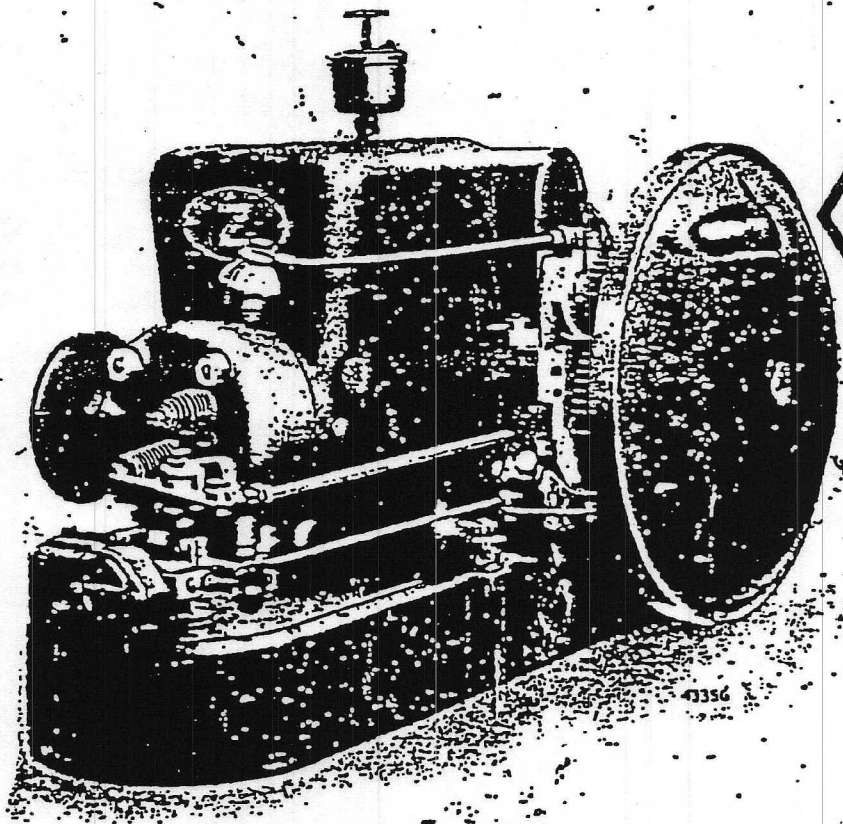


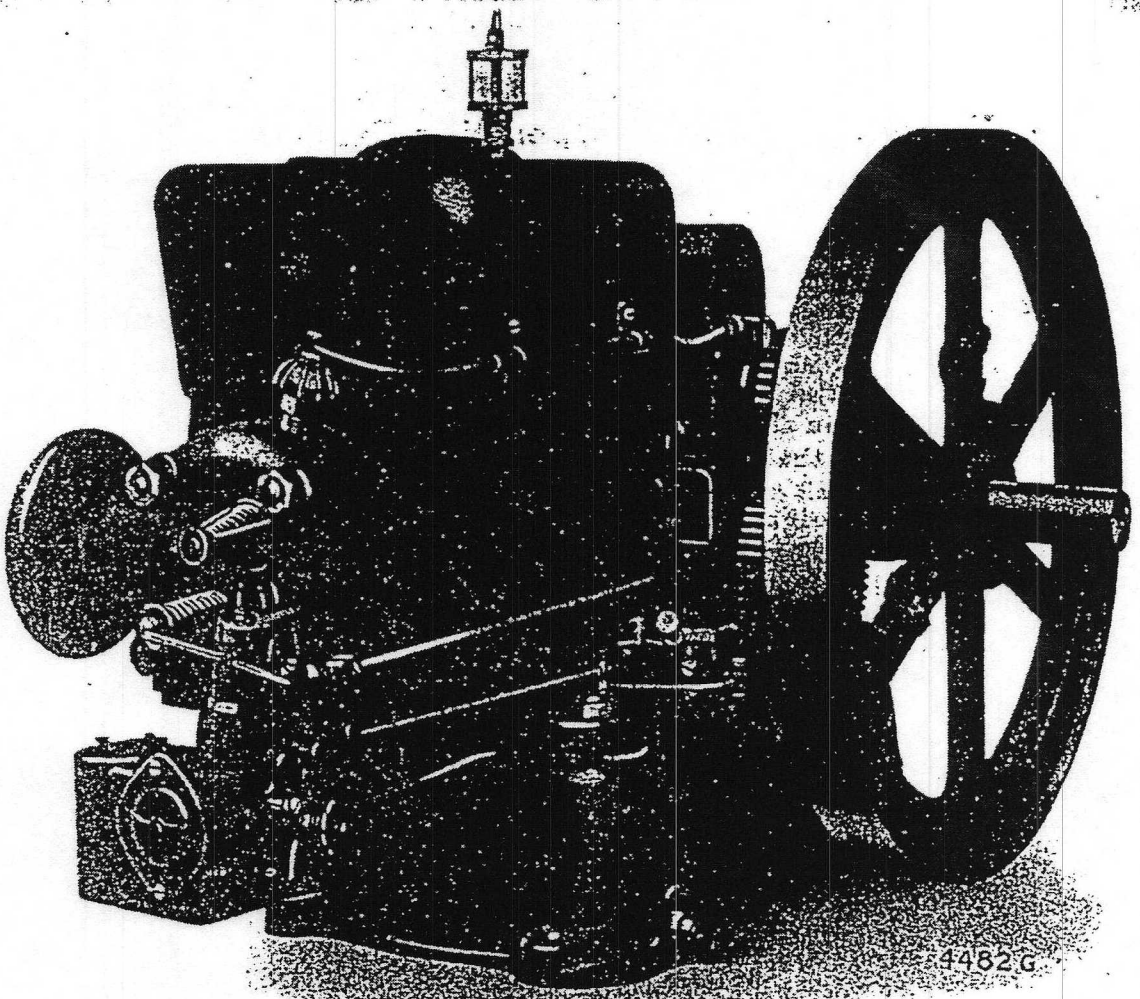
INSTRUCTIONS No. 2548D
FOR SETTING UP AND OPERATING
Fairbanks-Morse
2, 3 and 6 H. P. "Z"
Throttling Governor Engines
Model "ZA"
With Type "R" High Tension Rotary Magneto

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



2 H. P. "Z" Throttling Governor Engine with Type "R" (4335G)
High Tension Rotary Magneto

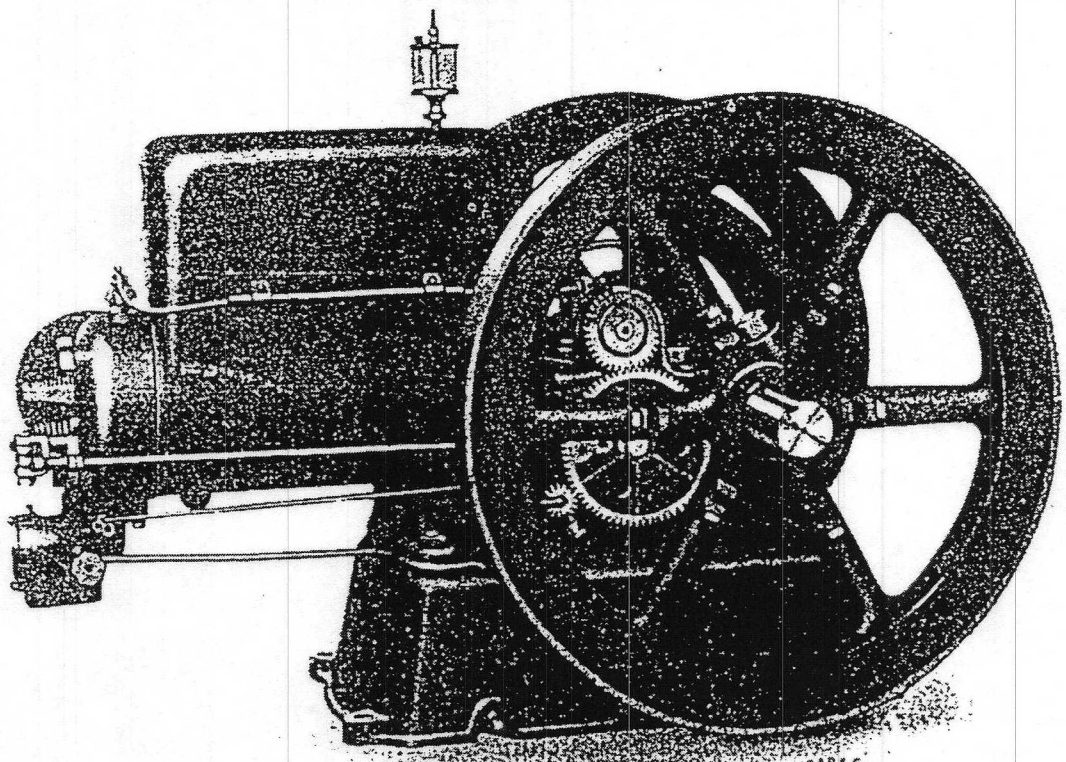
FAIRBANKS, MORSE & CO.



4482G

3 H. P. TYPE "Z" THROTTLING GOVERNOR ENGINE

(4482G)



4484G

6 H. P. TYPE "Z" THROTTLING GOVERNOR ENGINE

(4484G)

INSTRUCTIONS No. 2548D

For Setting Up and Operating Fairbanks-Morse 2, 3 and 6 H. P. "Z" Oil Engines with Type "R" High Tention Rotary Magneto

When Engine is Received

1. Remove the engine from the crate, being careful to avoid damage. Screw the oil cup 527, on the cylinder oil pipe. Attach the pulley to the fly-wheel opposite the governor side by means of the cap screws furnished. With steel pulleys larger than 4-inch, three bent steel clips are furnished to catch inside the curled rim and take the bolts.

- 2. Clean all parts.
- 3. See that the Governor Parts are Free From Dirt or Paint.

4. Oil all moving parts and turn the flywheel over by hand slowly to see that all parts are free.

5. Fill the grease cups with hard oil and screw down.

Foundation

6. If engine is to be located on a foundation, follow the foundation plans, which will be furnished free on request. Leave two or three feet of room all around the engine.

If Located in a Building

7. If the engine is installed in a building the exhaust should be piped outside. This pipe should be short and with few bends. Water may collect in long exhaust pipes so a small hole or other drain should be provided where water might collect. When the pipe is long (20 feet), or has several elbows (4), the pipe should be increased in size and better results will be obtained if an exhaust pot is installed near the engine.

Fuel

8. These engines can use as fuel, Gasoline, Kerosene and some varieties of Light Distillate. In this book the fuel will be called "Oil Fuel."

Read Tags

9. Read the Tags on the Engine But Do Not Remove Them Until you are familiar with its operation.

WHAT TO DO BEFORE STARTING

Fill Fuel Tank

10. Fill the oil fuel tank.

Oiling Water

11. Put water in hopper, but at first only enough to cover top of cylinder. In cold weather hot water will make the engine easier to start.

Oiling

12. Fill oil cup 527 with good medium grade of Gas Engine Oil and adjust oiler to feed 8 drops per minute on 2 H. P., 12 drops per minute on 3 H. P., 20 drops per minute on 6 H. P. Gradually cut down these amounts as the engine wears in, until at the end of a month, one-half the amounts are used.

Fill the four grease cups. Two 505 are on the main bearings, 509A is on the crank pin bearing, and 506 is on the cam gear bearing, and also on the governor spindle bearing. They should be screwed down one or two turns until grease is forced freely into bearings.

Oil by Hand

13. With a hand oil can go over the engine, oiling the governor thoroughly. Squirt a little oil in places where there are oil holes, and where one part moves against another.

Oil the suction and exhaust valve stems and guides, suction valve drag spring 120, on 3 and 6 H. P., and the exhaust rod where it enters the cam gear bracket.

In freezing weather, oil the piston where the end comes out of the cylinder, because the cylinder oil may not feed until it is warmed up.

TO START THE ENGINE

Gasoline for Starting

14. Fill the reservoir with gasoline.

Fuel Valve

15. Close the oil throttle 76B, open gasoline throttle valve 376A from 1/8 to 3/4 turn, depending on the grade of fuel, 1/4 turn being the average for starting. If the engine is run on gasoline, throttle valve 76B may be used for starting as well as running.

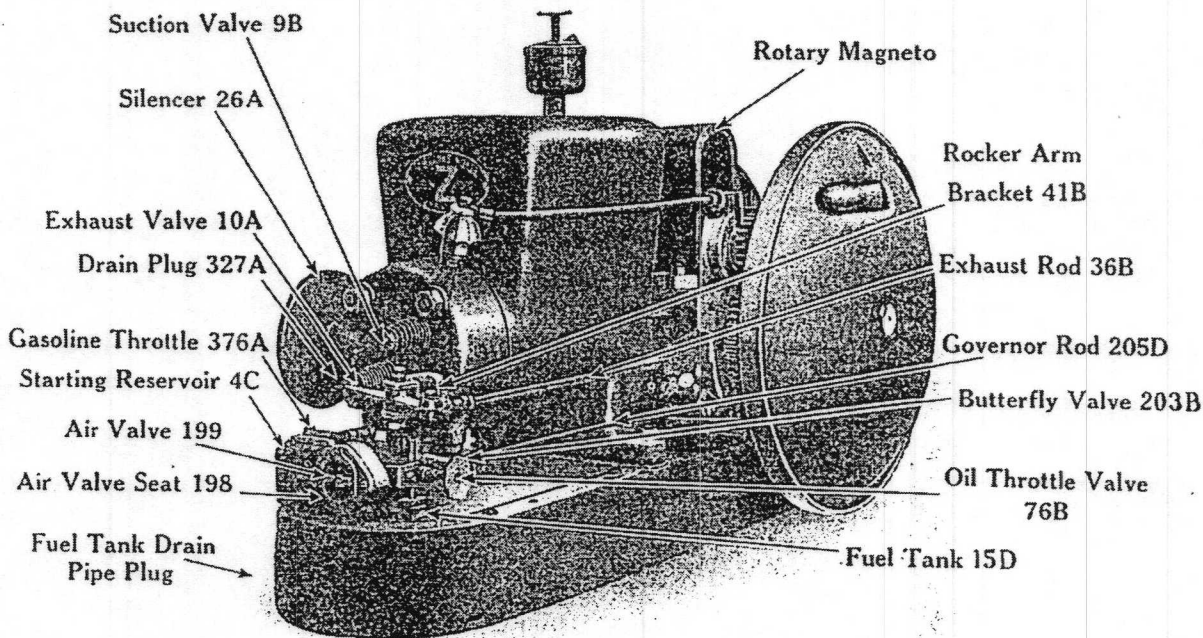
Starting

16. Turn the crank until the piston comes up against the compression. Hold the suction or upper valve open with the left hand until the piston reaches dead center, then close the air inlet opening in the air valve with the fingers of the left hand for one revolution only, removing the fingers while rapidly

continuing to crank. If held longer, too much fuel will be drawn in. The mixture will not ignite if there is too much fuel. Gradually open the throttle valve, starting with $\frac{1}{8}$ of a turn until the position of the valve for easy starting has been established.

17. The spark gap is to be .020" or the thickness of the gauge found on the magneto. Spark Plug Gap

18. Too much fuel used in starting (particularly with a hot engine) will "FLOOD" the engine. When flooded, close the fuel throttle, relieve the compression by holding suction valve open and turn the flywheel over a number of revolutions in order to work out the excess fuel. Flooded Engine



2 H. P. TYPE "Z" THROTTLING GOVERNOR ENGINE (4335G)

AFTER THE ENGINE IS STARTED

19. After the engine takes its first impulse, remove the starter crank (on 3 and 6 H. P. engines) and adjust the gasoline throttle valve to the point where engine runs best.

20. The engine will usually run on oil fuel after using one reservoir full of gasoline. In cold weather it may require two fillings. When the engine is warm enough gradually open the oil throttle valve 76B, and close gasoline throttle valve 376A. It is well to have the gasoline throttle valve slightly open until the engine is hot enough to run well on the oil fuel alone. After closing gasoline throttle, the oil fuel throttle should again be adjusted to give as little fuel as the engine will run on smoothly. The handle of the oil fuel throttle is marked with a notch at the factory when the engine is tested and should generally point down when the engine is in operation.

Running on Oil Fuel

21. Fill water hopper two-thirds full and replenish this water as it boils away.

Fill Hopper

22. Tighten Cylinder Head Nuts after engine has been run and warmed up. Attention to this matter will prevent water leaks, and the blowing out of cylinder head gaskets.

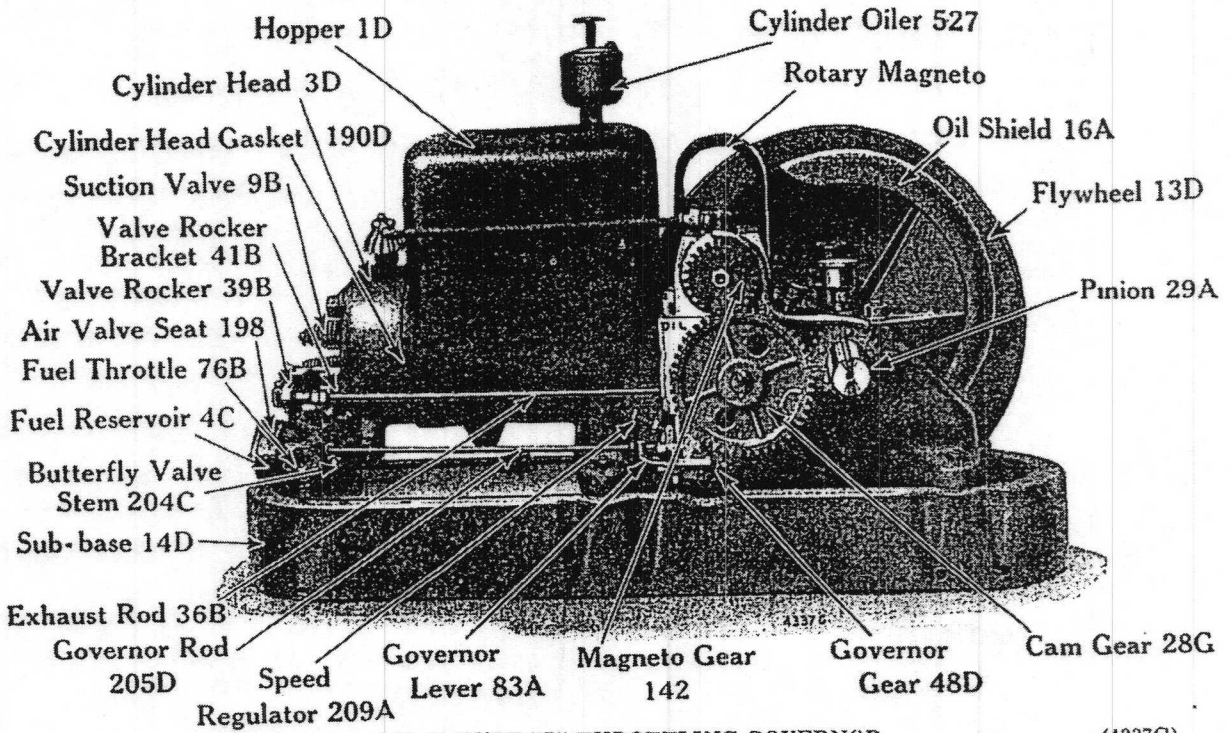
Tighten Nuts

TO STOP ENGINE

23. To stop engine, first close oil fuel throttle valve 76B, then close cylinder oiler 527, and in freezing weather drain out the water from cylinder jacket through plug 327A provided. Turn the engine over until the exhaust

To Stop

valve is closed. This is a precaution against the formation of rust on cylinder walls and exhaust valve in case the engine stands idle for some time. Furthermore dirt and grit will not lodge on the protruding end of the piston.



2 H. P. TYPE "Z" THROTTLING GOVERNOR

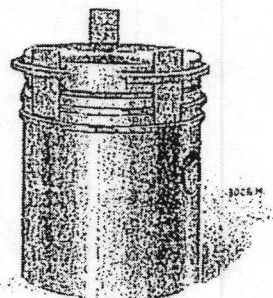
(4337G)

DESCRIPTION OF PARTS OF ENGINE AND MANNER OF ADJUSTMENT

- Lost Compression** 24. Should the engine on starting turn too easily, it has lost compression because some leak is taking place. The suction valve as well as exhaust valve should be examined. If they seat tightly, examine piston (see paragraph 29). See that the cylinder head gasket forms a tight joint with the cylinder and head.
- Suction Valve** 25. The suction valve 9B, is an ordinary poppet valve, automatic in its action and has a lift of about three-eighths of an inch. The lift is limited by means of a spring 310A, on the valve stem. This valve on 3 and 6 H. P. engines is also fitted with a friction spring 120, (patented) causing a friction on the suction valve spring collar 121, and prevents chattering. Oil this every time engine is run.
- Exhaust Valve** 26. The exhaust valve 10A, like the suction valve, is in the cylinder head, with spring and stem outside in plain sight. If it sticks, use kerosene, work it by hand, then put on some lubricating oil.
- Cleaning and Regrinding Valves** 27. If it is necessary to grind suction or exhaust valve, the cylinder head may be removed and the valves ground in with ground glass or fine emery and oil. Carefully clean both valve and seat before replacing.
- Carbon Head Gasket** Carbon may best be cleaned out by taking off the cylinder head.
28. Gaskets hold better if covered with linseed or lubricating oil when applied. Before applying gasket **scrape off all traces of old gasket**. Gasket should be about $\frac{3}{4}$ -inch thick. After putting on new gasket 190D, the nuts should be tightened, and also tightened again when engine is hot.
- To Remove Piston** 29. The piston may be taken out without removing cylinder head. Take off shield and unbolt the rod. Turn crank to out position. The position may now be withdrawn. Clean with gasoline or a hot solution of lye and water. A solution composed of one pound of lye to three gallons of boiling water may be used when the piston is removed. Rinse thoroughly with water. Loosen the rings and clean the grooves, scrape off all carbon found inside. Oil the piston well before replacing. In replacing piston, turn it bottom side up so that the stop pins can be seen, otherwise the rings may be broken. Be sure to turn it

right side up before bolting on connecting rod cap, otherwise the pin will get no oil. The rings can be removed from piston by taking three strips of tin about one-half inch wide and six inches long. Slip one piece of tin under the middle of the ring and over the ring groove, then with the help of a screw driver the other strips can be slipped under the ends and the rings in turn slipped off the piston.

To Remove
Piston Ring



(3006M)

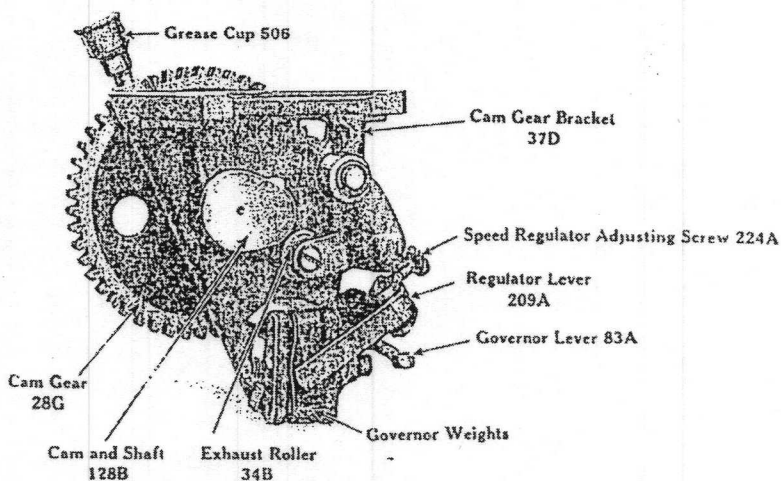
METHOD OF REMOVING PISTON RINGS

30. To remove piston pin 7A, first take cotter pin from the end of dowel pin 71A. With a screw driver remove dowel pin. The piston pin can then be driven out. In reassembling parts be sure to tighten up dowel pin and put cotter pin in place.

Piston Pin
Dowel

31. The governor is fitted with a friction drag spring 33B, the purpose of which is to steady the governor action. The force of the spring can be adjusted by small screw 321. If there is too much tension the governor will be slow to respond to change in load. If not enough tension, the governor rod 205D will jump at each explosion.

Action of
Governor



(4338G)

CAM GEAR BRACKET AND GOVERNOR ASSEMBLY

32. If it is necessary for any reason to reset butterfly valve stem arm 206C, take cotter pin out of governor rod end 405A, and remove from 206C. Pull one governor weight 82A, out as far as it will go, and then put a wedge under it to hold it in that position. Loosen lock nut 404, holding pull rod end 405A in place. Close butterfly by turning valve stem arm 206C, in clockwise direction as far as it will go when pointing upward, then screw pull rod end 405A, on governor pull rod 205D, until the pull rod is 1/16-inch too short to go into hole in valve stem arm 206C. Remove wedge from under governor weight. Tighten nut 404, against 405A, and reassemble parts removed. If these instructions are followed, the engine cannot run away.

Butterfly
Valve

Decreasing Engine Speed

33. The governor normally holds the engine at its rated speed, but each engine is provided with a speed regulator 209A-C, which decreases the speed by turning the adjusting screw. It must be remembered that when the speed of the engine is decreased, the horse power also decreases.

The speed regulator is intended for temporary speed variation. If it is desired that the engine run continuously at lower than rated speed, the adjustment should be made on the governor by unscrewing the adjusting screw 156A.

Suction Feed

34. Fuel is lifted from the tank into the reservoir 4C by suction. If the engine should miss fire or back fire in the air suction or show lack of power with plenty of fuel in the tank, examine the check valve 89. This has a fine wire screen in the lower end which may be clogged.

Also note the ball in the check valve. It may not be seating properly due to dirt on the seat. The auxiliary air valve is at the air inlet of the reservoir 4C. It should work freely at all times.

Piping

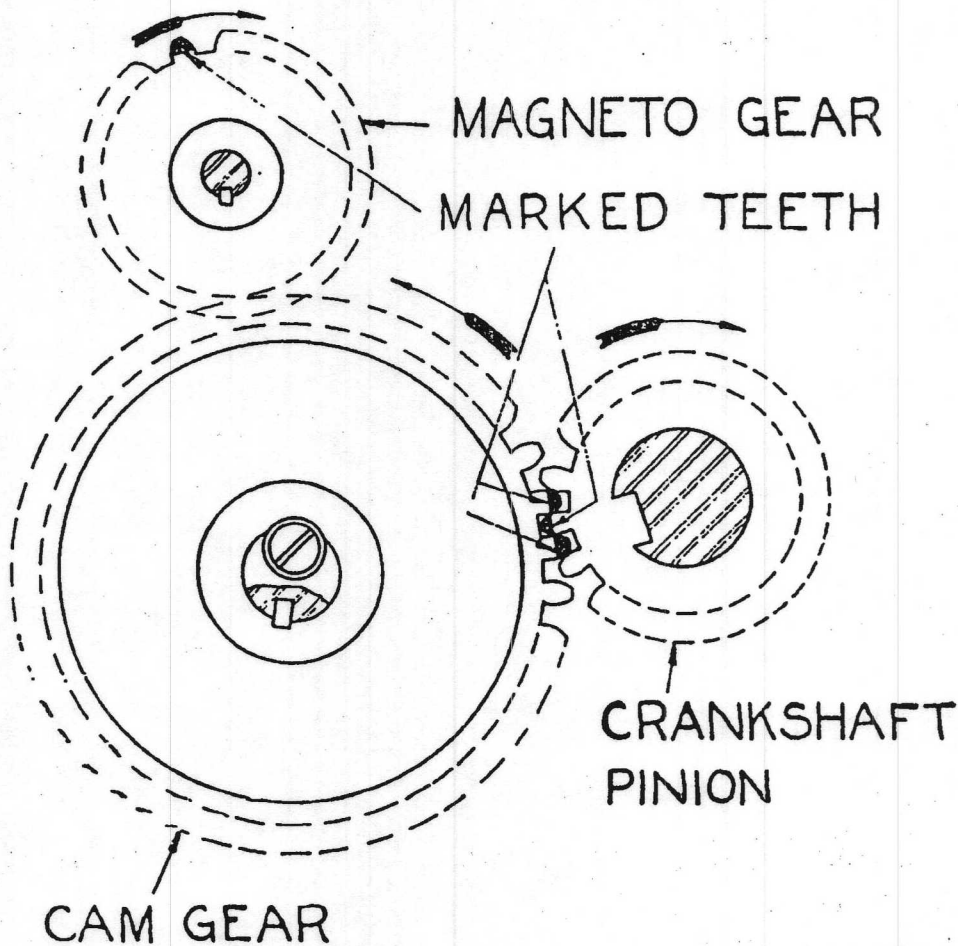
35. To remove fuel piping and check valve from fuel tank, unscrew cap and remove the clamp 297 that holds the fuel throttle valve seat 197A in the reservoir. The valve seat and fuel piping can then be removed.

Draining Fuel Tank

36. This tank is provided with a drain closed by a pipe plug.

Setting Gears

37. In case it is necessary to remove the cam gear, crank shaft pinion or magneto pinion from the engine, it is very essential that it be replaced according to the following instructions. Otherwise the engine will not develop its proper horse power or may not operate at all.



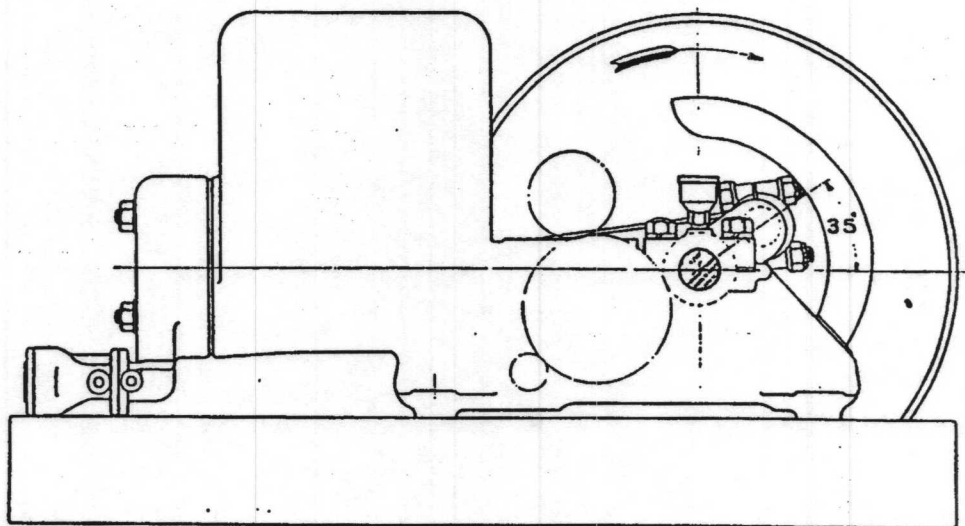
CAM SETTING DIAGRAM

42ZAA21

A tooth space in the cam gear is marked by having the outside corners of two teeth leveled off. If the magneto is removed be sure upon reassembling that the marked tooth on the magneto pinion meshes between the marked teeth on the cam gear. Both the magneto pinion and the crankshaft pinion marked teeth should mesh with the marked teeth on the cam gear.

38. Turn the engine to where the crank 25D, is straight up. Then set the cam gear with the nose of the cam straight up. Next see that there is about $\frac{1}{32}$ " clearance between end of exhaust rod and the valve rocker arm. Adjust to this clearance by the two nuts on exhaust rod. Such a setting should bring the valve timing very nearly as described in paragraph 39.

Valve Timing



VALVE TIMING CHART

(40ZAA2)

39. The cam should begin to open the exhaust valve about 35 degrees before outer dead center of crank, as shown in cut 40ZAA2. The cam should close the exhaust valve when the crank is in position shown in cut 41ZAA1 or about 5 degrees above the inner dead center. When the exhaust valve is closed the exhaust rod 36B is loose.

40. In order to remove the cam gear, unfasten the governor pull rod and remove the exhaust rod, then take out the two screws holding the cam gear bracket to the base. The cam gear bracket complete can then be removed and all parts inspected. If it is necessary to remove the cam gear, the gear must be pulled from the shaft after the screw and washer are removed. Do not try to drive the cam shaft out of the gear.

Removing
Cam Gear

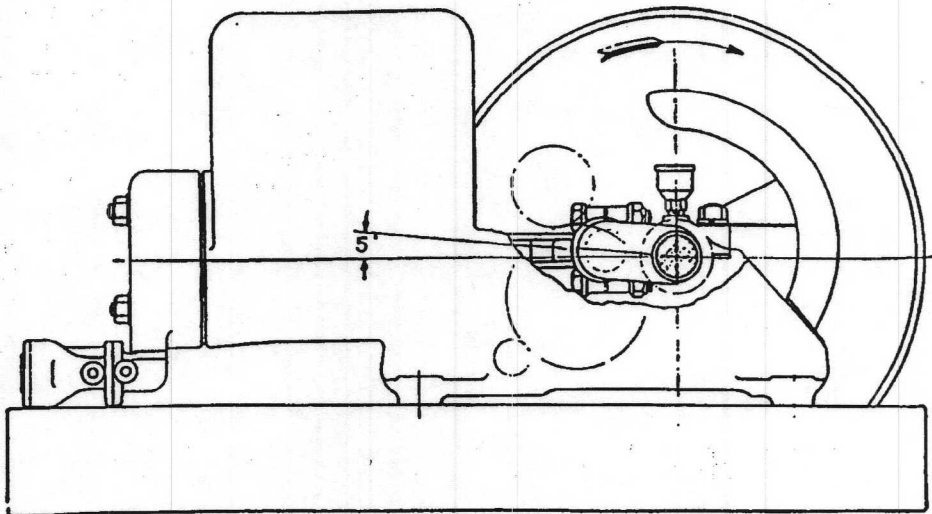
In replacing the bracket care must be taken to mesh the gear and pinion according to paragraph 37 and the cam setting chart.

41. Crank shaft bearings can be adjusted by unbolting caps and removing one or two of the thin shims. In reassembling, the bolts must be drawn up tight and yet the shaft must turn perfectly free. If not free, shims should be put back until bolts can be drawn tight without clamping the shaft. Replace the cotter pins in the bolts.

Bearing
Adjustment

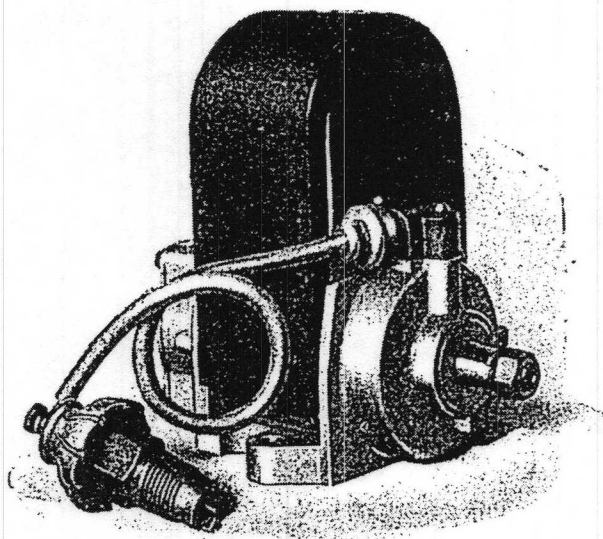
42. It is intended that the engine should be cranked from the governor side. If for any reason it is necessary to crank the opposite side it will be necessary to reverse the pawl in the starter crank.

Cranking
Engine



(41ZAA1)
VALVE TIMING CHART
SHOWING DIRECTION OF ROTATION OF FLYWHEELS

- Renewals** 43. These bearings all have renewable linings. A little fitting and scraping of new linings may be needed to make them fit perfectly.
- Cooling Water** 44. After starting, the water should never be allowed to fall as low as the top of the cylinder wall, as the cylinder will get too hot. It is expected that the water will boil under heavy load. Put in more water as it boils away.
- Engine Jacket Broken by Freezing** 45. The engine jacket is liable to be broken by freezing if water is left in during cold weather unless non-freezing solution is used.
- Non-Freezing Solution** 46. A non-freezing mixture of calcium chloride and water may be used in the jacket. Three pounds of calcium chloride to each gallon of water will not freeze solid at zero Fahrenheit. It is better, however, to drain the jacket in freezing weather when the engine is not in use.
- Removing Scale or Deposit** 47. While the deposit or scale varies in character in different localities it can usually be removed by draining the engine cylinder jacket, and filling the jacket with a solution of one part commercial sulphuric acid to ten parts water. Allow to stand over night and then wash out with fresh water.
- To Remove Flywheel** 48. On 3 and 6 H. P. loosen bolts and drive wedges into the split on each side of arms, generally the wheel is then loosened so it can be easily pulled off. If not, drive it by placing piece of hard wood against the inside hub of wheel. In replacing, tighten the bolt before driving the key.
- Crank Shaft End Play** 49. The flywheels should be set snugly up against the main bearings but not so tight that they will bind.
50. The 3 and 6 H. P. crank cases are each provided with a drain plug. This should be removed occasionally and the cases drained to prevent oil from being thrown into the cylinder and piston.



(4505G)

TYPE "R" HIGH TENSION ROTARY MAGNETO

51. The magneto cable is held in the collector brush holder by means of a threaded terminal. The same being removed by revolving the entire cable. When replacing the same be sure the cable terminal is screwed in tight.

Removing
Magneto Cal

52. External parts for the magneto will be furnished as shown in the repair parts list. If replacements are necessary on internal parts, avoid breaking the seal and return the magneto complete to the nearest branch.

Magneto
Replacemen

53. The 6 H. P. engines are supplied with an impulse coupling which automatically operates on starting. After the engine receives its first few impulses the coupling automatically cuts out. The impulse coupling retards the spark for starting, thereby eliminating danger of back fire while cranking as well as giving the magneto a starting impulse greater than that obtainable by hand cranking. The latter gives greater ease in starting and a hotter spark for ignition.

Impulse
Coupling

REPAIR PARTS LIST FOR 2, 3 AND 6 H. P. Throttling Governor "Z" Engines

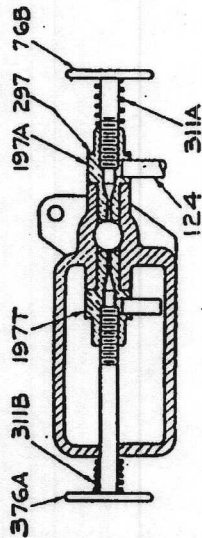
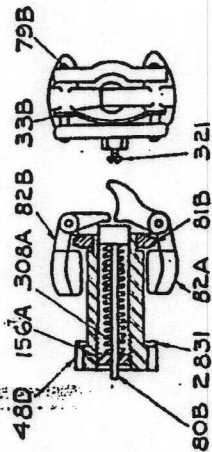
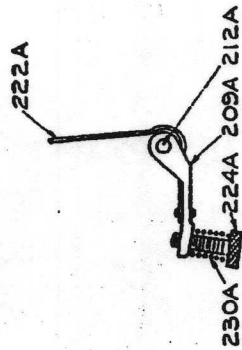
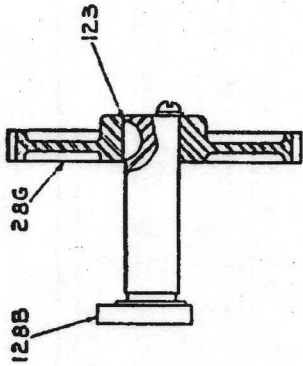
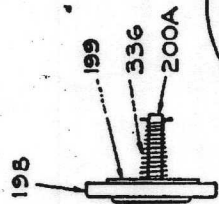
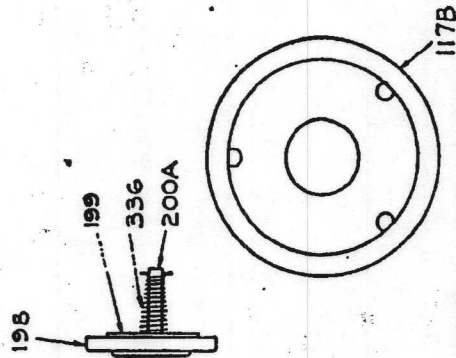
INSTRUCTIONS FOR ORDERING REPAIR PARTS

To insure obtaining the proper repair parts without delay, give the complete description of the part or parts wanted as shown in the following example:

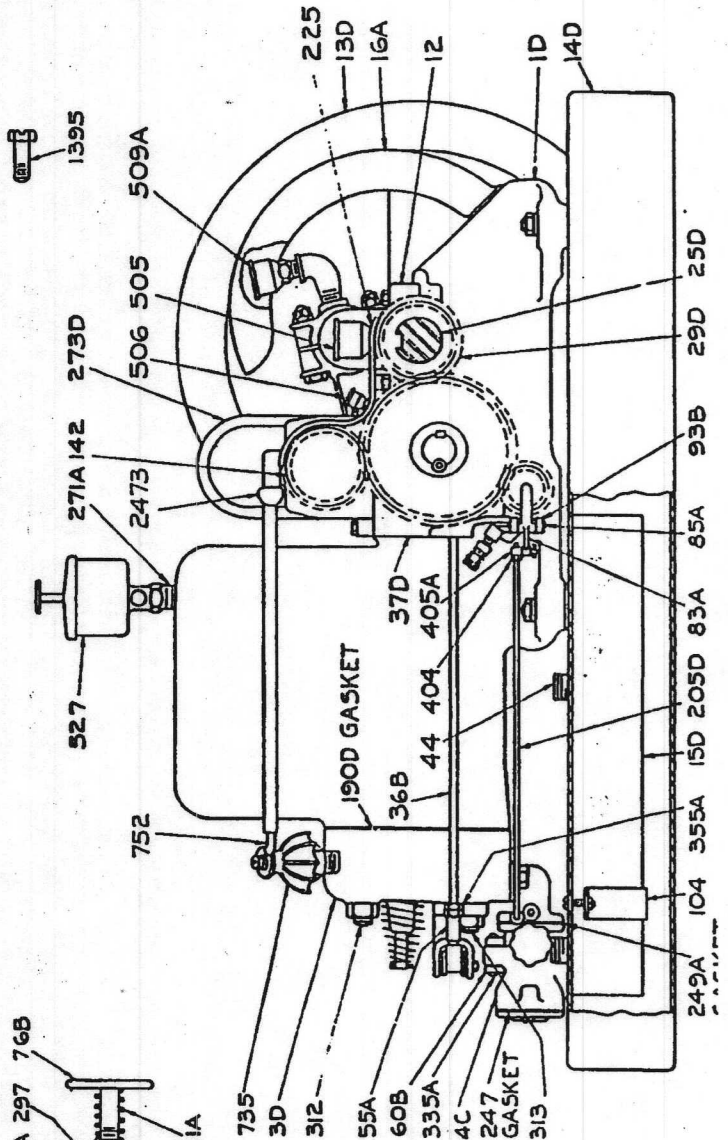
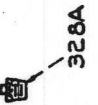
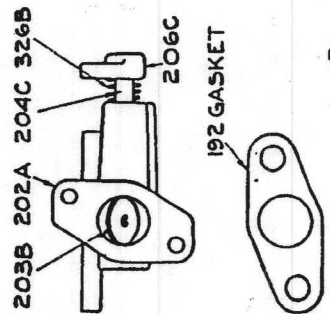
- | | |
|----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Description of Part | <ol style="list-style-type: none"> 1. Quantity of parts wanted, "one." 2. Repair number, "1D." 3. Name of part, "cylinder." 4. Size of engine, "2 H. P." 5. Type of engine, "throttling governor." 6. Engine serial No., "576189." |
| Repair Order | The repair order, in this case, should read: "One 1D cylinder for 2 H. P. throttling governor engine, serial number 576189." |
| Engine Serial Number | IMPORTANT: The most important items of the above information are the repair number and the engine serial number. The latter is stamped on the hopper of the engine. |

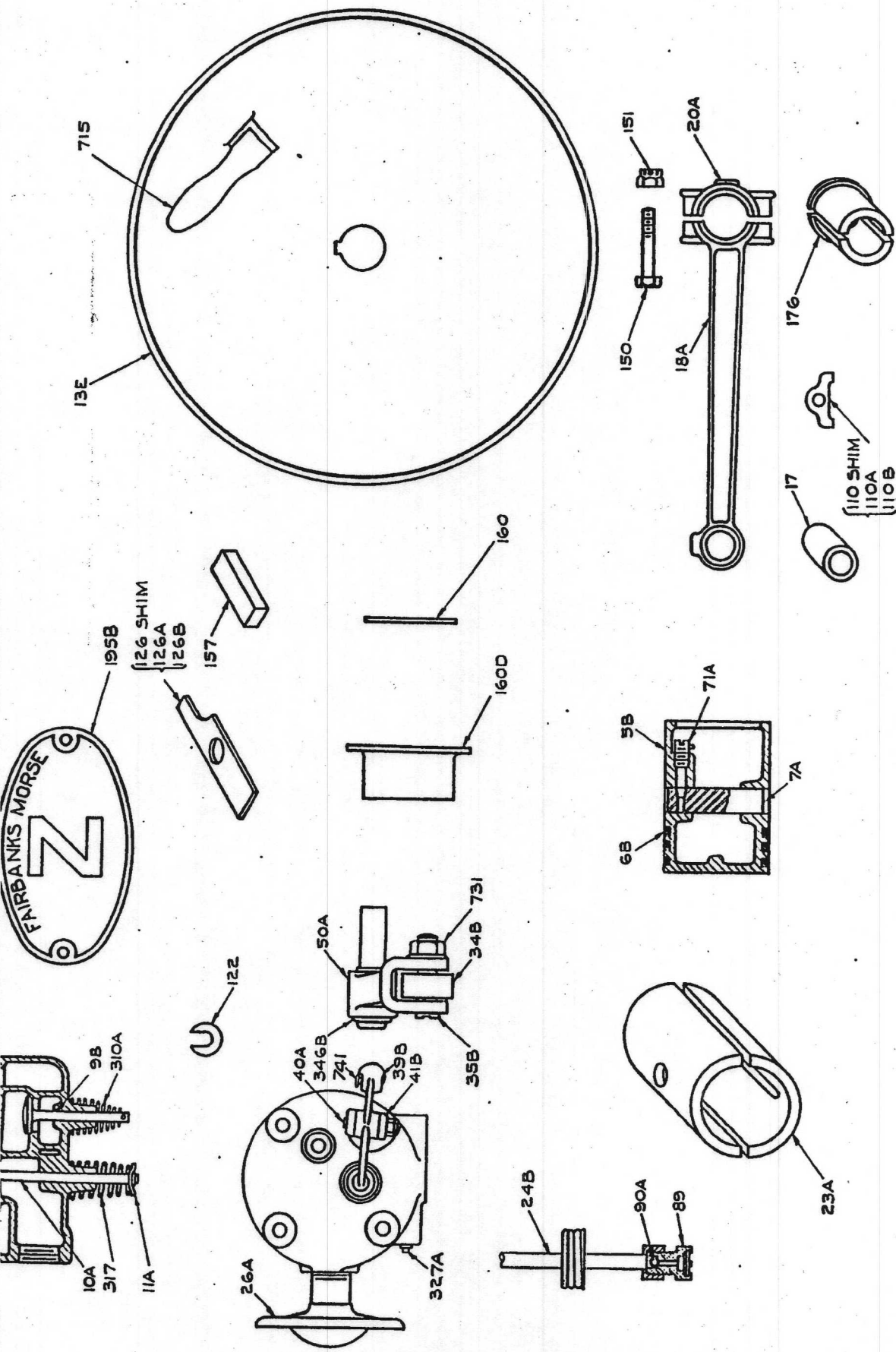
HOW TO USE THE REPAIR LIST AND THE REPAIR CHARTS

- | | |
|------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Numerical Arrangement | The first column at the left of each page shows the repair numbers of all complete groups and all separate parts, arranged in numerical order. |
| Complete Group | The repair number, when shown in bold-faced type and followed by a dash and the letter "C" (indicating complete), is a group number which covers all the items to the next horizontal line. |
| "Group Part" Column | The second column from the left contains the repair numbers of all of the parts included in each of these groups. |
| Bracketed Group | Parts, which are followed by the words "always with" are not furnished separately, but only with the parts included within the brackets. |
| "Included in Group" Column | When a part is shown with its repair number in numerical order (in the first column), the "Included in Group" column will indicate whether this part is also included in another group. |
| "Number Used" Column | The number of parts in each group is shown in the "Number Used" column. The total number of parts used is shown when the part is arranged in numerical order. |
| Repair Charts | The repair charts show all the parts which have their repair numbers. The part wanted can be found by locating its repair number on the repair chart, and the name of the part when found by locating the same repair number, in numerical order, in the repair list. |
| Ordering by Groups | Always order by group number if possible. Before doing so, carefully check over the group to make sure that all parts included therein are wanted, for they will all be furnished unless otherwise specified. If it is found that in a group every part but one or two is wanted, order the group and specify "less" the repair numbers not wanted; i. e., in the 5B-C group every part is wanted except the piston rings; the order should read: 5B-C piston less rings 6B. |
| Parts without Repair Numbers | If any part without a repair number is wanted, such as a stud, cap screw, bolt, etc., refer to the repair chart and find the number of the part with which it is used. Then by referring to the repair list, the part without a repair number will be found following the numbered part with which it is used. In some cases, the part without a repair number will be found following the numbered part in the numerical arrangement of the repair numbers. Use the name and the size of the parts, as shown in the repair list, when ordering parts which have no repair numbers. If the size of these parts is the same on all sizes of the product, only one dimension is shown following the part (in the "NAME OF PART" column) when arranged in numerical order. If the sizes of the parts without repair numbers are different, each dimension is listed in the same order as in the "Number Used" column. |



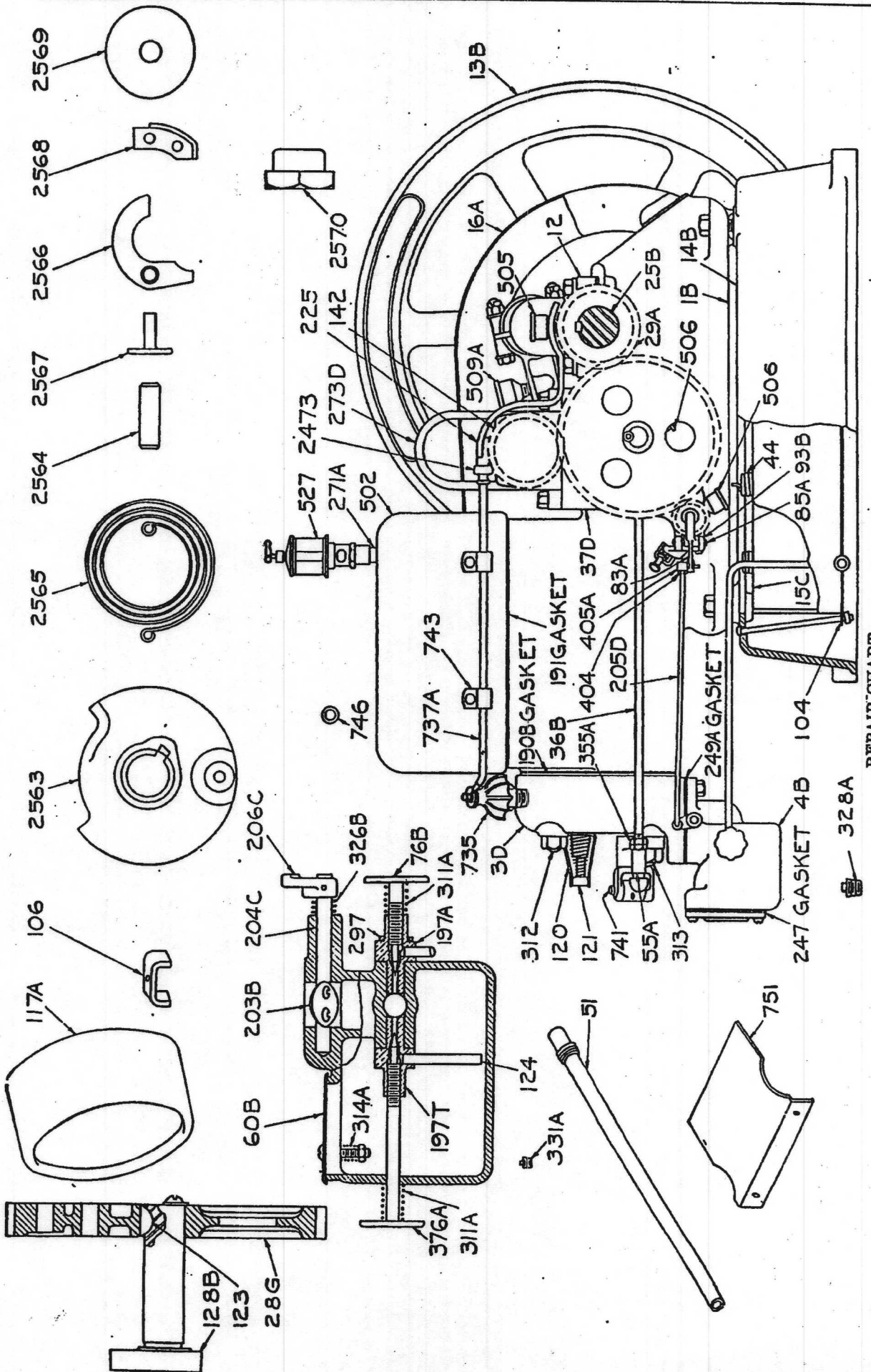
B-331A





REPAIR CHART
H. P. "Z" ENGINE

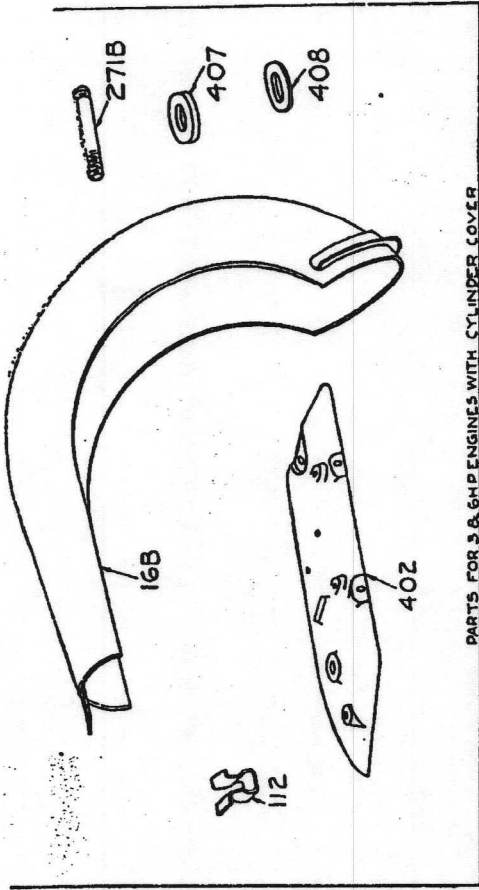
(50ZA13)



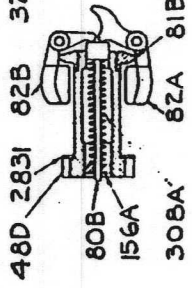
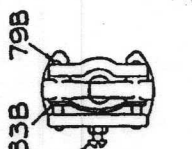
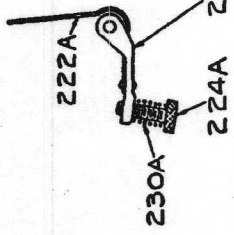
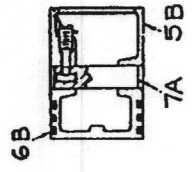
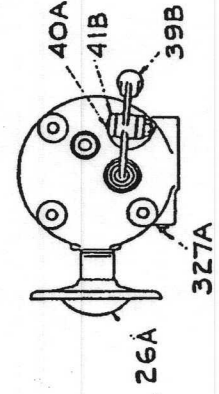
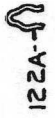
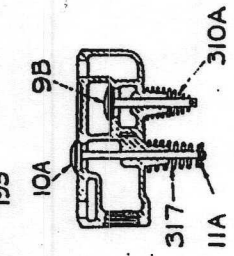
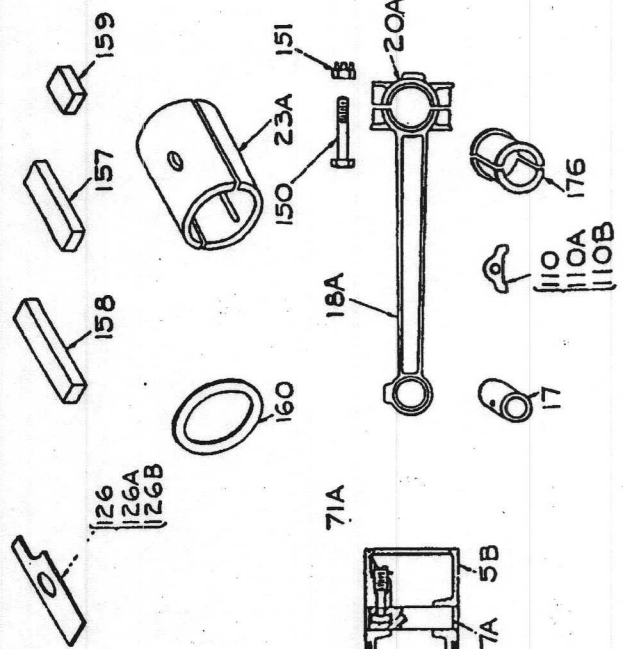
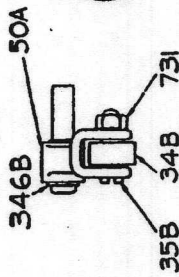
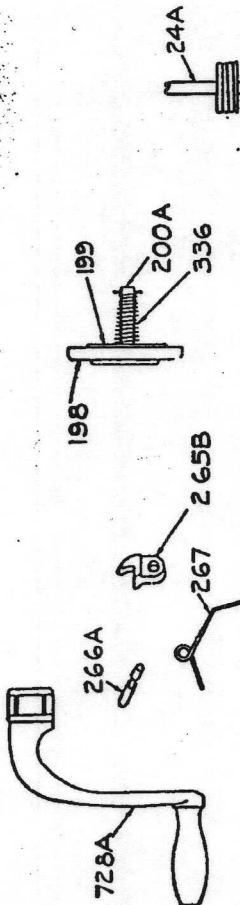
REPAIR CHART

3 AND 6 H. P. "Z" ENGINE

(50ZBA1)



PARTS FOR 3 & 6 HP ENGINES WITH CYLINDER COVER



Repair List—Fairbanks-Morse "Z" Oil Engines

17
2548D

Repair Numbers		Before Ordering Repair Parts Read the Instructions on Page 12	Included in Group	Number Used		
Arranged Numerically	Group Part			2 H.P.	3 H.P.	6 H.P.
		NAME OF PART				
1B-C	1B	1B-C Cylinder and Base.....		1	1	
		Cylinder and Base, always with.....		1	1	
	312	Cylinder to Head Stud (short).....		3	3	
	313	Cylinder to Head Stud (long).....		1	1	
		Cylinder to Head Stud Nut.....		4	4	
	12	Main Bearing Cap.....		2	2	
1B		Main Bearing Hex Head Cap Screw.....		4	4	
		Main Bearing Hex. Hd. Cap Screw Lockwasher.....		4	4	
	126	Main Bearing Shim (thick).....		4	4	
	126A	Main Bearing Shim (medium).....		12	12	
	126B	Main Bearing Shim (thin).....		8	8	
	328A	Base Drain Plug.....		1	1	
	271A	Cylinder Oil Nipple.....		1	1	
	195B	Name Plate, with screws and washers.....		1	1	
	502	Hopper.....		1	1	
		Hopper to Cylinder Carriage Bolt.....		4	6	
		Hopper to Cylinder Carriage Bolt Square Nut.....		4	6	
		Hopper to Cylinder Carriage Bolt Plate Washer.....		4	6	
	191	Hopper to Cylinder Gasket.....		1	1	
	751	Hopper Baffle Plate.....		1	1	
23A	Main Bearing Liners.....		4	4		
		Cylinder to Head C. P. S. F. Nuts.....		4	4	
1D-C	1D	1D-C Cylinder and Base.....		1		
		Cylinder and Base, always with.....		1		
	312	Cylinder to Cylinder Head Stud (short).....		3		
	313	Cylinder to Cylinder Head Stud (long).....		1		
		Cylinder to Head Stud Nut, 1/2".....		4		
	12	Main Bearing Cap.....		2		
1D		Main Bearing Cap Hex. Hd. Cap Screw.....		4		
		Main Bearing Cap Screw Lockwasher.....		4		
	126	Main Bearing Shim (thick).....		4		
	126A	Main Bearing Shim (medium).....		12		
	126B	Main Bearing Shim (thin).....		8		
	328A	Base Drain Plug.....		1		
	195B	Name Plate with Screws and Washers.....		1		
	271A	Cylinder Oil Nipple.....		1		
	23A	Main Bearing Liner (furnished in pairs only).....		2 Pr.		
	3D-C	3D	3D-C Cylinder Head.....		1	1
	9B-C	Cylinder Head with Plug 327A.....		1	1	
	10A-C	Suction Valve.....		1	1	
		Exhaust Valve.....		1	1	
4B-C	4B	4B-C Reservoir.....		1	1	
	4B	Reservoir, always with.....		1	1	
	331A	Reservoir Drain Plug.....		1	1	
	197T	Starting Fuel Throttle Valve Seat.....		1	1	
	376A	Starting Fuel Throttle Valve.....		1	1	
	311A	Starting Fuel Throttle Valve Spring.....		1	1	
	60B	Reservoir Cover.....		1	1	
	314A	Reservoir Cover Spring.....		1	1	
		Reservoir Cover Stove Bolt.....		1	1	
		Reservoir Cover Stove Bolt Nut.....		1	1	
	197A-C	Fuel Throttle Valve Seat.....		1	1	
	297	Fuel Throttle Valve Seat Clamp.....		1	1	
		Fuel Throttle Valve Seat Clamp R. H. M. Screw.....		2	2	
	198-C	Air Valve Seat.....		1	1	
	247	Air Valve Seat Gasket.....		1	1	
		Air Valve Seat R. H. M. Screw.....		2	2	
	203B-C	Butterfly Valve.....		1	1	
		Reservoir to Head Cap Screw (short) 3/8".....		1	1	
		Reservoir to Head Cap Screw (long).....		1	1	
4D-C	4C	4D-C Reservoir.....		1		
		Reservoir, always with.....		1		
	331A	Reservoir Drain Plug.....		1		
	197T	Starting Throttle Valve Seat.....		1		
	60B	Reservoir Cover.....		1		
	335A	Reservoir Cover Pin.....		1		
	376A	Starting Fuel Throttle Valve.....		1		
	311B	Starting Fuel Throttle Valve Spring.....		1		
	197A-C	Fuel Throttle Valve Seat.....		1		
	297	Fuel Throttle Valve Seat Clamp.....		1		
		Fuel Throttle Valve Seat Clamp R. H. M.....		1		
	198-C	Air Valve Seat.....		1		
		Air Valve Seat R. H. M. Screws.....		2		
	247	Air Valve Seat Gasket.....		1		
		Reservoir to Valve Casing R. H. M. Screw #14-20x3/4".....		2		
		Reservoir to Valve Casing Lockwasher, 1/4".....		2		

Repair List—Fairbanks-Morse "Z" Oil Engines

Repair Numbers		Before Ordering Repair Parts Read the Instructions on Page 12 NAME OF PART	Included in Group	Number Used		
Arranged Numerically	Group Part			2 H.P.	3 H.P.	6 H.P.
5B-C		5B-C Piston				
5B	5B	Piston.....	1	1	1	
6B	6B	Piston Rings.....	1	1	1	
7A	7A	Piston Pin.....	3	3	3	
	71A	Piston Pin Lock Pin with cotter.....	1	1	1	
9B-C		9B-C Suction Valve	3D-C			
9B	9B	Suction Valve, always with.....	1	1	1	
		Suction Valve Cotter.....	1			
9B	9B	Suction Valve.....	1			
	120	Suction Valve Friction Spring.....		1	1	
	121	Suction Valve Spring Collar.....		1	1	
	122A	Suction Valve Spring Collar Lock.....		1	1	
	310A	Suction Valve Spring.....	1	1	1	
		Suction Valve Cotter, 3/2" x 5/8".....	1			
10A-C		10A-C Exhaust Valve	3D-C			
10A	10A	Exhaust Valve.....	1	1	1	
11A	11A	Exhaust Valve Spring Collar.....	1	1	1	
	122	Exhaust Valve Spring Collar Lock.....	1	1	1	
	317	Exhaust Valve Spring.....	1	1	1	
12		Main Bearing Cap.....	1B-1D			
		Main Bearing Hex. Head Cap Screw.....	1B-1D	2	2	
		Main Bearing Lockwasher.....	1B-1D	4	4	
		Flywheel, always with.....	1B-1D	4	4	
13B	13B	Flywheel Clamp Bolt.....		2	2	
		Flywheel Clamp Bolt C. P. S. F. Hex. Nut.....		2	2	
13D		Flywheel with Group 25F-C (pulley side).....	25D		3	
13E		Flywheel with Group 25F-C (cranking side).....	25D	1		
14B-C		14B-C Sub-Base				
14B	14B	Sub-Base.....		1	1	
	15C	Fuel Tank.....		1	1	
	104	Fuel Tank Strap.....		1	1	
		Fuel Tank Strap Carriage Bolt.....		2	2	
		Fuel Tank Strap Carriage Bolt Nut.....		2	2	
		Engine to Sub-Base Carriage Bolt with nut.....		4	4	
14D-C		14D-C Sub-Base				
14D	14D	Sub-Base.....	1			
	15D-C	Fuel Tank.....	1			
	104	Fuel Tank Strap, Head End with bolts and nuts.....	1			
		Sub-Base to Engine Carriage Bolt, 3/8" x 1 1/2".....	4			
		Sub-Base to Engine Carriage Bolt Lockwasher, 3/8".....	4			
15C	15C	Fuel Tank, always with.....	14B-C	1	1	
	44	Fuel Tank Filler Cap.....		1	1	
		Fuel Tank Drain Fitting.....		1	1	
		Fuel Tank Drain Pipe Plug.....		1	1	
		Fuel Tank Drain Pipe Plug, 1/8".....	15C	1	1	
15D-C		15D-C Fuel Tank	14D-C			
15D	15D	Fuel Tank.....	1			
	44	Fuel Tank Filler Cap.....	1			
		Fuel Tank Drain Pipe Plug.....	1			
		Fuel Tank Drain Pipe Plug, 1/4".....	15D-C	1		
16A		Oil Shield with Clips.....		1	1	
		Oil Shield Stove Bolt.....		1	1	
		Oil Shield Stove Bolt Nut.....		1	1	
17		Oil Shield Stove Bolt Lockwasher.....		1	1	
		Piston Pin Bushing.....	18A	1	1	
18A-C		18A-C Connecting Rod				
18A	18A	Connecting Rod, always with.....	1	1	1	
	20A	Connecting Rod Cap.....	1	1	1	
	17	Piston Pin Bushing.....	1	1	1	
	110	Connecting Rod Shim (thick).....	4	4	4	
	110A	Connecting Rod Shim (medium).....	14	14	14	
	110B	Connecting Rod Shim (thin).....	4	4	4	
	150	Connecting Rod Bolts with cotters.....	2	2	2	
	151	Connecting Rod Bolt Castle Nuts.....	2	2	2	
	176	Connecting Rod Crankpin Liner (furnished in pairs only).....	1 Pr.	1 Pr.	1 Pr.	

Repair Numbers		Before Ordering Repair Parts Read the Instructions on Page 12 NAME OF PART	Included in Group	Number Used		
Arranged Numerically	Group Part			2 H.P.	3 H.P.	6 H.P.
20A 23A		Connecting Rod Cap..... Main Bearing Liner (furnished in pairs only).....	18A-C 1B-C 1D-C	1 2 Pr.	1 2 Pr.	1 2 Pr.
24A 24B		Fuel Suction Tube with connections..... Fuel Suction Tube with connections.....	197A 197A	1	1	1
25E		25E Crankshaft.....		1	1	1
25B	25B 29A 159	Crankshaft, always with..... Crankshaft Pinion..... Crankshaft Pinion Key.....		1 1 1	1 1 1	1 1 1
25F-C		25F-C Crankshaft..... Note. —It will rarely be necessary to furnish any of the following parts, but if, due to accident, any of the parts are needed a complete assembly 25F-C will be shipped. Purchasers should return the old assembly complete and full credit will be issued for all parts not broken or damaged.		1		
25D	25D 29D 160 160D 13D 13E 157 715	Crankshaft, always with..... Crankshaft Pinion..... Crankshaft End Thrust Washer..... Crankshaft Spacer Collar..... Flywheel (pulley side)..... Flywheel (cranking side)..... Flywheel Key..... Starting Handle..... Starting Handle Rivet (oval head).....		1 1 1 2 1 1 2 1 1		
26A		Exhaust Silencer with Nipple.....		1		
28G-C 28G	28G 128B 123	28G-C Cam Gear..... Cam Gear..... Cam and Shaft..... Cam Gear to Shaft Woodruff Key..... Cam Gear to Shaft R. H. M. Screw #14—20x $\frac{3}{8}$ "..... Cam Gear to Shaft Screw Lockwasher, $\frac{1}{4}$ ".....	37H-C	1 1 1 1 1 1	1 1 1 1 1 1	1 1 1 1 1 1
29A 29D 33B 34B 35B		Crankshaft Pinion..... Crankshaft Pinion with Group 25D..... Governor Weight Friction Spring..... Exhaust Roller..... Exhaust Roller Pin.....	25B, 25D 25D 81G-C 50A-C 50A-C 1 1 1 1 1	1 1 1 1 1	1 1 1 1 1
36B-C 36B	36B 55A 355	36B-C Exhaust Rod..... Exhaust Rod..... Exhaust Rod End..... Exhaust Rod End Nut.....		1 1 1 1	1 1 1 1	1 1 1 1
37H-C 37D	37D 2831 346B 28G-C 50A-C 81G-C 93B-C 506	37H-C Cam Gear Bracket..... Cam Gear Bracket, always with..... Governor Pinion Shaft Washer..... Exhaust Roller Rocker Pin Spring Ring..... Cam Gear..... Exhaust Roller Rocker..... Governor..... Governor Lever Bracket..... Governor Lever Bracket Screw, $\frac{1}{16}$ "x $\frac{3}{8}$ "..... Governor Lever Bracket Lockwasher, $\frac{1}{16}$ "..... Cam Gear Bracket Grease Cup.....		1 1 1 1 1 1 1 1 2 2 1	1 1 1 1 1 1 1 1 2 2 1	1 1 1 1 1 1 1 1 2 2 1
39B 40A		Exhaust Valve Rocker Arm with Oiler 741..... Exhaust Valve Rocker Arm Fulcrum Pin with Oiler 741..... Exhaust Valve Rocker Arm Fulcrum Pin Jam Nut, $\frac{3}{8}$ "..... Exhaust Valve Rocker Arm Fulcrum Pin Lockwasher, $\frac{3}{8}$ ".....		1 1 1 1	1 1 1 1	1 1 1 1
41B		Exhaust Valve Rocker Bracket.....		1	1	1
44 48D		Fuel Tank Filler Cap..... Governor Pinion with Shaft.....	15C, 15D 81G-C	1 1	1 1	1 1
50A-C 50A	50A 34B 35B 731	50A-C Exhaust Roller Rocker..... Exhaust Roller Rocker..... Exhaust Roller..... Exhaust Roller Pin..... Exhaust Roller Pin Nut.....	37H-C	1 1 1 1 1	1 1 1 1 1	1 1 1 1 1
51		Fuel Tank Filler Tube.....		1	1
55A 60B 71A		Exhaust Rod End..... Reservoir Cover..... Piston Pin Lock Pin with cotter..... Piston Pin Lock Pin Cotter, $\frac{1}{8}$ "x $\frac{1}{8}$ ".....	36B-C 4B-C, 4D-C 5B-C 5B-C	1 1 1 1	1 1 1 1	1 1 1 1
76B 79B 80		Fuel Throttle Valve..... Governor Weight Pin..... Governor Sleeve Pin.....	197A-C 81G-C 81G-C	1 2 1	1 2 1	1 2 1

Repair Numbers		Before Ordering Repair Parts Read the Instructions on Page 12 NAME OF PART	Included in Group	Number Used		
Arranged Numerically	Group Part			2 H.P.	3 H.P.	6 H.P.
81G-C		81G-C Governor.....	37H-C	1	1	1
81B	81B	Governor Head.....		1	1	1
82A	82A	Governor Weight with ball.....		1	1	1
82B	82B	Governor Weight (plain).....		1	1	1
	79B	Governor Weight Pin.....		2	2	2
	33B	Governor Weight Friction Spring.....		1	1	1
	80B	Governor Sleeve Pin.....		1	1	1
	308A	Governor Weight Spring.....		1	1	1
	156A	Governor Weight Spring Adjusting Screw.....		1	1	1
	48D	Governor Pinion with shaft.....		1	1	1
83A		Governor Lever.....	93B-C	1	1	1
85A		Governor Lever O. H. Rivet.....	93B-C	1	1	1
89		Fuel Check Valve Body with screen.....	197A-C	1	1	1
90A		Fuel Check Valve Ball.....	197A-C	1	1	1
93B-C		93B-C Governor Lever Bracket.....	37H-C	1	1	1
93B	93B	Governor Lever Bracket.....		1	1	1
	83A	Governor Lever.....		1	1	1
	85A	Governor Lever Fulcrum Pin or Rivet.....		1	1	1
	209A-C	Speed Regulator Lever.....		1	1	1
	212A	Speed Regulator Lever Fulcrum Pin.....		1	1	1
104		Governor Lever Bracket Screw, 5/16"x3/4".....		2	2	2
		Governor Lever Bracket Lockwasher, 3/16".....		2	2	2
		Fuel Tank Strap.....	14B-C, 14D-C	1	1	1
		Fuel Tank Strap Carriage Bolt, 3/16"x5 1/4".....	14B-C		2	2
		Fuel Tank Strap Carriage Bolt Nut, 3/16".....			2	2
106		Pulley to Flywheel Clips.....			3	3
		Pulley to Flywheel Machine Bolt.....			3	3
		Pulley to Flywheel Machine Bolt Nut.....			3	3
110		Connecting Rod Shim (thick).....	18A-C	4	4	4
110A		Connecting Rod Shim (medium).....	18A-C	14	14	14
110B		Connecting Rod Shim (thin).....	18A-C	4	4	4
117A		Pulley with Bolts.....			1	1
117B		Pulley with Reinforcing Ring.....		1		
		Pulley Reinforcing Ring (not furnished separately).....		1		
		Pulley Fil. Hd. Cap Screw, 5/16"x5/8".....		3		
		Pulley Cap Screw Lockwasher, 3/16".....		3		
120		Suction Valve Drag Spring.....	9B-C		1	1
121		Suction Valve Spring Collar.....	9B-C		1	1
122		Exhaust Valve Spring Collar Lock.....	10A-C	1	1	1
122A		Suction Valve Spring Collar Lock.....	9B-C		1	1
123		Cam to Gear Woodruff Key.....	28G-C	1	1	1
124		Starting Fuel Tube (not furnished separately).....	197-T	1	1	1
126		Main Bearing Shim (thick).....	1B, 1D	4	4	4
126A		Main Bearing Shim (medium).....	1B, 1D	12	12	12
126B		Main Bearing Shim (thin).....	1B, 1D	8	8	8
128B		Cam and Shaft.....	28G-C	1	1	1
142A		Magneto Gear.....	273D-C	1	1	1
150		Connecting Rod Bolts with cotters, 3/16"x7/8".....	18A-C	2	2	2
151		Connecting Rod Bolt Castle Nuts.....	18A-C	2	2	2
156A		Governor Weight Spring Adjusting Screw.....	81G-C	1	1	1
157		Flywheel Key.....	25D	2	1	1
158		Flywheel Key Governor Side.....			1	1
159		Crankshaft Pinion Key.....			1	1
160		Crankshaft End Thrust Washer with Group 25D.....	25D	1	1	1
160D		Crankshaft Spacer Collar with Group 25D.....	25D	2		
176		Connecting Rod Crankpin Liner.....	18A-C	1 Pr.		
190B		Cylinder Head Gasket (copper asbestos).....			1	1
190D		Cylinder to Head Gasket.....		1		
191		Cylinder to Hopper Gasket.....	1B-C		1	1
192		Cylinder to Butterfly Valve Casing Gasket.....		1		
195B		Name Plate.....	1B, 1D	1	1	1
		Name Plate Drive Screws.....	1B, 1D	2	2	2
		Name Plate Drive Screw Washers.....	1B, 1D	2	2	2
197A-C		197A-C Fuel Throttle Valve Seat.....	4B-C, 4D-C	1	1	1
	197A	Fuel Valve Seat, always with.....		1	1	1
	24A	Fuel Suction Tube with connections.....			1	1
	24B	Fuel Suction Tube with connections.....		1		
		Fuel Suction Tube Connection (not furnished separately).....		1	1	1
		Fuel Suction Opening Cap (not furnished separately).....		1	1	1
	89	Fuel Check Valve Body with screen.....		1	1	1
	90A	Fuel Check Valve Ball.....		1	1	1
	76B	Fuel Throttle Valve.....		1	1	1
	311A	Fuel Throttle Valve Spring.....		1	1	1
197T-C		197T-C Starting Throttle Valve Seat.....		1	1	1
197T	197T	Starting Throttle Valve Seat, always with.....	4B, 4D	1	1	1
	124	Starting Fuel Tube.....		1	1	1
	376A	Starting Throttle Valve.....	4B-C, 4D-C	1	1	1
	311B	Starting Throttle Valve Spring.....	4D-C	1	1	1

Repair List—Fairbanks-Morse "Z" Oil Engines

21
2548D

Repair Numbers		Before Ordering Repair Parts Read the Instructions on Page 12	Included in Group	Number Used		
Arranged Numerically	Group Part			2 H.P.	3 H.P.	6 H.P.
198C		198C Air Valve Seat.....	4B-C, 4D-C	1	1	1
198	198	Air Valve Seat, always with.....		1	1	1
	200A	Air Valve Guide with cotter.....		1	1	1
199	199	Air Valve.....		1	1	1
	336	Air Valve Spring.....		1	1	1
		Air Valve Seat to Reservoir Screws #10—24x $\frac{1}{2}$ " : #14—20x $\frac{3}{8}$ " : #14—20x $\frac{3}{8}$ ".....	4B-C, 4D-C	2	2	2
200A		Air Valve Seat to Reservoir Lockwasher, $\frac{3}{16}$ ", $\frac{1}{4}$ ", $\frac{1}{4}$ ".....		2	2	2
		Air Valve Guide.....	198	1	1	1
		Air Valve Guide Cotter, $\frac{1}{16}$ "x $\frac{1}{2}$ ".....	198	1	1	1
202A-C		202A-C Butterfly Valve Casing.....		1		
202A	202A	Butterfly Valve Casing.....		1		
	203B-C	Butterfly Valve.....		1		
		Valve Casing to Head Cap Screw, $\frac{3}{8}$ "x $\frac{3}{4}$ ".....		2		
203B-C		203B-C Butterfly Valve.....	202A-C	1	1	1
203B		Butterfly Valve.....		1	1	1
204C		Butterfly Valve Stem (always with 206C).....		1	1	1
		Butterfly Valve R. H. M. Screw.....		1	2	2
		Butterfly Valve R. H. M. Screw Lockwasher.....		1	1	1
	206C	Butterfly Valve Lever (always with 204C).....		1	1	1
	326B	Butterfly Valve Lever Shaft Spring.....		1	1	1
205D-C		205D-C Governor Pull Rod.....		1	1	1
205D	205D	Governor Pull Rod.....		1	1	1
	405A	Governor Pull Rod End.....		1	1	1
	404	Governor Pull Rod End Nut.....		1	1	1
		Governor Pull Rod Cotter.....		2	2	2
206C		Butterfly Valve Stem Arm, always with.....		1	1	1
		Butterfly Valve Stem 204C.....		1	1	1
		Butterfly Valve Stem Arm Pin #209.....		1	1	1
209A-C		209A-C Regulator Lever.....	93B-C	1	1	1
209A	209A	Speed Regulator Lever, always with.....		1	1	1
	222A	Speed Regulator Leaf Spring.....		1	1	1
	224A	Speed Regulator Adjusting Screw.....		1	1	1
	230A	Speed Regulator Adjusting Screw Spring.....		1	1	1
212A		Speed Regulator Lever Fulcrum Pin.....	93B-C	1	1	1
222A		Speed Regulator Leaf (not furnished separately).....	209A-C	1	1	1
224A		Speed Regulator Adjusting Screw.....	209A-C	1	1	1
225		Gear Guard.....		1	1	1
230A		Speed Regulator Adjusting Screw Spring.....	209A-C	1	1	1
247		Air Valve Seat Gasket.....	4B-C, 4D-C	1	1	1
249A		Fuel Reservoir Gasket.....		1	1	1
265A		Starting Crank Pawl.....	728A	1	1	1
266A		Starting Crank Pawl Pin.....	728A	1	1	1
267		Starting Crank Pawl Spring.....	728A	1	1	1
271A		Cylinder Oiler Nipple.....	1B, 1D	1	1	1
273D-C		273D-C Magneto.....		1	1	1
273D	273D	Magneto.....		1	1	1
	142A	Magneto Gear.....		1	1	1
		Armature Drive End Woodruff Key, #3.....		1	1	1
		Armature Drive End Shaft Nut, $\frac{1}{16}$ " S. A. E.....		1	1	1
		Armature Drive End Shaft Lockwasher, $\frac{5}{16}$ ".....		1	1	1
	2473	High Tension Terminal Waterproof Cup Rubber.....		1	1	1
	737A	Magneto Cable Conduit.....		1	1	1
	752	Magneto Cable with Terminal.....		1	1	1
	2563C	Impulse Coupling.....		1	1	1
		Magneto to Bracket F. Hd. Cap Screw, $\frac{3}{16}$ "x1".....		2	2	2
		Magneto to Bracket F. Hd. Cap Screw Lockwasher.....		2	2	2
297		Fuel Throttle Valve Seat Clamp.....	4B-C, 4D-C	1	1	1
		Fuel Valve Seat Clamp Screw #14—20x1".....	4B-C, 4D-C	1	2	2
309A		Governor Weight Spring.....	81G-C	1	1	1
310A		Suction Valve Spring.....	9B-C	1	1	1
311A		Fuel Throttle Valve Spring.....	4B-C	1	1	1
311B		Starting Throttle Valve Spring.....	4D-C, 197T-C	1		
312		Cylinder Head Stud (short).....	1B, 1D	3	3	3
313		Cylinder Head Stud (long).....	1B, 1D	1	1	1
		Cylinder to Head Stud Nut, $\frac{1}{2}$ ", $\frac{3}{8}$ ", $\frac{3}{4}$ ".....		4	4	4
314A		Reservoir Cover Spring.....	4B	1	1	1
317		Exhaust Valve Spring.....	10A-C	1	1	1
321		Governor Friction Spring Adjusting Screw.....		1	1	1
326B		Butterfly Valve Lever Shaft Spring.....	203B-C	1	1	1
327A		Cylinder Head Drain Plug.....	3D-C	1	1	1
328A		Base Drain Plug.....	1B, 1D	1	1	1
331A		Reservoir Drain Plug.....	4B, 4C	1	1	1
335A		Reservoir Cover Pin.....	4D-C	1		

Repair List—Fairbanks-Morse "Z" Oil Engines

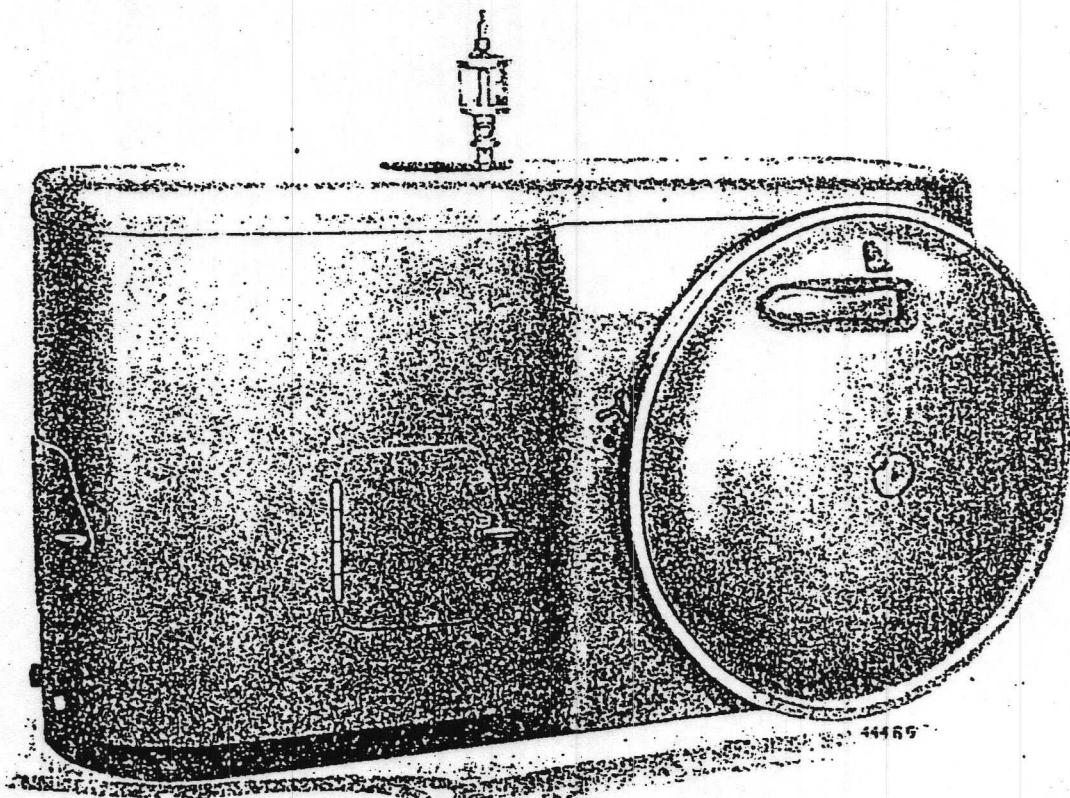
Repair Numbers		Before Ordering Repair Parts Read the Instructions on Page 12 NAME OF PART	Included in Group	Number Used		
Arranged Numerically	Group Part			2 H.P.	3 H.P.	6 H.P.
336		Air Valve Spring.....	198-C	1	1	1
346B		Exhaust Roller Rocker Pin Spring Ring.....	37D	1	1	1
355		Exhaust Rod End Nut.....	36B-C	1	1	1
376A		Starting Fuel Throttle Valve.....	4B-C, 4D-C	1	1	1
404		Governor Pull Rod End Nut.....	197T-C	1	1	1
405A		Governor Pull Rod End.....	205D-C			
502		Hopper with Name Plate, Screws and Washers.....	205D-C			
		Hopper to Cylinder Carriage Bolt.....	1B-C	1	1	1
		Hopper to Cylinder Nut.....	1B-C	4	6	6
		Hopper to Cylinder Plate Washer.....	1B-C	4	6	6
505		Main Bearing Grease Cups (1/4" pipe thread).....	1B-C	4	6	6
506		Cam Gear Bracket Grease Cup (1/8" pipe thread).....		2	2	2
509A		Connecting Rod Grease Cup (1/4" pipe thread).....	37H-C	1	1	1
		Connecting Rod Street Elbow.....		1	1	1
527		Cylinder Oiler.....		1	1	1
715		Starting Handle with rivet.....	25D	1		
		Starting Handle O. H. Rivet, 5/16"x2".....	25D	1		
728A-C		728A-C Starter Crank.....				
	728A	Starter Crank, always with.....			1	1
728A	205B	Starter Crank Pawl.....			1	1
	266A	Starter Crank Pawl Pin.....			1	1
	267	Starter Crank Pawl Spring.....			1	1
731		Exhaust Roller Pin Nut.....	50A-C	1	1	1
735		Spark Plug Cover.....		1	1	1
737A		Magneto Cable Conduit.....	273D-C		1	1
741		Exhaust Valve Rocker Oil Cup.....	39B, 40A	1	1	1
743		Magneto Cable Conduit Clip.....			2	2
		Magneto Cable Conduit R. H. M. Screws.....			2	2
746		Magneto Cable Conduit Clip Washer.....			2	2
751		Hopper Baffle Plate.....	1B-C		1	
752		Magneto Cable with Terminal 2474.....	273D-C	1	1	
1395		Cam Gear Bracket to Cylinder Cap Screw.....		2		
		Cam Gear Bracket Hex. Head Cap Screw, 1/2"x1 1/4".....			2	2
		Cam Gear Bracket Screw Lockwasher, 1/2".....			2	2
2473		High Tension Waterproof Cup Rubber.....	273D-C	1	1	1
2474		High Tension Terminal.....	273D-C	1	1	1
2563C		2563C Impulse Coupling.....	273D-C			1
	2563	Impulse Coupling Gear Hub, always with.....				1
2563	2566	Impulse Coupling Latch.....				1
	2567	Impulse Coupling Rivet.....				1
2564	2564	Impulse Coupling Gear Pin.....				1
2565	2565	Impulse Coupling Drive Spring.....				1
	2568	Impulse Coupling Stop.....	2563			1
		Impulse Coupling Stop Fil. Hd. M. Screw #12—25x5/8".....				1
		Impulse Coupling Stop Lockwasher #12.....				1
	2569	Impulse Coupling Washer.....				1
	2570	Impulse Coupling Nut.....				1
2566		Impulse Coupling Latch with Rivet.....	2563-C			1
2567		Impulse Coupling Rivet.....	2563-C			1
2568		Impulse Coupling Stop.....	2563-C			1
2569		Impulse Coupling Washer.....	2563-C			1
2570		Impulse Coupling Nut.....	2563-C			1
2831		Governor Pinion Shaft Washer.....	37D	1	1	1
190B		Complete Set of Gaskets.....		1	1	1
190D		Cylinder to Head Gasket.....		1	1	
191		Cylinder to Head Gasket.....				1
192		Cylinder to Hopper Gasket.....			1	1
247		Cylinder Head to Butterfly Casing Gasket.....		1	1	1
249A		Air Valve Seat Gasket.....		1	1	1
		Fuel Reservoir Gasket.....		1	1	1
33B		Complete Set of Springs.....		1	1	1
120		Governor Weight Friction Spring.....		1	1	1
230A		Suction Valve Drag Spring.....			1	1
267		Speed Regulator Adjusting Screw Spring.....		1	1	1
308A		Starting Crank Pawl Spring.....			1	1
310A		Governor Weight Spring.....		1	1	1
311A		Suction Valve Spring.....		1	1	1
311B		Fuel Throttle Valve Spring.....		1	1	1
314A		Starting Throttle Valve Spring.....		1	1	1
317		Reservoir Cover Spring.....		1	1	1
326B		Exhaust Valve Spring.....		1	1	1
336		Butterfly Valve Shaft Lever Spring.....		1	1	1
		Air Valve Spring.....		1	1	1

TROUBLE CHART

Trouble	Possible Cause	Remedy	See Paragraph	
Engine will not start.	Instructions not followed.	Read and follow instructions.	1-18	
	No fuel in tank.	Fill tank.	10	
	Water in gasoline used in starting.	Drain out water.		
	Water in engine cylinder.	Spin engine by hand, holding suction valve open.	18	
		See that gasket is unbroken.	28	
	Engine flooded with fuel.	Close fuel needle valve, hold suction valve open and crank engine.	18	
	Poor compression.	Valve leaks.	Grind valves.	27
		Head gasket leaks.	Put on new gasket.	28
		Piston blows.	Remove rings and clean.	29
	Engine very cold.	Put but little water (preferably hot water), in hopper.	11	
No spark or poor spark.	Spark plug dirty.	Take out and clean.		
	Grounded.	Porcelain broken in plug. See that wire from magneto is not grounded.		
	Gap too wide.	Set spark plug gap to thickness of gauge on magneto.	17	
	Mechanism sluggish cold weather.	Oil all parts well, using a little kerosene.		
Engine misses fire after being started.	Ignition.	Spark plug dirty.	Take out and clean.	
		Spark plug grounded.	Porcelain broken in plug.	
		Wire grounded.	See that wire from magneto is not grounded.	
Engine runs irregularly.	Governor stuck.	See that governor parts are free. Use kerosene to loosen.		
		Adjust (33B) spring.	31	
	Weak exhaust valve spring.	Put washer under spring till new spring can be obtained.		
	Auxiliary air valve.	See that valve moves freely and spring is not broken.	34	
Engine tends to run away.	Butterfly may not close.	Adjust butterfly crank and governor travel.	32	

Trouble Chart—Fairbanks-Morse "Z" Oil Engines

Trouble	Possible Cause	Remedy	See Paragraph
Engine will not carry load.	Exhaust valve setting off.	Re-set.	37, 38, 39
	Poor compression.	See "Engine will not start."	27, 28, 29
	Too rich mixture.	Adjust fuel throttle.	20
	Carbon in combustion space.	Remove head and clean.	27, 28
	Silencer clogged.	Clean out.	
	Butterfly moved.	Re-set.	32
Engine knocks.	Hard explosion.	Remove head and clean carbon.	27, 28
	Loose crank pin bearing.	Take up bearing.	41
	Loose flywheel.	Tighten bolts.	48
	Scale formation in jacket.	Clean out scale.	47
Engine smokes.	Exhaust { Too much lubricating oil. Too much fuel.	Adjust lubricator.	12
		Adjust fuel throttle.	20
	Piston. { Oil thrown into piston by crank. Piston blows.	Drain and clean out crank case.	50
		Remove piston, clean rings, may need new rings.	29
Engine uses too much fuel.	Throttle open too far.	Close partly.	20
	Poor compression.	See "Engine will not start."	27, 28, 29
	Exhaust valve setting off.	Re-set.	37, 38, 39
	Exhaust pipe or silencer choked.	Clean.	
	Fuel drips from suction pipe. } Weak throttle valve spring.	Lengthen spring by stretching. Order new spring.	
Cylinder oiler does not feed properly.	Piston blows.	Clean piston and rings; may need new springs.	29
	No vent in shank of boiler.	Drill $\frac{3}{16}$ " hole into the oil feed pipe below oiler.	
Carbon forms.	Too much fuel.	Close throttle partly.	20
	Too much lubricating oil.	Adjust cylinder oiler.	12
	Engine too cold.	See that engine is hot before turning on oil fuel.	20
Water boils away too rapidly. should use 1 gallon per horse-power hour.	Mixture too rich.	Close throttle.	20
		Never let the water get below top of cylinder.	



2 H. P. TYPE "Z" ENGINE FOR CONCRETE MIXER (44186)

Fairbanks, Morse & Co.

(INCORPORATED)

MANUFACTURERS

Executive Offices: Chicago, Ill.

	Branches	
Atlanta, Ga.		Louisville, Ky.
Baltimore, Md.		Milwaukee, Wis.
Boston, Mass.		Minneapolis, Minn.
Charlotte, N. C.		New Orleans, La.
Chicago, Ill.		New York, N. Y.
Cincinnati, Ohio		Omaha, Neb.
Cleveland, Ohio		Pittsburgh, Pa.
Dallas, Tex.		Portland, Ore.
Denver, Colo.		Salt Lake City, Utah
Des Moines, Iowa		San Francisco, Cal.
Detroit, Mich.		Seattle, Wash.
Indianapolis, Ind.		St. Louis, Mo.
Jacksonville, Fla.		St. Paul, Minn.
Kansas City, Mo.		Stuttgart, Ark.
Los Angeles, Cal.		

Foreign Branches

London, England

Fairbanks-Morse Co. (Australasia), Limited
Sydney, Australia

The Canadian Fairbanks-Morse Co., Limited

St. John	Toronto	Regina
Quebec	Windsor	Calgary
Montreal	Winnipeg	Vancouver
	Ottawa	