

# OPERATING MANUAL AND PARTS LIST

FOR



**Model "B"—7½ RGU Engine-Generator Unit**

**Model "B-1"—7½ RGU Engine-Generator Unit**

**Model "C" Ice-Engine Unit**

**Model "D" Ice-Engine Unit**

**Model "D-1" Ice-Engine Unit**

For

**RAILWAY PASSENGER CAR LIGHTING  
AND AIR CONDITIONING SYSTEMS**

Edition 1

Form No. 1389

Price \$5.00

REFRIGERATION DIVISION

# **WAUKESHA MOTOR COMPANY**

WAUKESHA, WISCONSIN

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# INTRODUCTION

This book is a commercial instruction manual covering the following models of Waukesha Engine-Generator Units for car lighting and electrical accessories; and Ice-Engine Units for air conditioning systems of railway passenger cars:

Model "B"—7½ RGU Engine-Generator Unit

Model "B-1"—7½ RGU Engine-Generator Unit

Model "C" Ice-Engine Unit

Model "D" Ice-Engine Unit

Model "D-1" Ice-Engine Unit

This manual is divided into five main parts. Part I covers the details of the engine only. Part II covers the Waukesha Railroad Engine-Generator Unit. Part III covers the Waukesha Railroad Ice-Engine Unit. Part IV pertains to the various types of Waukesha Fuel Supply Systems, and Part V the Service Parts List.

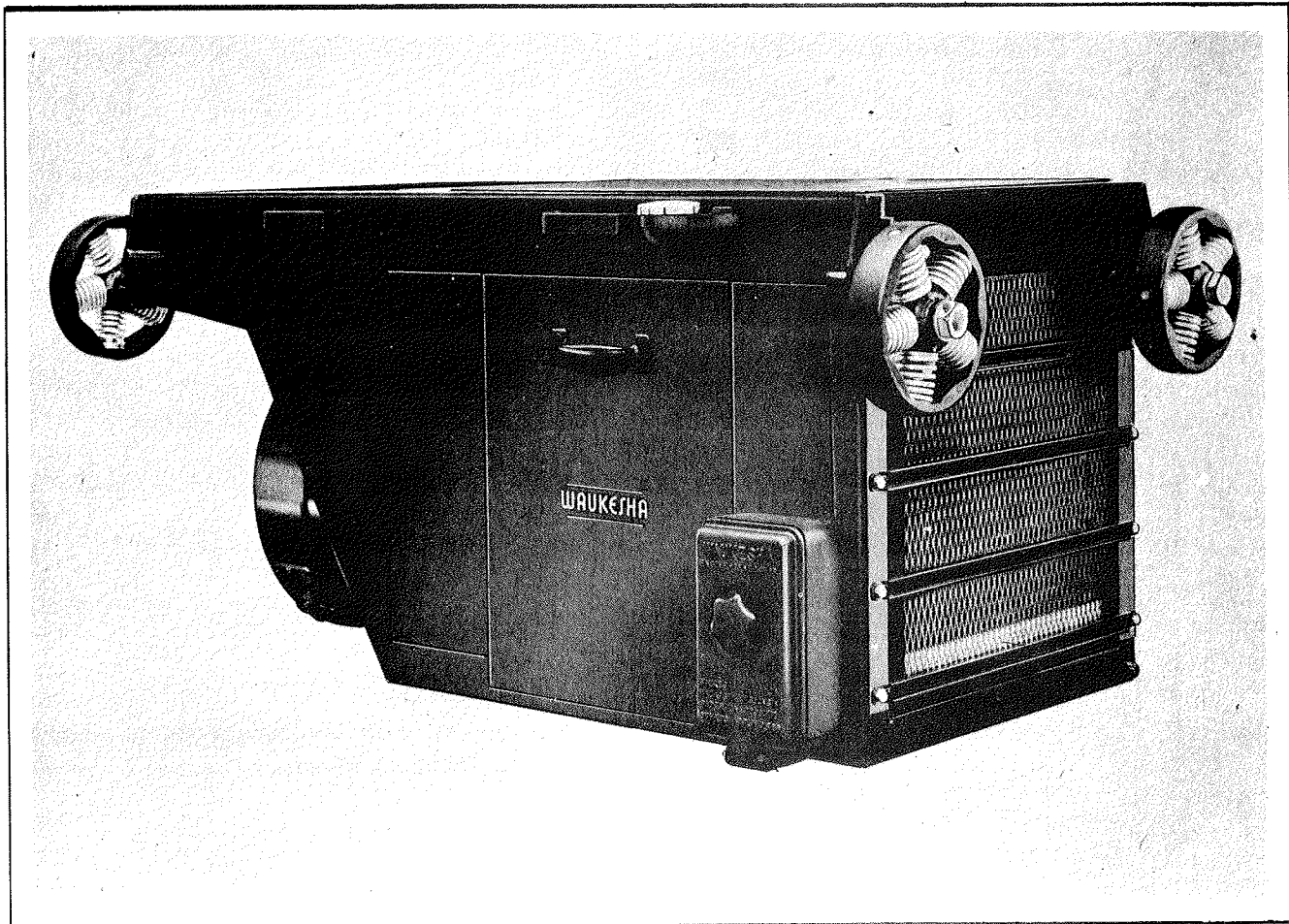


FIG. 1—MODEL "B"—7½ RGU ENGINE-GENERATOR UNIT

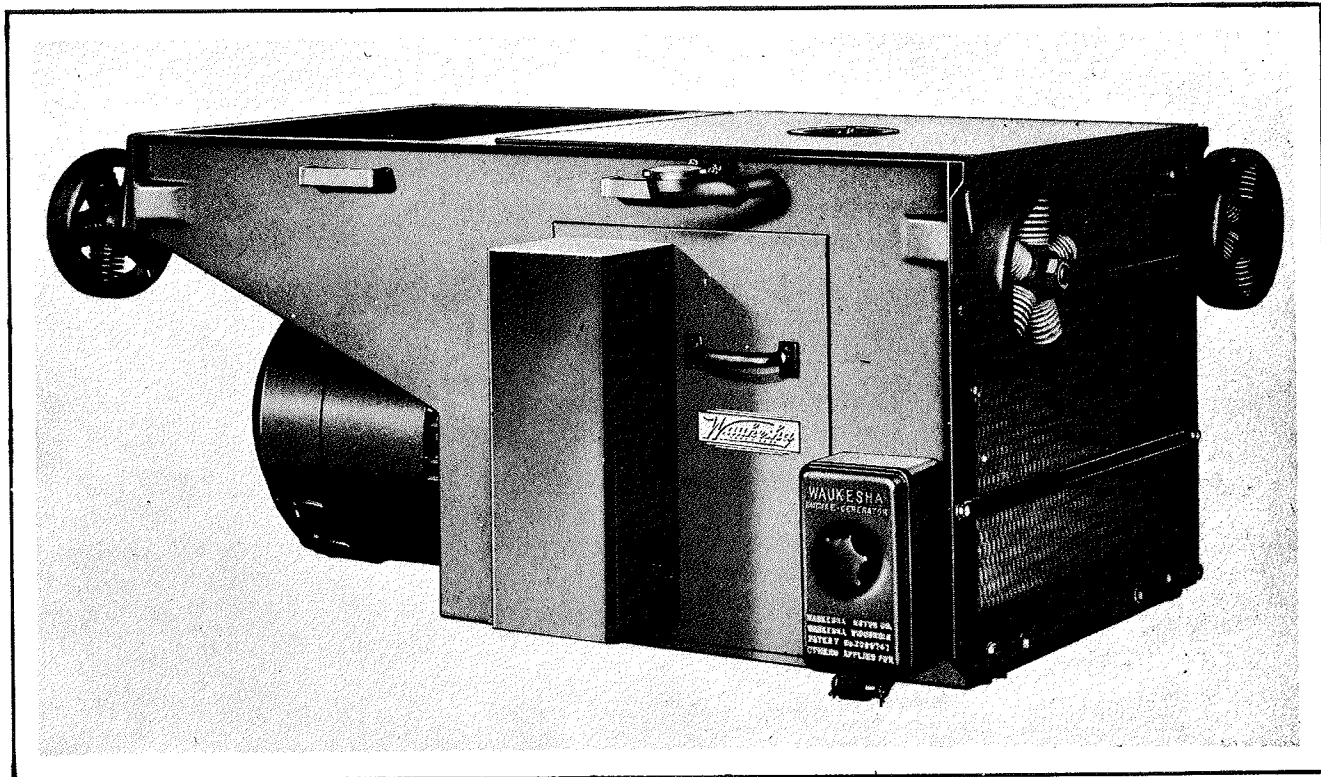


FIG. 2—MODEL "B-1"—7½ RGU ENGINE-GENERATOR UNIT

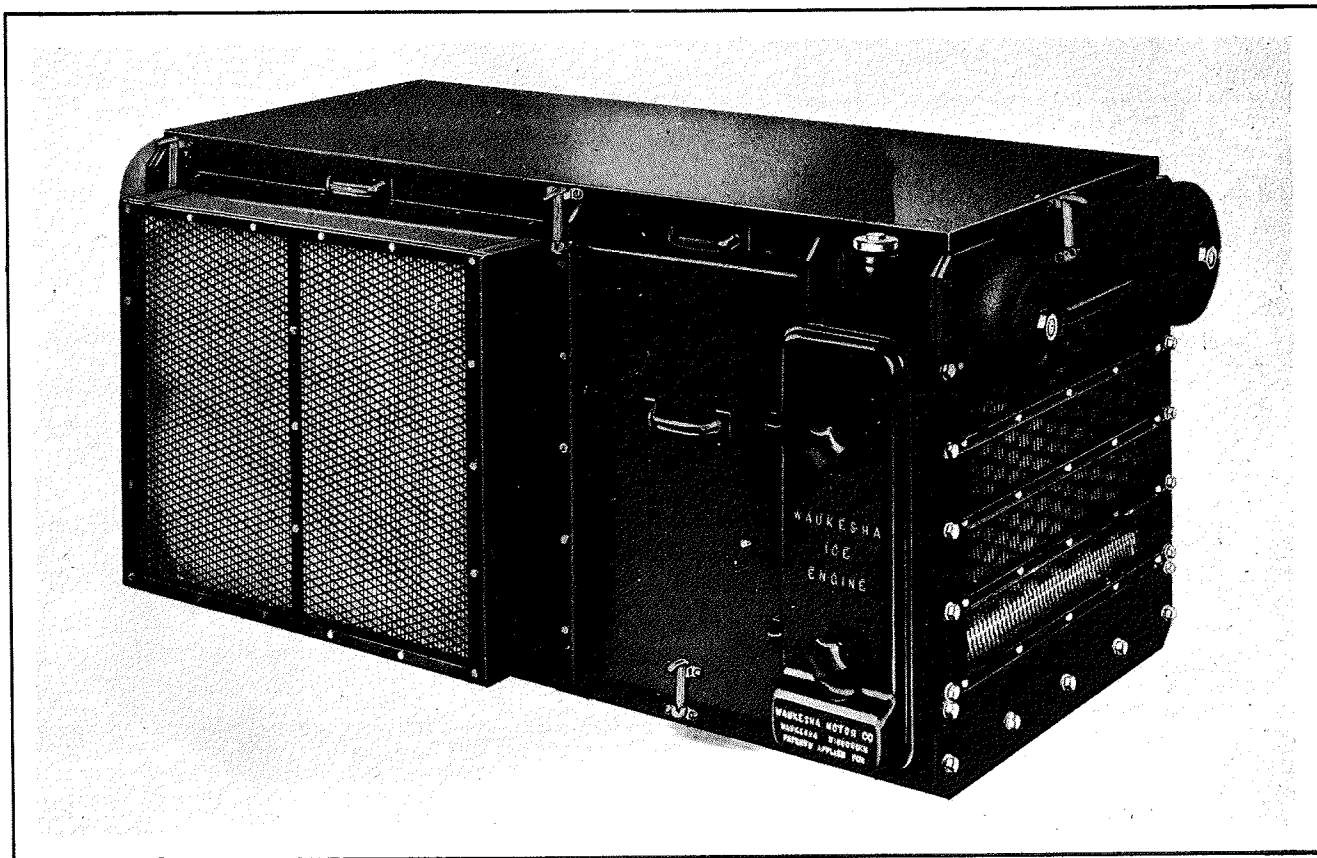


FIG. 3—MODEL "C" ICE ENGINE UNIT

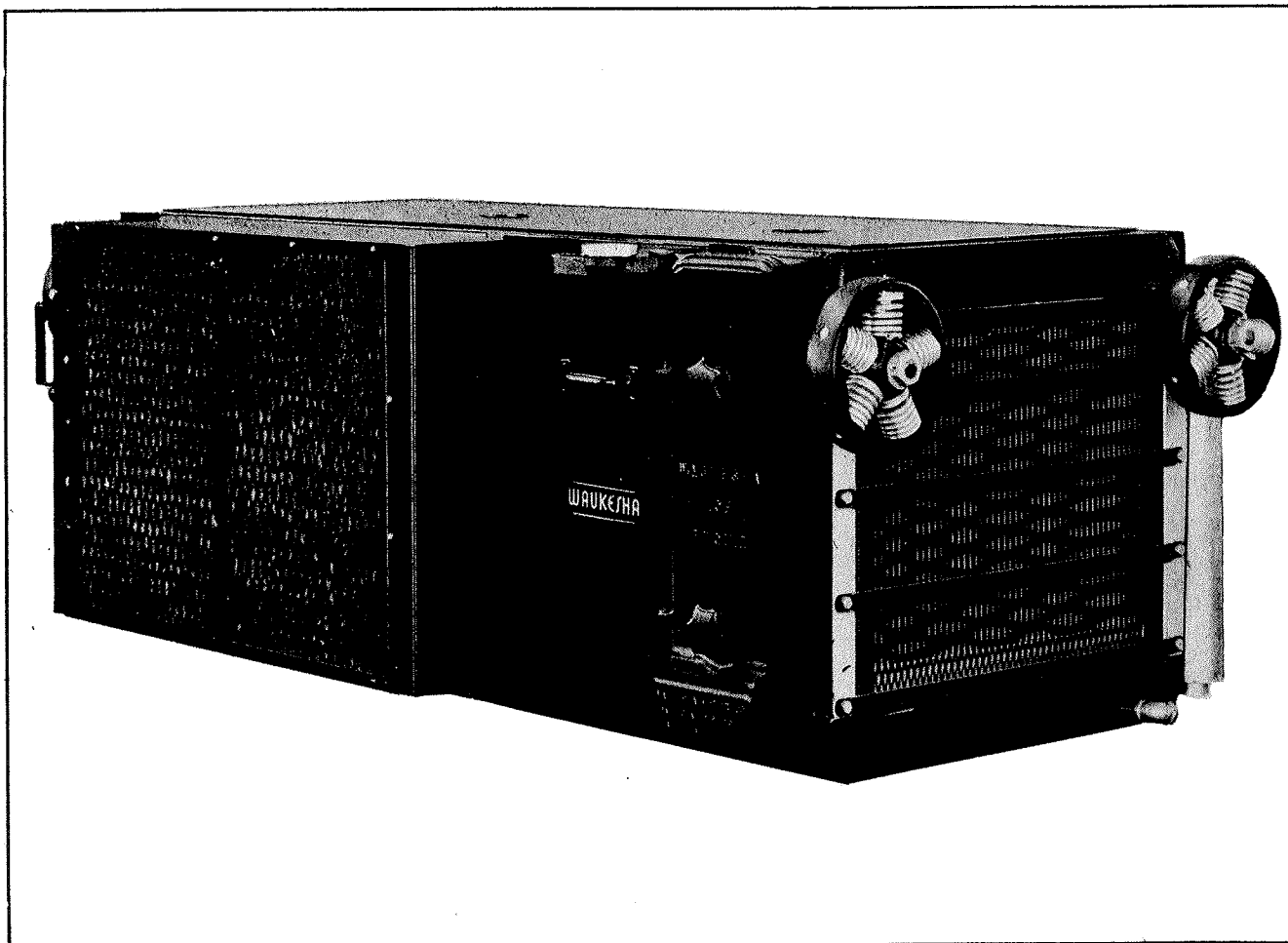


FIG. 4—MODEL "D" ICE ENGINE UNIT

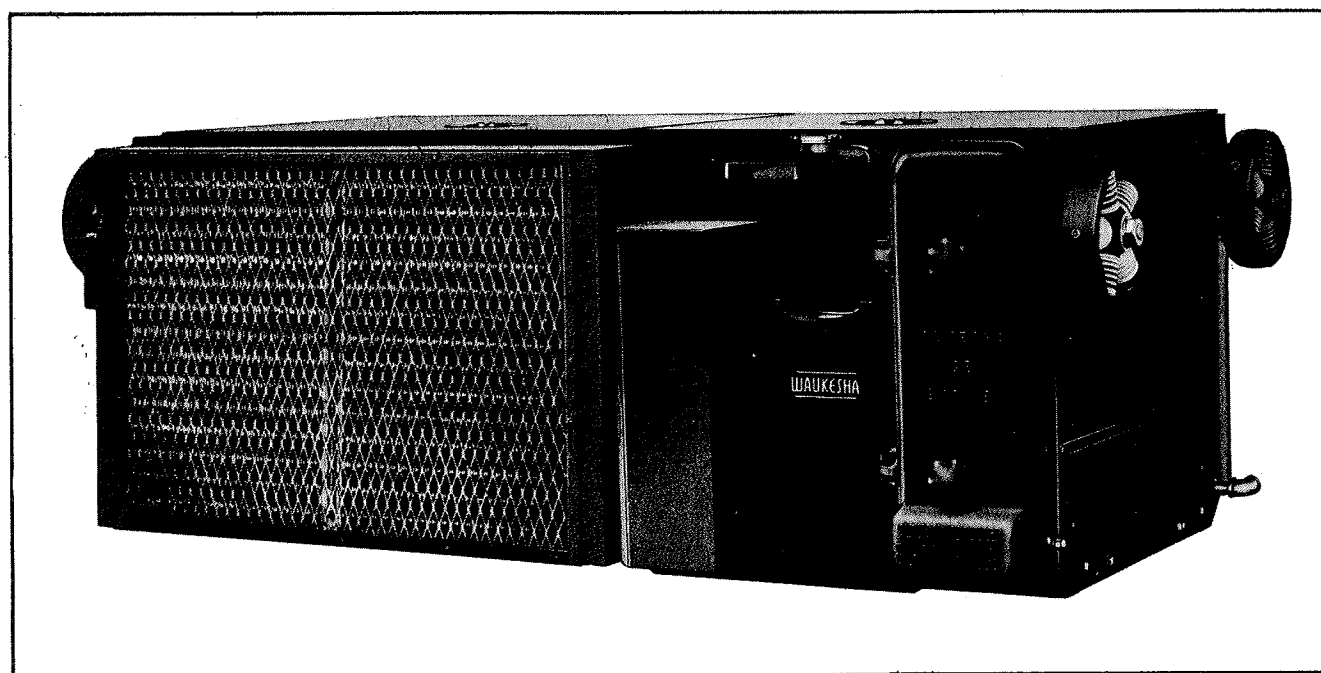


FIG. 5—MODEL "D-1" ICE ENGINE UNIT

## PART I.

### ENGINE INFORMATION

#### DETAILS OF "FC" ENGINE

##### 101. General Information.

The engine is a 4-cylinder, liquid cooled, 4-cycle propane engine which drives either a 7 ton reciprocating type compressor, or a 7½ KW generator. Details of these units may be found in Part II and III. The following paragraphs describe the various engine parts and their operation.

##### 102. Engine Cooling System.

See figure 6 for a schematic diagram of the engine cooling system. Water from the radiator is drawn into the pump which forces it under pressure through the water jackets of the engine, and back to the radiator for cooling.

##### 103. Water Pump.

The water pump is located on the magneto side of the engine and is driven by a gear at engine speed. The water enters the bottom of the pump and is forced by the pump impeller to the engine water jacket. Packing glands are located at each end of the pump housing to prevent the loss of coolant. A grease cup which lubricates the pump bearing is located at the top of the water pump body, and must be filled and turned down periodically. The copper line connection between the engine block and the top of the water pump allows the air to escape from the pump when the system is being refilled.

##### 104. Radiator.

The radiators used for cooling are of adequate capacity to meet all normal operating loads. Where extremely abnormal conditions exist, an auxiliary 10 gallon expansion tank or an automatic radiator filler float (Page No. 118, Figure No. 40) may be used in conjunction with the radiator. The top of the radiator contains inspection plates which may be removed for inspecting, repairing and cleaning the tubes. Clean-out connections are located at the bottom of the radiator.

The method of flushing out the radiator varies, but should be done periodically to insure high radiator cooling capacity. (Special instructions for cleaning the cooling systems of Waukesha Units may be obtained from the Waukesha Motor Co., Railway Division, Waukesha, Wisconsin.) In the top radiator expansion tank in the engine compart-

ment will be found a small air relief cock which will facilitate filling of the radiator. Be sure to close this after the system is filled. On the older models, the lower opening, which has an extending tube to the side of the unit frame, is used in servicing for a quick check of the water level. It is very important that the radiator be kept clean both internally and externally, as a radiator plugged with dirt, rust, scale and grease will cause overheating of the engine.

##### 105. Radiator Filling Cap.

Since these units have sealed cooling systems, a pressure type radiator filler cap is used. The filler cap contains a spring-loaded valve on the under side, which rests on a seat in the neck of the filler opening, and when the cap is pressed down and locked in place, approximately four pounds pressure in the cooling system is required to raise the valve off its seat. The later Model "D-1" and "B-1" Units have radiators which contain separate filler openings and pressure relief openings. The radiator filler which is located outside the engine frame, has a standard cap without a pressure relief. The pressure relief opening is located in the center of the radiator and has its own pressure relief cap.

##### 106. Radiator Hose.

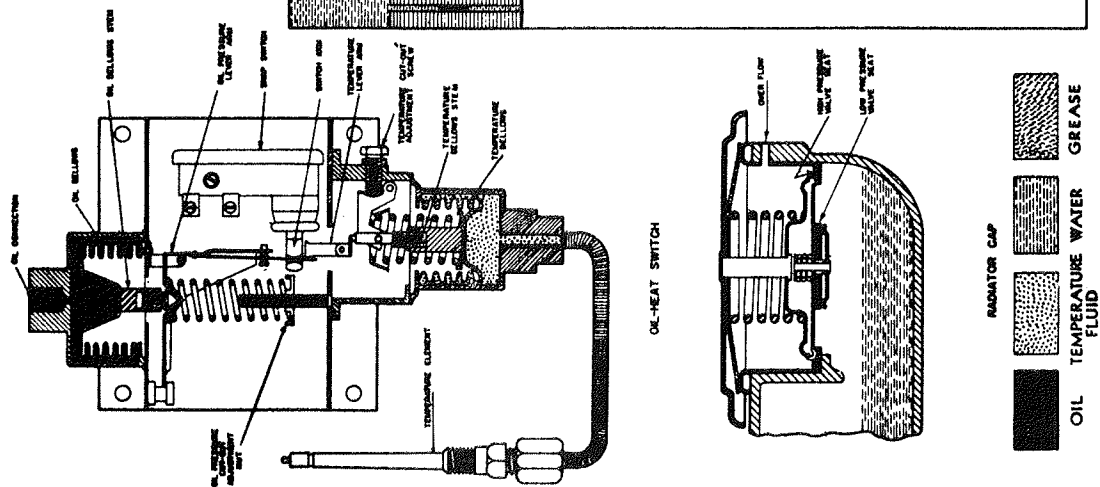
Heat and oil will cause a radiator hose which has been in service for a considerable time, to rot, crack, or age-harden, therefore clogging the radiator tubes. If an inspection of the internal section of the radiator reveals a soft brownish sludge, the hoses should be checked and renewed if necessary.

##### 107. Engine Radiator Fan.

The engine radiator fan is used to pull air through the radiator core. The fan requires oil or a light grease once a month. The fan belt should also be checked periodically for fraying or breaks.

The later Model "D-1" and "B-1" Units are equipped with radiator fan belt tightener. Proper tension is applied to the fan belt by tightening the fan belt adjusting screw or arm to take up the slack in the belts. The belt should have about a one-inch total movement midway between the two pulleys for proper tension.

## ENGINE COOLING SYSTEM



**FIG. 6—SCHEMATIC DIAGRAM OF ENGINE COOLING SYSTEM**

**108. Coolant (Use of Anti-Freeze Solutions).**

Under normal operating conditions the engine radiator should be filled with clean soft water. If the car is subject to freezing weather on a portion of its run, the engine cooling system should be protected with an anti-freeze solution. (See manufacturer's recommendations for proper mixture.) For immediate information, the following table for Prestone is included:

25%..... + 10° F.	40%..... — 12° F.
33%..... — 0° F.	50%..... — 34° F.

**NOTE:** In some installations where the units operate at high engine temperatures, a coolant solution of 70% or 100% of Prestone is used to raise its boiling point. It is important that the solution be changed to the above percentages when the unit is again subject to freezing weather.

**109. Lubrication System.**

The engine is lubricated by a combination of pressure and spray systems. The oil pump with its intake submerged in the oil supply at the bottom of the crankcase, delivers oil to the main-header in the crankcase. Oil under pressure is thus delivered to the three camshaft bearings, main bearings, rod bearings, and timing gear spray. The crankcase mist lubricates the cylinders, pistons, and floating piston pins. Oil holes drilled in the camshaft serve to connect the oil header to the spray jets and deliver oil to the timing gears. The pressure in the system is controlled by a spring-loaded relief valve which returns any excess oil delivered by the pump to the oil supply, thus keeping the system operating at safe pressures. The oil pressure gauge line is connected to the main oil line vent. Normal pressures may range from 15 to 35 pounds per square inch. See paragraph 111.

**110. Oil Pump.**

The oil pump is of the positive pressure type. The pump consists of a drive gear and idler gear which mesh together and force the oil from the oil pan through the pump shaft housing of the main oil line. A baffle encloses the lower part of the oil pump intake and a screen covers the oil intake port. The pump drive shaft gear meshes with a worm on the camshaft.

**111. Oil Pressure Relief Valves.**

Oil pressure is regulated by an adjustable spring-loaded relief valve which opens when the pressure

exceeds the setting of the adjusting screw and diverts the excess oil back into the crankcase. The valve is built into the side of the crankcase directly back of the carburetor. An acorn nut prevents an oil leak at the end of the oil pressure adjusting screw. A copper gasket seals the oil between the half nut and crankcase and the half nut and acorn nut. Oil pressure in the lubricating system is raised or lowered by removing the acorn nut, loosening the half nut, and turning the adjusting screw in or out to get the desired pressure.

The oil pump on Model "D-1" and "B-1" Units also has another relief valve which is adjusted and set at 50 lbs. This is used as a protection when oil is cold and engine oil pressure is high, to protect the oil gauges and oil pressure switch bellows, or any device which may be connected into the oil pressure system.

**112. Oil Filter.**

The oil filter is so located in the lubrication system that only a small part of the oil is by-passed through it to be cleaned. The filtering material is a cotton waste pack. The filter should not be packed too tightly or no oil will pass through it. If it is packed too lightly the oil will not be cleaned. The oil filter should be repacked with 3½ oz. of long fiber cotton waste when the crankcase oil is changed.

**113. Ignition and Timing.**

The ignition is by a magneto. The magneto with impulse coupling is built for operation on standard four-cylinder engines. The system consists of a magneto, spark plug cables, and spark plugs. Two types of magnetos are used, the Edison Type CD-4, and a Bosch MJA-4C, heavy-duty, 1100 series magneto.

**114. Magneto (Edison CD-4).**

Three separate functions occur within the magneto:

- (a) Current generation, which occurs in the primary circuit when the primary winding of several hundred turns of heavy wire is rotated in the interlocking magnetic field. A permanent magnet provides the magnetic field. A low voltage current flows from ground through the primary to the breaker points and back to ground. The current flow stops when the breaker points are open.
- (b) Voltage transformation, which takes place in the interlocking primary and secondary windings of the coil, the high voltage surge being caused by breaking the primary circuit at the

point the primary current reaches its maximum value. The secondary winding has thousands of turns of very fine wire.

- (c) Spark distribution, which consists in conducting the high voltage secondary surge to the desired spark plug at the proper time to ignite the mixture of fuel and air in the cylinder.

#### 115. Breaker Points (Edison CD-4).

The magneto has a breaker cam which causes the breaker contact points to open. An ignition spark is produced when the breaker contact points open the primary circuit at a point of maximum current. The breaker points are actuated mechanically in accordance with the path the breaker arm rubbing block follows on the breaker cam. Contact points may get dirty and worn with use. It is advisable to inspect the contacts occasionally. This may be done by removing the distributor block. Contacts are in good condition when the contact surfaces are clean, fairly even, and show a fine grained or frosty appearance. If they are dirty or pitted, they may be cleaned and resurfaced with a hone (tungsten) or file (platinum). Contacts that are badly worn must be replaced.

#### 116. Condenser (Edison CD-4).

Instead of having the current arc across the breaker points and burn them, the condenser provides a momentary storage place. The amount of current which can flow into the condenser is limited so that the condenser is very quickly charged. This action of the condenser quickly stops the flow of current in the primary winding. Consequently, the magnetic field produced by this current, collapses.

#### 117. Distributor (Edison CD-4).

The ignition distributor serves to deliver the high voltage surges to the correct spark plug at the correct time. The distributor assembly consists of a distributor cap, a distributor disc and ignition cables. After the high voltage surge leaves the high tension coil it is carried to the center brush of the distributor cap. The metal insert in the rotor then carries the high voltage surge to the four brushes which transmit it through the ignition cable to the correct spark plugs.

#### 118. Impulse Coupling (Edison CD-4).

A mechanical device known as the impulse coupling or starter, is installed between the engine drive and the magneto proper. Its primary function is to intensify the ignition spark at low speeds in order to

facilitate engine starting. In addition, it provides the means for automatically retarding the ignition spark, during the starting period, thus reducing the possibility of damage to the engine. The impulse coupling functions as a mechanical reservoir to store the energy which is available at a low rate during the engine starting period. Then, when the point is reached in the engine cycle where ignition of the fuel mixture should occur, all of this accumulated mechanical energy is instantly released to produce the torque necessary for a strong ignition spark. Since the point at which the energy release occurs can be controlled in the construction of the coupling, it is possible to provide an automatic retard of the ignition spark during the starting period. (15° is used in this magneto.) The impulse coupling consists of a shell and a hub, connected together by a strong spring. One half of the coupling (the shell) is fitted to a drive member on the engine drive shaft, while the other half (the hub) is keyed to the magneto rotor shaft. In operation at slow speeds a pawl on the magneto half of the coupling engages a stop pin mounted on the frame, which acts to prevent further movement of the rotor, while the engine half of the coupling continues to rotate. The relative change in position winds up the connecting spring. When the point is reached where an ignition spark is desired, the pawl is released and the drive spring permitted to snap the magneto rotor forward at high speed through its firing position. As the speed of the engine picks up and reaches 250 R.P.M. centrifugal force acting on the pawls withdraws them to a position where they no longer engage the coupling stop pin, the impulse coupling then acts as a solid drive member.

#### 119. General Description of Bosch Magneto.

The MJA-4C magneto employs the induction principle of current generation, the coil winding being stationary and the magneto rotating between laminated pole shoes. The condenser and interrupter are also stationary. Brush and rotating track combinations are confined solely to the high-tension distributor. Screened ventilators are mounted on either side of the housing and the action of the magnet rotor insures constant change of air throughout the interior of the magneto.

#### 120. Installation of Bosch Magneto.

The magneto, producing an ignition spark only at certain definite points in the rotation of the magnet rotor, must be connected to the engine in such a manner that the spark is available always at the

instant when required in the cylinder, i. e., about top dead center of compression stroke. Refer to paragraph 207 for timing instructions after installation.

### 121. Spark Plug.

The actual occurrence of the ignition spark within the engine cylinder takes place across the points of a spark plug. During engine operation the ignition spark between the electrodes gradually eats them away. This action changes the spark gap and affects the engine operation to a point where it becomes necessary to readjust the gap. The correct setting for the spark plug gap is .015 inches when Edison magnetos are used, and .025 with Bosch magnetos. Do not bend or move the center electrode when adjusting the gap as the insulator holding this electrode might crack. Use a flat or wire type feeler gauge to check the width of the gap, and bend only the ground or outside electrode.

Since one of the most common causes of plug failure is the coating of carbon and dirt that forms around the center electrode, periodic checks should be made of the spark plugs to assure efficient engine operation.

### 122. The Manometer.

The mercury manometer in the control box indicates the pressure in the fuel line to the Ensign regulator. Read this gauge only when the engine is running. The normal pressure should be 3 to 5 ounces and may be obtained by adjusting the low pressure regulator described in paragraphs 1204-i and 1205.

If some doubt exists concerning the zero setting of the manometer, take off the fitting connecting the 1/8-inch pipe to the Ensign regulator and see that the mercury column returns to zero.

### 123. The Ensign Regulator (See Figure 51, SK 275).

The Ensign fuel regulator with gas has the same general function as the float bowl of a gasoline carburetor. Without accurate control of the gas pressure, proper metering of the gas at the carburetor cannot be accomplished.

When the engine is at rest, the upper or pilot diaphragm, B, has atmospheric pressure on both sides. "F" is the main diaphragm with the pressure of the gas supply on both sides. Slight suction from the engine applied through the passage, D, to the under side of the diaphragm, B, pulls it down and opens the pilot valve, C. The opening of pilot valve,

C, relieves the pressure of gas over F, permitting it to lift. When F lifts, it opens the main fuel supply valve, E, which supplies the gas required by the carburetor. Breather, J, used on early models only, maintains atmospheric pressure on the top side of the diaphragm, B. When the engine is at rest, valve E is held closed by its weight and by the pressure of the gas.

### 124. The Carburetor.

The Ensign carburetor is used as a mixing chamber for the fuel and air. A fuel adjusting screw, which regulates the amount of fuel entering the carburetor is located on the side of the carburetor. The gas enters the carburetor through a jet in the center of the venturi where it is mixed with the air. There are two different types of carburetors used depending upon the type of unit. Those used on Ice-Engine Units have "ICE" stamped on the carburetor mounting flange. Those used on Engine-Generator Units have "GEN" stamped on them. Some installations have a balancing line connecting the top section of the Ensign regulator and the carburetor. This set-up is used to counteract the effect that a partially plugged air cleaner has on the air-fuel mixture. When the amount of air is restricted by a partially plugged air cleaner, the balancing tube will affect the regulator so that only a proportionally smaller amount of fuel will enter the carburetor.

### 125. Fuel Mixture Adjustment.

The fuel mixture adjustment screw will be found on the side of the carburetor secured by a lock nut. When the engine is operating at normal load, turn the screw clockwise until the engine starts to lose speed. Then turn it counter-clockwise approximately one-fourth to one-half turn. This should give the most economical adjustment as well as the best engine performance. (See paragraph 128 for method of adjusting fuel mixture on units having a vacuum gauge.) The normal setting of this load adjustment screw is approximately one and one-half turns open. **CAUTION:** Tighten the hexagonal lock nut securely.

### 126. The Pre-Cleaner.

The air pre-cleaner is attached to the air-cleaner intake. The air first enters the pre-cleaner where the larger particles of dirt are taken out of the air and settled in a small container on the side of the cleaner. The air then enters the air cleaner.

### 127. The Vortex Air Cleaner.

The dust-laden air is drawn into the central vortex chamber where it acquires a whirling motion, picking

up an oil spray from the reservoir. Centrifugal action throws the dust particles downward where they cling to the oil film on the disc, and the oil carries the entrained dust into the cup. Part of the oil spray, with the air, is drawn upward into the filter element composed of specially crimped wire. The oil with the remaining dust particles is filtered from the air and drains back into the oil reservoir. The cleaned air, free of dust and oil, then passes into the cylinders of the engine.

### 128. Vacuum Gauge.

The vacuum gauge, mounted on the instrument panel with the oil gauge, gives an indication of the operation of the engine and furnishes a means of accurately adjusting the fuel mixture. To correctly adjust the fuel mixture, have the engine running with the load constant and adjust the mixture at the "load adjustment" on the carburetor (See figure 51, SK-275) so as to obtain the highest possible vacuum on the gauge.

The gauge will give an indication of the amount of load on the engine; the vacuum will drop as the load increases. Should the gauge read 4 inches or less, look for incorrect adjustment of the carburetor, low fuel pressure, timing out of adjustment, some tight bearing or source of unnecessary friction which would result in excessive load on the engine.

If the needle of the gauge fluctuates violently, look for faulty operation of the engine valves.

## SERVICE AND MAINTENANCE

### 201. Lubrication Suggestions.

- (a) **Crankcase:** The engine crankcase requires refilling every 300 hours of operation. Refer to the Tabulated Data for proper viscosity of oil.
- (b) **Air Cleaner and Breather Cap:** The air cleaner to the carburetor intake must be cleaned as often as conditions require it. It is extremely important that the oil in the cleaner does not become thick with suspended dust particles. Clean and fill the removable cup to the level indicated on the filter name plate. The breather cap on the engine must be washed and cleaned whenever the carburetor air cleaner is cleaned.

Experience has shown that the air intake from the filter to the carburetor and also the carburetor venturi tend to become coated with

a thick sludge. Especially is this true if the air filter is not properly serviced. Hence, it has been found necessary every 300 hours of engine operation to remove the upper half of the air filter, the air connection to the carburetor, and the carburetor itself, and wash these parts thoroughly in gasoline. Any coating in the venturi throat of the carburetor seriously impairs the power output of the engine and the movement of the butterfly valve; hence, the importance of regular cleaning.

- (c) **Engine Water Pump:** The engine water pump requires turning of the grease cup  $\frac{1}{2}$  turn approximately once a week. Use a good automotive water pump grease.
- (d) The engine radiator fan requires oil or a light grease once a month. Use S.A.E. 30 oil or a light bearing grease.
- (e) The magneto requires lubrication of the felt distributor arm cam wick twice a year, and by an experienced magneto man when the magneto is overhauled.

**NOTE:** The above lubrication instructions are only suggestions. The variations in length of run, climatic conditions, etc. will vary the above instructions.

### 202. Cleaning the Radiator and Engine Compartment.

Frequency of cleaning will depend entirely upon the type of service in which the car is operating. The radiator and engine compartment should be blown out as often as the type of service demands.

The radiator is equipped with convenient inspection holes for inspecting its internal condition. Grease, sludge, or lime deposits in the radiator greatly reduce the cooling efficiency, and must be periodically removed. Suitable cleaning compounds are available on the market for removing such deposits and should be used as often as necessary, depending upon the operating conditions.

### 203. Metering Valve.

The metering valve should be removed from the supporting pipe connecting it to the valve compartment door, and sloshed in benzol (gasoline will not do) to dissolve the gums and lacquers which accumulate from crankcase vapors. After thorough cleaning, dry out the valve with compressed air, and reinstall the fittings. They must be tight to prevent air leaking

into the intake manifold and to avoid upsetting the carburetion.

#### 204. Valve Timing.

The flywheel is stamped "INO-1" for opening position of the intake valve for cylinder No. 1; "EXO-1" for opening position of the exhaust valve for cylinder No. 1; and "FIRE" for the ignition timing for cylinder No. 1. These marks can be seen through a small inspection hole on the top of the flywheel bell housing. Be sure the valve tappet clearances are correct before checking or changing the valve timing. Refer to the Tabulated Data sheet for the proper clearances.

#### 205. Magneto Timing (Edison CD-4).

On the flywheel, 12 degrees (1-9/32 inches) before top dead center of piston No. 1, is stamped the word "FIRE" for the correct instant for the ignition timing of cylinder No. 1. A deep groove is provided at this point which can be seen through the inspection hole in the bell housing. The magneto is held in place by two cap screws, and it is connected to the drive shaft through an adjustable coupling, so that it is easily disconnected or retimed when necessary. Before loosening this coupling, mark the exact shaft positions to simplify timing the magneto when it is replaced. Always refer to the flywheel markings or to the piston position as a final check as to the correctness of the ignition timing. **CAUTION:** Since the magneto fires only every other time the No. 1 piston is up, it is extremely important that the spark occurs at the proper stroke. To check this, remove spark plug No. 1 and turn the engine by means of the radiator fan until air flows out of the spark plug opening. The ignition should occur 12 degrees before the piston reaches top dead center on this compression stroke.

With the No. 1 piston in the proper position for ignition and the word "FIRE" appearing in the timing hole, proceed as follows to check or retime the magneto.

- (a) Loosen the hexagonal lock nut on the drive coupling. This loosens the coupling drive on the shaft from the pump and permits the magneto to be turned without disturbing the engine.
- (b) Rotate the magneto clockwise (facing the drive end) until the impulse trips and spark occurs at spark plug No. 1. (If no spark occurs the engine may be grounded. In that case remove the ground wire from the top of the magneto.) The impulse coupling automatically

retards the spark 15 degrees on starting. Hence, do not tighten magneto coupling at the position where the above spark occurs, but proceed as directed in next paragraph.

- (c) Now slowly rotate the impulse coupling back, counter-clockwise (after the spark has occurred in plug No. 1), until the magnetic pull is felt, but not far enough to engage the impulse coupling again. The spark occurs at the point of highest magnetic pull, and can be readily seen or felt. Now tighten the hexagonal lock nut on the drive coupling.

The breaker points, located behind the bakelite distributor cap, should be honed or filed and adjusted twice a year, or as often as required by the type of service. Breaker gap clearance should be .014-.016 inches. To adjust, loosen the three small screws holding the breaker arm assembly. Then by rotating the entire assembly, the desired breaker gap clearance may be obtained.

If excessive wear shows on the distributor rotor, it can be made smooth again with a fine sandpaper or by a fine cut taken off by a lathe.

Be sure that the high tension ignition wires make good clean metallic contact in the distributor in the magneto. Any green corrosion at these points indicates poor or no metallic contact, which, in turn, seriously impairs the spark intensity, plus overburdening the magneto. (See SK-272, figure 22, Parts List, for cross section of the magneto.)

#### 206. Magneto Maintenance (Edison CD-4).

The magnetos require a complete overhaul at least twice a year. This work should be done by trained magneto men or the magneto manufacturer representative.

#### 207. Bosch MJA-4C Magneto Timing.

The proper operating results are obtained by timing the engine and the magneto as follows: Remove the breaker point cover. Rotate the impulse coupling counter-clockwise, facing the drive end of the magneto (this to prevent the engagement of coupling weights), passing through the "contacts open" point to a position slightly beyond the point where the contacts close. Then rotate coupling clockwise until contacts are just separating. With the piston of the No. 1 cylinder in the firing position on the compression stroke, both the engine and magneto are in their correct relation for firing. Connect the magneto drive to the engine.

The arrow which is visible through the observation window in the center of the distributor plate should point to the upper right cable outlet (looking toward window). This is the cable which is to be connected to the spark plug in No. 1 cylinder (nearest to the radiator). Complete the installation by connecting the remaining cables of the magneto to the spark plugs in the proper firing order which is 1-3-4-2.

The firing sequence on the distributor or high-tension end of the magneto follows the opposite direction of rotation from that indicated by the arrow on the magneto name plate and must be taken into consideration when cables are connected to the spark plugs. Replace the breaker point cover.

### 208. Bosch Magneto Maintenance.

The cam lubricating felt wick is saturated with Mobile grease No. 2 by the magneto manufacturer and should be re-lubricated periodically with a small quantity of S.A.E. 50 or 60 oil.

The magnet rotor ball bearings and distributor gear bearing are packed with high-temperature American Bosch U S 508 grease and require no additional lubrication between overhauls.

Extreme care must be exercised so that the contact points remain free from oil and grease. When a periodic repair of the engine is undertaken, the magneto should be checked and repaired if necessary.

### 209. Grinding Engine Valves.

Examine the valves and valve seats once a year for any carbon or pitting. Replace any valves that are pitted or grooved. If possible, have the valves reground on a special grinding machine for that purpose, and have the valve seats refaced with a special fine reaming tool. However, if only a slight grinding and reseating is needed, it is possible to use some fine valve grinding compound (Cloverleaf No. 2-A is recommended) on each valve face, and then with a slight pressure and oscillating motion, proceed to grind the valve until a smooth face and seat results. Apply the compound sparingly. Turn the valve about a quarter turn each way for about three or four times, then raise the valve and turn it about a quarter or half a turn to another position. Then lower the valve until it seats and continue grinding. Do not overdo the grinding. It is better to replace or remachine any valves or seats that are badly pitted or scarred, than to remove all of the seating surface by grinding.

### 210. Removing Engine Head.

Drain the radiator water, remove all the spark plugs to avoid breakage, remove the engine heat switch thermal bulb and then after removing the hexagon nuts, take off the engine head and top water connection. Remove the head gasket, and throw it away. *NOTE: Always use a new head gasket whenever the cylinder head is removed and reinstalled.*

It is extremely important to clean the finished surfaces of the head and cylinder block to remove any burnt carbon particles or other foreign substances that may have clung to them. Grease both sides of the new gasket, and slip it in place on the studs. Then place the cylinder head in position and tap it lightly into place. In drawing up the cylinder head nuts, tighten them in a staggered fashion, a little at a time on each until they are drawn up evenly as indicated by a torque wrench set for 725-750 inch pounds. Then after the engine has run until hot, tighten all the cylinder head nuts again. This is extremely important due to the high compression engine. After the engine has been in service, it is well to check the nuts again while the engine is hot.

### 211. Testing of Engine Temperature Switch.

Waukesha units are equipped with either one of the following types of Engine Temperature Switch:

Engine Heat Switch—Part No. Y-7646.

Combination Oil-Heat Switch—Part No. Y-6977-A.

Engine Heat Switch—Part No. 950009.

The operating point of the thermal element of the temperature switch may be checked either on the unit or by the bench method.

- (a) The bench method is accomplished by removing the thermal element from the engine head and placing it in a cup of oil. Slowly heat the oil and at the same time agitate the oil. A test light should be connected through the switch contacts. When it lights note the oil temperature. The temperature should be approximately 225° to 230° F. where water only is used in the cooling system during the summer-time. The temperature reading should be 245° to 250° F. where 75 per cent Prestone is used both summer and winter. As the oil temperature in the test cup drops, the switch should open its contacts 10° to 15° F. below the closing point. The Detroit-Lubricator Type switches (Y-7646 and Y-6977-A) are adjusted by turning the adjusting screw on the side of

the thermal power element clockwise to raise both make and break settings. The A.C. type heat switch (950009) is not adjustable and must be replaced with a new switch if its cut-out point is inaccurate.

- (b) For a quick check, insert a test thermometer in the engine head, and cover the radiator so that the engine temperature will rise. With the engine operating, connect a test light or bell across the contacts of the snap switch in the oil-heat switch case. When the engine temperature reaches 225° (water only) or 245° (Prestone solution) F., set the temperature adjustment of the switch so that the snap switch will close.

## 212. Procedure for Reading FC Engine Compression Pressure.

The lowest compression pressure for the FC engine operating on propane that would be acceptable is 75 pounds when read under the following conditions:

- (a) All of the spark plugs removed to increase the cranking speed.
- (b) The maximum reading type of gauge used.
- (c) Reading observed after 10 to 12 compression strokes. (Take reading after the same number of compression strokes on all cylinders for comparative results.
- (d) Engine warm and properly lubricated.
- (e) A cranking speed of 125 r.p.m. or more.

On a new or overhauled engine which has been properly broken in and properly lubricated, the pressure reading range should be from 115 to 140 pounds when warm.

Another factor almost as important as the actual pressure measured is the variation in pressures obtained on the four cylinders on the same engine. When the pressure readings vary as much as 10 to 20 percent, even though the lowest reading may be above 75 pounds, the cause for the low reading should be investigated. The next step is to inject some heavy oil around the piston and cylinder walls to properly seal the piston. Then after cranking the engine a few times to properly distribute the oil on the cylinder wall, another pressure reading should be taken and if the pressure reading is still considerably below the average reading, it indicates, of course, that most of the compression loss is through either of the valves instead of past the piston.

## 213. Torque Wrench Recommendations.

A torque wrench is recommended when tightening engine head nuts and connecting rod bearing cap bolts. Care should be taken when using this wrench, so that it is not used beyond its range.

The torque wrench recommendations for various applications are as follows:

<i>Name</i>	<i>Bolt Size</i>	<i>Foot lbs.</i>	<i>Inch lbs.</i>
Cylinder Head	7/16-14	60-63	725-750
Main Bearing	1/2-13	88-92	1050-1100
Connecting Rod	3/8-24	44-46	525-550
Flywheel	1/2-13	67-69	800-825

## WAUKESHA RAILROAD ENGINE-GENERATOR UNIT

### PART II.

#### WAUKESHA RAILROAD ENGINE-GENERATOR UNIT

Model: "B" (7½ RGU-40 and 7½ RGU-80)

Model: "B-1" (7½ RGU-40 and 7½ RGU-80)

#### INTRODUCTION AND PREPARATION FOR USE

##### 301. Introduction.

The Waukesha Engine-Generator was designed to furnish electrical energy for car lighting and electrical appliances.

The two Engine-Generator models covered in this section are Model "B" and "B-1." The later "B-1" model is essentially the same as the earlier "B" model except for the following changes of accessories and characteristics:

- (a) The radiator on the Model "B-1" Engine-Generator Unit has added water capacity, separate pressure relief outlet, heavier core construction, and improved inspection and clean-out facilities. By changing the detachable fan shrouding, this radiator is also interchangeable with that used on the new Model "D-1" Ice-Engine Unit.
- (b) The air-cleaner set-up used on the Model "B-1" has been improved to provide a greater dust handling capacity.
- (c) The radiator fan assembly on the Model "B-1" is readily adjustable and has sealed ball bearings with adequate grease reservoir.
- (d) The engine head on the Model "B-1" contains a more positive type heat switch, which is affected by the true temperature of head material instead of the coolant temperature.
- (e) The unit frame construction on the Model "B-1" has been changed to accommodate the new type radiator.

##### 302. General Information.

The Waukesha Engine-Generator Unit is a self-powered generating system consisting of:

- (a) A Waukesha heavy duty four-cylinder internal combustion engine with accessories.

- (b) A Waukesha direct connected generator of special design, heavy duty, roller bearings, fully enclosed and mechanically cooled.

- (c) A fuel system consisting of a fuel cylinder cabinet, propane fuel cylinders, the necessary pressure regulators and valves for safety and sequence unloading, and an exhaust by-pass valve for maintaining propane pressures. (See Part IV for details of Fuel Supply System.)

- (d) The Engine-Generator panel, on which is mounted the necessary controls which automatically start and stop the engine according to the electrical load.

##### 303. Installation.

The engine and generator are assembled on a structural steel chassis mounted on cushioned spring wheels and supported by steel channel tracks. The unit may be rolled out from under the railway car for any major servicing without disconnecting fuel, exhaust or electric lines.

In locating the Engine-Generator under the car, it is important that the radiator end be accessible to free air movement, and if possible, mount the unit so that the radiator end is in the direction of train movement. Installation drawing SK-484-A and SK-487 of figures 9 and 47 respectively, give complete dimensions for mounting tracks, generator terminal block, fuel lines, fuel cylinder cabinet, and exhaust pipe. Wiring diagram SK-420-P, of figure 11, contains complete instructions for car wiring necessary to the Engine-Generator.

##### 304. Starting the Engine-Generator Unit for the First Time.

After the Engine-Generator Unit is in place, and a check has been made to see that all parts are in working order and all the car wiring is complete, the engine is ready to be put in service; however, the following instructions should be followed step by step for this first starting of the engine.

- (a) **Lubrication:** Fill the engine crankcase with five quarts of a good quality automobile cylinder oil (See tabulated data for correct S.A.E. rating for operating temperature.) All bearings have been greased at the factory and require no further greasing at this time.
- (b) **Cooling System—Radiator:** Fill the engine radiator with clean soft water. In the radiator tank in the engine compartment will be found a small air relief cock (top cock) which will facilitate filling of the radiator—be sure to close this after the cooling system is filled. On the older models, the lower cock is used in servicing for a quick check on the water level. To provide extra coolant capacity, some installations have an additional 10-gallon auxiliary expansion tank mounted directly above the unit and connected to the radiator with lengths of hose. When this set-up is used, extra care should be taken to see that both the expansion tank and radiator are filled. (See paragraphs 102 to 108 for details of cooling system.)
- (c) **Fuel:** Propane fuel is used in the engine. Under atmospheric pressure it is a gas because the liquid has a boiling point of 51° F. below zero. Propane itself is colorless, and odorless, but a tracer gas is added to make it easy to detect a leak in the fuel system. Propane exists as a liquid in the fuel tanks at a pressure of 125 lbs. per square inch at 70° F. Each tank has a capacity of 100 lbs. or 23.6 gallons of liquid propane. (For details of the fuel system see part IV.)
- (d) **Prepare Air Cleaner:** Remove the lower cup of the air cleaner. Pour in enough engine oil to cover the oil level mark on the removable disc located in the air cleaner cup. Use S.A.E. 10 lubricating oil.

### 305. Starting Engine.

The engine may now be started by using the manual start switch in the control box or start switch on control panel in car locker.

### 306. Stopping Engine.

The engine will continue to run until stopped by the low current relay, or manually. To manually stop the unit, push stop button either on car panel or push button in control box.

## GENERAL OPERATING INFORMATION

### 401. Operating Speed, Adjusting the Governor Setting (Refer to Fig. 19, SK-1028).

The Engine-Generator speed is set at 1200 R.P.M. at full load. The engine maintains this speed regardless of the generator load. The following procedure must be followed if it is necessary to adjust the governor:

- (a) With the engine at rest, loosen or disconnect the governor spring H, back out the damping screw, I, until it protrudes about  $\frac{3}{8}$  inch beyond the lock nut, and screw out idler stop screw, A, enough to permit the carburetor throttle butterfly to fully close. Also turn out screw, C, until throttle butterfly is wide open.
- (b) Disconnect the throttle rod at E.
- (c) Adjust the carburetor lever by means of locking screw, B, until the distance, J, is  $\frac{1}{2}$  the total horizontal travel of the carburetor lever.
- (d) Hold the governor lever, F, and the throttle arm, L, as far to the left as possible. This is the full-load wide open throttle position of these levers.
- (e) Adjust the length of the carburetor throttle rod, D, until it is  $\frac{1}{8}$ -inch short of reaching the governor lever, F. Reconnect the throttle rod to the governor lever. Warm up engine and set fuel adjustment, K, for highest vacuum. (According to gauge on instrument panel.)
- (f) Run the engine and with a full  $7\frac{1}{2}$  KW load, set the speed to 1200 R.P.M. by means of adjusting screw, G.
- (g) Remove the generator load, and if the engine hunts, turn damping screw, I, slowly clockwise until hunting just stops, but no more.
- (h) The no-load speed should not be more than approximately 75-100 R.P.M. greater than the full load speed. If it is greater, check for excess binding or friction in the carburetor throttle shaft and throttle rod and bearings.
- (i) Adjust idle screw, A, until minimum engine speed with throttle held closed is approximately 400 R.P.M.

### 402. Engine Oil Pressure.

The engine oil pressure should range between 15 and 35 pounds. The pressure may be adjusted by turning the oil relief valve adjusting screw on the engine block directly beneath the carburetor.

#### 403. Fuel Supply Pressure.

The fuel pressure shown on the gauge in the fuel cylinder cabinet will depend on the number of fuel cylinders as follows: (Outside temperatures must be above zero degrees.)

One cylinder .....	10 pounds
Two cylinders .....	20 pounds
Three cylinders .....	30 pounds
Four cylinders .....	40 pounds

It is assumed that each cylinder contains sufficient fuel, at least 3 to 4 pounds, and that the engine is running, otherwise the above pressures might be considerably lower.

The pressure in the car line from the main pressure regulator to the engine regulator should be 4 ounces when a single cabinet is used. To vary this pressure, remove the hexagon cap in the center of the large regulator and turn the adjusting screw clockwise for more pressure, and vice versa. (For complete details of fuel supply system, see Part IV of this manual.)

#### 404. Engine Cranking Speeds.

During extreme cold weather, it may be desirable to increase the cranking torque of the generator in starting the engine. This can easily be done by putting a jumper between 21 and 22 on the control panel of the earlier Model "B" units, shorting out part of the starting resistor.

#### 405. Excessive Cranking Protection.

Should the engine fail to start for any reason, the engine will be cranked intermittently by the intermittent starting switch until the automatic starting timer advances off its starting position in approximately 3 minutes.

#### 406. Intermittent Starting Switch.

The intermittent starting switch (C), which is mounted on the control panel serves two purposes (See figures 11 and 13, SK-420-P and SK-470-E):

- (a) It permits the generator to crank the engine for approximately 15 seconds and then breaks the starting circuit for 45 seconds, recycling until the engine starts or until the automatic starting timer advances off its starting position in approximately 3 minutes.
- (b) The second purpose is to open the control relay circuit to stop the Engine-Generator when the low current relay reaches its cut-out point.

On some of the older Model "B" units the intermittent starting switch is also used to open the

control relay (P) circuit whenever the engine oil pressure drops to approximately 5 pounds or the engine temperature is above approximately 220° F.

#### 407. Engine Temperature Switch (Part No. 950009).

The later model "B-1" units have a new type heat switch. If the engine overheats and causes the engine head temperature to go above 225° F., a small thermo-switch screwed into the cylinder head will energize the circuit to a heating element in the engine control panel. If the engine temperature stays above 225° F. for more than 1 to 2 minutes, it will trip this switch and ground the magneto, stopping the engine. After checking the cause for the overheating of the engine, this switch must be reset manually to start the engine. *NOTE:* If the units must operate at high engine temperatures, a solution with 75% or 100% of Prestone is used, and the switch is set for 240° F. instead of 225° F. (Refer to paragraph 108 for coolant details.)

#### 408. Oil Pressure Switch (As Used on Model "B-1" Units).

The pressure switch which is mounted in the engine compartment, provides protection against low oil pressure. If the oil pressure drops to approximately four pounds, the oil pressure switch will close the circuit and energize the oil-heat thermal switch located on the control panel. In about 1 to 2 minutes this switch will trip open, stopping the Engine-Generator. This switch must be manually reset.

#### 409. Combination Oil-Heat Switch.

Most of the Model "B" units have a combination oil-heat switch set-up. Should the engine for any reason become overheated, causing the engine head temperature to go above 220-230° F., or should the oil pressure go below 4-6 pounds, an oil-heat switch located in an enclosed box on the magneto side of the engine will make contact to energize the oil-heat thermal switch located on the Engine-Generator control panel. In about 1½ minutes this switch will trip open, stopping the Engine-Generator. This switch must be manually reset. (Refer to paragraph 211, for details on testing the engine temperature switch.)

#### 410. Tip-Over Switch (Used on Model "B" Units).

The tip-over switch is mounted inside the cover of the electrical junction box in the engine compartment, and will ground the magneto in case the engine generator unit tips more than 45 degrees in any direction.

**411. Engine Generator Controls.**

- (a) **General:** The operation of the automatic controls which stop and start the Engine-Generator depend upon the correct setting of the generator voltage regulator. Before attempting to set the regulator, permit the Engine-Generator to run a sufficient time so that both the generator and regulator are hot. The regulator is set by first inserting a piece of paper in the reverse current relay and the low current relay. Then adjust the potential coils spring tension to the following voltages: On lead batteries, set the potential coil at 38 volts with 16 cells and 76 volts for 32 cells. When Edison batteries are used, the setting is 43-45 volts and 86-90 volts respectively.

Next, check the setting of the maximum current regulator. Discharge the battery sufficiently, or obtain sufficient load by train-lining. **CAUTION:** Maximum generator output must not exceed 187 amperes and  $7\frac{1}{2}$  K W.

- (b) **Automatic Starting Timer (6, Figure 20):** This timer is used to start the Engine-Generator at either  $\frac{1}{4}$ ,  $\frac{1}{2}$ , or 1 hour intervals (Customer Option) depending upon the type of service, size of batteries, and connected load. One-quarter hour cam is supplied for winter service. The timer receives its electrical impulses from the timing relay.
- (c) **Timing Relays (21, and 22, Figure 20):** Two timing relays are used. These relays provide the electrical impulse to the automatic starting timer. This impulse is given every 3 minutes. See figures 16 and 17, SK-468 and SK-469 for details of their operation.
- (d) **Control Circuit Relay (15, Figure 20):** This is the pilot relay which is controlled either by the automatic starting timer or the manual switch on the panel or the manual switch in the engine control box. This relay when de-energized grounds the magneto to stop the engine.
- (e) **Starting Contactor (20, Figure 20):** The starting contactor is used to motor the generator for starting the engine. It is controlled by the control circuit relay and the reverse current relay.
- (f) **Low Current Relay (27, Figure 20):** This relay is used to stop the engine whenever the generating rate reduces to a pre-determined setting, determined by the minimum car load,

voltage, and leveling off rate of the battery. The low current relay should be set at a few amperes above the leveling off rate of the battery plus the minimum continuous car electrical load when in service.

- (g) **Load Current Relay Panel (Refer to Figures 11 and 13, SK-470-E and SK-420-P):** This panel, when used, will automatically start the Engine-Generator above a pre-determined load on the battery, regardless of the position of the automatic timer. This setting depends on the size of the battery, size of the load, and length of the "off" cycle of the generator. This panel operates as follows: When the load current is of sufficient amount to open contact (F) of the load current relay, the time delay relay (R) is de-energized. In approximately 10 seconds its contact (R) closes to start the Engine-Generator. Contact (R) has also approximately 10 seconds delay in opening. This time delay to close or to open eliminates any false starts or stops of the Engine-Generator due to sudden fluctuations in the load current.

- (h) **Auxiliary Panel for Edison Batteries (Refer to Figure 53):** To minimize battery flushing and fuel consumption, it has been found desirable with Edison batteries to use an auxiliary control panel in conjunction with the standard Engine-Generator panel. This panel consists of a sensitive voltage relay with normally open contacts connected in series with the generator regulator potential coil. As the battery voltage rises during charging, the voltage relay is set to pull in at a given voltage, representing an approximately fully-charged battery. The voltage relay contacts are now closed, energizing the generator regulator potential coil, which is set to regulate at a reduced voltage, and a corresponding lower charging rate. The low current relay on the Engine-Generator panel is set to stop the Engine-Generator at a fully-charged current value corresponding to the reduced voltage, plus the minimum continuous car electrical load when in service.

**412. Cycle of Operation (Refer to Figures 11 and 13).**

The complete cycle of the Engine-Generator is as follows:

- (a) When the control circuit is energized for the first time, the 3-minute timing relay (26-27)

(normally open, quick make, slow break) and the automatic starting timer coil (34-35) are energized. The automatic starting timer coil advances the automatic starting timer one step. The 3-minute timing relay coil closes its contacts (24-25). This energizes the relay coil (30-31) of the 5-second timing relay (normally closed, quick make, slow break) and after 5-seconds this opens its relay contacts (28-29) which then de-energizes the 3-minute timing relay coil (26-27) and also the automatic starting timer coil (34-35). Since the 3-minute timing relay is slow opening, it will take approximately 3 minutes to open. When it opens it de-energizes the 5-second timing relay coil (30-31) closing its contacts (28-29), and energizing the 3-minute timing relay coil (26-27) and the automatic starting timer coil (34-35). The cycle is then repeated. (See wiring diagrams SK-420-P and SK-470-E, of figures 11 and 13.)

- (b) When the automatic starting timer coil (34-35) is energized, it moves the cam in the automatic starting timer one step. (Assume the operation is for 15-minute intervals.) After 5 impulses or steps, the cam has moved to the positions where contact is made (36-37) energizing the control circuit relay.
- (c) The control circuit relay, when energized by the automatic starting timer, energizes the starting contactor and also opens the ground circuit to the magneto.
- (d) The starting contactor energizes the series field in the generator. This motors the generator until the engine starts. As soon as the engine starts and the generator voltage is  $\frac{1}{2}$  volt above battery voltage (1 volt on 80-volt equipment) the back contact on the reverse current relay opens the circuit to the starting contactor coil.
- (e) As the batteries approach a charged condition, the charging rate drops. At a pre-determined setting the low current relay drops out, closing the circuit to the heating element in the intermittent switch.
- (f) After the heating element is energized for 15-20 seconds, the contacts open to de-energize the control circuit relay.
- (g) The control circuit relay drops out and grounds the magneto, stopping the engine. As

the generator comes to rest, the polarity of terminal No. 14 on the Engine-Generator control panel reverses, energizing the starting timer until the 5-second relay opens its contact (28-29). This, in turn, advances the cam one notch to open the starting circuit (36-37).

- (h) Approximately three minutes after the engine has stopped, the timing relay again moves the timing cam one step. After 5 impulses the automatic starting timer energizes the control circuit relay, again starting the engine.

#### 413. Manual Stop-Start Buttons.

The engine can be started or stopped manually either at the unit or at the panel by pushing either of the above mentioned buttons. The start buttons are connected in parallel with both the automatic timer contacts and the contacts of the time relay on the load current relay panel. The stop buttons are connected in series with the control relay coil and serve to de-energize the control relay to stop the engine.

### SERVICE MAINTENANCE INSTRUCTIONS AND OPERATING DIFFICULTIES

#### 501. Lubrication Suggestions.

- (a) **Crankcase:** The engine crankcase requires draining and refilling every 300 hours of operation. Use No. 10 oil for winter and also the first filling of a new engine, and No. 30 oil for summer.
- (b) **Engine Radiator Fan:** The engine radiator fan requires oil or a light grease once a month.
- (c) **The Engine Water Pump:** The engine water pump requires turning of the grease cup  $\frac{1}{2}$  turn approximately once a week. Use a good automotive water pump grease.
- (d) **Magneto:** The magneto requires lubrication twice a year, and by an experienced magneto man when the magneto is overhauled.
- (e) **Generator Bearing:** The ball bearing in the generator requires greasing approximately once every two months. The following is a partial list of recommended greases:
  - (1) Mast Lubricant Company ..... Lubrico M-6
  - (2) Cities Service Oil Company.....Trojan M-3
  - (3) Sinclair Refining Company.....Universal
  - (4) Standard Oil Co.....Superla 4X or 6X
  - (5) Texas Company.....Starfax No. 3
  - (6) Socony Vacuum Company.....BRB No. 4

*NOTE:* The above lubrication instructions are only suggestions. The variation in length of run, climatic conditions, etc., will vary the above instructions.

#### **502. Radiator.**

The radiator is equipped with convenient inspection holes and covers for inspecting the internal condition of the radiator. Grease, sludge, or lime deposits in the radiator greatly reduce the cooling efficiency of the radiator and must be periodically removed. Suitable cleaning compounds are available on the market for removing such deposits and should be used as often as necessary, depending upon the operating conditions.

#### **503. Cleaning the Radiator and Engine Compartment.**

The frequency of cleaning the radiator and engine compartment will depend entirely upon the type of service in which the car is operating. The radiator and engine compartment should be blown out as often as the type of service demands.

#### **504. Electrical Contacts.**

Regular attention is necessary to clean and keep clean all the electrical contacts in the control equipment. These contacts should have periodical inspection by competent employees.

#### **505. Belt.**

**Refer to Part 1, Paragraph 107.**

#### **506. Air Cleaner and Breather Cap.**

The air cleaner to the carburetor intake and the crankcase breather must be cleaned as often as conditions require it. It is extremely important that the oil in the cleaner and crankcase breather does not become thick with suspended dust particles. Clean and fill the removable cup to the level indicated—using engine oil. (See paragraph 201 (b), for further details.)

#### **507. Metering Valve.**

The metering valve should be removed from the supporting pipe connecting it to the valve compart-

ment door, and sloshed in benzol (gasoline will not do) to dissolve the gums and lacquers which accumulate from crankcase vapors. After thorough cleaning, dry out the valve with compressed air, and reinstall the fittings. They must be tight to prevent air leaking into the intake manifold and to avoid upsetting the carburetion.

#### **508. Fuel Mixture Adjustment (See Figure 51, SK-275).**

The fuel or load adjustment screw is secured by a lock nut. When the Engine-Generator is operating at normal load, turn the screw clockwise until the engine starts to lose speed. Then turn it counter-clockwise until the highest vacuum is reached. (Vacuum gauge is located in the control box.) Do not turn further. This is the most economical adjustment and gives the best engine performance.

*CAUTION:* Tighten the hexagonal lock nut securely.

#### **509. Valve Timing.**

(For valve timing details, refer to paragraph 204.)

#### **510. Magneto Timing.**

(For magneto timing details, refer to paragraph 205, or 207.)

#### **511. Grinding Valves.**

(For valve grinding details, refer to paragraph 209.)

#### **512. Removing Engine Head.**

(For details of engine head removal, see paragraph 210.)

#### **513. Magneto Maintenance.**

The magnetos require a complete overhaul at least twice a year. This work should be done by trained magneto men or the magneto manufacturer representative.

#### **514. Generator Maintenance.**

The generator and regulators require the same maintenance as do axle-driven units. Weekly inspection of the generator commutator and brushes is recommended. Also weekly blowing out of any accumulated dust in the generator housing. Check brush tension periodically. Check by hooking a spring scale on the brush holder clamp. Tension should read 3-4 pounds.

### 515. Armature Removal.

The generator armature may be removed as follows:

- (a) Remove end cover, fan assembly, and head enclosing covers.
- (b) Disconnect the leads to the generator brush holders.
- (c) Remove the front head.
- (d) Armature may now be removed. (No puller required.)

### 516. Testing of Engine Temperature Switch.

(For testing details of engine temperature switch, refer to paragraph 211.)

### 517. Engine Compression.

(For engine compression details, see paragraph 212.)

### 518. Test for Ensign Regulator Shut-Off.

For a quick check when the Ensign regulator is suspected of leaking, a tester consisting of a jar half full of water, tubing, and fitting should be used. Break the fuel line union at carburetor and while holding fitting against the half union, and the other end of tubing below the water level in jar, observe if bubbles appear in water filled jar. Blow gently against top regulator diaphragm through breather or equalizer opening, and see if regulator again shuts off. Should bubbles appear when regulator is closed, shut off the fuel line, remove the top half of regulator body, and inspect the valve seat.

### 519. Operating Difficulties.

- (a) **Improper Fuel Pressures:** If the fuel pressure gauge located in the fuel cabinet shows a pressure considerably higher than the desired pressure for that fuel cylinder with engine running, and also will not reduce when the adjusting screw is turned in (clockwise) it indicates that the small fuel regulator (Y-6163-B) seat or diaphragm is defective and should be replaced.

If the fuel pressure to the engine, which should be 3-5 ounces varies considerably, as shown on the manometer, or reads considerably higher after the engine is stopped, it indicates a defective seat in the main fuel regulator (Y-6162). If fuel is escaping through the vent, the diaphragm is ruptured and must be replaced.

In extremely cold weather be sure to keep all of the fuel cylinders as full as possible to minimize the refrigerating effect in each cylinder as fuel is being drawn.

Be sure all exhaust connections are reasonably tight so that maximum exhaust enters the heater pads. All exhaust piping, wherever possible, must be well insulated.

The heater pads may be opened for cleaning should they become coated or dirty.

- (b) **Improper Oil Pressures:** The engine oil pressure should range between 15-35 pounds. The pressure may be adjusted by turning the oil relief valve adjusting screw on the engine block directly beneath the carburetor.

- (c) **Engine Fails to Start (See Figure 10, SK-420-N-1 and SK-463-E-1 for Model "B" Units) (See Figure 11, SK-420-P for Model "B-1" Units):** If generator fails to crank engine, check the following:

- (1) Starting fuse.
- (2) Control circuit fuse.
- (3) Contacts in oil-heat switch.
- (4) Contacts in intermittent starting switch.

If the generator cranks but the engine fails to start, check the following:

- (1) Fuel pressures.
  - (2) Ignition. If no spark at plugs, check for ground on magneto by removing the ground wire from the magneto.
  - (3) Improper fuel adjustment on the carburetor.
  - (4) If choking of air intake to carburetor starts the engine, it indicates a defective fuel shut-off regulator.
  - (5) Air in the fuel line.
  - (6) Carburetor venturi dirty, restricting flow.
- (d) **Ignition:** The gaps in the spark plugs should be checked every 150 hours of engine operation. The spark plug gaps must be between .015-.018 inches when Edison magnetos are used and .025 inches for Bosch magnetos. This gap size is extremely important, due to the high compression engine. Replace the spark plugs every 600 hours of engine operation, but be sure to reset the gaps on the new plugs to the above dimension.

If no spark occurs at the plugs, the fault may be a ground on the wire from the magneto or a defective magneto itself. The magneto breaker point gap is set at .016-.018 inches.

Check also for good, clean metallic contact of the high tension ignition wires at the magneto distributor block and the spark plug shields. Green corrosion at these points indicates arcing due to poor or no metallic contact.

## 520. Service Chart:

**NOTE:** These instructions are only suggestions.

The variation in length of run, climatic conditions, etc., will vary the following instructions:

### (a) Daily.

- (1) Remove side door, and blow out engine compartment and radiator with air hose.
- (2) Check oil level in crankcase.
- (3) Remove bottom cup of air cleaner, clean and refill with oil, if necessary.
- (4) Remove pre-cleaner cup and clean out dirt.
- (5) Start engine, and observe operation.

### (b) Weekly Inspection.

- (1) Clean engine compartment and radiator with air hose.
- (2) Check engine crankcase.
- (3) Clean and refill bottom half of air cleaner according to instructions on name plate.
- (4) Clean crankcase breather cap in gasoline.
- (5) Check radiator fan belt.
- (6) Give water pump grease cup a half turn.
- (7) Check and fill engine radiator.

### (c) Monthly Inspection.

- (In addition to Daily and Weekly Inspections)
- (1) Add grease to engine radiator fan bearing.
  - (2) Repack oil filter.
  - (3) Drain and refill engine crankcase.
  - (4) Check the generator brushes and commutator. Blow out with air.

- (5) Remove generator and cover screen and blow out from inside with air hose; also, blow out air passages around generator.

## 521. Tabulated Data.

### ENGINE-GENERATOR

(Models "B" 7½ RGU and "B-1" 7½ RGU)

#### Engine

Model .....	FC
Bore (inches) .....	3¼
Stroke (inches) .....	4
Cylinders .....	4
Displacement (cu. in.) .....	133
Horse Power Available, 1100 R.P.M. ....	20
Oil Capacity, with filter (quarts) .....	5
Oil Pressure (lbs. per sq. in.) .....	15-35
Oil, Summer Operation S.A.E. No. ....	30
Oil, Winter Operation S.A.E. No. ....	10
Water Capacity—	
Engine and Radiator Only (qts.), Model "B".....	13
Engine and Radiator Only (qts.), Model "B-1".....	16
Valve Tappet Clearance, Cold—Exhaust (in.).....	.012
Valve Tappet Clearance, Cold—Intake (in.).....	.010
Firing Order .....	1-3-4-2
Spark Advance, degrees ahead of dead	
center on flywheel .....	12°
Intake valve opens, degrees after dead	
center on flywheel .....	5°
Spark Plugs (4) .....	18 mm
Magneto Breaker Point Gap	
(Edison Spaldorf) .....	.017
Magneto Breaker Point Gap (Bosch) .....	.015

#### Generator

Rated Voltage (DC) .....	40 or 80
KW .....	7½
Field Poles .....	4

#### General

Weight Engine-Generator (lbs.) .....	1300
Fuel Cylinder Capacity, Propane (23.6 gal.) lbs. ....	100
Engine Fan Belt Part Number	
(Models "C," "B," and "D") .....	Y-6036-A
Engine Fan Belt Part Number	
(Models "B-1" and "D-1") .....	Y-19482
Intermittent Switch, Closed for (sec.) .....	15
Intermittent Switch, Open for (sec.) approx. ....	45
Oil Switch, Opens at (lbs.) .....	6 to 11
Oil Switch, Closes at (lbs.) .....	4
Engine Heat Switch Closes at .....	225° (water) 245° (Prestone)

**PART III.**  
**WAUKESHA RAILROAD ICE ENGINE UNIT**  
**for**  
**AIR CONDITIONING SYSTEMS**  
**Models: "C", "D", and "D-1"**

**INTRODUCTION, DESCRIPTION, AND INSTALLATION**

**601. General Information.**

The Waukesha Ice Engine unit for air conditioning is a self-powered refrigerating system consisting of: (1) A Waukesha heavy duty four-cylinder internal combustion engine with accessories: (2) A four-cylinder V-type refrigerant compressor connected to the engine by multiple V-belts. The whole is assembled on a structural steel chassis mounted on cushion wheels and supported by steel channel tracks. The unit may be rolled out from under the railway car on the tracks for any major servicing, without disconnecting any refrigerant, fuel, or electric lines.

**602. Description and Difference of Various Models.**

The Model "D" and "D-1" Railway Ice-Engine Units are more compact machines weighing less than the Model "C" and having a number of refinements in control and safety devices and a more convenient arrangement of accessories. When referring to the operation and care of the Models "D" and "D-1" units, the new control devices described in the following paragraphs should be kept in mind.

- (a) The crank limit switch on the Model "D" unit contains a 3-min. thermal element which is used with an intermittent cranking switch (see intermittent starting switch below). When the intermittent starting switch is not used, a 1½ minute element is used. (See wiring diagrams SK-363-E and SK-363-F, figures 32 and 33.) Refer to paragraph 705-e, for further details.
- (b) A vacuum switch located in the engine compartment of Model "D" and "D-1" units takes the place of the slide switch which controls the cranking on the Model "C" units.
- (c) An intermittent starting switch is used in the control circuits of the Model "D" units, but not on the Model "D-1."

- (d) A vacuum gauge is mounted on the instrument panel of the Model "D" and "D-1" units.
- (e) A mercury manometer that indicates the fuel line pressure is located in the left side of the control box of the Model "D" and "D-1" units.

**603. Freon Cycle (See Figure 42).**

- (a) **Refrigeration:** Mechanical refrigeration is a process which alternately changes the state of the liquid refrigerant from the liquid to the vapor state, and from the vapor to the liquid state. For the vaporization of a liquid, heat is required. If a refrigerant such as Freon is changed from a liquid to a vapor state, a large amount of heat will be needed. This heat is taken from the materials or space to be cooled by the refrigerant.
- (b) **Freon—12:** Freon, which is the refrigerant used in the Waukesha system, boils or becomes a gas at 22° F. below zero at atmospheric pressure. The change of state of the refrigerant takes place in the system as follows:
- (c) **Compressor:** The vapor of the refrigerant enters the 4-cylinder V-type compressor where its pressure and temperature is increased.
- (d) **Condenser:** The high pressure Freon gas passes from the compressor to the condensers where it is cooled and changed to a liquid. This unit has two condensers, one mounted on each side of the unit frame. The condenser consists of a series of tubes through which the Freon flows. The temperature of the Freon is reduced by the air which is drawn over the tubes. This cooling at high pressure causes a change of state in the refrigerant so that it is condensed again and becomes a liquid.
- (e) **Sub-Cooler:** When the cooling load is the heaviest during hot weather, the sub-cooler is used to increase the Ice-Engine's cooling capacity. It operates in conjunction with the air condensers of the unit. It is completely self-contained, including a ½ hp. motor, fin-type cooling coil, circulating water pump,

large spray nozzle, blower, filter, pressure or temperature switch, and a 40 gallon water reservoir. The water is sprayed through the nozzle and blown over the fin-type coil. This reduces the temperature of the coil and absorbs some of the heat from the liquid Freon. A float valve may be connected to the car water system for the purpose of making up the water lost by evaporation.

- (f) **Receiver Tank:** From the sub-cooler the liquid Freon flows to the receiver tank which has a capacity of approximately 50 lbs. of liquid Freon.
- (g) **Liquid Line Strainer or Combination Strainer-Dryer:** After the liquid Freon leaves the receiver tank it passes through a liquid line strainer. It contains two fine copper screens and a felt filter which remove any dirt, copper filings, or solder from the Freon.
- (h) **Solenoid Valve:** A solenoid valve is located before the evaporator expansion valve. In some installations, where a split evaporator is used two solenoid valves are used. These shut-off valves are electrically controlled by the cooling thermostat relays. The cooling load relay is de-energized when the car temperature reaches that of the thermostat setting. This stops the flow of Freon to the expansion valve or valves. Operation of the solenoid valve is based upon the by-pass principle where the main valve opens by the pressure difference between the refrigerant above and below the operating piston.
- (i) **Expansion Valve:** The expansion valve meters out the amount of liquid Freon that enters the evaporator according to the temperature of its thermal bulb clamped on the evaporator outlet line. It is a pressure reducing valve, thermostatically controlled and located between the solenoid valve and the evaporator. The thermostatic bulb is attached to the evaporator outlet and is charged with a gas or liquid which produces a pressure on the thermostatic element, increasing as the temperature of the bulb increases. This increasing and decreasing of pressure opens and closes the needle valve. The expansion valve allows at all times the exact amount of refrigerant required to meet the evaporator load and keeps the entire coil nearly flooded without allowing liquid to pass into the suction line.

- (j) **Evaporator:** The evaporator consists of a series of tubes in which the refrigerant at a low temperature boils and changes its state to a gas. This action absorbs the required amount of heat from the air blown over it by the car blower fan to change the liquid to a gas.

After the refrigerant gas leaves the evaporator, it returns to the compressor, completing its cycle.

#### 604. Preparation for Use.

- (a) **Installation of Unit:** In locating the Ice Engine under the car, it is important to provide a location where all sides of the unit will be accessible to free air movement. The units should be as great a distance from the center sill of the car as A. A. R. right-of-way clearances will permit. Installation drawing SK-343-A, figure 21, gives complete dimensions for mounting tracks, receiver, unit and fuel carrier. Wiring diagrams SK-252, SK-252-B, and SK-252-C of figures 24 and 27 give complete instructions for the car wiring necessary to the Model "C" and "D," and "D-1" Ice Engines.
- (b) **Refrigerant Lines:** In installing the suction line from the evaporator to the Ice Engine it is important to provide some slope of the suction line toward the Ice Engine so that the compressor oil will tend to drain back to the compressor.

Where air condensers only are used, it is very desirable to obtain some heat transfer from the warm liquid line to the cool suction line. The most effective method of obtaining this heat transfer is by the use of three or four feet of  $2\frac{1}{8}$  O. D. tubing slipped over the  $1\frac{5}{8}$  inch O. D. suction line. A  $2\frac{1}{8}$  inch x  $1\frac{5}{8}$  x  $\frac{3}{4}$  tee at each end of the large tube will permit the liquid Freon to be passed over the suction line but inside of the three or four feet of  $2\frac{1}{8}$  inch O. D. tube. A liquid temperature drop of 14 to 18 degrees can be obtained by this arrangement. It has the further advantage of eliminating all possibility of flash gas appearing at the expansion valve. (See figure 42.)

Some heat transfer may be obtained by clamping together the liquid and suction line for as many feet as possible, using wide brass or copper straps every three or four feet, and then covering both pipes together with insulation.

**605. Starting the Ice Engine for the First Time.**

(a) **General:** After the Ice Engine unit is in place and connected to the car refrigerant lines, it will be necessary to operate the engine and drive the compressor in order to exhaust all the air and moisture from the lines, and to prepare the system to receive the charge of refrigerant. Following this, a preliminary charge will be introduced for testing of joints for leaks under pressure with a Halide lamp, and then a final charging preparatory to putting it in regular service. The following instructions should be observed step by step for this first starting of the engine.

(b) **Lubrication:** Fill the engine crankcase with five quarts of a good quality S.A.E. No. 30 automobile cylinder oil. The compressor is shipped from the factory, filled with the proper amount of oil. All bearings also have been greased at the factory and require no further greasing at this time.

Fill the engine air cleaner with about a cupful of engine oil, in accordance with the instructions on the cleaner name plate.

(c) **Radiator:** Fill the engine radiator with clean *soft* water. In the radiator expansion tank in the engine compartment will be found a small air relief cock (top cock) which will facilitate filling of the radiator—be sure to close this after the system is filled. The lower cock is used in servicing for a quick check on the water level. If water runs out at this level, no water has to be added to the radiator. If a radiator auxiliary tank (10 gal.) is used, water is added only through filler in auxiliary tank. Be sure that the top connection in radiator connects to top hose connection of auxiliary tank, and the bottom radiator connection to the bottom connection of auxiliary tank. See paragraphs 104 and 105 for details of the latest type radiator as used on the Model "D-1" Ice Engine Units.

If the car is subject to freezing weather on a portion of its run, then protect with an anti-freeze solution in the cooling system (capacity of 4 gallons for Model "D" and "D-1.")

(d) **Setting Refrigerant Valves for Evacuating and Charging System.** Refer to paragraph 901 entitled "To Pump Vacuum On Empty System and To Charge With Freon" for the setting of the refrigerant valves and for evacu-

ating and charging with Freon. The use of a suitable chemical dryer such as activated alumina or silica gel (obtained from any refrigeration supply house) is recommended for the first two or three hours of cooling. It should be connected in series with the liquid line out of the receiver. If silica gel is used, it may be left in the system permanently, changing it only each season. Any other drying agent used should not be left in the system more than two or three hours as it may disintegrate and pass into the system.

(e) **Setting Fuel Valves:** The following instructions apply to each fuel cabinet, whether two, three or more are used.

Open the valves on each fuel cylinder to the full open position by turning them counter-clockwise one-half turn to "OPEN." Similarly open all the fuel line valves. The fuel pressure shown on the gauge will depend on the number of fuel cylinders in the fuel cabinet. For details of fuel supply system, see Part IV "Fuel Supply System."

(f) **Starting Engine For Test:** To start the unit from the control box; turn blower fan to "ON" at car panel and lift the Toggle Switch in the control box.

To start the unit from the car panel; turn the blower fan to "ON" and cooling switch to its cooling position.

**NOTE:** To evacuate the entire system, the solenoid valve must be energized during the entire evacuating period. **THIS IS VERY IMPORTANT!** This can be accomplished by either holding or blocking up the toggle starting switch, or energizing the thermostat circuit from the car panel. Failure to open the solenoid valve while pumping a vacuum will result in a vacuum being obtained in only a part of the system. To prevent the Ice Engine from stopping during this evacuating period, insert a piece of paper between the contacts of the low pressure switch Q, figure 42. *Be sure* to remove the paper after evacuating.

(g) **Removing Air From System (Refer to Figure 42):** After all the valves have been properly set as instructed in the foregoing, and the Ice Engine is running, the system will begin to pump a vacuum and discharge air and some oil through the connection B, figure 42,

in the control box. It will require ten or fifteen minutes of operation to discharge the system sufficiently so that only an occasional drop or bubble of oil will appear. After the first fifteen-minute period of operation, if there is still a steady flow of air and oil from the connection at (B), there is a leak which must be located and closed. To completely evacuate the system will require longer. If the compound gauge (X) in the control box shows the vacuum to be reduced to 20-28 inches, continue operation for a period of two hours. For some time prior to the end of this evacuation period, there should be no sign of air or oil coming from connections (B), and the system is ready to receive a charge of refrigerant.

- (h) **Charging with Refrigerant:** Before introducing the entire charge of refrigerant, a small amount should first be put into the system and time allowed for it to circulate through the entire system in order to check for leaks with a Halide lamp. In stopping the unit to test for leaks, leave the solenoid valve (V) energized and stop the unit by opening the low pressure switch (Q). This procedure permits a higher pressure on the low side of the system, which is necessary in testing for leaks.

If leaks are found, the Freon in that part of the system must be removed. If the leak is in the low side of the system—from the lower receiver valve through the evaporator and back to the compressor crankcase—remove the Freon as outlined in paragraph 905, being careful not to run the compressor after the low side pressure gauge (X) becomes zero. Any further operating would reduce pressure below zero, causing air to be drawn into the system through the leak.

The Freon level in the receiver should be in the sight glass when the unit is operating and cooling. Any level considerably lower than this may cause some Freon gas to pass out through the lower outlet of the receiver, with consequent loss in the cooling capacity. Fifty pounds of Freon will normally be sufficient, but the use of the sub-cooler or a long or large liquid line to the expansion valve may require a few more pounds to bring the operating level into the sight glass. Very cool air over the condensers, causing more Freon to stay as a liquid in the condensers, will also lower the visible Freon level.

## 606. Stopping the Ice Engine (Refer to Fig. 42).

The engine is stopped by de-energizing the solenoid refrigerant valve (V), which is accomplished by either opening the thermostat circuit at the car panel, or lowering the toggle starting switch in the control box. The engine continues to run for a few moments until the low side pressure has been reduced to about 7½ lbs., as shown by gauge (X). The low pressure switch (Q) then operates to ground the magneto and stop the engine.

## GENERAL OPERATING INFORMATION

### 701. Operating Speeds.

Drawing SK-267-A, figure 23, shows the relation between the suction pressure and the engine speed, as determined by the modulated control drawing SK-238 C, figure 22. For adjustment of the modulated control refer to the following paragraphs.

- (a) **The Modulator:** The modulator is a device which will vary the speed of the engine according to the low side Freon pressure, which also varies with the refrigeration load. When the pressure is low, the speed of the engine is decreased proportionately, reducing the compressor capacity and therefore, reducing the rate of cooling in the car. This acts to level off the temperature and also the humidity in the car and prevents frequent cycling of the unit. If the low side Freon pressure rises, which indicates a demand for more cooling, the engine speed is increased and the compressor capacity restored.

The low side Freon pressure operating through a bellows presses against the modulator stem, which increases or decreases the spring tension on the governor arm as required. The adjustment of the modulator will be explained along with the adjustment of the governor to which it is attached.

- (b) **The Governor:** The governor regulates the maximum speed of the engine by operating a carburetor butterfly valve. The governor shaft is driven from the engine timing gear train. To this shaft are attached two small flyweights so that when the shaft revolves, the weights are thrown out centrifugally in such a manner as to exert pressure on a plunger on the shaft. The plunger in turn operates a fork attached to the pivot of the governor control arm. An adjustable link connects the governor control

arm to the carburetor butterfly. The linkage is so connected that as the flyweights revolve faster and faster, the force exerted tends to close the carburetor butterfly valve and slow down the engine.

(c) **Adjusting Speed (See Figures 22 and 23):**  
The following procedure must be followed in installing or readjusting the modulated control:

- (1) Adjust the governor damping screw (P) so it protrudes  $\frac{1}{8}$  inch beyond the lock nut.
- (2) Remove the pin (E) from the governor arm.
- (3) The minimum speed of the engine is determined only by the screw (A) on the carburetor and the load on the engine. Therefore, first start the engine and obtain 14-15 pounds suction pressure (by snapping off and on the liquid solenoid valve by means of the toggle switch in the control box). Then adjust the screw (A) on the carburetor until the desired speed is obtained (1150-1200 R.P.M. on the condenser fan).
- (4) Adjust the distance (Q) to approximately  $\frac{1}{4}$  inch by loosening the screw (B) and slipping the carburetor arm on the throttle shaft. The throttle shaft must be turned against the stop screw (A) for this adjustment.
- (5) Valve (H) must be in the wide open position (counter-clockwise).
- (6) Turn the adjusting nut (J) until the modulator stem (O) just starts to move at 15 pounds (maximum) *rising* pressure. As the adjusting nut (J) is turned up (clockwise) the tension is increased on the spring (F), requiring a higher pressure to move the modulator stem. The total modulator stem (O) travel is  $\frac{1}{4}$  inch from 0 to 45 pounds pressure. The movement must be checked on a rising suction pressure obtained by shutting off the liquid solenoid valve until the pressure is below 15 pounds, then opening the valve again.
- (7) With the engine running at the proper minimum speed (as set in Step 3 above)

and with a suction pressure of 14-15 pounds, tentatively adjust the length of the eye bolt (K) until the slack in the governor spring (L) is just taken up. The pin (E) should be out for this adjustment.

- (8) Now adjust the length of the governor rod (D) so it just reaches (less  $\frac{1}{16}$  inch) the governor arm (N) when the engine is running at the minimum speed setting corresponding to 14-15 pounds suction pressure. By making the length  $\frac{1}{16}$  inch short, the screw (A) on the carburetor will hit the stop each time the suction pressure is 15 pounds or less.
- (9) Run the engine a few minutes with as much load on the evaporator as possible so as to create a high suction pressure (not over 45 pounds). Then read the condenser fan speed and compare with the speed indicated on the curve for that suction pressure. If the speed does not check within 50 R.P.M., change the governor spring adjustment screw (K) in the direction needed.
- (10) Recheck the minimum speed at 14-15 pounds suction pressure. The carburetor arm should be against the stop screw (A). If not, shorten the governor rod (D) the amount necessary, but no more.

## 702. Operating Refrigerant Pressures.

The refrigerant suction or low side pressure will vary according to the temperature of the air pressed through the evaporator. After the unit has operated a few minutes it will range from 20-45 pounds with Freon. If the car temperature is high, the low side pressure will also be high when a thermostatic expansion valve is used.

The discharge or high side pressure will increase with an increase in suction pressure, or with an increase in the air temperature through the condenser. The high side pressure in pounds will be approximately double the air temperature in degrees—with 70 degree air, the high side pressure will be about 140-150 lbs. per sq. in., with a normal back pressure of 35-37 pounds.

For excessive high side pressures, refer to paragraph 1101, entitled "Improper Refrigeration Pressures."

**703. Operating Engine Oil Pressures.**

Engine oil pressure should range between 15 and 35 pounds. The pressure may be adjusted by turning the oil relief valve adjusting screw on the engine block directly beneath the carburetor. For further details on the oiling system, refer to paragraph 109.

**704. Fuel Supply Pressures.**

For complete details of the fuel supply pressures and sequence of emptying the fuel tanks, refer to paragraph 1205.

**705. Model "D" and "D-1" Ice-Engine Controls and Protective Devices.**

- (a) **Engine Unloading for Starting (See Figure 42):** The engine is automatically unloaded for starting by the solenoid by-pass valve (W). When the thermostat is energized to start the engine, the solenoid by-pass valve is also energized and opened. The reverse-flow check valves (S) prevent a reverse flow from the condenser to the compressor. Therefore, the compressor as it is turned over is entirely unloaded, enabling the starter to readily crank and start the engine. Furthermore, the by-pass valve is de-energized and closed only after the engine is up to speed. This is accomplished by the vacuum switch.
- (b) **High Pressure Switch (Refer to Drawing SK-360-E, Figure 30):** The high pressure switch is a dual protection switch. At a head pressure of 300 pounds it will open its upper contact which is in series with the liquid solenoid valve. The unit will start to pump down, causing the head pressure to lower. At 295 pounds the switch closes its upper contact, again energizing the liquid solenoid valve. A sudden rise in head pressure to 350 pounds, due, for example, to the compressor discharge valves being closed, will cause the switch to close its lower contacts, grounding the magneto and stopping the engine. The pressure switch will start the engine at 290 pounds.
- (c) **Low Pressure Switch:** The low pressure switch is actuated by the low side Freon pressure. It has an upper and a lower contact. The upper contact which carries the cranking circuit, closes at a pressure of 15 lbs. The lower contact which serves to ground the magneto primary and stop the engine closes at 7½ lbs. The low pressure switch is the main control for stopping the engine, as it functions to ground the magneto after the refrigerant

solenoid valves close and the system pumps down.

- (d) **High Pressure Relief Valves (Used on Models "C" and "D"):** A high pressure relief valve is connected between the heads and crankcase of the compressor. It provides a second protection for a sudden high pressure; it is set open at 400 pounds, and automatically closes again at about 350 pounds.

*NOTE:* The use of this valve is optional and may be omitted from the unit. The later Model "D-1" units do not have this valve in their refrigerant system.

- (e) **Starter Crank Limit Switch (Refer to Drawing SK-360-E, Figure 30):** The switch is located in the control box, and stops the cranking of the engine if the starter cranks for more than 3 minutes. A 3 minute heating element permits the intermittent cranking switch to function for three minutes. (See paragraph below, Intermittent Starting Switch.) On some installations the intermittent starting switch has been omitted; therefore, a lower rate heating element (1—1.5 minutes) is used in the crank limit switch. When the unit has been cranking for more than the period of time mentioned above, the heating element trips the switch and stops the unit. This switch must be reset manually to start the engine again. This is done by pushing down the plunger which will project from the top of the case and show the word "OFF" whenever the switch has tripped open.
- (f) **Intermittent Starting Switch (Used on Model "D" Units):** The intermittent starting switch, mounted in the control box just above the suction pressure gauge, permits the starter to crank the engine for approximately 15 seconds and then breaks the starting circuit for 45 seconds, recycling until either the engine starts or the crank limit switch opens after a three-minute period. *NOTE:* The use of this switch is optional and is used on installations where intermittent starting for a three minute period is desired. On installations where this switch is omitted, the starting motor cranks continuously for 1½ minutes only. (See paragraph 705-e, above for details on crank limit switch.) When the intermittent switch is used, a 3-minute crank limit heating element is used. Without the intermittent switch, a 1 to 1½ minute heating element is used.

- (g) **Vacuum Switch:** The vacuum switch is located on the partition sheet in the engine compartment just above the manifold and controls the cranking of the engine. The vacuum switch breaks the circuit to the starter and the solenoid by-pass valve when the engine begins to operate and creates a 1½ inch vacuum.
- (h) **Manual Start Toggle Switch:** The manual start toggle switch is located in the unit control box and is used for starting the unit and for testing its operation. Before lifting up on the toggle switch, the blower fan switch in the car panel should be turned to "ON."
- (i) **Combination Oil-Heat Stop Switch:** Should the engine for any reason become overheated, causing the engine heat coolant temperature to go above 225-230° F. or should the oil pressure go below 4-6 pounds, an oil-heat switch located in an enclosed box on the magneto side of the engine will make contact to energize the thermal element of the oil-heat switch located in the control panel. In about 1½ minutes this switch will trip open stopping the unit. The switch must be manually reset. *NOTE:* This combination switch is used mostly on Model "D" Ice-Engine Units. On some of the installations an individual oil pressure switch and a heat switch are used. (Refer to the paragraphs below.)
- (j) **Individual Engine Temperature Switch (Part No. 950009):** The new type temperature switch as used on Model "D-1" Ice-Engine units has the advantage of functioning through metal conduction, thus protecting the engine, even though the coolant level has dropped too low to circulate. The complete switch assembly is located on the magneto side of the unit in the engine cylinder head. When the head metal temperature reaches 225° F. or 245° F. (depending on the type of switch and coolant), it will make contact to energize the thermal element of the oil-heat switch located in the control box. In ½ minute this switch will trip open, stopping the unit. This switch is not adjustable and must be renewed if its cut-out point is inaccurate. (See paragraph 211, for testing details.) A switch with a 225° F. setting must be used when water only is used; and a switch with 245° F. setting for 75%-100% Prestone solutions.
- (k) **Engine Temperature Switch (Y-6551-A):** This heat switch is wired to close the circuit to the crank limit switch heater coil if the engine temperature exceeds 225° F., stopping the engine after 1½ minutes. *NOTE:* In some installations where the units must operate at high engine temperatures, a solution with a high percentage of Prestone is used, and the switch is set for 245° F. instead of 225-230° F. (Refer to paragraph 108 for details of Prestone percentage used when engine operates at high temperatures, and paragraph 211 for testing of temperature switch.)
- (l) **Engine Oil Pressure Switch (Part Number 950036):** This switch provides protection against low oil pressure and trips the oil-heat switch if the oil pressure is less than 4 to 5 pounds for more than ½ minute.
- (m) **Fuel Safety Devices:** Refer to Paragraph 1204 for details of the fuel system safety devices.
- (n) **Pilot Light Indications:** A thermostatic switch, when used, is mounted near the evaporator, and operates the indicating pilot lights in the car. The thermo-bulb on the switch is clamped to the outlet side of the expansion valve at the evaporator. The thermostat pilot light will show when the thermostat is closed and will switch to the cooling pilot light when the unit starts cooling. The switch is set to operate on a 65° F. decreasing bulb temperature.
- (o) **Compressor By-Pass Solenoid Valve:** This valve is energized during the time the engine is cranking and is de-energized by opening of the vacuum switch after the engine is running. When energized, the valve opens allowing Freon in the compressor heads to return to the crankcase, preventing the compressor from pumping, thereby reducing the load on the cranking motor.
- (p) **Tip-Over Switch (Used on Model "D" Units):** This switch is mounted inside the cover of the electrical junction box in the engine compartment and will ground the magneto in case the engine tips more than 45° in any direction.
- 706. Remote Control Panel.**
- On some installations a remote control panel has been placed in the car electrical locker on which duplicates of the crank-limit and oil-heat reset switches have been installed. This was done to facili-

tate the resetting of these switches from within the car if necessary. The heater elements and contacts are connected in parallel with those that are mounted in the unit control box; therefore, both oil-heat switches or both crank-limit switches must be tripped "OFF" before the engine stops.

After checking the cause of the switches tripping "OFF," it is only necessary to reset a stop switch at the unit or on the remote control panel to run the engine.

### 707. Modulator.

The modulator is a device which will vary the speed of the engine according to the low side Freon pressure. (Refer to paragraph 701 for details of the modulator and its adjustment.)

### 708. Starter Motor.

The starting motor is a special type motor designed to transmit cranking torque to the engine when it is operated, and to disconnect from the engine after the engine has started.

- (a) **Starting Contactor:** The starting contactor has two functions; one, to engage the starting motor pinion gear with the flywheel ring gear, and two, to complete the starting motor circuit. The starting contactor solenoid has two windings, a pull-in coil and a hold-in coil.
- (b) **Starter Switch Condenser:** An electrolytic condenser is connected to the main terminals of the solenoid switch, and before the unit is connected to the car it should be made absolutely certain that the red lead from the condenser is connected to the positive terminal. If the machine is placed in operation with these connections reversed, the condenser will be ruined and unnecessary pitting of the magnetic switch contacts will result. (NOTE: The later model starting motor, part No. Y-6334-E, does not require a condenser.)

### 709. Fuel Strainer.

A fuel strainer is located just ahead of the Ensign regulator to prevent particles of dirt, scale, etc., from entering the regulator and carburetor. Inspect and clean yearly.

## SERVICE INSTRUCTIONS

Refer to the "Service Chart," Paragraph 813, for an itemized summary of the service instructions.

### 801. Lubrication.

Refer to the lubrication chart, SK-263, figure 43, for complete instructions for oiling and greasing.

The oil level in the compressor will vary somewhat with the length of time the compressor has been running or standing. This is due to the fact that mineral oil will absorb Freon, the exact amount depending on the oil temperature and the pressure in the compressor crankcase. Hence, for a true indication of the oil level, observe it through the sight glass in the end of the compressor crankcase while the compressor is running, and after a run of one-half hour or more. Oil may be added to the system in the same manner as the refrigerant, or by pumping the system down to zero and adding the oil through the plugged hole in the compressor top cross-fitting. The oil capacity of the compressor is 6 quarts, and an Ice Machine Oil with a 300 Oil Saybolt Viscosity at 100° F. should be used. (Refer to paragraph 605-h, "Charging With Refrigerant.")

Some of the later Type "D-1" units are provided with grease fittings that contain pressure reliefs so that excessive pressure will not be exerted on the bearing seals. An overflow indicates when the reservoir is full.

Most of the units have grease fittings so arranged with extensions that they are accessible for greasing from the bottom of the unit. Those that are not provided with grease extensions, are greased through grease fittings attached directly to the grease chambers. (Refer to lubrication chart SK-263, figure 43, for location of grease fittings.)

The following are a partial list of recommended greases for the compressor and drive bearings:

- (1) Texas Company .....Starfak No. 2
- (2) Standard Oil of Indiana .....Superla 4X
- (3) Sinclair Oil Company .....Opaline
- (4) Standard Oil of California .....Calol
- (5) Fiske Grease Company ....Olemite Pyro No. 41
- (6) Imperial Oil Co. of Canada.....IMP-R XB No. 1

### 802. Coolant (Water or Prestone).

The engine cooling system should be checked periodically and filled with clean soft water or an anti-freeze solution depending on the operating temperatures. (Refer to paragraph 108 for further coolant details.) The Ice-Engine capacity is 4 gallons for the radiator and engine only. A 10 gallon auxiliary expansion tank is used on some installations to increase the coolant capacity.

The upper pet-cock on the radiator is an air bleed to be opened only to facilitate the addition of water. The lower cock on units having two cocks represents the minimum water level. If water runs out at this point, no additional water is needed. Both cocks must always be kept closed.

### **803. Cleaning Condensers and Radiators.**

The refrigerant condensers and the engine radiator should be cleaned frequently. Frequency of cleaning will depend entirely upon the type of service the car is in. Any accumulation of dirt on either the condenser or the engine radiator, or on the compressor cylinder and cylinder head cooling fins will reduce the cooling efficiency of the parts. The bottom of the compressor compartment can be readily removed to facilitate cleaning.

### **804. Cleaning Refrigerant Filters.**

A screen type filter is located in the Ice-Engine Unit in the suction line. Another one is located ahead of the liquid solenoid valve and expansion valve, usually overhead in the car. These two strainers can be readily cleaned by shutting off the outlet valve (6, figure 42) on the receiver, and pumping down to zero. On new installations the strainers should be cleaned after only a few hours operation, and thereafter as often as appears necessary. A small screen is also located in each solenoid valve and may require cleaning, especially if the main line strainers have filled.

### **805. Electrical Contacts.**

Special attention is necessary in cleaning and keeping the electrical contacts clean in the control equipment. While the manufacturer has used special efforts in the construction of a dust-proof cabinet, it is possible for dust or dirt to be admitted when the cabinet is opened for inspection. These contacts should have periodical inspections. This is particularly true of the cranking limit switch, high pressure and low pressure switches, and the vacuum switch.

### **806. Belts.**

The engine fan belt, compressor drive belts, and condenser fan drive belts should be inspected weekly, and if any indication of failure is evidenced, the belts should be replaced. **ALL MULTIPLE BELTS ARE MATCHED FOR UNIFORM LENGTH. Therefore, in replacing belts, COMPLETE SETS SHOULD ALWAYS BE APPLIED.** To replace belts, unscrew the belt tighteners as far as possible.

Correct belt tension is important and affects their life. Both over-tightening and under-tightening will shorten the life of the belt. Therefore, an automatic belt tightener arrangement is provided on the compressor and condenser fan belts. By turning the condenser fan belt tightener knob and the radiator belt tightener knob until the spring is the same length as the rubber stop inside, the proper tension will be automatically provided throughout the entire life of the belts.

### **807. Freon Level.**

When the Ice-Engine is running under normal conditions and load, the refrigerant level should be in the sight glass in the receiver. Any refrigerant level considerably below the sight glass would indicate a loss of refrigerant, and would permit Freon gas to pass out into the liquid line. This reduces the cooling capacity considerably. Refer to paragraph 902, "Adding Freon to Partially Charged System."

### **808. Air Cleaner and Breather Cap.**

The air cleaner to the carburetor intake must be cleaned as often as conditions require it. (Refer to paragraph 201-b for servicing details.)

### **809. Fuel Mixture Adjustments (SK-275, Figure 51).**

The load adjustment screw will be found on the side of the carburetor secured by a lock nut. When the Ice-Machine is operating at normal load, turn the screw clockwise until the engine starts to lose speed. Then turn it counter-clockwise approximately one-fourth to one-half turn. This should give the most economical adjustment as well as the best engine performance. The normal setting of this load adjustment screw is approximately one and one-half turns open. **CAUTION:** Tighten the hexagonal lock nut securely.

### **810. High and Low Pressure Switches.**

The high and low pressure switches require infrequent attention, aside from keeping the contacts and switch cases clean. The factory settings, as mentioned under paragraphs 705-b and 705-c, must not be changed. Be sure to leave the covers on at all times, to prevent dirt from entering.

### **811. Engine Adjustment and Maintenance.**

- (a) **Valve Timing:** (Refer to paragraph 204 for valve timing instructions.)
- (b) **Magneto Timing:** (Refer to paragraph 205 for Edison Magneto timing, and paragraph 207 for Bosch Magneto timing.)

(c) **Grinding Engine Valves:** (Refer to paragraph 209 for valve grinding details.)

(d) **Removing Engine Head:** (Refer to paragraph 210 for details of removing the engine head.)

## 812. Compressor Maintenance.

(a) **Removing Compressor Heads (See Figure 42):** Each compressor head is readily removed by closing valve (6) and running the engine until the low side pressure is approximately zero, as shown by the gauge (X). Then close compressor head valves (3) and (4) by turning clockwise as far as possible. Each head can now be removed by removing the cap screws holding the discharge valves on the head, and also the cap screws holding the head.

Each valve assembly in the head can be removed by inserting two snug fitting pins in two of the holes in the valve body, and unscrewing the entire assembly by using a flat bar as a lever.

(b) **Removing Compressor Seal (Refer to SK-1034, Figure 8, of Parts List):** To repair or replace the compressor shaft seal, proceed as follows:

- (1) Remove the two 1¼ inch hexagonal nuts and the two cap screws on the fan bracket assembly.
- (2) Remove the three cap screws which tap into the compressor pulley through the fibre coupling disc (No. 41).
- (3) Remove the compressor shaft nut (No. 47).
- (4) Insert 2 ¾-16 cap screws in the tapped holes in the spider hub (No. 45). These cap screws must be threaded at least 1¼ inch. By tightening down these cap screws they will bottom and serve as a puller to remove the spider hub from the compressor shaft.
- (5) Remove the Allen head set screws holding the seal plate (No. 44). The entire assembly can now be readily pulled out.
- (6) **CAUTION:** In replacing the spider hub to the compressor shaft, be sure to place the point on the pulley stamped "KEY WAY HERE" directly opposite the key way in the shaft. This is extremely important for proper balancing of the compressor. Be sure to tighten compressor shaft nut securely. Also be sure to insert the hollow cap screw (containing the 1/8

inch pipe plug) in the tapped hole that is drilled for greasing the compressor pulley bearing.

(c) **Removing Compressor Pulley (Refer to SK-1034, Figure 8, Parts List):**

- (1) Remove the condenser fan and compressor pulley belts.
- (2) Remove the entire fan bracket assembly (No. 12).
- (3) Remove the condenser fan and compressor drive pulley (No. 15).
- (4) Remove the compressor coupling hub (No. 45) from the compressor.
- (5) The entire compressor pulley can now be pulled off. The ball bearing (No. 43) can be removed by first removing the pulley bearing plate (No. 39).
- (6) In replacing the compressor coupling hub, be sure to insert the hollow cap screw in the tapped hole that is drilled out for greasing the compressor pulley bearing.

## 813. Service Chart.

(The following instructions are only suggestions. The variation in length of run, climatic conditions, train schedules, etc., will vary these instructions.)

For calculating hours of operation, multiply fuel cylinders used by 20.

(a) **Daily Inspection:**

- (1) **Condensers and Radiator.**  
Pull out sliding doors below compressor, then blow out with air hose. Also clean radiator and engine with the air hose.
- (2) Check oil level in crankcase.
- (3) Check water level in radiator.
- (4) Clean intake air cleaner and pre-cleaner.
- (5) Start unit and check fuel pressures and observe operation of cooling system.
- (6) Check and clean sub-cooler filter during cooling season.

(b) **Weekly Inspection:** In addition to the items of daily inspection as listed above, the check-up should include:

- (1) Check all belts and belt tensions. (Refer to paragraph 806.)
- (2) Clean crankcase breather cap by washing in gasoline.

- (3) Check Freon level in receiver sight-glass when unit is operating (Refer to paragraph 807).
- (4) Check water filler cap gasket.
- (5) Make visual inspection of entire unit for oil or water leaks.
- (6) Drain and flush out evaporator sub-cooler. Clean water strainers, spray nozzles and refill sump. Clean air intake filter.
- (7) Start the unit and check the operation of the starting motor, engine vacuum switch, engine oil pressure and pressure switch, engine modulator, low pressure switch, engine vacuum gauge and compressor bypass valves.
- (8) Turn grease cup on engine water pump one-half turn. Check water pump packing gland.
- (c) **Monthly Inspection:** In addition to the daily and weekly inspections, the check-up should include:
  - (1) Remove the upper half of the air filter, the air connection, and the carburetor, and wash thoroughly in gasoline.
  - (2) Spark plugs—remove, clean and reset gap. Gap adjustment is made by bending side electrodes only. Replace plugs after every 600 hours of engine operation. (Refer to paragraph 121.)
  - (3) Check visually the magneto and spark plug cables.
  - (4) Check the magneto fibre coupling for proper clearance. It should be .015 inch between coupling and drive member.
  - (5) Check for Freon leaks.
  - (6) Check for Propane leaks by odor of tracer gas and by painting suspected lines with soap water.
  - (7) Check settings of fuel pressure regulator. (Refer to paragraph 1204-e.)
  - (8) Check engine fuel mixture adjustment. (Refer to paragraph 809.)
  - (9) Check oil level in compressor crankcase, with the engine running, after unit has run for one-half hour.
  - (10) Clean refrigerant filters. On a new installation clean once or twice after only a few hours of operation.

- (11) Test operation of crank limit switch by grounding magneto and hold starting toggle switch in position to keep starter cranking until it trips the switch.
- (12) Check and grease sparingly the six Alemite lubricating points on the compressor and condenser fan drive.
- (13) Change the engine crankcase oil.
- (14) Clean oil filler and repack oil filter element with new waste. Do not pack filter too tightly.
- (15) Grease sub-cooler motor sparingly with a light roll grease.
- (16) Inspect engine vacuum switch vent cap and if necessary clean the felt pad and screws.
- (d) **Six Month Inspection:** In addition to the monthly inspection of items, the check-up should include:
  - (1) Remove the magneto and give it a thorough inspection and test. Check distributor rotor, brushes and points.
  - (2) Remove radiator inspection plates and clean and examine interior of radiator.
  - (3) Clean propane fuel line filter located just before the Ensign regulator.
  - (4) Place a drop of oil in each starting motor bearing oiler and also on the governor and carburetor linkage.
  - (5) Remove and clean the engine head once a season.
  - (6) Check the engine valves for seating and for tappet clearances.

#### 814. Tabulated Data.

##### ICE-ENGINE

(Models "C," "D," and "D-1")

##### Engine:

Model .....	FC
Bore—(Inches) .....	3 $\frac{1}{4}$
Stroke—(Inches) .....	4
Cylinders .....	4
Displacement—(Cu. In.) .....	133
Horse power available, 1100 R.P.M. ....	20
Oil Capacity, with filter—(Quarts) .....	5
Oil Pressure—(Lbs. per sq. in.) .....	15-35
Oil, S.A.E. No. ....	30
Water Capacity—(Quarts) .....	16

Valve Tappet Clearance, Cold—Exhaust (In.)	012
Valve Tappet Clearance, Cold—Intake (In.)	010
Firing Order	1-3-4-2
Spark Advance, degrees ahead of dead center on flywheel	12°
Spark Advance, inches ahead of dead center on flywheel	1-9/32
Intake Valve Opens, degrees after dead center on flywheel	5°
Spark Plugs (4)	18 mm

**Compressor:**

Part Number (Model "D" and "D-1")	Y-6600
Part Number (Model "C")	Y-6375
Bore—(Inches)	3 1/2
Stroke—(Inches)	2 1/2
Displacement—(Cu. In.)	96
Oil Capacity—(Quarts)	6
Oil Saybolt Viscosity at 100° F. (Ice Machine Oil)	300
Speed Ratio Engine to Compressor	2
Speed Ratio Condenser Fan to Engine	1.5

**General:**

Weight Ice Engine—(Lbs.)	1650
Receiver Capacity, Freon—(Lbs.)	50
Fuel Tank Capacity, Propane—(23.6 gal.)	100 lbs.
Belts—Engine Fan (1)—Part No.	Y-6036-A
Condenser Fan, Model "C," (3)—Part No.	Y-6407
Condenser Fan, Models "D" and "D-1" (2) Part No.	Y-6575
Compressor Drive (All models) (7) Part No.	Y-6705
High Pressure Switch, set to stop engine at—(Lbs.)	350
High Pressure Switch, set to start engine at—(Lbs.)	300
High Pressure Switch, set to open liquid solenoid valve circuit at—(Lbs.)	300
High Pressure Switch, set to close liquid solenoid valve circuit at—(Lbs.)	295
Low Pressure Switch, set to stop engine at—(Lbs.)	7 1/2
Low Pressure Switch, set to start engine at—(Lbs.)	15
Starter Crank Limit Switch trips out in—(Minutes)	1-2
Modulated Control—Minimum engine speed at 15 lbs. suction pressure	750
Maximum engine speed at 45 lbs. suction pressure	1300
High Pressure Relief Valve (If Used) Set to open at (lbs.)	400
Set to reclose at (lbs.)	350

**SUMMARY OF OPERATIONS****901. To Pump Vacuum on Empty System and to Charge with Freon (Refer to Piping Diagram Figure 42).**

- (a) Close both high side valves (3 and 4) on the compressor head. All of the other valves must be open.
- (b) Open high pressure valve (2) in control box and remove cap (B). *IMPORTANT:* Do not remove cap (A).
- (c) Energize the refrigerant solenoid valve by either turning on the blower fan and cooling switch at car panel (if temperature is too low to close the thermostat relay, be sure to short out the thermostat); or by holding or blocking up the toggle starting switch in the control box. Failure to open the refrigerant solenoid valve will result in a vacuum being obtained in only a part of the system.
- (d) Run engine by holding or blocking up the low pressure switch (Q) until the discharge line shows no bubbles.
- (e) Cap tightly high side connection (B) while unit is still running. Close valve (1) and remove cap (A).  
  
Check the amount of Freon in the Freon drum by weighing the drum before charging the system.
- (f) Connect the Freon charging line to the low side connection (A) on the control box. Purge line of air before tightening.
- (g) Open valves (3 and 4) on compressor head. *This is very important.*
- (h) Close outlet (lower valve 6) on receiver.
- (i) Run unit by lifting toggle switch and low pressure switch (Q).
- (j) Open low pressure valve (1) in the control box and also valve on refrigerant drum. Regulate pressure to not over 50 pounds. As the pressure decreases, apply one or two blow torches to the bottom of the Freon drum, or apply steam or hot water to drum.
- (k) Charge the system with 50 lbs. of Freon, as determined by weighing the Freon drum. Level should be in the sight glass when operating.

normally—valve (6) open. With sub-cooler more Freon may be necessary.

- (l) Close low side valve (1) in control box and valve on Freon drum. Cap tightly connection (A) on control box.
- (m) Open (lower) outlet receiver valve (6). For cooling, all the valves must be fully open, except the gauge valves (1 and 2), which should be opened only to obtain gauge readings.

**902. Adding Freon to Partially Charged System (See Figure 42).**

- (a) Purge and connect charging line from Freon drum to the low side connection (A) on the control box.
- (b) Close outlet (lower) valve (6) from receiver.
- (c) Valves (3, 4, 5, 8, 9 and 10) must be in their normal operating position—open.
- (d) Open valve on Freon drum and also valve (1) in control box.
- (e) Run unit by lifting toggle switch in control box.
- (f) Observe rise in Freon level in receiver. *NOTE:* Level in receiver should be in sight glass when unit is operating with normal load (Valve 6 open). The operating level may be considerably lower than that with valve (6) closed. Hence, check for true operating level by opening valve (6), before disconnecting Freon drum.

**903. Trapping Freon in Receiver and Condensers.**

- (a) Close outlet (lower) valve (6) from receiver.
- (b) Run unit by lifting switch in the control box and pressing reset button (R) on low pressure switch (Q).
- (c) Run engine until low side gauge (X) shows zero pressure.
- (d) If Freon still in the condensers is desired in the receiver, apply steam to the condensers.
- (e) Close upper valve on receiver (5).

**904. Trapping Freon in Condensers (See Figure 42).**

- (a) Close outlet valve on condensers (10).
- (b) Run unit by holding up toggle switch.
- (c) Apply heat, if necessary, to the receiver.

- (d) *CAUTION:* Watch high pressure gauge (Y) in control box. Do not interfere with high pressure switch (P) stopping unit if high pressure should develop, which would indicate that the condensers are full and that excess Freon must be removed from the system through the high side connection (B) in control box.

Run system until low side pressure is 0, pressing reset button (R) on low pressure switch (Q), to keep engine from stopping at 7½ pounds.

**905. Removing Freon From System (See Figure 42).**

- (a) Connect a Freon line to the high side connection (B) in the control box. Purge line of air.
- (b) Run the unit by holding up the toggle switch in control box.
- (c) Open the high pressure valve (2) in the control box.
- (d) Keep the Freon drum cool with running water.
- (e) Press reset button (R) on low pressure switch (Q) when necessary to keep engine from being stopped.
- (f) After all the Freon is out of the receiver, close compressor head valves (3 and 4) and apply steam to the condensers to drive remaining liquid Freon into drum.
- (g) Be careful not to overload the Freon drum. Fill only ¾ full. Check amount of Freon in the drum by weighing drum before and during charging.

**SUB-COOLER**

**1001. Model "D-9000" Sub-Cooler.**

The evaporative sub-cooler, if used, should preferably be connected in the liquid line from the Ice-Engine to the receiver. (See note on SK-343-A, figure 21.) The installation of the shut-off valve in the line between the Sub-Cooler and the Ice-Engine will permit pumping the refrigerant out of the Sub-Cooler and into the Ice-Engine air condensers.

The pressure switch, if used, is connected in series with the leads to the ½ HP. motor. It is set to start the motor at 175 pounds head pressure, and to stop it at 150 pounds head pressure.

Checking the operation of the spray nozzle, motor brushes, and the water pump is facilitated by a hinge which permits the entire assembly to be swung out 90° after loosening the sub-cooler motor lock nut. The spray pump can be operated in the swung-out position and the nozzle performance observed. The sub-cooler is made for 40 gallons of water and can also be provided with a snap action float valve to use the water supply of the car to supplement the sub-cooler tank capacity.

The water capacity of 40 gallons will last from 8 to 12 hours, depending on the outside temperature and humidity. In some installations where appreciable condensate drains from the evaporator, the frequency of filling may be reduced by piping the drain from the evaporator to the sub-cooler. Do not use less than a one inch iron pipe to prevent clogging.

#### 1002. Service Chart, Model "D-9000" Sub-Cooler.

In case of major repair or for overhauling during the winter, the entire blower-motor-pump assembly may easily be removed by simply disconnecting the Twist-Lock electric plug and the water intake hose coupling at the pump, and then lifting the unit off the hinges. When reassembling the Sub-Cooler, be sure to lock the electric plug by twisting it to the right.

To prevent accidental addition of water to the sub-cooler sump during freezing weather, lock the water filler cap by inserting a  $\frac{3}{8}$ -16 x  $\frac{3}{4}$  cap screw in the hole provided for it.

#### 1003. Model "RD-500 and "RD-502" Sub-Cooler.

The new RD-500 series of sub-cooler are listed as follows:

Model RD-500.....40 Gal. tank capacity, 32 volts  
Model RD-502.....40 Gal. tank capacity, 64 volts

The Model RD-500 and RD-502 sub-coolers have a temperature switch to control the starting and stopping of the sub-cooler motor by means of a load relay. (In some installations a pressure switch similar to that used in the model "D-9000" sub-cooler is used instead of the temperature switch.) The temperature switch is set to start the motor when the outside temperature reaches 90° F. An electric solenoid valve, when used, is also actuated by the temperature or pressure switch, and opens and closes the water supply line from the car water supply to the sub-cooler sump. A ball type float valve regulates the water flow to keep the water in the sump at a constant level.

The weatherproof control box contains a temperature switch (or pressure switch, if used), motor relay, radio type capacitor, terminal block, and a push button enabling a service man to readily check the operation of the sub-cooler without turning on any controls in the car electric locker.

#### 1004. Service Chart, Model "RD-500" and "RD-502" Sub-Coolers.

For major repair and overhauling, the blower motor pump assembly may easily be removed by disconnecting the screw cap plug and the water intake hose, and then swinging the unit out 90° to lift the unit off the hinges.

Flush the sub-cooler tank and coil with water once a week during the cooling season; also, clean air filter and water screen.

Check the water pump packing periodically.

Grease motor sparingly with light roll grease once a month.

Check the solenoid valve, temperature switch, and the ball float valve periodically.

### OPERATING DIFFICULTIES

#### 1101. Improper Pressures.

- (a) **High Side Pressure:** A "high-side" pressure considerably higher than twice the outside temperature, with a normal back pressure of 35-37 pounds, indicates ineffective condensers, too much refrigerant, or air in the system. Clean each condenser thoroughly with both steam and air. Check the condenser fan belts and replace them with a new set if the belts indicate excessive wear.

A further check as to whether air is in the system is to observe the head pressure after a unit has been off for several hours—long enough so that the refrigerant in the receivers and condensers has assumed the outside ambient temperature. Note the head pressure reading and compare it to the Freon pressure temperature chart corresponding to the outside ambient temperature. If the observed pressure is considerably higher than that on the chart, it indicates air in the system.

The following are a few pressure-temperature figures for Freon-12. (NOTE: These fig-

ures apply only to a unit that has been off for several hours—not a running unit.)

70° F. ....	70 lbs.
75° F. ....	76 lbs.
80° F. ....	84 lbs.
85° F. ....	92 lbs.
90° F. ....	100 lbs.
95° F. ....	108 lbs.
100° F. ....	117 lbs.
105° F. ....	126 lbs.
110° F. ....	136 lbs.
115° F. ....	140 lbs.
120° F. ....	157 lbs.

Considerable air may be trapped in the receiver. Later model receivers are equipped with a purge valve on top of the receiver. Open this valve and blow out for several seconds. Repeat again if necessary after the engine has run for an hour or two.

If the receiver is entirely full, remove the excess refrigerant. To purge air from the condensers, remove the cap on connection (B) and open slightly valve (2). Next, run the Ice-Engine unit for a few minutes, then stop and repeat the purging process as described above. It may be necessary to do this several times. (Figure 42.)

The best way to remove all the air from any system, where it is definitely known that considerable air is in the system, is to pump all the refrigerant back into an external drum through the high-side connection (B) in the control box. Then by blowing off considerable gas from the top of the drum one can be assured no air remains with the refrigerant.

- (b) **Suction Pressure:** The suction pressure varies with the load in the evaporator and the compressor speed. The load varies directly with the size of the evaporator, and the amount, temperature, and humidity of the air passing through it. Abnormally low suction pressure may be due to any of the following reasons:

- (1) One or more expansion valves not functioning. due either to clogged strainer screen, or valve orifice.
- (2) The thermostatic bulb on the expansion valve may have lost its charge, or it may not be in good contact with the refrigerant suction line.
- (3) The strainer in the liquid line from the receiver may be clogged and require clean-

ing. There is also a strainer in the solenoid valve which may become clogged, particularly if the strainer in the liquid line ahead of it has failed.

- (4) The strainer in the suction line near the compressor may be clogged.
- (5) The evaporator may be restricted, dirty or inefficient.
- (6) There may be too little refrigerant in the system.
- (7) The expansion valves may be improperly adjusted.

Abnormally high suction pressure may be due to:

- (1) The expansion valves not operating, or being stuck open due to dirt or foreign matter in the valve mechanism.
  - (2) The compressor head valves may be defective.
  - (3) The system may have too much refrigerant.
  - (4) The expansion valves may be adjusted for too high a suction pressure, or the expansion valve orifices may be too large. This would be indicated by the temperature of the return line being too cold, considering the evaporator pressure. A superheat of 10-15° is satisfactory.
  - (5) If the high pressure relief valve (Z, figure 42), or the by-pass unloading valve (W), should not be seating properly, a higher suction pressure would result. This is further indicated by an excessively hot line from the relief valve to the crankcase. Remove the cap on top of the high pressure relief and tap on the top pin. The opening pressure may be raised by loosening packing nut and turning the stem clockwise.
- (c) **Fuel Pressures:** If the fuel pressure gauge located in the fuel cabinet shows a pressure considerably higher than the desired pressure for that fuel cylinder, and also will not reduce when the adjusting screw is turned clockwise, with the engine running, it indicates that the small fuel regulator (Y-6163-B) seat or diaphragm is defective and should be replaced, or repaired.

If the fuel pressure to the engine, which should be 3-5 ounces varies considerably, as measured with a mercury "U" gauge, it indicates a defective seat in the main fuel regu-

lator (Y-6162). If fuel is escaping through the vent, the diaphragm is ruptured and must be replaced.

### 1102. Adjusting Speed.

(Refer to paragraph 701-C, for details pertaining to Engine Speed Adjustment.)

### 1103. Ice Engine Unit Fails to Start (SK-360-E, Figure 30).

(a) If the starter fails to crank engine, check the following:

- (1) Main 50 ampere fuse in starter circuit—located in electric locker in car.
- (2) Fuses in the thermostat circuit.
- (3) Voltage at the Ralco receptacle. Full voltage should appear across receptacle numbers 1(+) and 4(—), also between 2(+) and 4(—) if thermostat is closed.
- (4) Contacts in the high and low pressure switches.
- (5) Contacts in the vacuum switch.
- (6) Contacts in the crank limit switch.
- (7) Solenoid on the starting motor, including the starting motor itself.

(b) If the starter cranks but the engine fails to start, check the following:

- (1) Fuel supply.
- (2) Ignition. If no spark at plugs, check for ground on the magneto by removing the wire at the engine heat switch or by removing the ground wire from the magneto.
- (3) Improper fuel adjustment on the carburetor. The adjustment screw should be approximately  $1\frac{1}{2}$  turns out.
- (4) If choking of air intake to carburetor starts the engine, it indicates a defective fuel shut-off regulator.
- (5) Air in the fuel line.
- (6) Improper fuel pressure—should be 3-5 ounces.

(c) The starter crank limit switch may trip out due to any of the following causes:

- (1) Engine heat switch is grounded due to an overheated engine ( $225^{\circ}$  F.), or due to the switch being defective. An overheated engine may be due to the lack of radiator water, defective engine fan belt, restricted air flow to radiator, improper ignition or

valve timing, overloaded engine, lack of oil pressure, or improper fuel adjustments. *NOTE:* This paragraph applies only to units having only a crank limit reset button in the Ice-Engine control box, and not an "OIL-HEAT" reset button.

- (2) Ignition failure.
- (3) Excess cranking without starting.
- (4) Improper fuel adjustments, or lack of fuel.
- (5) Defective starting motor, or starting motor solenoid.
- (6) Defective shut-off fuel regulator.

(d) The OIL-HEAT reset switch (used on later Model "D" and "D-1" units) may trip out due to any of the following causes:

- (1) Same as item (1) under (c) above.
- (2) Low oil pressure.
- (3) Excessive engine head temperature.
- (4) Defective vacuum switch contacts.
- (5) Oil pressure or engine heat switch out of adjustment.
- (6) Ground or short circuit in wires to oil and heat switch.

### 1104. Ignition.

The gaps in the spark plugs should be checked about once a month. These gaps should be .015-.018 inch with an Edison magneto, and .025 inch with a Bosch magneto. This gap size is extremely important, due to the high compression engine. Replace the spark plugs every 600 hours of engine operation, but be sure to reset the gaps on the new plugs to the above dimension.

If no spark occurs at the plugs the fault may be in the engine heat switch (on Model "C" units only), a ground on the wire from the magneto, or a defective magneto itself.

### 1105. Belts.

Failure of the belts to give the normal service expected may be due to:

- (a) Incorrect tension on the belts.
- (b) Misalignment between the driven and the driving pulley.
- (c) Wrong sized belts.
- (d) Rough belt grooves on the pulleys.
- (e) Using unmatched belts.

Use only the standard belts recommended by the manufacturer.

## RAILROAD ICE ENGINE UNIT

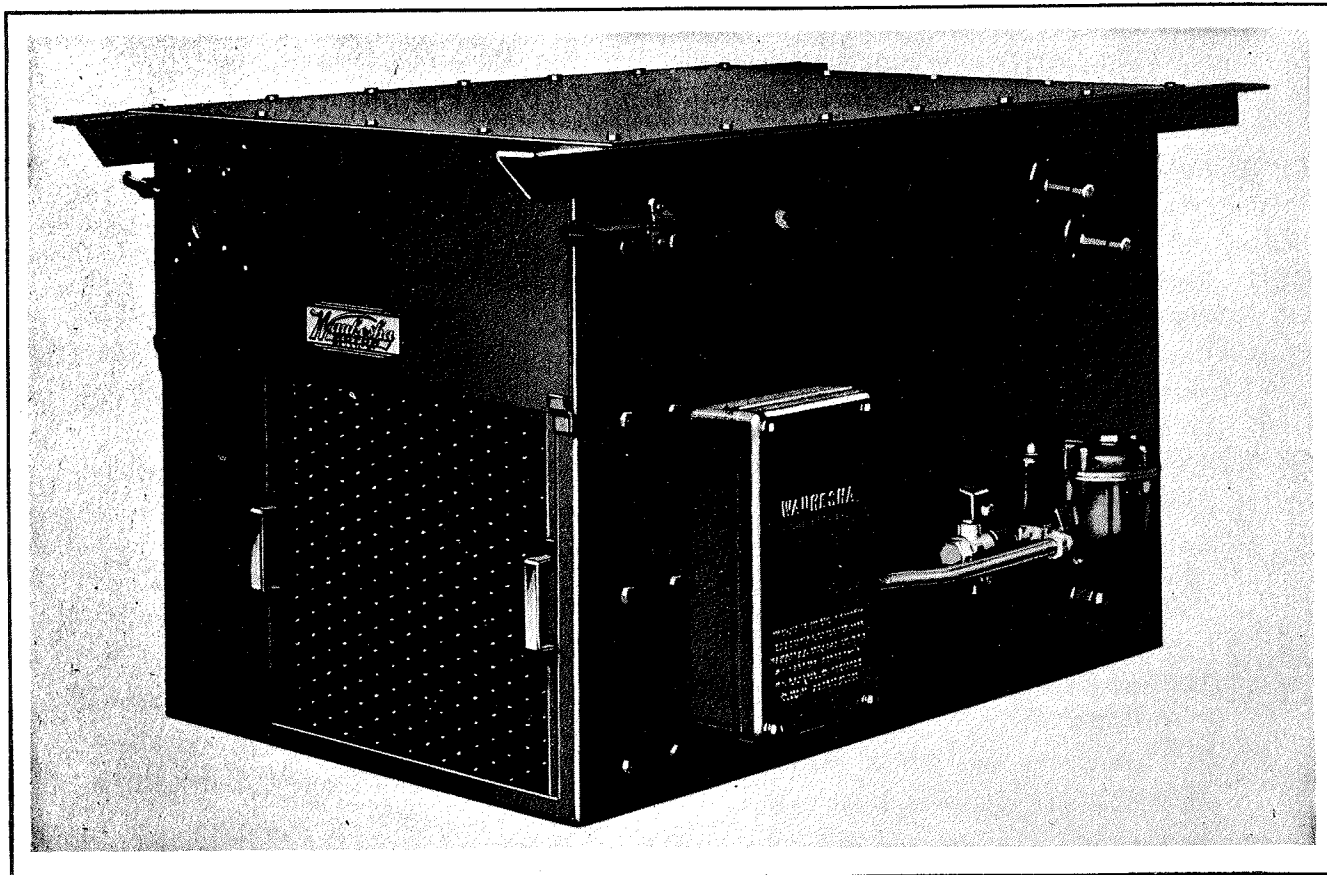


FIG. 7—SUB-COOLER UNIT

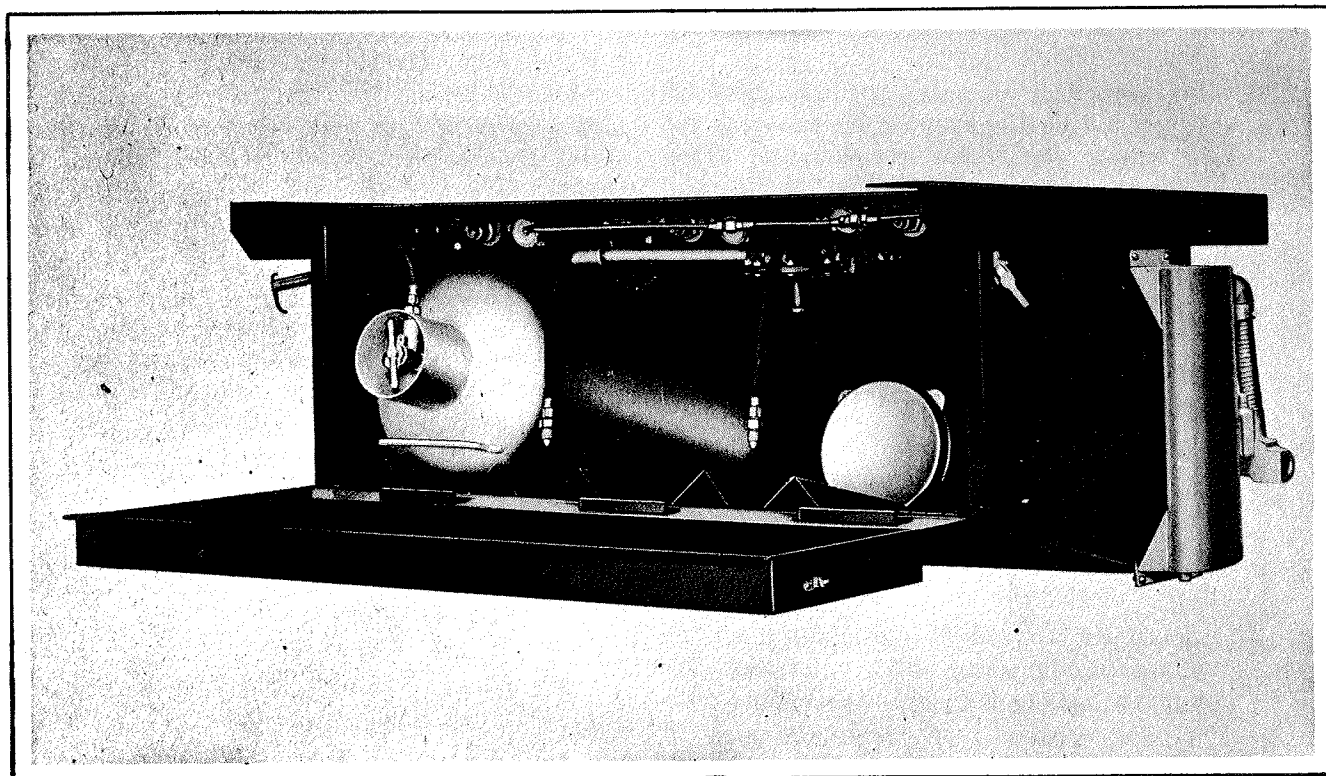


FIG. 8—FUEL TANK CARRIER

## PART IV.

## FUEL SUPPLY SYSTEM

## DETAILS OF FUEL SUPPLY SYSTEM

**1201. Fuel System.**

The fuel supply system consists of a specially designed cabinet which contains the manifolding, valves, and regulators to provide sequence unloading of fuel cylinders. The cabinets are furnished in various sizes to accommodate two, three, or four cylinders of Propane.

The fuel system is built in two types: Type "B," for use when the units are operating in continuous warm temperatures, and Type "M" for installations for year around service where cold temperatures are encountered. The Type "M" differs from the Type "B" in that it is equipped with automatic vapor pressure control, or manual control of the heat which is applied to the bottom of the fuel cylinders by means of hollow discs, through which the engine exhaust gas can be by-passed. A pressure valve, actuated by gas pressure in the fuel cylinder, (or a manual control), controls the by pass exhaust line and thus maintains correct operating pressures under all weather and temperature conditions.

**1202. Fuel.**

Propane gas is used in this fuel system. It is a liquid in the fuel cylinders, but is drawn off into the manifold only as a dry gas, and so delivered to the engine. Propane itself is colorless and odorless, but a tracer gas having a distinct unpleasant odor is added to make it easy to detect a leak. It exists as a liquid in the fuel tanks at pressures of 125 lbs. per square inch at 70° F. Propane has all of the inherent advantages of natural gas as a universal fuel, due to its uniform composition, high thermal value, and favorable physical characteristics. Its octane rating is 125, therefore permitting high compression ratios, which result in high fuel efficiency, and complete combustion.

**1203. Fuel Tank.**

The fuel tank is a cylinder approximately 42 inches long and 16 inches in diameter. This tank is built to withstand operating pressures of over 260 lbs. Each tank has a capacity of 100 lbs. or 23.6 gallons of liquid propane.

The cylinder valve is attached to the top of the fuel tank and has a curved pipe extending inside of the fuel tank towards the top of the tank so that gas and not liquid is admitted to the valve. For this reason, there is a definite position in which the fuel tank must be placed in the fuel cabinet. When placing the fuel cylinders within the cabinet, the handles on the tank should be at the bottom and in a horizontal position. *NOTE:* Do not stand or rest full tanks on the valve end as liquid propane will enter the valve extension pipe and cause "slugging" of the valve.

This valve assembly also contains a high pressure release valve and slug valve which are described in more detail in paragraph 1204-a through 1204-c.

The hand shut-off valve portion of the cylinder valve has a diaphragm separating the gas chamber from the handle stem.

The cylinder valve also contains a safety valve, which is normally closed until the special fitting on the end of the flexible hose is inserted in the valve. This forces the valve back into the open position allowing the gas to flow into the flexible hose connection.

**1204. Fuel System Control and Safety Devices.**

The following safety devices are incorporated in the fuel system:

- (a) **Tank High Pressure Relief Valve:** If the cylinder should be overfilled with propane, a relief valve located on the side of the cylinder valve will open at 350 pounds and allow the extra liquid to escape before an excessive pressure is reached.
- (b) **Tank Check Valve:** Should the handle of the cylinder valve be in the "OPEN" position, and the hose connection to the valve be removed, a spring loaded check valve automatically closes as the hose connection is unscrewed. This makes it impossible to let fuel out of a disconnected fuel cylinder by turning the handle to "OPEN."
- (c) **Tank Slug Check Valve:** If a hose connection from a fuel cylinder should break and cause a sudden increase in gas flow to more than 100 cubic feet per hour, or if the handle on the

fuel cylinder valve is opened too suddenly, causing a momentary rush of fuel, a slug check valve automatically shuts off the fuel from that cylinder. This automatic check valve is located in the main cylinder valve on the fuel cylinder. It is opened again by manually closing and slowly opening the fuel valve handle on the fuel cylinder.

(d) **Reverse Flow Check Valve:** A reverse flow check valve, located in the high pressure line out of each fuel cylinder, closes automatically to prevent the discharge of the other fuel cylinders in the event a fuel hose connection is ruptured. It opens automatically again when normal flow is resumed.

(e) **High Pressure Regulator:** The high pressure regulator reduces the tank pressure down to 10, 20, 30 lbs. per sq. in., etc. The valves operate as follows:

As the pressure on the lower side of the diaphragm is reduced, the spring on the top side of the diaphragm forces it down. The valve seat being attached to the diaphragm by the valve stem will open, allowing the gas to flow from the inlet side, past the valve seat, up around the valve stem and out the outlet side. A pressure adjusting screw, located on the top of this regulator, increases or decreases the spring pressure on the top side of the diaphragm, thereby increasing or decreasing the gas pressure necessary on the lower side of the diaphragm in order to open or close the valve. Adjustment should be made with the engine running.

(f) **High Pressure Excess Flow Valve:** A high pressure excess flow valve located in the high pressure line from each of the first stage fuel regulators closes in case of a break anywhere in the high pressure fuel lines between the first and second stage pressure regulators. This valve will open automatically in a few minutes when the pressure equalizes if there is no broken line.

(g) **Shut-Off Valve:** The shut-off valve is hand operated and is used when adjusting the high pressure regulator or changing fuel cylinders. This valve has a metal diaphragm which prevents the gas from leaking around the valve handle stem.

(h) **High Pressure Gauge:** This gauge indicates

the inlet pressure to the low pressure regulator.

(i) **Low Pressure Regulator:** The low pressure regulator reduces the gas pressure from 10, 20, 30, or 40 pounds on the inlet side to 3 to 5 ounces on the outlet. A screw located at the bottom of the regulator adjusts the spring pressure on the diaphragm which regulates the pressure of the gas leaving the regulator. When the gas pressure above the diaphragm is lower than 3 or 5 ounces the spring forces the diaphragm up, actuating the lever arm, which in turn opens the valve seat. As the pressure above the diaphragm builds up, it forces the assembly down and closes the valve. If the main diaphragm breaks, the pressure releases a valve at the top of the regulator allowing the gas to escape indicating a defective regulator.

(j) **Low Pressure Excess Flow Valve:** A break or leak in the low pressure line, after the main regulator, with a flow of approximately 125 cubic feet per hour or more, will close an excess flow valve located in the fuel cabinet in series with the  $\frac{3}{4}$  inch iron pipe fuel line to the engine. This valve will open again automatically in a few minutes, when the pressure equalizes if there is no broken line. This valve unlike the high pressure excess flow valve, is operated by a diaphragm and is much more sensitive to the flow of gas. Do not attempt any adjustment on this valve; replace, if defective.

(k) **Automatic Shut-Off Regulator:** An automatic shut-off regulator located in the engine compartment near the carburetor, shuts off the fuel supply whenever the engine stops. Furthermore, when the engine is running, this regulator meters the quantity of fuel to the engine in accordance with the power requirements, and at a pressure slightly below atmospheric.

#### 1205. Fuel Supply Pressures (Sequence of Emptying Fuel Tanks).

The fuel pressure shown on the gauge will depend on the number of fuel cylinders in the fuel cabinets, as follows (engine running):

(Outside temperature must be above zero degrees)

One cylinder .....	10 pounds
Two cylinders .....	20 pounds
Three cylinders .....	30 pounds
Four cylinders .....	40 pounds

It is assumed that each cylinder contains sufficient fuel—at least 3 to 4 pounds—otherwise the above pressures might be considerably lower.

The pressure in the car line from the main pressure regulator to the engine regulator should be 4 ounces when a single cabinet is used, or 3 ounces and 5 ounces where two fuel supply cabinets are used. Be sure to set with both engines running. To vary this pressure, remove the hexagon cap in the center of the large regulator and turn the adjusting screw clockwise for more pressure and vice versa.

Where two fuel cabinets are used, it is usually convenient to have the fuel always drawn from one cabinet first, until all those cylinders are empty. This can be readily accomplished regardless of the number of fuel cylinders in each cabinet by setting the main pressure regulator (Y-6162) in one fuel cabinet (the one without the heater pads) to maintain 2 ounces higher pressure to the engine than from the other cabinet. Thus, set one regulator to maintain 5 ounces (when the engine is running), and the other 3 ounces. The fuel will flow from the cabinet maintaining the higher pressure until all the fuel cylinders in that cabinet are approximately empty, and then flow from the second fuel cabinet.

In the case of a 3-cylinder fuel supply, the fuel will first flow from the right cylinder, called cylinder No. 1, to the manifold, maintaining a pressure of approximately 30 pounds at the main regulator (40 pounds if a fourth cylinder is used). As long as this cylinder maintains this pressure, the fuel will flow from this cylinder alone, until it is emptied or until less than about two pounds of fuel remain. The manifold pressure will then drop to approximately 20 pounds, the pressure at which the second cylinder cuts in. The fuel will now flow from the second cylinder until it is empty, when the third cylinder will automatically cut in to supply the fuel at approximately 10 pounds pressure to the main regulator.

Hence, if the fuel pressure gauge shows approximately 30 pounds with the engine running, it is apparent the first cylinder is supplying the fuel. If the gauge shows approximately 20 pounds, obviously the fuel is being drawn from the second cylinder; the first cylinder now being empty and may be removed. Similarly, if this gauge shows approximately 10 pounds, the first and second cylinders both are empty and may be removed. Due to variations in tank pressures with outside temperature, each tank should be weighed if the exact fuel content must be known.

**NOTE:** In all cases when changing fuel tanks, move the cylinder then in use to position No. 1. Then load positions No. 2 and No. 3 with the full cylinder.

Under cold operating conditions, the vaporization of propane is much slower, and under sub-zero conditions too slow for the proper operation of the Engine

Generator Unit. To overcome this condition, a fuel pressure controlled exhaust by-pass valve is used to by-pass the hot engine exhaust gases to the heater pads located under the fuel cylinders. These pads raise the propane temperature and vaporization rate. In extremely cold weather all fuel cylinders should be as full as possible, as this helps to keep the fuel pressures up, in addition to the heater pads.

The exhaust by-pass valve by-passes all of the engine exhaust gases through the propane cylinder heating pads whenever the propane cylinder pressure is below 75 pounds (approximately 40 degrees outside temperature). The exhaust by-pass valve will be exhausting all of the exhaust gases through the muffler whenever the propane cylinder pressure is above 125 pounds at approximately 70 degrees F. outside.

In some installations, the automatic exhaust by-pass valve is equipped with a manually operated handle which may be set either in an open or closed position, depending on the outside operating temperatures encountered during the run.

#### 1206. Steam Heated Fuel Cabinets.

The sectional type fuel cabinets designated as model "FS" are automatically heated by steam during cold weather operating conditions. Application drawing SK-1087-A, Page No. 78-A shows the steam piping and electrical control wiring. All sectional type fuel cabinets are shipped from the factory with the internal steam coils installed. These coils also act as the support cradles for the propane fuel cylinders.

The steam heat control is entirely automatic when Vapor No. 1668 steam admission valve is set on center automatic position. Only in emergencies should this valve be set on manual "ON" or "OFF" position.

When the propane cylinder vapor pressure drops to approximately 4 pounds due to decrease in the ambient temperature, the contacts of control switch close and energize the No. 1668 steam valve. This valve opens when energized. Steam (low pressure) then passes through the cabinet steam coils and heats the fuel cylinders. As the vapor pressure in the cylinders increases (2 to 3 pounds) the contacts of control switch open and de-energize the No. 1668 steam valve. Standard type retarders and steam traps protect the steam piping from freezing. A 1-MFD 400 volt condenser is connected across the contacts of the control switch to protect the contacts of this switch.

Details of the propane unloading manifolding are the same for both types of cabinets. Therefore, the information contained in Part IV also applies to the sectional cabinet except for the steam heat and its automatic control. Fig. 33, Page No. 110 shows manifold piping details and Fig. 32, Page No. 107 is a picture of a complete "FS-2" two-cylinder heated sectional fuel cabinet.



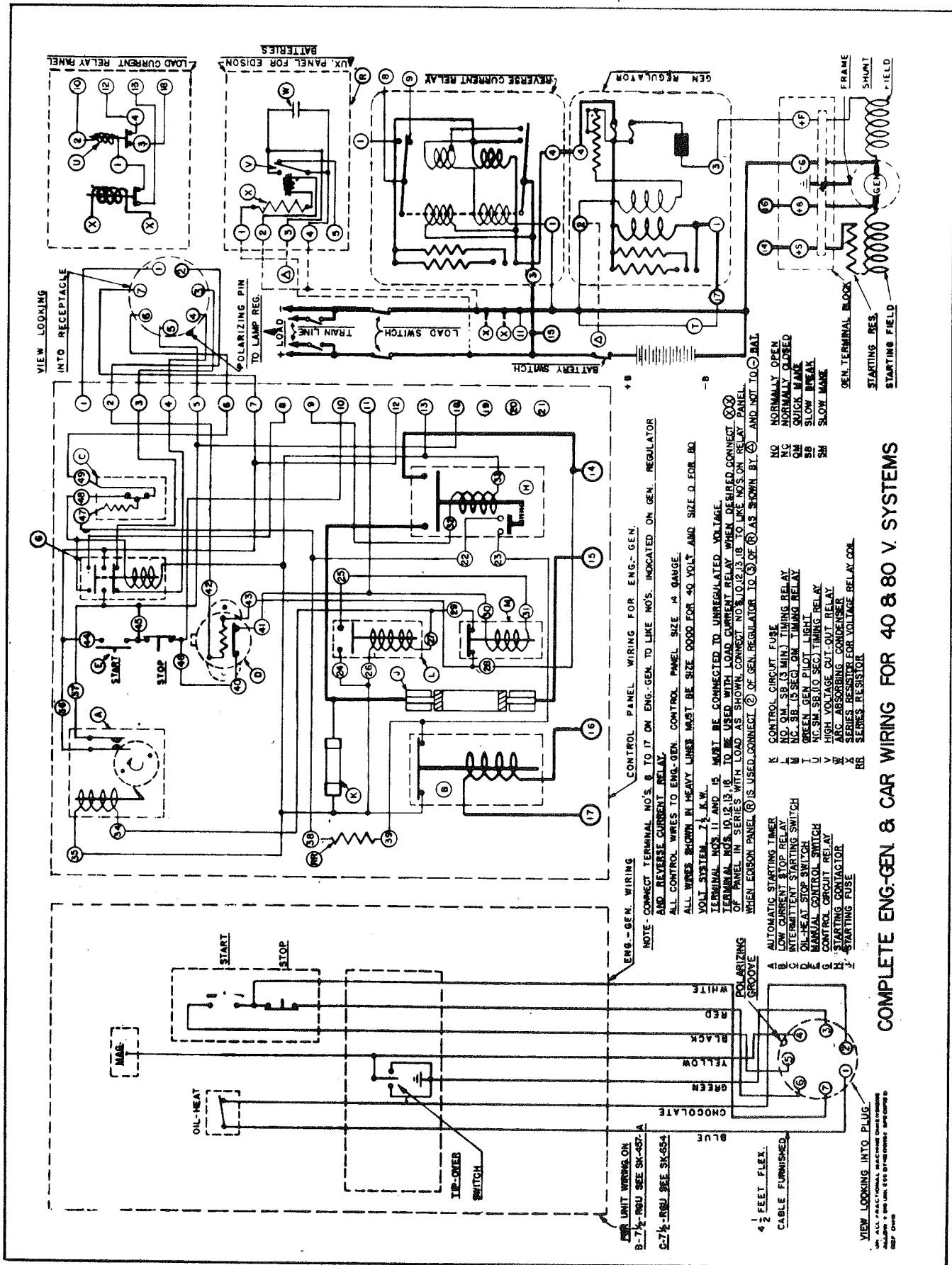
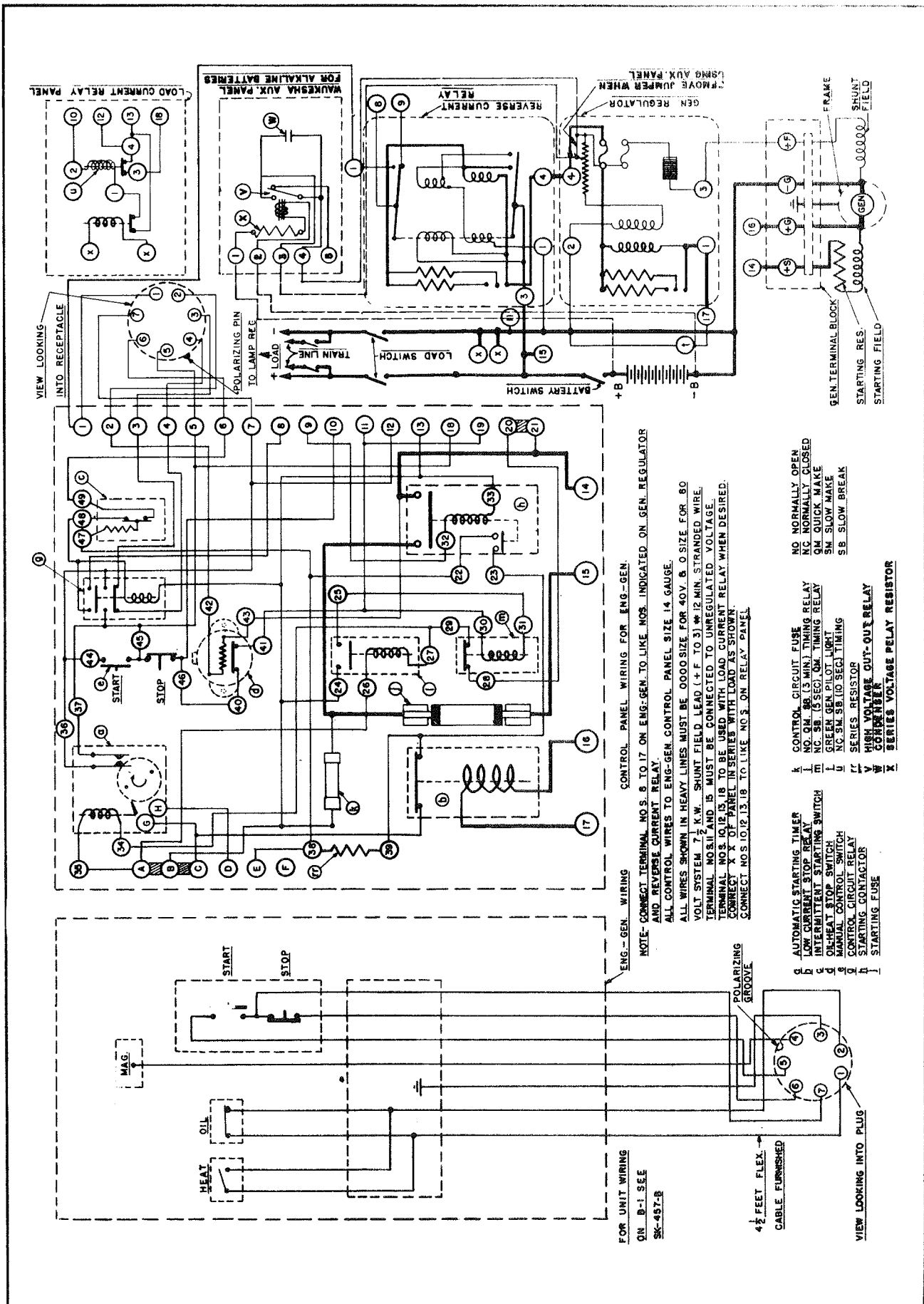


FIG. 10—MODEL "B"—7½ RCU ENGINE-GENERATOR CAR WIRING (SK-420-N-1 AND SK-463-E-1)



# INSTALLATION AND OPERATING ILLUSTRATIONS

Fig. 11A



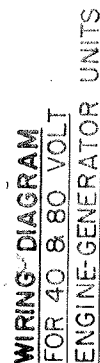


FIG. 11B—MODEL "B-1" ENGINE GENERATOR AND CAR WIRING DIAGRAM FOR 40 AND 80 VOLT SYSTEM (SK-470-F)

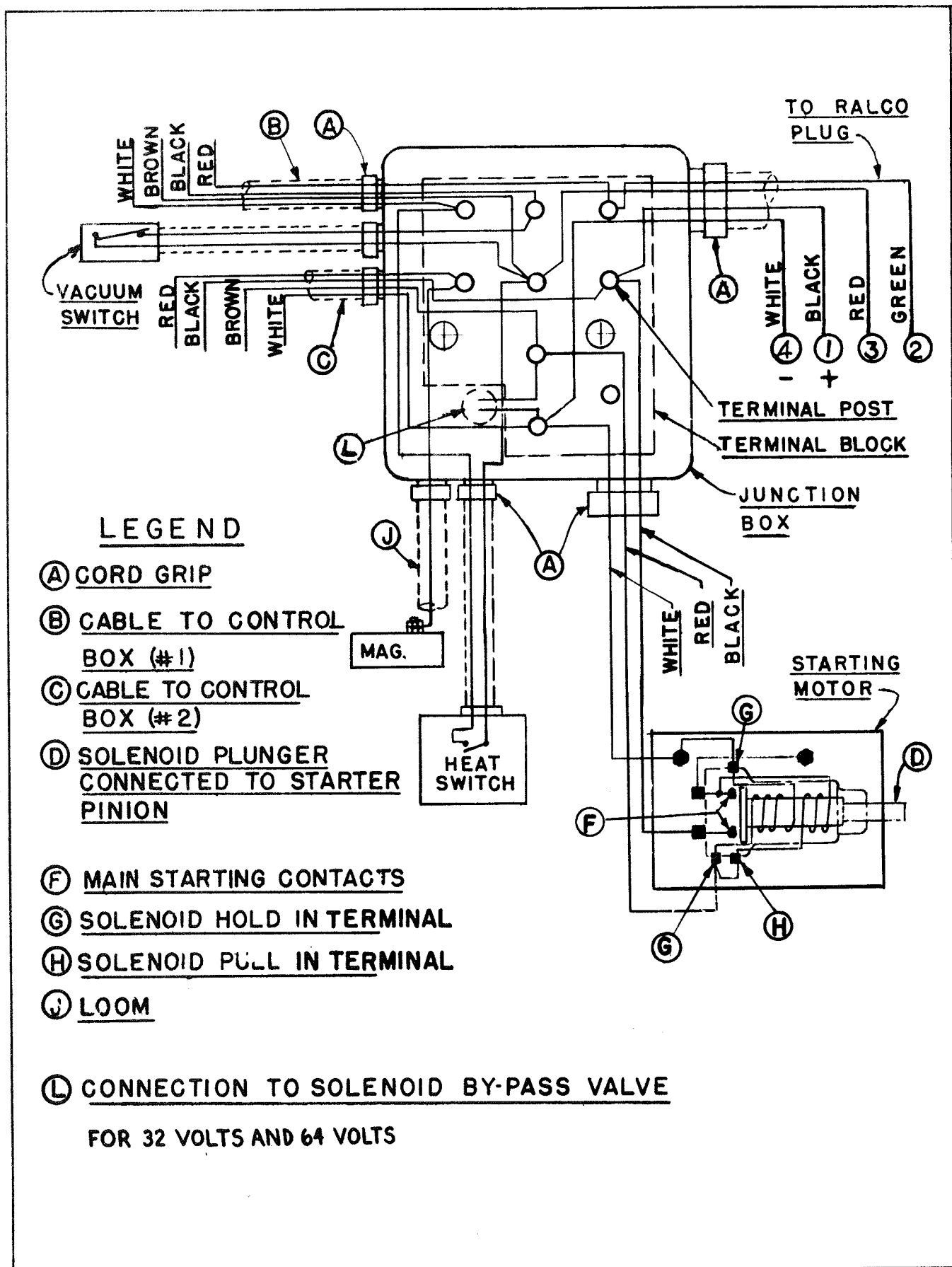
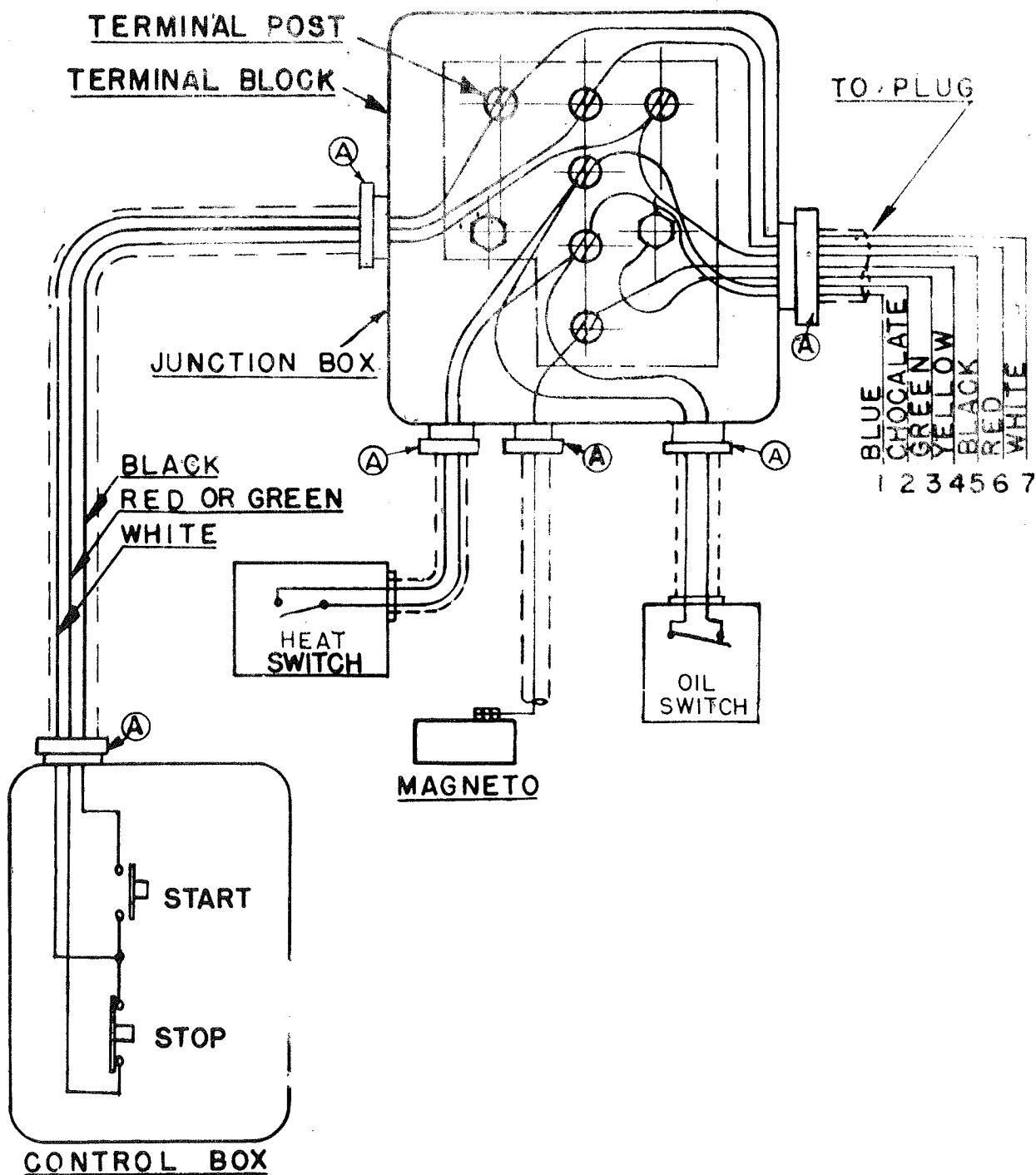


FIG. 12—MODEL "D-1" JUNCTION BOX WIRING



FOR 40 VOLT AND 80 VOLT SYSTEM

Ⓐ DENOTES CORD GRIP

FIG. 13 —MODEL "B-1" ENGINE-GENERATOR JUNCTION BOX WIRING

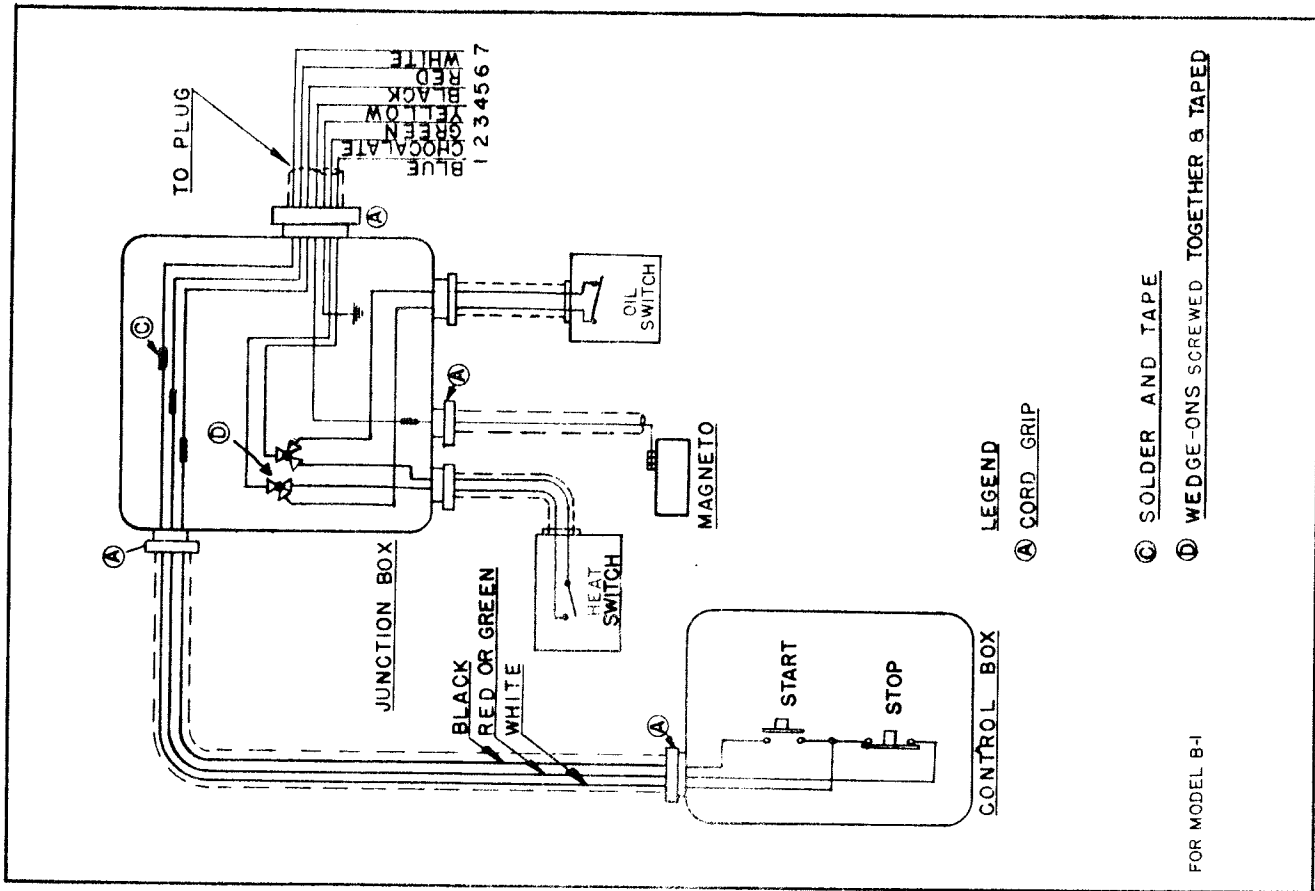


FIG. 15—MODEL "B-1" ENGINE-GENERATOR JUNCTION BOX  
WIRING (SK-457-B)

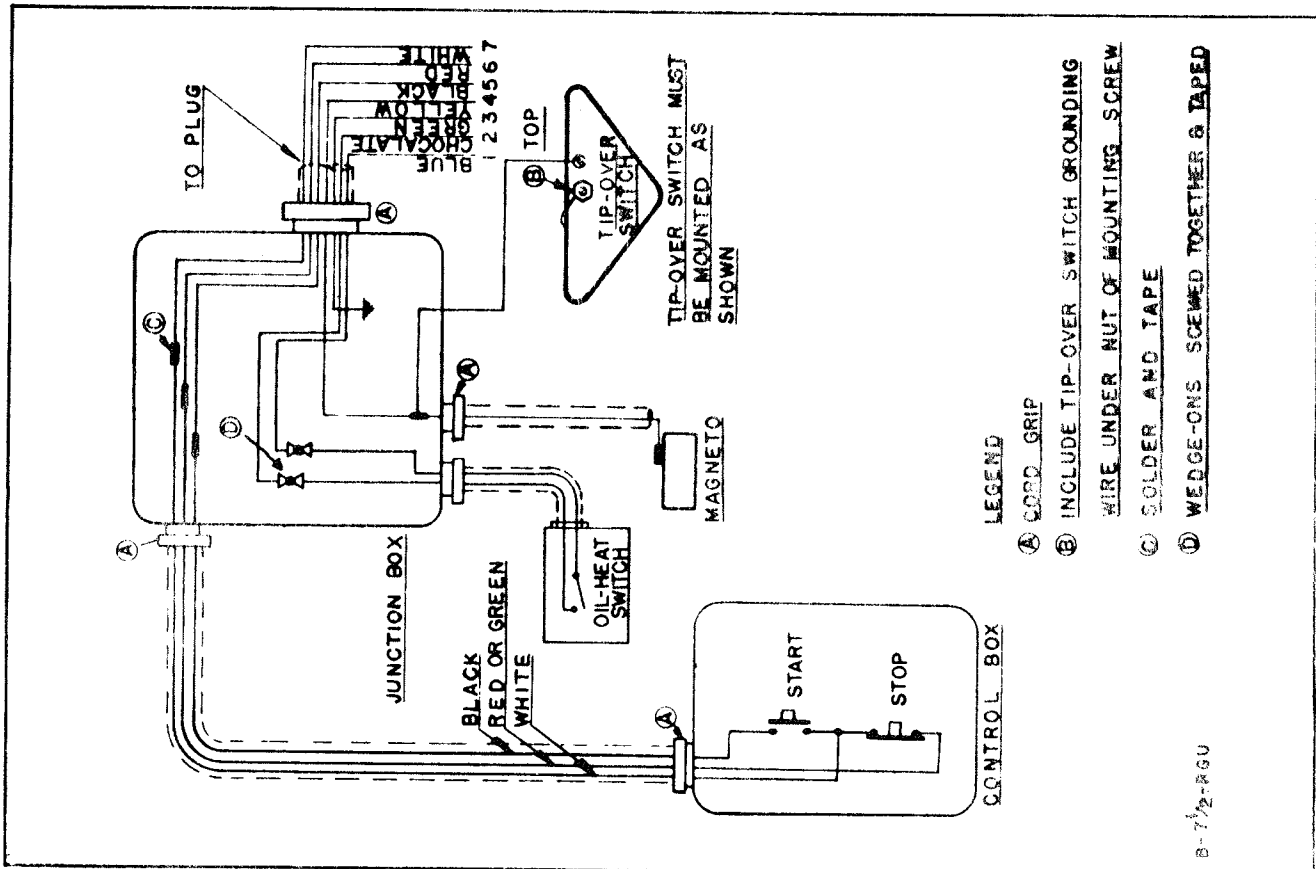
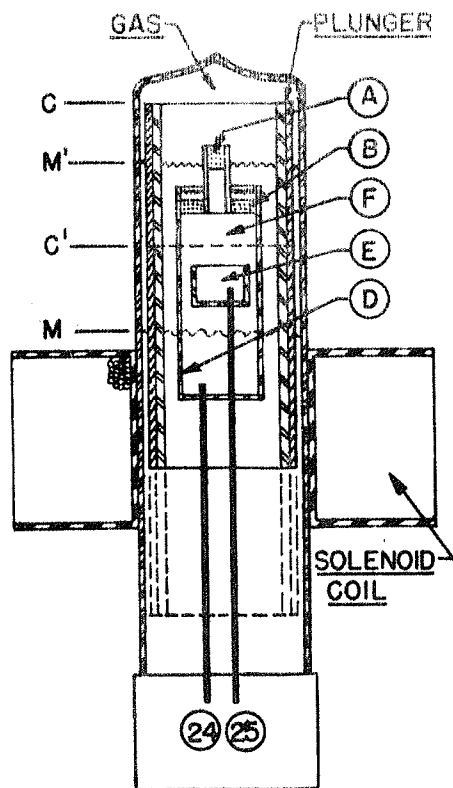


FIG. 14—MODEL "B-1" ENGINE-GENERATOR JUNCTION BOX  
WIRING (SK-457-A)

# INSTALLATION AND OPERATING ILLUSTRATIONS



## 3-MINUTE TIMING RELAY

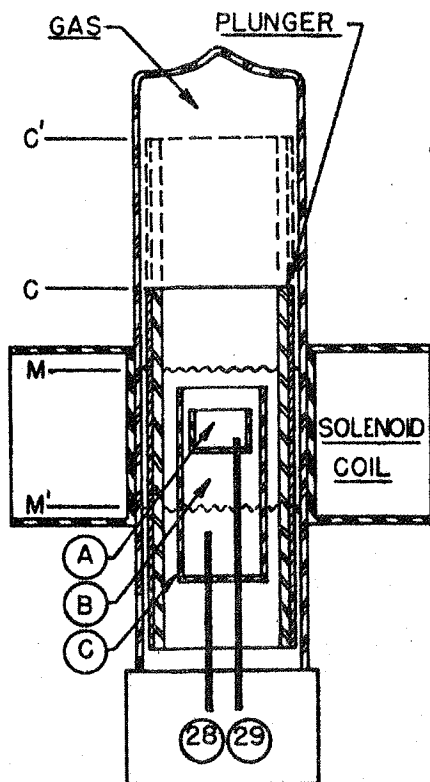
C-NORMAL HEIGHT OF PLUNGER.  
C'-HEIGHT OF PLUNGER WHEN SOLENOID IS ENERGIZED.  
M-NORMAL HEIGHT OF MERCURY.  
M'-HEIGHT OF MERCURY WITH PLUNGER AT C'.

### OPERATION

WHEN SOLENOID COIL IS ENERGIZED, PLUNGER MOVES FROM C TO C' DISPLACING THE MERCURY AND RAISING ITS LEVEL FROM M TO M'. MERCURY ENTERING HOLE AT D, FORCES THE GAS FROM F THRU B UNTIL MERCURY SPILLS INTO CUP E AND COMPLETES CIRCUIT BETWEEN 24 AND 25.

WHEN SOLENOID COIL IS DEENERGIZED, PLUNGER THEN RISES AND MERCURY LEVEL FALLS. MERCURY WILL BLEED THUR HOLE D, FLOW BEING RESTRICTED BY GAS RETURNING THRU A, (MERCURY SEALING B) UNTIL LEVEL IS BELOW CUP E, BREAKING THE CIRCUIT BETWEEN 24 AND 25.

FIG. 16—3-MINUTE TIMING RELAY (SK-468)



## 5-SECOND TIMING RELAY

C-NORMAL HEIGHT OF PLUNGER.  
C'-HEIGHT OF PLUNGER WHEN SOLENOID IS ENERGIZED.  
M-NORMAL HEIGHT OF MERCURY.  
M'-HEIGHT OF MERCURY WITH PLUNGER AT C'.

### OPERATION

WHEN SOLENOID COIL IS ENERGIZED, PLUNGER MOVES FROM C TO C'. MERCURY DISPLACES THE PLUNGER AND ITS LEVEL FALLS FROM M TO M'. THE LOWERING OF MERCURY LEVEL IN B IS RETARDED BY BLEED HOLE G. WHEN LEVEL FALLS BELOW CUP A, CIRCUIT BETWEEN 28 AND 29 IS BROKEN.

WHEN SOLENOID COIL IS DEENERGIZED, PLUNGER FALLS AND MERCURY RISES UNTIL IT SPILLS INTO CUP A COMPLETING THE CIRCUIT BETWEEN 28 AND 29.

FIG. 17—5-SECOND TIMING RELAY (SK-469)

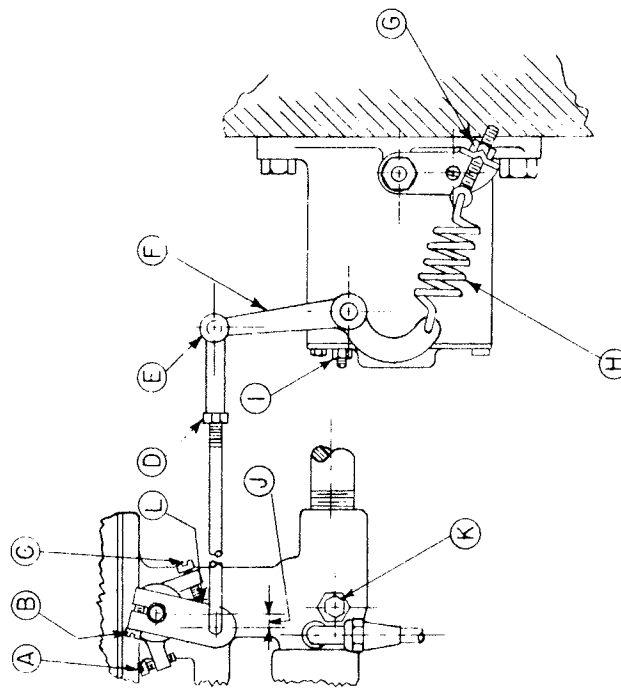


FIG. 19—ENGINE-GENERATOR SPEED CONTROL (SK-1028)

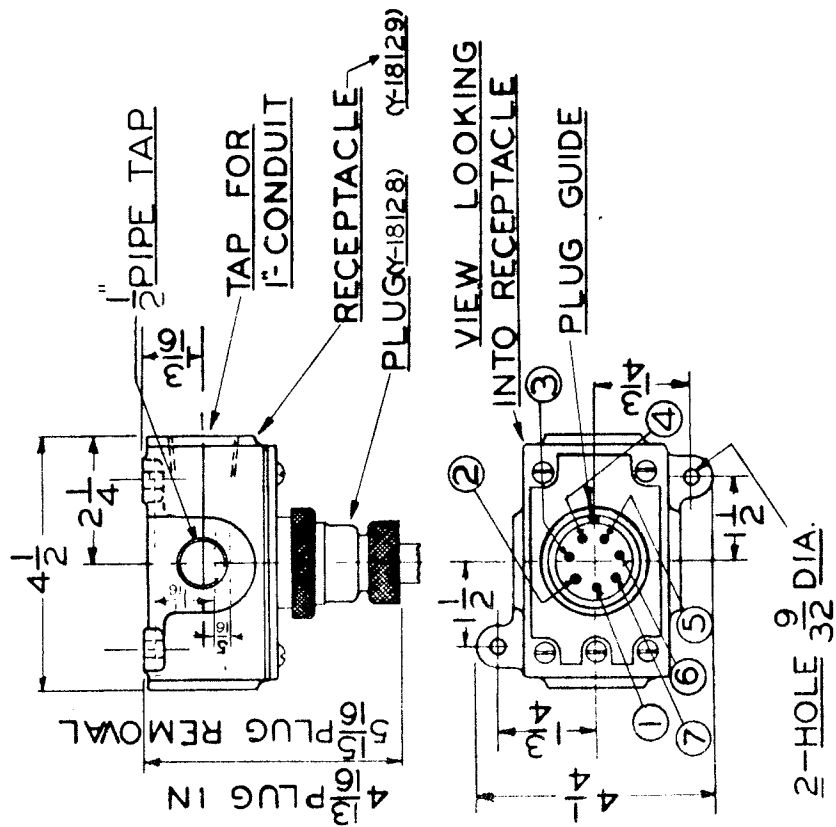


FIG. 18 PLUG AND RECEPTACLE FOR ENGINE-GENERATOR  
CONTROL CIRCUIT (SK-410)

# INSTALLATION AND OPERATING ILLUSTRATIONS

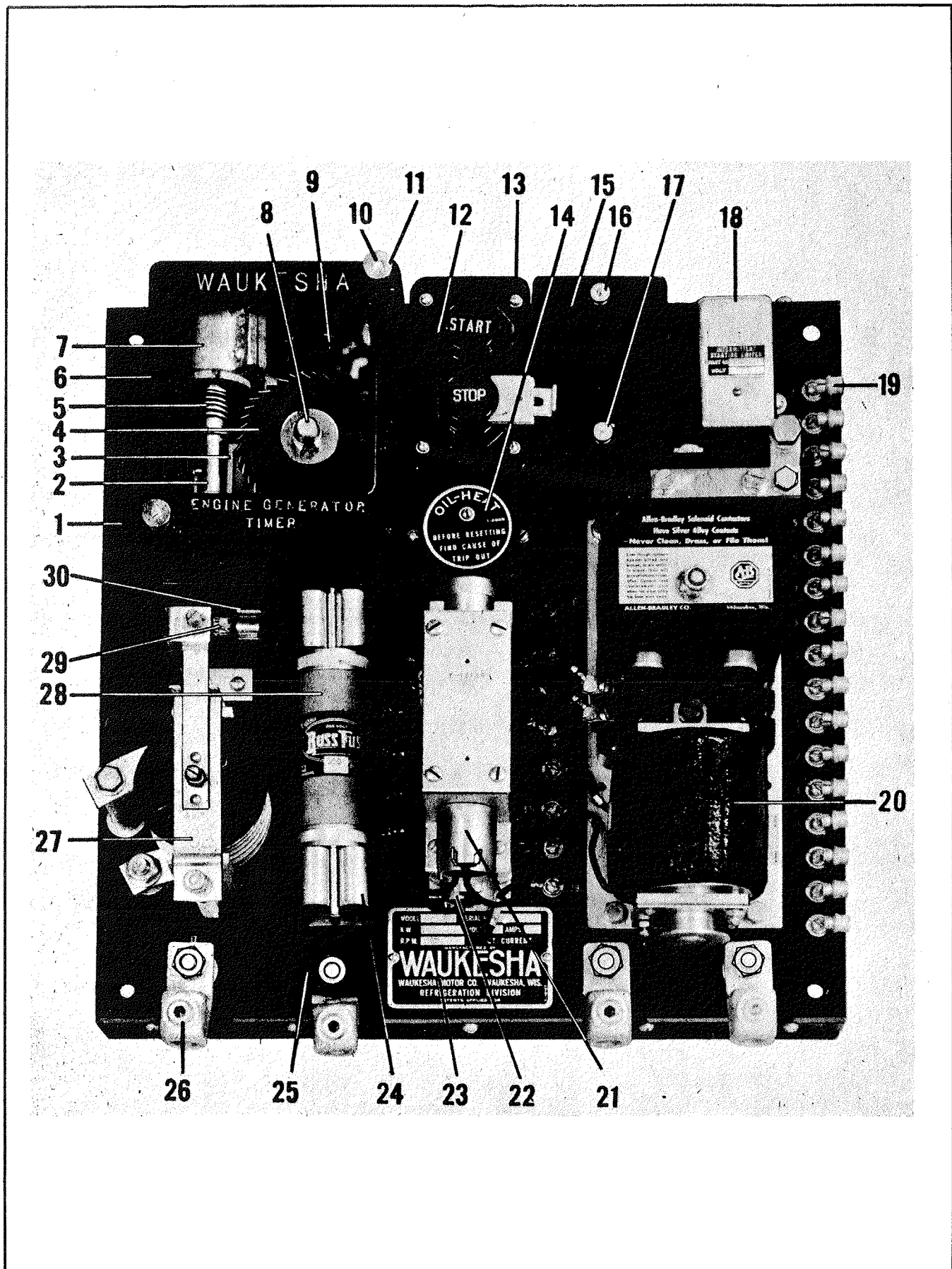
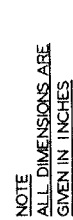


FIG. 20—ENGINE-GENERATOR CONTROL PANEL



INSTALLATION DRAWING OF  
WALKESHA ICE-ENGINE  
RAILWAY TYPE  
MODEL - D

FUEL CABINET DIMENSIONS	
INCH CYL.	A
1	24
2	37 1/2
3	55
4	72 1/2

MATERIAL LISTED BELOW  
NOT FURNISHED

- (15) LARGE COMBINATION STRAINER AND DRIER
- (16)  $3/4" \times 1/2"$  REDUCING STREET ELBOW (MALLEABLE)
- (17)  $1/2"$  UNION (MALLEABLE)
- (18) FUELLINE  $3/4"$  IRON PIPE

FUEL SYSTEM

L. SUPPLY CABINET (ITEM B)  
COMPLETE WITH MANFOLDING  
SEE TABLE FOR SIZES  
L. CYLINDERS (EXTRA)

STANDARD WAUKESHA ICE-ENGINE MODEL D (ITEM A)  
INCLUDES THE FOLLOWING-

① ICE-ENGINE	⑨ REFRIGERANT RECEIVER WITH MOUNTING FEET
② MOUNTING TRACKS	⑩ REFRIGERANT RECEIVER VALVES
③ FLEXIBLE REFRIGERANT LINE (LIQUID)	⑪ COPPER SWEAT ELBOW FOR 1/8" ACTUAL
④ FLEXIBLE REFRIGERANT LINE (SUCTION)	⑫ O.D. COPPER TUBING
⑤ FLEXIBLE TUBING SUPPORTS	⑬ PILOT LIGHT CONTROL -FOR LOCATION
⑥ FLEXIBLE FUEL LINE	SEE DRAWING SK-252
⑦ ELECTRICAL RECEPTACLE AND PLUG	

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**REQUEST CERTIFIED PRINT**  
**FOR FINAL INSTALLATION**

FIG. 21—INSTALLATION DRAWING OF ICE ENGINE UNIT (SK-343-A)

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FOR FINAL INSTALLATION**

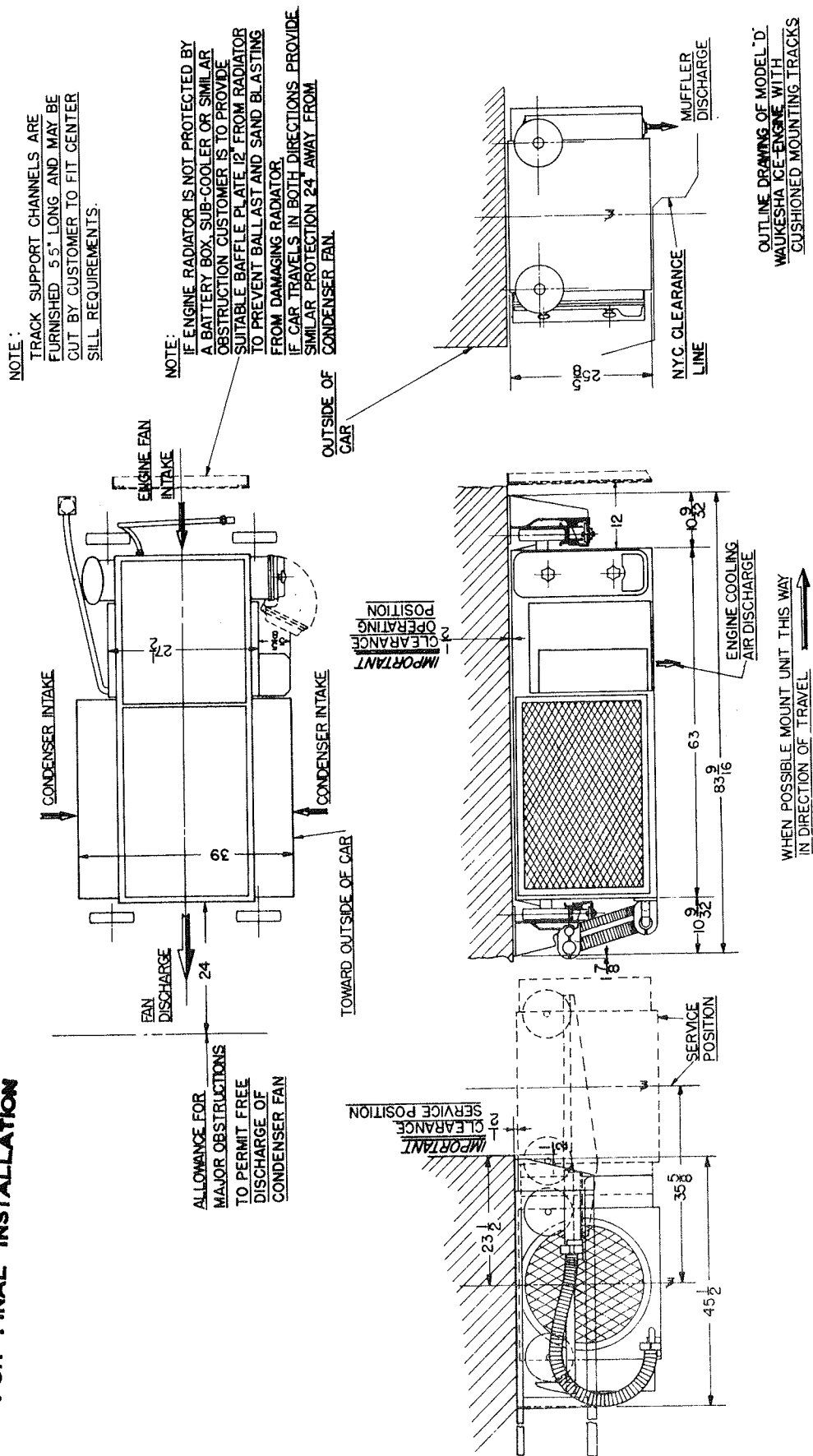
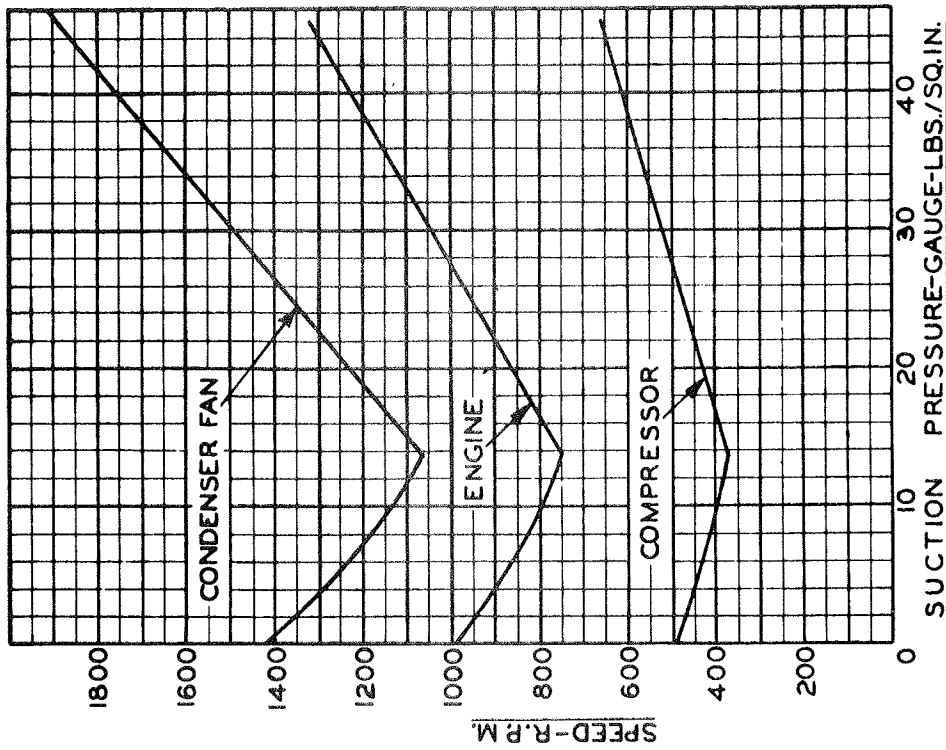


FIG. 21A—OUTLINE DRAWING OF MODEL "D" AND "D-1" ICE ENGINE UNIT WITH CUSHION MOUNTING TRACKS (SK-483-A)



MODULATED-SPEED CURVES

MODEL-D ICE-ENGINE  
REVISED 5-10-38

FIG. 23—MODULATED SPEED CURVES (SK-267-A)

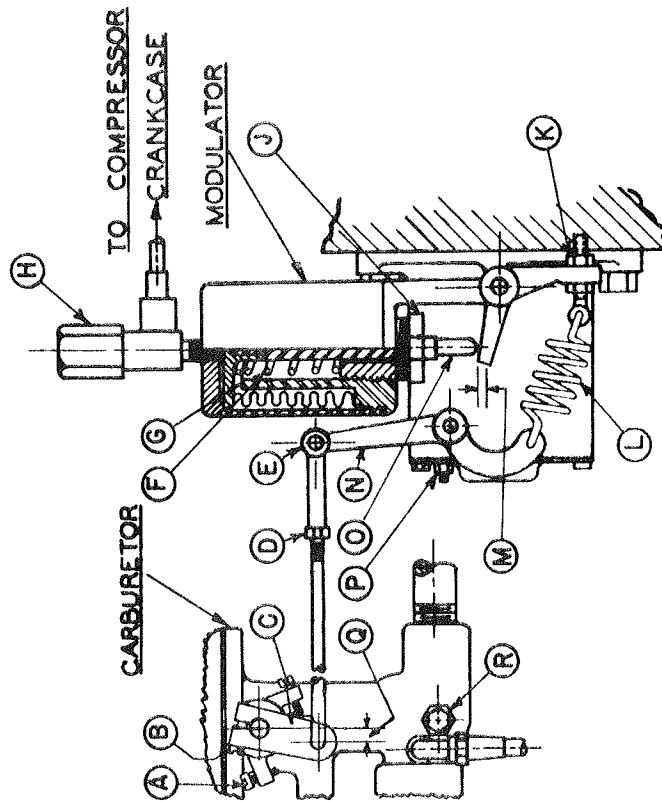


FIG. 22—MODULATED ENGINE SPEED CONTROL (SK-238-C)

# INSTALLATION AND OPERATING ILLUSTRATIONS

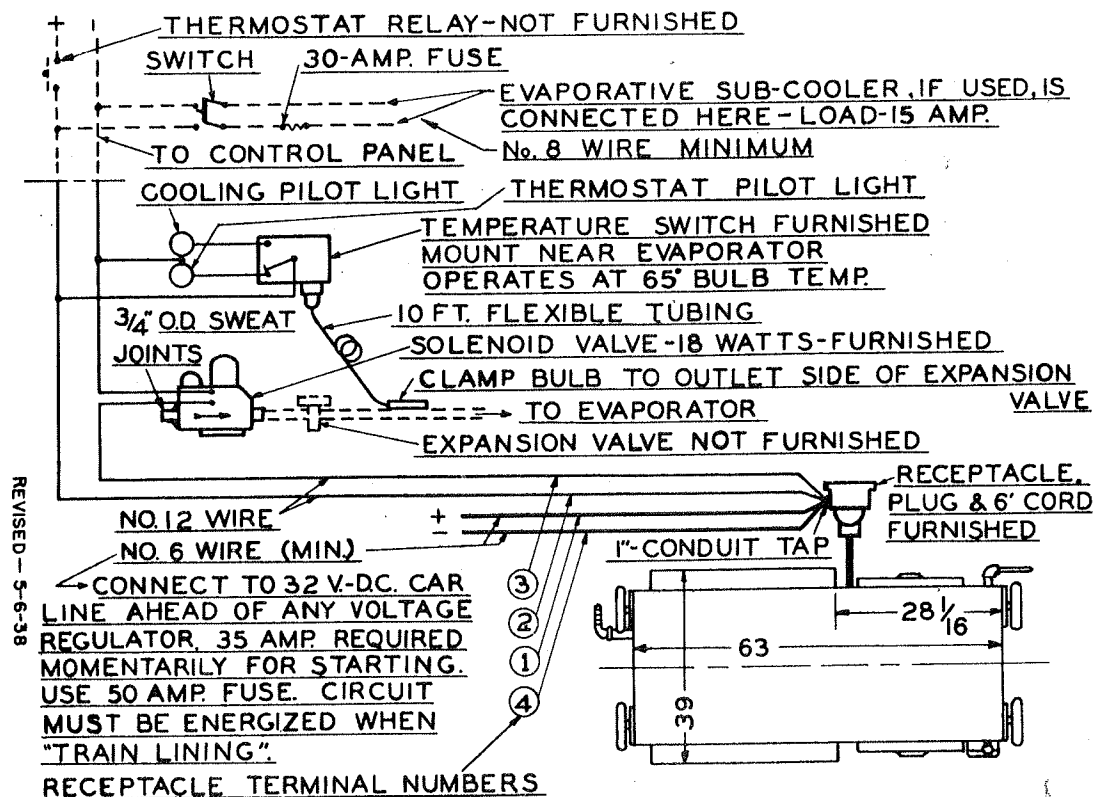


FIG. 24—CAR WIRING FOR MODEL "C" ICE ENGINE UNIT (SK-252)

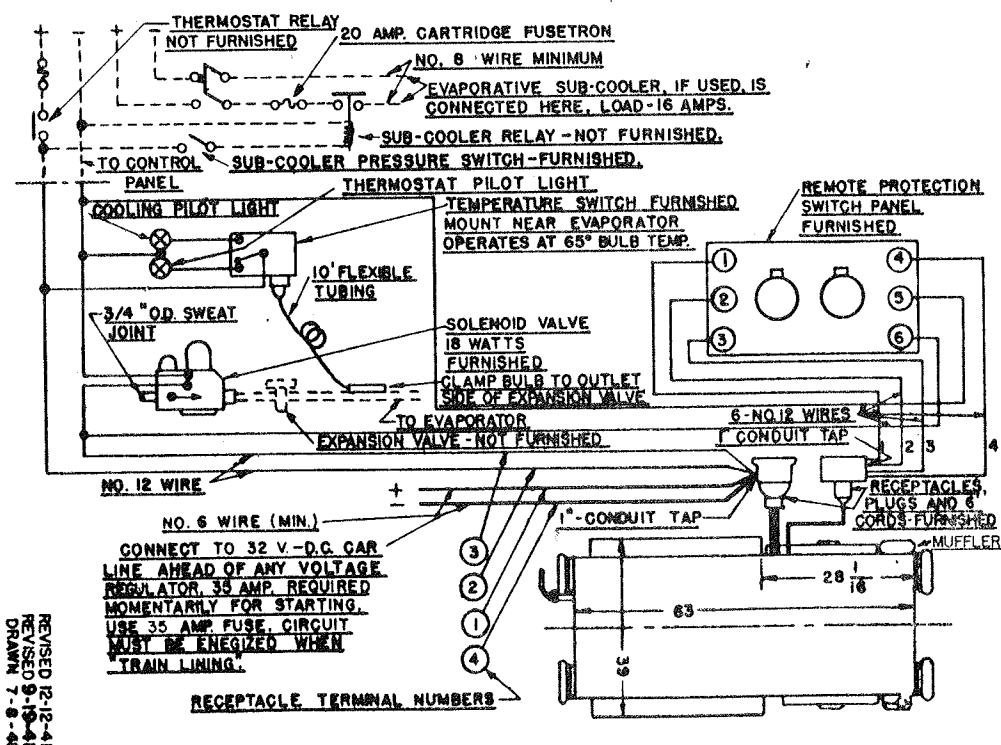


FIG. 25—CAR WIRING FOR MODEL "D" ICE ENGINE (32 VOLT) (SK-598)

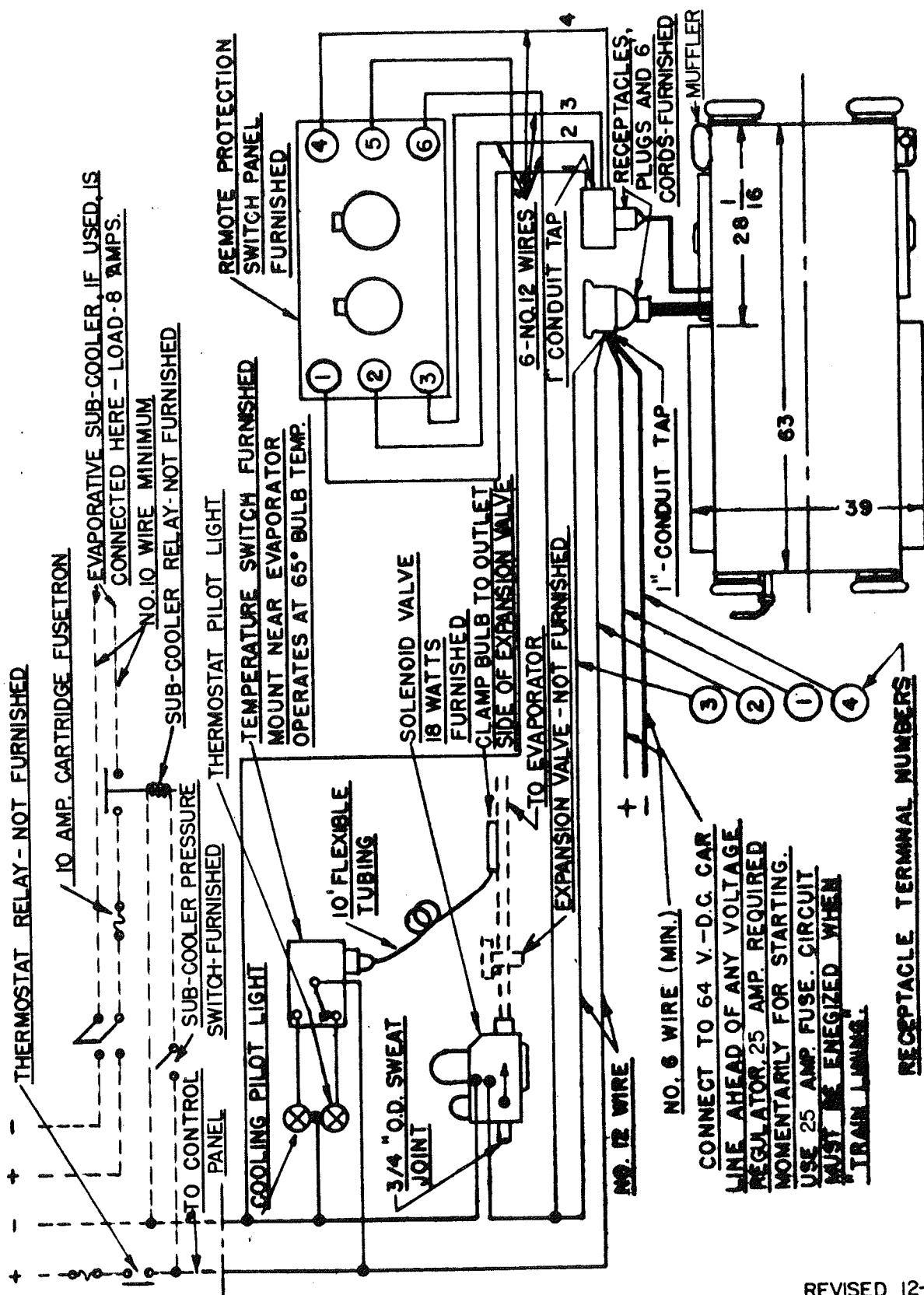


FIG. 26—CAR WIRING FOR MODEL "D" ICE ENGINE UNIT (64 VOLT) (SK-599)

REVISED 12-17-41  
DRAWN 8-8-40

# INSTALLATION AND OPERATING ILLUSTRATIONS

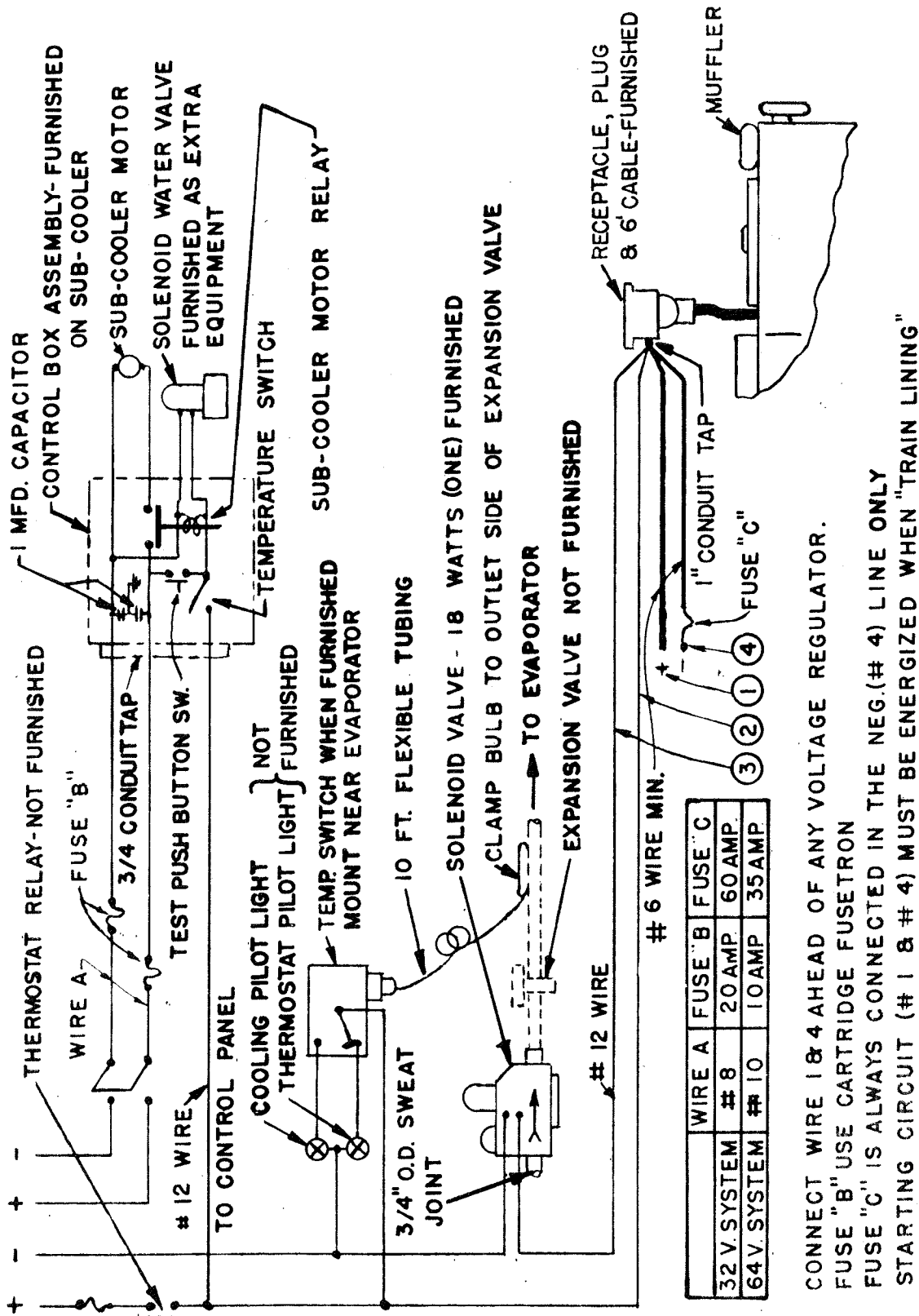


FIG. 27—CAR WIRING FOR MODEL "D-1" ICE ENGINE UNIT (32 AND 64 VOLT) (SK-252-B AND SK-252-C)

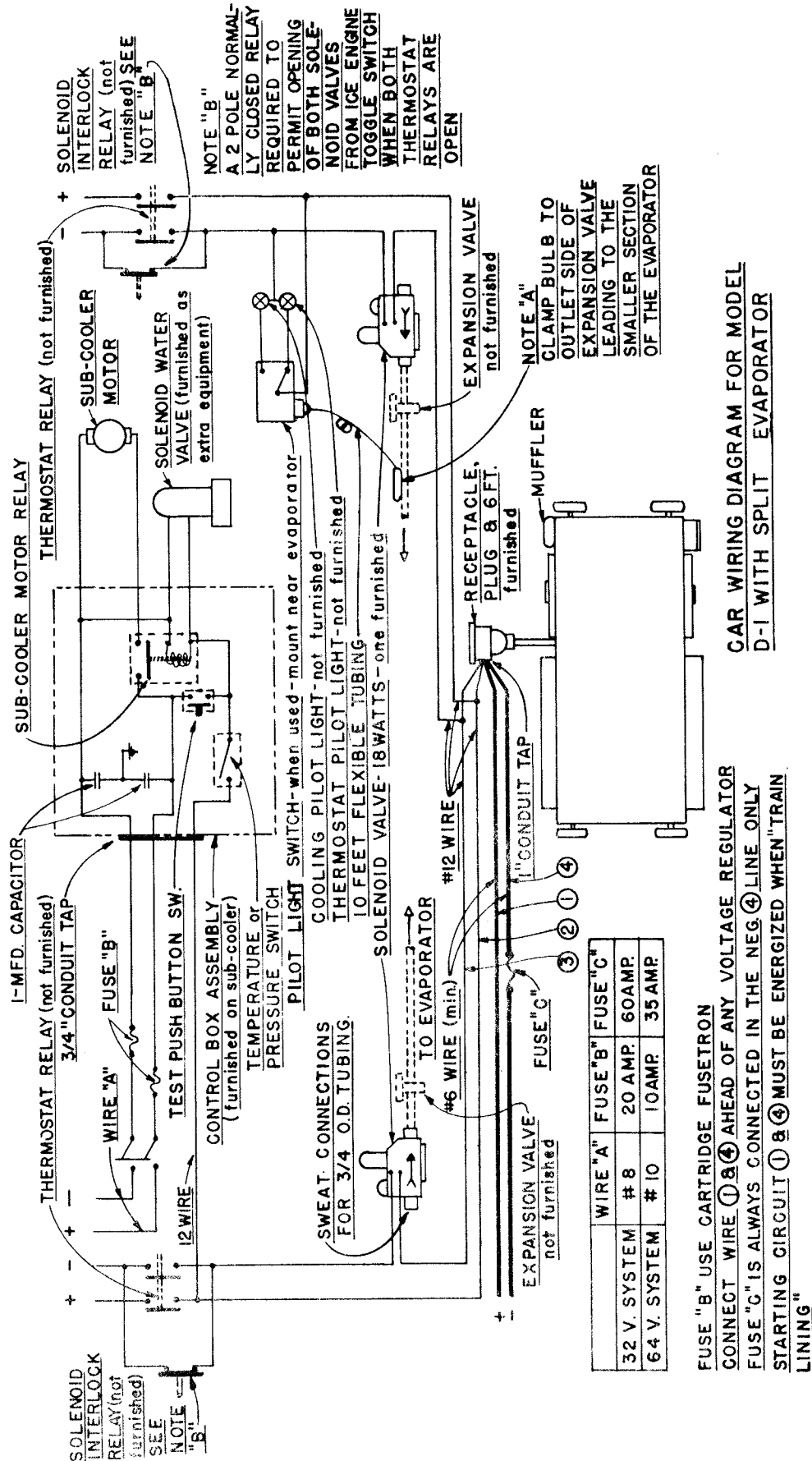


FIG. 28—CAR WIRING DIAGRAM FOR MODEL "D-1" ICE ENGINE UNIT WITH SPLIT EVAPORATOR (32 AND 64 VOLT) (SK-1041)

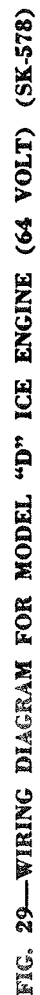


FIG. 29—WIRING DIAGRAM FOR MODEL "D" ICE ENGINE (64 VOLT) (SK-578)

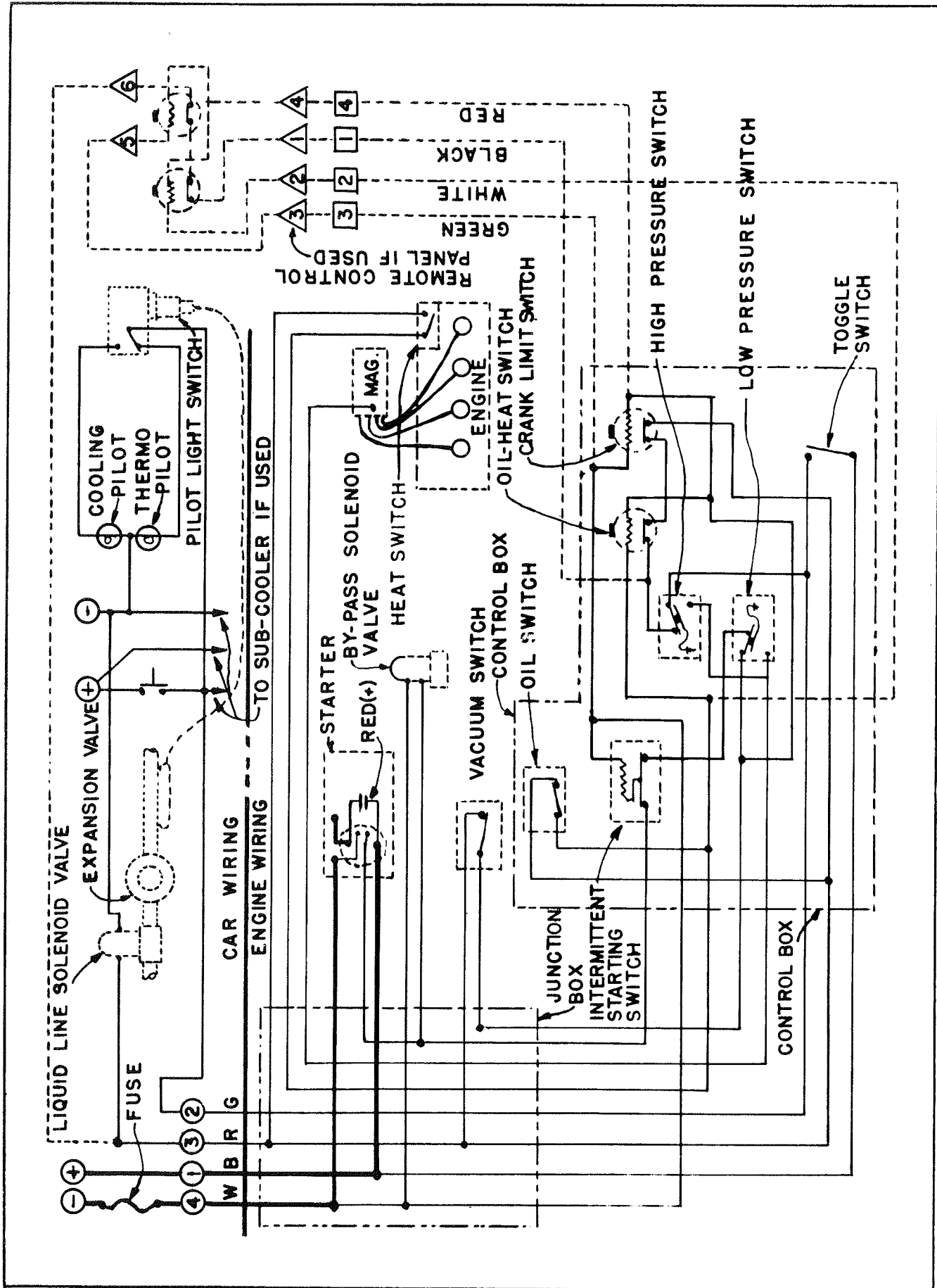


FIG. 30—WIRING DIAGRAM FOR MODEL "D-1" ICE ENGINE (32 VOLT) (SK-360-1)

# INSTALLATION AND OPERATING ILLUSTRATIONS

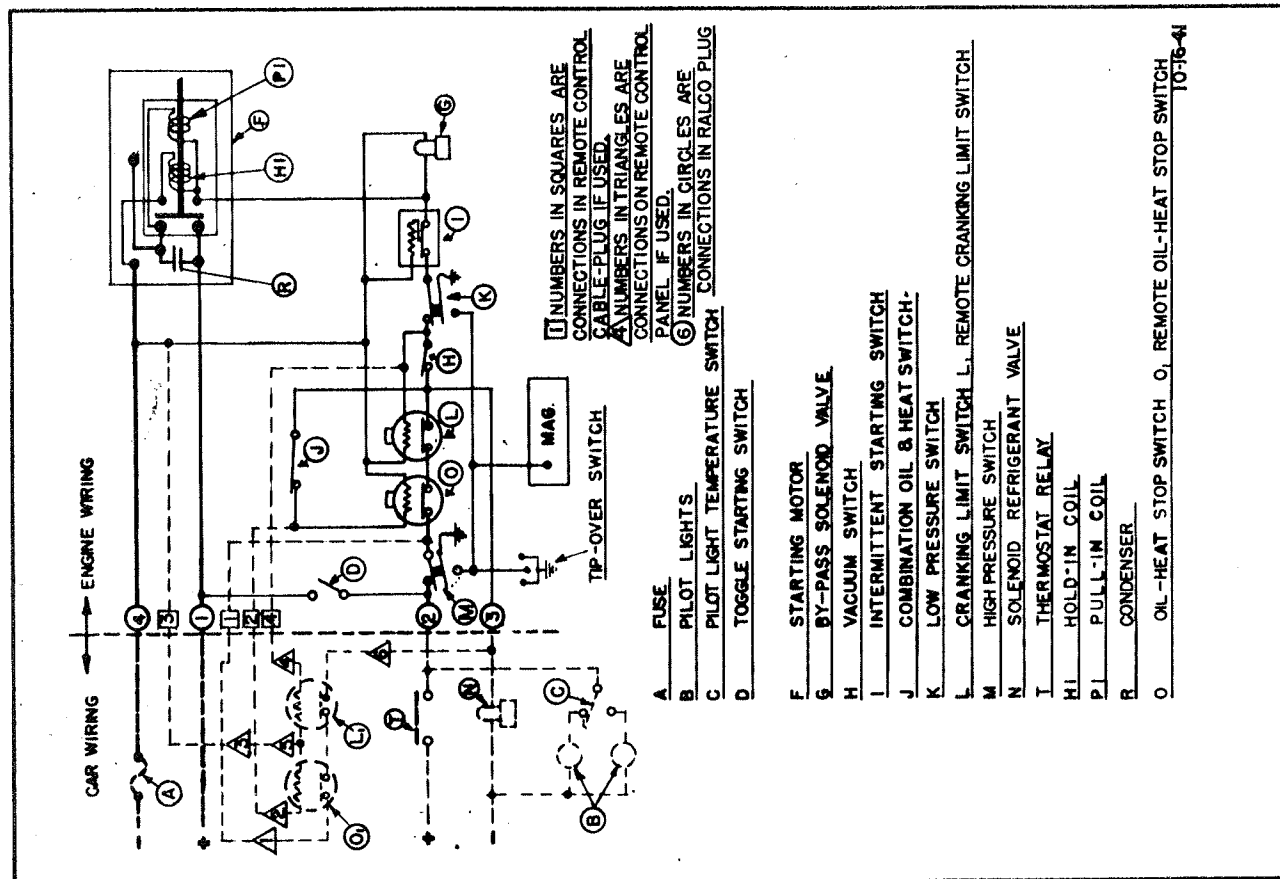


FIG. 32—LINE WIRING DIAGRAM, MODEL "D" ICE ENGINE (32 VOLT) (SK-363-E)

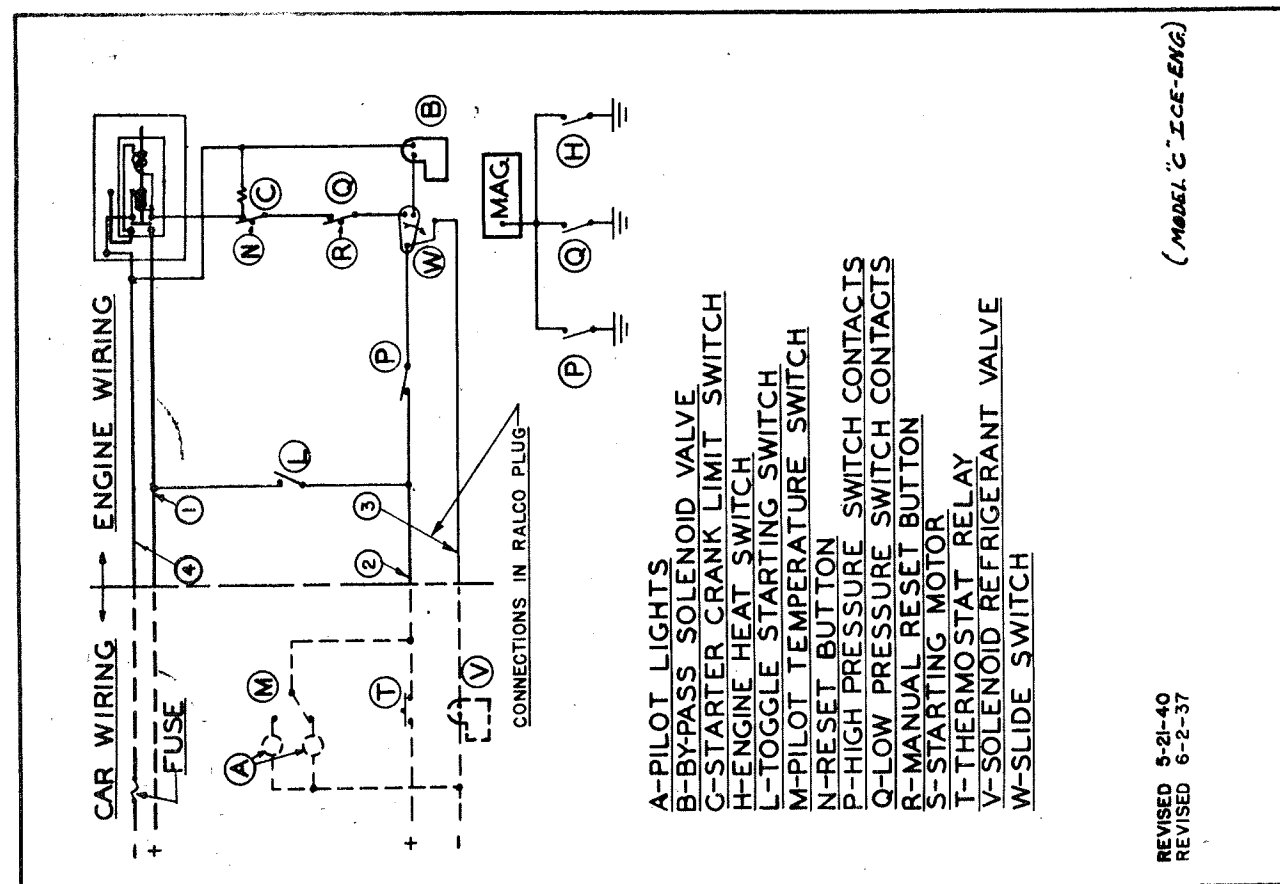
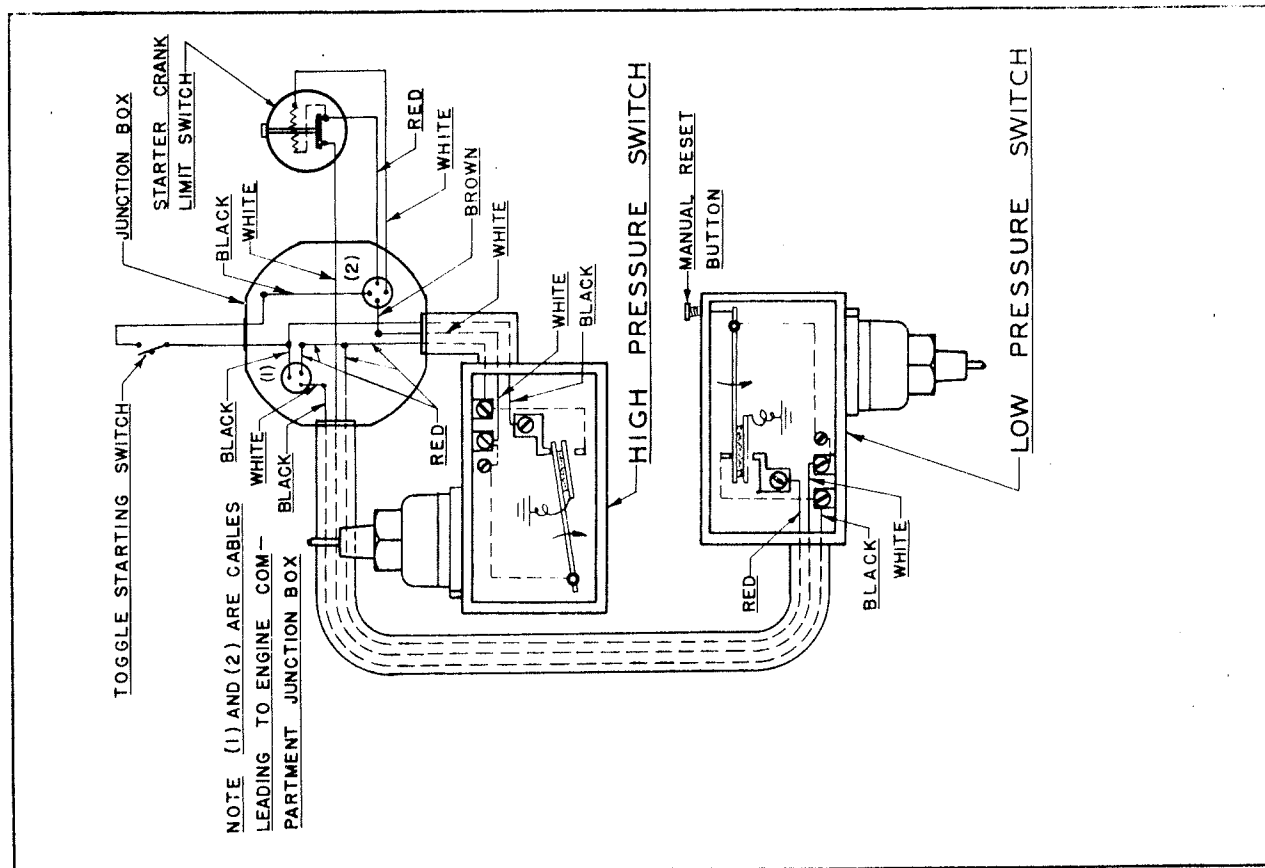


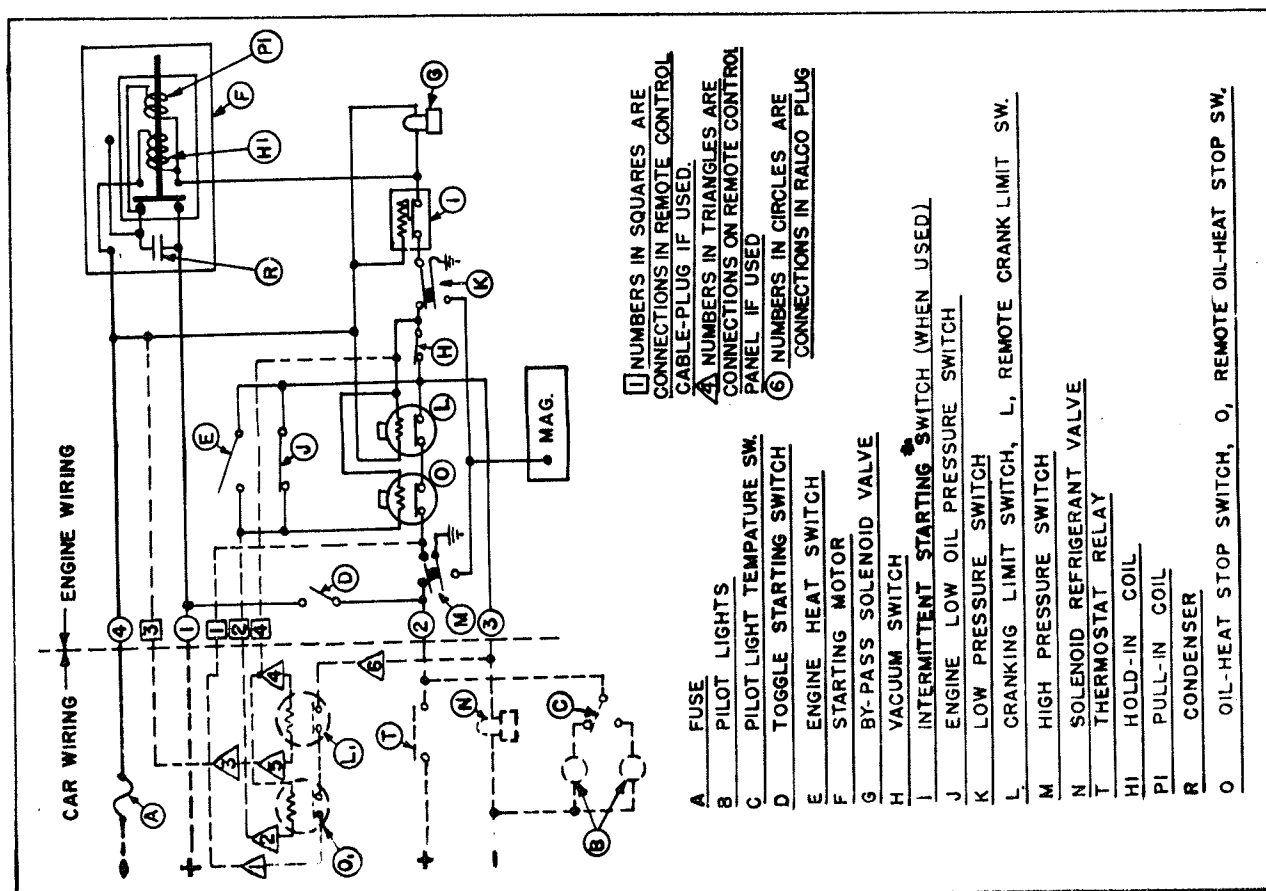
FIG. 31—LINE WIRING DIAGRAM, MODEL "C" ICE ENGINE (32 VOLT) (SK-251)

REVISED 5-21-40  
REVISED 6-2-37

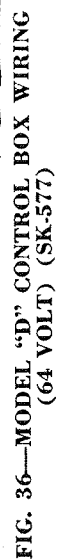
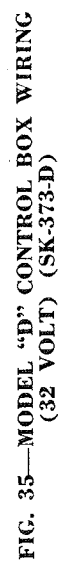
(MODEL "C" ICE-ENG)



**FIG. 34—MODEL "C" ICE ENGINE CONTROL BOX WIRING  
(SK-266)**



**FIG. 33—LINE WIRING DIAGRAM, MODEL “D-1” ICE ENGINE  
(32 VOLT) (SK-363-F)**





# INSTALLATION AND OPERATING ILLUSTRATIONS

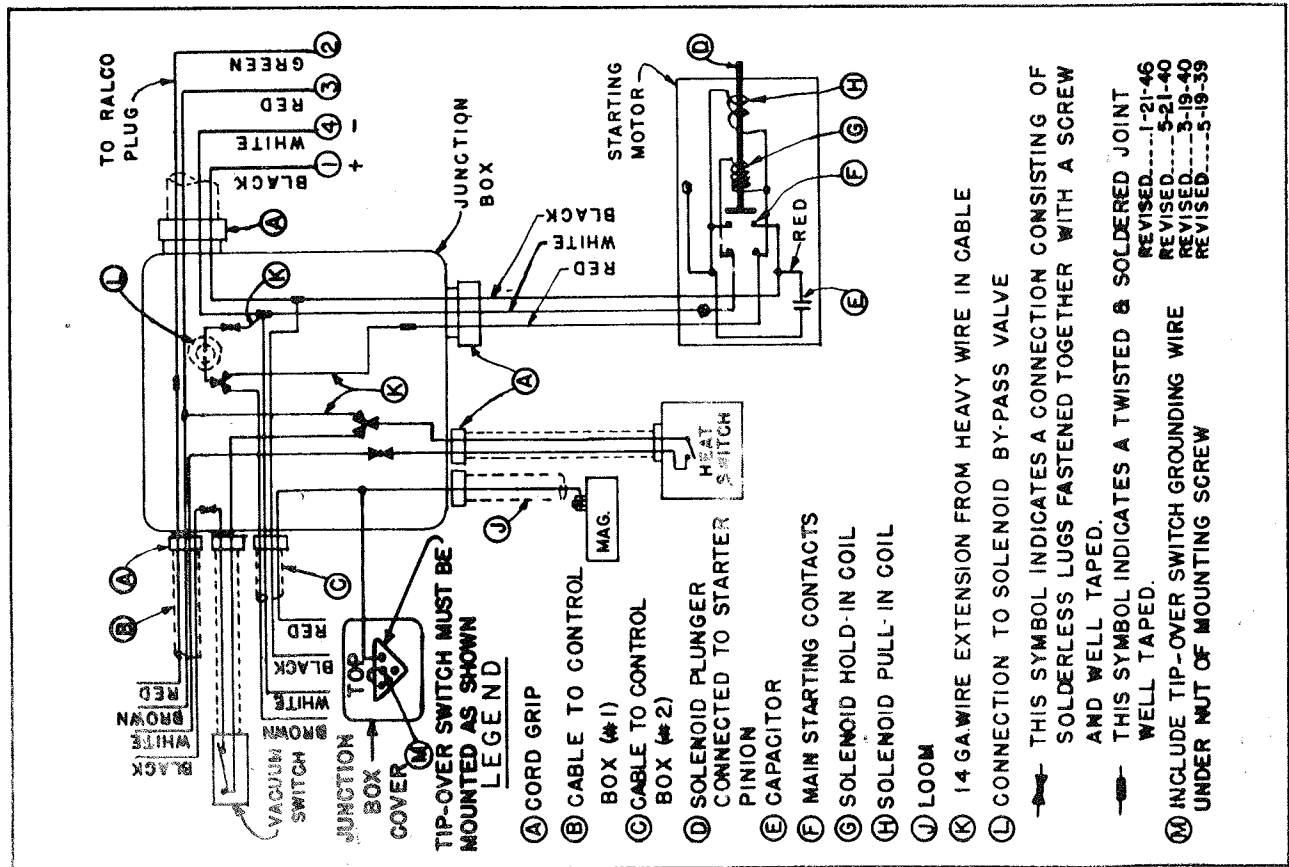


FIG. 39—MODEL "D" JUNCTION BOX WIRING  
(32 VOLT) (SK-372-D)

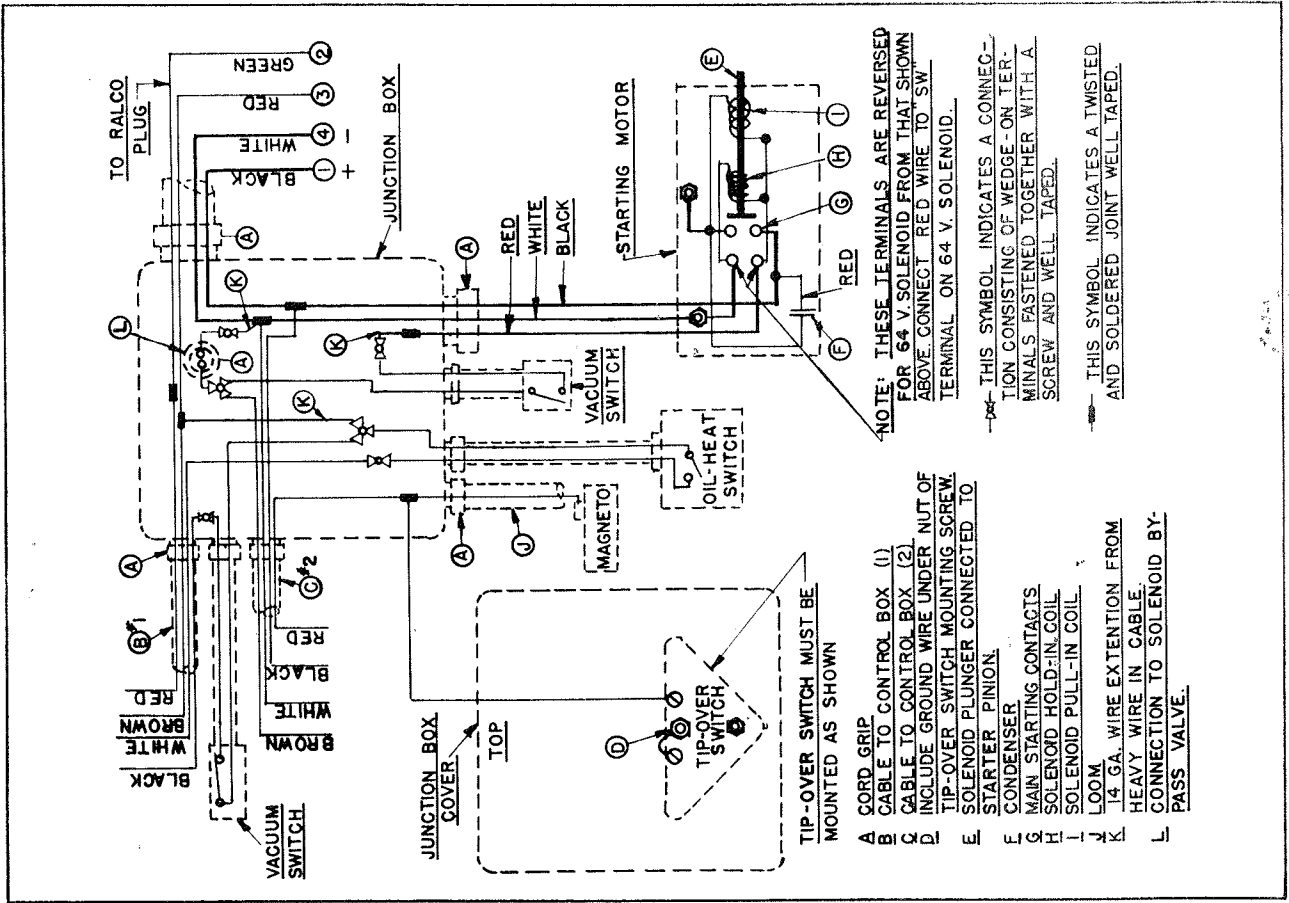


FIG. 40—MODEL "D" JUNCTION BOX WIRING  
(64 VOLT) (SK-576)

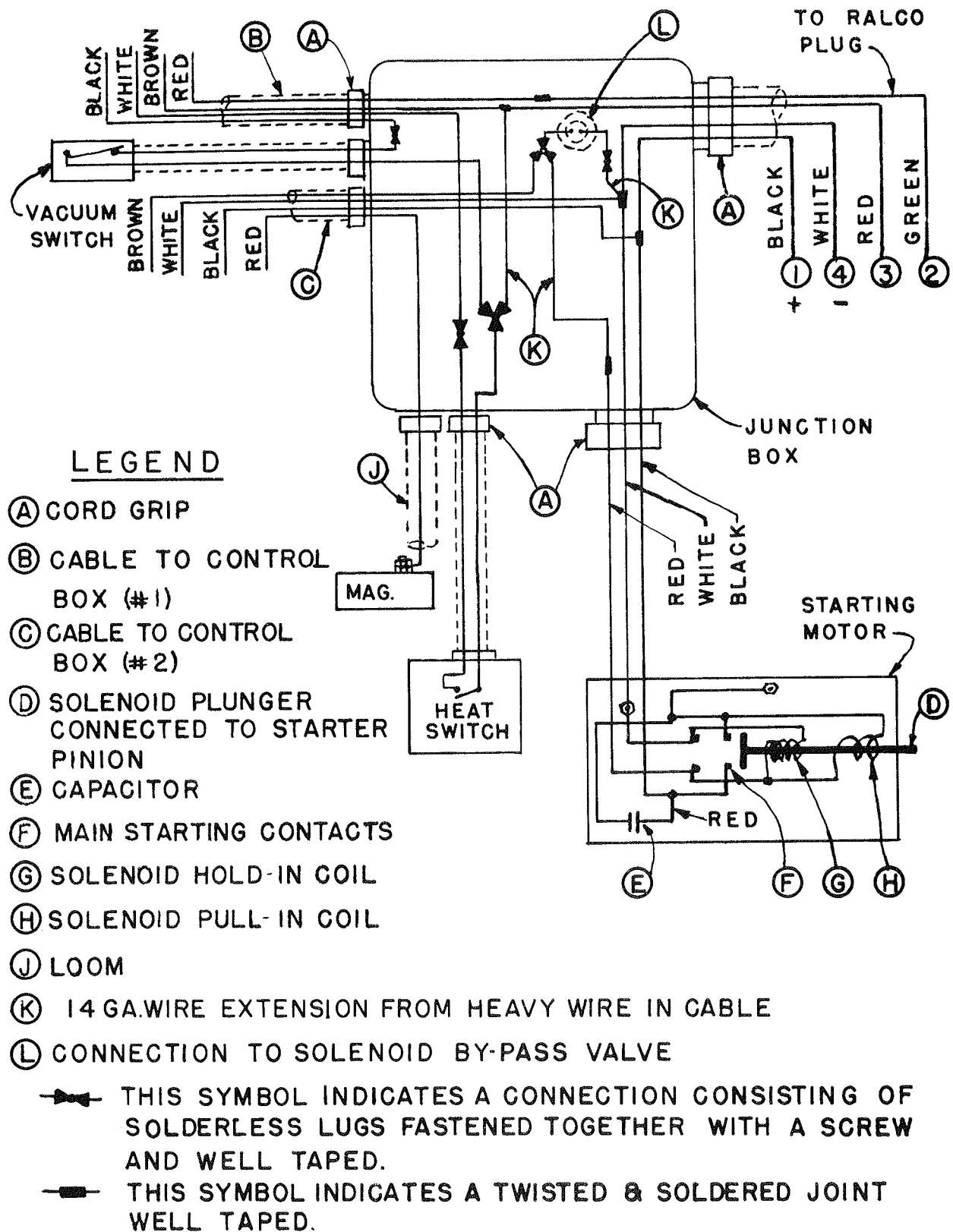


FIG. 41—MODEL "D-1" JUNCTION BOX WIRING (32 VOLT) (SK-372-F)

# INSTALLATION AND OPERATING ILLUSTRATIONS

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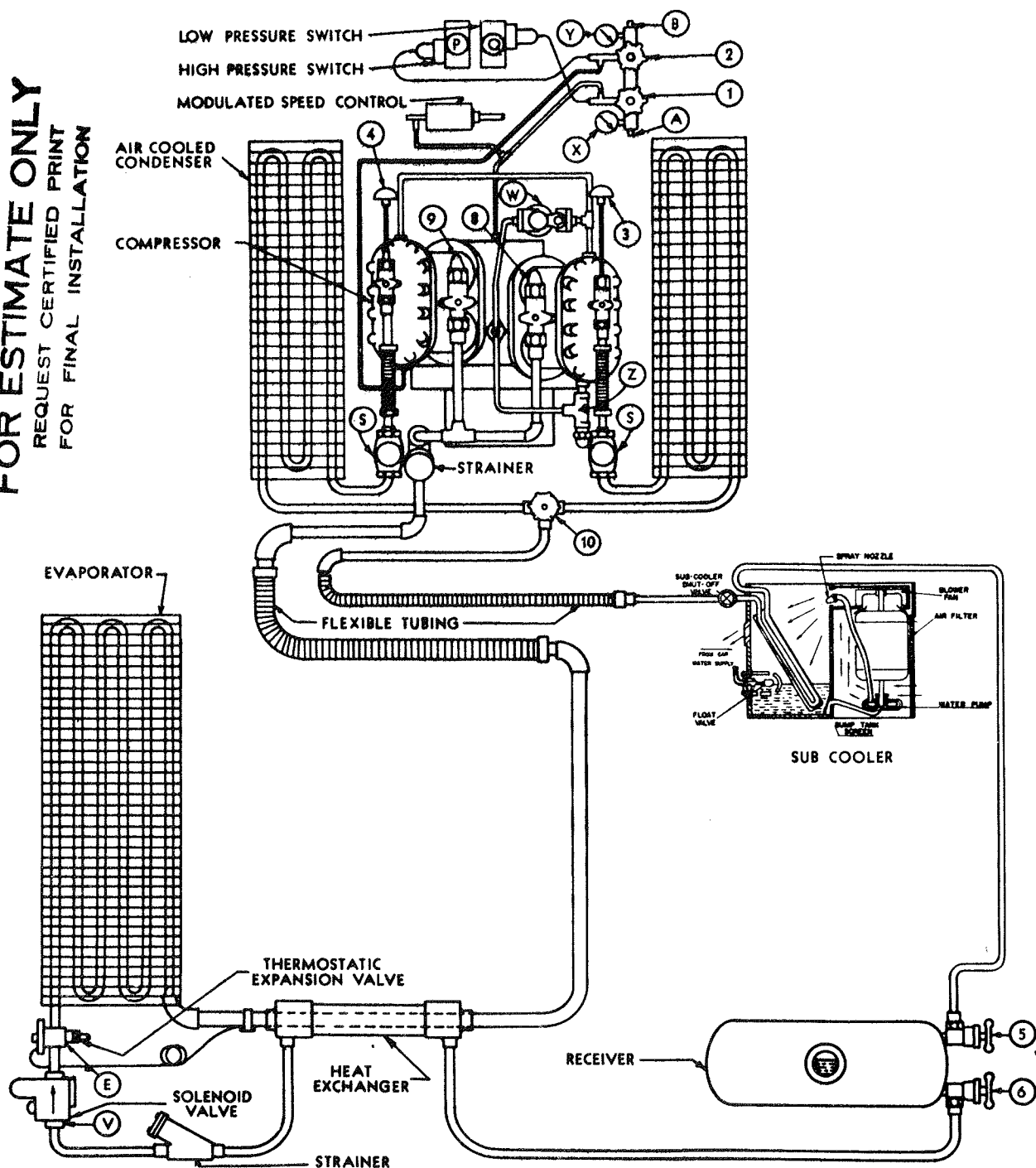


FIG. 42—SCHEMATIC PIPING DIAGRAM OF ICE ENGINE UNIT



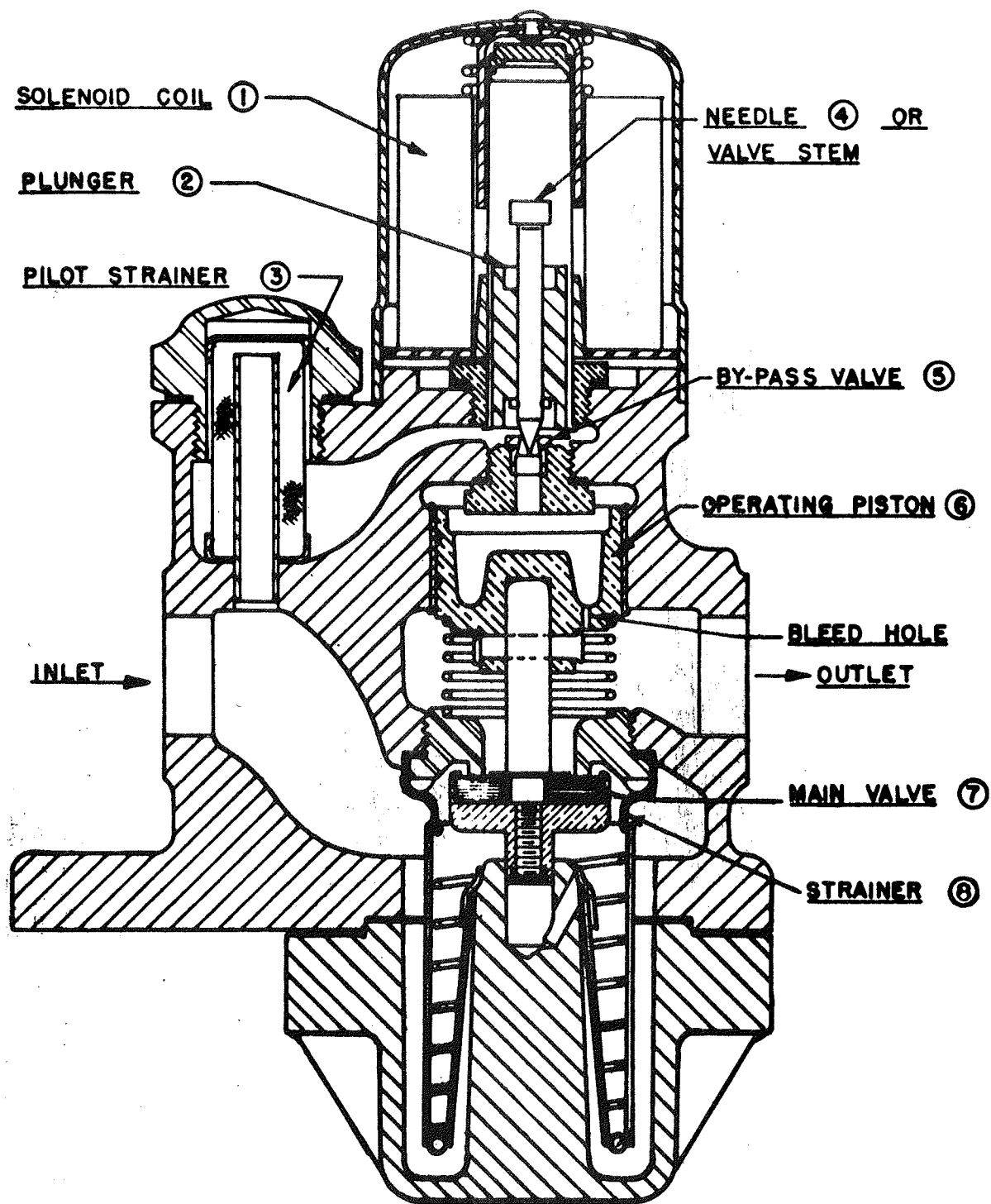


FIG. 45—MODEL 70-NAS SOLENOID VALVE (SK-276-A)

WEIGHTS	MERCURY OR STEEL EVAPORATOR	
	EVAPORATIVE SUB-COOLER 40 GAL. (EMPTY)	EVAPORATIVE SUB-COOLER 40 GAL. (FULL)
	550"	610"
	333"	333"
	883"	943"

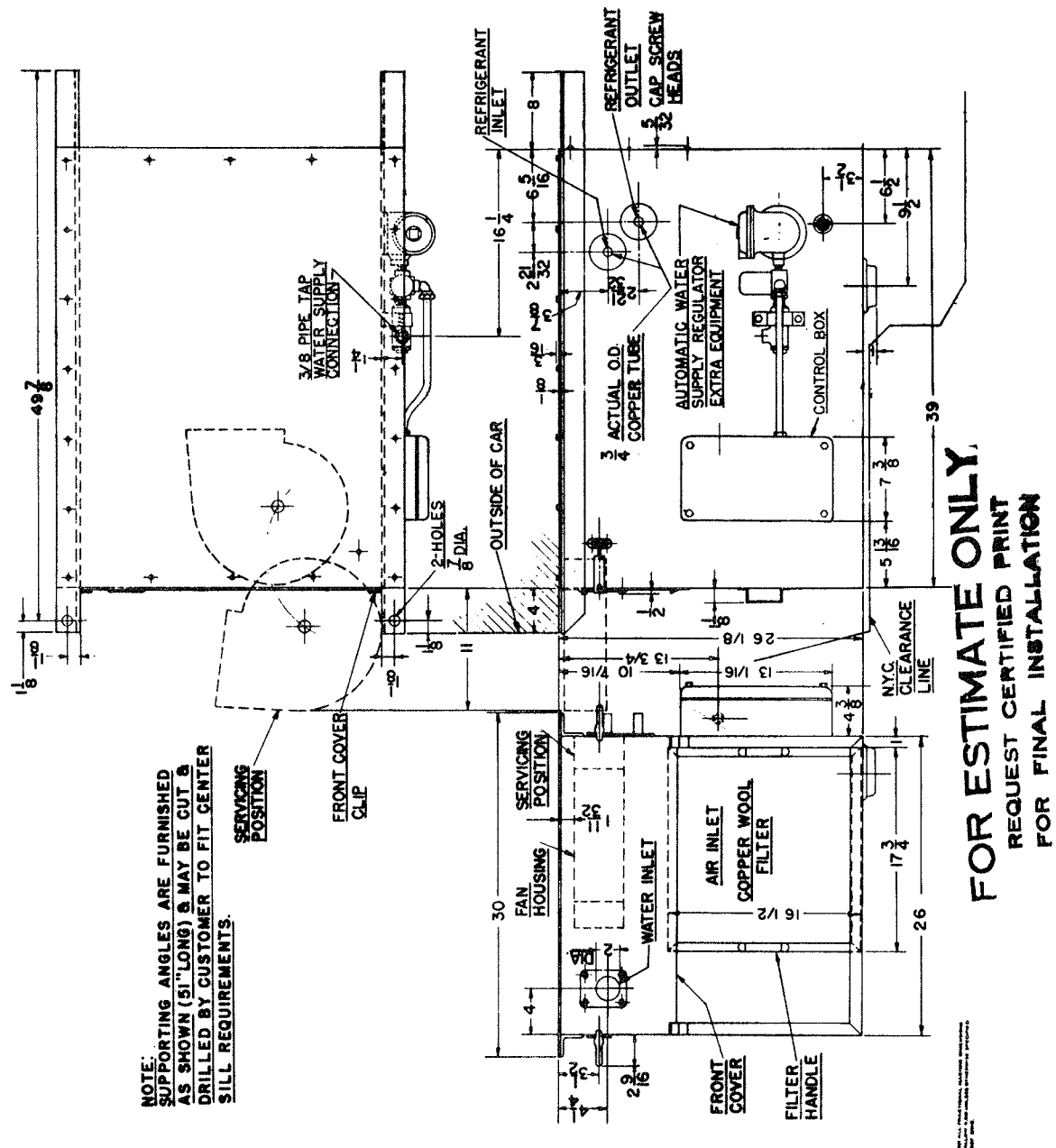


FIG. 46—SUB-COOLER DIMENSIONAL DIAGRAM (SK-347-M)

NO. CYL.	A	B	C	D
1	24	$4\frac{5}{8}$	$11\frac{3}{4}$	
2	$37\frac{1}{2}$	$12\frac{3}{8}$	$29\frac{1}{4}$	$7\frac{3}{4}$
3	55	$18\frac{3}{4}$	$45\frac{1}{2}$	$4\frac{1}{4}$
4	$70\frac{1}{2}$	$36\frac{1}{4}$	$64\frac{1}{4}$	$17\frac{1}{2}$

**FOR ESTIMATE ONLY**  
**REQUEST CERTIFIED PRINT**  
**FOR FINAL INSTALLATION**

NOTE: SUPPORTING ANGLES ARE FURNISHED  
60" LONG AND MAY BE CUT BY CUSTOMER  
TO FIT CENTER SILL REQUIREMENTS.

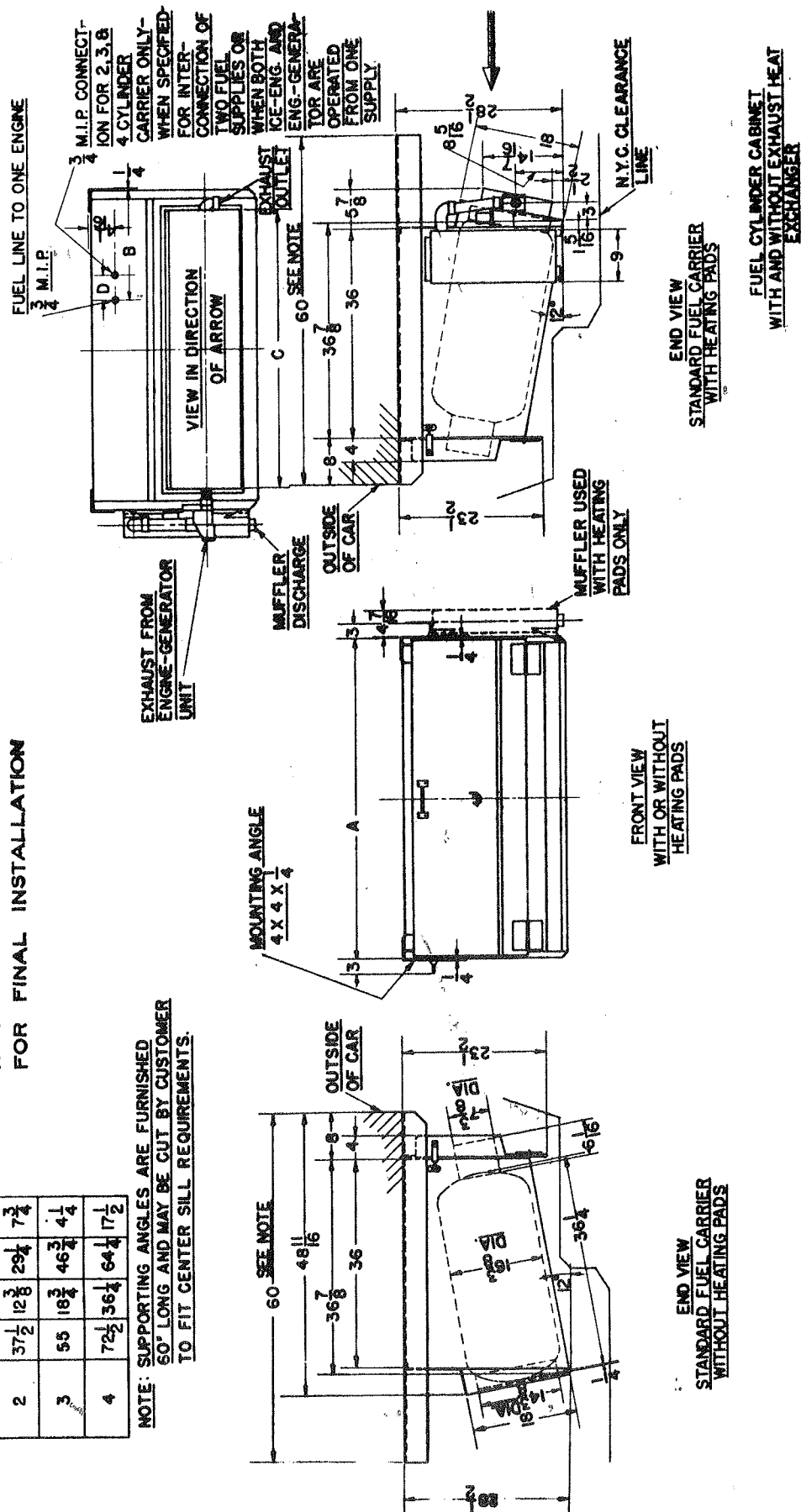
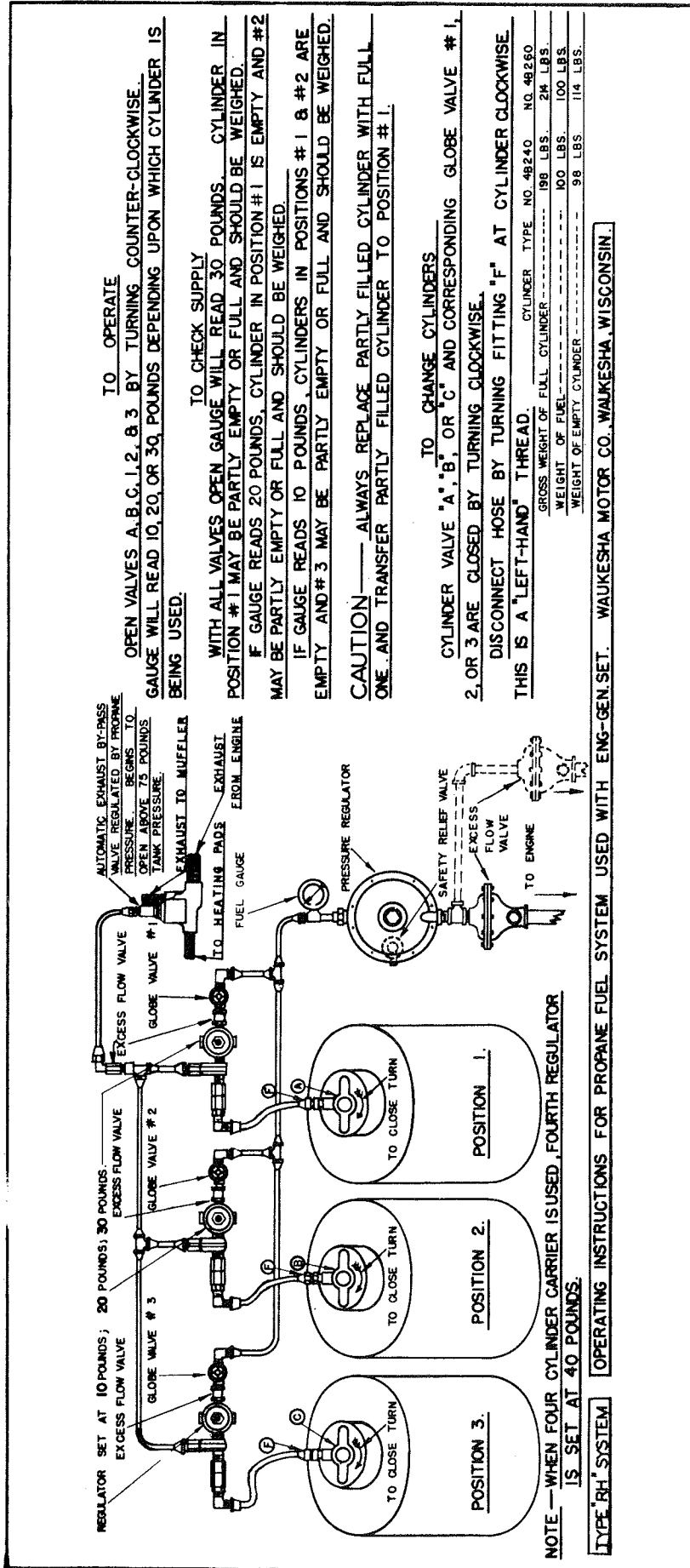


FIG. 47—INSTALLATION OF FUEL CYLINDER CABINET WITH AND WITHOUT EXHAUST HEAT EXCHANGER (SK-487)



TO OPERATE  
OPEN VALVES A, B, C, 1, 2, & 3 BY TURNING COUNTER-CLOCKWISE.  
GAUGE WILL READ 10, 20, OR 30 POUNDS DEPENDING UPON WHICH CYLINDER IS BEING USED.

TO CHECK SUPPLY  
WITH ALL VALVES OPEN GAUGE WILL READ 30 POUNDS. CYLINDER IN POSITION #1 MAY BE PARTLY EMPTY OR FULL AND SHOULD BE WEIGHED.  
IF GAUGE READS 20 POUNDS, CYLINDER IN POSITION #1 IS EMPTY AND #2 MAY BE PARTLY EMPTY OR FULL AND SHOULD BE WEIGHED.  
IF GAUGE READS 10 POUNDS, CYLINDERS IN POSITIONS #1 & #2 ARE EMPTY AND #3 MAY BE PARTLY EMPTY OR FULL AND SHOULD BE WEIGHED.

CAUTION — ALWAYS REPLACE PARTLY FILLED CYLINDER WITH FULL ONE AND TRANSFER PARTLY FILLED CYLINDER TO POSITION #1.

TO CHANGE CYLINDERS  
CYLINDER VALVE "A", "B", OR "C" AND CORRESPONDING GLOBE VALVE #1, 2, OR 3 ARE CLOSED BY TURNING CLOCKWISE.  
DISCONNECT HOSE BY TURNING FITTING "F" AT CYLINDER CLOCKWISE.  
THIS IS A "LEFT-HAND" THREAD.

GROSS WEIGHT OF FULL CYLINDER	CYLINDER TYPE NO. 48240	NO. 48260
WEIGHT OF FUEL	198 LBS.	214 LBS.
WEIGHT OF EMPTY CYLINDER	100 LBS.	100 LBS.
	98 LBS.	114 LBS.

FIG. 48—OPERATING INSTRUCTIONS FOR TYPE "RH" PROPANE FUEL SYSTEMS USED WITH ENGINE GENERATOR UNITS (SK-356-B)

**FOR ESTIMATE ONLY**  
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FOR FINAL INSTALLATION

**FOR ESTIMATE ONLY  
REQUEST CERTIFIED PRINT  
FOR FINAL INSTALLATION**

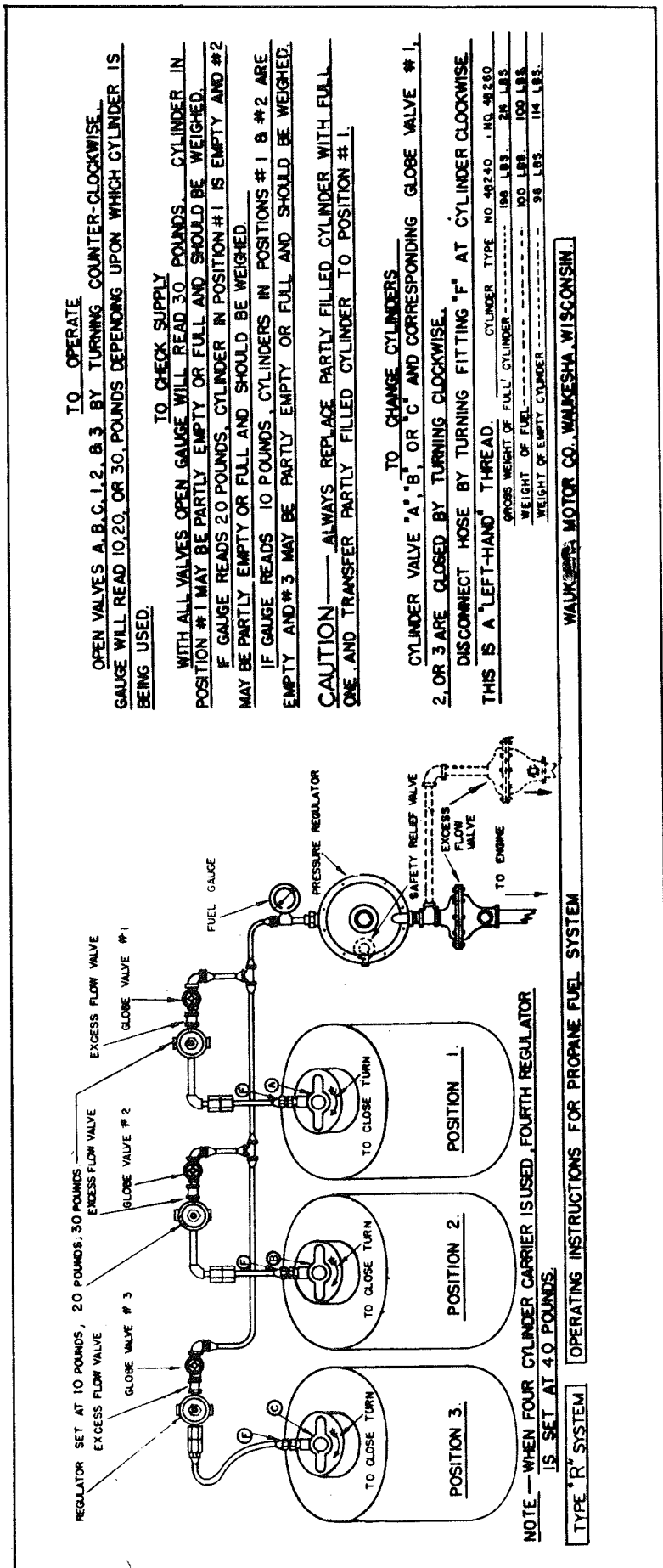


FIG. 49—OPERATING INSTRUCTIONS FOR TYPE "R" PROPANE FUEL SYSTEMS USED WITH ICE ENGINE UNITS (SK-371-A)

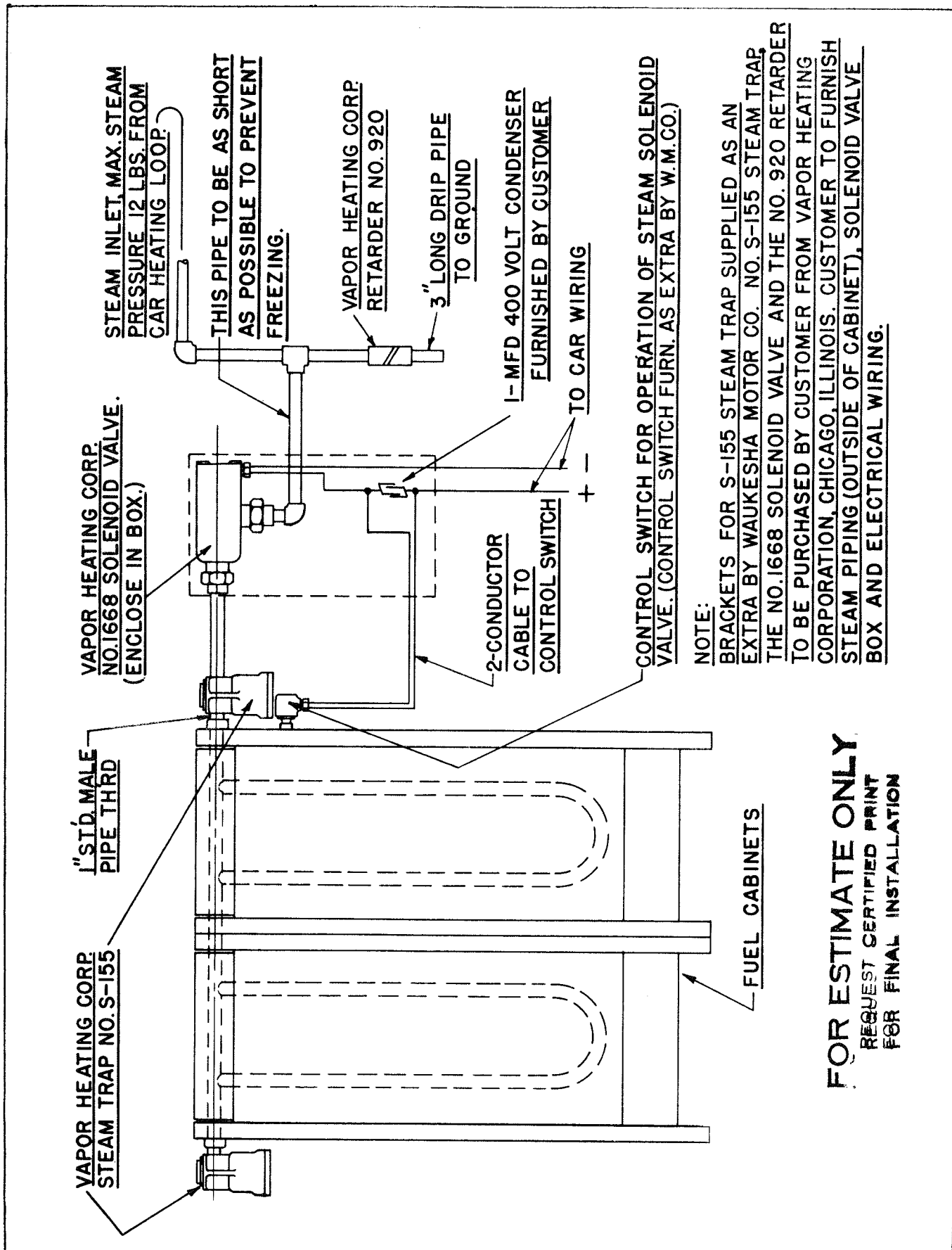


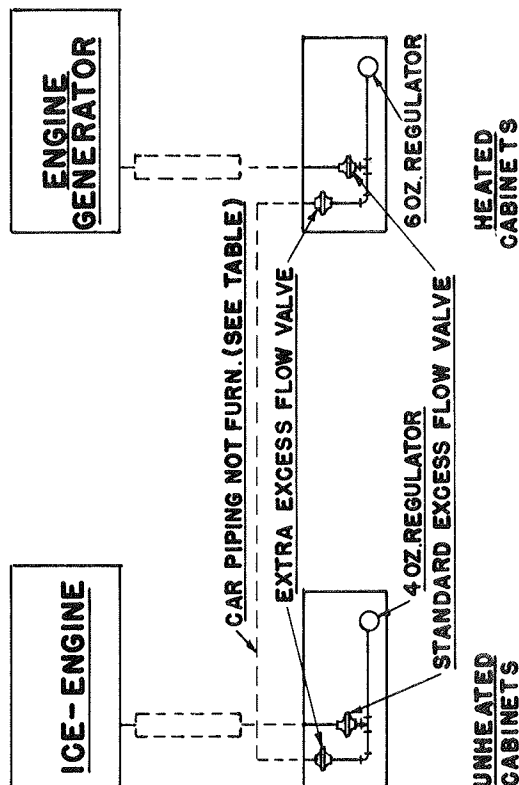
FIG. 49A—APPLICATION OF VAPOR HEATING STEAM IN-  
LET VALVE TO WAUKESHA FUEL CABINET

# FOR ESTIMATE ONLY

REQUEST CERTIFIED PRINT  
FOR FINAL INSTALLATION

**NOTE.**  
PROVIDE A 400 CU. IN. SURGE CHAMBER IN EACH  
FUEL LINE BETWEEN FUEL CABINET AND UNIT  
OR USE FUEL LINE OF THE LENGTH AND PIPE  
SIZE GIVEN IN THIS TABLE.

PIPE SIZE ST'D IRON PIPE	LENGTH OF PIPE IN FEET TO PROVIDE 400 CU. IN. SURGE CHAMBER
2	10
2 1/2	7
3	4 1/2



LENGTH OF PIPE EXCLUSIVE OF SURGE CHAMBER BETWEEN CABINETS OR BETWEEN CABINET AND UNITS.	MINIMUM PIPE SIZE
5 FT. OR LESS	3/4" ST'D I.P.
6 FT. TO 25 FT.	1" ST'D I.P.
26 FT. OR MORE	1 1/4" ST'D I.P.

## NOTE.

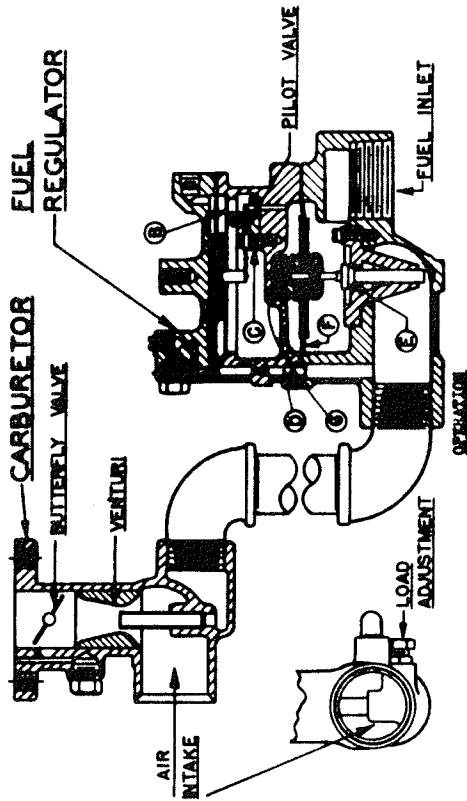
IF COPPER TUBING IS USED THE I.D. MUST NOT BE  
SMALLER THAN THE CORRESPONDING IRON PIPE SIZE.  
NUMBER OF FITTINGS MUST BE KEPT TO A MINIMUM  
TO REDUCE FRICTIONAL RESISTANCE AND PREVENT  
IRREGULAR OPERATION OF PROTECTIVE DEVICES.

## NOTE:

FUEL PIPING DIAGRAM SK-447 FIGURE 50 PAGE 79  
MANUAL 1389 COVERS SUGGESTED PRACTICE PRIOR  
TO OCT. 1948. DRAWING SK-447-C COVERS SUGGESTED  
PRACTICE OF INSTALLATIONS MADE AFTER OCT. 1948

SCHEMATIC PIPING DIAGRAM OF FUEL SUPPLIES FOR  
ICE-ENGINE AND ENGINE-GENERATOR OPERATION

FIG. 49B—FUEL PIPING DIAGRAM



The Ensigen Fuel Regulator has the same general function with gas, as does the float bowl of a gasoline carburetor with gasoline. It shuts off the flow of gas when engine demand has ceased, and secondly, it meters the flow of gas to the carburetor in proportion to the load demand on the engine.

The regulator operates as follows: "B" is the pilot diaphragm and operates a pilot valve "B". "A" is the main diaphragm and operates the main valve "A". Pressure of the gas supply is connected directly under "A", and is also connected above "B" by the restricted passage "C". Suction from the carburetor applied to the under side of "B" through the passage "D" opens "C". The pressure of the gas over "A" is reduced by opening of the valve "C" and this reduction of pressure permits "A" to lift and open valve "B", which supplies the gas required by the carburetor.

The pressure of the gas at fuel inlet to the regulator must be 6" to 8" of water column, or 3 to 4 ounces per square inch, when the engine is running.

The load adjustment on the carburetor screws in (clockwise) for leaner mixture and out (counter-clockwise) for richer mixture. For the initial start of engine set the load screw as shown in the table for the type of fuel being used.

## Fuel

BUTANE	(3200 BTU/cu. ft.)
PROPANE	(2300 BTU/cu. ft.)
NAT. GAS	(1100 BTU/cu. ft.)
WFG. GAS	(525 BTU/cu. ft.)

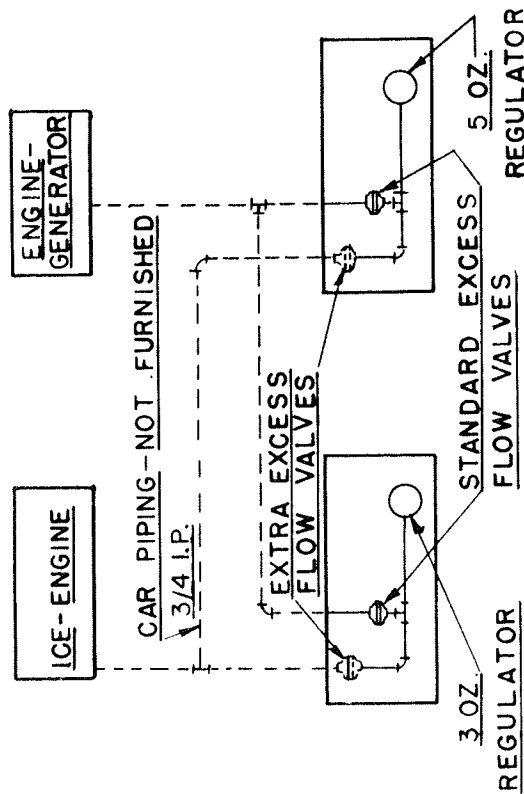
## No. Turns Open

3/4 to 1
1-1/2 to 1-3/4
2-1/4 to 2-1/2
3 to 3-1/4

With the load applied, screw the load adjustment in (clockwise), until the engine loses speed, then out approximately 1/8 turn. Such adjustment should give approximately best performance and minimum fuel consumption.

ENSIGN CARBURETOR COMPANY  
Chicago, Illinois      Eastington Park, California      Tulsa, Oklahoma

FIG. 51—"ENSIGN" GAS CARBURETOR AND FUEL REGULATOR (SK-375)



STANDARD FUEL CABINET  
(SEE SK-339)  
OR SK-487

FUEL CABINET WITH HEAT EXCHANGERS  
(SEE SK-429)  
OR SK-487

## SCHEMATIC PIPING DIAGRAM

OF FUEL SUPPLIES FOR

ICE-ENGINE AND ENGINE-

GENERATOR OPERATION.

FOR ESTIMATE ONLY  
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FIG. 50—FUEL PIPING DIAGRAM (SK-447)

# INSTALLATION AND OPERATING ILLUSTRATIONS

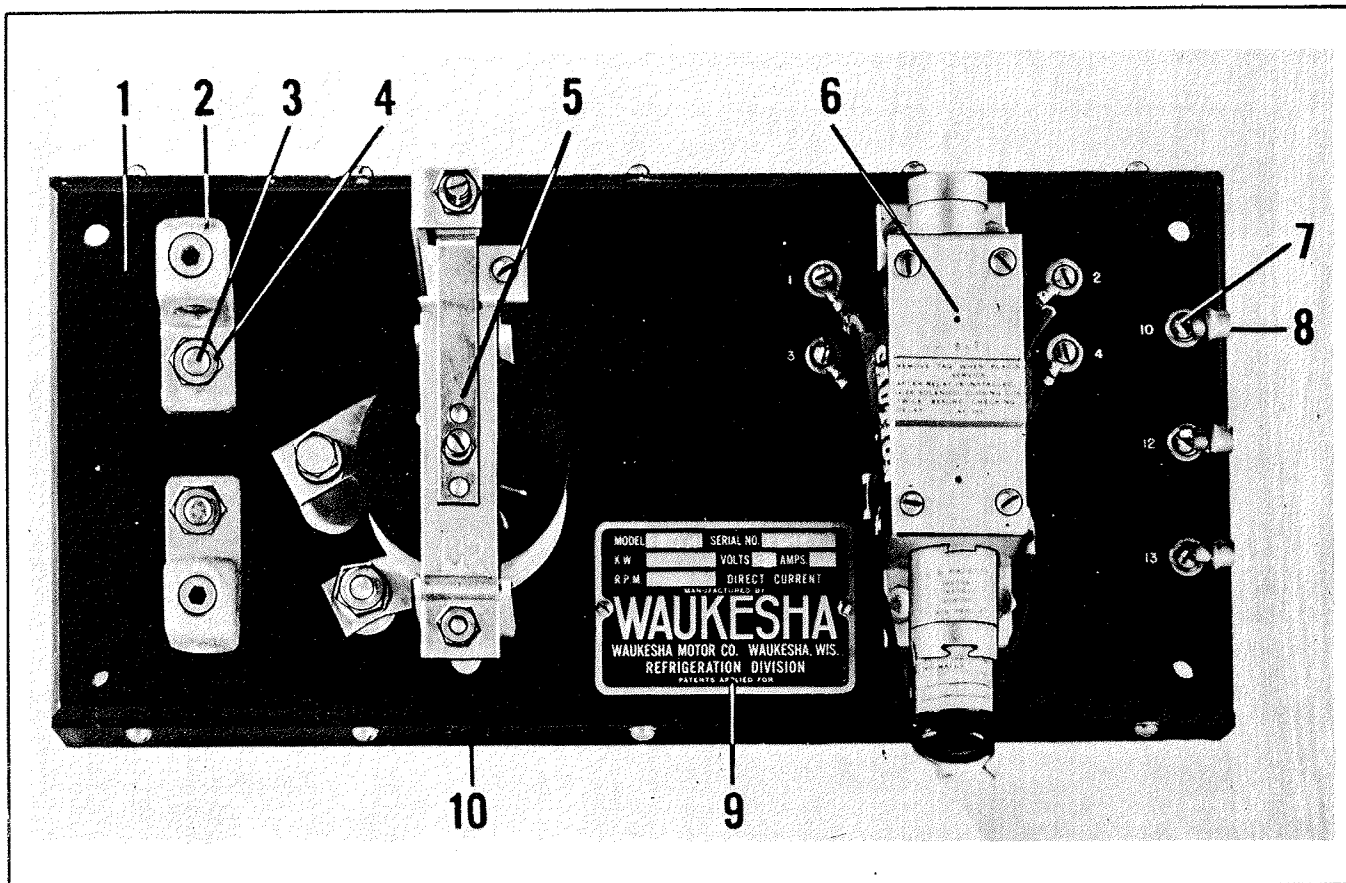


FIG. 52—LOAD CURRENT RELAY PANEL

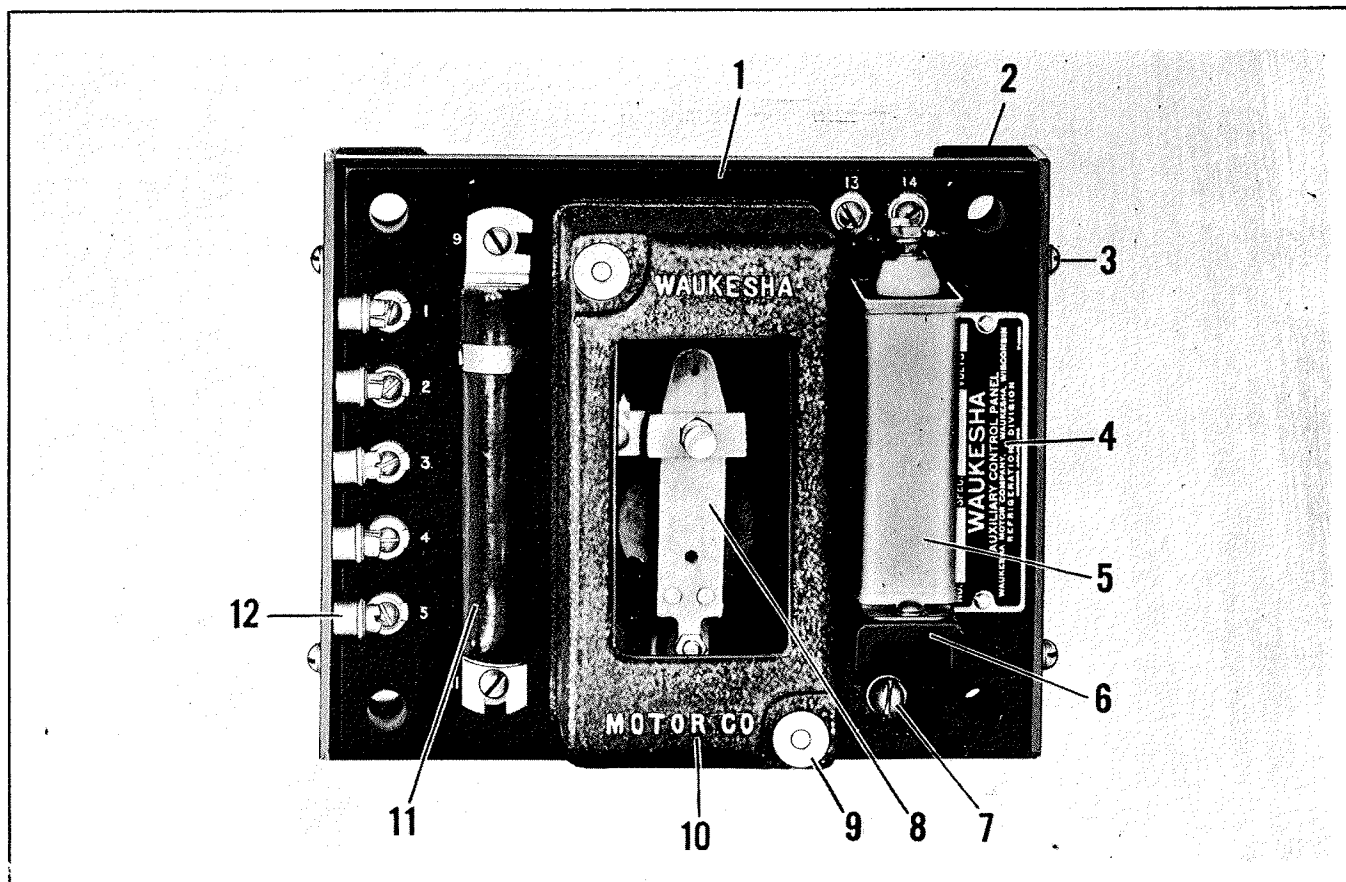


FIG. 53—AUXILIARY PANEL FOR EDISON BATTERIES



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OPERATING INSTRUCTIONS

FOR

LONG CYCLE CONTROL

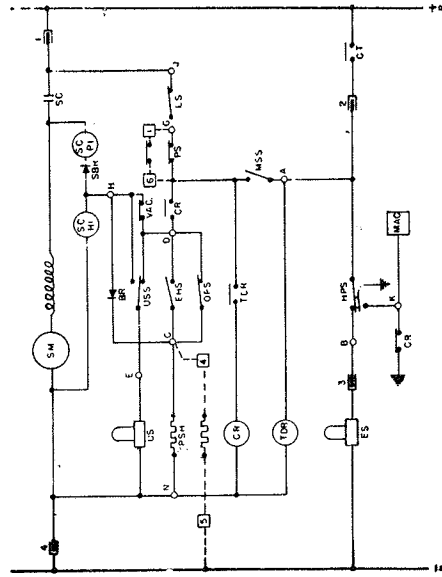
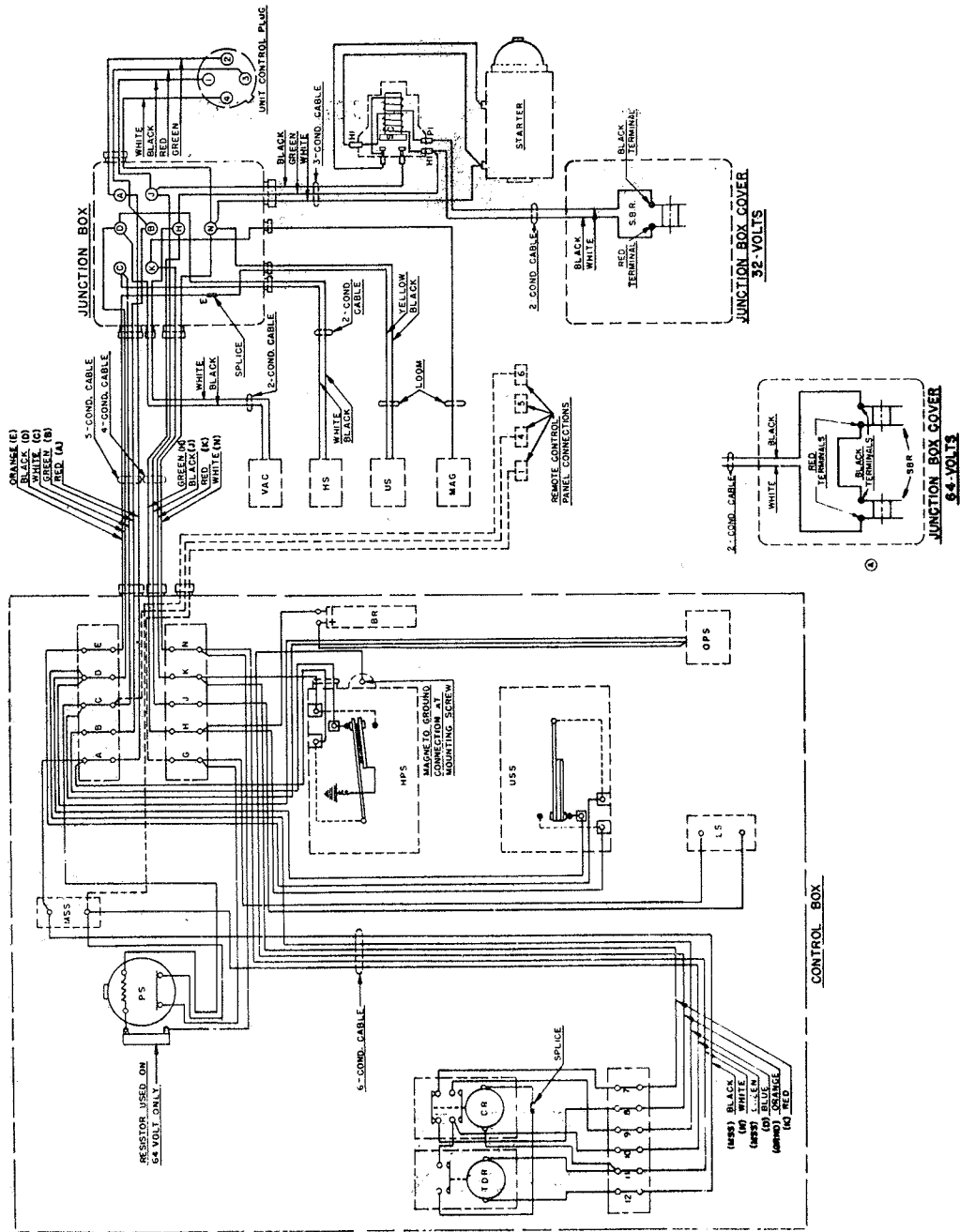
OF

WAUKESHA MODEL D-2 ICE ENGINES

WAUKESHA MOTOR COMPANY  
RAILWAY DIVISION  
WAUKESHA, WISCONSIN

# LEGEND

BR—BLOCKING RECTIFIER  
CR—CONTROL RELAY  
CT—CAR THERMOSTAT  
EHS—ENGINE HEAT SWITCH  
ES—EVAPORATOR SOLENOID  
HPS—HIGH PRESSURE SWITCH  
LS—LOCKOUT SWITCH  
MAG—MAGNETO  
MSS—MOMENTARY START SWITCH  
OPS—OIL PRESSURE SWITCH  
PS—PROTECTIVE SWITCH  
PSH—PROTECTIVE SWITCH HEATER  
SBR—STARTER BLOCKING RECTIFIER  
SC—STARTING CONTACTOR  
SC-HI—STARTING CONTACTOR—HOLD IN COIL  
SC-PI—STARTING CONTACTOR—PULL IN COIL  
SM—STARTING MOTOR  
TDR—TIME DELAY RELAY (20 MIN—QMS.B.)  
US—UNLOADING SOLENOID  
US—UNLOADING SOLENOID SWITCH  
VAC—VACUUM SWITCH  
ICE ENGINE PLUG CONNECTOR  
WHIRL FOR REMOTE CONTROL PANEL  
--- REMOTE CONTROL PANEL CONNECTIONS



ICE ENGINE UNIT AND LINE DIAGRAM  
FOR 32 & 64-VOLT DC SYSTEM

SK-1564-A  
WALNUTS MOTOR CO  
387  
D  
10-808  
10-808

## INTRODUCTION

This supplement contains operating information and service parts list for the Waukesha Model D-2 Railway Type Ice-Engine and special 9-KW (65 volt) Engine Generators on Chicago and North Western Railway Gallery type suburban cars.

The Waukesha equipment on these cars includes two Railway Type D-2 Ice-Engines (less air condensers and condenser fan), one 9-KW (65 volt) Engine-Generator, Master Control Panel, Battery Charging Panel and two Propane Fuel Cabinets carrying a total of eight cylinders. Waukesha did not furnish such items as the evaporative condenser, evaporator units or the air conditioning control circuit and control panel.

## PART I

The Waukesha Engine is equipped with automatic long-cycle control and is designated as Model D-2 Master Ice-Engine. Supplementary instructions to the basic instructions as found in form 1389 are as follows:

Short cycling of Freon Compressor Units can be the result of several conditions, two of which may be excessive compressor capacity and "sensitive" car thermostats at certain temperature and load conditions. Some of the newer air-conditioning systems favor "short-cycling" of the cooling thermostat circuit, similar to heat control, to maintain a more even car temperature. The differential on the low setting thermostat tube is held at a minimum. Waukesha Ice-Engines having compressor modulation and automatic long-cycle control lend themselves to this type of cooling control.

Compressor capacity modulation, in combination with complete compressor unloading, is necessary to minimize unit short cycling. The Modulator Control Valve on the engine automatically varies the compressor speed between 300 and 600 RPM, to provide capacity modulation according to the cooling demand. Along with compressor modulation, the long-cycle control provides complete unloading of the compressor. A "sensitive" car thermostat can indirectly load and unload the compressor without stopping the ice-engine. If there is no cooling demand for a 20 to 30 minute period, the ice-engine will automatically stop. It will start again when the car requires cooling. The new automatic long-cycle control of Master Ice-Engine reflects in more uniform car cooling, better humidity control, minimizes unit starts and stops, and provides over-all economy of operation.

### Sequence of Operation

Please refer to Line Wiring Diagram SK-1565-A. The positions of the controls as shown are with the unit not in operation and the car thermostat control satisfied.

Sequence of Operation Continued

When the car thermostat control relay contacts (CT) close, the evaporator solenoid valve (ES) is energized, permitting the refrigerant to pass through the expansion valve into the evaporator and back to the compressor. Simultaneously the coil of the mercury time delay relay (TDR) is energized. The quick-make, slow-break contact of this relay (TDR) closes, energizing the coil of the control relay (CR). The normally-closed contact of this relay opens, removing the ground from the magneto, and the normally-open contact closes. This provides a positive circuit from the #1 contact of the plug connector (positive battery) through the lock-out safety switch (LS), the protective switch (PS), the contact of the control relay (CR), and the vacuum switch (VAC) to the starting contactor hold-in (SC-HI) and pull-in (SC-PI) coils. The contact (SC) of the starter solenoid assembly closes, energizing the starting motor (SM) to crank the engine.

During the cranking period, the compressor unloading solenoid valve (US) is always energized (unloading the compressor) by either the top or bottom contact of the unloading solenoid switch (USS). After the engine starts, the vacuum switch (VAC) contacts open at approximately  $1\frac{1}{2}$  inches of engine manifold vacuum, thereby de-energizing the starting motor circuit. With the vacuum switch contacts open, the unloading solenoid is only energized through the bottom contact of the unloading switch (USS). The movable contact of the unloading switch closes to the bottom contact at approximately 5 pounds, and to the top contact at approximately 15 pounds Freon suction pressure.

With the Ice-Engine running, each time the car thermostat (CT) is satisfied (opens) the evaporator solenoid (ES) closes. As the compressor low side or suction pressure reaches approximately five pounds, the unloading solenoid switch (USS) drops to its bottom contact, energizing the unloading solenoid valve (US). The compressor then operates unloaded. Likewise each time the car thermostat (CT) is satisfied or opens, the time delay relay coil (TDR) is de-energized. If the car thermostat remains satisfied more than twenty minutes, the quick-make, slow-break contact of this delay relay (TDR) opens. This de-energizes the coil of the control relay (CR), causing the Ice-Engine to stop by grounding the magneto (MAG) through the normally-closed contacts of the control relay (CR). Each time the car thermostat (CT) closes, the twenty minute timing cycle starts again.

The Momentary Start Switch (MSS) in the unit control box may still be used for yard testing of the Ice-Engine.

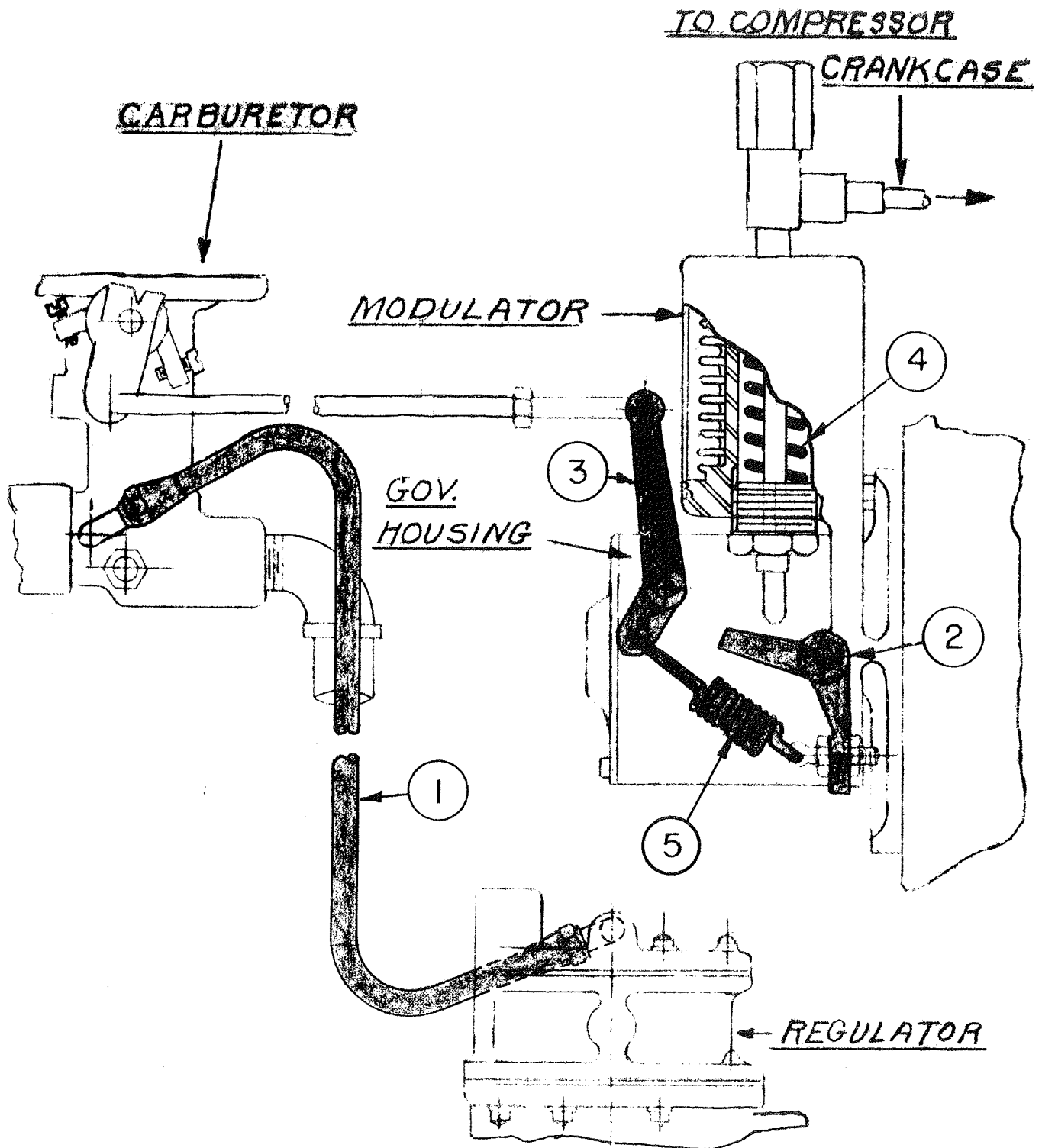
With the automatic long-cycle control, short cycling of the Ice-Engine is practically eliminated. A car thermostat can open and close every 10 or 15 minutes for hours and the unit will not stop, likewise, if there is no cooling demand for twenty minutes, the Ice-Engine stops and may be off hours before that car again calls for cooling.

### Protective Controls

All Ice-Engines have the Freon high-pressure protective switch in the control box. In the wiring diagram legend it is identified as "HPS." This switch de-energizes the evaporator solenoid valve at approximately 300 pounds head pressure. It may open and close the solenoid valve until the head pressure returns to normal. If, however, the pressure should increase to 350 pounds, the center movable contact (HPS) will drop to the bottom contact and stop the unit by grounding the magento.

The lock-out switch (LS) is operated manually. It is a normally closed switch. When this switch is open, it will prevent the unit from cranking or starting during service routine. It can also be used to stop the unit from the control box.

The Ice-Engine still retains its three protective circuits, namely excessive cranking, low lubricating oil pressure, and high operating engine coolant temperature. The oil-heat trip switch and a crank-limit switch are combined into one switch called the protective switch (PSO.) Should the lubricating oil pressure drop below four pounds, the oil pressure switch (OPS) contacts will close. If the engine temperature exceeds 265°F., the engine heat switch (EHS) contacts will close. Both will open the protective switch (PS) by energizing the 1½-minute heater element (PSH). This same switch (PSH) provides protection against excessive cranking by energizing the same heater element (PSH) through the vacuum switch contacts and the blocking rectifier (BR). This blocking rectifier prevents false operation of the starting motor contactor through either of the two protective switches "OPS" and "EHS".



DET.	PART NO.	REQ.	DESCRIPTION
1	OY-7606	1	BALANCE TUBE
2	Y-6791-A	1	GOVERNOR SPRING LEVER
3	B-6123-B	1	GOVERNOR LEVER
4	953238	1	MODULATOR CONTROL SPRING
5	953239	1	GOVERNOR SPRING

TITLE- MODULATED ENGINE  
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SK  
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## PART V

## PARTS CATALOG—INTRODUCTION

This Parts Catalog illustrates, describes and indicates the interchangeability of parts used on the following units:

Model "B" - 7-1/2 RGU Engine-Generator Unit  
 Model "B-1" - 7-1/2 RGU Engine-Generator Unit  
 Model "C" Ice Engine Unit  
 Model "D" Ice Engine Unit  
 Model "D-1" Ice Engine Unit  
 Sub-Cooler Unit  
 Fuel Tank Carriers

This Parts Catalog is divided into five sections consisting of Engine Parts, Ice-Engine Accessory and Unit Parts, Engine-Generator Accessory and Unit Parts, Sub-Cooler Parts and Fuel Carrier Parts.

All reference to parts, prices and operating information is subject to change without notice.

HOW TO USE PARTS LIST

1. The first column of the parts list contains the figure number on which the part is illustrated and the identifying reference numbers. For example: 2-5 indicates that the part appears on Figure 2, and is identified by reference number 5.
2. The second column contains the part ordering number.
3. The third column contains the number of parts required per assembly.

Example

Refer to 2-13 in Fig. and Ref. No. column. The list calls for eight (8), XD-56-A, Valve Tappet assemblies, which consists of:

1 Tappet - Valve  
 1 Screw - Valve Tappet Adjust.  
 1 Nut - Hex. Jam, 5/16 - 24

4. The fourth column gives a parts description.
5. Columns five to nine form an interchangeability chart showing how many different Engine-Generator and Ice Engine Models can use one specific part.

Example

To find the part number of the crankshaft used on the Model "D" Ice-Engine Unit:

- a) Turn to Figure 2. The crankshaft is identified by Refer. No. 20.
- b) Turning to the parts list, it will be found that line 2-20 contains Part No. BD-14-K; and one (1) is required per assembly.
- c) An X appears in the Ice-Engine Model "D" column, indicating that the part is used on the Model "D" Ice Engine Unit. It is also interchangeable and may be used on the other four units.

ENGINE PARTS

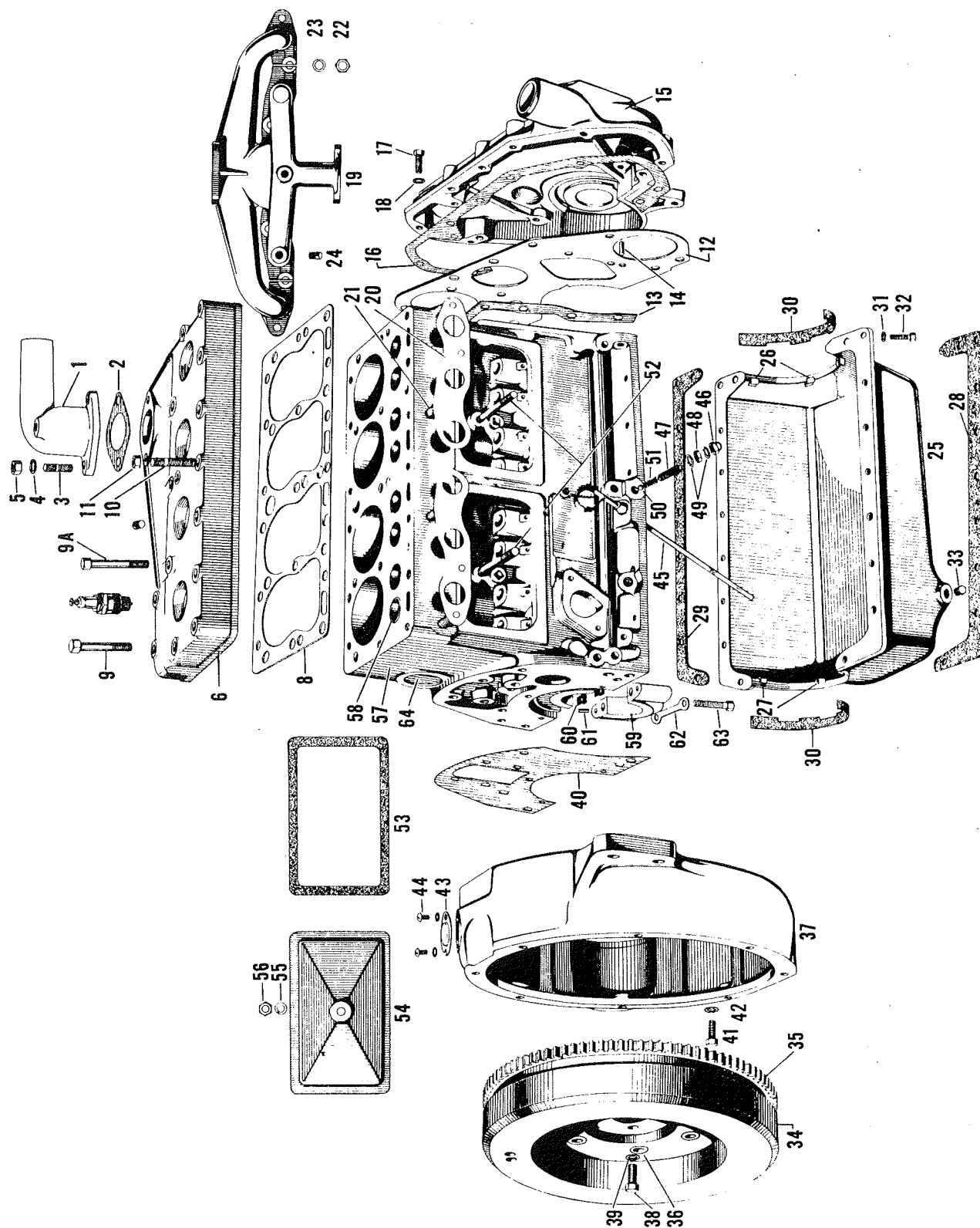


FIG. 1.—CRANK CASE, GEAR COVER, OIL PAN, CYLINDER HEAD, FLYWHEEL AND MANIFOLD PARTS

ENGINE PARTS										
FIG. & REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS			
				B	B-1		C	D	D-1	
1-1	Y-66 19	1	Elbow—Water Outlet					X		
1-1	BE-437-A	1	Elbow—Water Outlet				X			
1-1	950004	1	Elbow—Water Outlet		X					
1-1	Y-18005-A	1	Elbow—Water Outlet	X						
1-1	950003	1	Elbow—Water Outlet						X	
1-2	BE-433	1	Gasket—Water Manifold Flange	X	X		X	X	X	
1-3	B-291	2	Studs	X	X		X	X	X	
1-4	21052	2	Washers—Lock, 3/8 in.	X	X		X	X	X	
1-5	21193	2	Nut—Hex. 3/8-24 in.	X	X		X	X	X	
1-6	68502-D	1	Head—Cylinder	X	X			X	X	
1-7	78282-D	1	Plug—Sq. Hd. Pipe, 3/8 in.	X	X			X	X	
	78282-E	1	Plug—Sq. Hd. Pipe, 1/2 in.	X	X			X	X	
1-8	68000-C	1	Gasket—Cylinder Head	X	X		X	X	X	
1-9	B-10188	18	Screw—Cylinder Head Cap, 7/16-14 x 2-7/16 in.	X	X		X	X	X	
1-9A	B-10189	3	Screw—Cylinder Head Cap, 7/16-14 x 2 13/16 in.	X	X			X	X	
1-10	BD-10	2	Stud—Cylinder Head	X	X			X	X	
1-11	21201	2	Nut—Hex, 7/16-20	X	X			X	X	
1-12	BE-803	1	Plate—Timing Gear	X	X		X	X	X	
1-13	BD-78-A	1	Gasket—Timing Gear Plate	X	X		X	X	X	
1-14	B-565	1	Pin—Dowel	X	X		X	X	X	
	21340	3	Screw—Hex. Cap, 3/8-16 x 5/8 in. (Timing Plate to Crankcase)	X	X		X	X	X	
	21632	3	Washer—Shakeproof Lock, 3/8 in.	X	X		X	X	X	
1-15	Group 399-7	1	Cover Assembly—Gear	X	X		X	X	X	
1-16	BE-806	1	Gasket—Gear Cover	X	X		X	X	X	
1-17	21362	3	Screw—Cap, 3/8-16 x 2 (Gear Cover to Plate)	X	X		X	X	X	
	21365	1	Screw—Cap, 3/8-16 x 3-1/2 in.		X				X	
	21348	1	Screw—Cap, 3/8-16 x 1 in.		X				X	
1-18	21052	5	Washer—Lock, 3/8 in.	X	X		X	X	X	
1-19	YD-115-K	1	Manifold—Combination	X	X		X	X	X	
1-20	BD-127	2	Gasket—Intake and Exhaust Manifold (Copper)	X	X		X	X	X	
1-20	BD-127-B	2	Gasket—Intake and Exhaust Manifold (Steel)	X	X		X	X	X	
1-21	BD-120	6	Stud—Intake and Exhaust Manifold	X	X		X	X	X	
1-22	21193	6	Nut—Hex. 3/8-24	X	X		X	X	X	
1-23	B-221	2	Washer—Exhaust Manifold Stud	X	X		X	X	X	
1-24	21781	1	Screw—Parker Kalon Type "Z" No. 12 x 3/8 Rd. Hd. (To Plug 3/16 Hole in Manifold)	X	X		X	X	X	
1-25	YD-357-R	1	Pan Assembly—Oil				X			
1-25	068414	1	Pan Assembly—Oil	X	X			X	X	
1-26	BD-583	5	Clip—Cork Retainer	X	X		X	X	X	
1-27	BD-584	1	Clip—Rear Cork Retainer	X	X			X	X	
1-28	BD-192	1	Gasket—Right Oil Pan	X	X		X	X	X	
1-29	BD-191	1	Gasket—Left Oil Pan	X	X		X	X	X	

ENGINE PARTS										
FIG. & REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS			
				B	B-1		C	D	D-1	
I-30	BD-193-B	2	Gasket—End Oil Pan	X	X			X	X	
I-31	21051	18	Washer—Lock, 5/16 in.	X	X		X	X	X	
I-32	21309	18	Screw—Hex. Hd. Cap, 5/16-18 x 3/4 in.	X	X		X	X	X	
I-33	78282-D	1	Plug—Sq. Hd. Pipe 3/8 in.	X	X		X	X	X	
	D-68013-B	1	Flywheel, Ring Gear, and Bushing Assembly, Consists of:					X	X	
I	C-68013-B	1	Flywheel with Ring Gear Assembly, Consists of:					X	X	
I-34	68013-B	1	Flywheel					X	X	
	B-6439-C	1	Gear—Ring				X	X	X	
I-36	28014	6	Bushing—Drive				X	X	X	
I-34	068013-G	1	Flywheel				X			
I-37	68857	1	Housing—Flywheel					X	X	
I-37	BE-802-E	1	Housing—Flywheel				X			
	A-68013-C	1	Flywheel Assembly, consists of:	X	X					
	68013-C	1	Flywheel	X	X					
	Y-18364	6	Bushing—Drive	X	X					
	Y-18002	1	Housing—Flywheel	X	X					
I-38	B-9837	4	Screw—Hex. Hd. Cap, 7/16 - 20 x 1-9/16 in.	X	X			X	X	
I-39	BD-21	2	Lock—Flywheel Cap Screw	X	X			X	X	
	B-9824	2	Pin—Dowel (Flywheel)	X	X			X	X	
	OY-6670	1	Partition Sheet Assembly, (Between Crankcase and Flywheel Housing on Ice-Engine)					X	X	
I-40	B-10358	1	Gasket—Flywheel Housing	X	X			X	X	
I-41	B-9512	5	Screw—Hex. Hd. Cap, 1/2-13 x 1-1/4 in.	X	X		X	X	X	
	B-9511	3	Screw—Hex. Hd. Cap.	X	X		X	X	X	
I-42	21612	8	Washer—Shakeproof Lock #1124, 1/2 in.	X	X		X	X	X	
I-43	B-7042	1	Cover—Timing Hole	X	X		X	X	X	
I-44	21117	2	Screw—Rd. Hd. Mach. #14-20x 1/2 in.	X	X		X	X	X	
	21050	2	Washers—Lock, 1/4 in.	X	X		X	X	X	
I-45	0950053	1	Oil Level Gauge Assembly		X				X	
	0950155	1	Tee—Special		X				X	
	B-2666	1	Bushing—Oil Gauge	X	X			X	X	
	0950157	1	Pipe Assembly—Oil Gauge		X				X	
	950158	1	Support—Oil Gauge Pipe		X				X	
	Y-14386	1	Clamp		X				X	
	9019	1	Cover—Starter (Engine—Generator Units)	X	X					
	21343	3	Screw—Hex. Hd. Cap, 3/8-16 x 3/4	X	X					
I-45	073163	1	Oil Level Gauge Assembly	X				X		
I-45	063454	1	Oil Level Gauge Assembly				X			
	21052	3	Washers—Lock, 3/8 in.	X	X					
	78282-F	1	Plug—Sq. Hd. Pipe, 3/4 in. (Bottom of Engine Generator Flywheel Housing)	X	X					
I-46	65500	1	Nut—Relief Valve	X	X		X	X	X	

ENGINE PARTS										
FIG.& REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS			
				B	B-1		C	D	D-1	
1-47	B-766-A	1	Screw—Relief Valve Adjusting	X	X		X	X	X	
1-48	21207	1	Nut—Half, 1/2-13	X	X		X	X	X	
1-49	B-2469	2	Washer—Copper	X	X		X	X	X	
1-50	B-811	1	Ball—Steel	X	X		X	X	X	
1-51	B-1852	1	Spring—Relief Valve	X	X		X	X	X	
1-52	BD-194	2	Stud—Valve Cover	X	X		X	X	X	
1-53	BD-196	2	Gasket—Valve Cover	X	X		X	X	X	
1-54	BD-195	1	Cover—Valve (Rear)	X	X		X	X	X	
	YD-195-G	1	Cover Assembly—Valve (Front)	X	X		X	X	X	
1-55	BD-190	2	Gasket—Valve Cover Stud	X	X		X	X	X	
1-56	21193	2	Nut—Hex, 3/8-24	X	X		X	X	X	
	B-3527	1	Cover—Fuel Pump Pad	X	X		X	X	X	
	B-3605	2	Gasket—Fuel Pump Cover	X	X		X	X	X	
	21307	2	Screw—Hex. Cap, 5/16-18 x 5/8 in.	X	X		X	X	X	
	21051	2	Washer—Lock, 5/16 in.	X	X		X	X	X	
	65508-A	1	Plate—Engine Name (Crankcase)	X	X		X	X	X	
	B-557-A	4	Pin—Escutcheon	X	X		X	X	X	
1-57	G-68320-H	1	Crankcase Assembly, Consists of:	X	X		X	X	X	
	68320-H	1	Crankcase Assembly	X	X		X	X	X	
1-58	75923-C	4	Insert—Stellite Exhaust Valve	X	X		X	X	X	
1-59	68047	1	Cap—Rear Bearing Main	X	X		X	X	X	
	68049-A	1	Cap—Center Bearing Main	X	X		X	X	X	
	68046	1	Cap—Front Bearing Main	X	X		X	X	X	
1-60	B-10239-A	2	Shim—Rear Bearing	X	X		X	X	X	
	B-10292-A	2	Shim—Center Bearing	X	X		X	X	X	
	B-10291-A	2	Shim—Front Bearing	X	X		X	X	X	
1-61	B-1842	2	Dowel—Main Bearing	X	X		X	X	X	
1-62	BD-7	3	Lock—Bearing Cap Screw	X	X		X	X	X	
1-63	BD-5-B	6	Screw—Main Bearing Cap	X	X		X	X	X	
	B-9984	1	Bushing—Distributor Shaft	X	X		X	X	X	
1-64	B-6417	1	Plug—Expansion (Crankcase Rear)	X	X		X	X	X	
	B-4171	6	Plug—Expansion (Crankcase Front)	X	X		X	X	X	
	78283-A	2	Screw—Countersunk Hdless. Set	X	X		X	X	X	
	78283-G	3	Screw—Countersunk Hdless. Set	X	X		X	X	X	
	78280-A	6	Plug—Slotted Head	X	X		X	X	C	
	BD-262	1	Plug—Oil Gauge Hole	X	X		X	X	X	
	63007	1	Plug—Distributor Hole	X	X		X	X	X	
2-1	68027	1	Bushing—Camshaft (Front)	X	X		X	X	X	
2-2	68050	1	Bushing—Camshaft (Center)	X	X		X	X	X	
2-3	68053	1	Bushing—Camshaft (Rear)	X	X		X	X	X	
2-4	68122-A	2	Bushing—Front Main Bearing	X	X		X	X	X	
2-5	68118-C	2	Bushing—Center Main Bearing	X	X		X	X	X	
2-6	68121-B	2	Bushing—Rear Main Bearing	X	X		X	X	X	
2-7	68009	8	Guide—Valve	X	X		X	X	X	
2-8	68136	4	Valve—Intake	X	X		X	X	X	
2-9	68136-C	4	Valve—Exhaust	X	X		X	X	X	
2-10	68035-C	8	Spring—Valve	X	X		X	X	X	
2-11	B-9793	8	Retainer—Valve Spring	X	X		X	X	X	
2-12	B-9792	16	Taper—Valve Spring	X	X		X	X	X	

ENGINE PARTS

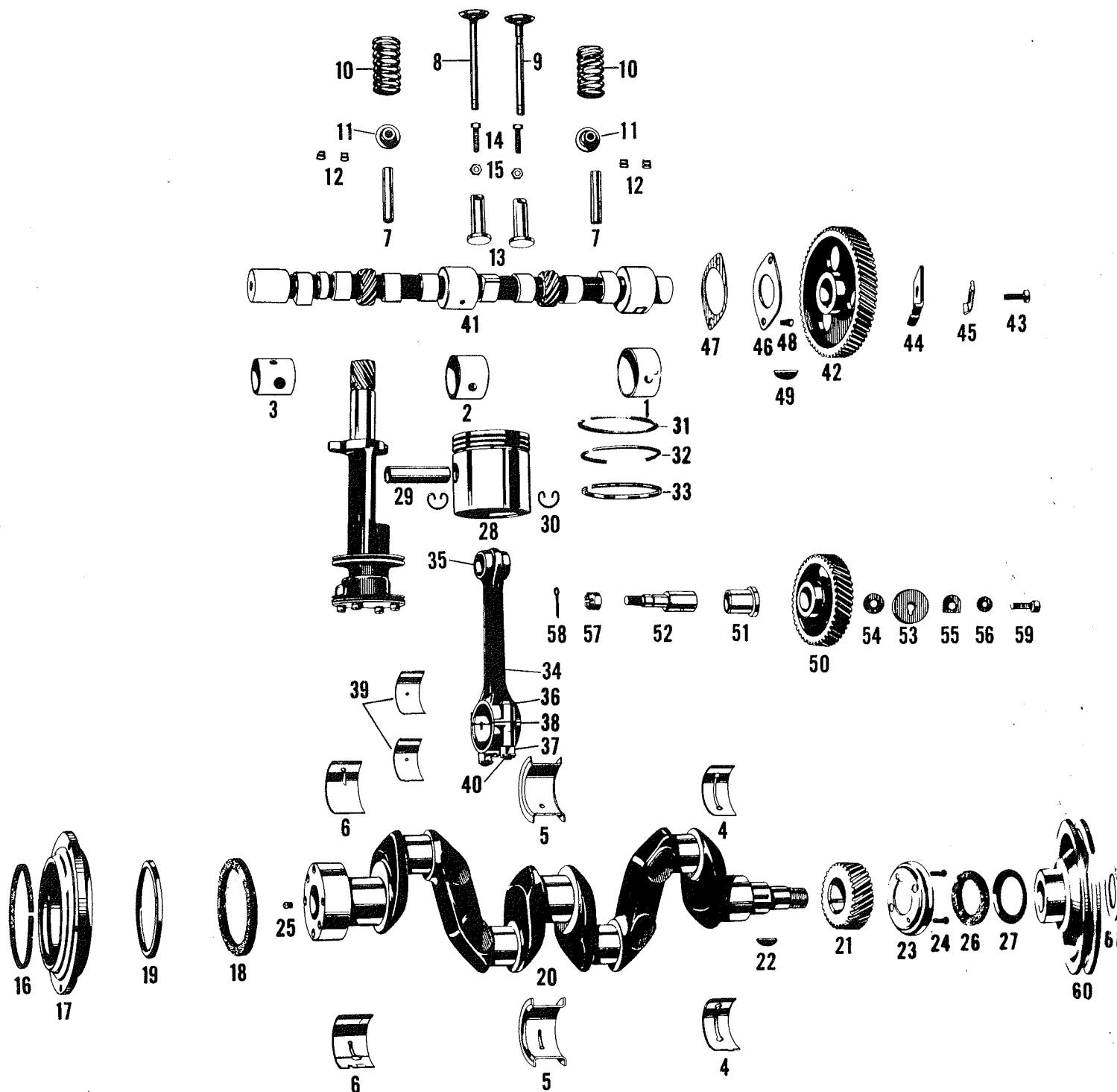


FIG. 2—CRANKSHAFT, CAMSHAFT, VALVES, PISTONS AND GEARS

ENGINE PARTS									
FIG. & REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS		
				B	B-1		C	D	D-1
2	XD-56-A	8	Tappet Assembly—Valve, consists of:	X	X		X	X	X
2-13	BD-56-A	1	Tappet—Valve	X	X		X	X	X
2-14	BC-70	1	Screw—Valve Tappet Adjust.	X	X		X	X	X
2-15	21187	1	Nut—Hex. Jam, 5/16-24	X	X		X	X	X
2-16	BD-368-A	1	Gasket—Closure Plate	X	X		X	X	X
2-17	BD-364-A	1	Plate—Main Bearing Closure	X	X		X	X	X
2-18	BD-366	1	Seal—Rear Crankshaft Oil	X	X		X	X	X
2-19	BD-367	1	Cup—Crankshaft Oil Seal	X	X		X	X	X
	21051	3	Washer—Lock, 5/16 in.	X	X		X	X	X
	21309	3	Screw—Hex. Hd. Cap, 5/16-18 x 3/4 in.	X	X		X	X	X
2-20	BD-14-K	1	Crankshaft	X	X		X	X	X
2-21	68012	1	Gear—Crankshaft	X	X		X	X	X
2-22	21007	2	Key—Woodruff #9	X	X		X	X	X
2-23	B-733-A	1	Thrower—Front Crankshaft Oil	X	X		X	X	X
2-24	21796	2	Screw—Drive	X	X		X	X	X
2-25	78280-A	1	Plug—Slotted Hd. Pipe	X	X		X	X	X
	BD-13	1	Thrower—Rear Crankshaft Oil	X	X		X	X	X
2-26	BD-87	1	Seal—Gear Cover Oil	X	X		X	X	X
2-27	BC-82	1	Cup—Gear Cover Oil Seal	X	X		X	X	X
2-28	00-68204-A	4	Piston (Assembled with Pin and Retainers)	X	X		X	X	X
	0-68204-A	4	Piston with Pin	X	X		X	X	X
	68204-A	4	Piston	X	X		X	X	X
2-28	0068404-A	4	Piston with Pin and Retainer (4-Ring Groove)	X	X		X	X	X
	068404-A	4	Piston with Pin (4-Ring Groove)	X	X		X	X	X
	68404-A	4	Piston (4-Ring Groove)	X	X		X	X	X
	951822	8	Piston Ring (Used with 68404-A)	X	X		X	X	X
	951821	4	Piston Ring (Used with 68404-A)	X	X		X	X	X
2-29	68006	4	Pin—Piston	X	X		X	X	X
2-30	37030	8	Ring—Piston Pin Retainer	X	X		X	X	X
2-31	951575	4	Ring—Piston (Top Comp.) (Used with 68204-A)	X	X		X	X	X
2-31	951576	4	Ring—Piston (Top Comp.) (Used with 68204-A)	X	X		X	X	X
2-32	951577	4	Ring—Piston (Gen. Comp.) (Used with 68204-A)	X	X		X	X	X
2-33	951578	4	Ring—Piston (Bottom Oil) (Used with 68204-A and 68404-A)	X	X		X	X	X
2-34	068007	4	Connecting Rod Assembly, consists of:	X	X		X	X	X
2-35	37008	1	Bushing—Piston Pin	X	X		X	X	X
2-36	B-4858	2	Bolt—Connecting Rod	X	X		X	X	X
2-37	BD-24	2	Nut—Castle	X	X		X	X	X
2-38	B-10337-A	2	Shim	X	X		X	X	X
	0068007	4	Connecting Rod with Bearing	X	X		X	X	X
2-39	68010-A	8	Bearing—Connecting Rod	X	X		X	X	X
2-40	21062	8	Pin—Cotter, 3/32 x 3/4	X	X		X	X	X
2-41	68123-A	1	Camshaft	X	X		X	X	X
2-42	BD-80-A	1	Gear—Camshaft	X	X		X	X	X
2-43	B-1231	1	Screw—Camshaft Lock	X	X		X	X	X
2-44	B-779-A	1	Plate—Camshaft Lock	X	X		X	X	X
2-45	B-780-A	1	Lock—Camshaft Screw	X	X		X	X	X

ENGINE PARTS

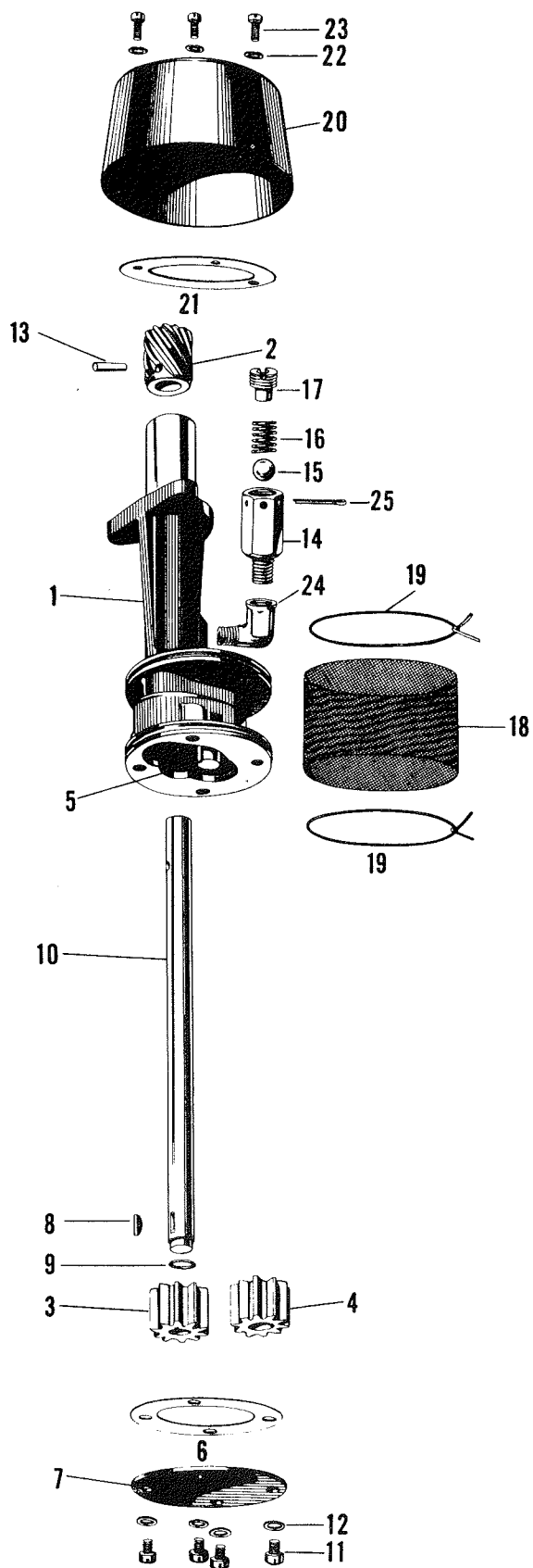


FIG. 3—OIL PUMP PARTS

ENGINE PARTS										
FIG. &				ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS			
REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	B	B-1		C	D	D-1	
2-46	BD-85	1	Plate—Camshaft Thrust	X	X		X	X	X	
2-47	BD-86	1	Lock—Camshaft Thrust Plate	X	X		X	X	X	
2-48	21307	2	Screw—Hex. Hd. Cap, 5/16 - 18 x 5/8	X	X		X	X	X	
2-49	21863	1	Key—Hi Pro #606	X	X		X	X	X	
2	XD-71-A	1	Gear Assembly—Idler, consists of:	X	X		X	X	X	
2-50	BD-71-A	1	Gear—Idler	X	X		X	X	X	
2-51	BD-76	1	Bushing—Idler Gear	X	X			X	X	
2-52	BD-72-A	1	Stud—Idler Gear	X	X			X	X	
2-53	B-740	1	Washer—Idler Gear	X	X			X	X	
2-54	B-926	8	Shim—Idler Gear	X	X			X	X	
2-55	B-741	1	Lock—Idler Gear Screw	X	X			X	X	
2-56	B-363	1	Washer	X	X		X	X	X	
2-57	21600	1	Nut—Castle	X	X		X	X	X	
2-58	21065	1	Pin—Cotter, 1/8 x 1 in.	X	X		X	X	X	
2-59	21340	1	Screw—Cap, 3/8-16 x 5/8 in.	X	X		X	X	X	
2-60	Y-6601	1	Pulley—Fan	X	X			X	X	
2-60	BE-815-E	1	Pulley—Fan				X			
2-61	21617	1	Washer—External Shakeproof Lock, 1 in.	X	X		X	X	X	
2-62	Y-7174	1	Nut—Fan Pulley	X	X		X	X	X	
3	068180	1	Oil Pump Assembly				X			
3	68180-1	1	Body				X			
3	068280	1	Pump Assembly—Oil	X				X		
3	0068280-A	1	Pump Assembly—Oil, with Relief Valve, Consists of:	X	X			X	X	
3	068280-A	1	Oil Pump Assembly, Consists of:	X	X			X	X	
3-1	68280-1	1	Body	X	X			X	X	
3-2	98051	1	Gear—Oil Pump	X	X		X	X	X	
3-3	37081-A	1	Gear—Drive	X	X		X	X	X	
3-4	37085	1	Gear—Driven	X	X		X	X	X	
3-5	37083	1	Shaft—Idler	X	X		X	X	X	
3-6	BD-359	1	Gasket—Oil Pump	X	X		X	X	X	
3-7	BD-358	1	Cover—Oil Pump	X	X		X	X	X	
3-8	21001	2	Key—Woodruff, #2	X	X		X	X	X	
3-9	B-9420	1	Ring—Snap	X	X		X	X	X	
3-10	68184	1	Shaft—Drive	X	X		X	X	X	
3-11	21701	4	Screw—Fil. Hd. Mach. 1/4-20 x 1/2 in.	X	X		X	X	X	
3-12	21050	4	Washer—Lock 1/4 in.	X	X		X	X	X	
3-13	B-5134	1	Pin	X	X		X	X	X	
3	08-1250	1	Relief Valve Assembly, Consists of:	X	X			X	X	
3-14	B-1250	1	Body—Relief Valve	X	X			X	X	
3-15	105516	1	Ball—Relief Valve	X	X			X	X	
3-16	B-5124	1	Spring—Relief Valve	X	X			X	X	
3-17	B-1252	1	Screw—Relief Valve Adj.	X	X			X	X	
3-18	BD-355	1	Screen—Oil Pump	X	X		X	X	X	
3-19	BD-356	2	Wire—Oil Pump Screen	X	X		X	X	X	
3-20	BD-360	1	Baffle—Oil Pump	X	X		X	X	X	
3-21	BD-361	1	Gasket—Oil Pump Baffle	X	X		X	X	X	
3-22	21049	3	Washer—Lock, 3/16 in.	X	X		X	X	X	
3-23	21127	3	Screw—Fil. Hd. Mach. #10-32 x 3/8 in.	X	X		X	X	X	
3-24	B-567	1	Elbow—Street, Brass	X	X		X	X	X	

ENGINE PARTS									
FIG. & REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS		
				B	B-1		C	D	D-1
3-25	21503	1	Pin—Cotter, 3/32 x 1 in.	X	X			X	X
	21309	2	Screw—Hex. Hd. Cap, 5/16-18 x 3/4 (Pump to Crankcase)	X	X		X	X	X
	21051	2	Washers—Lock, 5/16 in.	X	X		X	X	X
	A-68160-A	1	Water—Pump Assembly (New Type) Consists of:	X	X		X	X	X
4	068160-A	1	Water—Pump Assembly, Consists of:	X	X		X	X	X
4	X-68160-A	1	Body Assembly—Water Pump, Consists of:	X	X		X	X	X
4-1	68160-A	1	Body—Water Pump	X	X		X	X	X
	B-7715	1	Bushing—Water Pump Body	X	X		X	X	X
4-2	B-7730	1	Bushing—Water Pump Body	X	X		X	X	X
4-3	B-6202	1	Dowel	X	X		X	X	X
4-4	B-6840	2	Dowel	X	X		X	X	X
4-5	68061-A	1	Cover	X	X		X	X	X
4-5A	B-1883	2	Dowel	X	X		X	X	X
4-6	B-7718-A	1	Gasket	X	X		X	X	X
4-7	B-7717-A	1	Nut—Stuffing (Used on A-68168-A)	X	X		X	X	X
	B-7717	1	Nut—Stuffing	X	X		X	X	X
4-8	B-7721	1	Nut—Stuffing	X	X		X	X	X
	B-7721-A	1	Nut—Stuffing (A-68160-A)	X	X		X	X	X
4-9	B-7716-A	4	Packing	X	X		X	X	X
	B-327-K	6	Packing (Used on A-68160-A)	X	X		X	X	X
4-10	63573	1	Seal—Oil	X	X		X	X	X
4-11	68056-B	1	Shaft	X	X		X	X	X
4-12	68163	1	Vane	X	X		X	X	X
4-13	21579	1	Pin—Taper, #3 x 1-1/2 in.	X	X		X	X	X
4-14	BD-98	1	Lock—Magnetto Gear	X	X		X	X	X
4-15	BD-97-B	1	Gear—Magnetto	X	X		X	X	X
4-16	BD-90	1	Nut—Magnetto Gear Lock	X	X		X	X	X
4-17	B-3593	2	Gland	X	X		X	X	X
4-18	21002	1	Key—Woodruff, #3	X	X		X	X	X
4-19	21135	4	Screw—Fil. Hd. Cap, 5/16-18 x 5/8 in.	X	X		X	X	X
	116575	1	Spring—Water Pump (Used on A-68160-A)	X	X		X	X	X
	BD-89-A	1	Gasket—Water Pump Mounting	X			X		
4-20	B-7720-A	1	Elbow—Water Inlet	X	X		X	X	X
	78280-B	1	Plug—Slotted Hd. Pipe (Bottom of Elbow)	X	X		X	X	X
4-21	BD-197-A	1	Gasket—Water Inlet Elbow	X	X		X	X	X
4-22	B-7722	1	Screw—Water Inlet Elbow	X	X		X	X	X
4-23	1944	1	Hose—Water Pump	X	X		X	X	X
4-24	65697	2	Clamp—Hose	X	X		X	X	X
4-25	08-10758	1	Vent Pipe Assembly, Consists of:	X	X		X	X	X
	B-10758	1	Tube—Copper, 1/4 O.D. x 3-1/2 in.	X	X		X	X	X
	B-403	1	Elbow—Compression (In Case)	X	X		X	X	X
	B-404	1	Fitting—Compression (In Pump)	X	X		X	X	X
4-26	B-5563	1	Cock—Drain	X	X		X	X	X
4-27	B-577	1	Cup—Grease	X	X		X	X	X
	21362	3	Screw—Hex. Hd. Cap (Water Pump to Gear Cover)	X	X		X	X	X
	21052	3	Washer—Lock	X	X		X	X	X
	B-7402	2	Pin Groove (Water Pump to Gear Cover)	X	X		X	X	X
4-28	Y-6642	1	Elbow—Water Pump Inlet				X	X	X
	Y-18006-A	1	Elbow—Water Pump Inlet	X	X				
4-29	B-2692	1	Gasket—Water Pump Inlet Elbow	X	X		X	X	X
4-30	21348	2	Screw—Hex Hd. Cap, 3/8-16 x 1 in.	X	X		X	X	X
4-31	21052	2	Washer—Lock, 3/8 in.	X	X		X	X	X

ENGINE PARTS										
FIG. & REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS			
				B	B-1		C	D	D-1	
			(ROTARY SEAL TYPE WATER PUMP)							
4	D-68160-D	1	Water Pump Assembly (With Rotary Seal)							
			Consists of:							
4-1	X-68160-D	1	Water Pump Body Assembly, Consists of:							
	68160-D	1	Body (Not Sold Separately)							X
4-2	B-7730	1	Bushing—Front	X	X		X	X		X
4-3	B-6202	1	Pin	X	X		X	X		X
	B-7715	1	Bushing—Rear	X	X		X	X		X
4-4	B-6840	1	Dowel							X
4-5	68061-B	1	Cover	X	X		X	X		X
4-5A	B-1883	2	Dowel	X	X		X	X		X
4-6	B-7718-A	1	Gasket							
4-7	Omit									
4-8	Omit									X
4-9	117800	2	Seal—Water Pump							X
	117796	2	Ring—Retainer							X
	117802	2	Washer							X
4-10	63573	2	Seal—Oil	X	X		X	X		X
4-11	68056-C	1	Shaft—Water Pump	X	X		X	X		X
4-12	68163	1	Vane	X	X		X	X		X
4-13	21579	1	Pin—Taper, #3 x 1-1/2	X	X		X	X		X
4-14	BD-98	1	Lock—Magneto Gear	X	X		X	X		X
4-15	BD-97-B	1	Gear—Magneto	X	X		X	X		X
4-16	BD-90	1	Nut							
4-17	Omit			X	X		X	X		X
4-18	21002	1	Key, #3							
4-19	21307	4	Screw, Hex. Hd. Cap 5/16-18 x 5/8	X	X		X	X		X
	21056	4	Lock Washer (5/16)	X	X		X	X		X

ENGINE PARTS										
FIG. & REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS			
				B	B-1		C	D	D-1	
4-32	41936-C	1	Drain Tube—Engine	X	X		X	X	X	
	B-4092	1	Nut—Flare	X	X		X	X	X	
	080707	1	Oil Line Assembly (Case to Governor) consists of:	X	X		X	X	X	
	80707	1	Line—Oil	X	X		X	X	X	
	B-3663	2	Nut—Flare	X	X		X	X	X	
	B-3664	2	Elbow—Half Union	X	X		X	X	X	
	K-341 and K-341-A	1	Governor Assembly (Used on Model "D" Ice-Engine Units, now superseded by K-341-B)	X	X		X	X	X	
5	K-341-B	1	Governor Assembly, consists of:	X	X		X	X	X	
5-1	B-6114-E	1	Housing—Governor	X	X		X	X	X	
5-2	B-6115-C	1	Cover—Governor Housing	X	X		X	X	X	
5-3	B-6117	1	Gasket—Governor Housing Cover	X	X		X	X	X	
	0B-6145	1	Shaft Assembly—Governor, Consists of:	X	X		X	X	X	
5-4	B-6145	1	Shaft—Governor	X	X		X	X	X	
5-5	B-6127	1	Carrier—Governor Weight	X	X		X	X	X	
	B-6169	1	Pin—Groove (Weight Carrier to Shaft)	X	X		X	X	X	
5-6	B-6090	1	Thrust—Ball Bearing	X	X		X	X	X	
5-7	B-6146	2	Bearing—Ball	X	X		X	X	X	
5-8	B-6101-A	2	Weight—Governor	X	X		X	X	X	
5-9	B-6255	1	Shifter—Governor	X	X		X	X	X	
5-10	B-6122	2	Shaft—Governor Weight	X	X		X	X	X	
	B-4028	2	Pin—Groove 3/32 x 1/2 (Weight to Weight Shaft)	X	X		X	X	X	
5-11	B-6124	1	Lever—Governor Shifter	X	X		X	X	X	
5-12	B-6126-B	1	Shaft—Governor Lever	X	X		X	X	X	

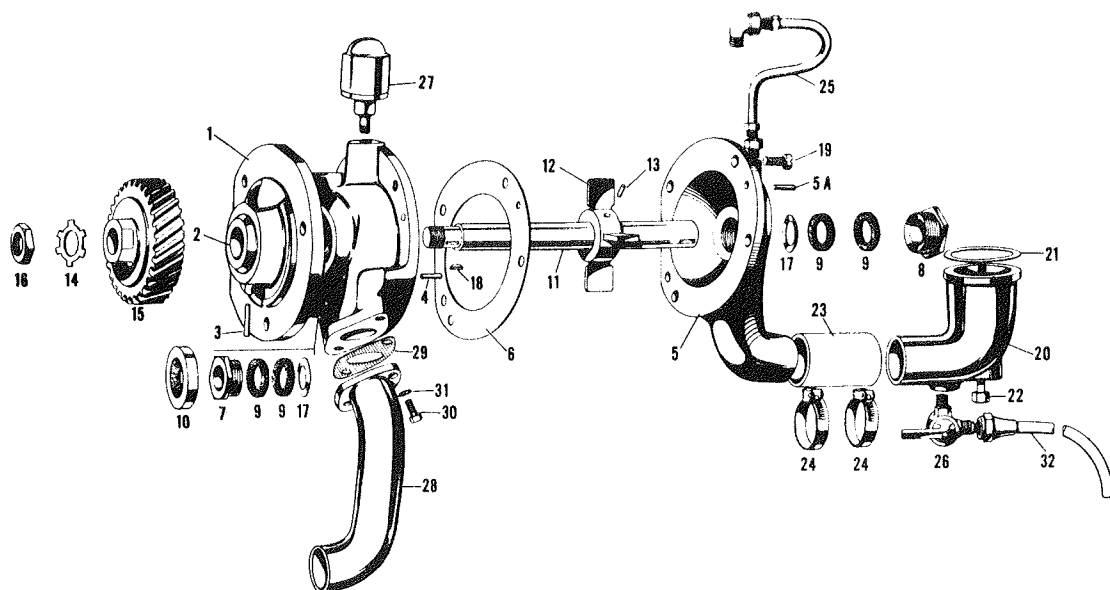


FIG. 4—WATER PUMP PARTS

ENGINE PARTS										
FIG. & REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS			
				B	B-1		C	D	D-1	
5-13	B-6123-B	1	Lever—Governor	X	X		X	X	X	
5-13	B-6518	1	Lever—Governor	X	X		X	X	X	
5-14	21025	1	Pin—Taper, #00 x 3/4 in. (Lever to Governor Lever Shaft)	X	X		X	X	X	
	B-5071	3	Pin—Groove, 3/32 x 5/8 (Governor Shifter Lever to Lever Shaft)	X	X		X	X	X	
5-15	B-7355	1	Screw—Bumper, 1/4-28	X	X		X	X	X	
5-16	B-7356	1	Spring—Bumper	X	X		X	X	X	
5-17	21187	1	Nut—Hex. Jam, 5/16-24	X	X		X	X	X	
5-18	21127	5	Screw—Fil. Hd. Mach. #10-32 x 3/8 in.	X	X		X	X	X	
5-19	21049	5	Washer—Lock, 3/16 in.	X	X		X	X	X	
5-20	B-6125	1	Gear—Governor	X	X		X	X	X	
5-21	21002	1	Key—Woodruff, #3	X	X		X	X	X	
5-22	B-5456	1	Pin—Groove, 1/8 x 7/8 in.	X	X		X	X	X	
	B-536	1	Plug—Expansion	X	X		X	X	X	
5-23	B-6316	1	Retainer—Oil Seal	X	X		X	X	X	
5-24	B-6315	1	Washer—Oil Seal	X	X		X	X	X	
5-25	B-6274	1	Ring—Snap	X	X		X	X	X	
5	K-198-A and K-198-D	1	Governor Assembly (Used on Model "B" and "B-1" Engine Generator Units). (NOTE: K-198-A consists of all the parts listed above under K-341-B <u>plus</u> the following)	X	X		X	X	X	
	21128	1	Screw—Fil. Hd. Mach. #10-32 x 1/2 in.	X	X					
5-26	B-6162	1	Bracket—Governor Spring	X	X					
5-27	B-391	1	Stud, 5/16 x 13/16 in.	X	X					
5-28	21185	1	Nut—Hex, 5/16 - 24	X	X					
5-29	21051	1	Washer—Lock, 5/16 in.	X	X					
5-30	B-6298	1	Spring—Governor	X	X					
5-31	B-6163	1	Screw—Adjusting	X	X					
5-32	B-6164	1	Nut—Adjusting	X	X					
5-33	Y-18532	1	Rod—Governor	X	X			X	X	
	B-6118	1	Rod—Governor				X			
5-34	21263	1	Nut—Hex. #10-32	X	X			X	X	
5-35	Y-18217	1	End—Governor Rod	X	X			X	X	
	B-6121	1	End—Governor Rod				X			
5-36	Y-18218	1	Pin—Governor Rod End	X	X			X	X	
	B-6119	1	Pin—Governor Rod End				X			
5-37	21057	2	Pin—Cotter, 1/16 x 1/2 in.	X	X		X	X	X	
5-38	BE-809	1	Gasket—Governor Housing	X	X		X	X	X	
5-39	21348	2	Screw—Hex. Hd. Cap, 3/8-16 x 1 in.	X	X		X	X	X	
5-40	21052	2	Washer—Lock, 3/8 x 1/8 x 3/32 in.	X	X		X	X	X	
	OY-6458-B	1	Modulated Control Assembly, consists of:					X	X	
5-41	OY-7425	1	Bellows Assembly—Low Pressure Modulator				X	X	X	
5-42	Y-6459-A	1	Cylinder—Modulator Control				X	X	X	
5-43	Y-6460	1	Head—Modulator Control Cylinder				X	X	X	
5-44	Y-6792-A	1	Rod—Modulated Control				X	X	X	
5-45	Y-7427	1	Spring—Modulator				X	X	X	
5-46	Y-6461	1	Nut—Modulated Control Adjusting				X	X	X	
	B-7974-A	1	Washer—Felt				X	X	X	
	B-7973	1	Retainer—Felt Washer				X	X	X	

## ENGINE PARTS

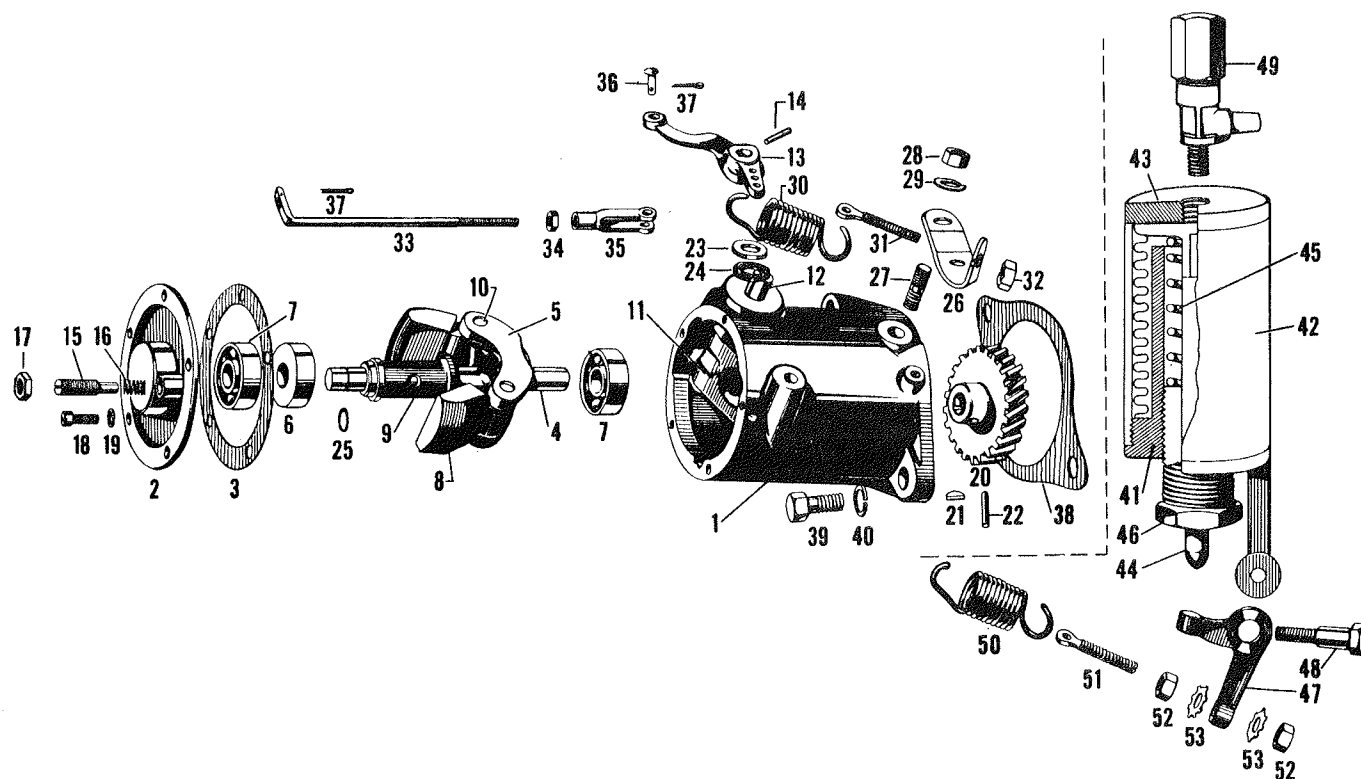


FIG. 5—GOVERNOR PARTS

FIG. & REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS			
				B	B-1		C	D	D-1	
5-47	Y-6791	1	Lever—Governor Spring				X	X	X	
5-48	Y-6456	1	Screw—Shoulder				X	X	X	
5-49	Y-6468	1	Valve—Angle				X	X	X	
5-50	B-10137	1	Spring—Governor				X	X	X	
5-51	Y-6493	1	Screw—Governor Spring Adjusting				X	X	X	
5-52	21176	2	Nut—Hex. Jam, 1/4-20, Cad. Pl.				X	X	X	
5-53	21608	2	Washer—Shakeproof Lock, 1/4 in.				X	X	X	
5-54	21358	1	Screw—Hex. Hd. Cap, 3/8-16 x 1-1/2 in.				X	X	X	

## ENGINE PARTS

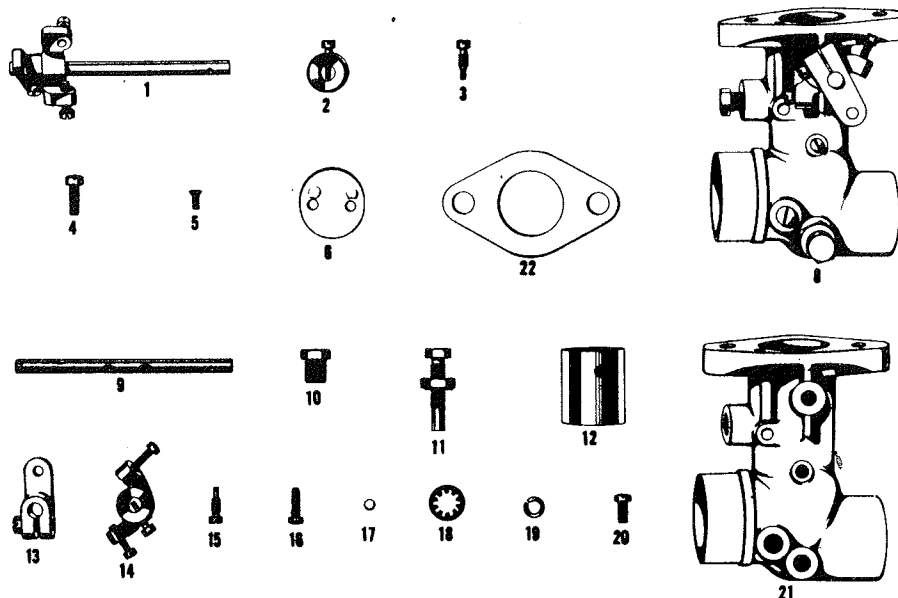


FIG. 6—ENSIGN CARBURETOR PARTS

FIG. & REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS			
				B	B-1		C	D	D-1	
6	51034-A	1	Carburetor Assembly (Used on Engine-Generator Units)	X	X					
6	51034	1	Carburetor Assembly (Used on Ice Engine Units)				X	X	X	
			Consists of:							
6-1	E-6469	1	Lever and Stop Assembly—Throttle Shaft	X	X		X	X	X	
6-2	E-3K682	1	Collar Assembly	X	X		X	X	X	
6-3	E-5B210	1	Screw—Throttle Shaft Collar Set	X	X		X	X	X	
6-4	E-5075	2	Screw—Throttle Stop Adjusting	X	X		X	X	X	
6-5	E-6731	2	Screw—Throttle Shaft	X	X		X	X	X	
6-6	E-4913	1	Disc—Throttle	X	X		X	X	X	
6-8	E-5477	1	Tube Assembly—Air Horn & Throttle	X	X		X	X	X	
6-9	E-4912	1	Shaft—Throttle	X	X		X	X	X	
6-10	E-5145	1	Plug	X	X		X	X	X	
6-11	E-5950	1	Screw & Lock Nut Assembly—Fuel Adjusting	X	X		X	X	X	
6-12	E-4917-18	1	Venturi				X	X	X	
6-12	E-4917-22	1	Venturi	X	X					
6-13	E-5988	1	Lever Assembly—Throttle	X	X		X	X	X	
6-14	E-5718	1	Stop Assembly—Throttle	X	X		X	X	X	
6-15	E-5B210	1	Screw—"B" Throttle Shaft Set	X	X		X	X	X	
6-16	E-821-8	1	Screw—Throttle Clamp	X	X		X	X	X	
6-17	E-302	2	Plug—Welch 3/16 in.	X	X		X	X	X	
6-18	E-5823	1	Washer—Lock	X	X		X	X	X	
6-19	E-225-F	1	Washer—Venturi Set Screw Lock	X	X		X	X	X	
6-20	E-821-6	1	Screw—Venturi Set	X	X		X	X	X	
6-21	E-6434	1	Air Horn & Throttle Tube & Nozzle Assembly	X	X		X	X	X	
6-22	B-365	1	Gasket—Carburetor	X	X		X	X	X	
	21816	2	Screw—Hex. Hd. Cap, 5/16-18 x 7/8 in. Cad. Pl.	X	X		X	X	X	
	21538	2	Washer—Lock, 5/16 in. Cad. Pl.	X	X		X	X	X	

ICE ENGINE ACCESSORY AND UNIT PARTS										
FIG. & REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS			
				B	B-1		C	D	D-1	
7-1	50900	4	Plug—Spark	X	X		X	X	X	
7-1	Y-18668	4	Plug—Spark—Aircraft Shield	X	X		X	X	X	
	Y-18685		Elbow—Spark Plug—Shield	X	X		X	X	X	
	950353		Sleeve—Connector	X	X		X	X	X	
	950354		Connector	X	X		X	X	X	
7-2	B-8963-A	4	Nipple—Rajah Safety	X	X		X	X	X	
7-3	65110-E	1	Nipple—Pipe, 1/8 x 3 in. long	X	X			X	X	
	Y-14549	1	Elbow—Metering Valve	X	X			X	X	
7-4	Y-14428-A	1	Valve—Metering	X	X			X	X	
7-5	B-1686	2	Elbow—Half Union	X	X			X	X	
7-6	078281	1	Tube Assembly—Metering Valve, consists of:	X	X			X	X	
	78281	1	Tube—Copper	X	X			X	X	
	B-4092	2	Nut—Flare	X	X			X	X	
7-7	Y-6618-A	1	Oil Filler and Air Cleaner Pipe	X				X		
7-7	0Y-7660	1	Oil Filler Elbow Assembly, consists of:	X	X			X	X	
	Y-7660	1	Elbow—Oil Filler		X				X	
	Y-7324-A	1	Adapter—Oil Bath Breather		X				X	
	Y-7074	1	Neck—Oil Filler	X	X			X	X	
	21538	2	Washer—Lock, 5/16" in. Cad. Pl.	X	X			X	X	
	21310	2	Screw—Hex. Hd. Cap, 5/16-18 x 3/4 in. Cad. Pl.	X	X			X	X	
7-8	Y-7072	1	Cap—Oil Filler	X	X			X	X	
	78589-A	1	Breather—Oil Bath		X				X	
	024170-C	1	Pipe—Breather				X			
	B-9037-B	1	Cap—Breather				X			
7-9	78589	1	Breather—Oil Bath	X	X			X		
	A-9812	1	Gasket—Oil Bath Breather	X	X			X		
	Y-7324-A	1	Adapter—Oil Bath Breather	X	X			X		
	0950286		Adapter—Oil Bath Breather (Used with Group 399-7)	X				X		
7-10	0Y-7325	1	Stud—Oil Bath Breather Winged	X	X			X	X	
7-11	Y-7329	1	Precleaner—Stator	X				X		
7-12	Y-6502	2	Clamps—Hose	X				X		
7-13	Y-7303	1	Cleaner—Air	X				X		
	21349	4	Screw—Hex. Hd. Cap, 3/8-16 x 1 in. Cad. Pl.	X				X		
	21729	4	Washer—Lock, 3/8 in. Cad. Pl.	X				X		
	Y-7304	1	Tube—Air Cleaner Inlet	X						
7-14	Y-7322	1	Tube—Air Cleaner Inlet					X		
7-15	Y-7328	1	Adapter—Air Cleaner Tube	X				X		
	21281	2	Screw—Hex. Hd. 1/4-20 x 1 in. Cad. Pl.	X				X		
7-16	Y-6577	1	Hose—Air Cleaner (Long)	X	X			X	X	
	B-4855	1	Gasket—Air Cleaner	X	X			X	X	
	Y-7661	1	Cleaner—Air		X				X	
	Y-7662	1	Precleaner		X				X	
	21729	4	Washer—Lock 3/8 x 1/8 x 3/32 in.		X				X	
	39018	2	Screw—Spec. Cap		X				X	
	21344	2	Screw—Hex. Hd. Cap, 3/8-16 x 3/4 in. Cad. Pl.		X				X	
	Y-6577-B	1	Hose—Air Cleaner (Short)		X				X	
	Y-6502	4	Clamps—Hose		X				X	
	Y-7656	1	Ell—Air Cleaner to Carburetor		X				X	
	Y-6090	1	Cleaner—Air				X			
	B-2970	1	Hose—Air Cleaner (Top)				X			
	Y-6499	2	Clamp—Air Cleaner Hose (Top)				X			
	7044	1	Hose—Air Cleaner (Bottom)				X			

ICE ENGINE ACCESSORY AND UNIT PARTS

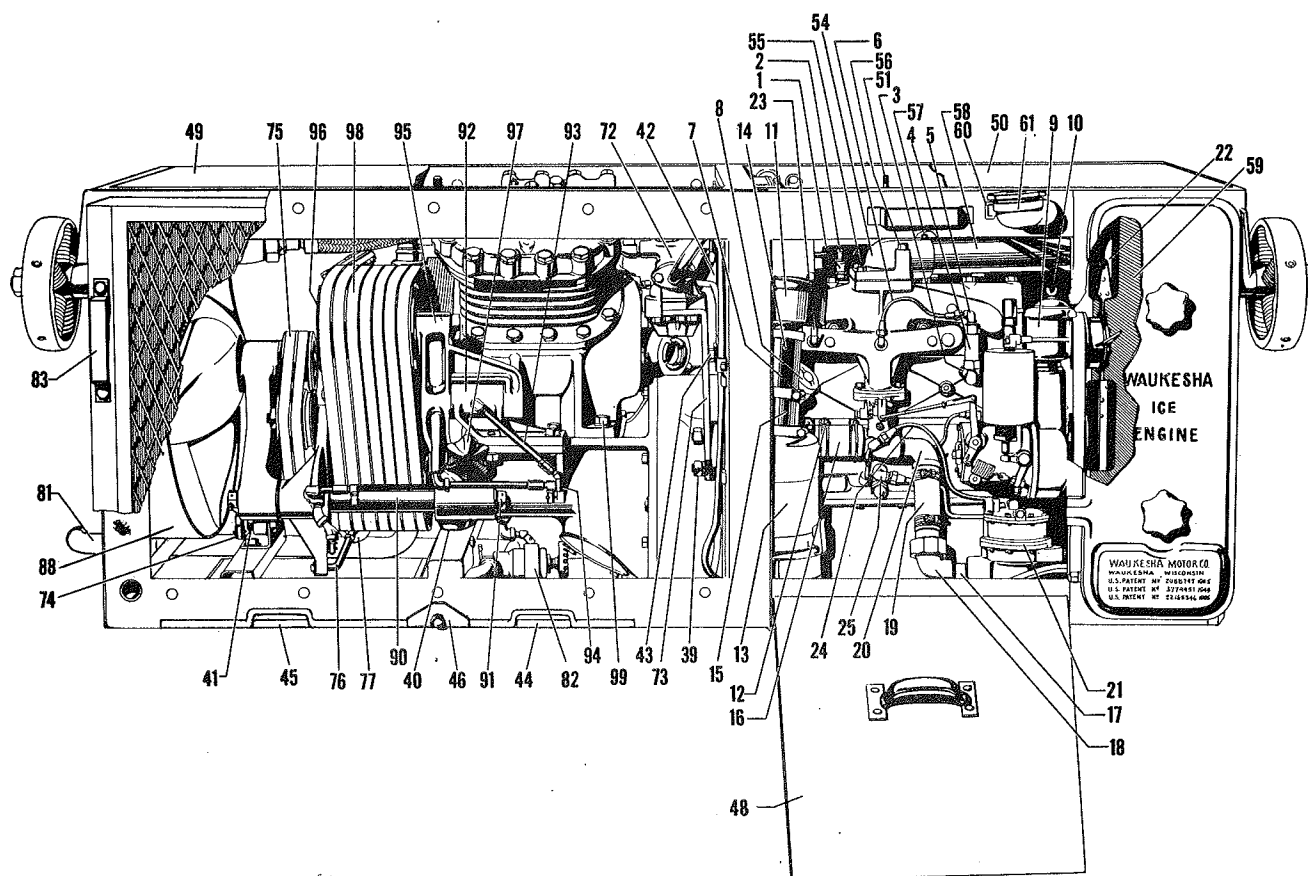


FIG. 7—CARBURETOR SIDE OF ICE ENGINE UNIT

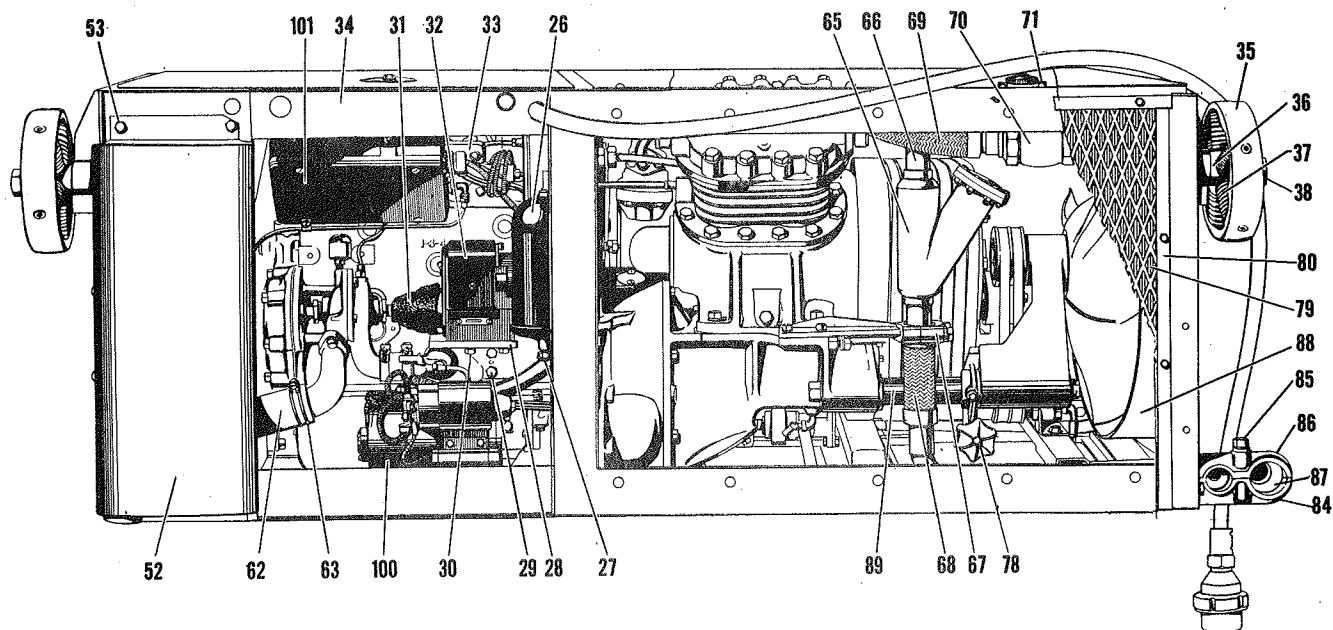


FIG 7A—MAGNETO SIDE OF ICE ENGINE UNIT

ICE ENGINE ACCESSORY AND UNIT PARTS										
FIG.& REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS			
				B	B-1		C	D	D-1	
7-17	Y-6503	2	Clamp—Air Cleaner Hose (Bottom)				X			
	Y-6133-B	1	Pipe—Air Cleaner				X			
	Y-6132	1	Support—Air Cleaner				X			
	Y-6131	1	Clamp—Air Cleaner				X			
	21344	1	Screw—Hex. Hd. Cap, 3/8-16 x 3/4 in. Cad. Pl.				X			
	21348	1	Screw—Hex. Hd. Cap, 3/8-16 x 1 in.				X			
	21190	2	Nut—Hex. 3/8-16 Cad. Pl.				X			
	21052	2	Washer—Lock, 3/8 in.				X			
	Y-7238	1	Nipple—Close, 3/4 Galv.	X	X			X	X	
	7-18	Y-6741	1	Elbow—Malleable Iron Female Union, 3/4 in. Galv.	X	X		X	X	X
7-19	Y-6232	2	Nipple—3/4 in.	X	X		X	X	X	
	Y-6242-A	1	Hose—Carburetor				X	X	X	
	Y-18099	1	Hose—Carburetor	X	X					
	Y-6503	2	Clamps—Hose	X	X		X	X	X	
7-20	Y-7235	1	Elbow—Mall. Iron Street, 3/4 in. Galv.	X	X		X	X	X	
7-21	50573-C	1	Regulator (For detail parts list, see Figure 21.)	X	X		X	X	X	
	21310	2	Screws—Hex. Hd. Cap, 5/16-18 x 3/4 in. Cad. Pl. (Regulator to Bracket)	X	X		X	X	X	
	21538	2	Washer—Lock, 5/16 in. Cad. Pl.	X	X		X	X	X	
	Y-11087	1	Bushing—Mall. Iron Reducing, 1 x 1/2 in. Galv.	X	X		X	X	X	
	Y-6761	1	Strainer—Regulator	X	X			X	X	
	Y-6818	2	Nipple—Close, 1/2 in. Galv.	X	X				X	
	Y-6762	2	Nipple, 1/2 pipe x 5 in. long Galv.	X				X		
	Y-6736	1	Elbow—Mall. Iron Female Union 1/2 in. Galv.	X	X			X	X	
	950020	1	Pipe—Fuel, 1/2 x 19-7/8 in. long, Galv.		X					
	950020-C	1	Pipe—Fuel, 1/2 x 21-1/2 in. long, Galv.						X	
7-22	Y-6737-A	1	Pipe—Fuel, 1/2 pipe x 14-7/8 in. Galv.	X				X		
	Y-11089	2	Elbow—Mall. Iron Pipe, 1/2 in. Galv.	X	X			X	X	
	950020-A	1	Nipple—Pipe, 1/2 x 7 in. long, Galv.		X					
	950020-B	1	Nipple—Pipe, 1/2 x 8 in. long, Galv.					X	X	
	Y-6899	1	Bushing—Fuel Line Support	X	X			X	X	
	Y-6494	1	Plug—Sq. Hd. Pipe, 1/2 in.	X	X			X	X	
	F-16-H	1	Fan Assembly, (As used on Model "D" and "B" Units) consists of:	X			X	X		
	3986-LD	1	Blade Assembly	X			X	X		
	1428-D	8	Screw—Machine	X			X	X		
	0267-D	8	Washer—Lock	X			X	X		
	1449-D	1	Gasket—Cork	X			X	X		
	1429-D	8	Nut—Square	X			X	X		
	2091-D	1	Thrust Nut Assembly	X			X	X		
	4247-D	1	Plug—Oil (Special)	X			X	X		
	474-D	1	Washer—Bronze	X			X	X		
	2791-D	1	Washer—Steel	X			X	X		
	2182-D	1	Roller and Cage Assembly Only	X			X	X		

ICE ENGINE ACCESSORY AND UNIT PARTS											
FIG. & REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS				
				B	B-1		C	D	D-1		
7-23	2157-D	1	Hub Assembly	X			X	X			
	2158-D	1	Spindle	X			X	X			
	Y-6036-A	1	Belt—Fan	X			X	X			
	101625	1	Fan Assembly				X				
	Y-6027-C	1	Bracket—Fan	X							
	Y-6027-A	1	Bracket—Fan				X	X			
	B-5004	1	Nut—Fan Half, 5/8-18	X			X	X			
	Y—18814-M	2	Washer—Plain, 5/8 in. Cad. Pl.	X			X	X			
	21553	1	Pin Cotter, 3/32 x 1 in. Cad. Pl.	X			X	X			
	21363	3	Screw—Hex. Cap 3/8-16 x 2 in. Cad. Pl.	X			X	X			
	21537	3	Washer—Lock, 3/8 in. Cad. Pl.	X			X	X			
	F-16-H	1	Fan Assembly, less Blade & Spider (02157-D)	X			X	X			
	0Y-19472-B	1	Support Assembly—Fan (For Fan Support and Fan detailed Parts List as used on Model D-1 and B-1 Units, refer to Figure 10.)		X					X	
	(MANIFOLD TO VACUUM SWITCH LINE)										
	B-1686	1	Elbow—Half Union, 1/4 Tube x 1/8 M. P.					X	X		
	B-10168	1	Elbow—Street, 1/8 Pipe					X	X		
	63599	1	Fitting—1/8 Compression Tee					X	X		
	039000	1	Union Assembly—Restricted Half					X	X		
	B-4092	2	Nut—Flare, 1/4 in.					X	X		
	B-7948-B	1	Tube—Copper, 1/4 O. D. x (.035) wall x 9 in.					X	X		
	(BALANCE TUBE—CARBURETOR TO REGULATOR)										
	0Y-7606	1	Tube Assembly—Balance, consists of:						X	X	
	Y-7606	1	Tube—Copper, 1/4 O. D. x 13-1/4 in. long						X	X	
	B-4092	2	Nut—Flare		X				X	X	
	0Y-7596	1	Elb—Restricted Half Union, consists of:		X				X	X	
	Y-7597	1	Plug—Restriction		X				X	X	
	Y-7596	1	Elbow—Special Half Union		X				X	X	
	B-1686	1	Elbow—Half Union, 1/4 Flare x 1/8 M. P.		X				X	X	
	(CASE TO OIL SWITCH, NOT USED ON UNITS WITH ELECTRIC SENDING UNIT.)										
7-25	B-1686	1	Elbow—Half Union, 1/4 Flare x 1/8 M. P.	X				X			
	B-4094	1	Union—Half, 1/4 Flare x 1/8 M. P.					X			
	B-4092	2	Nut—Flare, 1/4 in.	X				X			
	41936-G	1	Tube—Copper, 1/4 O. D. x 53 in. long	X				X			
	Y-6327	2	Clip—Tubing, 1/4 in.	X				X			
	21880	1	Screw—Rd. Hd. Mach., 1/4 - 20 x 1/2 in. Cad. Pl.	X				X			
	2174	1	Nut—Hex. 1/4-20, Cad. Pl.	X				X			
	21536	1	Washer—Lock, 1/4 in. Cad. Pl.	X				X			
	Y-6838	1	Filter—Oil (See Fig. #16 R-6)	X	X			X	X		
	0101130-D	1	Filter—Oil				X				
7-26	21355	4	Screw—Hex. Hd. Cap, 3/8-16 x 1-3/8 in. Cad. Pl.					X	X		
	21729	4	Washer—Lock, 3/8 in. Cad. Pl.	X	X		X	X	X		
	21190	4	Nut—Hex. 3/8-16 Cad. Pl.	X	X		X	X			

ICE ENGINE ACCESSORY AND UNIT PARTS											
FIG.& REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS				
				B	B-1		C	D	D-1		
7-27			(RETURN—BOTTOM OF FILTER TO CASE)								
	B-1686	1	Elbow—Half Union, 1/4 flare x 1/8 M. P.	X	X		X	X	X		
	B-7106	1	Adapter (long)				X	X	X		
	B-4094	1	Union—Half	X	X		X	X	X		
	B-4092	2	Nut—Flare, 1/4 in.	X	X		X	X	X		
	B-7948-R	1	Tube—Copper, 1/4 O. D. x 5-1/2 in. long				X	X	X		
			(CASE TO OIL FILTER LINE, ENTERS SIDE OF FILTER BASE)								
	B-1686	1	Elbow—Half Union, 1/4 flare x 1/8 M. P.				X	X	X		
	76483-L	1	Tube—Copper							X	
	Y-6739	1	Tee—Sweat Tube, 1/4 x 1/8 x 1/4 in. (To Gauge Line)				X	X			
	41936-F	1	Tube—Copper, 1/4 O. D. x 32-5/8 in.				X	X			
	B-7948-D	1	Tube—Copper, 1/4 O. D. x 18 in				X	X			
	B-4094	1	Union—Half		X		X	X	X		
	B-567	1	Elbow—Street, 1/8 in. Brass				X	X	X		
	B-4092	2	Nut—Flare, 1/4 in.		X		X	X	X		
	Y-6327	2	Clip—Tubing, 1/4 in.				X	X	X		
	7-28	68267	1	Bracket—Magneto	X	X		X	X	X	
	7-29	21352	4	Screw—Hex. Hd. Cap, 3/8-16 x 1-1/4 in.	X	X		X	X	X	
		21052	4	Washer—Lock, 3/8 in.	X	X		X	X	X	
		21504	2	Pin—Taper, #4 x 3/4 in.	X	X		X	X	X	
		21002	1	Key—Woodruff #3 (Magneto Coupling)	X	X		X	X	X	
7-30	21346	2	Screw—Magneto Mounting Hex. Hd. Cap, 3/8-16 x 7/8 in.	X	X		X	X	X		
	21052	2	Washer—Lock 3/8 in. (Mag. to Bracket)	X	X		X	X	X		
	21030	2	Pin—Taper #2 x 1 in.	X	X		X	X	X		
7-31	Y-6409	1	Cover—Magneto Coupling Dust	X	X		X	X	X		
7-32	A-50120-L	1	Magneto—Bosch Assembly	X	X			X	X		
	0116553-A	1	Cable Assembly—Bosch Magneto					X	X		
7-33	0B-1365	1	Cable Support Assembly, consists of:					X	X		
	B-1365	1	Bracket—Cable Support				X	X	X		
	B-1360	2	Block—Cable Support					X	X		
	B-10454	4	Block—Cable Support				X				
	B-1362	1	Clamp—Cable Support				X	X	X		
	21300	2	Screw—Cap, 1/4-28 x 1 in.				X	X	X		
	21177	2	Nut—Hex. 1/4-28				X	X	X		
	21050	2	Washer—Lock, 1/4 in.				X	X	X		
	B-363	1	Washer					X	X		
7-34	0950021-A	1	Frame—Ice Engine, consists of:					X	X		
	950058	1	Angle—Loose Frame						X		
	21815	2	Screw—Flat Hd. Mach. 3/8-16 x 1						X		

ICE ENGINE ACCESSORY AND UNIT PARTS											
FIG. & REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS				
				B	B-1		C	D	D-1		
7	21611	2	Washer—Shakeproof Lock, 3/8 in.							X	
	21190	2	Nut—Hex. 3/8-16 Cad. Pl.							X	
	AY-6615		Wheel Assembly Cushion				X				
	0Y-6615-D	4	Wheel Assembly—Cushion, consists of:	X	X			X	X		
	Y-6615-A	1	Rim—Cushion Wheel	X	X		X	X	X		
	Y-6616-B	1	Hub—Cushion Wheel	X	X		X	X	X		
	Y-6975	10	Support—Spring	X	X		X	X	X		
	Y-6636-B	5	Spring	X	X			X	X		
	Y-6636-A	5	Spring (Use on AY-6615)				X				
	21547	5	Screw—Socket Hd. Cap, 3/8-16 x 1/2 in.	X	X		X	X	X		
	B-2747	5	Washer—Copper	X	X		X	X	X		
	Y-6979	2	Bushing	X	X		X	X	X		
	Y-6978	5	Stud	X	X		X	X	X		
	7-38	Y-6035	4	Nut—Hex. Jam	X	X		X	X	X	
		Y-6125-A	4	Washer—Wheel	X	X		X	X	X	
0Y-6033-A		2	Bracket Assembly—Hanger Wheel (LH)				X				
0Y-6034-A		2	Bracket Assembly—Hanger Wheel (RH)				X				
21562		4	Pin—Cotter 1/8 x 2 in. Cad. Pl.	X	X		X	X	X		
(ENGINE TO FRONT SUPPORT)											
Y-7574		2	Screw—Drilled Hd. Cap, 3/8-16 x 1 in. Cad. Pl.				X	X	X		
116050-G		2	Wire—Safety, #16 (.06oz.) Dead Soft Brass, 12 in.				X	X	X		
Y-18814-H		2	Washer—Plain 3/8 in. Cad. Pl.				X	X	X		
(FLYWHEEL HOUSING SUPPORT)											
7-39	21432	2	Screw—Hex. Cap, 1/2-13 x 1-1/2 in. Cad. Pl.					X	X		
	21434	2	Screw—Hex. Cap, 1/2-13 x 1-3/4 in. Cad. Pl.					X	X		
	21539	4	Washer—Lock, 1/2 in. Cad. Pl.					X	X		
	21206	4	Nut—Hex. 1/2-13, Cad. Pl.					X	X		
	21887	2	Screw—Hex. Cap, 5/8-11 x 2-1/2 in. Cad. Pl.				X				
	21222	2	Nut—Hex. 5/8-11, Cad. Pl.				X				
	21540	2	Washer—Lock, 5/8 in. Cad. Pl.				X				
	(COMPRESSOR SUPPORT TO FRAME)										
7-40	21426	2	Screw—Hex. Cap, 1/2-13 x 1 in., Cad. Pl.					X	X		
	21539	2	Washer—Lock, 1/2 in. Cad. Pl.				X	X	X		
	Y-18814-K	2	Washer—Plain, 1/2 in. Cad. Pl.				X	X	X		
	21429	2	Screw—Hex. Hd. Cap, 1/2-13 x 1-1/4 in. Cad. Pl.				X				
	Y-6191-A	4	Shim—1/32 in.					X	X		
	Y-6191	2	Shim—1/8 in.					X	X		
	0950059	1	Bracket—Condenser Fan Support						X		
	21896	2	Screw—Hex. Hd. Cap, 7/16-14 x 1-3/4 in. Cad. Pl.						X		
	21635	2	Washer—Shakeproof Lock, Internal 7/16 Cad. Pl.							X	
										X	

ICE ENGINE ACCESSORY AND UNIT PARTS											
FIG. & REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS				
				B	B-1		C	D	D-1		
7-42	21901	2	Screw—Hex. Hd. Cap, 7/16 - 14 x 7/8							X	
	21902	2	Washer—Lock, 7/16 in.								X
	21198	2	Nut—Hex. 7/16-14 Cad. Pl.								X
	Y-6684	1	Partition Sheet—Top					X			
	Y-6326-A	1	Partition Sheet (Top)								
	OY-6684	1	Sheet—Partition (Top)								X
	Y-6087-B	1	Partition Sheet (Bottom)					X			
	OY-6224	1	Cover—Sight Gauge Hole						X	X	
	Y-83-A	1	Spring						X	X	
	21394	1	Screw—Hex. Cap, 7/16-14 x 1-1/4 in. Cad. Pl.							X	X
	21200	2	Nut—Hex. Jam, 7/16-14 Cad. Pl.							X	X
	Y-18814-J	1	Washer—Plain, 7/16 in. Cad. Pl.							X	X
	21274	9	Screw—Hex. Cap, 1/4-20 x 5/8 in. Cad. Pl.							X	X
	21276	1	Screw—Hex. Cap, 1/4-20 x 3/4 in. Cad. Pl.							X	X
	21174	10	Nut—Hex. 1/4-20, Cad. Pl.							X	X
	21629	11	Washer—Shakeproof Lock, 1/4 in. Cad. Pl.							X	X
	OY-7659	1	Support—Air Cleaner								X
	21276	2	Screw—Hex. Hd. Cap, 1/4-20 x 3/4 in.								X
	21536	2	Washer—Lock, 1/4 in. Cad. Pl.								X
	21344	2	Screw—Hex. Hd. Cap, 3/8-16 x 3/4 in.								X
	21729	2	Washer—Lock, 3/8 in.								X
7-44	Y-6721	1	Door—Small Bottom							X	X
7-44	Y-4068	1	Door—Small Bottom					X			
7-45	Y-6719	1	Door—Large Bottom							X	X
7-45	Y-4067	1	Door—Large Bottom					X			
7-46	Y-6722	1	Clamp—Bottom Door					X	X	X	
	21988	2	Screw—Hex. Cap, 1/2-13 x 1/2 in. Cad. Pl. (Clamp)					X			
	Y-18814-K	1	Washer—Plain, 1/2 in. Cad. Pl. (Under Clamp)							X	X
	21539	1	Washer—Lock, 1/2 in. Cad. Pl.							X	X
	21539	2	Washer—Lock, 1/2 in. Cad. Pl.					X			
	21206	1	Nut—Hex, 1/2-13 Cad. Pl.							X	X
								X	X	X	
7-47	Y-6402	2	Spring—Clean — Out Door Clamp					X	X	X	
	21797	2	Screw—Hex. Hd. Parker Kalon Cap, #14 x 1/2 in. Cad. Pl.							X	X
7-48	950867	2	Door Assembly	X	X					X	
	OY-6066	2	Cover Assembly—Side					X			
	Y-46	2	Transfer Name (Located on Side Doors)	X	X			X	X	X	
	Y-6708	2	Spring—Door Clamping	X	X				X	X	
	21805	2	Screw—Parker Kalon Cap, 3/8 x 5/8 Cad. Pl.	X	X				X	X	
7-49	OY-6805	1	Cover—Compressor Compartment							X	
7-49	0950067	1	Cover—Compressor Compartment								X
	OY-7429	1	Bracket—Cover Stud							X	X
7-50	OY-6806	1	Cover—Engine Compartment							X	
7-50	0950068	1	Cover—Engine Compartment								X

ICE ENGINE ACCESSORY AND UNIT PARTS									
FIG. & REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS		
				B-1			C	D	D-1
7-51	0Y-6068	1	Cover—Top Assembly				X		
	Y-6382	7	Fasteners—Hood Cover				X		
	Y-6803	1	Stud—Engine Compartment Cover	X	X			X	X
	Y-6403	2	Nut—Wing	X	X			X	X
7-52	Y-6118-A	1	Muffler				X		
7-52	Y-6674	1	Muffler					X	X
7-53	21805	4	Screw—Parker Kalon Cap, 3/8 x 5/8 in. Cad. Pl.					X	
7-53	21339	4	Screw—Hex. Hd. Cap, 3/8-16 x 1/2 in. Cad. Pl.						X
	21344	4	Screw—Hex. Hd. Cap, 3/8-16 x 3/4 in.				X		
	21729	4	Washer—Lock, 3/8 Cad. Pl.				X		
	21633	4	Washer—Shakeproof Lock						X
7-54	Y-6637	1	Flange—Exhaust					X	X
7-54	BE-800	1	Flange—Exhaust				X		
	BE-801	1	Gasket—Exhaust Flange				X	X	X
7-55	Y-6638	2	Screw—Exhaust Flange (Everdur 3/8 x 2-1/2 in.)					X	X
	Y-18160	4	Screw—Cap, 3/8-16 x 1-1/2 in.				X		
7-56	Y-18012	2	Screw—Exhaust Flange (Everdur 3/8 x 1 in.)					X	X
7-57	21797	1	Screw—Hex. Hd. Parker Kalon Cap, #14 x 1/2 in. Cad. Pl.					X	X
7-58	Y-6626	1	Pipe—Exhaust					X	X
	Y-6502	1	Clamp—Hose (Exhaust Pipe to Muffler)					X	X
	Y-6238	1	Nipple—Exhaust Pipe (Short)				X		
	Y-6235	2	Elbow				X		
	Y-6234	1	Elbow—Street				X		
	Y-6236-A	1	Nipple—Exhaust Pipe (Long)				X		
	Y-6237-A	1	Nipple—Exhaust Pipe (Center)				X		
7-59	Y-6671-A	1	Radiator					X	
7-59	QY-6017-CA	1	Radiator				X		
	B-205	1	Cock—Pet, 1/4 in.				X	X	
	78283-J	1	Plug—Ctsk. Hd. Pipe, 1/2 in.					X	
	78280-D	1	Plug—Slotted Hd. Pipe, 1/4 in.					X	
7-60	Y-6279	2	Union—Half, 1/4 flare x 1/4 M. P.					X	
	B-205	1	Cock—Pet, 1/4 in.					X	
	0Y-7430-A	1	Tube—Radiator Vent					X	
	Y-6537	3	Plug—Sq. Hd. Pipe, 3/4 Galv.					X	
	65423-P	1	Nipple, 3/4 x 4-1/2 in.					X	
7-61	0Y-6639	1	Cap Assembly—Radiator Filler, Consists of:				X	X	
	Y-6639	1	Body—Filler				X	X	
	950291	1	Cap—Filler				X	X	
	950198	1	Gasket	X	X		X	X	X
	950289	1	Neck	X	X		X	X	X

ICE ENGINE ACCESSORY AND UNIT PARTS										
FIG. & REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS			
				B	B-1		C	D	D-1	
7-62	0Y-6702-A	1	Guard Assembly—Radiator, consists of:					X		
	Y-6702-A	1	Screen—Radiator					X		
	Y-6117-B	2	Guard—Radiator					X		
	21805	10	Screw—Hex. Hd. Parker Kalon, 3/8 x 5/8 in. Cad. Pl.					X		
	21729	4	Washers—Lock, 3/8 in. Cad. Pl.					X		
	Y-6117-A	5	Guard—Radiator				X			
	0Y-6092-A	1	Screen—Radiator				X			
	21797	10	Screw—Parker Kalon Cap, #14 x 1/2 in. Cad. Pl.				X			
	21421	10	Screw—Hex. Cap, 1/2-13 x 5/8 in.				X			
	21613	10	Washer—Shakeproof, 1/2 in. Cad. Pl.				X			
	Y-6175	1	Hose—Radiator Bottom				X	X		
	Y-6174	1	Hose—Radiator Top					X		
	Y-6499	4	Clamp—Hose					X		
	Y-19468	1	Radiator (Refer to Fig. 17 for illustration)		X					X
7-63	0950060	1	Shroud—Left Half Top Radiator							X
	0950061	1	Shroud—Right Half Top Radiator							X
	21174	2	Nut—Hex., 1/4-20							X
	21629	6	Washer—Shakeproof Lock, 1/4 in. Internal							X
	21272	6	Screw—Hex. Hd. Cap, 1/4-20 x 1/2 in.							X
	0950062	1	Shroud—Bottom Radiator							X
	39010	4	Screw—Special Hex. Hd. Cap							X
	21631	4	Washer—Shakeproof Lock, 5/16 in. Internal							X
	950006	1	Elbow—Radiator Water Outlet							X
	26128	1	Plug—Sq. Hd. Pipe, 1/2 in.							X
	950007	1	Gasket—Water Outlet Flange							X
	21349	2	Screw—Hex. Hd. Cap, 3/8-16 x 1 in.							X
	B-8556	2	Washer—Copper							X
	21426	4	Screw—Hex. Hd. Cap, 1/2 - 13 x 1 in. (Radiator Mounting)							X
	B-205	2	Cock—Pet, 1/4 in.		X					X
	0Y-7430-D	1	Tube—Radiator Vent, consists of		X					X
	Y-7430-D	1	Tube—Copper		X					X
	B-4092	2	Nut—Flare		X					X
	Y-7238	1	Nipple—Pipe, 3/4 in. close		X					X
	78206-K	1	Elbow—Street, 45 deg. 3/4 in. Brass		X					X
	0Y-6079-C	1	Cap Assembly—Pressure Relief, consists of		X					X
	Y-6079-D	1	Body		X					X
	950291	1	Cap—Relief		X					X
	950198	1	Gasket—Cap		X					X
	950298	1	Neck		X					X
	78282-L	3	Plug—Sq. Hd. Pipe, 3/4 in. Brass		X					X
	26128	1	Plug—Sq. Hd. Pipe, 1/2 in.		X					X
	78202-K	1	Elbow—Street, 3/4 in. Brass		X					X
	Y-6992	1	Nipple—Pipe, 3/4 x 6 in.		X					X
	0Y-19481	1	Cap Assembly—Radiator, consists of:		X					X

ICE ENGINE ACCESSORY AND UNIT PARTS											
FIG. & REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS				
				B	B-1		C	D	D-1		
7-64	Y-19481	1	Body		X					X	
	Y-14394	1	Neck		X					X	
	Y-14393	1	Cap		X					X	
	0950015	1	Screen Assembly—Radiator		X					X	
	21805	4	Screw—Parker Kalon Hex. Hd. 3/8 x 5/8 in.		X					X	
	Y-18676-C	1	Hose—Top Radiator							X	
	Y-6502	2	Clamp—Top Radiator Hose, 1 - 7/8 in.		X					X	
	950016	1	Hose—Bottom Radiator							X	
	Y-6499	2	Clamp—Bottom Radiator Hose							X	
	Y-6174	1	Hose—Top Radiator				X				
	Y-6175	1	Hose—Bottom Radiator				X				
	Y-6499	4	Clamp—Bottom Radiator Hose				X				
	0Y-6239-A	2	Stem Assembly—Extension Valve, consists of:						X	X	
	Y-6239-A	1	Stem—Valve						X	X	
	Y-6675	1	Knob						X	X	
	B-5544	1	Pin—Groove						X	X	
	Y-6819	2	Grommet—Rubber (In Partition Sheet)						X	X	
	Y-6239	1	Stem—Extension Valve (Short)				X				
	Y-6156	1	Stem—Extension Valve (Long)				X				
	B-5544	2	Pin—Groove				X				
	21551	2	Pin—Cotter, 3/32 x 3/4 in. Cad. Pl.				X	X	X		
	B-5759	2	Knob				X				
7-65	Y-6178-A	2	Grommet—Rubber				X				
	Y-6398	1	Strainer—Suction Line				X	X	X		
	Y-4062	1	Strainer Screen				X	X	X		
	Y-4061	1	Strainer Gasket				X	X	X		
7-66	Y-6663	1	Elbow—Special 1 - 3/4 in.					X	X		
	950070-A	1	Tube—Hard Copper, 1 in. O.D. x .065 x 7 in. long						X	X	
7-67	Y-6384	1	Tee, 1 - 3/4 x 1 x 1 in.				X	X	X		
	Y-6478	1	Elbow, 1 - 3/8 Tube x 1 - 3/8 Fitting				X				
	Y-6385	2	Elbow, 1 - 3/8 Sweat Tube				X				
	Y-6651	1	Elbow—Special, 1 in.				X		X		
	0Y-6507	1	Support Assembly—Suction Line					X	X		
	0Y-7208	1	Support Assembly—Suction Line Strainer				X				
	21436	1	Screw—Hex Cap, 1/2 - 13 x 2 in. Cad. Pl.				X				
	21351	2	Screw—Hex Cap, 3/8 - 16 x 1 - 1/8 in. Cad. Pl.				X				
	21349	2	Screw—Hex Hd. Cap, 3/8 - 16 x 1 in.					X	X		
	21729	2	Washer—Lock, 3/8 in.				X	X	X		
	Y-6474-A	1	Line—Flexible Suction, 1 - 3/8 in.					X	X		
	Y-6474	1	Line—Flexible Suction, 1 - 3/8 in.				X				
7-68	Y-6484	1	Clamp—Suction Line					X	X		
	Y-6480	1	Sleeve—Suction Line				X				
	21281	1	Screw—Hex. Hd. Cap 1/4 - 20 x 1 in. Cad. Pl.					X	X		
	21174	1	Nut—Hex, 1/4 - 20 Cad. Pl.					X	X		
	21536	1	Washer—Lock, 1/4 in. Cad. Pl.					X	X		
	Y-6472-A	2	Line—Flexible Discharge, 3/4 in.				X	X	X		
	Y-6473	1	Line—Flexible Discharge, (Short)				X				
	Q-950422	2	Valve—Refrigerant Check				X	X	X		

ICE ENGINE ACCESSORY AND UNIT PARTS										
FIG. & REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS			
				B	B-1		C	D	D-1	
7-71	Y-6676	2	Support—Check Valve					X	X	
	950424	2	(Support—Check Valve (Used with 0950422)					X	X	
	Y-6484	2	Strap—Pipe, 1 in. Cad. Pl.				X			
	21339	4	Screw—Hex. Cap, 3/8 - 16 x 1/2 in. Cad. Pl.					X	X	
	21316	2	Screw—Cap, 5/16 - 18 x 1 - 1/4, Cad. Pl.				X			
	21358	2	Screw—Hex. Cap, 3/8 - 16 x 1 - 1/2 in. Cad. Pl.					X	X	
	21182	2	Nut—Hex. 5/16-18, Cad. Pl.				X			
	21729	6	Washer—Lock, 3/8 in. Cad. Pl.					X	X	
	21190	2	Nut—Hex, 3/8-16 Cad. Pl.					X	X	
	Y-6643	1	Cross—Sweat Tube					X	X	
	Y-6388	1	Plug—Hex. Hd. Pipe, 3/8 in. (Brass)					X	X	
	Y-6645	1	Tube—Unloading (Solenoid Valve to Compressor)				X	X	X	
7-72	0950743	1	Valve—Solenoid (32 volt) (See Figure 24 for detailed parts list.)				X	X	X	
7-72	0950744	1	Valve—Solenoid (64 volt) (See Figure 24 for detailed parts list)					X	X	
7-73	Y-6677	1	Support—Solenoid Valve					X	X	
7-73	Y-6475	1	Support—Solenoid Valve				X			
	21347	3	Screw—Hex. Hd. Cap, 3/8-16 x 7/8 in. Cad. Pl.					X	X	
	21729	3	Washer—Lock, 3/8 in. Cad. Pl.					X	X	
	Y-6661	1	Bend—Return				X	X	X	
	Y-6390	1	Tee—Sweat Tube, 5/8 in.				X	X	X	
	Y-6662	1	Tube—Equalizer (Between Compressor Heads)					X	X	
	950069-A	1	Tube—Hard Copper, 5/8 O.D. x .040 wall x 3-1/2 in.					X	X	
	Y-6449	1	Adapter, 3/8 O.D. Tube x 1/4 Male Pipe					X	X	
	78273-X	1	Tube—Soft Copper, 3/8 O.D. x .035 wall x 94 in. (Compressor to Low Pressure Gauge)					X	X	
	78273-Y	1	Tube—Soft Copper, 3/8 O.D. x .035 wall x 104 in. (Compressor to High Pressure Gauge)					X	X	
	Y-6819	2	Grommet—Rubber (In Partition Sheet)					X	X	
	Y-6246	3	Clip—Tubing, 3/8 in.					X	X	
	21274	3	Screw—Hex. Cap, 1/4-20 x 5/8 in. Cad. Pl.					X	X	
	21174	3	Nut—Hex. 1/4-20 Cad. Pl.					X	X	
	21536	3	Washer—Lock, 1/4 in. Cad. Pl.					X	X	
7-74	B-6461	1	Fitting—Alemite (Straight)					X	X	
7-74	B-7659	1	Fitting—Alemite, 45°				X			
	Y-6858	1	Nipple—Short, 1/8 x 1-1/2 in.					X	X	
7-75	Y-6575	2	Belt—Condenser Fan					X	X	
7-75	Y-6407	3	Belt—Condenser Fan				X			
7-76	0Y-6565	1	Rod Assembly—Condenser Fan Idler					X	X	
	21551	1	Pin—Cotter, 3/32 x 3/4 Cad. Pl.					X	X	
	Y-18814-H	1	Washer—Plain, 3/8 Cad. Pl.					X	X	
	Y-6514	2	Washer					X	X	
	Y-6516	1	Stop—Idler Spring					X	X	

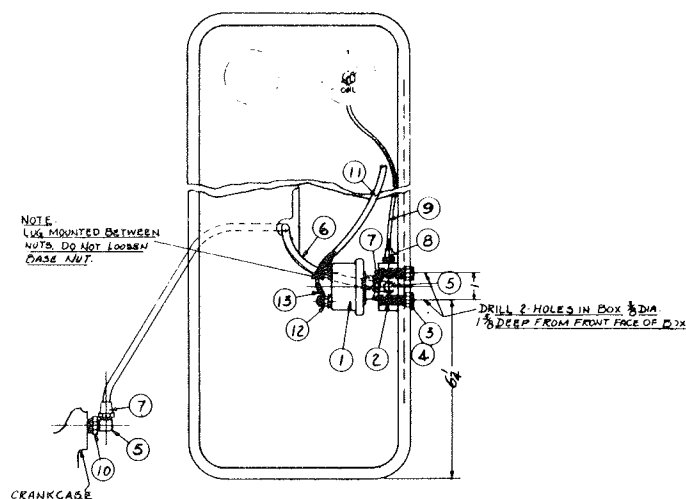
ICE ENGINE ACCESSORY AND UNIT PARTS										
FIG. & REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS			
				B	B-1		C	D	D-1	
7-77	Y-6515	1	Spring—Condenser Fan Idler					X	X	
7-77	YY-6513	1	Spring—Condenser Fan Idler				X			
7-78	Y-6511	1	Knob—Idler Spring Release					X	X	
7-78	Y-7080	1	Knob—Idler Spring Release				X			
	Y-7049-B	1	Screw—Condenser Fan Idler Spring				X			
	B-6175	1	Pin—Groove				X			
	Y-6641	1	Support—Belt Takeup					X	X	
	21847	1	Screw—Sq. Hd. Set, 3/8-16 x 1-1/4 in. Cad. Pl.					X	X	
	21192	1	Nut—Hex. Jam, 3/4-16 Cad. Pl.					X	X	
7-79	Y-6640	2	Condenser					X	X	
7-79	OY-6013-BA	2	Condenser				X			
	Y-7505	1	Screw—Hex. Hd. Cap					X	X	
	21886	19	Screw—Hex. Hd. Cap, 1/2-13 x 3/4 in. Cad. Pl.				X	X	X	
	21539	20	Washer—Lock, 1/2 in. Cad. Pl.				X	X	X	
7-80	Y-6710	2	Guard—Condenser					X	X	
	Y-6421	2	Guard—Condenser (Left)				X			
	Y-6422	2	Guard—Condenser (Right)				X			
	21797	32	Screw—Parker Kalon, Hex. Hd. Cap, #14 x 1/2 in. Cad. Pl.				X			
	21797	28	Screw—Parker Kalon Hex. Hd. Cap, #14 x 1/2 in. Cad. Pl.					X	X	
	Y-18814-B	32	Washer—Wrought, 1/4 in. Cad. Pl.				X			
	Y-6664	1	Tube—Front Condenser Inlet					X	X	
	Y-6667	1	Tube—Rear Condenser Inlet					X	X	
	Y-6754	1	Tube—Copper (Between Condensers)					X	X	
	Y-6755	1	Tube—Copper (Condenser to Valve)					X	X	
7-81	Y-6756	1	Line—Discharge, Copper Tube, 3/4 O.D. x .049 wall x 34-1/2 in.					X	X	
	Y-6408	1	Couplings—3/4 in.				X			
		1	Line—Condenser Discharge, 3/4 O.D. x .049 wall x 8 1/2 ft.				X			
	Y-6807	1	Clip—Tubing, 3/4 in.					X	X	
	Y-6727	1	Tee—Sweat Tube, 3/4 in.					X	X	
	21274	1	Screw—Hex. Cap, 1/4-20 x 5/8 in. Cad. Pl.					X	X	
7-82	Y-6732	1	Valve—Two Way, 3/4 in.					X	X	
	Y-6411	1	Valve—Three Way				X			
	21174	1	Nut—Hex. 1/4-20 Cad. Pl.					X	X	
	21816	1	Screw—Hex. Hd. Cap, 5/8-18 x 7/8 in. Cad. Pl.					X	X	
	21536	1	Washer—Lock, 1/4 in. Cad. Pl.					X	X	
	21538	2	Washer—Lock, 5/16 in. Cad. Pl.					X	X	
	21890	1	Screw—Hex. Cap, 5/16-18 x 1-1/8 in. Cad. Pl.					X	X	
	21182	2	Nut—Hex. 5/16-18 Cad. Pl.					X	X	
	Y-6410	1	Elbow—Sweat Tube Female, 3/4 in.					X	X	

ICE ENGINE ACCESSORY AND UNIT PARTS									
FIG. & REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS		
				B	B-1		C	D	D-1
7-83	Y-6486	1	Plug—Sweat Tube, 3/4 in.					X	X
	Y-6487	1	Plug—Sweat Tube, 1-3/8 in.					X	X
	Y-6608	1	Handle—Ice Engine					X	X
	21805	2	Screw—Parker Kalon Hex. Hd. Cap, 3/8 x 5/8 in. Cad. Pl.					X	X
	0Y-6413	1	Support Assembly—Flexible Tubing, con- sists of:				X	X	X
7-84	Y-6413	1	Support—Flexible Tubing (On Unit) (Furnished in Assembly only) (0Y-6413)				X	X	X
7-85	21887	1	Screw—Hex. Hd. Cap, 5/8-11 x 2-1/2 in. Cad. Pl.				X	X	X
7-86	21540	1	Washer—Lock, 5/8 in. Cad. Pl.				X	X	X
	Y-6415	1	Clamp—Flexible Tubing Support (Furnished in Assembly Only)				X	X	X
	21436	2	Screw—Hex. Hd. Cap, 1/2-13 x 1 in. Cad. Pl.				X	X	X
7-87	21539	2	Washer—Lock, 1/2 in. Cad. Pl.				X	X	X
	Y-6718	1	Guard—Suction Line					X	X
7-87	Y-6488	1	Guard—Suction Line				X		
	21363	1	Screw—Hex. Hd. Cap, 3/8-16 x 2 in. Cad. Pl.				X	X	X
	21729	1	Washer—Lock, 3/8 in. Cad. Pl.				X	X	X
7-88	21190	1	Nut—Hex., 3/8-16 Cad. Pl.				X	X	X
	0Y-6692	1	Shroud Assembly—Condenser Fan					X	X
7-88	0Y-6065-A	1	Shroud Assembly—Condenser Fan				X		
7-89	21805	14	Screw—Parker Kalon Hex. Hd. 3/8 x 5/8 in. Cad. Pl.					X	X
	Y-6694	1	Guard—Condenser Fan					X	X
	0Y-6093-B	1	Guard—Condenser Fan				X		
	Y-6219	4	Nut—Wing				X	X	X
	21988	16	Screw—Hex. Cap, 1/2-13 x 1/2 in. Cad. Pl.				X		
	21539	16	Washer—Lock, 1/2 in. Cad. Pl.				X		
	0Y-6658	1	Support Assembly—Fan Bracket					X	X
	0Y-6657	1	Shaft Assembly—Idler Arm					X	X
	Y-6393	2	Shaft—Idler Arm				X		
	21640	2	Washer—Shakeproof Lock, 1-1/4 in. Cad. Pl.				X	X	X
7-91	Y-6128	4	Nut—Hex. Jam, Cad. Pl.				X		
	0Y-6730	2	Screw—Drive Shaft Cap					X	X
	Y-6731	2	Washer—Plain					X	X
	Y-6669	2	Washer—Plain					X	X
7-92	Y-6620	1	Bracket—Idler Lever					X	X
7-92	Y-7079	1	Bracket—Idler Lever				X		
7-93	21429	4	Screw—Hex. Hd. Cap, 1/2-13 x 1-1/4 in. Cad. Pl.				X	X	X
	21613	4	Washer—Shakeproof Lock, 1/2 in. Cad. Pl.				X	X	X
	B-567	1	Elbow—Street, 1/8 in. (Brass)					X	X
	Y-6501	1	Elbow—Street, 1/8 in. (Galv)						
	Y-6729	2	Nipple—Pipe, 1/8 x 5 in.					X	X
	Y-6723	2	Coupling—Malleable Iron, 1/8 in.					X	X

ICE ENGINE ACCESSORY AND UNIT PARTS										
FIG.& REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS			
				B	B-1		C	D	D-1	
7-94	B-7659	1	Fitting—Alemite, 45°					X	X	
	Y-6378	1	Fitting—Alemite, 90°				X	X	X	
7-95	Y-7078-A	1	Arm—Compressor Drive Idler					X	X	
7-95	Y-7078	1	Arm—Compressor Drive Idler				X			
	Y-7021-A	1	Shaft—Compressor Idler Arm				X	X	X	
	Y-7026	2	Bushings—Idler Arm				X	X	X	
	B-432	2	Plug—Expansion				X	X	X	
	Y-7020-B	1	Shaft—Compressor Drive Idler Pulley					X	X	
	Y-7020	1	Shaft—Compressor Drive Idler Pulley				X			
	21240	1	Nut—S. A. E. Hex Jam, 7/8 - 9 Cad. Pl.				X	X	X	
	21616	1	Washer—Shakeproof Lock, 7/8 in. Cad. Pl.				X	X	X	
	78280-D	1	Plug—Pipe, 1/8 in. (Screw Slot)				X	X	X	
	Y-6040	2	Bearing—Felt Seal Ball				X	X	X	
7-96	Y-7018-C	1	Pulley—Compressor Drive Idler				X	X	X	
	Y-7022-B	1	Pin—Compressor Idler Spring					X	X	
	Y-7022-A	1	Pin—Compressor Idler Spring				X			
	21200	1	Nut—Hex Jam, 7/16 - 14 Cad. Pl.				X			
	21721	1	Washer—Shakeproof Lock, 7/16 in. Cad. Pl.				X	X	X	
	Y-6342	1	Spring—Compressor Drive Idler				X	X	X	
	21190	1	Nut—Hex, 3/8 - 16 Cad. Pl.				X	X	X	
	Y-7049-B	1	Screw—Compressor Idler Spring				X	X	X	
	21633	1	Washer—Shakeproof Lock, 3/8 in. Cad. Pl.				X	X	X	
7-97	Y-7080	1	Knob—Idler Spring Release				X	X	X	
	B-6175	1	Pin—Groove, 5/32 x 3/4 in.				X	X	X	
	Y-6314	1	Spacer				X	X	X	
	Y-7081	1	Swivel—Idler Spring				X	X	X	
7-98	Y-6705	7	Belt—Compressor Drive					X	X	
7-98	Y-7048	7	Belt—Compressor Drive				X			
	39009	1	Lug—Sweat					X	X	
7-99	21432	4	Screw—Hex Hd. Cap, 1/2 - 13 x 1-1/2 in. Cad. Pl.					X	X	
	21539	4	Washer—Lock, 1/2 in. Cad. Pl.					X	X	
7-100	Y-6839-B	1	Motor—Starting 64-Volt (See Fig. 20)				X	X	X	
7-100	Y-6334-F	1	Motor—Starting 32-Volt (See Fig. 20)				X	X	X	
	BE-269-A	1	Spacer—Starting Motor				X	X	X	
	21368	3	Screw—Hex Hd. Cap, 3/8 - 16 x 2-3/4 in. Cad. Pl.				X	X	X	
	21729	3	Washer—Lock, 3/8 in.				X	X	X	
7-101	GROUP 399-2	1	Oil Pressure Switch Assembly, Consists of:	X	X		X	X	X	
	B-1686	2	Elbow—Half Union	X	X		X	X	X	
	B-4092	2	Nut—Flare	X	X		X	X	X	
	B-7601	1	Adapter	X	X		X	X	X	
	B-7948-K	1	Tube—Copper	X	X		X	X	X	
	B-8957-D	1	Tube—Copper	X	X		X	X	X	
	Y-6438	1	Adapter—Sweat Tube	X	X		X	X	X	
	Y-6785-M	1	Tirex—Two Wire	X	X		X	X	X	
	Y-18984-A	2	Lug—Solderless	X	X		X	X	X	
	Y-19154	2	Sleeve—Terminal							

## TEMPERATURE AND OIL SWITCH KITS

## OIL SWITCH KIT

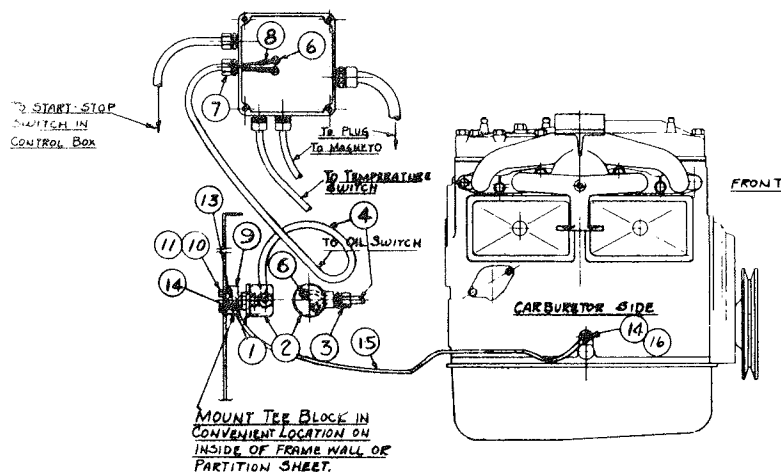


WIRING DIAGRAMS MODEL "D" ICE-ENGINE  
SEE SK-373-E FOR (32 VOLT)

GROUP 399-2  
MODEL "D" ICE-ENGINE

DET.	PART NO.	REQ.	DESCRIPTION
1	950036	1	Oil Switch
2	950071	1	Tee Block
3	21347	2	Hex. Hd. Cap Screw
4	21633	2	Shakeproof Lock Washer
5	B-1686	2	Half Union Elbow
6	B-7948-K	1	Copper Tube
7	B-4092	2	Flare Nut
8	Y-6438	1	Sweat Tube Adapter
9	B-8957-D	1	Copper Tube
10	B-7106	1	Adapter
11	Y-6785-M	1	#16 2-Wire Tirex
12	Y-18984-A	2	Solderless Lug
13	Y-19154	2	Terminal Sleeve

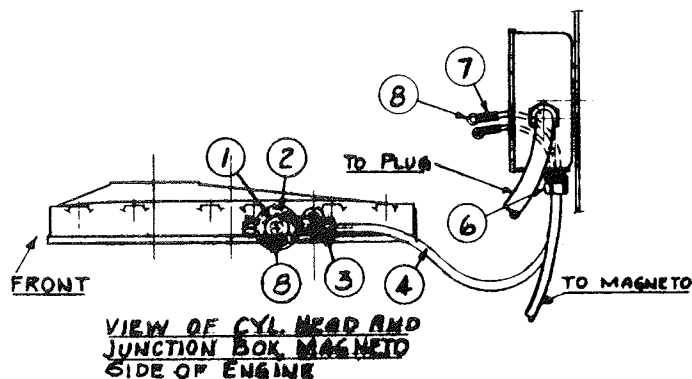
## OIL SWITCH KIT



GROUP 399-17  
MODEL "B" ENGINE-GENERATOR

DET.	PART NO.	REQ.	DESCRIPTION
1	950036	1	Oil Switch
2	0950072	1	Elbow Adapter Asm.
3	Y-6784	1	Cord Grip
4	Y-6785-D	1	2-Wire Tirex
5			
6	Y-18984-A	4	Solderless Lug
7	Y-6867-A	1	Cord Grip
8	Y-19154	2	Terminal Sleeve
9	950071	1	Tee Block
10	21342	2	Hex. Hd. Cap Screw
11	21633	2	Shakeproof Lock Washer
12	Y-14179	1	Pipe Plug
13	B-1686	1	Half Union Elbow
14	B-4092	2	Flare Nut
15	B-7948-K	1	Copper Tube
16	B-4094	1	Half Union

## TEMPERATURE SWITCH KIT



GROUP 399-18  
MODEL "D" ICE-ENGINE  
MODEL "B" ENGINE-GENERATOR

DET.	PART NO.	REQ.	DESCRIPTION
1	950009-A	1	Temperature Switch
2	0950072	1	Elbow Adapter Asm.
3	Y-6784	1	Cord Grip
4	Y-6785-N	1	2-Wire Tirex
5			
6	Y-6867-A	1	Cord Grip
7	Y-19154	2	Terminal Sleeve
8	Y-18984-A	4	Solderless Lug

ENGINE PARTS										
FIG. & REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS			
				B	B-1		C	D	D-1	
7-101-A	21347	2	Screw—Hex. Hd. Cap	X	X		X	X	X	
	21633	2	Washer—Shakeproof Lock	X	X		X	X	X	
	950036	1	Switch—Oil	X	X		X	X	X	
	21264	2	Nut—Hex	X	X		X	X	X	
	21606	2	Washer—Shakeproof Lock	X	X		X	X	X	
	950071	1	Block—Tee	X	X		X	X	X	
	*Group 399-17	1	Oil Pressure Switch Assembly	X	X		X	X	X	
	Y-6784	1	Grip—Cord	X	X		X	X	X	
	Y-6785-D	1	Tirex—Two Wire	X	X		X	X	X	
	Y-6867-A	1	Grip—Cord	X	X		X	X	X	
	Y-18984-A	4	Lug—Solderless	X	X		X	X	X	
	Y-19154	2	Sleeve—Terminal	X	X		X	X	X	
	950036	1	Switch—Oil	X	X		X	X	X	
	21264	2	Nut—Hex	X	X		X	X	X	
	21606	2	Washer—Shakeproof Lock	X	X		X	X	X	
	950072	1	Adapter—Elbow	X	X		X	X	X	
	950071	1	Block—Tee	X	X		X	X	X	
	21342	2	Screw—Hex. Hd. Cap	X	X		X	X	X	
	21633	2	Washer—Shakeproof Lock	X	X		X	X	X	
	Y-14179	1	Plug—Pipe	X	X		X	X	X	
	21873	1	Screw—Fillister Head	X	X		X	X	X	
	21629	1	Washer—Shakeproof Lock	X	X		X	X	X	
7-101-B	*Group 399-18	1	Temperature Switch Kit, Consists of:	X	X		X	X	X	
	Y-6784	1	Grip—Cord	X	X		X	X	X	
	Y-6785-M	1	Tirex—Two Wire	X	X		X	X	X	
	Y-6867-A	1	Grip—Cord	X	X		X	X	X	
	Y-18984-A	4	Lug—Solderless	X	X		X	X	X	
	Y-19154	2	Sleeve—Terminal	X	X		X	X	X	
	950009	1	Switch—Temperature	X	X		X	X	X	
	21264	2	Nut—Hex	X	X		X	X	X	
	21606	2	Washer—Shakeproof Lock	X	X		X	X	X	
	950072	1	Adapter—Elbow	X	X		X	X	X	
	21873	1	Screw—Fillister Hd. Mach.	X	X		X	X	X	
	21629	1	Washer—Shakeproof Lock							
*See Page 28-B for Assembly Drwg.										

ICE ENGINE ACCESSORY AND UNIT PARTS										
FIG. & REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS			
				B	B-1		C	D	D-1	
8-1	Y-6652	1	Fan—Axial Flow, 21 in.					X	X	
8-1	0Y-6392	1	Fan—Axial Flow				X			
8-2	Y-6406	2	Bearing—Ball (Felt Seal) #206				X	X	X	
8-3	Y-6520-A	1	Shaft—Condenser Fan					X	X	
8-3	Y-6397	1	Shaft—Condenser Fan				X			
8-4	Y-6521	1	Ring—Snap					X	X	
8-5	Y-6561-A	1	Pulley—Condenser Fan					X	X	
8-5	Y-6394	1	Pulley—Condenser Fan				X			
8-6	21859	2	Screw—Allen Set, 1/4-20 x 1/2 in. Cup. Pt.				X			
	21013	2	Key—Woodruff, #16				X	X	X	
	21615	2	Washer—Shakeproof Lock, 3/4 in. Cad. Pl.				X	X	X	
	21232	2	Nut—Hex. Jam, 3/4-10 Cad. Pl.				X	X	X	
8-7	Y-6400-A	1	Shaft—Condenser Fan Idler					X	X	
8-7	Y-6400	1	Shaft—Condenser Fan Idler				X			
8-8	78280-A	1	Plug—Slotted Hd. Pipe, 1/8 in.					X	X	
	B-10283	1	Pin—Groove, 1/4 x 3/4 in.					X	X	
	B-6054	1	Pin—Groove				X			
8-8	Y-6562-A	1	Pulley—Condenser Fan Idler					X	X	
8-8	Y-6396	1	Pulley—Condenser Fan Idler				X			
8-9	Y-6040	2	Bearing—Ball, #205				X	X	X	
	Y-18814-P	1	Washer—Plain, 3/4 in. Cad. Pl.				X	X	X	
	21615	1	Washer—Shakeproof Lock, 3/4 in. Cad. Pl.				X	X	X	
	21232	1	Nut—Hex. Jam, 3/4-10 Cad. Pl.				X	X	X	
8-10	Y-6412-C	1	Arm—Condenser Fan Idler					X	X	
	Y-6412	1	Arm—Condenser Fan Idler				X			
	Y-6523	2	Bushing—Idler Arm					X	X	
	Y-6853	2	Elbow—Street, 1/8 x 45°					X	X	
8-11	Y-6724	2	Screw—Drilled Hd. Cap					X	X	
8-12	116050-H	2	Wire—Brass Safety, #14 (.064 x 5 in.)					X	X	
	Y-18814-Q	2	Washer—Plain, 7/8 in. Cad. Pl.					X	X	
	B-567	2	Elbow—Street, 1/8 in.					X	X	
	Y-6501	1	Elbow—Street, 1/8 x 90°					X	X	
	Y-6216-F	1	Support—Condenser Fan				X	X	X	
8-13	Y-6723	1	Coupling—Pipe					X	X	
	Y-6378	1	Fitting—Street, 1/8 x 90° (Brass)					X	X	
	Y-6723	1	Coupling—Pipe					X	X	
	Y-6858	1	Nipple—Short, 1/8 x 1-1/2 in.					X	X	
8-14	B-6461	1	Fitting—Alemite Straight (Idler Arm to Bushing)					X	X	
	B-567	1	Elbow—Street, 1/8 x 90° (Brass)					X	X	
8-15	Y-6518-A	1	Pulley—Compressor and Fan Drive					X	X	
	Y-7024	1	Pulley—Compressor Drive				X			

## ICE ENGINE ACCESSORY AND UNIT PARTS

## ICE ENGINE ACCESSORY AND UNIT PARTS

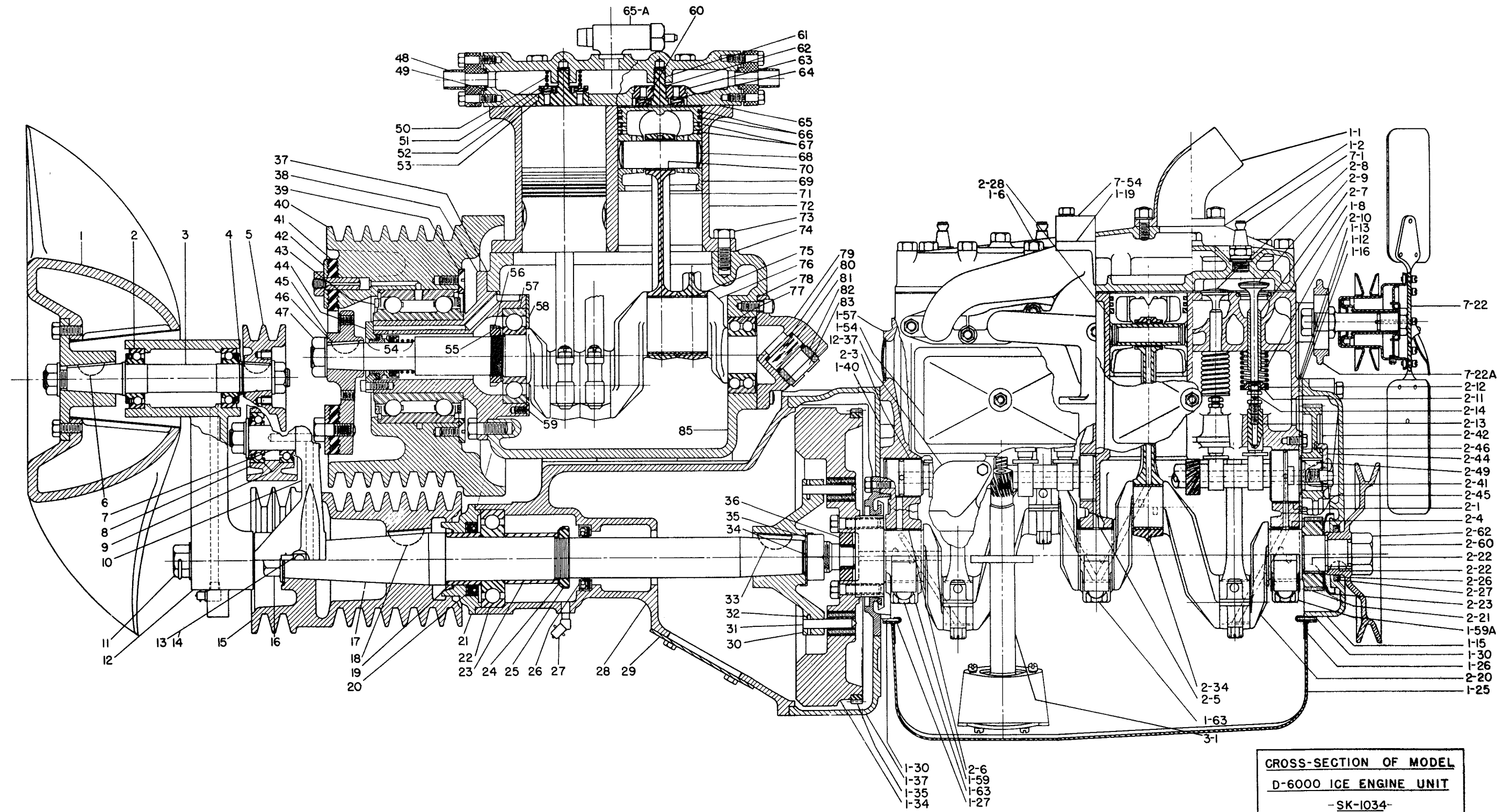


FIG. 8—CROSS-SECTION OF MODEL "D" ICE ENGINE UNIT

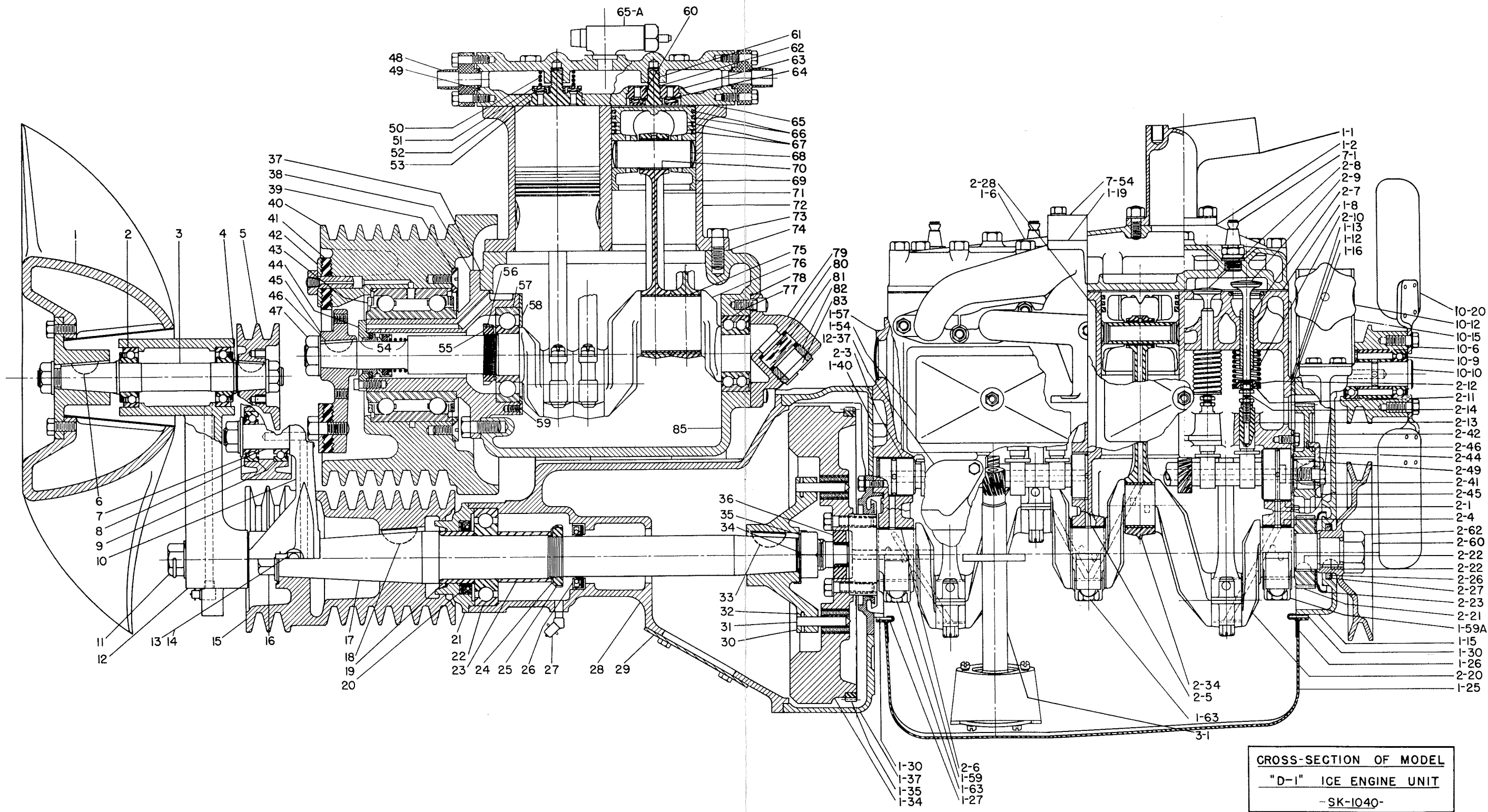


FIG. 8A—CROSS SECTION OF MODEL "D-1" ICE ENGINE UNIT

ICE ENGINE ACCESSORY AND UNIT PARTS										
FIG. & REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS			
				B	B-1		C	D	D-1	
8-16	Y-6395-A	1	Pulley—Condenser Fan Drive				X			
	OY-6730	1	Screw—Drive Shaft Cap					X	X	
	21640	1	Washer—Shakeproof Lock, 1-1/4 in. Cad. Pl.					X	X	
8-17	Y-6509	1	Shaft—Compressor Drive					X	X	
8-17	Y-6377-A	1	Shaft—Compressor				X			
8-18	Y-6128	1	Nut—Hex. Jam				X			
	21534	1	Key—Woodruff, #6				X	X	X	
	Y-6564	1	Collar—Thrust					X	X	
8-20	Y-6569	1	Seal—Grease (Front)					X	X	
8-20	Y-6038	1	Seal—Grease				X			
8-21	Y-6530	1	Retainer—Ball Bearing					X	X	
8-21	Y-7023	1	Retainer—Ball Bearing				X			
	21310	4	Screw—Hex. Hd. Cap, 5/16-18 x 3/4 in. Cad. Pl.					X	X	
	21306	4	Screw—Hex. Hd. Cap, 5/16-18 x 1/2 in. Cad. Pl.				X			
	21538	4	Washer—Lock, 5/16 in. Cad. Pl.				X	X	X	
8-22	Y-6567	1	Bearing—Drive Shaft Ball					X	X	
8-22	Y-6041	1	Bearing—Seal Ball, #8507				X			
8-23	Y-6566	1	Spacer—Drive Shaft					X	X	
8-24	Y-6570	1	Washer—Ball Bearing Lock					X	X	
8-25	Y-6571	1	Nut—Ball Bearing Lock					X	X	
8-26	Y-6572	1	Seal—Grease (Rear)					X	X	
8-27	B-7659	1	Fitting—Alemite, 45°					X	X	
	Y-6378	1	Fitting—Alemite, 90°				X			
8-28	Y-7016-B	1	Bearing Support—Compressor and Outboard					X	X	
8-28	Y-7016	1	Bearing Support—Compressor Outboard (See Interchangeability Section)				X			
	21351	6	Screw—Hex. Hd. Cap, 3/8-16 x 1-1/8 in. Cad. Pl.				X	X	X	
	21349	2	Screw—Hex. Hd. Cap, 3/8-16 x 1 in. Cad. Pl.				X	X	X	
	21729	8	Washer—Lock, 3/8 in. Cad. Pl.				X	X	X	
	Y-6379	1	Plug—Hex. Hd. Drain, 3/8 Pipe Thd.				X			
	Y-6753	1	Pin—Idler Arm Stop					X	X	
8-29	B-336	1	Pin—Idler Arm Stop				X			
	Y-7302	1	Cover—Outboard Bearing Support					X	X	
	B-9232	1	Gasket—Oil Pan Cover					X	X	
	21308	4	Screw—Hex. Hd. Cap, 5/16-18 x 5/8 in. Cad. Pl.					X	X	
	21538	4	Washers—Lock, 5/16 in. Cad. Pl.					X	X	
8-30	B-567	1	Elbow—Street, 1/8 in.					X	X	
	OY-6524	1	Hub Assembly—Compressor Coupling Consists of:-				X	X	X	
	Y-6524-A	1	Hub—Coupling				X	X	X	
8-31	Y-6376	6	Pin—Drive				X	X	X	
8-32	B-5456	6	Pin—Groove, 1/8 x 7/8 in.				X	X	X	
8-33	21534	1	Key—Woodruff, #6				X	X	X	
	21544	1	Screw—Allen Set, 3/8-16 x 1 in. Cup Point				X			
8-34	Y-6531	1	Washer—Special Lock					X	X	
8-35	21884	1	Nut—S. A. E. Hex Jam, 1-1/4 - 12 Cad. Pl.					X	X	
8-36	OY-18365-B	1	Bushing Assembly—Pilot	X	X			X	X	
	Y-6375	1	Compressor—4 Cylinder "V"-Type (Superceded by Y-6600)				X			

ICE ENGINE ACCESSORY AND UNIT PARTS										
FIG. & REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS			
				B	B-1		C	D	D-1	
	Y-6600	1	Compressor—4 Cylinder "V"-Type, Consists Of:					X	X	X
8-37	951413	1	Gasket—Frame Front Cover				X	X	X	
8-38	951644	1	Cover—Frame Front				X	X	X	
	21426	8	Screw—Hex Hd. Cap, 1/2-13 x 1 in. Cad. Pl.				X	X	X	
8-39	951645	1	Plate—Pulley Bearing				X	X	X	
	951414	1	Gasket—Pulley Bearing Plate				X	X	X	
	21995	4	Screw—Bearing Plate Flat Hd. Mach., 3/8-16 x 1/2 in.				X	X	X	
		2	Screw—Drive, #6 x 1/4 in.					X	X	
8-40	951647	1	Pulley—Compressor "V" Belt				X	X	X	
8-41	Y-6928	1	Disc—Coupling				X	X	X	
8-42	951648	6	Washer—Coupling Clamping				X	X	X	
	107177	5	Screw—Hex. Hd. Cap, 1/2-13 x 1 in. Cad. Pl.				X	X	X	
	951649	1	Screw—Wheel Bearing Lubric. Cap				X	X	X	
	Y-20206	1	Fitting—Alemite					X	X	
	Y-18802	1	Plug—Pipe, 1/8 in.				X			
8-43	Y-4022	1	Bearing—Coupling Pulley				X	X	X	
8-44	Y-4108	1	Plate—Crankshaft End Seal				X	X	X	
	Y-4115	1	Gasket—End Seal Plate				X	X	X	
	21984	6	Screw—End Seal Plate Cap, 5/16-18 x 3/4 in.				X	X	X	
	951650	1	Spring—Wheel Bearing Lock (Seal Plate)					X	X	
8-45	951651	1	Hub—Compressor Coupling				X	X	X	
8-46	Y-4120	1	Key—Crankshaft, 5/16 in. sq. x 1-1/4 in.				X	X	X	
8-47	21233	1	Nut—Crankshaft				X	X	X	
	26474	1	Washer—Crankshaft Nut Lock, 3/4 x 1-1/4 x 1/8 in. Cad. Pl.				X	X	X	
8-48	951652	3	Flange—Cylinder Head Tube, 5/8 in.				X	X	X	
	951653	1	Flange—Cylinder Head Tube, 3/8 in.				X	X	X	
8-49	Y-6497-A	4	Gasket—Tube Flange				X	X	X	
	21890	8	Screw—Hex Hd. Cap, 5/16-18 x 1-1/8 in. Cad. Pl.				X	X	X	
	0951654	4	Complete Valve Assembly—Discharge, Consists of:—				X	X	X	
8-50	951655	4	Spring—Discharge Valve Assembly				X	X	X	
8-51	951656	4	Plate—Discharge Valve Stop				X	X	X	
8-52	951657	4	Plate—Discharge Valve				X	X	X	
	951658	4	Spring—Discharge Valve				X	X	X	
8-53	951654	4	Seat—Discharge Valve				X	X	X	
	951659	4	Washer—Valve Stop Plate				X	X	X	
	951687	4	Washer—Valve Seat				X	X	X	
	951660	4	Pin—Valve Locking				X	X	X	
	951661	4	Spring—Valve Locking Pin				X	X	X	
8-54	Y-7594-B	1	Seal Assembly—Crankshaft End, Consists Of:—				X	X	X	
	Y-4106	1	End Plate (Cast Iron)				X	X	X	
	Y-4109	1	Seal Face (Cast Iron)				X	X	X	
	Y-4110	1	Friction Ring				X	X	X	

ICE ENGINE ACCESSORY AND UNIT PARTS										
FIG.& REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS			
				B	B-1		C	D	D-1	
	Y-4114	1	Spring Holder (Rear)				X	X	X	
	Y-4113	1	Spring				X	X	X	
	Y-4115	1	Gasket (Between End Plate & Brg. Support)				X	X	X	
8-55	Y-6571	1	Nut—Ball Bearing Lock				X	X	X	
8-56	Y-6570	1	Washer—Ball Bearing Lock				X	X	X	
8-57	Y-6567	1	Bearing—Crankshaft Single Row Ball				X	X	X	
8-58	951662	1	Plate—Ball Bearing Clamp				X	X	X	
8-59	21739	4	Screw—Flat Hd. Mach. 1/4-20 x 1/2 in.				X	X	X	
	0951663	4	Valve Assembly—Inlet, Consists of:				X	X	X	
8-60	951658	4	Spring—Inlet Valve				X	X	X	
8-61	951665	4	Plate—Inlet Valve Stop				X	X	X	
8-62	951659	4	Washer—Valve Stop Plate				X	X	X	
8-63	951663	4	Seat—Inlet Valve				X	X	X	
8-64	951657	4	Plate—Inlet Valve				X	X	X	
	951687	4	Washer—Valve Seat				X	X	X	
	951660	4	Pin—Valve Locking				X	X	X	
	951661	4	Spring—Valve Locking Pin				X	X	X	
8-65	951666	2	Head—Cylinder				X	X	X	
	951415	2	Gasket—Cylinder Head				X	X	X	
	21440	20	Screw—Cylinder Hex. Hd. Cap, 1/2 x 2-1/2 in.				X	X	X	
8-65A	951371	2	Valve—Cylinder Head Shut-Off Discharge				X	X	X	
	Y-6496-A	2	Gasket—Shut-Off Valve				X	X	X	
	21358	4	Screw—Hex. Head Cap, 3/8-16 x 1-1/2 in. Cad. Pl.				X	X	X	
8-66	951668	2	Ring—Piston (Compression)				X	X	X	
8-67	951669	2	Ring—Piston (Oil Wiper)				X	X	X	
8-68	951670	1	Pin—Piston				X	X	X	
8-69	951671	1	Piston				X	X	X	
8-70	951672	4	Bushing—Connecting Rod (Upper)				X	X	X	
8-71	951673	4	Rod—Connecting				X	X	X	
8-72	951674	2	Cylinder				X	X	X	
8-73	21426	24	Screw—Hex. Hd. Cap, 1/2 x 1 in. Cad. Pl.				X	X	X	
	950417	2	Valve—Cylinder Inlet Shut-Off				X	X	X	
	Y-6495-A	2	Gasket—Shut-Off Valve				X	X	X	
	21438	4	Screw—Hex. Hd. Cap, 1/2-13 x 2-1/4 in. Cad. Pl.				X	X	X	

ICE ENGINE ACCESSORY AND UNIT PARTS										
FIG.& REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS			
				B	B-1		C	D	D-1	
	21116	2	Screw—Rd. Head—Mach. 1/4-20 x 3/8 in. Cad. Pl.				X	X	X	
		2	Wire—Soft Steel .081 x 10 in.				X	X		
8-74	951416	2	Gasket—Cylinder to Frame				X	X	X	
8-75	951677	8	Bearing—Connecting Rod (Lower)				X	X	X	
	951678	8	Bolt and Nut—Connecting Rod				X	X	X	
8-76	951679	1	Crankshaft				X	X	X	
8-77	951646	1	Bearing—Crankshaft Double Row Ball				X	X	X	
8-78	951417	1	Gasket—Frame Rear Cover				X	X	X	
8-79	951681	1	Cover—Frame Rear					X	X	
	3W-2174	1	Cover—Frame Rear				X			
8-80	951418	2	Gasket—Oil Sight Glass						X	X
	Y-6837	2	Gasket—Oil Sight Glass				X			
8-81	Y-6820	1	Glass—Oil Sight				X	X	X	
8-82	951683	1	Ring—Oil Sight Glass Follower					X	X	
	951684	1	Washer—Oil Sight Glass				X			
8-83	950360	1	Nut—Oil Sight Glass				X	X	X	
8-84		6	Screw—Allen Hd. Cap, 1/2-13 x 7/8 in.					X	X	
	21426	6	Screw—Hex. Hd. Cap, 1/2 x 1 in. Cad. Pl.				X			
8-85	951685	1	Frame—Compressor				X	X	X	
	3H-1609	1	Frame—Compressor				X			
	951652	1	Flange—Crankcase Tube (Top—Center of Comp. Crankcase)				X	X	X	
	Y-6495-A	1	Gasket—Tube Flange				X	X	X	
	21427	2	Screw—Hex Hd. Cap, 5/16-18 x 1-1/8 in. Cad. Pl.					X	X	
	21426	2	Screw—Hex Hd. Cap, 5/16-18 x 1 in. Cad. Pl.				X			
	78282-B	1	Plug—Pipe, 1/4 in.				X			
	OY-6123	1	Box Assembly—Control, Consists Of:-						X	
	AY-6123-B	1	Box Assembly—Control, Consists Of:-							X
9-1	Y-6123-H	1	Box—Control					X		
	Y-6160	2	Pin—Control Box Hinge				X	X	X	
	21556	4	Pin—Cotter, 1/8 x 3/4 in. Cad. Pl.				X	X	X	
	B-3104	2	Plug—Pipe, (Brass)					X	X	
9-2	Y-6201	1	Stud (Long)				X	X	X	
9-3	Y-6745	1	Stud (Short)					X	X	
	Y-6124-B	1	Cover—Control Box				X	X	X	
9-4	Y-6124	1	Cover—Control Box				X	X	X	
9-5	Y-6127-A	1	Gasket—Control Box Cover				X	X	X	
9-6	Y-6161-A	2	Knob—Control Box				X	X	X	
	B-7695	2	Gasket				X	X	X	
	B-9578	2	Ring—Snap				X	X	X	
	OY-6776	1	Holder—Service Data						X	
	OY-6214-A	1	Holder—Service Data				X			
	Y-7497	1	Plate—Name					X	X	

## ICE ENGINE ACCESSORY AND UNIT PARTS

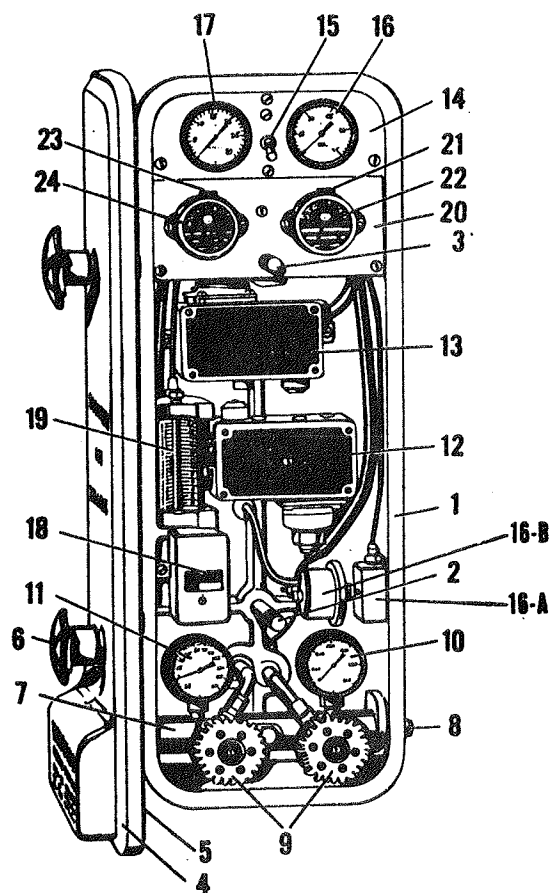


FIG. 9—ICE ENGINE CONTROL BOX

FIG. & REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS			
				B	B-1		C	D	D-1	
9-7	21766	4	Screw—Parker Kalon Rd. Hd., #4 x 3/16 in. Cad. Pl.				X	X	X	
	Y-6436	1	Manifold—Refrigerant Service				X	X	X	
9-8	Y-6279	2	Union—Half				X	X	X	
	Y-6280	2	Nut—Flared Tube Cap				X	X	X	
9-9	21361	1	Screw—Hex. Hd. Cap, 3/8-16 x 1-3/4 in. Cad. Pl.				X	X	X	
	21729	1	Washer—Lock, 3/8 in. Cad. Pl.				X	X	X	
9-10	Y-6442	2	Valve—Packless Angle				X	X	X	
	Y-6445	2	Tee—3/8 x 1/8 x 3/8				X	X	X	
9-10	B-8018	2	Retainer—Felt				X	X	X	
	B-4680	2	Washer—Felt				X	X	X	
	Y-6750	2	Elbow—Tube Street Elbow, 3/8 in.				X	X	X	
	Y-6143-C	1	Gauge—Head Pressure				X	X	X	

ICE ENGINE ACCESSORY AND UNIT PARTS										
FIG.& REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS			
				B	B-1		C	D	D-1	
9-11	Y-6144-B	1	Gauge—Compound				X	X	X	
9-12	Y-6440	1	Switch—Low Pressure				X	X	X	
	Y-6256	1	Bushing—Composition					X	X	
	21101	2	Screw—Rd. Hd. Mach., #10-24 x 1/2 in. Cad. Pl.					X	X	
	21625	2	Washer—Shakeproof Lock, 3/8 in.					X	X	
	B-8957	1	Tubing—Copper, 1/8 x .035 x 14-1/2 in.					X	X	
	Y-6739	1	Tee—Sweat Tube, 1/4 x 1/8 x 1/4 in.					X	X	
	B-7948-F	1	Tubing—Copper, 1/4 x .035 x 15 in.					X	X	
	B-7948-R	1	Tubing—Copper, 1/4 x .035 x 5-3/8 in.					X	X	
	Y-6780	1	Tee—Sweat Tube, 3/8 x 1/4 x 3/8 in.					X	X	
	78273-Z	1	Tubing—Copper, 3/8 x .035 wall x 3-1/16 in.					X	X	
	Y-6778-A	1	Tirex—Three Wire, #16 x 25 in. lg. (To Low Pressure Switch)					X	X	
9-13	Y-6441	1	Switch—High Pressure				X	X	X	
	Y-6256	1	Bushing—Composition					X	X	
	21101	2	Screw—Rd. Hd. Mach., #10-24 x 1/2 in. Cad. Pl.					X	X	
	21625	2	Washer—Shakeproof Lock, 3/16 in.					X	X	
	Y-6748	1	Coil—High Pressure Choke (Located in back of control box)					X	X	
	Y-6437	1	Coil—High Pressure Choke (Located in box)				X			
	21358	1	Screw—Hex. Hd. Cap, 3/8-16 x 1-1/2 in. Cad. Pl.					X	X	
	Y-18814-H	1	Washer—Plain, 3/8 in. Cad. Pl.					X	X	
	21729	1	Washer—Lock, 3/8 in. Cad. Pl.					X	X	
	Y-6445	1	Tee—Sweat Tube, 3/8 x 1/8 x 3/8 in.					X	X	
	78273-Z	1	Tubing—Copper (Choke Coil), 3/8 x .035 x 3-1/16 in.					X	X	
	Y-6778-C	1	Tirex—Three Wire, #16 x 12 in. Lg. (To High Press. Switch)					X	X	
9-14	Y-6746	1	Panel					X	X	
9-14	Y-6138-A	1	Panel				X			
	21101	3	Screw—Rd. Hd. Mach., #10-24 x 1/2 in. Cad. Pl.					X	X	
	21625	3	Washer—Shakeproof Lock, 3/16 in.					X	X	
9-15	Y-6252	1	Switch—Momentary Start				X	X	X	
	21090	2	Screw—Rd. Hd. Mach., #8-32 x 3/8 in. Cad. Pl.					X	X	
	21260	2	Nut—Mach. Screw, #8-32 Cad. Pl.					X	X	
	21818	2	Washer—Shakeproof Lock, 5/32 in.					X	X	
	950035-A	2	Wire—Aircraft, #16 x 8 in. Lg. (To Momentary St. Switch)					X	X	
9-16	Y-7540	1	Gauge—Oil	X	X		X	X	X	
		1	Tube—Copper, 1/8 O.D. x 1/16 I.D. x 34 in. Long					X		

ICE ENGINE ACCESSORY AND UNIT PARTS												
FIG. & REF. NO.		PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS				
					B	B-1		C	D	D-1		
9-16A	Y-6764	1		Elbow—Sweat Tube, 1/8 Male Pipe x 1/8 Tube							X	
	B-8957-D	1		Tubing—Copper, 1/8 O. D. x .035 Wall x 16 in. (Oil Gauge)							X	
	Y-6438	1		Adapter—Sweat Tube, 1/8 Tube x 1/8 M. P.					X		X	
	950071	1		Block—Tee (Located in the side of the control box) (To Oil Gauge to Oil Pressure Switch)							X	
	21314	2		Screw—Hex. Hd. Cap, 5/16-18 x 1 in. Cad. Pl.							X	
	21631	2		Washer—Shakeproof, 5/16 in. Cad. Pl.							X	
	B-1686	1		Elbow—Half Union, 1/8 Pipe x 7/16-20							X	
	B-7948-K	1		Tube—Copper, 1/4 O. D. x .035 Wall x 24 in.							X	
9-16B	B-4092	2		Nut—Flare							X	
	950036	1		Switch—Oil Pressure (Mounted in the side of Control Box) (See Refer No. 7-101 for other types)			X				X	
	Y-6785-M	1		Tirex—Two Wire, #16 x 17 in. Lg. (To Oil Press. Switch)							X	
	Y-18984-A	2		Lug—Solderless, for #16-#14 Wire and #10 Strand							X	
	Y-19154	2		Sleeve—Terminal							X	
9-17	Y-12029	1		Gauge—Vacuum	X	X			X		X	
	Y-6764	1		Elbow—Sweat Tube					X		X	
9-18	B-8957-P	1		Tubing—Copper					X		X	
	Y-6660	1		Switch—Intermittent Start (If Used)					X		X	
9-19	21101	2		Screw—Rd. Hd. Mach., #10-24 x 1/2 in.					X		X	
	21625	2		Washer—Shakeproof Lock, #10					X		X	
	Y-6778-A	1		Tirex—Three Wire, #16 x 25 in. Lg. (To Intermittent Start Switch)					X		X	
	50048-B	1		Manometer					X		X	
	Y-6438	1		Adapter, 1/8 M. D. x 1/8 in. Sweat Tube					X		X	
	B-8957-W	1		Tubing—Copper, 1/8 O. D. x 1/16 I. D. x 33 in.					X		X	
	21163	2		Screw—Headless Set, Cone Point, 1/4-20 x 3/4 in. Cad. Pl.					X		X	
				(JUNCTION BOX TO CONTROL BOX CABLE)								
	Y-6867-B	2		Grip—Cord						X		X
	Y-19154	1		Sleeve—Terminal						X		X
9-20	Y-6779	2		Tirex—Four Wire, #16 x 58 in. Long					X		X	
	78283-J	1		Plug—Pipe					X		X	
	Y-6139	1		Box—3-1/4 Octagon Outlet Box				X				
	Y-6140-A	1		Cover—Octagon Outlet Box				X				
	Y-6892	1		Panel—Sub					X		X	
	21101	3		Screw—Rd. Hd. Mach., #10-24 x 1/2 in. Cad. Pl.					X		X	

ICE ENGINE ACCESSORY AND UNIT PARTS										
FIG. & REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS			
				B	B-1		C	D	D-1	
9-21	21625	3	Washer—Shakeproof Lock, 3/16 in.					X	X	
	Y-6146-A	1	Switch—Cut Out (Starting Crank-Limit)				X	X	X	
9-22	Y-6894	1	Plate—Crank Limit Name				X	X	X	
	21696	1	Screw—Fill Hd. Mach., #6-32 x 5/16 in. Cad. Pl.					X	X	
	Y-6311-A	1	Element—1-1/2 Minute (Used in Starting Crank Limit Switch of 32 Volt Systems)				X	X	X	
	Y-6311-A	1	Element—Used 64 Volt Operation with 950738 in Series				X	X	X	
	21090	2	Screw—Rd. Hd. Mach., #8-32 x 3/8 in. Cad. Pl.				X	X	X	
	21818	2	Washer—Shakeproof Lock, 5/32 in.				X	X	X	
9-23	Y-19225-G	3	Wire—Aircraft, #16 x 6 in. Long						X	
	Y-18984-D	3	Lug—Solderless						X	
9-24	Y-6146-A	1	Switch—Cut-Out (Oil Heat)					X	X	
	Y-6895	1	Plate—Oil Heat Name					X	X	
	21696	1	Screw—Fil. Hd. Mach., #16 x 5/16 in. Cad. Pl.					X	X	
	Y-6311-B	1	Element—Half Minute (Used in Oil-Heat Cut-Out Switch of 32 Volt Systems when Intermittent Starting Switch is used.)					X	X	
	Y-6311-B	1	Element—Used 64 Volt Operation with 950739 in Series					X	X	
	21090	2	Screw—Rd. Hd. Mach., #8-32 x 3/8 in. Cad. Pl.					X	X	
	21818	2	Washer—Shakeproof Lock, 5/32 in. Cad. Pl.					X	X	
	Y-6779-A	1	Tirex—Four Wire, #16 x 23 in. Long					X	X	
	Y-18984-D	5	Lug—Solderless					X	X	
	21353	2	Screw—Hex. Hd. Cap, 3/8-16 x 1-1/4 in. Cad. Pl.					X	X	
	21347	2	Screw—Hex. Hd. Cap, 3/8-16 x 7/8 in. Cad. Pl.					X	X	
	21633	4	Washer—Shakeproof Lock, 3/8 in.					X	X	
	Y-6267	1	El—Half Union (Oil Pressure Switch)							X
	Y-6766	1	Elbow—Compression Male (Fuel Regulator)							X
	OY-6842	1	Box—Junction (Located on Center Partition Above Oil Filter)					X	X	
	Y-6867-B	2	Grip—Cord (Control Box)					X	X	
	78283-A	1	Plug—Ctsk. Hd. Pipe, 1/2 in.					X	X	
	21342	2	Screw—Hex. Hd. Cap, 3/8-16 x 5/8 in. Cad. Pl.					X	X	
	21633	2	Washer—Shakeproof Lock, 3/8 in.					X	X	

ICE ENGINE ACCESSORY AND UNIT PARTS									
FIG. & REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS		
				B	B-1		C	D	D-1
	Y-6843-B	1	Cover—Junction Box					X	X
	Y-6846	1	Gasket—Cover					X	X
	21279	4	Screw—Hex. Hd. Cap, 1/4-20 x 7/8 in. Cad. Pl.					X	X
	21629	4	Washer—Shakeproof Lock, 1/4 in.					X	X
	Y-6968	1	Grip—Cord (Starter, Ralco Plug)					X	X
	950641-A	1	Terminal Block						
			(JUNCTION BOX TO STARTER WIRING)						
	Y-6767-A	1	Tirex—Three Wire, #8-32 in. Long					X	X
	Y-19052-A	1	Lug—Solderless 1/4 Stud Hole					X	X
	Y-19052-B	1	Lug—Solderless 3/8 Stud Hole						X
	39016	1	Lug—Solderless						X
	Y-19154-D	3	Sleeve—Terminal						X
	Y-19225-G	2	Wire—Aircraft, #16 x 6 in. Long						X
	Y-18984-A	5	Lug—Solderless					X	X
	21666	2	Screw—Brass Rd. Hd. Mach., #10-24 x 3/8					X	X
	21644	2	Washer—Bronze Shakeproof Lock					X	X
	21869	2	Nut—Brass Mach. Screw, #10-24					X	X
	950076	1	Elbow—Solenoid Valve					X	X
	Y-6867-A	2	Grip—Cord (Solenoid Valve)					X	X
	Y-6456-U	1	Loom, 7/32 I.D. x 13 in. Long (Solenoid Valve)					X	X
	950009-A	1	Switch—Heat					X	X
	0950072	1	Adapter—Elbow						X
	21629	1	Washer—Shakeproof Lock						X
	21873	1	Screw—Fil. Hd. Cap. 1/4-20 x 5/8 Cad. Pl.						X
	Y-6784	1	Grip—Ralco Cord						X
	Y-6867-A	1	Grip—Cord						X
	Y-6785-B	1	Tirex—Two Wire #16 x 12" Long						X
	Y-19154	2	Sleeve—Terminal						X
	Y-18984-A	6	Lug—Solderless						X
	21666	2	Screw—Brass Rd. Hd. Mach.						X
	21644	2	Washer—Bronze Shakeproof Lock						X
	21869	2	Nut—Brass Mach. Screw						X
	Y-6867-A	1	Grip—Cord (Magneto Ground)					X	X
	Y-19246-H	1	Wire—Aircraft #14 x 13" Lg.					X	X
	Y-6456-D	1	Loom 7/32 I.D. x 6" Lg.					X	X
	Y-18984-A	1	Lug—Solderless					X	X
	Y-19154	1	Sleeve—Terminal					X	X
	21666	1	Screw—Brass Rd. Hd. Mach.					X	X
	21644	1	Washer—Bronze Shakeproof Lock					X	X
	21869	1	Nut—Brass Mach. Screw					X	X
			(JUNCTION BOX TO RALCO PLUG)						
	Y-6147-A	1	Plug—Ralco, four pole				X	X	X
	Y-6968	1	Grip—Cord				X	X	X
	Y-6248	1	Connector—Squeeze Angle 90°				X		
	Y-6774-E	1	Tirex—Four Wire, #8 x 92 in. Long				X	X	X

## ICE ENGINE ACCESSORY AND UNIT PARTS

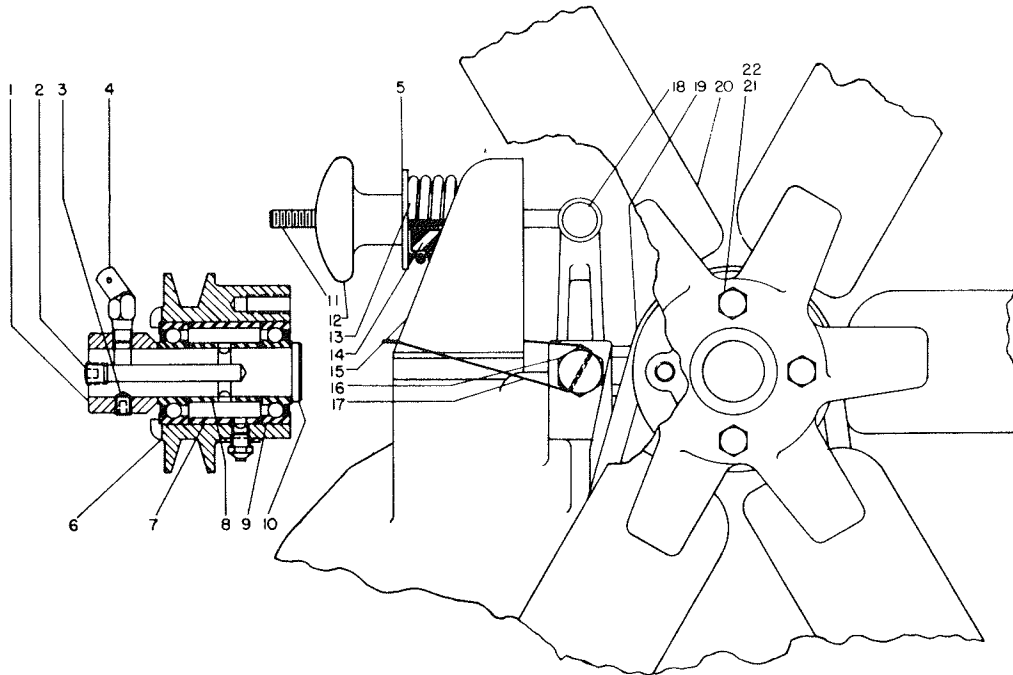


FIG. 10—FAN SUPPORT ASSEMBLY PARTS FOR MODEL "B-1" AND "D-1" UNITS

FIG. & REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS		
				B	B-1		C	D	D-1
10-1	0Y-7537	1	Clamp Assembly—Cable, Consists Of:					X	X
	Y-7537	1	Clamp—Cable					X	X
	21706	4	Screw—Fil. Hd. Mach. #8-32 x 7/8 Cad. Pl.					X	X
	21625	4	Washer—Shakeproof Lock					X	X
	Y-6246	2	Clip—Tubing, 5/8 in.					X	X
	Y-6807	3	Clip—Tubing, 3/4 in.					X	X
	21797	3	Screw—Parker Kalon Hex. Hd. #14 x 1/2 in. Cad. Pl.					X	X
	0Y-19472-B	1	Support Assembly—Fan, Consists of:-		X				X
	Y-19472-A	1	Support—Fan		X				X
	B-6461	1	Alemite Fitting						
	Y-19480-A	1	Bearing		X				X
	10-2 Y-18802	1	Plug—Allen Headless Pipe, 1/8 in.		X				X
	10-3 21881	1	Screw—Socket Hd. Set. Cup Pt., 5/16-18 x 3/8 in. Cad. Pl.		X				X
	10-4 B-7659	1	Fitting—Alemite		X				X
	10-6 Y-19470-A	1	Sheave—Fan		X				X
	10-7 Y-19473-A	1	Spacer—Fan Bearing (Housing)		X				X
	10-8 Y-19484	1	Spacer—Fan Bearing (Shaft)		X				X
	10-9 Y-6040	2	Bearing—Ball		X				X
	10-10 Y-19474	1	Shaft—Fan		X				X
	39022	1	Fitting—Grease Relief		X				X

## ENGINE PARTS

FIG. & REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS			
				B	B-1		C	D	D-1	
	0950754	1	Adjustable Fan Support Assembly						X	
10A-1	950754	1	Support—Adjustable Fan						X	
10A-2	Y-18802	1	Plug—Allen Hdless. Pipe 1/8"						X	
10A-3	21881	1	Screw—Socket Hd. Set						X	
10A-4	B-7659	1	Fitting—Alemite						X	
10A-5	39022	1	Fitting—Grease Relief						X	
10A-6	Y-19470-A	1	Sheave—Fan						X	
10A-7	Y-19473-A	1	Spacer—Fan Bearing (Hsg.)						X	
10A-8	Y-19484	1	Spacer—Fan Bearing (Shaft)						X	
10A-9	Y-6040	2	Bearing—Ball						X	
10A-10	Y-19474	1	Shaft—Fan						X	
10A-11	0950755	1	Adjustable Fan Support Bracket						X	
			Assembly						X	
	950755	1	Bracket—Fan Support						X	
	950756	2	Bearing						X	
10A-12	0950758	1	Lock Assembly						X	
10A-13	B-9059	1	Nut—Elastic Stop						X	
10A-14	950757	1	Pin—Fan Support						X	
10A-15	B-9611	2	Plug—Expansion						X	

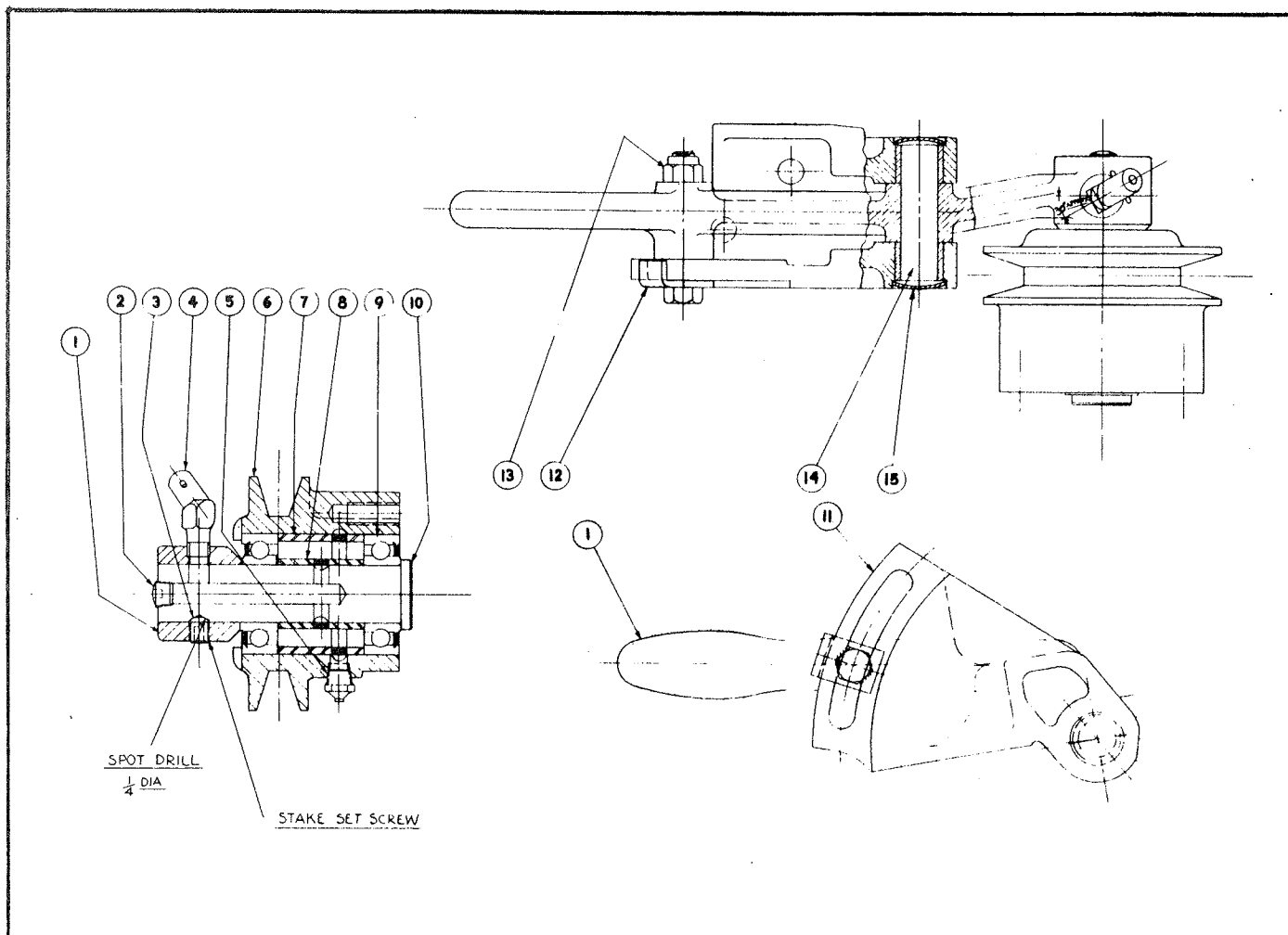


FIG. 10A—FAN SUPPORT ASSEMBLY PARTS FOR MODEL "B-1" AND "D-1" UNITS

## ICE ENGINE ACCESSORY AND UNIT PARTS

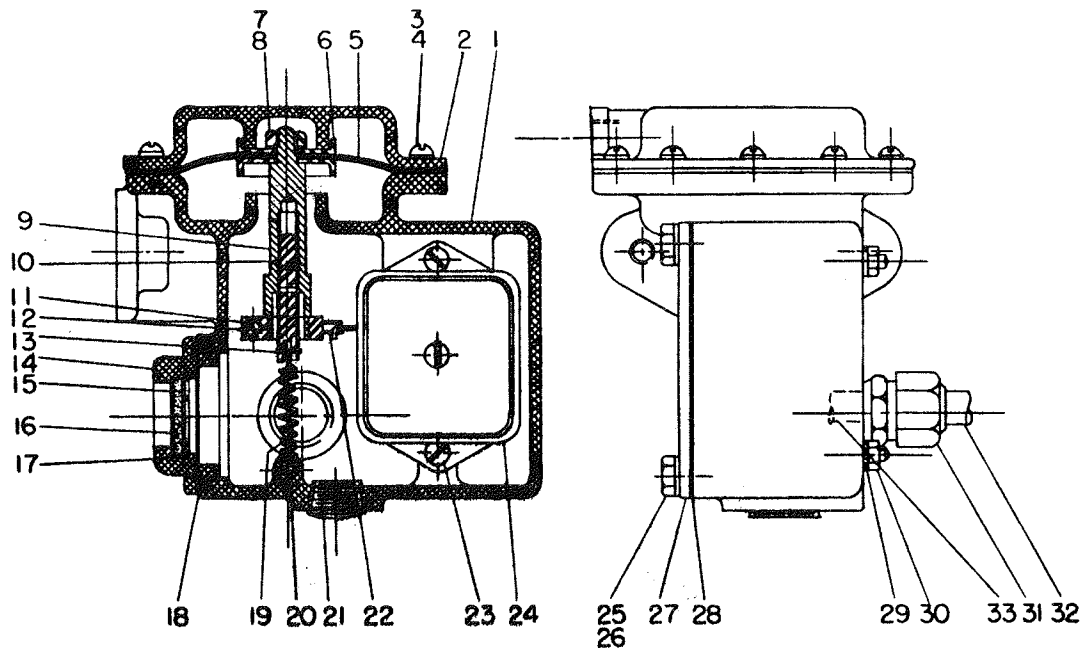


FIG. 11—LOW VACUUM SWITCH ASSEMBLY PARTS

FIG. & REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS			
				B	B-1		C	D	D-1	
10-11	Y-19479	1	Bolt—Eye		X				X	
10-12	Y-6511	1	Knob—Fan Spring Release		X				X	
10-13	Y-6515	1	Spring		X				X	
	Y-6514	1	Washer—Special		X				X	
10-14	Y-6516	1	Stop—Spring		X				X	
10-15	950292	1	Support—Spring (Used only with New 950282 Gear Cover)		X				X	
10-15	Y-19475-A	1	Support—Spring (Used only with Y-19469 Gear Cover)		X				X	
	21342	2	Screw—Hex. Hd. Cap, 3/8-16 x 5/8 in. Cad. Pl. (Spring Support to Gear Cover)		X				X	
	21729	2	Washer—Lock, 3/8 in. Cad. Pl.		X				X	
10-16	Y-19476	1	Pin—Fan Support		X				X	
10-17	116050	1	Wire—Brass Safety		X				X	
10-18	Y-19478	1	Pin—Yoke End		X				X	
	Y-18814-H	1	Washer—Plain, 3/8 in. Cad. Pl.		X				X	
	21556	1	Pin—Cotter, 1/8 x 3/4 in.		X				X	
10-19	Y-19482	1	Belt—Fan		X				X	
10-20	Y-19464	1	Fan		X				X	
10-21	21633	4	Washer—Shakeproof Lock, 3/8 in. Cad. Pl.		X				X	
10-22	21347	4	Screw—Hex. Hd. Cap, 3/8-16 x 7/8 in. Cad. Pl.		X				X	

ICE ENGINE ACCESSORY AND UNIT PARTS									
FIG.&				ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS		
REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	B	B-1		C	D	D-1
	0Y-7517-E	1	Switch Assembly—Low Vacuum, Consists of:					X	X
								X	X
11-1	Y-7515-A	1	Body—Vacuum Switch					X	X
11-2	Y-7514	1	Chamber—Vacuum					X	X
11-3	21625	10	Washer—Shakeproof Lock, #10, Cad. Pl.					X	X
11-4	21101	10	Screw—Rd. Hd. Mach, #10-24 x 1/2 in. Cad. Pl.					X	X
11-5	Y-6752	2	Diaphragm—Vacuum Switch					X	X
11-6	Y-6760	2	Washer—Cup					X	X
11-7	21176	1	Nut—Half, 1/4-20 Cad. Pl.					X	X
11-8	21608	1	Washer—Shakeproof Lock, 1/4 in. Cad. Pl.					X	X
11-9	Y-7511	1	Rod—Diaphragm					X	X
11-10	Y-7510	1	Screw—Takeup					X	X
11-11	0950472	1	Clamp					X	X
11-12	21897	1	Screw—Socket Hd. Cap, #10 - 32 x 1 in. Cad. Pl.					X	X
11-13	Y-7513	1	Pin					X	X
	0950634	1	Cap Assembly—Vacuum Switch Breather, consists of:					X	X
11-14	950634	1	Cap—Vacuum Switch Breather					X	X
11-15	Y-6789-A	1	Screen—Breather					X	X
11-16	Y-6790-A	1	Pad—Breather Felt					X	X
11-17	B-10275	1	Ring—Snap					X	X
11-18	63347	1	Gasket—Breather Cap					X	X
11-19	Y-7508	1	Spring—Low Vacuum Switch					X	X
11-20	21137	1	Screw—Fil. Hd. Mach. #6-32 x 1-1/4 in. Cad. Pl.					X	X
11-21	78283-J	1	Plug—Ctsk. Hd. Pipe, 1/2 in.					X	X
11-22	Y-7512	1	Arm—Wire (Use 0950472)					X	X
11-23	21672	2	Screw—Rd. Hd. Mach. #10-32 x 1-1/4 in. Cad. Pl.					X	X
11-24	Y-7517	1	Switch					X	X
11-25	21276	4	Screw—Hex. Hd. Cap, 1/4-20 x 3/4 in.					X	X
11-26	21629	4	Washer—Shakeproof Lock, 1/4 in.					X	X
11-27	Y-7522	1	Cover					X	X
11-28	Y-7523	1	Gasket					X	X
11-29	21606	2	Washer—Shakeproof Lock, #10 Cad. Pl.					X	X
11-30	21264	2	Nut—Hex. #10-32, Cad. Pl.					X	X
11-31	Y-6867-A	1	Grip—Cord					X	X
11-32	Y-6785-J	1	Tirex—Two Wire, #16 x 20 in. Long					X	X
11-33	Y-18984-A	2	Lug—Solderless					X	X
	Y-6978	2	Stud					X	X
	B-10168	1	Elbow—Street 1/8 pipe					X	X
	63599	1	Fitting—Compression Tee 1/8 in.					X	X
	039000	1	Union—Half, 1/4 Flare x 1/8 M.P.					X	X
	21729	2	Washer—Lock, 3/8 in. Cad. Pl.					X	X
	21196	2	Nut—Hex. Jam, 3/8-24					X	X
DETACHED PARTS									
	Y-6113-C	1	Receiver—Refrigerant					X	X
	Y-6113-B	1	Receiver—Refrigerant					X	X

ICE ENGINE ACCESSORY AND UNIT PARTS										
FIG.& REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS			
				B	B-1		C	D	D-1	
	Y-6404	2	Valve—Receiver				X	X	X	
	Y-6418	1	Tubing—Small Flexible Metal, 3/4 in.				X	X	X	
	Y-6419	1	Tubing—Flexible Metal, 1-3/8 in.				X	X	X	
	Y-6405	1	Elbow—Sweat Tube, 1-5/8 x 1-3/8				X	X	X	
	Y-6742	1	Strap—Flexible Tubing					X	X	
	Y-6491	1	Strap—Flexible Tubing				X			
	Y-6492	1	Clamp—Flexible Tubing Strap				X	X	X	
	21885	1	Screw—Hex. Cap, 3/8 - 16 x 2-1/4 in. Cad. Pl.				X	X	X	
	21190	1	Nut—Hex., 3/8 - 16 Cad. Pl.				X	X	X	
	21729	1	Washer—Lock, 3/8 in. Cad. Pl.				X	X	X	
	Y-6157	1	Hose—Fuel				X	X	X	
	A950743	1	Valve—Solenoid (32 volt) (Mounted in Car) (For parts list see fig. 24.)				X	X	X	
	A950744	1	Valve—Solenoid (64 volt) (Mounted in Car) (For parts list see fig. 24.)					X	X	
	Y-6203	1	Switch—Temperature (Mounted in Car)				X	X	X	
	Y-6148	1	Receptacle—Four Pole (Mounted on Car)				X	X	X	
	Y-6494	1	Plug—Iron Pipe, 1/2 in. Cad. Pl.					X	X	
	Y-6852	1	Valve—Angle (Purge)					X	X	
	Y-6280	1	Nut—Flared Tube Cap					X	X	
	Y-7388	2	Stop—Wheel					X	X	
	Y-7506	2	Screw—Hex. Hd. Cap, 5/8 - 11 x 2 in. Cad. Pl.					X	X	
	21222	2	Nut—Hex. 5/8 - 11 Cad. Pl.					X	X	
	21438	4	Screw—Hex. Hd. Cap, 1/2 - 13 x 1-1/2 in. Cad. Pl.					X	X	
	21539	4	Washer—Lock, 1/2 in.					X	X	
	Y-6809	1	Support—Fuel Line					X	X	
	21805	1	Screw—Parker - Kalon Cap, 3/8 x 5/8 Cad. Pl.					X	X	
	OY-6413	1	Support Assembly—Flexible Tubing (Mounted on Cushion Mounting Tracks) consists of:					X	X	
	Y-6413	1	Support—Flexible Tubing (Sold in Assembly Only)					X	X	
	Y-6415	1	Clamp—Flexible Tubing Support (Sold in Assembly Only)				X	X	X	
	21887	1	Screw—Hex. Hd. Cap, 5/8 - 11 x 2-1/2 in.					X	X	
	21540	1	Washer—Lock, 5/8 in. Cad. Pl.					X	X	
	OY-6414	1	Support—Flexible Tubing (On Track) (Assembly Only)				X			
	21539	2	Washer—Lock, 1/2 in. Cad. Pl.					X	X	
	21439	2	Screw—Hex. Hd. Cap, 1/2 - 13 x 2-1/2 in.					X	X	
			(CUSHION MOUNTING TRACK PARTS)							
	A951006	1	Track Assembly—Right Hand Mounting consists of:				X	X	X	
	0951006	1	Track—R. H. Mounting				X	X	X	
	Y-7361	6	Mounting—Shear Rubber				X	X	X	

ICE ENGINE ACCESSORY AND UNIT PARTS										
FIG.& REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS			
				B	B-1		C	D	D-1	
	21886	18	Screw—Hex. Head Cap, 1/2 - 13 x 3/4 in. Cad. Pl.				X	X	X	
	Y-7505	6	Screw—Special Hex. Hd.				X	X	X	
	21208	24	Nut—Hex Jam, 1/2 - 13, Cad. Pl.				X	X	X	
	21539	24	Washer—Lock, 1/2 in. Cad. Pl.				X	X	X	
	Y-7389	2	Plate—Rubber Bumper				X	X	X	
	21339	4	Screw—Hex. Hd. Cap, 3/8 - 16 x 1/2 in. Cad. Pl.				X	X	X	
	21729	4	Washer—Lock, 3/8 in. Cad. Pl.				X	X	X	
	A951007	1	Track Assembly—Left Hand Mounting consists of:				X	X	X	
	0951007	1	Track—Left Hand Mounting				X	X	X	
	Y-7361	6	Mounting—Shear Rubber				X	X	X	
	21886	18	Screw—Hex. Hd. Cap, 1/2 - 13 x 3/4 in. Cad. Pl.				X	X	X	
	Y-7505	6	Screw—Special Hex. Nut Cap				X	X	X	
	21208	24	Nut—Hex Jam, 1/2 - 13 Cad. Pl.				X	X	X	
	21539	24	Washer—Lock, 1/2 in. Cad. Pl.				X	X	X	
	Y-7389	2	Plate—Rubber Bumper				X	X	X	
	21339	4	Screw—Hex. Hd. Cap, 3/8 - 16x1/2 in. Cad. Pl.				X	X	X	
	21729	4	Washer—Lock, 3/8 in. Cad. Pl.				X	X	X	
	Y-7423	2	Extension—Track				X	X	X	

ENGINE GENERATOR ACCESSORY AND UNIT PARTS										
FIG. & REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS			
				B	B-1		C	D	D-1	
12-1	Y-18002	1	Housing—Flywheel	X	X					
	A-68013-C	1	Flywheel Assembly, Consists Of:	X	X					
12-2	68013-C	1	Flywheel	X	X					
12-3	Y-18364	6	Bushing—Drive	X	X					
	B-9837	4	Screw—Hex. Hd. Cap, 7/16-20 x 1-9/16 in.	X	X			X	X	
	BD-21	2	Lock—Flywheel Cap Screw	X	X			X	X	
	OY-18352	1	Hub Assembly—Coupling, Consists Of:	X	X					
12-4	Y-18353-A	6	Pin—Drive	X	X					
12-5	Y-18352	1	Hub—Coupling	X	X					
	Y-18354	6	Screw—"Unbrake" Hollow Hd. Set, 3/8-16 x 1/2 in.	X	X					
12-6	OY-18365-B	1	Bushing Assembly—Drive Shaft Pilot, Consists Of:	X	X			X	X	
	Y-18365	1	Bushing—Drive Shaft Pilot (Sold in Assembly Only)	X	X			X	X	
	Y-18367-B	1	Bearing—Pilot Bushing (Sold in Assembly Only)	X	X			X	X	
	21884	1	Nut—Hex. Jam, 1-1/4-12	X						
12-7	Y-7458	1	Nut—Hex. Jam, 1-1/4-18 Cad. Pl.		X					
12-8	Y-6531	1	Washer—Special Lock	X	X					
12-9	21534	1	Key—Drive Shaft	X	X					
			GENERATOR (TYPE K3C)							
	Y-18124-A	1	Generator Assembly (40-volt)	X						
	Y-18125-A	1	Generator Assembly (80-volt) Consists of: (Note: The 40 and 80 volt generators consist of the same parts, except for those that are identified as 40 or 80 volt items, respectively)							
12-10	L-81767-1	1	Armature Assembly (40-volt) removable shaft	X						
12-10	L-81762-2	1	Armature Assembly (80-volt) removable shaft	X						
	L-9577-F-130-1	1	Commutator Assembly (40-volt) used with armature with fixed shaft only.	X						
	L-9577-F-130-2	1	Commutator Assembly (80-volt) used with armature with fixed shaft only.	X						
	L-9577-F-148-1	1	Commutator Assembly (40-volt) used with armature with removable shaft only.	X						
	L-9577-F-148-2	1	Commutator Assembly (80-volt) used with armature with removable shaft only.	X						
	L-82715-1	29	Coils—Armature (Set of 29 used) (40-volt)	X						
	L-82716-1	29	Coils—Armature (set of 29 used) (80-volt)	X						
	L-87187-1	1	Insulation Set—Slot Wedge, Consists of: (Not used on later type Generators)							
	18-TE-18	29	Wedge—Slot (long)	X						
	19-TE-18	29	Wedge—Slot (short)	X						
	L-87973-1	1	Shaft—Armature (removable type)	X						
	L-87959-1	1	Shaft—Armature (fixed type)	X						
	520-H-479	1	Nut—Armature Lock (special)	X						
	520-H-491	1	Plug—Shaft End	X						

ENGINE GENERATOR ACCESSORY AND UNIT PARTS										
FIG. & REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS			
				B	B-1		C	D	D-1	
12-11	520-H-492	1	Nut—Bearing Lock	X						
		1	Key—S. F., 1/2 x 3/8 x 4 in.	X						
	514-F-469	1	Cover—Generator Frame	X						
12-12	L-9514-E-12-1	1	Cover Assembly—Enclosed	X						
	519-H-32	2	Pin (Cover Assembly to Frame)	X						
	21097	8	Screw—Rd. Hd. Mach. 10-24 x 3/8 in. (In- terpole Coil Leads)	X						
12-13	21262	8	Nut—Hex. #10-24, Zinc Plated	X						
	21625	8	Washer—Shakeproof Lock, #10 Zinc Pl.	X						
	L-9573-F-17-1	4	Brush Holder Assembly (40-volt)	X						
	21353	4	Screw—Brush Holder Cap, 3/8-16 x 1-1/4 in. (40-volt)	X						
	21190	4	Nut—Brush Holder Hex., 3/8-16 (40-volt)	X						
	21729	4	Washer—Brush Holder, 3/8 in. (40-volt)	X						
	21353	8	Screw—Brush Holder, Hex. Hd. Cap, 3/8-16 x 1-1/4 (80 volt)	X						
12-14	574-F-516	1	Fan	X						
	21312	4	Screw—Fan Assembly Cap, 5/16-18 x 7/8 in.	X						
	21819	4	Washer—Shakeproof Lock, 5/16 in.	X						
12-15	L-9573-A-6-1	1	Rocker Assembly—Brush Holder (40-volt)	X						
	L-9573-E-50	1	Rocker Assembly—Brush Holder (80-volt)	X						
	Y-18543	4	Brush (40-volt)	X						
12-15	Y-18543-A	4	Brush (80-volt)	X						
12-16	573-E-42	1	Rocker—Brush	X						
	573-H-237-C1	8	Washer—Insulating	X						
	518-H-508-C1	8	Bushing—Insulating	X						
	518-H-620	4	Strip—Backing	X						
	514-F-210	1	Fan Guard Assembly, consists of Guard Screen and Louver	X						
12-17	514-E-212	1	Guard—Fan	X						
	514-E-213	1	Screen	X						
	514-E-214	1	Louver	X						
	21100	8	Screw—Fan Guard Rd. Hd. Mach. No. 10-24 x 1/2	X						
	21049	8	Washer—Lock, #10	X						
	574-H-362	1	Support—Fan	X						
12-18	520-H-428	1	Plug—Special Pipe	X						
12-19	N-08	1	Nut—Special	X						
	W-08	1	Washer—Special Lock	X						
12-20	26158	1	Key—Hi-Pro #708	X						
	577-H-391	1	Ring—"V"	X						
12-21		1	Strip, 3/16 x 1/4 x 9-13/16 in. (used on older models)	X						
12-22	Y-6567	1	Bearing—Ball (SKF-6309)	X						
12-23	Y-4032	2	Seal—Oil Retainer	X						
	572-H-158	1	Cap—Front Inner Bearing	X						
12-24	26156	4	Screw—Allen Hd. Cap, 5/16-18 x 2 in.	X						

## ENGINE GENERATOR ACCESSORY AND UNIT PARTS

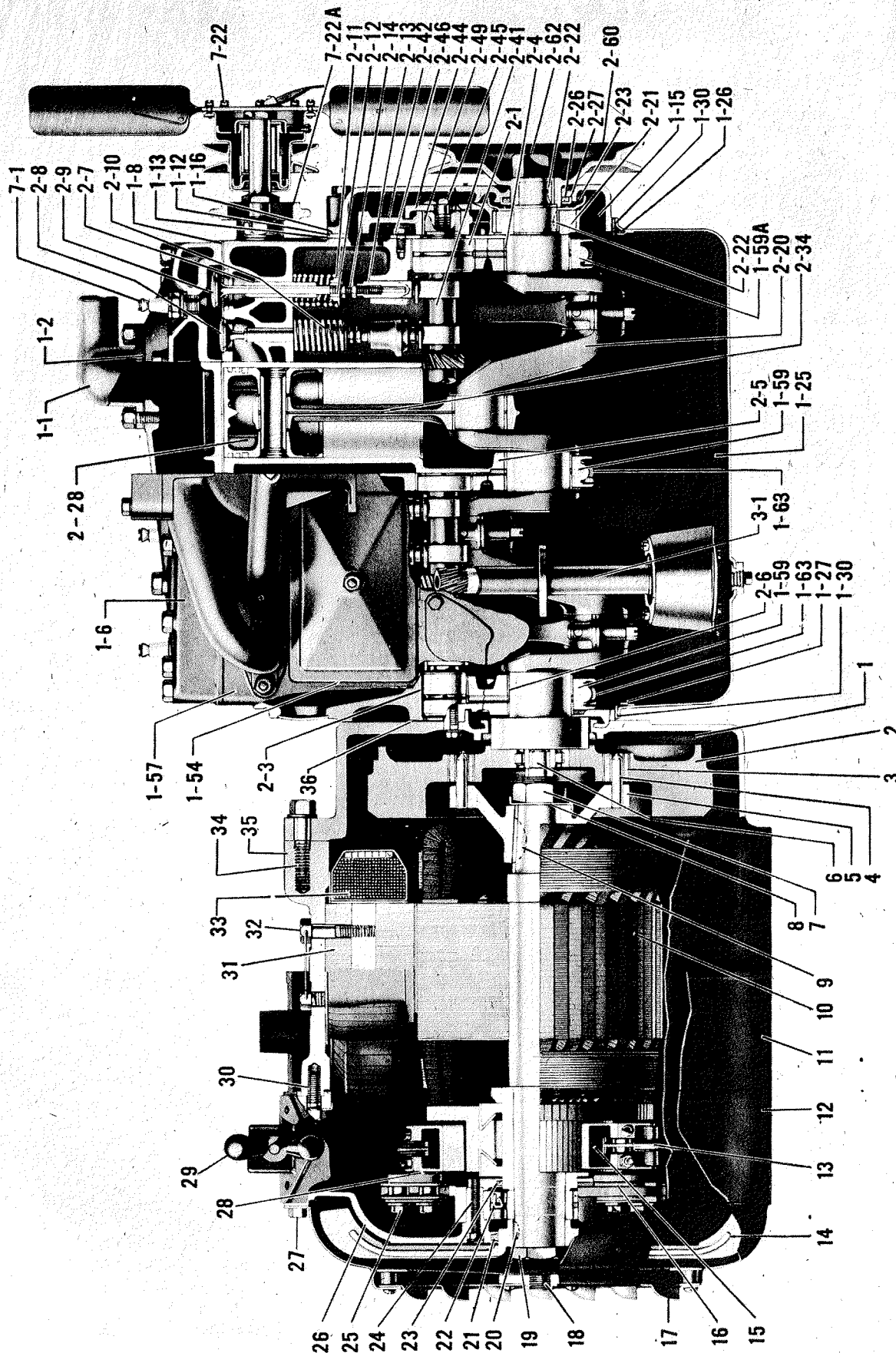


FIG. 12—CROSS-SECTION OF MODEL "B" ENGINE GENERATOR

ENGINE GENERATOR ACCESSORY AND UNIT PARTS

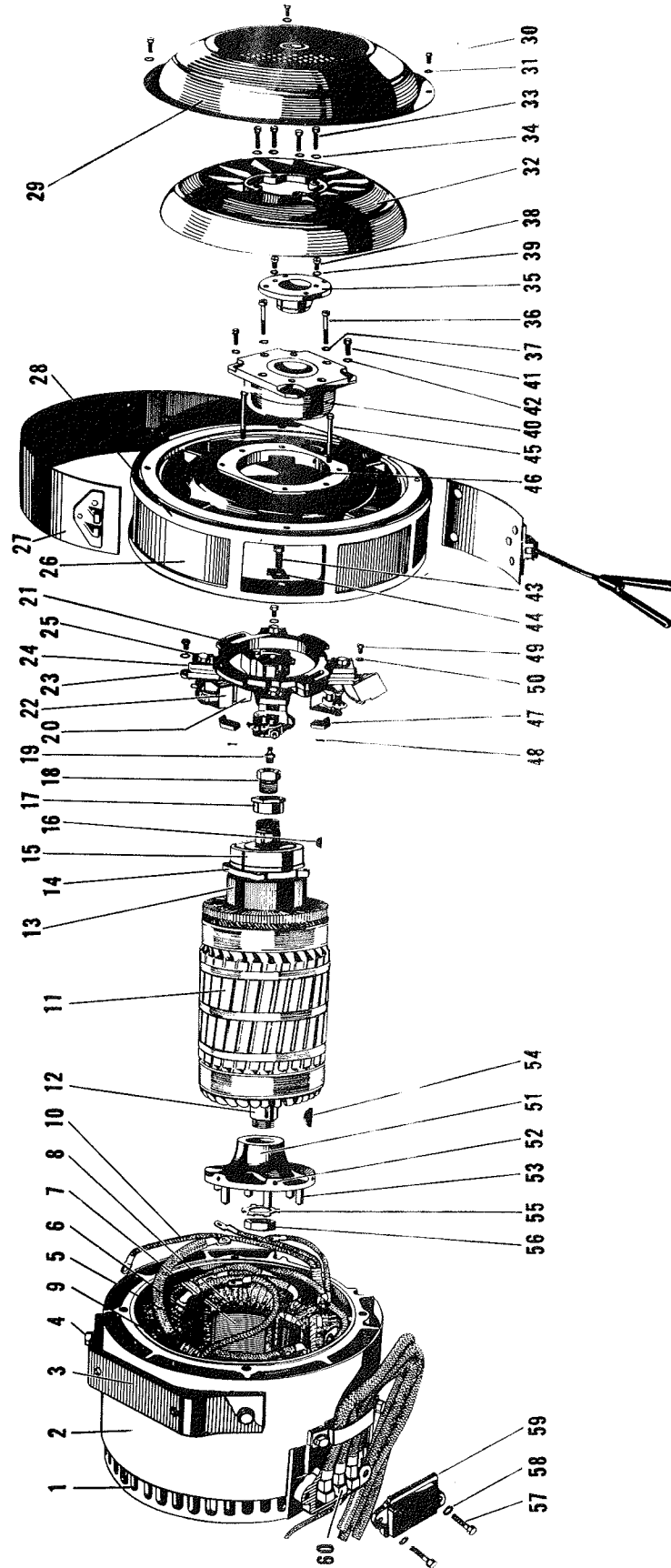


FIG. 13—EXPLODED VIEW — GENERATOR TYPE K3W

ENGINE GENERATOR ACCESSORY AND UNIT PARTS									
FIG. & REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS		
				B	B-1		C	D	D-1
12-25	21538	4	Washer—Lock, 5/16 in.	X					
	21361	4	Screw—Brush Holder Cap, 3/8-16 x 1-3/4 (40-volt)	X					
12-26	572-A-26	1	Head—Front	X					
12-27	21308	4	Screw—Fan Guard Hex. Hd. Cap, 5/16-18 x 5/8 in.	X					
12-28	573-H-305	4	Stud—Brush Holder (80-volt)	X					
12-29	532-F-37	1	Handle—Brush Holder Enclosure Cover	X					
12-30	21429	4	Screw—Hex. Head Cap, 1/2-13 x 1-1/4 in. Cad. Pl.	X					
12-31	518-H-525	4	Washer—Special Lock, 1/2 in.	X					
	517-F-112	4	Interpole	X					
	L-84115-1	4	Coil—Interpole (40-volt)	X					
12-31	L-84117-1	4	Coil—Interpole (80-volt)	X					
12-32	21438	8	Screw—Hex. Hd. Cap (Field Pole) 1/2-13 x 2-1/4 in.	X					
	21429	6	Screw—Hex. Hd. Cap (Interpole) 1/2-13 x 1-1/4 in.	X					
	21121	15	Screw—Rd. Hd. Mach. 5/16-18 x 1/2 in. Cadmium plated	X					
	21122	2	Screw—Rd. Hd. Mach. 5/16-18 x 5/8 in. Cadmium plated	X					
	21538	17	Washer—Lock, 5/16 in. Cadmium plated	X					
	21184	17	Nut—Jam, 5/16-18 Cadmium plated	X					
	21145	2	Screw—Flat Hd. Cap (Interpole) 1/2-13 x 1-1/4 in.	X					
12-33	L-84114-1	4	Coil—Field (40-volt)	X					
12-33	L-84116-1	4	Coil—Field (80-volt)	X					
12-34	21464	5	Screw—Hex. Hd. Cap (Flywheel Housing Support) 5/8-11 x 1 in. Cad. Pl.	X					
	21540	5	Washer—Lock, 5/8 in. Cad. Pl.	X					
12-35	L-9571-A-4-1	1	Field Ring Assembly (40-volt)	X					
12-35	L-9571-A-4-2	1	Field Ring Assembly (80-volt)	X					
	L-9571-F-66-1	4	Pole—Field	X					
12-36	B-10358	1	Gasket—Flywheel Housing	X	X		X	X	X
12-37	B-3527	1	Cover—Fuel Pump Pad	X	X		X	X	X
	B-3605	2	Gasket—Fuel Pump Cover	X	X		X	X	X
	21307	2	Screw—Hex. Hd. Cap 5/16-18 x 5/8 in.	X	X		X	X	X
	21051	2	Washer—Lock, 5/16 in.	X	X		X	X	X
GENERATOR TYPES - K3W (NEW DESIGN)									
	Y-18509	1	Generator Assembly (40-volt) Consists of:	X	X				
	Y-18510	1	Generator Assembly (80-volt) Consists of:	X	X				
			(Note: The 40 and 80 volt generators consist of the same parts, except for those that are identified as 40 or 80 volt items. respectively.)	X	X				
13-1	L-9571-A-11	1	Field Ring Assembly	X	X				

ENGINE GENERATOR ACCESSORY AND UNIT PARTS									
FIG. & REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS		
				B	B-1		C	D	D-1
13-2	514-F-511	1	Cover—Frame	X	X				
13-3	529-F-157	1	Strap—Generator Supporting	X	X				
13-4	21467	2	Screw—Hex. Hd. Cap, 5/8-11 x 1-3/4 in.	X	X				
	21055	2	Washer—Lock, 5/8 in.	X	X				
13-5	571-F-112	4	Interpole	X	X				
13-6	L-84115-1	4	Coil—Interpole (40-volt)	X	X				
13-6	L-84117-1	4	Coil—Interpole (80-volt)	X	X				
	21429	6	Screw—Hex. Hd., Cap (Interpole) 1/2-13 x 1-1/4 in.	X	X				
	21145	2	Screw—Flat Hd. Cap, (Interpole) 1/2-13 x 1-1/4 in.	X	X				
13-7	L-9571-F-66-1	4	Pole—Field	X	X				
13-8	L-84114-1	4	Coil—Field (40-volt)	X	X				
13-8	L-84116-1	4	Coil—Field (80-volt)	X	X				
	21438	8	Screw—Hex. Hd. Cap (Field Pole) 1/2-13 x 2-1/4 in.	X	X				
13-9	21121	15	Screw—Rd. Hd. Mach. 5/16-18 x 1/2 in. Cadmium plated	X	X				
	21631	17	Washer—Shakeproof Lock, 5/16 in.	X	X				
	21184	17	Nut—Hex. Jam, 5/16-18, Cadmium Plated	X	X				
	21098	8	Screw—Rd. Hd. Mach. #10-24 x 3/8 in. Cad. Pl.	X	X				
	21261	8	Nut—Hex. #10-24	X	X				
	21625	8	Washer—Shakeproof Lock, #10	X	X				
	21122	2	Screw—Rd. Hd. Mach. 5/16-18 x 5/8 in. Cad. Pl.	X	X				
	21272	2	Screw—Hex. Hd. Cap, 1/4-20 x 1/2 in. Cad. Pl.	X	X				
	21629	2	Washer—Shakeproof Lock, 1/4 in.	X	X				
13-10		7 ft.	Wire—Stranded, #14, cut to required lengths	X	X				
		6	Lug—Sherman, 1/2 in. with 11/32 in. hole	X	X				
		2	Lug—Sherman, 3/8 in. with 9/32 in. hole	X	X				
		4	Lug—Sherman, 7/16 in. with 13/32 in. hole	X	X				
		2	Lug—Sherman, 3/8 in. with 11/32 in. hole	X	X				
13-11	L-81762-1	1	Armature Complete (40-volt)	X	X				
13-11	L-81762-2	1	Armature Complete (80-volt)	X	X				
	L-82715-1	29	Coils—Armature (Set of 29 used) (40-volt)	X	X				
	L-82716-1	29	Coils—Armature (Set of 29 used) (80-volt)	X	X				
	L-87187-1	1	Insulation—Slot—Set of	X	X				
13-12	L-87973-1	1	Shaft—Armature (removable)	X	X				
	520-H-479	1	Nut—Armature Shaft Lock (Special)	X	X				
13-13	L-9577-F-148-1	1	Commutator Assembly (40-volt)	X	X				
13-13	L-9577-F-148-2	1	Commutator Assembly (80-volt)	X	X				
13-14	572-F-283	1	Cap—Front Inner Bearing	X	X				
13-15	No. 6409	1	Bearing—Ball	X	X				
13-16	26158	1	Key—Hi-Pro #708	X	X				

ENGINE GENERATOR ACCESSORY AND UNIT PARTS										
FIG. & REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS			
				B	B-1		C	D	D-1	
13-17	520-H-492	1	Nut—Lock (special)	X	X					
13-18	520-H-491	1	Plug—Shaft End	X	X					
13-19	SD-1627	1	Alemite—Male Hydraulic, 1/8 in.	X	X					
13-20	Y-18543	4	Brush (40-volt)	X	X					
13-20	Y-18543-A	4	Brush (80-volt)	X	X					
13-21	L-9573-A-6-1	1	Rocker Assembly—Brush Holder 40 Volt	X	X					
	L-9573-E-50-1	1	Rocker Assembly—80 Volt	X	X					
	573-E-58	1	Rocker—Brush Holder	X	X					
13-22	L-9573-F-17-2	4	Holder Assembly—Brush (40-volt)	X	X					
13-22	L-9573-F-17-3	4	Holder Assembly—Brush (80-volt)	X	X					
13-23	573-H-304	4	Rocker Insulation—Brush Holder	X	X					
13-24	573-H-303	4	Rocker Insulation—Brush Holder	X	X					
	1-TE-32	4	Tube—Mica	X	X					
13-25	21357	4	Screw—Hex. Hd. Cap, 3/8-16 x 1-1/2 in.	X	X					
	21632	4	Washer—Shakeproof Lock, 3/8 in.	X	X					
	18-H-895	4	Washer—Special	X	X					
13-26	572-A-28	1	Head—Front	X	X					
	21429	8	Hex Hd. Cap Screw	X	X					
	21539	8	Lock Washer	X	X					
13-27	L-9514-E-13-1	1	Cover—Head Enclosing	X	X					
13-28	520-F-17	2	Gasket—Head Enclosing Cover	X	X					
	519-H-62	4	Pin—Head Enclosing Cover, 1/2 dia. x 1-1/8 in.	X	X					
13-29	514-E-227	1	Guard—Fan	X	X					
13-30	21308	4	Screw—Hex. Hd. Cap, 5/16-18 x 5/8 in.	X	X					
13-31	21631	4	Washer—Shakeproof Lock, 5/16 in.	X	X					
13-32	574-E-82	4	Fan	X	X					
13-33	21312	4	Screw—Hex. Hd. Cap, 5/16-18 x 7/8 in.	X	X					
13-34	21631	4	Washer—Shakeproof Lock, 5/16 in.	X	X					
13-35	574-H-374	1	Support—Fan	X	X					
13-36	26150	4	Screw—Allen Head Cap, 5/16-18 x 2-3/4 in.	X	X					
13-37	21538	4	Washer—Lock, 5/16 in.	X	X					
13-38	26157	2	Screw—Fil. Hd. Mach. 5/16-18 x 3/8 in.	X	X					
13-39	21538	2	Washer—Lock, 5/16 in.	X	X					
13-40	572-E-812	1	Capsule—Bearing	X	X					
13-41	21313	4	Screw—Hex. Hd. Cap, 5/16-18 x 1 in.	X	X					
13-42	21631	4	Washer—Shakeproof Lock, 5/16 in.	X	X					
13-43	21429	4	Screw—Hex. Head Cap, 1/2-13 x 1-1/4 in. Cadmium Plated	X	X					
13-44	518-H-525	4	Washer—Special Lock	X	X					
13-45	520-H-493	2	Screw—Special Cap, 3/8-16 x 3 in. zinc plated and drilled for cotter pin	X	X					
13-46	21540	2	Washer—Lock, 5/8 in. Cadmium plated	X	X					
13-47	573-H-277	2	Block—Anchor, 5/8 x 3/4 x 1-1/4 in.	X	X					
13-48	21551	2	Pin—Cotter, 3/32 x 3/4 in. Cadmium Plated	X	X					
13-49	21358	4	Screw—Hex. Hd. Cap, 3/8-16 x 1-1/2 in. Cadmium Plated (Leads to Brush Holder)	X	X					
13-50	21625	4	Washer—Shakeproof Lock, 3/8 in.	X	X					
13-51	0Y-18352	1	Hub Assembly—Coupling	X	X					

ENGINE GENERATOR ACCESSORY AND UNIT PARTS										
FIG. & REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS			
				B	B-1		C	D	D-1	
13-52	Y-18352	1	Hub—Coupling	X	X					
	Y-18354	6	Screw—"Unbrako" Hollow Hd. Set, 3/8 — 16 x 1/2 in.	X	X					
13-53	Y-18353-A	6	Pin—Drive	X	X					
13-54	21534	1	Key—Drive Shaft	X	X					
13-55	Y-6531	1	Washer—Special Lock	X	X					
13-56	21884	1	Nut—S. A. E. Hex. Jam, 1-1/4 -12 Cad. Pl.	X	X					
13-57	21436	2	Screw—Hex. Hd. Cap, 1/2-13 x 2 in. Cad. Pl.	X	X					
	OY-18982	1	Lead, +F, #8 Rubber Tirex, 9 Ft.	X	X					
	OY-18187-C	2	Lead, +G -G, #0 Rubber Tirex, 9 Ft.	X	X					
	OY-18187-D	1	Lead, +S, #0 Rubber Tirex, 12-1/2 Ft.	X	X					
13-58	21539	2	Washer—Lock, 1/2 in. Cad. Pl.	X	X					
13-59	514-F-515	1	Cover—Terminal Box	X	X					
13-60	9579-F-19	1	Terminal Board Assembly	X	X					
	21953	5	Screw—Hex. Hd. Cap, 5/8-11 x 2 in. Cad. Pl. (Generator to Flywheel Housing)	X	X					
	B-367-A	2	Washer (Shim)	X	X					
	21540	5	Washer—Lock, 5/8 in. Cad. Pl.	X	X					
	Y-18270	2	Screw—Generator Support Cap	X	X					
	21540	2	Washer—Lock, 5/8 in. Cad. Pl.	X	X					
	116051-D	1	Safety Wire—Dead Soft Brass, #14 (.062) x 20 in. long	X	X					
	Y-18167	1	Plate—Name (Generator)	X	X					
14-1	78589-A	1	Breather—Oil Bath (Note: On Model "B-1" units, breather is oil filler)	X	X			X	X	
	Y-7324-A	1	Adapter—Oil Bath Breather	X				X		
	OY-7325	1	Stud—Oil Bath Breather	X	X			X	X	
	OY-18037-B	1	Box Assembly—Control, consists of:	X	X					
	Y-18037-C	1	Box—Control Necessary to use with 18038-B	X	X					
14-3	Y-18134	1	Panel—Control Box	X	X					
	21101	4	Screw—Rd. Hd. Mach. #10-24 x 1/2 Cad. Pl.	X	X					
	21625	4	Washer—Shakeproof Lock, #10	X	X					
14-4	Y-12029	1	Gauge—Vacuum	X	X			X	X	
14-5	Y-7540	1	Gauge—Oil	X	X			X	X	
14-6	Y-6287-C	1	Gasket—Cover	X	X					
14-7	Y-18039	1	Stud—Cover Box	X	X					
14-8	OY-18149-B	1	Switch Assembly, consists of:	X	X					
	Y-18150-B	1	Cover—Switch	X	X					
	Y-18149	1	Switch—Push Button	X	X					
	21889	4	Screw—Rd. Hd. Mach. #8-32 x 1/2 in. Cad. Pl.	X	X					
	21818	4	Washer—Shakeproof Lock, Int. #8	X	X					
14-9	50048-B	1	Manometer	X	X			X	X	
	21163	2	Screw—Headless Cone Point Set	X	X			X	X	
14-10	Y-6161-A	1	Cover—Knob	X	X					
	B-7695	1	Gasket	X	X					
	B-9578	1	Ring—Snap	X	X					
14-11	Y-18038-B	1	Cover—Control Box Necessary to use with Y-18037-C	X	X					
	Y-18041	1	Pin—Hinge (Used on Y-18038)	X	X					
	Y-18041	2	Pin—Hinge (Used on Y-18038-B)	X	X					

ENGINE GENERATOR ACCESSORY AND UNIT PARTS											
FIG. & REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS				
				B	B-1		C	D	D-1		
14-12	B-10394	1	Spring—Hinge Pin	X	X						
	21556	2	Pin Cotter, 1/8 in. x 3/4 in. Cad. Pl.	X	X						
	Y-18167	1	Plate—Unit Name	X	X						
	21766	2	Screw—Parker Kalon Rd. Hd. Type "Z", #4 x 3/16, Cad. Pl.	X	X						
			(CRANKCASE TO OIL GAUGE TO OIL FILTER LINE)								
	B-4094	2	Union—Half, 1/4 Flare x 1/8 M.P.	X	X		X	X	X		
	B-4092	2	Nut—Flare, 1/4 in.	X	X		X	X	X		
	B-10168	1	Elbow	X	X						
	41936-E	1	Tube—Copper, 1/4 O.D. x (.035) wall x 16 in.	X	X						
	63599	1	Fitting—1/8 Compression Tee	X	X						
	B-8957-Y	1	Tube—Copper, 1/8 O.D. x 1/16 I.D. x 58 in. long	X	X						
	Y-14212-K	1	Autoduct, 50 in. long	X	X						
	Y-6764	1	Elbow, 1/8 Sweat Tube x 1/8 Male Pipe	X	X						
			(REGULATOR TO MANOMETER LINE)								
	Y-6438	1	Adapter, 1/8 Tube x 1/8 Male Pipe	X	X						
	Y-14212-E	1	Autoduct, 28 in. long	X	X						
	B-8957-W	1	Tube—Copper, 1/8 O.D. x 1/16 I.D. x 33 in. long	X	X						
	Y-6766	1	Elbow—Compression Male, 1/8 in.	X	X						
	Y-6761	1	Strainer—Regulator	X	X			X	X		
	Y-6818	2	Nipple—Close, 1/2 in. Galv.	X	X			X	X		
	Y-6736	1	Elbow—Union Pipe	X	X			X	X		
	Y-6737-A	1	Pipe—Fuel, 1/2 x 14-7/8 in. long	X							
	950020	1	Pipe—Fuel, 1/2 in. x 19-7/8 in. long		X			X	X		
	Y-11089	2	Elbow—Pipe, 1/2 in.	X	X			X	X		
	950020-A	1	Nipple—Pipe, 1/2 x 7 in. long		X			X	X		
	Y-6738	1	Nipple—Pipe, 1/2 in. x 3 in. long	X							
	Y-6494	1	Plug—Square Hd. Pipe, 1/2 in.	X	X			X	X		
	Y-6899	1	Bushing—Fuel Line Support	X	X			X	X		
	14-13	50573-C	1	Regulator (Refer to Fig. #21 for detailed parts list)	X	X			X	X	
		21538	2	Washer—Lock, 5/16 in. Cad. Pl.	X	X					
		21310	2	Screw—Hex. Hd. Cap, 5/16 in. x 3/4 in. Cad. Pl.	X	X			X	X	
		Y-11087	1	Bushing—Reducing, 1 in. x 1/2 Galv.	X	X			X	X	
		Y-7235	1	Elbow—Street, 3/4 in. Malleable Iron Galv.	X	X					
	14-14	Y-18099	1	Hose—Carburetor	X	X					
		Y-6503	2	Clamp—Hose	X	X					
		Y-6232	2	Nipple—Pipe, 3/4 in.	X	X					
	14-15	Y-6741	1	Elbow—Female Union Pipe, Malleable Iron, 3/4 in.	X	X					
		Y-7238	1	Nipple—Close, 3/4 in.	X	X					
	14-16	51034-A	1	Carburetor (Refer to Figure 6 for detailed parts list)	X	X					

## ENGINE GENERATOR ACCESSORY AND UNIT PARTS

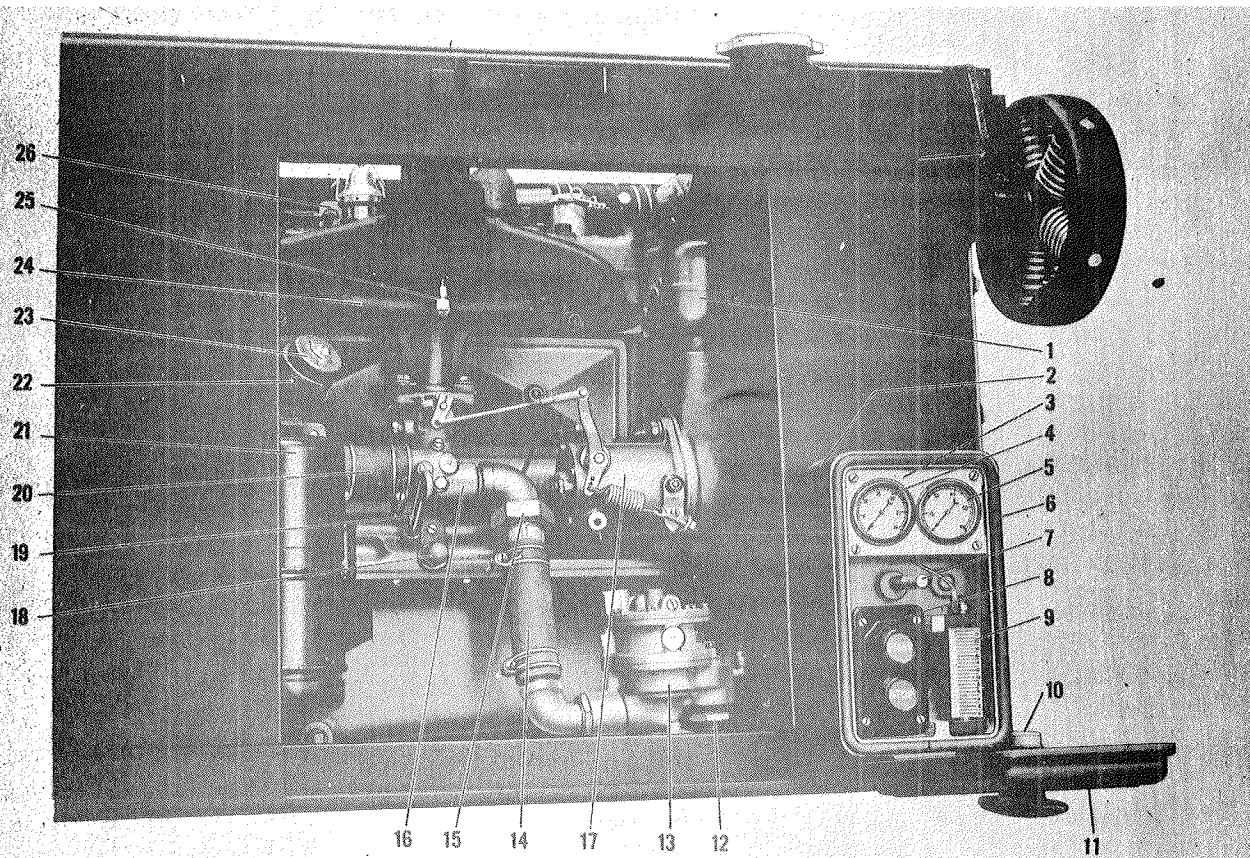


FIG. 14—CARBURETOR SIDE VIEW OF ENGINE-GENERATOR

FIG. & REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS			
				B	B-1		C	D	D-1	
14-17	K-198-A	1	Governor Assembly (Refer to Figure 5 for detailed parts list)	X	X					
14-18	65500	1	Nut—Oil Relief Valve (Refer to Figure 1, Ref. Nos. 46 to 50 for detailed parts list)	X	X			X	X	
14-19	073163	1	Gauge Assembly—Oil Level	X				X		
14-19	0950053	1	Gauge Assembly—Oil Level (Refer to Figure 1, Ref. No. 45 for detailed parts list)	X	X			X	X	
14-20	Y-6577	1	Hose—Air Cleaner (Long)	X	X			X	X	
	Y-6502	4	Clamps—Hose		X				X	
	Y-6577-B	1	Hose—Air Cleaner (Short)		X					
	B-4855	1	Gasket—Air Cleaner	X	X			X	X	
	Y-7661	1	Cleaner—Air (Refer to Fig. #7, Ref. #16 to #17)		X				X	
	Y-7662	1	Precleaner		X				X	
	21729	4	Washer—Lock, 3/8 x 1/8 x 3/32 in.		X				X	
	39018	2	Screw—Special Cap		X				X	
	21344	2	Screw—Hex. Hd. Cap 3/8 - 16 x 3/4 in. Cad. Pl.		X				X	
	Y-7656	1	El1—Air Cleaner to Carburetor		X				X	

ENGINE GENERATOR ACCESSORY AND UNIT PARTS											
FIG. & REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS				
				B	B-1		C	D	D-1		
14-21	0Y-7658	1	Support—Air Cleaner		X					X	
	Y-7303	1	Cleaner—Air	X				X			
	21344	4	Screw—Hex. Hd. Cap 3/8 - 16 x 1 in. Cad. Pl.	X				X			
	21729	4	Washer—Lock, 3/8 Cad. Pl.	X				X			
	Y-7328	1	Adapter—Air Cleaner Inlet Tube	X				X			
14-22	Y-7304	1	Tube—Air Cleaner Inlet	X							
	Y-6502	2	Clamps—Hose	X				X			
	Y-7329	1	Precleaner—Stator	X				X			
	Y-6618-A	1	Oil Filler and Air Cleaner Pipe	X				X			
	21310	1	Screw—Hex. Hd. Cap, 5/16 - 18 x 3/4 Cad. Pl.	X				X			
	21947	1	Screw—Allen Hd. Cap, 5/16 - 18 x 1 in. Cad Pl.	X				X			
	21538	2	Washer—Lock, 5/16 Cad. Pl.	X				X			
14-23	Y-7072	1	Cap—Oil Filler	X				X			
	0Y-7660	1	Elbow Assembly—Oil Filler, consists of:		X					X	
	Y-7660	1	Elbow—Oil Filler		X					X	
	Y-7324-A	1	Adapter—Oil Bath Breather		X					X	
	Y-7074	1	Neck—Oil Filler	X	X			X		X	
14-24	YD-115-K	1	Manifold—Combination (Refer to Figure 1, Ref. No. 19 for detailed parts list)	X	X		X	X	X		
			(MANIFOLD TO VACUUM GAUGE LINE)								
14-25	Y-6766	1	Elbow—Compression, 1/8 Tube x 1/8 M. P.	X	X						
	Y-6764	1	Elbow, 1/8 Sweat Tube x 1/8 Male Pipe	X	X						
	B-8957-X	1	Tube—Copper, 1/8 O. D. x 1/16 I. D. x 53 in.	X	X						
	Y-14212-K	1	Autoduct, 50 in. long	X	X						
			(CARBURETOR TO REGULATOR TUBE)								
	0Y-7593	1	Tube Assembly—Balance, consists of:	X	X						
	Y-7593	1	Tube—Copper, 1/4 O. D. x (.035) Wall x 14-1/4 in.	X	X						
	B-4092	2	Nut—Flare, 1/4 in.	X	X						
	0Y-7596	1	Elbow Assembly—Restricted Half Union, Con- sists of:	X	X			X	X		
	Y-7596	1	Elbow—Special Half Union	X	X			X	X		
	Y-7597	1	Plug—Restriction	X	X			X	X		
	B-1686	1	Elbow—Half Union, 1/4 Flare x 1/8 M. P.	X	X			X	X		
	14-26	0Y-7563	1	Support Assemboy—Magneto Cable, consists of:	X	X					
		Y-7563	1	Support—Magneto Cable	X	X					
21279		2	Screw—Hex. Hd. Cap, 1/4 - 20 x 7/8 Cad. Pl.	X	X						
15-1	68267	1	Bracket—Magneto	X	X		X	X	X		
	8D-89-A	1	Gasket—Magneto Bracket	X							
15-2	21352	4	Screw—Hex. Hd. Cap, 3/8-16 x 1-1/4 in.	X	X		X	X	X		
	21052	4	Washer—Lock, 3/8 in.	X	X		X	X	X		
	21504	2	Pin—Taper, #4 x 3/4 in.	X	X		X	X	X		
	21002	1	Key—Woodruff, #3 (Magneto Coupling)	X	X		X	X	X		
15-3	21346	2	Screw—Magneto Mounting Hex. Hd. Cap, 3/8- 16 x 7/8 in.	X	X		X	X	X		

ENGINE GENERATOR ACCESSORY AND UNIT PARTS										
FIG.& REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS			
				B	B-1		C	D	D-1	
15-4 15-5 15-6	21052	2	Washer—Lock, 3/8 in. (Mag. to Bracket)	X	X		X	X	X	
	21030	2	Pin—Taper, #2 x 1 in.	X	X		X	X	X	
	E-50120-L	1	Magneto—Bosch (Refer to Fig. No. 23)	X	X			X	X	
	Y-6409	1	Cover—Magneto Coupling Dust	X	X		X	X	X	
	0116553-A	1	Cable Assembly—Magneto Consists of:	X	X					
	20929	1	Wire	X	X					
	Y-18731	4	Terminal	X	X					
	65583-A	4	Washer	X	X					
15-7	068160-A	1	Water Pump Assembly (Refer to Figure 4,							
15-7	A-68160-A		Reference Nos. 1 - 32 for detailed parts							
			list)	X	X		X	X	X	
15-7	A-68160-D	1	Reference Page 10A, Fig. 4	X	X		X	X	X	
15-8	Y-18006-A	1	Elbow—Water Pump Inlet	X	X					
	B-2692	1	Gasket—W. P. Inlet Elbow	X	X		X	X	X	
	21052	2	Washer—Lock 3/8 in.	X	X		X	X	X	
	21348	2	Screw—Hex. Hd. Cap, 3/8-16 x 1 in.	X	X		X	X	X	
15-9	B-7979	1	Hose—Bottom Radiator	X						
	Y-6502	2	Clamp—Hose	X	X					
15-10	Y-6036-A	1	Belt—Fan	X						
15-11	F-16-H	1	Fan—(Refer to Figure 7, Ref. No. 22 for							
			detailed parts list for fan)	X				X		
	21553	1	Pin—Cotter, 3/32 x 1 in. Cad. Pl.	X			X	X		
	Y-18814-M	1	Washer—Plain, 5/8 in. Cad. Pl.	X			X	X		
	B-5004	1	Nut—Hex. Hd. Half, 5/8-18	X	X			X	X	
	21540	1	Washer—Lock, 5/8 in. Cad. Pl.	X	X			X	X	
	Y-6027-C	1	Bracket—Fan		X					
	21360	3	Screw—Hex. Hd. Cap, 3/8-16 x 1-3/4 in.	X						
	21537	3	Washer—Lock, 3/8 in.	X	X			X	X	
	0Y-19472-B	1	Support Assembly—Fan (Refer to Figure							
			10, Refer Nos. 1 to 22 for detailed							
			parts list of fan and fan support parts							
			as used on Model "B-1" and "D-1" Units.)		X				X	
15-12	0950008-A	1	Frame—Engine Generator		X					
15-13	0Y-6224	1	Cover—Timing Hole	X	X					
	21344	2	Screw—Hex. Hd. Cap, 3/8-16 x 3/4 in.							
			Cad. Pl.	X	X					
	21190	2	Nut—Hex. 3/8-16 Cad. Pl.	X	X					
	21729	2	Washer—Lock, 3/8 in. Cad. Pl.	X	X					
15-14	0Y-18133	1	Cover—Engine Compartment	X						
15-14	0950019	1	Cover—Engine Compartment		X					
15-15	Y-6803	1	Stud—Engine Compartment Cover	X	X			X	X	
	Y-6403	1	Nut—Cover Winged	X	X			X	X	
15-16	950867	1	Door Assembly—Used on Left & Right Side	X	X			X	X	
15-17	Y-46	2	Transfer—Name (Located on Side Door)	X	X					
	Y-6708	2	Spring—Door Clamp (Attached to the Top of							
			Frame Door Opening)	X	X			X	X	
	21805	2	Screw—Parker Kalon Hex. Cap, 3/8 x 5/8 Cad. Pl.	X	X			X	X	

ENGINE GENERATOR ACCESSORY AND UNIT PARTS									
FIG. & REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS		
				B	B-1		C	D	D-1
15-18	0Y-18516	1	Shield—Manifold Heat	X	X				
15-19	0Y-18517	1	Shield—Engine Compartment Exhaust, Consists of:	X	X				
	Y-18517	1	Shield (Furnished as Assembly Only)	X	X				
	Y-18525	1	Clamp—Exhaust Shield (Furnished as Assembly Only)	X	X				
	Y-18526	1	Cover—Exhaust Shield	X	X				
	21778	4	Screw—Parker Kalon Rd. Hd. #10 x 3/8 in. Cad. Pl.	X	X				
	21181	2	Nut—Hex, 5/16-18	X	X				
15-20	Y-18519	1	Shield—Outside Exhaust	X	X				
	Y-18529	1	Cover—Outside Exhaust Shield	X	X				
	21803	2	Screw—Parker Kalon Hex. Hd. Cap, 5/16 x 1/2 Cad. Pl.	X	X				
	21310	2	Screw—Hex. Hd. Cap, 5/16-18 x 3/4 in.	X	X				
	21538	2	Washer—Lock, 5/16 x 9/64 x 1/16 Cad. Pl.	X	X				
	21778	4	Screw—Parker Kalon Rd. Hd. #10 x 3/8 Cad. Pl.	X	X				
	21797	4	Screw—Parker Kalon Hex. Hd. Cap, #14 x 1/2 Cad. Pl.	X	X				
15-21	950074-A	1	Rock Wool (3 lbs. - Loose)	X	X				
	Y-18518	1	Shield—Exhaust (Generator Compartment)	X					
	21797	4	Screw—Parker Kalon Hex. Hd. Cap, #14 x 1/2 in. Cad. Pl.	X					

## ENGINE GENERATOR ACCESSORY AND UNIT PARTS

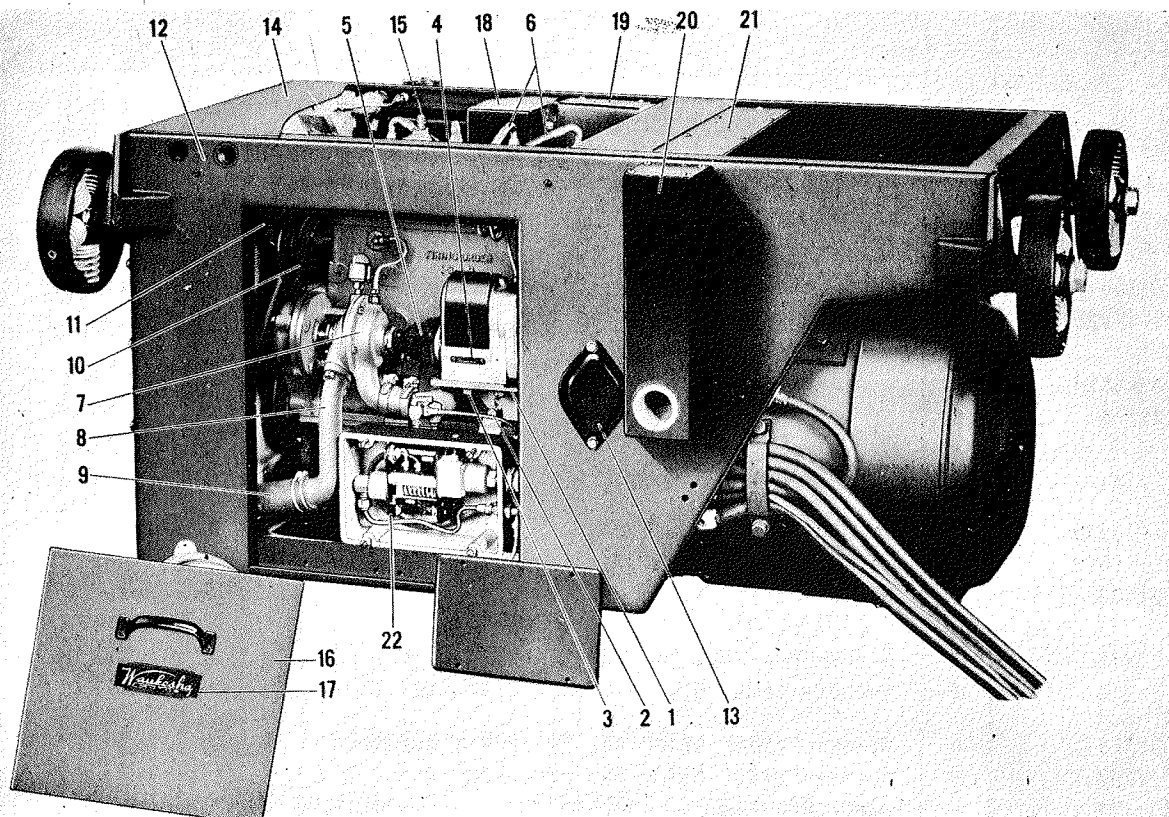


FIG. 15—MAGNETO SIDE VIEW OF ENGINE-GENERATOR

FIG.& REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS			
				B	B-1		C	D	D-1	
15-22	Y-18527	1	Cover—Exhaust Shield Top (Generator Compartment)	X						
	21778	7	Screw—Parker Kalon Rd. Hd. Mach. Type "Z" #10 x 3/8 in. Cad. Pl.	X						
	Y-18528	1	Angle—Exhaust Shield Top Cover	X						
	21797	3	Screw—Parker Kalon Hex. Cap, #14 x 1/2 in. Cad. Pl.	X						
			See Ref. 7-101-A and Ref. 7-101. These two oil pressure switch (Group 399-3) and temperature switch (Group 399-4) replace OY-6980 combination oil pres- sure, and water temperature switch.	X	X					

ENGINE GENERATOR ACCESSORY AND UNIT PARTS											
FIG. & REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS				
				B	B-1		C	D	D-1		
16-1	Y-18004	1	Flange—Exhaust Manifold	X	X						
	BE-801	1	Gasket—Exhaust Manifold Flange	X	X						
	Y-18012	4	Screw—Cap	X	X						
16-2	Y-18142	1	Nipple—Pipe	X	X						
16-3	Y-18143	1	Nipple—Pipe	X	X						
16-4	Y-6235	3	Elbow—Pipe	X	X						
16-5	Y-18144	1	Nipple—Pipe, 1-1/2 x 8 in.	X	X						
	Y-18271	1	Bolt—U	X	X						
	Y-18266	1	Bar—Tie	X	X						
	21192	6	Nut—Hex. Jam, 3/8-16, Cad. Pl.	X	X						
	21729	4	Washer—Lock, 3/8 in., Cad. Pl.	X	X						
16-6	Y-18058	1	Nipple—End Exhaust Pipe	X							
	Y-6838	1	Filter Assembly—Oil, consists of:	X	X			X	X		
	HW-1651	1	Base	X	X			X	X		
	A-2403	1	Shell	X	X			X	X		
	B-7358	1	Gasket—Bottom Shell	X	X			X	X		
	B-7369	1	Gasket—Top Oil Filter	X	X			X	X		
	SA-1667	1	Tube—Assembly	X	X			X	X		
	SA-1327	1	Element—Duo-Flo	X	X			X	X		
	21353	4	Screw—Hex. Hd. Cap, 3/8-16 x 1-1/4 in. Cad.Pl.	X	X						
	21729	4	Washer—Lock, 3/8 in. Cad. Pl.	X	X						
			(OIL FILTER TO CASE - RETURN)								
		B-1686	1	Elbow—Half Union, 1/4 Flare x 1/8 M.P.	X	X		X	X	X	
		B-4094	1	Union—Half, 1/4 Flare x 1/8 M.P.	X	X		X	X	X	
	B-4092	2	Nut—Flare, 1/4 in.	X	X		X	X	X		
	41936-C	1	Tube—Copper, 1/4 O.D. x (.035) wall x 6 in.	X	X						
16-7	Y-18018	4	Shields—Spark Plug (Used on older models, Refer to Figure 15, Ref. No. 6 for latest type)	X	X						

## ENGINE GENERATOR ACCESSORY AND UNIT PARTS

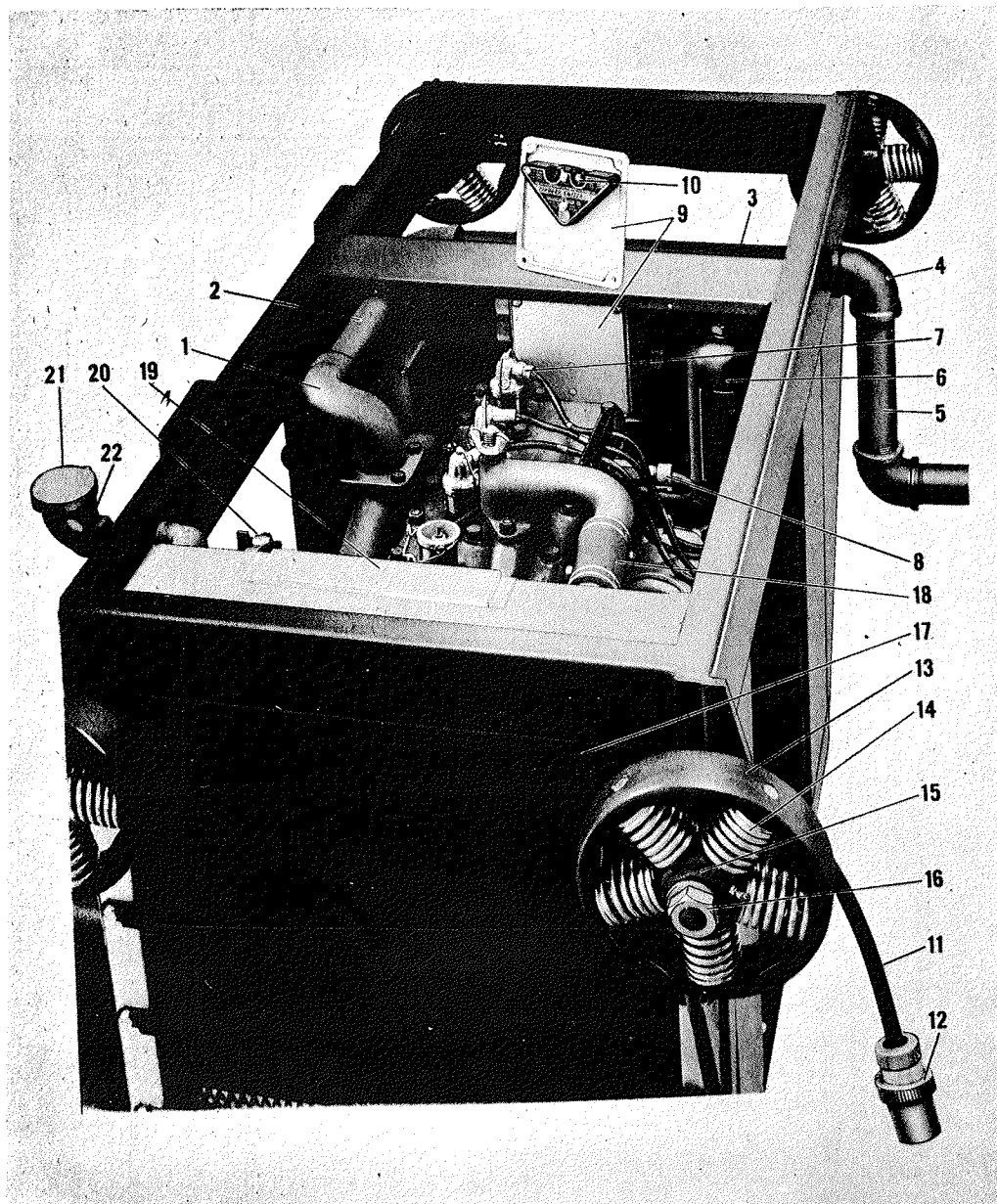


FIG. 16—TOP VIEW OF ENGINE-GENERATOR

FIG. & REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS			
				B	B-1		C	D	D-1	
16-8	Y-7646	1	Switch—Heat (If combination oil-heat switch is used, refer to Figure 15, Ref. No. 22)	X			X			
	Y-18268	1	Extension—Heat Switch	X						
	Y-6848	1	Grip—Cord	X						
	Y-6427	2	Terminal—Wedge-On, #16	X						
	950009	1	Switch—Heat (Part of Group 399-4)		X					X
	950072	1	Adapter—Elbow		X					X
	21873	1	Screw—Fill. Hd. Mach. 1/4-20 x 5/8 in. Cad. Pl.		X					X

ENGINE GENERATOR ACCESSORY AND UNIT PARTS											
FIG.& REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS				
				B	B-1		C	D	D-1		
16-9	21629	1	Washer—Shakeproof Lock, Int. 1/4 in. Cad.Pl.		X				X		
	Y-6785-B	1	Tirex—Two Wire, #16, 12 in. Lg.		X						
	Y-18984-A	4	Lug—Solderless		X						
	Y-19154	2	Sleeve—Terminal		X						
	Y-6867-A	1	Grip—Cord		X						
	Y-6784	1	Adapter—Ralco Cord Grip		X						
	21347	3	Screw—Hex. Hd. Cap, 3/8-16 x 7/8 Cad. Pl.		X						
	21633	3	Washer—Shakeproof Lock, Int. 3/8 in. Cad. Pl.		X						
	Y-6842-B	1	Box—Junction	X							
	950641-B	1	Terminal Block	X	X						
	21342	2	Screw—Hex. Hd. Cap, 3/8-16 x 5/8 in. Cad. Pl.	X	X						
	21633	2	Washer—Shakeproof Lock, Int. 3/8 in. Cad. Pl.	X	X						
	Y-6843	1	Cover—Junction Box	X							
	Y-6843-B	1	Cover—Junction Box		X						
	Y-6846	1	Gasket—Junction Box cover	X	X						
16-10	21279	4	Screw—Hex. Hd. Cap, 1/4-20 x 7/8 in. Cad. Pl.	X	X						
	21629	4	Washer—Shakeproof Lock, Int. 1/4 in. Cad. Pl.	X	X						
	Y-6867-A	2	Grip—Cord	X	X						
	78206-H	1	Elbow—Street, 1/2 x 45 deg. (Galv.)	X	X						
	Y-6778-B	1	Tirex—Three Wire, #16, 5-1/2 ft. lg.	X	X						
	Y-18984-A	3	Lug—Solderless, for #16 Wire, #8 Stud	X	X						
	Y-19154	3	Sleeve—Terminal	X	X						
	Y-6847	1	Switch—Tipover	X							
	21664	2	Screw—Rd. Hd. Mach. #8-32 x 1-1/4 in. Cad.Pl.	X							
	21260	2	Nut—Hex. #8-32 Cad. Pl.	X							
	21604	2	Washer—Shakeproof Lock, Ext. #8, Cad. Pl.	X							
	Y-14574-H	1	Wire—Rubber Covered Stranded, #14, 12 in. lg.	X							
	Y-6457	1	Terminal—Wedge-On, #14	X							
	Y-18169-D	1	Tirex—7 Wire, #16, 10 ft. lg.	X	X						
	Y-18128-A	1	Plug—7 Pole (Less Gland Nut)	X	X						
16-12	Y-7296-A	1	Grip—Cord (3/4 Pipe)	X	X						
	Y-18342	1	Connector—Universal Two Screw, 3/4 in.	X	X						
	Y-18277-A	1	Bushing—3/4 in. (Galv.)	X	X						
	0Y-18331	1	Clamp Assembly—Cable, Consists of:	X	X						
	Y-18331	1	Clamp—Cable	X	X						
	21125	4	Screw—Fil. Hd. Mach. #8-32 x 1/2 in. Cad. Pl.	X	X						
	Y-18984-A	2	Lug—Solderless	X	X						
	21666	2	Screw—Rd. Hd. Mach. (Brass) #10-24 x 3/8 in.	X	X						
	21644	2	Washer—Shakeproof Lock, #10 (Bronze)	X	X						
	21869	2	Nut—Hex. Hd. Mach. #10-24 (Brass)	X	X						
	(MAGNETO GROUND TERMINAL)										
	Y-19246-T	1	Wire—Aircraft, #14, 20 in. lg.	X	X						
	Y-6456-F	1	Loom, 7/32 I.D. x 16 in. lg.	X	X						
	Y-18984-A	2	Lug—Solderless, for #14 Wire	X	X						

ENGINE GENERATOR ACCESSORY AND UNIT PARTS									
FIG. & REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS		
				B	B-1		C	D	D-1
	Y-19154	1	Sleeve—Terminal	X	X				
	Y-6867-A	1	Grip—Cord	X	X				
	21098	1	Screw—Rd. Hd. Mach, #10-24 x 3/8 in. Cad. Pl.	X	X				
	21625	1	Washer—Shakeproof Lock, Int. #10, Cad. Pl.	X	X				
	Y-18187	1	Cable (Generator Grounding) 5-1/2 ft. lg.	X	X				
	Y-18493-B	1	Lug—Terminal, 1/2 in. Stud	X	X				
	21539	1	Washer—Lock, 1/2 in. Cad. Pl.	X	X				
	21426	1	Screw—Hex. Hd. Cap, 1/2-13 x 1 in. Cad. Pl.	X	X				
	Y-6246	4	Clip—Wire, 5/8 in.	X	X				
	21101	4	Screw—Rd. Hd. Mach. #10-24 x 1/2 in. Cad. Pl.	X	X				
	21625	4	Washer—Shakeproof Lock, Int. #10, Cad. Pl.	X	X				
	21262	4	Nut—Hex. Mach. Screw, #10-24 Cad. Pl.	X	X				
			(RESISTOR ASSEMBLY—LOCATED ON REAR PARTITION ABOVE GENERATOR)						
	OY-18485-C	1	Resistor Assembly (40 volt) (Superseded by A-950116) Consists of:	X		OY-18485-C ASSEMBLY NOT AVAILABLE			
	Y-18344-A	1	Grid—Resistor	X					
	Y-18345-D	1	Frame—Resistor	X		Y-18345-D FRAME NOT AVAILABLE			
	Y-18337	9	Spacer	X					
	Y-18343	9	Support—Porcelain Resistor	X					
	Y-18368	9	Gasket—Asbestos	X					
	21363	9	Screw—Hex. Hd. Cap, 3/8-16 x 2 in. Cad. Pl.	X					
	Y-18814-H	9	Washer—Plain, 3/8 in. Cad. Pl.	X					
	Y-18340	3	Washer—Insulator	X					
	Y-18341	3	Bushing—Insulator	X					
	Y-18339	1	Post—Terminal	X					
	Y-18369	2	Terminal—Resistor	X					
	Y-18370	3	Nut	X					
	21729	5	Washer—Lock, 3/8 in. Cad. Pl.	X					
	21826	5	Nut—Hex. (Brass) 3/8-16	X					
	Y-18338	1	Bar—Bus	X					
	Y-18493	2	Lug—Terminal	X					
	Y-18346	1	Cover	X					
	21782	4	Screw—Rd. Hd. Parker Kalon, Type "Z" #12 x 3/8 Cad. Pl.	X					
	Y-6222	2	Nipple	X					
	106026	2	Nut—Lock	X					
	OY-18485-D	1	Resistor Assembly (80 volt) (Superseded by A-950116-A) Consists of the same items as OY-18485-C except for:	X		OY-18485-D NOT AVAILABLE			
	Y-18344-A	1	Grid—Resistor	X					
	21426	2	Screw—Hex. Hd. Cap (Resistor Mounting) 1/2- 13 x 1 in. Cad. Pl.	X					
	21539	2	Washer—Lock, 1/2 in. Cad. Pl.	X					
	21344	1	Screw—Hex. Hd. Cap, 3/8-16 x 3/4 in. Cad. Pl.	X					
	21729	1	Washer—Lock, 3/8 in. Cad. Pl.	X					
	A-950116	1	Resistor Assembly (40 Volt) (Supersedes OY-18485-C) Consists of:	X	X				
	O950116	1	Frame—Resistor						

ENGINE GENERATOR ACCESSORY AND UNIT PARTS										
FIG. & REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS			
				B	B-1		C	D	D-1	
	Y-18344-A	1	Grid—Resistor	X	X					
	Y-18337	9	Spacer	X	X					
	Y-18343	9	Support—Porcelain Resistor	X	X					
	Y-18368	9	Gasket—Asbestos	X	X					
	Y-18814-H	9	Washer—Plain	X	X					
	21885	9	Screw—Hex. Hd. Cap	X	X					
	21633	9	Washer—Shakeproof Lock	X	X					
	21190	9	Nut—Hex.	X	X					
	950119	2	Washer—Insulator	X	X					
	950120	2	Bushing—Insulator	X	X					
	26087	2	Washer	X	X					
	Y-18601-C	1	Stud—Resistor	X	X					
	Y-18390-B	4	Washer—Lock	X	X					
	21826	3	Nut—Hex. (Brass)	X	X					
	Y-18493	2	Lug—Terminal	X	X					
	Y-6222	1	Nipple	X	X					
	106026	1	Nut—Lock	X	X					
	A-950116-C	1	Resistor Assembly (80 Volt) (Supersedes OY-18485-D) Consists of the same items as A-950116 except for:	X	X					
	Y-18344-B	1	Grid—Resistor	X	X					
	21901	4	Screw—Hex. Hd. Cap 7/16-14 x 7/8 Lg. Cad. Pl.		X					
	21635	4	Washer—Shakeproof Lock, Ext. 7/16 in. Cad. Pl.		X					
	21198	4	Nut—Hex.		X					
	950118	1	Cover—Resistor		X					
	Y-18814-H	2	Washer—Plain		X					
	Y-6219	2	Nut—Wing		X					
	Y-18371	1	Support—Cable	X	X					
	21310	2	Screw—Hex. Hd. Cap, 5/16-18 x 3/4 in. Cad. Pl.	X	X					
	21631	2	Washer—Shakeproof Lock, Int. 5/16 Cad. Pl.	X	X					
	21182	2	Nut—Hex. 5/16-18 Cad. Pl.	X	X					
	Y-6222	1	Nipple (Used on Cable From Generator to Resistor)	X	X					
	106026	1	Nut—Lock, 3/4 in.	X	X					
	Y-18342	1	Connector—Universal 2-Screw	X						
16	AY-6615-D	4	Wheel Assembly—Cushion, Consists of:	X	X					
16-13	Y-6615-A	1	Rim—Cushion Wheel	X	X					
16-14	Y-6636-B	5	Spring—Cushion Wheel	X	X					
16-15	Y-6616-B	1	Hub—Cushion Wheel	X	X					
	Y-6975	10	Support—Spring	X	X					
	21547	5	Screw—Socket Hd. Cap, 3/8-16 x 1/2 in. Cad. Pl.	X	X					
	B-2747	5	Washer—Copper	X	X					
	Y-6979	2	Bushing	X	X					
	Y-6978	5	Stud	X	X					
	OY-6616-B	4	Hub Assembly—Cushion Wheel, consists of: Y-6975, Y-6979, & Y-6978	X	X					

ENGINE GENERATOR ACCESSORY AND UNIT PARTS											
FIG. & REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS				
				B	B-1		C	D	D-1		
16-16	Y-6035	4	Nut—Jam	X	X						
	Y-6125-A	4	Washer—Wheel	X	X						
	21562	4	Pin—Cotter 1/8 x 2 in. Cad. Pl.	X	X						
			(FRONT MOTOR SUPPORT)								
	Y-7574	2	Screw—Drilled Hex. Hd. Cap, 3/8-16 x 1 in. Cad. Pl.	X	X						
	116050-G	1	Wire—Dead Soft Safety, #16 (.062) x 12 in. lg.	X	X						
	Y-18814-H	2	Washers—Wrought, 3/8 in. Cad. Pl.	X	X						
			(FLYWHEEL HOUSING SUPPORT)								
	21464	5	Screw—Hex. Hd. Cap, 5/8-11 x 1 in. Cad. Pl.	X	X						
	21540	5	Washer—Lock, 5/8 in. Cad. Pl.	X	X						
	16-17	0Y-18131-A	1	Screen Assembly—Radiator	X						
	16-17	0950015	1	Screen Assembly—Radiator		X					
21805		10	Screw—Hex. Hd. Parker Kalon, 3/8 x 5/8 Cad. Pl.	X							
Y-18814-H		4	Washer, 3/8 in. Cad. Pl.	X							
21805		4	Screw—Hex. Hd. Parker Kalon Cap, 3/8 x 5/8 Cad. Pl.		X						
16-18	B-7979	1	Hose—Top Radiator	X							
	Y-6502	2	Clamp—Hose	X							
16-19	Y-18130-A	1	Radiator	X							
	Y-6279	2	Union—Half, 1/4 Flare x 1/4 M.P.	X							
	0Y-7430-B	1	Tube—Radiator Vent	X							
16-20	B-205	2	Pet Cock, 1/4 in.	X							
	78280-D	1	Plug—Slotted Hd. Pipe, 1/4 in.	X							
	Y-6537	3	Plug—Sq. Hd. Pipe, 3/4 in. (Galv.)	X							
	78283-J	1	Plug—Ctsk. Hd. Pipe, 1/2 in.	X							
	Y-18123	1	Nipple—Pipe, 3/4 x 3 in. lg.	X							
16	0Y-6639	1	Filler Assembly—Radiator, Consists of:	X							
16-21	0950291	1	Cap—Radiator Filler	X							
16-22	Y-6639	1	Body—Radiator Filler	X							
17-1	B-205	1	Pet Cock		X					X	
	Y-6279	2	Union—Half		X						
17-2	0Y-7430-D	1	Tube Assembly—Radiator Vent, Consists of:		X					X	
	Y-7430-D	1	Tube—Copper		X					X	
	B-4092	2	Nut—Flare		X					X	
17-3	0Y-6079-C	1	Cap Assembly—Pressure Relief, Consists of:		X					X	
	Y-6079-D	1	Body		X					X	
17-4	0950291	1	Cap—Relief with Gasket		X					X	
	950198	1	Filler—Cap Gasket		X					X	
17-5	78206-K	1	Elbow—Street, 45°, 3/4 in. Brass		X					X	
	Y-7238	1	Nipple—Close Pipe, 3/4 in.		X					X	
	A-950298	1	Filler—Body and Cap Assem.		X					X	
	950298	1	Red Filler—Body Neck		X					X	
17-6	Y-18676-C	1	Hose—Top Radiator		X						
	Y-18676-D	1	Hose—Bottom Radiator		X						
17-7	Y-6502	4	Clamp—Hose		X						
	0950010	1	Shroud—Left Half Top Radiator		X						
	0950011	1	Shroud—Right Half Top Radiator		X						

## ENGINE GENERATOR ACCESSORY AND UNIT PARTS

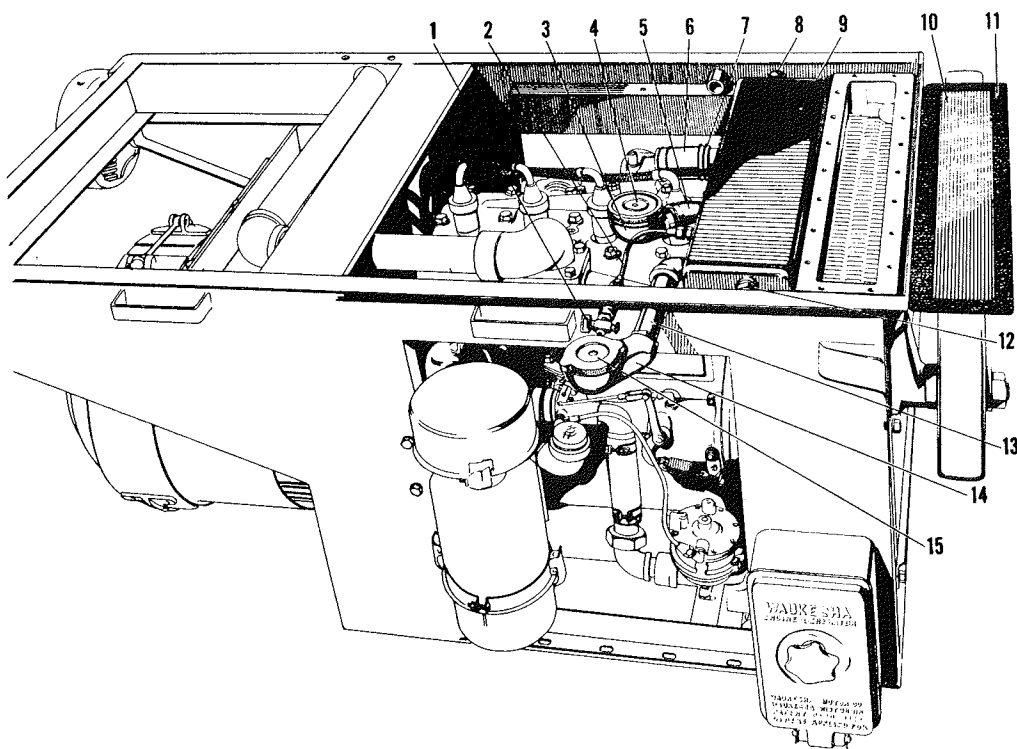


FIG. 17—RADIATOR DETAILS OF MODEL "B-1" ENGINE-GENERATOR

FIG. & REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS			
				B	B-1		C	D	D-1	
17-8 17-9 17-10 17-11	21629	6	Washer—Shakeproof Lock, Int. 1/4 in. Cad. Pl.		X					
	21272	6	Screw—Hex. Hd. Cap, 1/4-20 x 1/2 in. Cad. Pl.		X					
	0950012	1	Shroud—Bottom Radiator		X					
	39010	4	Screw—Special Hex. Hd. Cap		X					
	Y-18814-W	4	Washer—Plain, 5/16 in. Cad. Pl.		X					
	21631	4	Washer—Shakeproof Lock Int. 5/16 in. Cad. Pl.		X					
	950005	1	Elbow—Water Outlet (Bottom of Radiator)		X					
	26128	1	Plug—Sq. Hd. Pipe 1/2 Brass		X					
	950007	1	Gasket—Water Outlet Flange		X					
	21349	2	Screw—Hex. Hd. Cap, 3/8-16 x 1 in. Cad. Pl.		X					
	B-8556	2	Washer—Copper, 3/8 in.		X					
	26128	1	Plug—Sq. Hd. Pipe, 1/2 in. Brass		X					
	Y-19468	1	Radiator		X					X
	Y-4073	1	Cover—Radiator Inspection		X					X
	Y-4074	1	Gasket—Radiator Inspection Cover		X					X
	26095	18	Screw—Rd. Hd. Mach. 1/4-20 x 5/8 in. Brass		X					X
	21050	18	Washer—Lock, 1/4 in.		X					X
	21426	4	Screw—Hex. Hd. Cap, 1/2-13 x 1 in. Cad. Pl. (Rad. Mtg.)		X					X
	Y-18814-K	4	Washer—Plain, 1/2 in. Cad. Pl.		X					X
	26110	4	Washer—Shakeproof Lock, Int. 1/2 in. Cad. Pl.		X					X

ENGINE GENERATOR ACCESSORY AND UNIT PARTS										
FIG.& REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS			
				B	B-1		C	D	D-1	
17-12	78282-L	1	Plug—Sq. Hd. Pipe, 3/4 in. (Top of Radiator)		X					X
	78282-L	2	Plug—Sq. Hd. Pipe, 3/4 in. (Bottom-Front Clean-Out Holes)		X					X
	78202-K	1	Elbow—Street, 3/4 in. Brass (Radiator Drain)		X					X
	Y-14179	1	Plug—Hex. Hd. Pipe, 1/4 in. Brass (Radiator Drain)		X					X
17-13	Y-6992	1	Nipple—Pipe 3/4 in. x 6 in. Lg.		X					
	78202-K	1	Elbow—Street, 3/4 in. Brass		X					X
17	OY-19481	1	Cap Assembly—Radiator Filler, Consists of:		X					X
17-14	Y-19481	1	Body		X					X
	Y-14394	1	Neck		X					X
17-15	Y-14393	1	Cap		X					X
(CUSHION MOUNTING TRACK PARTS)										
	AY-7422-A	1	Track Assembly—Right Hand Mounting, Consists of:		X					
	OY-7422-A	1	Track—Right Hand Mounting		X					
	Y-7361	6	Mounting—Shear Rubber		X					
	21886	18	Screw—Hex. Hd. Cap, 1/2-13 x 3/4 in. Cad. Pl.		X					
	Y-7505	6	Screw—Special Hex. Hd. Cap		X					
	21208	24	Nut—Hex. Jam, 1/2-13, Cad. Pl.		X					
	21539	24	Washer—Lock, 1/2 in., Cad. Pl.		X					
	Y-7389	2	Plate—Rubber Bumper		X					
	21339	4	Screw—Hex. Hd. Cap, 3/8-16 x 1/2 in. Cad. Pl.		X					
	21729	4	Washer—Lock, 3/8 in. Cad. Pl.		X					
	AY-7421-A	1	Track Assembly—Left Hand Mounting, Consists of:	X	X		X	X	X	
	OY-7421-A	1	Track—Left Hand Mounting	X	X		X	X	X	
	Y-7361	6	Mounting—Shear Rubber	X	X		X	X	X	
	21886	18	Screw—Hex. Hd. Cap, 1/2-13 x 3/4 in. Cad. Pl.	X	X		X	X	X	
	Y-7505	6	Screw—Special Hex. Hd. Cap	X	X		X	X	X	
	21208	24	Nut—Hex. Jam, 1/2-13 Cad. Pl.	X	X		X	X	X	
	21539	24	Washer—Lock, 1/2 in. Cad. Pl.	X	X		X	X	X	
	Y-7389	2	Plate—Rubber Bumper	X	X		X	X	X	
	21339	4	Screw—Hex. Hd. Cap, 3/8-16 x 1/2 in. Cad. Pl.	X	X		X	X	X	
	21729	4	Washer—Lock, 3/8 in. Cad. Pl.	X	X		X	X	X	
	Y-7423	2	Extension—Track	X	X		X	X	X	
	OY-6716	2	Extension—Track	X			X	X		
(DETACHED PARTS)										
	OY-18179-A	1	Block Assembly—Terminal (Mounted Under Car) (80 Volt)	X	X					
	OY-18179	1	Block Assembly—Terminal (Mounted Under Car) (40 Volt) Consists of:	X	X					
	Y-18179	1	Support—Terminal Block	X	X					
	Y-18192	1	Block—Terminal	X	X					

ENGINE GENERATOR ACCESSORY AND UNIT PARTS										
FIG. & REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS			
				B	B-1		C	D	D-1	
	21947	4	Screw—Socket Hd. Cap, 5/16-18 x 1 in.	X	X					
	21546	2	Screw—Socket Hd. Cap, 5/16-18 x 1-1/2 in.	X	X					
	Y-18231	2	Stud	X	X					
	21226	2	Nut—Hex. 5/8-18, Cad. Pl.	X	X					
	21540	2	Washer—Lock, 5/8 in. Cad. Pl.	X	X					
	Y-18199	2	Terminal—T. & B. Wedge-On	X	X					
	Y-18493	1	Lug—#4/0 Terminal 13/32 Hole (40-volt)	X	X					
	Y-18491	2	Lug—#4/0 Terminal 13/64 in. Hole (80-volt)	X	X					
	Y-18508	1	Connector—#4/0 (Ex. Flex.) T. & B. Terminal 13/32 in. (40-volt)	X	X					
	Y-18493-A	1	Lug—#4/0 Terminal 29/64 in. Hole (40-volt)	X	X					
	Y-18491-A	2	Lug—Connector 29/64 in. Hole (80-volt)	X	X					
	Y-18508-A	1	Connector—#4/0 (Ex. Flex.) T.&B. Term- inal 29/64 Hole	X	X					
	Y-18493-B	1	Lug—#4/0 Terminal, 33/64 in. Hole (40- volt)	X	X					
	Y-18491-B	2	Lug—Connector, 33/64 in. Hole (80-volt)	X	X					
	Y-18508-B	1	Connector—#4/0 (Ex. Flex.) T.&B. Term- inal 33/64 Hole	X	X					
	Y-18204-A	1	Block—Terminal	X	X					
	Y-18200-A	1	Connector—#4/0 T.&B. Terminal	X	X					
	21613	1	Washer—Shakeproof, Ext. 1/2 in. Cad. Pl.	X	X					
	21826	3	Nut—Hex. 3/8-16 (Brass)	X	X					
	21824	3	Nut—Hex. Jam, 3/8-16 (Brass)	X	X					
	B-4671	3	Washer—Brass, 3/8 I.D. x 7/8 O.D.	X	X					
	Y-18225	1	Bolt—Terminal, 1/2 in.	X	X					
	Y-18226	1	Bolt—Terminal, 7/16 in.	X	X					
	Y-18227	1	Bolt—Terminal, 3/8 in.	X	X					
	Y-18228	1	Bolt—Terminal, 5/16 in.	X	X					
	21948	1	Nut—Hex. 5/16-18 (Brass)	X	X					
	21822	1	Nut—Hex. Jam, 5/16-18 (Brass)	X	X					
	21950	1	Washer—Brass, 5/16 I.D. x 11/16 O.D.	X	X					
	Y-18129	1	Receptacle—7 Pole Control	X	X					
	78283-J	1	Plug—Ctsk. Pipe, 1/2 in.	X	X					
	Y-6157	1	Hose—Fuel	X	X					
	Y-6809	1	Support—Fuel Line	X	X					
	21805	1	Screw—Parker Kalon Hex. Cap, 3/8 x 5/8 Cad. Pl.	X	X					
	Y-7388	2	Stop—Wheel, Cad. Pl.	X	X					
	Y-7506	2	Screw—Hex. Hd. Cap	X	X					
	21226	2	Nut—Hex. 5/8-18, Cad. Pl.	X	X					
	21438	4	Screw—Hex. Hd. Cap, 1/2-13 x 2-1/4 in. Cad. Pl.	X	X					
	21539	4	Washer—Lock, 1/2 in. Cad. Pl.	X	X					
	0Y-18530	1	Connection Assembly—Flexible Exhaust, Con- sists of:	X	X					
	Y-18530	1	Connection—Flared Exhaust	X	X					
	Y-18520	1	Tube—Flexible Exhaust	X	X					
	Y-18060-A	1	Nipple—Pipe	X	X					

ENGINE GENERATOR ACCESSORY AND UNIT PARTS										
FIG. & REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS			
				B	B-1		C	D	D-1	
18 18-1   										

ENGINE GENERATOR ACCESSORY AND UNIT PARTS										
FIG. & REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS			
				B	B-1		C	D	D-1	
18-4	0Y-18209	1	Cam Assembly—Timing (80 volt) Consists of:	X	X					
	Y-18209	1	Cam—4-Point Timing (Winter)	X	X					
	Y-18222	1	Bushing	X	X					
18-4	0Y-18208	1	Cam Assembly—Timing (40 volt) Consists of:	X	X					
	Y-18208	1	Cam—2-Point Timing (Summer)	X	X					
	Y-18222	1	Bushing	X	X					
18-5	Y-18273	1	Spring—Bumper	X	X					
18-6	Y-18251	1	Cover—Timer	X	X					
	Y-18254	4	Gasket (Between Glass & Cover)	X	X					
	Y-18252	1	Glass—Timer Cover	X	X					
18-7	Y-18253	6	Clip	X	X					
	21724	6	Screw—Flat Hd. Mach. #6-32 x 3/8 in. Cad. Pl.	X	X					
	21621	6	Washer—Shakeproof Lock, Int. #6 Cad. Pl.	X	X					
	21258	6	Nut—Hex. #6-32 Cad. Pl.	X	X					
	Y-18214	1	Support—Solenoid	X	X					
	Y-18230	1	Solenoid (80-Volt)	X	X					
	Y-18229	1	Solenoid (40-Volt)	X	X					
	21960	4	Screw—Flat Hd. Mach. #8-32 x 5/8 in. Cad. Pl.	X	X					
	21641	4	Washer—Shakeproof Lock, Int. #8 Cad. Pl.	X	X					
	21889	2	Screw—Rd. Hd. Mach. #8-32 x 1/2 in. Cad. Pl.	X	X					
	21818	2	Washer—Shakeproof Lock, Int. #8, Cad. Pl.	X	X					
	18-8	Y-18246	1	Shaft—Timer	X	X				
21954		1	Nut—Castle, 3/8-24 Cad. Pl.	X	X					
21553		1	Pin—Cotter, 3/32 x 1 in. Cad. Pl.	X	X					
Y-18236		1	Washer—Felt	X	X					
21955		1	Washer—Brass, 9/16 I.D. x 1-1/4 O.D. x .091 Thick	X	X					
Y-18247		1	Spring—Drag	X	X					
21551		1	Pin—Cotter, 3/32 x 3/4 in. Cad. Pl.	X	X					
Y-18211		1	Pawl—Timer	X	X					
Y-18212		1	Pin—Pawl Support	X	X					
21058		1	Pin—Cotter, 1/16 x 1/2 in. Cad. Pl.	X	X					
21956		2	Washer—Brass, .200 I.D. x 7/16 O.D. x .036	X	X					
18-9		Y-18248	1	Spring—Pawl	X	X				
	Y-18276	1	Pin—Spring (Long)	X	X					
	Y-18176	1	Pin—Pawl Spring	X	X					
	Y-18219	1	Switch—Micro	X	X					
	Y-18234	1	Support—Switch	X	X					
	21957	1	Screw—Rd. Hd. Mach. #6-32 x 7/8 in. (Brass)	X	X					
	21958	1	Screw—Rd. Hd. Mach. #6-32 x 1-1/4 in. (Brass)	X	X					
	21621	2	Washer—Shakeproof Lock, Int. #6, Cad. Pl.	X	X					
	21959	1	Screw—Fil. Hd. Mach. #6-32 x 5/8 in. (Brass)	X	X					

## ENGINE GENERATOR ACCESSORY AND UNIT PARTS

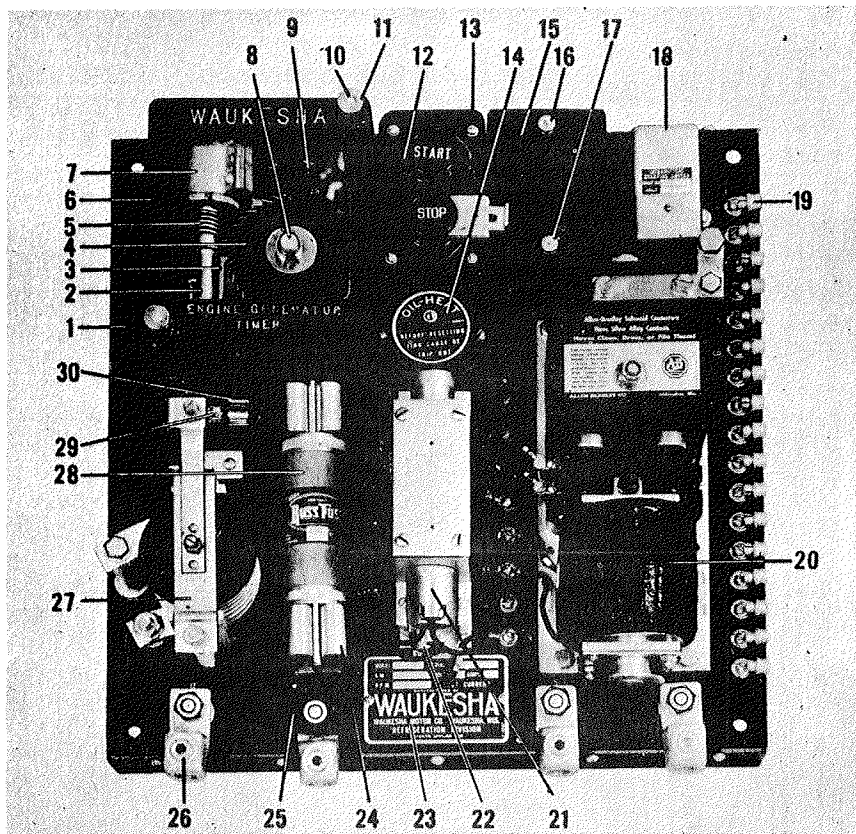


FIG. 18—ENGINE-GENERATOR CONTROL PANEL

FIG. & REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS			
				B	B-1		C	D	D-1	
18-10 18-11	21867	1	Nut—Brass Hex. #6-32	X	X					
	OY-18334	1	Lead Assembly—Terminal, Consists of:	X	X					
	Y-18250	1	Lug—Terminal	X	X					
	Y-18334-C	1	Wire—Lead, 7-1/2 in. Long	X	X					
	OY-18333	1	Lead Assembly—Terminal, Consists of:	X	X					
	Y-18250	1	Lug—Terminal	X	X					
	Y-18334-B	1	Wire—Lead, 3 in. Long	X	X					
	Y-18255	2	Stud	X	X					
	Y-18256	2	Nut—Cover	X	X					
	18-12									
18-12 18-13 18-14	OY-18149-C	1	Switch Assembly—Push Button, Consists of:	X	X					
	Y-18149	1	Switch—Push Button	X	X					
	Y-18150-C	1	Cover—Push Button Switch	X	X					
	21817	4	Screw—Rd. Hd. Mach. #6-32 x 1/2 in. Cad. Pl.	X	X					
	OY-18335	3	Wire Assembly—Lead, Consists of:	X	X					
	Y-18250	2	Lug—Terminal	X	X					
	Y-18334-A	1	Wire—Lead 6 in. Lg.	X	X					
	Y-18330	1	Support—Switch	X	X					
	21965	4	Screw—Rd. Hd. Mach. #6-32 x 1 Cad. Pl.	X	X					
	21621	4	Washer—Shakeproof Lock, #6, Int. Cad. Pl.	X	X					
18-14	Y-6146-A	1	Switch—Oil-Heat	X	X					

ENGINE GENERATOR ACCESSORY AND UNIT PARTS											
FIG.& REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS				
				B	B-1		C	D	D-1		
18-15	OY-18335-A	4	Wire Assembly—Lead, Consists	X	X						
	Y-18473	1	Terminal—Shakeproof	X	X						
	Y-18334-A	1	Wire—Lead 6# in. Lg.	X	X						
	Y-18250	1	Lug—Terminal	X	X						
	21696	1	Screw—Fil. Hd. Mach. #6-32 x 5/16 in. Cad. Pl.	X	X						
	Y-6311	1	Element—Thermal (3/4-Min., on 80 Volt Units)	X	X						
	Y-6311-B	1	Element—Thermal (1/2-Min., on 40 Volt Units)	X	X						
	Y-6895	1	Plate—Name (Oil-Heat)	X	X						
	21817	2	Screw—Rd. Hd. Mach. #6-32 x 1/2 in. Cad. Pl.	X	X						
	21621	2	Washer—Shakeproof Lock, Int. #6, Cad. Pl.	X	X						
	Y-18260	1	Cover—Control Relay	X	X						
	Y-18191	1	Gasket—Relay Cover	X	X						
	Y-18261	2	Spacer—Cover	X	X						
	Y-18147	1	Relay—Control (80-Volt) Consists of:	X	X						
	Y-18146	1	Relay—Control (40-Volt) Consists of:	X	X						
	SD-75-A	1	Coil Assembly (80-Volt)	X	X						
	SD-50-A	1	Coil Assembly (40-Volt)	X	X						
	SD-1286	2	Bracket—Front Contact	X	X						
	SD-1619	1	Bracket—Back Contact	X	X						
	SD-825	1	Spring—Tension	X	X						
	SD-425	6	Spring—Compression	X	X						
	SD-1422	1	Yoke Assembly—Left Hand (Front Contact)	X	X						
	SD-1488	1	Yoke Assembly—Center (Back Contact)	X	X						
	SD-1421	1	Yoke Assembly—Right Hand (Front Contact)	X	X						
	18-16	Y-18262	2	Stud—Cover	X	X					
	18-17	Y-18263	2	Nut—Relay Cover	X	X					
		Y-18180	8	Stud—Brass	X	X					
		21602	8	Washer—Shakeproof Lock, Ext. #6, Cad. Pl.	X	X					
		21867	34	Nut—Brass Hex. #6-32	X	X					
		21962	24	Washer—Brass, #6	X	X					
		Y-18513	1	Resistor (8 ohm)	X	X					
	18-18	Y-6840	1	Switch—Intermittent Starting (80-Volt)	X	X					
	18-18	Y-6660	1	Switch—Intermittent Starting (40-Volt)	X	X					
		21101	2	Screw—Rd. Hd. Mach. #10-24 x 1/2 in. Cad. Pl.	X	X					
		21625	2	Washer—Shakeproof Lock, #10, Cad. Pl.	X	X					
		OY-18333	3	Wire Assembly—Lead, Consists of:	X	X					
		Y-18250	1	Lug—Terminal	X	X					
		Y-18334-B	1	Wire—Lead, 3 in. Lg.	X	X					
18-19	Y-18154	17	Terminal—Wedge-On	X	X						
18-20	Y-18122	1	Contactor—Starting (80-Volt)	X	X						
18-20	Y-18121	1	Contactor—Starting (40-Volt)	X	X						

ENGINE GENERATOR ACCESSORY AND UNIT PARTS									
FIG. & REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS		
				B	B-1		C	D	D-1
18	0Y-18335	2	Wire Assembly—Lead, Consists of:	X	X				
	Y-18250	2	Lug—Terminal	X	X				
	Y-18334-A	1	Wire—Lead, 6 in. lg.	X	X				
	Y-18322	1	Tube—Insulating	X	X				
	Y-18323	1	Tube—Insulating	X	X				
	Y-18324	1	Block—Insulating	X	X				
	21276	4	Screw—Hex. Hd. 1/2-30 x 3/4 in. Cad. Pl.	X	X				
	21536	4	Washer—Lock, 1/4 in. Cad. Pl.	X	X				
	Y-18170	1	Bar—Bus	X	X				
	Y-18171	1	Bar—Bus	X	X				
	Y-18162	2	Nut—Bronze Hex. 3/8-16 Electro Tinned	X	X				
	0Y-18140	1	Relay Assembly—Timing (80-Volt) Consists of:	X	X				
	Y-18141	1	Relay (80-Volt, 3-Min.)	X	X				
	Y-18140	1	Relay (80-Volt, 5-Sec.)	X	X				
	0Y-18138	1	Relay Assembly—Timing (40-Volt) Consists of:	X	X				
	Y-18139	1	Relay (40-Volt, 3-Min.)	X	X				
	Y-18138	1	Relay (40-Volt, 5-Sec.)	X	X				
	21276	4	Screw—Hex. Hd. Cap, 1/4-20 x 3/4 in. Cad. Pl.	X	X				
	21536	4	Washer—Lock, 1/4 in. Cad. Pl.	X	X				
	P-462534	1	Contact—Mercury Tube, Part of Y-18141 and Y-18139	X	X				
	P-462025	1	Circuit—Iron, Part of Y-18141 and Y-18139	X	X				
	P-187-1-113	1	Coil (80-Volt) Part of Y-18141	X	X				
	P-187-1-112	1	Coil (40-Volt) Part of Y-18139	X	X				
	P-462327	1	Cap, Part of Y-18138, Y-18139, Y-18140 and Y-18141	X	X				
	P-74-4-19	1	Clip—Retaining, Part of Y-18138, Y-18139, Y-18140 and Y-18141	X	X				
	P-57-16-24	2	Washer—Rubber, Part of Y-18138, Y-18139, Y-18140 and Y-18141	X	X				
	P-464013	1	Contact—Mercury Tube, Part of Y-18140 and Y-18138	X	X				
	P-462028	1	Circuit—Iron, Part of Y-18140 and Y-18138	X	X				
	P-187-1-109	1	Coil (80-Volt) Part of Y-18140	X	X				
	P-187-1-107	1	Coil (40-Volt) Part of Y-18138	X	X				
18-23	Y-18167	1	Plate—Panel Name	X	X				
	Y-18372-A	1	Tag—Warning	X	X				
18-24	21766	4	Screw—Parker Kalon Rd. Hd. #4 x 3/8 in. Cad. Pl.	X	X				
	Y-18159	2	Clip—Fuse (200-A)	X	X				
18-25	Y-18321	1	Insulator	X	X				
	21611	1	Washer—Shakeproof Lock, 3/8 in. Cad. Pl.	X	X				
18-25	Y-18165	4	Screw—Bronze Hex. Hd. Cap, 3/8-16 x 1-3/4 in. Electro Tinned	X	X				
	Y-18161	4	Washer—Copper, 3/8 in. Cad. Pl.	X	X				
18-25	Y-18163	4	Washer—Bronze Lock, 3/8 in. Cad. Pl.	X	X				
	Y-18166	8	Nut—Everdur Hex. Jam, 3/8-16 Cad. Pl.	X	X				

ENGINE GENERATOR ACCESSORY AND UNIT PARTS											
FIG. & REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS				
				B	B-1		C	D	D-1		
18-26	Y-18348-B	1	Wire—Rockbestos, 30 ft. (cut in length)	X	X						
	Y-18422	2	Lug—Sherman	X	X						
	Y-18491	4	Lug—Connector (80-Volt)	X	X						
	18-26	Y-18206-A	4	Lug—Connector (40-Volt)	X	X					
18-27	Y-18136	1	Relay—Low Current (40-Volt) Consists of:	X	X						
	Y-18137		Relay—Low Current (80-Volt)								
	CH-640-57	1	Lever Assembly—Contact	X	X						
	CH-831-775-A	1	Button—Contact	X	X						
	CH-969-922-J	1	Spring—Tension	X	X						
	CH-9-153-2	1	Coil	X	X						
	Y-18172	1	Bar—Bus	X	X						
	Y-18173	1	Bar—Bus	X	X						
18-28	Y-18162	2	Nut—Bronze, 3/8-16, Electro Tinned	X	X						
	Y-18183-A	1	Fuse (80-Volt)	X	X						
	18-28	Y-18158-A	1	Fuse (40-Volt)	X	X					
		Y-18175	1	Bar—Bus	X	X					
18-29	Y-18160	2	Screw—Bronze Cap, 3/8-16 x 1-1/2 in.	X	X						
	Y-18162	2	Nut—Bronze Hex, 3/8-16, Electro Tinned	X	X						
	Y-18163	2	Washer—Bronze Lock, 3/8 in. Cad. Pl.	X	X						
	Y-18156	1	Fuse (10 amp.)	X	X						
	18-30	Y-18157-A	2	Clip—Fuse	X	X					
		OY-18469-A	1	Panel Assembly—Load Relay, Consists of:	X	X					
	19-1	Y-18469-A	1	Panel—Load Relay	X	X					
	19-2	Y-18206-A	2	Lug—Connector	X	X					
Y-18259		4	Terminal—Mounting	X	X						
19-3	Y-18165	2	Screw—Bronze Hex. Hd. Cap, 3/8-16 x 1-3/4 in. Electro Tinned	X	X						
19-4	Y-18161	2	Washer—Copper, 3/8 in. Cad. Pl.	X	X						
	Y-18163	2	Washer—Bronze Lock, 3/8 in. Cad. Pl.	X	X						
	Y-18166	4	Nut—Brass Hex. Jam, 3/8-16, Cad. Pl.	X	X						
	19-5	Y-18136	1	Relay—Low Current, Consists of:	X	X					
CH-640-57		1	Lever Assembly—Contact	X	X						
CH-831-775-A		1	Button—Contact	X	X						
CH-969-922-J		1	Spring—Tension	X	X						
CH-9-153-2		1	Coil	X	X						
Y-18172		2	Bar—Bus	X	X						
Y-18162		2	Nut—Bronze, 3/8-16, Electro Tinned	X	X						
19-6		Y-18470	1	Relay—Timing, Consists of:	X	X					
	P-463128	1	Contact	X	X						
	P-462028	1	Circuit—Iron	X	X						
	P-187-1-107	1	Coil (40-Volt)	X	X						
	P-462327	1	Cap	X	X						
	P-74-4-19	1	Clip—Retaining	X	X						
	P-57-16-24	2	Washer—Rubber	X	X						
	21276	4	Screw—Hex. Hd. Cap, 1/4-20 x 3/4 in. Cad. Pl.	X	X						
	Y-18814-G	4	Washer—Lock, 1/4 in. Cad. Pl.	X	X						

## ENGINE GENERATOR ACCESSORY AND UNIT PARTS

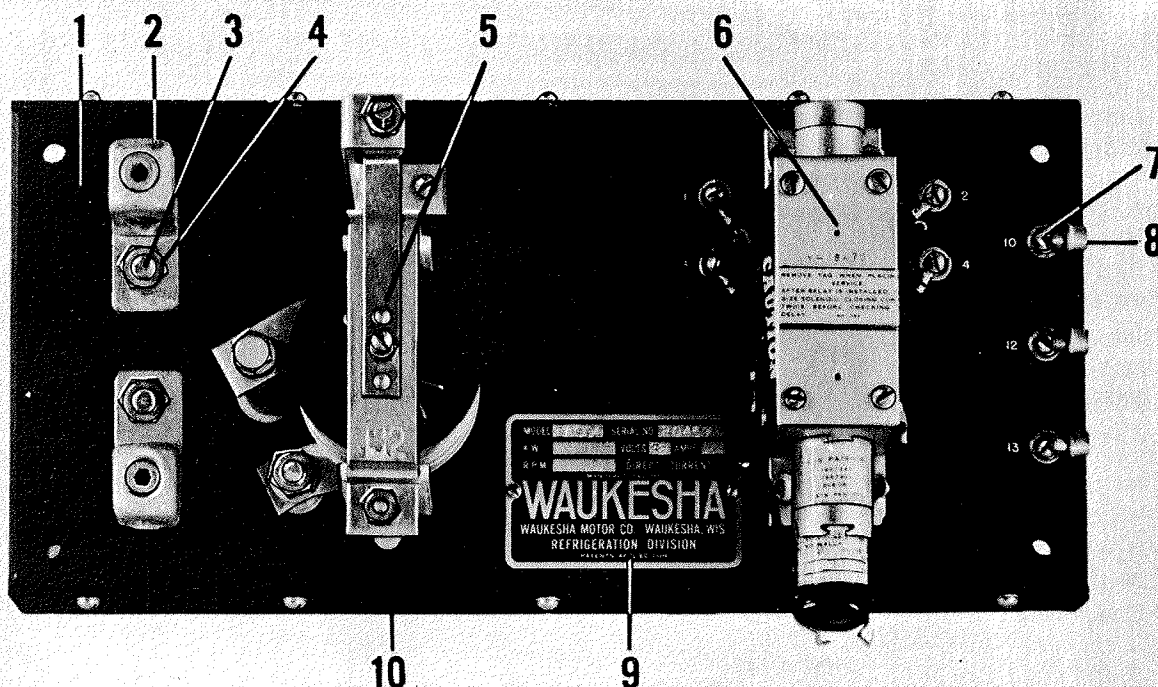


FIG. 19—LOAD CURRENT RELAY PANEL

FIG. & REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS		
				B	B-1		C	D	D-1
19-7	Y-18135	7	Support—Terminal	X	X				
	21961	14	Screw—Rd. Hd. Mach. #8-32 x 5/16 in. Electro Tinned	X	X				
19-8	Y-18154	3	Terminal—Wedge-On	X	X				
	Y-18348		Wire—Rockbestos, #14, 2-1/2 ft.	X	X				
19-9	Y-18486	1	Plate—Name	X	X				
	26118	2	Screw—Parker Kalon, #4 x 3/8 in.	X	X				
19-10	OY-18267	2	Support Assembly—Panel	X	X				
	21667	10	Screw—Rd. Hd. Mach. #10-24 x 3/4 in. Cad. Pl.	X	X				
	21625	10	Washer—Shakeproof Lock, #10, Cad. Pl.	X	X				
20	Y-6839-B	1	Starting Motor (64-Volt)						
20	Y-6334-F	1	Starting Motor (32-Volt) (Delco-Remy Model 1109409) Consists of:				X	X	X
	OY-4119		Switch Assembly—Solenoid (64 Volt)						
	OY-4117-A	1	Switch Assembly—Solenoid, Consists of:				X	X	X
	UDR-1118177		Solenoid Assembly (64 Volt)						
20-1	UDR-1118176	1	Solenoid Assembly (32 Volt)				X	X	X
20-2	DR-1857789	1	Terminal and Plate Assembly				X	X	X
	DR-1904287	1	Plate—Terminal (Only)				X	X	X
20-3	DR-1855489	2	Stud—Terminal, 1/2-13				X	X	X
	DR-1855488	1	Strip—Stud Insulating (Inside)				X	X	X
	DR-1855490	2	Washer—Terminal Stud Insulating Bushing				X	X	X

ENGINE GENERATOR ACCESSORY AND UNIT PARTS										
FIG. & REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS			
				B	B-1		C	D	D-1	
20-4	DR-1903058	2	Washer—Terminal Stud Ins.				X	X	X	
	DR-1902495	3	Washer—Terminal Stud Plain,				X	X	X	
	DR-1902494	4	Washer—Terminal Stud Lock, 1/2 in.				X	X	X	
	DR-1873333	2	Nut—Stud, 1/2-13 x 5/16 thk.				X	X	X	
	DR-1873334	2	Nut—Stud, 1/2-13 x 7/16 thk.				X	X	X	
	DR-1903023	1	Clip—Terminal (Large)				X	X	X	
	DR-1908336	1	Bushing—Terminal Lead Ins.				X	X	X	
20-5	DR-1901840	4	Screw—Terminal Plate Attaching				X	X	X	
20-6	DR-120217	4	Washer—Terminal Plate Att. Screw Lock				X	X	X	
20-7	DR-1903161	2	Stud—Terminal, 1/4-20				X	X	X	
	DR-1902314	2	Strip—Terminal Stud Ins. (Small Inside Sq. Hole)				X	X	X	
	DR-1905124	6	Washer—Terminal Stud Ins. Bushing				X	X	X	
	DR-1902315	2	Washer—Terminal Stud Plain (Small Sq. Hole Inside)				X	X	X	
	DR-1872459	2	Washer—Terminal Stud Ins. 1/4 x 5/8 x 1/16				X	X	X	
	DR-834560	2	Washer—Terminal Stud Plain				X	X	X	
	DR-1874495	4	Washer—Terminal Stud Lock 1/4 in.				X	X	X	
	DR-134551	4	Nut—Terminal Stud, 1/4-20				X	X	X	
20-8	DR-1883642	1	Plunger and Rod Assembly				X	X	X	
	DR-1855481	1	Disc—Contact (On Push Rod)				X	X	X	
	DR-1869505	1	Spring—Contact (On Push Rod)				X	X	X	
	DR-1847239	1	Washer—Contact Spring Retainer (Cupped)				X	X	X	
	DR-1847238	1	Washer—Contact Spring Retainer				X	X	X	
	DR-1849235	1	Washer—Contact Spring Plain				X	X	X	
	DR-125215	1	Nut—Contact Attaching				X	X	X	
	DR-107761	1	Pin—Contact Attaching Nut Cotter				X	X	X	
20-9	DR-1860959	4	Screw—Solenoid Mounting				X	X	X	
20-10	DR-103319	4	Washer—Lock (Solenoid Mounting Screw)				X	X	X	
20-11	DR-1906619	1	Link Assembly—Shift Lever				X	X	X	
	DR-1863305	1	Pin—Shift Lever				X	X	X	
	DR-112726	1	Pin—Cotter (Shift Lever Pin)				X	X	X	
20-12	DR-1889664	1	Band—Cover				X	X	X	
20-13	DR-132926	1	Screw—Cover Band				X	X	X	
20-14	DR-1881201	1	Coil—Field (R.H. to Terminal) (64-Volt)				X	X	X	
20-14	DR-1906597	1	Coil—Field (R.H. to Terminal) (32 Volt)				X	X	X	
	DR-1881202	1	Coil—Field (R.H. to Brush) (64 Volt)				X	X	X	
	DR-1906598	1	Coil—Field (L.H. to Brush) (32 Volt)				X	X	X	
	DR-1865640	2	Shoe—Pole				X	X	X	
20-15	DR-1843646	2	Screw—Pole Shoe				X	X	X	
	DR-809062	2	Pin—Dowel (C. E. & D. E.)				X	X	X	
20-16	DR-1865636	1	Frame and Pin Assembly (C. E.)				X	X	X	
20-16A	DR-1865638	1	Frame—Commutator End				X	X	X	
20-17	DR-1906616	2	Stud—Terminal				X	X	X	
	DR-812622	2	Washer—Terminal Stud Plain (Inside)				X	X	X	
	DR-805790	2	Washer—Terminal Stud Plain (Outside)				X	X	X	

ENGINE GENERATOR ACCESSORY AND UNIT PARTS

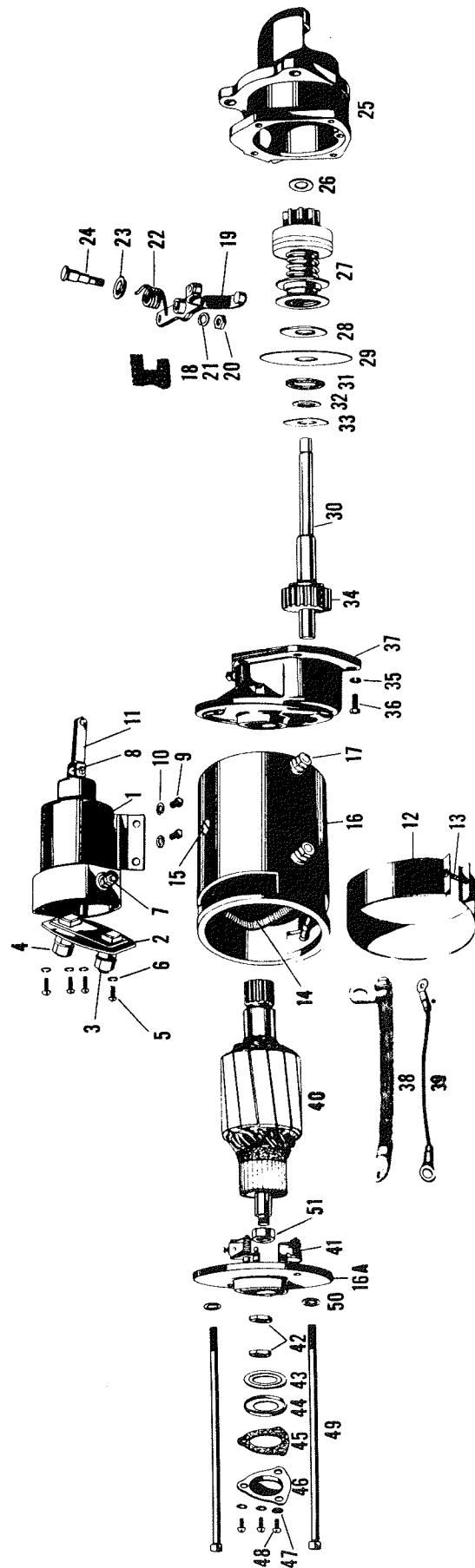


FIG. 20—STARTING MOTOR

ENGINE GENERATOR ACCESSORY AND UNIT PARTS										
FIG. & REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS			
				B	B-1		C	D	D-1	
20-18	DR-1861076	6	Washer—Terminal Stud Ins. 3/4 O.D.				X	X	X	
	DR-1904669	8	Washer—Terminal Stud Ins. 9/16 O.D.				X	X	X	
	DR-110730	4	Washer—Terminal Stud Lock				X	X	X	
	DR-805258	4	Nut—Terminal Stud				X	X	X	
	DR-1867721	1	Seal—Shift Lever Dust				X	X	X	
20-19	DR-1354734	1	Lever—Shift				X	X	X	
20-20	DR-805258	1	Nut—Shift Lever Stud				X	X	X	
20-21	DR-110730	1	Washer—Shift Lever Stud Lock				X	X	X	
20-22	DR-1845936	1	Spring—Shift Lever				X	X	X	
20-23	DR-1835998	1	Support—Shift Lever Spring				X	X	X	
20-24	DR-1848796	1	Stud—Shift Lever				X	X	X	
20-25	DR-1865625	1	Housing—Drive				X	X	X	
	DR-1862383	1	Bushing (In Drive Housing)				X	X	X	
	DR-114998	1	Oiler (In Drive Housing)				X	X	X	
	DR-802691	1	Wick—Oil (In Drive Housing)				X	X	X	
							X	X	X	
20-26	DR-1838568	1	Space—Washer (D. E.)				X	X	X	
20-27	DR-37870	1	Drive Assembly—Overrunning Clutch				X	X	X	
20-28	DR-819468	1	Washer—Brake (Leather - D. E.)				X	X	X	
20-29	DR-1837055	1	Plate—Drive Housing Cover				X	X	X	
20-30	DR-1865633	1	Shaft—Drive				X	X	X	
20-31	DR-124546	2	Key—Woodruff				X	X	X	
	DR-813134	1	Washer—Felt (Between Gear & Cover Plate)				X	X	X	
	DR-819149	1	Washer—Space (Between Gear & Cover Plate)				X	X	X	
	DR-809817	1	Thrower—Oil (Between Gear & Cover Plate)				X	X	X	
	DR-1837052	1	Gear—Reduction				X	X	X	
20-35	DR-103319	4	Washer—Drive Housing Attaching Screw lock				X	X	X	
20-36	DR-116633	4	Screw—Drive Housing Attaching				X	X	X	
20-37	DR-1872572	1	Housing—Gear				X	X	X	
	DR-1868060	1	Bushing (In Gear Housing for Arm. Shaft)				X	X	X	
	DR-1868061	1	Bushing (In Gear Housing for Drive Shaft)				X	X	X	
	DR-114998	2	Oiler (In Gear Housing)				X	X	X	
	DR-802691	2	Wick (In Gear Housing)				X	X	X	
20-38	DR-103865	1	Plug—Pipe (In Gear Housing)				X	X	X	
	DR-103893	1	Plug—Expansion (In Gear Housing)				X	X	X	
	DR-1873916	1	Cable—Solenoid Connector				X	X	X	
							X	X	X	
							X	X	X	
20-39	DR-1906621	1	Lead—Solenoid Ground Terminal				X	X	X	
	DR-200223	1	Clip—Terminal (For Battery Cable)				X	X	X	
	DR-200015	1	Clip—Terminal (Switch Term. of Solenoid)				X	X	X	
20-40	DR-1881136	1	Armature—(64 Volt)				X	X	X	
20-40	DR-1881471	1	Armature—(32 Volt)				X	X	X	
20-41	DR-809642	2	Holder—Brush				X	X	X	
	DR-812016	2	Pin and insulator—Brush Holder Hinge				X	X	X	
	DR-812015	2	Pin and insulator—Brush Holder Stop				X	X	X	
	DR-113702	1	Oiler (C. E.)				X	X	X	
	DR-37077	1	Washer—Felt (C. E.)				X	X	X	
	DR-37078	1	Cup—Felt Retainer (C. E.)				X	X	X	
							X	X	X	
							X	X	X	

## ENGINE GENERATOR ACCESSORY AND UNIT PARTS

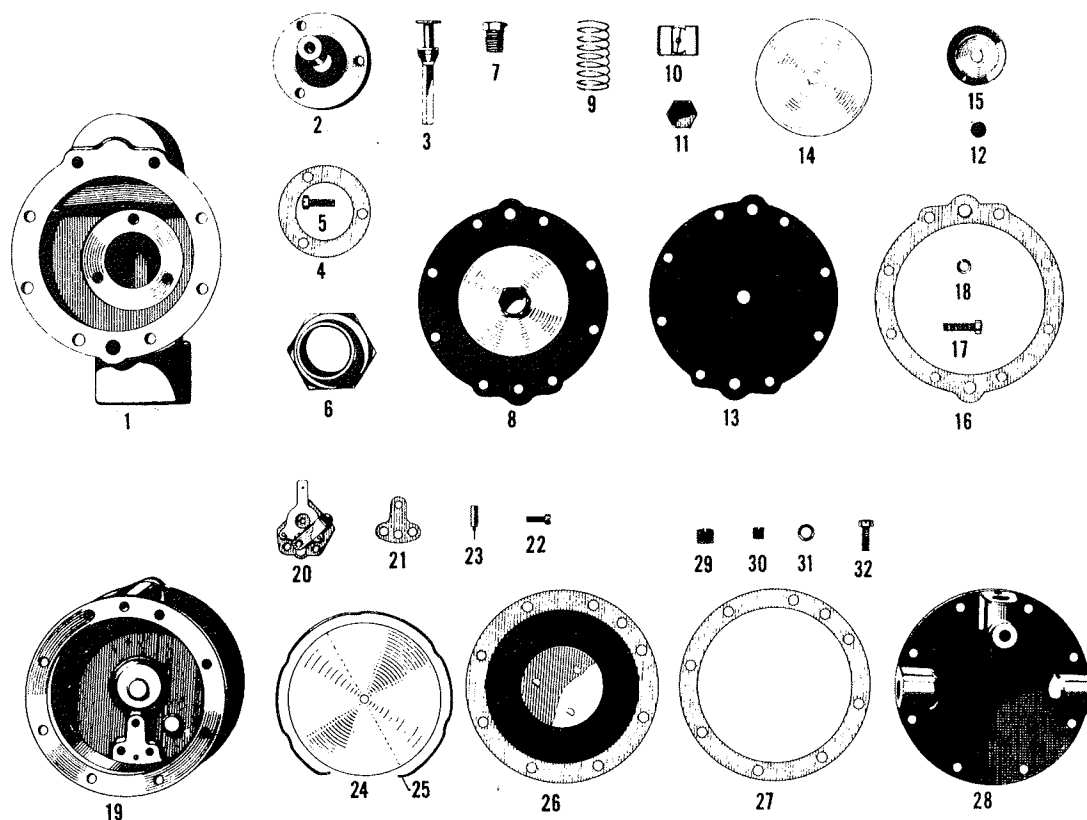


FIG. 21—ENSIGN REGULATOR

FIG. & REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS		
				B	B-1		C	D	D-1
	DR-1864716	2	Brush				X	X	X
	DR-813521	1	Spring—Brush (R. H.)				X	X	X
	DR-1865641	1	Spring—Brush (L. H.)				X	X	X
	DR-1862803	2	Screw—Brush Attaching				X	X	X
	DR-106495	2	Washer—Brush Attaching Screw Lock						X
	DR-809551	2	Washer—Brush Attaching Screw Plain				X	X	X
	DR-141540	2	Screw—Lead Attaching to Brush				X	X	X
	DR-802730	2	Washer—Attaching Screw Lock				X	X	X
	DR-37837	1	Collar—Oil Throwing (Inside C. E.)				X	X	X
	DR-903203	1	Bearing—Ball (C. E.)				X	X	X
20-42	DR-1868768	2	Nut—Shaft (C. E.)				X	X	X
20-43	DR-809960	1	Plate—Ball Bearing Space (C. E.)				X	X	X
20-44	DR-814984	1	Cup—Ball Bearing Space (C. E.)				X	X	X
20-45	DR-1835457	1	Gasket—End Cover Plate (C. E.)				X	X	X
20-46	DR-816212	1	Plate—End Cover (C. E.)				X	X	X
20-47	DR-106497	3	Washer—End Cover Plate Att. Screw Lock (C. E.)				X	X	X
20-48	DR-1904829	3	Screw—End Cover Plate Attaching (C. E.)				X	X	X
20-49	DR-1904330	2	Bolt—Thru				X	X	X
20-50	DR-108579	2	Washer—Thru Bolt Lock				X	X	X
20-51	DR-37837	1	Collar—Spacer				X	X	X

ENGINE GENERATOR ACCESSORY AND UNIT PARTS										
FIG. & REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS			
				B	B-1		C	D	D-1	
21	50573-C	1	Regulator Assembly—Fuel, Consists of:	X	X		X	X	X	
21-1	E-4791	1	Body—Regulator	X	X		X	X	X	
21-2	E-268-5	1	Seat—Valve	X	X		X	X	X	
21-3	E-4802	1	Valve Assembly	X	X		X	X	X	
21-4	E-3-243	1	Gasket—Valve Seat	X	X		X	X	X	
21-5	E-821-9	3	Screw—Valve Seat	X	X		X	X	X	
21-6	E-5860	1	Bushing—Special Face, 3/4 x 1 in.	X	X		X	X	X	
21-7	E-5145	1	Plug—Hex. Hd. Pipe	X	X		X	X	X	
21-8	E-6778	1	Diaphragm Assembly—Lower	X	X		X	X	X	
21-9	E-3-258	1	Spring—Diaphragm	X	X		X	X	X	
21-10	E-4754	1	Screw Assembly—Diaphragm	X	X		X	X	X	
21-11	E-6461	1	Nut Assembly—Diaphragm Screw	X	X		X	X	X	
21-12	E-4759	1	Screen—Diaphragm By-Pass	X	X		X	X	X	
21-13	E-3-256-B	1	Diaphragm—Lower	X	X		X	X	X	
21-14	E-6343	1	Plate—Diaphragm, Large	X	X		X	X	X	
21-15	E-3-283	1	Plate—Diaphragm, Small	X	X		X	X	X	
21-16	E-3-273	1	Gasket—Bowl to Diaphragm	X	X		X	X	X	
21-17	E-821-10	8	Screw—Bowl	X	X		X	X	X	
21-18	E-284	8	Washer—Bowl Screw Lock	X	X		X	X	X	
21-19	E-6463	1	Bowl Assembly—Partial	X	X		X	X	X	
21-20	E-4793	1	Valve Assembly—Pilot	X	X		X	X	X	
21-21	E-4795	1	Gasket—Valve Lever Support	X	X		X	X	X	
21-22	E-771-6	3	Screw—Valve Lever Support	X	X		X	X	X	
21-23	E-4800	1	Rod Assembly—Valve Lever Push	X	X		X	X	X	
21-24	E-4616	1	Plate—Partition	X	X		X	X	X	
21-25	E-4798	1	Wire—Partition Plate Locking	X	X		X	X	X	
21-26	E-5712	1	Diaphragm Assembly—Upper	X	X		X	X	X	
21-27	E-5546	2	Gasket—Upper Diaphragm	X	X		X	X	X	
21-28	E-6462	1	Cover—Bowl, Partial Assembly	X	X		X	X	X	
21-29	E-3094	2	Plug—Screw Driver Slotted Pipe	X	X		X	X	X	
21-30	E-4-220	1	Plug—Screw	X	X		X	X	X	
21-31	E-284	8	Washer—Cover Screw Lock	X	X		X	X	X	
21-32	E-821-8	8	Screw—Cover	X	X		X	X	X	
↑	ES-7616	2	Gasket—Timing Slot Cover	X	X		X	X	X	
	ES-17394	4	Screw—Timing Slot Cover	X	X		X	X	X	
	ES-23149	4	Washer—Lock (For 1/2 in. Pipe)	X	X		X	X	X	
	ES-51270	4	Washer—(For 1/2 in. Pipe)	X	X		X	X	X	
	ES-7524	2	Washer—Felt (Rear Bearing)	X	X		X	X	X	
	ES-51266	1	Cap—Felt Retaining	X	X		X	X	X	
	ES-51237	2	Plug—Oil Hole	X	X		X	X	X	
	ES-3721	1	Washer—Rear Bearing (Rear Bearing Plate)	X	X		X	X	X	
	ES-512	1	Washer—Ground Terminal Connector	X	X		X	X	X	
	ES-51287	1	Plate—Ground Terminal Connector	X	X		X	X	X	
↓	ES-53367	2	Screw—Ground Terminal Connector Plate	X	X		X	X	X	

## ENGINE GENERATOR ACCESSORY AND UNIT PARTS

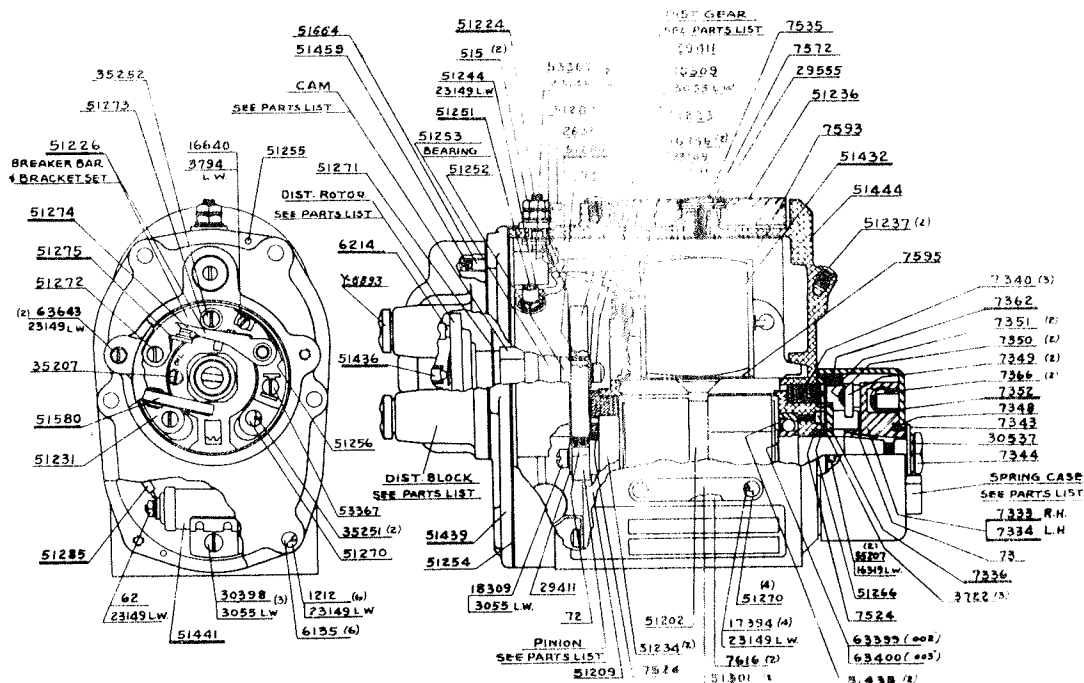


FIG. 22—EDISON MAGNETO

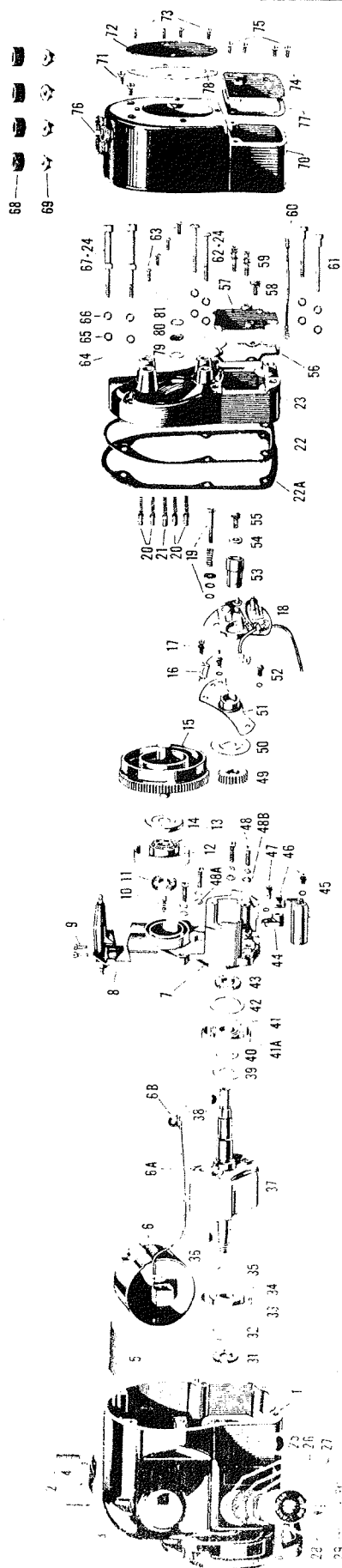
FIG. & REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS		
				B	B-1		C	D	D-1
	ES-23149	2	Washer—Lock (For 53367)	X	X		X	X	X
	ES-515	2	Nut—Ground Terminal Hex.	X	X		X	X	X
	ES-3055	1	Washer—Lock (For 515)	X	X		X	X	X
	ES-2635	1	Lug—Ground Terminal	X	X		X	X	X
	ES-51439	1	Cover—Front with Wash and Dowel	X	X		X	X	X
	ES-51254	1	Gasket—Front Cover	X	X		X	X	X
	ES-51255	2	Pin—Front Cover Dowel	X	X		X	X	X
	ES-1212	6	Screw—Front Cover	X	X		X	X	X
	ES-23149	6	Washer—Lock (For 1212)	X	X		X	X	X
	ES-6135	6	Seal (For 1212)	X	X		X	X	X
	ES-35207	1	Screw—Distributor Bearing Oil Hole	X	X		X	X	X
	(MAGNETO DISTRIBUTOR PARTS)								
	ES-51664	4	Brush and Spring—Dist. Block Carbon	X	X		X	X	X
	ES-51459	1	Spring—Dist. Block H. T. Coil	X	X		X	X	X
	ES-51267	1	Gasket—Dist. Block	X	X		X	X	X
	Y-6893	4	Nut—Dist. Block Thumb	X	X		X	X	X
	ES-63643	2	Screw—Dist. Block Attach.	X	X		X	X	X

ENGINE GENERATOR ACCESSORY AND UNIT PARTS									
FIG. & REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS		
				B	B-1		C	D	D-1
	ES-23149	2	Washer—Lock (For 63643)	X	X		X	X	X
	ES-51436	1	Brush and Cap, Dist. Block Center	X	X		X	X	X
	ES-51218	1	Disc, Dist. Complete	X	X		X	X	X
	ES-51230	1	Gear—Dist.	X	X		X	X	X
	ES-51252	1	Washer—Dist. Gear Spacing	X	X		X	X	X
	ES-51253	1	Bearing—Dist. Shaft Ball	X	X		X	X	X
	ES-72	1	Key—Dist. Shaft	X	X		X	X	X
	ES-29411	1	Washer—Dist. Shaft Plain	X	X		X	X	X
	ES-51454	1	Block—Dist. Complete	X	X		X	X	X
	ES-18309	1	Screw—Dist. Shaft	X	X		X	X	X
	ES-3500	1	Washer—Lock (For ES-18309)	X	X		X	X	X
	ES-51271	1	Disc—Safety Cap	X	X		X	X	X
	ES-51336	1	Cam	X	X		X	X	X
(CUTTER COIL BREAKER PARTS)									
	ES-51251	1	Terminal—Breaker, Group	X	X		X	X	X
	ES-51244	1	Nut—Breaker Terminal Slotted	X	X		X	X	X
	ES-23149	1	Washer—Lock (For 51244)	X	X		X	X	X
	ES-51231	1	Plate—Breaker Base	X	X		X	X	X
	ES-35251	2	Screw—Breaker Base Plate (Bottom)	X	X		X	X	X
	ES-51226	1	Breaker Bar & Contact, Set	X	X		X	X	X
	ES-51274	1	Bar—Breaker	X	X		X	X	X
	ES-16640	1	Screw—Breaker Bar Spring	X	X		X	X	X
	ES-3794	1	Washer—Lock (For 16640)	X	X		X	X	X
	ES-51275	1	Bracket—Contact with Contact	X	X		X	X	X
	ES-51272	1	Screw—Contact Bracket Plate (1/4" Red)	X	X		X	X	X
	ES-53367	1	Screw—Contact Bracket Holding (Short)	X	X		X	X	X
	ES-35252	1	Screw—Contact Bracket Holding (Long - Top)	X	X		X	X	X
	ES-51273	1	Washer—Lock (For 35252)	X	X		X	X	X
	ES-51286	1	Lead Assembly—Primary	X	X		X	X	X
	ES-51256	1	Insulator—Breaker Stud	X	X		X	X	X
(MAGNETO COIL & CONDENSER PARTS)									
	ES-51690	1	Coil—H. T., Complete	X	X		X	X	X
	ES-51233	1	Clamp—Coil	X	X		X	X	X
	ES-16756	2	Screw—Coil Clamp	X	X		X	X	X
	ES-23149	1	Washer—Lock (For 16756)	X	X		X	X	X
	ES-7593	1	Insulator—Coil Top	X	X		X	X	X
	ES-7595	1	Insulator—Coil Bottom	X	X		X	X	X
	ES-51441	1	Condenser Assembly	X	X		X	X	X
	ES-51285	1	Lead Assembly—Condenser	X	X		X	X	X
	ES-62	1	Nut—Condenser	X	X		X	X	X
	ES-23149	1	Washer—Lock (For ES-62)	X	X		X	X	X
(MAGNETO ROTOR & MAIN BEARING PARTS)									
	ES-51202	1	Rotor	X	X		X	X	X
	ES-73	1	Key—Drive	X	X		X	X	X

ENGINE GENERATOR ACCESSORY AND UNIT PARTS										
FIG. & REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS			
				B	B-1		C	D	D-1	
↑	ES-51234	2	Bearing—Ball, Complete	X	X		X	X	X	
	ES-63399	1	Shims .002" (Approx.)	X	X		X	X	X	
	ES-63400	1	Shims .003" (Approx.)	X	X		X	X	X	
	ES-51209	1	Plate—Front Bearing, Only	X	X		X	X	X	
	ES-30398	3	Screw—Front Bearing Plate	X	X		X	X	X	
	ES-3055	3	Washers—Lock (For ES-30398)	X	X		X	X	X	
	ES-7524	1	Washer—Front Bearing Felt	X	X		X	X	X	
	ES-51435	2	Ring—Bearing Housing Sealing	X	X		X	X	X	
			(PINION GEAR PARTS)							
	ES-51229	1	Gear—Pinion	X	X		X	X	X	
	ES-72	1	Key—Pinion Gear	X	X		X	X	X	
	ES-18309	1	Screw—Pinion Gear	X	X		X	X	X	
	ES-29411	1	Washer—Pinion Gear Plate	X	X		X	X	X	
	ES-3055	1	Washer—Lock (For ES-30398)	X	X		X	X	X	
			(MAGNETO IMPELLER PARTS)							
	ES-51236	1	Impeller—Only	X	X		X	X	X	
	ES-7572	1	Impeller—Magnet	X	X		X	X	X	
	ES-29555	1	Washer—Lock (For 7572)	X	X		X	X	X	
	ES-7535	1	Seal—Magnet	X	X		X	X	X	
			(MAGNETO IMPELLER PARTS)							
	ES-7381	1	Starter—Complete H. 15 Deg. Lag Angle	X	X		X	X	X	
	ES-7386	1	Unit Assembly—Rotating—Complete	X	X		X	X	X	
	ES-7370	1	Member—Drive—Spring Case Only				X	X	X	
	ES-7333	1	Member—Magnet				X	X	X	
	ES-7323	1	Plate Screw—Stop Pin		X		X	X	X	
	ES-7340	3	Screw—Stop Pin Plate Rotating	X	X		X	X	X	
	ES-7362	1	Felt Seal Holder—Screw—With Attach- ing Screws	X	X		X	X	X	
	ES-35207	2	Screw—Felt Seal Holder	X	X		X	X	X	
	ES-16319	2	Washer—Lock (For ES-35207)	X	X		X	X	X	
	ES-7352	1	Spring Assembly—With Felt and Stop Pins	X	X		X	X	X	
	ES-7366	2	Pin—Spring Stop	X	X		X	X	X	
	ES-7349	2	Lever—Stop	X	X		X	X	X	
	ES-7350	2	Washer—Stop Lever	X	X		X	X	X	
	ES-7351	2	Ring—Stop Lever Snap	X	X		X	X	X	
	ES-7348	1	Washer—Magnet Member Bearing Felt Notch	X	X		X	X	X	
	ES-30537	1	Washer—Shaft Lock	X	X		X	X	X	
	ES-7344	1	Nut—Shaft	X	X		X	X	X	
23	50120-L	1	Magnet Assembly—Bosch (Model MJA-4C) Consists of:	X	X			X	X	
23-1	HG-524	1	Housing—Magnet (Drilled for Coupling)	X	X			X	X	
	FP-71561	1	Plug—Edge Distance Hole Felt	X	X			X	X	
23-2	SC-1060	2	Screw—Lock, for Mounting Coil	X	X			X	X	
	FP-81953	1	Clip—Terminal, for Distributor Plate Cable	X	X			X	X	

ENGINE GENERATOR ACCESSORY AND UNIT PARTS										
FIG.& REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS			
				B	B-1		C	D	D-1	
23-3	WA-2	1	Washer—Rotor Shaft Plain	X	X			X	X	
	WT-67446	1	Nut—Rotor Shaft Hexagon	X	X			X	X	
	65586	4	Nipple—Rubber	X	X			X	X	
	GG-523	1	Gauge—Magneto	X	X			X	X	
	NP-5292	1	Plate—Name (For Type Designation)	X	X			X	X	
23-4	SC-121-6-CA	2	Screw—Name Plate	X	X			X	X	
23-5	IS-5287	1	Insulation—Conductor	X	X			X	X	
23-6	CL-523	1	Coil—High Tension	X	X			X	X	
23-6A	KL-100657	1	Cable, For Coil (Specify Length)	X	X			X	X	
23-6B	EC-1002	1	Clip—For Cable	X	X			X	X	
23-7	BK-521	1	Bracket—Distributor Gear	X	X			X	X	
23-8	EC-5283	1	Conductor—High Tension	X	X			X	X	
23-9	SC-1167	2	Screw and Lock Washer—Conductor Fast	X	X			X	X	
23-10	SA-63379	1	Brush and Spring—Dist. Gear Grounding	X	X			X	X	
23-11	WA-81751	1	Washer—Felt (Under Ball Bearing)	X	X			X	X	
23-12	IS-52268	1	Strip—Bearing Packing	X	X			X	X	
23-13	BB-1001	1	Bearing—Distributor Gear Ball	X	X			X	X	
23-14	WA-1204	1	Shield—Oil (For Ball Bearing)	X	X			X	X	
23-15	GE-5257	1	Distributor Gear and Rotor Assembly	X	X			X	X	
	GE-5256	1	Gear—Distributor, Only	X	X			X	X	
23-16	RT-5262	1	Rotor, Distributor, Only	X	X			X	X	
	SC-523	3	Screw—Dist. Rotor Fastening	X	X			X	X	
	WA-1005-CA	3	Washer—Plain	X	X			X	X	
	PL-528	1	Plate—Stop, Clockwise	X	X			X	X	
	WA-6-4-CA	2	Lock Washer—Stop Plate Fastening	X	X			X	X	
23-18	SC-1029	1	Screw Fastening—Stop Plate Fastening	X	X			X	X	
	PL-52119	1	Plate, Breaker with Riveted Parts and Support Plate	X	X			X	X	
	IN-5235	1	Breaker Assembly	X	X			X	X	
	SP-5214	1	Spring Breaker Assembly (Large)	X	X			X	X	
	LE-5235	1	Lever Breaker	X	X			X	X	
	WA-86678	1	Washer Plain—Lever Stud	X	X			X	X	
	FP-84971	1	Pin Cotter—Breaker Lever Stud	X	X			X	X	
	SC-1004-CA	1	Screw Fastening—Breaker Lever Spring	X	X			X	X	
	WA-5-4	1	Washer Lock—Breaker Lever Spring Fastening Screw	X	X			X	X	
	BK-5253	1	Bracket—Contact with Platinum Point	X	X			X	X	
	SC-1149	1	Screw and Lock Washer—Bracket Fastener	X	X			X	X	
	CB-5227	1	Cable Assembly—Bracket Grounding	X	X			X	X	
	23-19	SD-1001-CA	1	Stud—Stop Plate	X	X			X	X
	23-19	WA-98904	1	Washer—Plain, for Stud	X	X			X	X
	23-19	SP-525	1	Spring—for Stud	X	X			X	X
23-20	SA-82876	4	Brush and Spring—Distributor Plate	X	X			X	X	
23-21	SA-82736	1	Brush and Spring—Distributor Plate Center	X	X			X	X	
23-22	GA-522	1	Gasket—Distributor Plate	X	X			X	X	

# ENGINE GENERATOR ACCESSORY AND UNIT PARTS



ENGINE GENERATOR ACCESSORY AND UNIT PARTS									
FIG. & REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS		
				B	B-1		C	D	D-1
23-22A	PL-5224	1	Plate—Between Shield and Magneto Housing. Use only on 50120-L Magneto	X	X			X	X
23-23	DP-52534	1	Plate—Distributor (Used on 50120-K Magneto)	X	X			X	X
23-23	DP-52540	1	Plate—Distributor (Used on 50120-L Magneto)	X	X			X	X
	WN-521		Window—Observation	X	X			X	X
	SP-1001-CA	1	Ring—Window	X	X			X	X
	GA-1003	1	Gasket—Window	X	X			X	X
23-24	SC-1002-CA	2	Screw—Plate Fastening (Short)	X	X			X	X
23-24	SC-1003-CA	4	Screw—Plate Fastening (Long)	X	X			X	X
	WA-288	6	Washer—Fastening Screw Lock	X	X			X	X
	WA-98922	6	Washer—Fastening Screw Plain	X	X			X	X
	WA-5280	6	Washer—Sealing	X	X			X	X
23-25	GA-5210	1	Gasket—Ventilator Felt	X	X			X	X
23-26	SN-528	2	Screen—Ventilator Wire	X	X			X	X
23-27	WA-5269	1	Washer—Ventilator Screen Inforcing	X	X			X	X
	EC-1002	1	Clip—Cable Holding	X	X			X	X
23-28	CV-52126	1	Cover—Ventilator	X	X			X	X
23-29	NP-5226	1	Plate—Ventilator Name	X	X			X	X
23-30	SC-1173	2	Screw and Lock Washer—Ventilator Cover Fastening	X	X			X	X
23-31	WA-1010	1	Washer—Felt, For Drive End of Rotor	X	X			X	X
23-32	IS-222	1	Washer—Bearing Paper	X	X			X	X
23-33	IS-52265	2	Strip—Packing, For Rotor Ball Bearing	X	X			X	X
23-34	BB-60226	1	Bearing—Ball (Drive End)	X	X			X	X
23-35	WA-1204	1	Washer—Oil Throwing (Drive End)	X	X			X	X
23-36	KY-11-4	1	Key—Woodruff (Drive End)	X	X			X	X
23-37	RT-5282	1	Rotor—Magnet, Only	X	X			X	X
23-38	KY-11-3	1	Key—Woodruff (Gear End)	X	X			X	X
23-39	WA-1204	1	Washer—Oil Throwing (Breaker End)	X	X			X	X
23-40	WA-61		Shim—Bearing (.0125) (Use if Necessary)	X	X			X	X
23-40	WA-106		Shim—Bearing (.0071) (Use if Necessary)	X	X			X	X
23-40	WA-107		Shim—Bearing (.004) (Use if Necessary)	X	X			X	X
23-40	WA-1009		Shim—Bearing (.0197) (Use if Necessary)	X	X			X	X
23-41	BB-60226	1	Bearing—Ball (Breaker End)	X	X			X	X
23-41A	IS-52265	1	Strip—Packing, For Rotor Ball Bearing	X	X			X	X
23-42	IS-222	1	Washer—Bearing Paper	X	X			X	X
23-43	WA-81751	1	Washer—Felt, For Inter. End of Rotor	X	X			X	X
23-44	BL-522	1	Block—Terminal (On Gear Bracket)	X	X			X	X
23-45	CW-5210	1	Condenser with support	X	X			X	X
23-46	SC-1143	2	Screw and Lock Washer—Condenser Fast.	X	X			X	X
	SC-1168	1	Screw and Lock Washer—(For Condenser Lead)	X	X			X	X
23-47	SC-1169	2	Screw and Lock Washer—Block Fastening	X	X			X	X
	WA-72613	2	Washer—Fastening Screw Plain	X	X			X	X
23-48	SC-1166	4	Screw and Lock Washer—Bracket Fastening	X	X			X	X

ENGINE GENERATOR ACCESSORY AND UNIT PARTS										
FIG. & REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS			
				B	B-1		C	D	D-1	
23-48A	WA-1252	4	Washer—Plain Distributor Gear Bracket Fastening Screw	X	X			X	X	
23-48B	WA-6-6	4	Washer—Lock, Distributor Gear Bracket Fastening Screw	X	X			X	X	
23-49	GE-5220	1	Gear—Magnet Rotor	X	X			X	X	
23-50	WA-523	1	Washer—Indicating	X	X			X	X	
23-51		1	Plate—Interrupter, Support	X	X			X	X	
23-52	SC-1029-CA	3	Screw—Inter. Support Plate Fastening	X	X			X	X	
	WA-6-4-CA	3	Washer—Plate Fastening Screw Lock	X	X			X	X	
23-53	CA-525	1	Cam	X	X			X	X	
23-54	WA-5241	1	Washer—Cam Retaining	X	X			X	X	
23-55	SC-1165	1	Screw and Lock Washer—Cam Fastening	X	X			X	X	
23-56	GA-521	1	Gasket—Control Arm CAP	X	X			X	X	
23-57	CP-525	1	Cap Assembly—Distributor Plate Complete with Gasket, Grounding Screw and Lock-washer	X	X			X	X	
	CP-5214	1	Cap w/Gasket (Fixed)	X	X			X	X	
23-58	SC-1006-CA	1	Screw—Cap Grounding	X	X			X	X	
	WA-45279	1	Washer—Ground Screw Lock	X	X			X	X	
23-59	SC-1001-CA	2	Screw—Cap Fastening	X	X			X	X	
	WA-98922	2	Washer—Fastening Screw Plain	X	X			X	X	
	WA-288	2	Washer—Fastening Screw Lock	X	X			X	X	
	CB-5264	1	Cable (Terminal Block to Interrupter)	X	X			X	X	
	SP-5213	1	Spring—On Interrupter (Small)	X	X			X	X	
	SP-5214	1	Spring—On Interrupter (Large)	X	X			X	X	
	BR-521	1	Brush and Spring—Inter. Grounding	X	X			X	X	
23-60	CB-52177	1	Cable Grounding—Distributor Cap to Shield	X	X		X	X	X	
23-61	SD-526	2	Stud—Fastening Distributor Plate and Support Shield (Short) (Used on 50120-L Only)	X	X		X	X	X	
23-61	SC-1003-CA	2	Screw Fastening—Distributor Plate (Long) (Used on 50120-K Only)	X	X		X	X	X	
23-62	SC-1003-CA	2	Screw Fastening—Distributor Plate (Long) (Used on both 50120-K and 50120-L)	X	X		X	X	X	
23-63	SC-42-7-CA	4	Screw Fastening—High Tension Cable to Distributor Plate	X	X		X	X	X	
23-64	WA-5280	4	Washer Sealing—Distributor Plate Fastening Screw	X	X		X	X	X	
23-65	WA-98922	4	Washer Plain—Distributor Plate Fastening Screw	X	X		X	X	X	
23-66	WA-288	4	Washer Lock—Distributor Plate Fastening Screw	X	X		X	X	X	
23-67	SC-1002-CA	2	Screw Fastening—Distributor Plate (Short) (Used on 50120-K Only)	X	X		X	X	X	
23-67	SD-527	2	Stud Fastening—Distributor Plate and Support Shield (Long) (Used on 50120-L Only)	X	X		X	X	X	
23-68	NT-523	4	Nut—Round Cable Outlet	X	X		X	X	X	

ENGINE GENERATOR ACCESSORY AND UNIT PARTS									
FIG. & REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS		
				B	B-1		C	D	D-1
23-69	65583-A	4	Rubber Bushing	X	X		X	X	X
23-70	UCV-52533	1	Shield	X	X		X	X	X
23-71	USC-78-7-CA	2	Screw Fastening—Shield Upper	X	X		X	X	X
23-72	UPL-5248	1	Plate—Circular	X	X		X	X	X
23-73	USC-1145	4	Screw with Lock Washer Fastening—Circular Plate	X	X		X	X	X
23-74	UCV-52551	1	Cap—Shield Cover	X	X		X	X	X
23-75	USC-1170	2	Screw Fastening with Lock Washer—Shield Cover Cap to Stud Fastening Distributor Plate to Magneto	X	X		X	X	X
	UFL-7358	1	Drive Member (On Water Pump Shaft)	X	X		X	X	X
	UDC-739	1	Disc—Intermediate Drive (Fibre)	X	X		X	X	X
			(MAGNETO IMPULSE COUPLING) for 50120-K and 50120-L	X	X		X	X	X
	UICB2A20-15		Coupling—Impulse Assembly	X	X		X	X	X
	UNT-731	1	Lock Nut	X	X		X	X	X
	UWA-5-16	1	Washer—Lock for Rotor Shaft Nut	X	X		X	X	X
	UHG-73120	1	Housing	X	X		X	X	X
	UPN-736	2	Button—Spring Stop	X	X		X	X	X
	USP-736	1	Spring—Spiral	X	X		X	X	X
	UPK-734	1	Wick—Felt for Spring	X	X		X	X	X
	UCA-739	1	Cam	X	X		X	X	X
	USA-65972	2	Weight	X	X		X	X	X
	UHB-7328	1	Hub	X	X		X	X	X
	USC-732	4	Screws Fastening for Arrester Plate	X	X		X	X	X
	UWA-1116	4	Washer—Lock for Arrester Plate	X	X		X	X	X
			Fastening Screw	X	X		X	X	X
	UPK-83361	1	Packing for Arrester Plate	X	X		X	X	X
	UPL-7366	1	Plate—Arrester with Packing	X	X		X	X	X
24	0950744	1	Valve—Refrigerant Solenoid (64 Volt)				X	X	X
24	0950743	1	Valve—Refrigerant Solenoid (32 Volt)				X	X	X
			(Automatic Products #30394-4) Consists of:				X	X	X
24-1	UAP-21435	1	Cover—Bottom Flange				X	X	X
24-2	UAP-26358	4	Screw—Cover Cap				X	X	X
24-3	UAP-49156	1	Strainer Assembly				X	X	X
24-4	UAP-24386	1	Gasket—Lower Body Flange				X	X	X
	UAP-89722	1	Piston and Seat Assembly Consists of:				X	X	X
24-5	UAP-89721	1	Cup Assembly—Valve Seat				X	X	X
24-6	UAP-43661	1	Seat—Main Valve (1/2 in. orifice)				X	X	X
24-7	UAP-28086	1	Spring				X	X	X
24-8	UAP-43495	1	Piston (Only)				X	X	X
24-9	UAP-26272	1	Gasket—Valve Seat				X	X	X
24-10	UAP-49267-2	1	Bushing and Support Assembly				X	X	X
	UAP-26269	1	Gasket—Valve Seat Bushing and Support				X	X	X
24-11	UAP-49225-2	1	Plunger Assembly				X	X	X
24-12	UAP-21464	1	Body				X	X	X
	UAP-59014	1	Pilot Tube Assembly				X	X	X
24-13	UAP-22445	1	Washer—Flux				X	X	X
24-14	UAP-24659	1	Washer—Insulating				X	X	X
24-15	UAP-49481	1	Coil (32 Volt)				X	X	X

## ENGINE GENERATOR ACCESSORY AND UNIT PARTS

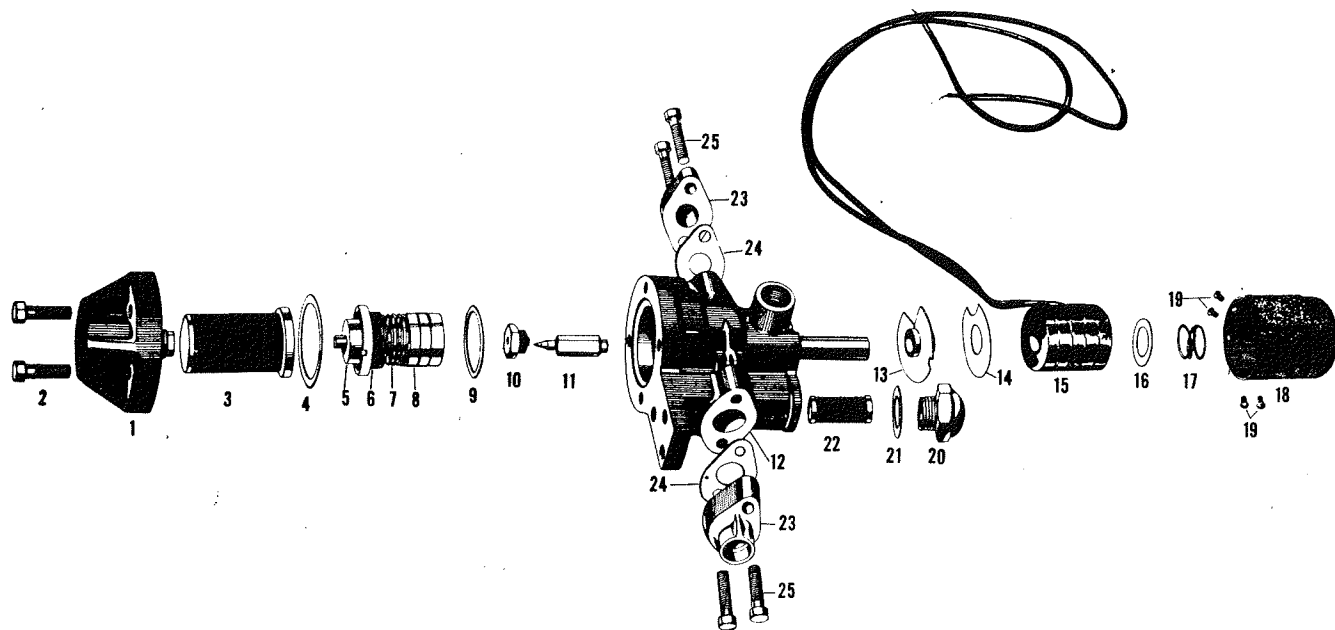


FIG. 24—REFRIGERANT SOLENOID VALVE

FIG. & REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS		
				B	B-1		C	D	D-1
24-15	UAP-49461	1	Coil (64 Volt)				X	X	X
24-16	UAP-24657	1	Washer—Insulating				X	X	X
24-17	UAP-28088	1	Spring—Coil Hold-Down				X	X	X
24-18	UAP-22635	1	Cover				X	X	X
24-19	UAP-26093	4	Screw—Rd. Hd. Mach.				X	X	X
24-20	UAP-23780	1	Cap—By-Pass				X	X	X
24-21	UAP-26271	1	Gasket—By-Pass Cap				X	X	X
24-22	UAP-29644-1	1	Screen—By-Pass				X	X	X
24-23	950747	2	Flange—Tube, 5/8 in.				X	X	X
24-24	950749	2	Gasket—Tube Flange				X	X	X
24-25	21316	4	Screw—Cap Screw 5/16-18 x 1-1/4 in. Cad. Pl.				X	X	X
	A-950743	1	Valve—Solenoid (32 Volt) (Mounted in Car)				X	X	X
	A-950744	1	Valve—Solenoid (64 Volt) (Mounted in Car)					X	X
	950748	2	Flange—Tube, 3/4 in.				X	X	X

## AUXILIARY CONTROL PANEL

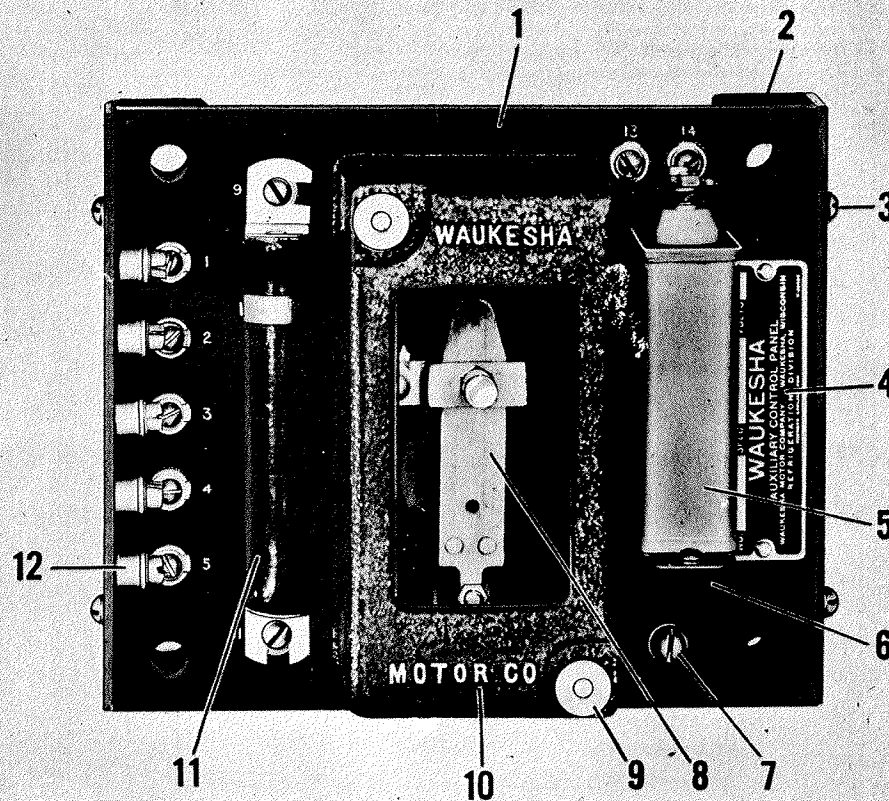


FIG. 25—EDISON AUXILIARY PANEL

FIG. & REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS		
				B	B-1		C	D	D-1
			(USED WITH EDISON BATTERIES)						
25	0Y-18475	1	Panel Assembly—Auxiliary Control (40-volt) consists of:	X	X				
25	0Y-18475-A	1	Panel Assembly—Auxiliary Control (80-volt) consists of:	X	X				
25-1	Y-18475	1	Panel—Relay	X	X				
25-2	0Y-18484	1	Support Assembly—Panel	X	X				
25-3	21667	4	Screw—Rd. Hd. Mach. #10-24 x 3/4 in. Cad. Pl.	X	X				
	21625	4	Washer—Shakeproof Lock, Int. #10 Cad. Pl.	X	X				
25-4	Y-18486	1	Plate—Name	X	X				
	26118	2	Screw—Parker Kalon Rd. Hd. #4 x 3/8 in. Cad. Pl.	X	X				
25-5	105985	1	Condenser	X	X				
25-6	Y-18474	1	Bracket—Condenser	X	X				
25-7	26008	2	Screw—Rd. Hd. Mach. 1/4-20 x 3/4 in. Cad. Pl.	X	X				
	21629	2	Washer—Shakeproof Lock, Int. 1/4 in. Cad. Pl.	X	X				
	21966	2	Screw—Rd. Hd. Mach. #10-32 x 5/16 in. Electro. Tinned	X	X				

AUXILIARY CONTROL PANEL									
FIG. & REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS		
				B	B-1		C	D	D-1
25-8	21625	2	Washer—Shakeproof Lock, Int. #10 Cad. Pl.	X	X				
	Y-18348-A	1	Wire—Rockbestos #14 x 4-1/2 Ft. Lg.	X	X				
	Y-18482	1	Relay—Voltage	X	X				
	21272	2	Screw—Hex. Hd. Washer 1/4-20 x 1/2 in. Cad. Pl.	X	X				
	21629	2	Washer—Shakeproof Lock, Int. 1/4 in. Cad. Pl.	X	X				
	Y-18250	2	Lug—Terminal (for Coil Leads)	X	X				
	0Y-18333	2	Lead Assembly—Terminal, Consists of:	X	X				
	Y-18250	1	Lug—Terminal	X	X				
	Y-18334-B	1	Lead—Wire (3 in. lg.)	X	X				
	0Y-18335-B	2	Lead Assembly—Terminal, Consists of:	X	X				
25-9	Y-18473-A	1	Lug	X	X				
	Y-18250	1	Lug—Terminal	X	X				
	Y-18334-D	1	Wire—Lead	X	X				
	Y-18256	2	Nut—Cover	X	X				
	Y-18476	2	Stud—Cover	X	X				
	Y-18477	1	Cover—Relay	X	X				
	Y-18254-A	2	Gasket	X	X				
	Y-18254-B	2	Gasket	X	X				
	Y-18478	1	Glass—Relay Cover	X	X				
	Y-18253	4	Clip	X	X				
25-10	21724	4	Screw—Flat Hd. Mach. #6-32 x 3/8 in. Cad. Pl.	X	X				
	21602	4	Washer—Shakeproof Lock, Ext. #6 Cad. Pl.	X	X				
	21258	4	Nut—Hex. #6-32 Cad. Pl.	X	X				
	Y-18480	1	Resistor (40-volt)	X	X				
	Y-18481	1	Resistor (80-volt)	X	X				
	Y-18154	5	Terminal—Wedge On	X	X				
	26119	22	Screw—Rd. Hd. Mach. #8-32 x 5/16 in. Brass	X	X				
	26120	4	Screw—Rd. Hd. Mach. #10-32 x 5/16 in. Brass	X	X				
	26121	1	Screw—Rd. Hd. Mach. 1/4-20 x 5/16 in. Brass	X	X				
	21625	2	Washer—Shakeproof Lock, Int. #10, Cad. Pl.	X	X				
25-11	21629	1	Washer—Shakeproof Lock, Int. 1/4 in. Cad. Pl.	X	X				
	Y-18135	11	Support—Terminal	X	X				
	Y-18472	1	Terminal—Mounting	X	X				
	Y-18145	2	Terminal—Mounting	X	X				

# Sub-Cooler Parts

FIG. & REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERAL MODELS		AIR COND. MODELS			
				B	B-1	C	D	D-1	
26-1	A-950385	1	Tank Assembly (40 gal. Silicon Bronze)			X	X	X	
	950398	1	Cover—Hand Hole			X	X	X	
	950160	1	Gasket—Cover			X	X	X	
	26114	8	Screw—Everdur Hex. Hd. Cap			X	X	X	
	23448	8	Washer—Copper			X	X	X	
	26172	8	Washer—Bronze Shakeproof			X	X	X	
	950397	1	Grille—Air Outlet (Rear of Sub-Cooler)			X	X	X	
	21798	8	Screw—Parker Kalon Hex. Hd. #14 x 5/8 in. Cad. Pl.			X	X	X	
26	0950388	1	Cover Assembly—Front, consists of:			X	X	X	
26-2	950388	1	Cover—Front			X	X	X	
	950394	1	Elbow—Water Filler			X	X	X	
	21976	4	Screw—Brass Hex. Hd. Cap 1/4-20 x 5/8 in.			X	X	X	
	Y-19390	4	Washer—Bronze Lock			X	X	X	
26-3	21820	4	Nut—Brass Hex. Thin 1/4-20			X	X	X	
	Y-9094	1	Flange—Water Filler			X	X	X	
	Y-9095	1	Cover—Water Filler			X	X	X	
	Y-9123	1	Spring—Cover			X	X	X	
	Y-9096	1	Pin—Water Filler Cover			X	X	X	
	21552	2	Pin—Brass Cotter, 3/32 x 3/4 in.			X	X	X	
	21797	4	Screw—Parker Kalon Hex. Hd. #14 x 1/2 in. Cad. Pl.			X	X	X	
	Y-46	1	Transfer—Name			X	X	X	
26-4	Y-6382	2	Fastener—Front Cover			X	X	X	
	21778	4	Screw—Rd. Hd. Parker Kalon Type "Z" #10 x 3/4 Ca. Cad. Pl.			X	X	X	
	Y-9097	1	Plug—Ctsk. Hd. Pipe, 2 in. (Bottom of Steel Tank)			X	X	X	
	Y-9165	1	Plug—Ctsk. Hd. Pipe, 2 in. (Bottom of Sil. Bronze Tank)			X	X	X	
26-5	950389	1	Cover—Top			X	X	X	
	21311	10	Screw—Hex. Hd. Cap 5/16-18 x 3/4 in. Brass			X	X	X	
	21182	9	Nut—Hex. 5/16-18 Cad. Pl.			X	X	X	
	21648	1	Washer—Ext.—Int. Shakeproof Lock 5/16 Cad. Pl.			X	X	X	
	21631	9	Washer—Shakeproof Lock, Int. 5/16 Cad. Pl.			X	X	X	
26-5	Y-9086	1	Cover—Top (Older Models)			X	X	X	
	21797	20	Screw—Parker-Kalon Hex. Hd. #14 x 1/2, Cad. Pl.			X	X	X	
	Y-9043	1	Strainer (inside Tank)			X	X	X	
	950390	1	Eliminator (inside Tank)			X	X	X	
	Y-9030-A	1	Coil—Evap. Sub-Cooler			X	X	X	
26-6	950391	2	Disc—Refrigerant Line Outlet			X	X	X	
	Y-9130	2	Gasket—Refrigerant Line Outlet			X	X	X	
	21778	6	Screw—Parker-Kalon Rd. Hd. #10 x 3/8 in. Type "Z" Cad. Pl.			X	X	X	
26-7	Y-9247	2	Cap—Tube (For coil)			X	X	X	
	21828	2	Screw—Parker-Kalon Hex. Hd. #14 x 3/8 in. Cad. Pl.			X	X	X	

## SUB-COOLER PARTS

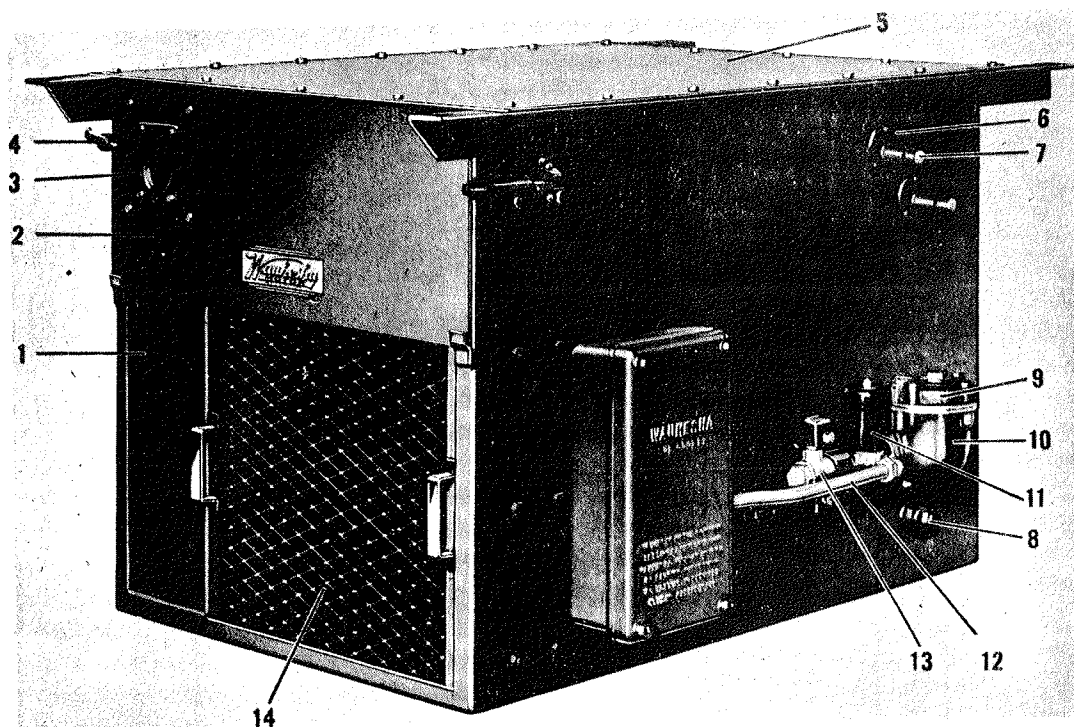


FIG. 26—SUB-COOLER

FIG. & REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS			
				B	B-1		C	D	D-1	
	26 171	4	Screw—Everdur Hex. Hd. Cap, 3/8-16 x 3/4 in.				X	X	X	
	Y-9162	4	Nut—Everdur Hex. 3/8-16				X	X	X	
	Y-9163	4	Washer—Everdur Lock, 3/8 in.				X	X	X	
	950393	1	Deflector—Air Stream (Inside Tank)				X	X	X	
	21828	2	Screw—Parker-Kalon Hex. Hd. #14 x 3/8 in. Cad. Pl.				X	X	X	
	Y-18814-G	2	Washer—Plain, #14				X	X	X	
	950075	1	Ring—Tapping (For Water Regulator Assembly)				X	X	X	
	Y-14113	1	Gasket				X	X	X	
	21732	2	Screw—Flat Hd. Mach. #10-24 x 1/2 in. Cad. Pl.				X	X	X	
	Y-9155	1	Grommet				X	X	X	
26-8	78282-L	1	Plug—Sq. Hd. Pipe, 3/4 in. Brass				X	X	X	
	0950031-E	1	Regulator Assembly—Water, 64 Volt				X	X	X	
26	0950031-D	1	Regulator Assembly—Water, 32 Volt Consists of:				X	X	X	
	0950017-A	1	Valve Assembly—Float, Consists of:				X	X	X	
26-9	950040	1	Cover—Float Valve				X	X	X	
26-10	950017-A	1	Body—Float Valve				X	X	X	
	950018-A	4	Guide—Side				X	X	X	
	950051	1	Stop—Bottom				X	X	X	
	950054	1	Float—Seamless				X	X	X	
	950042	1	Adapter—Orifice				X	X	X	
	105278	1	Copper Washer				X	X	X	

SUB-COOLER PARTS											
FIG.& REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS				
				B	B-1		C	D	D-1		
26-11	21877	1	Washer—Copper				X	X	X		
	950044	1	Orifice				X	X	X		
	950378	1	Orifice Valve				X	X	X		
	21876	1	Washer—Brass 3/8 in.				X	X	X		
	950045	1	Nut—Orifice				X	X	X		
	B-3104	1	Plug—Pipe				X	X	X		
	950041	1	Gasket—Cover				X	X	X		
	21289	4	Screw—Hex. Hd. Cap				X	X	X		
	21629	4	Washer—Shakeproof Lock				X	X	X		
	950046		Adapter—Flange				X	X	X		
	950047	1	Gasket—Adapter				X	X	X		
	Y-18673-A	2	Stud				X	X	X		
	21182	2	Nut—Hex. 5/16-18 Cad. Pl.				X	X	X		
	21629	2	Washer—Shakeproof Lock, Int. 1/4 in. Cad. Pl.				X	X	X		
	950048-A	1	Valve—Solenoid, 64 Volt				X	X	X		
	950048	1	Valve—Solenoid, 32 Volt				X	X	X		
	Y-18984	2	Lug—Solderless				X	X	X		
	Y-19154	2	Sleeve—Terminal				X	X	X		
	950114	1	Ell—Thinwall				X	X	X		
	Y-9225	1	Connector—Thinwall				X	X	X		
	26-12	950115	1	Conduit—Water Regulator				X	X	X	
		950050	1	Nipple—Brass Close				X	X	X	
	26-13	950049	1	Strainer—Water				X	X	X	
		Y-14113	1	Gasket—Body (Water Regu. to Tank)				X	X	X	
		B-6314-A	5	Stud				X	X	X	
		21629	6	Washer—Shakeproof Lock, Int. 1/4 in. Cad. Pl.				X	X	X	
	21178	5	Nut—Hex. 1/4-28 Cad. Pl.				X	X	X		
	21285	1	Screw—Hex. Hd. Cap, 1/4-20 x 1-1/4 in. Cad. Pl.				X	X	X		
	950043	1	Clamp				X	X	X		
	21633	2	Washer—Shakeproof Lock, Int. 3/8 in. Cad.Pl.				X	X	X		
	Y-6867-C	1	Grip—Cord				X	X	X		
	Y-7257	1	Plug—Square Hd. Pipe 3/8 in.				X	X	X		
26-14	950778	1	Filter Assembly—Air				X	X	X		
27	0950022-A	1	Box Assembly—Control (with Hi. Press. Switch and angle Valve)				X	X	X		
	950121	1	Control—High Pressure				X	X	X		
	Y-6468	1	Valve—Angle (In Tank of sub-coolers with Hi. Press. Control)				X	X	X		
27	0950022	1	Box Assembly—Control (with Temp. Switch) consists of:				X	X	X		
27-1	950022	1	Box—Control				X	X	X		
	80609	1	Plug—Expansion				X	X	X		
27-2	Y-18672-B	4	Stud				X	X	X		
	21538	4	Washer—Lock, 5/16 in. Cad. Pl.				X	X	X		

SUB-COOLER PARTS

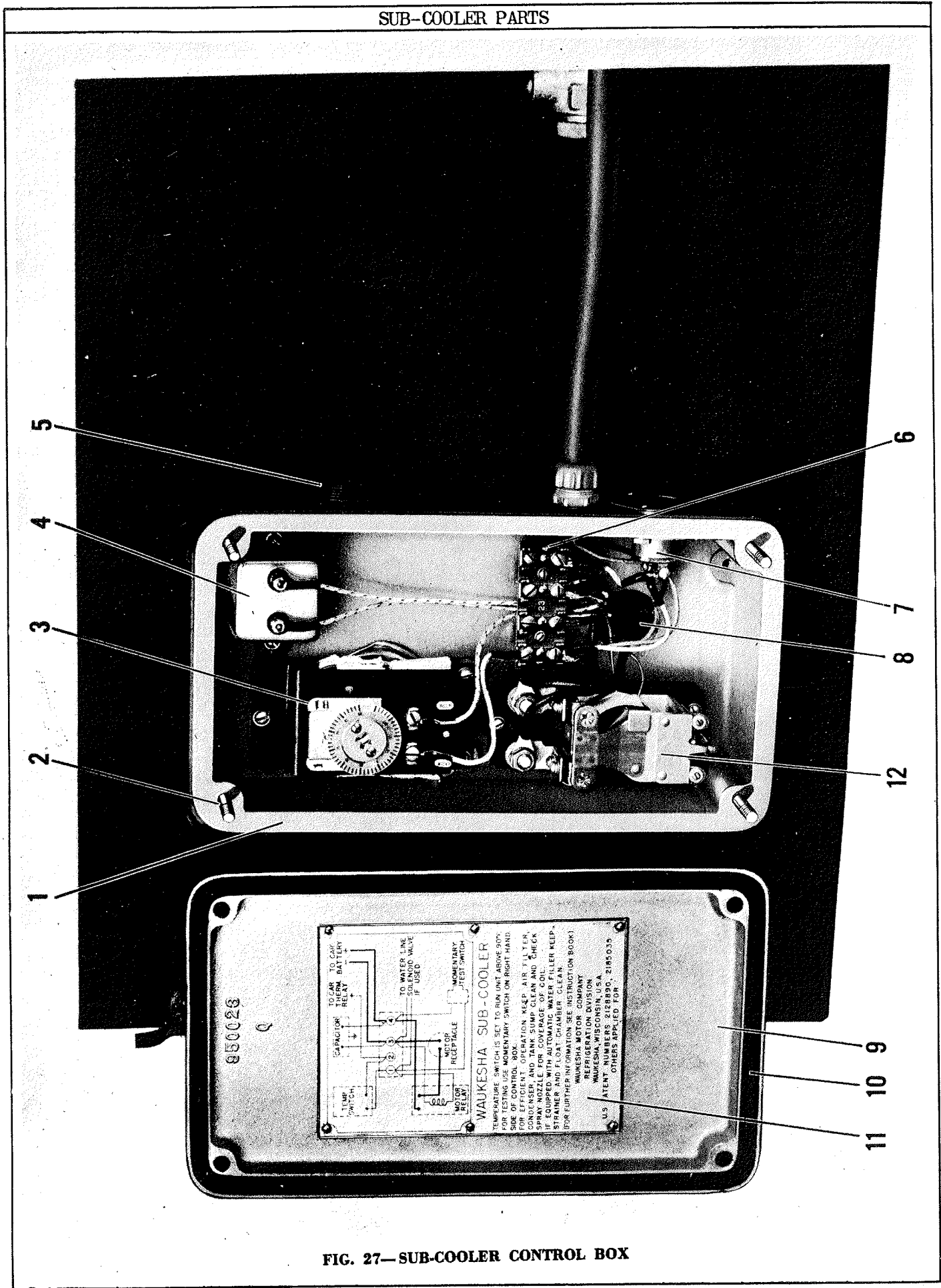


FIG. 27—SUB-COOLER CONTROL BOX

SUB COOLER PARTS											
FIG. & REF. NO.	PART NUMBER	NO REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS				
				B	B-1		C	D	D-1		
27-3	21182	4	Nut—Hex. 5/16-18, Cad. Pl.				X	X	X		
	9500 25	1	Switch—Temperature				X	X	X		
	21101	3	Screw—Rd. Hd. Mach. #10-24 x 1/2 in. Cad. Pl.				X	X	X		
	21625	3	Washer—Shakeproof Lock, Int. #10 Cad. Pl.				X	X	X		
	26102	4	Screw—Socket Hd. Set, Cup Point #10-24 x 1/2 in. Cad. Pl.				X	X	X		
	C-950035-Z	1	Wire Assembly, consists of:				X	X	X		
	Y-19225-F	1	Wire—Aircraft #16, 4 in. lg.				X	X	X		
	Y-18984	2	Lug—Solderless				X	X	X		
	Y-19154	2	Sleeve—Terminal				X	X	X		
	D-950035-P	1	Wire Assembly				X	X	X		
	Y-19225-Y	1	Wire—Aircraft, #16, 7 in. lg.				X	X	X		
	Y-18984	2	Lug—Solderless				X	X	X		
	Y-19154	2	Sleeve—Terminal				X	X	X		
	27-4	21630	2	Washer—Bronze Shakeproof Lock, Int. #6				X	X	X	
9500 29		1	Capacitor				X	X	X		
21090		2	Screw—Rd. Hd. Mach. #8-32 x 3/8 in. Cad. Pl.				X	X	X		
21818		2	Washer—Shakeproof Lock, Int. #8 Cad. Pl.				X	X	X		
21850		2	Washer—Bronze Shakeproof Lock, Int. #6				X	X	X		
D-950035-Q		2	Wire Assembly, consists of:				X	X	X		
Y-19225-Z		1	Wire—Aircraft, #16, 9 in. Lg.				X	X	X		
Y-18984		1	Lug—Solderless				X	X	X		
Y-18984-D		1	Lug—Solderless				X	X	X		
Y-19154		2	Sleeve—Terminal				X	X	X		
27-5	78283-K	1	Plug—Ctsk. Hd. Pipe, 3/4 in.				X	X	X		
27-6	9500 24	1	Strip—Terminal				X	X	X		
	21817	2	Screw—Rd. Hd. Mach. #6-32 x 1/2 in. Cad. Pl.				X	X	X		
	21621	2	Washer—Shakeproof Lock, Int. #6 Cad. Pl.				X	X	X		
	21851	8	Washer—Bronze Shakeproof Lock #8				X	X	X		
27-7	950327	1	Switch—Push Button				X	X	X		
	950026	1	Support—Switch				X	X	X		
	950027	1	Diaphragm				X	X	X		
	950028	1	Ring—Diaphragm				X	X	X		
	21103	3	Screw—Rd. Hd. Mach. #10-24 x 7/8 Cad. Pl.				X	X	X		
	21262	3	Nut—Hex. #10-24 Cad. Pl.				X	X	X		
	21625	3	Washer—Shakeproof Lock, Int. #10 Cad. Pl.				X	X	X		
	D-950035	1	Wire Assembly, consists of:				X	X	X		
	Y-19225-B	1	Wire—Aircraft #16, 2 in. lg.				X	X	X		
	Y-18984	1	Lug—Solderless, #10 Stud				X	X	X		
	Y-18984-D	1	Lug—Solderless				X	X	X		
	Y-19154	2	Sleeve—Terminal				X	X	X		
		C-950035-W	1	Wire Assembly				X	X	X	

## SUB-COOLER PARTS

FIG. & REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS		
				B	B-1		C	D	D-1
27-8	Y-19225-D	1	Wire—Aircraft #6, 4 in. lg.				X	X	X
	Y-18984	1	Lug—Solderless				X	X	X
	Y-18984-D	1	Lug—Solderless				X	X	X
	Y-19154	2	Sleeve—Terminal				X	X	X
	950033	1	Unit—Receptacle Contact				X	X	X
	950032	1	Housing—Receptacle				X	X	X
	OY-7613-C	1	Wire Assembly, consists of:				X	X	X
	Y-7613-G	1	Wire—Extra Flexible #12, 3 in. lg.				X	X	X
	Y-18994-B	1	Lug—Solderless				X	X	X
	Y-19154-C	2	Sleeve—Terminal				X	X	X
27	21310	4	Screw—Hex. Hd. Cap, 5/16-18 x 3/4 in. Cad. Pl.				X	X	X
	21538	4	Washer—Lock, 5/16 in. Cad. Pl.				X	X	X
	0950023	1	Cover Assembly, consists of:				X	X	X
	27-9 950023	1	Cover—Control Box				X	X	X
	27-10 Y-6287-H	1	Gasket				X	X	X
	960034	1	Shield—Instruction Drawing				X	X	X
	27-11 SK-1024	1	Drawing—Instruction				X	X	X
	26130	6	Screw—Parker Kalon Rd. Hd. Type Z #4 x 1/4 in. Cad. Pl.				X	X	X
	27-12 Y-19152-A	1	Relay—Motor (40-volt)				X	X	X
	27-12 Y-19152-B	1	Relay—Motor (80-volt)				X	X	X
	Y-19165	1	Insulator—Base				X	X	X
	21103	2	Screw—Rd. Hd. Mach. #10-24 x 7/8 in. Cad. Pl.				X	X	X
	21667	1	Screw—Rd. Hd. Mach. #10-24 x 3/4 in. Cad. Pl.				X	X	X
	21625	3	Washer—Shakeproof Lock, Int. #10 Cad. Pl.				X	X	X
	Y-19390-A	2	Washer—Bronze Lock 5/16 in.				X	X	X
	OY-7613-D	1	Wire Assembly, consists of:				X	X	X
	Y-7613-J	1	Wire—Extra Flexible #12, 7 in. lg.				X	X	X
	Y-18994-B	1	Lug—Solderless				X	X	X
	Y-19005-A	1	Lug—Solderless				X	X	X
	Y-19154-C	2	Sleeve—Terminal				X	X	X
	OY-7613-B	1	Wire Assembly, consists of:				X	X	X
	Y-7613-H	1	Wire—Extra Flexible #12, 6 in. lg.				X	X	X
	Y-19005-A	1	Lug—Solderless				X	X	X
	Y-19154-C	2	Sleeve—Terminal				X	X	X
	28 OY-9093-F	1	Motor and Fan Assembly—Sub-Cooler Pump (40-volt) consists of:				X	X	X
	28 OY-9093-C	1	Motor and Fan Assembly—Sub-Cooler Pump (80-volt) consists of:				X	X	X
	0950407	1	Housing Assembly—Fan, consists of:				X	X	X
	28-1 950407	1	Housing				X	X	X
	26154	4	Nut—Everdur Hex				X	X	X
	28-2 Y-9125-A	1	Gasket—Fan Housing				X	X	X
28-3	Y-9055	1	Wheel—Fan				X	X	X

SUB-COOLER PARTS										
FIG. & REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS			
				B	B-1		C	D	D-1	
28-4	Y-9054	1	Support—Inlet Ring and Housing				X	X	X	
	21308	4	Screw—Hex. Hd. Cap				X	X	X	
	21631	4	Washer—Shakeproof Lock				X	X	X	
	21355	4	Screw—Hex. Hd. Cap, 3/8-16 x 1-3/8 in. Cad. Pl.				X	X	X	
	21190	4	Nut—Hex. 3/8-16 Cad. Pl.				X	X	X	
	21729	4	Washer—Lock, 3/8 in. Cad. Pl.				X	X	X	
	Y-9046	1	Hinge—Movable				X	X	X	
	Y-9101	1	Pin—Upper Hinge				X	X	X	
	Y-9134	1	Pin—Lower Hinge				X	X	X	
	21351	4	Screw—Hex. Hd. Cap, 3/8-16 x 1-1/8 in. Cad. Pl.				X	X	X	
	21190	4	Nut—Hex. 3/8-16 Cad. Pl.				X	X	X	
	21729	4	Washer—Lock, 3/8 in. Cad. Pl.				X	X	X	
	Y-9164	1	Plate—Name				X	X	X	
	21766	2	Screw—Parker Kalon Rd. Hd. Type Z #4 x 3/16 in. Cad. Pl.				X	X	X	
	Y-9050	1	Nozzle—Spray				X	X	X	
	Y-9051	1	Support—Spray Nozzle				X	X	X	
	21342	2	Screw—Hex. Hd. Cap, 3/8-16 x 5/8 in. Cad. Pl.				X	X	X	
	21729	2	Washer—Lock, 3/8 in. Cad. Pl.				X	X	X	
	Y-9126	1	Coupling—Nozzle Hose				X	X	X	
	Y-9128	1	Hose—Discharge				X	X	X	
	Y-9092	1	Coupling—Female Hose				X	X	X	
	Y-9129	1	Clamp—Double Tight Hose				X	X	X	
	Y-9091	1	Nipple—Male Hose				X	X	X	
	Y-9129-A	1	Clamp—Double Tight Hose				X	X	X	
	Y-9135-A	1	Washer—Hose				X	X	X	
	Y-9049	1	Elbow—Flanged, 90 deg.				X	X	X	
	Y-9034	1	Gasket—Flange				X	X	X	
	21285	2	Screw—Hex. Hd. Cap, 1/4-20 x 1-1/4 in. Cad. Pl.				X	X	X	
	21292	2	Screw—Hex. Hd. Cap, 1/4-20 x 2 in. Cad. Pl.				X	X	X	
	21174	4	Nut—Hex. 1/4-20 Cad. Pl.				X	X	X	
	21536	4	Washer—Lock, 1/4 in. Cad. Pl.				X	X	X	
	Y-9091	1	Nipple—Male Hose				X	X	X	
	Y-9034	1	Gasket—Flange				X	X	X	
Y-9178	1	Elbow—Water Pump Inlet				X	X	X		
73448-A	4	Washer—Copper				X	X	X		
21276	2	Screw—Hex. Hd. Cap, 1/4-20 x 3/4 in. Cad. Pl.				X	X	X		
21283	2	Screw—Hex. Hd. Cap, 1/4-20 x 1-1/8 in. Cad. Pl.				X	X	X		
Y-9031	1	Body—Water Pump				X	X	X		
Y-9032	1	Cover—Pump Body				X	X	X		
Y-6979	1	Bushing				X	X	X		
21276	8	Screw—Hex. Hd. Cap, 1/4-20 x 3/4 in. Cad. Pl.				X	X	X		

## SUB-COOLER PARTS

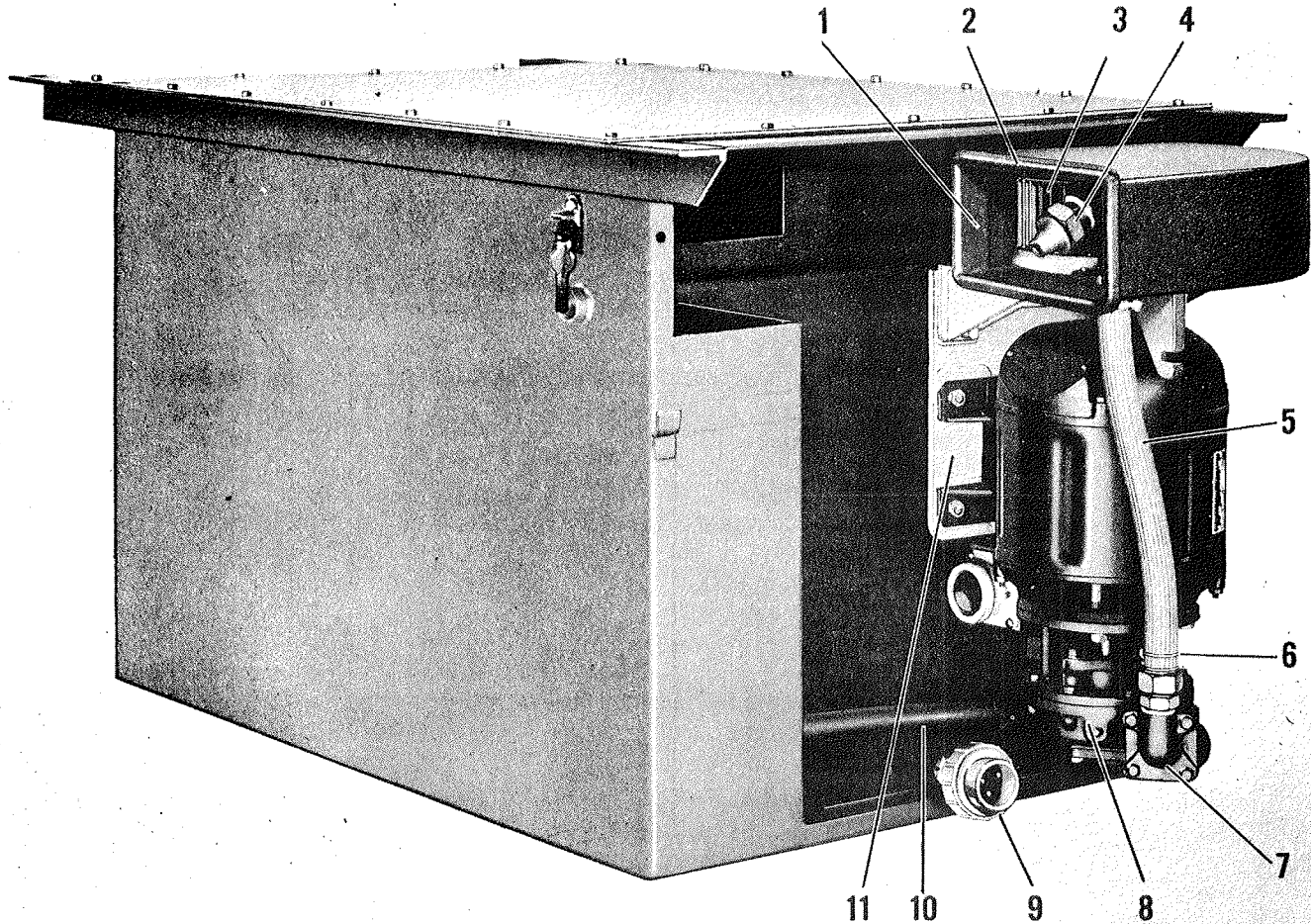


FIG. 28—SUB-COOLER PUMP AND FAN ASSEMBLY

FIG. & REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS			
				B	B-1		C	D	D-1	
28-9	73448-A	8	Washer—Copper				X	X	X	
	78282-B	1	Plug—Sq. Hd. Pipe, 1/8 in.				X	X	X	
	B-5911	1	Cock—Angle Drain				X	X	X	
	Y-9035	1	Gasket—Body				X	X	X	
	Y-9132	1	Impeller				X	X	X	
	21881	1	Screw—Socket Hd. Set, 5/16-18 x 3/8 in. Cad. Pl.				X	X	X	
	0Y-9038	1	Flange Assembly—Split, consists of:				X	X	X	
	Y-9037	1	Flange—Male Split (Not sold separately)				X	X	X	
	Y-9038	1	Flange—Female Split (Not sold separately)				X	X	X	
	21353	2	Screw—Hex. Hd. Cap, 3/8-16 x 1-1/4 in. Cad. Pl.				X	X	X	
	Y-18814-H	2	Washer—Plain, 3/8 in.				X	X	X	
	Y-9142-A	3	Packing—Pump				X	X	X	
	950037	1	Shell—Plug				X	X	X	
	950038	1	Unit—Plug Contact				X	X	X	

SUB-COOLER PARTS									
FIG. & REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS		
				B	B-1		C	D	D-1
28-10	OY-9127	1	Hose Assembly—Suction, consists of:				X	X	X
	Y-9127	1	Hose—Suction				X	X	X
	Y-9092	1	Coupling—Female Hose				X	X	X
	Y-9129	1	Clamp—Double Tight Hose				X	X	X
	Y-9129-A	1	Clamp—Double Tight Hose				X	X	X
	Y-9135-A	1	Washer—Hose				X	X	X
28-11	Y-9045	1	Hinge—Stationary				X	X	X
	21353	8	Screw—Hex. Hd. Cap, 3/8-16 x 1-1/4 in. Cad. Pl.				X	X	X
	21190	8	Nut—Hex. 3/8 in. Cad. Pl.				X	X	X
	21729	8	Washer—Lock, 3/8 in. Cad. Pl.				X	X	X
	Y-9090	1	Bolt—Eye				X	X	X
	Y-9131	1	Pin—Eye Bolt Hinge				X	X	X
	21882	1	Pin—Cotter				X	X	X
	Y-9048	1	Knob—Lock				X	X	X
	Y-9056-A	1	Motor—Sub-Cooler (64-volt)				X	X	X
	Y-9056	1	Motor—Sub-Cooler (32-volt) (refer to Fig. #29 for detail parts list)				X	X	X
	21344	4	Screw—Hex. Hd. Cap, 3/8-16 x 3/4 in. Cad. Pl.				X	X	X
	21729	4	Washer—Lock, 3/8 in. Cad. Pl.				X	X	X
	OY-14106-D	1	Valve Assembly—Snap Action Float (used on units not equipped with Water Regulator) consists of:				X	X	X
	Y-14106-B	1	Body—Float Valve				X	X	X
	Y-14113	1	Gasket—Float Valve				X	X	X
	21276	6	Screw—Hex. Hd. Cap, 1/4-20 x 3/4 in. Cad. Pl.				X	X	X
	B-4188	6	Washer—Copper				X	X	X
	21732	2	Screw—Flat Hd. #10-24 x 1/2 in. Cad. Pl.				X	X	X
	BD-190	2	Washer—Copper				X	X	X
	Y-14108-B	1	Seat—Needle Valve				X	X	X
	OY-14421-A	1	Valve Assembly—Needle, consists of:				X	X	X
	Y-14421-A	1	Valve—Needle				X	X	X
	Y-14420-A	2	Pin—Guide				X	X	X
	Y-14114-A	1	Pin—Needle Valve Pivot				X	X	X
	Y-14107	1	Lever—Needle Valve				X	X	X
	Y-14104	1	Yoke—Float Valve				X	X	X
	Y-14097-A	1	Shaft—Float Valve				X	X	X
	OY-14383-A	1	Spring Assembly—Float Valve				X	X	X
	Y-14383-A	1	Spring—Float Valve (Not sold sepa- rately)				X	X	X
	Y-14384-A	2	Pivot—Float Valve Spring (Not sold separately)				X	X	X
	Y-14112-A	1	Float				X	X	X
	Y-14105-A	2	Pins—Travel Limiting				X	X	X
	Y-14109-A	2	Pivot—Needle Valve Spring				X	X	X
	78282-B	1	Plug—1/4 Pipe Sq. Hd.				X	X	X

SUB-COOLER PARTS

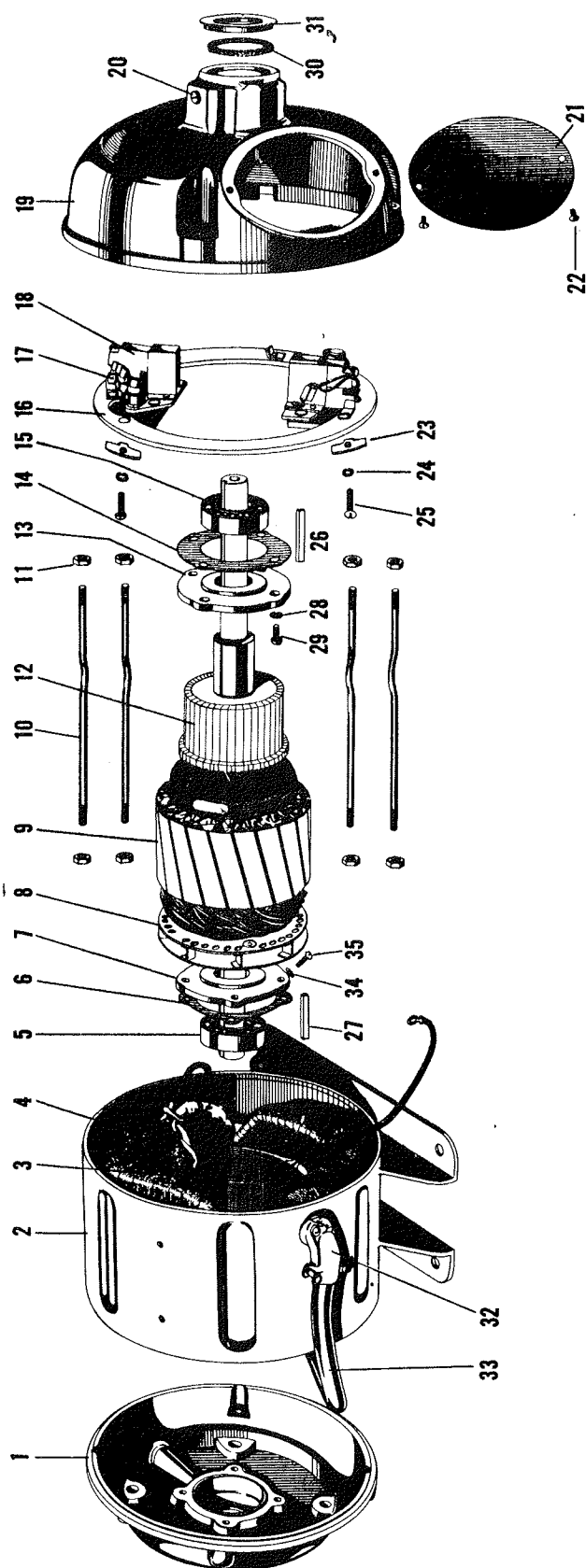


FIG. 29—SUB-COOLER MOTOR DETAILS

WAUKESHA MOTOR COMPANY  
RAILWAY DIVISION  
WAUKESHA, WISCONSIN

May 7, 1958

BREAKDOWN OF PART NUMBER Y-9056-B FAN MOTOR (32 VOLT)

BREAKDOWN OF PART NUMBER Y-9056-C FAN MOTOR (64 VOLT)

KURZ AND ROOT MOTORS

<u>Item No.</u>	<u>Part No.</u>	<u>Name</u>	<u>No. Req'd.</u>
1	960104	Drive End Bracket	1
2	960401	Field Frame	1
3	960402	Field Pole	2
4	960124	Field Coil 32 Volt (pair)	1
4	960123	Field Coil 64 Volt (pair)	1
5	960125	Ball Bearing	1
6		Not required	
7		Not required	
8		Not required	
9	960121	Armature Assembly 32 Volt	1
9	960174	Armature Assembly 64 Volt	1
10		Not required	
11		Not required	
12	960404	Commutator	1
13		Not required	
14		Not required	
15	960125	Ball Bearing	1
16	960126	Brushholder Ring	1
17	960132	Brush Spring	2
18	960129	Brushholder	2
18	960131	Brush	4
19	960105	Comm. End Bracket	1
20	25-1951-10	Headless Pipe Plug	2
21	960406	Sht. Metal Cover	2
22	50-938-14	Rd. Hd. Screw	4
23		Not required	
24	21536	Split Lock Washer	2
25	73-939-48	Hex Hd. Cap Screw	2
26	44-934-45	Key	1
27	44-934-44	Key	1
28		Not required	
29		Not required	
30	960407	Oil Seal	2
31		Not required	
32	Y-6867-E	Cable Fitting	1
33	Y-9139-D	Cable	1

SUB-COOLER AND FUEL CARRIER PARTS									
FIG. & REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS		
				B	B-1		C	D	D-1
29	Y-9056-C	1	Motor—Sub-Cooler, (64 Volt)					X	X
29	Y-9056-B	1	Motor—Sub-Cooler, (32 Volt) Consists of:					X	X
PARTS FOR THE KURZ AND ROOT MOTOR									
			<u>Quantity</u> <u>Part Number</u> <u>Part Name</u>						
			1      AA-X534      Armature						
			2      11-X534      Field Coil						
			2      18-588-1      Brushholder						
			2      19-946-2      DC Brush						
			2      20-954      BH Spring						
			2      15-944-4      Ball Bearing						
			1      17-2014      Brushholder Ring						
29	Y-9056-A	1	Motor—Sub-Cooler, 1/2 H.P. (64-Volt)	Y-9056-A	Not	Available			
29	Y-9056	1	Motor—Sub-Cooler, 1/2 H.P. (32-Volt)	Y-9056	Not	Available			
			Consists of:						
29-1	I-HE-1809	1	Plate—Back End				X	X	X
29-2		1	Stator Assembly—32 Volt				X	X	X
29-2		1	Stator Assembly—64 Volt					X	X
29-3		2	Pole—Field				X	X	X
29-4	WE-5000-A	2	Coil—Stator - 64 Volt					X	X
29-4	WE-5000	2	Coil—Stator - 32 Volt				X	X	X
29-5	Y-9150	1	Bearing—Ball (Back)				X	X	X
29-6	I-HC-4113	1	Gasket—Ball Bearing Cap (Back)				X	X	X
29-7	I-HD-2472	1	Cap—Ball Bearing (Inside - Back)				X	X	X
29-8	HC-5196-1	1	Blower Assembly				X	X	X
29-9	WE-5001-A	1	Rotor Assembly (Complete) 64 Volt					X	X
29-9	WE-5001	1	Rotor Assembly (Complete) 32 Volt				X	X	X
29-10	I-HC-7293	4	Bolt—Thru				X	X	X
29-11	21264	4	Nut—Thru Bolt, #10-32				X	X	X
29-12	HC-5189-1	1	Commutator				X	X	X
29-13	I-HD-3402	1	Cap—Ball Bearing (Front)				X	X	X
29-14	HC-2974	1	Gasket—Ball Bearing Cap (Front)				X	X	X
29-15	B-5868	1	Bearing—Ball (Front)				X	X	X
29-16	HD-3627	1	Arm Assembly—Rocker				X	X	X
29-17	HC-3102	4	Spring—Brush				X	X	X
29-18	HC-3103	2	Brush Assembly				X	X	X
29-19	I-HC-8164	1	Plate—End (Front, Commutator End)				X	X	X
29-20	78280-A	2	Plug—Grease, 1/8 in.				X	X	X
29-21	HD-4122	2	Plate—End Plate Cover				X	X	X
29-22	21087	4	Screw—Rd. Hd. Mach #8-32 x 1/4 in.				X	X	X
29-23	HC-5542	2	Clamp—Rocker Arm				X	X	X
29-24	21049	2	Washer—Lock #10 (Rocker Arm Clamp)				X	X	X
29-25	21670	2	Screw—Rd. Hd. Mach. #10-32 x 3/4 (Rocker Arm Clamp)				X	X	X
29-26	4-MC-1749	1	Key—Pulley (Front)				X	X	X
29-27	73-MC-1751	1	Key—Pulley (Back)				X	X	X
29-28	21050	4	Washer—Lock 1/4 (Ball Bearing Cap (Front)				X	X	X
29-29	21133	4	Screw—Fil. Hd. Mach. 1/4-20 x 5/8 in. (Front)				X	X	X
29-30	I-HC-4111	1	Washer—Ball Bearing Felt				X	X	X

SUB-COOLER AND FUEL CARRIER PARTS										
FIG. & REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS			
				B	B-1		C	D	D-1	
29-31	1-HC-4352	1	Cap—Ball Bearing (Outside)				X	X	X	
29-32		1	Fitting—Condulet				X	X	X	
29-33		1	Cable				X	X	X	
29-34	21049	4	Washer—Lock #10 (Ball Bearing Cap) (Back)				X	X	X	
29-35	21670	4	Screw—Rd. Hd. Mach. #10-32 x 3/4				X	X	X	
			(FUEL CARRIER PARTS)							
30-1	0950097	1	Carrier—2 cyl. Fuel, for Types "R" and "RH"	X	X		X	X	X	
30-1	0950098	1	Carrier—3 cyl. Fuel, for Types "R" and "RH"	X	X		X	X	X	
30-1	0950099	1	Carrier—4 cyl. Fuel, for Types "R" and "RH"	X	X		X	X	X	
30-2	Y-6382	2	Fastener—Hood	X	X		X	X	X	
	21778	4	Screw—Parker-Kalon Rd. Hd. #10 x 3/8, Cad. Pl.	X	X		X	X	X	
	Y-6220	2	Catch—Hood Fastener	X	X		X	X	X	
	21904	4	Rivet—#5 Tinnings	X	X		X	X	X	
	Y-6071	2	Pull—Door	X	X		X	X	X	
	26122	4	Screw—Flat Hd. Mach. #10-24 x 5/8 in. Cad. Pl.	X	X		X	X	X	
	21625	4	Washer—Shakeproof Lock Ext. #10 Cad. Pl.	X	X		X	X	X	
	21262	4	Nut—Hex. #10-24 Cad. Pl.	X	X		X	X	X	
	Y-6528	2	Spring—Fuel Cylinder Clamp (2-cylinder)	X	X		X	X	X	
	Y-6528	3	Spring—Fuel Cylinder Clamp (3-cylinder)	X	X		X	X	X	
	21426	3	Screw—Hex. Hd. Cap, 1/2-13 x 1 in. Cad. Pl.	X	X		X	X	X	
	21206	3	Nut—Hex. 1/2-13 Cad. Pl.	X	X		X	X	X	
	21539	3	Washer—Lock, 1/2 in. Cad. Pl.	X	X		X	X	X	
	0Y-6997-A	1	Holder Assembly—Tank Instruction (2-cyl.)	X	X		X	X	X	
	0Y-6872-A	1	Holder Assembly—Tank Instruction (3-cyl.)	X	X		X	X	X	
	21766	6	Screw—Parker-Kalon Rd. Hd. Type "Z" #4 x 3/16, Cad. Pl.	X	X		X	X	X	
	Y-18814-B	6	Washer—Plain, #4 Cad. Pl.	X	X		X	X	X	
	Y-46	1	Transfer—Name	X	X		X	X	X	
	Y-7497	1	Plate—Name	X	X		X	X	X	
	21766	4	Screw—Parker-Kalon Rd. Hd. Type "Z" #4 x 3/16, Cad. Pl.	X	X		X	X	X	
30-3		3	Cylinder—Fuel (Not furnished by Waukesha Motor Company)	X	X		X	X	X	
30-4	0Y-7647-A	3	Hose Assembly—High Pressure Fuel (consists of:)							
	Y-7647-A	3	Hose—High Pressure Fuel	X	X		X	X	X	
	Y-7648	6	Nipple—P.O.L.	X	X		X	X	X	
	Y-7649	6	Nut—P.O.L.	X	X		X	X	X	
	Y-6266	3	Elbow—Street 1/4	X	X		X	X	X	
	B-5528	19	Nut—Flare, 3/8 in.	X	X		X	X	X	
	B-1687	4	Elbow—Half Union, 3/8 Flare x 1/4 M.P.	X	X		X	X	X	
	B-10455	3	Tee—Flare Tube 3/8 x 3/8 x 3/8	X	X		X	X	X	
	Y-6167-B	3	Valve—Check (See Fig. 36)	X	X		X	X	X	
	Y-6869	3	Valve—Tee Type Check	X	X					
	Y-6545	3	Nipple—Brass, 1/4 x 1/4 in.	X	X		X	X	X	
30-5	Y-6163-G	1	Regulator (See Fig. 37 for Breakdown)	X	X		X	X	X	
30-6	Y-6163-G	1	Regulator (See Fig. 37 for Breakdown)	X	X		X	X	X	
30-7	Y-6163-G	1	Regulator (See Fig. 37 for Breakdown)	X	X		X	X	X	
	Y-6578	3	Valve—Excess Flow (See Fig. 38 for Breakdown)	X	X		X	X	X	
30-8	Y-6166	3	Valve—Globe (Special) (See Fig. 39 for Breakdown)	X	X		X	X	X	

SUB-COOLER AND FUEL CARRIER PARTS										
FIG.& REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS			
				B	B-1		C	D	D-1	
30-9	Y-6218	6	Clamp—Regulator Assembly	X	X		X	X	X	
	21366	6	Screw—Hex. Hd. Cap 3/8-16 x 2-1/2 in. Cad. Pl.	X	X		X	X	X	
	21190	6	Nut—Hex. 3/8-16 Cad. Pl.	X	X		X	X	X	
	21729	6	Washer—Lock, 3/8 in. Cad. Pl.	X	X		X	X	X	
	Y-6401	1	Valve—Excess Flow (See Fig. 34 for Breakdown)	X	X		X	X	X	
	Y-12075	1	Cap—Pipe, 3/4 in.	X	X		X	X	X	
30-10	B-3104	2	Plug—1/8 Slotted Head Pipe, 1/8 in. Brass	X	X		X	X	X	
	Y-7403	1	Union—3/4 Male & Female	X	X		X	X	X	
	0Y-6598-A	1	Nipple Assembly—Pipe (long)	X	X		X	X	X	
	0Y-6597	1	Nipple Assembly—Pipe (short)	X	X		X	X	X	
30-11	Y-6603	1	Nipple—Pipe, 3/4 x 13-1/2 in. Galv.	X	X		X	X	X	
	Y-6538	1	Tee, 3/4 Mall. Galv.	X	X		X	X	X	
	Y-6537	1	Plug—Sq. Hd. Pipe, 3/4 in. Galv.	X	X		X	X	X	
	Y-6162-C	1	Regulator (large) 4 oz. (See Fig. 35 for Breakdown)	X	X		X	X	X	
30-12	Y-6266	1	Elbow—Street	X	X		X	X	X	
	21308	2	Screw—Hex. Hd. Cap 5/16-18 x 5/8 in. Cad. Pl.	X	X		X	X	X	
	21631	2	Washer—Shakeproof Lock, Int. 5/16 in. Cad. Pl.	X	X		X	X	X	
	78201-A	1	Nipple—Close 1/4 in.	X	X		X	X	X	
	Y-6543	1	Tee, 1/4 in. Brass	X	X		X	X	X	
	78202-C	2	Elbow—90° St. 1/4 in. Brass	X	X		X	X	X	
	Y-6168-A	1	Gauge—Pressure	X	X		X	X	X	
	Y-6900	1	Coupling—1/4 in. Female	X	X		X	X	X	
	Y-6990	1	Tee—3/8 Flare x 1/4 M.P. x 3/8 Flare	X	X	X	X	X	X	
	Y-6897	1	Coupling—Female, 3/8 Flare x 1/4 in. F.P.	X	X		X	X	X	
	Y-7090	1	Grommet—3/8 in. Rubber	X	X		X	X	X	
	Y-6247	2	Clip—3/8 in. Wire	X	X		X	X	X	
	21880	2	Screw—Rd. Hd. Mach. 1/4-20 x 1/2 in. Cad. Pl.	X	X		X	X	X	
	21174	2	Nut—Hex. 1/4-20, Cad. Pl.	X	X		X	X	X	
	21536	2	Washer—Lock, 1/4 Cad. Pl.	X	X		X	X	X	
	44774-A	3	Tube—Copper, 3/8 O.D. x .035 wall x 3-1/2 in.	X	X		X	X	X	
	44774-B	1	Tube—Copper, 3/8 O.D. x .035 wall x 4-1/2 in.	X	X		X	X	X	
	76368	1	Tube—Copper, 3/8 O.D. x .035 wall x 11-3/4 in.	X	X		X	X	X	
		1	Tube—Copper, 3/8 O.D. x .035 wall x 8-1/2 in.	X	X		X	X	X	
	78273-B	1	Tube—Copper, 3/8 O.D. x .035 wall x 15-1/2 in.	X	X		X	X	X	
	44774-F	2	Tube—Copper, 3/8 O.D. x .035 wall x 20 in.	X	X		X	X	X	
		1	Tube—Copper, 3/8 O.D. x .035 wall x 45 in.	X	X		X	X	X	

## SUB-COOLER AND FUEL CARRIER PARTS

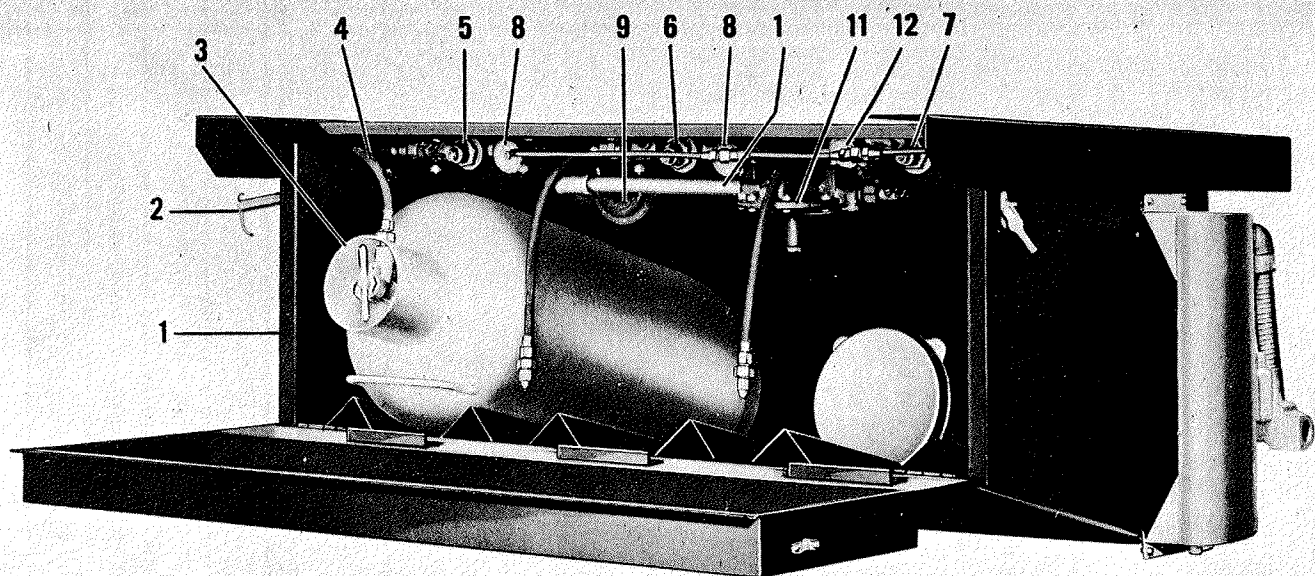


FIG. 30—FUEL CARRIER (FRONT)

FIG. & REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS		
				B	B-1		C	D	D-1
31-1	Y-6873	1	Elbow—Exhaust Outlet (On Type "RH")	X	X				
31-2	Y-6989	1	Shield—Heater Pad (2-cylinder)	X	X				
	Y-6878	1	Shield—Heater Pad (3-cylinder)	X	X				
	Y-6859	1	Shield—Heater Pad (4-cylinder)	X	X				
	21797	12	Screw—Parker Kalon Hex. Hd. #14 x 1/2 in. Cad. Pl.	X	X				
		12 lb.	Wool—Rock (Loose)	X	X				
31-3	Y-6857	3	Pipe—Exhaust Heater	X	X				
31-4	Y-6854	3	Pad—Heating	X	X				
	Y-6855-A	3	Cover—Heating Pad	X	X				
	78283-C	2	Plug—1 in. Ctsk. Pipe	X	X				
	Y-6856	3	Gaskets—Heating Pad Cover	X	X				
	Y-11085	1	Nipple	X	X				
	Y-18012	12	Screw—Hex. Hd. Cap (Everdur) 3/8-16 x 1 in.	X	X				
	21344	12	Screw—Hex. Hd. Cap, 3/8-16 x 3/4 in. Cad. Pl.	X	X				
	21729	24	Washer—Lock, 3/8 in. Cad. Pl.	X	X				
	21797	6	Screw—Parker-Kalon Hex. #14 x 1/2 in. Cad. Pl.	X	X				
31	OY-18207-D	1	Valve Assembly—Exhaust By-Pass, consists of:	X	X				
31-5	OY-18514-A	1	Tube Assembly—By-Pass Valve (Side)	X	X				
31-6	Y-18210	1	Cover—Exhaust By-Pass Valve	X	X				

## SUB-COOLER AND FUEL CARRIER PARTS

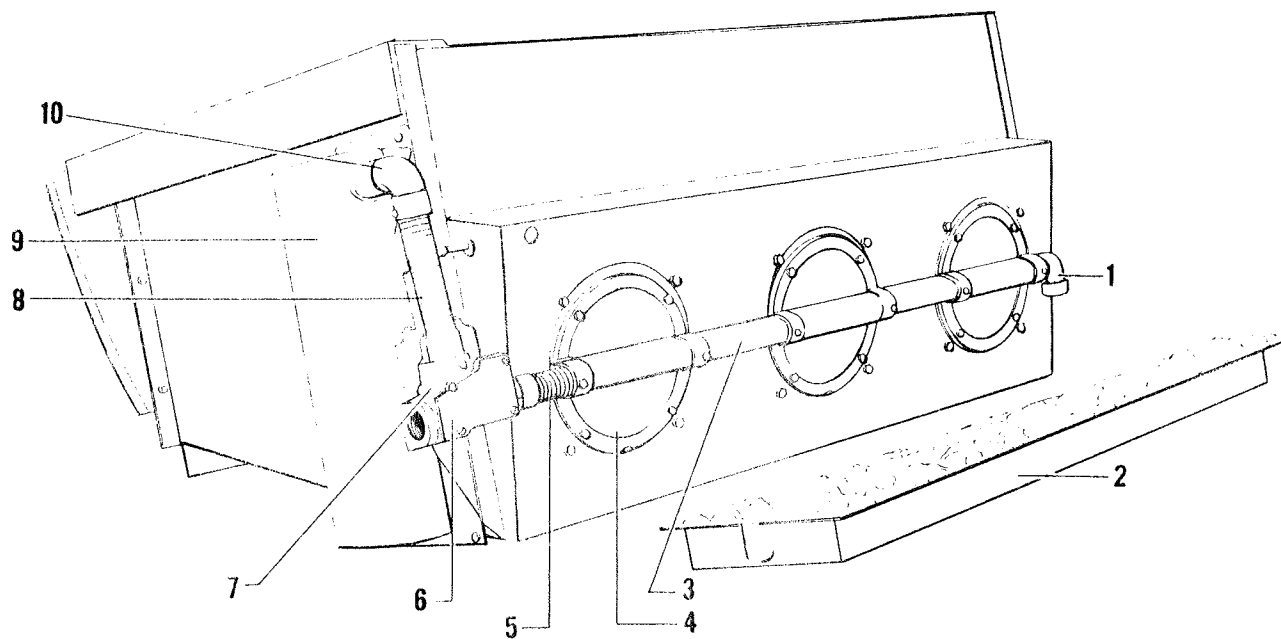


FIG. 31—FUEL CARRIER (REAR)

FIG. & REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS			
				B	B-1		C	D	D-1	
31-7	Y-18207-A	1	Body—Exhaust By-Pass Valve	X	X					
	26025	4	Screw—Hex. Hd. Cap, 1/4-20 x 7/8 (Everdur)	X	X					
	21629	4	Washer—Shakeproof Lock, Int. 1/4 in.	X	X					
	Y-18223	1	Butterfly—By-Pass Valve	X	X					
	B-5071	2	Pin—Groove	X	X					
	Y-18224	1	Shaft—By-Pass Valve Butterfly	X	X					
	Y-18232	1	Lever—By-Pass Valve Butterfly Shaft	X	X					
	26113	1	Screw—Hex. Hd. Cap, 1/4-20 x 1/2 in. (Everdur)	X	X					
	Y-18241	1	Gasket—By-Pass Valve Rear Cover	X	X					
	Y-18242-A	1	Cover—By-Pass Valve Rear	X	X					
	26115	4	Screw—Hex. Hd. Cap, 1/4-20 x 3/4 in. (Everdur)	X	X					
	21629	4	Washer—Shakeproof Lock, Int. 1/4 Cad. Pl.	X	X					
	Y-18363	1	Bracket—Support	X	X					
	26113	3	Screw—Hex. Hd. Mach. 1/4-20 x 1/2 in. (Everdur)	X	X					
	21629	3	Washer—Shakeproof Lock, Int. 1/4 in. Cad. Pl.	X	X					
	21805	2	Screw—Parker-Kalon Cap, 3/8 x 5/8 Cad. Pl.	X	X					
	21633	2	Washer—Shakeproof Lock, 3/8 in. Cad. Pl.	X	X					
	0Y-18235-B	1	Siphon Assembly—By-Pass Valve	X	X					

SUB-COOLER AND FUEL CARRIER PARTS									
FIG.& REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS		
				B	B-1		C	D	D-1
	0Y-18366	1	Support Assembly—By-Pass Valve Spring, consists of:	X	X				
	Y-18356	1	Support—By-Pass Valve Spring	X	X				
	Y-18357	1	Gasket—By-Pass Valve Spring Support	X	X				
	26114	4	Screw—Hex. Hd. 1/4-20 x 5/8 in. (Everdur)	X	X				
	21629	4	Washer—Shakeproof Lock, Int. 1/4 in. Cad. Pl.	X	X				
	Y-18450	1	Cylinder—By-Pass Valve Spring	X	X				
	Y-18361	1	Link—Connector	X	X				
	Y-18218	1	Pin—Yoke End	X	X				
	21058	1	Pin—Cotter, 1/16 x 1/2 in. Cad. Pl.	X	X				
	Y-18362	1	Stud—Spring Control	X	X				
	Y-18360	1	Guide—Spring	X	X				
	21824	1	Nut—Hex. Jam, 3/8-16 Brass	X	X				
	21633	1	Washer—Shakeproof Lock, Int. 3/8 in.	X	X				
	Y-18220	1	Spring—By-Pass Valve	X	X				
	Y-18359	1	Cover—Spring	X	X				
	B-5528	1	Nut—Flare, 3/8 in.	X	X				
31-8	0Y-18515-A	1	Tube Assembly—By-Pass Valve (Top)	X	X				
31-9	Y-6860	1	Muffler	X	X				
	21805	4	Screw—Parker-Kalon Cap, 3/8 x 5/8 Cad. Pl.	X	X				
	Y-6873-B	1	Elbow—Exhaust Inlet	X	X				
	21797	2	Screw—Parker-Kalon Hex. Cap #14 x 1/2 in. Cad. Pl.	X	X				

SECTIONAL TYPE FUEL CABINET PARTS										
FIG. & REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS			
				B	B-1		C	D	D-1	
32	RD-625	1	Cabinet—Complete One Cylinder Sectional Fuel (Master Section) Consists of:	X	X		X	X	X	
32		1	Cabinet—One Cylinder Fuel, Less Mani- folding, Consists of:	X	X		X	X	X	
32-1	0950303	1	Cabinet—Fuel Cylinder	X	X		X	X	X	
32-2	0950290	1	Cover—Right Side	X	X		X	X	X	
	21355	6	Screw—Hex. Hd. Cap, 3/8-16 x 1-3/8 in., Cad. Pl.	X	X		X	X	X	
	21349	4	Screw—Hex. Hd. Cap, 3/8-16 x 1 in., Cad. Pl.	X	X		X	X	X	
	21633	10	Washer—Shakeproof Lock, 3/8 in., Cad. Pl.	X	X		X	X	X	
	21190	10	Nut—Hex., 3/8-16, Cad. Pl.	X	X		X	X	X	
32-3	950305	1	Spring—Door	X	X		X	X	X	
	950306	1	Support—Door Spring	X	X		X	X	X	
	21347	2	Screw—Hex. Hd. Cap, 3/8-16 x 7/8 in., Cad. Pl.	X	X		X	X	X	
	21633	2	Washer—Shakeproof Lock, 3/8 in., Cad. Pl.	X	X		X	X	X	
	21190	2	Nut—Hex., 3/8-16, Cad. Pl.	X	X		X	X	X	
32-4	950318	2	Hinge—Butt	X	X		X	X	X	
	21273	6	Screw—Hex. Hd. Cap, 1/4-20 x 5/8 in.	X	X		X	X	X	
	21646	6	Washer—Shakeproof Lock, 1/4 in., Cad. Pl.	X	X		X	X	X	

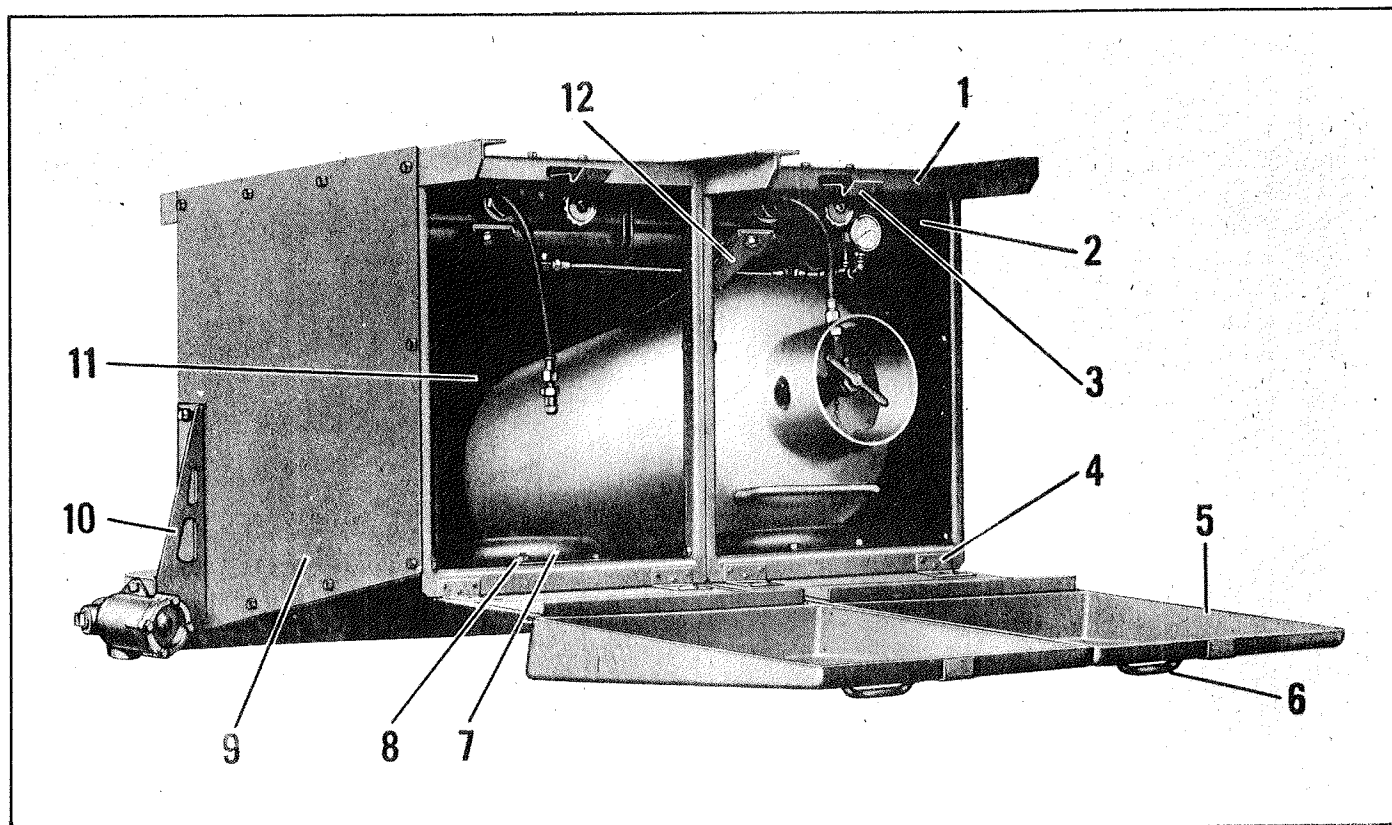


FIGURE 32—SECTIONAL TYPE FUEL CABINET

SECTIONAL TYPE FUEL CABINET PARTS									
FIG. & REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS		
				B	B-1		C	D	D-1
32-5	21174	6	Nut—Hex., 1/4-20, Cad. Pl.	X	X		X	X	X
	21739	6	Screw—Flat Hd. Mach., 1/4-20 x 1/2 in. Cad. Pl.	X	X		X	X	X
	950308	1	Door	X	X		X	X	X
	Y-46	1	Transfer—Name	X	X		X	X	X
32-6	Y-6071	1	Handle—Door	X	X		X	X	X
	21732	4	Screw—Flat Hd. Mach., 10-24 x 1/2 in., Cad. Pl.	X	X		X	X	X
32-7	21625	4	Washer—Shakeproof Lock, 10-3/16, Cad. Pl.	X	X		X	X	X
	21262	4	Nut—Hex., 10-24, Cad. Pl.	X	X		X	X	X
	0950301	1	Cradle Assembly—Fuel Cylinder	X	X		X	X	X
	21426	6	Screw—Hex. Hd. Cap, 1/2-13 x 1, Cad. Pl.	X	X		X	X	X
32-8	26187	6	Washer—Shakeproof Lock, 1/2 in.	X	X		X	X	X
	21206	6	Nut—Hex., 1/2-13, Cad. Pl.	X	X		X	X	X
32-9	950289	1	Cover—Left Side	X	X		X	X	X
	21355	6	Screw—Hex. Hd. Cap, 3/8-16 x 1-3/8 in., Cad. Pl.	X	X		X	X	X
32-10	21349	4	Screw—Hex. Hd. Cap, 3/8-16 x 1, Cad. Pl.	X	X		X	X	X
	21633	10	Washer—Shakeproof Lock, 3/8 in., Cad. Pl.	X	X		X	X	X
	21190	10	Nut—Hex., 3/8-16, Cad. Pl.	X	X		X	X	X
	950317	1	Support—Steam Trap (On Heated Carriers)	X	X		X	X	X
32-11	21349	1	Screw—Hex. Hd. Cap, 3/8-16 x 1, Cad. Pl.	X	X		X	X	X
	21633	1	Washer—Shakeproof Lock, 3/8 in., Cad. Pl.	X	X		X	X	X
	21190	1	Nut—Hex., 3/8-16 in., Cad. Pl.	X	X		X	X	X
	Y-11115	2	Cap—Pipe (On Heated Carriers)	X	X		X	X	X
32-12	0950299	1	Cover—Rear Top	X	X		X	X	X
	21803	7	Screw—Hex. Hd. Parker Kalon	X	X		X	X	X
	950372	1	Cover—Rear Bottom	X	X		X	X	X
	21347	5	Screw—Hex. Hd. Cap	X	X		X	X	X
32-12	21190	5	Nut—Hex.	X	X		X	X	X
	21538	7	Washer—Lock	X	X		X	X	X
	26241	2	Screw—Hex. Hd. Cap	X	X		X	X	X
	Y-6528	1	Spring—Fuel Cylinder Clamp	X	X		X	X	X
32-12	21426	1	Screw—Hex. Hd. Cap	X	X		X	X	X
	21539	1	Washer—Lock	X	X		X	X	X
	950036	1	Switch—Pressure (On Heated Cabinets) (Used on Master Cab Only)	X	X		X	X	X
	950072	1	Adapter—Elbow (On Heated Cabinets) (Used on Master Cab Only)	X	X		X	X	X
32-12	21629	1	Lock—Shakeproof (On Heated Cabinets) (Used on Master Cab Only)	X	X		X	X	X
	21873	1	Screw—Fill. Hd. Mach. (On Heated Cabinets) (Used on Master Cab Only)	X	X		X	X	X
	Y-6784	1	Grip—Ralco Cord (On Heated Cabinets) (Used on Master Cab Only)	X	X		X	X	X
				X	X		X	X	X

SECTIONAL TYPE FUEL CABINET PARTS										
FIG. & REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS			
				B	B-1		C	D	D-1	
	950319	2	Coupling—Compression (On Heated Cabinets) (Used on Master Cab Only)	X	X		X	X	X	
	950314	2	Adapter—Trap Pipe (On Heated Cabinets) (Used on Master Cab Only)	X	X		X	X	X	
			Sub-Cabinet—One Cylinder Sectional Fuel is the same as shown above. The following attaching parts are used in connecting the master and sub-cabinets, etc.							
	21363	6	Hex. Hd. Cap Screw	X	X		X	X	X	
	21349	3	Hex. Hd. Cap Screw	X	X		X	X	X	
	21355	1	Hex. Hd. Cap Screw	X	X		X	X	X	
	21633	10	Shakeproof L. W.	X	X		X	X	X	
	21190	10	Hex. Nut	X	X		X	X	X	

# FUEL CABINET ACCESSORIES

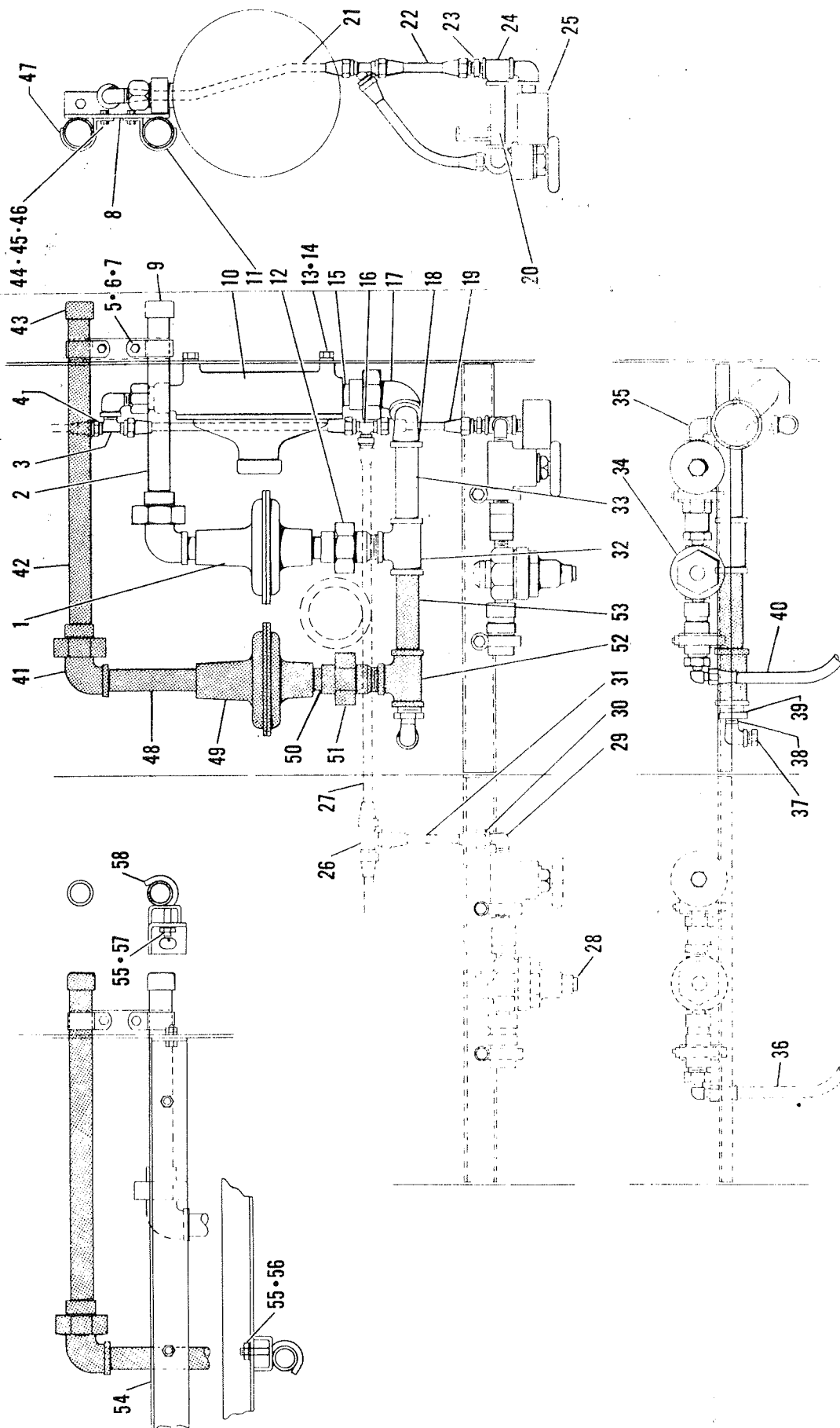


FIGURE 33—FUEL CABINET MANIFOLD

FUEL CABINET ACCESSORIES									
FIG. & REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS		
				B	B-1		C	D	D-1
33-1	Y-6401	1	Excess Flow Valve (See Fig. #34 for Breakdown)	X	X		X	X	X
33-2	48636-Y	1	Pipe (Used on Master Cab. Only)	X	X		X	X	X
33-3	39026	1	Flare Tube Tee (Used on Master Cab. Only)	X	X		X	X	X
33-4	Y-6280-A	1	Flare Tube Cap (Used on Master Cab. Only)	X	X		X	X	X
33-5	21308	3	Hex. Hd. Cap Screw (Used on Master Cab. Only)	X	X		X	X	X
33-6	21648	3	Shakeproof L. W. (Used on Master Cab. Only)	X	X		X	X	X
33-7	21182	3	Hex. Nut (Used on Master Cab. Only)	X	X		X	X	X
33-8	950191	1	Pipe Support (Used on Master Cab. Only)	X	X		X	X	X
33-9	Y-12075	1	Pipe Cap	X	X		X	X	X
33-10	Y-6162-C	1	Regulator (Used on Master Cab. Only) (See Fig. #35 for Breakdown)	X	X		X	X	X
33-11	Y-19011	1	Clamp (Used on Master Cab. Only)	X	X		X	X	X
33-12	Y-7403	1	Male and Female Union (Used on Master Cab. Only)	X	X		X	X	X
33-13	21305	2	Hex. Hd. Cap Screw (Used on Master Cab. Only)	X	X		X	X	X
33-14	21646	2	Shakeproof L. W. (Used on Master Cab. Only)	X	X		X	X	X
33-15	100832-A	3	Close Nipple (Used on Master Cab. Only)	X	X		X	X	X
33-16	B-10455	1	Flare Tube Tee	X	X		X	X	X
33-17	Y-6741	2	Union Elbow (Used on Master Cab. Only)	X	X		X	X	X
33-18	78206-G	1	Street Elbow (Used on Master Cab. Only)	X	X		X	X	X
33-19	B-5528	4	Flare Nut	X	X		X	X	X
33-20	Y-14581	1	Pipe (Used on Master Cab. Only)	X	X		X	X	X
33-21	44774-P	1	Copper Tube (Used on Master Cab. Only)	X	X		X	X	X
33-22	44774-A	1	Copper Tube (Used on Master Cab. Only)	X	X		X	X	X
33-23	B-5526	1	Half Union (Used on Master Cab. Only)	X	X		X	X	X
33-24	Y-6543	1	Tee (Used on Master Cab. Only)	X	X		X	X	X
33-25	Y-6168-A	1	Pressure Gauge (Used on Master Cab. Only)	X	X		X	X	X
33-26	B-10455	1	Flare Tube Tee	X	X		X	X	X
33-27	44744	1	Copper Tube	X	X		X	X	X
33-28	0Y-6579-F	1	Fuel Manifold Assembly	X	X		X	X	X
	Y-6167-B	1	Check Valve (See Fig. #36 for Breakdown)	X	X		X	X	X
	Y-6163-G	1	Regulator (See Fig. #37 for Breakdown)	X	X		X	X	X
	Y-6578	1	Excess Flow Valve (See Fig. #38 for Breakdown)	X	X		X	X	X
	Y-6166	1	Special Globe Valve (See Fig. #39 for Breakdown)	X	X		X	X	X
	Y-6218	2	Regulator Assem. Clamp	X	X		X	X	X
	21366	2	Hex. Hd. Cap Screw	X	X		X	X	X
	21190	2	Hex. Nut	X	X		X	X	X
	21729	2	Lock Washer	X	X		X	X	X
33-29	B-1687	1	Half Union Elbow (Sub-Cab.)	X	X		X	X	X
33-30	B-5528	4	Flare Nut (Sub-Cab.)	X	X		X	X	X
33-31	78273-K	1	Copper Tube (Sub-Cab.)	X	X		X	X	X
33-32	Y-6538	1	Tee (Used on Master Cab. Only)	X	X		X	X	X

FUEL CABINET ACCESSORIES									
FIG.& REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS		
				B	B-1		C	D	D-1
33-33	100832-V	1	Pipe (Used on Master Cab. Only)	X	X		X	X	X
33-34	0Y-6579-F	1	Fuel Manifold Assembly (Sub-Cab.)	X	X		X	X	X
33-35	78202-C	3	Street Elbow (Used on Master Cab. Only)	X	X		X	X	X
33-36	0Y-7647-A	1	Fuel Hose Assembly	X	X		X	X	X
	Y-7647-A	1	Fuel Hose	X	X		X	X	X
	Y-7648	2	Nipple P.O.L.	X	X		X	X	X
	Y-7649	2	Nut P.O.L.	X	X		X	X	X
	Y-6266	1	Elbow	X	X		X	X	X
33-37	Y-14179-A	1	Hex. Hd. Pipe Plug (Used on Master Cab. Only)	X	X		X	X	X
33-38	Y-6501	1	Street Elbow (Used on Master Cab. Only)	X	X		X	X	X
33-39	48797-F	1	Reducing Bushing (Used on Master Cab. Only)	X	X		X	X	X
33-40	0Y-7647-A	1	Fuel Hose (For Breakdown See Ref. 33-36) (If extra excess flow valve used, additional following parts req. Master Cab. Only)	X	X		X	X	X
33-41	Y-6741	1	Union Elbow	X	X		X	X	X
33-42	48636-X	1	Pipe	X	X		X	X	X

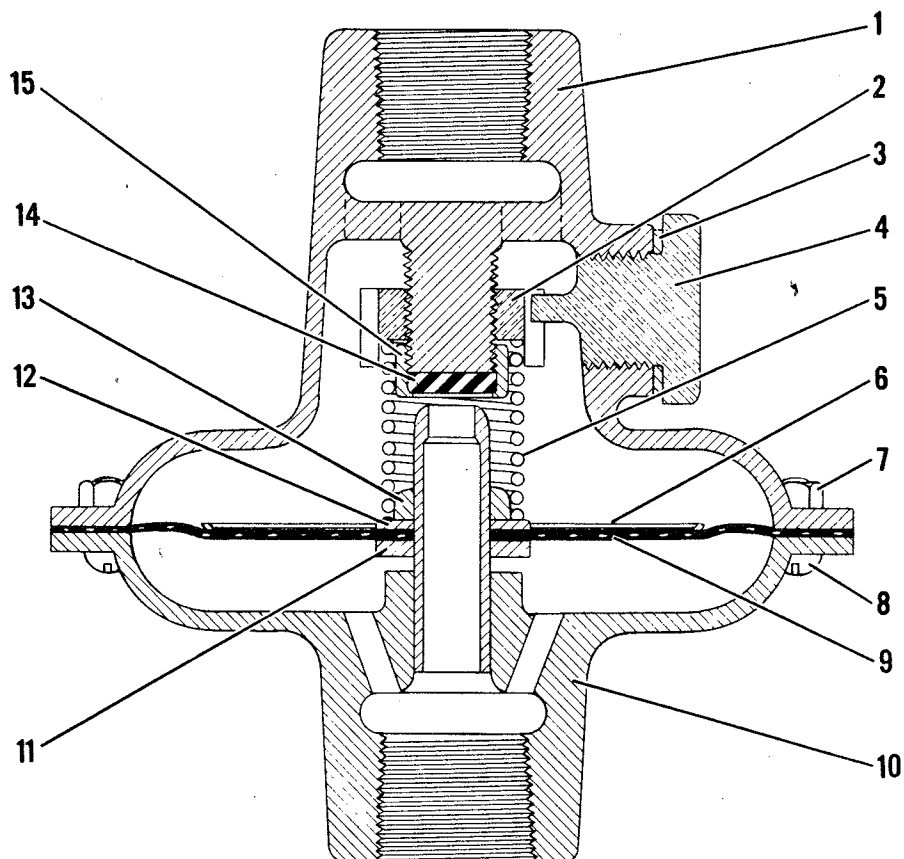


FIGURE 34—EXCESS FLOW VALVE

FUEL CABINET ACCESSORIES										
FIG.& REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS			
				B	B-1		C	D	D-1	
33-43	Y-12075	1	Pipe Cap	X	X		X	X	X	
33-44	21308	1	Hex. Hd. Cap Screw	X	X		X	X	X	
33-45	21648	1	Shakeproof L. W.	X	X		X	X	X	
33-46	21182	1	Hex. Nut	X	X		X	X	X	
33-47	Y-19011	1	Clamp	X	X		X	X	X	
33-48	65423-V	1	Pipe	X	X		X	X	X	
33-49	Y-6401	1	Excess Flow Valve	X	X		X	X	X	
33-50	100832-A	1	Close Nipple	X	X		X	X	X	
33-51	Y-7403	1	Male and Female Union	X	X		X	X	X	
33-52	Y-6538	1	Tee	X	X		X	X	X	
33-53	100832-V	1	Pipe	X	X		X	X	X	
33-54	950307	1	Manifold Pipe Support	X	X		X	X	X	
33-55	21182	2	Hex. Nut	X	X		X	X	X	
33-56	21648	1	Shakeproof L. W.	X	X		X	X	X	
33-57	21538	1	Lock Washer	X	X		X	X	X	
33-58	Y-7362	2	Pipe Support Hook	X	X		X	X	X	
34	Y-6401		Excess Flow Valve	X	X		X	X	X	
34-1	} Not Available as Service Replacement			X	X		X	X	X	
34-2				X	X		X	X	X	
34-3				X	X		X	X	X	
34-4				X	X		X	X	X	
34-5				X	X		X	X	X	
34-6				X	X		X	X	X	
34-7	BB-2400-32	8	Nut—Hex. Hd.	X	X		X	X	X	
34-8	BB-2400-30	8	Screw—Rd. Hd. Mach.	X	X		X	X	X	
34-9	BB-2779-9	1	Diaphragm	X	X		X	X	X	
34-10	} Not Available as Service Replacement			X	X		X	X	X	
34-11				X	X		X	X	X	
34-12				X	X		X	X	X	
34-13				X	X		X	X	X	
34-14	BB-2779-6	1	Disc	X	X		X	X	X	
34-15	Not Available as Service Replacement			X	X		X	X	X	

† Revised July, 1949

## BREAKDOWN OF Y-6162, Y-6162-A, Y-6162-B AND Y-6162-C REGULATOR

FIG. & REF. NO.	PART NAME	MODEL 6100	MODEL 5800	MODEL 2500	MODEL 2500-RR	MODEL 2503
35-1	Body	6100-1	5800-1	2500-1	2500-1	2503-1
35-2	Diaphragm	2503-37	—	2500-9	2500-RR-9	2503-37
35-3	Lever Screw	—	—	2400-13	2400-13	2400-13
	Lever Screw Washer	—	—	2400-14	2400-14	2400-14
35-4	Plunger Pin	5800-A-18	5800-18	5800-21	5800-21	5800-21
	Cotter Pin	—	5800-19	—	—	—
	Valve Disc	1175-16	1175-16	1175-16	2845-16	—
35-5	Diaphragm Plate	5800-A-8	5800-8	5800-A-8	5800-A-8	2503-8
	Diaphragm Lock Nut	5800-5	5800-5	2500-5	2500-5	—
	Bonnet Spring	5800-6	5800-6	2500-6	2500-6	—
35-6	Lever	—	—	2500-11	2500-11	2503-10
	Diaphragm	—	—	2400-24	2400-24	—
	Diaphragm Washer	—	—	2293-15	2293-15	—
	Safety Relief Bonnet	—	—	2400-27	2400-27	—
	Spring	—	—	2400-28	2400-28	—
	Adj. Screw	—	—	2400-29	2400-29	—
	Diaphragm Eyelet	—	—	2400-26	2400-26	—
	Diaphragm Plate	—	—	2400-25	2400-25	—
35-7	Yoke	5800-A-10	5800-10	2400-10	2400-10	2503-9
35-8	Lever Pin	5800-21	5800-21	—	2400-12	2400-12
35-9	Diaphragm Plate Guide	—	—	—	—	2401-8
35-10	Spring Guide	—	—	—	—	2503-7
35-11	Regulator Spring	—	—	—	—	2503-6W
35-12	Relief Valve Spring	—	—	—	—	2503-14
35-13	Bonnet	6100-2	5800-2	2500-2	2500-2	2503-2
35-14	Relief Adj. Nut	—	—	—	—	2503-15
35-15	Bonnet Cap	—	—	—	—	2503-23
35-16	Bonnet Washer	6100-4	—	6100-4	6100-4	2503-24
	Bonnet Plug	6100-7	—	6100-7	6100-7	—
35-17	Adj. Screw	5800-4	5800-4	5800-4	5800-4	2503-5
	Adj. Screw Lock Disc	—	5800-7	—	—	—
	Relief Valve Elbow	6100-3	—	—	—	—
	Connecting Lever	6100-20	5800-20	—	—	—
35-18	Bonnet Bolt	—	—	5800-22A	5800-22A	5800-22A
	Bonnet Nut	—	—	5800-22B	5800-22B	5800-22B
	Valve Body Set Pin	5800-25	5800-25	—	—	—
	Plunger Assembly	6100-25	—	—	—	—
35-19	Plunger	5800-A-17	5800-17	2500-15B	2500-15B	2503-11
35-20	Disc w/Ret.	—	—	2400-17	2845-17	2503-13
	Bonnet Bolt & Nut	5800-22	5800-22	—	—	—
35-21	Valve Body Washer	5800-15	5800-15	1149-30	1149-30	1149-30

## BREAKDOWN OF Y-6162, Y-6162-A, Y-6162-B AND Y-6162-C REGULATOR

FIG. & REF. NO.	PART NAME	MODEL 6100	MODEL 5800	MODEL 2500	MODEL 2500-RR	MODEL 2503
35-22	Valve Body	5800-A-13	5800-13	2500-20	2564-20-A	2503-12
	Safety Relief Valve	2866	—	—	—	—
	Union Coupling Nut	1175-14	1175-14	—	—	—
	Disc Replacing Cap	—	—	2400-21	2400-21	—
	Disc Rep. Cap Washer	—	—	2400-22	2400-22	—
	Screen Ret.	—	1175-23	—	—	—
	Screen	—	5800-32	—	—	—
	Mercury Seal Elbow	—	5800-34	—	—	—
	Mercury Seal Assem.	—	5800-3	—	—	—
	Upper Diaphragm	—	5800-9	—	—	—
	Lower Diaphragm	—	5800-11	—	—	—

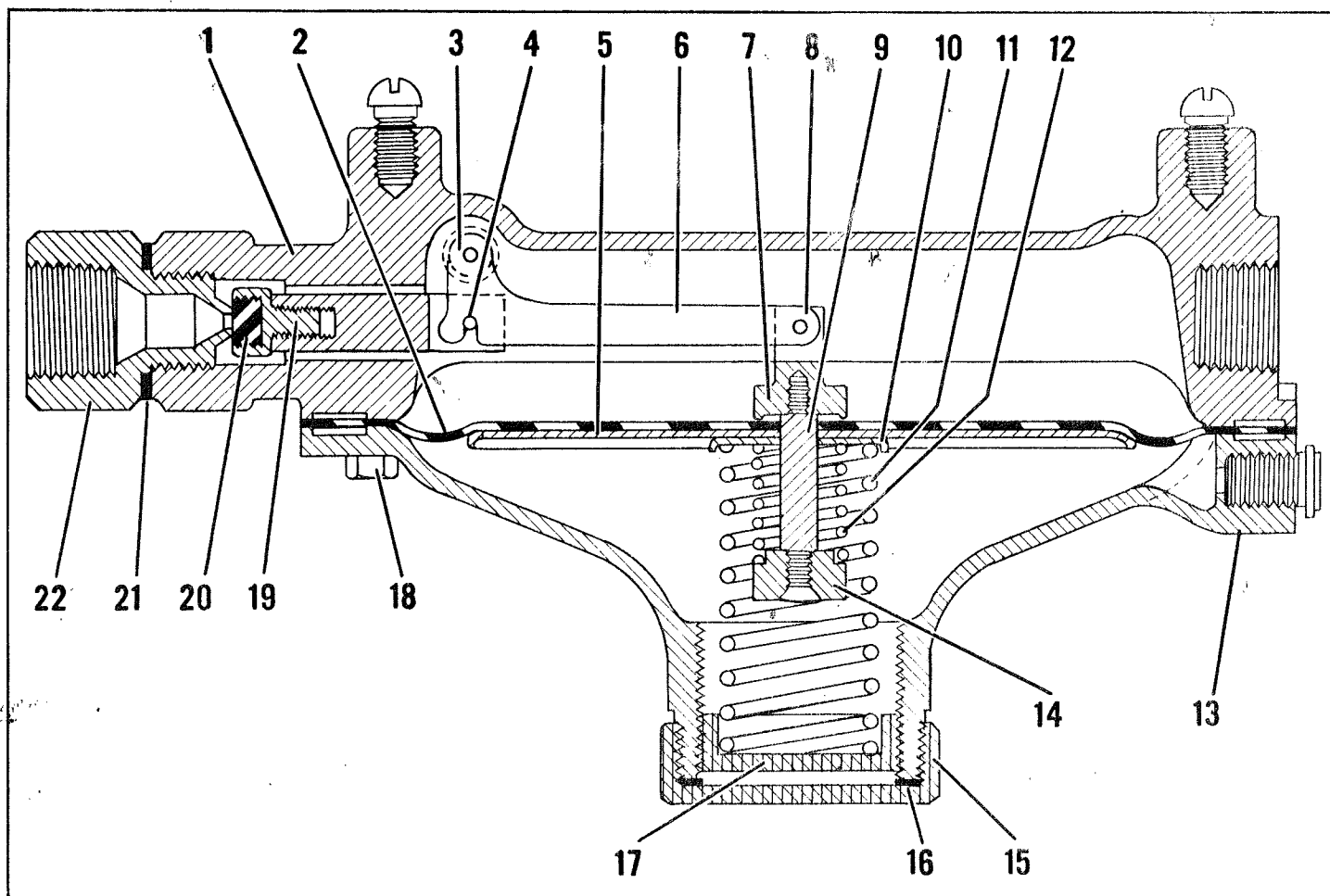


FIGURE 35—REGULATOR

FUEL CABINET ACCESSORIES										
FIG.& REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS			
				B	B-1		C	D	D-1	
36	Y-6167-B		Check Valve, Consists of:	X	X		X	X	X	
36-1	Not Available as		Service Replacement	X	X		X	X	X	
36-2	BB-2885-12	1	Washer—Aluminum	X	X		X	X	X	
36-3	}	Not Available as	Service Replacement	X	X		X	X	X	
36-4				X	X		X	X	X	
36-5				X	X		X	X	X	
36-6	BB-2885-6	1	Check Disc	X	X		X	X	X	
36-7	21088	1	Disc Ret. Screw	X	X		X	X	X	
37	Y-6163-G		Regulator, Consists of:	X	X		X	X	X	
37-1	BB-1734-4	1	Adjusting Screw	X	X		X	X	X	
37-2	BB-1734-4A	1	Adj. Screw Lock Nut	X	X		X	X	X	
37-3	BB-1147-2	1	Bonnet	X	X		X	X	X	
37-4	BB-197-5	1	Spring Button	X	X		X	X	X	
37-5	BB-197-6	1	Spring Light	X	X		X	X	X	
37-6	BB-963-7	1	Spring Heavy	X	X		X	X	X	
37-7	BB-1147-10	1	Yoke	X	X		X	X	X	
37-8	BB-197-8	1	Diaphragm Plate	X	X		X	X	X	
37-9	BB-1147-23	1	Diaphragm Washer	X	X		X	X	X	
37-10	BB-1147-9	1	Diaphragm	X	X		X	X	X	
37-11	BB-1147-17	1	Centerpiece	X	X		X	X	X	
37-12	BB-1147-15	1	Nozzle	X	X		X	X	X	
37-13	BB-1734-1	1	Body	X	X		X	X	X	
37-14	BB-1147-16	1	Seat	X	X		X	X	X	
37-15	BB-1147-19	1	Ring—Seat Retaining	X	X		X	X	X	
37-16	BB-1147-25	1	Guide—Centerpiece	X	X		X	X	X	
37-17	BB-1147-3	1	Back Cap	X	X		X	X	X	
37-18	BB-1147-21	1	Washer—Back Cap	X	X		X	X	X	

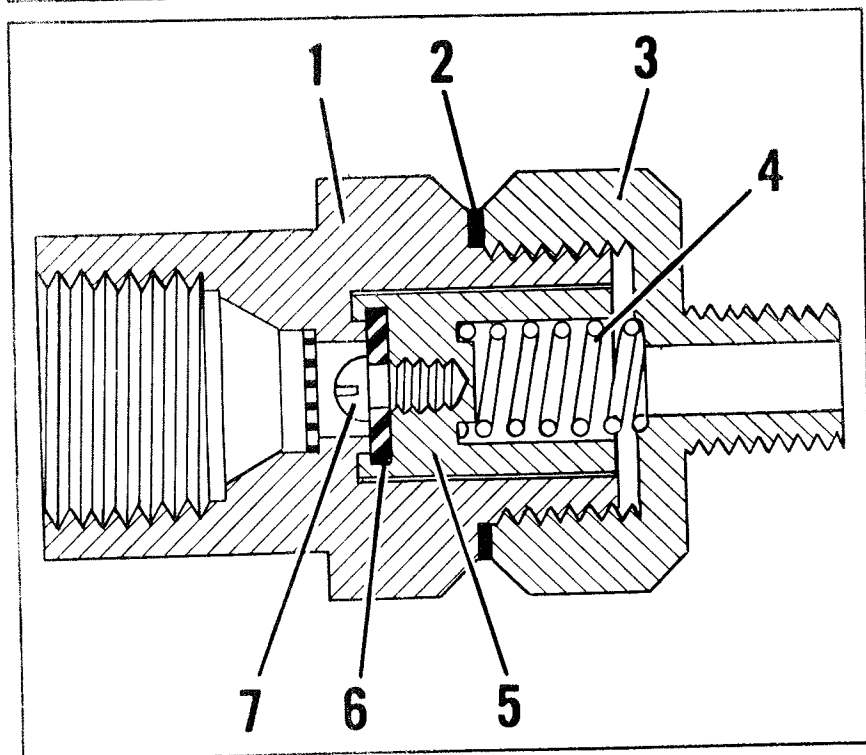


FIGURE 36—CHECK VALVE

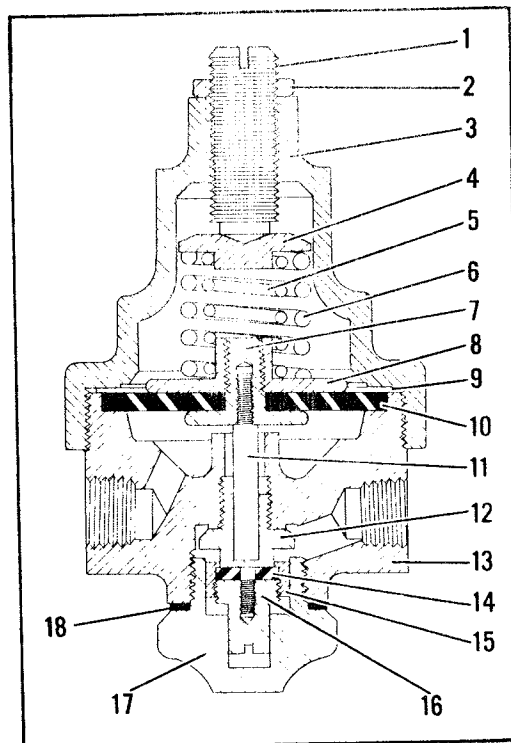


FIGURE 37—REGULATOR

## FUEL CABINET ACCESSORIES

FIG.& REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS			
				B	B-1		C	D	D-1	
38	Y-6578		Excess Flow Valve, Consists of:	X	X		X	X	X	
38-1	} Not Available as Service Replacement			X	X		X	X	X	
38-2				X	X		X	X	X	
38-3				X	X		X	X	X	
38-4				X	X		X	X	X	
38-5				X	X		X	X	X	
39	Y-6166		Globe Valve	X	X		X	X	X	
39-1	BB-2701-1	1	Stem—Valve	X	X		X	X	X	
39-2	BB-2630-2	1	Lock Nut	X	X		X	X	X	
39-3	BB-2649-3	1	Wheel—Handle	X	X		X	X	X	
39-4	BB-2852-1	1	Bonnet	X	X		X	X	X	
39-5	BB-3713-3	1	Diaphragm Nut	X	X		X	X	X	
39-6	BB-2852-4	1	Diaphragm (3)	X	X		X	X	X	
39-7	BB-2762-6	1	Body	X	X		X	X	X	
39-8	BB-3713-5	1	Diaphragm Stem	X	X		X	X	X	
39-9	BB-2800-8	1	Disc Retainer	X	X		X	X	X	
39-10	BB-2651-9R	1	Valve Disc	X	X		X	X	X	

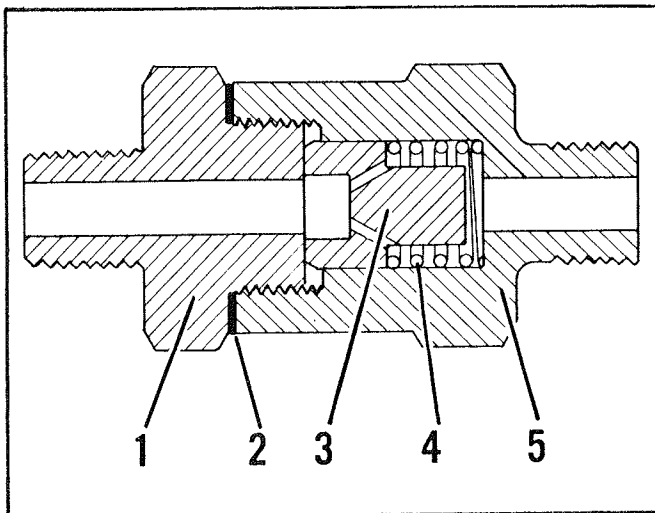


FIGURE 38—EXCESS FLOW VALVE

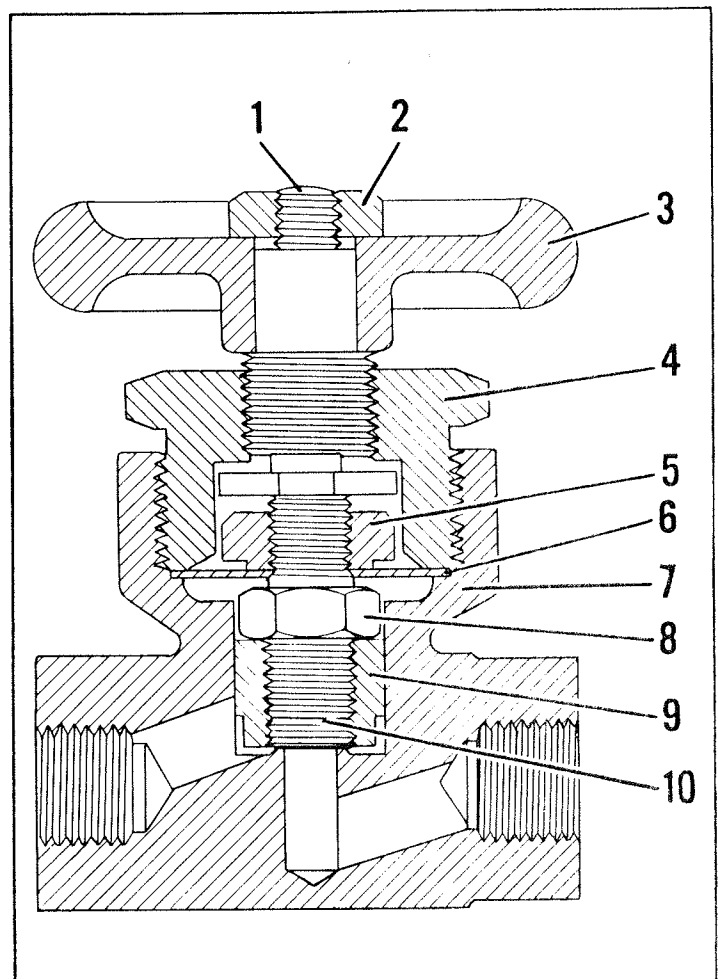


FIGURE 39—GLOBE VALVE

AUTOMATIC RADIATOR FILLER										
FIG.& REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS			
				B	B-1		C	D	D-1	
	Group 399-13	1	Automatic Radiator Filler Assembly		X					X
1	0951008	1	Float Chamber Assembly		X					X
2	951014	1	Float Valve		X					X
3	951009	1	Cover Gasket		X					X
4	951010	1	Float Valve Chamber Cover		X					X
5	21379	10	Copper Washer		X					X
6	21108	10	Rd. Hd. Machine Screw		X					X
7	950049	1	Strainer		X					X
8	950050	1	Close Nipple		X					X
9	951019	2	Spacer		X					X
10	B-7948-N	1	Copper Tube (48")		X					X
11	B-4092	6	Flare Nut		X					X
12	21361	2	Hex. Hd. Cap Screw		X					X
13	21650	2	Shakeproof Lock Washer		X					X
14	B-1686	6	Half Union Elbow		X					X
15	78212-B	3	Reducing Bushing		X					X
16	B-4541	1	Reducing Bushing		X					X
17	Y-14362	1	Half Union Elbow		X					X
18	951015	1	Hose Connector		X					X
19	951017	1	(Female Pipe Swivel)							
			Hose Connector							
			(Male Pipe)		X					X
20	951016-A	1	Hose		X					X
21	21342	2	Hex. Hd. Cap Screw		X					X

## AUTOMATIC RADIATOR WATER FILLER ASSEMBLY

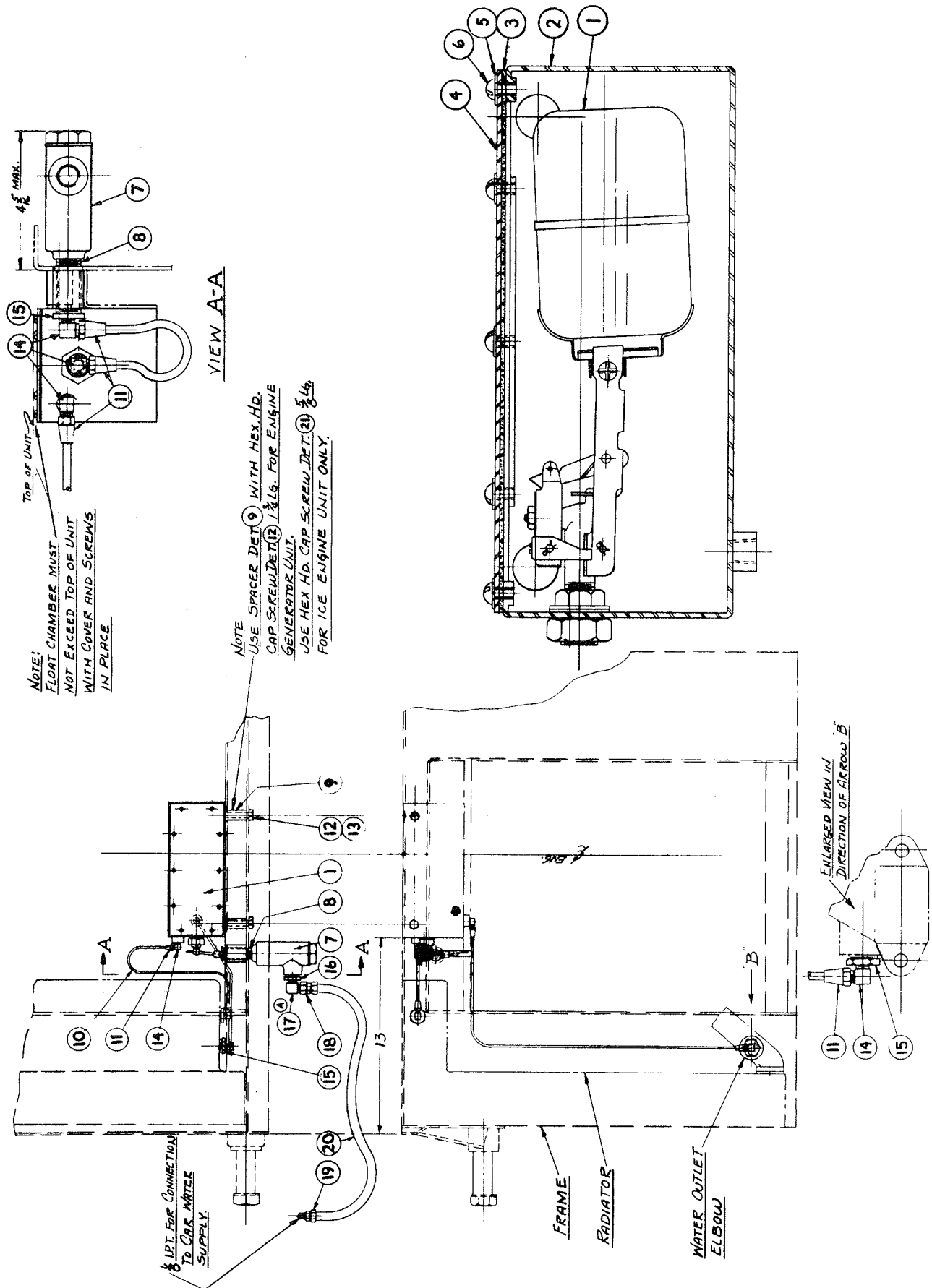


FIG. 40—AUTOMATIC RADIATOR WATER FILLER ASSEMBLY

Page 120, Parts List

AUTOMATIC RADIATOR FILLER										
FIG. & REF. NO.	PART NUMBER	NO. REQ.	DESCRIPTION	ENGINE GENERATOR MODELS			ICE ENGINE UNIT MODELS			
				B	B-1		C	D	D-1	
	Group 399-13	1	Automatic Radiator Filler Assembly		X					X
1	0951008	1	Float Chamber Assembly		X					X
2	951014	1	Float Valve		X					X
3	951009	1	Cover Gasket		X					X
4	951010	1	Float Valve Chamber Cover		X					X
5	21379	10	Copper Washer		X					X
6	21108	10	Rd. Hd. Machine Screw		X					X
7	950049	1	Strainer		X					X
8	950050	1	Close Nipple		X					X
9	951019	2	Spacer		X					X
10	B-7948-N	1	Copper Tube (48")		X					X
11	B-4092	6	Flare Nut		X					X
12	21361	2	Hex. Hd. Cap Screw		X					X
13	21650	2	Shakeproof Lock Washer		X					X
14	B-1686	6	Half Union Elbow		X					X
15	78212-B	3	Reducing Bushing		X					X
16	B-4541	1	Reducing Bushing		X					X
17	Y-14362	1	Half Union Elbow		X					X
18	951015	1	Hose Connector		X					X
19	951017	1	(Female Pipe Swivel)							
			Hose Connector							
			(Male Pipe)		X					X
20	951016-A	1	Hose		X					X
21	21342	2	Hex. Hd. Cap Screw		X					X

P A R T S   L I S T

COVERING

LONG CYCLE CONTROL BOX

MODEL D-2

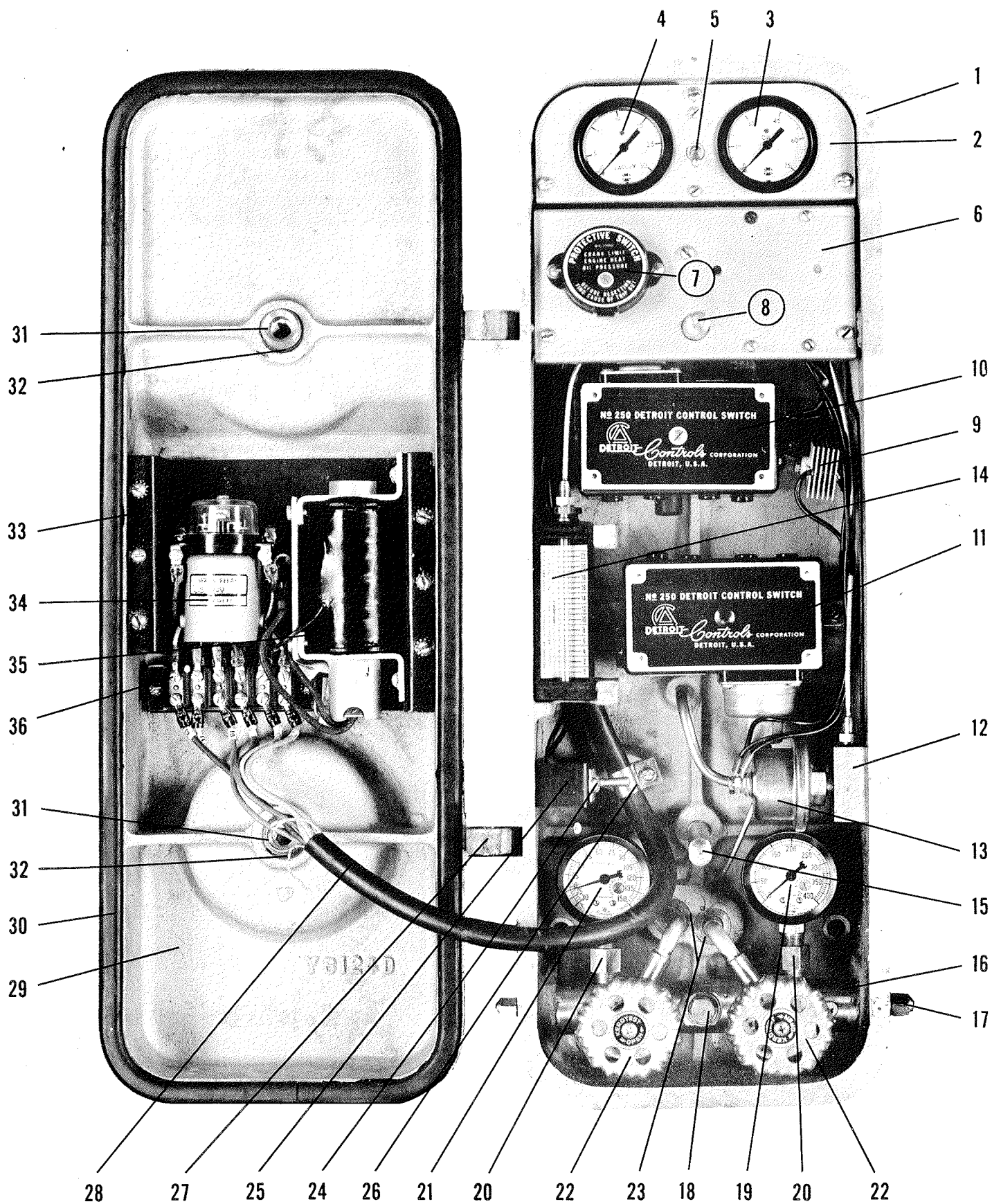
WAUKESHA RAILWAY TYPE ICE-ENGINE

MAY 1955

WAUKESHA MOTOR COMPANY

RAILWAY DIVISION

WAUKESHA, WISCONSIN



Long Cycle Control Box

LONG CYCLE CONTROL BOX

<u>Refr.</u>	<u>Part Number</u>	<u>Part Name</u>	<u>32 Volt</u>	<u>64 Volt</u>
	CY-6123-B	Control Box Assembly	1	
	DY-6123-A	Control Box Assembly		1
1	Y-6123-K	Control Box	1	1
2	Y-6746	Panel	1	1
	21101	Rd. Hd. Machine Screw	3	3
	21625	Shakeproof Lock Washer	3	3
3	Y-7540	Oil Gauge	1	1
4	Y-12029	Vac. Gauge	1	1
	Y-6764	Sweat Tube Elbow (V.C.)	1	1
	116182-C	Copper Tube (Vac. Gauge)	1	1
	Y-14212-Q	Loom (Vac. Gauge)	1	1
5	Y-6252	Momentary Start Switch	1	1
	21090	Rd. Hd. Machine Screw	2	2
	21260	Machine Screw Nut	2	2
	21818	Lock Washer	2	2
6	953106	Sub-Panel	1	1
	21101	Rd. Hd. Machine Screw	3	3
	21625	Shakeproof Lock Washer	3	3
	951031-J	Terminal Block	2	2
	21108	Rd. Hd. Machine Screw	2	2
	21606	Shakeproof Lock Washer	2	2
	21264	Hex Nut	2	2
	953095	Terminal Block Support	1	1
	21818	Shakeproof Lock Washer	2	2
	21961	Rd. Hd. Machine Screw	2	2
7	Y-6146-A	Cut-out Switch	1	1
	953100	Name Plate Protection Switch	1	1
	39035	Plastic Rd. Hd. Machine Screw	1	1
	21696	Fil. Hd. Machine Screw	1	1
	Y-6311-A	Thermal Element	1	1
	21090	Rd. Hd. Machine Screw	2	2
	21818	Shakeproof Lock Washer	2	2
	950738	Resistor Protective Switch		1
	26306	Rd. Hd. Machine Screw		1
8	Y-6201-A	Stud	1	1
9	953094	Rectifier	1	1
	953093	Rectifier Support	1	1
	26545	Rd. Hd. Machine Screw	1	1
	21602	Shakeproof Lock Washer	2	2
	21258	Hex Nut	1	1
10	953099	High Pressure Switch	1	1
	Y-6438-A	Sweat Tube Adapter		
	Y-6256	Bushing	1	1

<u>Refr.</u>	<u>Part Number</u>	<u>Part Name</u>	<u>32 Volt</u>	<u>64 Volt</u>
11	21101	Rd. Hd. Machine Screw	1	1
	26051	Rd. Hd. Machine Screw	1	1
	21625	Shakeproof Lock Washer	2	2
	Y-6784	Choke Coil (Lee to H.P. Switch)	1	1
	21358	Hex Head Cap Screw	1	1
	Y-18814-H	Plain Washer	1	1
	21729	Lock Washer	1	1
	953097	Low Pressure Switch	1	1
	Y-6436-A	Sweat Tube Adapter	1	1
	Y-6256	Bushing	1	1
	21101	Rd. Hd. Machine Screw	2	2
	21625	Shakeproof Lock Washer	2	2
		Angle Valve		
	Y-6750	Sweat Tube Street Elbow	1	1
	78273-Z	Copper Tube	1	1
	Y-6780	Sweat Tube Tee	1	1
		Tee to Tee L.P.		
	B-7948-R	Copper Tube	1	1
	Y-6739	Sweat Tube Tee	1	1
		Tee to Modulator		
12	950999	Refrigerant Line	1	1
		Tee to L.P. Switch		
	B-8957	Copper Tube	1	1
	950071	Tee Block	1	1
	21349	Hex Hd. Cap Screw	2	2
	21633	Shakeproof Lock Washer	2	2
		Oil Gauge to Tee Block		
	Y-6764	Sweat Tube Elbow	1	1
	Y-6438	Sweat Tube Adapter	1	1
	B-8957-D	Copper Tube	1	1
13		Tee Block - Inlet Line		
	B-1686	Half Union Elbow	1	1
	65012-D	Copper Tube	1	1
	B-4092	Nut	2	2
	950036-A	Oil Pressure Switch	1	1
14	50048-B	Manometer	1	1
	Y-6438	Adapter	1	1
	B-8957-M	Copper Tubing	1	1
	Y-14212-T	Loom	1	1
15	26313	Soc. Hd. Set Screw	2	2
	Y-6745	Stud	1	1

<u>Refr.</u>	<u>Part Number</u>	<u>Part Name</u>	<u>32 Volt</u>	<u>64 Volt</u>
16	Y-6436-A	Refrigerant Service Manifold	1	1
	Y-18802-A	Socket Hd. Pipe Plug	2	2
17	Y-6280	Flare Tube Cap Nut	2	2
	Y-6279-B	Half Union	2	2
18	21361	Hex Hd. Cap Screw	1	1
	Y-18814-H	Washer	1	1
	21729	Lock Washer	1	1
19	Y-6143-C	High Pressure Gauge	1	1
20	39048-A	Gauge Extension	2	2
21	Y-6144-B	Compound Gauge	1	1
22	Y-6442-A	Packless Angle Valve	2	2
23	B-8018	Felt Retainer	2	2
	B-4680	Felt Washer	2	2
		Angle Valve to Tee H.P.		
	Y-6750	Sweat Tube Street Elbow	1	1
	78273-Z	Copper Tube	1	1
	Y-6445	Sweat Tube Tee	1	1
24	Y-18594	Switch	1	1
	21106	Rd. Hd. Machine Screw	2	2
	21625	Shakeproof Lock Washer	2	2
25	950760	Switch Bracket	1	1
	21108	Rd. Hd. Machine Screw	2	2
	21625	Shakeproof Lock Washer	2	2
26	Y-14176	Clip	2	2
	21101	Rd. Hd. Machine Screw	2	2
	21606	Shakeproof Lock Washer	2	2
27	Y-6160	Hinge Pin	2	2
	21556	Cottor Pin	4	4
28	Y-7358-F	Cable	1	1
	AY-6124	Control Box Cover Assembly	1	
	DY-6124	Control Box Cover Assembly		1
29	Y-6124-D	Control Box Assembly	1	1
30	Y-6127-A	Cover Gasket	1	1
31	Y-6161-A	Knob	2	2
	B-7695	Knob Gasket	2	2
32	B-9578	Snap Ring	2	2
	A-953092	Cover Panel Assembly	1	
	C-953092	Cover Panel Assembly		1
33	953092	Cover Panel	1	1
34	952678	Pilot Relay	1	
	953101	Pilot Relay		1
	21602	Shakeproof Lock Washer	2	2
	26005	Rd. Hd. Machine Screw	2	2

<u>Refr.</u>	<u>Part Number</u>	<u>Part Name</u>	<u>32 Volt</u>	<u>64 Volt</u>
35	953096	Relay-Time Delay	1	
	953102	Relay-Time Delay		1
	953098	Time Delay Relay Tube	1	1
	21606	Shakeproof Lock Washer	4	4
	21966	Rd. Hd. Machine Screw	4	4
36	951031-F	Terminal Block	1	1
	21602	Shakeproof Lock Washer	2	2
	26005	Rd. Hd. Machine Screw	2	2
	21606	Shakeproof Lock Washer (Panel to Cover)	6	6
	21101	Rd. Hd. Machine Screw (Panel to Cover)	6	6

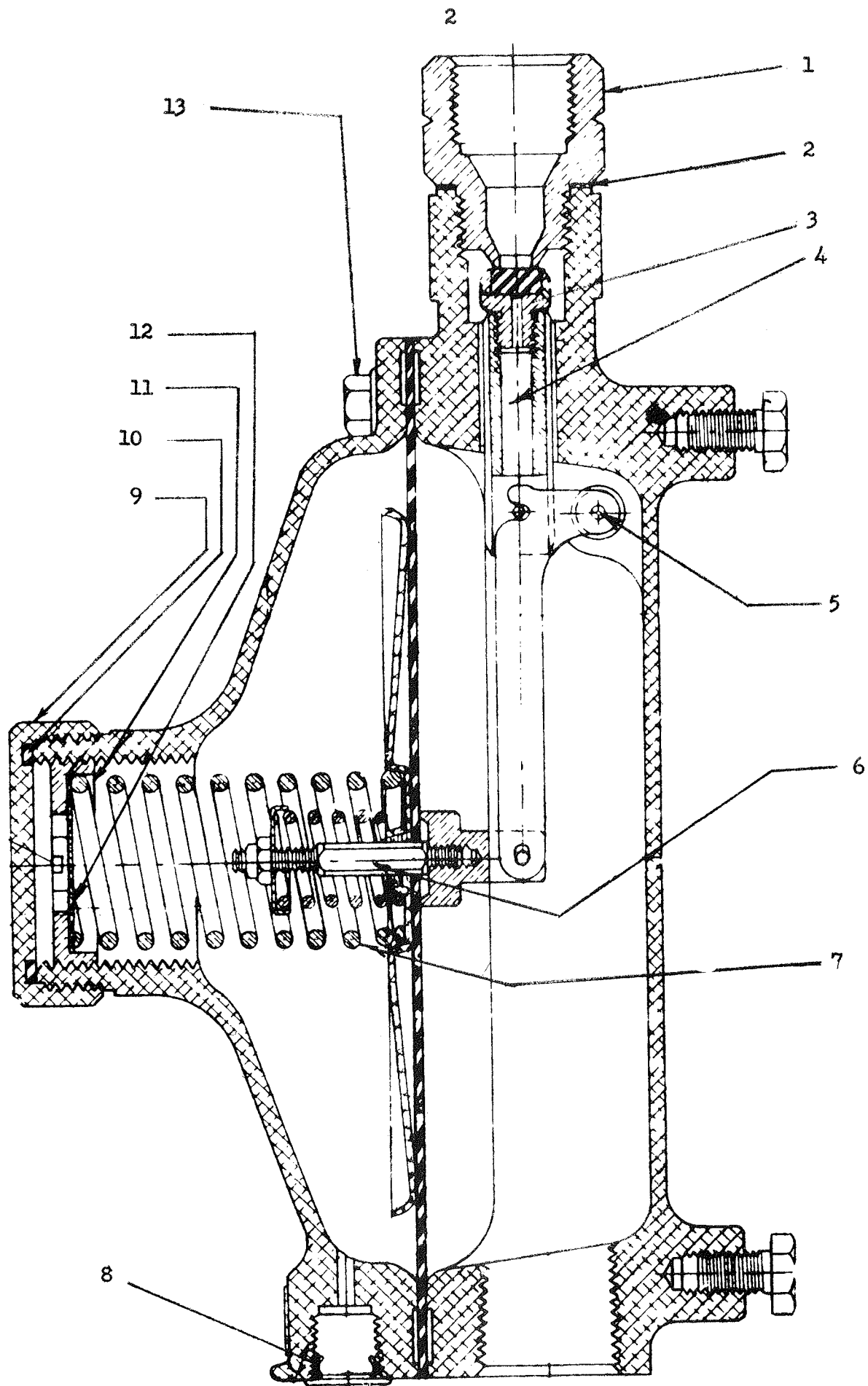
PARTS LIST  
FOR  
WAUKESHA RAILWAY TYPE PROPANE  
FUEL CABINET MANIFOLDING

FORM NUMBER M-2409

WAUKESHA MOTOR COMPANY  
RAILWAY DIVISION  
WAUKESHA, WISCONSIN

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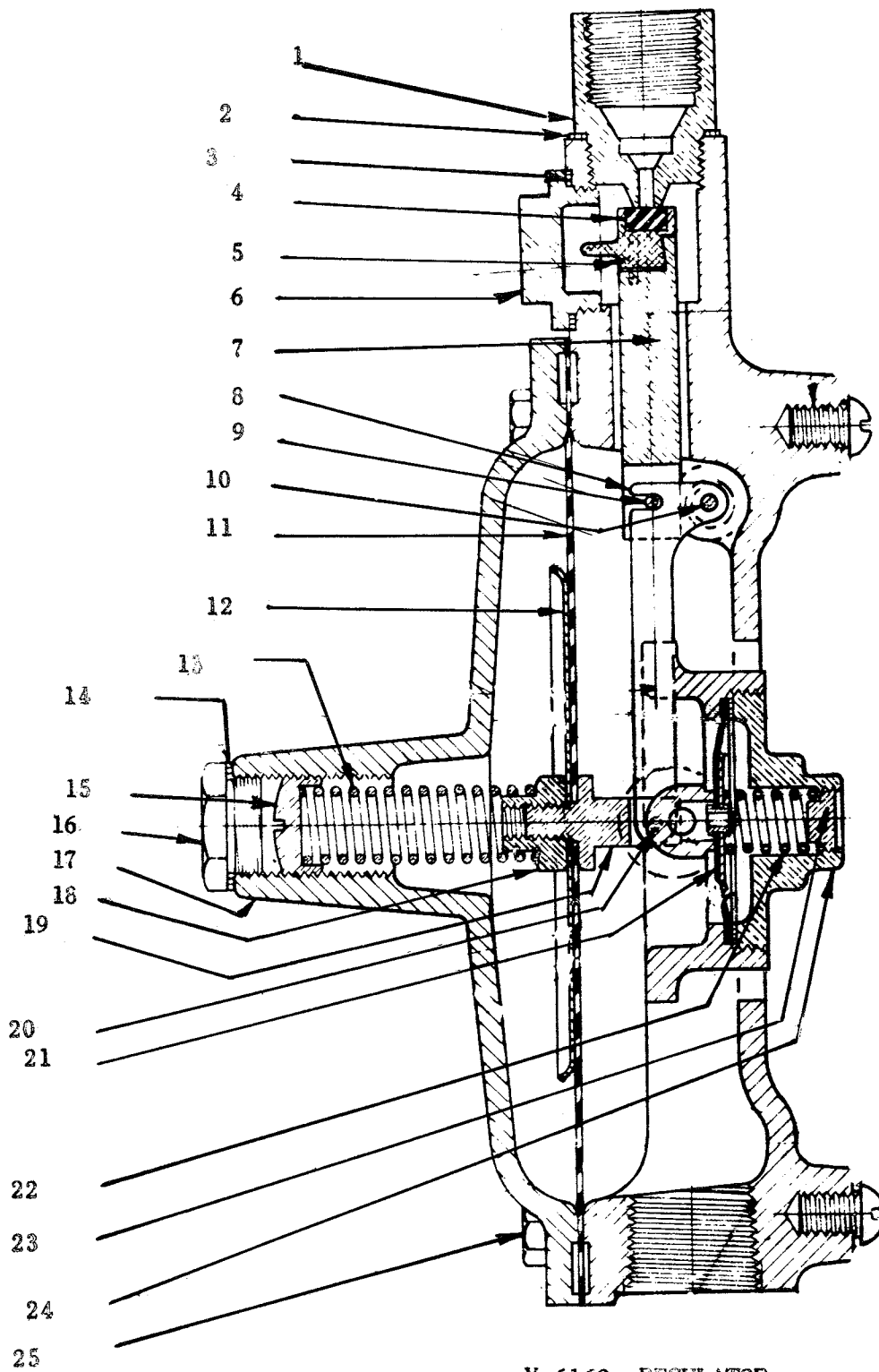
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Y-6162-C REGULATOR

## REGULATOR

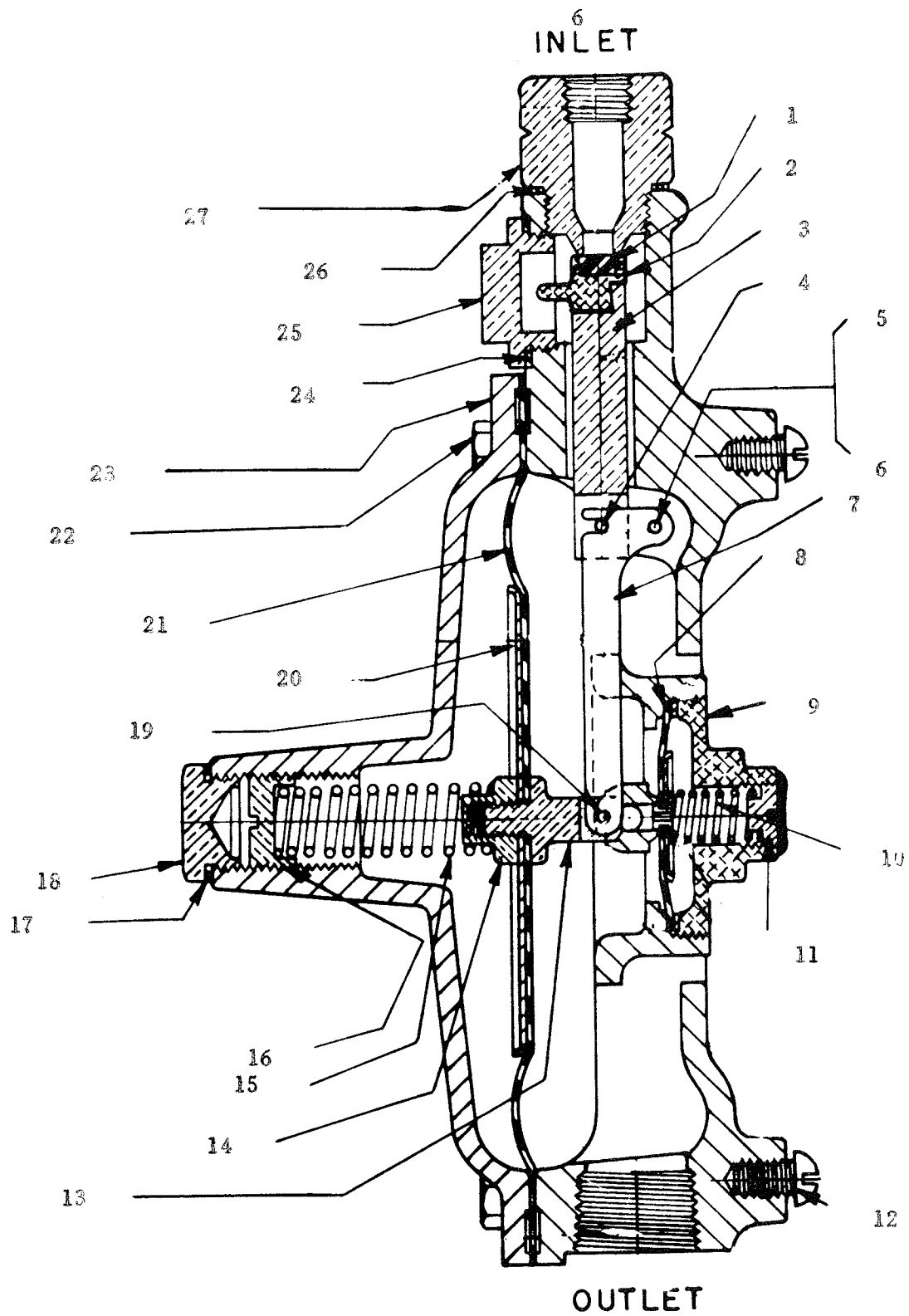
<u>REF.</u> <u>NO.</u>	<u>PART</u> <u>NUMBER</u>	<u>PART</u> <u>DESCRIPTION</u>	<u>REQUIRED</u>
	Y-6162-C	Regulator	
1	960420	Inlet Nipple	1
2	960199	Inlet Nipple Washer	1
3	960235	Disc & Retainer Assembly	1
4	960421	Plunger Assembly	1
5	960422	Lever Pivot Pin & Washer Assembly	1
6	960238	Diaphragm Assembly	1
7	960233	Spring (Ice-Engine-Enginator)	1
	953052	Spring (Range Cabinet)	1
8	960419	Vent	1
9	960236	Bonnet Cap	1
10	960237	Bonnet Cap Washer	1
11	960231	Adjusting Screw	1
12	960418	Slip Disc	1
13	21279	Hex Head Cap Screw	8
	21174	Hex Nut	8



Y-6162 REGULATOR

## REGULATOR (2500)

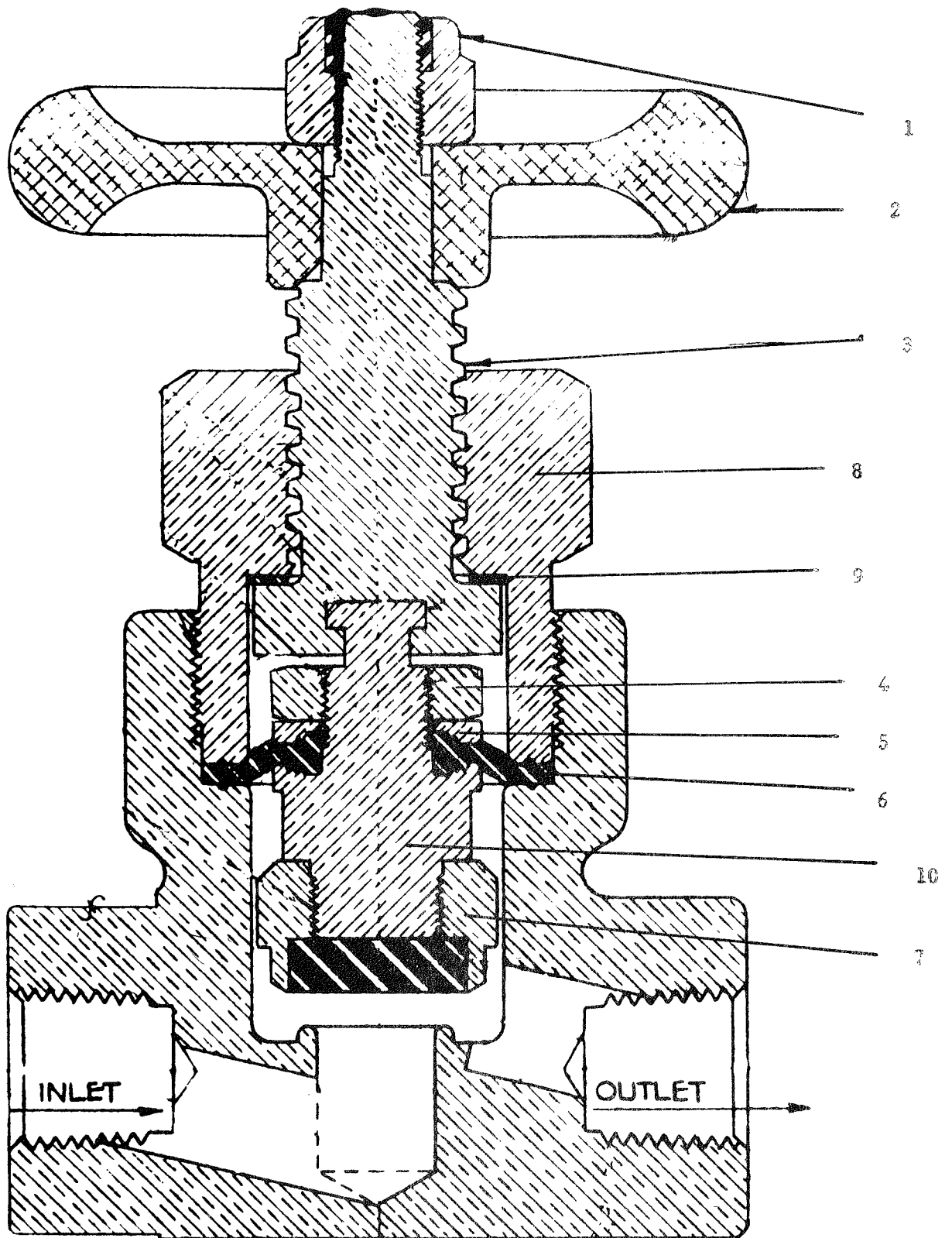
<u>REF. NO.</u>	<u>PART NUMBER</u>	<u>PART DESCRIPTION</u>	<u>REQUIRED</u>
	Y-6162	Regulator (2500)	1
1	960423	Inlet Nipple	1
2	960199	Inlet Nipple Washer	1
3	960216	Disc Replacing Cap Washer	1
4	960424	Valve Disc	1
5	960215	Disc Retainer	1
6	960425	Disc Replacing Cap	1
7	960426	Plunger	1
8	960427	Lever	1
9	960428	Plunger Pin	1
10	960429	Lever Screw	1
	960430	Lever Screw Washer	1
11	960230	Diaphragm	1
12	960431	Diaphragm Plate	1
13	960229	Bonnet Spring	1
14	960432	Bonnet Plug Washer	1
15	960433	Adjusting Screw	1
16	960434	Bonnet Plug	1
17	960435	Bonnet	1
18	960436	Diaphragm Lock Nut	1
19	960437	Yoke	1
20	960214	Lever Pin	1
21	960217	Diaphragm Assembly	1
22	960218	Spring	1
23	960441	Adjusting Screw	1
24	960440	Safety Relief Bonnet	1
25	21279	Hex Head Cap Screw	8
	21174	Hex Nut	8



X-6162 REGULATOR

## REGULATOR (2500-RR)

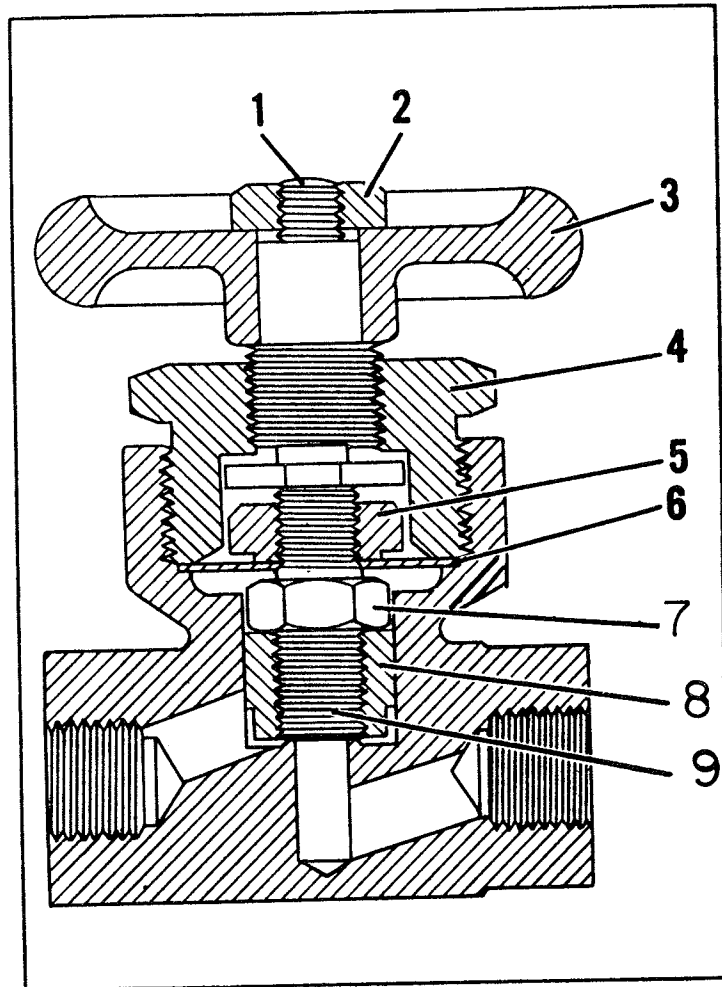
<u>REF. NO.</u>	<u>PART NUMBER</u>	<u>PART DESCRIPTION</u>	<u>REQUIRED</u>
	Y-6162	Regulator (2500-RR)	1
1	960252	Valve Disc	1
2	960439	Disc Retainer	1
3	960426	Plunger	1
4	960428	Plunger Pin	1
5	960429	Lever Screw	1
6	960430	Lever Screw Washer	1
7	960427	Lever	1
8	960217	Diaphragm Assembly	1
9	960440	Safety Relief Bonnet	1
10	960218	Spring	1
11	960441	Adjusting Screw	1
12	21274	Screw	1
13	960437	Yoke	1
14	960436	Diaphragm Lock Nut	1
15	960229	Bonnet Spring	1
16	960433	Adjusting Screw	1
17	960432	Bonnet Plug Washer	1
18	960434	Bonnet Plug	1
19	960214	Lever Pin	1
20	960431	Diaphragm Plate	1
21	960230	Diaphragm	1
22	21279	Hex Head Cap Screw	8
	21174	Hex Nut	8
23	960435	Bonnet	1
24	960216	Disc Replacing Cap Washer	1
25	960425	Disc Replacing Cap	1
26	960199	Inlet Nipple Washer	1
27	960420	Inlet Nipple	1



Y-6166 VALVE

## VALVE

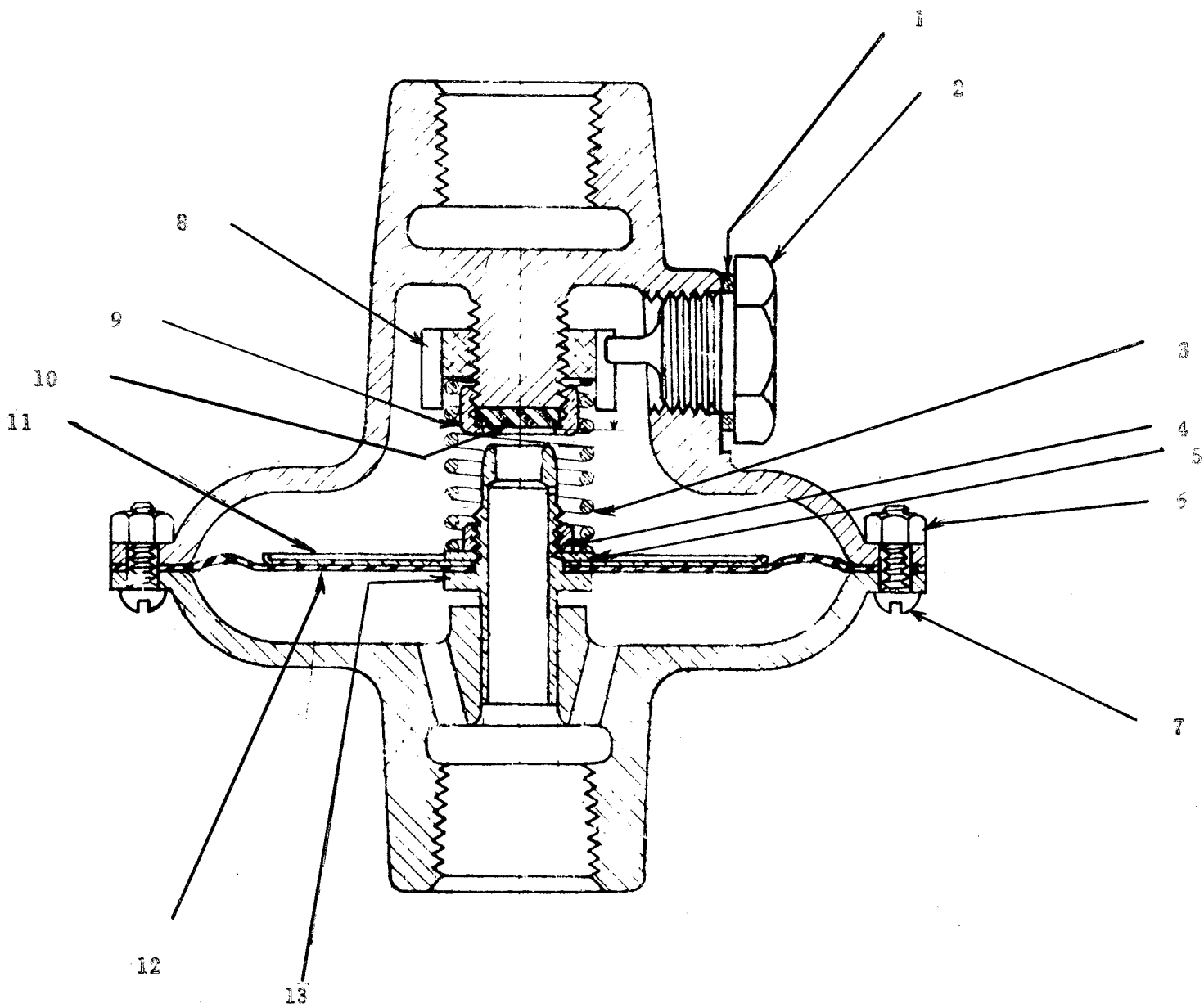
<u>REF.</u> <u>NO.</u>	<u>PART</u> <u>NUMBER</u>	<u>PART</u> <u>DESCRIPTION</u>	<u>REQUIRED</u>
	Y-6166	Valve	
1	960239	Handwheel Lock Nut	1
2	960382	Handwheel	1
3	960390	Diaphragm, Bonnet & Stem Assembly	1
	960389	Diaphragm Assembly	1
4	960415	Diaphragm Nut	1
5	960227	Diaphragm Nut Slip Washer	1
6	960225	Diaphragm	1
7	960226	Disc & Retainer	1
	960412	Stem	1
8	960411	Bonnet	1
9	960405	Stem Washer	1
10	960409	Diaphragm Stem	1



Y-6166 -GLOBE VALVE

## GLOBE VALVE (OLD STYLE)

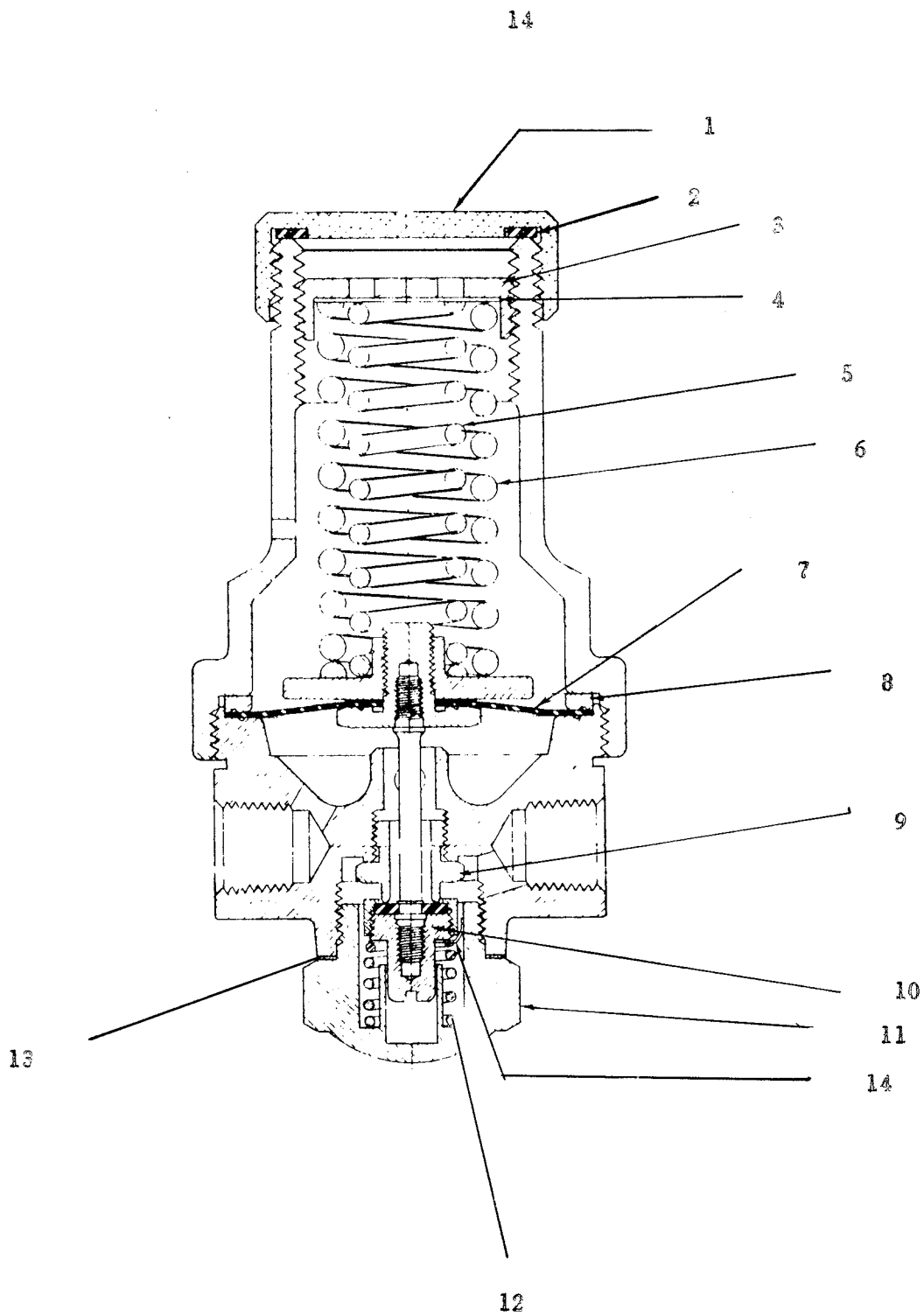
<u>REF.</u> <u>NO.</u>	<u>PART</u> <u>NUMBER</u>	<u>PART</u> <u>DESCRIPTION</u>	<u>REQUIRED</u>
	Y-6166	Globe Valve (Old Style)	1
1	960380	Valve Stem	1
2	960381	Lock Nut	1
3	960382	Wheel Handle	1
4	960383	Bonnet	1
5	960391	Diaphragm Nut	1
6	960253	Diaphragm	1
7	960384	Diaphragm Stem	1
8	960385	Disc Retainer	1
9	960241	Valve Disc	1



Y-6401 EXCESS FLOW VALVE

## EXCESS FLOW VALVE

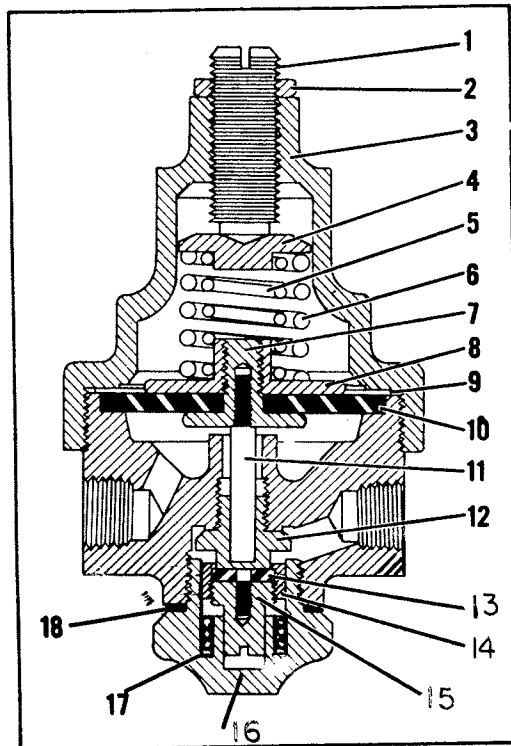
<u>REF. NO.</u>	<u>PART NUMBER</u>	<u>PART DESCRIPTION</u>	<u>REQUIRED</u>
	Y-6401	Excess Flow Valve	1
1	960413	Plug Gasket	1
2	960414	Adjustment Plug	1
3	960251	Spring	1
4	960250	Diaphragm Lock Nut	1
5	960417	Lock Nut Washer	1
6	21260	Nut	8
7	21889	Machine Screw	8
8	960397	Spring Adjusting Nut	1
9	960248	Disc Retainer	1
10	960246	Disc	1
11	960410	Diaphragm Plate	1
12	960248	Diaphragm	1
13	960249	Nozzle	1



Y-6163-J REGULATOR

## REGULATOR

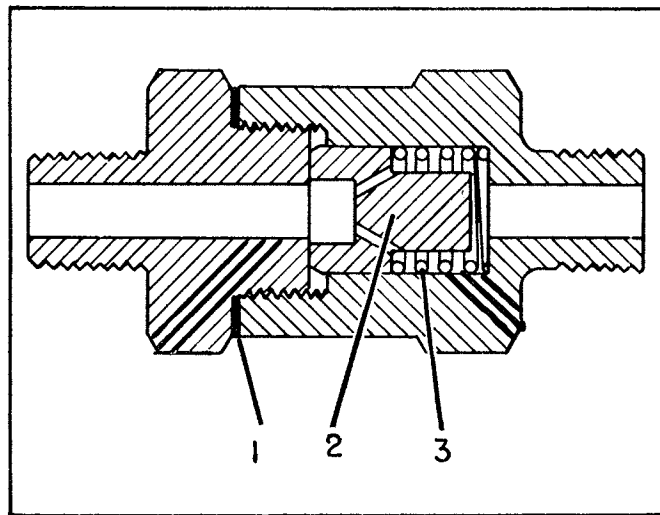
<u>REF. NO.</u>	<u>PART NUMBER</u>	<u>PART DESCRIPTION</u>	<u>REQUIRED</u>
	Y-6163-J	Regulator	1
1	960221	Bonnet Cap	1
2	960222	Bonnet Cap Washer	1
3	960392	Adjusting Screw	1
4	960223	Slip Disc	1
5	960244	Spring	1
6	960224	Spring	1
7	960161	Diaphragm & Yoke Assembly	1
8	960158	Diaphragm Ring	1
9	960194	Nozzle	1
10	960160	Stem & Centerpiece	1
		Assembly	1
11	960394	Back Cap Assembly	1
	960193	Back Cap	1
12	960212	Spring	1
13	960196	Back Cap Washer	1
14	960396	Friction Washer	1



Y-6163-G -CHECK VALVE

## REGULATOR

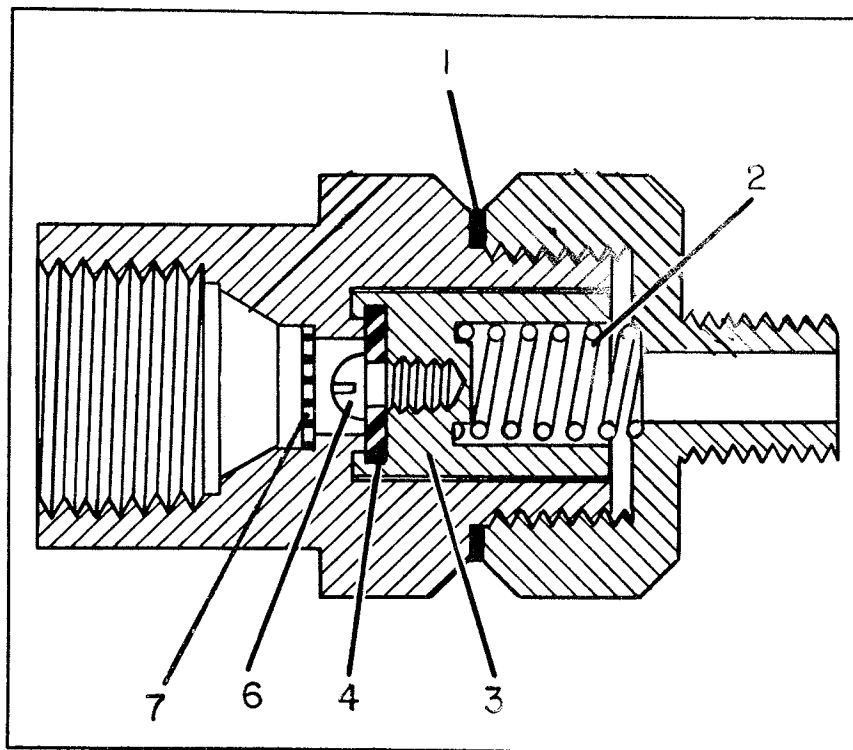
<u>REF. NO.</u>	<u>PART NUMBER</u>	<u>PART DESCRIPTION</u>	<u>REQUIRED</u>
	Y-6163-G	Regulator	1
1	960205	Adjusting Screw	1
2	960206	Lock Nut	1
3	960192	Bonnet	1
4	960144	Spring Button	1
5	960146	Spring	1
6	960191	Spring	1
7	960379	Diaphragm & Yoke Assembly	1
8	960445	Diaphragm Plate	1
9	960197	Diaphragm Washer	1
10	960156	Diaphragm	1
11	960211	Centerpiece	1
12	960194	Nozzle	1
13	960160	Seat & Centerpiece Assembly	1
14	960195	Seat Retaining Ring	1
15	960198	Centerpiece Guide	1
16	960193	Back Cap	1
17	960212	Back Cap Spring	1
18	960196	Back Cap Washer	1



Y-6578 -EXCESS FLOW VALVE

## EXCESS FLOW VALVE

<u>REF.</u> <u>NO.</u>	<u>PART</u> <u>NUMBER</u>	<u>PART</u> <u>DESCRIPTION</u>	<u>REQUIRED</u>
	Y-6578	Excess Flow Valve	1
1	960228	Washer	1
2	960245	Slug	1
3	960386	Spring	1



Y-6167-B —CHECK VALVE

## CHECK VALVE

<u>REF.</u> <u>NO.</u>	<u>PART</u> <u>NUMBER</u>	<u>PART</u> <u>DESCRIPTION</u>	<u>REQUIRED</u>
	Y-6167-B	Check Valve	1
1	960255	Washer	1
2	960243	Spring	1
3	960388	Check Guide	1
4	960254	Check Disc	1
5	960145	Screw	1
6	960242	Screen	1