Model 600 Diesel Crawler

Service Manual

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CASE

CASE TERRATRAC
CRAWLER TRACTOR
MODEL 600 DIESEL

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FOREWORD

It is the policy of the Case Co. to build machines with long and useful life expectency. The reputation of this company and their products are dependent upon the diligent and conscientious maintenance given these products by the field service people.

Thousands of satisfied users have proven the design and quality of the Case products. In the final analysis it will be the field service personnel that will write the final chapter to the success story.

The Case Co. recognizes the importance of the thoroughly trained technician. No longer is the mechanic considered as a "grease monkey" or the "necessary evil". To elevate the service man to his rightful place in the Professional field the company has inaugurated a "Mobile Training Program". This program has been highly successful and very fruitful. The Case Co. now is planning even greater and far more reaching programs to further this endeavor.

Service Representatives for the Case Co. and its Dealers Servicemen are located all over the world and they represent the finest in Service Personnel. This Service Manual has been written as a reference guide, and is dedicated to those that service, maintain, and teach the Case Industrial Equipment.

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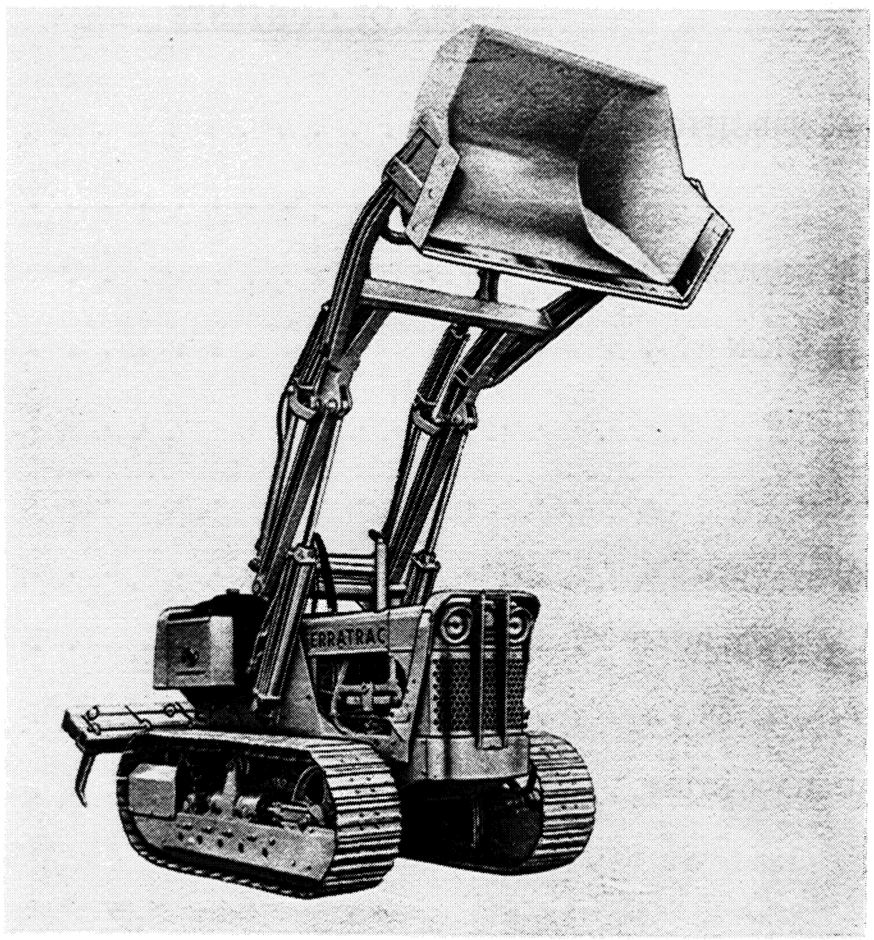
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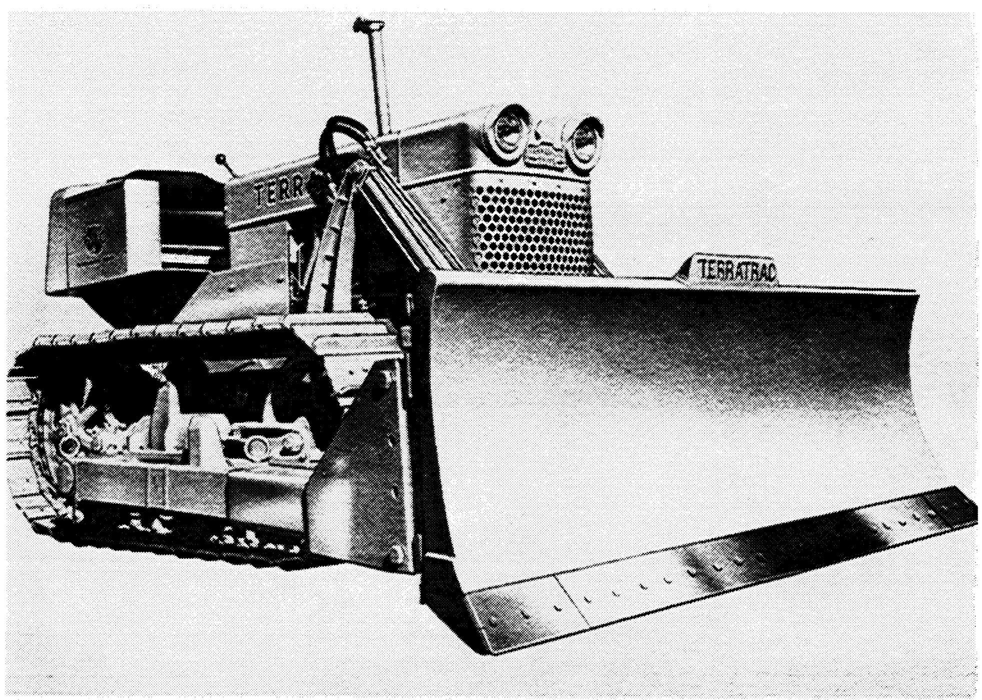
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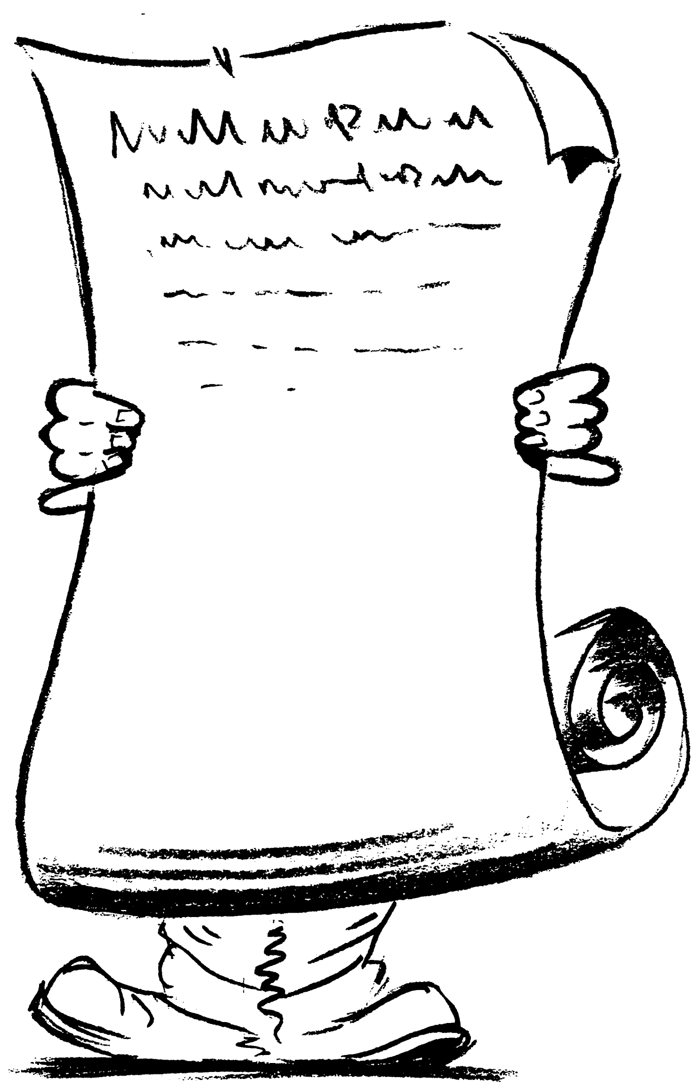
GENERAL SPECIFICATIONS

I



MODEL 600 SPECIFICATIONS (DIESEL)

CAPACITIES (U.S.)

Fuel Tank	25 Gal.
Cooling	4-1/2 Gal.
Transmission and Torque Converter	7 Gal.*
Final Drive (Ea.)	6 Pts.
Crankcase	12 Qt.
Air Cleaner	1 Qts.
Hydraulic Brake System	1-1/2 Pt.
Hydraulic System-Terraloader	36 Qts.**
Hydraulic System-Terradozer	36 Qts.

* (5-1/2 Quart Converter included)
** (These figures quoted on the basis of the oil level being 4-1/2" from top of the tank.)

TRANSMISSION

	Forward	Reverse
First	0 to 1.66 MPH	0 to 1.82 MPH
Second	0 to 3.22 MPH	0 to 3.42 MPH
Third	0 to 3.40 MPH	0 to 3.73 MPH
Fourth	0 to 6.56 MPH	0 to 7.20 MPH

ENGINE

Continental Model ED-208 Diesel

Number of Cylinders	4
Bore	3-11/16"
Stroke	4-7/8"
Governed RPM (Full Load)	2250
Injection System	Roosa Master
Firing Order	1, 3, 4, 2
Valve Tappet Clearance	.014 Int. (Hot) .014 Exh. (Hot)

TRACK

Tread Gauge	49"
Length on Grade	62-5/8"
Standard Shoe Width	14"

DIMENSIONS

Width	63"
Height Over Cowl	65"
Weight (approximately)	7380 lbs.
Height Above Ground	16"

ROLL BACK:

At Ground Line	40°
At Maximum Lift	50°

REACH: (BUCKET DUMPED)

At 7 Foot	43-1/4"
At Maximum Lift	36-1/4"

4" Diameter Tilt Cylinder
5" Diameter Lift Cylinder

DRAWBAR PULL

Maximum with Converter Stalled

Forward:	1st.	20,700
	2nd.	11,750
	3rd.	10,000
	4th.	5,660

TRACTOR: LOADER - REAR WEIGHT

Overall Length at Carry	201"
Overall Height - Bucket Raised	138"
Overall Width	71"
Weight	16,550
Center of Gravity - Behind Front Idler	38"
Hydraulic System Capacity - Tank	20 Gal.
(per Lift Cylinder)	2 Gal.

TRACTOR: LOADER - SCARIFIER

Overall Length	219"
Overall Height - Bucket Raised	138"
Overall Width	71"
Weight	18,950
Hydraulic System Capacity	20 Gal.
(per Lift Cylinder)	2 Gal.

TRACTOR: - BULLDOZER

Overall Length	154-1/2"
Overall Height - Exhaust Stack	74"
Overall Width	96"
Weight	12,150
Hydraulic System Capacity	20 Gal.
(per Lift Cylinder	2 Gal.

TRACTOR: - BULLDOZER - HYDRAULIC ADJUSTMENT

Overall Length	154-1/2"
Overall Height - Exhaust Stack	74"
Overall Width	96"
Weight	12,150
Hydraulic System Capacity	20 Gal.
(per Lift Cylinder	2 Gal.

TRACTOR: - ANGLEDOZER

Overall Length	158"
Overall Height - Exhaust Stack	74"
Overall Width	112"
Weight	12,150
Hydraulic System Capacity	20 Gal.
(same as Hydraulic Dozer) (per Lift Cylinder)	2 Gal.

TRACTOR: - ANGLEDOZER - HYDRAULIC ADJUSTMENT

Overall Length	158"
Overall Height - Exhaust Stack	74"
Overall Width	112"
Weight	12,150
Hydraulic System Capacity	20 Gal.
(per Lift Cylinder)	2 Gal.

LOADER - DIMENSIONS AND PERFORMANCE

BUCKET CAPACITY:

Rated, Yards (Heaped)	1-1/2 yds.
Bucket Width	71"
Digging Depth	11"
Dumping Clearance, Maximum (Bucket Dumped)	109-3/8"
Lift Capacities (Bucket Raised)	
Net	6500 lbs.
Gross	8850 lbs.

BUCKET CAPACITY: (continued)

Lift Capacities (Ground Level)	
Gross	16,600 lbs.
Breakout Ground Level	8750 lbs.

DUMPING ANGLE:

At Ground Level	90°
At 7 Foot	63°
At Maximum Lift	50°

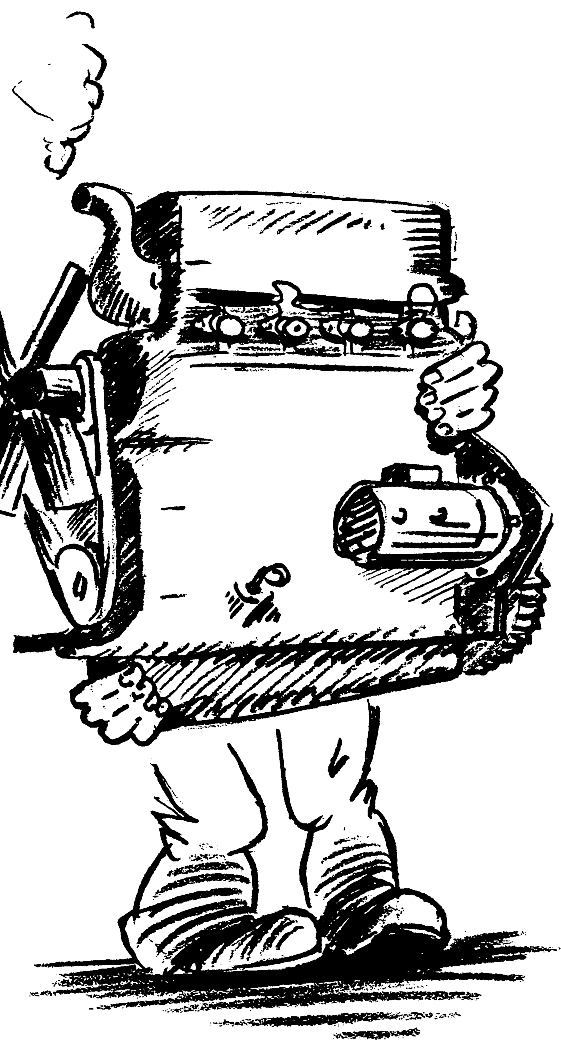
BULLDOZER - DIMENSIONS AND PERFORMANCE

Blade Length	96"
Blade Height	31-1/2"
Digging Depth	13-1/2"
Lift Above Ground Maximum	34"
Crown - Total	12"

ANGLEDOZER - DIMENSIONS AND PERFORMANCE

Blade Length	112"
Blade Height	31-1/2"
Digging Depth	13-1/2"
Lift Above Ground Maximum	34"
Crown - Total	12"

ENGINE



II

GROUP II

ENGINE

ENGINE DIESEL
GROUP II
SECTION A - GENERAL INFORMATION AND SPECIFICATIONS

Engine

Continental Model ED-208 Diesel

Number of Cylinders	4
Bore	3-11/16
Stroke	4-7/8
Governed R. P. M. (Under full load)	2250
Injection System	Roosa Master
Firing Order	1,3,4,2,
Valve Tappet Cl.	.014 Int. (Hot) .014 Exh. (Hot)

Elementary Principles of Diesel Engines

In order to dispel any mystery there may be, with regard to the diesel engine and how it operates, let us take a moment to compare Diesel Engine with its gasoline counterpart.

Mechanically, the two are alike. Both have pistons moving up and down in cylinders with connecting rods attached to a crankshaft converting the reciprocating motion of the pistons into a rotary motion; valves in the cylinder heads operated by a camshaft and push rods; the intake valve to admit air into the cylinder and the exhaust valve to permit the disposition of the burned gases. The camshaft is driven through a train of timing gears so that the opening and closing of the exhaust and intake valves are properly timed with the stroke of the piston and crankshaft.

The engines are so much alike in exterior appearance that the only way most people are able to distinguish between them is to look for the carburetor and distributor on the gasoline engine or injection pump on the diesel.

Both operate on mixtures of liquid fuel and air inside the combustion chambers. The ignition of these mixtures under pressure and the subsequent expansion furnishes the power to drive the piston downward on its power stroke. The one big difference between the two types of engines lies in the way the fuel is handled and combustion brought about.

In a gasoline engine desired proportions of fuel and air are mixed in the carburetor before entering the cylinder through the intake valve. In a diesel engine, air is drawn into the cylinder through the intake valve and is compressed. At the proper time a measured quantity of fuel is injected into this air thus forming a combustible mixture which is self-ignited due to the temperature of the compressed air.

In a gasoline engine the suction or downward stroke of the piston draws in a combustible mixture of air and gasoline which is compressed in the upward stroke, then ignited by an electric spark whereupon the expansion of this compressed mixture begins, forcing the piston down on the power stroke.

In the diesel engine, the piston on the down stroke draws in clean, pure air which is compressed on the upward stroke. At the proper instant, fuel is injected into this compressed air which then ignites from the heat of compression, causing the expansion of the mixture, which forces the piston down on the power stroke. The compression ratio of diesel engines is twice that of gasoline engines, and it is the heat generated by the comparatively rapid compression of the air, which ignites the fuel as it is sprayed in under high pressure.

It is a well known fact that the tendency in gasoline engine design is to increase compression ratios in order to obtain more power and greater efficiency out of the engine without increasing the bore and stroke. Compression ratios are however limited by the octane number of fuels available and the desire to keep combustion chamber temperatures down to prevent pre-ignition. A diesel engine is not controlled by these conditions, consequently, compression ratios in the neighborhood of 15 to 1 can be used with entire satisfaction since there is no possibility of the air in this engine igniting until injection of the fuel provides a combustible mixture. This high compression in a diesel causes the temperature of the air to rise under compression to approximately 900° Fahrenheit, which is far above the ignition point of the fuel, thus igniting the mixture.

To summarize, both engines are heat engines of the internal combustion type, the power in each case being developed from the expansion of the mixture of air and fuel after ignition occurs. Since the expansion is directly related to the compression, the diesel is able to deliver a greater amount of work using a given quantity of fuel. This is basically the reason for its superior efficiency, which results in its saving in fuel cost.

Cylinder Diesel

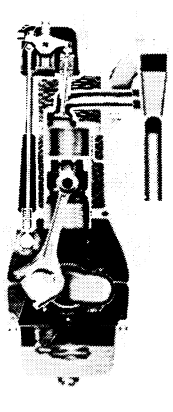


Figure 1

Intake

Air only is drawn into the cylinder through the open intake valve by the suction created by the Downward moving piston. Figure 1

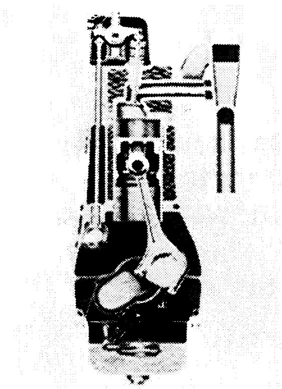


Figure 2

Compression

The intake valve is now closed and the air in the cylinder is highly compressed by the Upward Moving piston. This high compression of the air raises the temperature to between 900° and 1000° F. Figure 2

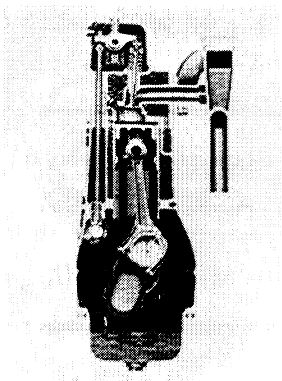


Figure 3

Injection and Combustion

At a definite point, shortly before the piston reaches the top of its stroke, fuel is injected into the cylinder by the spray nozzle. The fuel is ignited by the heat of the highly compressed air. Figure 3

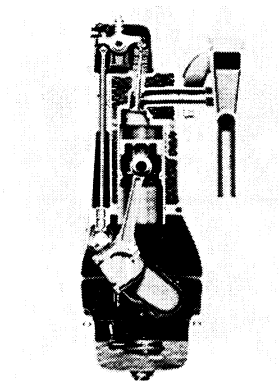


Figure 4

Power

The expansion of the gases resulting from the burning of the fuel exerts pressure on top of the piston, driving it Downward. Figure 4

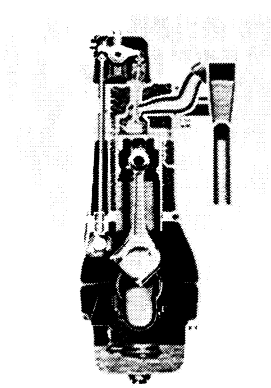


Figure 5

Exhaust

As the piston passes the bottom of its stroke the exhaust valve opens and the burnt gases are expelled by the now Upward moving piston. The intake valve opens about the time the piston reaches the top of its stroke, and a similar sequence of events, often referred to as the cycle, repeats itself. Figure 5

GROUP II
SECTION B - FUEL AND LUBRICATION

Fuel Oil Recommendations

Diesel fuel oil selection, handling and filtration is of great importance. The fuel not only supplies the energy for all the work done by the engine but it also lubricates the parts of the fuel injection system which operate with very close tolerances. Fuel oil that contains water, abrasives or sulphur in excess of our recommended specifications can cause extensive damage to the engine.

Diesel Fuel Oil Specifications

Continental Red Seal Diesels have been designed and developed to use Grade #2D Diesel Fuel Oil which can be a cracked residual, a blend or preferably a straight-run distillate having the following fuel characteristics:

DIESEL FUEL CHARACTERISTICS	EFFECTS	INDUSTRIAL AND AGRICULTURAL DIESELS 1800 RPM MAX.
A.P.I. Gravity @ 60^{o} F.	Lower Gravity Fuels contain more heat Units / Gal.	30-40
Cetane Number	Indicative of Ignition Quality, Higher Number, Better Starting & Idling.	40 Minimum
Volatility: Initial Boiling Point	To prevent premature vaporization during hot weather operation.	320^{o} F. Minimum
50% Recovery	Less smoke with fuel at low 50 % & 90 % Recovery Temperatures.	580^{o} F. Maximum 650^{o} F. Maximum 700^{o} F. Maximum
	Higher end points only partially burn, causing build up of deposits in energy cell and nozzle, causing pintle sticking and smoke.	
Distillation Recovery	Lower % recovery indicates heavy oil fractions to cause smoke and poor combustion.	98 %

Total Sulphur	Sulphurous acids corrode and increase engine wear.	.5% Maximum
Corrosion (Copper) 3 hours @ 212^{O} F.	Discoloration of pitting on polished copper strip shows same effect on engine parts.	Pass Test
Pour Point	Fuel Oil must be in fluid state to prevent clogging due to congealing wax.	10^{O} F. below lowest anticipated operating temperature.

Warning: The Grade #2D Diesel Fuel Oil should not be confused with the # 2 Furnace Oil which has no definite limits on ash content, sulphur content, and Cetane Value.

Handling & Storage

Fuel should always be strained or filtered before being put into the supply tank, as it is easier and cheaper to remove dirt from the fuel BEFORE it finds its way into the engine fuel system.

The storage tank should be constructed for fuel oil storage with provision for removal of accumulated sludge and water - which should be done at regular 10-day intervals.

In addition, the fuel should be filtered between the storage tank and the dispensing pump. Double filtering is preferable and the filter equipment should be maintained as recommended by the manufacturer.

The open end of the dispenser funnels, measures and containers should be covered, when not in use, to prevent the entrance of dirt or moisture, and should be kept scrupulously clean at all times.

Fuel System Precautions

1. Fill the fuel tank at the end of each day to keep condensation to a minimum. When emptying the drum of fuel oil, agitate it as little as possible and leave about 1" of fuel, which may contain sediment or water, in the bottom of the drum.

2. Shut off fuel supply valve at fuel tank when disconnecting lines -- to save needless waste of fuel.

3. Drain first stage fuel filter daily. This will also prevent ice damage to the filtering element where freezing temperatures are encountered.

4 DO NOT USE WASTE OR LINTY RAGS AROUND FUEL CONTAINERS OR FUEL INJECTION EQUIPMENT.

5. Use of clean fuel and daily care of the first-stage filter will prolong the life of the final-stage filter. For further details see Section on Fuel Injection.

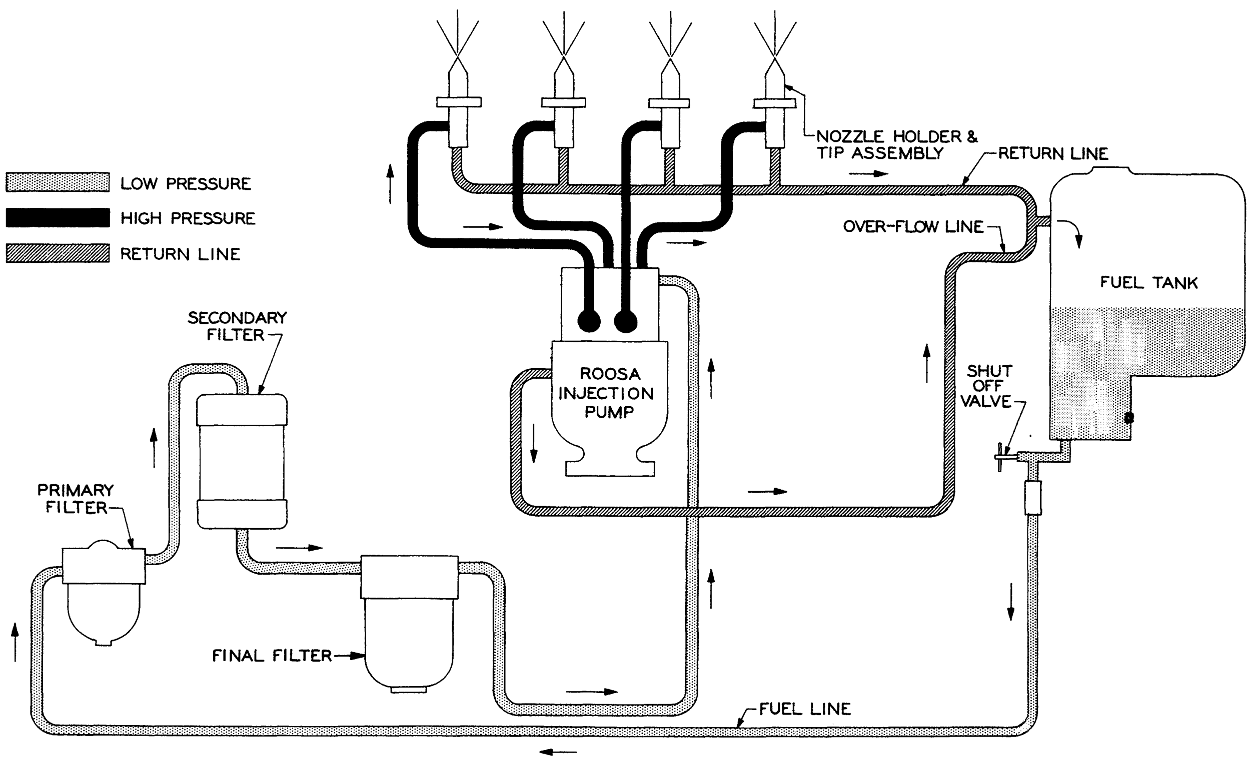


Figure 6 - Schematic Fuel Filter

Lubrication Recommendations

Diesel Engines operate with much higher pressures in the combustion chambers than their gasoline counterparts. Diesel fuels have much higher end points, that is, heavier ends of fuel which do not vaporize readily and burn completely. This results in a tendency to form deposits in the combustion area as well as in the ring grooves which could cause clogging of energy cells, rings sticking in the grooves and poor performance in general with resultant rapid wear and increased maintenance expense.

To counteract these conditions, the choice of fuels and lubricating oils must be made according to the specifications.

Oils used in the Lubrication System must have certain qualities to provide a satisfactory oil film on friction surfaces to minimize wear, to protect bearings from corrosion and to keep engines free from harmful deposits.

Lubricating Oils for Diesel Engines are compounded with additives to provide this protection. They are better able to resist oxidation resulting from the higher operating pressures found in the Diesel and at the same time hold combustion by-products in suspension until removed when the oil is drained. Diesel Engines are generally used in heavy duty operation. The American Petroleum Institute have classified oils for three types of service: DG, DM, DS - General Service, Moderate Service and Severe Service depending on the type of operation.

For Service DG (Diesel General)

As the name indicates, this DG oil is for use in General or Ordinary service where diesel fuel oil with less than .4% sulphur is used with normal engine operation and maintenance.

For Service DM (Diesel Moderate)

This oil is to be used in diesel engines operating under severe conditions, or using fuel which tends to promote deposits but where design characteristics or operating conditions make the engine either less sensitive to fuel effects or more sensitive to residues from the lubricating oil.

For Service DS (Diesel Severe)

This oil is to be used when the diesel fuel oil has over .4% sulphur content coupled with severe operating conditions under heavy loads and high temperature conditions or very light or intermittent operation at low temperatures.

While oils in this category are, by no means, a safeguard against failure to follow proper maintenance procedures, they are absolutely necessary where operating conditions approach those outlined in the preceding paragraph. We recommend using motor oils meeting DS specifications.

OPERATING CONDITIONS

TEMPERATURE	SEVERE	S.A.E. NUMBER
Below 10° F.	Service DS	10W or 5W-20
10° to 32° F.	Service DS	20 or 10W-30
32° to 90° F.	Service DS	30 or 10W-30
Above 90° F.	Service DS	30 or 10W-30

As in other internal combustion engines, oils must be selected as to S.A.E. number grades in accordance with the atmospheric temperature where the engine is to be operated.

Except for the break-in period, designated elsewhere in this manual as the first 50 hours, select the grade of oil as shown in the above chart.

Continental Diesel Engines have full pressure lubrication through drilled passages in the cylinder block and crank shaft to all main and connecting rod bearings as well as to the timing gears and overhead valve rocker arms, the over flow from which lubricates the tappets. The oil pressure is automatically regulated by a spring loaded Relief Valve.

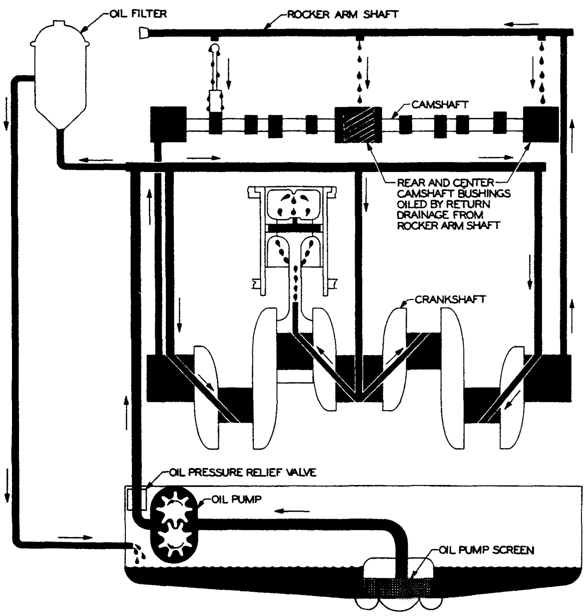


Figure 7 - Lubrication Diagram
(The camshaft has been moved up in order to simplify the Schematic drawing)

A by-pass type oil filter is provided to remove dirt and foreign elements from the oil, a percentage of which is passed through the filter during operating period. The removal of grit, sludge and foreign particles causes filter elements to clog and become ineffective unless they are replaced at regular intervals.

Oil filter elements or cartridges should be replaced at every oil change or approximately every 50 hours operation.

Oil Change Frequency

Engine oil does not "wear out". However, heavy-duty detergent oil in Diesel engines becomes contaminated from by-products of combustion, dirt, water and unburned fuel entering the crankcase, and the detergents holding the carbon particles in suspension in the crankcase.

In normal industrial operation, the Continental Diesel engines should have the oil and filter element changed after every 50 hours of operation. The oil should be drained when the engine is at normal operating temperature.

Oil Pump

The oil pump on the four cylinder diesels is mounted on the front bearing cap. It is a gear type pump driven by the timing gear on the crankshaft.

This pump rarely gives any trouble; if it does it can be readily removed and either repaired or replaced with a new one.

The normal oil pressure is 30 to 40 lbs. and at idling speed should not fall below 7 lbs. If the pressure fluctuates or falls below these limits, STOP THE ENGINE IMMEDIATELY and find the cause to the trouble. Refer to engine overhaul for repairing.

Air Cleaner

Diesel engines, when operating, consume several thousand cubic feet of air per hour. Since dusty air is full of abrasive matter, the engine would soon wear excessively if the air cleaner did not collect the dust in the oil cup.

Since air cleaners are not 100% efficient, there efficiency is DECREASED by the lack of proper servicing.

Proper servicing means cleaning thoroughly and refilling with new oil, and maintaining air tight connections between the air cleaner and intake manifold so that all air entering the engine is filtered.

The number of hours an engine may be permitted to run before the air cleaner is serviced depend entirely on operating conditions, and no definite interval can be established. In extremely dusty operations, this might be once or twice a day, while in dust protected areas, the air cleaner should be serviced when changing the oil.

Dirt or foreign particles removed from the air settle at the bottom of the air cleaner oil sump. This deposit must not be permitted to build up to any quantity.

The speed at which this builds up indicates how often the air cleaner should be serviced.

IT REQUIRES ONLY A COMPARATIVELY SMALL QUANTITY OF ABRASIVE DUST TO WEAR OUT AN ENGINE. The rapidity with which this occurs depends on the maintenance the engine and its equipment receive. A planned air cleaner servicing program will increase the effective life of your engine.

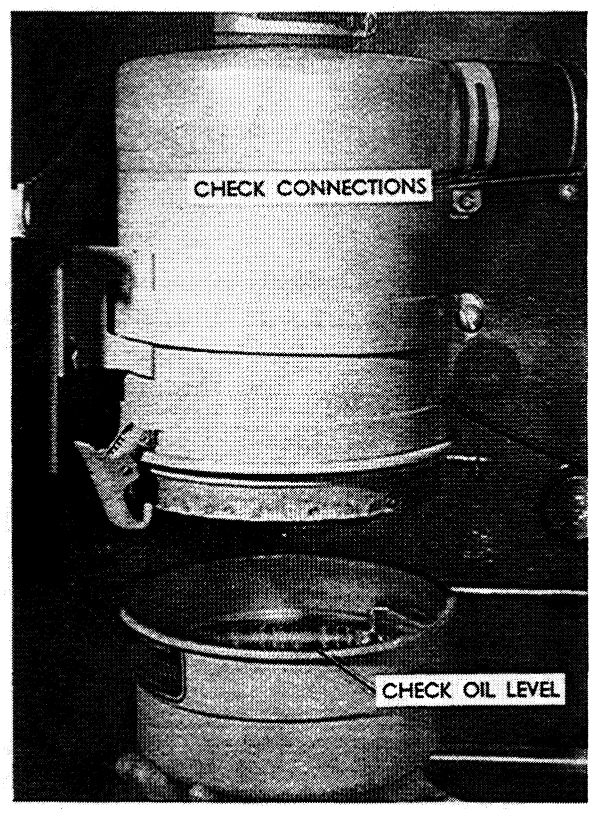


Figure 8 - Air Cleaner

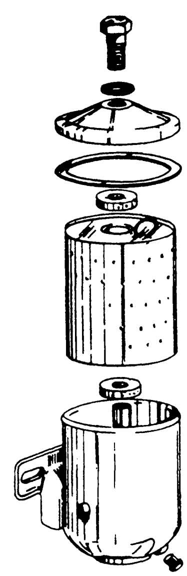


Figure 9 - Oil Filter

GROUP II
SECTION C - ENGINE COOLING

The function of the cooling system is to prevent the temperatures in the combustion chamber, which may reach as high as 3500 degrees F., from damaging the engine and at the same time keep the operating temperatures within safe limits.

Maintaining the cooling system efficiency is important, as engine temperatures must be brought up to and maintained within satisfactory range for efficient operation, - but must be kept from overheating, in order to prevent damage to valves, pistons and bearings.

Continental Diesel Engines operate most efficiently with water temperatures of 165 - 185 degrees F. and a thermostat and by-pass system is used to control these temperatures. 175-210^{O} F. is the normal operating temperature when a pressurized cooling system is used.
The thermostat valve remains closed and only allows the water to recirculate within the engine itself until normal operating temperatures are reached. This provides for both rapid and even temperature increase of all engine parts during the warm up period. When the desired temperature is reached, the thermostat valve opens and allows the water to circulate through both the engine and radiator.

The cooling water is circulated by a water pump located at the front of the engine block. The coolest water enters at the pump from the lower or suction opening, then is directed through integral distribution passages cast in the cylinder head, to the areas in and around the valve seats and combustion chamber. This method provides that the coldest water reaches the parts in the engine subjected to the highest temperatures.

The cylinder walls, in turn, are cooled by convection currents only, which keeps the cylinder barrels at a more uniform temperature and thereby greatly reduces crankcase oil dilution and sludge formation.

Upon leaving the cylinder head, the water enters the thermostat housing in which is mounted the by-pass type thermostat which controls the opening to the radiator or heat exchanger. Upon being discharged from the thermostat housing, the water enters the radiator where it is cooled before re-entry into the engine.

RADIATOR

The radiator consists of tubes through which the cooling water is circulated. In standard radiator design fins are connected to the tubes to give an extended surface through which heat can be dissipated. It is important that these tubes be kept clean on the inside and the fins free of dirt on the outside so that maximum heat transfer can take place in the radiator.

Blowing out between the fins of the radiator, using compressed air, in a direction opposite to that of the fan circulated air, will serve to keep the cooling surfaces of the core free of dirt and other particles.

Every 500 hours of operation the radiator and cooling system should be well cleaned and slushed with clean water.

Wherever possible, only soft clean water should be used in the cooling system. Hard water will cause scale to form in the radiator and the engine water jackets and cause poor heat transfer. Where the use of hard water cannot be avoided, an approved water softener can be used.

CLEANING COOLING SYSTEM

Deposits of sludge, scale and rust on the cooling surfaces prevent normal heat transfer from the metal surfaces to the water and in time render the cooling system ineffective to properly maintain normal operating temperatures. The appearance of rust in the radiator or coolant is a warning that the corrosion inhibitor has lost its effectiveness and should be cleaned before adding fresh coolant.

Dependable cleaning compounds should be used. Follow the procedure recommended by the supplier. This is of prime importance because different cleaners vary in concentration and chemical compostions. After cleaning and flushing, the system should be filled with an approved anti-freeze compound containing a rust and corrosion inhibitor or water with a corrosion inhibitor.

RADIATOR PRESSURE CAP

Many operations use a pressure cap on the radiator to prevent overflow loss of water during normal operation. This spring loaded valve in the cap closes the outlet to the overflow pipe of the radiator and thus seals the system, so that pressure developing within the system raises the boiling point of the coolant and allows higher temperatures without overflow loss from boiling. Most pressure valves open at 4 pounds, allowing steam and water to pass out the overflow pipe, however, the boiling point of the coolant at this pressure is 225 degrees F. at sea level. When a pressure cap is used an air tight cooling system is necessary with particular attention to tight connections and a radiator designed to withstand the extra pressure.

EIGHT "MUSTS" FOR CONTINENTAL DIESEL USERS

1. Use only #2D Diesel Fuel Oil.

2. Use Lubricating Oil of recommended grade for operation. Change filter element each time oil is changed.

3. Maintain 165 - 185 degrees F. operating temperatures - will pay dividends in economy, performance and engine life.

4. Check for leaks - fuel - oil - water - air in fuel lines.

5. Avoid "lugging" - Operating engines in recommended range provides increased performance and reliability.

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6. Cleanliness - of fuel oil and its handling is most important to provide trouble-free operation and the added dividend in long life of the fuel injection system.

7. Idling Engine - Slow engine down to low idle for approximately 5 minutes before stopping engine, but do not allow it to run for prolonged periods at idle.

8. Follow recommended preventative maintenance program.

GROUP II
SECTION D - COLD WEATHER STARTING & MAINTENANCE

COLD WEATHER STARTING - Below 32 degrees

The requirements for satisfactory cold weather operation of Diesel engines differ somewhat from those of gasoline engines. This is brought about, to a large extent by a difference in the fuels.

The Diesel engine depends on the heat from the air compressed in the combustion chamber to ignite the fuel when it is injected into this air. It requires a temperature of approximately 900 degrees F. in the combustion chamber to institute this combustion process.

Since Diesel fuels in general are the same the year around, it is up to the operator and manufacturer to find ways and means to facilitate starting and satisfactory operation.

With engines standing out in temperatures below freezing,difficulty may be expected in raising the temperature of the air in the combustion chamber to the point where it will ignite fuel even though compression pressures do meet the required minimum of 325 lbs. per square inch, and the starter will turn the engine over at a desirable minimum of 150 RPM.

To meet this need, we have provided cold starting equipment with which we actually inject a metered quantity of ether base starting-fluid into the air entering the combustion chamber in order to get the engine started, after which it rapidly developes enough internal temperature to continue running on the regular fuel.

STARTING FLUID INJECTION EQUIPMENT

This equipment provides for the injection of a starting fluid which is basically ether, in metered quantities, into the air stream entering the combustion chamber.

A gelatin capsule containing the desired amount of starting fluid is dropped into a dispenser and punctured, thus releasing the fluid, which is then picked up by the priming pump and forced as a spray into the intake manifold, through a nozzle assembled in the cover plate.

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