WALTER E. COLE
COMO SHOP

OPERATING MANUAL
AND
PARTS LIST

FOR THE
WAUKESHA
ICE ENGINE
AN
ENGINE DRIVEN REFRIGERATING UNIT
FOR
RAILWAY CAR
AIR CONDITIONING
SYSTEMS

EDITION 4
FORM REF. 1025-A

Price $2.00

REFRIGERATION DIVISION
WAUKESHA MOTOR COMPANY
WAUKESHA, WISCONSIN
U. S. A.

PRINTED IN U. S. A.

INSTRUCTIONS FOR INSTALLATION, CARE, AND MAINTENANCE

of the

W A U K E S H A I C E E N G I N E U N I T

for

RAILWAY AIR CONDITIONING

MODEL "C"

*****

WAUKESHA MOTOR COMPANY
REFRIGERATION DIVISION
WAUKESHA WISCONSIN

C O N T E N T S

(Numbers refer to Section and Page)

WAUKESHA ICE ENGINE AIR CONDITIONING UNIT

INSTALLATION

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.

The fuel system consists of a fuel cylinder cabinet, cylinders of propane, and the necessary pressure regulators and valves.

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-155-B gives complete dimensions for mounting tracks, receiver, unit and fuel carrier. Wiring diagram SK-252 gives complete instructions for the car wiring necessary to the Ice Engine.

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 2-1/8" O.D. tubing slipped over the 1-5/8" O.D. suction line. A 2-1/8" x 1-5/8" x 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 2-1/8" O.D. tube. See the heat exchanger outlined on the piping diagram SK-264. 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 SK-264)

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.

STARTING THE ICE ENGINE FOR THE FIRST TIME

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.

LUBRICATION

Fill the engine crankcase with four quarts of a good quality S.A.E. #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.

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 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 4 gallons).

SETTING REFRIGERANT VALVES FOR EVACUATING & CHARGING SYSTEM

Refer to the page entitled "SUMMARY OF OPERATIONS" for the setting of the refrigerant valves and for evacuating and charging with Freon. The use of a suitable chemical dryer and drying agent (obtained from any refrigeration supply house) is recommended for the first two or three hours of cooling. It should be temporarily connected in series with the liquid line out of the receiver. CAUTION: Do not leave it connected in the line more than two or three hours, as the drying

agent may disintegrate and pass into the system.

SETTING FUEL VALVES

The following instructions apply to each fuel cabinet used, whether one or more.

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. See the paragraph on "Fuel Supply Pressures" under "GENERAL OPERATING INFORMATION."

STARTING ENGINE FOR TEST

Press reset button (R) to close the low pressure switch (Q, SK-245). Then start engine by lifting toggle starting switch (L) in the control box.

NOTE: To evacuate the entire system, the solenoid valve (V, drawings SK-245 and SK-264) must be energized and open during the entire evacuating period. THIS IS VERY IMPORTANT! This can be accomplished by either holding or blocking up the toggle starting switch (L), 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.

REMOVING AIR FROM SYSTEM

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) 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 period, there should be no signs of air or oil coming from connection (B), and the system is ready to receive a charge of refrigerant.

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 (drawing SK-264) through the evaporator and back to the compressor crankcase--remove the Freon as outlined under "Summary of Operations," being careful not to run compressor after the low side pressure gauge (X, SK-264) 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 bull's-eye 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 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 operating level into bull's-eye. Very cool air over the condensers, causing more Freon to stay as a liquid in the condensers, will also lower the visible Freon level.

STOPPING THE ICE ENGINE

The engine is stopped by de-energizing the solenoid refrigerant valve (V), which is accomplished by either opening the thermostat circuit (T) at the car panel, or lowering the toggle starting switch (L) in the control box. (See drawing SK-251). The engine continues to run for a few moments until the low side pressure has been reduced to about 7-1/2 lbs., as shown by gauge (X). The low pressure switch (Q) then operates to ground the magneto and stop the engine.

When the engine is started, however, either from the car panel or by the toggle switch (L) in the control box, the solenoid valve is not opened until the engine and compressor are up to speed. This feature, accomplished by the vacuum operated slide switch, permits easy starting with minimum load, and applies the load only after the unit starts and is up to speed.

GENERAL OPERATING INFORMATION

ENGINE UNLOADING FOR STARTING

The engine is automatically unloaded for starting by the solenoid by-pass valve (W, drawing SK-264). 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, drawing SK-264) prevent a reverse flow from the condensers 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, accomplished by the vacuum operated slide switch moving off the contact bar (A, drawing SK-265).

OPERATING SPEEDS

Drawing SK-267 shows the relation between the suction pressure and the engine speed, as determined by the modulated control (drawing SK-238). For adjustment of the modulated control, see paragraph entitled "Adjusting Speed" under "OPERATING DIFFICULTIES."

OPERATING PRESSURES

Refrigerant Pressures

The refrigerant suction or low side pressure will vary according to the temperature of the air passed 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 condensers. 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 entitled "IMPROPER REFRIGERANT PRESSURES" under "OPERATING DIFFICULTIES."

Engine Oil Pressure

Engine oil pressure should range between 15 and 25 pounds. The pressure may be adjusted by turning the adjusting screw on the engine block directly beneath the carburetor.

Fuel Supply Pressures

The fuel pressure shown on the gauge will depend on the number of fuel cylinders in the fuel cabinet, as follows:

One cylinder	30 pounds
Two cylinders	45 pounds
Three cylinders	60 pounds
Four cylinders	75 pounds

It is assumed that each cylinder contains sufficient fuel--at least 3 - 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 3 ounces. 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 to maintain one ounce higher pressure to the engine than from the other cabinet. Thus, set one regulator to maintain 4 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 empty.

The regulator located in the engine compartment shuts off the fuel supply whenever the engine stops. It performs the same general function as the float bowl, of a gasoline carburetor. The fuel must be drawn into the carburetor at a pressure slightly below atmospheric. See the Ensign drawing (SK-275) included in this book.

The fuel will first flow from the right cylinder, called cylinder No. 1, to the manifold, maintaining a pressure of 60 pounds at the main regulator (75 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 two pounds of fuel remains. The manifold pressure will then drop to 45 lbs., the pressure at which the second cylinder cuts in. The fuel will now flow from the second cylinder until it too is empty, when the third cylinder will automatically cut in to supply the fuel at 30 lbs. pressure to the main regulator.

Hence, if the fuel pressure gauge shows 60 pounds with the engine running, it is apparent the first cylinder is supplying the fuel. If the gauge shows 45 pounds, obviously the fuel is being drawn from the second

cylinder; the first cylinder now being empty, it may be removed. Similarly, if this gauge shows 30 pounds, the first and second cylinders both are empty and may be removed.

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

PROTECTIVE DEVICES

High Pressure Switch

The high pressure switch (P, drawing SK-245) 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 (V). 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--valves (3) and (4), drawing SK-264--will cause the switch to close its lower contact, grounding the magneto and stopping the engine. The pressure switch will start the engine again at 290 pounds.

High Pressure Relief Valve

A high pressure relief valve (drawing SK-268) is connected between the heads and crankcase of the compressor. It provides a second protection for a sudden high pressure; it is set to open at 400 pounds, and automatically closes again at about 350 pounds.

Starter Crank Limit Switch

The switch (C, drawing SK-245) located in the control cabinet, stops the cranking of the engine if the starter cranks for more than 1 to 2 minutes. This switch must be reset manually to start the engine again. This is done by pushing down the plunger (N) which will project from the top of the case and show the word "OFF" whenever the switch has tripped open.

Engine Temperature Switch

Should the engine for any reason become overheated, causing the engine head temperature to go above 220 degrees, a small grounding switch (H, drawing SK-245) screwed into the cylinder head will automatically ground the magneto and stop the engine. As soon as the engine temperature is lowered about 4 degrees, the engine will again start automatically, or if the engine temperature remains above 220 degrees more than 1 to 2 minutes, it will trip the cranking limit switch (C). Manual resetting as explained above is then necessary to restart the engine.

Fuel Safety Devices

The following safety devices are incorporated in the fuel system (see drawing SK-149-A and Fig. 4):

(1) If the cylinder should be over filled 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.

(2) Should the handle of the cylinder valve be in the "OPEN" position, and the hose connection to the valve being 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."

(3) 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.

(4) A break or leak in the low pressure line - after the main regulator, with a flow of 100 cubic feet per hour or more will close an excess flow valve (Y-6401), located in the fuel cabinet in series with the 1/2 inch iron pipe fuel line to the engine. This valve will open again automatically in a few moments.

(5) 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.

(6) An automatic shut-off regulator (No. 272, Fig. 2) 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.

PILOT LIGHT INDICATIONS

A thermostatic switch mounted near the evaporator

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.

SERVICE INSTRUCTIONS

See the enclosed Service Chart for an itemized summary of the service instructions.

LUBRICATION

Refer to the enclosed lubrication chart (SK-263) 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 bull's-eye in the end of the compressor crankcase immediately after the compressor has been stopped, following a run of one-half hour or more. Oil is added to the system in the same manner as the refrigerant. See the paragraph "CHARGING UNIT WITH REFRIGERANT."

WATER

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

CLEANING CONDENSERS & RADIATOR

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 condensers or the engine radiator, or on the compressor cylinders and cylinder head cooling fins will reduce the cooling efficiency of these parts. The bottom of the compressor compartment can be readily removed to facilitate cleaning.

CLEANING REFRIGERANT FILTERS

A screen type filter is located in the Ice Engine unit in the suction line. Another one is located immediately ahead of the liquid solenoid valve and expansion valve, overhead in the car. These two strainers are of the "Y" type and can be readily cleaned by shutting off the outlet valve (6, drawing SK-264) on the receiver, and pumping down the low side pressure to zero. On new installations the strainers should be cleaned after only a few hours operation, and thereafter as often as appears necessary--at least every 150 hours of engine operation.

A small screen is also located in each solenoid valve and may require cleaning, especially, if the main line strainers have failed.

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 inspection by competent employees. This is particularly true of cranking limit switch (C) and high and low pressure switches (P) and (Q).

Keep the vacuum operated slide switch cover on securely at all times to keep out all dust. Be sure that the gasket material is intact and in place.

BELTS

The engine fan belt, compressor drive belt, 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 as far as possible, the belt tighteners with new belts, proper tension will be automatically provided throughout the entire life of the belts. CAUTION: The engine fan belt should have about one inch total movement midway between the two pulleys for proper tension. Any less than this imposes an excessive load on the fan pulley bearing with a resultant shortened life on the bearing.

FREON LEVEL

When the Ice Engine is running under normal conditions and load, the refrigerant level should be in the bull's-eye in the receiver. Any refrigerant level considerably below the bull's-eye gauge would indicate a loss of refrigerant, and would permit Freon gas to pass out into the liquid line. This reduces the cooling capacity considerably. See the "SUMMARY OF OPERATIONS" for procedure in adding Freon.

AIR CLEANER & BREATHER CAP

The air cleaner to carburetor intake must be cleaned as often as conditions require it. It is extremely im-

portant 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--about a cupful--using engine oil. The breather cap on the engine must be dipped into gasoline 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. This job is readily accomplished with minimum time. 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.

FUEL MIXTURE ADJUSTMENT (SK-275)

The normal speed and full load adjustment screw will be found on the side of the carburetor secured by a lock nut. When the Ice 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. The normal setting of this load adjustment screw is approximately one and one-half turns open. CAUTION: Tighten the hexagonal lock nut securely.

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 "PROTECTIVE DEVICES" must not be changed.

ENGINE ADJUSTMENTS AND MAINTENANCE

Valve Timing

The flywheel is stamped "INO-1" for opening position of the intake valve for cylinder No. 1; "EXO-1" for the 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 tapped clearances are correct before checking or changing the valve timing. Refer to the enclosed Tabulated Data sheet for the proper clearances.

Magneto Timing

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 for cylinder No. 1. A deep groove is provided at this point which can be readily seen through the inspection hole in the bell housing. The magneto is held in place by three cap screws, and 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 spark occurs at the proper stroke. To check this, remove spark plug No. 1 and turn the engine by means of the engine or condenser fan, until air flows out of the spark plug opening. The ignition should occur 12° before the piston reaches top dead center on this compression stroke.

With the No. 1 piston in the proper position for ignition, proceed as follows to check or retime the magneto:

(1) 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.

(2) 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 magneto may be grounded in the pressure switches. In that case remove the ground wire from the top of the magneto.) The impulse coupling automatically retards the spark 15° on starting. Hence do not tighten magneto coupling at the position where the above spark occurs, but proceed as directed in the next paragraph.

(3) 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. With the magneto held in this position, tighten the hexagonal lock nut on the drive coupling (loosened in paragraph No. 1).

The breaker points, located behind the bakelite distributor cap, should be honed or filed and adjusted once a year. Breaker gap clearance should be .014-.016 inch. 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 sandpapered smooth again with a fine sandpaper.

Grinding Engine Valves

Examine the valves and valve seats once a year for any carbon or pitting. Replace any valves that are deeply pitted or grooved. The exhaust valve seats may be removed if found too badly pitted. 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 for that purpose. However, if only a slight grinding and reseating is needed, it is possible to use some fine valve grinding compound (Cloverleaf No. 2A is recommended) on each valve face, and then with a slight pressure and an 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 scored, than to remove all of it by grinding.

Removing Engine Head

The engine head is removed by simply draining the radiator water, removing all the spark plugs to avoid breakage, and then removing the hexagon nuts holding the head and the top water connection.

In replacing the head, however, it is extremely important that the gasket surfaces on the head and block be thoroughly cleaned, including any carbon deposit on the pistons and in the combustion chambers. Always use a new gasket every time the head is removed. Apply a small amount of grease to each side of the gasket, then place it on the stud bolts, and follow with the head. In drawing up the cylinder head nuts, be sure to draw them up evenly all around, drawing them up just as tight as possible without stripping the threads. 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.

COMPRESSOR MAINTENANCE

Removing Compressor Heads

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 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 head, and also the cap screws holding the discharge valves on the head. (See SK-264)

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. (See SK-270.)

Removing Compressor Seal

To repair or replace the compressor shaft seal, proceed as follows (See SK-270):

(1) Remove the two 1-1/4" hexagon 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 fiber coupling disc (No. 18).

(3) Remove the compressor shaft nut (No. 24).

(4) Insert a 3/8-16 cap screw in the tapped hole in the spider arm (No. 22). This cap screw must be threaded at least 1-1/4". By tightening down this cap screw, it 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. 21). 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.

Removing Compressor Pulley

The compressor pulley is removed as follows (see drawing SK-270):

(1) Remove the condenser fan and compressor pulley belts.

(2) Remove the entire fan bracket assembly (No. 13).

(3) Remove the condenser fan drive pulley (No. 14) and the compressor drive pulley (No. 37).

(4) Remove the compressor coupling hub (No. 22) from the compressor.

(5) The entire compressor pulley can now be pulled off. The ball bearing (No. 20) can be removed by first removing the pulley bearing plate (No. 16).

(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.

OPERATING DIFFICULTIES

IMPROPER PRESSURES

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.

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. (SK-264)

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.

Suction Pressure

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 cleaning. There is also a strainer in the solenoid valve which may become clogged 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) There may be expansion valves 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 8 - 10° is satisfactory.

(5) If the high pressure relief valve (Z, drawings SK-264 and SK-268), 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 and tap on pin (A). The opening pressure may be raised by loosening packing nut (D) and turning clockwise stem (C). This in turn is best accomplished by applying the wrench to and turning packing nut (B).

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 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 - 4 ounces, varies considerably, as measured with a mercury "U" gauge, 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.

ADJUSTING SPEED - (See drawings SK-267 and SK-238)

The following procedure must be followed in installing or readjusting the modulated control:

(1) Adjust the governor damping screw (A) so it protrudes 1/8 inch beyond the lock nut.

(2) Remove the pin (N) from the governor arm.

(3) The minimum speed of the engine is determined only by the screw (I) 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 (V) by means of switch (L) in the control box). Then adjust the screw (I) on the carburetor until the desired speed is obtained (1150 - 1200 on the condenser fan).

(4) Adjust the distance (G) to approximately 1/4 inch by loosening the screw (M) and slipping the carburetor arm on the throttle shaft. The throttle shaft must be turned against the stop screw (I) for this adjustment.

(5) Valve (B) must be in the wide open position (counter-clockwise).

(6) Turn the adjusting nut (K) until the modulator stem (L) just starts to move at 15 pounds (maximum) rising pressure. As the adjusting nut (K) is turned up (clockwise) the tension is increased on the spring (O), requiring a higher pressure to move the modulator stem (L). The movement must be checked on a rising suction pressure obtained by shutting off the liquid solenoid valve (V) until the pressure is below 15 pounds, then opening the valve again.

(7) As the total modulator stem (L) travel is 1/4 inch from 0 to 45 pounds pressure, the distance (D) should be 1/8 inch for symmetrical travel. Adjust by turning the clevis (P). NOTE: After this adjustment has been made, check the clearance (H) when the modulator stem is pulled out the full 1/4 inch travel. There must be sufficient clearance so that it will not act as a stop and limit the modulator stem travel. This travel is determined only by the stop (Q) in the modulator itself.

(8) With the engine running at the proper minimum speed (as set in paragraph 2) and with a suction pressure of 14 - 15 pounds, tentatively adjust the length of the eye bolt (C) until the slack in the governor spring (E) is just taken up. The pin (N) should be out for this adjustment.

(9) Now adjust the length of the governor rod (J) so it just reaches (less 1/16 inch) the governor arm (R) when the engine is running at the minimum speed setting corresponding to 14 - 15 pounds suction pressure. By making the length 1/16 inch short the screw (I) on the carburetor will be assured of hitting the stop each time

the suction pressure is 15 pounds or less.

(10) 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 (C) in the direction needed.

(11) Recheck the minimum speed at 14 - 15 pounds suction pressure. The carburetor arm should be against the stop screw (I). If not, shorten the governor rod (J) the amount necessary, but no more.

ICE ENGINE UNIT FAILS TO START (See SK-245)

If 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 operated slide switch.

(6) Contacts in the crank limit switch.

(7) Solenoid on the starting motor, including the starting motor itself.

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 magneto by removing the wire at the engine heat switch (H) or by removing the ground wire from the magneto.

(3) Improper fuel adjustment on the carburetor. The adjustment screw should be approximately 1-1/2 turns out.

(4) If choking of air intake to carburetor starts the engine, it indicates a defective fuel shut-off regulator (No. 272, Fig. 2).

(5) Air in the fuel line.

(6) Improper fuel pressure - should be 3 - 4 ounces.

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

(1) Engine heat switch (H) is grounded due to an overheated engine (220° F.), or due to the switch being defective. An overheated engine may be due to 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.

(2) Ignition failure.

(3) Improper fuel adjustments, or lack of fuel.

(4) Defective shut-off fuel regulator (No. 272, Fig.2)

IGNITION

The gaps in the spark plugs should be checked every 150 hours of engine operation. The gaps must be between .015 - .018 inches. 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 (H, drawing SK-245), a ground on the wire from the magneto, or a defective magneto itself.

BELTS

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

(1) Incorrect tension on the belts.

(2) Misalignment between the driven and the driving pulley.

(3) Wrong sized belts.

(4) Rough belt grooves on the pulleys.

(5) Using unmatched belts.

Use only the standard belts recommended by the manufacturer.

SUB-COOLER

The evaporative sub-cooler, if used, should preferably be connected in the liquid line from the receiver to the expansion valve to permit pumping out the refrigerant in case of any leaks.

The pressure switch, if used, is connected in series with the leads to the 1/2 H.P. motor. It is set to start the motor at 175 pounds head pressure, and to stop it at 150 pounds head pressure.

The water capacity is 38 gallons, and will last from 8 to 12 hours, depending on the outside temperature and humidity. 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.

Outside of a weekly cleaning and flushing, very little attention is needed to the sub-cooler. See the service chart for a summary of servicing needed.

TABULATED DATA

1937 EQUIPMENT

ENGINE

Model	FC
Bore - (Inches)	3-1/4
Stroke - (Inches)	4
Cylinders	4
Displacement - (Cu. In.)	133
Horse power available, 1160 R.P.M.	20
Oil Capacity, without filter - (Quarts)	4
Oil Pressure - (Lbs. per Sq. In.)	15 - 20
Oil, S.A.E. No.	30
Water Capacity - (Gallons)	4
Valve Tappet Clearances cold - Exhaust - (Inches)	.008
Intake (Inches)	.006
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), Part No. B-3655	18 mm

COMPRESSOR

Part Number	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 Receiver Capacity, Propane - (23.6 gal.)	100 lbs.
Belts - Engine Fan (1) - Part No.	Y-6036-A
Condenser Fan (3) - Part No.	Y-6407
Compressor Drive (7)	Y-7048
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 set to open at (lbs.) - - - - - - - -	400
set to reclose at (lbs.)- - - - - - -	350

SUMMARY OF OPERATIONS

(See enclosed Piping Diagram SK-264)

TO PUMP VACUUM ON EMPTY SYSTEM AND TO CHARGE WITH FREON

(1) Close both high side valves (3 & 4) on compressor head. All the other valves must be open.

(2) Open high pressure valve (2) in control box and remove cap (B). (Important) Do not remove cap (A).

(3) Energize the refrigerant solenoid valve by either (1) turning on blower fan and cooling switch at car panel (if temperature is too low to close thermostat relay, be sure to short out thermostat), or (2) by holding or blocking up toggle starting switch (L) 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.

(4) Run engine by holding or blocking up low pressure switch (Q) until low pressure gauge (X) shows 20 - 27 inches of vacuum -- at least two hours. If there are no leaks, the discharge at (B) will cease entirely.

(5) Cap tightly high side connection (B) while unit is still running. Close valve (1) and remove cap (A).

(6) Connect the Freon charging line to the low side connection (A) on the control box. Purge line of air before tightening. Note weight of drum.

(7) Open valves (3 & 4) on compressor head. Very important.

(8) Close outlet (lower) valve (6) on receiver.

(9) Run unit by lifting toggle switch (L) and low pressure switch (Q).

(10) Open low pressure valve (1) in the control box and also valve on refrigerant drum. Regulate pressure to not over 50 pounds. As pressure decreases, apply one or two blow torches to the bottom of the Freon drum, or apply steam or hot water to drum.

(11) Charge the system with 50 lbs. of Freon, as determined by weighing Freon drum. Level should be in bull's-eyes when operating normally--valve (6) open. With sub-cooler more Freon may be necessary.

(12) Close low side valve (1) in control box and valve

on Freon drum. Cap tightly connection (A) on control box.

(13) Open (lower) outlet receiver valve (6). For cooling all the valves must be fully open, except the gauge valves (1 & 2), which should be opened only to obtain gauge readings.

ADDING FREON TO PARTIALLY CHARGED SYSTEM

(1) Purge and connect charging line from Freon drum to the low side connection (A) on the control box.

(2) Close outlet (lower) valve (6) from receiver.

(3) Valves (3, 4, 5, 8, 9, & 10) must be in their normal operating position--namely, open.

(4) Open valve on Freon drum and also valve (1) in control box.

(5) Run unit by lifting toggle switch (L) in control box.

(6) Observe rise in Freon level in receiver. NOTE: Level in receiver should be in bull's eyes 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.

TRAPPING FREON IN RECEIVER AND CONDENSERS

(1) Close outlet (lower) valve (6) from receiver.

(2) Run unit by lifting switch (L) in the control box and pressing reset button (R) on low pressure switch (Q).

(3) Run engine until low side gauge (X) shows zero pressure.

(4) If Freon still in the condensers is desired in the receiver, apply steam to the condensers.

(5) Close upper valve on receiver (5).

TRAPPING FREON IN CONDENSERS

(1) Close outlet valve on condensers (10).

(2) Run unit by holding up switch (L).

(3) Apply heat, if necessary, to the receiver.

(4) 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 condensers are full and that excess Freon must be removed from system through the high side connection (B) in control box.

(5) Run system until low side pressure is 0, pressing reset button (R) on low pressure switch (Q), to keep engine from stopping at 7-1/2 pounds.

REMOVING FREON FROM SYSTEM

(1) Connect Freon line to the high side connection (B) in control box. Purge line of air.

(2) Run the unit by holding up the toggle switch (L) in control box.

(3) Open the high pressure valve (2) in the control box.

(4) Keep the Freon drum cool with running water.

(5) Press reset button (R) on low pressure switch (Q) when necessary to keep engine from being stopped.

(6) After all the Freon is out of the receiver, close compressor head valves (3 & 4) and apply steam to the condensers to drive remaining liquid Freon into drum.

(7) Be careful not to overload the Freon drum. Fill only 3/4 full. Check amount of Freon in the drum by weighing drum before and after charging.

SERVICE CHART

(For hours of operation multiply fuel cylinders used by 20)

AIR CLEANER

Clean and refill weekly--more often if conditions warrant it. Once every 300 hours of engine operation remove the upper half of the air filter, the air connection, and the carburetor, and wash thoroughly in gasoline.

BELTS

Inspect all belts weekly.

BREATHER CAP

Clean weekly by washing in gasoline.

CONDENSERS AND RADIATOR

Pull out sliding doors below compressor, then blow out with air hose. Also clean radiator and engine with the air hose.

FREON

Keep Freon level in bull's-eye in receiver when unit is operating.

ENGINE HEAD

Remove and clean once a season.

ENGINE VALVES

Check once a season for seating and for tappet clearances.

LUBRICATION

See lubrication chart SK-263.

MAGNETO

Check distributor rotor, brushes, and points once a season. Contact opening must be .014 - .016 inches.

REFRIGERANT FILTERS

Clean every 150 hours of engine operation. On a new installation clean once or twice after only a few hours of operation.

SPARK PLUGS

Reset gaps to .015 - .018 inches every 150 hours of engine operation. Replace spark plugs every 600 hours of engine operation.

SUB-COOLER

Flush sub-cooler tank and coil with water once each week. Clean air filter and water screen at weekly intervals. Check water pump packing periodically. Spray nozzles should be cleaned frequently to insure full spray coverage of cooling coil.

Grease motor sparingly with Calol light roll grease or equivalent approximately every 450 hours of operation.

WATER

Keep the water level above the lower pet cock on the radiator.

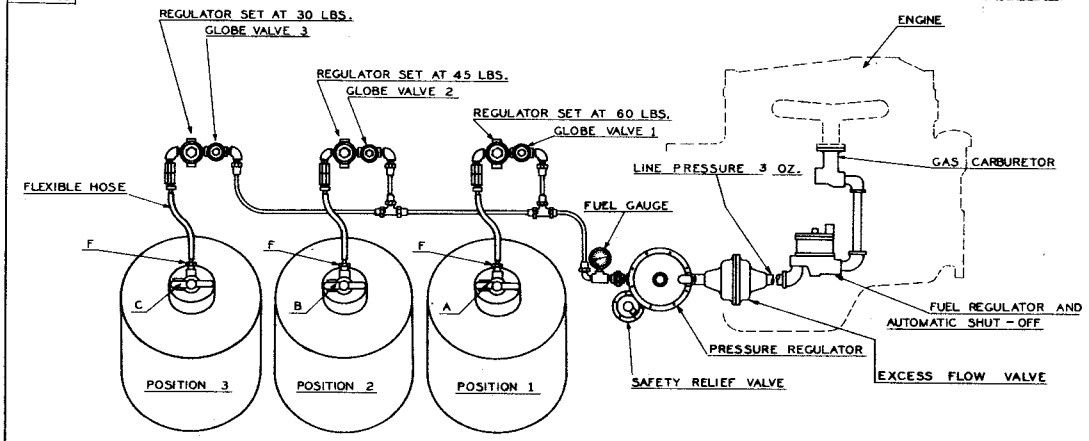
For freezing temperatures protect the radiator with a suitable anti-freeze solution, as follows:

1 gallon	Prestone	protects	to	10°	above zero
1-1/2 gallons	"	"	"	8°	below zero
2 gallons	"	"	"	34°	" "

WATER PUMP

Check the water pump packing for leaks, weekly. Replace once a year. Turn down grease cup one-half turn weekly.

SK-149-A



TO OPERATE

OPEN VALVES A,B,C,1,2 AND 3 BY TURNING COUNTER-CLOCKWISE. GAUGE WILL READ 30, 45 OR 60 LBS. DEPENDING FROM WHICH CYLINDER FUEL IS BEING USED.

TO CHECK SUPPLY

WHEN GAUGE READS 60 LBS. CYLINDER IN POSITION 1 MAY BE PARTLY EMPTY OR FULL AND SHOULD BE WEIGHED.

WHEN GAUGE READS 45 LBS. CYLINDER IN POSITION 1 IS EMPTY AND 2 MAY BE PARTLY EMPTY OR FULL AND SHOULD BE WEIGHED.

WHEN GAUGE READS 30 LBS. CYLINDERS IN POSITONS 1 AND 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 TO POSITION 1.

NOTE! WHEN FOUR-CYLINDER CARRIER IS USED, FOURTH REGULATOR IS SET AT 75 LBS.

TO CHANGE CYLINDER

CLOSE CYLINDER VALVE A,B OR C AND CORRESPONDING GLOBE VALVE 1,2 OR 3.

DISCONNECT HOSE BY TURNING FITTING "F" AT CYLINDER CLOCKWISE. (LEFT HAND THREAD).

GROSS WEIGHT OF FULL CYLINDER	197 1/2 LBS.
WEIGHT OF FUEL	100 LBS.
WEIGHT OF EMPTY CYLINDER	97 1/2 LBS.

SCHEMATIC DIAGRAM AND OPERATING INSTRUCTIONS OF PROPANE FUEL SYSTEM USED IN CONNECTION WITH ENGINE DRIVEN WAUKESHA RAILWAY AIR CONDITIONING UNIT.

FUEL SYSTEM

S.10-P.1

DR ALL FRACTIONAL MACHINE DIMENSIONS ALLOW ±.010 UNLESS OTHERWISE SPECIFIED

MODELS - DRAWN 4-27-37 TRACED 5-27-37 CHECKED APPROVED FILE C WAUKESHA MOTOR CO. WAUKESHA, WIS. SK-149-A

SK-155-B

-NOTE-

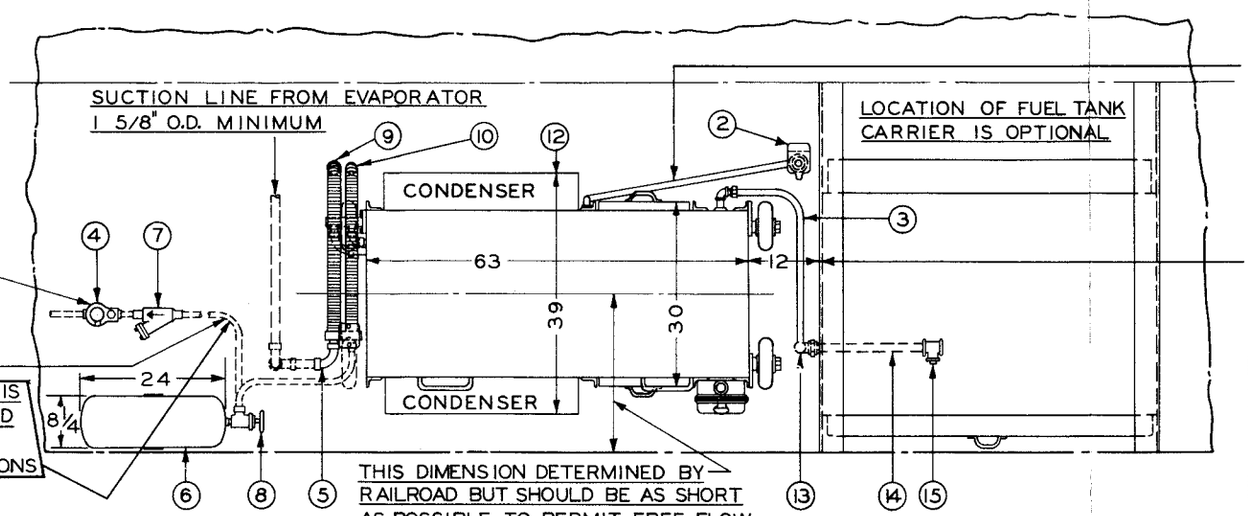
ALL MATERIAL SPECIFIED AND SHOWN IN FULL LINES IS FURNISHED BY WAUKESHA MOTOR CO.

PLACE SOLENOID VALVE AS CLOSE AS POSSIBLE TO INLET SIDE OF EXPANSION VALVE. NOT TO EXCEED 18 INCHES

LIQUID LINE TO EVAPORATOR 3/4" O.D. MINIMUM

-NOTE-IF EVAPORATIVE SUB-COOLER IS USED PLACE IN SERIES WITH LIQUID LINE BETWEEN RECEIVER ⑥ AND STRAINER ⑦. SEE SK-234 FOR DIMENSIONS

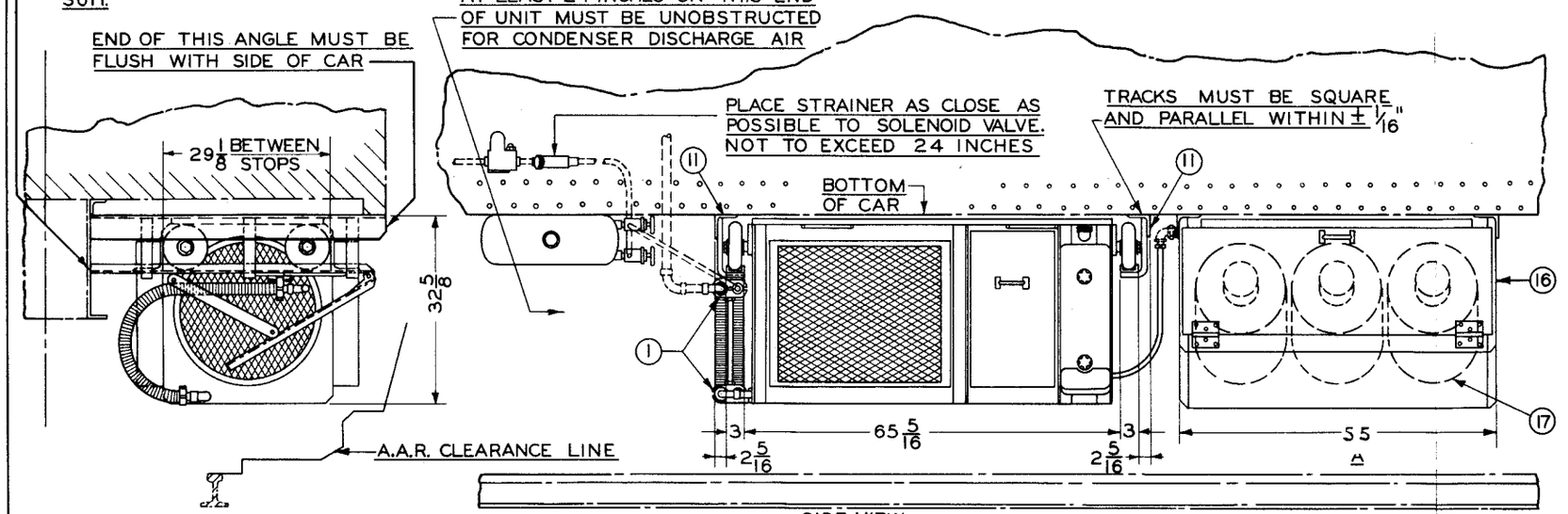
WELD OR RIVET END OF CHANNEL TO CENTER SILL. CHANNELS AND SUPPORTING ANGLES FOR TRACKS ARE FURNISHED 60 INCHES LONG. DRILL AND CUT LENGTH TO SUIT.



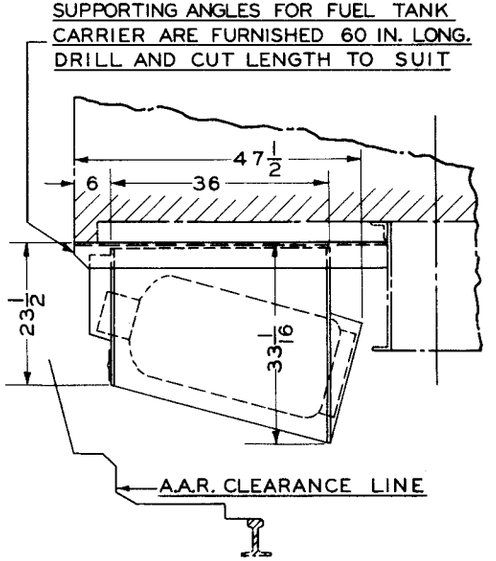
PLAN VIEW

FUEL CARRIER

No. OF CYL.	A INCHES
1	24
2	41
3	55
4	72½



SIDE VIEW

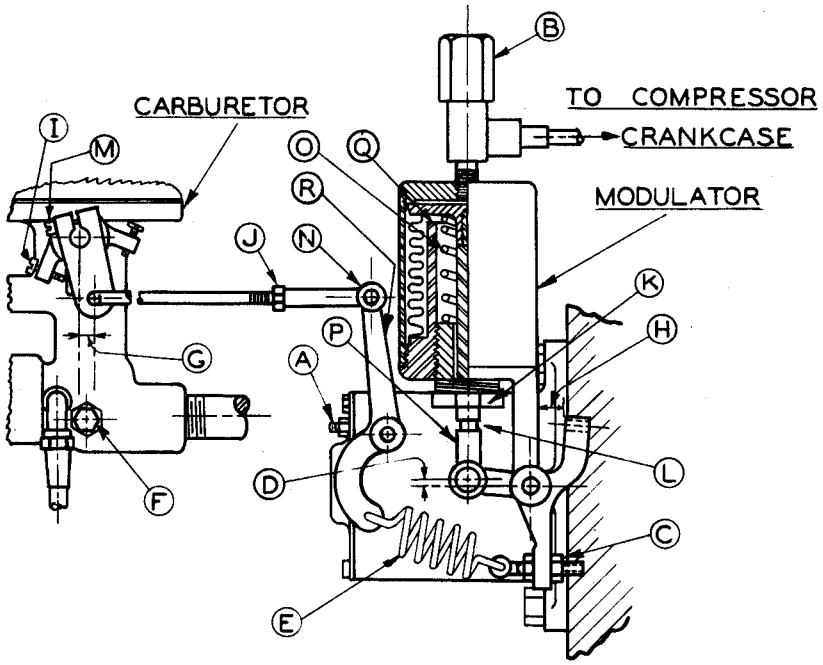


① FLEXIBLE TUBING SUPPORTS
② ELECTRICAL RECEPTACLE AND PLUGS
③ FLEXIBLE FUEL LINE
④ SOLENOID VALVE
⑤ ELBOW 1 5/8" O.D.
⑥ REFRIGERANT RECEIVER
⑦ STRAINER
⑧ RECEIVER VALVES
⑨ FLEXIBLE REFRIGERANT LINE
⑩ FLEXIBLE REFRIGERANT LINE
⑪ MOUNTING TRACKS
⑫ WAUKESHA ICE ENGINE
⑬ UNION ELBOW-NOT FURNISHED
⑭ FUEL LINE 1/2" PIPE-NOT FURNISHED
⑮ MANIFOLD CONNECTING TEE
⑯ FUEL CYLINDER CARRIER AND MANIFOLDING
⑰ FUEL CYLINDER-3

INSTALLATION DRAWING OF
WAUKESHA ICE ENGINE
RAILWAY TYPE
MODEL-C

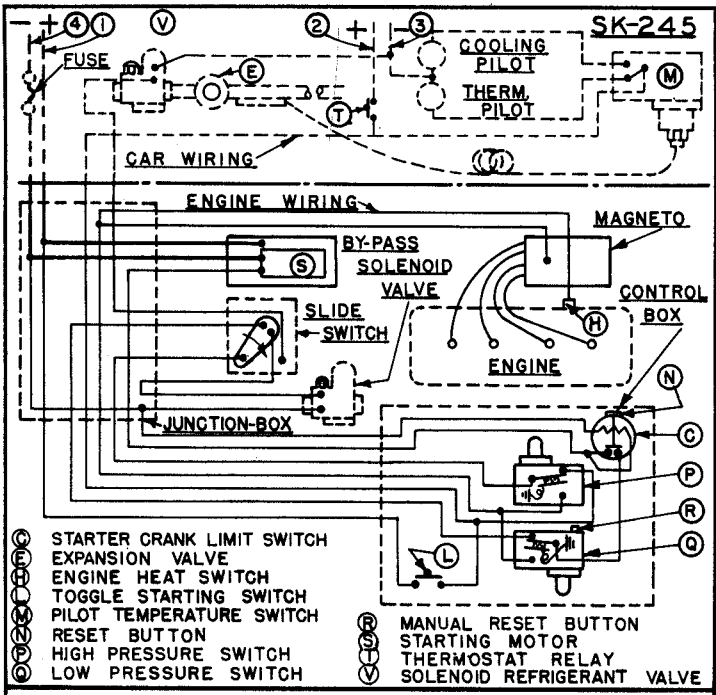
ON ALL FRACTIONAL MACHINE DIMENSIONS ALLOW ±.010 UNLESS OTHERWISE SPECIFIED

MODELS-	DRAWN	TRACED	CHECKED	APPROVED			
E-6000 E.R.U.	Holmes	A.R.L. 11-28-36	Pfaff	Pfaff	D	WAUKESHA MOTOR CO. WAUKESHA, WIS.	SK-155-B
					FILE		PART NO.



MODULATED ENGINE SPEED CONTROL

WAUKESHA MOTOR CO. WAUKESHA, WIS.	TITLE—MODULATED CONTROL	DR. W.E.C. CH. 3-8-37 APP.	A FILE	SK 238



OPERATING INSTRUCTIONS

TO START COOLING UNIT FROM CONTROL BOX

Turn blower fan to "ON" at car panel and lift Toggle Switch "L" in control box.

TO START COOLING UNIT FROM CAR PANEL

Turn blower fan to "ON" and cooling switch to "LOW". Thermostat pilot light will show if thermostat is on and will switch to the cooling pilot light when unit starts cooling.

UNIT FAILS TO START

If starter fails to crank engine, check:

1. Starter Crank Limit Switch "C". If word "OFF" appears, push down reset button "N".
2. Contacts on the Slide Switch.
3. High and Low Pressure Switches.

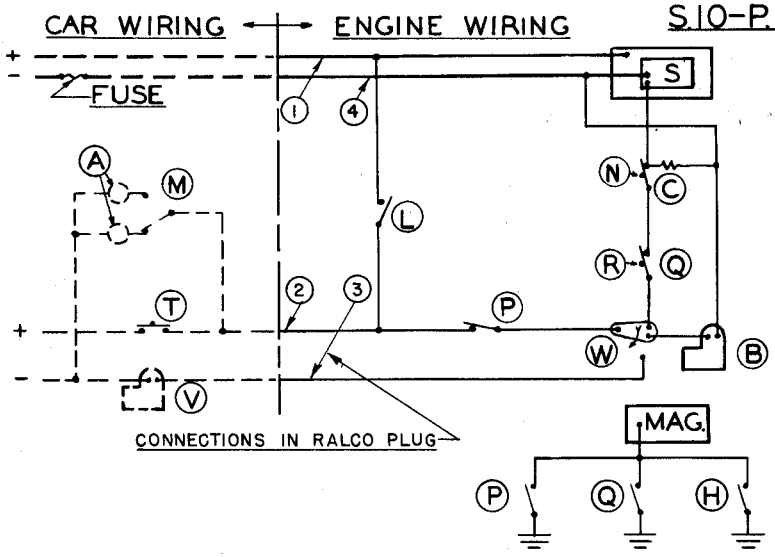
If starter cranks engine but engine fails to start, check:

1. Fuel Supply. See instructions in fuel carrier cover.
2. Spark at spark plugs. If no spark, check for ground on magneto by removing wire at "Engine Heat Switch "H".

If unit fails to pump down and stop, push down movable contact "Q".

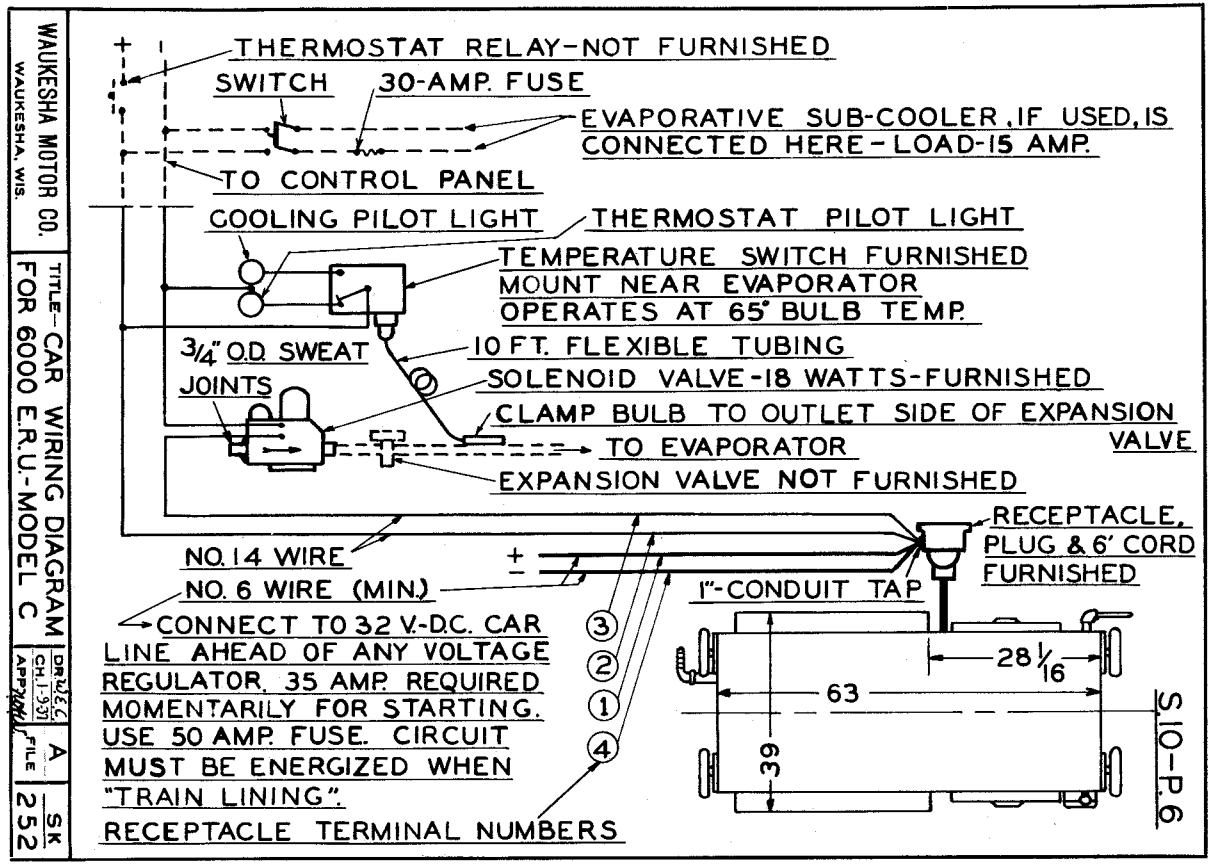
WAUKESHA MOTOR CO. WAUKESHA, WIS.	TITLE— WIRING DIAGRAM 32-VOLTS	DR RHM CH 3-6-37 APP	A FILE	SK 245

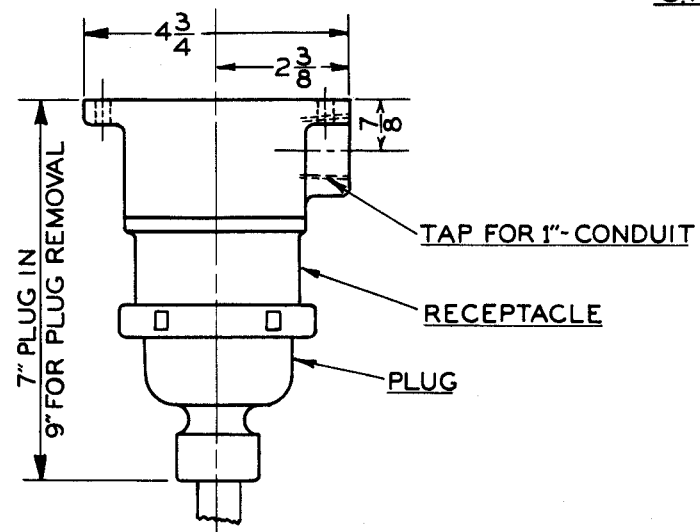
S.10-P.5

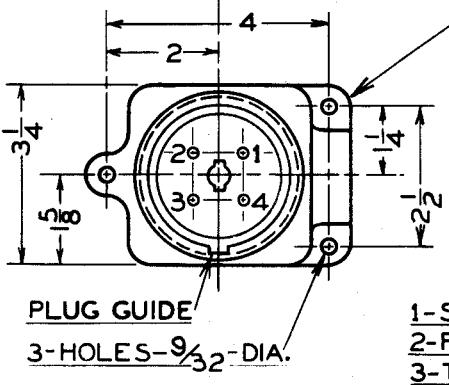


A-PILOT LIGHTS
B-BY-PASS SOLENOID VALVE
C-STARTER CRANK LIMIT SWITCH
H-ENGINE HEAT SWITCH
L-TOGGLE STARTING SWITCH
M-PILOT TEMPERATURE SWITCH
N-RESET BUTTON
P-HIGH PRESSURE SWITCH CONTACTS
Q-LOW PRESSURE SWITCH CONTACTS
R-MANUAL RESET BUTTON
S-STARTING MOTOR
T-THERMOSTAT RELAY
V-SOLENOID REFRIGERANT VALVE
W-SLIDE SWITCH

WAUKESHA MOTOR CO. WAUKESHA, WIS.	TITLE- SCHEMATIC WIRING DIAGRAM-32-VOLTS	DR WEC CH 1-7-31 APP	A FILE	SK 251


WAUKESHA MOTOR CO.
WAUKESHA, WIS.
TITLE- CAR WIRING DIAGRAM FOR 6000 E.R.U.-MODEL C
DR. J.E.C. CH. 1-9-37
APP.
FILE A
SK 252
THERMOSTAT RELAY-NOT FURNISHED
SWITCH
30-AMP. FUSE
EVAPORATIVE SUB-COOLER, IF USED, IS CONNECTED HERE - LOAD-15 AMP.
TO CONTROL PANEL
COOLING PILOT LIGHT
THERMOSTAT PILOT LIGHT
TEMPERATURE SWITCH FURNISHED
MOUNT NEAR EVAPORATOR
OPERATES AT 65° BULB TEMP.
3/4" O.D. SWEAT JOINTS
10 FT. FLEXIBLE TUBING
SOLENOID VALVE-18 WATTS-FURNISHED
CLAMP BULB TO OUTLET SIDE OF EXPANSION VALVE
TO EVAPORATOR
EXPANSION VALVE NOT FURNISHED
RECEPTACLE, PLUG & 6' CORD FURNISHED
NO. 14 WIRE
NO. 6 WIRE (MIN.)
1"-CONDUIT TAP
CONNECT TO 32 V.-D.C. CAR LINE AHEAD OF ANY VOLTAGE REGULATOR. 35 AMP. REQUIRED MOMENTARILY FOR STARTING. USE 50 AMP. FUSE. CIRCUIT MUST BE ENERGIZED WHEN "TRAIN LINING".
RECEPTACLE TERMINAL NUMBERS
3
2
1
4
28 1/16
63
39
S.10-P.6





1-STARTER (+)
2-FROM THERMOSTAT (+)
3-TO SOLENOID VALVE
4-STARTER (-)

WAUKESHA MOTOR CO. WAUKESHA, WIS.	TITLE-CONNECTIONS IN RALCO PLUG AND RECEPTACLE	DR. W.E.C. CH. 3-4-31 APP.	A FILE	SK 262

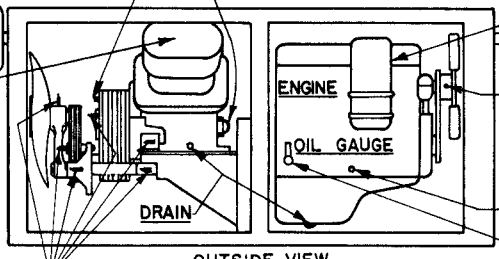
1/8" PIPE PLUG FOR GREASING COMPRESSOR PULLEY BEARING USE CALOL LIGHT ROLL GREASE

GREASE ONCE A YEAR

COMPRESSOR OIL SIGHT GAUGE KEEP LEVEL IN GLASS

S.10-P.8

AIR FILTER- CLEAN AND REFILL ONCE A WEEK- SEE INSTRUCTIONS ON NAMEPLATE



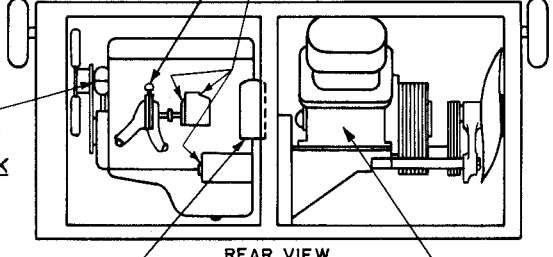
OUTSIDE VIEW

COMPRESSOR DRIVE- 6-ALEMITE FITTINGS GREASE EVERY 150 HOURS- USE ONLY CALOL LIGHT ROLL GREASE- 225 BUSH ST., SAN FRANCISCO, CALIF.

MAINTAIN CRANKCASE TO HIGH LEVEL MARK ON GAUGE-DRAIN AND REFILL EVERY 150 HOURS- USE BEST GRADE OIL- S.A.E. 30

USE AUTOMOTIVE WATER PUMP GREASE KEEP CUP FULL-TURN DOWN 1/2 REV. EACH WEEK

ADD ONE OR TWO DROPS OF LIGHT OIL TO THE STARTER AND MAGNETO ONCE A MONTH



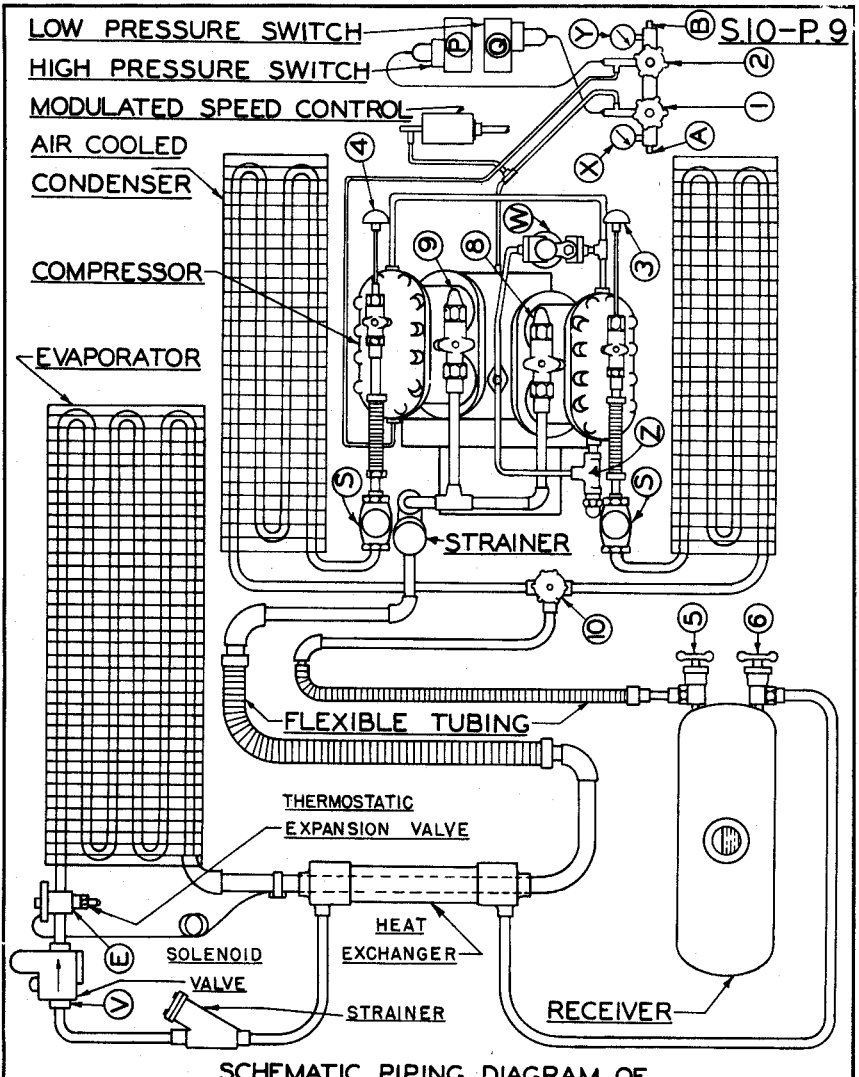
REAR VIEW

OIL FILTER—REPLACE ELEMENT OR REPACK WITH CLEAN WASTE ONCE EVERY 300 HOURS SEE DIRECTIONS ON NAMEPLATE

USE SPECIAL DEHYDRATED MINERAL OIL-DRAIN ONCE A YEAR—CHECK LEVEL MONTHLY—SEE INSTRUCTION BOOK FOR ADDING OIL VISCOSITY 300 AT 100° F CAPACITY- 6 QTS.

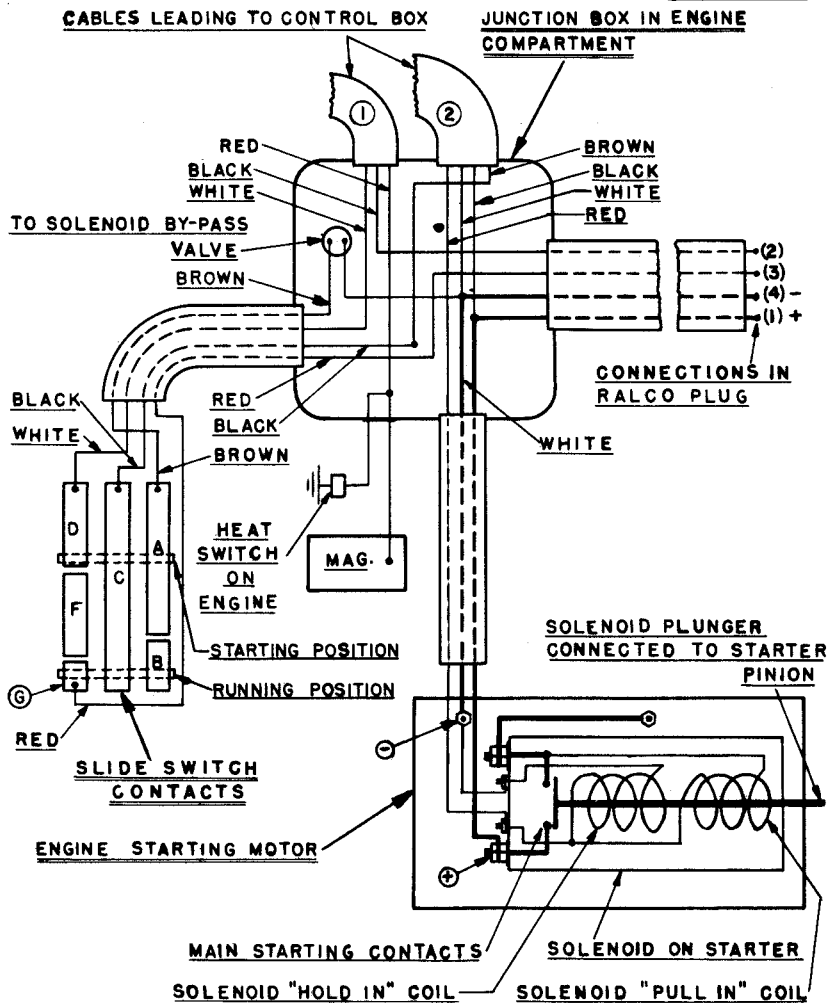
TO DETERMINE HOURS OF OPERATION MULTIPLY FUEL CYLINDERS USED BY 20

WAUKESHA MOTOR CO. WAUKESHA, WIS.	TITLE— LUBRICATION CHART	DR RAM CH. 7-5-37 APP. FILE	A	SK 263

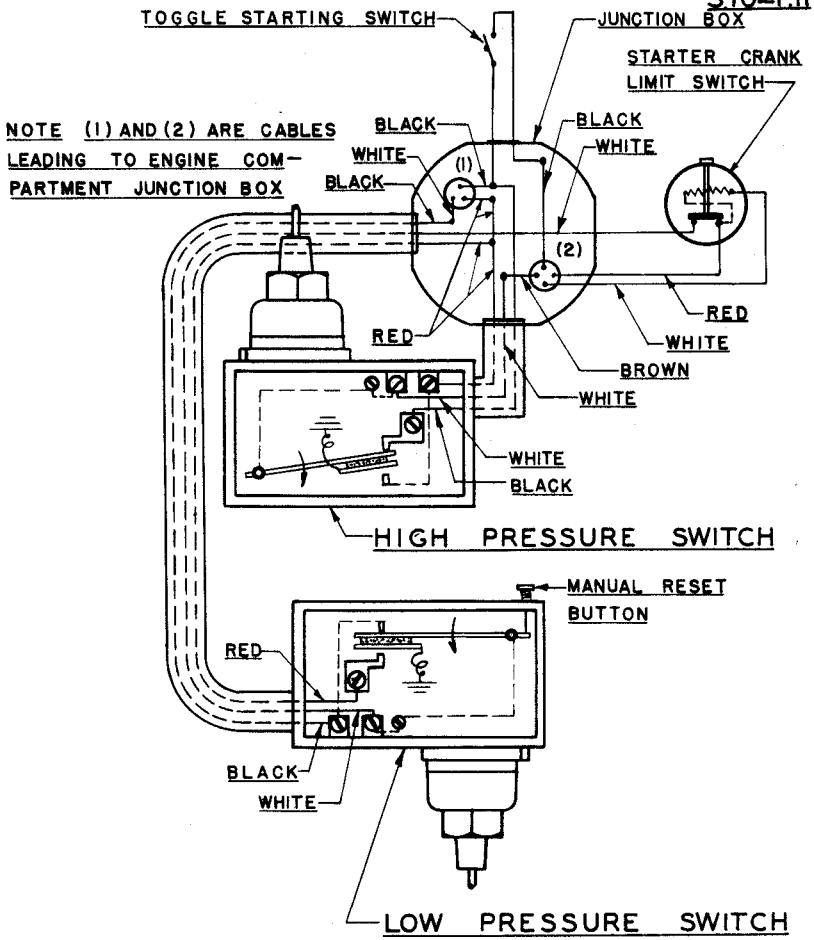


SCHEMATIC PIPING DIAGRAM OF WAUKESHA ICE ENGINE RAILWAY TYPE

WAUKESHA MOTOR CO. WAUKESHA. WIS.	TITLE— PIPING DIAGRAM	DR. RAM A CH. 6-17 APP. 7-10-17 FILE	SK 264

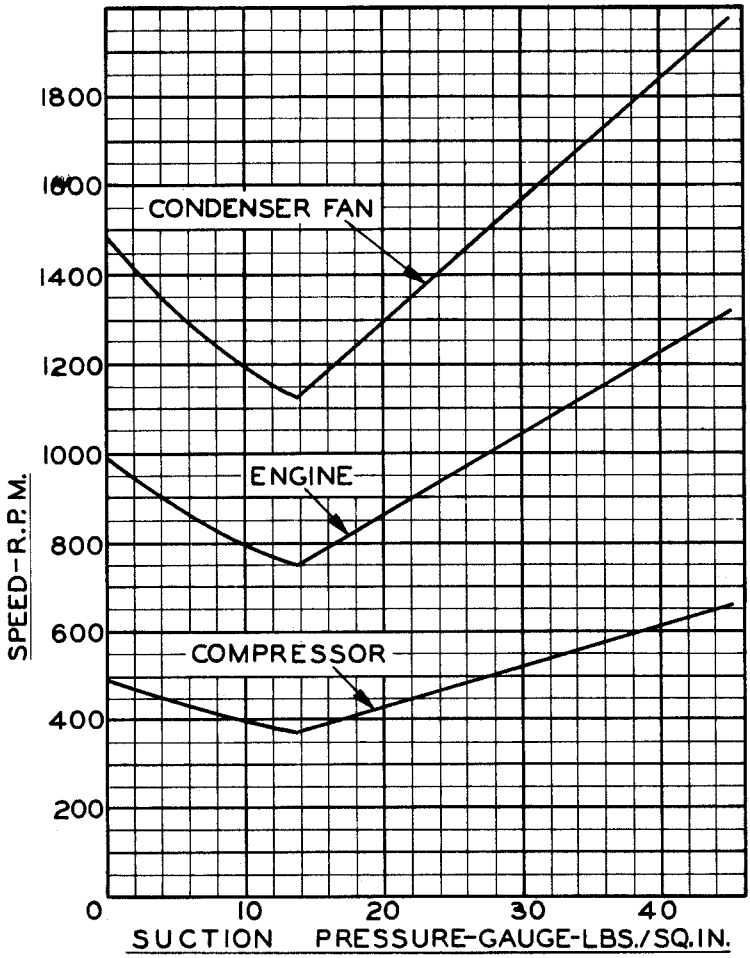


WAUKESHA MOTOR CO. WAUKESHA, WIS.	TITLE– WIRING CONNECTIONS IN ENGINE COMPARTMENT	DR. & C. CH. APP.	A FILE	SK 265



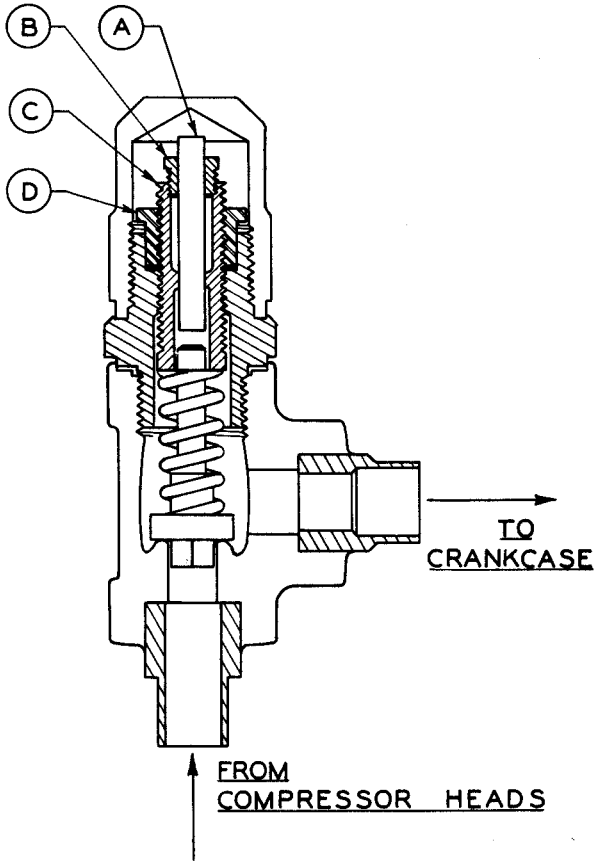
WAUKESHA MOTOR CO. WAUKESHA, WIS.	TITLE—WIRING CONNECTIONS IN CONTROL BOX	DRW E C CH J-6-51 APP	A FILE	SK 266

S.10—P.12



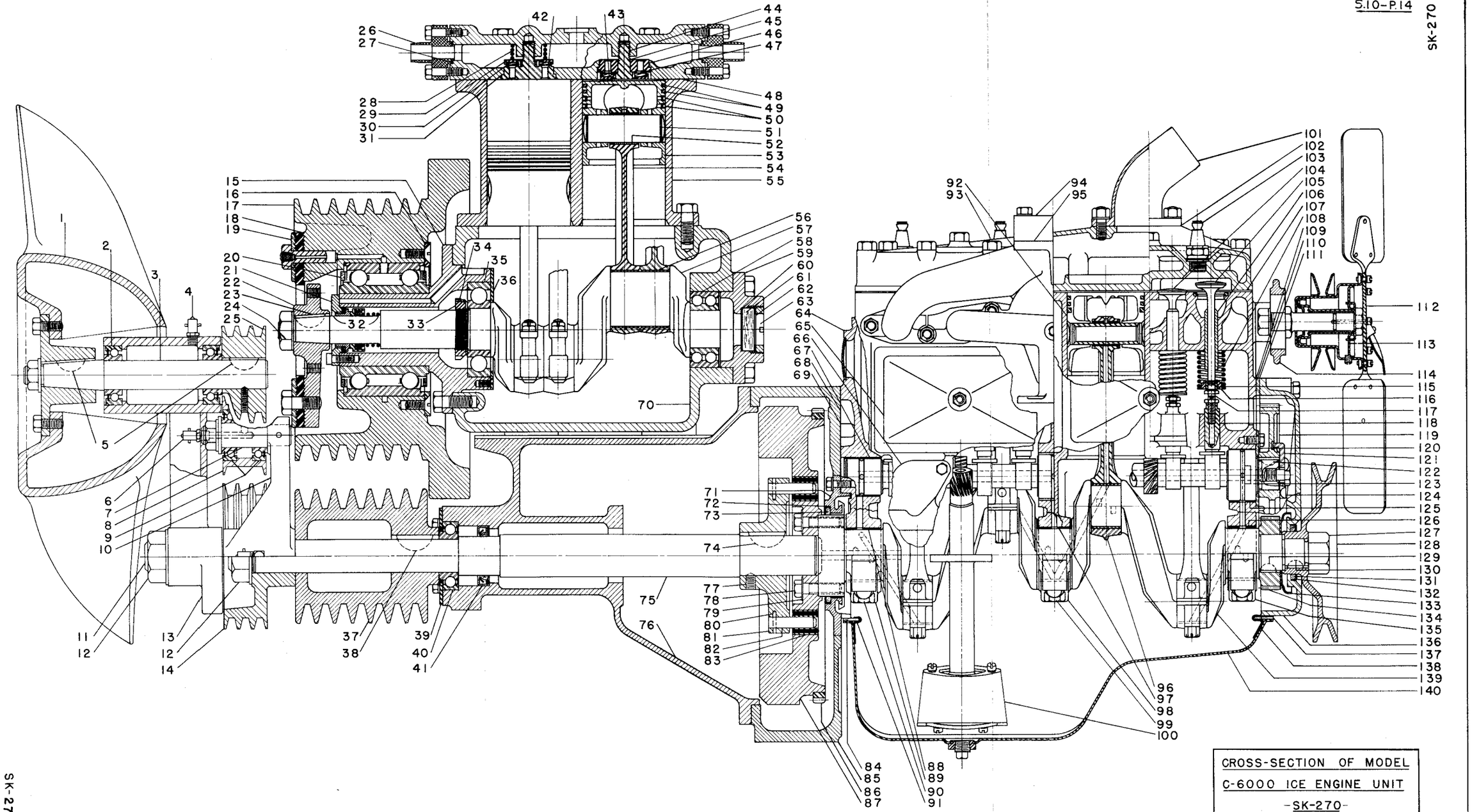
MODULATED-SPEED CURVES

WAUKESHA MOTOR CO. WAUKESHA. WIS.	TITLE— MODULATED CONTROL CURVES	DR. W.E.C CH. 3-7-39 APP.	A FILE	SK 267



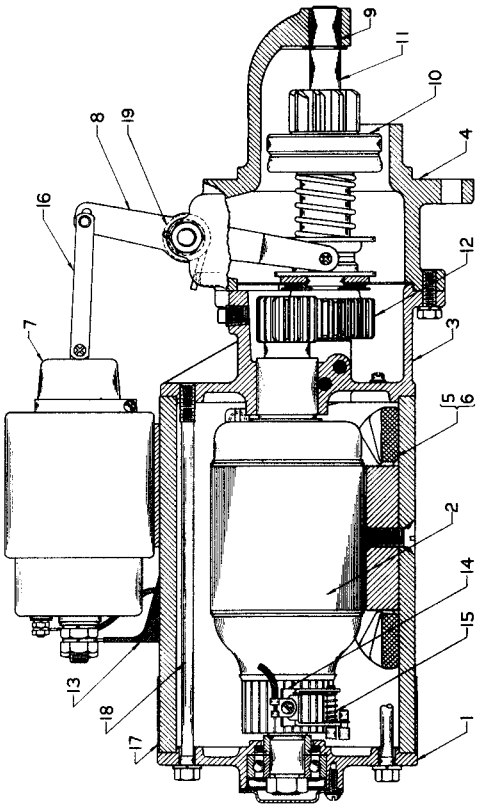
HIGH PRESSURE RELIEF VALVE

WAUKESHA MOTOR CO. WAUKESHA. WIS.	TITLE-HIGH PRESSURE RELIEF VALVE	DR. R.A.M. CH. 3-9-37 APP.	A FILE	SK 268



CROSS-SECTION OF MODEL
C-6000 ICE ENGINE UNIT
-SK-270-

S.10-P.15



STARTING MOTOR

WAUKESHA MOTOR CO. WAUKESHA. WIS.	TITLE— 32 VOLT	DR. 3-10-37 CH. APP.	A FILE	SK 271	

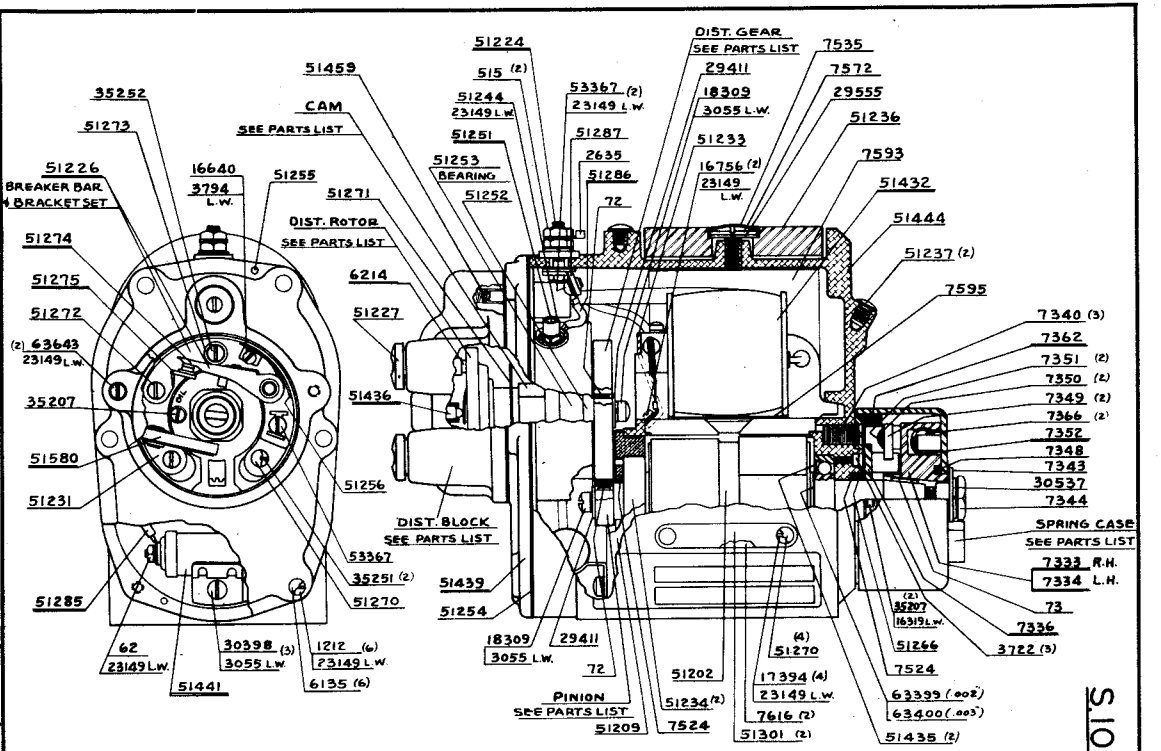
WAUKESHA MOTOR CO.
WAUKESHA, WIS.

TITLE— MAGNETO

DR 3-10-37
CH.
APP.

A
FILE

SK 272



EDISON-SPLITDORF MAGNETO

S.10-P.16

OPERATION The Ensign 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.

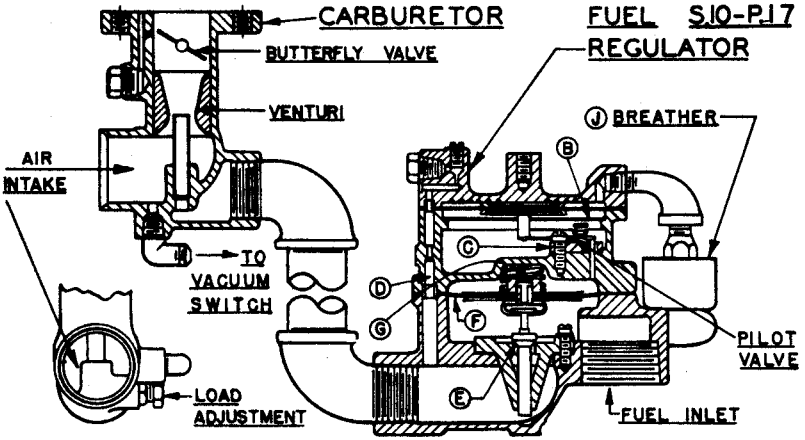
The regulator operates as follows: "B" is the pilot diaphragm and operates a pilot valve "C". "F" is the main diaphragm and operates the main valve "E". Pressure of the gas supply is connected directly under "F", and is also connected above "F" by the restricted passage "G". Suction from the carburetor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

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.

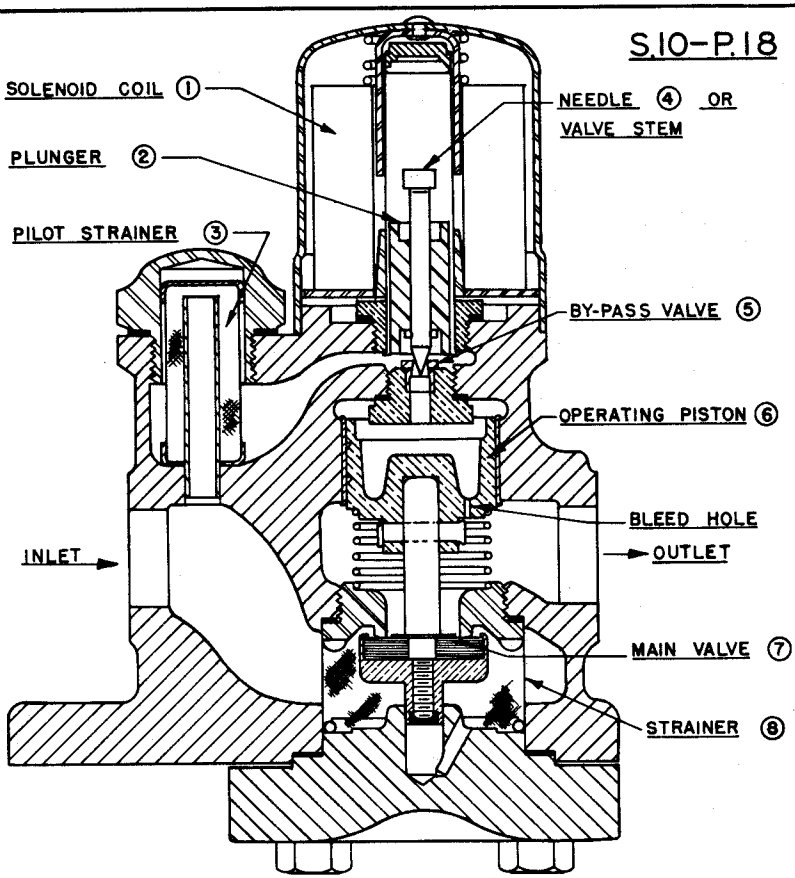
The load adjustment on the carburetor screws in (clockwise) for leaner mixture and out (counter-clockwise) for richer mixture. For the initial start of engine set the load screw as shown in the table for the type of fuel being used.

Fuel		No. Turns Open
BUTANE	(3200 BTU/ cu. ft.)	3/4 to 1
PROPANE	(2300 BTU/ cu. ft.)	1-1/2 to 1-3/4
NAT. GAS	(1100 BTU/ cu. ft.)	2-1/4 to 2-1/2
MFG. GAS	(525 BTU/ cu. ft.)	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 the best performance and minimum fuel economy.



WAUKESHA MOTOR CO. WAUKESHA, WIS.	TITLE—"ENSIGN" GAS CARBURETOR AND FUEL REGULATOR FOR ICE ENGINE	DR RAM CH JJJ APP.	A FILE	SK 275



OPERATION - The operation of the Model 70-N solenoid valve is based upon the by-pass principle, for the main valve is opened by the pressure difference between the refrigerant above and below the operating piston. The solenoid is used only to open the small by-pass with consequent low power consumption. When the solenoid is energized, the plunger is pulled upward a short distance and gains momentum before raising the valve stem. When the by-pass is thus opened, it allows the refrigerant to pass into the chamber above the piston. This piston is connected directly to the main valve. The area of the piston is greater than the area of the main valve and the piston is therefore forced downward, automatically opening the main valve. When the solenoid is de-energized the needle comes down closing the by-pass valve. Since the main valve is held open against the coil spring it now returns to the closed position. The valve closes with the flow of the liquid forming a tight seal. Any refrigerant remaining above the piston bleeds out through a small hole in the piston to the discharge side.

WAUKESHA MOTOR CO. WAUKESHA, WIS.	TITLE— MODEL 70-N SOLENOID VALVE	DRRAM CH 3-18-37 APP.	A FILE	SK 276

SERVICE PARTS LIST

FOR MODEL "C" 1937 WAUKESHA ICE ENGINE

RAILWAY TYPE

ORDERING INSTRUCTIONS

When ordering service parts always give the following information:

1. Model and number of Ice Engine. (On name plate in control box)
2. Part number, quantity required and description of part.
3. To insure prompt service address your order to:

   Waukesha Motor Company
   Refrigeration Division
   Waukesha, Wisconsin

NOTE:

Reference numbers 1 - 200 refer to SK-270
Reference numbers 200 - 400 refer to Figs. 1 and 2
Reference numbers 400 - 500 refer to Fig. 3
Reference numbers 500 - 600 refer to Fig. 4

Reference numbers 1 - 400 refer to the Ice Engine Unit
Reference numbers 400 - 500 refer to the Sub-Cooler
Reference numbers 500 - 600 refer to the Fuel System

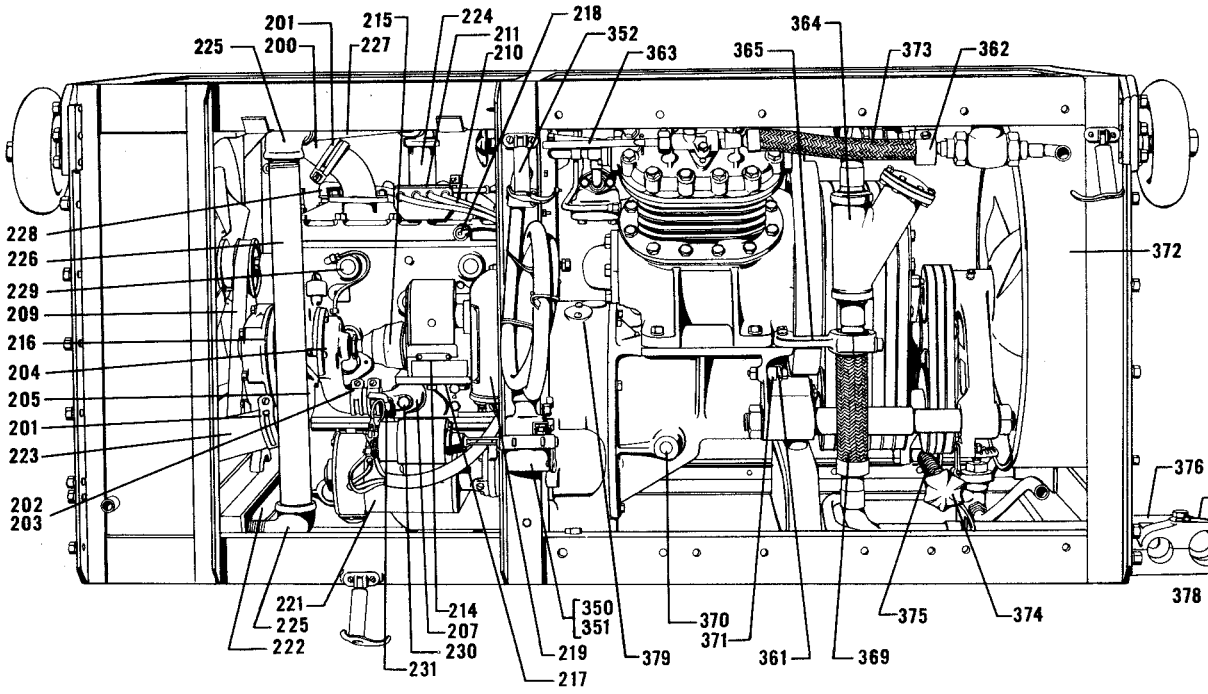


FIG. 1
REAR VIEW OF ICE ENGINE UNIT

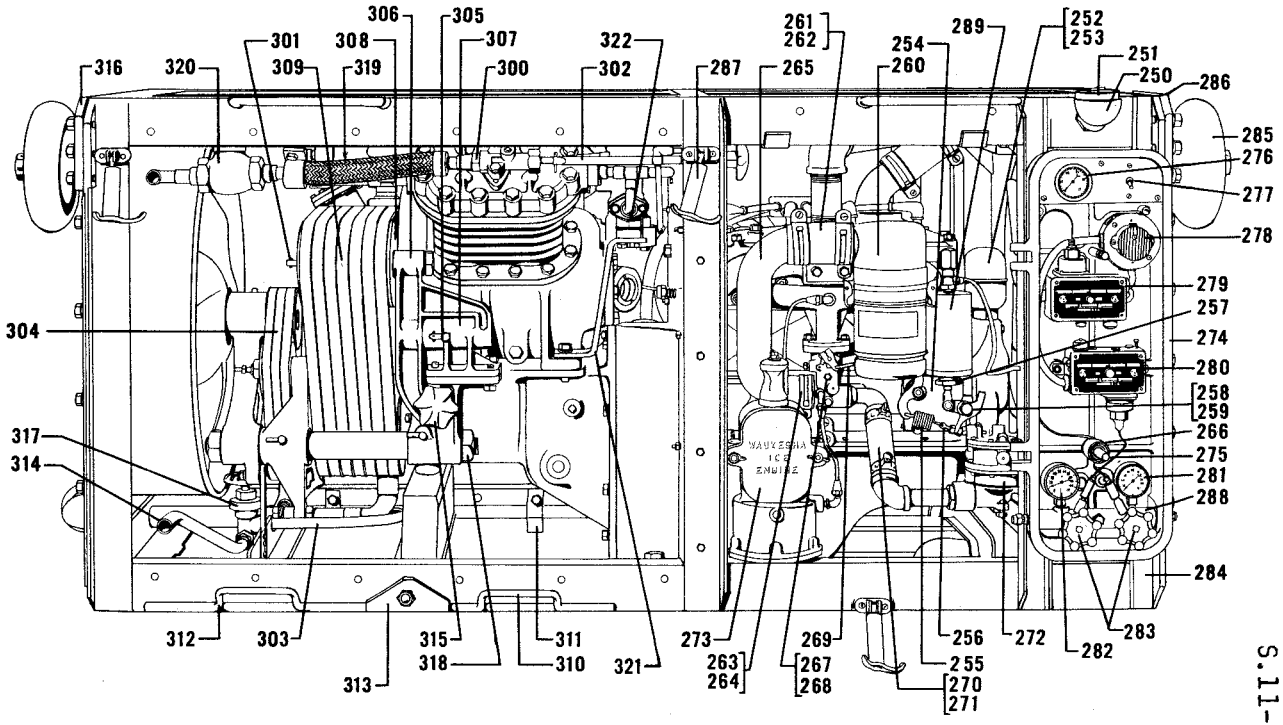


FIG. 2
FRONT VIEW OF ICE ENGINE UNIT

S.11-P.4

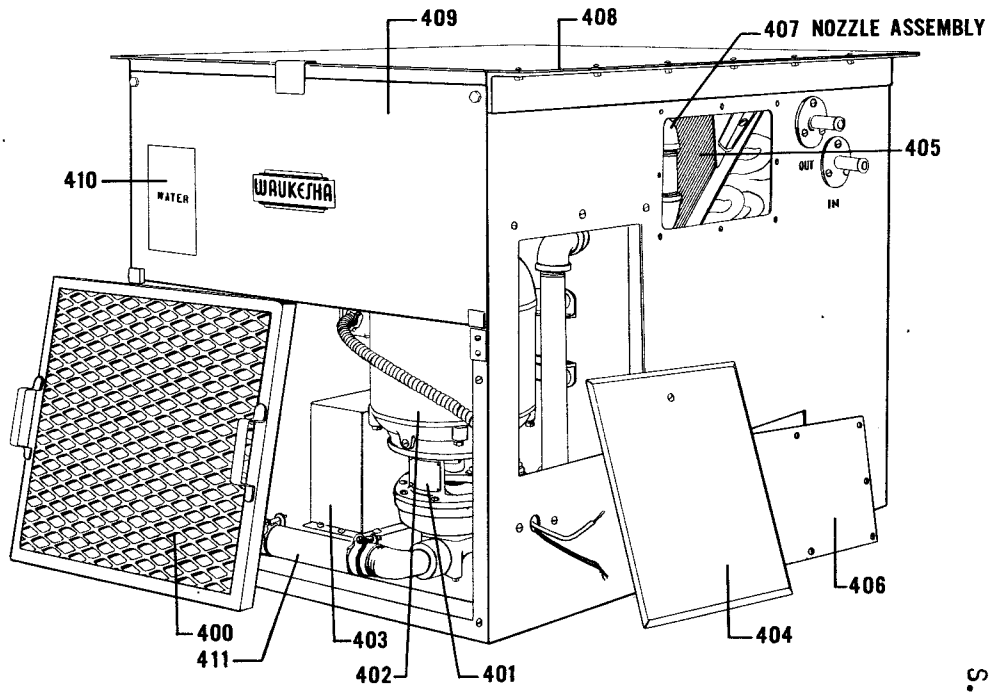


FIG. 3
SUB-COOLER

S.11-P.5

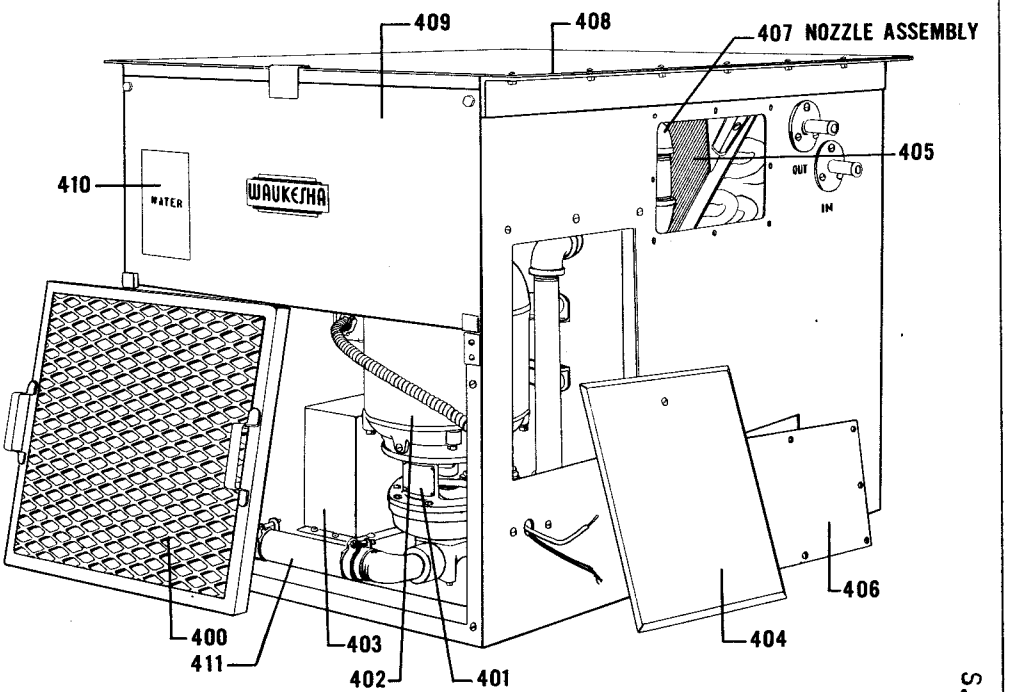


FIG. 3
SUB-COOLER

S.11-P.5

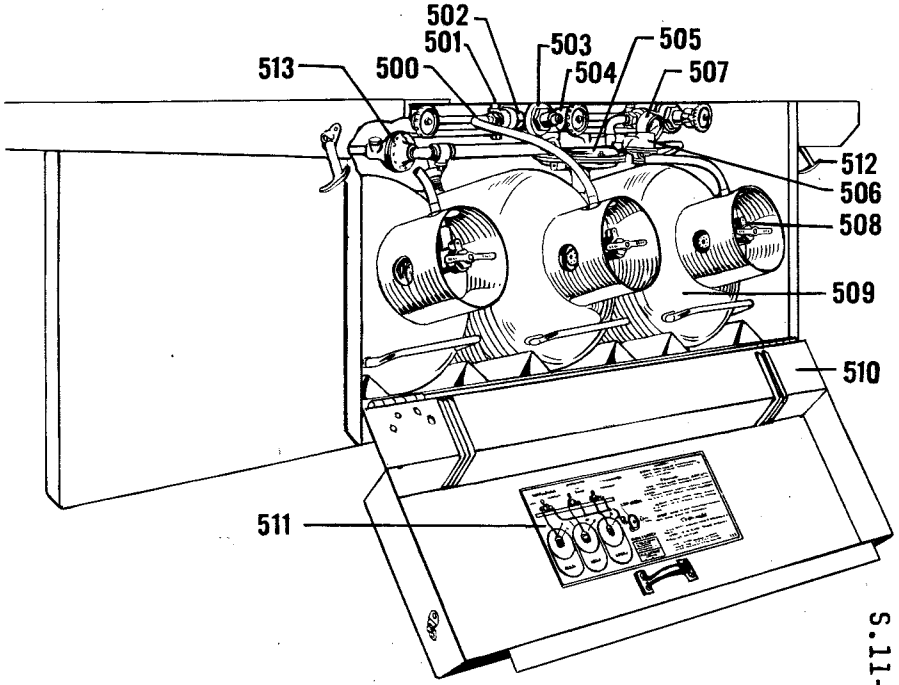


FIG. 4
FUEL SYSTEM

S.11-P.5A

ICE ENGINE UNIT

REFERENCE NUMBER	PART NO.	REQUIRED	NAME
1	Y-6392	1	Axial Flow Fan
		1	Hex Jam Nut 3/4-10 Cad. Pl.
		1	Shakeproof Lock Washer #1132 Cad. Pl.
2	Y-6406	2	N. D. Seal Ball Bearing #8506
3	Y-6397	1	Condenser Fan Shaft
4	B-6461	1	Alemite Fitting Straight
5		2	#16 Woodruff Keys
6	B-7659	1	Alemite Fitting 45°
7	Y-6400	1	Condenser Fan Idler Shaft
	Y-6498	1	3/4 Special Hex Nut Cad.Pl.
	B-6054	1	Groov Pin
		1	3/4 Wrought Washer Cad. Pl.
		1	Shakeproof Lock Washer #1132 Cad. Pl.
8	Y-6396	1	Condenser Fan Idler Pulley
9	Y-6040	2	N. D. Seal Ball Bearing #8505
10	Y-6412	1	Condenser Fan Idler Arm
	Y-6378	1	Alemite Fitting 90°
11	Y-6393	2	Idler Arm Shaft
12	Y-6128	4	Hex Jam Nut Cad. Pl.
		4	Shakeproof Lock Washer #1240 Cad. Pl.
13	Y-6216-A	1	Condenser Fan Support
14	Y-6395	1	Condenser Fan Drive Pulley
15	3W2177	1	Frame Front Cover
	3W2191	1	Frame Front Cover Gasket
16	3W2200	1	Pulley Bearing Plate
	3W3889	1	Pulley Bearing Plate Gasket
		4	Flat Hd. Machine Screw 3/8 x 1/2 lg.
17	3R1602	1	Compressor "V" Belt Pulley
		8	Small Head Cap Screws 1/2 x 1" lg.
18	3W2182	1	Coupling Disc
19	3W2198	6	Coupling Clamping Washer
		5	Coupling Disc Cap Screws Small Head 1/2 x 1" lg.
	3W3856	1	Wheel Bearing Lubricating
		1	Cap Screw 1/2 x 1" lg.
		1	1/8 Pipe Plug
20	X22T7	1	Compressor Pulley Bearing
21	3W2184	1	Crankshaft End Seal Plate
	3W2193	1	End Seal Plate Gasket
		6	End Seal Plate Cap Screw 5/16 x 3/4 lg.
22	3W2178	1	Compressor Coupling Hub
23		1	Crankshaft Key 5/16 sq. x 1-1/4 lg.
24	3W2197	1	Crankshaft Nut
		1	Crankshaft Nut Lock Washer 3/4

REFERENCE NUMBER	PART NO.	REQUIRED	NAME
25	Y-6394	1	Condenser Fan Pulley Driven
		2	Allen Set Screw 1/4-20 x 1/2 lg. Cup Pt.
26	3W3884	3	Cyl. Head Tube Flange (5/8)
	3W3900	1	Cyl. Head Tube Flange (3/8)
27	Y-6497	4	Tube Flange Gasket
		8	Tube Flange Cap Screw 5/16 x 1 lg.
28	PP431	4	Discharge Valve Assembly Spring
	17K-2-F	4	Complete Discharge Valve Assembly
29	3W2188	4	Discharge Valve Stop Plate
30	17K3	4	Discharge Valve Plate
31	3W2187	4	Discharge Valve Seat
32	3W2181	1	Crankshaft End Seal
33	X22T3N	1	Ball Bearing Lock Nut
34	X22T3W	1	Ball Bearing Lock Washer
35	X22T3	1	Crankshaft Ball Bearing (Single Row)
36	3W1429	1	Ball Bearing Clamp Plate
		4	Clamp Plate Mach. Screw 1/4 x 1/2 lg.
37	Y-7024	1	Compressor Drive Pulley
38		2	#G - Woodruff Key
39	Y-7023	1	Ball Bearing Retainer
		4	Hex Cap Screws 5/16 x 1/2 Cad. Pl.
		4	Lock Washers 5/16 Cad.Pl.
	Y-6378	1	Alemite Fitting 90°
40	Y-6041	1	N. D. Seal Ball Bearing #8507
41	Y-6038	1	Grease Seal
42	17K9	8	Discharge Valve Spring
	17K-1-F	4	Complete Inlet Valve Assembly
43	17K8	4	Inlet Valve Spring
44	3W2186	4	Inlet Valve Stop Plate
45	3W3855	8	Valve Stop Plate Washer
46	3W2185	4	Inlet Valve Seat
47	17K3	4	Inlet Valve Plate
	X1026T28	8	Valve Seat Washer
	3W2196	8	Valve Locking Pin
	PP430	8	Valve Locking Pin Spring
48	3H1611	2	Cylinder Head
	3W2189	2	Cylinder Head Gasket
		24	Cylinder Head Cap Screw 1/2 x 2-1/2 lg.
49	5A106	8	Piston Ring - Compression
50	5A107	8	Piston Ring - Oil Wiper
51	3W1423	4	Piston Pin
52	3W1422	4	Connecting Rod Bushing (Upper)

REFERENCE NUMBER	PART NO.	REQUIRED	NAME
53	3R763	4	Piston
54	3R768	4	Connecting Rod
55	3H1610	2	Cylinder
	3W2190	2	Cylinder to Frame Gasket
		24	Cylinder to Frame Cap Screws Small heads 1/2 x 1" lg.
	32-60	1	Breather Copper Sponge
	3W2235	2	Breather Sponge Clamp
		2	Soft Steel Wire 1/16 x 10" lg.
		2	Button Head Screw 1/4 x 3/8 lg.
56	3W1421	8	Connecting Rod Bearing (Lower)
		8	Connecting Rod Bolts and Nuts 3/8 x 2-1/4 lg.
57	3R767	1	Crankshaft
58	X22T4	1	Crankshaft Ball Bearing - (Double Row)
59	3W2174	1	Frame Rear Cover
	3W2192	1	Frame Rear Cover Gasket
		6	Cap Screws - Small Head 1/2 x 1"
60	3W2238	2	Oil Sight Glass Gasket
61	3W2237	1	Oil Sight Glass
62	3W2239	1	Oil Sight Glass Washer
63	3W2236	1	Oil Sight Glass Nut
64	68320-H	1	Crankcase
		2	Pipe Plugs 1/2 ctsk.
	B-6417	1	Expansion Plug
65	BD-195	2	Valve Cover
	BD-196	2	Valve Cover Gaskets
	BD-194	2	Valve Cover Studs
		2	Hex Nuts 3/8-24
	BD-190	2	Valve Cover Stud Gasket
66	B-3527	1	Fuel Pump Pad Cover
	B-3605	1	Fuel Pump Pad Cover Gasket
		2	Cap Screws 5/16-18 x 5/8 lg.
		2	Lock Washer 5/16
67	68053	1	Camshaft Bushing (Rear)
	68050	1	Camshaft Bushing (Center)
68	Y-6087-B	1	Partition Sheet (Bottom Half)
	Y-6326-A	1	Partition Sheet (Top Half)
69	BD-27	1	Flywheel Housing Gasket
70	3H1609	1	Compressor Frame
	Y-6497	1	Tube Flange Gasket
	3W3884	1	Crankcase Tube Flange
		2	Cap Screw - Small Head - 5/16 x 1 lg.
		1	1/4 Pipe Plug

REFERENCE NUMBER	PART NO.	REQUIRED	NAME
	Y-6388	1	3/8 Hex Head Pipe Plug
71	BD-364-A	1	Main Bearing Closure Plate
	BD-368-A	1	Main Bearing Closure Plate Gasket
		3	Cap Screws 5/16-18 x 3/4 lg.
		3	Lock Washer 5/16
72	BD-367	1	Crankshaft Oil Seal Cup
73	BD-366	1	Crankshaft Oil Seal (Rear)
	BD-365-A	1	Crankshaft Oil Wick
	BD-13	1	Oil Thrower (Rear)
74		1	#G Woodruff Key
75	Y-6377	1	Compressor Drive Shaft
	Y-6128	1	Hex Jam Nut
76	Y-7016	1	Compressor Outboard Bearing Support
	B-336	1	Idler Arm Stop Pin
		8	Hex Cap Screws 3/8-16 x 1# lg. Cad. Pl.
		8	L. W. 3/8 Cad. Pl.
	Y-6379	1	Hex hd. Drain Plug 3/8 pipe thd.
77		1	Allen Set Screw 3/8-16 x 1" lg. Cup point
78	B-9837	4	Cap Screws
79	BD-21	2	Cap Screw Lock
80	B-5456	6	Groov Pins 1/8 x 7/8 lg.
81	Y-6032-A	1	Coupling Hub
82	Y-6376	6	Drive Pin
83	28014	6	Drive Bushings
84	BD-193	1	Oil Pan Gasket (Rear)
85	BE-802-E	1	Flywheel Housing
	B-9512	4	Cap Screws 1/2-13 x 1-1/4 lg.
	B-9511	2	Cap Screws
		6	Shakeproof Lock Washer#1124
86	B-6439-B	1	Ring Gear
87	68013	1	Flywheel
88	68121-A	2	Main Bearing Bushing (Rear)
89	68047	1	Main Bearing Cap (Rear)
	B-10293-A	2	Main Bearing Shim (Rear)
	B-1842	2	Dowel Pin
90	BD-5-B	2	Main Bearing Cap Screw
	BD-7	1	Main Bearing Cap Screw Lock
91	BD-584	3	Cork Retaining Clip (Rear)
92	68204	4	Pistons
	68006	4	Piston Pins
	37030	8	Piston Pin Retaining Ring
	37205	4	Piston Ring (Compression)
	37405	4	Piston Ring (70)
	23505	4	Piston Ring (85)
93	68502-B	1	Cylinder Head

REFERENCE NUMBER	PART NO.	REQUIRED	NAME
94	BE-800	1	Exhaust Manifold Flange
	BE-801	1	Exhaust Manifold Flange Gasket
	Y-6336	4	Cap Screws 3/8-16 x 1-1/2 lg.
95	BD-115-A	1	Combination Manifold
	BD-127	2	Intake and Exhaust Manifold Gasket
	BD-120	6	Combination Manifold Studs
		6	Hex Nuts 3/8-24
	B-221	2	Manifold Stud Washer
96	0068007	4	Connecting Rod Assembly
	68007	4	Connecting Rod
	37008	4	Piston Pin Bushings
	BD-23-A	8	Connecting Rod Bolts
	BD-24	8	Castle Nuts
	B-10337-A	8	Shims
		8	Cotter Pins 3/32 x 3/4
	68010-A	8	Connecting Rod Bearings
97	68118-A	2	Main Bearing Bushing (Center)
98	68049-A	1	Main Bearing Cap (Center)
	B-10292-A	2	Main Bearing Shims (Center)
99	BD-5-B	2	Main Bearing Cap Screws
	BD-7	1	Main Bearing Cap Screw Lock
		2	Main Bearing Dowel Pins
100	068180	1	Oil Pump Assembly
	68180	1	Body
	BD-358	1	Cover
	BD-359	1	Gasket
	37085	1	Gear (Driven)
	37081-A	1	Gear (Driven)
	37083	1	Shaft (Idler)
	68084	1	Shaft (Drive)
	98051	1	Gear
	B-997	1	Pin
		1	Woodruff Key #2
		4	Fil. Head Mach. Screw 1/4 x 1/2 lg.
		4	Lock Washers 1/4
	B-9420	1	Snap Ring
		2	Cap Screws 5/16-18 x 3/4 lg.
		2	Lock Washers 5/16
	BD-360	1	Oil Pump Baffle
	BD-361	1	Oil Pump Baffle Gasket
	B-9612	3	Fil. Hd. Mach. Screw
		3	Lock Washers 3/16
	BD-355	1	Oil Pump Screen
	B-356	2	Oil Pump Screen Wire
101	BE-437-A	1	Top Water Manifold
102	BE-433	1	Water Outlet Flange Gasket

REFERENCE NUMBER	PART NO.	REQUIRED	NAME
	B-291	2	Studs
		2	Hex Nuts 3/8-24
		2	Lock Washer 3/8
103	B-3655	4	Spark Plugs
104	68036-A	4	Valve (Intake)
105	68136	4	Valve (Exhaust)
	75923	4	Valve Insert (Exhaust)
106	68009	8	Valve Guide
107	68000-C	1	Cylinder Head Gasket
108	68035-A	8	Valve Springs
109	BD-78-A	1	Timing Gear Plate Gasket
110	BE-803	1	Timing Gear Plate
		3	Cap Screws 3/8-16 x 5/8 lg.
		3	Shakeproof Lock Washer #1220
		5	Cap Screw 3/8-16 x 2 (gear cover to plate)
		5	Lock Washers 3/8
	B-565	2	Dowel Pins
111	BE-806	1	Gear Cover Gasket
112	1881-LD	1	Fan Blade Assembly
113	1881-D	1	Fan Hub Assembly
114	Y-6027	1	Fan Bracket
		3	Cap Screws 3/8-16 x 1-3/4 lg.
		3	Lock Washers 3/8
		1	Hex Nut 5/8-18
		1	Plain Washer 5/8
115	B-9792	6	Valve Spring Tapers
116	B-9793	8	Valve Spring Retainer
117	BC-70	8	Valve Tappet Adj. Screw
118	BD-56-A	8	Valve Tappets
		8	Half Nuts 5/16-24
119	BD-80-A	1	Camshaft Gear
120	BD-85	1	Camshaft Thrust Plate
		2	Cap Screws 5/16-18 x 5/8
	BD-86	1	Camshaft Thrust Plate Lock
121	BD-779-A	1	Camshaft Lock Plate
122		1	Hi-pro Key 606
123	68123	1	Camshaft
124	B-780-A	1	Camshaft Screw Lock
	B-1231	1	Camshaft Lock Screw
125	68027	1	Camshaft Bushing (Front)
126	68122-A	2	Main Bearing Bushing (Front)
127	B-7174	1	Fan Pulley Nut
		1	Shakeproof Lock Washer #1136
128	BE-815-C	1	Fan Pulley
129		1	Woodruff Key #9
130		1	Woodruff Key #9
131	BD-87	1	Gear Cover Oil Seal
132	BC-82	1	Gear Cover Oil Seal Cup
133	B-733-A	1	Crankshaft Oil Thrower

REFERENCE NUMBER	PART NO.	REQUIRED	NAME
	B-9824	2	Dowel Pins
	63099	2	Drive Screws
134	68012	1	Crankshaft Gear
135	68046	1	Main Bearing Cap (Front)
	B-10291-A	2	Main Bearing Shims (Front)
	BD-5-B	2	Main Bearing Cap Screws
	BD-7	1	Main Bearing Cap Screw Lock
136	BE-805-L	1	Gear Cover
137	B-193	1	Oil Pan Gasket (Front)
138	BD-583	3	Cork Retaining Clip (Front)
	BD-191	1	Oil Pan Gasket (Right)
	BD-192	1	Oil Pan Gasket (Left)
139	BD-14-B	1	Crankshaft
140	BD-357	1	Oil Pan
		18	Cap Screws 5/16-18 x 3/4
		18	Lock Washers 5/16
		1	Pipe Plug 3/8

REFERENCE NUMBER	PART NO.	REQUIRED	NAME
200	Y-6174	1	Radiator Hose (Top)
201	B-1862	4	Hose Clamps
		2	Hex Hd. Cap Screw 5/16-18 x 1-1/2 Cad. Pl.
202	1944	1	Water Pump Hose
203	1965	2	Water Pump Hose Clamps
204	068160-A	1	Water Pump Assembly
	68160-A	1	Water Pump Body
	68061-A	1	Cover
	B-7718-A	1	Gasket
	B-7717	1	Packing Nut
	B-7721	1	Packing Nut
	B-7716	4	Packing
	B-3593	2	Packing Washer
	B-7715	1	Bushing
	B-6840	1	Pin
	B-1883	2	Dowels
	B-5330	1	Oil Seal Cup
	B-5331	1	Oil Seal
	B-7730	1	Bushing
	B-6202	1	Pin
	BD-97-B	1	Magneto Gear
	BD-98	1	Magneto Gear Lock
	BD-90	1	Magneto Gear Lock Nut
		1	#3 Woodruff Key
	68056	1	Water Pump Shaft
		1	#8 Woodruff Key
	68163	1	Vane
		1	#3 x 1-1/2 Taper Pin
		4	Fil. Hd. Cap Screw 5/16-18 x 5/8 lg.
205	Y-6129	1	Water Pump Inlet Elbow (to Radiator)
	B-2692	1	Water Pump Inlet Elbow Gasket
		2	Cap Screws 3/8-16 x 1" lg.
		2	Lock Washers 3/8
207	B-7720-A	1	Water Pump Inlet Elbow
	BD-197-A	1	Water Pump Inlet Elbow Gasket
		1	1/4 Pipe Plug (Slotted head)
	B-403	1	Elbow Fitting (In Case)
	B-404	1	Straight Fitting (In Pump)
		1	1/4 O.D. Copper Tubing 3-1/2 lg.
	B-577	1	Grease Cup
209	Y-6036-A	1	Engine Fan Belt
210	B-10777	1	Magneto Cable (Set)
211	B-1365	2	Magneto Cable Support Bracket
	B-10454	4	Magneto Support Cable Block
	B-1362	2	Cable Support Clamp

REFERENCE NUMBER	PART NO.	REQUIRED	NAME
		4	Cap Screw 1/4-28 x 1" lg.
		4	Hex Nuts 1/4-28
		4	Lock Washers 1/4
214	Y-6179	1	Magneto - Complete
			MAGNETO HOUSING PARTS
	51444	1	Housing Only
	51301	2	Timing Slot Covers
	7616	2	Timing Slot Cover Gaskets
	17394	4	Timing Slot Cover Screws
	23149	4	Lock Washers for 17394
	51270	4	Seal for 17394
	7524	2	Felt Washers (rear bearing)
	51266	1	Felt Retaining Cap
	51237	2	Oil Hole Plug
	3722	3	Rear Bearing Removal Hole Plug Screw
	51224	1	Ground Terminal Group Complete
	51287	1	Ground Terminal Connector Plate
	53367	2	Ground Terminal Connector Plate Screws
	23149	2	Lock Washers for 53367
	515	2	Ground Terminal Hex Nut
	3055	1	Lock Washer for 515
	2635	1	Ground Terminal Lug
	51439	1	Front Cover with Gasket & Dowel Pins
	51254	1	Front Cover Gasket
	51255	2	Front Cover Dowel Pin
	1212	6	Front Cover Screws
	23149	6	Lock Washer for 1212
	6135	6	Seal for 1212
	35207	1	Distributor Bearing Oil Hole Screw
			MAGNETO DISTRIBUTOR PARTS
	51454	1	Distributor Block Complete
	6214	4	Dist. Block Carbon Brush & Spring
	51459	1	Dist. Block H. T. Coil Spring
	51267	1	Distributor Block Gasket
	51227	4	Distributor Block Thumb Nut
	63643	2	Distributor Block Attaching Screws
	23149	2	Lock Washers for 63643
	51436	1	Distributor Block Center Brush & Cap
	51218	1	Distributor Disc Complete
	51230	1	Distributor Gear
	51252	1	Distributor Gear Spacing Washer
	51253	1	Distributor Shaft Ball Bearing

REFERENCE NUMBER	PART NO.	REQUIRED	NAME
	72	1	Distributor Shaft Key
	29411	1	Distributor Shaft Plain Washer
	18309	1	Distributor Shaft Screw
	3055	1	Lock Washer for 18309
	51271	1	Safety Gap Disc
	51336	1	Cam
			MAGNETO CIRCUIT BREAKER PARTS
	51251	1	Breaker Terminal Group
	51244	1	Breaker Terminal Slotted Nut
	23149	1	Lockwasher for 51244
	51231	1	Breaker Base Plate
	35251	2	Breaker Base Plate Screws (bottom)
	51226	1	Breaker Bar & Fixed Contact Set
	51274	1	Breaker Bar
	16640	1	Breaker Bar Spring Screw
	3794	1	Lock Washer for 16640
	51275	1	Contact Bracket with Contact
	51272	1	Contact Bracket Pivot Screw (shouldered)
	53367	1	Contact Bracket Holding Screw (short)
	35252	1	Contact Bracket Holding Screw (long - top)
	51273	1	Lock Washer for 35252
	51286	1	Primary Lead Assembly
	51256	1	Breaker Stud Insulator
			MAGNETO COIL & CONDENSER PARTS
	51432	1	H. T. Coil Complete
	51233	1	Coil Clamp
	16756	2	Coil Clamp Screws
	23149	1	Lock Washer for 16756
	7593	1	Coil Top Insulator
	7595	1	Coil Bottom Insulator
	51441	1	Condenser Assembly
	51285	1	Condenser Lead Assembly
	62	1	Condenser Nut
	23149	1	Lockwasher for #62
			MAGNETO ROTOR & MAIN BEARING PARTS
	51202	1	Rotor
	73	1	Drive Key
	51234	2	Ball Bearing Complete
	51435	2	Bearing Grease Sealing Ring
	63399	1	Shims .002" (approx.)
	63400	1	Shims .003" (approx.)
	51209	1	Front Bearing Plate Only

REFERENCE NUMBER	PART NO.	REQUIRED	NAME
	30398	3	Front Bearing Plate Screws
	3055	3	Lock Washers for 30398
	7524	1	Front Bearing Felt Washer
			MAGNETO PINION GEAR PARTS
	51229	1	Pinion Gear
	72	1	Pinion Gear Key
	18309	1	Pinion Gear Screw
	29411	1	Pinion Gear Plain Washer
	3055	1	Lock Washer for 18309
			MAGNETO MAGNET PARTS
	51236	1	Magnet Only
	7572	1	Magnet Screw
	29555	1	Lock Washer for 7572
	7535	1	Magnet Seal
			MAGNETO IMPULSE STARTER PARTS
	7381	1	Complete Starter R.H. 15 deg. lag angle
	7386	1	Rotating Unit Assembly Complete
	7370	1	Drive Member, Spring Case Only
	7333	1	Magneto Member Assembly
	7323	1	Stop Pin Plate & Attaching Screws
	7340	3	Stop Pin Plate Attaching Screws
	7362	1	Felt Seal Holder & Seal with Attaching Screws
	35207	2	Felt Seal Holder Screws
	16319	2	Lockwashers for 35207
	7352	1	Spring Assembly with Felt & Stop Pins
	7366	2	Spring Stop Pins
	7349	2	Stop Lever
	7350	2	Stop Lever Metal Washer
	7351	2	Stop Lever Snap Rings
	7348	1	Magneto Member Bearing Felt
	7343	1	Notched Washer
	30537	1	Shaft Lock Washer
	7344	1	Shaft Nut
215	Y-6409	1	Magneto Coupling Cover
216	BD-89-A	1	Water Pump Mounting Gasket
217	68267	1	Magneto Bracket
		4	Cap Screws 3/8-16 x 1-1/4 lg.
		4	Lock Washer 3/8
		2	Taper Pins #4 x 3/4 lg.
		2	Cap Screws 3/8-16 x 7/8 lg. (Magneto to Bracket)
		2	Lock Washers 3/8 (Magneto to Bracket)
218	B-9220	1	Heat Switch
	Y-6369	1	Heat Switch Extension

REFERENCE NUMBER	PART NO.	REQUIRED	NAME
219	90055	1	Oil Filter
		1	Oil Filter Cartridge
		4	Cap Screws 3/8-16 x 1-1/4 lg. Cad. Pl.
		4	Hex Nuts 3/8-16 Cad. Pl.
		4	Lock Washers 3/8 Cad. Pl.
221	BE-269	1	Starter Spacer
		3	Hex Cap Screws 3/8-16 x 2-1/2 lg.
		3	Lock Washers 3/8
	Y-6334-A	1	32-Volt Starting Motor
	DR-1865638	1	Commutator End Frame
	DR-901203	1	Ball Bearing (C.E.)
	DR-1871689	2	Armature
	DR-1865634	1	Gear Housing
	DR-1865625	1	Drive Housing Assembly
	DR-1871686	1	Field Coil (R.H.)
	DR-1871687	1	Field Coil (L.H.)
	DR-1871645	1	Solenoid Switch
	DR-1853346	1	Plunger Boot
	DR-1853344	1	Plunger Boot Clamp
	DR-115315	1	Plunger Boot Clamp Screw
	DR-143179	1	Plunger Boot Clamp Scr.Nut
	DR-1854734	1	Shift Lever
	DR-1862383	1	Bushing (Drive Housing)
	DR-37870	1	Overrunning Clutch
	DR-1865633	1	Motor Drive Shaft
	DR-1837052	1	Reduction Gear
	DR-1865646	1	Lead Assembly (Solenoid to Motor Term
	DR-1864716	2	Brush
	DR-812016	2	Brush Holder Hinge Pin and Insulation
	DR-812015	2	Brush Holder Stop Pin and Insulation
	DR-809642	2	Brush Holder
	DR-813521	1	Brush Spring (R.H.)
	DR-1865641	1	Brush Spring (L.H.)
	DR-1854737	1	Shift Lever Linkage
	DR-16957	2	Cover Band (Cork lined - 1/2 Band)
	DR-107728	2	Cover Band Screw
	DR-809763	2	Thru Bolt
	DR-141553	2	Thru Bolt Lock Washer
	DR-1845936	1	Shift Lever Spring
	DR-1845935	1	Shift Lever Stud
	DR-805258	1	Shift Lever Stud Nut
	DR-142248	1	Shift Lever Stud Lock Washer
222	Y-6118	1	Muffler
		4	Cap Screws 3/8-16 x 3/4 lg.
		4	Lock Washer 3/8
223	Y-6175	1	Bottom Water Hose

REFERENCE NUMBER	PART NO.	REQUIRED	NAME
224	Y-6238	1	Exhaust Pipe Nipple (Short)
225	Y-6235	2	Elbows
	Y-6234	1	Street Elbow
226	Y-6236-A	1	Exhaust Pipe Nipple (Long)
227	Y-6237-A	1	Exhaust Pipe Nipple (Center)
228	B-8963	4	Rajah Safety Nipple
229	B-4171	6	Expansion Plugs
230	B-7722	1	Water Inlet Elbow Screw
231	B-5911	1	Drain Plug
250	Y-6979-B	1	Radiator Filler Cap Body
251	Y-6078	1	Radiator Filler Cap
	0Y-6017-C	1	Radiator
252	B-9037	1	Breather Cap
253	024170-C	1	Breather Pipe
254	K-341	1	Governor Assembly
	B-6114-E	1	Governor Housing
	BE-809	1	Governor Housing Gasket
	B-6115-C	1	Governor Housing Cover
	B-6117	1	Governor Housing Cover Gasket
	B-6145	1	Governor Shaft
	B-6146	2	Ball Bearings
	B-6090	1	Thrust Ball Bearing
	B-6127	1	Governor Weight Carrier
	B-6101-A	2	Governor Weight
	B-6255	1	Governor Shifter
	B-6122	2	Governor Weight Shaft
	B-4028	2	Groov Pin 3/32 x 1/2
	B-6169	1	Groov Pin 1/8 x 1
	B-6124	1	Governor Shifter Lever
	B-6126-B	1	Governor Lever Shaft
	B-6518	1	Governor Lever
	B-5071	3	Groov Pin 3/32 x 5/8
	B-7355	1	Bumper Screw 1/4 x 28
	B-7356	1	Bumper Spring
		1	Hex Nut 5/16 x 24
		5	Fil. Hd. Screw #10-32 x 1/2 lg.
		5	Lock Washer 3/16
		1	Taper Pin #00 x 3/4 lg.
	B-6125	1	Governor Gear
		1	#3 Woodruff Key
	B-5456	1	Groov Pin 1/8 x 7/8
	B-6274	1	Snap Ring
	B-536	1	Expansion Plug
	B-6315	1	Oil Seal Washer
	B-6316	1	Oil Seal Retainer

REFERENCE NUMBER	PART NO.	REQUIRED	NAME
255	B-10137	1	Governor Spring
256	Y-6493	1	Governor Spring Adj. Screw Cad. Pl.
		2	Hex Jam Nuts 1/4-20 Cad.Pl.
257	Y-6465	1	Modulated Control Spring
	Y-6461	1	Modulated Control Adj. Nut
	B-7974-A	1	Felt Washer
	B-7973	1	Felt Washer Retainer
	B-8317	1	Rod End
	B-6667	1	Rod End Pin
		1	Cotter Pin 3/32 x 5/8 lg. Cad. Pl.
258	Y-6467	1	Governor Spring Lever
259	Y-6466	1	Shoulder Screw
260	Y-6090	1	Air Cleaner
261	B-2970	1	Air Cleaner Hose (Top)
262	B-1862	2	Air Cleaner Hose Clamp (top)
263	7044	1	Air Cleaner Hose (Bottom)
264	B-578	2	Air Cleaner Hose Clamp (Bottom)
265	Y-6133-A	1	Air Cleaner Pipe
	Y-6132	1	Air Cleaner Clamp Support
	Y-6131	1	Air Cleaner Clamp
		1	Cap Screw 3/8-16 x 3/4 lg.
		1	Cap Screw 3/8-16 x 1 lg.
		2	Hex Nuts 3/8-16
		2	Lock Washers 3/8
266	Y-6437	1	High Pressure Choke
267	51034	1	Carburetor Assembly
268	B-365	1	Carburetor Gasket
		2	Cap Screws 5/16-18 x 7/8 lg.
		2	Lock Washers 5/16
269	B-6118	1	Governor Rod
	B-6121	1	Governor Rod End
	B-6119	1	Governor Rod End Pin
		1	Cotter Pin 1/16 x 1/2
		1	Hex Nut #10-32
270	Y-6242	1	Carburetor Hose
271	B-5078	2	Carburetor Hose Clamp
	Y-6232	2	Nipple
		1	Elbow 3/4 x 90°
		1	Nipple 3/4 x 3-1/2 lg.
	Y-7235	1	Street Elbow
272	50573-C	1	Regulator Assembly
	E-5272	1	Lower Diaphragm Assembly
	E-5712	1	Upper Diaphragm Assembly
	E-4793	1	Pilot Valve Assembly
	E-4795	1	Pilot Valve Gasket
	E-4802	1	Main Valve Assembly
273	Y-6443	1	Vacuum Slide Switch Case
	Y-307-A	1	Bushing (Large)

REFERENCE NUMBER	PART NO.	REQUIRED	NAME
	Y-6444	1	Bushing (Small)
	Y-6429	1	Vacuum Slide Switch Cover
	Y-6287-A	1	Slide Switch Cover Gasket
	Y-6430	2	Rod End
	Y-6453	2	Rod End Pin
	Y-6219	2	Wing Nuts
	Y-6450	1	Squeeze connector 1/2
	B-4680	1	Felt Washer (Small)
	B-8018	1	Felt Washer Retainer (Small)
	Y-6291	1	Panel
		4	Rd. Hd. Mach Screw #10-24 x 7/8 Cad. Pl.
		4	Shakeproof Lock Washer #1210 Cad. Pl.
	Y-6292	1	Stationary Contact "A"
	Y-6293	1	" " "B"
	Y-6294	1	" " "C"
	Y-6295	1	" " "D"
	Y-6451	1	" " "F"
	Y-6298	1	" " "G"
	Y-6299	4	Stationary Contact Stud
		8	Rd. Hd. Mach. Scr. #8-32 x 1/2 Cad. Pl.
		8	Shakeproof Lock Washer #1208 Cad. Pl.
		8	Hex Nuts #8-32 (Brass)
	Y-6290-A	1	Sliding Contact Block
	Y-6289-A	1	Sliding Contactor
	Y-6303	1	Sliding Contact Plate
		2	Rd. Hd. Mach. Screws #8-32 x 1" (Brass)
		2	Hex Nuts #8-32 (Brass)
	B-3246	10	Brass Washers
		1	Cotter Pin 3/32 x 1" Cad. Pl.
	Y-6431	1	Vacuum Slide Switch Shaft
	Y-6446-A	1	Slide Switch Dust Sleeve
		1	Hex Nut 1/4-28 Cad. Pl.
		2	Wrought Washer Cad. Pl.
		2	Hex Jam Nuts 1/4-28 Cad.Pl.
		1	Soft Brass Wire #16 x 9" lg.
	Y-6428	1	4-1/2 Cup Packing
	Y-6434	1	4-1/2 Cup Packing Expander
	Y-6432	1	Piston Plate (Small)
	Y-6433	1	Piston Plate (Large)
		1	Shakeproof Lock Washer #1124 Cad. Pl.
		1	Hex Nut 1/2-13 Cad. Pl.
	Y-6447	1	Slide Switch Spring
	Y-6435	1	Slide Switch Cylinder Head
	Y-6448	1	Slide Switch Cylinder Head Gasket
		1	1/8 Pipe Plug (Slotted) Cad. Pl.

REFERENCE NUMBER	PART NO.	REQUIRED	NAME
		1	1/4 Pipe Plug (Slotted) Cad. Pl.
	B-1686	2	Half Union Elbow 1/4 flare x 1/8 male pipe thd.
	B-4092	4	Flare Nut 1/4
	Y-6489	1	Tee 1/4 flare x 1/4 male pipe thd. x 1/4 flare
274	Y-6124	1	Control Box Cover
	Y-6127	1	Control Box Cover Gasket
	Y-6161-A	2	Control Box Knobs
	B-7695	2	Gaskets
	B-9578	2	Snap Rings
	0Y-6214-A	1	Service Data Holder
		8	Parker Kalon (Type Z) #4 x 3/16 Cad. Pl.
	Y-658	8	Washers
	Y-6123-B	1	Control Box
	Y-6160	2	Control Box Hinge Pins
		4	Cotter Pins 1/8 x 3/4 Cad. Pl.
	Y-6201	2	Studs
	B-4680	2	Felt Washer (Small)
	B-8018	2	Felt Retainer (Small)
276	50003-C	1	Oil Gauge
	Y-6438	1	Adapter 1/8 male pipe x 1/8 sweat tube
277	Y-6252	1	Momentary Starting Switch
	Y-6138-A	1	Instrument Panel
278	Y-6139	1	3-1/4 Octagon Outlet Box
	Y-6140-A	1	Octagon Outlet Box Cover
	Y-6146-A	1	Starter Crank Limit Switch
	Y-6311-A	1	Thermal Element
279	Y-6441	1	High Pressure Switch
280	Y-6440	1	Low Pressure Switch
281	Y-6143-B	1	Head Pressure Gauge
282	Y-6144-A	1	Compound Gauge
283	Y-6442	2	Packless Angle Valve
	Y-6445	2	TEE - 3/8 x 1/8 x 3/8
284	0Y-6015-C	1	Structural Steel Frame
285	0Y-6380	4	Composition Wheel
	Y-6125	4	Wheel Washer
	Y-6035	4	Jam Nut
		4	Cotter Pin 1/8 x 2 lg. Cad. Pl.
286	0Y-6033-A	2	Hanger Wheel Bracket Assem. (L.H.)
287	Y-6381	7	Hood Fastener
		28	Parker Kalon Type Z Scr. #10 x 3/8 Rd. Hd.
	Y-6220	7	Hood Fastener Catches
288	Y-6436	1	Refrigerant Service Manifold

REFERENCE NUMBER	PART NO.	REQUIRED	NAME
		1	Hex Cap Screw 3/8-16 x 1-3/4 lg. Cad. Pl.
		1	Lock Washer 3/8 Cad. Pl.
	Y-6279	2	Half Union
	Y-6280	2	Flared Tube Cap Nut

REFERENCE NUMBER	PART NO.	REQUIRED	NAME
300	303-S	2	Compressor Discharge Valve (Shown)
	Y-6496	2	Compressor Discharge Valve Gasket
		4	Cap Screw 3/8 x 1-1/2 (Small Head)
	6302	2	Compressor Inlet Valve (not shown)
	Y-6495	2	Compressor Inlet Valve Gasket (not shown)
		4	Cap Screws 1/2 x 2-1/2
301	B-6461	1	Alemite Fitting Straight
302	Y-6156	1	Extension Valve Stem (Long)
	B-5759	1	Knob
	B-5544	1	Groov Pin
		1	Cotter Pin 3/32 x 3/4 Cad. Pl.
	Y-6178-A	1	Rubber Grommet
303		1	Compressor Discharge Tube
304	Y-6407	3	Condenser Fan Drive Belts
305	Y-6378	1	Alemite Fitting 90°
306	Y-7078	1	Compressor Drive Idler Arm
	Y-7021-A	1	Compressor Idler Arm Shaft
	Y-7026	2	Idler Arm Bushings
	B-432	2	Expansion Plug
307	Y-7079	1	Idler Lever Bracket
		4	Hex Cap Screws 1/2-13 x 1-1/4 Cad. Plated
		4	Shakeproof Lock Washer #1124 Cad. Pl.
308	Y-7020	1	Compressor Drive Idler Shaft
		1	Jam Nut 7/8-9 Cad. Pl.
		1	Shakeproof Lock Washer #1134 Cad. Pl.
		1	1/8 Pipe Plug (Slotted)
	Y-7018	1	Compressor Drive Idler Pulley
	Y-6040	2	N.D. Seal Ball Brg. #8505
309	Y-7048	7	Compressor Drive Belt
310		1	Clean Out Door (R.H.)
311	Y-6402	2	Clean Out Door Clamp Spring
		2	Hex Cap Screw 1/2-13 x 1/2 lg. Cad. Pl.
		2	Lock Washers 1/2
312		1	Clean Out Door (L.H.)
313		1	Clean Out Door Clamp
314		2	Condenser Discharge Tube
	Y-6408	2	3/4 Couplings
315	Y-7049-A	1	Compressor Idler Spring Screw
	Y-7080	1	Knob
	B-6175	1	Groov Pin

REFERENCE NUMBER	PART NO.	REQUIRED	NAME
	Y-6314	1	Spacer
		1	Shakeproof Lock Washer #1120 Cad. Pl.
	Y-7081	1	Idler Spring Swivel
316	OY-6034-A	2	Hanger Wheel Bracket Assem. (R.H.)
317	Y-6411	1	3-Way Valve
318	Y-6128	4	Hex Jam Nut Cad. Pl.
319	Y-6473	1	Flexible Discharge Line (Short)
320	Y-6420	2	Refrigerant Check Valve
	Y-6410	3	3/4 Elbow
321	Y-6475	1	Solenoid Valve Support
322	Y-6277-A	1	Solenoid Valve
	Y-6477	1	Elbow 5/8 fitting x 5/8 fitting
	Y-6389	3	Elbow 5/8 fitting x 5/8 tube
	Y-6270	1	Elbow 5/8 O.D. tube
	Y-6390	1	Tee 5/8 O.D. tube
	AP-29821	1	Solenoid Coil (32 Volt D.C.)
	AP-39152-2	1	Plunger Assembly
	AP-26269	1	Tube Adapter Gasket
	AP-29644-1	1	Pilot Valve Strainer
	AP-26271	1	Strainer Plug Gasket
	AP-39112-2	1	By-pass Valve and Bushing
	AP-26269	1	By-pass Bushing Gasket
	AP-21292	1	Piston
	AP-28086	1	Piston Spring
	AP-28088	1	Solenoid Coil Spring
	AP-23727	1	Valve Seat (Large)
	AP-26272	1	Valve Seat Gasket
	AP-39124-2	1	Valve Seat Cup Assembly
	AP-28112	1	Strainer Screen
	AP-24386	1	Lower Flange Gasket
	AP-24264	2	Flange Plate Gasket
	AP-21306	2	Flange 5/8 O.D. tube
	Y-6386	1	Pressure Relief Valve
	Y-6387	1	Forged Cross 5/8 sweat tube
	Y-6391	1	Adapter 5/8 fitting x 3/8 female pipe
	Y-6388	1	3/8 Pipe Plug Hex Hd. Brass
	AP-21325	2	Flange 3/4 O.D. Tube

REFERENCE NUMBER	PART NO.	REQUIRED	NAME
350	Y-6147-A	1	4 Pole Plug
351	Y-6148-A	1	4 Pole Receptacle
352		1	#8 - 4 Wire Tirex 7 ft. lg.
	Y-6248	1	Squeeze Angle Connector 90°
361	Y-6342	1	Compressor Drive Idler Spring
		1	Hex Nut 3/8-16 Cad. Pl.
362	Y-6484	2	1" Pipe Strap Cad. Pl.
		2	Hex Nuts 5/16-18 Cad. Pl.
		2	Cap Screws 5/16-18 x 1-1/4 Cad. Pl.
		2	Lock Washers 5/16
363	Y-6239	1	Extension Valve Stem (Long)
	B-5759	1	Knob
	B-5544	1	Groov Pin
		1	Cotter Pin 3/32 x 3/4 Cad. Pl.
	Y-6178-A	1	Rubber Grommet
364	Y-6398	1	Suction Line Strainer
	Y-6383	1	Elbow 1" Sweat Tube
	Y-6384	1	Tee 1-3/8 x 1 x 1 Sweat Tube
	Y-6478	1	Elbow 1-3/8 tube x 1-3/8 fitting
	Y-6385	2	Elbow 1-3/8 sweat tube
365	Y-7208	1	Suction Line Strainer Clamp
		2	Hex Cap Screw 3/8-16 x 1-1/8 Cad. Pl.
		2	Lock Washers 3/8 Cad. Pl.
		1	Hex Hd. Cap Screw 1/2-13 x 2 Cad. Pl.
		1	Lock Washer 1/2 Cad. Pl.
	Y-6480	1	Suction Line Sleeve
369	Y-6474	1	1-3/8 Flexible Suction Line
370	Y-6379	2	Plug
371	Y-7022-A	1	Compressor Idler Spring Pin
		1	Hex Jam Nut 7/16-14 Cad. Pl.
		1	Shakeproof Lock Washer #1122 Cad. Pl.
372	OY-6093-B	1	Condenser Fan Guard
	OY-6065-A	1	Condenser Fan Shroud
	Y-6219	5	Wing Nut
		16	Hex Cap Screws 1/2-13 x 1/2 lg. Cad. Pl.
		16	Lock Washers 1/2 Cad. Pl.
373	Y-6472	1	3/4 Flexible Discharge Line (Long)
374	Y-7049-A	1	Condenser Fan Idler Spring Screw
	Y-7080	1	Idler Spring Release Knob
	B-6175	1	Groov Pin

REFERENCE NUMBER	PART NO.	REQUIRED	NAME
		1	Shakeproof Lock Washer #1120 Cad. Pl.
375	Y-6350	1	Condenser Fan Idler Spring
	Y-7022-A	1	Condenser Fan Idler Spring Pin
		1	Hex Jam Nut 7/16-14 Cad.Pl.
		1	Shakeproof Lock Washer #1122 Cad. Pl.
		1	Hex Nut 7/16-14 Cad. Pl.
		1	Hex Nut 3/8-16 Cad. Pl.
376	Y-6488	1	Suction Line Guard
		1	Hex Cap Screw 3/8-16 x 1-3/4 Cad. Pl.
		1	Hex Nut 3/8-16 Cad. Pl.
		1	Lock Washer 3/8
377	Y-6415	1	Flexible Tubing Support Clamp
378	Y-6413	1	Flexible Tubing Support (on unit)
		1	Hex Cap Screw 5/8-11 x 2-1/2 Cad. Pl.
		1	Lock Washer 5/8 Cad. Pl.
		2	Hex Cap Screw 1/2-13 x 1-1/4 Cad. Pl.
		2	Lock Washer 1/2
379	B-7042	1	Timing Hole Cover
		2	Rd. Hd. Mach. Screw #14 x 1/2 lg.
		2	Lock Washer 1/4

MISCELLANEOUS ICE ENGINE PARTS NOT ILLUSTRATED

PART NO.	REQUIRED	NAME
Y-6117-A	5	Radiator Guard
0Y-6092-A	1	Radiator Screen
	10	Parker Kalon Cap Scr. #14 x 1/2 Cad. Pl.
	10	Hex Cap Screws 1/2-13 x 5/8 lg.
	10	Shakeproof Lock Washer #1124 Cad.Pl.
Y-6381	1	Hood Fastener Support
	2	Hex Cap Screw 3/8-16 x 1/2 lg. Cad. Pl.
Y-6119	1	Front Cover Plate
	7	Hex Cap Screws 1/2-13 x 1/2 Cad.Pl.
	7	Lock Washer 1/2 Cad. Pl.
0Y-6068	1	Top Cover Assembly
0Y-6066	2	Side Cover Assembly
0Y-6013-BA	2	Condenser
	24	Hex Cap Screw 1/2-13 x 3/4 Cad. Pl.

PART NO.	REQUIRED	NAME
	24	Lock Washer 1/2 Cad. Pl.
Y-6421	2	Condenser Guard (Left)
Y-6422	2	Condenser Guard (Right)
	32	Parker Kalon Cap Screw #14 x 1/2 Cad. Pl.
	32	Wrought Washer 1/4 Cad. Pl.
Y-6113-B	1	Refrigerant Receiver
Y-6404	2	Receiver Valve
Y-6405	1	Reducing Elbow 1-5/8 x 1-3/8 Sweat Tube
Y-6418	1	3/4 Flexible Metal Tube
Y-6419	1	1-3/8 Flexible Metal Tube
Y-6416	1	Liquid Line Filter
Y-6157	1	Fuel Hose
Y-6277	1	Solenoid Valve
Y-6203	1	Temperature Switch
Y-6492	1	Flexible Tubing Strap Clamp
Y-6491	1	Flexible Tubing Strap
	1	Hex Nut 3/8-16 Cad. Pl.
	1	Lock Washer 3/8 Cad. Pl.
	1	Hex Cap Screw 3/8-16 x 2-1/4 lg. Cad. Pl.
0Y-6083-B	1	Mounting Track (R.H.)
0Y-6084-B	1	Mounting Track (L.H.)
Y-6414	1	Flexible Tubing Support (On Track)
	2	Cap Screw 1/2-13 x 1-1/4 lg. Cad. Pl.
	2	Lock Washers 1/2 Cad. Pl.
	1	Cap Screw 5/8-11 x 2-1/2 Cad. Pl.
	1	Lock Washer 5/8
Y-6415	1	Flexible Tubing Support Clamp Cad. Pl.

SUB-COOLER PARTS

REFERENCE NUMBER	PART NO.	REQUIRED	NAME
400	S 1	1	Copper Wool Filter
401	S 2	1	Pump Assembly less bracket
	S 12	2	Flanged Elbows (Pump)
401-A	SW 1	1	Pump Bracket with Wagner Motor
401-B	SG 1	1	Pump Bracket with G. E. Motor
	SG 2	1	Pump Bracket Ring
402	SW 2	1	Pump Motor (Wagner)
402-A	SG 3	1	Pump Motor (G. E.)
402-B	SW 3	2	Brushes for Wagner Motor
402-C	SG 4	4	Brushes for G. E. Motor
403	S 3	1	Pressure Switch
404	S 4	1	Motor Inspection Hole Cover
405	S 5	1	Condenser Coil
406	S 6	1	Spray Nozzle Inspection Hole Cover
407	S 7	1	Spray Nozzle Assembly
	B 8	6	Spray Nozzles
408	S 8	1	Top Cover
409	S 9	1	Front Cover
410	S 10	1	Water Filler Hole Cover
411	S 11	1	Water Pump Suction Hose

FUEL SYSTEM PARTS

REFERENCE NUMBER	PART NO.	REQUIRED	NAME
500	Y-6169-A	3	High Pressure Fuel Hose
501	Y-6218	6	Regulator Assembly Clamp
		6	Hex Cap Screws 3/8-16 x 2-1/2 Cad. Pl.
		6	Hex Nuts 3/8-16 Cad. Pl.
		6	Lock Washers 3/8 Cad. Pl.
502	Y-6167-A	3	Check Valve (#2760)
			Seat (Disc) (2885-6)
			Spring (2885-8)
503	Y-6163-B	1	Regulator Set at 30# (#2761)
	Y-6164-B	1	Regulator Set at 45# (2761)
	Y-6165-B	1	Regulator Set at 60# (#2761)
			Seat Disc (#2761-16)
			Diaphragm (2761-9)
			Diaphragm Washer (1147-23)
			Back Cap Washer (1147-21)
504	Y-6166	3	Special Globe Valve (#2762)
			Seat (Disc) (2651-9R)
			Diaphragm (3) (2852-4)
505	Y-6162	1	Regulator (Large) (#6100)
			Diaphragm (5800-A)
			Seat (Disc) (1175-16)
			Spring (5800-6)
506		1	Safety Relief Valve (2866)
507	Y-6168	1	Pressure Gauge
508		3	Special Cyl. Shut Off Valve (2759)
			Seat (Disc) (2651-9R)
			Diaphragm (3713-4)
			Slug Check Spring (2758-3)
			Lock Nut Washer (2950-2)
			Check Disc (2885-6)
			Check Spring (2885-8)
			Plug (2759-2)
			Plug Chain with Ring on Both Ends (2759-3)
509	OY-6114	3	Propane Fuel Cylinder
510	Y-6088-A	1	Fuel Cylinder Carrier
	Y-6187	2	Clamp
	Y-6188-A	1	Flat Spring
		4	#8 Tinners Rivets
	Y-6312	4	Clamp Spring
	Y-6189	6	Collars
	B-6054	6	Groov Pins
	OY-6192	2	Clamp Rod
		4	5/8-11 Jam Nut Cad. Pl.
	Y-6186	1	Clamp Equalizer
	Y-6183	1	Clamp Eccentric
	B-5417	1	Groov Pin
	Y-6184	1	Clamp Shaft

REFERENCE NUMBER	PART NO.	REQUIRED	NAME
	Y-6185	1	**Clamp Lever**
		1	Hex Cap Screw 3/8-16 x 1-1/2 Cad. Pl.
		1	Lock Washer 3/8 Cad. Pl.
511	OY-6212	1	Tank Instruction Holder
	Y-6211	1	Celluloid
	SK-143-A	1	Blueprint
512	Y-6272	2	Hood Fastener
	Y-6220	2	Hood Fastener Catch
513	Y-6401	1	Excess Flow Valve (#2779)
			Diaphragm (2779-9)
			Seat (Disc) (2779-6)
			Spring (2779-13)

I N D E X

(Numbers refer to Section and Page)

OPERATING MANUAL

AND

PARTS LIST

FOR

MODEL D

Waukesha Ice Engine

for

Railway Air Conditioning

This Supplement must be added to Edition 3,
Form Ref. 1025-A.

WAUKESHA MOTOR COMPANY
REFRIGERATION DIVISION
WAUKESHA, WISCONSIN

SUPPLEMENT TO OPERATING MANUAL
EDITION 3, FORM REF. 1025-A
FOR MODEL "D" WAUKESHA ICE-ENGINE (RAILWAY TYPE)

GENERAL INFORMATION*

The Model "D" Railway Ice-Engine is a more compact machine 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 operating manual for instructions relative to the operation and care of the Model "D" Ice-Engine, the new control devices described in the following paragraphs should be kept in mind.

DESCRIPTION OF NEW CONTROL DEVICES

Crank Limit Switch

The crank limit switch now contains a new heating element which will permit intermittent cranking (see intermittent starting switch below) for three minutes instead of the one and one-half minute period described on Page 3, Section 3. A study of the wiring diagram (SK-363-A) will show that the crank limit switch is now also used to stop the engine in case of low oil pressure or engine overheating.

This switch should never be tied down so that it cannot release when necessary.

Vacuum Switch

The vacuum switch, located on the partition sheet in the engine compartment just above the manifold, replaces the slide switch and controls the cranking of the Ice-Engine. The vacuum switch breaks the circuit to the starter and the solenoid by-pass valve when the engine begins to operate.

Intermittent Starting Switch

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. This action makes the operation of the engine more certain, since under some conditions the engine may fail to start on the first attempt but will start

*See Edition 3, Section 1.

readily on the second or third.

Oil Pressure Switch

The oil pressure switch which forms the cover of the electrical junction box in the engine compartment serves two purposes: (1) - It interlocks electrically with the vacuum switch and prevents the starting motor from engaging when the engine is running at low vacuum. (2) - It provides protection against low oil pressure and trips the crank limit switch if the oil pressure is less than 5-1/2 pounds for more than three minutes.

Engine Heat Switch

The engine heat switch is now wired to close the circuit to the crank limit switch heater coil if the engine temperature exceeds 217° F., stopping the engine after three minutes. If the engine stops due either to overheating or low oil pressure, the operation of the crank limit switch closes the solenoid liquid valve at the evaporator, and this in turn causes the Ice-Engine to pump down and stop.

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 (SK-275, Section 10, Page 17) 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" or less, look for incorrect adjustment of the carburetor, low fuel pressure, timing out of adjustment, extremely high Freon head pressure or 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.

Manometer

The mercury manometer in the left side of the control box indicates the pressure in the fuel line to the Ensign regulator. Read this gauge only when the engine is running and be sure to loosen the vent screw on top of the manometer. The normal pressure should be 4 ozs. and may be obtained by adjusting the large pressure regulator shown on SK-149-A (Section 10, Page 1) and

described in the 2nd and 3rd paragraphs on Page 2, Section 3.

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

Fuel Strainer

A fuel strainer has been added just ahead of the Ensign regulator to prevent particles of dirt, scale etc., from entering the regulator and carburetor. One inspection a year should be sufficient.

Starter Switch Condenser

A condenser has been added to the solenoid switch on the starting motor on Model "C" and "D" units. This 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.

ADDITIONAL SERVICE INSTRUCTIONS*1

LUBRICATION

To correctly determine the oil level in the compressor, allow the machine to operate for a half hour, then stop it manually by depressing the lever of the low pressure switch so that the unit will not pump down and stop in the normal manner. Then after allowing a minute or two for the oil to settle, observe the level through the compressor bull's-eye. The oil level should be at the center of the bull's-eye.

ELECTRICAL EQUIPMENT

Periodically inspect the vacuum switch vent cap and if necessary clean the felt pad and the screens so that they will not offer a restriction to the air flow during the operation of the switch.

OPERATING DIFFICULTIES*2

ICE-ENGINE FAILS TO START (See SK-360-A)

If starter fails to crank engine:

5A. Check vacuum switch operation.

*1 See Edition 3, Section 4, Page 1.
*2 See Edition 3, Section 5, Page 4.

8. Check oil switch operation.

9. Check intermittent starting switch.

If starter cranks but the engine fails to start:

1A. Check fuel supply on manometer--should be 4 ozs.

The starter crank limit switch (See "L" on SK-363-A) may trip out for any of the following reasons:

1A. Engine fails to start

2A. Engine overheats thereby operating engine heat switch.

3A. Oil pressure drops below 5-1/2 lbs. while engine is running.

MODEL "D" SUB-COOLER *1

Since the first paragraph of Section 6 was written, it has been determined that lower head pressures in the Ice-Engine may be obtained by connecting the evaporative Sub-Cooler in the liquid line from the Ice-Engine to the receiver. (See note on SK-343-A). The installation of a 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.

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 knob (#427 - Section 11-A, Page 28). The spray pump can be operated in the swung-out position and the nozzle performance observed. The Model "D" Sub-Cooler is made for either 40 or 60 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.

SERVICE CHART *2

SUB-COOLER

In case of major repairs 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.

*1 See Edition 3, Section 6
*2 See Edition 3, Section 9

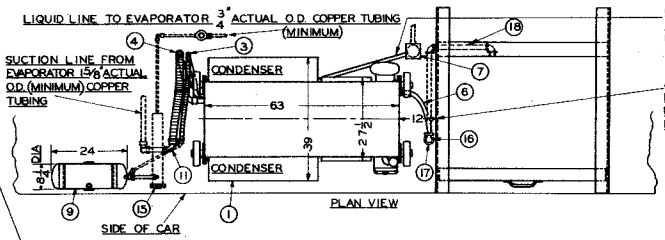
To prevent accidental addition of water to the Sub-Cooler during freezing weather, lock the water filler cap by inserting a 3/8-16 x 3/4 cap screw in the hole provided for it.

SK-343A

NOTE
ALL MATERIAL SPECIFIED AND SHOWN IN FULL LINES IS FURNISHED BY THE WAUKESHA MOTOR CO.

IF EVAPORATIVE SUB-COOLER IS USED SEE SK-312 FOR CONNECTIONS

SOLENOID LIQUID VALVE (8) CAN BE PLACED AHEAD OF THE EXPANSION VALVE IN THE EVAPORATOR COMPARTMENT OR UNDER THE CAR AT THE OUTLET OF THE REFRIGERANT RECEIVER (9)



FUEL CABINET DIMENSIONS	
No. CYL.	A
1	24
2	37 1/2
3	55
4	72 1/2

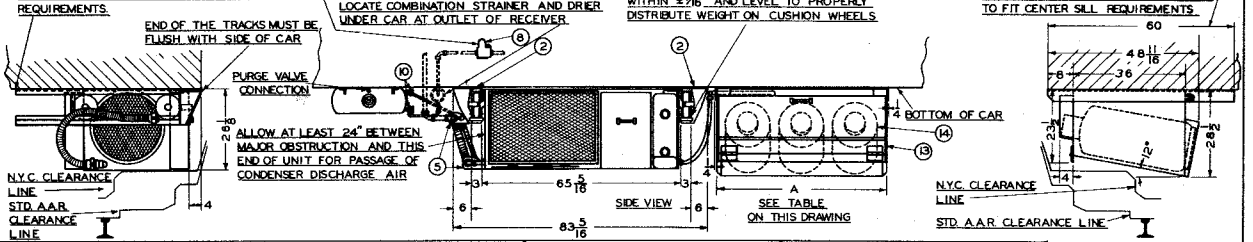
WELD OR RIVET END OF CHANNEL TO CENTER SILL. CHANNELS AND SUPPORTING PIECES ARE FURNISHED 60" LONG. DRILL AND CUT LENGTH TO FIT CENTER SILL REQUIREMENTS.

END OF THE TRACKS MUST BE FLUSH WITH SIDE OF CAR

LOCATE COMBINATION STRAINER AND DRIER UNDER CAR AT OUTLET OF RECEIVER

WHEEL CHANNELS MUST BE SQUARE, PARALLEL WITHIN ±1/16" AND LEVEL TO PROPERLY DISTRIBUTE WEIGHT ON CUSHION WHEELS

SUPPORTING ANGLES FOR FUEL TANK CARRIER ARE FURNISHED 60" LONG. CUT TO FIT CENTER SILL REQUIREMENTS



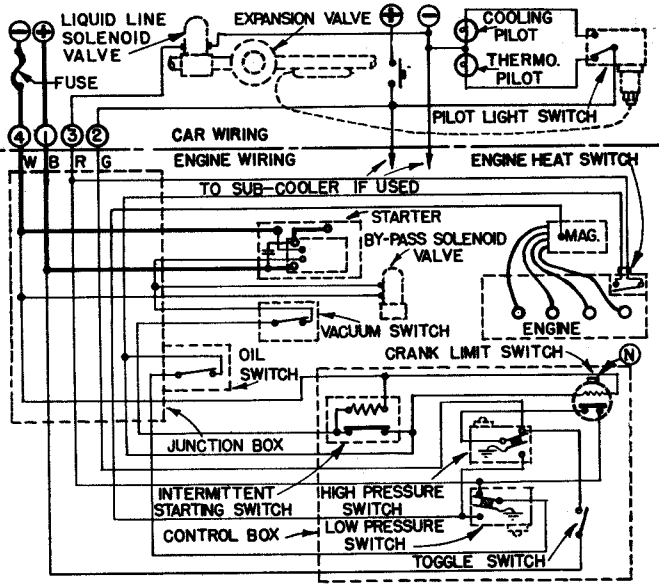
STANDARD WAUKESHA ICE-ENGINE MODEL D (ITEM A) INCLUDES THE FOLLOWING-		FUEL SYSTEM	MATERIAL LISTED BELOW NOT FURNISHED
(1) ICE-ENGINE	(9) REFRIGERANT RECEIVER WITH MOUNTING FEET	(13) FUEL SUPPLY CABINET (ITEM B) COMPLETE WITH MANIFOLDING SEE TABLE FOR SIZES	(15) LARGE COMBINATION STRAINER AND DRIER
(2) MOUNTING TRACKS	(10) REFRIGERANT RECEIVER VALVES	(14) FUEL CYLINDERS (EXTRA)	(16) 3/4" x 1/2" REDUCING STREET ELBOW (MALLEABLE)
(3) FLEXIBLE REFRIGERANT LINE (LIQUID)	(11) COPPER SWEAT ELBOW FOR 1 5/8" ACTUAL O.D. COPPER TUBING		(17) 1/2" UNION (MALLEABLE)
(4) FLEXIBLE REFRIGERANT LINE (SUCTION)	(12) PILOT LIGHT CONTROL - FOR LOCATION SEE DRAWING SK-252		(18) FUEL LINE 3/4" IRON PIPE
(5) FLEXIBLE TUBING SUPPORTS			
(6) FLEXIBLE FUEL LINE			
(7) ELECTRICAL RECEPTACLE AND PLUG			
(8) REFRIGERANT SOLENOID VALVE			

NOTE
ALL DIMENSIONS ARE GIVEN IN INCHES

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

DRAWN	D.D.W.	D	WAUKESHA MOTOR CO. WAUKESHA, WIS.	SK-343-A
CHECKED				

Section 10-A, Page 1



OPERATING INSTRUCTIONS

TO START COOLING UNIT FROM CONTROL BOX

Turn blower fan to "ON" at car panel and lift Toggle Switch in control box.

TO START COOLING UNIT FROM CAR PANEL

Turn blower fan to "ON" and cooling switch to "LOW." Thermostat pilot light will show if thermostat is on and will switch to the cooling pilot light when unit starts cooling.

UNIT FAILS TO START

If starter fails to crank engine:

1. Check Starter Crank Limit Switch. If word "OFF" appears, push down reset button "N."
2. See that Intermittent Starting Switch contacts are closed.
3. Check High and Low Pressure Switches.

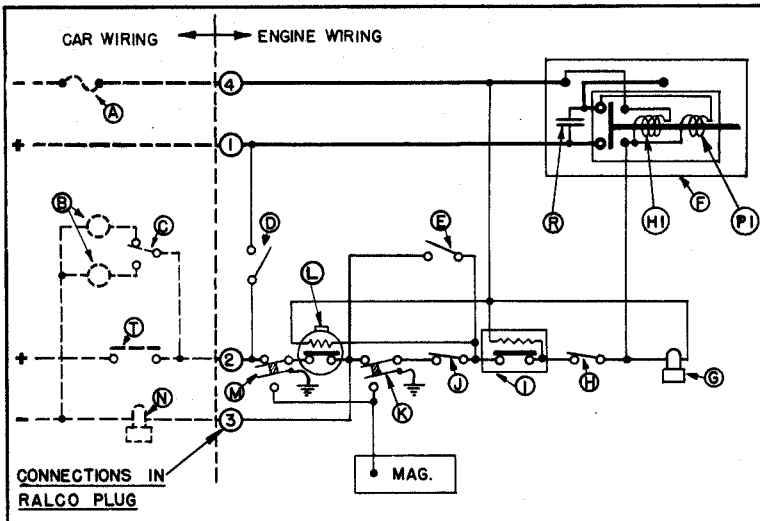
If starter cranks engine but engine fails to start:

1. Check Fuel Supply. See instructions in fuel carrier cover.
2. Check Spark at spark plugs. If no spark, check for ground on magneto by removing wire at top of magneto.

If unit fails to stop, manually operate low pressure switch.

REVISED 4/20 4/26/38

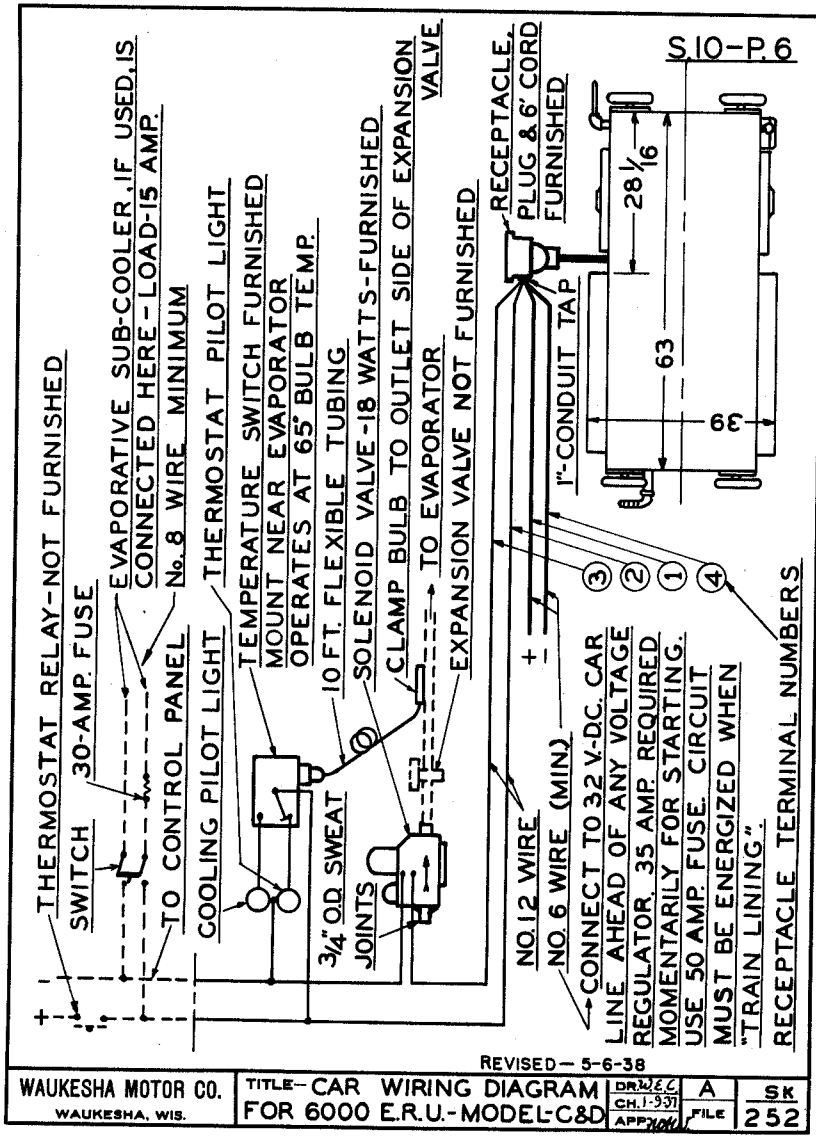
WAUKESHA MOTOR CO. WAUKESHA, WIS.	TITLE— WIRING DIAGRAM FOR MODEL "D" ICE-ENGINE	DR. MK CH. F.F. APP.	A FILE	SK 360-A

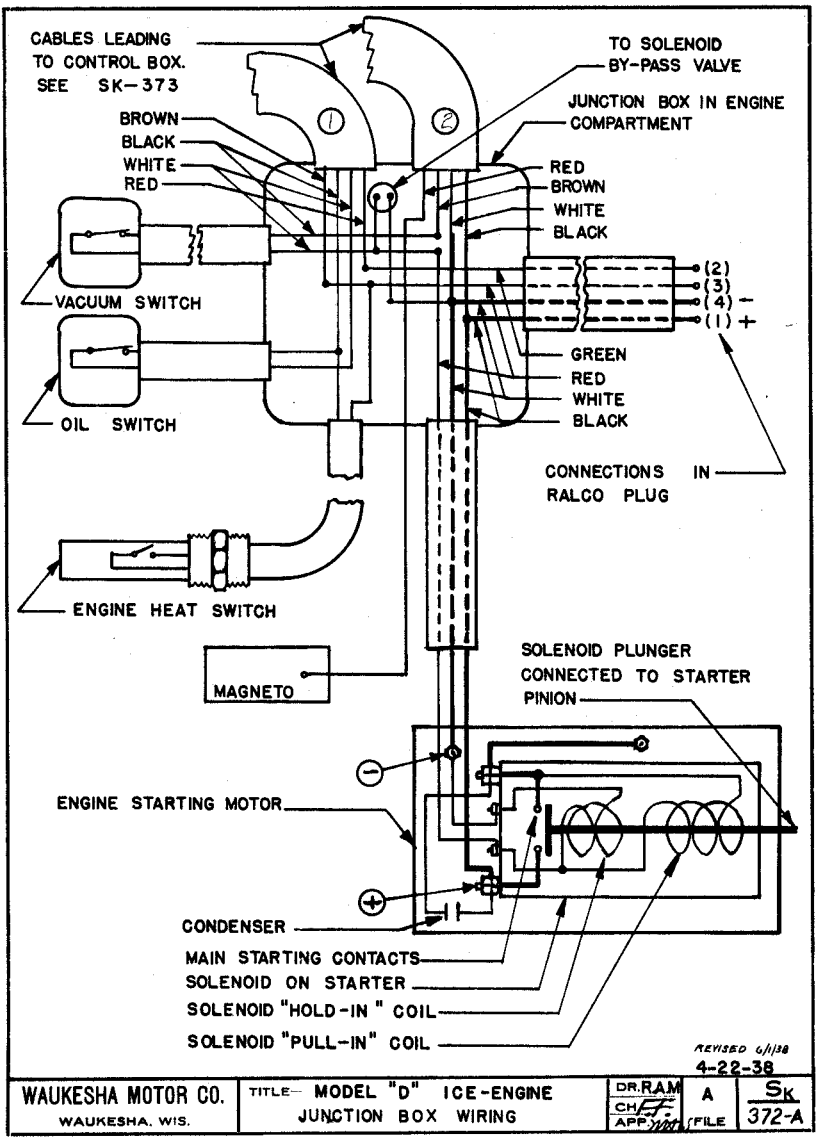


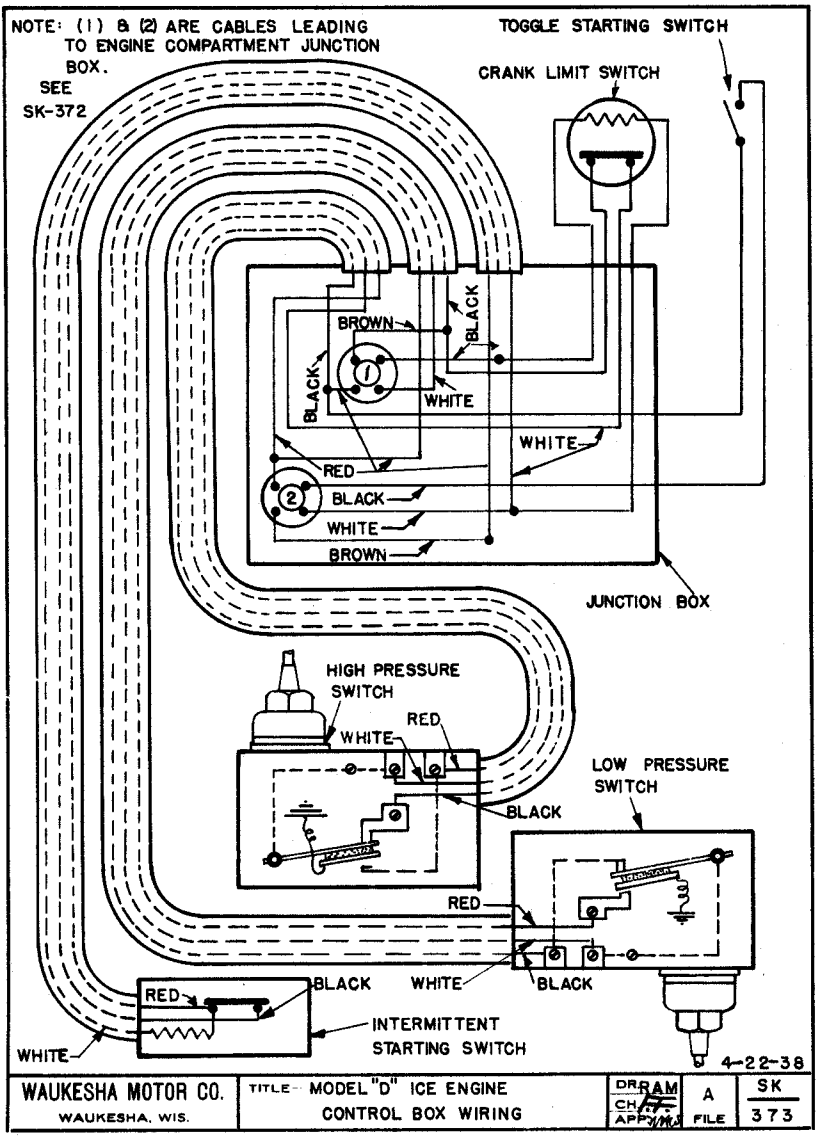
A	FUSE
B	PILOT LIGHTS
C	PILOT LIGHT TEMPERATURE SWITCH
D	TOGGLE STARTING SWITCH
E	ENGINE HEAT SWITCH
F	STARTING MOTOR
G	BY-PASS SOLENOID VALVE
H	VACUUM SWITCH
I	INTERMITTENT STARTING SWITCH
J	OIL PRESSURE SWITCH
K	LOW PRESSURE SWITCH
L	CRANKING LIMIT SWITCH
M	HIGH PRESSURE SWITCH
N	SOLENOID REFRIGERANT VALVE
T	THERMOSTAT RELAY
HI	HOLD-IN COIL
PI	PULL-IN COIL
R	CONDENSER

REVISED 4/1/38
5/23/38

WAUKESHA MOTOR CO. WAUKESHA, WIS.	TITLE— WIRING DIAGRAM FOR MODEL "D" ICE-ENGINE	DR. [illegible] CH. FF APP. [illegible]	A FILE	S K 363-A


THERMOSTAT RELAY-NOT FURNISHED
SWITCH
30-AMP. FUSE
EVAPORATIVE SUB-COOLER, IF USED, IS CONNECTED HERE-LOAD-15 AMP.
No. 8 WIRE MINIMUM
TO CONTROL PANEL
COOLING PILOT LIGHT
THERMOSTAT PILOT LIGHT
TEMPERATURE SWITCH FURNISHED
MOUNT NEAR EVAPORATOR
OPERATES AT 65° BULB TEMP.
10 FT. FLEXIBLE TUBING
SOLENOID VALVE-18 WATTS-FURNISHED
CLAMP BULB TO OUTLET SIDE OF EXPANSION VALVE
TO EVAPORATOR
EXPANSION VALVE NOT FURNISHED
3/4" O.D. SWEAT JOINTS
NO. 12 WIRE
NO. 6 WIRE (MIN.)
CONNECT TO 32 V-DC. CAR LINE AHEAD OF ANY VOLTAGE REGULATOR, 35 AMP. REQUIRED MOMENTARILY FOR STARTING. USE 50 AMP. FUSE. CIRCUIT MUST BE ENERGIZED WHEN "TRAIN LINING"
RECEPTACLE TERMINAL NUMBERS
RECEPTACLE, PLUG & 6' CORD FURNISHED
1"-CONDUIT TAP
S.10-P.6
28 1/16
63
39
REVISED — 5-6-38
WAUKESHA MOTOR CO.
WAUKESHA, WIS.
TITLE— CAR WIRING DIAGRAM FOR 6000 E.R.U.-MODEL-C&D
DR. W.E.C.
CH. I-9-37
APP.
A
FILE
SK 252


CABLES LEADING TO CONTROL BOX. SEE SK-373
TO SOLENOID BY-PASS VALVE
JUNCTION BOX IN ENGINE COMPARTMENT
BROWN
BLACK
WHITE
RED
RED
BROWN
WHITE
BLACK
(2)
(3)
(4) -
(1) +
VACUUM SWITCH
OIL SWITCH
GREEN
RED
WHITE
BLACK
CONNECTIONS IN RALCO PLUG
ENGINE HEAT SWITCH
MAGNETO
SOLENOID PLUNGER CONNECTED TO STARTER PINION
ENGINE STARTING MOTOR
CONDENSER
MAIN STARTING CONTACTS
SOLENOID ON STARTER
SOLENOID "HOLD-IN" COIL
SOLENOID "PULL-IN" COIL
REVISED 6/1/38
4-22-38
WAUKESHA MOTOR CO.
WAUKESHA, WIS.
TITLE— MODEL "D" ICE-ENGINE JUNCTION BOX WIRING
DR. R.A.M.
CH. F.
APP.
A
FILE
SK 372-A



WAUKESHA MOTOR CO. WAUKESHA, WIS.	TITLE- MODEL "D" ICE ENGINE CONTROL BOX WIRING	DR RAM CH APP	A FILE	SK 373

SERVICE PARTS LIST

FOR MODEL "D" WAUKESHA ICE-ENGINE

RAILWAY TYPE

* * *

ORDERING INSTRUCTIONS

When ordering service parts always give the following information:

1. Model and Number of Ice-Engine (on name plate in control box).
2. Part number, quantity required and description of part.
3. To insure prompt service, address your order to:

   Waukesha Motor Company
   Refrigeration Division
   Waukesha, Wisconsin

* * *

NOTE

This is a Supplement List to Edition 3, Form 1025-A, Section 11, Pages 1 to 28 inclusive.

Reference numbers in Supplement are identical to those in Edition 3 which covers the Model "C" unit. Part numbers and names as given in Supplement are for Model "D" Ice-Engine.

MODEL "D" ICE-ENGINE UNIT

REF. NO. MANUAL 1025-A	PART NO. MODEL "D"	REQ. "D" UNIT	NAME
1	Y-6652	1	Axial Flow Fan
	Y-6521	1	Snap Ring
		2	*Shakeproof Lock Washer #1132 Cad. Pl.
		2	*Hex Jam Nut 3/4-10 Cad.Pl.
2	*Y-6406	2	Felt Seal Ball Brg. #206
3	Y-6520-A	1	Condenser Fan Shaft
4	*B-6461	1	Alemite Fitting
		2	Hex Cap Scr. 7/16-14 x 1-1/2 lg.
		2	Shakeproof Lock Washers #1132 Cad. Pl.
		1	1/8 Close Nipple
		1	1/8 Elbow
	B-567	2	1/8 Street Elbows
		1	1/8 x 1-1/2" Nipple
	Y-6723	1	1/8 Coupling
5		2	*#16 Woodruff Keys
6	*B-7659	1	Alemite Fitting - 45°
		1	1/8 - 45° Street Elbow
7	Y-6400-A	1	Condenser Fan Idler Shaft
	B-10283	1	Groov Pin
		1	3/4-10 Hex Jam Nut Cad.Pl.
		1	*Shakeproof Lock Washer #1132 Cad. Pl.
		1	*S.A.E. Plain Washer 3/4" Cad. Pl.
8	Y-6562	1	Condenser Fan Idler Pulley
9	*Y-6040	2	Felt Seal Ball Brg. #205
		1	Street Elbow 1/8 - 90°
	B-7659	1	Alemite Fitting 45°
10	Y-6412-B	1	Condenser Fan Idler Arm
	*Y-6378	1	Alemite Fitting 90°
		1	Street Elbow 1/8 - 90°
		1	Pipe Nipple 1/8 x 1-1/2
		1	Coupling 1/8
11	Y-6657	1	Idler Arm Shaft
	Y-6658	1	Fan Bracket Support
12	Y-6724	2	Drilled Head Cap Screws
		2	Brass Wire #16 x 5" lg.
		2	S.A.E. Plain Washer 7/8 Cad. Pl.
	Y-6730	2	Cap Screws (Y-6657 - 58 Rear)
		2	Shakeproof Lock Washer #1240 Cad. Pl.

*Interchangeable between Model "C" and "D" units.

REF. NO MANUAL 1025-A	PART NO. MODEL "D"	REQ. "D" UNIT	NAME
	Y-6731	2	Steel Washers
	Y-6669	1	Steel Washer
	Y-6523	2	Idler Arm Bushings
13	Y-6216-D	1	Condenser Fan Support
		2	Hex Cap Screws 7/16-14 x 1-1/2" lg.
		2	Shakeproof Lock Washers #1122 Cad. Pl.
14	Y-6518-A	1	Compressor and Fan Drive Pulley
15	*3W2177	1	Frame Front Cover
	*3W2191	1	Frame Front Cover Gasket
16	*3W2200	1	Pulley Bearing Plate
		4	*Flat Hd. Mach. Scr. 3/8-16 x 1/2" lg.
17	3R4066	1	Compressor "V" Belt Pulley
		8	*Small Head Cap Screws 1/2 x 1"
18	*3W2182	1	Coupling Disc
19	*3W2198	6	Coupling Clamping Washer
		5	*Coupling Disc Cap Screws Small Head 1/2 x 1-1/4 lg.
	*3W3856	1	*Wheel Bearing Lubricating Cap Screw 1/2 x 1" lg.
		1	*1/8 Pipe Plug
20	*X22T7	1	Compressor Pulley Bearing
21	*3W6782	1	Crankshaft End Seal Plate
	*3W2193	1	End Seal Plate Gasket
		6	*End Seal Plate Cap Screw 5/16 x 3/4 lg. Allen Hd.
22	*3W2178	1	Compressor Coupling Hub
23		1	*Crankshaft Key 5/16 sq. x 1-1/4 lg.
24	*3W2197	1	Crankshaft Nut
		1	Crankshaft Nut Lock Washer 3/4
25	Y-6561-A	1	Condenser Fan, Pulley Driven
26	*3W3884	3	Cyl. Hd. Tube Flange (5/8)
	*3W3900	1	Cyl. Hd. Tube Flange (3/8)
27	*Y-6497-A	4	Tube Flange Gasket
		8	*Tube Flange Cap Scr. 5/16 x 1
28	*PP431	4	Discharge Valve Assembly Spring
	*17K-2-F	4	Complete Discharge Valve Assembly
29	*3W2188	4	Discharge Valve Stop Plate
30	*17K3	4	Discharge Valve Plate

*Interchangeable between Model "C" and "D" units.

REF. NO. MANUAL 1025-A	PART NO. MODEL "D"	REQ. "D" UNIT	NAME
31	*3W2187	4	Discharge Valve Seat
32	*3W2181	1	Crankshaft End Seal
33	*X22T3N	1	Ball Bearing Lock Nut
34	*X22T3W	1	Ball Bearing Lock Washer
35	*X22T3	1	Crankshaft Ball Bearing (Single Row)
36	*3W1429	1	Ball Bearing Clamp Plate
		4	*Clamp Plate Mach. Screw 1/4 x 1/2 lg.
37	Y-6518-A	1	Compressor and Fan Drive Pulley
38		1	*#G Woodruff Key
39	Y-6530	1	Ball Bearing Retainer
		4	Hex Cap Scr. 5/16-18 x 5/8 Cad. Pl.
		4	*Lock Washers 5/16 Cad.Pl.
	Y-6564	1	Thrust Collar
40	Y-6567	1	Drive Shaft Ball Brg.
	Y-6566	1	Drive Shaft Spacer
	Y-6570	1	Ball Brg. Lock Washer
	Y-6571	1	Ball Brg. Lock Nut
41	Y-6569	1	Grease Seal (Front)
	Y-6572	1	Grease Seal (Rear)
42	*17K9	8	Discharge Valve Spring
	*17K-1-F	4	Complete Inlet Valve Assembly
43	*17K8	4	Inlet Valve Spring
44	*3W2186	4	Inlet Valve Stop Plate
45	*3W3855	8	Valve Stop Plate Washer
46	*3W2185	4	Inlet Valve Seat
47	*17K3	4	Inlet Valve Plate
	*X1026T28	8	Valve Seat Washer
	*3W2196	8	Valve Locking Pin
	*PP430	8	Valve Locking Pin Spring
48	*3H1611	2	Cylinder Head
	*3W2189	2	Cylinder Head Gasket
		24	*Cylinder Head Cap Screw 1/2 x 2-1/2 lg.
49	*5A106	8	Piston Ring - Compression
50	*5A105	8	Piston Ring - Oil Wiper
51	*3W1423	4	Piston Pin
52	*3W1422	4	Connecting Rod Bushing (Upper)
53	*3R763	4	Piston
54	*3R768	4	Connecting Rod
55	*3H1610	2	Cylinder
	*3W2190	2	Cylinder to Frame Gasket
		24	*Cylinder to Frame Cap Screws Small heads 1/2 x 1" lg.

*Interchangeable between Model "C" and "D" units.

REF. NO. MANUAL 1025-A	PART NO. MODEL "D"	REQ. "D" UNIT	NAME
	*32-60	1	Breather Copper Sponge
	*3W2235	2	Breather Sponge Clamp
		2	*Soft Steel Wire 1/16 x 10" lg.
		2	*Button Head Screw 1/4 x 3/8 lg.
56	*3W1421	8	Connecting Rod Bearing (Lower)
		8	*Connecting Rod Bolts and Nuts 3/8 x 2-1/4 lg.
57	*3R767	1	Crankshaft
58	*X22T4	1	Crankshaft Ball Bearing - (Double Row)
59	*3W6850	1	Frame Rear Cover
	*3W2192	1	Frame Rear Cover Gasket
		6	Cap Screws - Hollow Head 1/2 x 7/8
60	*3W2238	2	Oil Sight Glass Gasket
61	*3W2237	1	Oil Sight Glass
62	*3W2239	1	Oil Sight Glass Washer
63	*3W2236	1	Oil Sight Glass Nut
64	*68320-H	1	Crankcase
		2	*Pipe Plugs 1/2 ctsk.
	*B-6417	1	Expansion Plug
65	*BD-195	2	Valve Cover
	*BD-196	2	Valve Cover Gaskets
	*BD-194	2	Valve Cover Studs
		2	Hex Nuts 3/8-24
	*BD-190	2	Valve Cover Stud Gasket
66	*B-3527	1	Fuel Pump Pad Cover
	*B-3605	1	Fuel Pump Pad Cover Gasket
		2	*Cap Screws 5/16-18 x 5/8 lg.
		2	*Lock Washer 5/16
67	*68053	1	Camshaft Bushing (Rear)
	*68050	1	Camshaft Bushing (Center)
68	Y-6670	1	Bottom Partition Sheet
	Y-6684	1	Top Partition Sheet
69	*BD-27	1	Flywheel Housing Gasket
70	3H2806	1	Compressor Frame
	*Y-6497-A	1	Tube Flange Gasket
	*3W3884	1	Crankcase Tube Flange
		2	*Cap Screw - Small Head 5/16 x 1 lg.
		1	*Pipe Plug 1/4
71	*BD-364-A	1	Main Bearing Closure Plate
	*BD-368-A	1	Main Bearing Closure Plate Gasket
		3	*Cap Screws 5/16-18 x 3/4 lg.
		3	*Lock Washer 5/16

*Interchangeable between Model "C" and "D" units.

REF. NO. MANUAL 1025-A	PART NO. MODEL "D"	REQ. "D" UNIT	NAME
72	*BD-367	1	Crankshaft Oil Seal Cup
73	*BD-366	1	Crankshaft Oil Seal (Rear)
	*BD-365-A	1	Crankshaft Oil Wick
	*BD-13	1	Oil Thrower (Rear)
74		1	*#G Woodruff Key
75	Y-6509	1	Compressor Drive Shaft
	Y-6730	1	Drive Shaft Cap Screw
		1	*Shakeproof Lock Washer #1240 Cad. Pl.
76	Y-7016-B	1	Compressor Outboard Brg. Support Casting
		6	Hex Cap Screws 3/8-16 x 1-1/8 Cad. Pl.
		2	Hex Cap Screws 3/8-16 x 1 Cad. Pl.
		8	*Lock Washers 3/8 Cad. Pl.
	Y-6753	1	Idler Arm Stop Pin
	B-9233	1	Outboard Brg. Inspection Cover
	B-9232	1	Inspection Cover Gasket
		4	Hex Cap Scr. 5/16-18 x 5/8 Cad. Pl.
		4	Lock Washers 5/16 Cad. Pl.
	B-567	2	1/8 Street Elbow
	B-7659	1	Alemite Fitting 45°
77			(Not used on Model "D")
		1	*#G Woodruff Key
78	*B-9837	4	Cap Screws
79	*BD-21	2	Cap Screw Lock
80	*B-5456	6	Groov Pin 1/8 x 7/8 lg.
81	Y-6524-A	1	Coupling Hub
82	*Y-6376	6	Drive Pin
83	*28014	6	Drive Bushings
	Y-6531	1	Special Lock Washer
		1	S.A.E. Hex Jam Nut 1-1/4-12 Cad. Pl.
	Y-6568	1	Drive Shaft Pilot Brg.
84	*BD-193	2	Oil Pan Gasket - Front and Rear
85	68857	1	Flywheel Housing
	*B-9512	4	Cap Screws 1/2-13 x 1-1/4
	*B-9511	2	Cap Screws
		6	*Shakeproof Lock Washers #1124
86	*B-6439-B	1	Ring Gear
87	68013-B	1	Flywheel
88	*68121-A	2	Main Bearing Bushing (Rear)
89	*68047	1	Main Bearing Cap (Rear)
	*B-10293-A	2	Main Bearing Shim (Rear)

*Interchangeable between Model "C" and "D" units.

REF. NO. MANUAL 1025-A	PART NO. MODEL "D"	REQ. "D" UNIT	NAME
	*B-1842	2	Dowel Pin
90	*BD-5-B	2	Main Bearing Cap Screw
	*BD-7	1	Main Bearing Cap Screw Lock
91	*BD-584	3	Cork Retaining Clip (Rear)
92	*68204	4	Pistons
	*68006	4	Piston Pins
	*37030	8	Piston Pin Retaining Ring
	*37205	4	Piston Ring (Compression)
	*37405	4	Piston Ring (70)
	*23505	4	Piston Ring (85)
93	*68502-C	1	Cylinder Head
94	*BE-800	1	Exhaust Manifold Flange
	*BE-801	1	Exhaust Manifold Flange Gasket
	Y-6638	2	Cap Screws 3/8 x 2-1/2
	Y-18012	2	Cap Screws 3/8 x 1
95	*BD-115-A	1	Combination Manifold
	*BD-127	2	Intake and Exhaust Manifold Gasket
	*BD-120	6	Combination Manifold Studs
		6	*Hex Nuts 3/8-24
	*B-221	2	Manifold Stud Washer
96	*0068007	4	Connecting Rod Assembly
	*68007	4	Connecting Rod
	*37008	4	Piston Pin Bushings
	*BD-23-A	8	Connecting Rod Bolts
	*BD-24	8	Castle Nuts
	*B-10337-A	8	Shims
		8	*Cotter Pins 3/32 x 3/4
	*68010-A	8	Connecting Rod Bearings
97	*68118-A	2	Main Bearing Bushing (Center)
98	*68049-A	1	Main Bearing Cap (Center)
	*B-10292-A	2	Main Bearing Shims (Center)
99	*BD-5-B	2	Main Bearing Cap Screws
	*BD-7	1	Main Bearing Cap Screw Lock
		2	*Main Bearing Dowel Pins
100	068280	1	Oil Pump Assembly
	68280	1	Pump Body
	*BD-358	1	Cover
	*BD-359	1	Gasket
	*37085	1	Gear (Driven)
	*37081-A	1	Gear (Drive)
	*37083	1	Shaft (Idler)
	68184	1	Shaft (Drive)
	*98051	1	Gear
	*B-997	1	Pin
		2	*#2 Woodruff Key

*Interchangeable between Model "C" and "D" units.

REF. NO. MANUAL 1025-A	PART NO. MODEL "D"	REQ. "D" UNIT	NAME
		4	*Fil. Head Mach. Screw 1/4-20 x 1/2
		4	*Lock Washers 1/4
	073163	1	Oil Gauge Stick
	*B-9420	1	Snap Ring
		2	*Cap Screws 5/16-18 x 3/4
		2	*Lock Washers 5/16
	*BD-360	1	Oil Pump Baffle
	*BD-361	1	Oil Pump Baffle Gasket
	*B-9620	3	Fil. Hd. Mach. Scr.
		3	*Lock Washers 3/16
	*BD-355	1	Oil Pump Screen
	*B-356	2	Oil Pump Screen Wire
101	Y-6619	1	Top Water Manifold
102	*BE-433	1	Water Outlet Flange Gskt.
	*B-291	2	Studs
		2	*Hex Nuts 3/8-24
103	*Y-6635	4	Spark Plugs
104	*68036	4	Valve (Intake)
105	*68136	4	Valve (Exhaust)
	*75923	4	Valve Insert (Exhaust)
106	*68009	8	Valve Guide
107	*68000-C	1	Cylinder Head Gasket
108	*68035-A	8	Valve Springs
109	*BD-78-A	1	Timing Gear Plate Gasket
110	*BE-803	1	Timing Gear Plate
		3	*Cap Screws 3/8-16 x 5/8 lg.
		3	*Shakeproof Lock Washer #1220
		5	*Cap Screw 3/8-16 x 2 (gear cover to plate)
		5	*Lock Washers 3/8
	*B-565	2	Dowel Pins
111	*BE-806	1	Gear Cover Gasket
	*F-16-E	1	Engine Fan Assembly
112	*1881-LD	1	Fan Blade Assy. for F-16-E Fan
113	2157-D	1	Fan Hub Assy. for F-16-E Fan
	2158-D	1	Spindle
114	*Y-6027-A	1	Fan Bracket
		3	*Cap Screws 3/8-16 x 1-3/4
		3	*Lock Washers 3/8
		1	*Hex Nut 5/8-18
		1	*Plain Washer 5/8
115	*B-9792	6	Valve Spring Tapers
116	*B-9793	8	Valve Spring Retainer
117	*BC-70	8	Valve Tappet Adj. Screw
118	*BD-56-A	8	Valve Tappets
		8	*Half Nuts 5/16-24

*Interchangeable between Model "C" and "D" units.

REF. NO. MANUAL 1025-A	PART NO. MODEL "D"	REQ. "D" UNIT	NAME
119	*BD-80-A	1	Camshaft Gear
120	*BD-85	1	Camshaft Thrust Plate
		2	*Cap Screws 5/16-18 x 5/8
	*BD-86	1	Camshaft Thrust Plate Lock
121	*BD-779-A	1	Camshaft Lock Plate
122		1	*Hi-pro Key 606
123	*68123	1	Camshaft
124	*B-780-A	1	Camshaft Screw Lock
	*B-1231	1	Camshaft Lock Screw
125	*68027	1	Camshaft Bushing (Front)
126	*68122-A	2	Main Bearing Bushing (Front)
127	*B-7174	1	Fan Pulley Nut
		1	*Shakeproof Lock Washer #1136
128	Y-6601	1	Fan Pulley
129		1	*Woodruff Key #9
130		1	*Woodruff Key #9
131	*BD-87	1	Gear Cover Oil Seal
132	*BC-82	1	Gear Cover Oil Seal Cup
133	*B-733-A	1	Crankshaft Oil Thrower
	*B-9824	2	Dowel Pins
	*63099	2	Drive Screws
134	*68012	1	Crankshaft Gear
135	*68046	1	Main Bearing Cap (Front)
	*B-10291-A	2	Main Bearing Shims (Front)
	*BD-5-B	2	Main Bearing Cap Screws
	*BD-7	1	Main Bearing Cap Screw Lock
136	*BE-805-L	1	Gear Cover
137	*BD-193	2	Oil Pan Gasket (Front and Rear)
138	*BD-583	3	Cork Retaining Clip (Front)
	*BD-191	1	Oil Pan Gasket (Right)
	*BD-192	1	Oil Pan Gasket (Left)
139	*BD-14-B	1	Crankshaft
140	68414	1	Oil Pan
		18	*Cap Screws 5/16-18 x 3/4
		18	*Lock Washers 5/16
		1	*Pipe Plug 3/8
	OY-6224	1	Sight Gauge Oil Cover

*Interchangeable between Model "C" and "D" units.

REF. NO. MANUAL 1025-A	PART NO. MODEL "D"	REQ. "D" UNIT	NAME
200	*Y-6174	1	Top Water Hose
201	*Y-6499	2	Hose Clamps
		2	*Hex Hd. Cap Screws 5/16-18 x 1-1/2
202	*1944	1	Water Pump Hose
203	*1965	2	Water Pump Hose Clamps
204	*068160-A	1	Water Pump Assembly
	*68160-A	1	Water Pump Body
	*68061-A	1	Cover
	*B-7718-A	1	Gasket
	*B-7717	1	Packing Nut
	*B-7721	1	Packing Nut
	*B-7716	4	Packing
	*B-3593	2	Packing Washer
	*B-7715	1	Bushing
	*B-6840	1	Pin
	*B-1883	2	Dowels
	*B-5330	1	Oil Seal Cup
	*B-5331	1	Oil Seal
	*B-7730	1	Bushing
	*B-6202	1	Pin
	*BD-97-B	1	Magneto Gear
	*BD-98	1	Magneto Gear Lock
	*BD-90	1	Magneto Gear Lock Nut
		1	*#3 Woodruff Key
	*68056	1	Water Pump Shaft
		1	*#8 Woodruff Key
	*68163	1	Vane
		1	*#3 x 1-1/2 Taper Pin
		4	*Fil. Hd. Cap Screw 5/16-18 x 5/8 lg.
205	Y-6642	1	Water Pump Inlet Elbow (To Radiator)
	*B-2692	1	Water Pump Inlet Elbow Gasket
		2	*Cap Screws 3/8-16 x 1
		2	*Lock Washers 3/8
207	*B-7720-A	1	Water Pump Inlet Elbow
	*BD-197-A	1	Water Pump Inlet Elbow Gasket
		1	*1/4 Pipe Plug (Slotted Head)
	*B-403	1	Elbow Fitting (In Case)
	*B-404	1	Straight Fitting (In Pump)
		1	*1/4 O.D. Copper Tubing 3-1/2 lg.
	*B-577	1	Grease Cup
209	Y-6036-A	1	Engine Fan Belt

*Interchangeable between Model "C" and "D" units.

REF. NO. MANUAL 1025-A	PART NO. MODEL "D"	REQ. "D" UNIT	NAME
210	*B-10777	1	Magneto Cable (Set)
211	*B-1365	2	Magneto Cable Support Bracket
	*B-10454	4	Magneto Support Cable Block
	*B-1362	2	Cable Support Clamp
		4	*Cap Screw 1/4-28 x 1" lg.
		4	*Hex Nuts 1/4-28
		4	*Lock Washers 1/4
214	*Y-6179	1	Magneto - Complete
			MAGNETO HOUSING PARTS
	*51444	1	Housing Only
	*51301	2	Timing Slot Covers
	*7616	2	Timing Slot Cover Gaskets
	*17394	4	Timing Slot Cover Screws
	*23149	4	Lock Washers for 17394
	*51270	4	Seal for 17394
	*7524	2	Felt Washers (Rear Bearing)
	*51266	1	Felt Retaining Cap
	*51237	2	Oil Hole Plug
	*3722	3	Rear Bearing Removal Hole Plug Screw
	*51224	1	Ground Terminal Group Complete
	*51287	1	Ground Terminal Connector Plate
	*53367	2	Ground Terminal Connector Plate Screws
	*23149	2	Lock Washers for 53367
	*515	2	Ground Terminal Hex Nut
	*3055	1	Lock Washer for 515
	*2635	1	Ground Terminal Lug
	*51439	1	Front Cover with Gasket & Dowel Pins
	*51254	1	Front Cover Gasket
	*51255	2	Front Cover Dowel Pin
	*1212	6	Front Cover Screws
	*23149	6	Lock Washer for 1212
	*6135	6	Seal for 1212
	*35207	1	Distributor Bearing Oil Hole Screw
			MAGNETO DISTRIBUTOR PARTS
	*51454	1	Distributor Block Complete
	*51664	4	Dist. Block Carbon Brush & Spring
	*51459	1	Dist. Block H. T. Coil Spring

*Interchangeable between Model "C" and "C" units.

REF. NO. MANUAL 1025-A	PART NO. MODEL "D"	REQ. "D" UNIT	NAME
	*51267	1	Distributor Block Gasket
	*51227	4	Distributor Block Thumb Nut
	*63643	2	Distributor Block Attaching Screws
	*23149	2	Lock Washers for 63643
	*51436	1	Distributor Block Center Brush and Cap
	*51218	1	Distributor Disc Complete
	*51230	1	Distributor Gear
	*51252	1	Distributor Gear Spacing Washer
	*51253	1	Distributor Shaft Ball Bearing
	*72	1	Distributor Shaft Key
	*29411	1	Distributor Shaft Plain Washer
	*18309	1	Distributor Shaft Screw
	*3055	1	Lock Washer for 18309
	*51271	1	Safety Gap Disc
	*51336	1	Cam
			MAGNETO CIRCUIT BREAKER PARTS
	*51251	1	Breaker Terminal Group
	*51244	1	Breaker Terminal Slotted Nut
	*23149	1	Lockwasher for 51244
	*51231	1	Breaker Base Plate
	*35251	2	Breaker Base Plate Screws (Bottom)
	*51226	1	Breaker Bar & Fixed Contact Set
	*51274	1	Breaker Bar
	*16640	1	Breaker Bar Spring Screw
	*3794	1	Lock Washer for 16640
	*51275	1	Contact Bracket with Contact
	*51272	1	Contact Bracket Pivot Screw (shouldered)
	*53367	1	Contact Bracket Holding Screw (short)
	*35252	1	Contact Bracket Holding Screw (long - top)
	*51273	1	Lock Washer for 35252
	*51286	1	Primary Lead Assembly
	*51256	1	Breaker Stud Insulator
			MAGNETO COIL & CONDENSER PARTS
	*51432	1	H. T. Coil Complete

*Interchangeable between Model "C" and "D" units.

REF. NO. MANUAL 1025-A	PART NO. MODEL "D"	REQ. "D" UNIT	NAME
	*51233	1	Coil Clamp
	*16756	2	Coil Clamp Screws
	*23149	1	Lock Washer for 16756
	*7593	1	Coil Top Insulator
	*7595	1	Coil Bottom Insulator
	*51441	1	Condenser Assembly
	*51285	1	Condenser Lead Assembly
	*62	1	Condenser Nut
	*23149	1	Lock Washer for #62
			MAGNETO ROTOR & MAIN BEARING PARTS
	*51202	1	Rotor
	*73	1	Drive Key
	*51234	2	Ball Bearing Complete
	*51435	2	Bearing Grease Sealing Ring
	*63399	1	Shims .002" (approx.)
	*63400	1	Shims .003" (approx.)
	*51209	1	Front Bearing Plate Only
	*30398	3	Front Bearing Plate Screws
	*3055	3	Lock Washers for 30398
	*7524	1	Front Bearing Felt Washer
			MAGNETO PINION GEAR PARTS
	*51229	1	Pinion Gear
	*72	1	Pinion Gear Key
	*18309	1	Pinion Gear Screw
	*29411	1	Pinion Gear Plain Washer
	*3055	1	Lock Washer for 18309
			MAGNETO MAGNET PARTS
	*51236	1	Magnet Only
	*7572	1	Magnet Screw
	*29555	1	Lock Washer for 7572
	*7535	1	Magnet Seal
			MAGNETO IMPULSE STARTER PARTS
	*7381	1	Complete Starter R.H. 15 deg. lag angle
	*7386	1	Rotating Unit Assembly Complete
	*7370	1	Drive Member, Spring Case Only
	*7333	1	Magneto Member Assembly
	*7323	1	Stop Pin Plate & Attaching Screws
	*7340	3	Stop Pin Plate Attaching Screws
	*7362	1	Felt Seal Holder & Seal with Attaching Screws
	*35207	2	Felt Seal Holder Screws

*Interchangeable between Model "C" and "D" units.

REF. NO. MANUAL 1025-A	PART NO. MODEL "D"	REQ. "D" UNIT	NAME
	*16319	2	Lock Washers for 35207
	*7352	1	Spring Assembly with Felt & Stop Pins
	*7366	2	Spring Stop Pins
	*7349	2	Stop Lever
	*7350	2	Stop Lever Metal Washer
	*7351	2	Stop Lever Snap Rings
	*7348	1	Magneto Member Bearing Felt
	*7343	1	Notched Washer
	*30537	1	Shaft Lock Washer
	*7344	1	Shaft Nut
215	*Y-6409	1	Magneto Coupling Cover
216	*BD-89-A	1	Water Pump Mounting Gasket
217	*68267	1	Magneto Bracket
		4	*Cap Screws 3/8-16 x 1-1/4 lg.
		4	*Lock Washer 3/8
		2	*Taper Pins #4 x 3/4 lg.
		2	*Cap Screws 3/8-16 x 7/8 lg. (Magneto to Bracket)
		2	*Lock Washers 3/8 (Magneto to Bracket)
218	Y-6751-A	1	Heat Switch
	Y-6821	1	Heat Switch Bushing (Not used on Model "D")
	Y-6369		(Heat Switch Extension)
219	*101130-D	1	Oil Filter
		2	Hex Cap Scr. 3/8-16 x 1-1/2 Cad. Pl.
		1	Hex Cap Screw 3/8-16 x 2-1/2 Cad. Pl.
		3	*Lock Washer 3/8 Cad. Pl.
		3	*Hex Nuts 3/8-16 Cad. Pl.
	12600	1	Oil Filter Element
	12254	1	Oil Filter Body Gasket
	*B-1686	2	Half Union Elbow
	*B-4094	2	Half Union Coupling
	*B-4092	4	Flare Nut 1/4
		1	*Copper Tube 1/4 O.D. x 48" lg.
	Y-6739	1	Sweat Tube Tee 1/4 x 1/8 x 1/4
	*Y-6740	1	Sweat Tube Tee 1/4
	*Y-6327	2	Tubing Clip 1/4
220	*BE-269	1	Starter Spacer
221	*Y-6334-B	1	Starting Motor
		3	Hex Cap Scr. 3/8-16 x 2-3/4
		3	*Lock Washers 3/8 Cad. Pl.

*Interchangeable between Model "C" and "D" units.

REF. NO. MANUAL 1025-A	PART NO. MODEL "D"	REQ. "D" UNIT	NAME
	*DR-1551	1	Solenoid Assembly
	*Y-6767	1	Cable #8 - 3-Wire x 36" lg.
(1)	*DR-1865638	1	Commutator End Frame
	*DR-901203	1	Ball Bearing (C.E.)
(2)	*DR-1871689	1	Armature
(3)	*DR-1865634	1	Gear Housing
(4)	*DR-1865625	1	Drive Housing Assembly
(5)	*DR-1871686	1	Field Coil (R.H.)
(6)	*DR-1871687	1	Field Coil (L.H.)
	*DR-1871645	1	Solenoid Switch
(7)	*DR-1853346	1	Plunger Boot
	*DR-1853344	1	Plunger Boot Clamp
	*DR-115315	1	Plunger Boot Clamp Screw
	*DR-143179	1	Plunger Boot Clamp Scr. Nut
(8)	*DR-1854734	1	Shift Lever
(9)	*DR-1862383	1	Bushing (Drive Housing)
(10)	*DR-37870	1	Overrunning Clutch
(11)	*DR-1865633	1	Motor Drive Shaft
(12)	*DR-1837052	1	Reduction Gear
(13)	*DR-1865646	1	Lead Assembly (Solenoid to Motor Term.)
(14)	*DR-1864716	2	Brush
	*DR-812016	2	Brush Holder Hinge Pin and Insulation
	*DR-812015	2	Brush Holder Stop Pin and Insulation
	*DR-809642	2	Brush Holder
(15)	*DR-813521	1	Brush Spring (R.H.)
	*DR-1865641	1	Brush Spring (L.H.)
(16)	*DR-1854737	1	Shift Lever Linkage
(17)	*DR-16957	2	Cover Band (Cork lined - 1/2 band)
	*DR-107728	2	Cover Band Screw
(18)	*DR-809763	2	Thru Bolt
	*DR-141553	2	Thru Bolt Lock Washer
(19)	*DR-1845936	1	Shift Lever Spring
	*DR-1845935	1	Shift Lever Stud
	*DR-805258	1	Shift Lever Stud Nut
	*DR-142248	1	Shift Lever Stud Lock Washer
	*DR-1868921	2	Terminal Contact Stud
	*DR-1868720	1	Contact Disc
222	Y-6674	1	Muffler
		4	Hex Hd. Parker Kalon Cap Screws 3/8 x 5/8 Cad. Pl.
223	*Y-6175	1	Bottom Water Hose
	*Y-6499	2	Hose Clamps
224) to 227)	Y-6626	1	Exhaust Pipe

*Interchangeable between Model "C" and "D" units.

Note Numbers in parentheses refer to SK-271 (S. 10, P.15).

REF. NO. MANUAL 1025-A	PART NO. MODEL "D"	REQ. "D" UNIT	NAME
	Y-6502	1	Hose Clamp
	Y-6637	1	Exhaust Flange
		1	Hex Hd. Parker Kalon Cap Screw #14 x 1/2 Cad. Pl.
	*BE-801	1	Exhaust Flange Gskt.
	Y-6638	2	Exhaust Flange Cap Screw 3/8 x 2-1/2
	Y-18012	2	Exhaust Flange Cap Scr. 3/8 x 1
228	*B-8963	4	Rajah Safety Nipples
229	*B-4171	6	Expansion Plugs
230	*B-7722	1	Water Inlet Elbow Scr.
231	*B-5563	1	Drain Cock
	B-4092	1	Flare Nut 1/4
		1	Copper Tube 1/4 O.D. x 6" lg.
250	Y-6639	1	Radiator Filler Body
251	Y-6656	1	Radiator Filler Cap
	Y-6671	1	Radiator
	B-205	1	Drain Cock
	Y-18102	1	Galv. Nipple 3/4 x 4"
252	*B-9037	1	Breather Cap
253	*024170-C	1	Breather Pipe
254	*K-341	1	Governor Assembly
	*B-6114-E	1	Governor Housing
	*BE-809	1	Governor Housing Gasket
	*B-6115-C	1	Governor Housing Cover
	*B-6117	1	Governor Housing Cover Gasket
	*B-6145	1	Governor Shaft
	*B-6146	2	Ball Bearings
	*B-6090	1	Thrust Ball Bearing
	*B-6127	1	Governor Weight Carrier
	*B-6101-A	2	Governor Weight
	*B-6255	1	Governor Shifter
	*B-6122	2	Governor Weight Shaft
	*B-4028	2	Groov Pin 3/32 x 1/2
	*B-6169	1	Groov Pin 1/8 x 1
	*B-6124	1	Governor Shifter Lever
	*B-6126-B	1	Governor Lever Shaft
	*B-6518	1	Governor Lever
	*B-5071	3	Groov Pin 3/32 x 5/8
	*B-7355	1	Bumper Screw 1/4 x 28
	*B-7356	1	Bumper Spring
		1	*Hex Nut 5/16 x 24
		5	*Fil. Hd. Screw #10-32 x 1/2 lg.

*Interchangeable between Model "C" and "D" units.

REF. NO. MANUAL 1025-A	PART NO. MODEL "D"	REQ. "D" UNIT	NAME
		5	*Lock Washer 3/16
		1	*Taper Pin #00 x 3/4 lg.
	*B-6125	1	Governor Gear
		1	*#3 Woodruff Key
	*B-5456	1	Groov Pin 1/8 x 7/8
	*B-6274	1	Snap Ring
	*B-536	1	Expansion Plug
	*B-6315	1	Oil Seal Washer
	*B-6316	1	Oil Seal Retainer
255	*B-10137	1	Governor Spring
256	*Y-6493	1	Governor Spring Adj. Screw Cad. Pl.
		2	*Hex Jam Nuts 1/4-20 Cad. Pl.
257	*Y-6465	1	Modulated Control Spring
	*Y-6461	1	Modulated Control Adj. Nut
	*B-7974-A	1	Felt Washer
	*B-7973	1	Felt Washer Retainer
258	Y-6791	1	Governor Spring Lever
259	*Y-6466	1	Shoulder Screw
	Y-6792	1	Modulated Control Rod
	*Y-6468	1	Angle Valve
	*Y-6458	1	Modulated Control Body
	*Y-6464	1	Modulated Control Sylphon
	*Y-6463	1	Modulated Control Head
	*Y-6459	1	Modulated Control Cylinder
	*Y-6460	1	Modulated Control Cylinder Head
260	50621	1	Air Cleaner
	B-4855	1	Air Cleaner Gasket
261	Y-6577	1	Air Cleaner Hose (Top)
262	Y-6502	2	Hose Clamps
263)			
264)			(Not used on Model "D")
265	Y-6618-A	1	Air Cleaner Pipe and Oil Filler
		1	Hex Hd. Cap Scr. 5/16-18 x 3/4 Cad. Pl.
		1	Allen Cap Scr. 5/16-18 x 1" Cad. Pl.
		2	Lock Washers 5/16 Cad. Pl.
	Y-7072	1	Oil Filler Cap
	Y-7074	1	Oil Filler Neck
	B-4855	1	Air Cleaner Gasket
266	Y-6748	1	High Pressure Choke Coil
	*Y-6445	1	Sweat Tube Tee 3/8 x 1/8 x 3/8
	Y-6780	1	Sweat Tube Tee 3/8 x 1/4 x 3/8
		1	Copper Tube 3/8 x 1

*Interchangeable between Model "C" and "D" units.

REF. NO. MANUAL 1025-A	PART NO. MODEL "D"	REQ. "D" UNIT	NAME
	Y-6739	1	Sweat Tube Tee 1/4 x 1/8 x 1/4
		1	Copper Tube 1/4 x 18 lg.
		1	Copper Tube 1/8 x 1/16 I.D. x 12 lg.
	50048-A	1	Manometer
	Y-6764	1	Elbow 1/8 M.P. x 1/8 S.T.
		1	Copper Tube 1/8 O.D. x 1/16 I.D. x 24"
		2	Conical Point Screw Slot Set Scr. 1/4-20 x 1/2 C.P.
267	*51034	1	Carburetor Assembly
268	*B-365	1	Carburetor Gasket
		2	*Cap Screws 5/16-18 x 7/8 lg.
		2	*Lock Washers 5/16
269	*B-6118	1	Governor Rod
	*B-6121	1	Governor Rod End
	*B-6119	1	Governor Rod End Pin
		1	*Cotter Pin 1/16 x 1/2
		1	*Hex Nut #10-32
270	Y-6242-A	1	Carburetor Hose
271	*Y-6503	2	Hose Clamps
	Y-7238	1	3/4 Close Nipple Galv.
	Y-6741	1	3/4 Malleable Iron Female Union Elbow - Galv.
	*Y-6232	2	Nipple 3/4
	*Y-7235	1	Mal. Iron Street Elbow 3/4 Galv.
	Y-6766	1	Compression Male Elbow 1/8
272	*50573-C	1	Regulator
	*B-10168	1	Street Elbow 1/8
		2	*Cap Screw 5/16-18 x 3/4 Cad. Pl.
		2	*Lock Washer 5/16 Cad. Pl.
	Y-11087	1	Mal. Iron Reducing Bushing 1 x 1/2 Galv.
	Y-6761	1	Regulator Strainer
	Y-6762	2	Nipple 1/2 x 5
	Y-6736	1	M. I. Female Union Elbow 1/2
	Y-6737-A	1	Pipe 1/2 x 14-7/8
	*Y-11089	2	1/2 Elbow Mal. Iron
	Y-6818	1	Close Nipple 1/2
	B-1686	2	Half Union Elbow 1/8 M.P. x 1/4 tube
	Y-6739	1	Sweat Tube Tee 1/4 x 1/8 x 1/4
	B-4092	2	Flare Nut 1/4
		1	Copper Tube 1/4 O.D. x 18

*Interchangeable between Model "C" and "D" units.

REF. NO. MANUAL 1025-A	PART NO. MODEL "D"	REQ. "D" UNIT	NAME
	*E-6151	1	Lower Diaphragm Assembly
	*E-5712	1	Upper Diaphragm Assembly
	*E-4793	1	Pilot Valve Assembly
	*E-4795	1	Pilot Valve Gasket
	*E-4802	1	Main Valve Assembly
	*E-268-5	1	Valve Seat
	*E-3-243	1	Valve Seat Gasket
	*E-821-9	3	Valve Seat Screws
	*E-3-258	1	Diaphragm Spring
	*E-4754	1	Diaphragm Screw Assembly
	*E-6461	1	Diaphragm Screw Nut Assy.
	*E-4757	1	Diaphragm By-Pass Screen
	*E-3-273	1	Bowl to Diaphragm Gskt.
	*E-821-10	8	Bowl Screws
	*E-284	8	Bowl Screw Lock Washers
	*E-4795	1	Pilot Valve Lever Support Gskt.
	*E-5546	1	Upper Diaphragm Gskt.
	*E-821-8	8	Cover Screws
	*OY-6788	1	Vacuum Switch Assembly
273	Y-6758	1	Vacuum Switch Body
	Y-6765	1	Vacuum Switch Body Gskt.
	Y-6757	1	Snap Switch Support and Diaphragm Stop
	Y-6759	1	Vacuum Switch Cover
		10	Rd. Hd. Mach. Scr. 10-24 x 3/4 Cad. Pl.
		10	Shakeproof Lock Washers #1210
	Y-6783	1	Snap Switch
	Y-6782	1	Snap Switch Support
		2	Rd. Hd. Mach. Scr. 4-36 x 5/16
		2	Lock Washers #1204 Cad.Pl.
	Y-6752	1	Vacuum Switch Diaphragm
	Y-6760	2	Cup Washers
	Y-6811	1	Cap Screw
		1	Jam Nut 1/4-20 Cad. Pl.
		1	Lock Washer 1/4 Cad. Pl.
	Y-6781	1	Vacuum Switch Breather Cap
	63347	1	Breather Cap Gskt.
	B-9748	1	Snap Ring
	Y-6790	1	Breather Felt Pad
	Y-6789	2	Breather Screen
	Y-6784	1	Cord Grip
	Y-6785	1	2-Wire Tirex Cable
274	*Y-6124	1	Control Box Cover
	*Y-6127-A	1	Control Box Cover Gasket
	*Y-6161-A	2	Control Box Knobs

*Interchangeable between Model "C" and "D" units.

REF. NO. MANUAL 1025-A	PART NO. MODEL "D"	REQ. "D" UNIT	NAME
	*B-7695	2	Gaskets
	*B-9578	2	Snap Rings
	OY-6776	1	Service Data Holder
	OY-6777	1	Instruction Holder
	65508-A	1	Name Plate
		12	*Parker Kalon Type "Z" Rd. Hd. #4 x 3/16 Cad. Pl.
	Y-6123-C	1	Control Box
	*Y-6160	2	Control Box Hinge Pins
		4	Cotter Pins 1/8 x 3/4 C.P.
		2	Pipe Plugs 1/8
	*Y-6201	1	Stud (Long)
	Y-6745	1	Stud (Short)
276	*50003-C	1	Oil Gauge
	Y-12029	1	Vacuum Gauge
	Y-6764	2	Sweat Tube Elbow 1/8 M.P. x 1/8 Tube
		1	Copper Tube 1/8 x 30 lg.
		1	Copper Tube 1/8 x 36 lg.
277	*Y-6252	1	Momentary Starting Switch
	Y-6746	1	Panel
			Junction Box (Not used on Model "D" - Box is cast in control box.)
	Y-6747	1	Junction Box Cover
278	*Y-6146-A	1	Starter Crank Limit Switch
	Y-6311	1	Element (3 min.)
279	*Y-6441	1	High Pressure Switch
280	*Y-6440	1	Low Pressure Switch
	*Y-6256	2	Composition Bushing
	Y-6660	1	Intermittent Starting Switch
281	*Y-6143-B	1	Head Pressure Gauge
282	*Y-6144-A	1	Compound Gauge
283	*Y-6442	2	Packless Angle Valve
	Y-6750	2	Sweat Tube St. Elbow 3/8
		2	Copper Tube 3/8 x 1-3/4 lg.
	*B-4680	2	Felt Washers
	*B-8018	2	Felt Retainer
	*OY-6793	1	Oil Switch Assembly
	*Y-6798	1	Oil Switch Body
	*Y-6796	1	Oil Switch Spring
	*Y-6795	1	Oil Switch Plunger
	*Y-6794	1	Oil Switch Sylphon
	*Y-6799	1	Oil Switch Sylphon Cover
	*Y-6802	1	Sylphon Cover Gasket
		5	*Rd. Hd. Mach Scr. 10-24 x 1/2
		4	*Shakeproof Lock Washers #1210

*Interchangeable between Model "C" and "D" units.

REF. NO. MANUAL 1025-A	PART NO. MODEL "D"	REQ. "D" UNIT	NAME
	*Y-6783	1	Snap Switch
	*Y-6782	1	Snap Switch Support
		2	*Rd. Hd. Mach. Scr. 4-36 x 5/16
		2	*Lock Washer #1204
	*Y-6797	1	Snap Switch Bracket
		2	*Rd. Hd. Mach. Scr. 10-24 x 1/2
		2	*Lock Washers #1210
	*Y-6775	2	Rubber Covered Wire #14 x 10"
	*Y-6256	1	Composition Bushing
	*Y-6800	1	Snap Switch Cover
	*Y-6801	1	Snap Switch Cover Gasket
284	OY-6666	1	Welded Steel Frame
285	*OY-6615-AB	4	Cushion Wheel Assembly
	Y-6615-A	4	Cushion Wheel Rim
	Y-6616-A	4	Cushion Wheel Hub
	Y-6617-B	20	Spring Support
	Y-6636-A	20	Spring (Wheel)
	Y-6125-A	4	Wheel Washer
	*Y-6035	4	Jam Nut
		4	*Cotter Pin 1/8 x 2 Cad.Pl.
286			(Not used on Model "D")
287			(Not used on Model "D")
288	*Y-6436	1	Refrigerant Service Mfld.
		1	*Hex Cap Screw 3/8-16 x 1-3/4 lg.
		1	*Lock Washer 3/8 Cad. Pl.
	*Y-6279	2	Half Union
	*Y-6280	2	Flare Tube Cap Nut
289	*OY-6458	1	Modulated Control Assembly

*Interchangeable between Model "C" and "D" units.

REF. NO. MANUAL 1025-A	PART NO. MODEL "D"	REQ. "D" UNIT	NAME
300	*303-S	2	Compressor Discharge Valve
	*Y-6496-A	2	Compressor Discharge Valve Gaskets
		4	*Cap Screws 3/8 x 1-1/2
	*6302	2	*Compressor Suction Valve
	Y-6495-A	2	Compressor Suction Valve Gasket
		2	*Cap Screw 1/2 x 2-1/2
301	B-7659	1	Alemite Fitting 45°
	B-567	1	Street Elbow 1/8
	Y-6729	1	Pipe Nipple 1/8 x 5
	Y-6723	1	Mall. Iron Coupling 1/8
302	*Y-6156	1	Extension Valve Stem (Short)
	*Y-6675	1	Refrigerant Valve Knob
	*B-5544	1	Groov Pin
		1	*Cotter Pin 3/32 x 3/4 Cad. Pl.
	Y-6819	1	Rubber Grommet
	Y-6651	1	Special Elbow 1"
303			(Not used on Model "D")
304	Y-6575	2	Condenser Fan Belts
305	B-7679	1	Alemite Fitting 45°
	B-567	1	Street Elbow 1/8
	Y-6729	1	Pipe Nipple 1/8 x 5"
	Y-6723	1	Mall. Iron Coupling 1/8
306	Y-7078-A	1	Compressor Drive Idler Arm
	Y-7021-A	1	Compressor Drive Idler Arm Shaft
	*Y-7026	2	Idler Arm Bushing
	*B-432	2	Expansion Plug
307	Y-6620	1	Idler Lever Bracket
		4	*Hex Cap Screw 1/2-13 x 1-1/4
		4	*Shakeproof Lock Washer #1124
308	Y-7020-B	1	Compressor Drive Idler Shaft
		1	*S.A.E. Hex Jam Nut 7/8-9 Cad. Pl.
		1	*Shakeproof Lock Washer #1134 Cad. Pl.
		1	*Pipe Plug 1/8 (Screw Slot)
	Y-6384	1	Tee 1-3/8 x 1 x 1
	*Y-6040	2	Felt Seal Ball Bearing Comp.
	*Y-7018-A	1	Compressor Drive Idler Pulley
309	Y-6705	7	Compressor Drive Belts
310	Y-6721	1	Small Bottom Door

*Interchangeable between Model "C" and "D" units.

REF. NO. MANUAL 1025-A	PART NO. MODEL "D"	REQ. "D" UNIT	NAME
311	*Y-6402	2	Clean Out Door Clamp Spring
312	Y-6719	1	Large Bottom Door
313	Y-6722	1	Clean Out Door Clamp
		1	Hex Cap Scr. 1/2-13 x 1-1/4
		1	Wrought Washer 1/2 Cad.Pl.
		1	Lock Washer 1/2 Cad. Pl.
314	Y-6755	1	Copper Tube (Cond. to Valve)
	Y-6664	1	Front Condenser Inlet Tube
	Y-6667	1	Rear Condenser Inlet Tube
	Y-6754	1	Copper Tube (Between Condensers)
315	*Y-7049-A	1	Compressor Idler Spring Screw
	*Y-7080	1	Idler Spring Release Knob
	*B-6175	1	Groov Pin 5/32 x 3/4
	*Y-6314	1	Spacer
		1	Shakeproof Lock Washer #1120
	*Y-7081	1	Idler Spring Swivel
	Y-6600	1	4-Cyl. "V" Type Compressor
	Y-6191	1	1/8 Thick Shim
	Y-6191-A	4	1/32 Thick Shim
316			(Not used on Model "D")
317	Y-6732	1	Two-Way Valve 3/4
318	Y-6730	4	Cap Screw
319) and 373)	Y-6472-A	2	Flexible Discharge Line 3/4
320	Y-6420-A	2	Check Valve
	Y-6676	2	Check Valve Support
		4	Hex Cap Screws 3/8-16 x 1/2
		2	Hex Cap Screws 3/8-16 x 1-1/2
		6	Lock Washers 3/8 Cad. Pl.
		2	Hex Nuts 3/8-16 Cad. Pl.
	OY-6644	1	Pressure Relief Valve
	Y-6643	1	Sweat Tube Cross
321	*Y-6677	1	Solenoid Valve Support
322	*Y-6725	1	Solenoid Valve (5/8 Flanges)
		3	*Hex Cap Screws 3/8-16 x 7/8
		3	*Lock Washers 3/8 Cad. Pl.
	Y-6645	1	Unloading Tube
	Y-6661	1	Return Bend
	*Y-6390	1	Sweat Tube Tee 5/8

*Interchangeable between Model "C" and "D" units.

REF. NO. MANUAL 1025-A	PART NO. MODEL "D"	REQ. "D" UNIT	NAME
	Y-6662	1	Equalizer Tube
		1	Copper Tube 5/8 O.D. x 3-1/2 lg.
	Y-6449	1	Adapter 3/8 O.D. x 1/4 M.P.
		2	Copper Tube 3/8 O.D. x 72 lg.
	Y-6763	2	Sweat Tube Coupling
	Y-6819	2	Rubber Grommets
	*Y-6244	4	Double Tubing Clips
			BREAKDOWN ON SOLENOID VALVE
	*AP-29821	1	Solenoid Coil (32-Volt D.C.)
	*AP-39152-2	1	Plunger Assembly
	*AP-26269	1	Tube Adapter Gasket
	*AP-29644-1	1	Pilot Valve Strainer
	*AP-26271	1	Strainer Plug Gasket
	*AP-39112-2	1	By-pass Valve and Bushing
	*AP-26269	1	By-pass Bushing Gasket
	*AP-21292	1	Piston
	*AP-28086	1	Piston Spring
	*AP-28088	1	Solenoid Coil Spring
	*AP-23727	1	Valve Seat (Large)
	*AP-26272	1	Valve Seat Gasket
	*AP-39124-2	1	Valve Seat Cup Assembly
	*AP-28112	1	Strainer Screen
	*AP-24386	1	Lower Flange Gasket
	*AP-24264	2	Flange Plate Gasket
	*AP-21306	2	Flange 5/8 O.D. tube
	*Y-6386	1	Pressure Relief Valve
	*Y-6387	1	Forged Cross 5/8 sweat tube
	*Y-6391	1	Adapter 5/8 fitting x 3/8 female pipe
	*Y-6388	1	3/8 Pipe Plug Hex Hd. Brass
	*AP-21325	2	Flange 3/4 O.D. Tube
	*AP-24387	2	Flange Gasket
350	*Y-6147-A	1	4-Pole Plug
351	*Y-6148	1	4-Pole Receptacle
352	*Y-6774	1	#8 - 4-Wire Tirex 84" lg.
	*Y-6248	1	Squeeze Connector 3/4-90°
	*Y-6773	1	3/4 I.D. Flex. Metal Conduit
	*Y-6768-A	4	#8 Wedge-On Signal Lug (1/4)
	*Y-6456	1	7/32 I.D. Loom 18" lg.
	*Y-6450	1	Squeeze Connector 1/2 straight

*Interchangeable between Model "C" and "D" units.

REF. NO. MANUAL 1025-A	PART NO. MODEL "D"	REQ. "D" UNIT	NAME
	*Y-6775	1	#14 Rubber Covered Wire 12
	*Y-6457	1	#14 Wedge-On Terminal
361	*Y-6342	1	Compressor Drive Idler Spring
		1	*Hex Nut 3/8-16
362	Y-6676	2	Check Valve Support
363	Y-6239-A	1	Extension Valve Stem (Long)
	Y-6675	1	Refrigerant Valve Knob
	*B-5544	1	Groov Pin
		1	*Cotter Pin 3/32 x 3/4 C.P.
	Y-6819	1	Rubber Grommet
364	*Y-6398	1	Suction Line Strainer
	Y-6663	1	Special Elbow 1-3/8
365	Y-6484	1	Suction Line Clamp
	Y-6507	1	Suction Strainer Support
		2	Hex Cap Scr. 3/8-16 x 1 Cad. Pl.
		2	Lock Washers 3/8 Cad.Pl.
	Y-6508	1	Suction Strainer Clamp
		2	Hex Cap Scr. 1/2-13 x 2 Cad. Pl.
		2	Lock Washers 1/2 Cad. Pl.
369	Y-6474-A	1	Flex. Suction Line 1-3/8
370			(Not used on Model "D")
371	Y-7022-B	1	Compressor Idler Spring Pin
		1	Hex Nut 3/8-16 Cad. Pl.
372	Y-6694	1	Condenser Fan Guard
	Y-6692	1	Condenser Fan Shroud
	*Y-6219	4	Wing Nuts
373			(See Ref. No. 319)
374			(Not used on Model "D")
375	*OY-6565	1	Condenser Fan Idler Tightener Assembly
	*Y-6565	1	Condenser Fan Idler Rod
	*Y-6510	1	Idler Rod Stop Collar
		1	*Cotter Pin 3/32 x 3/4 Cad. Pl.
		2	*S.A.E. Plain Washer 3/8 Cad. Pl.
	*Y-6514	2	Washers
	*Y-6516	1	Idler Spring Stop
	*Y-6515	1	Condenser Fan Idler Spring
	*Y-6511	1	Idler Spring Release Knob
	Y-6641	1	Belt Take-Up Support
		1	Sq. Hd. Set Screw 3/8-16 x 1-1/4
		1	Hex Jam Nut 3/8-16 Cad.Pl.
376	Y-6718	1	Suction Line Guard
		1	Hex Cap Scr. 3/8-16 x 2 Cad. Pl.

*Interchangeable between Model "C" and "D" units.

REF. NO. MANUAL 1025-A	PART NO. MODEL "D"	REQ. "D" UNIT	NAME
		1	*Lock Washer 3/8 Cad. Pl.
		1	*Hex Nut 3/8-16 Cad. Pl.
377	*Y-6415	1	Flexible Tubing Support Clamp
378	*Y-6413	1	Flexible Tubing Support (On unit)
		1	*Hex Cap Scr. 5/8-11 x 2-1/2 Cad. Pl.
		1	*Lock Washer 5/8 Cad. Pl.
		2	*Hex Cap Scr. 1/2-13 x 1-1/4 Cad. Pl.
		2	*Lock Washers 1/2 Cad. Pl.
379	*B-7042	1	Timing Hole Cover
		2	*Rd. Hd. Mach. Scr. #14 x 1/2
		2	*Lock Washers 1/4

MISCELLANEOUS ICE-ENGINE PARTS NOT ILLUSTRATED

Y-6117-A		(Not used)
Y-6702	1	Radiator Screen
	8	Hex Head Parker Kalon Cap Screw 3/8 x 5/8 Cad. Pl.
Y-6381		(Not used on Model "D")
Y-6119		(Not used on Model "D")
Y-6805	1	Compressor Compartment Cover
Y-6806	1	Engine Compartment Cover
Y-6803	1	Engine Compartment Cover Stud
Y-6804	1	Compressor Compartment Cover Stud
Y-6403	2	Wing Nuts 1/2 Cad. Pl.
Y-6808	1	Ice-Engine Handle
Y-6697	2	Side Door
*Y-46	2	Name Transfer
Y-6708	2	Door Clamping Spring
	2	Hex Head Parker Kalon Screws 3/8 x 5/8
Y-6640	2	Air Condensers
	20	Hex Cap Screws 1/2-13 x 3/4 Cad. Pl.
	20	*Lock Washers 1/2 Cad.Pl.
Y-6710	2	Condenser Guard
	28	*Parker Kalon C.S. #14 x 1/2 Cad. Pl.
Y-6422		(Not used on Model "D")

*Interchangeable between Model "C" and "D" units.

REF. NO. MANUAL 1025-A	PART NO. MODEL "D"	REQ. "D" UNIT	NAME
	*Y-6113-C	1	Refrigerant Receiver
	*Y-6404	2	Receiver Valve
	*Y-6405	1	Reducing Elbow 1-5/8 x 1-3/8
	*Y-6418	1	Flexible Metal Tube 3/4
	*Y-6419	1	Flexible Metal Tube 1-3/8
	Y-6517		(Not used on Model "D")
	*Y-6157	1	Fuel Hose
	*Y-6526	1	Solenoid Valve
	*Y-6203	1	Temperature Switch
	*Y-6492	1	Flexible Tubing Strap Clamp
	Y-6742	1	Flex. Tubing Strap
		1	*Hex Nut 3/8-16 Cad. Pl.
		1	*Lock Washer 3/8 Cad. Pl.
		1	*Hex Cap Screw 3/8-16 x 2-1/4 Cad. Pl.
	OY-6715	1	Mounting Track (R.H.)
	OY-6714	1	Mounting Track (L.H.)
	OY-6716	2	Track Extension
	Y-6814	2	Wheel Stop
	Y-6817	2	Track Extension Pin
	Y-6413	1	Flexible Tubing Support
	*Y-6415	1	Flexible Tubing Support Clamp
		2	*Cap Screw 1/2-13 x 1-1/4
		2	*Lock Washers 1/2 Cad. Pl.
		1	*Cap Screw 5/8-11 x 2-1/2 Cad. Pl.
		1	*Lock Washer 5/8 Cad. Pl.
	Y-6779	2	#16 - 4-Wire Tirex 62"
	Y-6775	1	#14 Wire 8" - Starting Switch
	Y-6778	1	#16 - 3-Wire 12" - To High Pressure Switch
	Y-6778	1	#16 - 3-Wire 20" - To Low Pressure Switch
	Y-6778	1	#16 3-Wire 24" - To Warp Switch

*Interchangeable between Model "C" and "D" units.

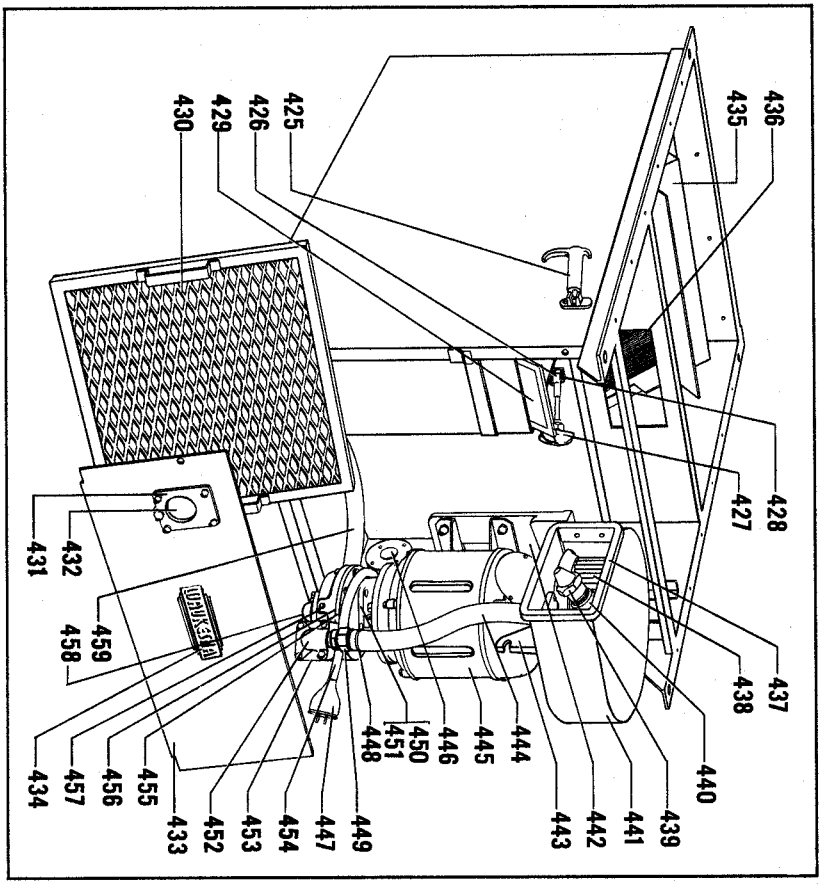


Fig. 5

SUB-COOLER

MODEL "D"

SUB-COOLER PARTS MODEL "D"

(For REFERENCE NO. See Figure 5 of Supplement)

REF. NO.	PART NO.	REQUIRED	NAME
425	Y-6382	2	Hood Fastener
		4	Rd. Hd. Parker Kalon #10 x 1/2 Type-Z
	Y-9087	2	Hood Fastener Spacers
426	Y-9090	1	Sub-Cooler Eye-Bolt
427	Y-9048	1	Sub-Cooler Lock Knob
	Y-9075	1	Eye-Bolt Hinge
428	Y-9131	1	Eye-Bolt Hinge Pin
		1	S.A.E. Cotter Pin 3/32 x 1/2 lg. Cad. Pl.
429	OY-9043	1	Strainer
430	OY-9042	1	Air Filter
431	Y-9094	1	Water Filler Flange
		4	Hex Hd. Parker Kalon Cap Screws #14 x 3/8 Cad.Pl.
432	Y-9095	1	Water Filler Cover
	Y-9096	1	Water Filler Cover Pin
		2	Cotter Pin 3/32 x 3/4 lg.
	Y-9123	1	Water Filler Cover Spring
433	Y-9083	1	Front Cover
	Y-9082	1	Water Stream Deflector
434	*Y-46	1	Name Transfer
435	OY-9057	1	Deflector Plate
		2	Hex Hd. Parker Kalons #14 x 3/8 Cad. Pl.
436	*Y-9030	1	Evaporative Sub-Cooler Coil
		4	Hex Hd. Cap Screws 3/8-16 Cad. Pl. (3/4)
		4	Hex Nuts 3/8-16 Cad.Pl.
		4	Lock Washers Cad. Pl.
		2	Hex Hd. Parker Kalon Cap Screws #14 - 3/8 Cad.Pl.
	Y-9077	2	Refrigerant Line Outlet Discs
	Y-9130	2	Refrigerant Line Gaskets
		6	Round Hd. Parker Kalons "Z" #10 x 3/8
	Y-9086	1	Top Cover
		20	Hex Hd. Parker Kalons #14 x 3/8 Cad. Pl.
	Y-9108	1	Grille
		8	Hex Head Parker Kalon #14 x 3/8 Cad. Pl.
	*Y-9097	1	Pipe Plug 2-1/2 Ctsk.
		1	Pipe Plug 3/4 sq. hd.
437	Y-9125-A	1	Fan Housing Gasket
	Y-9143	1	Gasket Retainer
438	Y-9055	1	5/8 Fan Assy. 2/3 width
439	Y-9050	1	Spray Nozzle

*Interchangeable between Model "D" and "C" Sub-Cooler

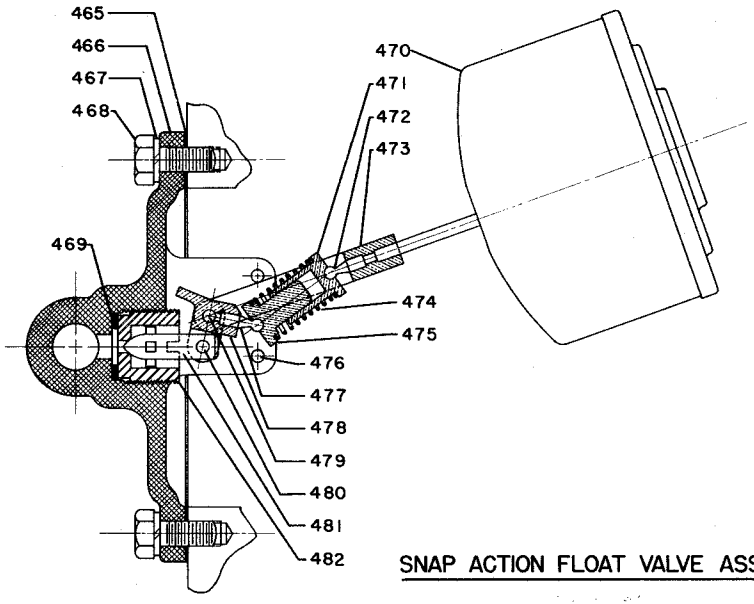
REF. NO.	PART NO.	REQUIRED	NAME
440	Y-9051	1	Spray Nozzle Support
		2	Hex Hd. Cap Screws 3/8-16 x 5/8 Cad. Pl.
		2	Lock Washers 3/8 Cad.Pl.
	Y-9126	1	Spray Nozzle Hose Coupling
	Y-9129	1	Double Tight Hose Clamp
441	OY-9047-A	1	Fan Housing Assembly
442	Y-9046	1	Hinge - Moveable
443	Y-9054	1	Inlet Ring and Housing Support
		4	Hex Hd. Cap Screws 5/16-18 x 5/8 Cad. Pl.
		4	Lock Washers 5/16 C.P.
		4	Hex Hd. Cap Screws 3/8-16 x 1-3/8 Cad. Pl.
		4	Lock Washers 3/8 Cad.Pl.
		4	Hex Nuts 3/8-16 Cad. Pl.
	Y-9045	1	Hinge - Stationary
	Y-9101	1	Sub-Cooler Hinge Pin
	Y-9134	1	Lower Hinge Pin
444	Y-9128	1	Sub-Cooler Discharge Hose
445	Y-9056	1	Sub-Cooler Motor
	*SW-3	2	Brushes for Motor
446	Y-9099	1	Cover Receptacle
	Y-6139	1	Octagon Outlet Box 3-1/4
447	Y-9100	1	Short Rubber Cover
	Y-9098	1	Twist Lock Cap
		2	Rd. Hd. Parker Kalon #10 x 3/8 Cad. Pl.
448	Y-9129	1	Hose Clamp
449	Y-9092	1	3/4 Hose Coupling (Female)
	Y-9091	1	3/4 Male Hose Nipple
	Y-9135	1	3/4 Hose Washer
450	*Y-9037	1	Split Flange - Male
451	*Y-9038	1	Split Flange - Female
		2	Hex Hd. Cap Screws 3/8-16 x 1-1/4 Cad. Pl.
	*Y-9142	1	Water Pump Packing
452	*Y-9049	1	Flanged Elbow 90°
453	*Y-9034	1	Flange Gasket
	*B-2135	4	Copper Washers
		2	Hex Hd. Cap Screws 1/4-20 x 3/4 Cad. Pl.
		2	Hex Hd. Cap Screws 1/4-20 x 1-5/8 Cad. Pl.
454		1	2-Wire Tirex #12 x 24" lg.
455	*Y-903	1	Water Pump Body
		8	Hex Hd. Cap Screws 1/4-20 x 3/4 Cad. Pl.

*Interchangeable between Model "D" and "C" Sub-Cooler

REF. NO.	PART NO.	REQUIRED	NAME
	*B-2135	8	Copper Washers
456	*Y-9035	1	Water Pump Body Gasket
457	*Y-9032	1	Water Pump Body Cover
	*B-5911	1	Angle Drain Cock
		1	Sq. Hd. Pipe Plug 1/8
	*Y-9132	1	Sub-Cooler Pump Impeller
		1	Allen Hd. Set Screw 5/16 -18 x 3/8 Cad. Pl.
		2	Plain Washer 3/8 Cad.Pl.
458	*Y-9049	1	Flanged Elbow 90°
	*Y-9034	1	Flange Gasket
		2	Hex Hd. Cap Screws 1/4-20 x 1 Cad. Pl.
		2	Hex Hd. Cap Screws 1/4-20 x 1-3/4 Cad. Pl.
		4	Hex Nuts 1/4-20 Cad. Pl.
	Y-9091	1	Male Hose Nipple 3/4
	Y-9135	1	Hose Washer 3/4
	Y-9092	1	Hose Coupling 3/4 (Female)
459	Y-9127	1	Sub-Cooler Suction Hose
	Y-9129	2	Double Tight Hose Clamps
	SUB-COOLER ACCESSORY MODEL "D" PRESSURE SWITCH (No REF. NO.)		
	0Y-9140	1	Pressure Switch Assembly
	*Y-9028	1	Pressure Switch
	Y-9138	1	Pressure Switch Bracket
		2	Rd. Hd. Mach. Screws #8-32 x 1/4 Cad. Pl.
		2	Lock Washers #1208 C.P.
		2	Hex Hd. Cap Screws 3/8-16 x 3/4 Cad. Pl.
		2	Hex Nuts 3/8-16 Cad. Pl.
		2	Lock Washers 3/8 Cad.Pl.
	Y-6468	1	Angle Valve
	Y-9139	1	#12 Two-Wire Tirex 25" lg.
	Y-9141	1	Ralco Cord Grip
	Y-6207	1	Rubber Grommet
		1	Copper Tube 1/4 x 50"
	Y-188	1	Flare Nut

*Interchangeable between Model "D" and "C" Sub-Cooler

SK-378



SNAP ACTION FLOAT VALVE ASSEMBLY

Fig. 6

IN ALL FRACTIONAL MACHINE DIMENSIONS ALLOW ±.010 UNLESS OTHERWISE SPECIFIED
REF. DIMS.

MODELS — DRAWN G.A.LOEW TRACED 7-18-38 CHECKED APPROVED

C FILE

WAUKESHA MOTOR CO. WAUKESHA, WIS.

SK-378 PART NO.

Form 993-D-350-6-38

SUB-COOLER ACCESSORY MODEL "D" SNAP ACTION FLOAT VALVE OY-14106 (For REFERENCE NO. See Fig. 6 of Supplement)

REF. NO.	PART NO.	REQUIRED	NAME
465	Y-14113	1	Float Valve Body Gskt.
466	Y-14106-A	1	Float Valve Body
467		6	Lock Washer 1/4 Cad.Pl.
468		6	Cap Screw 1/4-20 x 5/8 Cad. Plated
469	BD-190	1	Copper Washer
470	Y-14112	1	Float
471	Y-14102-A	1	Needle Valve Spring Retainer
472	Y-14109	1	Needle Valve Spring Pivot
473	Y-14104	1	Float Valve Yoke
474	Y-14111	1	Needle Valve Spring
475	Y-14110-B	1	Valve Spring Retainer Guide
476	Y-14105	2	Travel Limiting Pin
477	Y-14109	1	Needle Valve Spring Pivot
478	Y-14107	1	Needle Valve Lever
479	Y-14097	1	Float Valve Yoke Shaft
480	Y-14114	1	Needle Valve Pivot Pin
481	Y-14101	1	Needle Valve
482	Y-14108	1	Needle Valve Seat

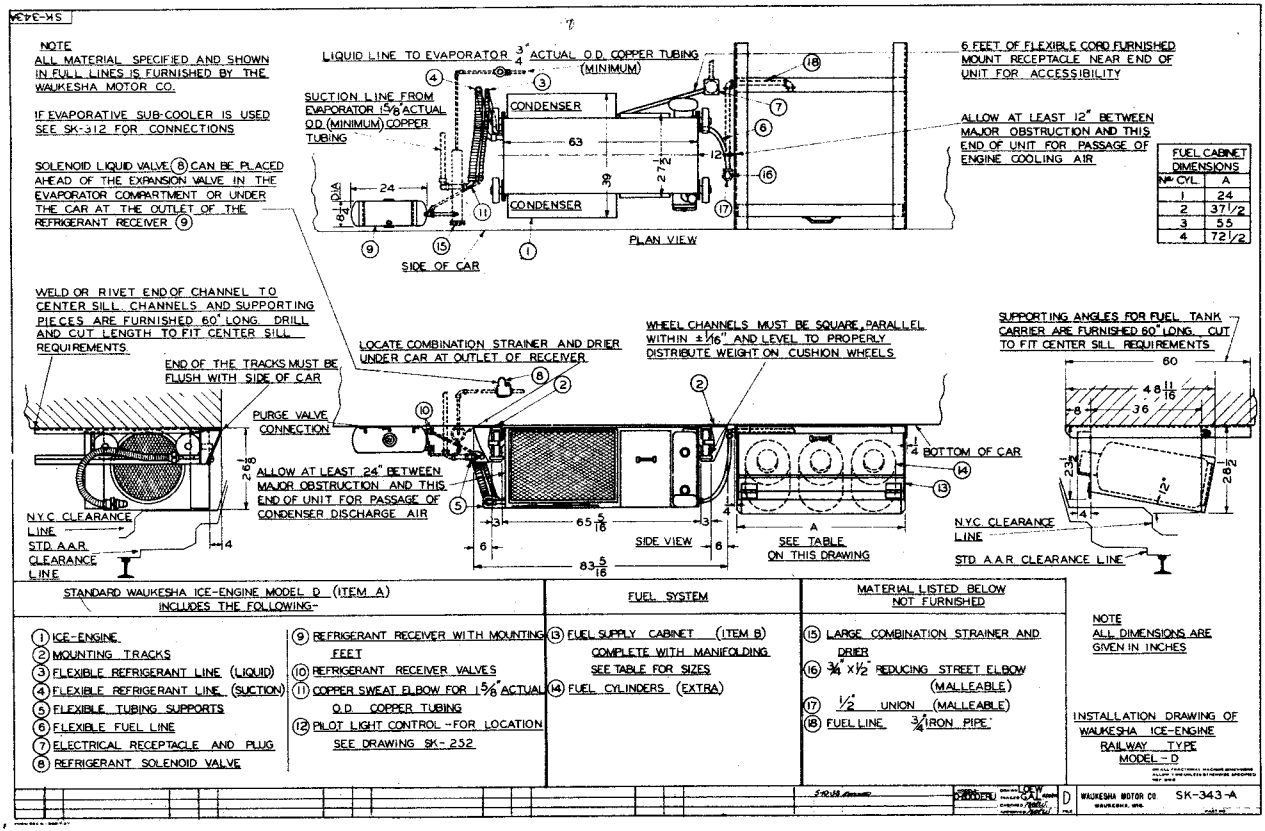
FUEL SYSTEM PARTS - 3-CFC-1
(Ref. Fig. 4)

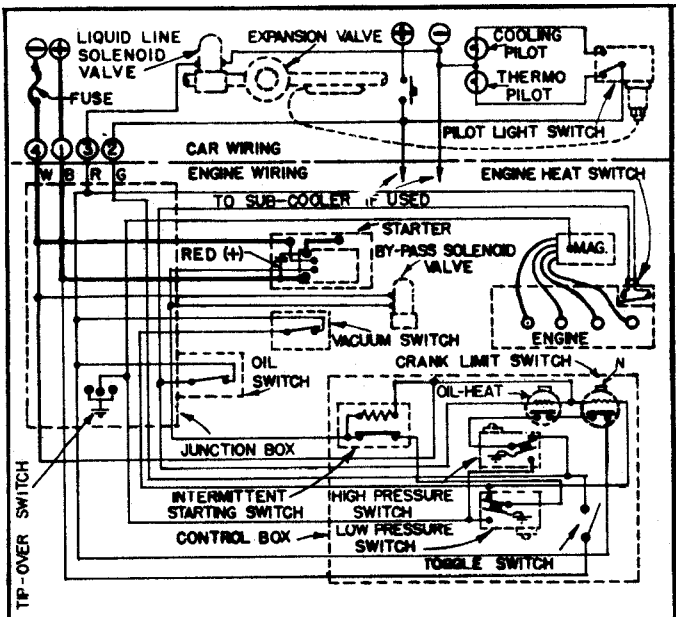
REF. NO. MANUAL 1025-A	PART NO. MODEL "D"	REQ. "D" UNIT	NAME
500	*Y-6169-A	3	High Pressure Fuel Hose
501	*Y-6218	6	Regulator Assembly Clamp
		6	*Hex Cap Screws 3/8-16 x 2-1/2 Cad. Pl.
		6	*Hex Nuts 3/8-16 C.P.
		6	*Lock Washers 3/8 C.P.
502	*Y-6167-A	3	Check Valve
			*Seat (Disc) 2885-6
			*Spring (2885-8)
503	*Y-6163-B	1	Regulator Set at 30#
	*Y-6164-B	1	Regulator Set at 45#
	*Y-6165-B	1	Regulator Set at 60#
			*Seat Disc (2761-16)
			*Diaphragm (2761-9)
			*Diaphragm Washer (1147-23)
			Back Cap Washer (1147-21)
504	*Y-6166	3	Special Globe Valve
			*Seat Disc (2651-9R)
			*Diaphragm (3) - (2852-4)
	*Y-6545	3	Nipples 1/4 x 1-1/4 Brass
505	*Y-6162	1	Regulator (Large)
		1	*Diaphragm (5800-A)
			*Seat (Disc) - (1175-16)
			*Spring (5800-6)
506	(Built in) (Regulator)	1	Safety Relief Valve
507	*Y-6168	1	Pressure Gauge
	Y-6603	1	Pipe Nipple 3/4 x 13-1/2 galv.
	*Y-11119	1	Elbow 3/4 Mall. Galv.
	OY-6597	1	Pipe Nipple Assy. (Short)
	OY-6598	1	Pipe Nipple Assy. (Long)
	B-3104	2	Slotted Head Pipe Plug 1/8
	*Y-6542	1	Close Nipple 1/4 Brass
	*Y-6543	1	Tee 1/4 Brass
		2	*Elbows 1/4-90° Brass
	*B-5526	1	Half Union 3/8 Flare x 1/4 Male Pipe
	*B-5528	10	Flare Nut 3/8
	*B-10455	2	Flare Tube Tee 3/8
	*B-1687	3	Half Union Elbow 3/8 Flare x 1/4 Male Pipe
508	*Y-6558	3	Cylinder Shut-Off Valve (2759)
			Seat (Disc) - (2651-9R)
			Diaphragm (3713-4)
			Slug Check Spring (2758-3)

*Interchangeable between Model "C" and "D" units.

REF. NO. MANUAL 1025-A	PART NO. MODEL "D"	REQ. "D" UNIT	NAME
			Lock Nut Washer (2950-2)
			Check Disc (2885-6)
			Check Spring (2995-8)
			Plug (2759-2)
			Plug Chain with Ring on Both Ends (2759-3)
509	*ZA-758	3	Fuel Cylinder 4-B-240
	*ZA-759	3	Fuel Cylinder 4-B-260
510	*ZA-755	1	3-Cyl. Fuel Carrier
	Y-6187 to 0Y-6212		(Not used on Model "D")
	Y-6528	3	Fuel Cylinder Clamp Spring
		3	Hex Hd. Cap Screws 1/2-13 x 1 Cad. Pl.
		3	Hex Nuts 1/2-13 Cad. Pl.
		3	Lock Washers 3/8 Cad. Pl.
	Y-6071	2	Door Pull
511	0Y-6602	1	Tank Instruction Holder Assembly
	Y-6212	1	Tank Instruction Holder
	Y-6211	1	Transparent Holder
		1	Blueprint SK-149-A
512	*Y-6382	2	Hood Fastener
	Y-6220	2	Hood Fastener Catch
513	*Y-6401	1	Excess Flow Valve
			*Diaphragm (2779-9)
			*Seat (Disc) - (2779-6)
			*Spring (2779-13)
	*Y-46	1	Name Transfer
	65508-A	1	Name Plate

*Interchangeable between Model "C" and "D" units.


NOTE
ALL MATERIAL SPECIFIED AND SHOWN IN FULL LINES IS FURNISHED BY THE WAUKESHA MOTOR CO.
IF EVAPORATIVE SUB-COOLER IS USED SEE SK-312 FOR CONNECTIONS
SOLENOID LIQUID VALVE (8) CAN BE PLACED AHEAD OF THE EXPANSION VALVE IN THE EVAPORATOR COMPARTMENT OR UNDER THE CAR AT THE OUTLET OF THE REFRIGERANT RECEIVER (9)
LIQUID LINE TO EVAPORATOR 3/4" ACTUAL O.D. COPPER TUBING (MINIMUM)
SUCTION LINE FROM EVAPORATOR 1 5/8" ACTUAL O.D. (MINIMUM) COPPER TUBING
CONDENSER
CONDENSER
63
39
27 1/2
12
24
6 1/4 DIA
PLAN VIEW
SIDE OF CAR
6 FEET OF FLEXIBLE CORD FURNISHED MOUNT RECEPTACLE NEAR END OF UNIT FOR ACCESSIBILITY
ALLOW AT LEAST 12" BETWEEN MAJOR OBSTRUCTION AND THIS END OF UNIT FOR PASSAGE OF ENGINE COOLING AIR
FUEL CABINET DIMENSIONS
No. CYL. | A
1 | 24
2 | 37 1/2
3 | 55
4 | 72 1/2
WELD OR RIVET END OF CHANNEL TO CENTER SILL. CHANNELS AND SUPPORTING PIECES ARE FURNISHED 60" LONG. DRILL AND CUT LENGTH TO FIT CENTER SILL REQUIREMENTS
END OF THE TRACKS MUST BE FLUSH WITH SIDE OF CAR
PURGE VALVE CONNECTION
26 1/8
N.Y.C. CLEARANCE LINE
STD. A.A.R. CLEARANCE LINE
4
LOCATE COMBINATION STRAINER AND DRIER UNDER CAR AT OUTLET OF RECEIVER
ALLOW AT LEAST 24" BETWEEN MAJOR OBSTRUCTION AND THIS END OF UNIT FOR PASSAGE OF CONDENSER DISCHARGE AIR
3
65 5/16
3
6
6
83 5/16
SIDE VIEW
WHEEL CHANNELS MUST BE SQUARE, PARALLEL WITHIN 1/16" AND LEVEL TO PROPERLY DISTRIBUTE WEIGHT ON CUSHION WHEELS
1/4
BOTTOM OF CAR
A
SEE TABLE ON THIS DRAWING
SUPPORTING ANGLES FOR FUEL TANK CARRIER ARE FURNISHED 60" LONG. CUT TO FIT CENTER SILL REQUIREMENTS
60
48 11/16
8
36
23 3/4
28 1/2
12°
1/4
N.Y.C. CLEARANCE LINE
STD. A.A.R. CLEARANCE LINE
STANDARD WAUKESHA ICE-ENGINE MODEL D (ITEM A) INCLUDES THE FOLLOWING-
(1) ICE-ENGINE
(2) MOUNTING TRACKS
(3) FLEXIBLE REFRIGERANT LINE (LIQUID)
(4) FLEXIBLE REFRIGERANT LINE (SUCTION)
(5) FLEXIBLE TUBING SUPPORTS
(6) FLEXIBLE FUEL LINE
(7) ELECTRICAL RECEPTACLE AND PLUG
(8) REFRIGERANT SOLENOID VALVE
(9) REFRIGERANT RECEIVER WITH MOUNTING FEET
(10) REFRIGERANT RECEIVER VALVES
(11) COPPER SWEAT ELBOW FOR 1 5/8" ACTUAL O.D. COPPER TUBING
(12) PILOT LIGHT CONTROL - FOR LOCATION SEE DRAWING SK-252
FUEL SYSTEM
(13) FUEL SUPPLY CABINET (ITEM B) COMPLETE WITH MANIFOLDING SEE TABLE FOR SIZES
(14) FUEL CYLINDERS (EXTRA)
MATERIAL LISTED BELOW NOT FURNISHED
(15) LARGE COMBINATION STRAINER AND DRIER
(16) 3/4" x 1/2" REDUCING STREET ELBOW (MALLEABLE)
(17) 1/2" UNION (MALLEABLE)
(18) FUEL LINE 3/4" IRON PIPE
NOTE
ALL DIMENSIONS ARE GIVEN IN INCHES
INSTALLATION DRAWING OF WAUKESHA ICE-ENGINE RAILWAY TYPE MODEL - D
DRW
D
WAUKESHA MOTOR CO
SK-343-A



OPERATING INSTRUCTIONS SK-360-B

TO START COOLING UNIT FROM CONTROL BOX
Turn blower fan to "ON" at car panel and lift Toggle Switch in control box.

TO START COOLING UNIT FROM CAR PANEL
Turn blower fan to "ON" and cooling switch to "LOW." Thermostat pilot light will show if thermostat is on and will switch to the cooling pilot light when unit starts cooling.

UNIT FAILS TO START
If starter fails to crank engine:
1. Check Starter Crank Limit Switch. If word "OFF" appears, push down reset button "H."
2. See that Intermittent Starting Switch contacts are closed.
3. Check High and Low Pressure Switches.

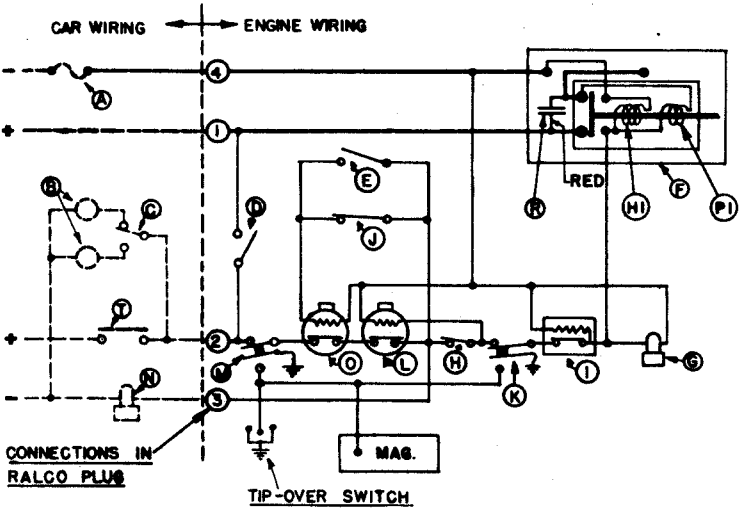
If starter cranks engine but engine fails to start:
1. Check Fuel Supply. See instructions in fuel carrier cover.
2. Check Spark at spark plugs. If no spark, check for ground on magneto by removing wire at top of magneto.

If unit fails to stop, manually operate low pressure switch.

(ENGINE HEAT SWITCH COMBINED WITH OIL SWITCH ON UNITS NO. 1960 & UP

REVISED 6/3/40
REVISED 5/21/40
REVISED 6-28-39
REVISED 4/28
4/26/38

WAUKESHA MOTOR CO. WAUKESHA, WIS.	TITLE- WIRING DIAGRAM FOR MODEL "D" ICE-ENGINE	DR EK CH EF APP	A FILE	SK 360-B

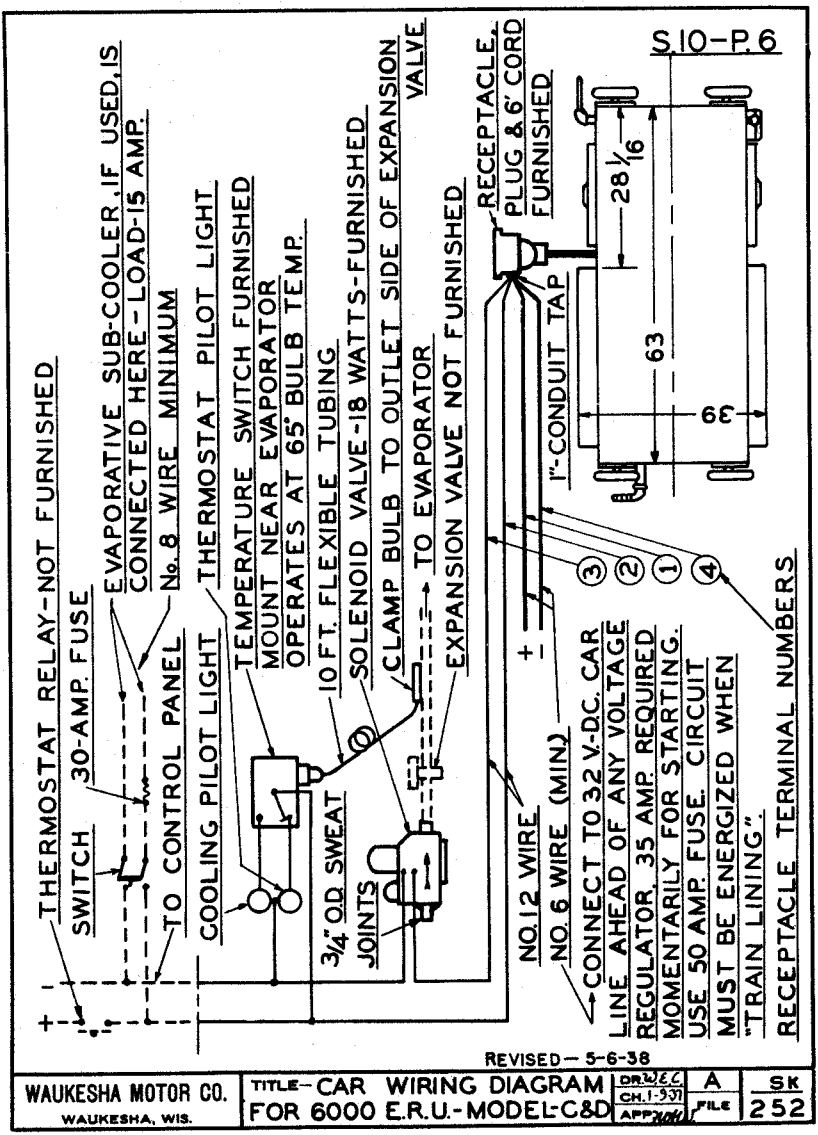


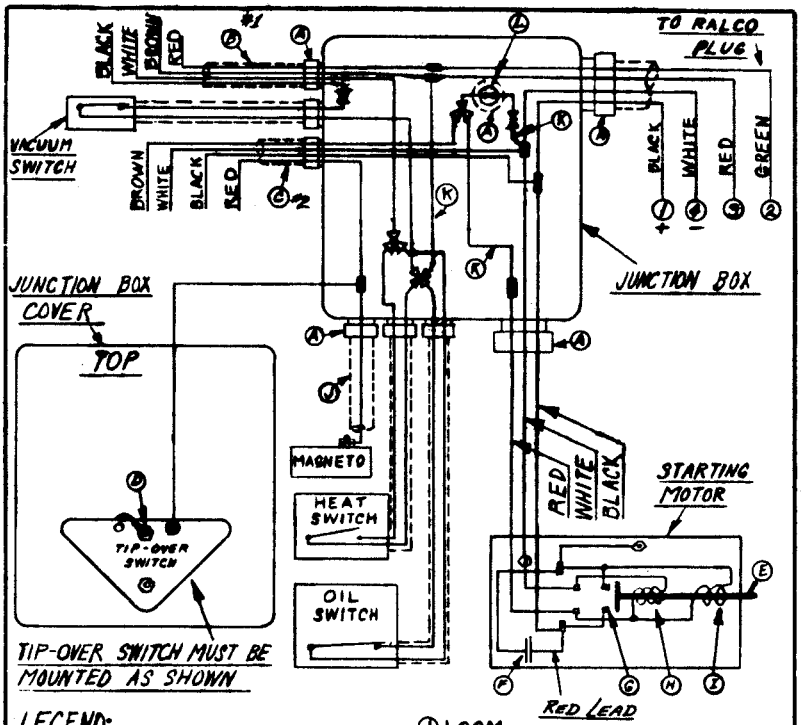
A	FUSE
B	PILOT LIGHTS
C	PILOT LIGHT TEMPERATURE SWITCH
D	TOGGLE STARTING SWITCH
E	ENGINE HEAT SWITCH
F	STARTING MOTOR
G	BY-PASS SOLENOID VALVE
H	VACUUM SWITCH
I	INTERMITTENT STARTING SWITCH
J	OIL PRESSURE SWITCH
K	LOW PRESSURE SWITCH
L	CRANKING LIMIT SWITCH
M	HIGH PRESSURE SWITCH
N	SOLENOID REFRIGERANT VALVE
T	THERMOSTAT RELAY
HI	HOLD-IN COIL
PI	PULL-IN COIL
R	CONDENSER
O	OIL-HEAT STOP SWITCH

(CONTACTS (E) & (J) COMBINED INTO ONE ON UNITS NO. 1860 & UP)

REVISED 6/3/40
REVISED 5/21/40
REVISED 4/31/31
REVISED 4/1/38
3/23/38

WAUKESHA MOTOR CO. WAUKESHA, WIS	TITLE— WIRING DIAGRAM FOR MODEL "D" ICE-ENGINE	DR. [illegible] CH. [illegible] APP. [illegible]	A FILE	S K 363-B


THERMOSTAT RELAY-NOT FURNISHED
SWITCH
30-AMP. FUSE
EVAPORATIVE SUB-COOLER, IF USED, IS CONNECTED HERE-LOAD-15 AMP.
TO CONTROL PANEL
No. 8 WIRE MINIMUM
COOLING PILOT LIGHT
THERMOSTAT PILOT LIGHT
TEMPERATURE SWITCH FURNISHED
MOUNT NEAR EVAPORATOR
OPERATES AT 65° BULB TEMP.
10 FT. FLEXIBLE TUBING
3/4" O.D. SWEAT JOINTS
SOLENOID VALVE-18 WATTS-FURNISHED
CLAMP BULB TO OUTLET SIDE OF EXPANSION VALVE
TO EVAPORATOR
EXPANSION VALVE NOT FURNISHED
RECEPTACLE
PLUG & 6' CORD FURNISHED
1"-CONDUIT TAP
NO. 12 WIRE
NO. 6 WIRE (MIN.)
CONNECT TO 32 V.-D.C. CAR LINE AHEAD OF ANY VOLTAGE REGULATOR. 35 AMP. REQUIRED MOMENTARILY FOR STARTING. USE 50 AMP. FUSE. CIRCUIT MUST BE ENERGIZED WHEN "TRAIN LINING".
RECEPTACLE TERMINAL NUMBERS
S10-P.6
28 1/16
63
39
REVISED—5-6-38
WAUKESHA MOTOR CO.
WAUKESHA, WIS.
TITLE—CAR WIRING DIAGRAM FOR 6000 E.R.U.-MODEL-C&D
DR. W.E.C.
CH. 1-31
APP.
A
FILE
SK 252



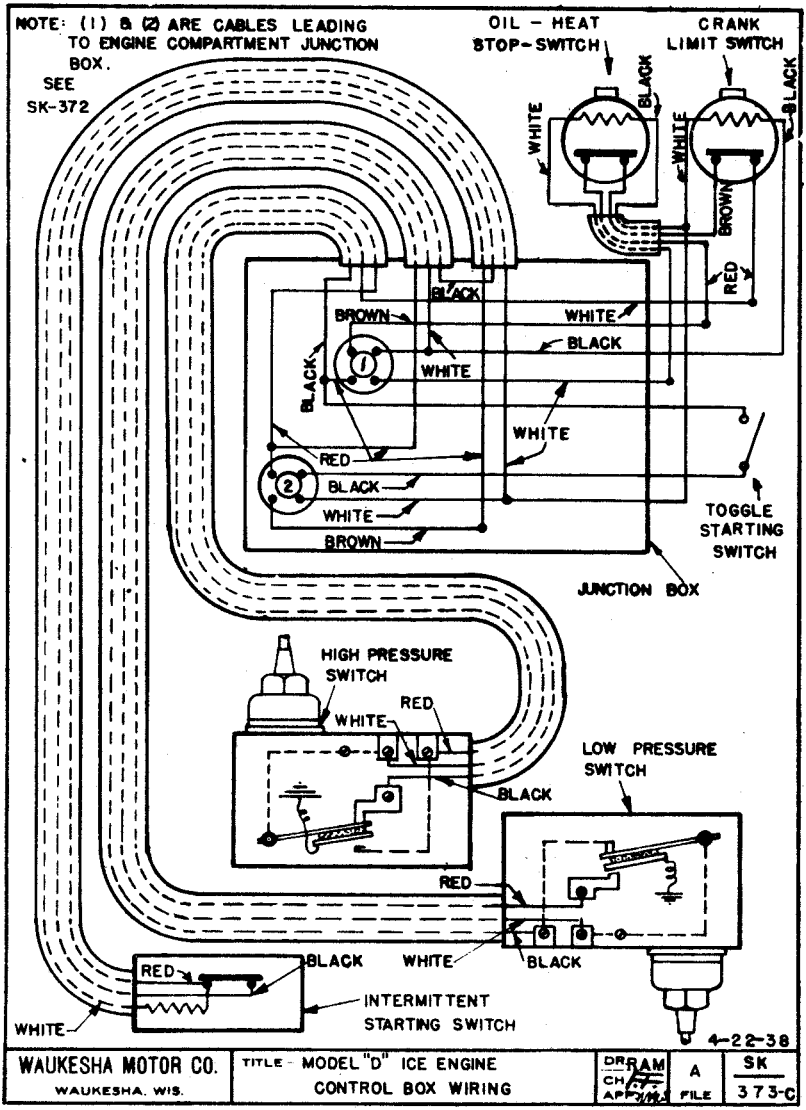
LEGEND:

- (A) CORD GRIP
- (B) CABLE TO CONTROL BOX (#1)
- (C) CABLE TO CONTROL BOX (#2)
- (D) INCLUDE TIP-OVER SWITCH GROUNDING WIRE UNDER NUT OF MOUNTING SCREW
- (E) SOLENOID PLUNGER CONNECTED TO STARTER PINION
- (F) CONDENSER
- (G) MAIN STARTING CONTACTS
- (H) SOLENOID HOLD-IN COIL
- (I) SOLENOID PULL-IN COIL
- (J) LOOM
- ⟿ THIS SYMBOL INDICATES A CONNECTION CONSISTING OF WEDGE ON TERMINALS FASTENED TOGETHER WITH A SCREW AND WELL TAPED.
- ▬ THIS SYMBOL INDICATES A TWISTED AND SOLDERED JOINT WELL TAPED.
- (K) #14 GA. WIRE EXTENSION FROM HEAVY WIRE IN CABLE
- (L) CONNECTION TO SOLENOID BY-PASS VALVE

(HEAT SWITCH & OIL SWITCH COMBINED INTO ONE ON UNITS No. 11650 & UP)

REVISED 6-14-39
REVISED 5-19-39

WAUKESHA MOTOR CO. WAUKESHA, WIS.	TITLE— MODEL "D" ICE-ENGINE JUNCTION BOX WIRING	DR. MA CH. MA APP.	A	SK 372-C


NOTE: (1) & (2) ARE CABLES LEADING TO ENGINE COMPARTMENT JUNCTION BOX. SEE SK-372
OIL - HEAT STOP-SWITCH
CRANK LIMIT SWITCH
WHITE
BLACK
WHITE
BLACK
BROWN
RED
BLACK
BROWN
WHITE
BLACK
WHITE
BLACK
WHITE
RED
2
BLACK
WHITE
BROWN
TOGGLE STARTING SWITCH
JUNCTION BOX
HIGH PRESSURE SWITCH
RED
WHITE
LOW PRESSURE SWITCH
BLACK
RED
RED
BLACK
WHITE
BLACK
WHITE
INTERMITTENT STARTING SWITCH
4-22-38
WAUKESHA MOTOR CO.
WAUKESHA, WIS.
TITLE - MODEL "D" ICE ENGINE CONTROL BOX WIRING
DR RAM
CH
APP
A
FILE
SK
373-C