Operator's Instruction Manual

CASE INDUSTRIAL W-10 DIESEL TERRALOAD'R

4 WHEEL DRIVE

J. I. CASE® CO. RACINE, WISCONSIN U.S.A.

TO THE PURCHASER OF A CASE TERRALOAD'R

The care you give your new Case Terraload'r will greatly determine the satisfaction and service life you will obtain from it. Use this manual as your guide. By observing the instructions and suggestions in this manual, your Case Terraload'r will serve you well for many years.

As an Authorized Case Industrial Dealer, we stock Genuine Case Parts, which are manufactured with the same precision and skill as the original equipment. Our factory trained staff is kept well informed on the best methods of servicing Case equipment and is ready and able to help you.

Should you require additional aid or information, contact us.

YOUR AUTHORIZED CASE INDUSTRIAL DEALER

To insure efficient and prompt service, please furnish us with the Model, Serial and Engine Numbers of your Terraload'r in all correspondence or contacts.

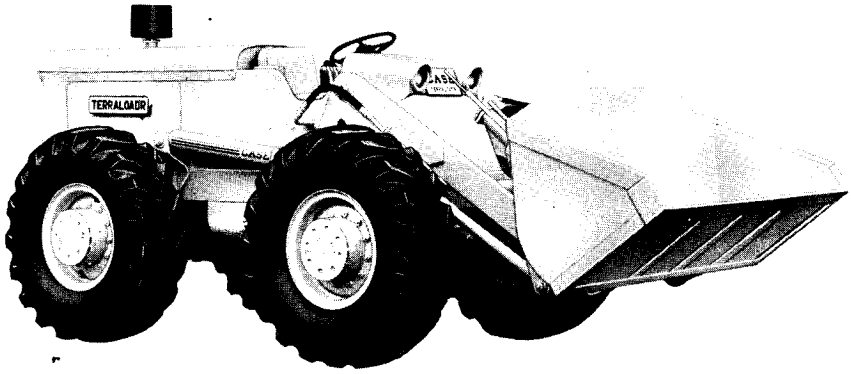


Figure 1. Right Side View of W-10 Terraload'r

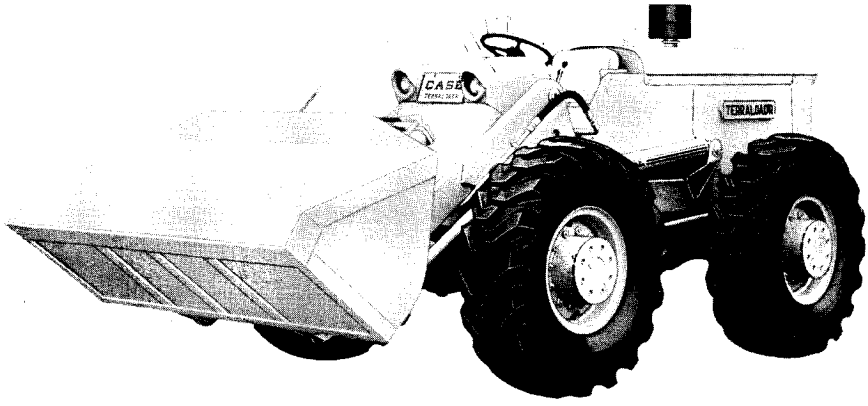


Figure 2. Left Side View of W-10 Terraload'r

TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

INTRODUCTION

The rubber tired loader, with its great variety of special tools and extra equipment, is a relatively new addition to the industrial equipment field. Because of its speed, maneuverability and adaptiveness, it has become a greatly needed machine for all types of construction and general contracting jobs, logging camps, municipal departments, coal yards, gravel pits, quarries, docks, airports, steel mills, foundries, public utility companies, lumber yards, railroads, large warehouses and factories.

The rugged combination of a Case Diesel Engine and Full Power Shift Transmission with three speeds forward and three speeds reverse, provides a full range of working speeds adaptabilety to all of the above uses.

Case Powrcel Diesel Engine

The Case W-10 Terraload'r is powered by a rugged six cylinder full diesel engine that is noted for its quiet operating characteristics and economy.

Advanced engineering includes the CASE POWRCEL combustion system which produces all of the available power out of each charge of injected fuel. To protect the closely fitted precision parts, the finest filters available have been provided to clean the fuel, the intake air and the crankcase oil.

Torque Converter

The torque converter provides smoothness of operation, ease of handling and eliminates gear shift guess work. Because torque is multiplied automatically, the engine power is fitted to the load more efficiently and only three range speeds are necessary for maximum performance, because the torque converter provides an infinite number of speed ratios in each range. The conventional clutch is eliminated.

Positive Control Hydraulics

The double acting hydraulic cylinders provide positive bucket control when raising, lowering, tilting or transporting. All the operating controls are conveniently located so the operator has complete control of the Terraload'r while in a comfortable seated position. Big Pay Loads in less time, with a

minimum amount of operator fatigue, result from this complete, positive control.

Maximum Stability

The wide wheel tread and low center of gravity give the Terraload'r exceptional balance and stability for handling heavy loads in rough terrain.

SERIAL NUMBER

When ordering parts from your Authorized Case Industrial Dealer and in all contacts or correspondence relative to your Case Terraload'r, always specify the Serial Number, Engine Number and Model of the Terraload'r.

The Model and Serial Numbers are stamped on the plate located on the instrument panel, Figure 3. The Engine Number is stamped on the right side of the engine block, near the generator, Figure 4.

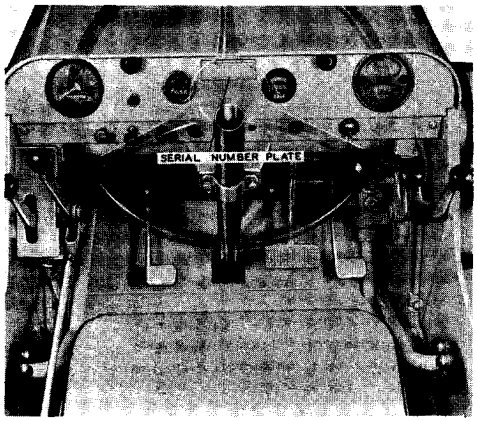


Figure 3

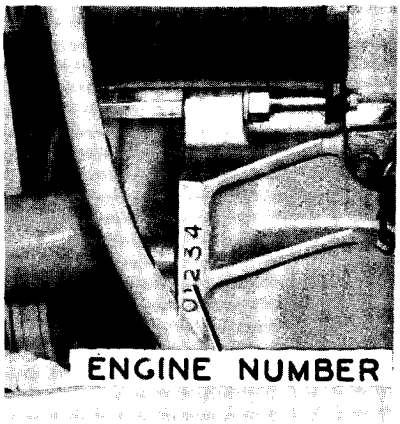


Figure 4

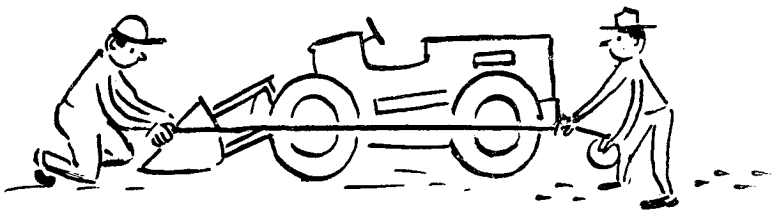
NOTE: The terms Right Hand and Left Hand whenever used in this manual, refer to the machine as viewed when seated in the operator' seat. See Page 2.

For convenient reference, fill in the Serial Number, Engine Number and Model Number of your Terraload'r in the spaces provided below.

Model Number_____

Engine Number_____ Serial Number_____

1



GENERAL SPECIFICATIONS

GENERAL SPECIFICATIONS FOR CASE W-10 DIESEL TERRALOAD'R

ENGINE

General

Type ---------- 6 Cylinder, 4 Stroke Cycle, Valve-in-Head Diesel Engine
Firing Order ---------- 1-5-3-6-2-4
Bore ---------- 4-1/8 Inches
Stroke ---------- 5 Inches
Piston Displacement ---------- 401 Cubic Inches
Compression Ratio ---------- 15 to 1
Cylinder Sleeves ---------- Removable Wet Type
Full Governed Engine Speed at No Load ---------- 1950 - 1970 RPM
Full Governed Engine Speed at Full Load ---------- 1800 RPM
Engine Idling Speed ---------- 600 RPM
Valve Tappet Clearance (Both Intake and Exhaust) ---------- .012 Inch (Cold)
Diesel Fuel Recommendation ---------- Number 2 Diesel Fuel (Refer to Fuel Specification Section).

Piston Rings

Rings Per Piston ---------- 4
Number of Compression Rings ---------- 3
Number of Oil Rings ---------- 1

Piston Pins

Type Pins ---------- Full Floating Type

Connecting Rods

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

Main Bearings

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

Engine Lubricating System

Oil Pressure ---------- 35 to 40 Pounds With Engine Warm and Operating at full Governed RPM.

Type System ---------- Forced Circulation

Oil Pump ---------- Gear Type, Floating Oil Screen Inlet.

Oil Filter ---------- Replaceable Element Full Flow.

FUEL SYSTEM

Fuel Injection System

Fuel Injection Pump ---------- Robert Bosch, Type PES (Multiple Plunger).

Pump Timing ---------- 33 Degrees Before Top Dead Center (Port Closing).

Fuel Injectors ---------- Robert Bosch, Throttling Pintle Type; (Opening Pressure 1850 to 2000 PSI).

Fuel Transfer Pump ---------- Plunger Type, Integral Part of Injection Pump.

Governor ---------- Variable Speed, Fly-Weight Centrifugal Type; Integral Part of Injection Pump

Fuel Filters

Fuel Strainer ------ Fine Mesh Screen in Fuel Tank Filler Opening; Removable for Cleaning.

1st Stage Fuel Filter ---------- Replaceable Element Type

2nd Stage Fuel Filter ---------- Replaceable Element Type

Final (3rd Stage) Fuel Filter ---------- Replaceable "Sealed Type" Filter

Fuel Tank Breather ---------- Located in Filler Cap; Removable for Cleaning

Fuel Tank Water Trap and Drain ---------- Located in Base of Fuel Tank

Fuel Gauges

Fuel Tank Gauge ---------- Located on Instrument Panel

Fuel Pressure Gauge ----- Located on Left Side of Engine. Indicates Condition of Fuel Filters (Standard Equipment).

COOLING SYSTEM

Type of System	Pressurized, Thermostat Controlled By-Pass Type; Forced Circulation (Impeller Type Pump).
Radiator	Heavy Duty Fin and Tube Type
Thermostat	Starts to Open At Approximately 188° F.; Fully Open at 208° F.
Radiator Shutters	Available as Extra Equipment
Pressure Cap Required	4PSI

ELECTRICAL SYSTEM

Type of System	24 Volt, Negative Ground
Batteries	Two 12 Volt Batteries Connected in Series (Group 5SH, 90 Ampere Hours at 20 Hour Rate).
Generator	24 Volt, Shunt Type.
Voltage Regulator	Automatic; Located on Fuel Tank Mounting Plate.
Starting Motor	24 Volt; Drive Assembly Sealed from Dust in Clutch Housing.

HYDRAULIC SYSTEM

Lift Cylinders - Double Acting	5" Dia. 33" Stroke
Tilt Cylinders - Double Acting	3-1/2" Dia. 25-1/2" Stroke
Pump	Gear Type Driven from Transmission
Pump Capacity at 1800 RPM	42 Gallons Per Minute
Reservoir	Electric Welded Steel Tank with Baffles, Breather, Oil Level Dip Stick and Full Flow Micronic Filter.
Standard Control Valve	Two spool, Four position with Internal Relief Valve - (Raise Neutral - Lower-Float).
Optional Control Valve	Two Spool, Three position with Internal Relief Valve. (Raise-Neutral - Lower).

POWER TRAIN

Torque Converter ---------- Single Stage, Ratio 3.5 to 1
Transmission ---------- Full Power Shift. 3 Speeds Forward and 3 Speeds Reverse.

Travel Speeds
- Low ---------- 0-2.6 MPH Forward and Reverse
- Intermediate ---------- 0-7.0 MPH Forward and Reverse
- High ---------- 0-23 MPH Forward and Reverse

Axles ---------- Spiral Bevel with Planetary Reduction in Hub

WHEELS AND TIRES

Standard (Both front and rear) ----------16.00 x 24
- Ply (Both front and rear) ---------- 12
- Tread (Both front and rear) ---------- 76-1/4"

Optional (Both front and rear) ----------14.00-24
- Ply (Both front and rear)---------- 8
- Tread (Both front and rear)----------76-1/4

Optional Rock Grader (Both front and rear)---------14.00-24
- Ply (Both front and rear)----------16
- Tread (Both front and rear)----------76-1/4"

Optional Sand Tires ---------- 14.00-24
- Ply ---------- 8
- Tread ----------76-1/4

APPROXIMATE CAPACITIES

Fuel Tank ---------- 35 Gallons
Cooling System ----------10-1/2 Gallons
Hydraulic Reservoir ---------- 14 Gallons
Torque Converter----------7-1/2 Gallons

NOTE
Refer also to Page 14.

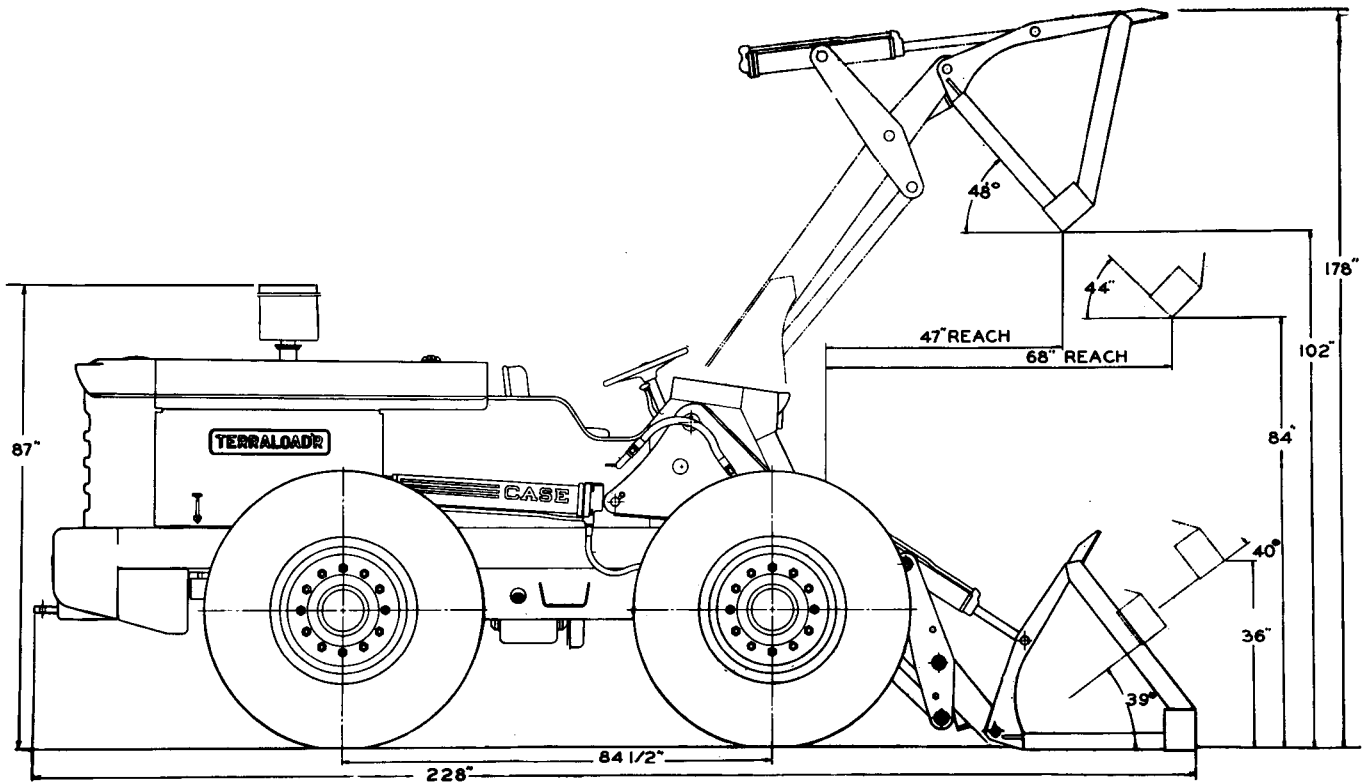

TERRALOADR
CASE
87"
48°
178"
44"
47"REACH
68" REACH
102"
84"
40°
36"
39"
84 1/2"
228"

Figure 5

OVERALL MEASUREMENTS

Height	87"
Width over Tires	93-1/4"
Length - Bucket on Ground	19'0"
Length - Bucket at Carry Position	19'6"
Wheel Base	84-1/2"
Ground Clearance	18"
Approximate Weight	18,120 Pounds

STANDARD BUCKET

Heaped Capacity	2 Cubic Yards
Struck Capacity	1-3/4 Cubic Yards
Width Outside (Standard Bucket)	94-1/2"
Height to Center of Hinge Pin	11'1"
Tip Back - Ground Level	39°
Tip Back at 3' Carry Position	40°
Raising Time	7-1/2 Seconds
Lowering Time	4 Seconds
Maximum Dumping Clearance	8'6"
Reach to Frame	47"
Reach to Tire	30"
Angle of Dump at Maximum Height	48°
Reach to Frame at 7'0" Dump Height	68"
Digging Depth	12" at 15°
Lift Capacity 0-MPH	13,000 Pounds
Lift Capacity 4-MPH	6,500 Pounds

TURNING RADIUS

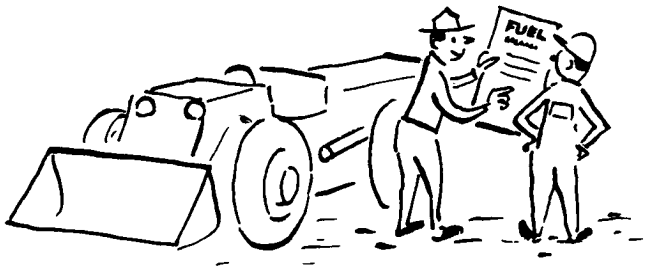
Outside Corner of Bucket At Carry Position	19'2"
Outside Rear Counterweight	22'9"

Lubrication Points	Approximate Capacities	Above 80°F.	80° to 32°F.	32° to —20°F.	—20°F. or Below
Engine Crankcase*	12 Quarts	SAE 30**	SAE 20W**	SAE 10W	SAE 5W
with Oil Filter	14 Quarts	SAE 30**	SAE 20W**	SAE 10W	SAE 5W
Fuel Injection Pump	½ Pint	SAE 30**	SAE 20W**	SAE 10W	SAE 5W
Transmission and Torque Converter					
(Initial Fill)	7½ Gallons	Automatic Transmission Fluid Type C	Automatic Transmission Fluid Type C	Automatic Transmission Fluid Type C	Automatic Transmission Fluid Type C
(Refill including Filter)	5¾ Gallons				
Hydraulic System Reservoir	14 Gallons	SAE 10W	SAE 10W	SAE 10W	SAE 10W
Power Steering and Power Brake System	2 Quarts	Automatic Transmission Fluid Type A	Automatic Transmission Fluid Type A	Automatic Transmission Fluid Type A	Automatic Transmission Fluid Type A
Axles (Both Rigid and Steering)					
Differential Housings (One each axle)	11 Quarts Each	SAE 90EP	SAE 90EP	SAE 80EP	SAE 80EP
Planetary Housings (Two each axle)	3 Quarts Each	SAE 90EP	SAE 90EP	SAE 80EP	SAE 80EP
Steering Gear Housing	1 Pint	SAE 90 General Purpose Gear Lubricant	SAE 90 General Purpose Gear Lubricant	SAE 90 General Purpose Gear Lubricant	SAE 90 General Purpose Gear Lubricant
All Pressure Fittings		No. 1 Gun Grease	No. 1 Gun Grease	No. 1 Gun Grease	No. 1 Gun Grease

*Refer to Page 33 for engine lubrication oil service designations.

For the first 480 hours, use engine oil **one grade lighter than recommended in the above table when the air temperature is above 32° Fahrenheit.

2

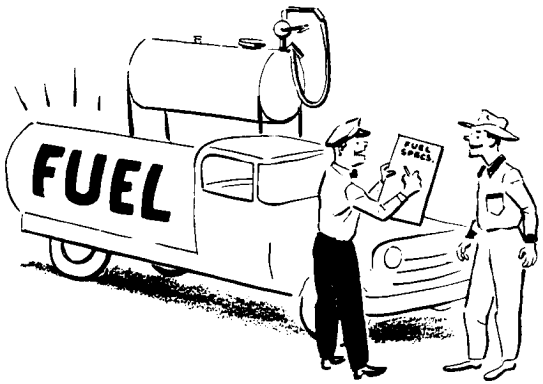


FUEL SPECIFICATIONS

DIESEL ENGINE FUEL

GENERAL

Many thousands of hours of economical operation have been built into the engine of your Case W-10 Terraload'r. The quality of fuel that you purchase and the precautions that you observe to see the only clean fuel enters your engine will be a deciding factor in its performance.



To protect the service life that was built into your Case diesel engine, do the following:

1. Purchase fuel only from a reliable dealer who handles a reputable, well-known brand and has the facilities to keep it clean during storage and delivery.

2. Use a Number 2 Diesel fuel that meets the requirements listed on the following page.

3. If necessary use a fuel conditioner as discussed on Pages 27 and 28.

4. Follow the precautions covering fuel handling and storage that are described in this section of the manual.

5. BUY CLEAN FUEL AND KEEP IT CLEAN.

FUEL SPECIFICATIONS FOR A SUITABLE NUMBER 2 DIESEL FUEL

Case Diesel Engines are designed to operate most efficiently when using a NUMBER 2 DIESEL FUEL. Most well known refiners and distributors market a good grade of diesel fuel and there should be no difficulty in obtaining it.

ATTENTION

Do not confuse Number 2 Diesel Fuel with Number 2 Furnace Oil, as this does not always meet the fuel specifications for Diesel Engines.

These are specifications for a suitable Diesel Fuel.

A. P. I. Gravity	32-39
Pour Point	A Rating 10 Degrees Lower Than the Lowest Expected Temperature
Volatility	
Initial Boiling Point (Minimum)	320° Fahrenheit
50% condensed	475°-550° Fahrenheit
Final Boiling Point (Maximum)	675° Fahrenheit
Distillation Recovery (Minimum)	97%
Flash Point	Legal Minimum Limit or Higher
S. U. Viscosity at 100° Fahrenheit	34-39 Seconds
CETANE (Minimum)	45 (45-55 for winter use)
Diesel Index	43
Water and Sediment (Maximum)	.05%
Ash (Maximum)	.02%
TOTAL SULPHUR (Maximum)	.5%
Conradson Carbon	.2%
Copper Strip Corrosion	Pass
Alkali and Mineral Acid	Neutral

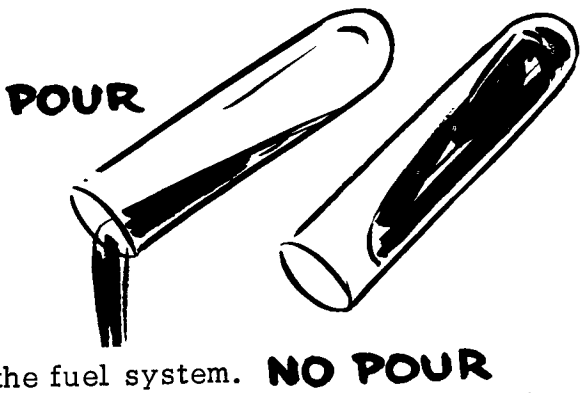
The use of Number 1 Diesel Fuel, which is a lighter fuel, may result in a loss of engine power and also increased fuel consumption, because it has less heat content and a lower viscosity than Number 2 Diesel Fuel. The life of the injection pump may also be affected because of the lack of lubricant in the lighter Number 1 Diesel Fuel.

DEFINITIONS OF DIESEL FUEL TERMS

The definitions of the following terms used in describing the fuel specifications will be used for reference when selecting a suitable fuel.

POUR POINT - is the lowest temperature at which fuel remains fluid and will pour.

Pour Point is especially important for cold weather operation because:



1. If the prevailing air temperatures are lower than the Pour Point, the engine will not start because the fuel will not flow through the fuel system.
2. The high precision injection pump and injector parts receive some of their lubrication from the diesel fuel. If the fuel is not fluid, serious damage may occur due to lack of lubrication.
3. Use diesel fuel that has a Pour Point rating at least 10° lower than the coldest anticipated temperature. At approximately 10° above the Pour Point, waxes, etc., in the fuel start to congeal and will clog the filters.

CETANE - is the self-igniting quality of diesel fuel. Do not apply the Cetane rating to diesel engine performance as you would Octane rating to gasoline engine performance. High Cetane ratings do not necessarily provide improved diesel engine performance. A Cetane number of 40 is considered low, while a Cetane number of 60 is considered high.

Your Case Diesel Engine is designed to operate most efficiently using a NUMBER 2 DIESEL FUEL with a Cetane number of 45 to 50. See Page 20 for cold weather recommendations.

Number 1 Diesel Fuel grades with higher Cetane numbers are not recommended because; Premium diesel fuels are higher in price but will not materially increase engine performance and result in higher operating costs; Number 2 Diesel Fuels with a Cetane Number of 45 to 50 are widely distributed and are readily available.

SULPHUR - is the percent of corrosive sulphur in the fuel.

A high sulphur content (above 0.5%) in diesel fuel is always undesirable, but is especially harmful when the engine must be operated in cold weather, intermittently or with varying loads, where it is difficult to maintain the correct operating temperature. These types of operations result in moisture condensation in the engine, which unites with the sulphur to form destructive acid.

High sulphur contents in the fuel will cause: excessive engine wear; formation of harmful deposits on valves, rings pistons and cylinder sleeve walls; possible corrosive damage to the fuel system.

To keep the engine free of harmful deposits and to counteract any destructive acids that may be formed, a Heavy Duty," additive type crankcase oil must be used.

Use a good grade "Heavy Duty" crankcase oil with a Service designation of DG (Series 1) if the sulphur content is 0.5% or less, and operating conditions are favorable - no prolonged idling, frequent stops and starts, or cold weather operation.

Use a good grade "Heavy Duty" crankcase oil with a Service designation of DM (Series 1) if operating conditions are favorable - not extreme high or low operating temperatures, no prolonged idling and the sulphur content of the fuel is less then 1%

Use a good grade "Extra Heavy Duty" crankcase oil with a Service Designation of "DS" (Series 2) if the sulphur content is above 0.5% (not exceding 1%) or where operating conditions are severe.

ASH - is the precentage of harmful non-combustible material in the diesel fuel. A fuel containing a higher maxium Ash content than .01 per cent can damage the extremely close fitting parts in the fuel injection system.

Fuel Recommendations For Cold Weather Operation

If your Terraload'r is to be operated during cold weather, special precautions should be observed as to the POUR POINT, CETANE RATING, and the SULPHUR CONTENT of the diesel fuel.

1. Use diesel fuel that has a Pour Point rating at least 10^{o} lower than the coldest anticipated temperature. At approximately 10^{o} above the Pour Point, waxes, etc. in the fuel start to congeal and will clog the filters.

2. The CETANE RATING SHOULD BE AT LEAST 45 to 55 for most efficient cold weather starting.

3. Special precautions must be taken to prevent the entry of water into the fuel system.

   a. Always refill the fuel tank at the end of each day's operation to prevent water condensation inside the tank.

   b. The drain on the fuel tank water trap should be opened daily before starting the engine to remove any accumulated water.

   c. Fuel must be allowed to settle in storage for at least 24 hours before putting it in the Terraload'r fuel tank.

4. A high sulphur content in the fuel is especially injurious to the engine when it is operated intermittently or with the coolant temperature below the recommended operating temperature.

The moisture condensation that forms during cold weather operation combines with the sulphur in the fuel to form corrosive acids which attack the finely machined surfaces.

Use Diesel fuel with a sulphur content of 0.5% or less.

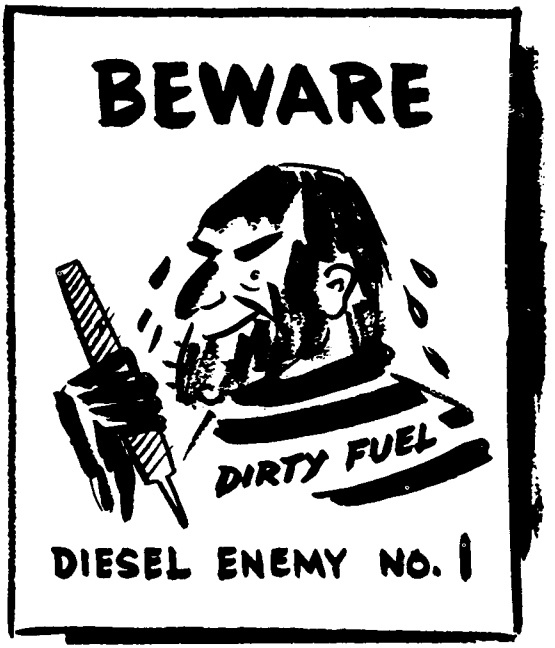
Keep engine up to recommended operating temperature. See Page 130.

Follow the crankcase oil recommendations on Pages 33 through 35.

Fuel Handling and Storage

Several references have been made in the preceding pages of this manual concerning the importance of fuel handling to insure that only clean diesel fuel enters the engine.

To more clearly explain the importance of proper fuel handling practices, we have tried to anticipate the questions that might be asked and to provide answers to them.



1. What are the reasons that special precautions are necessary in the handling and storage of diesel fuel?

a. The handling of diesel fuel presents a special problem because its specific gravity is relatively close to that of water and abrasive rust and dust particles, causing these contaminants to remain in suspension in the fuel for long periods of time. For this reason, diesel fuel must be allowed to settle for at least twenty-four hours without being disturbed in any way, before it is put into the Terraload'r fuel tank.

   If contaminated fuel is put into the fuel tank, the motion of the Terraload'r will prevent the contaminants from settling, so it is absolutely necessary that the fuel is clean when put into the tank.

b. The fuel injection system of a diesel engine has very closely fitted and highly polished parts in order to produce the extremely high pressure necessary for fuel injection.

   If contaminated fuel containing abrasives is used, some of the fine abrasive particles will pass through the fuel filter system and damage the fuel injection pump or injector nozzles. A damaged injection pump or injector nozzles will cause a loss of engine power.

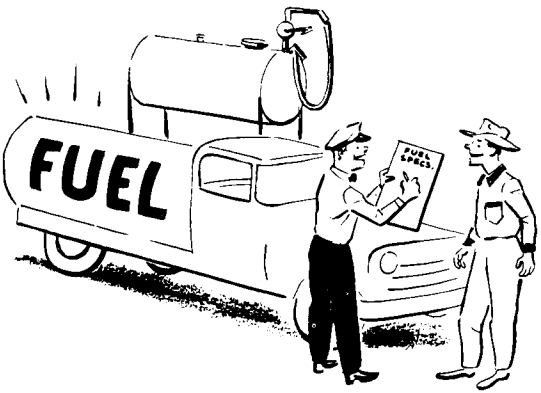
2. How does fuel get contaminated with water and abrasive particles?

   a. From careless handling by the distributor or refiner.

   b. By using improper storage facilities or in careless handling when transferring the fuel from the storage tank to the fuel tank.

3. How can I be certain that the diesel fuel that I put in my Case Terraload'r is clean?

   a. By purchasing fuel that meets the specifications on Page 17 from a fuel dealer who has storage and delivery equipment that will prevent dust, rust or other abrasives from getting into the fuel.



b. By storing the fuel in a rust proof tank and allowing it to settle for twenty-four hours before pumping it into the Terraload'r.

c. By cleaning the hose nozzle and the fuel tank filler cap before putting fuel into the Terraload'r fuel tank.

d. By forbidding the use of open cans and funnels for filling the fuel tank.

e. By filling the fuel tank only when the Terraload'r is out of the wind or dust.

f. By cleaning the storage tank and the Terraload'r fuel tank at regular intervals. This will insure that residue in the fuel tank will not contaminate a fresh fuel supply.

4. <u>If fuel containing abrasive particles or water is so injurious to the injection system of a diesel engine, why doesn't the manufacturer provide a filter system on the engine that will remove all of these contaminants from the fuel?</u>

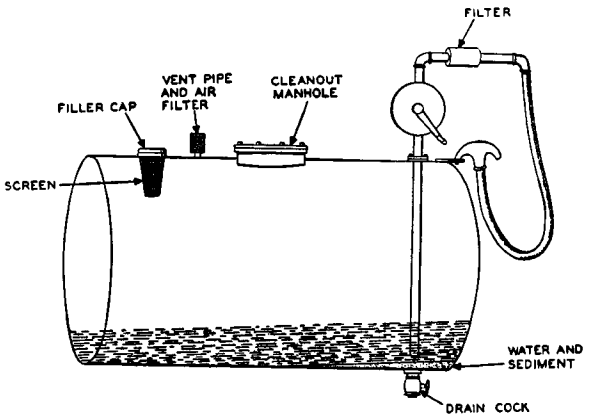
Your Case W-10 Diesel Terraload'r is equipped with a complete filtering system which includes:

a. An air filter in the fuel tank cover.
b. A screen at the fuel tank filler opening.

c. A water trap at the bottom of the fuel tank.
d. Three filters (first stage, second stage and third stage, each of which is progressively finer).

While this is the most reliable fuel filtering system that has as yet been devised for use on diesel engines, it is impossible for these filters to remove all of the fine abrasive particles which might be in suspension in fuel that has been handled carelessly. This means that the service life of your injection system depends, to a large extent, on the procedure you set up for handling the fuel that is to be put into your Terraload'r.

5. What equipment should I have to properly handle diesel fuel, so I can be assured that only clean fuel will be put into my Terraload'r fuel tank?



Use a rest proof storage tank similar to that illustrated above. This tank should be equipped with a pump, so the diesel fuel can be transferred directly from the storage tank to the Terraload'r fuel tank.

The hose from the pump should be equipped with a nozzle, so contamination of fuel by the use of dirty buckets or funnels can be eliminated.

6. How should I handle refueling in the field?

a. The recommended method is to mount a small portable rust proof tank (200 to 300 Gallons capacity) on a trailer. so it can be transported.

The tank and trailer can then be parked adjacent to the work area where the Terraload'r is operating.

Try to locate the tank and trailer so dust from the work area will not interfere with filling the Terraload'r fuel tank. The tank and trailer must remain motionless for at least twenty-four hours prior to transferring any of the fuel into the Terraload'r fuel tank.

b. Rust proof steel drums can be used in an emergency, but they are undesirable. If you find it necessary to use drums, spot them adjacent to the work area early enough so the fuel can settle for at least twenty-four hours before transferring fuel from the drums into the Terraload'r fuel tank.

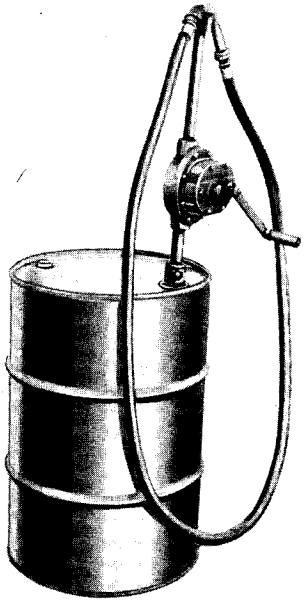


Figure 6

To remove fuel from a drum, use a pump with a hose that is long enough so the nozzle end can be inserted into the fuel tank opening. Raise the intake pipe on the pump high enough so it leaves 1/3 of the fuel remaining in the drum. After several drums have been 2/3 emptied, the remaining fuel can be used to fill other drums; but the fuel in the refilled drums should be allowed to settle for at least twenty-four hours before using it.

7. Why is it necessary that I fill the fuel tank immediately after completing each day's work.

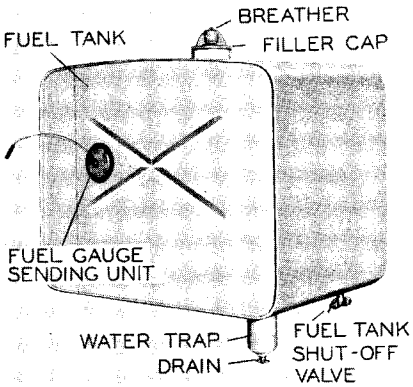
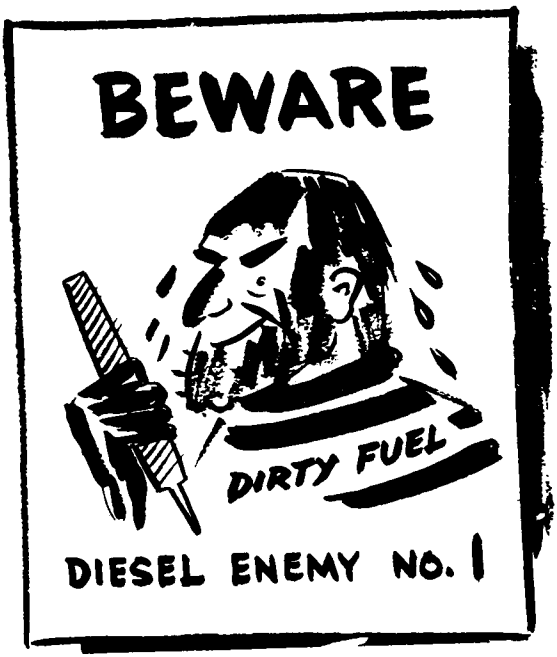


Figure 7

a. To prevent moisture condensation from forming in the tank.

b. To allow the fuel to set during the night, so contaminants will be drained off each morning when the water trap is drained, prior to starting the day's work.

8. How can I clean a fuel storage tank that has become contaminated with gum and varnish deposits from the fuel?



Drain all of the remaining fuel from the tank. Use a mixture of one part alcohol and one part benzol, or use acetone to dissolve the deposits in the tank. Flush the tank with clean fresh diesel fuel.

The temperature of the fuel during storage effects the formation of gum and varnish. Fuel that is stored in a warm place or where the sun directly strikes the tank will form gum more rapidly than fuel stored in a cool place where the temperature remains constant.

9. How long can Diesel Fuel be stored safely before harmful gums and varnishes are formed:

Most Diesel fuel is refined by a "cracking" process and has a natural tendency to form gum or varnish when stored. Most major fuel refiners and distributors add a "gum inhibitor" which retards the formation of gum and allows the fuel to be stored for longer periods.

Gum or varnish in diesel fuel plugs the fuel filtering system and interferes with the operation of closely fitted parts in the Fuel Injection System of a diesel engine.

Gum and varnish will result in power loss, misfiring and other symptoms that can easily be mistaken for mechanical difficulty and result in unnecessary expensive servicing of the Injection System and would provide only temporary relief.

In areas where gum and varnish in the fuel presents a problem, it is recommended that a "Diesel Fuel Conditioner" be used. "Diesel Fuel Conditioners" act as detergents or solvents and can be used to clean out gum and varnish deposits already in an engine and, when used regularly, will prevent further formation of these deposits.

The following "Fuel Conditioner" recommendations are made for areas troubled with gum and varnish in the fuel:

1. Obtain a "Diesel Fuel Conditioner" and use it as follows:

   A. Add it to the fuel in the main storage tank.

   B. Add a small quantity to the Terraload'r fuel tank daily.

   C. Use the "Conditioner" periodically, or when any symp-

toms develop in the engine that indicate gum and varnish deposits in the Fuel Injection System.

NOTE: Refer to the instructions furnished with the "Conditioner" as to the amount that should be used.

2. The following are "Diesel Fuel Conditioners" which are known to have been used in almost every major make of diesel engine:

   1. Siloo Diesel Fuel Conditioner

   2. Ameroid

   3. Kleerflame

   4. Shaler "Karbout"

   5. Whiz-Zorbit

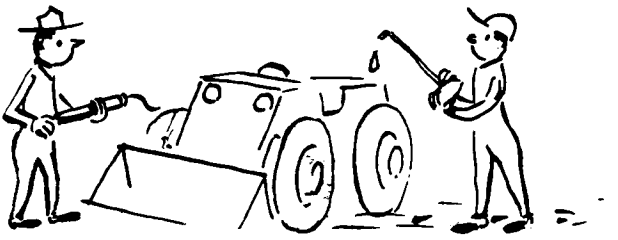
IMPORTANT

1. Buy Diesel Fuel in quantities that will be used up in 90 days or less.

2. Protect main storage tank with a shelter so the fuel can be kept as cool as possible.

3. When a Terraload'r is to remain idle for a month or longer, follow the Engine storage recommendations on Pages 157 through 159 of this manual.

3



LUBRICATION

LUBRICATION

Lubricating your Case Diesel Terraload'r will require only a few minutes of regular daily attention. Wherever possible, automatic lubrication or prepacked bearings have been provided to reduce the demand made on the operator's time.

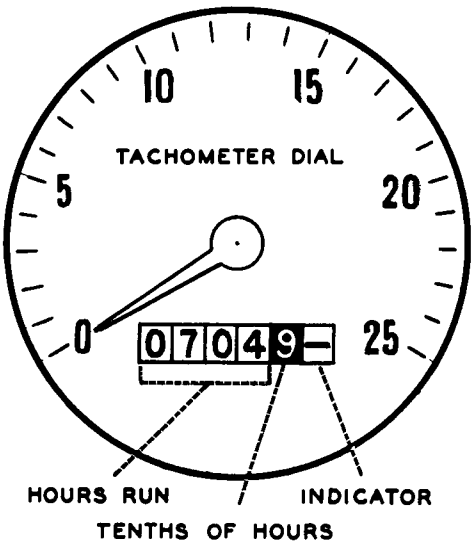


Figure 8. Engine Hour Meter

To assure maximum engine service and complete satisfaction, two factors must be observed:

1. Have a regular schedule of inspection and lubrication. All time intervals in the Lubrication Section and the Preventive Maintenance Section are based on Hour Meter Readings. Reading the Hour Meter provided on your Terraload'r will tell you when to service it.

2. Use only high quality oils and greases of unvarying specifications. Always buy from a reliable dealer who handles reputable, well-known brand lubricants. Use only oil and grease of the specifications recommended in this manual.

Lubrication Points	Approximate Capacities	Above 80°F.	80° to 32°F.	32° to —20°F.	—20°F. or Below
Engine Crankcase*	12 Quarts	SAE 30**	SAE 20W**	SAE 10W	SAE 5W
with Oil Filter	14 Quarts	SAE 30**	SAE 20W**	SAE 10W	SAE 5W
Fuel Injection Pump	½ Pint	SAE 30**	SAE 20W**	SAE 10W	SAE 5W
Transmission and Torque Converter					
(Initial Fill)	7½ Gallons	Automatic Transmission Fluid Type C	Automatic Transmission Fluid Type C	Automatic Transmission Fluid Type C	Automatic Transmission Fluid Type C
(Refill including Filter)	5¾ Gallons				
Hydraulic System Reservoir	14 Gallons	SAE 10W	SAE 10W	SAE 10W	SAE 10W
Power Steering and Power Brake System	2 Quarts	Automatic Transmission Fluid Type A	Automatic Transmission Fluid Type A	Automatic Transmission Fluid Type A	Automatic Transmission Fluid Type A
Axles (Both Rigid and Steering)					
Differential Housings (One each axle)	11 Quarts Each	SAE 90EP	SAE 90EP	SAE 80EP	SAE 80EP
Planetary Housings (Two each axle)	3 Quarts Each	SAE 90EP	SAE 90EP	SAE 80EP	SAE 80EP
Steering Gear Housing	1 Pint	SAE 90 General Purpose Gear Lubricant	SAE 90 General Purpose Gear Lubricant	SAE 90 General Purpose Gear Lubricant	SAE 90 General Purpose Gear Lubricant
All Pressure Fittings		No. 1 Gun Grease	No. 1 Gun Grease	No. 1 Gun Grease	No. 1 Gun Grease

*Refer to Page 33 for engine lubrication oil service designations.

For the first 480 hours, use engine oil **one grade lighter than recommended in the above table when the air temperature is above 32° Fahrenheit.

LUBRICATION FITTINGS CHART

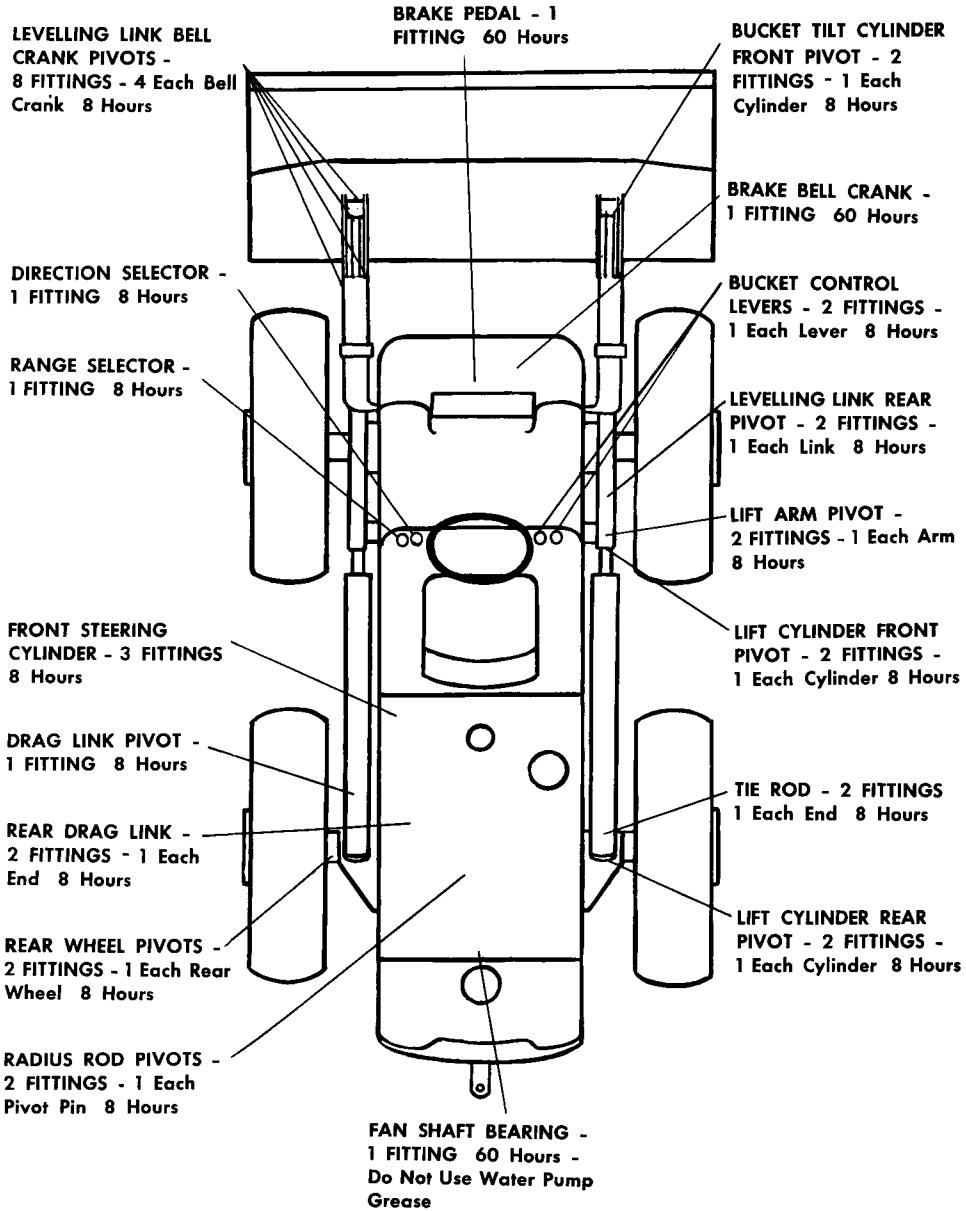


Figure 9

Selection of Lubricating Oil

It is extremely important that you select and use in your Case Diesel Terraload'r a stable, high quality, "Heavy Duty Type" engine lubricating oil that has the proper body (SAE Viscosity Rating) for the prevailing air temperatures.

It should be understood that a lubricating oil produced primarily for diesel engine usage will give better service because the properties of the oil will combat destructive acids and harmful deposits that may form in a diesel engine as a result of severe operating conditions or the type of fuel being burned.

Engine Oil Body Recommendations (SAE Viscosity Rating)

SAE 30---------- Air Temperatures above 80° F.
SAE 20-W---------- Air Temperatures from 80° to 32° F.
SAE 10-W---------- Air Temperatures from 32° F. to -20° F.
SAE 5-W*---------- Air Temperatures below -20° F.

*NOTE: If the Terraload'r is to operate under a heavy constant load during extremely cold weather, it is advisable to use SAE 10-W. It may then be necessary to drain the oil while it is still hot. Pre-heat the oil to approximately 100° F. before pouring it back into the crankcase just prior to starting.

Using lubricating oils of the recommended SAE Viscosity Rating assures you that the oil will remain fluid or free flowing within the specified air temperature ranges. The use of either heavier or lighter bodied oils than recommended may seriously affect engine lubrication and performance. Too light an oil used during warm weather may result in high oil consumption and cause increased engine wear. Using too heavy an oil during cold weather will affect starting, and may result in a poor rate of lubricant distribution causing increased engine wear.

ENGINE LUBRICATING OIL SERVICE DESIGNATIONS

To simplify the selection of a suitable heavy duty engine lubricating oil to meet diesel engine service conditions, the American Petroleum Institute (composed of most major oil companies and refineries) has adopted three service designations for diesel engine use.

1. Service "DG" - Favorable Diesel Engine Operation.
2. Service "DM" (Series 1) - Moderate to Severe Diesel Engine Operation.
3. Service "DS" (Series 2 and 3) - Severe Diesel Engine Operation.

Always use a high quality, stable, heavy duty engine oil with a service designation of DG, DM or DS, depending on your particular diesel engine operating conditions.

Service "DG" - For favorable diesel engine operation where there are no harmful low or high operating temperatures, no prolonged idling or frequent stops and starts and where the sulphur content of the fuel is less than .5%.

Service "DM" - For moderate to severe diesel engine operation where there are no extreme high or low temperatures, no prolonged idling and the sulphur content of the fuel is less than 1%

Service "DS" - For severe diesel engine operation such as:

1. Low temperature engine operating conditions, frequent stop and start operation, prolonged idling, operating with a light load (especially during cold weather) and operating without radiator shutters during extremely cold weather all tend to produce water in the engine. Water, when combined with sulphur in the fuel or in the crankcase

oil itself, will form destructive acids in the engine that cause excessive engine wear, harmful deposits and possible corrosive damage to the engine and fuel system.

2. High temperature engine operating conditions as a result of heavy loads during very hot weather, cause excessive engine wear. Lubricating oils that do not have the protective additives to withstand high temperatures may break down under this condition, resulting in excessive oil consumption, engine wear and harmful deposits.
3. Diesel fuel being used that has a sulphur content above .5%, but less than 1%. The higher the sulphur content in the diesel fuel, the greater are the chances for acid and deposit formations in the engine. When fuel containing sulphur in excess of .5% must be used, heavy duty "DS" lubricating oil will aid in preventing damage to the engine by tending to neutralize any acid formed and by carrying most of the sludge formation in suspension.

CAUTION: Change the crankcase oil frequently when severe operating conditions exist. The oil will eventually become saturated with contaminants and lose its protective properties.

The term "Heavy Type" does not refer to the weight or body (SAE) Viscosity Rating of an oil. A "Heavy Duty" oil is a detergent or additive type oil to which chemicals have been added to:

1. Make it more resistant to oxidation and corrosive substances, such as sulphur.
2. To improve some property in the oil, such as its Pour Point, or its ability to withstand heat and pressure.
3. To give the oil the ability to aid in preventing harmful deposits by holding carbon, sludge, etc., in suspension.

Checking Crankcase Oil Level

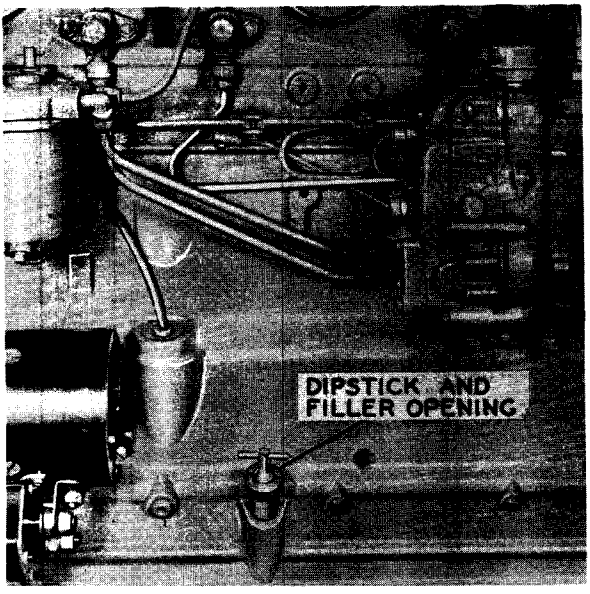


Figure 10. Checking Crankcase Oil Level

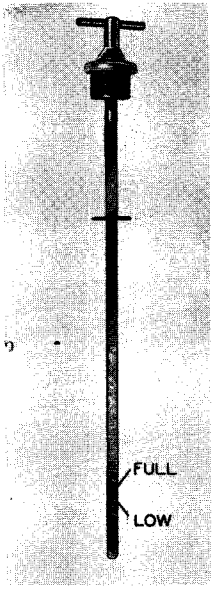


Figure 11. Dipstick

Check the crankcase oil level daily using the dipstick, Figure 11. The dipstick has "Full" and "Low" marks Add enough oil through the filler opening, Figure 10, so the oil level just reaches the "Full" mark. Do not overfill the crankcase.

CAUTION

1. The Terraload'r must be in level surface when checking crankcase oil level.
2. Allow sufficient time for oil to run down off the engine parts. This is a large engine. One quart of oil could easily remain distributed on the engine parts just after stopping. A good time to check is prior to starting the day's work and just after the midday lunch period.
3. For an accurate check of oil being consumed, your records must cover at least 50 hours of operation as recorded on the engine hour meter. Daily figures are misleading since most Terraload'rs are applied to varying loads from day to day and oil consumption will vary with the load.

Crankcase Oil Change

Crankcase Capacity ---------- 12 quarts, (14 quarts, including oil filter)

Drain and refill the crankcase at least every 120 hours of operation.

NOTE: Replace the crankcase oil filter element every second oil change or 240 hours.

If the engine service is severe - (frequent stopping and starting, high or low operating temperatures, high sulphur content in fuel) - the crankcase should be drained more often to prevent the formation of sludge or harmful deposits in the engine.

NOTE: You cannot determine the condition of a detergent (heavy duty) oil by its color. Detergent type oils will become much darker in color within a short period of operation. This is caused by the oils ability to hold carbon in suspension.

To drain the crankcase, remove the magnetic drain plug while the oil is still hot, Figure 12. To remove any metallic particles from the magnetic drain plug, strike it sharply against a hard piece of wood and wash it in clean diesel fuel. When installing the drain plug, be sure to replace the copper gasket on the plug.

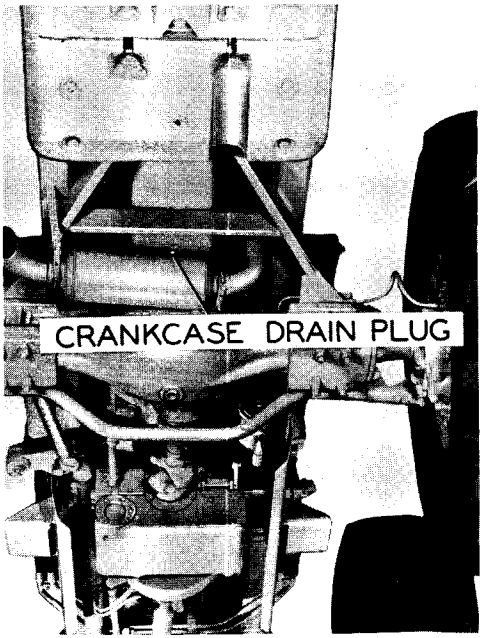


Figure 12
Crankcase Drain Plug

IMPORTANT-NOTICE

1. When just the crankcase is drained, always refill with 12 measured quarts of oil. Do not refill using the dipstick as a guide.

2. If you have drained the crankcase and replaced the oil filter element, pour in 14 measured quarts, operate the engine for a few minutes to fill the filter body; then check the oil level with the dipstick. Be sure to allow sufficient time for the oil to run down off the engine parts.

3. By following the above procedure, you will prevent overfilling or underfilling the crankcase; either of which can be detrimental to the engine service life and will give false oil consumption records.

Oil Filter

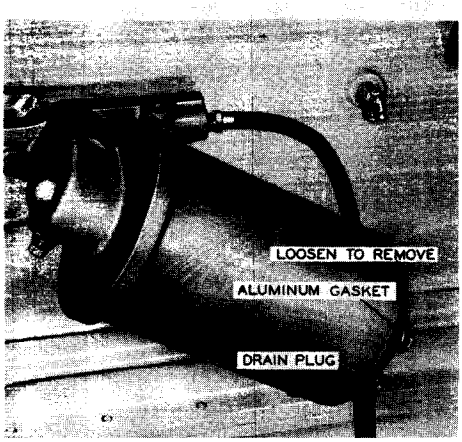


Figure 13

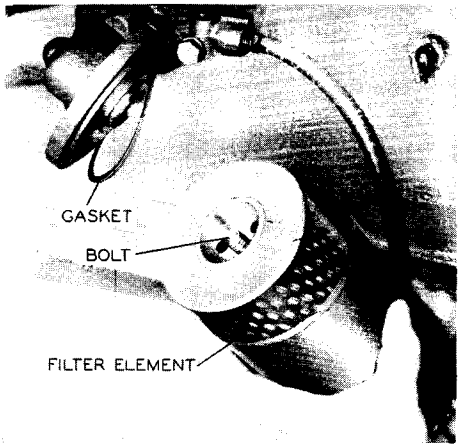


Figure 14

After each 240 hours of operation (two oil changes), install a new Genuine Case Filter Element as follows:

1. Remove the drain plug, Figure 13.

2. Loosen the nut on the filter shell until the shell and element can be lifted off the base together, Figure 14.

3. Pull the contaminated element out of the shell, Figure 14.

4. Flush the shell and filter base with clean diesel fuel.

5. Install a new Case Filter element on the bolt. Be sure the element is installed as shown in Figure 14.

   BE CAREFUL not to push the rubber grommet seal out of the element with the bolt.

6. Install the new filter base gasket provided with the new element, Figure 14.

7. Position the shell and element on the base and tighten the nut just enough to form a seal.

8. Replace the filter shell drain plug.

9. Operate the engine and check for leakage.

   NOTE: If leakage is observed between the shell and nut, a new aluminum shell gasket must be installed, Figure 13.

Genuine Case Filter Elements are obtainable from your Authorized Case Industrial Dealer. This element has been designed to protect your Case W-10 Diesel Terraload'r from harmful dust and abrasives. Do not use substitutes.

IMPORTANT

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

STEERING GEAR HOUSING

Every 24 hours, check the oil level in the Steering Gear Box located at the lower end of the steering column. Keep the gear box filled to the plug opening with SAE 90 General Purpose Gear Lubricant, winter and summer.

FUEL INJECTION PUMP LUBRICATION

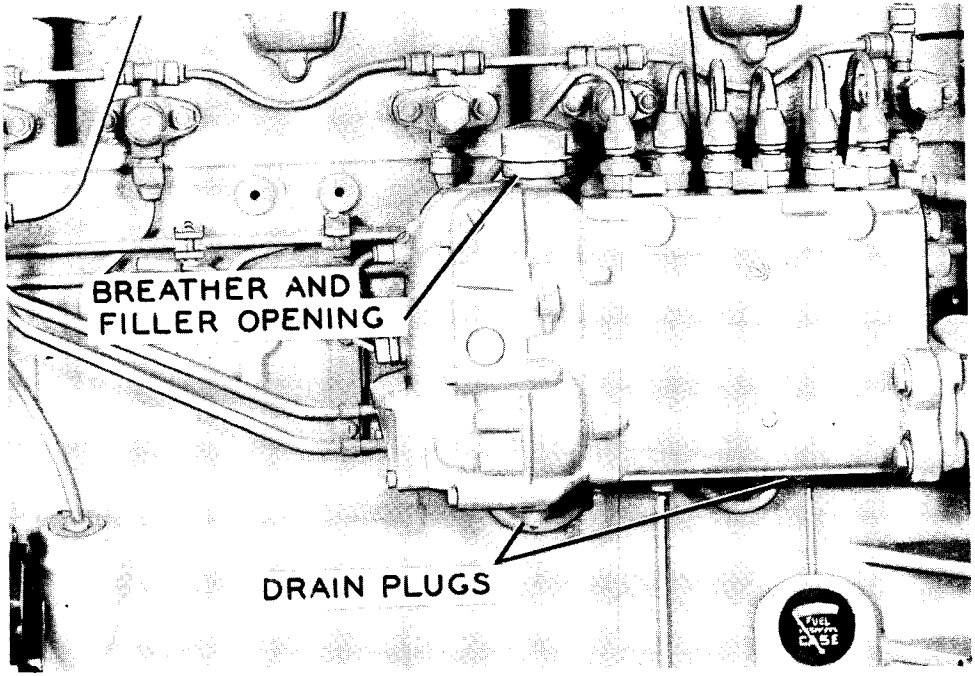


Figure 15

The camshaft and governor on the fuel injection pump are lubricated by the oil contained in the camshaft chamber, Figure 15.

Oil Change

Each time the crankcase oil is changed, drain and refill the injection pump with clean free flowing oil of the same grade and viscosity as used in the engine crankcase. To drain the lubricating oil from the injection pump, remove the two drain plugs from the bottom of the pump. Be sure to replace the plugs before refilling, Figure 15.

Capacity

The injection pump filler is located under the breather cap. To fill the injection pump, remove the breather cap and pour 1/2 pint of clean oil of the same viscosity as used in the engine crankcase through the filler opening. Figure 15.

HYDRAULIC POWER STEERING AND POWER BRAKES

Capacity of Power Steering and Power Brake System - 2 Quarts
Type Fluid----------Automatic Transmission Fluid - Type A.

Filling and Bleeding Air From System

Remove the reservoir cap, as shown in Figure 16. The hinged dipstick, attached to the cap, is marked "F" (full) and "L" (low). The fluid recommendation is also stamped on the dipstick.

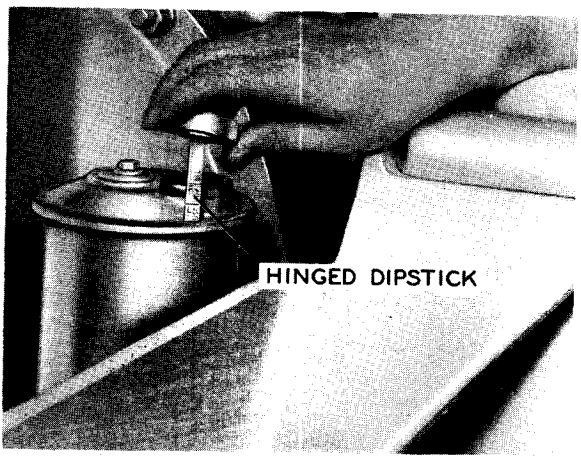


Figure 16

Carefully fill reservoir with clean Automatic Transmission Fluid - A. Replace the reservoir cap and start the engine. Turn the wheel through several turns; then stop the engine and refill the reservoir.

Do this until the fluid level ceases to drop after turning the steering wheel. The system is then completely filled.

Refer to Page 149, for bleeding brakes.

NOTE: The first few times you turn the steering wheel, do not make full turns. Make full turns only after a sufficient amount of fluid is added to the system. When making a full turn, DO NOT hold the wheels against the stops. This can result in damaging the pump drive belt through slippage, relief valve damage from excessive pressure and an overheating condition in the pump. IMPORTANT: While bleeding air from system, operate engine at low idle speed (approximately 600 RPM).

Checking The Reservoir Fluid Level

Check the reservoir fluid level every 60 hours of operation. Wipe the reservoir cover and cap clean before removing the cap. Keep the reservoir filled to the full mark on the dipstick.

Reservoir Filter Element

A replaceable filter element is provided in the fluid reservoir body, Figure 17. Replace the element every 1000 hours of operation, or more often in severe dust conditions. To replace the filter element remove and lift the contaminated element out. Install a new element in the same location as the one removed (install either end up).

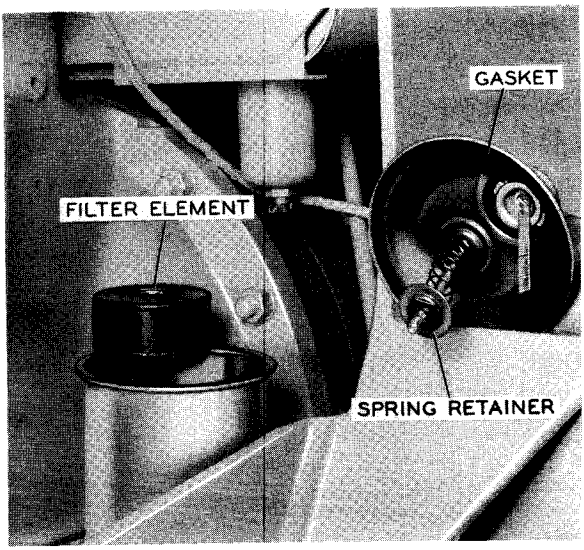


Figure 17

Use care not to damage the reservoir cover gasket when removing and reinstalling the cover. Check the spring retainer of the reservoir cover mounting bolt. Figure 17. It must be in the position shown. Should it slide upward on the bolt, the filtration action of the element will be lost.

NOTE: If proper care is taken to prevent the entry of dirt into the reservoir, and if the filter element is changed periodically, it should not be necessary to ever drain and replace the hydraulic steering fluid.

Hydraulic Power Steering and Brake Fluid Temperature

After the engine has been operating for a few minutes the steering fluid will reach operating temperature and the pump will feel very hot to the hand. This is a normal condition found in any hydraulic system and is caused by the fluid from the reservoir being circulated through the pump and control valve at a very accelerated rate whenever the engine operates. This condition will cause no difficulty as long as the reservoir is kept full.

FOUR WHEEL DRIVE LUBRICATION

Capacity (Both Rigid Axle and Steering Axle)

Planetary Gear Housing ---------- 3 Quarts (Each Wheel)
Differential ---------- 11 Quarts (Each Axle)
Oil Recommendations ---------- See Page 31.

Checking Oil Level

The oil level in the planetary and differential gear housings should be checked every 8 hours of operation or at the end of each shift.

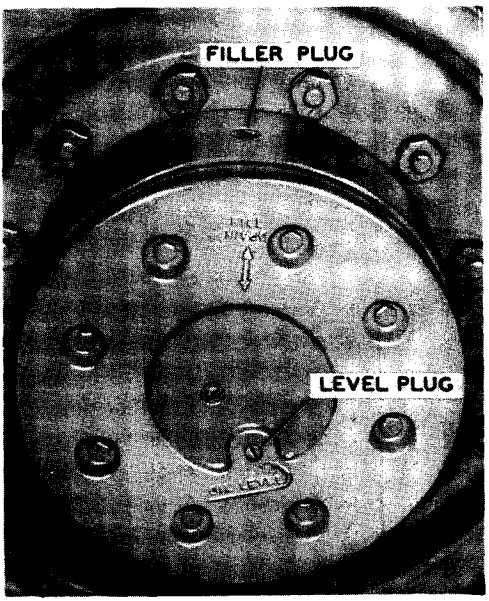


Figure 18

Planetary Gear Housing

To check the oil level in the planetary gear housing on each wheel, rotate the wheel so the level plug, Figure 18 is located at the bottom of the wheel. Remove the level plug, the oil level must be up to the level plug opening - if not remove the filler plug and add oil until the level rises to the level plug opening. Always reinstall both filler and level plug tightly.

Differential Gear Housing

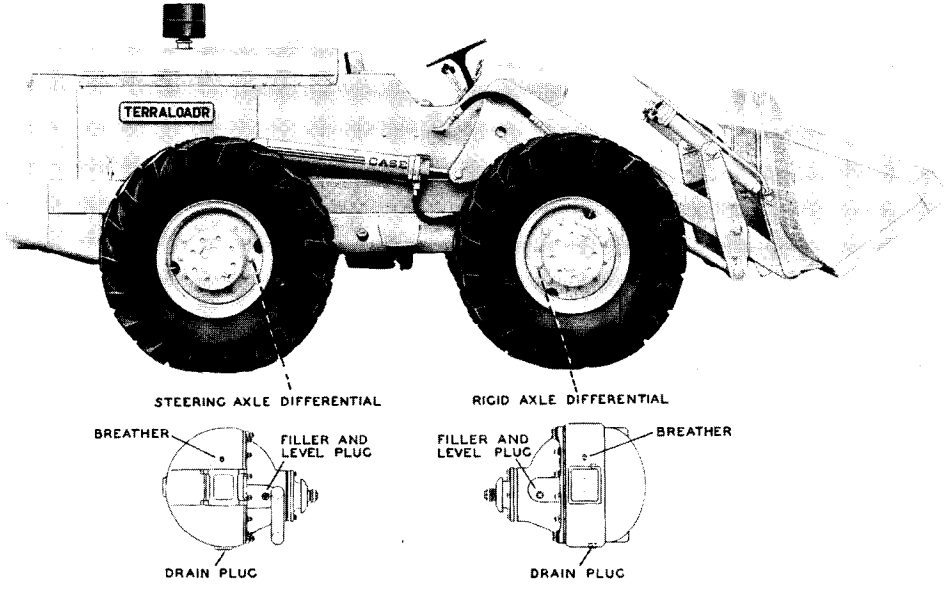


Figure 19. Differential Gear Housings

To check the oil level in the differential gear housings, locate the Terraload'r on a level surface and remove the filler plug, Figure 19, the oil level must be up to the filler plug opening - if not, add sufficient oil to bring the level up to the plug opening. NOTE: It will be necessary to pump the oil into the differential housings.

Oil Change

Planetary Gear Housings

Drain and refill the planetary gear housing on each wheel every 1000 hours of operation. This should be done while the oil is warm from operation.

1. To drain each planetary gear housing, rotate the wheel so the filler plug is located at the bottom of the wheel. Remove the filler plug and allow the oil to drain. Figure 20.
2. To fill the planetary gear housing with oil rotate the wheel so the filler plug opening is located at the top of the wheel. Fill the planetary housing to the level plug opening, Figure 21. Always replace level and filler plugs tightly.

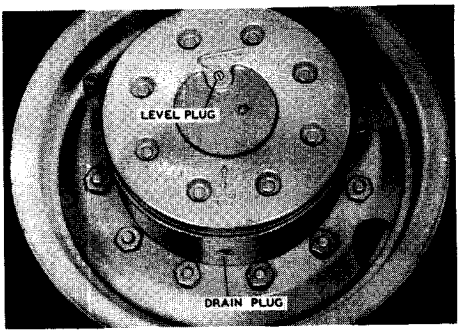


Figure 20

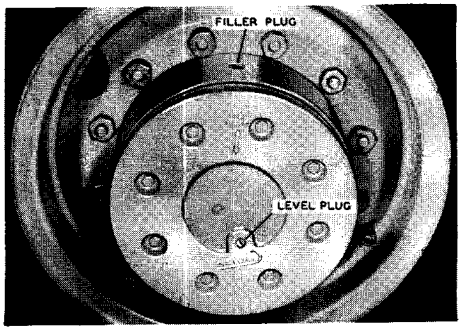


Figure 21

Differential Gear Housing

Drain and refill both differential gear housings every 1000 hours of operation. This should be done while the oil is still warm from operation.

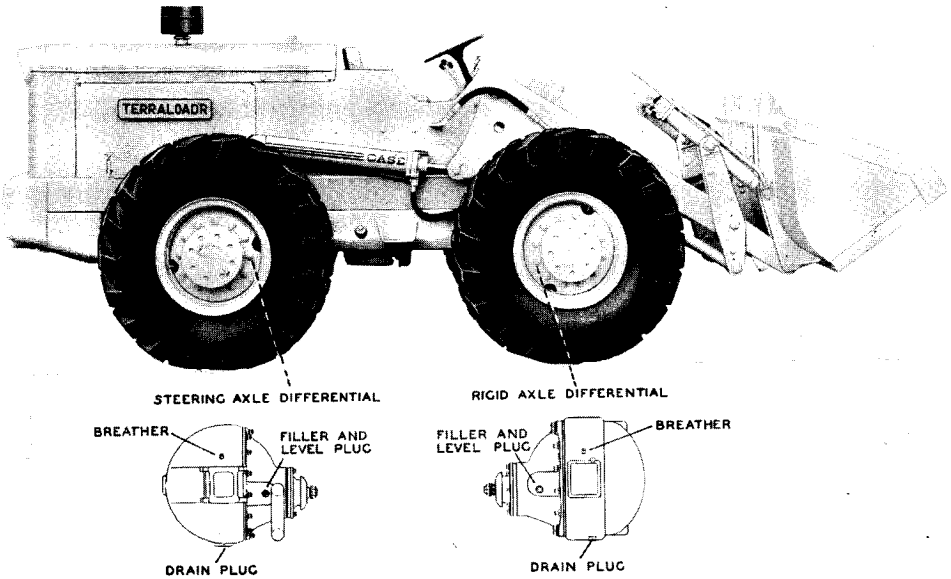


Figure 22

To drain each differential gear housing - remove the drain plugs, Figure 22. Replace the drain plugs and refill the housings to the filler plug openings, Figure 22.

TRANSMISSION LUBRICATION

Transmission Capacity

Entire System (Initial Fill)---------- 7-1/2 Gallons

Oil Sump (Including Oil Filter)---------- 5-3/4 Gallons

Oil Recommendation ---------- Automatic Transmission Fluid - Type C

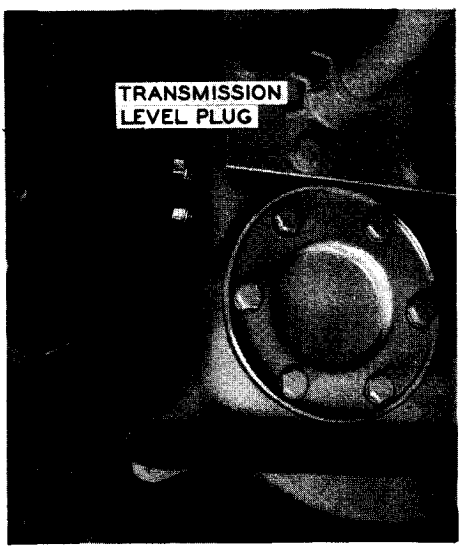


Figure 23. Transmission Level Plug

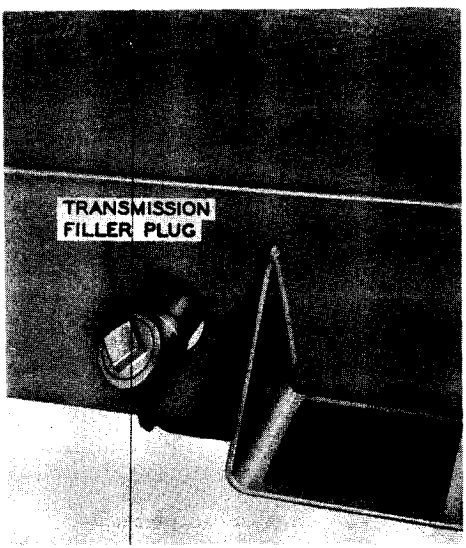


Figure 24. Transmission Filler Plug

Checking Transmission Fluid Level

Check the transmission fluid level every 8 hours of operation or at the end of each shift, with the engine running at idling speed, the fluid at operating temperature and the Transmission In Neutral Range.

To check the fluid level remove the top level plug, Figure 23. Fluid should be level with the plug opening - if not -- add sufficient oil to fill the sump to the top level plug opening.

Transmission Fluid Change

Drain and refill the transmission every 2000 hours of operation. This should be done while the fluid is still warm from operation. The Terraload'r must be located on a level surface.

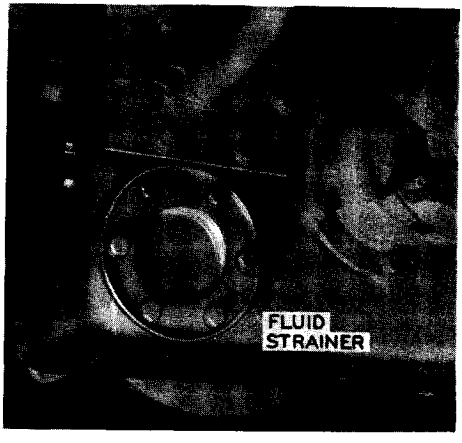


Figure 25. Transmission Fluid Strainer

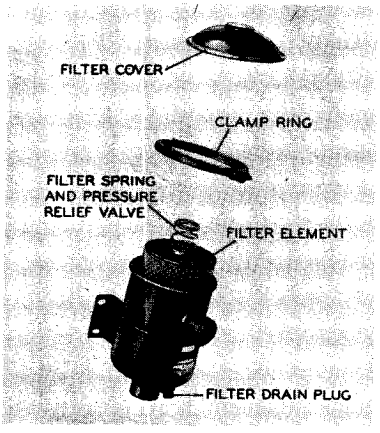


Figure 26. Transmission Filter Assembly

To change the transmission fluid proceed as follows:

1. Remove the drain plug from the transmission, Figure 27.

2. Remove the fluid strainer, Figure 25, and clean with mineral spirits, using a soft bristle brush. Reinstall clean strainer screen in transmission.

3. Remove the transmission filter drain plug, Figure 26.

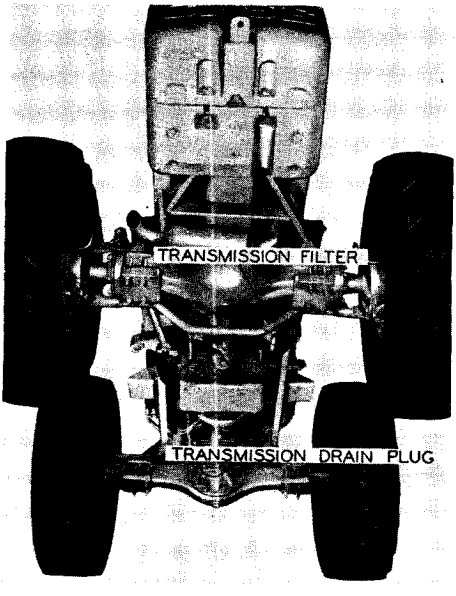


Figure 27. Transmission Drain Plug

4. To replace the contaminated filter element with a clean filter element, remove the clamp screw and ring. Figure 26. IMPORTANT: Be careful when removing filter cover not to lose filter spring and pressure relief valve.

5. Drain and flush out the filter body with clean fuel before installing the new fiter element. After installing the new element, reinstall pressure relief valve, spring, cover clamp ring and screw, Figure 26.

6. Pour 4 to 5 gallons of Type C Transmission Fluid through the Transmission filler opening, Figure 28.

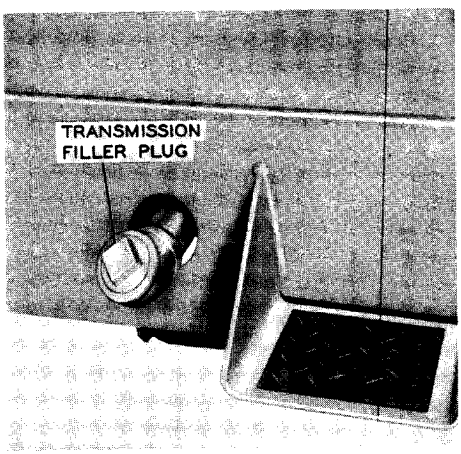


Figure 28

7. Start the engine and let it run at idling speed with the transmission in neutral range to charge the transmission hydraulic system

8. After the engine has been running at idling speed for a few minutes, add enough Type C Transmission Fluid to bring the oil up to the top level plug opening, Figure 24.

10. When the transmission has been filled to the correct level, - operate the engine until the transmission fluid is warm - then check filter for leaks.

HYDRAULIC SYSTEM

Capacity ---------- 14 Gallons
Fluid Recommendation ---------- SAE 10W (MS-DG)

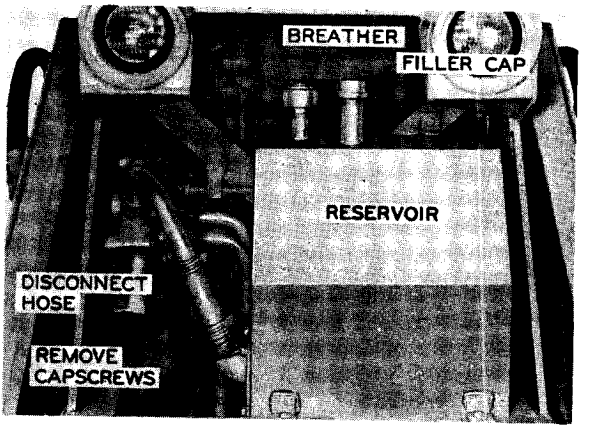


Figure 29

Checking Fluid Level

Every 60 hours of operation, check the fluid level in the hydraulic reservoir by means of the dipstick located in the filler cap, Figure 29. Be sure the bucket is lowered to ground level to force oil out of the lift cylinders. The dipstick is marked "Full" and "Low." When the oil in the reservoir falls below the "Full" mark on the dipstick, add SAE 10-W(MS-DG) oil through the filler opening, Figure 29, until the oil reaches the "Full" mark on the dipstick. Do Not Overfill.

Draining the Hydraulic Reservoir

Every 2500 Hours of operation, or once a season, whichever occurs first, drain the hydraulic reservoir. A drain plug is located on the underside of the hydraulic reservoir.

Remove and check the edge wound filter element each time the oil in the hydraulic reservoir is changed. Disconnect the hose and remove the capscrews, shown in Figure 29, to check the filter element. Wash the filter element in clean fuel.

Flush out the hydraulic reservoir and replace the filter

element, capscrews and hose. Figure 29. Refill the hydraulic reservoir to the "Full" mark on the dipstick with 10-W (MS-DG) oil. Start the engine and bleed the system by operating the lift and tilt control levers through several full cycles. Recheck the oil level with the dipstick and add oil if necessary.

Hydraulic Reservoir Breather

Every 5 to 60 hours, depending upon dust conditions remove and clean the edge wound paper filter element, Figure 30.

Wash the element in a greaseless cleaning fluid such as is used for removing spots from clothing.

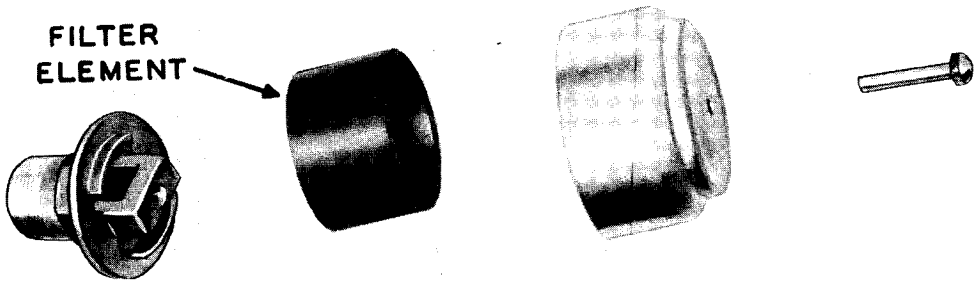


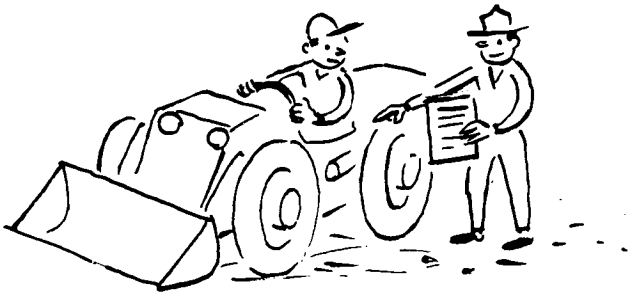
Figure 30. Hydraulic Housing

Breather Filter Element

IMPORTANT

Failure to keep the filter element clean will restrict the breathing of the hydraulic system and will result in oil being forced past the seals by the pressure build up.

4



OPERATING INSTRUCTIONS

RUN-IN PROCEDURE

IMPORTANT
AT ALL TIMES, KEEP THE ENGINE
UP TO THE RECOMMENDED MINIMUM
OPERATING TEMPERATURE
(WORK ZONE ON THE TEMPERATURE GAUGE)
DO NOT IDLE THE ENGINE

Careful attention must be given to proper "Run-In" procedure. Piston rings and cylinder sleeves can be seriously damaged in a new engine if "Run-In" instructions are not followed. The following procedure is recommended:

1. Operating Temperature
Maintain the coolant temperature in the Work Zone on the temperature gauge.

Low operating temperatures contribute to the formation of destructive acids and harmful deposits in the engine.

Adding or removing one or both hood sides will aid in regulating coolant temperature.

Radiator Shutters are available as extra equipment.

2. Crankcase Oil
Case Diesel Terraload'rs are shipped from the factory with a special "Run-In" oil in the crankcase. After the first 20 hours hours of operation, drain this oil while the engine is hot and replace it with fresh oil.

NOTE

For the next 480 hours, change the crankcase oil at the recommended 120 hour intervals, but use one grade lighter oil than recommended in the table on Page 31, when the air temperature is above 32 degrees F. Do not drain special run-in oil until the engine has been operated 20 hours.

PRE-STARTING CHECK LIST

Before starting your Case Diesel Terraload'r for the first time and before each operating period thereafter, check the following:

1. Make sure everyone responsible for the operation and maintenance of the Terraload'r understands the importance of clean fuel. Refer to Fuel Specifications on Page 17.
2. Check that all lubrication fittings are serviced as directed on Pages 30 through 32.
3. Check the crankcase and transmission are filled to levels indicated on Pages 36 and 46.
4. Be sure air cleaner element is clean. Refer to Preventive Maintenance Section.
5. Check that radiator is filled. Use only soft water that is as free as possible of scale forming minerals - or a reputable nationally recognized brand of ethylene glycol type anti-freeze. Refer to Page 31.
6. Check that the fuel tank is filled with clean, water free diesel fuel that meets requirements listed on Pages 17 through 21. Always wipe fuel tank cap clean before removing it. Drain any water or sediment from the water trap before starting each shift.
7. Visually check fuel system for leakage. Check the engine for coolant or crankcase oil leakage.
8. Check that both fan and power steering belts are just tight enough to eliminate slippage. Refer to Pages 136 and 137.
9. Check that torque converter pressure gauge registers in the green zone.
10. Check the hydraulic power steering and make sure the fluid reservoir is filled. Refer to Page 41.
11. Check the air pressure in the tires. See Page 157.
12. Check the oil level in the hydraulic reservoir.
13. Start the engine and let it warm up to the recommended operating temperature.
14. Operate the hydraulic control levers and observe the action of the bucket. Inspect the hoses and connections for evidence of oil leaks.

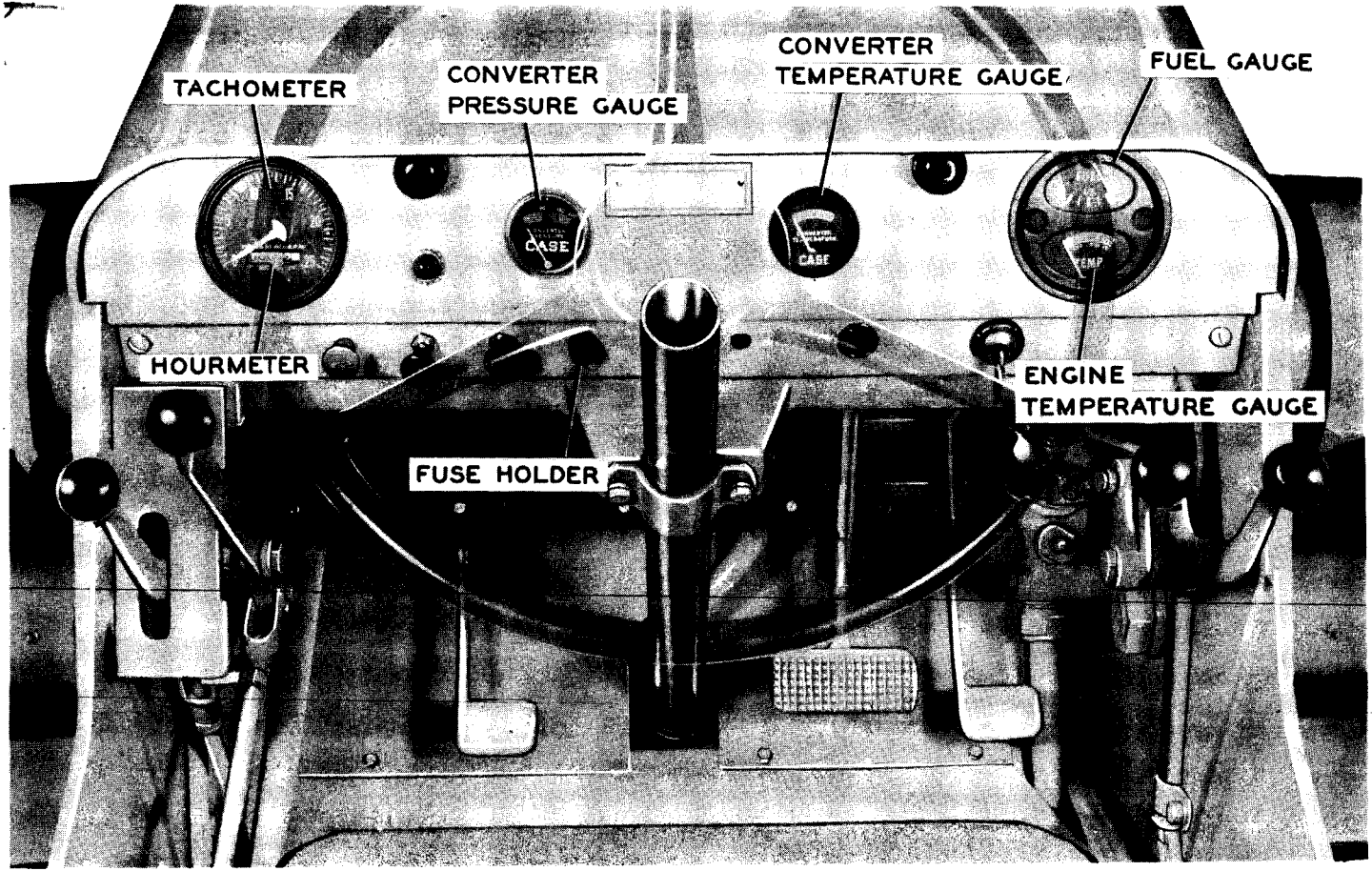

TACHOMETER
CONVERTER PRESSURE GAUGE
CONVERTER TEMPERATURE GAUGE
FUEL GAUGE
HOURMETER
ENGINE TEMPERATURE GAUGE
FUSE HOLDER

Figure 31

Tachometer - Figure 31. Indicates engine speed in revolutions per minute, Revolutions per minute are calibrated in hundreds on the tachometer dial.

Hourmeter - Figure 31. The hourmeter is located within the tachometer dial. The direct reading hourmeter indicates hours and tenths of hours that the engine has run. The hourmeter does not record clock hours, but rather the average engine hours, at a mean speed of 1650 RPM. The hourmeter provides a convenient means of knowing when to service the Terraload'r.

Torque Converter Pressure Gauge - Figure 31. Indicates hydraulic clutch operating oil pressure. The gauge needle should register in the Green (90 to 150 PSI) Zone on the gauge. If the gauge needle: drops out of the operating zone, will not reach the correct operating zone, or goes over the correct operating zone, DO NOT OPERATE THE TERRALOAD'R UNDER LOAD UNTIL THE CAUSE HAS BEEN DETERMINED AND CORRECTED. Refer to Pages 105 and 106.

Torque Converter Temperature Gauge - Figure 31. Indicates operating temperature of the oil in the torque converter. The gauge needle should register in the Green Zone on the gauge. If the gauge needle rises into the red zone - PLACE THE TRANSMISSION IN NEUTRAL, IDLE THE ENGINE UNTIL THE GAUGE NEEDLE RETURNS TO THE GREEN ZONE. One of the causes of converter oil over-heating is operating too long at stall speed. Refer to Page 105 and 106. for causes of torque converter oil overheating.

Fuel Gauge - Figure 31. Indicates amount of fuel in the fuel tank.

Engine Temperature Gauge - Figure 31. The gauge needle will register in the Work Zone when the engine is at correct operating temperature. Refer also to Page 130.

Fuse Holder - Figure 31. Contains 20 Amp fuse.

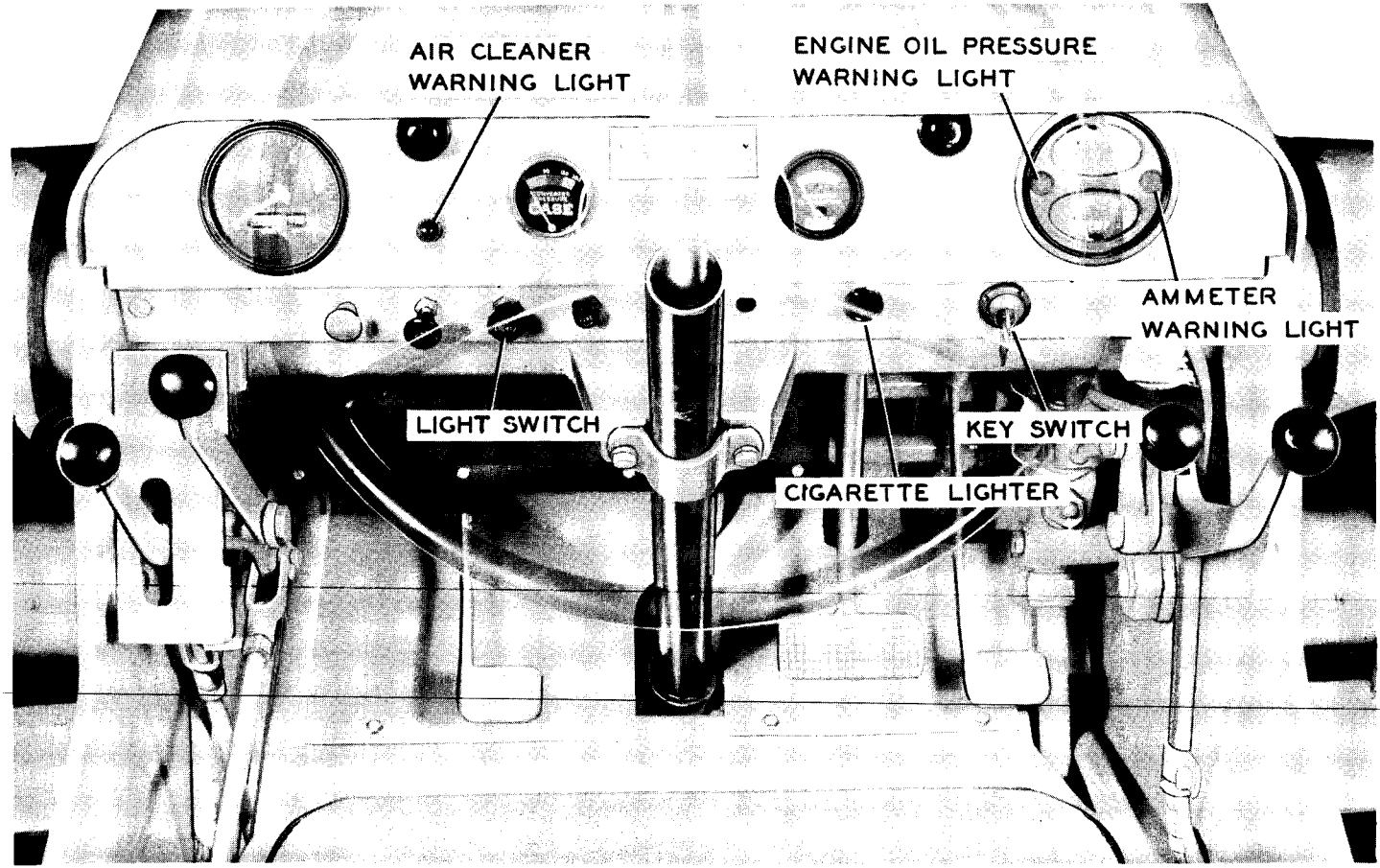

AIR CLEANER
WARNING LIGHT
ENGINE OIL PRESSURE
WARNING LIGHT
AMMETER
WARNING LIGHT
LIGHT SWITCH
KEY SWITCH
CIGARETTE LIGHTER

Figure 32

Engine Oil Pressure Warning Light - Figure 32. The oil pressure warning light will light when the key switch is turned to the start position and should go off when the engine starts. If the warning light remains on, or goes on during operation, it is an indication of no oil pressure or very low pressure. STOP THE ENGINE AND CHECK FOR THE CAUSE. Refer to Page 102.

Ammeter Warning Light - Figure 32. The warning light goes on when the key switch is turned on and should go off when the Terraload'r engine starts. If the ammeter warning light does not go off when the Terraload'r engine starts and is running, it is an indication that the battery is discharging and the generator is not supplying current. STOP THE ENGINE AND CHECK FOR THE CAUSE. Refer to Page 141, 144, and 145. NOTE: If the ammeter light flickers when the Terraload'r engine is at low idle, the battery, generator or regulator may not necessarily require servicing. However, if the warning light remains on when engine speed is increased, stop the engine immediately and check for the cause, Page 141, 144 and 145.

Air Cleaner Warning Light - Figure 32. Light goes on when air cleaner element should be serviced. Refer also to Page 127 and 128.

Cigarette Lighter - Figure 32. Push lighter element fully in to light. Lighter element will remain in socket until lit, then pop out to normal position. Pull lighter element out of socket use.

Key Switch - Figure 32. Combination four position switch. The four positions are ACCESSORY, OFF, RUN and START. The Terraload'r will not start without the key. Refer also to Page 65.

Light Switch - Figure 32. Pull the light switch out to first position to turn on headlights and instrument panel lights. Pull the light switch out to second position turn on headlights, instrument panel lights and rear lights.

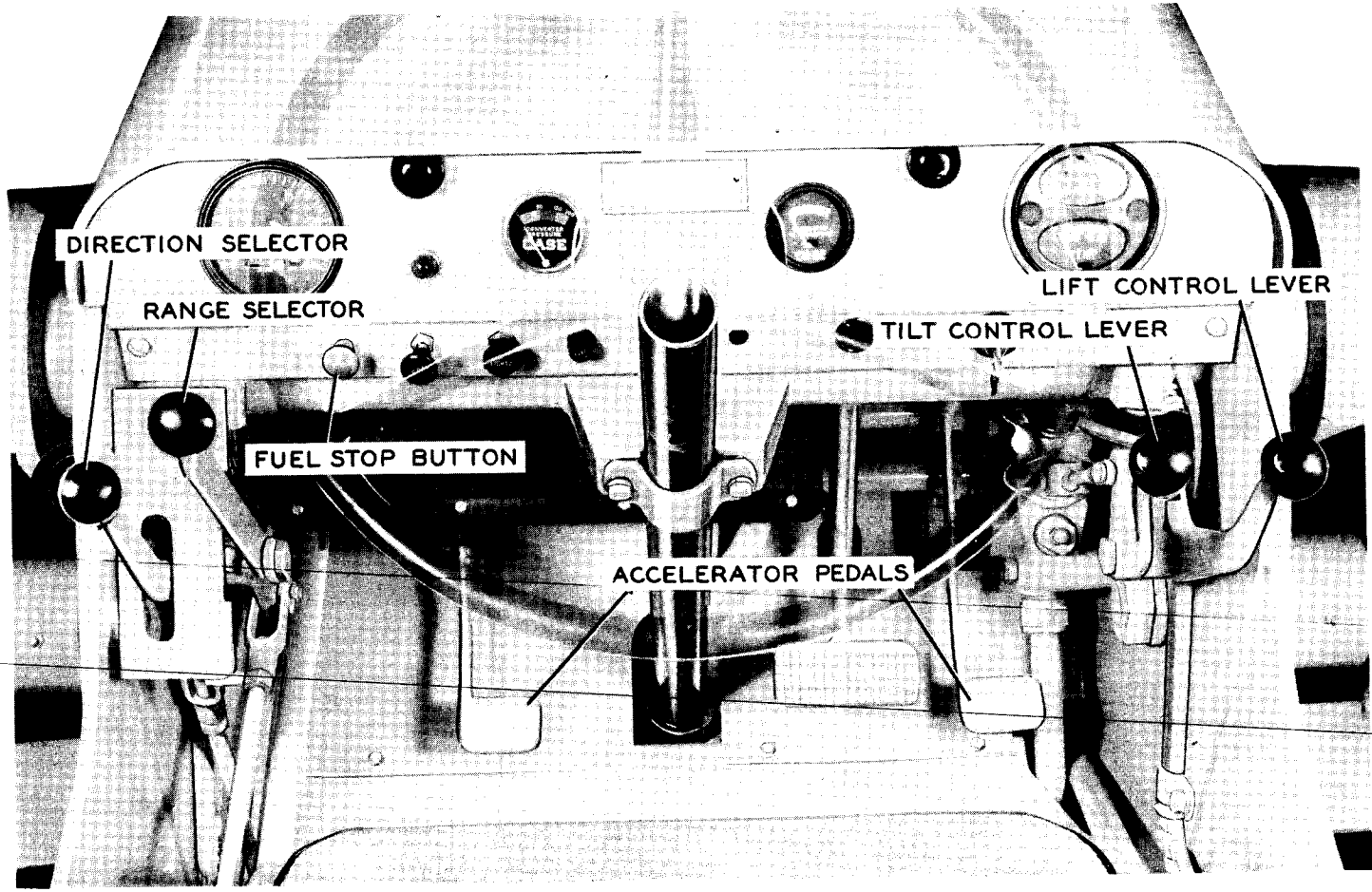

DIRECTION SELECTOR
RANGE SELECTOR
FUEL STOP BUTTON
ACCELERATOR PEDALS
TILT CONTROL LEVER
LIFT CONTROL LEVER

Figure 33

Fuel Stop Button - Figure 33. To stop the engine, pull the button OUT until the engine stops completely. Depress the accelerator pedals and push the button all the way IN to start the engine

Bucket Lift Control Lever - Figure 33. Push the control lever forward to lower the bucket. Pull the control lever rearward to raise the bucket. The raise and float positions are retained positions. The control lever must be manually moved from the raise or float positions. The control lever automatically returns to neutral from the lower position when released. Refer to Page 62 for complete operation of the lift control lever.

Bucket Tilt Control Lever - Figure 33. Push the tilt control lever forward to tilt the bucket down. Pull the tilt control lever rearward to tilt the bucket up. The tilt control lever automatically returns to neutral when released, stopping and holding the bucket in any position. Refer to Page 63.

Range Selector - Figure 33. Place the selector in any of the three ranges (Low, Intermediate, High) for the required working speed.

Direction Selector - Figure 33. Push direction selector forward to move the Terraload'r in a forward direction. Pull the direction selector rearward to move the Terraload'r in a rearward direction.

Brake Pedal - Figure 33. Depress brake pedal for braking action.

Accelerator Pedals - Figure 33. Depress either accelerator pedal or both pedals together to increase acceleration.

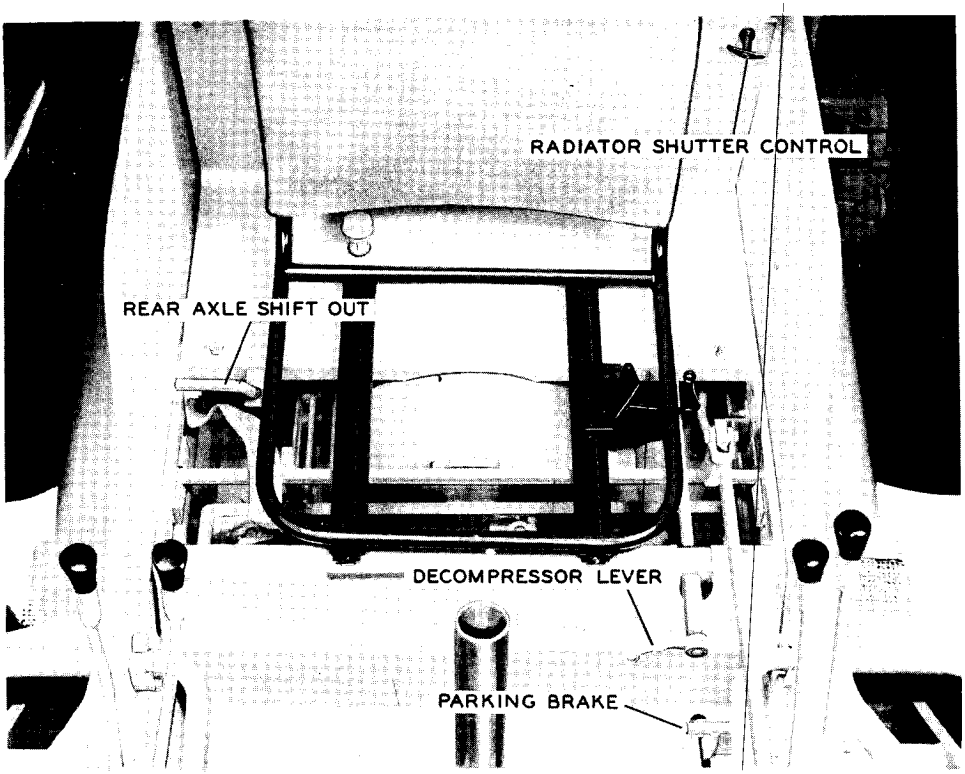


Figure 34

Radiator Shutter Control - (Extra equipment) - Figure 34. To close the shutters partially or fully, pull the control out to the required position, and turn the handle clockwise to lock the shutters in place.

Decompressor Lever - Figure 34. Raising the lever holds the exhaust valves open and relieves engine compression. Pushing the lever down releases the valves and restores compression. Refer also to Page 64.

Rear Axle Shift-Out - Figure 34. Push handle down to disengage rear axle for road travel. Pull handle up to engage rear axle for four wheel drive.

Parking Brake - Figure 34. Pull handle up to engage the parking brake when stopped on an incline or when the operator leaves the Terraload'r.

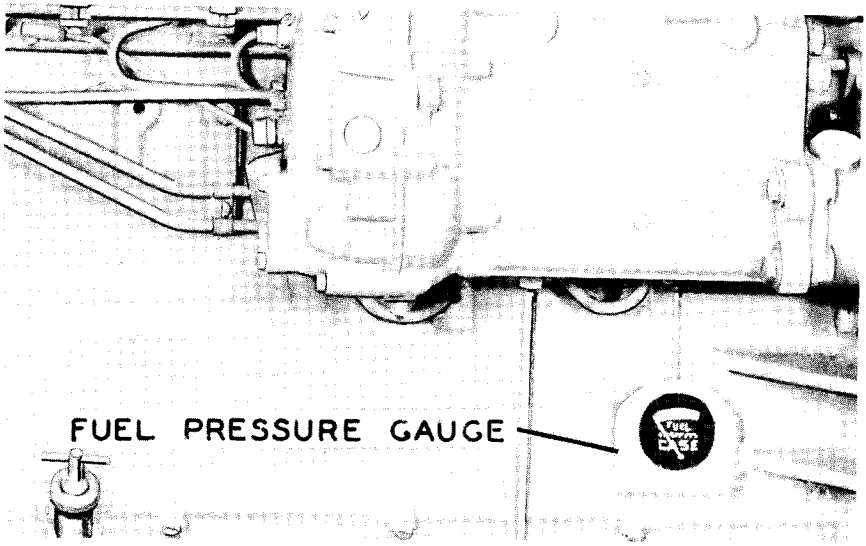


Figure 35

Fuel Pressure Gauge - Figure 35. The gauge indicates the condition of the Fuel Filters. When the needle is in the Green Zone, the filters are in good condition. Refer to Page 117.

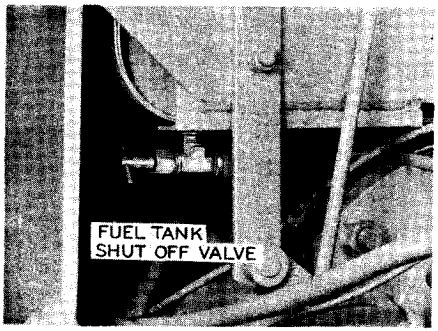


Figure 36

Fuel Tank Shut-Off Valve - Figure 36. Turn the valve fully IN to shut off fuel from the tank.

Operator's Seat Adjustment - Figure 36. The seat is adjustable forward or back by moving the lever to the required detent. The weight adjustment lever pushed forward increases firmness in the cushion, pushed back, the adjustment lever increases the softness of the cushion.

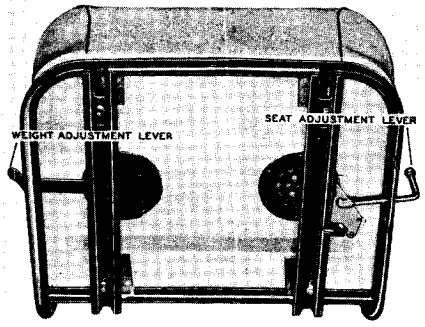
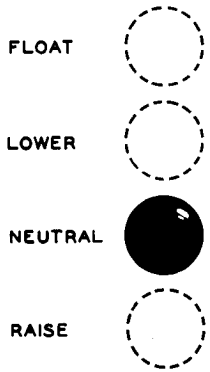


Figure 37

BUCKET LIFT CONTROL



Standard Lift Control

The standard lift control on Case W-10 Terraload'r is a two spool, four position valve with an internal relief valve. The four positions are Raise, Neutral, Lower and Float.

Figure 38. Standard Control

To raise the bucket - pull the control lever rearward, Figure 38. Raise is a retained position and the control lever must be manually moved from the raise position to any other required position. By placing the lever in the retained raise position, the operator's hand is free to work the tilt lever for fast, efficient crowding action.

To stop the bucket - the control lever must be manually moved from the raise or float positions to neutral. The control lever automatically returns to neutral from the lower position, when released, stopping the bucket and holding it in position.

To lower the bucket - push the control lever forward, Figure 38. It is necessary to hold the lever in this position to continue lowering the bucket. Releasing the lever will stop the bucket and hold it in position.

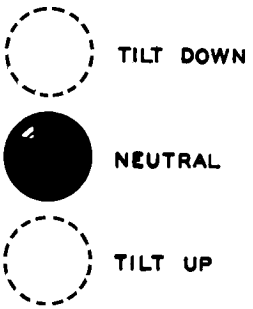
Float - is a retained position ahead of the lowering position, Figure 38 and provides the bucket with float action. By pushing the control lever all the way forward until the valve spool locks in a detent, the operator can allow the bucket to lower without holding the lever, thus leaving him free to operate the bucket tilt lever.

The retained float position also allows the bucket to skim over graded or smooth surfaces without constant lever manipulation. This float action prevents gouging or skipping.

Optional Lift Control

The optional lift control available for W-10 Terraload'r is a two spool, three position valve with an internal relief valve. The control lever is self centering, so when the lever is released from the raise or lower positions, it automatically returns to neutral. There is no float action.

BUCKET TILT CONTROL



Push the lever forward to tilt the bucket down. Pull the lever back to tilt the bucket up. Releasing the lever will allow it to automatically return to neutral, stop the bucket and hold it in position.

Figure 39

BUCKET SIGHT LEVEL GAUGE

A bucket sight level gauge, Figure 40, is located directly ahead of the operator and is in his normal line of vision when operating the Terraload'r.

The position of the gauge rod in its sheath indicates the angle at which the bucket is tilted.

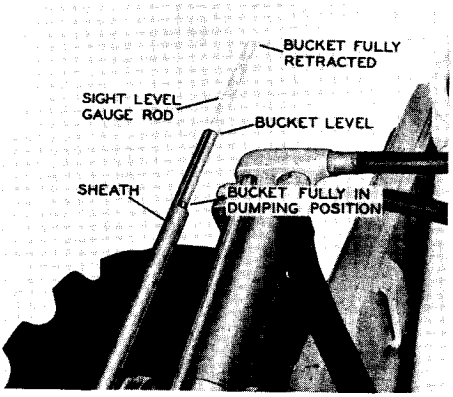


Figure 40

Bucket Retracted (Tilted Upward)
The rod will protrude above the end of its sheath.

Bucket in Level Position
The rod will be Approximately even with the end of its sheath. Figure 40.

Bucket in Dumping Position
The rod will be at the lower end of the cutaway protion of its sheath. Figure 40.

DECOMPRESSOR

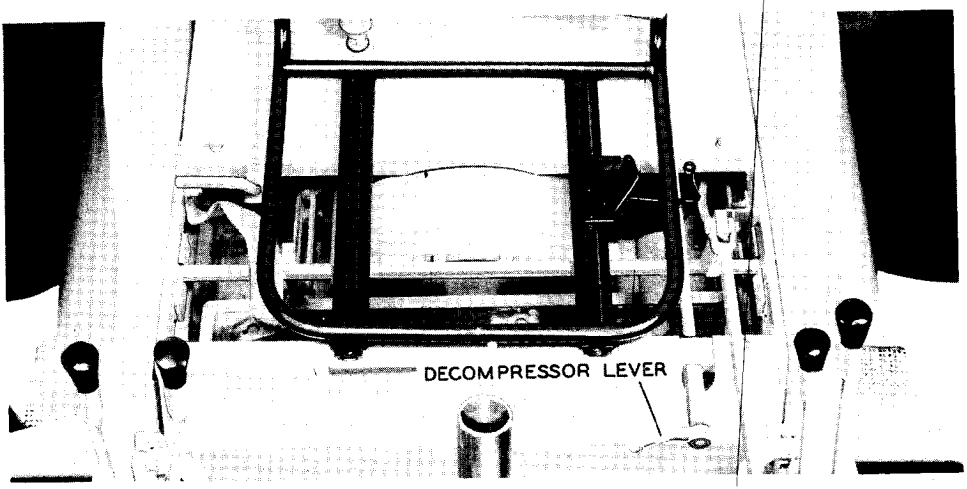


Figure 41. Decompressor Lever

The decompressor, Figure 41, makes it possible to manually relieve engine compression when it is necessary to hand crank the engine for operations such as checking valve tappet clearances, etc. Raising the lever holds the exhaust valves open and thereby relieves compression. Pushing the hand lever down releases the valves and restores compression.

NOTE: The decompressor may be used to stop the diesel engine in an emergency. Should the fuel stop control be damaged so the engine cannot be shut off, raising the decompressor lever will stop the engine.

The decompressor may also be used as an extra precautionary measure to prevent children or unauthorized persons from accidentally starting the diesel engine.

IMPORTANT

Do not use the decompressor lever as a regular means by which to stop the engine. Serious damage to the engine may result.

TERRALOAD'R STARTING PROCEDURE

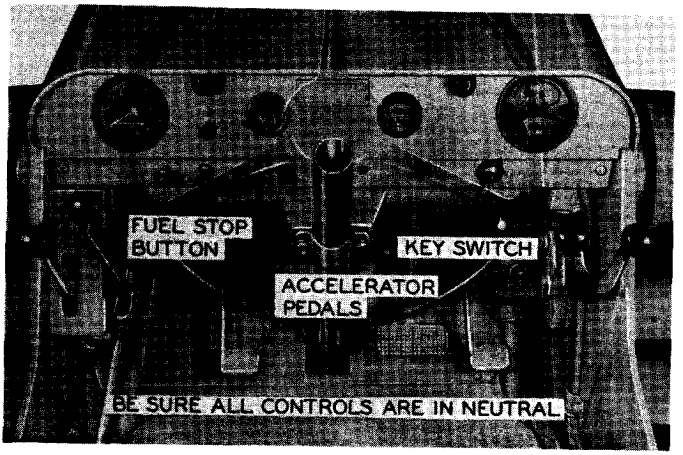


Figure 42

To start the engine of a W-10 Terraload'r, place all the controls in neutral. Depress the accelerator pedals half way and push the fuel stop button all the way in. Turn the key switch fully clockwise until the engine starts. Release the key.

CAUTION

1. Immediately check that oil pressure warning light and ammeter warning light go out. If not, stop engine and investigate.
2. If engine fires and stops, wait for starting motor to stop spinning before again turning key switch to start.
3. Do not use starting motor longer than 30 seconds without interruption. Wait at least 3 minutes so batteries can recuperate and starting motor can cool.

NOTE: While the engine is being turned over with the key switch, white or black exhaust smoke should be observed. If none is observed and engine will not start, it is an indication that no fuel is being delivered to the cylinders. Refer to Page 97.

Stopping the Engine

Idle the engine for a few minutes, before shutting it off, so engine parts can cool evenly. Place all controls in neutral. Pull the fuel stop button out and hold it until the engine stops completely. Turn the key switch counter-clockwise to OFF.

To start and operate your Case Diesel Terraload'r during cold weather, the following precuations must be observed:

1. Batteries - Both storage batteries must be fully charged. Refer to Pages 141 and 142.

2. Fuel Recommendations - the diesel fuel must have a Pour Point 10 degrees Fahrenheit lower than the prevailing air temperature and a Cetane rating from 45 to 55. The fuel must be clean and free of water. Refer to Page 15.

3. Crankcase Oil - the oil in the crankcase must be of the recommended viscosity. See Page 31.

4. Transmission Oil - always use Automatic Transmission Fluid-Type C.

5. Hydraulic Housing Oil - always use SAE 10W (MS-DG) both winter and summer.

6. Cooling System - the cooling system must be protected by a reputable brand of "High Boiling Point" type Ethylene Glycol anti-freeze.

7. Stopping the Engine - always allow the engine to reach operating temperature before stopping it. If the engine has been working under load, always idle the engine for a few minutes before stopping it so the engine parts can cool evenly.

8. Condensation in Fuel Tank - always fill the fuel tank at the end of the day's operation to prevent the tank from "sweating" and water entering the fuel.

9. Fuel Tank Water Trap - drain the fuel tank water trap daily to prevent any accumulation of water from freezing and causing possible damage to the water trap on the fuel tank due to expansion.

10. DURING EXTREMELY COLD WEATHER, the following extra precautions may be required:

    a. Remove and store the batteries in a moderately warm place (preferable room temperature). Reinstall the batteries just prior to starting.

    b. Drain the crankcase oil while it is still warm from operation. Store it in a warm place. If possible, pre-heat it to approximately 100 degrees Fahrenheit before replacing it just prior to starting.

    c. Drain and store the anti-freeze in a warm place. If possible, the anti-freeze should be warmed before replacing it in the cooling system just prior to starting.

CAUTION

NEVER IDLE THE ENGINE FOR PROLONGED PERIODS OF TIME!

DURING EXTREMELY COLD WEATHER, WATCH THE COOLANT TEMPERATURE CAREFULLY AND NEVER OPERATE THE ENGINE FOR PROLONGED PERIODS BELOW THE RECOMMENDED COOLANT TEMPERATURE, (WORK ZONE ON THE TEMPERATURE GAUGE).

During extremely cold temperatures, the engine will not warm up to or maintain the operating temperature at low engine speeds. Low idling speeds during extremely cold temperatures will result in incomplete combustion, heavy deposit formations on the valve system and possible serious damage to the engine.

1. Engine Warm Up Procedure
   a. Close the radiator shutters (if so equipped) or cover the radiator.
   b. Start the engine and allow it to run at a reduced speed just long enough for the oil to circulate through the engine. (Not over one or two minutes.)

2. Maintaining Engine Operating Temperature.
   When the engine is not operating under load, but the operator wishes to keep the engine running due to the extremely cold temperatures:
   a. Keep the hood sides in place on the Terraload'r.
   b. Keep the radiator shutters closed sufficiently to maintain temperature in the Work Zone range on the temperature gauge.
   c. DO NOT IDLE THE ENGINE.

COOLANT HEATER

The engine cylinder block on the W-10 Terraload'r is provided with two passages located on the Right Hand side of the engine near the engine oil filter, Figure 43. The MAXIMUM depth the coolant heater can be submerged in the cylinder block is 5-1/2 inches, Figure 44.

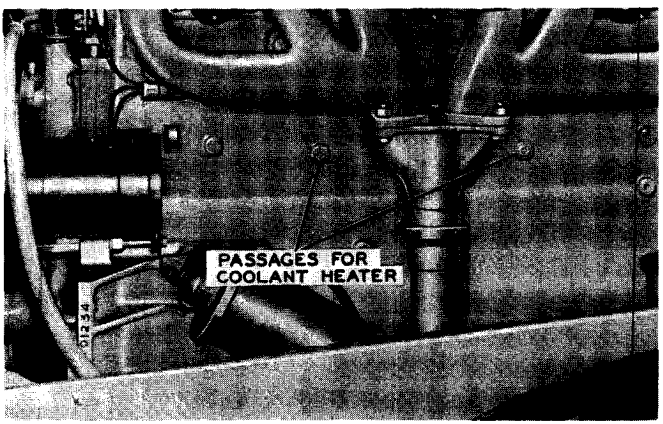


Figure 43

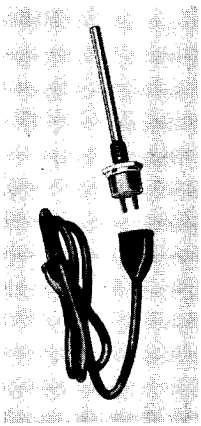


Figure 44

To install the coolant heater, remove the allen head pipe plugs from the cylinder block, Figure 43 and follow the heating element manufacturer's instructions for installation.

SAFETY PRECAUTIONS

1. Before starting the engine, be sure all operating controls are in Neutral.
2. Keep bucket as close to ground level as possible when transporting loads on grades or slopes.
3. Keep brakes in proper adjustment.
4. Never operate any of the controls from any position but seated in the operator's seat.
5. Be extra careful when working on banks or hillsides.
6. Keep Terraload'r in gear when going down steep grades.
7. Drive at speeds slow enough to insure safety and complete control, especially over rough terrain.
8. Reduce speed when making a turn or applying brakes.
9. Never shift to a lower range when operating at a high speed. Slow down at least as much as the lower range top speed before shifting down.
10. Never leave the engine running while it is unattended.
11. Always lower the Terraload'r lift arms to the ground or block them securely before performing any service operation or when leaving the machine unattended.
12. Never dismount from a Terraload'r when it is in motion.
13. Never permit persons other than the operator to ride the Terraload'r.
14. Never stand between a Terraload'r and machine when hitching unless all the controls are in neutral and the parking brakes locked.
15. Be careful removing radiator pressure cap when the radiator is hot. Refill only when the engine is stopped.
15. Do not oil, grease or adjust a Terraload'r when the engine is running.
17. Never refuel a Terraload'r when the engine is hot or running.
18. Do not smoke when refueling.
19. Never operate a Terraload'r in a closed shed or garage.
20. Do not wear loose fitting clothing which may catch in the moving parts.
21. To prevent highway accidents, use red warning flags in the daytime and red warning lamps at night.
22. Keep a first aid kit and fire extinguisher on the Terraload'r.

IMPORTANT CHECKS DURING OPERATION

Check Every Day

1. Daily lubrication points.
2. Drain water trap on fuel tank before starting.
3. Crankcase oil level - (check dipstick reading).
4. Hydraulic reservoir breather - (remove and clean every 5 to 60 hours depending on dust conditions).
5. Radiator coolant level.
6. Engine temperature gauge reading.
7. Converter temperature gauge reading.
8. Converter pressure gauge reading.
9. Crankcase and transmission breathers during extremely dusty conditions.
10. Brake pedal free travel.
11. Hour meter reading.
12. Fuel pressure gauge.
13. Fuel tank level gauge.
14. Check all hoses, lines, and connections for possible leakage.

Check Every 60 Hours

1. 60 hour lubrication points.
2. Transmission oil level.

3. Battery - (Take hydrometer reading and check liquid level).

4. Hydraulic reservoir breather - (Remove and clean every 5 to 60 hours depending on dust conditions.

5. Hydraulic reservoir oil level.

6. Fan and power steering pump Vee belts.

7. Tire pressures. Refer to Page 157.

8. Check power steering fluid level.

9. Remove and clean crankcase breathers.

10. Air cleaner warning light. Refer to Page 127.

Check Every 120 Hours

1. 120 hour lubrication points.

2. Drain and refill crankcase.

3. Air cleaner vacuum switch. Refer to Page 127.

Check Every 240 Hours

1. 240 hour lubrication points.

2. Install new crankcase oil filter element.

3. Valve tappet clearance.

4. Clean strainer in fuel tank filler opening.

5. Clean transmission case breather.

6. Check oil level in steering gear box housing.

Check Every 500 Hours

1. Generator brushes and commutator.

Check Every 1000 Hours

1. Transmission Oil - (Drain and refill with Automatic Transmission Fluid - Type C).
2. Hydraulic oil filter - (Remove and clean).
3. Oil pump floating screen - (Remove and clean).
4. Take your Terraload'r to your closest Authorized Case Industrial Dealer for a seasonal tune-up and inspection of both the engine and transmission.

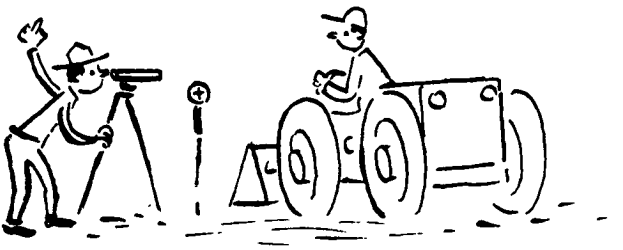
Check Every 2000 Hours

1. Final (third stage) fuel filter. (Replace if necessary).
2. Hydraulic System. Drain and refill with SAE 10W (MS-DG) oil.

THE BEST OPERATOR IS

Sure
Alert
Fit
Efficient

5



OPERATING KNOW-HOW

OPERATING KNOW-HOW

This section of the Operator's Manual will provide helpful suggestions to enable you to operate the Terraload'r most effectively. The amount of work accomplished per hour will depend primarily on the job layout and the development of a work cycle. From there on, operator skill and capability are the determining factors.

In many types of operations, personnel working in shifts or different operators assigned from day to day, will be servicing and operating the Terraload'r. For this reason, the Terraload'r has been designed with simplified operating controls and a minimum of daily service requirements, so there will be no difficulty in training a new operator.

A new operator should be trained to effectively use all of the advantages built into the Case W-10 Terraload'r. The procedure outlined below should be followed whenever a new operator is assigned to the Terraload'r.

1. Review this Operator's Manual thoroughly.

2. Go through the Pre-Starting Check List. Refer to Page 53.

3. Operate all the controls to be completely familiar with them. Refer to Pages 54 through 64.

4. Go through a simple work cycle: Fill the bucket, Transport the load, Empty the bucket, Return to refill. Refer to Pages 75 through 79.

5. Review all Safety Precautions listed in this Manual.

The Work Cycle

The first thing to be established for any type of loader operation is a work cycle, whether the operation is to be stockpiling, loading, land clearing, excavation, leveling or grading.

The work cycle for most Terraload'r applications consists of:

1. FILLING THE BUCKET
2. TRANSPORTING THE LOAD
3. EMPTYING THE BUCKET
4. RETURNING TO REFILL THE BUCKET

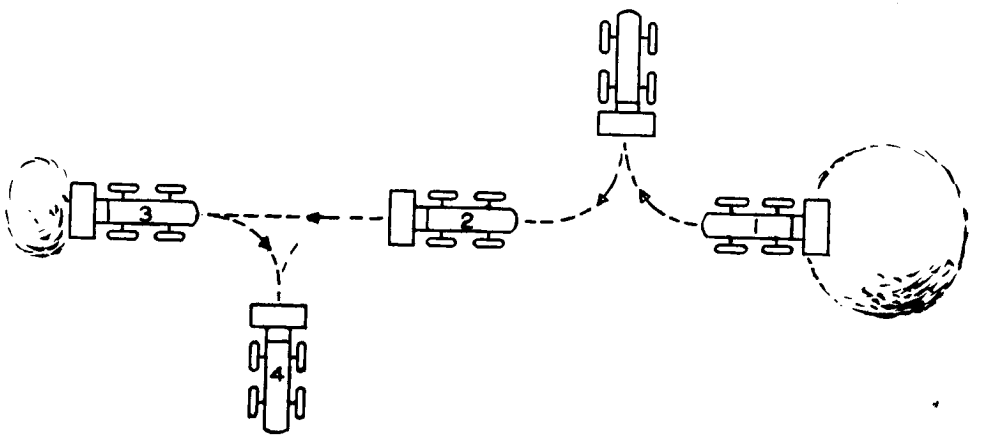
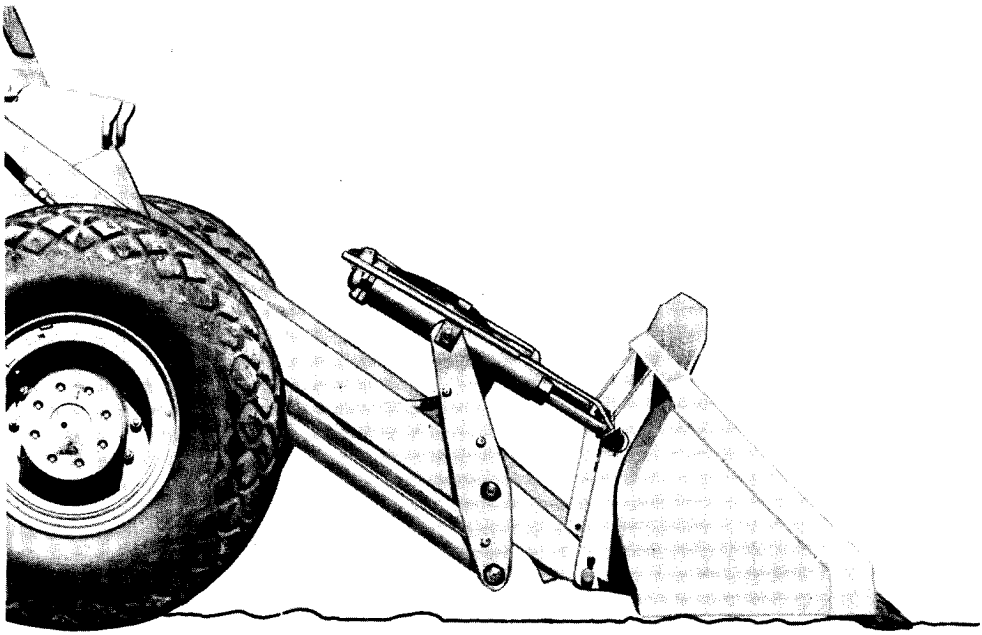


Figure 45

The following pages of this manual describe these steps in detail. The new operator should study these steps and practice each one until it is mastered. When the separate steps are mastered, the operator can co-ordinate them to further reduce the time consumed in completing the job.

Filling the Bucket

1. To fill the bucket, select a forward speed range to fit the terrain and material conditions. During the approach to the cut or stockpile, use the bucket sight level gauge as a guide and locate the bucket parallel to the ground with the Bucket Tilt Control, then push the Bucket Lift Control forward to lower the bucket to ground level, Figure 46.



BUCKET AT GROUND LEVEL AND PARALLEL TO THE GROUND

Figure 46

2. As the bucket penetrates the stockpile or cut to a point where enough resistance is encountered to stop the forward motion of the Terraload'r, place the lift control in the retained raise postion and inch the tilt control while continuing to move forward. This inching of the tilt control while the lift arms raise will bring the bucket up in a continual arc, filling it completely.

Figure 47

3. When the bucket is filled, the direction selector and range selector can be pulled back simultaneously, allowing the operator to back away from the cut or stockpile in a higher speed range and cut time in the work cycle.

Figure 48

This method of filling the bucket is sometimes called "crowding" and is the most efficient and speedy method to get a large pay load. Practice and continual operation in different types of material will enable the operator to gauge his initial penetration and length of arc to obtain a heaping bucket every cut.

Transporting the Load

The terrain and material conditions will be determining factors in this phase of the work cycle. The Direction Selector allows the operator to use forward and reverse to best advantage when transporting. In addition to the Direction Selector, the Range Selector (Low, Intermediate and High) can be used to shorten the work cycle. Filling the bucket is usually accomplished in a lower speed range, while transporting is usually in a higher speed range. Therefore, depending on type of material, terrain and transport distance, a skillful operator can select suitable speed ranges rapidly to save valuable time and adapt the Terraload'r to any conditions that may be encounterd.

The bucket should be carried as close to the ground as conditions permit to give the operator a clear view and to provide greater stability in transporting the load.

Emptying the Bucket

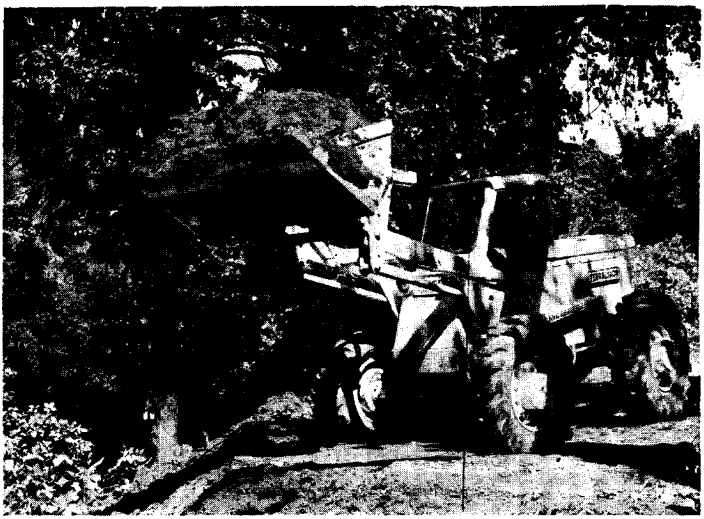


Figure 49

The operator can shorten the work cycle considerably by having the bucket in position to dump at the end of the transport run. By moving the Bucket Lift Control back as the dump area is near, the bucket will be at the proper height to load trucks, dump onto a stockpile or into a fill. Figure 49.

Move the Bucket Tilt Control fully forward to empty the bucket, Figure 50.

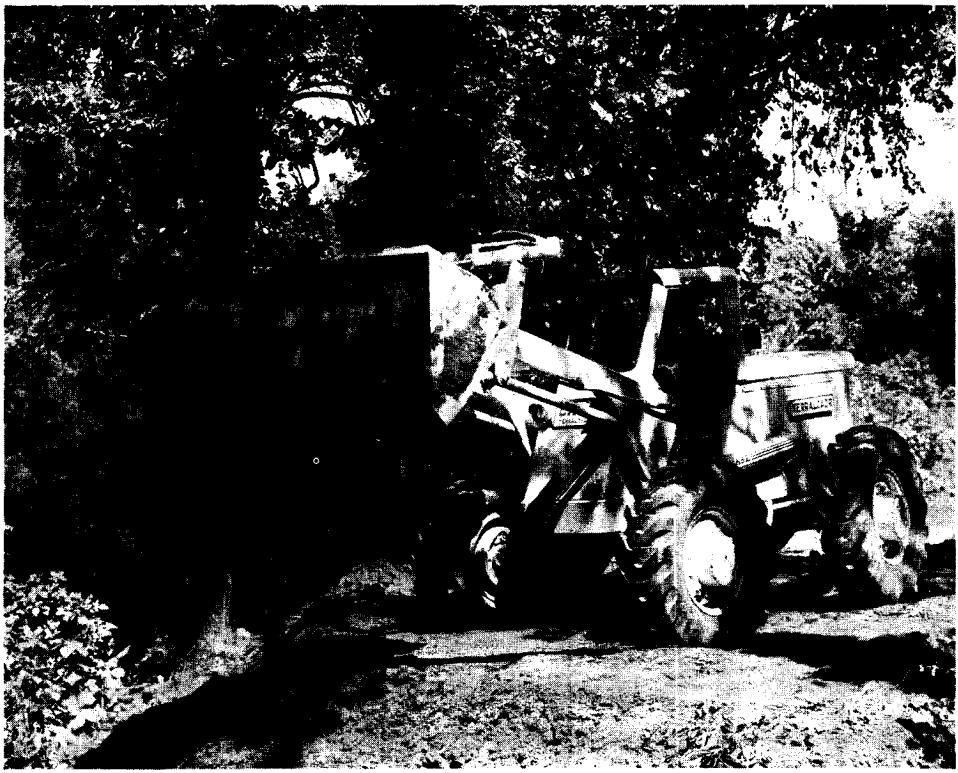


Figure 50

The use of both forward and reverse and the three speed ranges will enable the operator to save time in this phase of the work cycle. As the Terraload'r approaches to refill, the operator can use the sight level gauge as a guide to locate the bucket parallel to the ground while lowering the bucket to ground level and be ready for another bucket full when the stockpile or cut is reached.

Constant practice, a complete knowledge of the operating controls and their functions, and the ability to apply this knowlege with common sense and safety precautions will permit the new operator to perform any of the following jobs for which a Case Terraload'r can be used.

Stockpiling

Using the work cycle described on Pages 75 through 79 as a basis for stockpiling work, the largest amount of material can be moved in the least amount of time. The availability of a large capacity, light material bucket as extra equipment makes stockpiling a speedy operation. Certain material conditions may warrant the use of the standard bucket for stockpiling instead of the light material bucket.

Truck Loading

Most truck loading operations are controlled by a truck spotter and the work cycle is dependant on his ability and judgement along with the variables of: type of material, transport distance and terrain.

The following diagrams illustrate possible variations from the work cycle shown on Page 75.

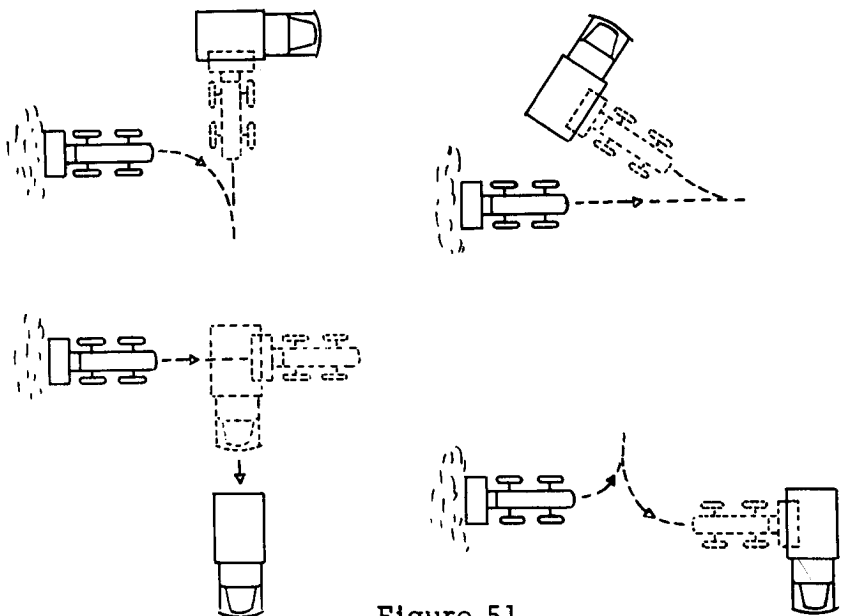


Figure 51

Note that the transport distances are usually short and that maneuverability and operator skill are most important. The work area is generally small and the alertness of the truck spotter and truck driver are also determining factors in the speed and ease of the loading operation.

Land Clearing

The Case W-10 Terraload'r is an important tool in the clearing of virgin land and preparation of the land for development.

The first phase of land clearing is to remove shrubs, brush and small trees. This will enable the operator to clear the working area sufficiently to plan his work cycle. For this phase, the bucket height should be set to just skim the ground surface and not remove valuable top soil. A brush rake, available as extra equipment, is an important tool in land clearing. Refer to Extra Equipment Section.

When the brush and shrubs have been cleared, the top soil may be removed and stockpiled for future use. Removing the top soil will also aid in exposing roots of any large trees that may have to be removed.

To remove large trees, several factors must be considered. Determine which direction the tree is to fall. Take advantage of roots exposed by topsoil removal, leaning or heavy branches on the side to which the tree must fall, and irregularities in the surface of the earth; all of which will aid in removing the tree more easily.

Remove large trees in the following manner:

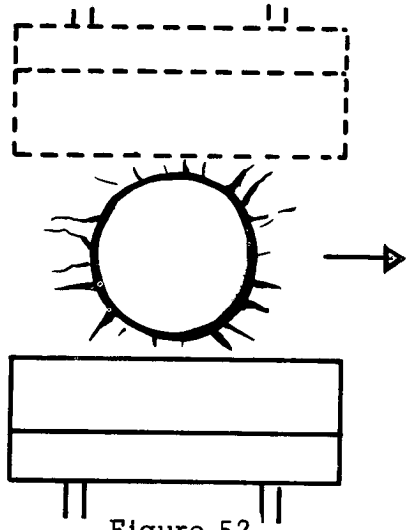


Figure 52

1. Take cuts with the bucket on the two sides of the trunk parallel to the line in which the tree is to fall, Figure 52.

Note: Make the cuts deep enough to break off or cut through the larger roots that are exposed as the earth is removed, Figure 53.

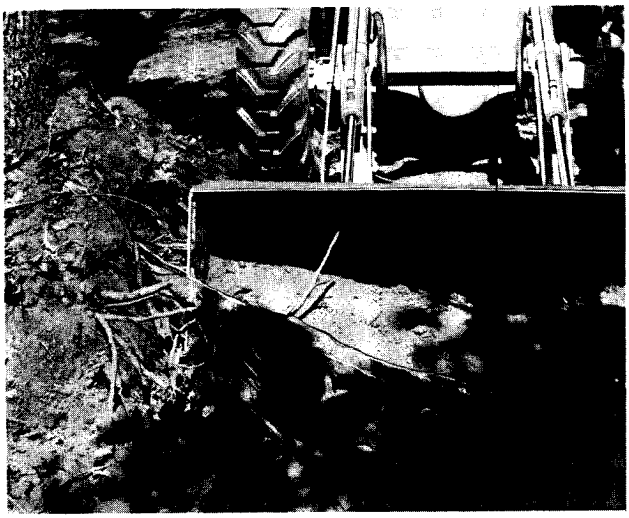


Figure 53

2. Dig a trench to the side of the trunk directly opposite the proposed line of fall. Figure 54. This will enable the Teraload'r to loosen the tree and cut away more of the root structure and also allow the machine to be below and clear of any upturning roots which might cause possible injury to the operator or damage to the machine.

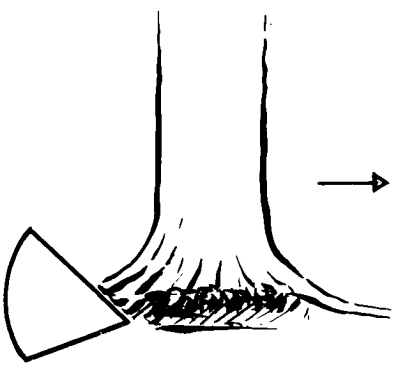


Figure 54

Note: At this point, the root structure of the tree may be such that the bucket could dig under the roots and lift up the entire tree and tilt it enough to direct its line of fall.

Many large trees will not have this simple root structure and will have to be pushed over by the Terraload'r. Raise the bucket as high as possible on the tree trunk to create greater leverage. Tilt the Bucket, Figure 55, so the cutting edge and the spill plate are both in contact with the trunk, then push the tree over.

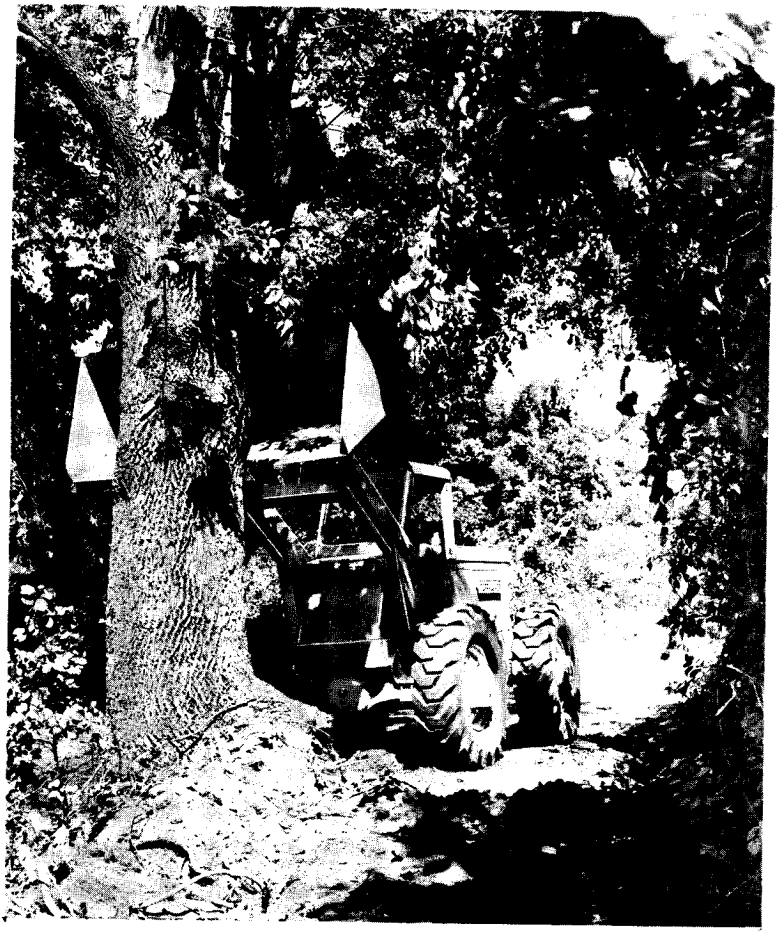


Figure 55

CAUTION

The utmost care must be taken in tree removal to avoid accidents which might cause injury to the operator or damage to the machine. Use common sense and follow the simple precautions listed in this section to prevent accidents.

Excavating

Another of the diversified uses of the Case Terraload'r is excavation work, such as digging basements.

Almost every excavation project requires some surveying. Boundaries must be established and topography of the site must be determined. The excavation should be staked out on the ground and as the work progresses, lines and grades should be given so the finished excavation will conform to plans.

In excavating work, the Terraload'r operator must determine his work cycle based upon: work area, type of excavation, soil conditions, stockpiling of the top soil and loading the excavated earth for removal.

This section of the manual illustrates and explains, the excavation of a simple rectangular basement. This basic method with minor variations, will serve for most excavation work.

The basement should first to layed out and stakes placed at the four corners, approximately two feet beyond the proposed foundation boundaries to allow for the final squaring of the corners and straightening the basement walls. Figure 56 illustrates staking out a basement for the initial excavation.

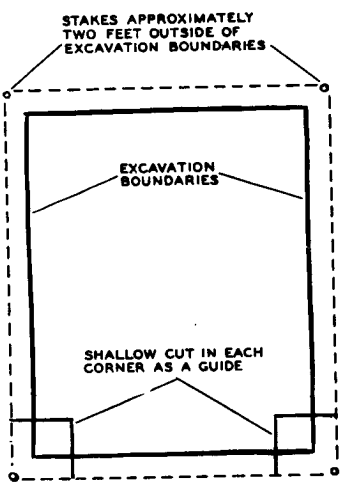


Figure 56

The operator can make a shallow cut with the bucket in each of the four corners, at the stakes, as a guide for the basement boundaries, Figure 56. The top soil can be scraped off and stockpiled, if it is to be saved.

The digging of an inside ramp, at the point most advantageous to the work area, can now be started.

Note: The inside ramp is usually constructed in a corner and inclined down one of the long sides of the proposed excavation, Figure 57.

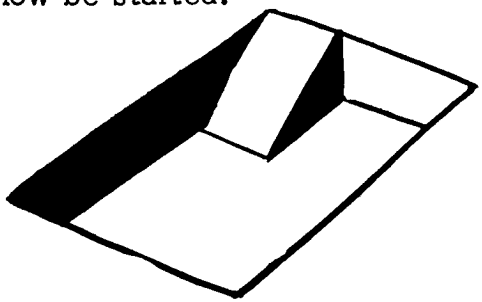


Figure 57

Digging the inside ramp will allow the operator to work down, on a gradual incline, to the requried depth. By constant forward and reverse operation, the inside ramp and maximum depth of excavation are accomplished at the same time.

Note: Care must be taken to cut the ramp gradual enough to allow trucks to back down, load and get out of the excavation easily with a full load.

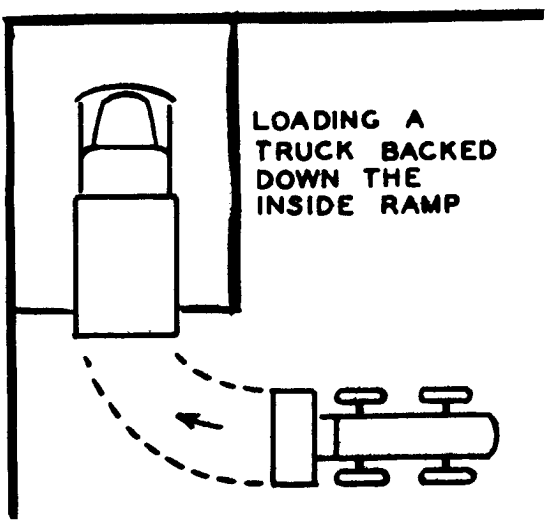


Figure 58

When the inside ramp and the maximum depth are obtained the entire excavation and earth removal can be accomplished working inside the basement, loading trucks as they are backed down the ramp; thereby shortening the work cycle.

The operator should cut a large enough work area inside the excavation to allow the Terraload'r to turn freely, transport and dump, using either forward or reverse ranges to the best advantage. If no trucks are available or the excavated earth is to be stockpiled for backfilling or grading, it may be advantageous to transport the earth out of the ramp in a forward gear range, rather than a reverse range, thus shortening the work cycle.

Figure 59

Figure 59 shows a Case Terraload'r transporting earth up an inside ramp.

When the required depth has been obtained and the basement roughed out, it is necessary to straighten out the excavation walls and to square off the corners. Figure 60 shows the simplest method for squaring off the corners.

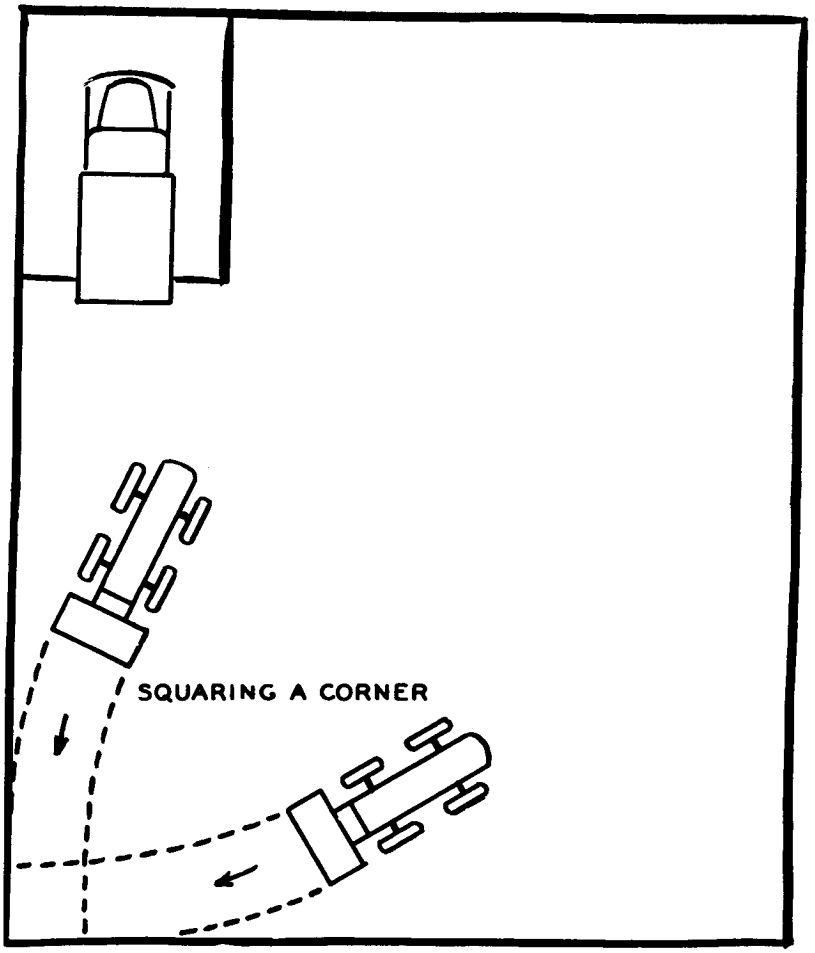


Figure 60

It is only necessary to square the three corners away from the inside ramp. Removal of the inside ramp in the fourth corner. Is the final step in the excavation and is explained on Page 89.

The number of passes required to square a corner depends on soil conditions and operator skill. Figure 61 shown a Case Terraload'r squaring a corner.

Figure 61. Squaring Excavation Corners

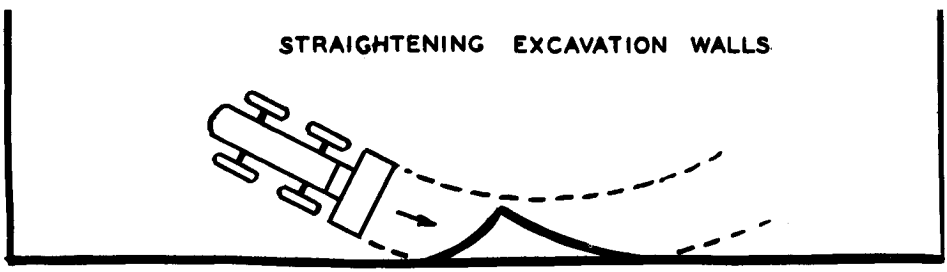


Figure 62

After each of the three corners has been squared, there may be an accumulation of dirt along the walls from spillage or bucket overflow. The work areas in the squared corners should be large enough to allow the Terraload'r to work out of each corner, straightening the rough edges and removing the accumulation, Figure 62. The squaring and straightening phase may vary slightly with different excavations.

When the three corners have been squared and the excavation walls straightened, it is necessary to remove the inside ramp and construct an outside ramp to enable the Terraload'r to drive out of the excavation. The Terraload'r should work on a continual incline, until it digs itself out of the excavation, thus, as the inside ramp is being removed, the construction of the outside ramp is in process. Figure 63 shows an outside ramp. After the foundation walls are layed, the outside ramp can be backfilled.

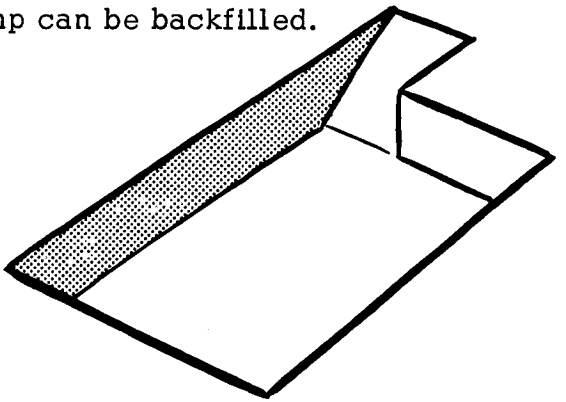


Figure 63

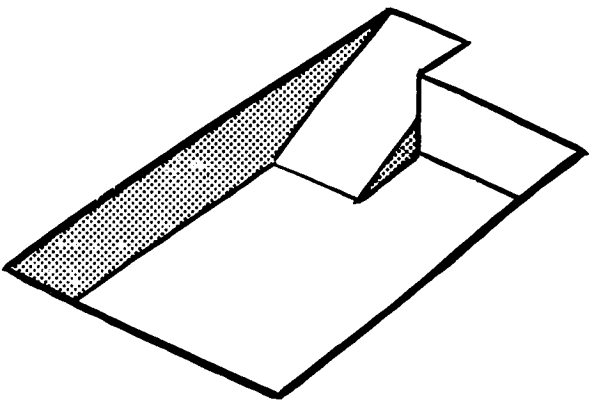


Figure 64

If space outside the excavation is limited, a combination inside-outside ramp can be used. Figure 64 shows a combination ramp. The use of a combination ramp also decreases the amount of earth remaining to be removed when the excavation is completed. Since the Case Terraload'r can easily climb a steep grade, the final outside ramp can be short and the amount of backfilling will be lessened.

Grading

A certain amount of grading can be done with the bucket of a Case Terraload'r. If the Terraload'r is to be used often for grading or dozing, there is available, as extra equipment, a dozer and backfill blade attachment. Refer to Extra Equipment Section.

In certain types of grading operations, the bucket of the Terraload'r provides many advantages. Large loads can be pushed with little overflow because of the scoop shape of the bucket, as shown in Figure 65.

Figure 65

The positive hydraulic control action allows the operator to deposit material where it is needed. To fill in low spots and compact portions, earth can be deposited and the bucket lowered to ground level.

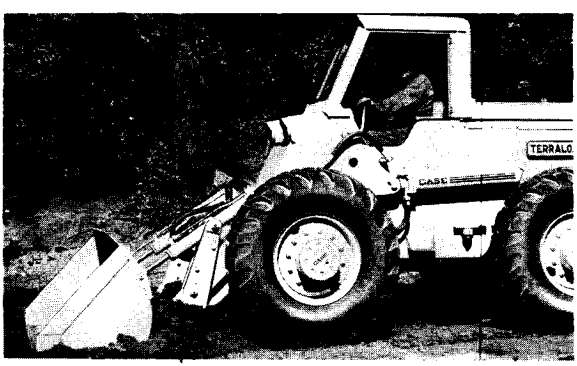


Figure 66

With the Terraload'r in reverse, the material is pushed by the back of the bucket to fill in low spots. Down pressure on the bucket will compact the fill, as shown in Figure 66.

PERCENTAGE OF SWELL OF EARTH

Payments for earth work are generally made on the basis of measurements of solid or compacted material. The terms "Pay Load," "Bank Measure," "Compact Measure," generally refer to the quantity of earth as measured in the cut before it is loosened. Since loaders, scrapers, and other pieces of equipment handle earth after it has been loosened, it is necessary to know the pay load hauled per trip.

The difference between the volume occupied by the material after it is loosened and that occupied in its original compact form is called the "swell" and is expressed in terms of percentage of the original volume occupied. Thus, if a cubic yard of solid rock occupies 1-1/2 cubic yards of space after it has been blasted, we would say that the swell is .5 or 50 percent. The following table gives the generally accepted percentages of swell for different classes of material.

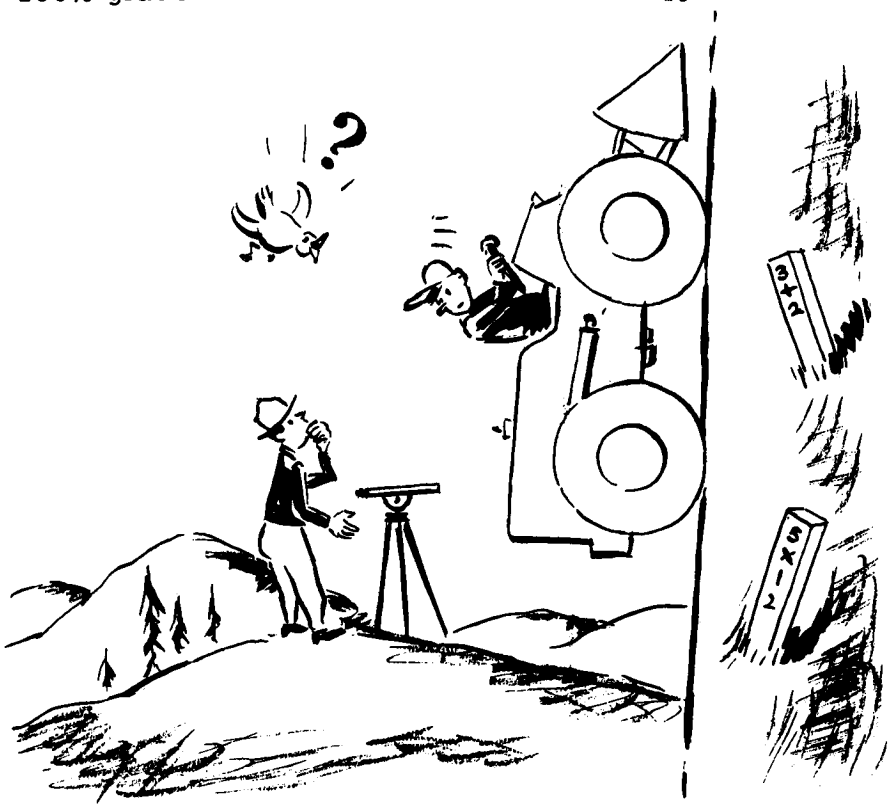
Percentage Swell Of Different Classes Of Earth On Loosening

MATERIAL	PERCENT SWELL
Clean Sand or Gravel	5 to 15
Top Soil	11 to 20
Loam	17-1/2
Good Common Earth	24 to 35
Clay with Sand or Gravel	30 to 45
Clay - Light and Friable	35 to 55
Clay - Hard and Tough	42 hard lump to 62 with rocks or roots
Shale and Soft Rock	50 to 73
Hard Rock	56 well blasted to 98 poorly blasted

GRADES AND GRADE LINES

Grades are referred to in per cent. The grade line is referred to as a plus or minus grade, Plus when going Up, Minus when going Down. For example: plus 1% grade is uphill at the rate of 1 foot per 100 feet of horizontal distance, while a minus 1.50% grade is downhill at the rate of 1.5 feet per 100 feet of horizontal distance.

Per Cent Grade	Angle of Grade	
1% grade	0°	34.4'
5% grade	2°	51.7'
10% grade	5°	42.6'
20% grade	11°	18.6'
25% grade	14°	2.2'
45% grade	24°	13.7'
75% grade	36°	52.2'
100% grade	45°	



APPROXIMATE WEIGHTS OF COMMON MATERIALS IN POUNDS PER CUBIC YARD

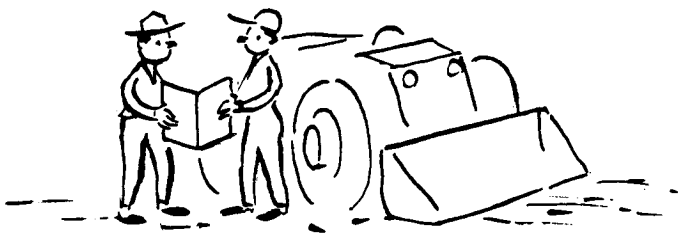
Ashes and Cinders	1000 - 1100
Average Crushed Stone	2700 - 3000
Clay	
Dry	2300 - 2400
Wet	2900 - 3000
Clay and Gravel (Dry)	2700
Coal (Broken)	
Anthracite	1500 - 1600
Bituminous	1350 - 1400
Coke	800
Common Earth	
Loose	2100
Packed	2500 - 2700
Wet Packed	3000 - 3100
Gravel	
Dry	3000 - 3100
Wet	3300 - 3400
Iron Ore (Broken)	3600 - 5500
Limestone (Broken)	2500 - 2700
Sandstone (Broken)	2300 - 2500
Shale(Broken)	2500 - 2700
Slag (Broken)	2400
Sand	
Dry	2200 - 2500
Wet	3000 - 3300
Sand and Gravel	2700 - 3000

WARNING!

LOWER THE TERRALOAD'R LIFT ARMS TO THE GROUND OR BLOCK THEM SECURELY BEFORE PERFORMING ANY SERVICE OPERATIONS OR WHEN LEAVING THE MACHINE UNATTENDED.

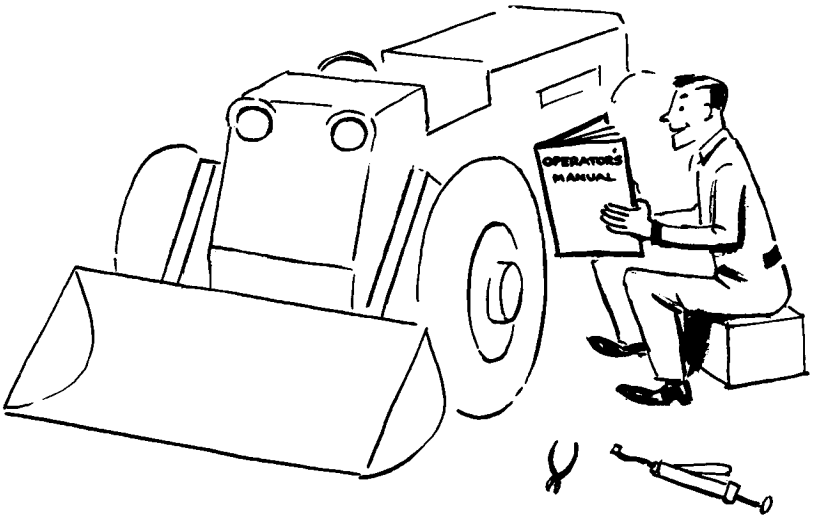
As a member of the National Safety Council, we are priviledged to use the Green Cross for Safety to designate not only our interest in Safety, but to point out more clearly the safety precautions in this manual.

6



SERVICE SUGGESTIONS

SERVICE SUGGESTIONS



On any engine, diesel or gasoline, the best way to locate and correct difficulties is to FIRST STOP AND THINK BEFORE YOU ACT! Keep in mind some of the simple basic requirements for a diesel engine to start and operate efficiently.

1. Power at the starting motor to turn the engine over fast enough to cause self-ignition of the fuel.

2. A supply of good, clean fuel, free of water contamination.

3. Air tight fuel lines and connections.

4. A full supply of clean air through the air filter.

5. A good grade of free flowing engine lubricating oil.

Systematically check the obvious things first, such as a closed fuel tank shut-off valve, air in the filters, water in the fuel, plugged fuel filters, etc.

Listed on the following pages are some simple checks that can be made to determine the cause of minor difficulties. If these suggestions do not correct the difficulty, call your Authorized Case Industrial Dealer. Do not tamper with the fuel pump or the injectors.

ENGINE WILL NOT START

Cause	Remedy
1. No fuel in tank.	1. Refill fuel tank and bleed fuel system. See Page 116.
2. Fuel Tank shut-off valve closed	2. Open valve and bleed fuel system Page 116.
3. Key switch not turned clockwise far enough	3. Turn key switch fully clockwise to start the engine.
4. Decompressor engaged.	4. Disengage decompressor. Refer to Page 64.
5. Slow cranking speed.	5. Check for: a weak or discharged battery; loose or corroded battery and starting motor connections; broken or worn cables that might be shorting the system.
6. Fuel stop button not all the way in.	6. Push fuel stop button fully in.
7. Air cleaner plugged.	7. Service air cleaner as described on Pages 127 and 128.
8. Fuel in tank not of recommended quality.	8. Drain fuel system and refull with recommended fuel, Page 17. Bleed fuel system. See Page 116.
9. Water in fuel system.	9. Drain fuel tank water trap and filters to remove water. Bleed fuel system. See Page 116. DRAIN WATER TRAP DAILY BEFORE STARTING.

10. Fuel line from tank to first stage filter plugged.	10. Disconnect fuel line and remove foreign material.
11. First stage fuel filter plugged.	11. Replace filter element as described on Page 121. Bleed the fuel system, Page 116.
12. Second stage fuel filter plugged.	12. Replace filter. See Page 122.

ENGINE SMOKES (BLACK OR BROWN) AND LACKS POWER

Cause	Remedy
1. Unsuitable fuel or fuel too high in Cetane.	1. Drain fuel system, refill with recommended fuel and bleed system, Page 116.
2. Air cleaner plugged.	2. Service cleaner as described on Pages 127 and 128.
3. Incorrect valve clearance.	3. Check and adjust valve clearance as described on Page 151.

(Call Your Authorized Case Industrial Dealer)

ENGINE SMOKES (BLUE-WHITE) AND LACKS POWER

Cause	Remedy
1. Coolant temperature too low.	1. Allow engine to warm up to minimum operating temperature.
2. Unsuitable fuel in the fuel system.	2. Drain system, refill with proper fuel, bleed system, Page 116.
3. Air in fuel system.	3. Bleed fuel system, Page 116.

4. Water in fuel system	4. Check fuel tank water trap and filters for water accumulation. If necessary, drain fuel system. Bleed system after refilling. See Page 116.
5. Oil level in crankcase too high.	5. Check and reduce level.

(Call Your Authorized Case Industrial Dealer)

ENGINE STALLS

Cause	Remedy
1. No fuel in tank.	1. Refill fuel tank. Bleed fuel system. Page 116.
2. Fuel tank shut-off valve closed.	2. Open shut-off valve. Bleed system, Page 116.
3. Unsuitable fuel or water in fuel.	3. Drain fuel system and refill with recommended fuel, Page 17. Bleed fuel system, Page 116.
4. Fuel tank breather plugged.	4. Wash breather filter and reinstall as described on Page 124.
5. Bleeder by-pass valve open.	5. Close bleeder by-pass valve, Page 115.
6. One or more fuel filters plugged.	6. Check and service filters as described on Pages 121 through 123.
7. Lack of coolant in engine.	7. Coolant level must be maintained well above radiator tubes.

8. Air leak in fuel line from the tank to first stage filter or to the transfer pump.	8. This will be indicated when air collects in fuel filters. Tighten and inspect fittings. Bleed fuel system Page 116.
9. Air cleaner plugged.	9. Service as described on Pages 127 and 128.
10. Coolant temperature too low.	10. Keep coolant temperature within work zone on temperature gauge.
11. Gum or varnish deposits forming in fuel, resulting in both plugging the fuel system and binding the governor action.	11. Use a "Diesel Fuel Conditioner" as described in the Fuel Specifications Section.

ENGINE OVERSPEEDS OR SURGES

(Call Your Authorized Case Industrial Dealer)

ENGINE OVERHEATING

Cause	Remedy
1. Lack of water.	1. Check and fill radiator.
2. Plugged radiator tubes.	2. Clean cooling system. Use ethylene glycol type antifreeze or soft water that is as free as possible of scale forming minerals.
3. Radiator fins plugged.	3. Clean radiator fins and screen.
4. Engine dirty.	4. Clean oil, dirt, from outside of engine.
5. Lack of crankcase oil.	5. Fill to full mark on dipstick.

6. Fan belt slippage.	6. Fan belt slippage will cause over-heating. Adjust or replace fan belt.
7. High ambient temperatures.	7. Remove one or both hood sides.

ENGINE MISFIRING ON ONE OR MORE CYLINDERS

Cause	Remedy
1. Unsuitable fuel or water in the fuel system.	1. Drain fuel system, refill with recommended fuel, Page 17. Bleed system, Page 116.
2. Air in fuel system.	2. Bleed system, Page 116.
3. Air cleaner plugged.	3. Service air cleaner as described on Page 127 and 128.
4. Coolant temperature too low.	4. Allow engine to warm up to operating temperature. Check thermostat, Page 132.
5. Incorrect valve tappet clearance.	5. Check and reset clearance as directed on Page 151.

(Call Your Authorized Case Industrial Dealer)

ENGINE DOES NOT SMOKE BUT LACKS POWER

Cause	Remedy
1. Air in fuel system.	1. Bleed system, Page 116.
2. Oil in crankcase too heavy.	2. Drain and refill crankcase with recommended seasonal grade oil, Page 31.
3. Engine overheating.	3. Refer to Page 100.

4. Unsuitable fuel.	4. Drain system and refill with fuel that meets specifications on Page 17.
5. Bleeder By-Pass Valve partly or fully open.	5. Bleeder By-Pass must be closed tightly during operation. See Page 115.
6. Partly plugged fuel filters.	6. See Pages 121 through 123.
7. Collapsed radiator hose.	7. Check and replace hose.
8. Engine overloaded.	8. Reduce load to normal
9. Fan blade bent or broken.	9. Consult your Authorized Case Industrial Dealer.
10. Air cleaner plugged.	10. Service air cleaner as described on Page 127 and 128.
11. Operating engine without thermostat.	11. Install genuine Case thermostat.

LOW OIL PRESSURE

Cause	Remedy
1. Lack of oil in crankcase	1. Add correct seasonal grade of engine oil, Page 31.
2. Poor quality engine lubricating oil or too light an oil.	2. Drain and refill with correct seasonal grade of engine oil, Page 31.
3. Oil pressure warning light.	3. Check that oil pressure warning light is functioning.
4. Loose connections on oil lines.	4. Check oil lines and tighten loose connections.

5. Oil pump floating screen dirty or plugged.	5. Have floating screen cleaned.

HYDRAULIC SYSTEM

Most malfunctioning of the lift or tilt cylinders on the W-10 Terraload'r can be attributed to the three causes listed below. Any servicing other than that listed below should be done by your Authorized Case Industrial Dealer because he has the knowledge and the special tools required for servicing the W-10 Terraload'r hydraulic system.

LIFT OR TILT CYLINDERS DO NOT FUNCTION PROPERLY

Cause	Remedy
1. Wrong oil used in system.	1. Drain system, flush thoroughly and refill with SAE 10 W(MS-DG) oil.
2. Low oil level in reservoir.	2. Fill reservoir to the full mark on the dipstick, Page 49.
3. Leaking or plugged hydraulic system.	3. Check system for leaks or plugged hoses and connections.

HYDRAULIC POWER STEERING

Loss of Power Assistance

Cause	Remedy
1. Lack of fluid in reservoir.	1. Refill reservoir and bleed system. (Check system for leakage). Page 41.
2. Wrong oil in system.	2. Drain and refill with Automatic Transmission Fluid-Type A.

3. Slipping or broken fan belt or pump drive belt.	3. Replace belt or adjust. Page 136.

Chatter or Shimmy in Wheels

Cause	Remedy
1. Slack in mechanical linkage.	1. Check steering system thoroughly from the steering wheel to the wheels for evidence of slack.
2. Air in system	2. Thoroughly bleed air from system as described on Page 42.
3. Wrong fluid in system.	3. If motor oil or similar fluids have been added to system, drain and refill with Automatic Transmission Fluid - Type A.
4. Shimmy in rear wheels.	4. Rear wheel misalignment. Adjust rear wheels so they are parallel, with no toe-in or toe-out.

(Call Your Authorized Case Industrial Dealer)

Fluid Foaming Out of Reservoir

Cause	Remedy
1. Wrong fluid in system.	1. Drain system completely and refill with Automatic Transmission Fluid Type A.
2. Plugged filter in reservoir.	2. Replace filter.

(Call Your Authorized Case Industrial Dealer)

TRANSMISSION AND TORQUE CONVERTER

The transmission in the Case W-10 Terraload'r requires a minimum amount of servicing. The service suggestions and remedies outlined on the following pages can be performed by the Terraload'r operator or mechanic. Should the transmission require servicing other than described in the following pages, it must be done ay an Authorized Case Industrial Dealer.

Your Authorized Case Industrial Dealer has the proper tools and fixtures, plus the factory trained staff to efficiently perform any service work on the transmission.

High Oil Temperature

Cause	Remedy
1. Low oil level.	1. Add oil. Refer to Page 46.
2. High oil level.	2. Drain oil to top level plug. Refer to Page 46.
3. Low coolant level.	3. Add coolant. Check Radiator for leaks.
4. Operating too long at stall speed.	4. "Stall Speed means the point at which under heavy load, the Terraload'r wheels turn very slowly or not at all and the engine continues to run at normal RPM. The overheating is caused by the engine continuing to deliver full horsepower into the converter. The converter is unable to release this horsepower through the wheels - thus this horsepower is released in the form of heat. Cool converter and shift into one range lower.

Loss Of Power

Cause	Remedy
1. Low Clutch Pressure.	1. Check Torque Converter Pressure Gauge. Gauge should register in the Green Zone. Page 55.
2. Low oil level.	2. Add oil. Refer to Page 46.
3. Leaks in lubricating system.	3. Check for oil leaks in external pressure lines.
4. Foaming oil.	4. Check oil level, Page 46. Add oil if necessary. Check for water in oil.

No Power In Any Range

Cause	Remedy
1. Low clutch pressure.	1. Check Torque Converter Pressure Gauge. Gauge should register in the Green Zone. Refer to Page 55.

Slow Clutch Engagement

Cause	Remedy
1. Foaming oil.	1. Check oil level. Add oil if necessary. Refer to Page 46. Check for water in oil.
2. Low clutch pressure.	2. Check Torque Converter Pressure Gauge. Gauge should register in the Green Zone. Refer to Page 55.

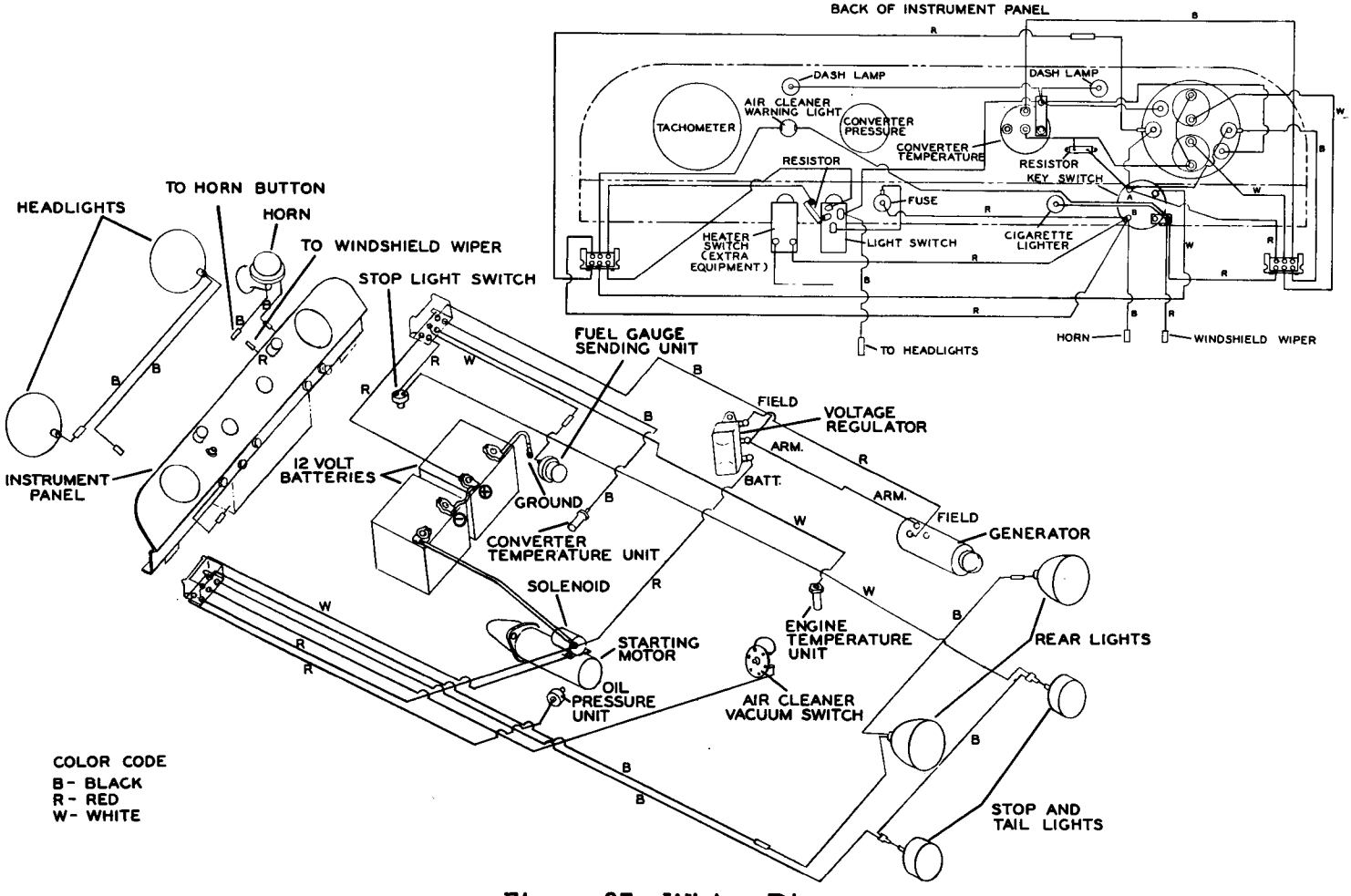


Figure 67. Wiring Diagram

Batteries

Please refer to "Storage Batteries," Pages 141 through 144, for battery maintenance.

When either of the batteries fails to take a full charge or will not hold a charge, replace it with a new battery that meets the specifications listed on Page 141.

Automatic Voltage Regulator and Generator

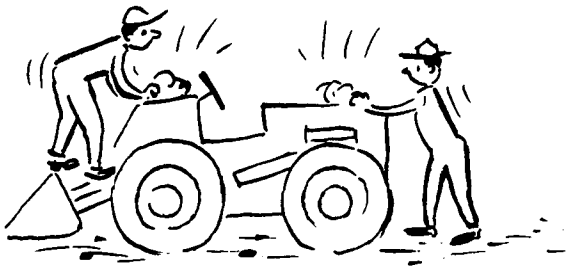
The function of the generator and regulator is to maintain the batteries at close to full charge. If either battery is low and the ammeter warning light indicates that the generator is not charging, check the following:

1. Check each battery. Make sure all cells will hold a charge. A Battery that has badly sulfated plates or one or more cells that will not hold a charge creates a high resistance in the system that affects the operation of the voltage regulator and generator.

2. Check all connections. Using the Wiring Diagram, Figure 67, as a guide, remove each wire individually and clean any paint, rust or corrosion from the connections. Repair or replace any defective wiring Make sure the connections are tight when replacing wires.

3. Check the generator brushes and commutator. If the brushes are worn, oil soaked, or if the commutator is dirty have the generator serviced at an Authorized Electrical Service Station.

7



PREVENTIVE MAINTENANCE

PREVENTIVE MAINTENANCE IS IMPORTANT TO YOU!

AS THE OWNER OF A CASE MODEL W-10 TERRALOAD'R YOU POSSESS A MACHINE THAT IS MADE TO THE HIGHEST STANDARDS POSSIBLE.

PREVENTIVE MAINTENANCE BY YOU OR YOUR OPERATOR IS THE EASIEST AND MOST ECONOMICAL MEANS OF ASSURING MANY SATISFACTORY PRODUCTIVE HOURS OF OPERATION.

The preceding sections of this operator's manual have dealt with instructions necessary for daily operation of your Terraload'r. The following subjects present detailed instructions concerning the care and adjustment of the various parts.

FUEL SYSTEM

The fuel system on your Case Model W-10 Terraload'r consists of a fuel supply tank, fuel filters and the fuel injection equipment. The service life of the fuel injection equipment on your diesel engine is wholly dependent upon the cleanliness of the fuel. If abrasives or water are permitted to reach the high precision moving parts in the injection equipment, rapid wear will result and poor performance may be expected. To prevent abrasives or water from reaching the injection equipment, it is important that you use clean fuel and regularly service the filters and water trap as described in this manual.

PROTECT YOUR FUEL SYSTEM

BUY CLEAN FUEL

AND

KEEP IT CLEAN

General Description

Figure 68 illustrates the fuel flow from the engine fuel supply tank to the combustion chambers. The fuel system is composed of the following units:

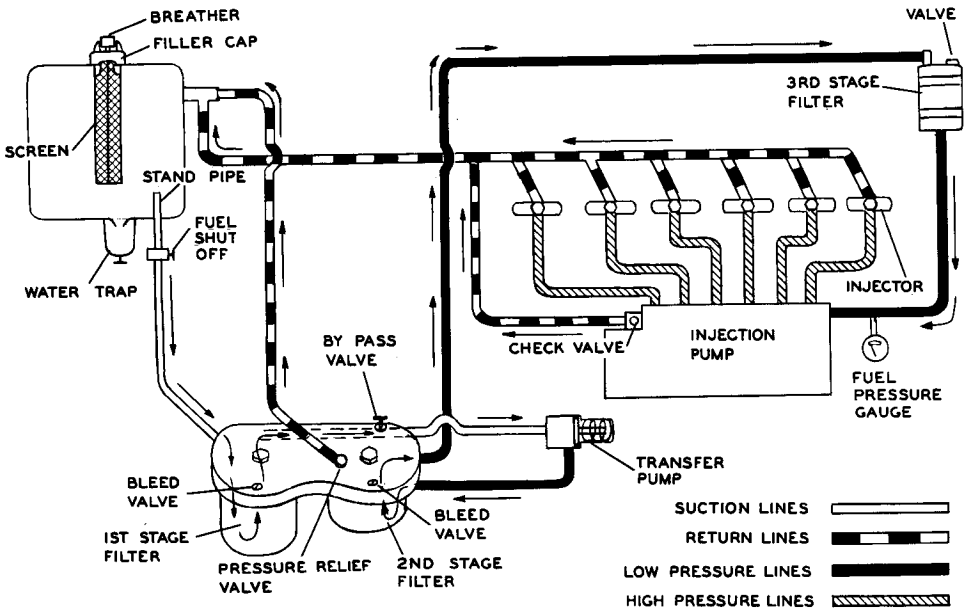


Figure 68. Diesel Fuel System Flow Diagram

FUEL SUPPLY TANK ---------- The filter type breather on the fuel tank filler cap can be removed for cleaning. A removable fine mesh screen filters the fuel entering the tank. A water trap with a drain valve is located on the bottom of the fuel tank.

FUEL TRANSFER PUMP-------- The fuel transfer pump which supplies fuel from the tank to the injection pump is an integral part of the injection pump.

FIRST STAGE FUEL FILTER ----- The first stage filter is of the replaceable element type. It removes abrasive particles from the fuel. A bleed valve is located in the top of the filter to vent air out of the filter.

SECOND STAGE FUEL FILTER -- The second stage filter uses a replaceable element which removes very fine abrasive particles from the fuel. A bleed valve is provided in the top of the filter to vent air out.

BLEEDER BY-PASS VALVE AND LINE ----- The bleeder by-pass valve is used only when bleeding air from the fuel system. When the by-pass valve is open, the fuel flows directly from the first stage filter through the cored passage in the filter head to the second stage filter, by-passing the fuel transfer pump.

FUEL PRESSURE GAUGE ------ The fuel pressure gauge is to be used as a guide for determining when to service the fuel filters. Refer to Page 117.

FINAL (THIRD STAGE) FUEL FILTER -------- The final (third stage) filter is of the "sealed unit" type. It provides the final filtering action before the fuel reaches the precision injection equipment. A bleed valve is located in the top of the filter to vent air out.

RELIEF (OVERFLOW VALVE) ---- The relief valve is provided on the inlet side of the second stage filter to maintain a preset pressure on the fuel entering the second and final filters. Fuel in excess of the preset pressure is returned directly to the fuel tank. This materially increases the service life of both the second and final filters.

FUEL INJECTION PUMP ------- The fuel injection pump receives fuel from the final filters and then meters and distributes the fuel under very high pressure to each of the six injectors. Fuel in excess of the engine demand is returned to the supply tank through the fuel return line.

FUEL INJECTORS ---------- The injectors deliver the metered fuel to the engine combustion chambers in a predetermined spray pattern. The small amount of fuel used to lubricate each injector is returned to the fuel tank through the leak-off and return lines.

BLEEDING THE FUEL SYSTEM

THE FUEL SYSTEM MUST BE BLED IF AIR ENTERS THE FUEL SYSTEM AS A RESULT OF:

1. Engine running out of fuel.

2. Parts removed for service or repairs.

3. Engine stored for a considerable period of time.

NOTE

AFTER RUNNING OUT OF FUEL, IT MAY BE POSSIBLE TO REFUEL AND START THE ENGINE WITHOUT BLEEDING. HOWEVER, A SMALL AMOUNT OF AIR MAY REMAIN IN THE FILTERS, RESULTING IN LACK OF POWER AND STALLING WHEN A LOAD IS APPLIED.

IMPORTANT

1. Be certain the fuel is full for bleeding operation.

2. Wipe the filter top clean before opening bleed valves.

3. CLOSE THE BLEEDER BY-PASS VALVE IMMEDIATELY AFTER BLEEDING THE FINAL FILTER. Although the engine may start and operate with the by-pass valve open, it will lack power and stall when a load is applied.

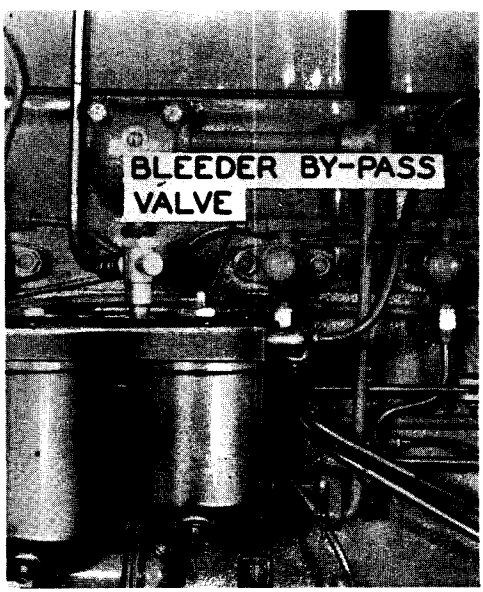


Figure 69

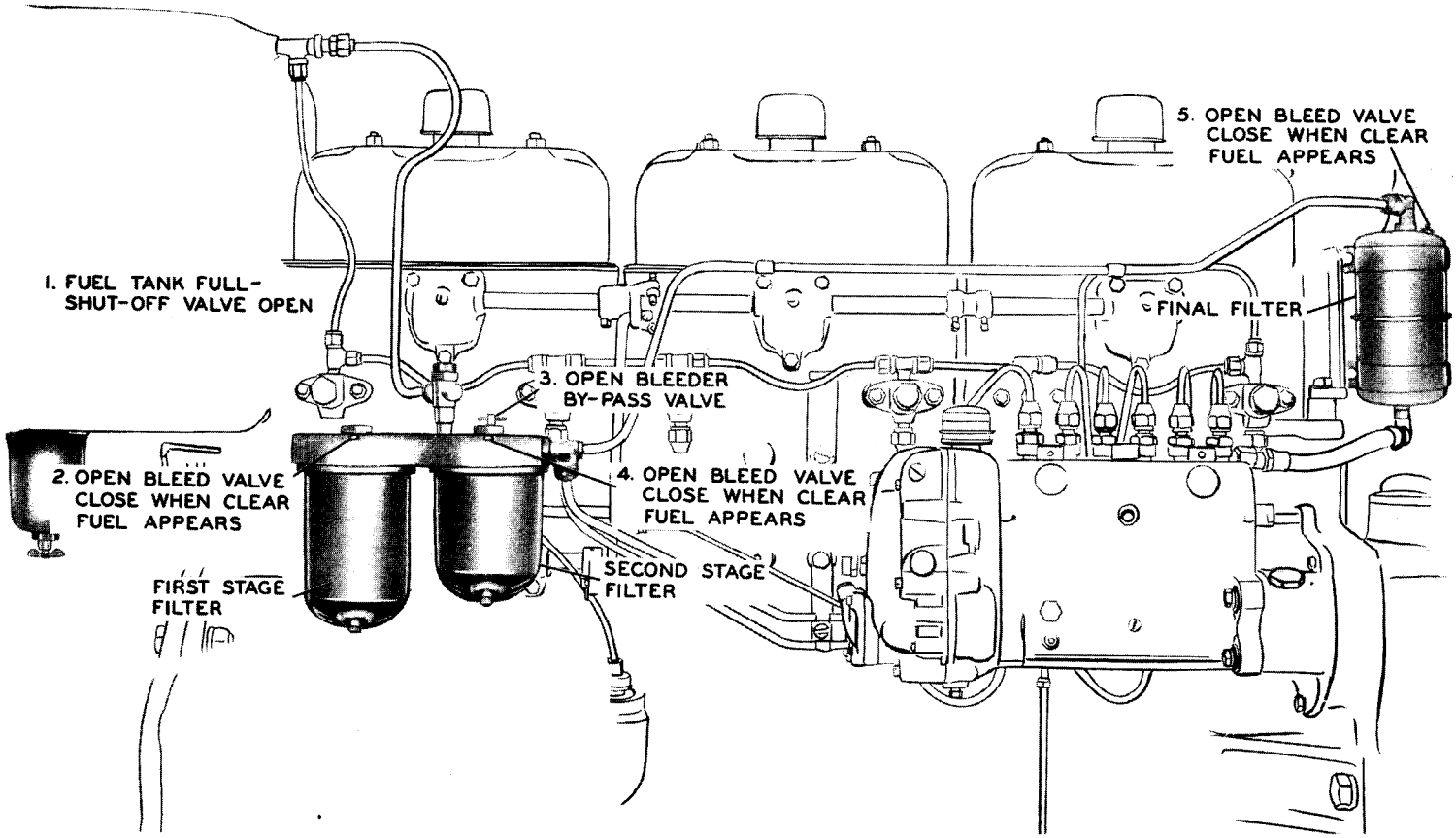


Figure 70. Sequence for Bleeding The Fuel System

CHECKING CONDITION OF FUEL FILTERS

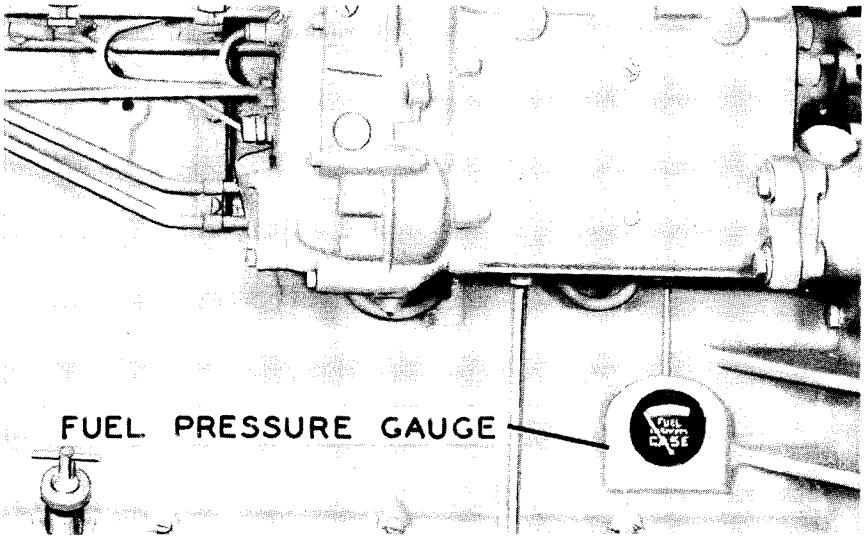


Figure 71

It is important that the fuel pressure gauge be checked daily. In normal operation, the needle will appear in the Green Zone, Figure 72. This indicates a satisfactory condition of all fuel filters.

As sediment gradually plugs a filter element, a drop in pressure will result. This will be indicated by the needle moving downward toward the Red Zone at the left side of the gauge, as shown in Figure 73.

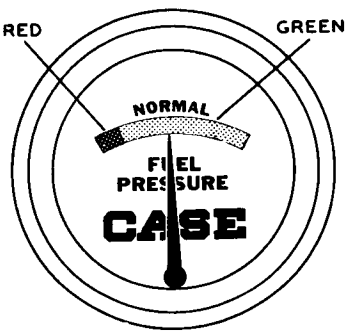


Figure 72. Element Is Clean

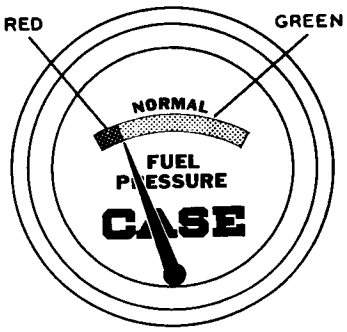


Figure 73. Replace Element

WARNING: When the needle enters the Red Zone, one or more of the filter elements has become plugged to the point where it must be serviced immediately.

SERVICING FUEL FILTERS

When servicing fuel filters, always begin with the first stage filter and by the process of elimination, follow on through the second and final stage filters, if necessary until the needle in the fuel pressure gauge registers in the Green Zone. Proceed in the following manner:

First Stage Filter

Service the first stage filter as described on Page 121. Bleed the system.

After bleeding the system, start the engine and check the fuel pressure gauge immediately. If the needle registers in the Green Zone, all fuel filters are now in satisfactory condition.

If the needle registers in the Red Zone, or if the engine fails to start, proceed to service the second stage filter.

Second Stage Filter

Service the second stage filter as described on Page 122. Bleed the system.

After bleeding the system, start the engine and observe pressure gauge reading. If the needle registers in the Green Zone, all fuel filters are now in a satisfactory condition. If the needle registers in the Red Zone, or the engine fails to start, proceed to check the final filter.

Final Fuel Filter

If you have been servicing the 1st and 2nd Stage fuel filters regularly and are using clean Diesel Fuel that meets Case specifications on Page 17, you can expect many thousands of hours of operation from the final filter.

A badly restricted final filter will result in a low pressure gauge reading or in a loss of power under load until finally the engine will stall.

How to check the Final Filter

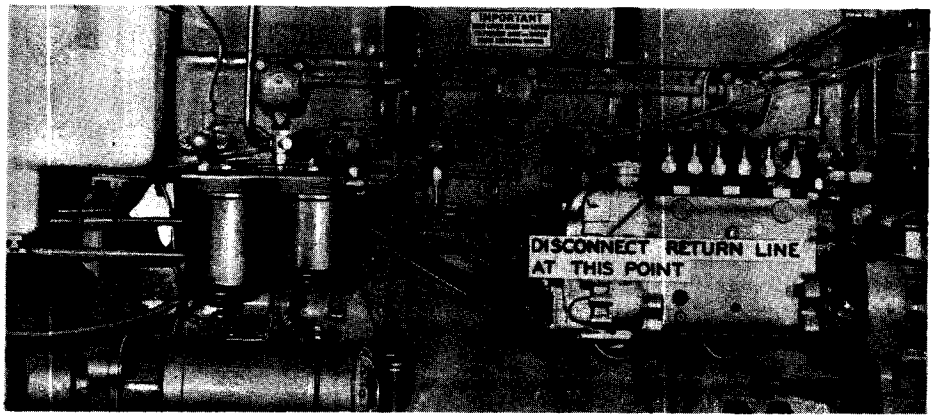


Figure 74

1. The fuel tank must be full.

2. Clean the outside of the fuel injection pump, the fuel lines and the area around the pump. This cannot be overemphasized.

3. Carefully disconnect the fuel return line at the point indicated in Figure 74. Make sure no dirt enters the line. NOTE: The fitting must be removed from the pump in order to obtain an accurate check. Use a 9/16 inch box end wrench to remove and tighten the fitting.

4. Open the bleeder by-pass valve, Figure 74. If a small continuous flow of fuel does not appear at the opening, the final filter is plugged and must be replaced. Refer to Page 123.

CAUTION

Use extra care to prevent dirt entering the fuel system when reconnecting the return line. Tighten the fitting carefully so the threads are not damaged. Do not over-tighten. Tighten the tubing nut until it seats against the fitting on the injection pump.

THE BLEEDER BY-PASS VALVE MUST BE CLOSED BEFORE STARTING THE ENGINE.

Checking 1st and 2nd Stage Filter Conditions If Engine Will Not Start

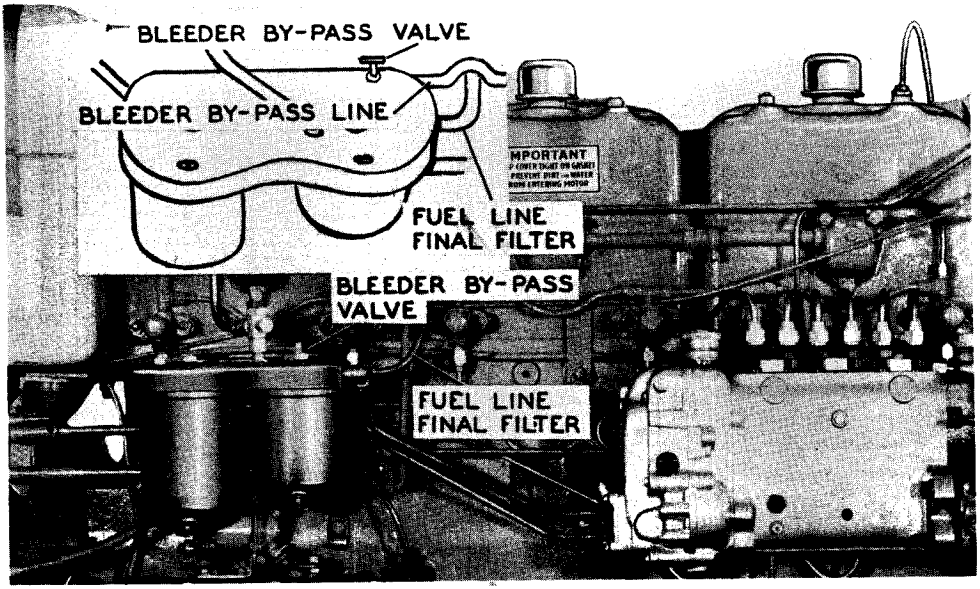


Figure 75

An engine that cannot be started due to a plugged fuel filter is easily recognized by a lack of exhaust smoke while the engine is being turned over by the starting motor. No exhaust smoke can only mean that no fuel is reaching the combustion chambers.

To determine which filter is plugged, proceed as follows:

1. Make sure the fuel tank is full.

2. Disconnect the 5/16 inch bleeder by-pass line at the by-pass valve, Figure 75. Check the fuel flow. If fuel does not flow freely, the first stage filter is plugged. Reconnect fuel line.

3. Open by-pass valve and disconnect fuel line to final filter, Figure 75. If fuel does not flow freely, the second stage filter is plugged. Reconnect fuel line.

4. Check the final filter as described on Page 119.

REPLACING FIRST STAGE FUEL FILTER

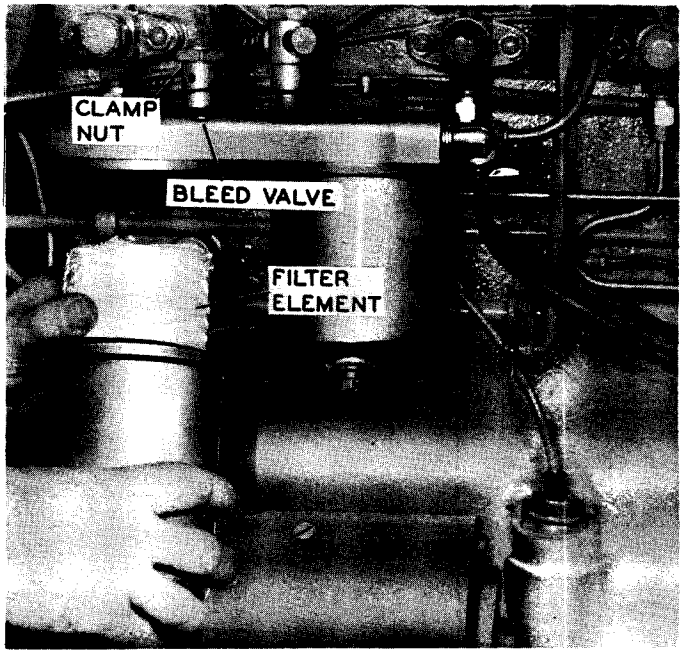


Figure 76. Removing First Stage Filter Element for Replacement

To Remove the Filter Element:

1. CLEAN THE LEFT HAND SIDE OF THE ENGINE THOROUGHLY. BE SURE NO DIRT IS LEFT ON THE FILTER BODY.
2. Close the fuel shut-off valve on the fuel tank, remove the drain plug from the bottom of the filter and allow it to drain.
3. Loosen the filter clamp nut on the filter cover until the body can be lowered away from the cover, Figure 76.
4. Lift the contaminated element out of the body and discard it Figure 76.
5. Wash the filter body assembly thoroughly in clean diesel fuel.
6. Install a new Genuine Case Filter Element in the filter body. Be sure to install the new filter body gasket provided with the new element. Check that the clamp nut gasket is in good condition. Replace it if necessary.
7. Install the filter drain plug and bleed the system as directed on Page 116.

REPLACING SECOND STAGE FILTER ELEMENT

Figure 77. Removing Filter Element for Replacement

To Remove the Filter Element:

1. **CLEAN THE LEFT HAND SIDE OF THE ENGINE THOROUGHLY. BE SURE** NO DIRT IS LEFT ON THE FILTER BODY.
2. Close the fuel shut-off valve on the fuel tank, remove the drain plug from the bottom of the filter and allow it to drain.
3. Loosen the filter clamp nut, Figure 77, until the entire filter body assembly can be lowered away from the top cover.
4. Lift the contaminated element out of the body and discard it, Figure 77.
5. Wash the filter body assembly thoroughly in clean diesel fuel.
6. Install a new Genuine Case Filter Element in the filter body. Be sure to install the new filter body gasket provided with the new element. Check that the clamp nut gasket is in good condition. Replace it if necessary.
7. Install the filter drain plug and bleed the system as directed in Page 116.

REPLACING FINAL FILTER

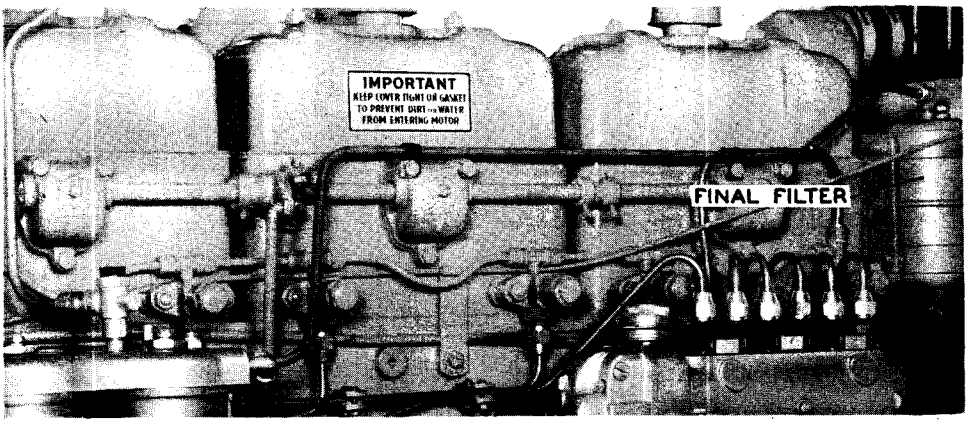


Figure 78

NOTE: The final filter can be expected to last thousands of hours ONLY if the first and second stage filters have been serviced regularly as directed in this manual and if the fuel being used is clean when it enters the tank and meets the specifications listed on Page 17.

While replacing the final filter is a simple matter mechanically, there are certain precautions that can only be safely performed in the Case Dealer's Service Shop where experienced personnel are available.

Removal of the final filter by inexperienced personnel will expose the high precisioned and most costly units of the fuel system to the entry of dirt.

REMEMBER

A PARTICLE OF DIRT THAT IS INVISIBLE TO THE NAKED EYE CAN SERIOUSLY DAMAGE THE HIGH PRECISION IN-INJECTION EQUIPMENT.

FUEL TANK WATER TRAP

Before starting the Terra-load'r engine for each day's operation, open the drain valve on the fuel tank water trap, Figure 79. Drain until clear fuel appears. This will remove any water or sediment that may have settled out of the fuel while the engine was stopped.

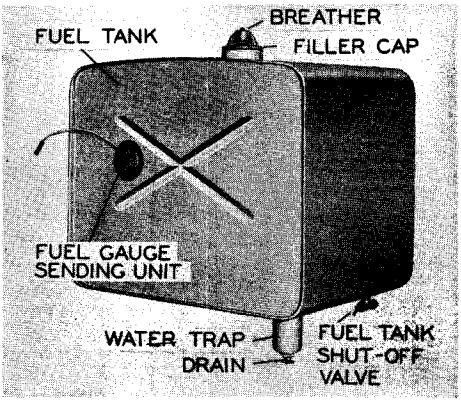


Figure 79

IMPORTANT: Always be sure to drain water trap daily in cold weather. If a large amount of water is allowed to accumulate and freeze in the trap - serious damage to the fuel tank may result.

IMPORTANT: Always fill the fuel tank at the end of each day's operation to prevent moisture condensation from forming in the tank and entering the fuel.

FUEL TANK BREATHER

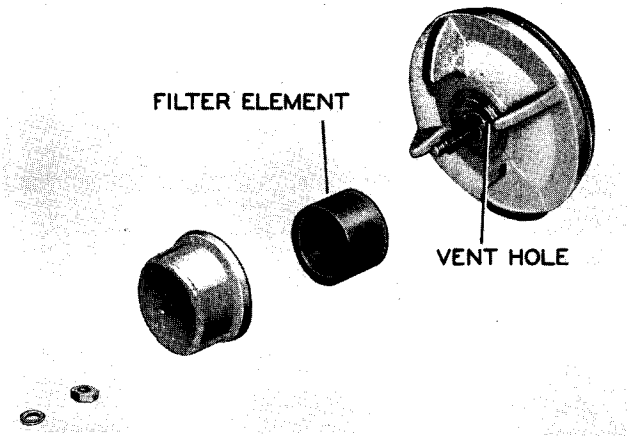


Figure 80. Fuel Tank Breather Assembly

Every 240 hours of operation, or more often in extremely dusty conditions, remove and clean the breather filter element on the fuel tank cap, Figure 80.

Wash the edge wound paper element in a greaseless cleaning fluid, such as that used for removing spots from clothing. Dirt accumulations will be found on the outside surface of the element. Make sure the vent hole in the fuel tank cap is open.

CAUTION

Do not use diesel fuel to clean the filter element.

FUEL TANK STRAINER SCREEN

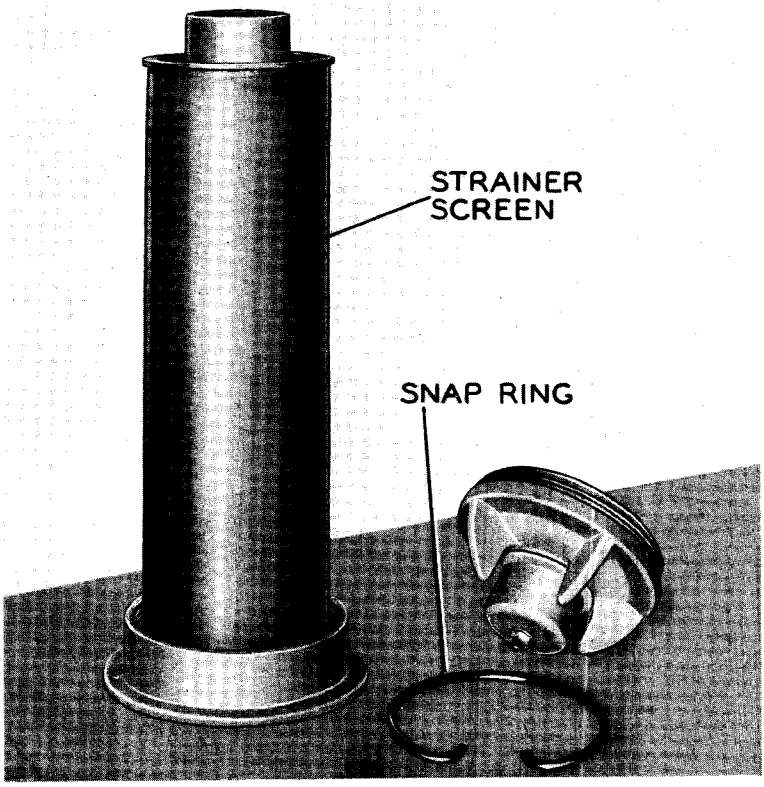


Figure 81. Removing Fuel Tank Strainer Screen.

Every 240 hours of operation, remove and clean the fine mesh screen located in the fuel tank filler opening, Figure 81.

To take out the screen for cleaning, remove the retainer snap ring from the filler opening and lift the screen out. Wash it thoroughly in clean diesel fuel. Blow the strainer screen out with compressed air.

CRANKCASE BREATHERS

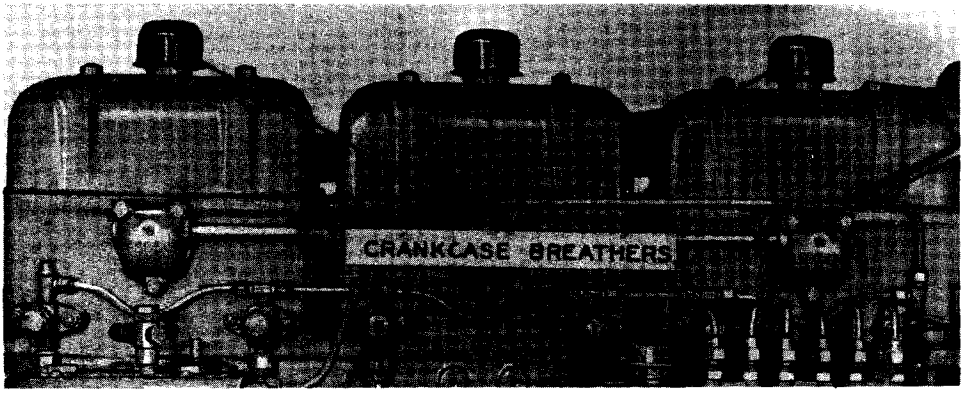


Figure 82. Crankcase Breathers

Your diesel engine is provided with three crankcase breathers, one on each valve cover, Figure 82. It is the important function of the breathers to provide crankcase ventilation and to prevent dirt and dust from entering the crankcase.

Failure to keep the breathers clean may result in:

1. Engine lubricating oil being forced past seals due to excessive pressures built up in crankcase.
2. Excessive oil consumption due to pressures built up in crankcase.
3. Formation of acids or sludge in the crankcase and harmful deposits in the engine due to improper ventilation.

Servicing Crankcase Breathers

Remove and clean the crankcase breathers every 60 hours of operation. During extremely dusty conditions, it may be necessary to clean the breathers as often as every 5 to 60 hours.

To service the breathers:

1. CLEAN THE AREA AROUND THE BREATHERS BEFORE REMOVING THEM.
2. Pull the breathers off the valve covers and wash them in clean diesel fuel. Shake them dry after cleaning.
3. Pour a small quantity of engine lubrication oil into each breather and shake the excess oil out. Replace the breathers on the valve covers.

AIR CLEANER

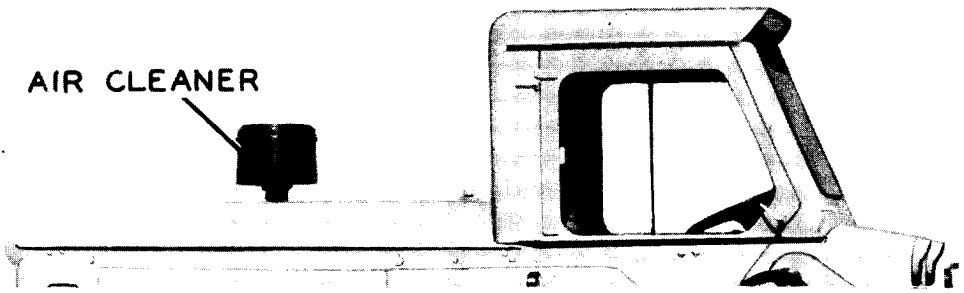


Figure 83

The dry type air cleaner on Case W-10 Terraload'r will provide hundreds of hours of satisfactory service if it is serviced properly.

The air cleaner filter element must be serviced immediately if the red warning light on the instrument panel lights. Refer to Page 57, Figure 32.

Check the warning light every 60 hours of operation to make sure it is functioning.

To check the warning light, place an electric insulated screw driver across the terminals of the vacuum switch and see if the warning light flashes on. The vacuum switch is located on the air intake stack. If the light does not flash, replace the bulb and check the wiring.

Every 120 hours of operation check the warning light vacuum switch to be sure it is working.

With the engine running, place your hands over the intake holes on the bottom of the air cleaner can. Figure 84. This will create a vacuum in the air intake system and cause the red warning light to flash if the vacuum switch is functioning properly.

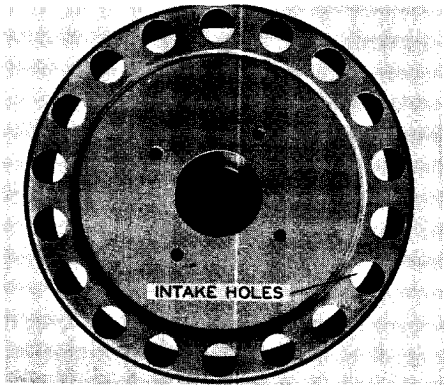


Figure 84

Cleaning the Filter Element

Unscrew the wing nut on top of the air cleaner can, remove the cover and filter element. Figure 85.

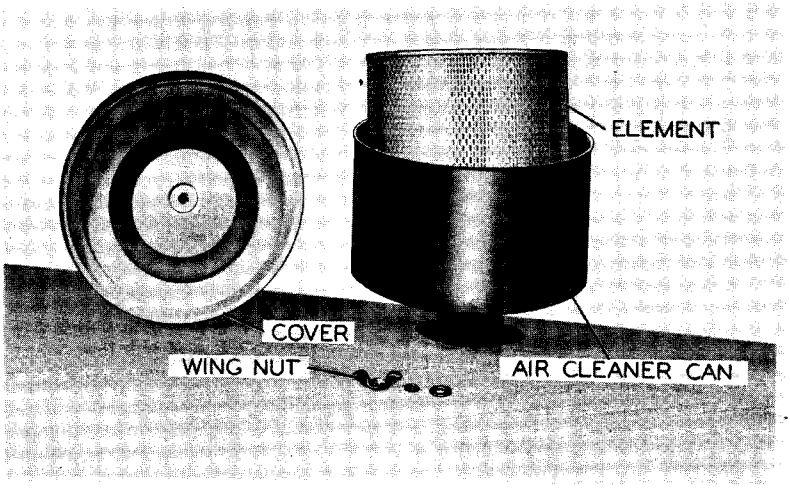


Figure 85

Tap the filter element against a firm surface to remove loose dirt.

Place the element on a flat clean surface, then place a board or plate with a small opening over the top of the filter element and gasket.

Insert an air hose through the opening in the board. Blow the filter element clean, starting with the low air pressure and gradually increasing it. Be careful not to rupture the filter element with extreme air pressures. Install a new element if the one being serviced is damaged in any way.

In this manner clean the filter element as thoroughly as possible. The element cannot be cleaned completely, so it is important that you check the warning light and vacuum switch often to be sure they are functioning.

Do not clean and use the same filter element more than three times. Replace the element when the warning light indicates a fourth cleaning would be necessary.

COOLING SYSTEM

Capacity of System ---------- 10-1/2 Gallons

Temperature Control (Thermostat)---188° to 208° Fahrenheit (Radiator Shutters Available as extra Equipment)

Operating Temperature ----- Keep Gauge Needle Within Work Zone on Temperature Gauge.

General Description

Your Case Diesel Terraload'r has a large capacity cooling system to provide efficient cooling under heavy loads. The coolant is circulated through the system by means of an impeller type pump which is driven from the crankshaft by a Vee Belt. Coolant is circulated through the radiator, down into a distributor gallery in the engine block; then up past the entire length of the cylinder sleeves into the cylinder heads where it passes into a water manifold and travels to the top of the radiator.

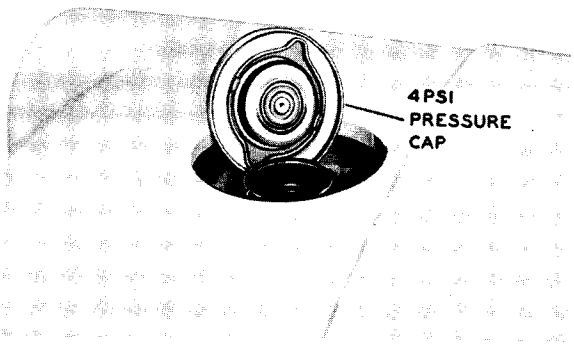


Figure 86. Radiator Cap Location

A thermostat and by-pass hose are located in the water manifold as shown in Figure 86. The thermostat blocks the coolant flow to the radiator when the coolant temperature is below its 188 degree Fahrenheit opening temperature. The coolant must then pass down through the by-pass hose and be recirculated through the engine until the heat of combustion warms it sufficiently to open the thermostat.

When the thermostat is fully open, the by-pass is closed and the coolant must pass through the radiator. A large fan draws air past the radiator tubes and dissipates heat in ex-

cess of the engine's operating temperature.

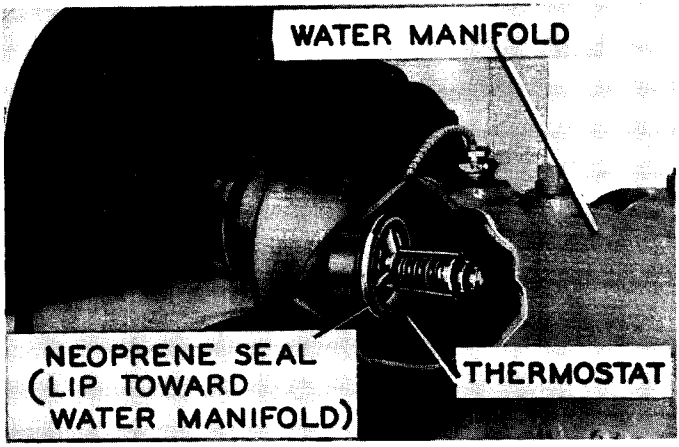


Figure 87. Thermostat Location

In this manner, the engine temperature is automatically maintained within its operating range.

CAUTION

DO NOT OPERATE THE ENGINE WITHOUT THE THERMOSTAT. IF THE THERMOSTAT IS NOT IN PLACE, COOLANT WILL CONTINUALLY BY-PASS THE RADIATOR AND OVER HEATING WILL OCCUR.

Rules for Maintaining Correct Operating Temperature of Your Diesel Engine:

1. ALWAYS operate the engine between 2/3 and wide open when the engine is not under load. DO NOT slow idle engine.
2. In areas where cool or cold climatic temperatures are common, radiator shutters (available as extra equipment) should be installed.
3. Keep radiator filled with a clean coolant. Use Ethylene Glycol base anti-freeze, or soft water that is as free as possible of scale forming minerals. Always use a reputable brand "Rust Inhibitor."
4. Keep radiator and engine clean.
5. Check fan and water pump drive belt for slippage. Make sure fan blades and shrouding are not bent.
6. Check that hoses are not collapsed or leaking.
7. Do not overload the engine.

ANTI-FREEZE SOLUTIONS

Your Case Terraload'r is shipped from the factory with high boiling type anti-freeze in the cooling system protected to 20 degrees below zero. This anti-freeze must be drained and discarded after first winter's use. Anti-freeze should never be used more than one winter due to the natural break down of the rust inhibitor.

Use only a nationally recognized brand of High Boiling Point Ethylene Glycol Base anti-freeze in the W-10 Terraload'r.

Low Boiling Point Type alcohol base anti-freeze solutions are not recommended for use. Loss from evaporation could be excessive since the boiling point of alcohol is frequently below the Terraload'r engine's minimum operating temperature.

DO NOT mix different types of anti-freeze solutions in the cooling system. The exact amount of protection afforded is almost impossible to determine by use of a tester when different types solutions are mixed.

CAUTION

Never use any of the following as anti-freeze:

1. Solutions of unknown composition such as: honey, sugar, glucose, or sodium silicate.
2. Inorganic salt base solutions such as: sodium chloride(comcon salt), calcium chloride, magnesium chloride.
3. Mineral oil or petroleum base solutions such as: kerosene, fuel oil or lubricating oil.

Checking Thermostat

During operation, check the temperature gauge frequently. Should the engine warm up very slowly under load, or if the temperature gauge needle does not reach the recommended operating range, remove and check the thermostat. Suspend the thermostat in a pan of water that is being heated and check the opening temperature with a thermometer. If the thermostat is inoperative, discard it and install a new genuine Case Thermostat having the same heat range as the original. The thermostat must start to open at 188° F., and be fully open at 208° F.

NOTE

An engine that is not working under load will be slow to warm up to operating temperature. This is due to the large capacity cooling system and is normal when the engine is under load, however, it should warm up reasonably soon.

During extremely cold weather, and if the thermostat is found to be operative, failure to maintain the proper operating temperature is an indication that radiator shutters are required.

Thermostat Removal and Installation

1. Drain the cooling system. See Pages 134 and 135.

2. Remove the hood.

3. Remove the upper radiator hose and the by-pass hose; then remove the thermostat housing. The thermostat is located between the water manifold and the thermostat housing, Figure 88.

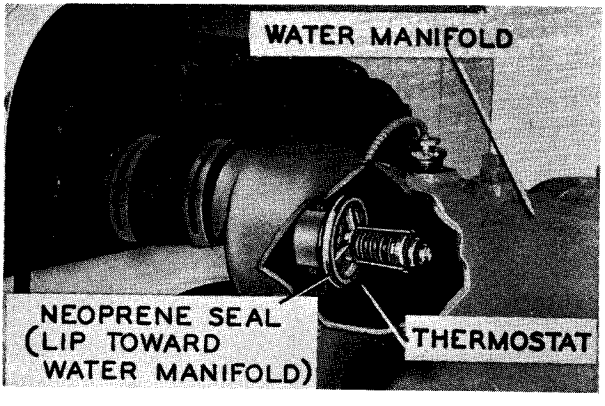


Figure 88

4. Install a new Genuine Case Thermostat (188° - 208° range), as indicated in Figure88.

5. Install the thermostat housing with a new gasket on the water manifold. Place a thin film of sealing compound on the gasket.

Be sure to remove all old gasket material before installing a new gasket.

Genuine Case Thermostats are obtainable from your Authorized Case Industrial Dealer. This thermostat has been designed to provide efficient heat control for your Case Diesel Terraload'r. Do not use substitutes.

FACTS TO REMEMBER ABOUT PRESSURIZED COOLING SYSTEMS

1. CAUTION: Always Remove the Pressure Cap Slowly. Quick removal of the pressure cap could reduce the pressure enough to cause the coolant to boil out of the radiator filler opening and result in painful burns to the operator.

2. The pressure cap on a pressurized cooling system is equipped with a control valve which functions as a Safety Relief Valve to keep the pressure within the system at 4 lbs. Operating the engine without a pressure cap or a pressure cap that has a control valve that is not set to function at the designated 4 lbs. can cause Serious Damage.

3. Pressurizing the cooling system reduces the loss of coolant by evaporation, surging or boiling, thus making the efficiency of the cooling system dependent upon good seals at the radiator cap, hoses and hose connections. It is especially important that All Leaks Regardless Of Size be repaired quickly. A small drip can become a heavy steam, when4 PSI of pressure are built up in the cooling system. A weak hose could burst while the Terraload'r is in operation and cause serious injury or damage. Check all hoses and hose connections frequently. Keep hoses, hose connections and Pressure Cap in good condition.

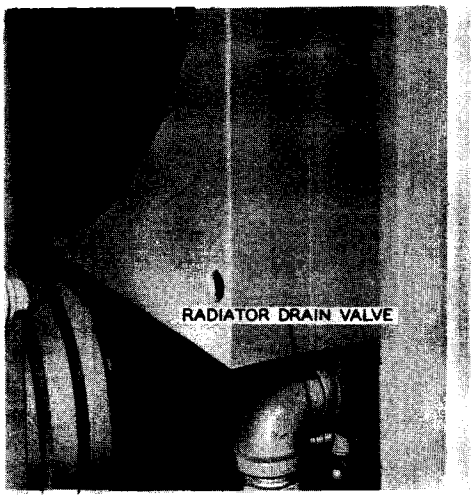


Figure 89. Radiator Drain Valve Location

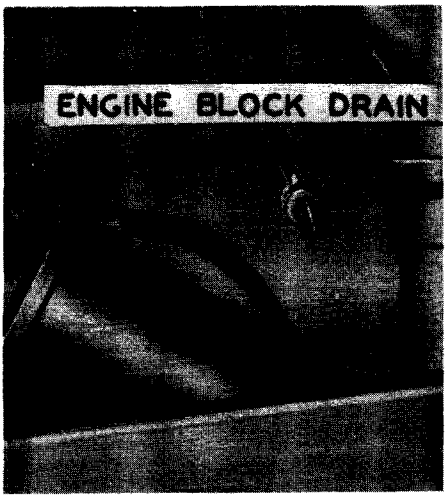


Figure 90. Engine Block Drain Valve Location

CAUTION!

NEVER POUR COOLANT INTO A HOT ENGINE. THE ENGINE BLOCK OR CYLINDER HEAD MIGHT CRACK BY THE SUDDEN CONTRACTION CAUSED BY THE DIFFERENCE IN TEMPERATURE BETWEEN THE METAL AND THE COOLANT.

Clean the cooling system at least once a year. In areas where water containing scale forming mineral is all that is available, clean the system more often. Mineral scale, rust or dirt deposits in the cooling system form an insulation which prevents the heat of combustion from passing into the coolant and being dissipated.

To clean the cooling system:

1. While the coolant is still hot, open the radiator drain valve and the engine block drain valve, Figures 89 and 90.

2. Add a radiator cleaner to the system and refill with clean water. Any nationally known commercial brand cleaner marketed by a reputable manufacturer may be used. Follow the directions provided with the cleaner.

3. After draining the cleaning solutions, flush the system with clean water before refilling for operation.

4. Check the hoses, elbows, pump and water manifold for leakage.

5. Make sure the outside of engine is clean and that radiator fins are cleaned of dirt accumulations.

NOTE

After the cooling system has been completely drained and refilled, operate the engine for approximately five minutes to bleed all air out of the system. Recheck coolant level and add coolant if necessary.

If water is used in the cooling system during the warm summer months, always add a reputable brand rust(or corrosion) inhibitor.

Fan and Water Pump Drive Belt

The effectiveness of the cooling system depends upon the condition and tautness of the Vee belt that drives the fan and water pump. Slippage in this belt can result in engine overheating, since neither the pump nor the fan will be driven at full speed.

Be sure the Vee belts on your Case W-10 Terraload'r are always in top shape and properly adjusted.

Fan Belt Adjustment

A properly adjusted Vee belt can be depressed 1/2 inch midway between the generator pulley and the fan pulley, Figure 91.

To tighten the belt loosen the generator mounting bolts and swing the generator farther away from the engine.

IMPORTANT: The belt must ride on the side of the Vee pulley - never on the bottom.

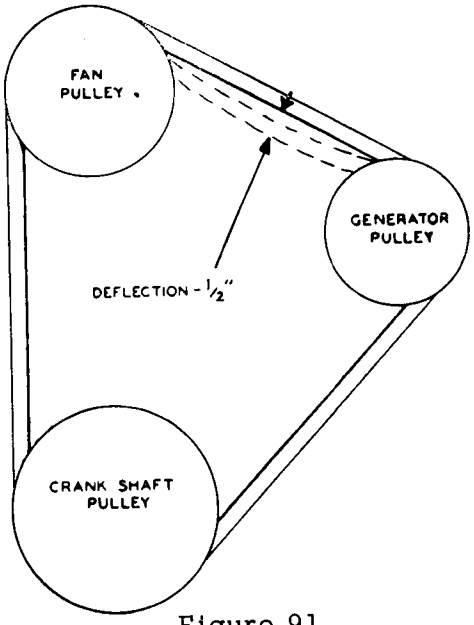


Figure 91

Replacing the Fan Belt

To install a new Vee belt proceed as follows:

1. Remove Power Steering Belts.
2. Loosen the generator mounting bolts and swing generator toward the engine.
3. Slip the new Vee belt over the fan and onto the fan pulley, then onto the lower drive pulley and the generator pulley.
4. Tighten the belt properly.

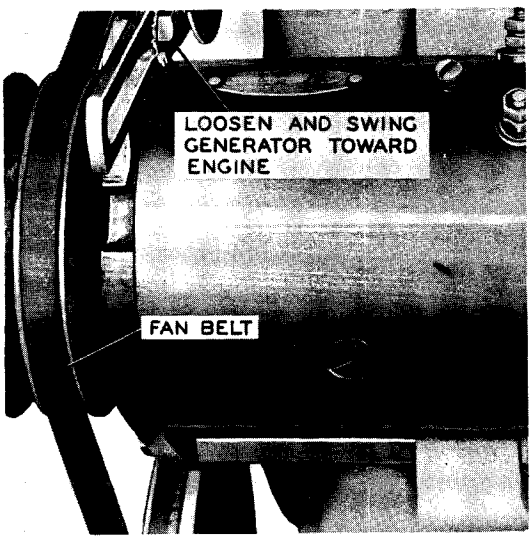


Figure 92

POWER STEERING DRIVE BELTS

The effectiveness with which the power steering and power brakes operate depends upon the condition and tautness of the Vee belt that drives the hydraulic steering pump. Slippage in these belts can result in sluggish steering action, since the hydraulic pump will not be driven at full speed, causing the volume of oil pumped through the system to be reduced.

Power Steering Drive Belt Adjustment

Properly adjusted power steering belts can be depressed 1/4 inch at a point midway between the crankshaft pulleys and the pulleys on the hydraulic power steering pump. To adjust the belt, loosen the lock nut on the adjusting bolt and move the pump assembly up or down to obtain the proper belt tension. Retighten the lock nut on the adjusting bolt.

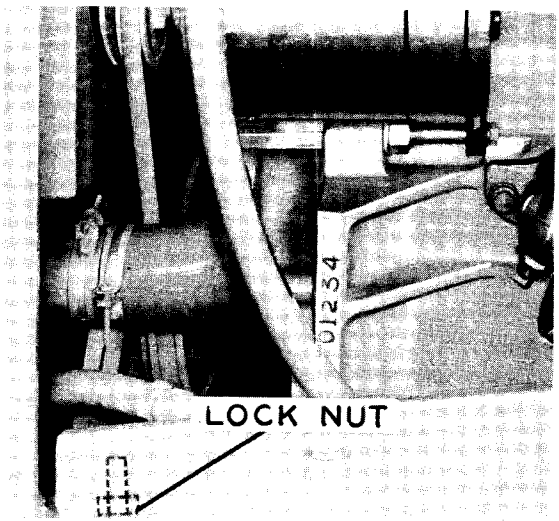


Figure 93

NOTE

The Hydraulic power steering requires no adjustment other than belt tension and keeping the fluid reservoir full. Should attention be required consult your Authorized Case Industrial Dealer.

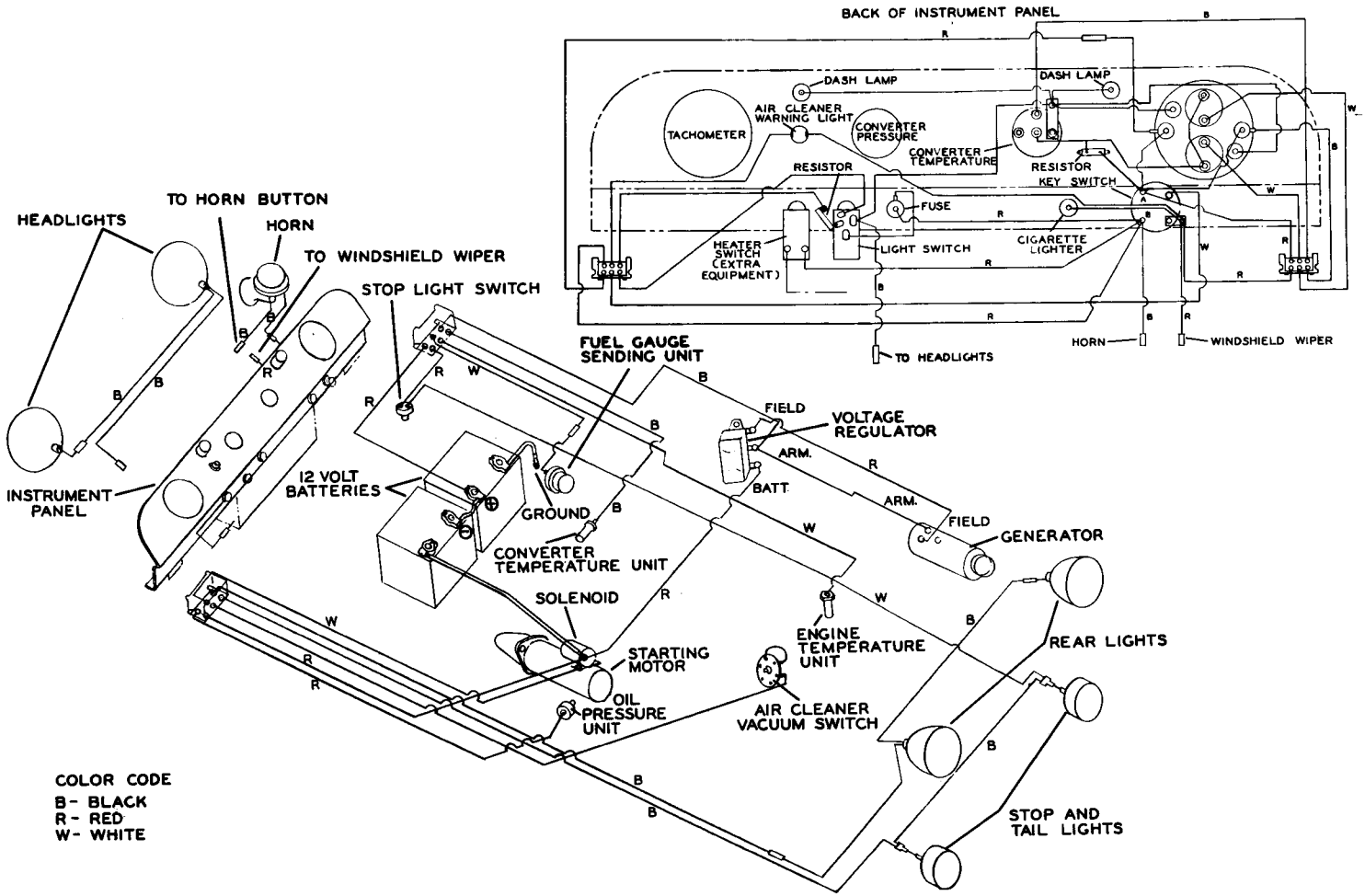


Figure 94. Wiring Diagram

The electrical system of the Case Model W-10 Diesel Terraload'r is a 24 volt, negative ground system. It consists of two 12 volt batteries connected in series, a 24 volt generator, a 24 volt starting motor, two 12 volt sealed unit headlights in series, two 12 volt sealed unit rear lights in series, two 24 volt combination stop and tail lights, and two 24 volt instrument panel lights in series. Refer to the wiring diagram, Figure 94. A 20 Ampere fuse is located on the instrument panel.

NOTE: All service work on electrical equipment should be done by Authorized Electrical Service Stations. They have all the necessary tools and equipment to do the work in a satisfactory manner and are familiar with handling electrical equipment.

Starting Motor

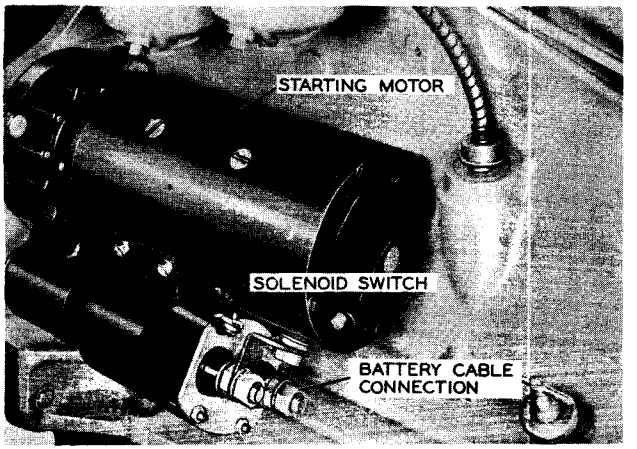


Figure 95. Starting Motor

The 24 starting motor on your Case Diesel Terraload'r is equipped with a drive assembly that is sealed in the fly wheel housing to prevent the entry of dust and other foreign material.

The front armature bearing is factory lubricated and requires no further lubrication, unless it is completely disassembled for servicing by an Authorized Case Industrial Dealer or Electrical Service Station.

Do not tamper with the starting motor solenoid switch. Have the starting motor serviced by an Authorized Electrical Service Station.

Storage Batteries

Battery Size (Each) ---------- Group 5SH 12 Volt; 90 Ampere Hours at 20 Hour Rate

When working around a storage battery, remember all of its exposed metal parts are "live." Never lay a metal object across the terminals as a spark or short circuit may result. Sparks, lighted matches and exposed flames must be kept away from the batteries due to the presence of explosive gas in the batteries.

The liquid in the battery is acid. Use care not to spill it on your hands or clothing.

Rules for Battery Care

1. Add pure water, as needed, to keep the separators covered. Check every 60 hours or weekly.

2. Keep the batteries in a healthy state of charge as shown by hydrometer readings.

3. Make sure the batteries are securely fastened in position. Wires leading from the battery should not touch cell connectors or lay on the battery container.

4. Keep the batteries clean and dry.

On a diesel engine it is very important to keep both batteries fully charged, since starting is largely dependent upon the cranking speed developed by the batteries and starting motor.

If both batteries are weak, recharging or replacing just one battery will not help. Both must be brought up to full charge.

Each week, and before adding water, take a hydrometer reading from every cell. The gravity reading from each cell should be between 1.250 and full charge.

NOTE: The full charge gravity reading will usually be indicated on the battery. A battery having a reading of 1.175 will freeze at approximately zero degrees Fahrenheit.

If one battery is weak and the other near full charge, there is a possibility of overcharging and damaging the fully charged battery. If it is necessary to add water to a battery frequently, it is probably being overcharged. CHECK BOTH BATTERIES and bring them up to full charge. Check for loose ground connections.

If a battery will not hold a charge, replace it with a new one meeting the specifications listed on Page 140.

Cold Weather Precautions

As air temperatures drop, a storage battery's output capacity lowers. A battery actually becomes "numb" from the cold and will not turn an engine over as fast or for as long a period as it will during warm temperatures.

Since starting a diesel engine is very dependent upon turning the engine over fast enough to cause self-ignition of the diesel fuel, the importance of having fully charged batteries for cold weather starting cannot be over-emphasized.

During extremely cold weather, the batteries should be removed and stored in a moderately warm place (preferably room temperature) in order to keep the output capacity up for starting.

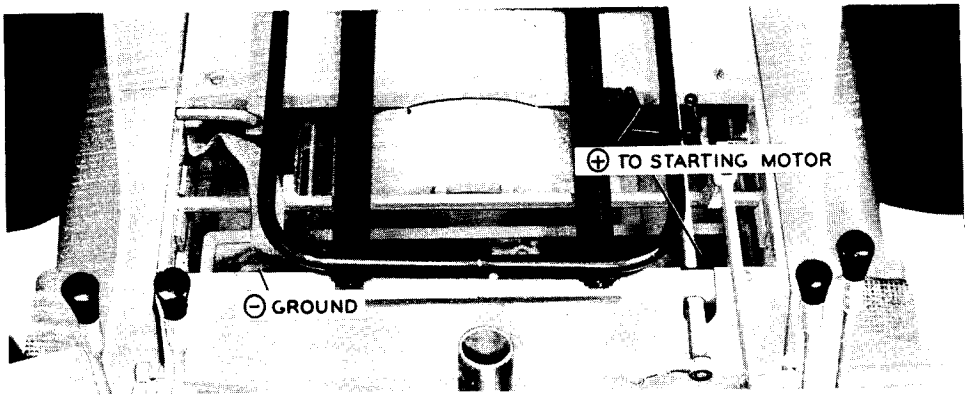


Figure 96. Battery Cable Hook-up

Adding Water

Unless the tap water in your area is "approved water" (water free of scale-forming minerals), always add distilled water to the battery.

When the water is added during freezing weather, the battery must receive a charge immediately to mix the water and the electrolyte. If it is not mixed, the water will remain at the top and freeze.

Check the liquid level in each cell weekly by removing the vent plugs. Water must be added before the tops of the separators are exposed. Do not overfill.

Vent Plugs

Always keep the vent plugs in place and tight. Be sure the vent holes are free of dirt to prevent gas pressure in cells from breaking the sealing or the container.

Cable Terminals and Battery Posts

The battery terminals must be kept clean and tight. A good method of cleaning terminals is to remove all excess corrosion with a wire brush, then wash with a weak baking soda solution or ammonia. After cleaning, a thin coating of vaseline or light cup grease will retard further corrosion. Be sure ground connection of the Terraload'r is kept clean.

Idle Battery

When the Terraload'r is not in active use, the battery will require a charge at sufficient intervals to keep the hydrometer reading at or above 1.250. An idle storage battery will slowly discharge.

Generator and Voltage Regulator

The 24 volt generator is driven by the fan belt. The charge or output is controlled by an automatic voltage regulator. Figure 97.

The generator and voltage regulator have been adjusted at the factory to automatically increase the generator output when a battery is at a low point and a high charge is required.

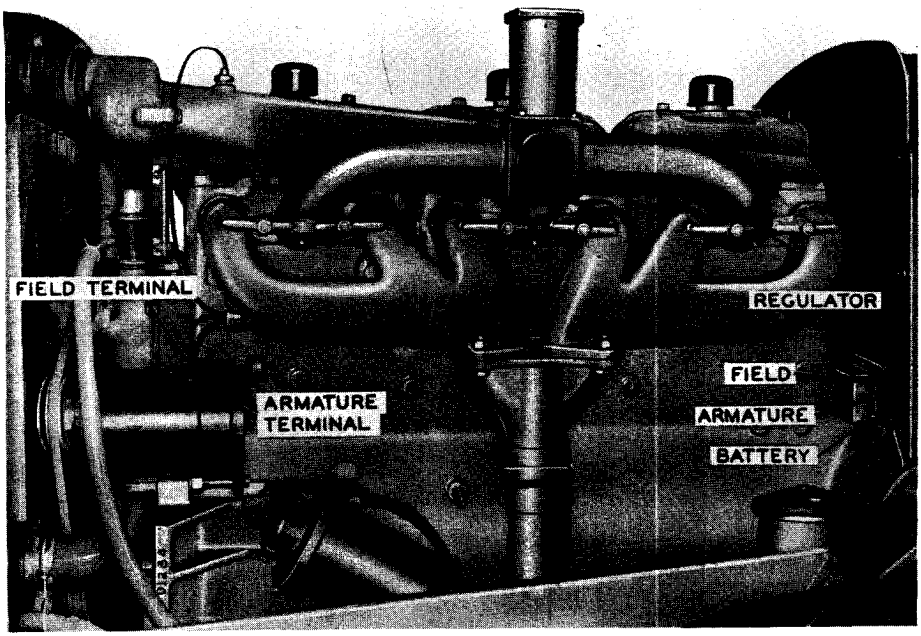


Figure 97. Generator and Voltage Regulator

When the battery approaches full charge, the regulator reduces the output and prevents overcharging. Do not tamper with either the voltage regulator or the generator.

If one or both batteries are low in charge and the ammeter warning light does not indicate that the generator is charging; check the following:

1. Check both batteries. Make sure they both will hold a charge. A battery that has badly sulfated plates or that has one or more cells that will not hold a charge creates a high resistance in the electrical system that affects voltage regulator and generator operation. Refer to "Storage Batteries," Page 140.

2. Check all connections. Using the Wiring Diagram, Page 138, as a guide, remove each wire individually and clean any paint, rust or corrosion from the connections. Repair or replace defective wiring. Make sure the connections are tight when replacing the wires.

3. Check the generator brushes and commutator. If the brushes are worn, oil soaked, or if the commutator is dirty, the generator must be serviced. (A dirty commutator is often the result of over-lubricating the generator.)

To clean the commutator, hold a piece of "00" grade sandpaper against it while turning the armature SLOWLY. Blow out loose particles of dirt or abrasives using compressed air.

Lighting Equipment

Headlights	35 Watt, 12 Volt Sealed Units in Series.
Rear Lights	35 Watt, 12 Volt Sealed Units in Series.
Instrument Panel Lights	1 C. P. Single Contact, 24 Volt.
Combination Stop and Tail Lights	Two Contact, 32-4 C. P. 24 Volt.

Headlights

Each headlight sealed unit is marked "Top R. H. and Top L. H." When installing a new sealed unit in the right hand headlight, make sure the marking "Top R. H." is up. When installing a new unit in the left hand headlight have the marking "Top L. H." up. This will provide the most efficient light pattern.

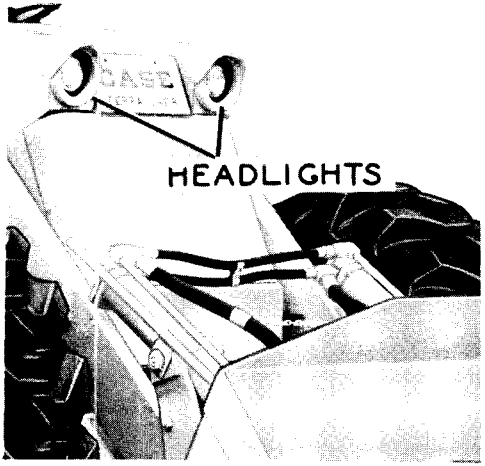


Figure 98

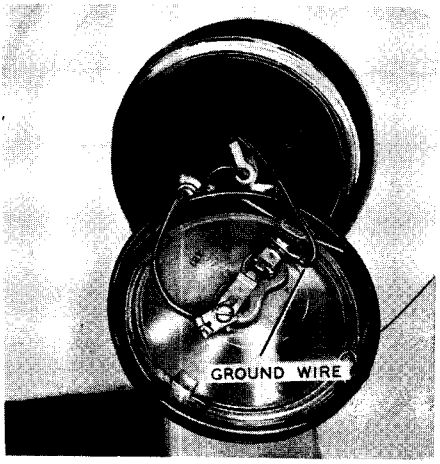


Figure 99

All genuine Case 12 Volt Replacement Sealed Units have a label marked "12-V," or are stamped "12-V" on the back of the unit. This marking is placed on the unit to make sure you do not install a 6 volt sealed unit - which would burn out immediately.

To install a new sealed unit, remove the clamp screw and the clamp, then pull the old unit out and disconnect the two wires shown in Figure 99. When connecting the new sealed unit wires, be sure the connections are tight.

Rear Lights

Note: Removal and Installation of Headlights and Rear Lights is exactly the same.

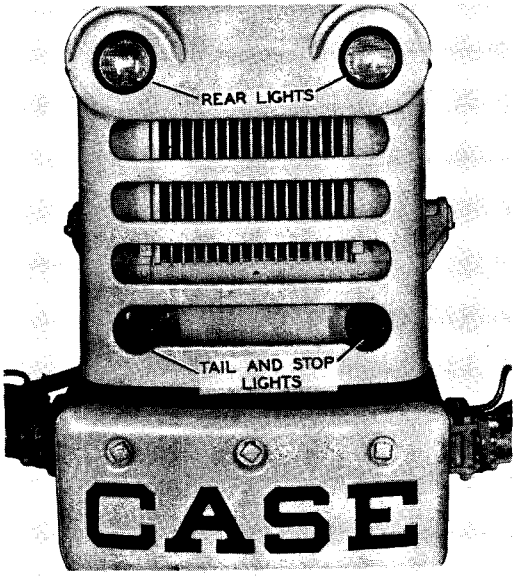


Figure 100. Rear Lights and Stop Lights

Instrument Panel Lights

Each instrument panel light uses a 1 Candle Power 24 Volt bulb. It is controlled by the headlight switch. To install a new bulb, pull the light hood off and replace the bulb.

OIL PUMP FLOATING SCREEN

All engine lubrication oil drawn into the oil pump must pass through the floating screen. It is very important that this screen be kept free of restrictions.

At least once every 1000 Hours, the floating screen assembly should be removed and cleaned in diesel fuel. To remove the screen it is necessary to first drain and remove the crankcase oil pan.

NOTE: It is recommended that you arrange to have your Authorized Case Industrial Dealer do this you take your Terraload'r in for its seasonal tune-up and inspection.

BRAKE SHOE ADJUSTMENT

Occasionally it may be necessary to adjust the brake shoes to compensate for loss of pedal due to lining wear.

To adjust the brake shoes proceed as follows:

Steering (Rear) Axle

1. Jack both rear wheels clear of the ground or floor. Be sure parking brake is released.
2. Expand brake shoes on each rear wheel, as shown in Figure 101, until a heavy drag is felt when rotating the wheels.
3. Loosen the brake adjusting nuts on both rear wheels evenly, just enough so the wheels turn freely. Lower the Terraload'r wheels to the ground or floor.

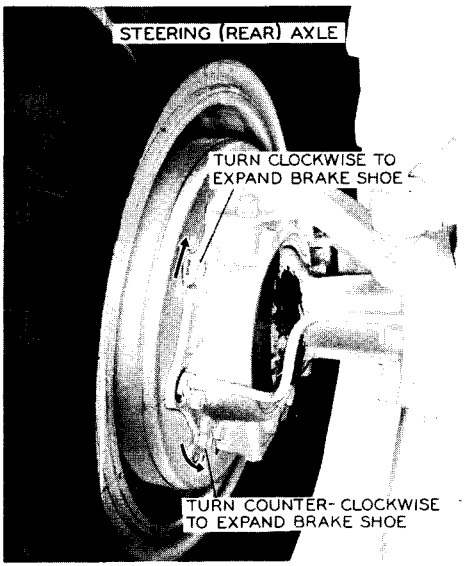


Figure 101

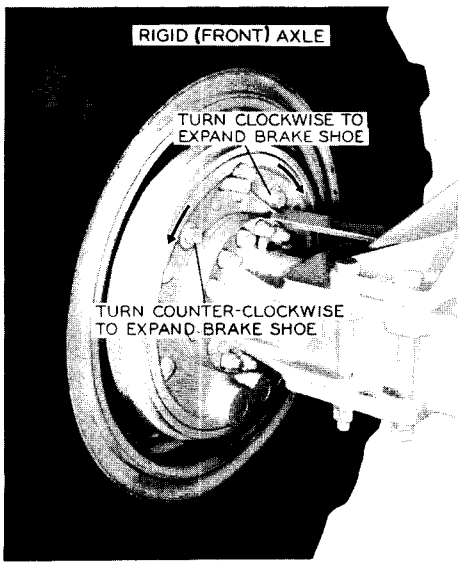


Figure 102

Rigid (Front) Axle

1. Jack both front wheels clear of the ground or floor. Be sure parking brake is released.
2. Expand brake shoes on each front wheel, as shown in Figure 102, until a heavy drag is felt when rotating the wheels.
3. Loosen the brake adjusting nuts on each front wheel evenly, just enough so the wheels turn freely. Lower the Terraload'r wheels to the ground or floor.

PARKING BRAKE ADJUSTMENT

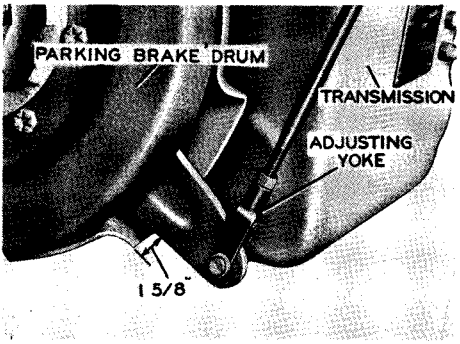


Figure 103

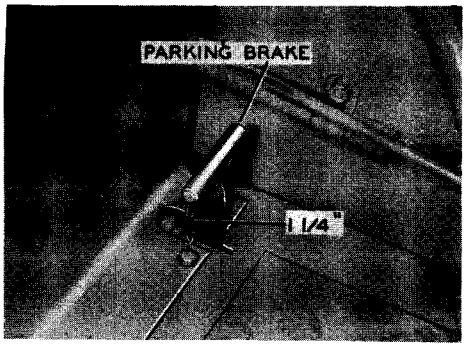


Figure 104

Occasionally it may be necessary to adjust the parking brake on the transmission.

To adjust the parking brake, disconnect the brake arm and yoke. By means of the adjustable yoke, shorten the brake linkage. Figure 103.

IMPORTANT: After adjusting the parking brake, check to make sure there is a minimum of 1-1/4 inch clearance between the bottom of the Parking Brake Handle and the operator platform, Figure 104. If there is less than 1-1/4 inch clearance, lengthen the brake linkage by means of the yoke until the clearance is obtained. Failure to allow for the 1-1/4 inch Brake Handle clearance will cause the brake to be adjusted too tight, which can result in damage to the parking brake.

CAUTION: After the parking brake has been adjusted several times the brake lining wear should be checked as follows:

1. Disconnect the adjusting yoke from the brake lever, Figure 103.

2. Check the travel of the brake lever - if the travel exceeds 1-5/8 inches - when disconnected from the yoke - the brake linings must be replaced.

(SEE YOUR AUTHORIZED CASE INDUSTRIAL DEALER)

BLEEDING THE HYDRAULIC POWER BRAKE SYSTEM

The Hydraulic Power Steering and Power Brake System use the same reservoir. The control valve meters fluid to both the power steering and power brake system.

Whenever the main brake fluid line is disconnected from the master cylinder - it will be necessary to bleed the brake system at ALL FOUR WHEELS.

Whenever a brake fluid line is disconnected from any individual wheel - that WHEEL CYLINDER must be bled.

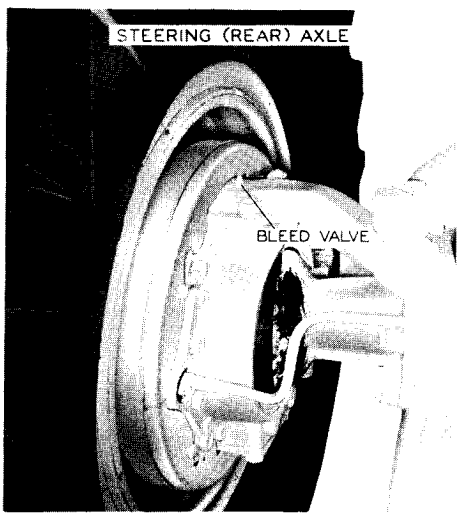


Figure 105

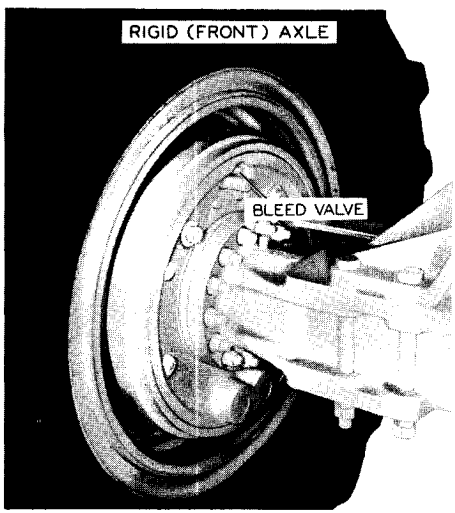


Figure 106

To bleed the brake system proceed as follows:

1. Loosen the bleeder valve on the wheel cylinder. Have someone depress the brake pedal while you observe flow of brake fluid from bleed valve. When air bubbles cease to appear, close the bleed valve, Figures 105 and 106.

2. Repeat this operation on all wheel cylinders that need bleeding.

3. Check the power steering and brake reservoir. Add Automatic Transmission Fluid- Type A, if necessary.

VALVE TAPPET CLEARANCE

Check the valve (tappet) clearance after every 240 hours of engine operation.

Clearance . 012 inch with engine cold (both intake and exhaust valves).

Sequence for Checking Valve Clearance The two valves for each cylinder are to be checked and adjusted when the piston for that particular cylinder is at top dead center on the compressions stroke. Start with Number 1 cylinder and follow the sequence of firing order (1-5-3-6-2-4).

Decompressor Lever Use the decompressor lever to release the compression when cranking the engine, but restore compression when checking or adjusting the valve clearances.

Setting The Number 1 Piston at Top Dead Center on the Compression Stroke.

A. Release the engine compression and crank the engine slowly, until the crankshaft pulley is in the position shown in Figure 107. The closely spaced marks will be above the pointer and the adjacent top dead center single mark will be aligned with the pointer.

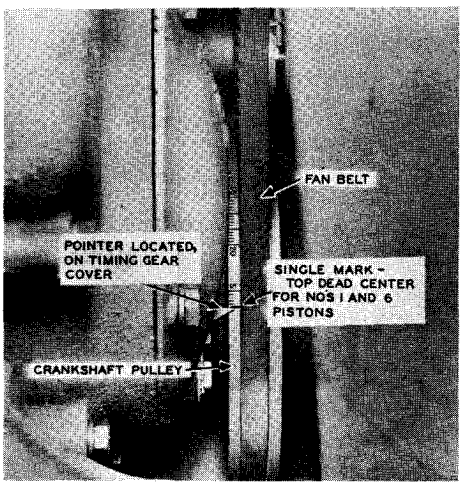


Figure 107

B. When Number 1 piston is at top dead center on the compression stroke, the push rods will be loose on Number 1 cylinder. The push rod for the exhaust valve on Number 2 cylinder will be tight. Refer to Figure 108. If the reverse is true, crank the engine one complete revolution.

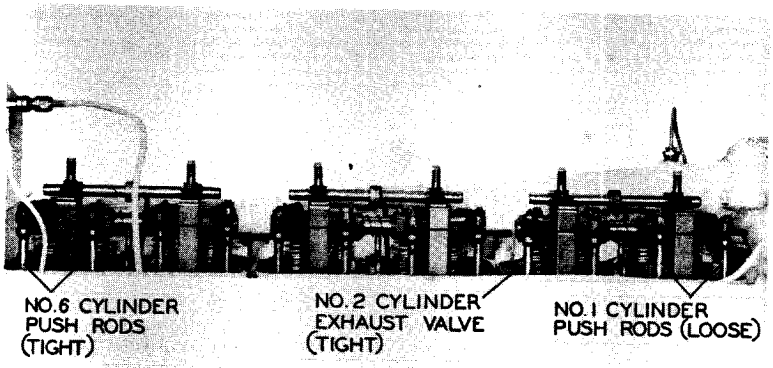


Figure 108. Checking Valve Push Rods

After checking and adjusting the valve clearance on Number 1 cylinder, rotate the flywheel one third revolution until the next single mark on the crankshaft pulley is aligned with the pointer. The piston in Number 5 cylinder will then be at top dead center on the compression stroke and the valve on that cylinder can then be checked and adjusted.

Continue on in this manner until the valve clearance on all cylinders has been checked and adjusted. It will require two complete revolutions of the crankshaft pulley to check all six cylinders.

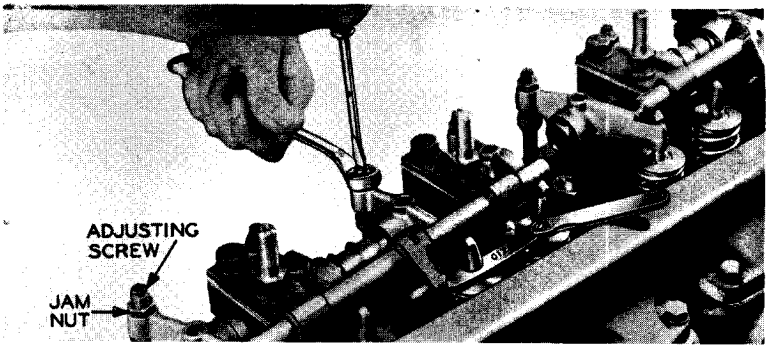


Figure 109. Checking and Adjusting Valve (Tappet) Clearance

After the valve tappet clearances are checked and while the valve covers are removed, start the engine and check that the rocker arm assembly is receiving lubrication.

GOVERNOR AND ENGINE SPEED

The governor on your Case Model W-10 Terraload'r is an integral part of the fuel injection pump. The governor has been set at the factory to produce a full load governed engine speed of 1800 RPM. The full governed engine speed at no load will be approximately 1950 - 1970 RPM.

DO NOT ATTEMPT TO ADJUST THE GOVERNOR OR THE THROTTLE LINKAGE. Unauthorized changes in the governed engine speed of a Case Terraload'r will automatically serve to void and waive any warranty whatsoever by the J.I. Case Company.

CHANGING TUBELESS TIRES

Changing tubeless tires on the W-10 Terraload'r is a simple process but requires some extra equipment to insure correct removal and installation of the rim from the tire. Listed below is the equipment to make tire changing speedy and efficient on the "TG" Series rims, which are standard equipment on the Terraload'r.

Two Tire Tools of the type shown in Figure 110.

Figure 110

One can of Rubber Lubricant of any well known brand.
One Babbit Hammer.

Removing Tire From Rim

1. Deflate the tire completely by removing the valve core.
2. Lay the tire and rim assembly on a flat surface with the loose flange side up.
3. Drive the flat ends of two tire tools between the tire and flange with a babbitt hammer. Figure 111. Locate the tools a few inches apart for greater prying action, Figure 112.

Figure 111

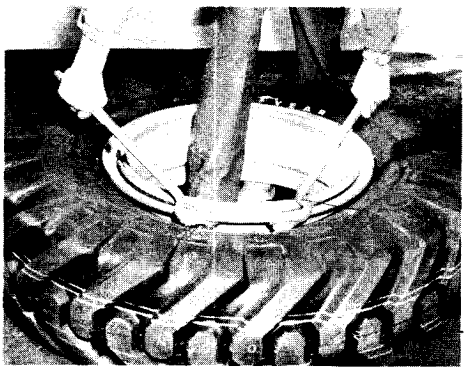


Figure 112

4. Pry out with both tools. Hold one tool in position, applying pry out action and slide the other tool a few inches and apply pry out action. Continue moving and prying in successive

steps around the circumference of the rim Figure 112, until the bead is entirely loose.

2. Stand on the flange and tire using your body weight to depress the flange far enough to insert the tool and pry the lock ring loose. Figure 113.

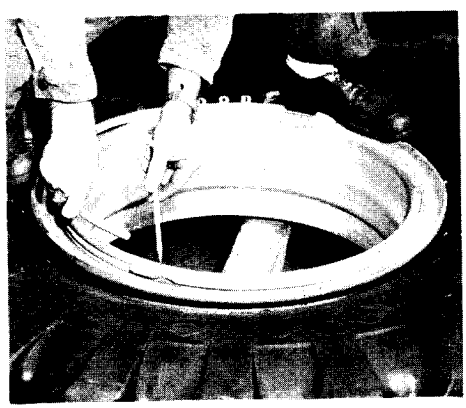


Figure 113

Figure 114

6. Depress the flange and remove the "O" Ring from the lower groove. Figure 114.
7. Remove the flange.
8. Turn the tire and rim assembly over and using the two tire tools, loosen the rim base flange in the same manner as described in Step 4 Figure 112.
9. Stand the tire up and remove the rim base.

Replacing Tire on Rim

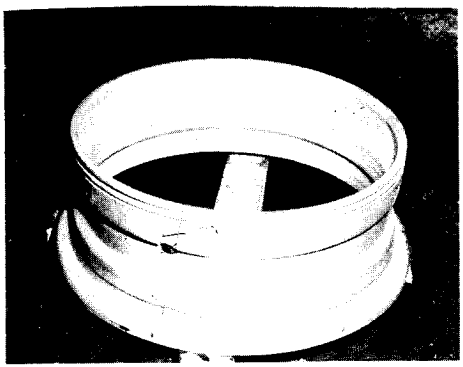


Figure 115

Figure 116

1. Locate the rim base on a flat surface with the fixed flange down. Place a wood block under the rim, Figure 115.

2. Install the valve spud on the rim and place the tire over the rim base.
3. Place the loose flange over the rim base and press it on straight, Figure 116. Be sure the flange is not cocked or binding on the rim base.
4. Stand on the flange using your body weight to depress the flange below the two grooves in the rim base, Figure 117.
5. Snap the lock ring into the upper groove, Figure 117.
   NOTE: Be sure the "hump" on the lock ring is UP to insure easy removal of the lock ring for future tire changing.

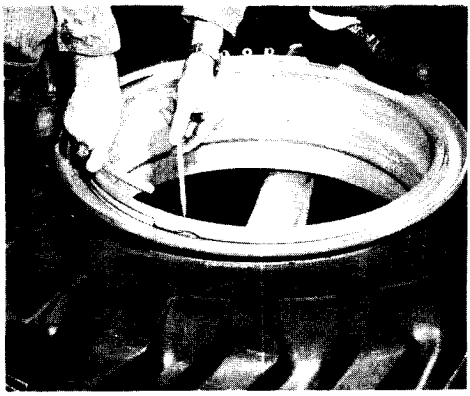


Figure 117

6. Coat the rubber "O" ring with a rubber lubricant and install it in the lower groove on the rim base, Figure 118.

Figure 118

Figure 119

NOTE: It may be necessary to hold the loose flange down with the tire tool to expose the "O" ring groove, Figure 118.

7. Replace the valve core in the tire.
8. Check to make sure the lock ring fits snugly and is locked in place around the entire circumference of the rim base, then start to inflate the tire, Figure 119, until the loose flange slides over the "O" ring and up against the lock ring.
9. Check the lock ring again to make sure it is properly sealed in the groove and fits snugly around the entire rim base, then inflate the tire to the required operating pressure.

IMPORTANT

Always Inflate Tires When They Are Cold

RECOMMENDED TIRE PRESSURES

16.00 x 24	12 Ply	Minimum	30 Pounds
16.00 x 24	12 Ply	Maximum	40 Pounds
14.00 x 24	8 Ply	Minimum	30 Pounds
14.00 x 24	8 Ply	Maximum	45 Pounds
14.00 x 24	8 Ply	(Sand Tires) Minimum	30 Pounds
14.00 x 24	8 Ply	(Sand Tires) Maximum	40 Pounds
14.00 x 24	16 Ply	(Rock Grader Tire)	70 Pounds

STORING THE TERRALOAD'R

Whenever the W-10 Terraload'r is to remain idle for an extended period of time or whenever it is to be removed from storage, certain precautions must be observed - especially as to protecting the fuel system.

To protect the diesel fuel system, the valves and the cylinder sleeve walls, proceed as follows:

1. Clean the Terraload'r thoroughly and completely lubricate it as directed on Page 32.

2. While the engine is still hot from operation:

   a. Drain the crankcase and refill it with a good grade of new engine oil. Refer to Page 31.

   b. Drain and clean the oil filter body and install a new element. Pages 38 and 39.

   c. Service the air cleaner as directed on Pages 127 and 128.

3. Drain the diesel fuel tank and pour one or two gallons of Diesel Flushing Oil into the fuel tank.

The following commercial Diesel Flushing Oils - or the equivalent - may be used:

Solnus XXX ---------- Sun Oil Co.

VM 1102 ---------- Socony Vacuum Sun Oil Co.

Carnea Oil #21 ---------- Shell Oil Co.

Alweather Oil ---------- Sinclair Refining Co.

Capella Oil AA ---------- The Texas Co.

Texaco Almag ---------- The Texas Co.

Texaco Almag ----------The Texas Co.

No. 10 C ---------- General Electric Co.

Wemco C ---------- Westinghouse Electric Co.

Lonco #71 ---------- London Chemical Co.

If flushing oil is not available, a mixture of 50 percent SAE 10-W engine crankcase oil and 50 percent pure white kerosene may be used.

4. Start and operate the engine until a blue-white smoke appears at the exhaust. This indicates the regular fuel in the filters has been used up and the flushing oil is being burned. Operate the engine for an additional ten minutes before stopping it.

5. While the engine is still hot, drain the coolant from the cooling system. After the system is drained, leave the radiator and engine block drains open and loosen the radiator cap to release pressure on the gasket. Place a warning tag on the radiator cap stating that cooling system has been drained.

6. Remove and store the batteries in a dry and moderately warm place - especially if freezing temperatures are expected. Take hydrometer reading periodically and record them, When the readings near 1.200, the battery must be recharged.

7. Raise and block up the Terraload'r. Protect the tires from heat and sun light. It is not necessary to reduce the air pressure in the tires, but be sure to inflate them properly before removing the Terraload'r from the blocking.

8. Be sure the crankcase breather caps are clean and in place and the pre-screener is on the air intake pipe.

Removing the Terraload'r from Storage

A diesel Terraload'r that has been in storage will require careful attention before it is started and placed in operation.

1. Refill the cooling system.

2. Make sure the tires are properly inflated, then take the Terraload'r off the blocking.

3. Make sure the air cleaner element intake pre-screener and the crankcase breather caps are clean.

4. Lubricate the Terraload'r completely to remove dried and dust contaminated grease.

5. Make sure the crankcase, the hydraulic reservoir and the transmission are filled to the correct levels.

6. Relieve the engine compression and hand crank the engine several complete revolutions to make sure it turns freely.

7. Replace the fully charged batteries. See Wiring Diagram, Figure 94.

8. Drain all of the Diesel Flushing Oil out of the fuel tank and the filters. Refill the tank with clean diesel fuel.

9. Bleed the fuel system as directed on Page 116.

10. Start the engine and let it run at idling speed. It is advisable to remove the valve covers to make sure no valves are sticking and that the rocker arm assembly is receiving lubrication. DO NOT ACCELERATE THE ENGINE OR RUN IT AT FULL SPEED IMMEDIATELY AFTER STARTING.

11. Immediately upon starting the engine, check the oil pressure and ammeter warning lights.

NOTE: The flushing oil in the fuel system will cause a blue-white exhaust for a short time. This will not damage the engine.

8

EXTRA EQUIPMENT

EXTRA EQUIPMENT

Although the standard bucket on the Case W-10 Terraload'r is used for most loader applications where the material weight is between 2800 and 3200 pounds per cubic yard, there are available, as extra equipment, several attachments to provide a wide range of special applications for which the Terraload'r is well suited. There are jobs where it may be advantageous to have more than one of the easily interchangeable attachments on hand to increase the versatility of the W-10 Terraload'r.

Light Material Bucket
(Extra Equipment)

The large capacity 2-7/8 cubic yards, heaped light material bucket, Figure 120, is used extensively in coal yards, by municipalities for snow removal and hauling, by factories for hauling cinders, steel shavings and many types of yard work where the material being handled weighs between 1800 and 2200 pounds per cubic yard. Refer to Page 164 for light material bucket installation.

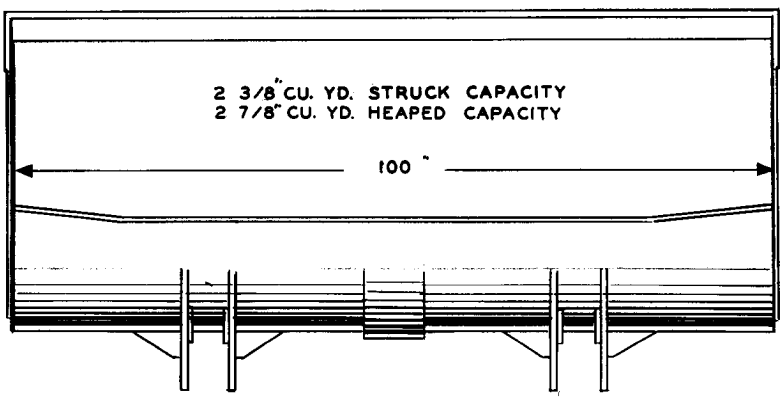


Figure 120
Heavy Duty Bucket
(Extra Equipment)
Bucket Teeth Optional

The heavy duty bucket, Figure 120, is available to provide a tool for digging and powerful pry-out action. Equipped with optional teeth, the bucket is used for excavation, for shallow

scarifying and for any operation requiring digging and heavy duty pry out action and where material weight is between 3200 and 4000 pounds per cubic yard. Refer to Page 164 for heavy duty bucket installation.

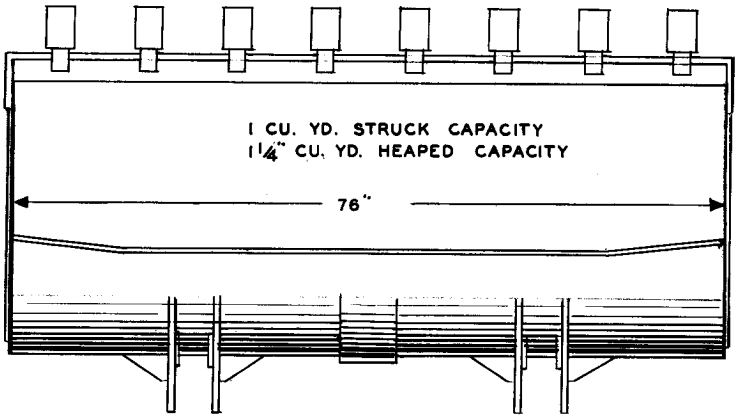


Figure 121. Heavy Duty Bucket With Optional Teeth

NOTE: The number of teeth and spacing of the teeth is dependent upon applications. Bucket teeth can be ordered separately to be installed to your specifications or can be installed on the bucket at the factory.

Dozer and Backfilling Blade Attachment
(Extra Equipment)

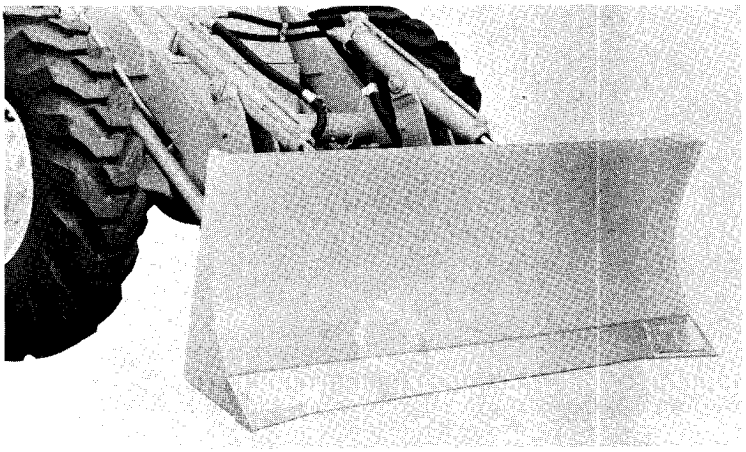


Figure 122

The large blade attachment is a handy tool for finishing grading, backfilling and dozing. Refer to Page 164, for installation of the dozer blade attachment.

Instructions for Installing and Removing

Buckets and Blade Attachment

Interchanging buckets or blades on the Terraload'r is a speedy operation that requires a minimum of tools and effort.

To remove the bucket or blade from the W-10 Terraload'r remove the retaining capscrews from the lock pins.

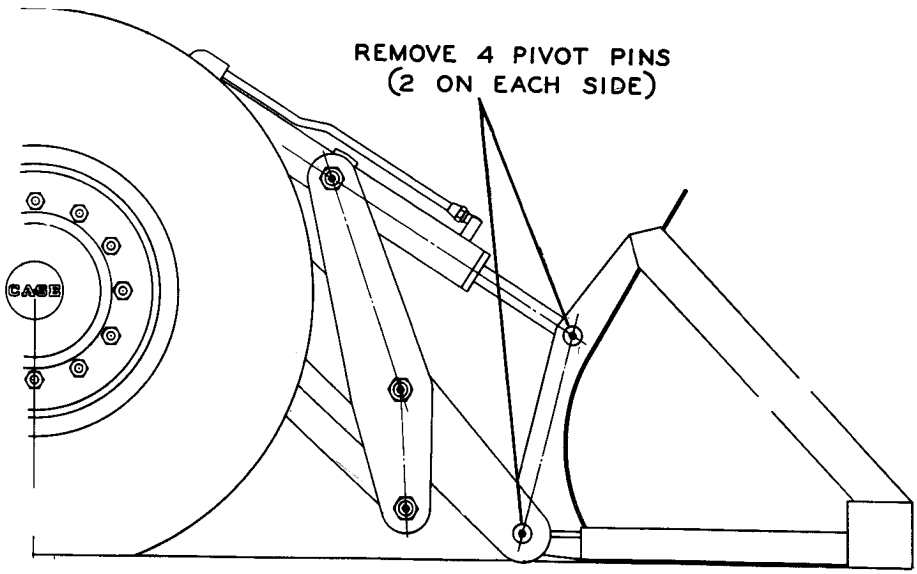


Figure 123

Remove the lock pins and the four bucket pivot pins Figure 123.

Remove the bucket or blade.

To install the bucket or blade, align the pivot pin holes on the bucket or blade with the pivot pin holes on the lift arms and the tilt cylinder arms, Figure 123.

Install the four pivot pins and the lock pins, Figure 123.

Drive the lock pins through the pivot pins and replace the lock pin retaining capscrews.

Snow Plow Attachments
(Extra Equipment)

The two types of snow plow attachments illustrated in Figures 124 and 125 are available as extra equipment to adopt the W-10 Terraload'r to any snow removal application.

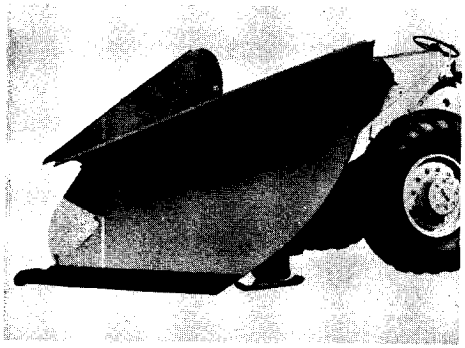


Figure 124

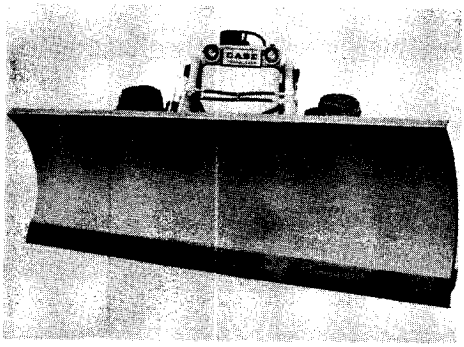


Figure 125

Brush Rake
(Extra Equipment)

The brush rake Figure 126, can be installed on W-10 Terraload'rs for use in land clearing operations.

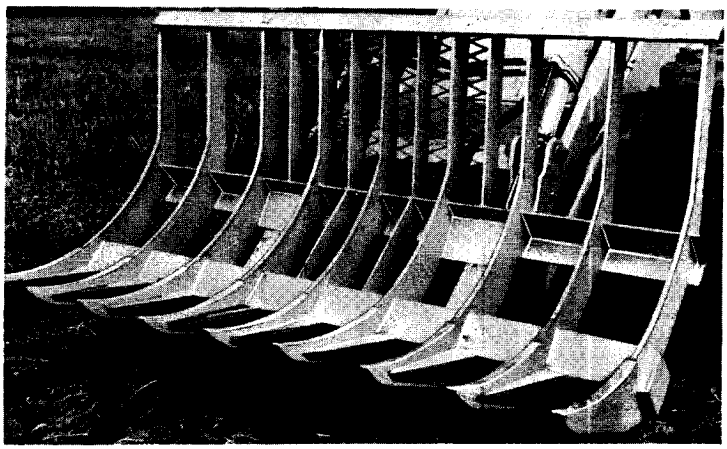


Figure 126

Refer to Page 164 for installing the brush rake attachment.

Operator's Cab
(Extra Equipment)

A strongly constructed operator's cab, Figure 127, can be ordered as extra equipment for the W-10 Terraload'r. The cab completely covers the operator's cockpit and provides the operator with protection from the elements. The large windshield equipped with a windshield wiper and glass panels in the doors and the rear window are adequate for the operator to have a clear view on all sides. Once installed, the cab need not be removed for seasons or weather changes. The doors can be secured open for warm weather operation, Figure 127, while the cab still provides adequate protection from dust and rain.

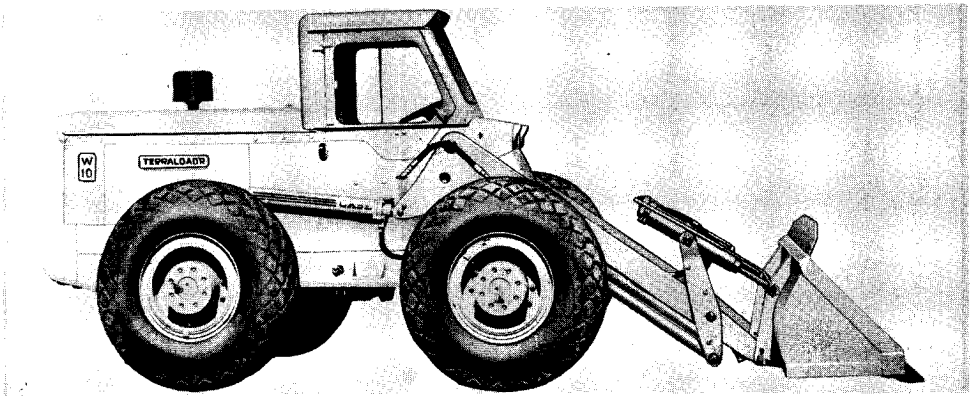


Figure 127

Radiator Shutters
(Extra Equipment)

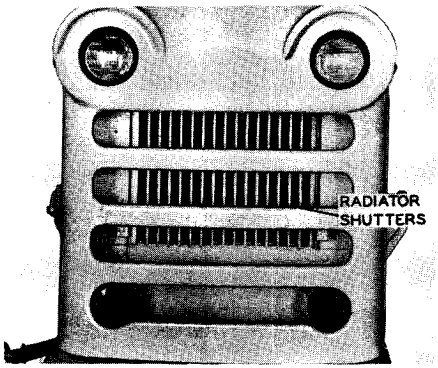


Figure 128

It may be necessary, during extremely cold weather to cover the radiator in order to maintain proper operating (coolant) temperature.

To close the radiator shutters part way or fully, pull the handle out to the required position and turn it clockwise to lock in position. Refer to Page 60.

Pusher Fan
(Extra Equipment)

There is available, as extra equipment, a pusher type fan. The pusher fan is recommended for use in warm temperatures to expell the heat out and away from the operator and engine. Where climatic conditions warrant, the use of both the suction fan in cool weather and the pusher fan in warm weather will aid in regulating engine operating temperature and will increase operator comfort.

Heater and Defroster
(Extra Equipment)

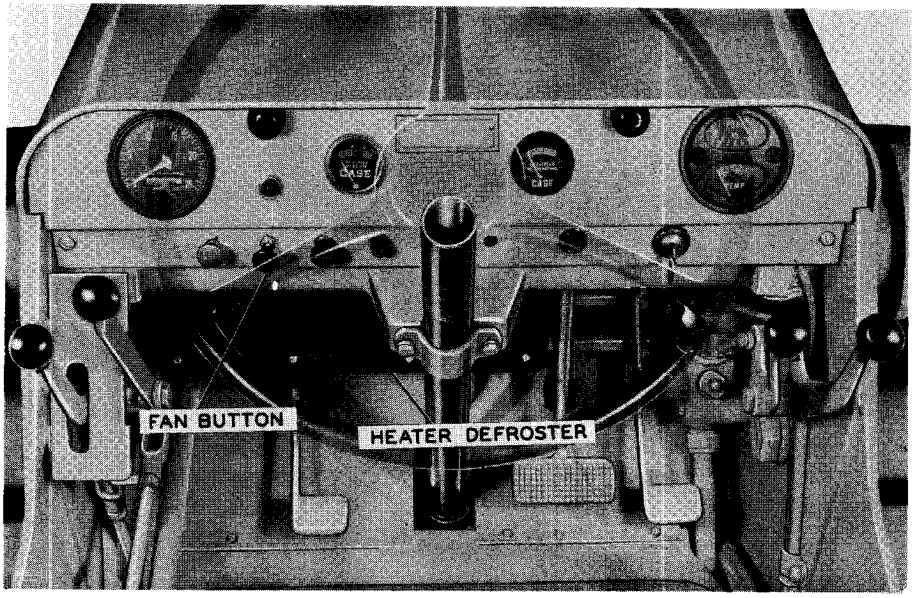


Figure 129

The heater and defroster attachment can be ordered as extra equipment from your Authorized Case Industrial Dealer.

The heater and defroster are operated by pulling the fan button, Figure 129, all the way out.

Accumulator
(Extra Equipment)

A hydraulic accumulator attachment is available for installation on Case W-10 Terraload'rs to reduce the shockload on the lift arm hydraulic circuit when the Terraload'r is operating over rough terrain.

The accumulator acts as a cushioning device for the hydraulic system. The accumulator attachment is equipped with a shut-off valve for use when the cushioning action is not required, such as level grading.

High Lift Arms
(Optional Equipment)

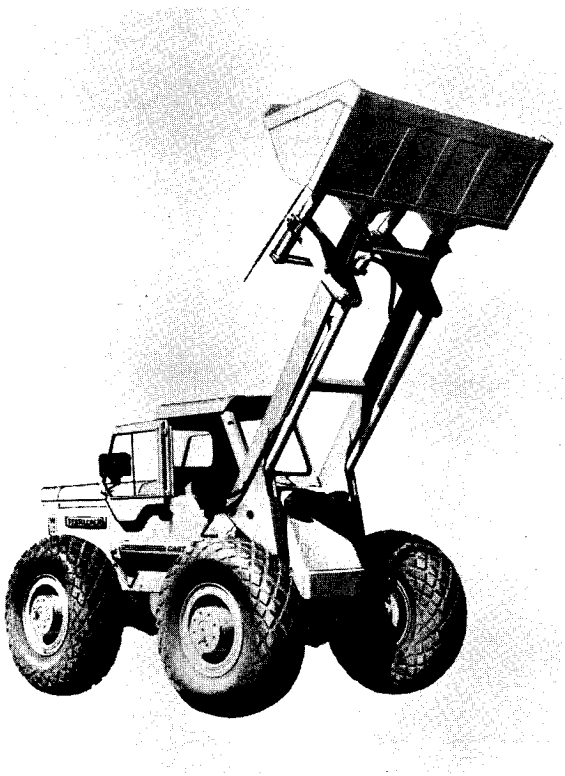


Figure 130

Optional high lift arms can be installed on W-10 Terraload'rs used in operations requiring a greater dumping clearance than the 8'6" with the standard lift arms.

W-10 Terraload'rs equipped with high lift arms can dump into an 11'8" hopper.

All of the available buckets and optional equipment used with the standard lift arms can be used with the high lift arms, provided the weight of the material being handled does not exceed the rated capacity of 4500 pounds.

NOTICE

Insist on
GENUINE CASE PARTS

CASE made parts fit and insure satisfactory service because they are made from the original patterns and of the same materials as used in new machines. - - - - -

FOR SERVICE AND PARTS
See Your Case Dealer

Always Give Model and Description, or Serial Number of Machine

NOTE: The J. I. Case Company reserves the right to make improvements in design or changes in specifications at any time without incurring any obligation to install them on units previously sold.

INDEX

INDEX (Continued)