Loosen the reservoir filler cap gradually to bleed off reservoir pressure before removing the filler cap.

c. Place a container under the reservoir drain. Use a clean container so samplings of the used oil can be made. The container should be large enough to catch the volume of oil in the reservoir. Direct the flow of draining oil through a large funnel and a length of hose fitted over the funnel spout. Remove the reservoir drain plug.

d. Remove the cover clamp ring, the cover assembly and the cover seal ring.

e. Remove the nuts that hold the filter elements in place. Then remove the large plate and elements. Close examination of used filter elements might indicate the condition of other hydraulic system components.

f. Remove the inlet screen assembly.

g. Tag all lines before disconnecting them so they can be connected to the proper port after they have been drained. Disconnect the steering cylinder lines at each steering cylinder to drain the lines and cylinders. Lines connected to the control valve should be disconnected and drained. Shift the hydraulic control levers to their various positions to empty oil trapped in the control valve body. Connect the lines to their hydraulic components as soon as possible after draining. Replace all seal rings.

h. Drain the lines at the pump outlets and flush the pump suction line with fresh SAE 10 oil. Connect the lines to the pump openings to prevent dirt entry. After flushing the suction lines, tape the line opening at the reservoir and pump.

Clean the reservoir as follows:

a. Clean the reservoir exterior with a spray of clean solvent. Rinse the inside of the reservoir with a warm flushing solution made of four parts clear diesel fuel oil to one part clean lubricating oil. Dry the reservoir interior with compressed air and cover the large opening. Remove the covering over the suction line opening and connect the line to the reservoir outlet. Use new seal rings when the suction line and drain plug are fastened to the reservoir.

b. Remove the breather units from the reservoir cover and disassemble them. Replace the filter elements and reassemble the breather units. Then wash the cover in fresh solvent and dry it with filtered compressed air. Install the breather units on the reservoir cover after the cover has been cleaned.

c. Rinse the screen with clean solvent to remove accumulated deposits. Use compressed air to blow out and dry the enclosure. Replace the screen and/or clamps in the reservoir if they are damaged.

After cleaning the reservoir and its components, remove the temporary protective cover from the reservoir opening, assemble the components, and install new filter elements as follows:

a. Insert a clean reservoir screen over the reservoir outlet.

b. Insert new filtering elements into the reservoir over the hold-down rods and seat them firmly. Place the large plate on top of elements and secure the elements in place with nuts.

c. Position a new seal ring around the large reservoir opening before putting the reservoir cover in place. Position the cover on the reservoir so it fits snug on the seal.

d. Secure the cover clamp ring in place.

Charge the system with new oil by starting the engine and operating the hydraulic controls through all positions. Turn the steering wheel to charge the steering circuit. A constant check of the reservoir oil level should be made as the system is being charged.

CLEAN FUEL INJECTORS.

Due to the special tools required, we suggest you contact your dealer or distributor to perform this function.

CHECK PARKING BRAKE.

As the parking brake is used, the linings will become worn and will require adjusting to maintain efficiency. Minor adjustments are made by turning the cap on the brake handle. Major adjustments should be made in the shop.

CHECK THERMOSTAT.

The thermostats should be removed from the housings and tested. To test the thermostat, suspend it and a reliable thermometer in a pail of water and heat.

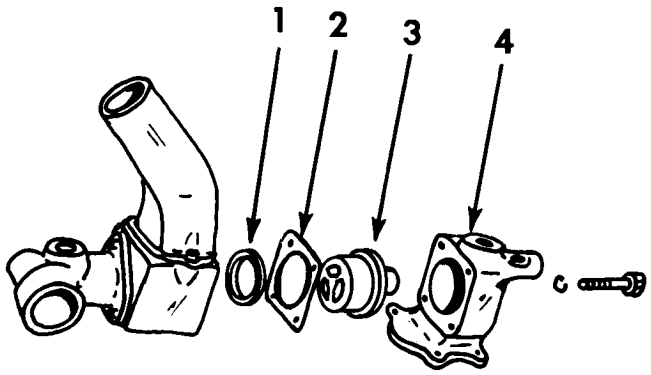


Figure 5-27A Removing Thermostat

Do not let the thermostat or thermometer touch the pail. When the water reaches the range stamped on the thermostat, it should open. If not, replace it. Use a new gasket when reinstalling.

REPLACE AIR CLEANER ELEMENTS.

Refer to 100 Hour Operations for air cleaner removal procedure. When element has been removed, discard it and insert new element.

ADDITIONAL MAINTENANCE

FUEL AND OIL HANDLING.

BLEED BRAKE SYSTEM.

WHEEL BRAKE ADJUSTMENT.

SERVICE BRAKE CHECK AND WEAR ADJUSTMENT.

BRAKE SYSTEM FLUSHING.

WHEEL AND TIRE CARE.

HYDROMETER CHECK COOLING SYSTEM.

USE OF BATTERY BOOSTER CABLES TO AID STARTING.

PRIME TURBOCHARGER.

FUEL AND OIL HANDLING.

Refiners and distributors of oils, greases, fuels and solvents are particularly careful to insure that their products are delivered in good condition, free of impurities. Those who service PAY® loader units with petroleum products should try to store them properly and eliminate the possibility of contamination.

Take the following precautions to keep dust, lint and water out of petroleum products and to prevent their deterioration.

a. Store only the minimum types and quantities necessary for normal operation to reduce confusion and ensure fresh products when needed. Identify and keep different types of petroleum products separated.

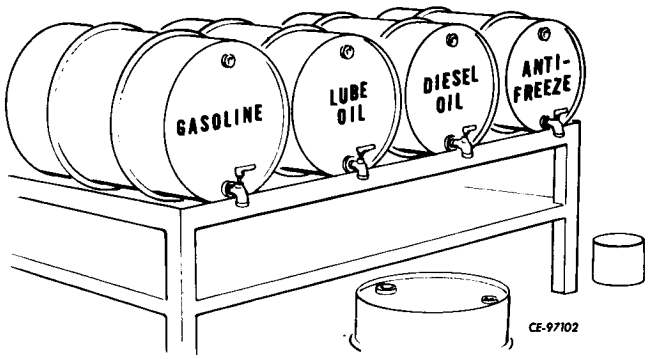


Figure 5-28A Storage of Fuels, Oils, Etc.

b. Store lubricants indoors and on their sides if possible. Chances of contamination and exposure to temperature extremes will be lessened.

c. If stored outdoors, place drums on their sides and on racks. Do not lay them on the ground. If a storage rack is not available for outside storage, stand drums upright on end. Place upright drums under cover as a precaution against inclement weather. The normal breathing action of a drum can suck in foreign matter that collects on top of the drum.

d. Products exposed to low temperatures that must be warmed before use should be heated carefully. Never apply direct heat, such as a flame, to the exterior of a drum. If rapid heating is required use exhaust steam. The preferred method of warming products is to transfer the drums to a warm area or room and allow them to gradually reach the surrounding temperature.

e. Before opening a drum, clean its top with a lint-free cloth so the drum contents are not contaminated.

f. Containers or hoses used to transfer petroleum products should be thoroughly clean.

g. Filter oils and fuel as they are emptied into the various reservoirs and housings. Use a fine mesh screen to filter the liquids.

Improper storage and handling of petroleum products will encourage failures. It is easier and cheaper to keep dust, water and lint out of petroleum products before use than to remove them once the products are in use.

BLEED BRAKE SYSTEM.

The hydraulic part of each power pack and wheel brake assembly must be "bled" when air is present in the brake fluid. Air is most likely to enter the brake fluid through system leaks, disconnected brake fluid lines or when the fluid level at a power pack is not properly maintained.

Manually bleed the hydraulic lines of a power pack as described below:

a. Start the engine and charge the compressed air part of the system. Then stop the engine.

b. After cleaning the cap of the affected power pack hydraulic cylinder, remove the cap and fill the cylinder reservoir with fresh brake fluid. Keep the reservoir filled with fluid during bleeding operations.

c. Attach a bleeder hose to the bleeder screw at the power pack. Submerge the loose end of the hose in a jar partially filled with brake fluid.

d. Open the bleeder screw one turn and apply one of the brake treadles slowly. Make additional treadle applications until no bubbles escape from the bleed hose. If no bleed hose is used, close the bleeder screw each time before releasing the brake treadle.

e. Close the bleeder screw and remove the bleeder hose. Then bleed each hydraulic wheel cylinder.

Keep the hydraulic cylinder of the power pack being serviced at least half full with fresh brake fluid at all times. After bleeding the hydraulic part of a power pack, fill the pack hydraulic cylinder to within 1/2 inch of the filler hole.

WHEEL BRAKE ADJUSTMENT.

Remove both adjustment covers in each brake backing plate and adjust brakes as follows:

◆ CAUTION: BLOCK TRACTOR WHEELS HAVING GROUND CONTACT TO PREVENT TRACTOR MOVEMENT WHILE ADJUSTING WHEEL BRAKES.

a. Set tractor parking brake and place blocks between rear axle cradle and frame to prevent axle oscillation. Jack up rear of tractor so wheels are off ground. Place adequate shoring under axle to support tractor.

b. At each shoe insert adjusting tool and rotate star wheel until lining drags on drum. Use inner edge of adjuster slot as fulcrum and move tool handle toward axle to bring lining into contact with brake drum.

c. When lining drags against rotating drum, rotate star wheel in opposite direction

until drag is relieved. Apply the brakes several times to center shoes. Then check adjustments.

d. After all shoes have been adjusted, install slot covers and remove supports used to keep tractor raised. Remove cradle and wheel blocks. Road test tractor to check brake adjustment.

SERVICE BRAKE CHECK AND WEAR ADJUSTMENT.

Determine the need for service brake lining clearance adjustment by fully applying brakes and measuring travel of power cluster piston stroke indicator. Refer to Figure 5-29A.

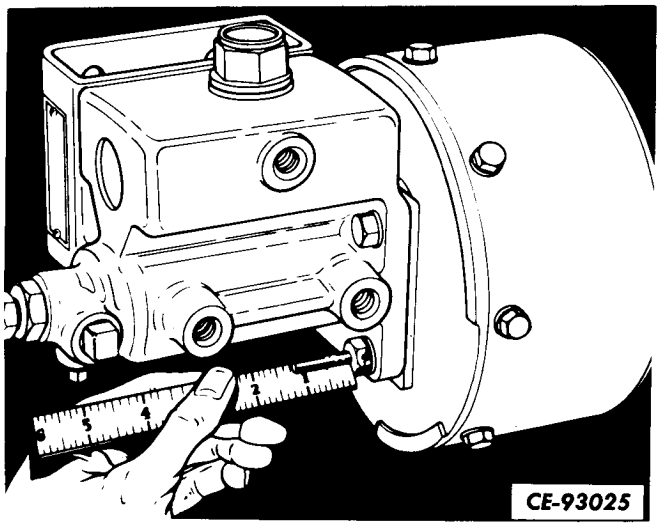


Figure 5-29A Measuring Piston Indicator Travel

Service brake adjustment is needed when indicator travel is 1 inch to 1-1/4 inch. Add fresh make-up fluid if necessary to keep fluid level in power cluster hydraulic cylinder within 1/2 inch to 3/8 inch of filler opening. After brake lining adjustment is made, indicator travel should be 3/8 inch to 3/4 inch.

BRAKE SYSTEM FLUSHING.

Brake hydraulic fluid should be changed when it appears dark in color, has a watery consistency, is comparatively odorless or lacks a thin lubricating film when rubbed between the fingers. Drain and flush all brake hydraulic lines as follows:

a. Open the bleed screw at the wheel brake hydraulic cylinder furthest from power cluster.

b. Charge the air system and apply a brake treadle slowly. Continue operating the treadle until fluid is no longer forced from the wheel cylinder bleed screw.

c. Drain fluid from remaining wheel cylinders in order according to their distance from the power cluster. Open the bleed screw at the power cluster last.

d. Add clean denatured alcohol to the hydraulic cylinder on the power cluster and then pump the fluid through the hydraulic lines. Continue passing clean flushing fluid through the hydraulic cylinder and line, (as in draining, open each bleed screw in turn and pump the brake pedal slowly) until clean fluid appears at each bleed screw. Clean fluid coming from the bleed screw indicates that the hydraulic lines and cylinders are clean.

e. Force all alcohol from the lines by adding fresh brake fluid at each power pack and pumping the brake fluid through the brake lines. Use brake fluid listed in the Lubrication Chart only.

f. Complete flushing the hydraulic brake system by closing the bleed screw at each wheel. Then bleed the lines and hydraulic cylinders one at a time as previously described.

NOTE: Do not use a mineral base solvent.

WHEEL & TIRE CARE.

All four tractor wheels are used to transmit drive line torque. The tire and wheel assemblies are held on the axle hubs with special nuts that have spherical surfaces. They seat in mating spherically countersunk holes in the wheel assembly. It is important that the wheel nuts be seated securely in the countersunk holes in the wheel assembly. Keep these nuts tight. Upon initial tightening of the nuts or after remounting a tire assembly, check that the wheel nuts are tight after one or two hours of operation. Then check them after every eight hours.

Working motions of the machine will tend to loosen the cap nuts and wear wheel rim rings. The mounting holes will become elongated as a result. Eventually the wheel studs will break off. Should a wheel stud break off, the stud on either side of it should also be replaced. If several break, replace all studs.

Obtain maximum tire service by:

a. Keeping the tires properly inflated. Refer to ten hour periodic maintenance operations. Under inflation will decrease tire life because the tire will flex too much. This causes high internal heat and tire damage. Over inflation subjects the center of the tire tread to extreme wear.

b. Keeping them free from oil, grease and fuel oil.

c. Checking them often for cuts and breaks. Remove imbedded stone and metal fragments.

d. Checking tire rims for bent or damaged flanges. Repair or replace damaged parts.

e. Keeping work roads clean of debris and in good condition.

Check the tire pressures daily while the tires are cool (as before operation). Do not remove increased pressure caused by operation. Check for air leaks at the valve cores after each inflation check because valve cores are subject to rapid wear. Replace valve cores found to be worn and keep a valve cap on each tire valve stem. The caps will keep dirt out of the valve stems and protect the valve cores from damage.

Small injuries to tires should be repaired upon discovery. Such injuries as minor cuts, snags or punctures can enlarge and eventually cause tire failures.

Cuts in the tire tread area that are of sufficient shape or depth to hold pebbles or dirt should be skived. Cut around the damaged area at an angle with a sharp pointed knife. The cut angle should be no greater than is required to expel all foreign matter. Limit the cut depth so it does not go deeper than the cloth breaker. All tires having cuts that penetrate into the cord body should be taken off the wheel for proper repair.

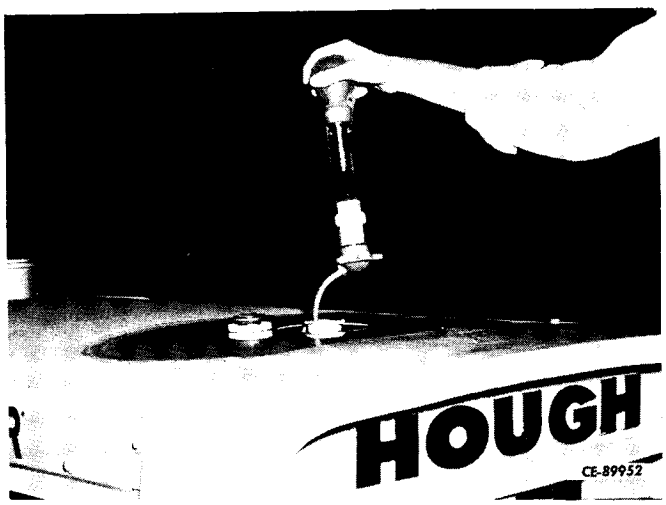


Figure 5-30A Hydrometer Checking Cooling Fluid

HYDROMETER CHECK COOLING SYSTEM.

When freezing weather conditions are evident and the cooling system is filled with an anti-freeze solution, frequenct checks should be made with a hydrometer to insure the system is still protected. Follow the instructions on the hydrometer for correct procedure in checking.

USE OF BATTERY BOOSTER CABLES TO AID STARTING.

When it is necessary to boost tractor batteries to aid starting, attach booster clamps at terminals shown in Figure 5-30B. Positive clamp from booster source to be attached first to indicated positive terminal of tractor battery. Negative clamp to indicated negative terminal of tractor battery last.

◆ CAUTION: IF BOOSTER CABLES ARE NOT ATTACHED CORRECTLY, THE ALTERNATOR WILL BE SERIOUSLY DAMAGED.

When removing booster cables, remove negative clamp first and positive clamp last.

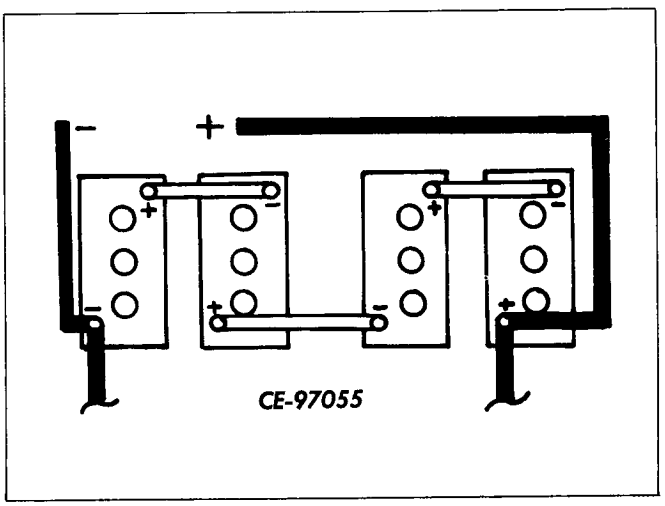


Figure 5-30B Booster Cable Connections

Figure 5-31A Priming the Turbocharger

PRIME TURBOCHARGER.

1. Clean the area where the oil inlet tube connects to the turbocharger.

2. Disconnect the oil inlet tube from the top of the turbocharger and move the tube slightly to expose the turbocharger oil inlet hole.

3. Using an oil squirt can, fill the center housing at the oil inlet hole with oil (same type and viscosity as in crankcase) up to the level of the opening.

4. Reconnect the oil inlet tube, using a new gasket.

SECTION CONTENTS

LOADER HYDRAULIC SYSTEM

PROBLEM	POSSIBLE CAUSE	REMEDY
System sluggish.	Low or incorrect oil.	Fill or replace with correct oil.
	Clogged reservoir filter.	Clean.
Excessive foaming of oil in reservoir.	Wrong oil.	Correct.
	Low oil.	Correct.
Noisy hydraulic pump.	Intake line or filters clogged.	Clean reservoir and suction line.
Chattering hydraulic cylinder.	Low oil.	Fill.
	Air in system.	Correct.
Excessive heat build up.	Air in system.	Correct.
	Wrong oil.	Correct.
	Low oil.	Fill.
	Clogged cooler.	Clean.

ENGINE TROUBLE SHOOTING

Refer to Cummins Operator's Manual.

TORQUE CONVERTER AND TRANSMISSION TROUBLE SHOOTING

PROBLEM	POSSIBLE CAUSE	REMEDY
Low pressure.	Oil level low.	Correct.
	Direction or range valve not working.	Check linkage.
	Improper range.	Shift to proper range.
Loss of power.	Parking brake on.	Adjust linkage or release.
	Foaming oil.	Correct oil level and check for air leak in oil line.
High oil temperature.	Clogged oil cooler.	Clean.
	Improper range.	Shift to proper range.
Slow or erratic clutch engaging.	Oil in transmission sump low.	Correct oil level.
	Clogged oil filter screen.	Remove and clean.
	Foaming oil.	Eliminate air leak in pump suction line.
	Improper linkage adjustment.	Adjust.

DRIVE LINE TROUBLE SHOOTING

PROBLEM	POSSIBLE CAUSE	REMEDY
Noise and vibration that comes and goes.	Loose parts in drive line. Missing hardware.	Tighten. Replace.
Noise comes and goes with little or no vibration.	Dry joint.	Lubricate.
Noise which is heard at all speeds.	Wrong lube in axle. Not enough lubricant.	Correct. Correct.
Loping.	Ballasted tires insufficiently filled. Tire pressure low. Wheel nuts loose.	Correct. Correct. Tighten.

BRAKE SYSTEM TROUBLE SHOOTING

PROBLEM	POSSIBLE CAUSE	REMEDY
No brakes.	Linings wet. Air pressure low.	Dry out. Check for leakage and tighten.
Brakes spongy.	Low on fluid.	Fill to correct level.

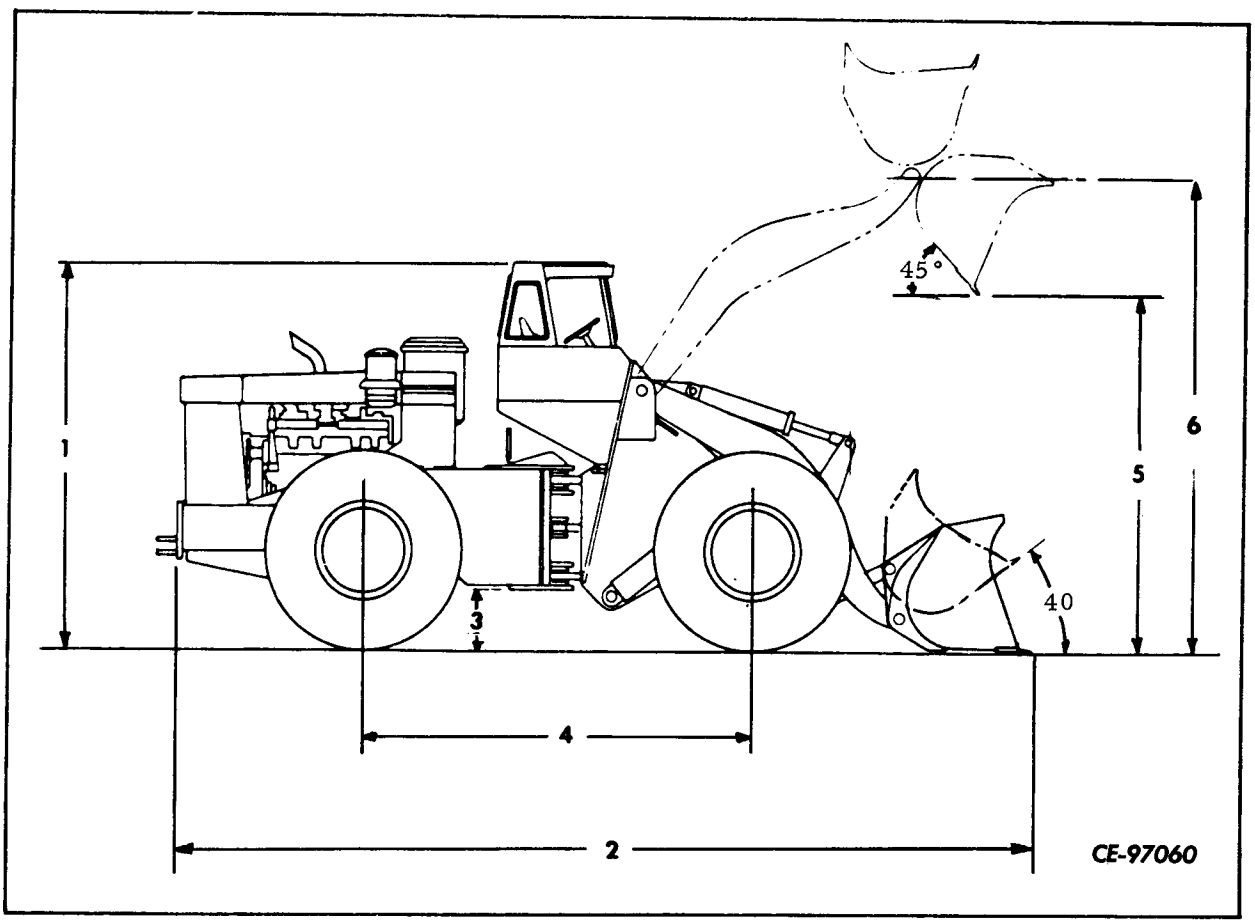
STEERING SYSTEM TROUBLE SHOOTING

PROBLEM	POSSIBLE CAUSE	REMEDY
Slow steering.	Restricted line or strainer.	Drain and flush system. Replace filter.
Jerky steering.	Air leak. Steering pivots dry.	Correct. Lubricate.

ELECTRICAL SYSTEM TROUBLE SHOOTING

PROBLEM	POSSIBLE CAUSE	REMEDY
Weak battery.	Key left on. Working cycle too short or erratic.	Observe proper shutdown. Provide charging means.
Ignition on - no lights, no gauges working.	Dead battery. Loose connection.	Charge or replace. Tighten.
One or more gauges not working.	Loose connection.	Tighten.

SECTION CONTENTS



Dimensions and specifications shown are with 10 cu. yd. (S.A.E. rated) Bucket and 33.25 x 35 - 32 P.R. Tires.

1. Height to top of cab - 15' 3"
2. Length with bucket on ground - 35' 6"
3. Ground clearance - 19.5"
4. Wheel Base - 15'
5. Dumping clearance - 13' 6"
6. Hinge pin to ground - 18' 5"

Maximum Working Capacity 36,000 Lbs.

Figure 7-1a Dimension diagram

RADIATOR

Cap Pressure	7 lbs.

GENERAL.

Total rear axle oscillation	30°
Turning radius at 40° articulation:	
To outside corner of bucket at carry	30' 8-1/2"
Drawbar pull (dry concrete)	73,200 lbs.
Weight over front axle (Approx.)	68,644 lbs.
Weight over rear axle (Approx.)	48,163 lbs.
Total weight (Approx.)	116,807 lbs.

ENGINE.

Make	Cummins
Model	VT-1710
Type	Turbo-charged four stroke cycle, diesel
Rated horsepower (2100 rpm)	570
	1540 ft. lbs.
Number of cylinders	12
Bore	5-1/2"
Stroke	6"
Piston displacement	1710 cu. in.

TORQUE CONVERTER.

Type	Single stage
Stall ratio	4.88:1

TRANSMISSION.

Make	Hough Division, International Harvester Co.
Model	P-6000
Type	Two speed, constant mesh, full reversing, power shift

Speed Ranges	Max. Forward & Reverse Road Speeds (MPH)
1	6.3
2	15.5

Clutches	Multiple disc, oil cooled
Pump capacity (maximum)	30 gpm at 2100 rpm
Filtration	30 gpm at 2100 rpm replaceable pleated paper, radial fin type element

FINAL DRIVES.

Front and rear axles	
Make	Hough Division, International Harvester Co.
Model	
Front	FR-500-4
Rear	FR-500-5
First reduction (both axles)	Center section; single pinion and gear
First reduction ratio	3.91:1
Second reduction (both axles)	Planetary wheel hubs
Second reduction ratio	6.46:1
Total final drive reduction	25.25:1

ELECTRICAL SYSTEM.

Battery rating (each)	200 amp. hr.
Polarity	Negative insulated
Ground connection	Negative battery terminal

SERVICE BRAKE SYSTEM.

Wheel brakes (each wheel)	Internal expanding, hydraulic operated

STANDARD TIRES.

Size	33.25 x 35 - 32 PR
Tread width	9' 2"
Working pressure	65 psi
Dry ballast	7200 lbs. each (rear tires only)

HYDRAULIC SYSTEM.

LOADER CIRCUIT.

Design type	Sealed, pressure controlled
Pump capacities (1200 rpm pump speed)	210 gpm
Filtration	6 replaceable 5 Micron
System control valve	
Number of spools	2
Bucket control spools	
Boom	Manual; four position, three positions detent locked
Bucket	Manual; two-way spring offset
Pressure regulator	Adjustable, pilot operated
Control cylinders	
Boom	Two, 9" diameter w/chrome plated rods
Bucket	Two, 8" diameter w/chrome plated rods

STEERING CIRCUIT.

Steering gear type	Worm gear
Pump	Vane type - positive displacement
Pump capacity (1200 rpm pump speed)	62 gpm
Steering cylinders	Two, 6" diameter w/chrome plated rods

LOADER OPERATION.

Recommended Bucket Dump Speed		6.0 sec.
Bucket closing time	Maximum	3.56 sec.
Bucket opening time		6.0 sec.
Boom raising time		10.1 sec.
Boom lowering time		7.5 sec.

MAINTENANCE MATERIALS.

For fuels, lubricants and fluids specifications, see Lubrication Chart, Section III.

SYSTEM CAPACITIES

LOCATION	INITIAL	REFILL
Engine crankcase -	58 qt.	To "Full" mark
Fuel tank	194.5 gal.	194.5 gal.
Cooling system	26 gal.	
Trans. converter & oil cooler	48 qt.	"Full" mark
Axle differential	14.5 gal.	14.5 gal.
Planetary hubs	20 pt. ea. whl.	20 pt. ea. whl.
Hydraulic system & reservoir	135 gal.	"Full" mark
Transfer drive	1 pt.	1 pt.

DEFINITIONS OF APPROXIMATE REFILL CAPACITY

ENGINE CRANKCASE:

Quantity required after draining both the engine through the drain plug and the filter(s) with the cartridges replaced.

COOLING SYSTEM:

Quantity required after draining both the radiator and the engine block if a drain is provided.

TRANSMISSION SYSTEM:

Quantity required after draining the transmission at the drain plug after a 5 minute wait or until a slow drip developes.

HYDRAULIC SYSTEM:

Quantity required to refill the reservoir only drained at the drain plug.

FUEL SYSTEM:

Quantity required after draining the tank at the drain plug.

DIFFERENTIALS:

Quantity required after draining at the drain plug.

PLANETARY HUBS:

Quantity required after draining at the drain plug.

NOTES

SECTION CONTENTS

COLD WEATHER STARTING AID

To aid in cold weather starting, ether is injected into the intake manifold.

Use the ether injector as follows:

a. Check to make sure the boom is down and the control levers are in "NEUTRAL" and "HOLD" positions.

b. Open the throttle to just above the idle position (approximately 800-1100 rpm).

c. Push the starter button and as the engine starts to turn over, inject the starting fluid by operating the primer pump, located on the instrument panel.

Discontinue the injection when the engine begins to fire and starts to accelerate. Sub-zero operation may require intermittent injection of starting fluid until the engine will support combustion.

◆ CAUTION: USE THE COLD WEATHER STARTING AID TO ASSIST IN COLD WEATHER STARTING ONLY.

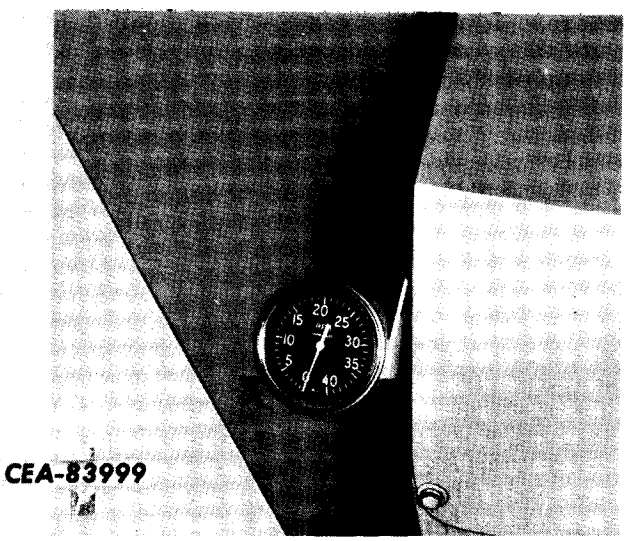


Figure 8-1a Tachometer installation

TACHOMETER.

The tachometer (Figure 8-1a) is mounted on a bracket at the front of the rear frame section. It is visible to the operator from the operator's seat. It indicates engine speed in hundreds of revolutions per minute.

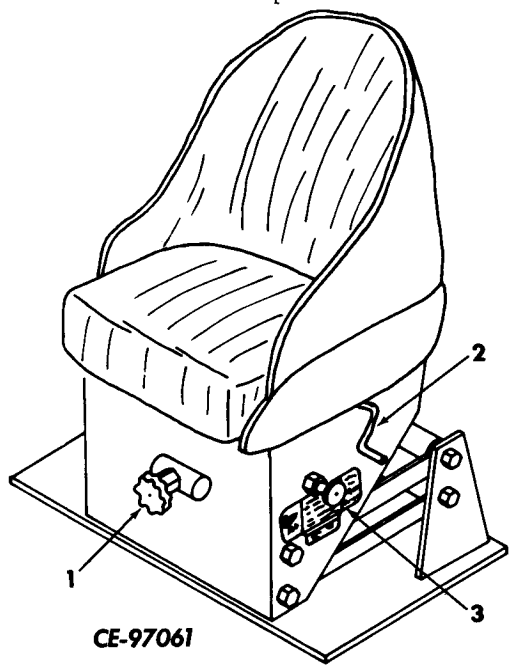


Figure 8-1b Air suspension seat

SEAT

The operator's seat is an air suspension type of seat with a height control adjustment (1) tilt for seat back (2) and air control switch (3) to either increase or decrease the amount of air in the cylinder which, in turn, makes for a stiffer ride or a softer ride. Do not use the air control switch to adjust height.

HEATER & DEFROSTER.

The heater is located on the floor to the right of the driver. A shut off valve located on the feed line to the heater should be closed when the heater is not in use. The switch on top of the heater is for the blower fan only. The blower has 2 speeds. To operate, turn it to the right for on and to the left for off. The defrosters will not work without the blower turned on.

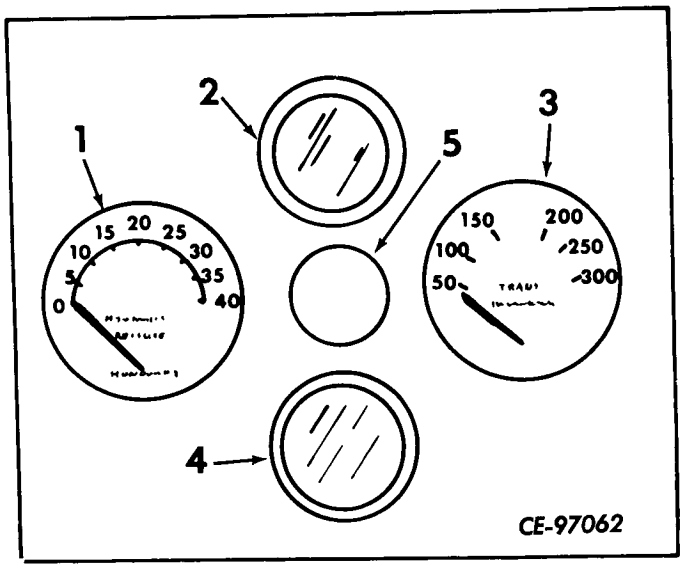


Figure 8-2A Auxiliary Instruments

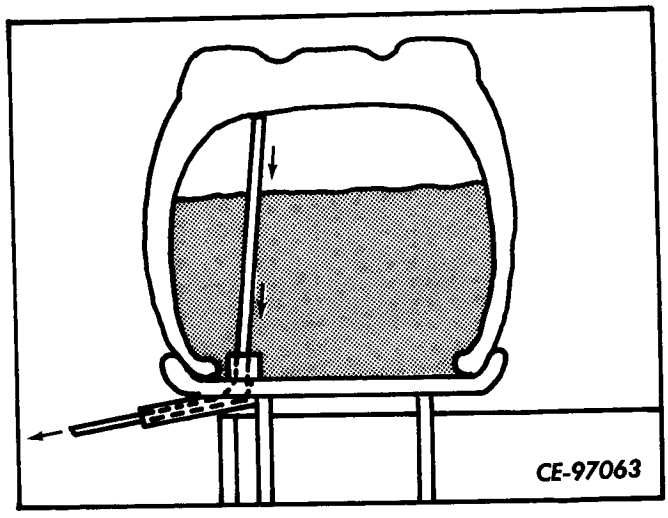


Figure 8-2B Deflator Kit (Led Ballast)

AUXILIARY INSTRUMENTS.

The instrument panel for the auxiliary instruments is mounted to the right hand side of the operator's seat. On this panel (Figure 8-2A) are the following gauges and lights. Item 1 - Hydraulic Pressure Gauge, Item 2 - Water Temperature Warning Light, Item 3 - Transmission Pressure Gauge, Item 4 - Oil Pressure Warning Light, Item 5 - Panel Light.

The Hydraulic Pressure Gauge should not exceed 2300 PSI at any time. If the pressure exceeds 2300 PSI, shutdown the machine until the condition is corrected. The Water Temperature Warning Light will be activated if the temperature rises above 195°. Normal running temperature should be 180° to 195°.

The Transmission Clutch Pressure Gauge should read between 220 and 250 PSI for normal working conditions. The low oil pressure warning light will be activated if the oil pressure drops below 45 PSI. When not making pressure check, disconnect the gauges to prolong gauge life.

DEFLATOR KIT (LED BALLAST).

To sucessfully deflat a tire loaded with Led Ballast, follow the procedure listed.

1. Position the tire with the valve at the top.

2. Remove the valve cap, insert the deflater tube thru the valve, making certain it goes all the way to the top of the tire.

3. Secure the deflater tube to the valve, pull the wire from the tube permitting the air to escape. It may be necessary to clean the tube with the wire periodically to insure all the air is expelled.