

FOR INSTALLING AND OPERATING

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Fairbanks-Morse
Type "C-O"
Heavy Duty Marine
Oil Engines

30, 45 and 60 H. P.

This pamphlet should be carefully read before attempting to do anything with the engine



FAIRBANKS, MORSE & CO.

(INCORPORATED)

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INSTRUCTIONS NO. 2519A

For Installing and Operating

Fairbanks-Morse Type "C-O" Engines

These engines operate on the "two-cycle system" and are designed to use kerosene, distillate, gas oil, fuel oil, and crude oil. The system used differs from that of the ordinary two-cycle gasoline engine in several important particulars.

The main frame or crank case is closed, and serves as a pump for air. The air enters the crank case through an automatic suction valve, and as the piston moves downward, the air is slightly compressed. Just before the end of this stroke the exhaust ports in the cylinder are uncovered by the piston, allowing the burned gases in the cylinder to escape.

Inlet ports in the opposite side of the cylinder communicate with the crank case through the air or transfer passage. Shortly after the exhaust ports have opened, the air ports are uncovered by the piston and pure air rushes from the crank case to the cylinder, cleaning the latter of exhaust or burned gases and charging it with fresh air. This air is trapped in the cylinder on the subsequent closing of the air and exhaust ports and as the piston moves upward compression of the air takes place.

Shortly before the upper dead center is reached, the injection pump forces a fine spray of oil fuel into the combustion chamber in the cylinder head. This vaporizes and mixes with the compressed air in the combustion space. At the dead center, when the compression has reached its maximum, ignition automatically occurs. The resulting pressure drives the piston downward doing useful work. After expansion has occurred the exhaust ports again open, and the cycle of operations is completed.

A very rigid foundation, properly bolted to the boat is absolutely essential for the satisfactory operation of the engine.

When the engine is installed line it up very carefully with the propeller and intermediate shafts, otherwise there will be hot bearings and waste of power on account of excessive friction.

The exhaust pipe must not be less than 5" and if it is of excessive length or contains an unusual number of bends, make the whole line of 6" pipe. In making up the exhaust pipe make it as short and as direct as possible, avoid all sharp bends and use only long sweep elbows, or preferable 45° elbows, when a turn is necessary.

Install a sufficient number of flanges in the line so that it will be possible to conveniently take the pipe apart for an occasional cleaning. The exhaust pipe will be hot while the engine is in operation and care should be exercised that there is no danger of the hot pipe setting the vessel on fire. Insulate the pipe where necessary and leave an air space of several inches where the pipe passes through wooden decks or bulkheads. Arrange the exhaust line in such a way that it will not interfere with work on the engine, such as removing pistons, etc.

A free exhaust is essential to the satisfactory operation of the engine, and no reasonable expense should be spared to provide a good exhaust line.

The most satisfactory exhaust installation is made up by using a stack as shown on page 2. This stack with the base and other necessary special fittings can be supplied from the factory. As can be noted from the cut, the base of the stack is kept filled with water from the engine circulating water system. This water will extinguish all sparks that might be thrown out with the exhaust gases and thus eliminate any danger of the sails or any part of the vessel catching fire.

This stack is so designed that it may be used for a twin installation by removing the blind flange and supplying a long sweep elbow. Riveted pipe may be used for the stack, in which case a flange with standard bolt spacing must be fitted to the stack for riveting.

**Two-Stroke
Cycle****Fuels Used****Cycle of
Operation****Exhaust****Inlet****Com-
pression****Injection****Ignition****Foundation
Bed****Exhaust
Pipe****Exhaust
Stack**

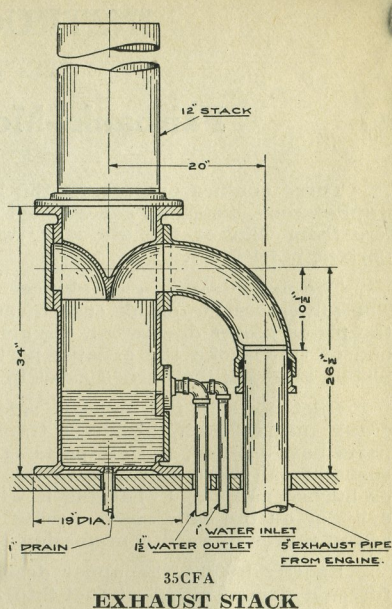
**Circulating
Water
Inlet**

Generally an intake well or box, provided with a grating or screen is installed in the vessel. The circulating water should be taken from this well to the circulating pump by using pipe not smaller in size than the flange on the pump, and this pipe should be run as directly as possible. If it is more than ten feet long, it is advisable to use larger size pipe. A sea cock is placed next to the intake well so that it is possible to shut off the water in case work has to be done on the pipe line.

An air chamber placed in the suction pipe line will tend to make the pump operate more quietly. A suitable air chamber may be made by using a short nipple and pipe fittings.

**Circulating
Water
Outlet**

If an exhaust stack is used, the circulating water is piped from the exhaust manifold to the inlet on the exhaust stack, and from the stack it should run overboard as directly as possible. In every case use pipe the same size as the flanges provided or larger. If no exhaust stack is used, the outlet water should be piped overboard as directly as possible. Never place any valves in the outlet line.

**Installation
of Fuel
Tank**

The fuel tank must be securely fastened in the boat and should be placed high enough so that the fuel pumps do not have to lift the fuel. An elevation of from one to four feet above the level of the pumps is desirable. The tank must be provided with an air vent so as to maintain atmospheric pressure on the oil-level. If it is necessary to have the fuel tank placed below the oil pump level, an auxiliary pump should be used to pump the fuel into a small auxiliary tank placed above the fuel pumps. This tank then supplies the injection pumps, the overflow being led back to the main tank.

**Auxiliary
Fuel
Pump**

An auxiliary fuel pump (145A-C) ready to attach to the engine, can be furnished by the factory and should be piped up as shown by diagram 15C2FA. Make sure that the pipes used for the fuel line are absolutely clean. Use shellac on all connections to insure tight joints.

**To Prime
Pump**

After the fuel line has been completed, it becomes necessary to fill the injection pipes leading to the injection nozzles. Disconnect these pipes at the injection pump discharge valve (206A). Set the lever (892) against the small stop pin. By means of the handle (557A) work the pump plunger up and down until the oil comes out at the discharge valve (544A). Should the pump refuse to work, prime the pump and hold your hand over the outlet. Work the pump again, as before, and if required, prime again. Continue this until all the air is out of the pump and oil comes out at the top. Connect the injection pipe at the pump and disconnect it at the injection nozzle. Pump until oil comes out at the end of the pipe. Then take the injection nozzle out of the cylinder head and screw it onto the pipe. Work the pump again until all the air is driven out. This is the case when after working the handle (557A) with a jerk, the flow of oil stops, abruptly. The oil must come out of the nozzle in the form of a fine spray without any heavy core. If a core exists renew the tip and spiral (204A). These operations have to be gone through on all pumps and injection nozzles.

**To Clean
Fuel
Strainer**

A strainer (465A) of fine mesh wire gauze, to strain the fuel is located in the pump bracket. If necessary this strainer can be cleaned without stopping the engine. To do this, proceed as follows: Shut off the fuel at the pump bracket and immediately open the pet cock. Take off the strainer cover (466A), pull out the strainer (465A) and clean it thoroughly with kerosene or gasoline. While doing this take care that the oil level does not drop too low or the engine will stop. Have a can of clean fuel ready and if

necessary pour some into the fuel reservoir, in the pump bracket. Replace the strainer and cover, leaving the pet cock open, and turn on the fuel again. When all the air has passed through the pet cock, close it.

Compressed air is used for starting these engines. An air compressor mounted on the engine is used to charge the air tanks while the engine is in operation, but it is advisable to have an independent small auxiliary air compressor or hand pump to fill the tanks, in case the air should be lost while the engine is standing still. Such a set is also used to pump up the tanks for the first start.

**Air
Compressor**

When installing the air tanks place a high grade valve next to each tank so that it can be closed when the pressure reaches 175 pounds, and the safety valve on the compressor blows off. These valves should always be closed when the engine is shut down for any length of time, so that there is no danger of losing the air through leaks in the pipe line. Care must be taken to get the air line absolutely tight, preferably use extra heavy fittings and make up all joints with a mixture of litharge and glycerine.

**Installation
of
Air Tanks**

When all tanks are filled to the maximum safe pressure—175 pounds, the cut-out (1540) should be screwed down. This will hold the suction valve off the seat and the compressor will not deliver any more air.

When in good working order the compressor will easily pump up to 175 pounds. If the air pressure builds up too slowly, examine the air compressor valves, also check up the clearance between the piston and cylinder head.

A simple way to do this is to remove the discharge valve and drop a small piece of lead wire in between the piston and head. Then turn the engine over and the thickness of the lead wire when taken out will give the exact clearance. This should be 1/64" but may increase due to wear of the eccentric strap or piston pin bushing. If this wear is excessive the strap should be re-babbitted and the bushing replaced. If the wear is only slight, the correct clearance may be obtained by putting in shims between the foot of the rod (926) and the eccentric strap.

**To Check
Clearance
of
Compressor
Piston**

The construction of the engine is such that it is possible to take out any of the main and center bearing bushings without dismantling the engine.

To remove the main bearing bushing (817) relieve the pressure of the shaft by jacking or wedging it up and take off the cap (805) and the upper half of the bushing. Then start to roll out the lower half by tapping it with a hammer, using a wooden driver to protect the bearing from being marred by the hammer.

**Main
Bearing
Removed**

To remove any of the center bearing bushings take off the corresponding plate (182A or 999 and 597A) on the crank case, next remove the top segments and proceed in the same manner as explained above, for removing the main bearing bushing. Replace all of the bolts and washers and draw the nuts up even all around to make a tight joint.

**Center
Bearing
Removal**

The upper and lower halves of the main and center bearing bushings are interchangeable and it is possible to make a temporary repair of a worn lower bushing by changing the upper half to the bottom.

**Bearing
Removal**

New bushings to interchange with those on the engine can be furnished from the factory, or the old bushings can be re-babbitted. When doing this, care should be taken that the bore is exactly concentric with the outside of the bushing, and a high grade babbitt must be used.

To remove the piston pin, take out the cotter pin in set screw (4A) and drive the piston pin out from the set-screw end. If the piston pin bushing (17A) shows excessive wear, it should be replaced.

**Removing
Piston Pins**

If the connecting rod box has been replaced or re-babbitted, it should be carefully fitted to the crank pin.

**Connecting
Rod Box**

If any of the connecting rod boxes or the crankshaft bushings have been replaced, run the engine slowly for about ten minutes, then examine the bearings and if they do not heat, run the engine slowly for about thirty minutes and examine the bearings again, before putting on load.

The thrust bearing is of the ball-bearing type and should require no ad-

Thrust Bearing

justment. However, if this bearing should slightly wear it will probably first be detected by warming up of the forward end bearing, which is caused by the crankshaft being pushed ahead by the propeller thrust to such an extent that the air sealing has to carry part of the thrust. To remedy this fault the crankshaft should be pushed aft and a shim placed between the thrust bearing body (1419) and the ball bearing (1422). Always make sure that there is a sufficient supply of lubricant in the bearing housing. Use only high grade neutral grease, preferably one of the special lubricants made for ball bearings.

From time to time the old grease should be taken out, the bearing washed in kerosene or gasoline, and packed in a fresh supply of lubricant.

Reverse Gear

The forward drive consists of a clutch of the multiple disc type. The plates (1447) must run dry, and for this reason two holes are provided in the clutch case (1460) to drain any oil which may run along the bushing of the gear drum into the clutch case. **(Do not put oil on clutch plates).**

A threaded collar (1451) mounted on the clutch hub (1446) serves, when tightened up, to increase the pressure on the plates (1447) to prevent slipping. This collar is held in place by a lock (1453). The clutch plates (1447) can be inspected by removing the clutch case (1460). The clutch hub is held in place by the nut (1454) and the split collar (1427) which sit into the shaft.

The reverse drive consists of a set of gears and pinions and two shoes to clamp the drum. The gears must run in oil. A heavy steam engine cylinder oil must be used. **(Use no grease).** A plug (1433) is provided for pouring oil into gear drum. Sufficient oil must be kept in the drum to lubricate all the gears and pinions thoroughly, however, not to such an extent that it flows out of the drum head bushing (1436) too freely.

The clamping shoes are connected by a rod which runs across the gear drum. This rod is threaded and provided with a nut to take up wear and increase the pressure on the shoes. Care should be used not to adjust the shoes so that they will drag on the drum when the operating lever (1474) is in its neutral or go-ahead position.

To inspect the gears and pinions remove the nuts and then the split drum head (1434) and (1435).

The clutch yoke (1465) is under pressure at the moment the clutch or the reverse is thrown in and, therefore requires oil, and must not be neglected.

Mechanical Lubricator

The engine is provided with a ratchet driven mechanical sight feed oiler, forcing oil to the cylinders, piston pins, crank pins and crankshaft bearings. A high grade medium heavy gas engine lubricating oil should be used. It is advisable to use lubricating oil approved by Fairbanks, Morse & Company.

Stain Lubricating Oil

The oil must be run through a fine mesh wire strainer when the lubricator is filled. It is a good plan to have this strainer soldered in the funnel used for filling. Always replace the cover of the oiler after it has been filled. The lubricator should be drained occasionally and washed out with kerosene or gasoline.

Quantity of Lubricant Required

The quantity of oil fed to the various parts should be approximately as follows:

Cylinder, intake side	30 to 35 drops
Cylinder, exhaust side	12 to 15 drops
Piston pin	12 to 15 drops
Main and intermediate bearings.....	15 to 20 drops
Crank pins	20 to 25 drops
Air compressor eccentric	6 to 8 drops
Water pump eccentric	6 to 8 drops
Fuel pump mechanism	6 to 8 drops

Adjusting Feeds

In some cases the number of drops fed can be reduced but this should be done very carefully. The amount of oil fed is regulated by turning the small adjusting screws on the cover of the lubricator, with a screw driver. Be sure that there is always a sufficient quantity of oil in the lubricator and that all feeds are working properly.

Before starting the engine, the lubricator should be cranked by hand to make sure that all pipes are filled. Otherwise the bearings and cylinders may be damaged before oil reaches them.

One of the most difficult points to explain in the operation of an injection type engine, is the action which takes place when the fuel is controlled by a governor.

To insure reliable action and ease in starting, the capacity of the fuel injection pumps is made about double the full load requirements. The amount of fuel injected at any time is controlled directly by the governor and any tendency to lower the speed of the engine, by increasing the load, is met by the governor by increasing the amount of fuel injected and thus trying to keep up the speed.

The rated speed being 400 R.P.M., the governor is arranged so that it does not come into action until the speed of the engine reaches about 385 R.P.M., and up to this point the engine receives about twice as much oil as required at full load. At approximately 420 R.P.M., the governor cuts off the oil entirely so that the entire governor action takes place within a range of about 35 R.P.M. change in speed.

The exact speeds at which the governors of different engines begin to act vary somewhat, due to slight variations in adjustments, but the range of change in speed from rated load remains approximately the same, even though the governor begins to act at a much lower speed than 385 R.P.M., a condition which obtains when the governor springs are counteracted by pulling backward the speed control lever (1602). Therefore if the engine runs about 420 R.P.M. idle and when loaded runs only around 385 R.P.M., with the speed control lever in its forward position, it is probably getting the maximum amount of fuel possible, and is sure to be overloaded. The reduction in speed from no load to rated load should never be more than approximately 25 R.P.M. If the speed is reduced more than this, it is proof that the engine is overloaded. The load may be decreased by changing the propeller or by slowing down the engine, by pulling the speed control lever back. This may be necessary when towing a heavy tow or when running in shallow water.

An overload is indicated by the appearance of the exhaust, by excessive fuel consumption or by choking up and slowing down of the engine, and general unsatisfactory and noisy operation. The reason for this is that as the load increases tending to slow the engine down, the governor gives the engine more fuel in an attempt to keep up the speed of the engine, injecting more fuel than the engine can burn. The fact that the engine does not materially decrease in speed when further load is put upon it does not show that the load it is carrying is too light. If the engine is operated on an overload and receives an excessive amount of fuel for any length of time, carbon will be formed in the vaporizers and unless the load is reduced, very unsatisfactory operation will be the result.

The engine speed is controlled by a centrifugal governor, located in the flywheel. When the engine leaves the factory the governor is adjusted so that with the rated load, the engine runs the speed stamped on the name plate—400 R.P.M. This speed should never be exceeded when the engine is pulling its rated load.

It is permissible, however, to lower the speed and this can be done in two ways, by releasing the tension on the governor springs (256A) or by pulling the speed control lever (1602) backward. For temporary reducing the speed, it is satisfactory to use the control lever, but if the speed is to be reduced permanently, it is advisable to slacken the governor springs until the desired speed is reached. This is necessary if the propeller pitch is too steep, and the engine is unable to turn it up to rated speed without being seriously overloaded.

If with rated load the engine speed is below 400 R.P.M. the governor springs (256A) must be tightened. Tighten both springs the same amount, and not more than 1/4" at a time. Remember that the speed at rated load must not exceed 400 R.P.M.

The governor is properly adjusted when the engine leaves the factory, but slight adjustments may become necessary from time to time.

Turn Lubricator When Starting

Governor Action

Signs of Overload

Maximum Speed Loaded

To Reduce Speed

To Increase Speed

Adjusting Governor

One very important point for the successful operation of the governor is to have the face of the regulating link (913), flush with the end of the intermediate regulating lever (889), when the governor sleeve (502A) is as far forward as it will go. This position of the regulating link is shown in the injection pump bracket assembly. To get the governor sleeve as far forward as it will go take off the governor springs and pull the governor weights out, or pull the speed control lever (1602) backward, use a bar to pry the governor weights out and block the governor sleeve in this position. When doing this take care that the governor sleeve actually comes up against its stop on the flywheel hub. If the link (913) does not line up with the end of the lever (889), it should be brought into this position by adjusting the length of the fuel control rod (1607). After the correct adjustment has been made, tighten up the lock nut on the fuel control rod. No attempt must be made to increase or reduce the amount of fuel with this adjustment. It is not proper to run the engine otherwise than having the link (913) flush with the end of the lever (889) when the governor sleeve (502A) is in its forward position.

Fuel Injection Pump

One essential feature of the engine, which for best results, must always be in perfect mechanical condition, is the fuel injection pump (531A). To examine the pump unscrew the pipe gland (206A) and hold your hand over the opening, or preferably screw a plug into the opening. If the plunger can be moved quite easily by means of the handle (557A) it is a sign that the suction valve or stuffing box leaks, or that there is air entrapped in the pump. If there is no air in the pump, the plunger will move hard and only slowly for the only means of escape for the oil is along the pump plunger and with a well-packed stuffing box, the oil will leak past only very slowly.

Removing Suction Valve

To remove the suction valve, proceed as follows: Unscrew plug (534A), then with the socket wrench furnished, take out the plug (1508) and remove the spring. Turn the socket wrench end for end, screw it into the valve cage (755) and pull the latter out of the pump body. When replacing the valves clean the parts thoroughly with gasoline and convince yourself that all valves hold tight. A properly ground valve, filled with gasoline and set aside should hold it for a long time without leaking, even with the valve springs removed.

Clean Fuel Injectors

The fuel injectors have to be examined occasionally to make sure that the valves do not leak and that the spirals are clean and free from carbon.

Use only the finest grade of carborundum, flour of glass or pumice stone for grinding the valves. Never use emery as even the finest grade of this is too coarse.

Injection Cam

The fuel pump is operated by a cam (546A), through a series of levers. This cam is held on the shaft in such a position that the fuel injection occurs when the corresponding piston is near its upper dead center. In order to get the best results with various grades of fuel this cam is not keyed to the shaft but is clamped to the eccentric (875) in such a way that the timing can be changed slightly.

When the engine leaves the factory it will operate satisfactorily on many oils without changing the position of the cam. However, if the operation is not entirely satisfactory a different timing should be tried.

To Change Timing

To do this, take off the cover plate (849) at the reverse gear housing and loosen the nut of bolt (566A) and crankshaft nut (1493). On the face of the eccentric (875) will be found a heavy graduation line and the flange of the cam is graduated from 0° to 15° ahead and from 0° to 15° back. Carefully note how the cam is set then turn it about 2½° or one-half the space between graduations. No set rules can be given as to which way to turn the cam but it is advisable to try earlier injection first. To do this turn the cam ahead or in the same direction that the engine runs. Never turn the cam more than 5° at a time as a slight change in timing the injection will often show remarkable results. Be sure and tighten the clamping nuts well before starting the engine, taking care that the cam is not rotated while doing so.

Air-Check Valves

The engine is equipped with an air starter. Pipes lead from this starter to the check valves (854) that are bolted to the cylinders. These check valves are only in operation while the air is turned on, but nevertheless they should be examined occasionally, any carbon formation present cleaned out, and the valves ground in if necessary.

The air starter consists of a disc rotating at engine speed and operated by a gear that is driven by another gear of the same diameter located on the crankshaft. This disc runs against a plate that is provided with openings. These openings lead to passages that are connected by pipes to the various engine cylinders. A slot in the disk uncovers alternately the openings in the plate and permits air to rush through the pipes to the different cylinders. Air is admitted to the disk through a quick opening valve.

If for some reason the air starter is disassembled, care should be taken that the starter gears and discs are properly timed. The engine should be turned over until the flywheel key is at the highest point of the shaft and the marked tooth on the crankshaft gear which is directly over the keyway is at the top, at which time the cylinder next the air starter is in the upper dead center position.

The air starter gear is marked for the different size engines as follows: Two cylinder left hand 2-L, two cylinder right hand 2-R, three cylinder left hand 3-L, three cylinder right hand 3-R, four cylinder left hand 4-L, four cylinder right hand 4-R. The marked tooth on the crankshaft gear should be placed in the space between the teeth marked 2-R, 2-L, etc. When re-assembling the air starter disc and air starter gear shaft, the spring ends are inserted in the hole and slot respectively and the spring twisted for about one-third turn in opposite direction to normal rotation. The disc and shaft are then pressed together so that the jaws on the disc engage the stops on the shaft. If this has been done correctly the disc is driven by the stops when running forward and by the spring when the engine reverses. Also, note that there is the necessary clearance between the teeth. This can be adjusted by adding or removing some of the shims between the feet of the starter body and the top of the reverse gear housing.

In order to see that the timing is correct, open all relief valves in the cylinders and disconnect the pipe unions next to the starter; then bar the flywheel over so that the piston in No. 1 cylinder is about 5 degrees ahead of dead center for the rotation in which the engine runs; partly open the quick opening valve; then air should blow through the relief valve. This should be done with each cylinder. While checking the timing the hand hole plates should be removed so that the cranks and connecting rods can be carefully observed.

It is not necessary to set the four cylinder engine for starting, it will start from any position. However, if after opening the gate valve the two or three cylinder engine does not start it must be turned over about one-quarter turn. Make sure that the compression relief valves are open before putting the bar into the flywheel, and that the fuel pump plungers are held up; in other words move the lever (892) until its spring plunger jumps into the hole. Never stand directly in front of the starting bar.

To start the engine when cold it is necessary to heat the combustion chambers as described later, either by electric plugs or by kerosene burners.

When ready to start, drain the crankcase compartments by means of the drain cocks provided. Open the sea cock. See that the lubricators are filled, and turn the hand crank long enough to make sure that the lubricator pipes are filled with oil. Also fill the lubricator cup on the air compressor cylinder and set it to feed about two or three drops per minute. Push the speed control lever (1602) ahead into its highest position. Pump about two strokes of fuel into each cylinder by means of the handle (557A). When the electric plugs or the starting tubes are heated sufficiently, open the globe valves in the air line and then the gate valve on the engine, and keep it open until the engine fires. Do not leave the gate valve open any longer than necessary, or you will waste compressed air. As the engine speeds up, pull the hand control lever (1602) backward for a few seconds to prevent the governor from giving an excessive amount of fuel. If the engine stops firing, pump one or two strokes of fuel into the cylinder by hand and if necessary, open up the gate valve again until the engine picks up speed again.

Do not forget to pull out the knife switches or shut off the burners about three minutes after starting.

Always make sure that the air pressure is sufficient for starting, before the engine is shut down.

Air Starter

Setting of Air Starter

To Set the Engine For Starting

To Start Engine

Watch Air Pressure

If everything is in good working order the engine will start on 7 pounds of air pressure but it is advisable to maintain a pressure of 15 pounds.

To Stop Engine

The engine can be stopped by pulling up the lever (892) so, that the little spring plunger will jump into the hole in the pump bracket. This operation should be performed very slowly.

To Cut Out One Cylinder

If it is desired to shut off the fuel to one cylinder only, the pump plunger can be raised by means of the handle (557A) and held in this position by catch (559A). This should be done if one of the combustion chambers should get cold, and has to be reheated. It would be unwise to keep on pumping fuel into the cylinder while the combustion chamber is too cold to ignite the charge.

Storage Battery

A six-volt storage battery of 63 ampere hours is used for the two cylinder engine and 115 ampere hour capacity for the three and four cylinder engines, in connection with the electric starting equipment.

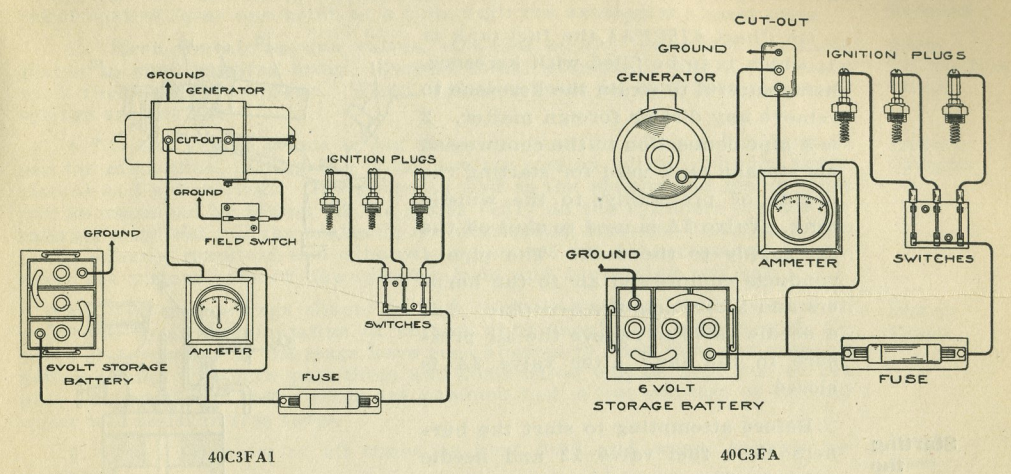
Electric Wiring

When installing the engine the negative terminal of the battery should be connected to the charging generator and to the set of small knife switches located on one of the cylinders, as shown by the wiring diagrams 40C3FA or 40C3FA1 depending on the generator furnished. The ignition plugs take about 22 amperes each, and a Number 6 cable should be used providing the total length of these two cables is not over 25 feet. If the length is greater use proportionately heavier cable to avoid excessive voltage drop.

Number 10 cable should be used to connect the generator and the battery. For all wiring, cable is preferable to solid wire, on account of the possibility of the wire being broken by the continuous slight vibrations.

Connecting Ammeter

The ammeter furnished with the engine is not of sufficient capacity to measure the current required for the ignition plugs, and care must be taken that the ammeter is connected as indicated in the diagram. It will then only show the rate at which the battery is being charged. At the rated engine speed, this charging current will be 10 amperes and proportionately less at lower speeds.



Wiring Diagram of Simms Generator

Wiring Diagram of Northeast Generator

The switch for the generator field of the Simms Generator, as shown on cut 40C3FA1, is for putting the generator out of service when battery is fully charged. It will prevent the battery from becoming overcharged.

For the North East Generator, as shown on cut 40C3FA, pull the small fuse on top of generator when the battery is fully charged.

For any information required regarding the operation of the generator or battery write direct to the nearest agency of their respective manufacturer.

If the engine is to be started by means of the electric plugs, screw one ignition plug into each combustion chamber and connect each one to one side of the leads from the knife switches. When ready to start, throw in all knife switches and after waiting about 30 seconds, start the engine as directed on page 7.

After the engine has been running about three minutes pull out all of the switches. THIS IS VERY IMPORTANT, as otherwise the plugs will become overheated and possibly burn out. An excessive discharge might also result in serious damage to the battery.

If for some reason one of the cylinders should refuse to fire regularly, the corresponding switch should be thrown in again for a short time. If the cylinder still misses, the trouble may be due to a burned-out plug or to a loose connection. If the plug and connections are O.K. small sparks will show at the switch when it is thrown in or out.

A special socket wrench is furnished for removing the ignition plugs when this becomes necessary. When replacing the plug, apply graphite to the threads so that there will be no chance of the plug burning fast.

If the engine is stopped after running for some time, it will retain sufficient heat for a period of from 5 to 10 minutes to start, without reheating the plugs. If the engine is shut down for a longer time, it will be necessary to switch on the current but only for a short time, say about one minute.

These engines are also equipped with kerosene burners which can be used in place of the electric plugs for heating the combustion chambers when starting the engine.

Generator Information

Starting With Electric Plugs

Pull Out Switches

Cylinder Missing

Removing Plug

Starting While Engine Is Warm

Kerosene Burners

On Chart 675CFA1 the fuel tank is 1, which is to be filled with kerosene, being careful to strain the kerosene to remove any dirt or foreign matter. 2 is a pipe connection to the compressed air storage tank used for starting the engine or preferably, to the whistle tank. Valve 3A is used to shut off the air supply to the tank. The pipe 4 conducts compressed air to the burners and 5 conducts the kerosene. 3 is a needle valve to relieve the air pressure in the tank after valve 3A is closed.

Starting the Burners

Before attempting to start the burners close fuel valve 12 and needle valve 3. Then open 3A and turn hood 13 so that stop 14 rests against side of body marked "OIL". Open the fuel valve 12 about one turn and hold a lighted match or oil wick torch at the mouth of the burner. The burner should light with a slightly yellow flame. Now turn hood 13 with stop 14 toward side of body marked "AIR" until flame is clear and has a characteristic roar.

Adjusting and Cleaning

If burner is not properly adjusted, or if it is taken apart for cleaning it will be necessary to readjust it. This is done by regulating the location of stop 14 on hood 13. Loosen clamp screw on stop 14 and turn hood 13 onto body 15 as far as it will go without exerting excessive force. Then with the air turned on at valve 3A, turn hood 13 out of body 15 just about 1/12 turn, to feel strong blast of air out of mouth of hood 13. Then light burner as described before and adjust location of stop 14 on hood 13 until a clear flame is obtained. Make final adjustment when burner is hot. In this location clamp stop 14 securely to hood 13 with stop 14 resting against the side marked "AIR". Turning hood 13 so that stop 14 points to "OIL" will cut down the air and give slightly yellow rich flame which is easy to ignite when burner is cold.

Air Pressure

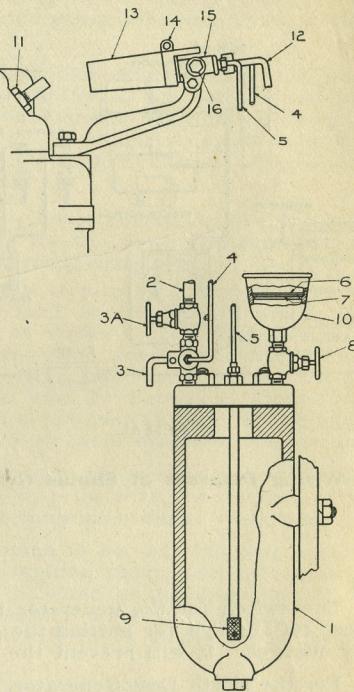
Burner will operate best between pressures of 100 and 150 pounds. Occasionally the burner should be thoroughly cleaned.

Cleaning

The screens 16 are easy to remove and should be cleaned frequently to get best results.

Clean Fuel

It is essential that the kerosene used with this burner be free from dirt, as improper action of the burner will nearly always be found to be due to its presence. In such a case the burner must be cleaned by removing the nozzle from the torch being careful to re-assemble according to the directions just given.



675CFA1

MISCELLANEOUS INSTRUCTIONS

1. If the exhaust is smoky, due to an overload, pull backward the speed control lever one notch at a time until the exhaust is almost clear.
2. Keep the air suction valves, mounted on the crankcase handhole plates, in good working order. Inspect them occasionally and if necessary wash them out in kerosene. When replacing them be sure that the small springs are not lost.
3. If the engine seems to lag in power capacity after it has been in use for some time, inspect the crankcase air suction valves, cylinder ports, pistons and piston rings. The ports, as well as the pistons and piston rings can be examined by taking off the plates (851) on the cylinders and on the exhaust manifold. If the engine is not overloaded, frequent cleaning of the ports, exhaust manifold and exhaust pipe should not be necessary. To remove the pistons take off the cylinder head and connecting rod box.
4. The piston rings should be free in their grooves. If they tend to stick due to an accumulation of carbon, they should be washed with alcohol or kerosene. If the rings have been allowed to stick fast, compression and explosion will blow past them and combustion will be poor due to the poor compression. If the rings are gummed fast, a hot solution of lye and water will assist to free them.
5. The fuel must at all times be kept fluid and warm enough for pumping.
6. Always strain the fuel oil when filling the tanks using a strainer made of wire gauze of not less than 50 mesh.
7. If the fuel pump and injection nozzle valves become leaky, carefully grind them into their respective seats, using a fine grade of carborundum paste, flour of glass or pumice stone. Do not use emery, as even the finest grades of this are too coarse.
8. All bolts and nuts should be carefully tightened up after the engine has been installed and occasionally thereafter. The inside of the crankcase should be inspected about once a week.
9. The water should always be drained off after shutting down the engine when there is any danger of freezing. Drain cocks will be found on the circulating pump and on the exhaust manifold.
10. Never pour lubricating oil into the crankcase compartments. Lubricating oil in the crankcase may be drawn into the cylinder with the scavenging air and thus provide excess fuel for the engine and cause it to get out of control of the operator.

Smoky Exhaust

Keep Air Suction Clean

Inspect Cylinders

Piston Rings

Strain Fuel

Grind Fuel Valves

Drain Jackets

REPAIR PARTS LIST

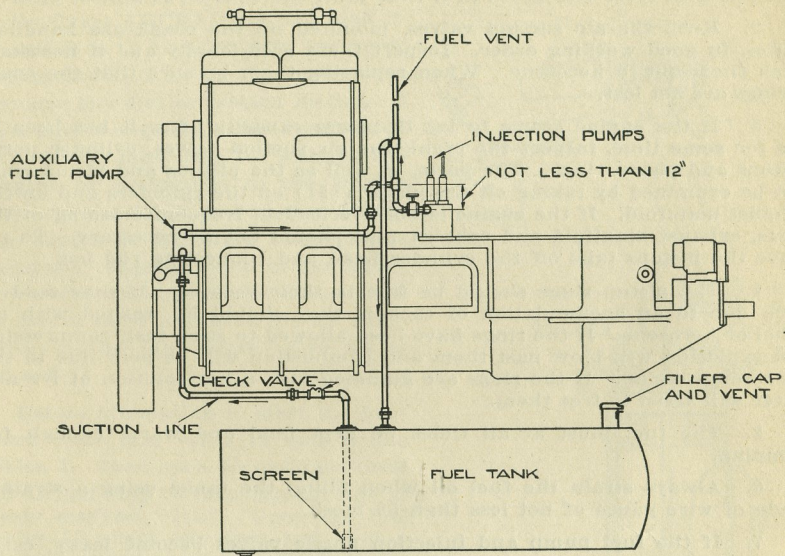


Chart No. 15C2FA

Chart Showing Auxiliary Fuel Pump Connections

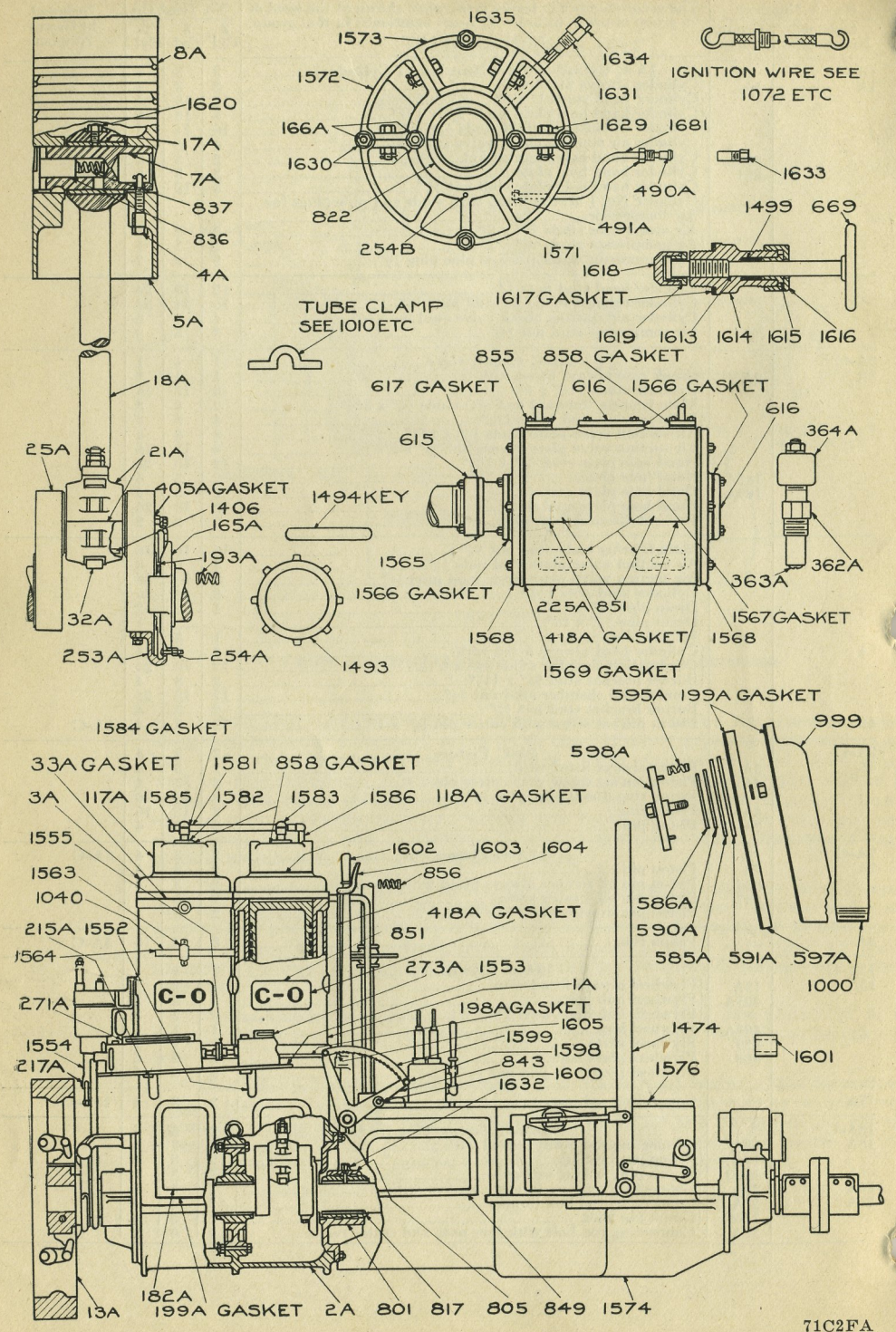
When ordering repair parts, always give the size or horsepower, type, shop number and if the part pertains to the cylinder, give the cylinder number. The shop number is very important. It is stamped on the name plate and on the cylinder. Always give the type, that is, whether the engine is right or left hand rotation and has two or more cylinders. A right hand engine rotates clockwise when facing the flywheel end. The cylinders are numbered 1, 2, 3, and 4, starting from the governor end. Too much care cannot be taken in giving these particulars.

When ordering a group complete use the repair number in heavy type, but for a single part use the repair number in light type. Before ordering a complete group of parts by the repair number in heavy type at the head of the group, carefully check over such group to make sure that all parts included therein are wanted as they will be furnished unless otherwise specified.

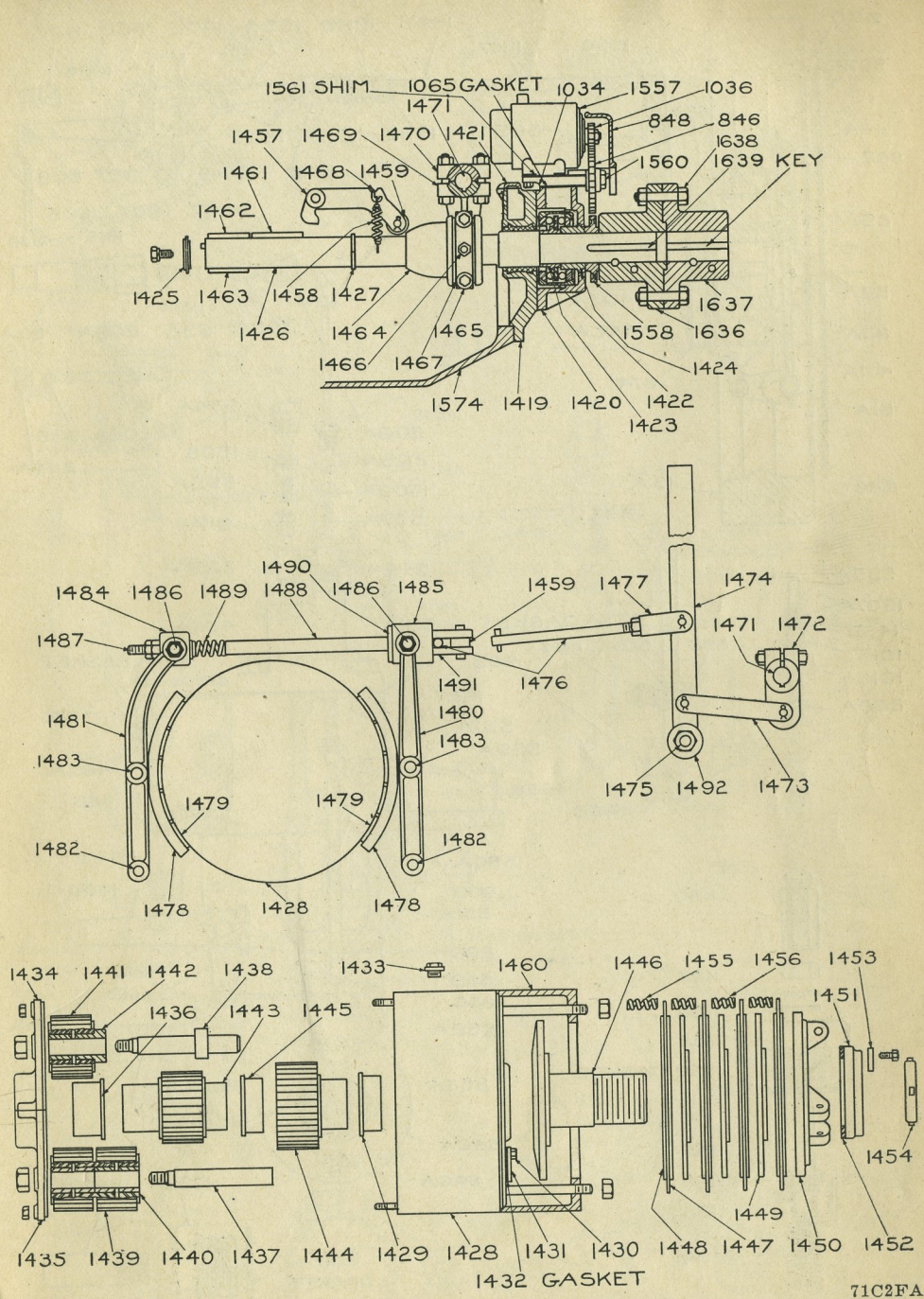
For example, the group 13A-C covers the flywheel complete. If it is found that in the group 13A-C all parts except 829 are wanted, order 13A-C less 829.

The group headings are arranged in numerical order. To determine repair numbers and names of parts wanted, and whether they can be ordered by group number, find the repair numbers of the parts on the repair chart and then, by referring to the parts list, determine the name of the parts and whether they can be ordered by group number.

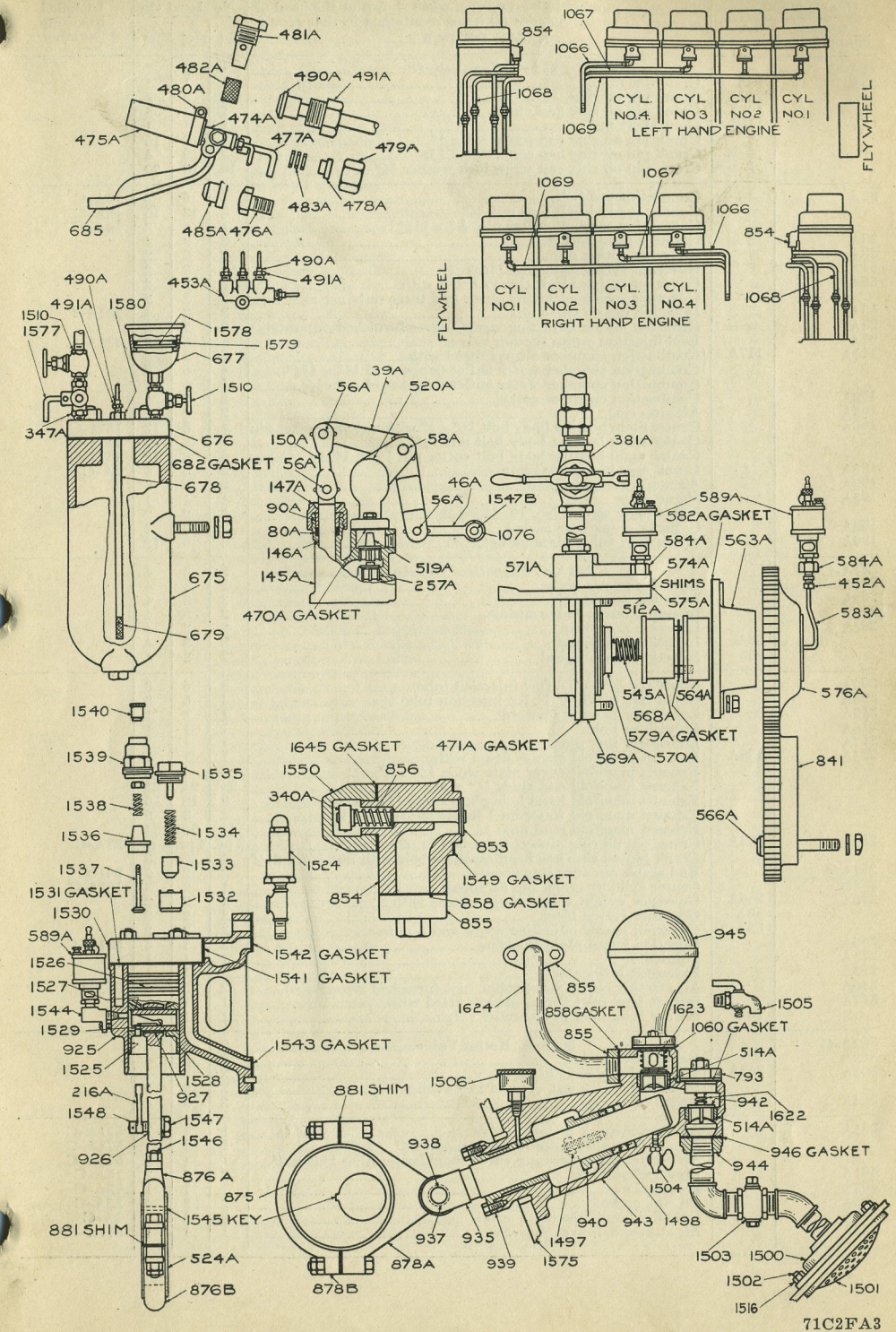
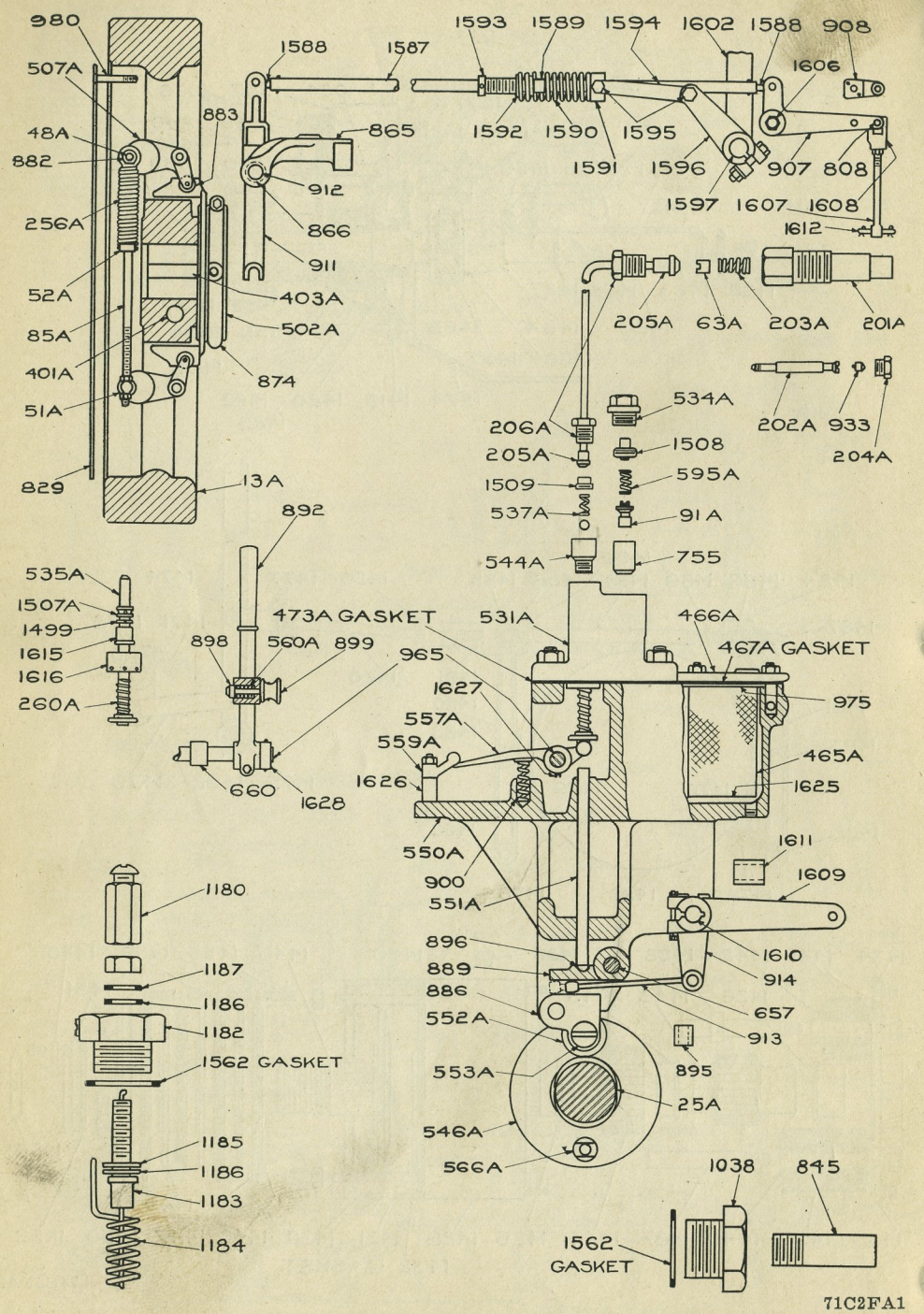
Repair Numbers Arranged Numerically	Group Parts	The group number in heavy type, when shown at the head of a group of parts, includes all items mentioned in that group. NAME OF PART	No. Used On			Included in Group Number
			2 Cyl	3 Cyl	4 Cyl	
1A-C 1A	1A	1A-C Cylinder (Give Number of Cylinder).....	2	3	4	
		Cylinder always fitted with.....	2	3	4	
		Cylinder head studs 1" x 6".....	12	18	24	
		Cylinder hand hole plate studs 1/2" x 1 3/4".....	8	12	16	
		Cylinder exhaust manifold studs 1/2" x 2".....	16	24	32	
		Cylinder air starting check valve studs 1/2" x 4 1/4".....	4	6	8	
		Cylinder hand hole plate gasket.....	2	3	4	
		Cylinder hand hole plate.....	2	3	4	
		Cylinder hand hole plate stud nut 1/2".....	8	12	16	
		Cylinder No. 1 always fitted with studs and pipe plugs for Air compressor.....	2	2	2	
		Air compressor studs 5/8" x 2 1/4".....	1	1	1	
		Air compressor studs 5/8" x 2 5/8".....	2	2	2	
Air compressor water passage pipe plug 1/2".....						
		Cylinder head stud nuts 1".....	12	18	24	
		Cylinder exhaust manifold stud nuts 1/2".....	16	24	32	
		Cylinder air starting check valve stud nuts 1/2".....	4	6	8	
		Air compressor stud nut 5/8".....	3	3	3	
2A-C 2A	2A	2A-C Crank Case.....	1	1	1	
		Crank case always fitted with.....	1	1	1	
		Cylinder studs 1 1/8" x 4".....	8	12	16	
		Main bearing (forward and aft) studs 5/8" x 3 1/2".....	8	8	8	
		Main bearing stud 5/8" x 2 1/4".....	8	8	8	
		Air suction valve plate studs 1/2" x 1 5/8".....	4	6	8	
		Air suction valve plate cover stud 1/2" x 2".....	8	12	16	
		Hand hole plate stud 1/2" x 1 5/8".....	12	18	24	
		Hand hole plate.....	2	3	4	
		Hand hole plate gasket.....	2	3	4	
		Hand hole plate stud nut.....	12	18	24	
		1 1/2" countersunk pipe plug.....	2	2	2	
		Main bearing body stud nut 5/8".....	16	16	16	
		Air suction valve plate stud nuts 1/2".....	4	6	8	
		Air suction valve plate cover stud nuts 1/2".....	8	12	16	
		Cylinder stud nuts 1 1/8".....	8	12	16	
		Drain pipe 3/8" x 13".....	1	2	2	
		Drain pipe 3/8" x 26".....			1	
		3/8" Coupling.....	1	2	3	
		Cylinder head always fitted with.....	2	3	4	
		Combustion chamber studs 5/8" x 6".....	12	18	24	
		Burner bracket stud 3/8" x 1 1/2".....	2	3	4	
		Combustion chamber stud nut 3/8".....	12	18	24	
		Burner bracket stud nut 3/8".....	2	3	4	
		Piston pin set screw with cotter pin 1/8" x 1".....	2	3	4	5A-C
5A-C 5A	5A	5A-C Piston.....	2	3	4	
		Piston always fitted with.....	2	3	4	
		Piston pin set screw with cotter pin.....	2	3	4	
		Piston ring dowel pin 3/8" x 1/8".....	8	12	16	
	8A	Piston ring.....	8	12	16	
	7A-C	Piston pin.....	2	3	4	5A-C
	7A	Piston pin oil scraper always fitted with dowel pin.....	2	3	4	
	836	Piston pin oil scraper spring.....	2	3	4	
	837	Piston pin woodruff key No. B.....	2	3	4	
8A	8A	Piston ring.....	8	12	16	5A-C
13A-C 13A	13A	13A-C Flywheel.....	1	1	1	
		Flywheel always fitted with.....	1	1	1	
		Flywheel hub bolts.....	2	2	2	
		Flywheel hub bolts nuts 1".....	2	2	2	
		Flywheel key.....	1	1	1	
		Flywheel plate.....	1	1	1	
		Flywheel plate bolt.....	6	6	6	
Flywheel plate bolt jam nut 3/8".....	6	6	6			
17A	17A	Connecting rod piston pin bushing.....	2	3	4	18A-C
18A-C 18A	18A	18A-C Connecting Rod.....	2	3	4	
		Connecting rod always fitted with.....	2	3	4	
		Piston pin bushing.....	2	3	4	
		Piston pin bushing set screw.....	2	3	4	
		Connecting rod box (upper) always with.....	2	3	4	
		Connecting rod box (lower).....	2	3	4	
20A 21A	20A	20A	2	3	4	
		21A	2	3	4	
		1406	2	3	4	
		32A	4	6	8	



71C2FA



71C2FA2



Repair Lists—Fairbanks-Morse Type C-O Oil Engines

Repair Numbers Arranged Numerically	Group Parts	The group number in heavy type, when shown at the head of a group of parts, includes all items mentioned in that group. NAME OF PART	No. Used On			Included in Group Number	
			Cyl	3 Cyl	4 Cyl		
25A-C	25A 253A 405A 1493	25A-C Crankshaft.....	1	1	1		
25A		Crank pin oil ring.....	1	1	1		
		Crank pin oil ring gasket.....	2	3	4		
		Crankshaft nut.....	2	3	4		
		Crank pin oil ring cap screw $\frac{3}{8}$ " x 1".....	1	1	1		
		Crank pin oil ring cap screw $\frac{3}{8}$ " x $1\frac{1}{4}$ ".....	8	12	16		
		Crank pin oil ring cap screw lock washer $\frac{3}{8}$ ".....	2	3	4		
			10	15	20		
32A		85A	Connecting rod bolt.....	4	6	8	18A-C
			Connecting rod bolt jam nut $\frac{3}{4}$ ".....	8	12	16	18A-C
	Connecting rod bolt cotter pin $\frac{3}{16}$ " x $1\frac{1}{4}$ ".....		4	6	8	18A-C	
33A	Cylinder head gasket.....		2	3	4		
48A	Governor spring pin.....		2	2	2		
51A	Governor spring adjusting block.....		2	2	2		
52A	Governor spring block always fitted with.....		2	2	2		
	Governor spring adjusting screw and three nuts.....		2	2	2		
63A	Injection nozzle valve nut.....		2	3	4	201A-C	
85A	Governor spring adjusting screw (never furnished separately)		2	2	2		
91A	Fuel injection pump suction valve.....	4	6	8	531A-C		
117A	117A	Combustion chamber always fitted with.....	2	3	4		
		Combustion chamber water outlet flange stud $\frac{1}{2}$ " x $1\frac{3}{4}$ ".....	4	6	8		
		Combustion chamber water outlet flange stud nuts $\frac{1}{2}$ ".....	4	6	8		
		Combustion chamber gasket.....	2	3	4		
118A	Air stop ring.....	2	2	2			
165A	Center main bearing body bolt $\frac{1}{2}$ " x 4" with nut and cotter pin	4	8	12	1571-C		
166A	Center main bearing body bolt nut $\frac{1}{2}$ ".....	4	8	12	1571-C		
	Center main bearing body bolt cotter pin $\frac{1}{8}$ " x 1".....	4	8	12	1571-C		
	Crank case hand hole plate.....	2	3	4	2A-C		
182A	Air stop ring spring.....	8	8	8			
193A	Name plate.....	1	1	1			
195A	Name plate screws No. 10-24 x $\frac{1}{4}$ ".....	2	2	2			
198A	Cylinder crank case gasket.....	2	3	4			
199A	Air suction valve plate gasket.....	6	9	12			
201A-C	63A 933	201A-C Injection Nozzle.....	2	3	4		
201A		Injection nozzle body.....	2	3	4		
202A		Injection nozzle valve.....	2	3	4		
203A		Injection nozzle valve spring.....	2	3	4		
204A		Injection nozzle tip.....	2	3	4		
		Injection nozzle nut.....	2	3	4		
	Injection nozzle spiral.....	2	3	4			
205A	225A	Gland for $\frac{1}{4}$ " O. D. fuel injection tube.....	4	6	8		
206A		Gland nut $\frac{3}{4}$ " S. A. E. for injection tube.....	4	6	8		
215A		Lubricator bracket forward.....	1	1	1		
216A		Lubricator link.....	1	1	1		
217A		Lubricator link pin.....	1	1	1		
225A		Exhaust manifold always fitted with.....	1	1	1		
		Exhaust manifold cover plate studs $\frac{1}{2}$ " x 2".....	6	6	6		
		Exhaust manifold end studs $\frac{1}{2}$ " x $2\frac{3}{4}$ ".....	24	24	24		
		Exhaust manifold hand hole plate studs $\frac{1}{2}$ " x $1\frac{5}{8}$ ".....	8	12	16		
		Exhaust manifold water inlet flange studs $\frac{1}{2}$ " x 2".....	8	8	8		
	Exhaust manifold stud nuts $\frac{1}{2}$ ".....	46	50	54			
253A	253A	Crank pin oil ring always furnished in pairs with.....	2 pr.	3 pr.	4 pr.	25A-C	
		Crank pin oil ring hex head machine bolt with nut $\frac{3}{8}$ " x $2\frac{1}{2}$ ".....	4	6	8		
254A		End crank pin oiler ring spout.....	2	2	2	801-C	
254B		Center cylinder crank pin oil spout.....	1	2	3	1571-C	
256A	256A 52A 85A	Governor weight spring always fitted with.....	2	2	2		
		Governor spring block.....	2	2	2		
		Governor spring adjusting screw and 3 nuts.....	2	2	2		
260A	Injection pump plunger spring.....	2	3	4	531A-C		
271A	Lubricator.....	1	1	1			
273A	Extension lubricator.....	1	1	1			
340A	Air starting check valve collar (not furnished separately)	2	3	4	85A-C		
347A	Burner tank inlet fitting always fitted with.....	1	1	1			
	Burner tank inlet fitting relief valve.....	1	1	1			
362A-C	363A	362A-C Relief Valve.....	2	3	4		
362A		Relief valve body.....	2	3	4		
363A		Relief valve always fitted with.....	2	3	4		
		Relief valve jam nut $\frac{1}{8}$ " and lockwasher.....	2	3	4		
364A	Relief valve cap.....	2	3	4			
381A	381A	Air starter quick opening valve.....	1	1	1	571A-C	
		Air starter quick opening valve nipple $\frac{3}{4}$ " x 26".....	1	1	1	571A-C	
		Air starter quick opening valve shoulder bushing $1\frac{1}{4}$ " x 1".....	1	1	1	571A-C	
		Flywheel hub bolt.....	2	2	2	13A-C	
401A	Flywheel key.....	1	1	1	13A-C		
403A	Oil ring gasket.....	2	3	4	25A-C		
405A	Cylinder hand hole plate gasket.....	2	3	4	1A-C		
418A	Air starter oil pipe connector.....	1	1	1	571A-C		
452A							

Repair Lists—Fairbanks-Morse Type C-O Oil Engines

Repair Numbers Arranged Numerically	Group Parts	The group number in heavy type, when shown at the head of a group of parts, includes all items mentioned in that group. NAME OF PART	No. Used On			Included in Group Number
			Cyl	3 Cyl	4 Cyl	
453A	465A 975 1625 466A 465A	Tube fitting tee.....	1	1	1	
465A		Filter screen always fitted with.....	1	1	1	
		Filter screen flange.....	1	1	1	
		Filter screen bottom.....	1	1	1	
		Filter cover.....	1	1	1	
		Filter cover stud $\frac{3}{8}$ " x $1\frac{5}{8}$ ".....	4	4	4	
		Filter cover stud nut $\frac{3}{8}$ ".....	4	4	4	
		Filter cover gasket.....	1	1	1	
467A		Air starter body gasket.....	1	1	1	571A-C
471A		Injection pump gasket.....	2	3	4	
473A						
474A-C	474A 474A 476A 477A 475A 485A 476A 477A 478A 479A 480A	474A-C Starting Burner with Adjustable Hood.....	2	3	4	
474A		Starting burner body always fitted with.....	2	3	4	
476A		Starting burner tip.....	2	3	4	
477A		Starting burner fuel valve.....	2	3	4	
475A		Starting burner hood always fitted with.....	2	3	4	
485A		Starting burner body tip.....	2	3	4	
476A		Starting burner fuel valve.....	2	3	4	
477A		Starting burner fuel valve gland.....	2	3	4	
478A		Starting burner fuel valve gland nut.....	2	3	4	
479A		Starting burner adjusting stop always fitted with.....	2	3	4	
480A	Starting burner adjusting stop round head screw $\frac{1}{4}$ " x $\frac{5}{8}$ ".....	2	3	4		
	Starting burner adjusting stop round head screw nut $\frac{1}{4}$ ".....	2	3	4		
481A	Starting burner screen plug.....	2	3	4		
482A	Starting burner screen.....	2	3	4		
483A	Starting burner packing ring.....	6	8	12		
485A	507A 883	Starting burner body tip.....	2	3	4	
490A		Gland for $\frac{1}{4}$ " O. D. lubricator and burner oil-tubes.....	26	37	47	
491A		Gland nut $\frac{1}{2}$ " S. A. E. for lubricator and burner oil-tubes.....	26	37	47	
502A		Governor sleeve.....	1	1	1	
507A		Governor weight always furnished with.....	2	2	2	
		Governor weight roller.....	2	2	2	
		Governor weight roller cottered pin $\frac{3}{8}$ " x $2\frac{1}{8}$ ".....	2	2	2	
		Governor weight roller cotter pin $\frac{1}{8}$ " x $\frac{3}{4}$ ".....	4	4	4	
		Air starter pump case cover.....	1	1	1	
		Water pump valve seat.....	2	2	2	943-C
	Air compressor eccentric.....	1	1	1		
512A	531A-C 531A	531A-C Injection Pump.....	2	3	4	
514A		Injection pump body always fitted with.....	2	3	4	
524A		Injection pump suction valve.....	2	3	4	
		Injection pump suction valve spring.....	2	3	4	
		Injection pump valve cage plug.....	2	3	4	
		Injection pump valve cage.....	2	3	4	
		Injection pump plunger spring.....	2	3	4	
535A		Injection pump plunger.....	2	3	4	
537A		Injection pump discharge valve spring.....	2	3	4	
1499		Injection pump plunger packing.....	6	9	12	
1507	Injection pump packing ring.....	2	3	4		
1508	Injection pump suction valve plug.....	2	3	4		
1544A	Injection pump discharge valve seat.....	2	3	4		
1509	Injection pump discharge valve guide.....	2	3	4		
1615	Injection pump packing gland.....	2	3	4		
1616	Injection pump packing nut.....	2	3	4		
	Injection pump discharge valve steel ball $\frac{1}{4}$ " diameter.....	2	3	4		
544A	568A 568A	Injection pump discharge valve seat.....	2	3	4	
545A		Air starter disc spring.....	1	1	1	
546A		Injection cam.....	1	1	1	
550A		Injection pump bracket.....	1	1	1	
551A		Injection pump plunger.....	2	3	4	
552A		Injection cam roller.....	2	3	4	
553A		Injection cam roller pin.....	2	3	4	
557A		Injection pump handle.....	2	3	4	
559A		Injection pump handle catch.....	2	3	4	
560A		Injection pump handle spring.....	2	3	4	
563A	Air starter bearing plate.....	1	1	1		
564A	Air starter bearing plate bushing.....	1	1	1		
566A	Injection cam drive pin.....	1	1	1		
	Injection cam drive pin nut $\frac{5}{8}$ ".....	1	1	1		
	Injection cam drive pin lock washer.....	1	1	1		
568A	Air starter gear shaft always fitted with.....	1	1	1		
	Air starter gear shaft studs $\frac{1}{2}$ " x $1\frac{1}{2}$ ".....	3	3	3		
	Air starter gear shaft stud nut ($\frac{3}{8}$ ").....	1	1	1		
	Air starter plate.....	1	1	1		
	Air starter disc.....	1	1	1		
569A	571A-C 571A	571A-C Air Starter.....	1	1	1	
570A		Air starter body always fitted with.....	6	6	6	
	Air starter body stud $\frac{1}{4}$ " x $2\frac{1}{4}$ ".....	6	6	6		

Repair Numbers		The group number in heavy type, when shown at the head of a group of parts, includes all items mentioned in that group. NAME OF PART	No. Used On			Included in Group Number
Arranged Numerically	Group Parts		2 Cyl	3 Cyl	4 Cyl	
		Air starter body stud nut.....	6	6	6	
		Air starter body stud lockwasher.....	6	6	6	
	570A	Air starter disc.....	1	1	1	
574A	574A	Air starter body shim (thick).....	4	4	4	
575A	575A	Air starter body shim (thin).....	4	4	4	
576A	576A	Air starter gear.....	1	1	1	
579A	579A	Air starter gear shaft gasket.....	1	1	1	
582A	582A	Air starter valve bearing plate gasket.....	1	1	1	
583A	583A	Air starter oil pipe always furnished with.....	1	1	1	
	452A	Air starter oil pipe connector.....	1	1	1	
584A	584A	Air starter oil pipe fitting.....	1	1	1	
	589A	Sight feed oiler.....	1	1	1	
	381A	Air start quick opening valve, nipple and shoulder bushing.....	1	1	1	
	452	Air starter oil pipe connector.....	1	1	1	
	471A	Air starter body gasket.....	1	1	1	
	545A	Air start disc spring.....	1	1	1	
	563A	Air start bearing plate.....	1	1	1	
	564A	Air start bearing plate bushing.....	1	1	1	
	568A	Air start bearing shaft, with studs, and nuts.....	1	1	1	
	569A	Air start plate.....	1	1	1	
	589A	Air start oiler.....	1	1	1	
	1189	Air starter disc spring bushing.....	2	2	2	
585A		Air suction valve large leather ring.....	2	3	4	
586A		Air suction valve small leather ring.....	2	3	4	
589A		Sight feed oiler.....	2	2	2	
590A		Air suction valve small steel ring.....	2	3	4	
591A		Air suction valve large steel ring.....	2	3	4	
595A		Air suction valve spring.....	16	24	32	
597A		Air suction valve stop.....	2	3	4	
598A		Air suction valve stop cap screw (1/2" x 2").....	2	3	4	
		Air suction valve stop cap screw nut (1/2").....	2	3	4	
		Air suction valve stop lock washer (1/2").....	2	3	4	
615		Exhaust pot pipe outlet flange.....	1	1	1	
616		Exhaust pot blind flange.....	2	2	2	
617		Exhaust pot pipe outlet flange gasket.....	1	1	1	
657		Injection pump intermediate regulating lever shaft.....	2	2	2	
660		Injection pump shaft handle spacer.....	1	2	3	
669		Circulating water valve stem handle.....	2	3	4	
675-C		675-C Burner Fuel Tank				
675	675	Burner fuel tank body always fitted with.....	1	1	1	
		Burner fuel tank cover studs 5/8" x 2 3/4".....	4	4	4	
		Burner fuel tank pipe plug (1").....	1	1	1	
		Burner fuel tank cover studs nuts 5/8".....	4	4	4	
		Burner fuel tank body stud 3/4" x 2 1/2".....	2	2	2	
		Burner fuel tank body stud nuts 3/4".....	2	2	2	
		Burner fuel tank body stud nuts lockwashers.....	2	2	2	
676	676	Burner fuel tank cover.....	1	1	1	
677	677	Burner fuel tank funnel.....	1	1	1	
678	678	Burner fuel tank outlet pipe always fitted with.....	1	1	1	
679	679	Burner fuel tank outlet pipe screen.....	1	1	1	
682	682	Burner fuel tank cover gasket.....	1	1	1	
	347A	Burner fuel tank inlet fitting.....	1	1	1	
	1577	Burner fuel tank inlet fitting relief valve.....	1	1	1	
	1578	Burner fuel tank funnel screen.....	1	1	1	
	1579	Burner fuel tank funnel screen lock spring.....	1	1	1	
	1510	Burner fuel tank globe valve 1/4".....	2	2	2	
		Burner fuel tank globe valve nipples (1/4" close).....	2	2	2	
685		Starting burner bracket.....	2	3	4	
699		Circulating water valve handle.....	2	3	4	
755		Injection pump valve cage.....	2	3	4	
759		Injection nozzle tip box wrench.....	1	1	1	
793		Circulating pump suction valve cover.....	1	1	1	
801-C		801-C Main Bearing (Forward and Aft)				
801	801	Main bearing always fitted with.....	2	2	2	
805	805	Main bearing cap.....	2	2	2	
		Main bearing cap stud 5/8" x 3".....	4	4	4	
		Main bearing cap stud nut 5/8".....	4	4	4	
	817	Main bearing bushing always furnished in pairs with dowel.....	2 pr.	2 pr.	2 pr.	
	254A	End crank pin oiler ring spout.....	2	2	2	
	1632	Main bearing set screw.....	2	2	2	
808		Regulating rod bell crank universal joint pin.....	1	1	1	
817	817	Main bearing bushing always furnished in pairs with.....	2 pr.	2 pr.	2 pr.	
		Main bearing bushing dowel pin 5/8" x 1/2".....	2	2	2	
822		Main center bearing bushing always furnished in pairs.....	2 pr.	2 pr.	2 pr.	
829		Flywheel plate.....	1	1	1	

Repair Numbers		The group number in heavy type, when shown at the head of a group of parts, includes all items mentioned in that group. NAME OF PART	No. Used On			Included in Group Number
Arranged Numerically	Group Parts		2 Cyl	3 Cyl	4 Cyl	
836	836	Piston pin oil scraper always fitted with.....	2	3	4	7A-C
		Piston pin oil scraper dowel pin 3/8" x 1/2".....	2	3	4	
837		Piston pin oil scraper spring.....	2	3	4	7A-C
841		Air starter drive gear.....	1	1	1	
843		Quadrant bracket.....	1	1	1	
845		Starting tube.....	2	3	4	
846		Generator intermediate gear.....	1	1	1	
848		Generator gear guard.....	1	1	1	
		Generator gear guard cap screw (3/8" x 1").....	2	2	2	
849		Reverse gear housing hand hole plate.....	1	1	1	
851		Cylinder hand hole plate.....	2	3	4	
853	853	Air starter check valve stem always fitted with.....	2	3	4	1A-C
	340A	Air starter check valve stem collar.....	2	3	4	854-C
		Taper pin No. 0 x 3/4" valve stem collar.....	2	3	4	
854-C		854-C Air Starter Check Valve				
854	854	Air starter check valve body.....	2	3	4	
	853	Air starter check valve stem always fitted with.....	2	3	4	
	340A	Air starter check valve stem collar and taper pin.....	2	3	4	
	856	Air starter check valve stem spring.....	2	3	4	
	1550	Air starter check valve clamping flange.....	2	3	4	
	1645	Air starter check valve clamping flange gasket.....	2	3	4	
855		Pipe flange.....	7	7	7	854-C, 943-C
		Pipe flange cap screw 1/2" x 1 1/2".....	4	6	8	
856		Air starting check valve stem spring.....	2	3	4	854-C
858		Gasket for pipe flange (855).....	7	7	7	854-C, 943-C
865		Governor lever shaft bracket.....	1	1	1	
866		Governor lever bushing.....	2	2	2	
874	874	Governor sleeve yoke always furnished in pairs with.....	1 pr.	1 pr.	2 pr.	
		Governor sleeve yoke studs 3/8" x 2 3/8".....	2	2	2	
		Governor sleeve yoke studs nuts 3/8".....	2	2	2	
		Governor sleeve yoke studs lockwasher.....	1	1	1	
		Circulating pump eccentric.....	1	1	1	943-C
875		875-C Air Compressor Eccentric Strap				
876A-C		Air compressor eccentric strap always fitted with.....	1	1	1	
876A	876A	Air compressor eccentric strap.....	1	1	1	
876B	876B	Air compressor eccentric strap bolt 1/2" x 3 1/4".....	2	2	2	
		Air compressor eccentric strap bolt nut 1/2".....	4	4	4	
		Air compressor eccentric strap shims.....	2	2	2	
	881	Air compressor eccentric rod stud 1/2" x 1 7/8".....	2	2	2	
	1546	Air compressor eccentric rod stud nut 1/2".....	2	2	2	
		Air compressor eccentric rod stud cotter pin 1/4" x 1".....	2	2	2	
878A-C		878A-C Circulating Pump Eccentric Strap				
878A	878A	Circulating pump eccentric strap always furnished with.....	1	1	1	
878B	878B	Circulating pump eccentric strap.....	1	1	1	
		Circulating pump eccentric strap bolts 1/2" x 3 1/4".....	2	2	2	
		Circulating pump eccentric strap bolts nut 1/2".....	4	4	4	
		Circulating pump eccentric strap shims.....	2	2	2	
		Circulating pump eccentric strap bushing.....	1	1	1	876A-C
881	881	Governor weight spring pin washer.....	2	2	2	
	937	Governor weight roller.....	2	2	2	
882		Injection cam roller follower.....	2	3	4	
883		Injection pump intermediate regulating lever.....	2	3	4	
886		Injection pump lever.....	1	1	1	
889		Injection pump cam roller bushing.....	2	3	4	
892		Injection pump push rod shoe.....	2	3	4	
895		Injection pump lever lock always fitted with.....	1	1	1	
896		Injection pump lever lock knob.....	1	1	1	
898	898	Injection cam lever lock taper pin No. 0 x 3/4".....	1	1	1	
899	899	Injection pump lever spring.....	2	3	4	
900		Regulating rod bell crank always fitted with.....	2	3	4	
907	907	Regulating rod bell crank plate.....	1	1	1	
908	908	Regulating rod bell crank plate dowel pin 1/8" x 5/8".....	2	2	2	
		Bell crank machine bolt 3/8" x 2 3/4" with nut and lockwasher.....	1	1	1	
		Governor lever.....	1	1	1	
		Governor lever shaft.....	1	1	1	
		Injection pump regulating link.....	2	3	4	
		Injection pump regulating lever.....	1	1	1	
		Injection pump regulating lever machine bolt (1/2" x 2") with nut and lock washer.....	1	1	1	
925-C		925-C Air Compressor				
925	925	Air compressor cylinder always fitted with.....	1	1	1	
		Air compressor cylinder head studs 1/2" x 2 3/4".....	4	4	4	
		Air compressor cylinder pipe plug 1/2".....	1	1	1	
		Air compressor cylinder dowel pin 3/8" x 5/8".....	1	1	1	
		Air compressor cylinder head stud nuts 1/2".....	4	4	4	
	876A-C	Air compressor eccentric strap.....	1	1	1	

Repair Parts List—Fairbanks-Morse Type C-O Oil Engines

Table with columns: Repair Numbers (Arranged Numerically, Group Parts), NAME OF PART, No. Used On (Cyl, Cyl, Cyl), and Included in Group Number. Lists various engine components like air compressor parts, fuel injection nozzle, and circulating pump parts.

Note: When ordering air pipes, give type and rotation of engine (right or left hand) and number of cylinder for which pipe is required.

Summary row for Air pipe (short): 2, 3 and 4 Cyl. engines. Columns: Repair Numbers, NAME OF PART, No. Used On (Cyl, Cyl, Cyl).

Repair Parts List—Fairbanks-Morse Type C-O Oil Engines

Table with columns: Repair Numbers (Arranged Numerically, Group Parts), NAME OF PART, No. Used On (Cyl, Cyl, Cyl), and Included in Group Number. Lists various engine components like air pipe, ignition plug, generator bracket, and reverse gear parts.

18A-C

Repair Parts List—Fairbanks-Morse Type C-O Oil Engines

Repair Numbers		The group number in heavy type, when shown at the head of a group of parts, includes all items mentioned in that group. NAME OF PART	No. Used On			Included in Group Number
Arranged Numerically	Group Parts		Cyl	3 Cyl	4 Cyl	
1447	1447	Reverse gear friction clutch steel plate always fitted with.....	4	4	4	
1448	1448	Reverse gear friction clutch steel plate facing.....	8	8	8	
		Reverse gear friction clutch steel plate facing tubular rivets No. 1 x 3/8"	144	144	144	
1449		Reverse gear friction clutch cast iron plate.....	3	3	3	
1450		Reverse gear friction clutch end plate.....	1	1	1	
1451		Reverse gear friction clutch adjusting nut.....	1	1	1	
1452		Reverse gear friction clutch adjusting nut collar.....	1	1	1	
1453		Reverse gear friction clutch adjusting nut lock.....	1	1	1	
		Reverse gear friction clutch adjusting nut lock screw 3/8" x 7/8"	1	1	1	
1454		Reverse gear friction clutch hub nut.....	1	1	1	
		Reverse gear friction clutch hub nut cap screw 5/8" x 7/8"	1	1	1	
1455		Reverse gear friction clutch plate spring (long).....	4	4	4	
1456		Reverse gear friction clutch plate spring (short).....	12	12	12	
1457		Reverse gear friction clutch finger.....	3	3	3	
1458		Reverse gear friction clutch finger spring.....	3	3	3	
1459		Clutch finger and brake rod end roller.....	4	4	4	
		Clutch finger pin 3/4" x 3 3/4" with cotter pins.....	3	3	3	
		Clutch finger cotter pin 3/8" x 1 1/2".....	6	6	6	
1460		Reverse gear finger clutch case.....	1	1	1	
1461		Reverse gear friction clutch.....	1	1	1	
1462		Reverse gear shaft gear key.....	1	1	1	
1463		Reverse gear shaft gear key.....	1	1	1	
1464		Reverse gear friction clutch cone.....	1	1	1	
1465		Friction clutch yoke half always furnished in pairs with screws, nuts and lockwasher.....	2	2	2	
1466		Friction clutch yoke pin.....	2	2	2	
		Friction clutch yoke half—cap screw 1/2" x 4 1/2".....	2	2	2	
		Friction clutch yoke half—cap screw nut 1/2".....	2	2	2	
		Friction clutch yoke half—lockwasher.....	2	2	2	
1467		Friction clutch yoke collar (always in pairs).....	2 pr.	2 pr.	2 pr.	
1468		Friction clutch finger spring connector.....	3	3	3	
1469	1469	Friction clutch shifting yoke always fitted with.....	1	1	1	
1470	1470	Friction clutch shifting yoke cap.....	1	1	1	
		Friction clutch shifting yoke cap screw 5/8" x 3 1/4".....	4	4	4	
		Friction clutch shifting yoke cap screw nut 5/8".....	4	4	4	
		Friction clutch shifting yoke cap key Woodruff No. 25.....	2	2	2	
1471		Friction clutch shifting yoke shaft.....	1	1	1	
1472	1472	Friction clutch shifting yoke lever always fitted with.....	1	1	1	
		Friction clutch shifting lever cap screw 5/8" x 3 1/2".....	1	1	1	
		Friction clutch shifting lever cap screw nut 5/8".....	1	1	1	
		Friction clutch shifting lever key Woodruff No. 25.....	1	1	1	
1473		Friction clutch shifting lever link.....	2	2	2	
		Shifting link pin 3/4" x 3" with cotter.....	2	2	2	
		Shifting link pin cotter 3/8" x 1 1/2".....	4	4	4	
1474		Reverse gear hand lever.....	1	1	1	
1475		Reverse gear hand lever stud.....	1	1	1	
		Reverse gear hand lever stud nut (1 1/2").....	1	1	1	
		Reverse gear hand lever stud jam nut 1".....	1	1	1	
		Reverse gear hand lever stud lock washer 1 1/2".....	1	1	1	
1476		Reverse gear brake rod.....	1	1	1	
		Reverse gear brake rod taper pin No. 4 x 1 3/4".....	1	1	1	
1477		Reverse gear brake rod end.....	1	1	1	
		Rod end pin (5/8" x 2 3/4") with cotters.....	1	1	1	
		Rod end pin cotter pin (1/8" x 1 1/4").....	2	2	2	
1478	1478	Reverse gear brake shoe always fitted with.....	2	2	2	
1479	1479	Reverse gear brake shoe wood blocks.....	10	10	10	
		Brake shoe block wood screws No. 13 x 1".....	26	26	26	
1480		Reverse gear brake shoe lever (straight).....	2	2	2	
1481		Reverse gear brake shoe lever (bent).....	2	2	2	
1482		Reverse gear brake shoe pin lower (with cotters).....	2	2	2	
1483		Reverse gear brake shoe pin upper (with cotters).....	2	2	2	
		Brake shoe lever cotter pins 3/8" x 1 1/2".....	4	4	4	
1484		Reverse gear brake shoe lever spacer for bent lever.....	1	1	1	
1485		Reverse gear brake shoe lever spacer for straight lever.....	1	1	1	
1486		Reverse gear brake shoe lever spacer bolt.....	4	4	4	
1487		Reverse gear brake shoe lever rod.....	2	2	2	
		Reverse gear brake shoe lever rod nut 3/4".....	1	1	1	
		Reverse gear brake shoe lever rod jam nut 3/4".....	1	1	1	
1488		Reverse gear brake shoe lever rod tube.....	1	1	1	
1489		Reverse gear brake shoe lever rod spring.....	2	2	2	
1490		Reverse gear brake shoe lever rod washer.....	2	2	2	
1491		Reverse gear brake shoe lever rod end.....	1	1	1	
		Brake rod end pin 5/8" x 2 3/4" with cotter pins.....	1	1	1	
		Brake rod end pin cotter pins (1/8" x 1 1/4").....	2	2	2	
1492		Brake rod end pin hand lever stud washer.....	1	1	1	
1493		Crankshaft nut.....	1	1	1	
1494		Crankshaft reverse gear key.....	2	2	2	
1497		Circulating pump gland stud nut.....	2	2	2	
1498		Circulating pump packing ring.....	3	3	3	
1499		Circulating water valve packing.....	12	18	24	

25A-C
943-C
943-C
1614-C531A-C

Repair Parts List—Fairbanks-Morse Type C-O Oil Engines

Repair Numbers		The group number in heavy type, when shown at the head of a group of parts, includes all items mentioned in that group. NAME OF PART	No. Used On			Included in Group Numbers
Arranged Numerically	Group Parts		Cyl	3 Cyl	4 Cyl	
1500		Sea strainer flange (1" pipe thd.).....	1	1	1	
1501		Sea strainer.....	1	1	1	
1502	1502	Sea strainer bolt 3/8" x 3 1/2" always furnished with.....	8	8	8	
	1516	Sea strainer bolt nut.....	8	8	8	
1503		Servicecock (1").....	1	1	1	
1504		Pet cock 1/4".....	1	1	1	943-C
1505		Pet cock 3/8".....	1	1	1	943-C
1506		Compression grease cup 3/8".....	1	1	1	943-C
1508		Injection pump suction valve plug.....	1	1	1	531A-C
1510		Globe valve 1/4".....	1	1	1	675-C
1516		Sea strainer bolt nut.....	8	8	8	
1524		Pop safety valve (3/8").....	1	1	1	925-C
1525-C		1525-C Air Compressor Piston	1	1	1	
1525		Air compressor piston.....	1	1	1	
1526		Air compressor piston ring.....	3	3	3	
1527		Air compressor piston pin.....	1	1	1	
1528		Air compressor piston pin lock pin spring.....	1	1	1	
1529		Air compressor piston pin lock pin.....	1	1	1	
1530-C		1530-C Air Compressor Cylinder Head	1	1	1	
1530		Air compressor cylinder head.....	1	1	1	
1531		Air compressor cylinder head gasket.....	1	1	1	
1532		Air compressor discharge valve guide.....	1	1	1	
1533		Air compressor discharge valve.....	1	1	1	
1534		Air compressor discharge valve spring.....	1	1	1	
1535		Air compressor discharge valve plug.....	1	1	1	
1536		Air compressor suction valve seat.....	1	1	1	
1537	1537	Air compressor suction valve always fitted with.....	1	1	1	
		Air compressor suction valve nut 1/4".....	1	1	1	
		Air compressor suction valve cotter pin 1/8" x 1/2".....	1	1	1	
1538		Air compressor suction valve spring.....	1	1	1	
1539		Air compressor suction valve cap.....	1	1	1	
1540		Air compressor suction valve cutout.....	1	1	1	
		Air compressor pop safety valve (3/8").....	1	1	1	
		Air compressor pop safety valve tee 3/8".....	1	1	1	
		Air compressor pop safety valve nipple 3/8" x 1 1/2".....	1	1	1	
1541		Air compressor cylinder head flange gasket.....	1	1	1	
		Air compressor cylinder head flange cap screw 3/8" x 1".....	2	2	2	
1542		Air compressor cylinder upper gasket.....	1	1	1	
1543		Air compressor cylinder lower gasket.....	1	1	1	
1544		Air compressor cylinder oil cup fitting.....	1	1	1	925-C
		Air compressor cylinder oil cup fitting round head machine screw No. 14-20 x 3/8".....	1	1	1	
1545		Air compressor eccentric key.....	1	1	1	
1546		Air compressor eccentric rod stud 1/2" x 1 7/8" with nut and cotter pin.....	2	2	2	87A-C
1547		Lubricator drive rod bearing stud always fitted with.....	1	1	1	
1548		Lubricator drive rod bearing stud collar.....	1	1	1	
		Drive rod bearing stud taper pin No. 1 x 3/4" long.....	1	1	1	
		Drive rod bearing stud lock washer 5/8".....	1	1	1	
1549		Air starting check valve gasket.....	2	3	4	
1550		Air starting check valve clamping flange.....	2	3	4	854-C
1551		Lubricator bracket—center (3 and 4 cyl. only).....	1	1	1	
1552		Lubricator bracket—rear.....	1	1	1	
1553		Lubricator plate.....	1	1	1	
1554	1554	Lubricator ratchet arm always fitted with.....	1	1	1	
		Lubricator ratchet arm pin and taper pin.....	1	1	1	
1555		Lubricator coupling half (3 and 4 cyl. only).....	2	2	2	
1556		Lubricator coupling pin.....	2	2	2	
1557		Generator.....	1	1	1	
		Generator cap screw and lock washer 3/8" x 1 1/2".....	4	4	4	
1558		Generator drive gear.....	1	1	1	
1559		Generator reverse current cutout.....	1	1	1	
1560		Generator intermediate gear pin.....	1	1	1	
1561		Generator bolt shim.....	12	12	12	
1562		Ignition plug gasket.....	4	6	8	11E-C
1563		Conduit pipe bracket.....	2	2	2	
		Conduit pipe bracket screws (1/4" x 1/2").....	2	2	2	
1564		Ignition wire conduit bushing.....	1	1	1	
1565	1565	Exhaust pot pipe connection always fitted with.....	1	1	1	
		Exhaust pot pipe connection studs 1/8" x 2".....	6	6	6	
		Exhaust pot pipe connection nuts 1/2".....	6	6	6	
		Exhaust pot pipe connection gasket.....	1	1	1	
1566		Exhaust manifold water connection gasket.....	2	3	4	
1567		Exhaust manifold end always fitted with.....	2	2	2	
1568	1568	Exhaust manifold end studs 1/2" x 2".....	12	12	12	
		Exhaust manifold end studs nuts 1/2".....	12	12	12	
1569		Exhaust manifold water gasket.....	2	2	2	

Repair Numbers Arranged Numerically	Group Parts	The group number in heavy type, when shown at the head of a group of parts, includes all items mentioned in that group. NAME OF PART	No. Used On			Included in Group Number
			2 Cyl	3 Cyl	4 Cyl	
1571-C		1571-C Main Center Bearing	1	2	3	
1571	1571	Main center bearing lower half always fitted with.....	1	2	3	
1572	1572	Main center bearing front and rear segments.....	2	4	6	
1573	1573	Main center bearing top segment.....	1	2	3	
1629	1629	Main center bearing segment bolt $\frac{1}{2}$ " x $1\frac{3}{4}$ " with nut and cotter pin.....	8	16	24	
	254B	Main center bearing oil tube.....	1	2	3	
	822	Main center bearing bushing always furnished in pairs.....	1 pr.	2 pr.	3 pr.	
	166A	Main center bearing bolt $\frac{1}{8}$ " x 4" with nut and cotter pin.....	6	12	18	
	1630	Main center bearing bolt washer.....	6	12	18	
1574	1574	Reverse gear housing always fitted with.....	1	1	1	
		Circulating pump plate studs $\frac{1}{2}$ " x $1\frac{1}{8}$ ".....	9	9	9	
		Cover plate studs $\frac{1}{8}$ " x $1\frac{3}{8}$ ".....	3	3	3	
		Fuel pump bracket studs $\frac{5}{8}$ " x $2\frac{1}{4}$ ".....	4	4	4	
		Top plate studs $\frac{5}{8}$ " x $2\frac{1}{4}$ ".....	6	6	6	
		$\frac{5}{8}$ " Nuts.....	10	10	10	
		$\frac{1}{2}$ " Nuts.....	12	12	12	
1575	1575	Circulating pump plate always fitted with.....	1	1	1	
		Circulating pump studs $\frac{5}{8}$ " x $2\frac{1}{4}$ ".....	4	4	4	
		Circulating pump studs nuts $\frac{5}{8}$ ".....	4	4	4	
1576		Reverse gear housing top plate.....	1	1	1	
1577		Burner tank inlet fitting relief valve.....	1	1	1	
1578		Burner tank funnel screen.....	1	1	1	
1579		Burner tank funnel screen lock spring.....	1	1	1	
1580		Burner tank outlet fitting (not furnished separately).....	1	1	1	
1581		Water outlet manifold.....	1	1	1	
1582		Water outlet manifold fitting.....	2	3	4	
1583		Water outlet manifold fitting cap.....	2	3	4	
1584		Water outlet manifold fitting gasket.....	2	3	4	
1585		Water outlet manifold cap.....	1	1	1	
1586		Water outlet manifold pipe.....	1	1	1	
1587	1587	Regulating rod always fitted with.....	1	1	1	
1588	1588	Regulating rod end.....	2	2	2	
		Regulating rod end taper pin No. 1 x $\frac{3}{4}$ ".....	2	2	2	
1589	1589	Regulating rod collar.....	1	1	1	
		Regulating rod collar taper pin No. 1 x 1".....	1	1	1	
1590		Speed control spring.....	1	1	1	
1591		Regulating rod spring block.....	1	1	1	
1592		Regulating rod spring adjusting block.....	1	1	1	
1593		Regulating rod spring adjusting block screw.....	1	1	1	
1594		Speed control spring lever link.....	2	2	2	
1595		Speed control spring lever link screw.....	4	4	4	
1596	1596	Speed control spring lever always fitted with.....	1	1	1	
		Speed control spring lever machine bolt ($\frac{1}{2}$ " x $2\frac{3}{4}$ " nut and lock washer).....	1	1	1	
1597		Speed control spring lever shaft.....	1	1	1	
1598		Speed control quadrant bracket bolt $\frac{5}{8}$ " x $1\frac{3}{4}$ ".....	2	2	2	
		Speed control quadrant bracket bolt nut $\frac{5}{8}$ ".....	2	2	2	
1599		Speed control quadrant bracket rack.....	2	2	2	
1600		Speed control quadrant bracket bolt $\frac{1}{2}$ " x $3\frac{1}{16}$ ".....	1	1	1	
1601		Speed control quadrant bracket rack spacer.....	1	1	1	
1602		Speed control lever bracket.....	1	1	1	
1603		Speed control lever latch.....	1	1	1	
1604		Speed control lever latch rod.....	1	1	1	
1605		Speed control lever latch.....	1	1	1	
1606		Regulating rod bell crank screw.....	1	1	1	
1607	1607	Fuel control rod always fitted with.....	1	1	1	
		Fuel control rod nut $\frac{1}{2}$ ".....	1	1	1	
1608		Fuel control rod end.....	1	1	1	
1609	1609	Fuel control lever always fitted with.....	1	1	1	
		Fuel control lever bolt ($\frac{1}{8}$ " x 2" nut and lock washer).....	1	1	1	
1610		Fuel control lever shaft.....	2	2	2	
1611		Fuel control lever shaft bushing.....	1	1	1	
1612		Fuel control lever pin with cotter pin $\frac{3}{32}$ " x $\frac{3}{4}$ ".....	2	3	4	
1613		Circulating water valve stem.....	2	3	4	1614-C
1614-C		1614-C Circulating Water Valve	2	3	4	
1614		Circulating water valve body.....	2	3	4	
1613	1613	Circulating water valve stem.....	2	3	4	
1615		Circulating water valve gland.....	2	3	4	
1616		Circulating water valve gland nut.....	2	3	4	
	1618	Circulating water valve.....	2	3	4	
	1619	Circulating water valve nut.....	2	3	4	
	1499	Circulating water valve packing.....	6	9	12	
	669	Circulating water valve handle.....	2	3	4	
1617		Circulating water valve body gasket.....	2	3	4	1614-C
1618		Circulating water valve.....	2	3	4	1614-C
1619		Circulating water valve nut.....	2	3	4	1614-C
1620		Piston pin bushing set screw.....	2	3	4	18A-C

Repair Numbers Arranged Numerically	Group Parts	The group number in heavy type, when shown at the head of a group of parts, includes all items mentioned in that group. NAME OF PART	No. Used On			Included in Group Number
			2 Cyl	3 Cyl	4 Cyl	
1621		Blind flange for exhaust manifold.....	1	1	1	
1622		Circulating pump suction valve spring.....	1	1	1	943-C
1623		Circulating pump discharge valve spring.....	1	1	1	943-C
1624		Circulating pump discharge pipe.....	1	1	1	943-C
1625		Filter screen bottom (not furnished separately).....	1	1	1	
1626		Injection pump handle catch stud.....	2	3	4	
		Injection pump handle catch stud nut $\frac{3}{8}$ ".....	2	3	4	
1627		Injection pump handle stop.....	2	3	4	
1628		Injection pump handle shaft collar.....	1	1	1	
1629		Center main bearing body segment bolt.....	8	16	24	
		Center main bearing body segment bolt nut $\frac{1}{2}$ ".....	8	16	24	
		Center main bearing body segment bolt cotter pin $\frac{1}{8}$ " x 1".....	8	16	24	
		Center main bearing body segment bolt washer.....	12	24	36	
		Center main bearing set screw.....	1	2	3	
		Main bearing set screw.....	2	2	2	
		Main bearing oil pipe fitting.....	1	1	2	
		Center main bearing oil pipe fitting.....	1	2	3	
		Center main bearing oil pipe.....	1	2	3	
		Propeller shaft coupling half (male).....	1	1	1	
		Propeller shaft coupling half (female).....	1	1	1	
		Propeller shaft coupling bolts $\frac{3}{4}$ " x $3\frac{3}{8}$ ".....	6	6	6	
		Propeller shaft coupling nut $\frac{3}{4}$ ".....	6	6	6	
		Propeller shaft hex. hd. machine bolt ($\frac{3}{4}$ " x $6\frac{1}{2}$ ".....)	4	4	4	
		Propeller shaft hex. hd. machine bolt nut ($\frac{3}{4}$ ".....)	4	4	4	
1639		Propeller shaft coupling key.....	2	2	2	
1645		Air check valve cap gasket.....	2	3	4	854-C
1646		Injection pump handle catch stud washer.....	2	3	4	
145A-C		145A-C Auxiliary Fuel Pump	1	1	1	
145A	145A	Auxiliary fuel pump body.....	1	1	1	
39A	39A	Auxiliary fuel pump bell crank always fitted with.....	1	1	1	
56A	56A	Auxiliary fuel pump bell crank drive pin.....	1	1	1	
		Auxiliary fuel pump bell crank taper pin No. 1 x $1\frac{3}{4}$ ".....	1	1	1	
46A		Auxiliary fuel pump drive rod.....	1	1	1	
56A		Auxiliary fuel pump bell crank drive pin.....	3	3	3	
58A		Auxiliary fuel pump bell crank shaft.....	1	1	1	
80A		Auxiliary fuel pump packing ($\frac{1}{8}$ " x 15" twisted asbestos).....	1	1	1	
90A		Auxiliary fuel pump stuffing box gland.....	1	1	1	
146A		Auxiliary fuel pump plunger.....	1	1	1	
147A		Auxiliary fuel pump stuffing box nut.....	1	1	1	
150A	150A	Auxiliary fuel pump drive link always fitted with.....	1	1	1	
56A	56A	Auxiliary fuel pump drive pin.....	2	2	2	
		Auxiliary fuel pump drive pin taper pin No. 1 x $1\frac{3}{4}$ ".....	2	2	2	
257A		Auxiliary fuel pump suction valve.....	1	1	1	
470A		Auxiliary fuel pump air chamber gasket.....	1	1	1	
519A		Auxiliary fuel pump discharge valve.....	1	1	1	
520A		Auxiliary fuel pump air chamber.....	1	1	1	
		Auxiliary fuel pump air chamber cap screw $\frac{3}{8}$ " x $1\frac{1}{4}$ ".....	2	2	2	
		Auxiliary fuel pump lock washer $\frac{3}{8}$ ".....	2	2	2	
1547A	1547A	Auxiliary fuel pump drive stud always fitted with.....	1	1	1	
1548	1548	Auxiliary fuel pump drive stud collar.....	1	1	1	
	1076	Auxiliary fuel pump drive stud collar.....	1	1	1	
		Auxiliary fuel pump drive stud collar taper pin No. 1 x $\frac{3}{4}$ ".....	1	1	1	
		Auxiliary fuel pump drive stud collar taper pin No. 1 x 1".....	1	1	1	
193A		748-C Springs	8	8	8	25A-C
203A		Injection nozzle spring.....	2	3	4	201A-C
256A		Governor weight spring.....	1	1	1	
260A		Injection pump plunger spring.....	2	3	4	531A-C
537A		Injection pump discharge valve spring.....	2	3	4	531A-C
545A		Air starter disc spring.....	1	1	1	571A-C
560A		Injection pump handle spring.....	2	3	4	
595A		Injection pump suction valve spring.....	2	3	4	531A-C
837		Piston pin wiper spring.....	2	3	4	7A-C
856		Air check valve spring.....	2	3	4	854-C
1528		Air compressor piston pin lock pin spring.....	1	1	1	1525-C
1534		Air compressor discharge valve spring.....	1	1	1	925-C
1590		Speed control spring.....	1	1	1	
1539		Air compressor suction valve spring.....	1	1	1	925-C
1622		Circulating pump suction valve spring.....	1	1	1	943-C
1623		Circulating pump discharge valve spring.....	1	1	1	943-C
33A		749-C Gaskets and Packing	2	3	4	
80A		Cylinder head gasket.....	1	1	1	145A-C
118A		Auxiliary fuel pump packing $\frac{1}{8}$ " x 15" twisted asbestos.....	2	3	4	
198A		Cylinder to crank case gasket.....	2	3	4	
199A		Air suction valve plate gasket.....	6	9	12	
405A		Oil ring gasket.....	2	3	4	25A-C
418A		Cylinder hand hole plate gasket.....	2	3	4	1A-C
467A		Filter cover gasket.....	1	1	1	

Repair Parts List—Fairbanks-Morse Type C-O Oil Engines

Repair Numbers Arranged Numerically	Group Parts	The group number in heavy type, when shown at the head of a group of parts, includes all items mentioned in that group. NAME OF PART	No. Used On			Included in Group Number
			2 Cyl	3 Cyl	4 Cyl	
470A		Auxiliary fuel pump air chamber gasket.....	1	1	1	145A-C
471A		Air starter body gasket.....	1	1	1	571A-C
473A		Injection pump gasket.....	2	3	4	
483A		Starting burner packing ring.....	6	8	12	474A-C
479A		Air starter gear shaft gasket.....	1	1	1	571A-C
582A		Air starter valve bearing plate gasket.....	1	1	1	571A-C
617		Exhaust pipe outlet flange gasket.....	1	1	1	
682		Burner fuel tank cover gasket.....	1	1	1	675-C
858		Pipe flange gasket.....	7	7	7	943-C,854-C
946		Circulating pump suction flange gasket.....	1	1	1	943-C
1060		Circulating pump air chamber gasket.....	2	2	2	943-C
1065		Generator bracket gasket.....	1	1	1	
1185		Ignition plug packing washer.....	2	3	4	1182-C
1186		Ignition plug insulating washer.....	4	6	8	1182-C
1432		Reverse gear drive packing washer gasket.....	6	6	6	
1498		Circulating pump packing ring.....	3	3	3	943-C
1499		Circulating water valve packing.....	12	18	24	1614-C-531AC
1531		Air compressor cylinder head gasket.....	1	1	1	1530-C
1541		Air compressor cylinder head flange gasket.....	1	1	1	
1542		Air compressor cylinder upper gasket.....	1	1	1	
1543		Air compressor cylinder lower gasket.....	1	1	1	
1549		Air starter check valve gasket.....	2	3	4	854-C
1562		Ignition plug gasket.....	2	3	4	1182-C
1566		Exhaust pipe connection gasket.....	1	1	1	
1567		Exhaust manifold water connection gasket.....	2	3	4	
1569		Exhaust manifold end gasket.....	2	2	2	
1617		Circulating water valve body gasket.....	2	3	4	1614-C
1645		Air check valve cap gasket.....	2	3	4	854-C
Wrenches						
		Socket wrench for injection tip (1/2").....	1	1	1	
		Socket wrench for 3/8" cap screw.....	1	1	1	
		Socket wrench 5/8" cap screw.....	1	1	1	
		Socket wrench for 3/4" cap screw.....	1	1	1	
		Socket wrench for 1" cap screw.....	1	1	1	
		Socket wrench for 1 1/8" cap screw.....	1	1	1	
		Wrench for injection pump stuffing box.....	1	1	1	
		Monkey wrench 12".....	1	1	1	
		Open end wrench for 1/4" and 5/16" cap screw.....	1	1	1	
		Open end wrench for 3/8" and 1/2" cap screw.....	1	1	1	
		Open end wrench for 5/8" and 3/4" cap screw.....	1	1	1	
		Open end wrench for 7/8" and 1" cap screw.....	1	1	1	
		Single open end wrench for 3/8" cap screw.....	1	1	1	
		Single open end wrench for 1/2" cap screw.....	1	1	1	
		Bar for removing piston.....	1	1	1	

**INJECTION TUBES—BURNER TUBES—LUBRICATING TUBES FOR
30-45-60 H.P. R.H. AND L.H. ENGINES.**

All tubes are furnished complete with glands and nuts or cinch connections.

When ordering tubes give style and length thus: Injection tube style "A", 44" long for (size) H.P. Engine number (?).

