

OPERATOR'S MANUAL AND PARTS CATALOG



Onan[®]

**ELECTRIC
POWER PLANTS
FOR RECREATIONAL VEHICLES**

•
SERIES

CCK

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ONAN

1400 73RD AVENUE N. E. • MINNEAPOLIS, MINNESOTA 55432

A DIVISION OF ONAN CORPORATION

N. Y. INTERNATIONAL OFFICE: Empire State Bldg.

SPECIFICATIONS

ENGINE	
Number of Cylinders	2
Cubic Inch Displacement	49.8
Cylinder Bore	3 1/4
Piston Stroke	3
Compression Ratio	5.5:1
RPM	1800
Ignition Type	Battery
Battery Voltage	12
Battery Size	
SAE Group 1H	2 in series
SAE Rating -20 Hour (nominal)	105 amp/hr
Battery Charge Rate (maximum)	6 amp
Ventilation Required (cfm)	
Engine	750 cfm
Generator	75 cfm
Combustion	32 cfm

GENERATOR

AC Voltage Regulation	±4%	
AC Frequency Regulation	5%	
Rating (output in watts)	<u>4.0 CCK</u>	<u>5.0 CCK</u>
60 Hertz AC Mobile Service	4000	5000

PLANT DIMENSIONS

Model 4.0 CCK, Single Phase, 2 Wire

Length	29 3/8
Width	20 1/2
Height	22
Weight	339

Model 5.0 CCK, Single Phase, 2 Wire

Length	32 7/8
Width	20 1/2
Height	22
Weight	397

FEATURES

- Battery Ignition
- Exciter Cranking
- Rotating Exciter
- Revolving Armature
- Output Rated at Unity Power Factor Load

NOTE: Hertz is a unit of frequency equal to one cycle per second.

TROUBLE-SHOOTING GUIDE

OPERATOR'S TROUBLE-SHOOTING GUIDE for ONAN GASOLINE ENGINES (Air Cooled)		CAUSE	TROUBLE																
			Hard Starting or Failure to Start	Starter Motor Doesn't Turn	Engine Misfires	Speed Too High	Speed Too Low	Hunting Condition	No Governor Control	Poor Sensitivity	Excessive Oil Consumption	Excessive Fuel Consumption	Low Oil Pressure	High Oil Pressure	Engine Backfires at Carburetor	Engine Overheats	Mechanical Knocks	Black Smoky Exhaust	Blue Smoky Exhaust
COOLING SYSTEM	Blown Head Gasket		●																
	Overheating			●															
	Dirt on Cooling Fins																		
	Inadequate Air Circulation (Ventilation)										●								
FUEL SYSTEM	Out of Fuel, or Shut-off Valve Closed		●																
	Poor Quality Fuel				●														
	Dirty Fuel Filter		●		●														
	Fuel Line Leaks		●		●			●											
	Mixture Too Rich		●		●														
	Mixture Too Lean		●		●														
	Engine Flooded		●		●														
	Run for Long Periods of Time at No Load		●		●														
Restricted Air Intake, Dirty Air Filter		●		●															
GOVERNOR SYSTEM	Linkage Loose or Disconnected																		
	Linkage Binding																		
	Excessive Wear in Linkage																		
	Incorrect Governor Adjustment																		
	Spring Sensitivity Too Great																		
LUBRICATION SYSTEM	Low Oil Supply																		
	Defective Gauge																		
	Excess Oil in Crankcase																		
	Oil Leaks From Engine Base or Connections																		
	Crankcase Oil Too Light or Diluted																		
	Crankcase Oil Too Heavy		●																
STARTING SYSTEM AND IGNITION SYSTEM	Battery Discharged or Defective		●	●															
	Loose Battery Connections		●	●															
	Load Connected When Starting		●	●															
	Open Solenoid		●	●															
	Defective Starter		●	●															
	Wrong Plug or Point Setting		●	●															
	Incorrect Timing		●	●															
	Spark Too Far Advanced																		

INSTALLATION

If the mobile electric power plant is to operate properly, it must be correctly installed. This manual gives some of the more important aspects of installation. For more details, a Technical Bulletin (T-012) is available from Onan.

Ventilation is the most important factor to be considered. The unit must have enough cooling air to operate safely and efficiently. The heated air must be disposed of to keep the engine from overheating and losing power.

For the CCK electric plant running at 1800 rpm, the amount of air discharged is 750 cfm. The minimum free air inlet with no filter or restriction is 140 sq. in.

Onan Vacu-Flo cooled units are specifically designed for mounting in small compartments (where proper cooling is difficult) and are equipped to provide sufficient cooling air and adequate disposition of heated air. With this type of cooling, a centrifugal fan in a scroll housing pulls cooling air into the compartment and over the cooling fins and surfaces of the engine. Heated air is expelled through a single discharge and away from the unit and installation area.

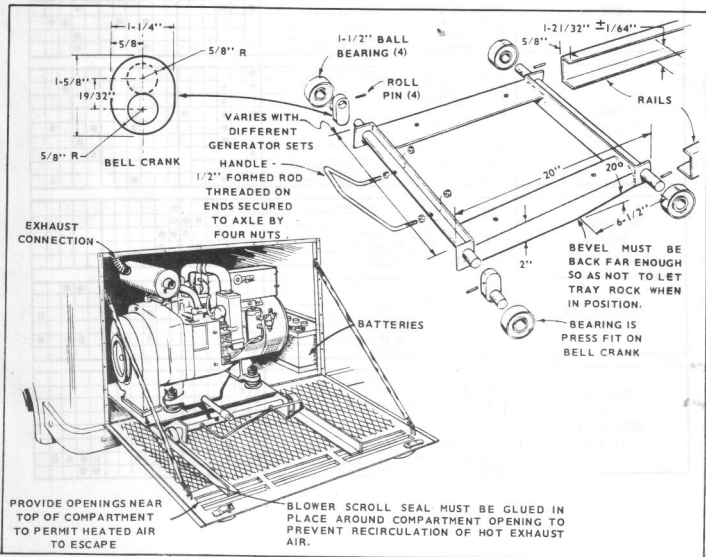


FIG. 1. TYPICAL "SLIDE OUT" TRAY FOR COMPARTMENT MOUNTING

LOCATION

The compartment itself should be of vapor tight design and completely independent of living quarters. A sheet metal covered compartment may be readily sealed and lends itself easily to treatment. The plant may have to be removed for service, so make the door large enough to facilitate removal of the unit.

The compartment location is determined by physical size, access opening and most important, best mounting support. Allow 2" clearance on all sides of the plant for rocking on mounts.

POSITIONING

The following should be considered for accessibility when mounting the unit in a compartment. (Position so operating instructions and nameplate are visible and/or install an accessible nameplate, data decal or sticker.)

1. Make air discharge duct as short as possible. Position so exhaust heated air is not drawn into cool air inlet.
2. Air cleaner should be easy to remove and service.
3. Battery or batteries must be accessible for service.
4. Oil fill tube cap should be easy to reach.
5. The control box switch should be visible.
6. Provide space for muffler.
7. Oil drain should be readily accessible.
8. Cylinder head readily accessible for service.
9. Rope start sheave should be accessible.

MOUNTING

The best method of mounting is to attach the plant to a mounting platform using Onan vibration isolators. See Figure 2. The vibration isolators must be properly installed to minimize vibration. The Onan mounts are a "fail-safe" type with mounting bolts that prevent the unit from breaking loose if the mounts are damaged.

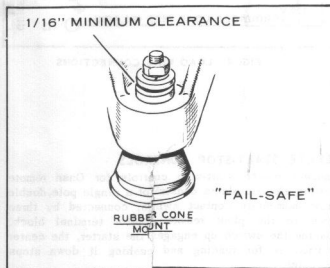


FIG. 2. ONAN VIBRATION ISOLATORS

The mounting base should be fastened directly to the supporting frame. Channel, box or angle iron can be used for a mounting base frame. This will provide the greatest support plus a base sealed against air, dirt and sound. Do not use sheet metal or thin plate without a supporting frame. Plywood of sufficient thickness for strength can be used, but unless it is suitably sealed, it is vulnerable to climatic elements, will tend to become oil soaked, and is not fireproof.

The supporting base or platform must be strong enough to withstand the shock from sharp turns, bumps, holes, etc. which accompany mobile applications. Brace the mounting platform to eliminate any chance of the platform bowing or bending.

It is desirable to mount the unit on a pullout tray to facilitate service and repair. The load wires, control wires and fuel lines must have enough slack and be flexible so the unit can slide out without disconnecting them. When using a pull-out tray, pipe the exhaust gases into the air outlet. The air outlet duct may face the bottom, side or top of the enclosure, depending on how the unit is installed.

FUEL SUPPLY (GASOLINE)

Install a separate fuel tank for the unit. If the plant has to be connected to the vehicle supply tank, do not tee off the vehicle supply line. The generating unit must have a separate fuel line because the more powerful vehicle fuel pump will starve the generating unit for gasoline.

FUEL LINES

Use annealed copper or seamless steel tubing and flared connections. Run fuel lines, at the top level of the tank to a point as close to the engine as possible, to reduce the danger of fuel siphoning out of the tank if the line should break. Install lines so they are accessible at all times and protected from mechanical injury. Use nonferrous metal straps, without sharp edges, to secure the fuel lines.

EXHAUST

If the unit is permanently mounted, pipe the exhaust to a muffler mounted under the floor. If the unit is mounted on a slide-out tray, vent the exhaust through the air discharge duct. Flexible exhaust tubing (used between the unit and the muffler) absorbs unit vibration. If the exhaust line passes through a flammable floor or partition, insulate with asbestos backed metal collars where it passes through these barriers. Exhaust lines may be asbestos wrapped to reduce heat radiation within the compartment. However, care should be taken to see that flexible exhaust sections that are wrapped still retain their flexibility.

When installing mufflers, other than those supplied with plant or if the exhaust system is excessively complicated, the exhaust back pressure should be checked. Exhaust back pressure at rated load, mea-

sured at the exhaust manifold, should not exceed 2 in. Hg. (Mercury column). Where a tapped hole is not provided, the manifold and/or a pipe coupling may be drilled and tapped. After measurement is made, plug the hole with an ordinary pipe plug.

WARNING Do not use discharged Vacu-Flo air for heating since it may contain carbon monoxide or other poisonous gases.

BATTERY CONNECTION

Connect the positive battery cable to the start solenoid (located in the control box). See Figure 3. Connect the negative battery cable to a good ground on the generator.

CAUTION Do not disconnect the starting battery while the engine is running. The resulting overvoltage will damage the electric choke and other control components.

In mobile applications where the generator is normally operated in ambient temperatures above 0°F and the battery is kept charged by frequent running of the unit, a single 12 volt battery of 72 amp/hr capacity minimum is sufficient.

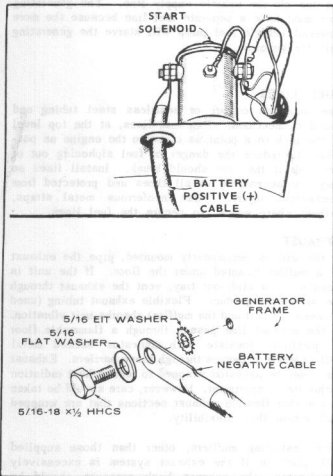


FIG. 3. BATTERY CONNECTION

WIRING

All wiring must meet applicable local electrical codes. Wires must be of adequate size, properly insulated and supported in an approved manner. Have a qualified electrician install and inspect the wiring.

Mount switches and controls securely to prevent damage from vibration and road shocks. All switches should be vibration proof to prevent accidental opening or closing while the vehicle is in motion. Protect load circuits and generator output circuits by proper size fuses or circuit breakers to prevent severe overload conditions from damaging the generator.

Some special precautions must be taken when installing AC load wires to Onan electric plants if the plant is single phase but has 3 output wires (120/240 volt output). Balance the 120 volt loads between the two legs of the generator windings. This means connecting half of the vehicle's 120 volt load to each leg of the generator output. The average running load would be approximately equal for each side of the generator output. Attempting to take the full load off only one leg could damage the generator output windings. Connect any 240 volt load across both windings.

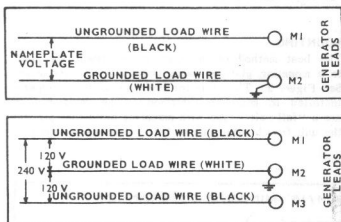


FIG. 4. LOAD WIRE CONNECTIONS

REMOTE START-STOP CONTROLS

Standard remote start-stop controls for Onan remote starting electric plants consist of a single pole, double throw momentary contact switch, connected by three wires to the plant remote control terminal block. Pushing the switch up engages the starter, the center position is for running and pushing it down stops the plant.

To control the plant from several locations, install separate switches and wire them in parallel (Figure 5). Any number of switches may be used.

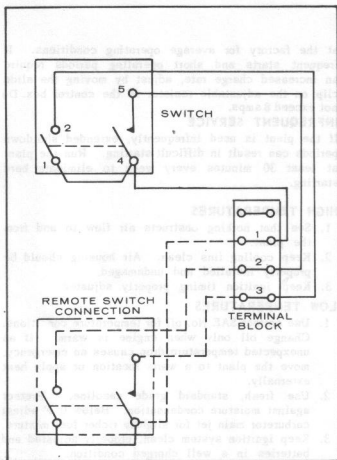


FIG. 5. REMOTE SWITCH CONNECTIONS

OUT-OF-SERVICE PROTECTION

Protect a plant that is not to be started in the following manner:

1. Turn off fuel supply and air until engine stops.
2. Drain oil from oil tank until only 1/2 inch remains.
3. Remove spark plug. Turn 1/4 inch (two 1/8 inch) gap in front of nut inhibitor for CAE 150 (1/2 inch) each cylinder. Check engine slowly (by hand) several times. Install spark plug.
4. Service air system.
5. Check governor linkage and adjust by engaging with a clean cloth.
6. Plug exhaust outlet to prevent entrance of moisture. (See page 200.)
7. Stop generator, unplug slip rings and disconnect generator or motor.
8. Stop engine unit. Cut outside parts with a light file in places as follows:
9. If battery is used, disconnect and follow standard battery storage procedure.

BEFORE STARTING

If the engine has been filled with oil to the "FULL" mark on the oil level indicator, refer to the Maintenance Section for the recommended oil changes and complete following oil recommendations.

ELECTRIC STARTING

Push the START STOP button to the "START" position. Release the button to stop the engine start.

If the engine fails to start in four try inhibitor on, stand at the battery and look behind the spark plug through the plug cover to a suitable solvent dry thoroughly and install. Heavy exhaust smoke when the engine is first started is normal and is caused by the inhibitor oil.

If the battery charge condition is too low to crank the engine, the plant can be started manually. Set the control lever (located inside the control box) to its manual start position. Turn the key with a fast steady pull to crank the engine. Do not hold. After starting, return the control lever switch to the electric start position to avoid discharging the battery.

APPLYING LOAD

If generator, allow plant to run as before connecting a heavy load. Continuous generator overloaded may cause high operating temperature. Do not damage the generator. Keep the load within maximum rating.

STOPPING

1. Push start-stop switch to stop position.
2. Release engine when plant stops. If stop circuit fails, close fuel valve.

BREAK-IN PROCEDURE

Continued break-in with the proper oil and a continuously operating maintenance program will help to make satisfactory service from your Onan electric plant.

When starting water for the first time, use the following sequence using SAE 150 oil:

1. One half hour at 1/2 load.
2. One half hour at 3/4 load.
3. Full load.
4. Change generator oil after the first 30 hours of operation.

BATTERY CHARGING

The battery-charging rate is automatically controlled by generator voltage. The high charge rate will not

OPERATION

BEFORE STARTING

Be sure the crankcase has been filled with oil to the "FULL" mark on the oil level indicator. Refer to the Maintenance Section for the recommended oil changes and complete lubricating oil recommendations.

ELECTRIC STARTING

Push the START-STOP switch to its "START" position. Release the switch as soon as the engine starts.

If the engine fails to start at first try, inhibitor oil used at the factory may have fouled the spark plug. Remove the plug, clean in a suitable solvent, dry thoroughly and install. Heavy exhaust smoke when the engine is first started is normal and is caused by the inhibitor oil.

If the battery charge condition is too low to crank the engine, the plant can be started manually. Set the control box switch (located inside the control box) to its *manual* start position. Pull the rope with a fast, steady pull to crank the engine. Do not jerk. After starting, return the control box switch to the *electric start* position to avoid discharging the battery.

APPLYING LOAD

If practical, allow plant to warm up before connecting a heavy load. Continuous generator overloading may cause high operating temperatures that can damage the windings. Keep the load within nameplate rating.

STOPPING

1. Push *start-stop* switch to *stop* position.
2. Release switch when plant stops. If stop circuit fails, close fuel valve.

BREAK-IN PROCEDURE

Controlled break-in with the proper oil and a conscientiously applied maintenance program will help to assure satisfactory service from your Onan electric plant.

When operating engine for the first time, use the following sequence using MS/DG oil:

1. One half hour at 1/2 load.
2. One half hour at 3/4 load.
3. Full load.
4. Change crankcase oil after the first 50 hours of operation.

BATTERY CHARGING

The battery charge rate is automatically controlled by a voltage regulator. The high charge rate was set

at the factory for average operating conditions. If frequent starts and short operating periods require an increased charge rate, adjust by moving the slide clip on the adjustable resistor in the control box. Do not exceed 8 amps.

INFREQUENT SERVICE

If the plant is used infrequently, extended shutdown periods can result in difficult starting. Run the plant at least 30 minutes every week to eliminate hard starting.

HIGH TEMPERATURES

1. See that nothing obstructs air flow to and from the plant.
2. Keep cooling fins clean. Air housing should be properly installed and undamaged.
3. Keep ignition timing properly adjusted.

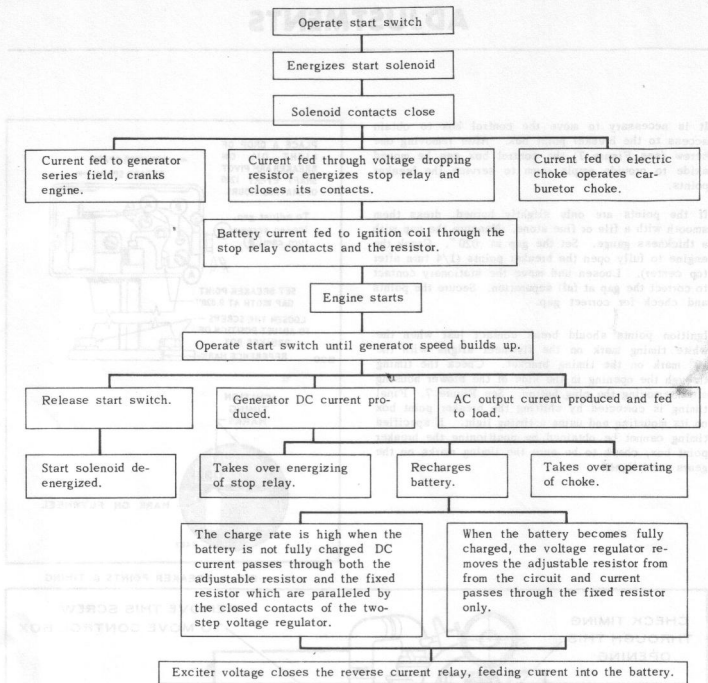
LOW TEMPERATURES

1. Use correct SAE No. oil for temperature conditions. Change oil only when engine is warm. If an unexpected temperature drop causes an emergency, move the plant to a warm location or apply heat externally.
2. Use fresh, standard grade gasoline. Protect against moisture condensation. Below 0°F adjust carburetor main jet for slightly richer fuel mixture.
3. Keep ignition system clean, properly adjusted and batteries in a well charged condition.
4. Partially restrict cool air flow, but use care to avoid overheating.

OUT-OF-SERVICE PROTECTION

Protect a plant that is to be out-of-service for more than 30 days as follows:

1. Run the plant until thoroughly warm.
2. Turn off fuel supply and run until plant stops.
3. Drain oil from oil base while still warm. Refill and attach a warning tag stating oil viscosity used.
4. Remove each spark plug. Pour 1 oz. (two table-spoons) of rust inhibitor (or SAE #50 oil) into each cylinder. Crank engine slowly (by hand) several times. Install spark plugs.
5. Service air cleaner.
6. Clean governor linkage and protect by wrapping with a clean cloth.
7. Plug exhaust outlet to prevent entrance of moisture, dirt, bugs, etc.
8. Wipe generator brushes, slip rings, etc. Do not apply lubricant or preservative.
9. Wipe entire unit. Coat rustable parts with a light film of grease or oil.
10. If battery is used, disconnect and follow standard battery storage procedure.



DUST AND DIRT

1. Keep plant clean. Keep cooling surfaces clean.
2. Service air cleaner as frequently as necessary.
3. Change crankcase oil every 50 operating hours.
4. Keep oil and gasoline in dust-tight containers.
5. Keep governor linkage clean.
6. Clean generator brushes, slip rings and commutator. Do not remove normal (dark brown) film. Do not polish.

HIGH ALTITUDE

For operation at altitudes of 2500 feet above sea level, close carburetor main jet adjustment slightly to maintain proper air-to-fuel ratio (refer to the Adjustments Section). Maximum power will be reduced approximately 4% for each 1000 feet above sea level, after the first 1000 feet.

ADJUSTMENTS

It is necessary to move the control box to obtain access to the breaker point box. After removing one screw (see Figure 7) the control box can be moved aside to provide ample room to service the breaker points.

If the points are only slightly burned, dress them smooth with a file or fine stone. Measure the gap with a thickness gauge. Set the gap at .020". Crank the engine to fully open the breaker points (1/4 turn after top center). Loosen and move the stationary contact to correct the gap at full separation. Secure the points and check for correct gap.

Ignition points should break contact just when the white timing mark on the flywheel aligns with the 19° mark on the timing bracket. Check the timing through the opening in the side of the blower housing after removing the plug button. See Figure 7. Final timing is corrected by shifting the breaker point box on its mounting and using a timing light. If specified timing cannot be obtained by positioning the breaker point box, check to be sure the timing marks on the gears are aligned.

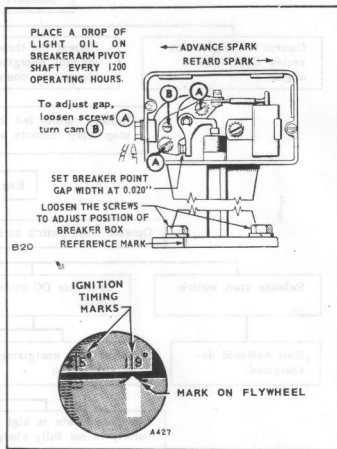


FIG. 6. BREAKER POINTS & TIMING

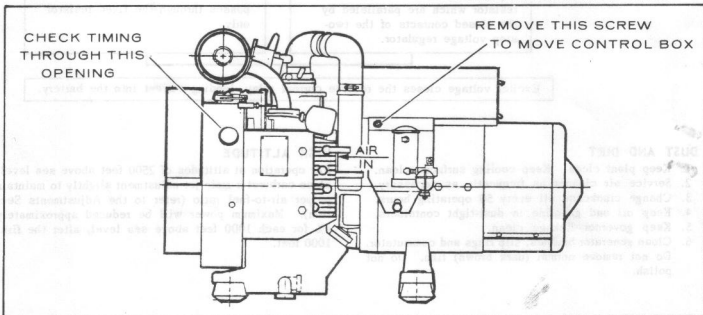


FIG. 7. TIMING MARK LOCATION

CARBURETOR, GASOLINE

The carburetor has an adjustable idling jet and an adjustable main jet. If the engine runs unevenly at half or full load due to faulty carburetion, the main adjusting needle requires adjustment. The idle adjusting needle normally requires little attention other than a periodic cleaning. A hunting condition (alternate increase and decrease in engine speed) at no load can sometimes be adjusted by an idle jet adjustment. Make all adjustments with the engine at normal operating temperature.

To adjust the main jet, connect a full or nearly full load to the engine. Turn the main adjusting needle out about two full turns. Then turn it in slowly until the engine begins to lose power and speed. Then turn it out slowly until the engine runs smoothly at full power and speed. If the engine develops a hunting condition try correcting by opening the main adjusting needle a little more. Do not open more than 1/2 turn beyond the maximum point of power. If this does not correct the condition, adjust the sensitivity of the governor.

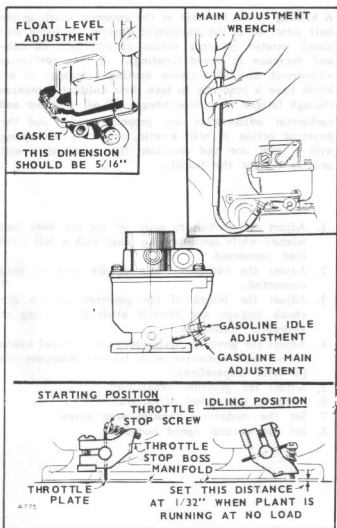


FIG. 8. CARBURETOR

Make the idle jet adjustment with no load connected to the engine. Turn the needle in until the engine loses considerable speed. Then turn it out until the engine runs smoothly.

SISSON CHOKE

This choke should not require any seasonal readjustment. If adjustment becomes necessary, pull choke lever up and insert a 1/16" diameter rod through shaft hole (opposite end from lever) and engage rod in notch of mounting flange, to lock shaft in place.

Loosen the choke lever clamp screw. With air inlet removed, adjust choke lever so carburetor choke plate is completely closed, or not more than 5/16" open. Tighten choke lever clamp screw and remove locking rod from shaft.

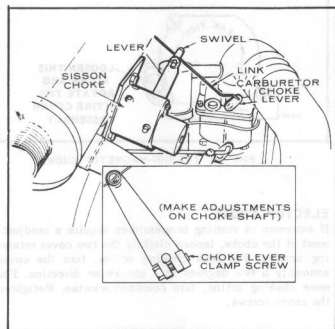


FIG. 9. SISSON CHOKE

THERMO-MAGNETIC CHOKE (OPTIONAL)

This choke uses a strip heating element and a heat sensitive bimetal spring to control the choke plate position. In addition to this, a solenoid is actuated during engine cranking, closing the choke all or part way, depending on ambient temperature. The bimetal is factory set to position the choke to the proper opening under any ambient condition.

If adjustment of the bimetal is needed, it must be made at ambient temperature. Do not attempt adjustments until the engine has been shut down for at least one hour. Loosen the screw which secures the choke body assembly (see Figure 10). Rotating the choke body clockwise richens and counterclockwise leans the choking effect. For ambient temperatures below 60°F the choke should be opened 1/8" with the solenoid not engaged. Tighten the screw that secures the choke body.

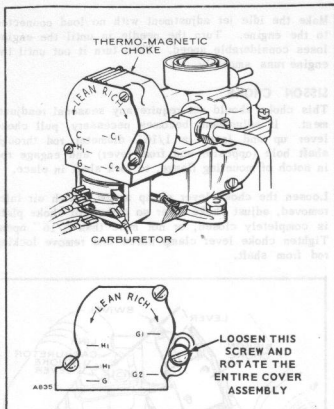


FIG. 10. THERMO-MAGNETIC CHOKE

ELECTRIC CHOKE

If extremes in starting temperatures require a readjustment of the choke, loosen slightly the two cover retaining screws. For less choking action, turn the cover assembly a few degrees in a clockwise direction. For more choking action, turn counterclockwise. Retighten the cover screws.

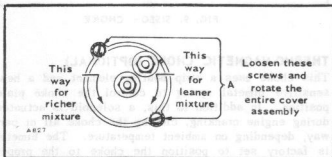


FIGURE 11. ELECTRIC CHOKE

GOVERNOR AND BOOSTER

The governor and booster control the speed of the engine. A speed adjustment includes adjusting both devices (Figure 12).

GOVERNOR

Before making final governor adjustments, run the plant about 15 minutes under light load to reach normal operating temperature. (If governor is completely out of adjustment, make a preliminary adjustment at no load to first attain a safe voltage operating range).

Engine speed determines the output voltage and current frequency of the generator. By increasing the engine speed, generator voltage and frequency are increased, and by decreasing the engine speed, generator voltage and frequency are decreased. An accurate voltmeter or frequency meter (preferably both) should be connected to the generator output in order to correctly adjust the governor. A small speed drop not noticeable without instruments will result in an objectionable voltage drop. The engine speed can be checked with a tachometer.

A binding in the bearings of the governor shaft, in the ball joint, or in the carburetor throttle assembly will cause erratic governor action or alternate increase and decrease in speed (hunting). A lean carburetor adjustment may also cause hunting. Springs of all kinds have a tendency to lose their calibrated tension through fatigue after long usage. If all governor and carburetor adjustments are properly made, and the governor action is still erratic, replacing the spring with a new one and resetting the adjustments will usually correct the trouble.

1. Adjust the carburetor main jet for the best fuel mixture while operating the plant with a full rated load connected.
2. Adjust the carburetor idle needle with no load connected.
3. Adjust the length of the governor linkage and check linkage and throttle shaft for binding or excessive looseness.
4. Adjust the governor spring tension for rated speed at no load operation with booster disconnected (or held inoperative).
5. Adjust the governor sensitivity.
6. Recheck the speed adjustment.
7. Set the carburetor throttle stop screw.
8. Set the vacuum speed booster.

VOLTAGE CHART FOR CHECKING GOVERNOR REGULATION

ALTERNATING CURRENT PLANTS	120 VOLT	120/240 VOLT
	1 PHASE 2 WIRE	1 PHASE 3 WIRE
Maximum No Load Volts	126	126
Minimum Full Load Volts Without Booster	110	110
Maximum Voltage Drop from No Load Operation to Full Load Operation	16	16
Preferred Voltage Regulation No Load to Full Load Operation	122-118	122-118
Preferred Voltage Spread	5	5

NOTE: Output rating is at UNITY power factor load.

SPEED CHART FOR CHECKING GOVERNOR REGULATION

Maximum No Load Speed RPM	1920
Hertz (Current Frequency)	64
Minimum Full Load Speed Without Booster RPM	1710
Hertz	57
Maximum Speed Drop from No Load Operation to Full Load Operation RPM	90
Hertz	3
Preferred Speed Regulation No Load to Full Load Operation RPM	1830-1770
Hertz	61-59
Preferred Speed Spread RPM	60
Hertz	2

LINKAGE

The engine starts at wide open throttle. The length of the linkage connecting the governor arm to the throttle shaft and lever is adjusted by rotating the ball joint. Adjust this length so that with the engine stopped and tension on the governor spring, the stop on the carburetor throttle lever just contacts the underside of the carburetor bowl. This setting allows immediate control by the governor after starting. It also synchronizes travel of the governor arm and the throttle shaft.

SPEED ADJUSTMENT

With the warmed-up plant operating at no load, and with the booster external spring disconnected (or otherwise held inactive), adjust the tension of the governor spring. Refer to Voltage Chart and the Speed Chart and select the column which corresponds to the nameplate of the plant in question. Turn the speed adjusting nut to obtain a voltage and speed reading within the limits shown.

SENSITIVITY ADJUSTMENT

Refer to the Governor Adjustment illustration, and to the Voltage and Speed Charts. Check the voltage and speed, first with no load connected and again with a full load. Adjust the sensitivity so as to give the closest regulation (least speed and voltage difference between no load and full load) without causing a hunting condition.

To increase sensitivity (closer regulation), shift the adjusting clip toward the governor shaft.

An adjustment for too much sensitivity will cause alternate increase and decrease of engine speed (hunting).

To decrease sensitivity, shift the adjusting clip toward the outer end of the governor arm. Too little sensitivity will result in too much difference in speed between no load and full load conditions.

Any change in the sensitivity adjustment usually requires a compensating speed (spring tension) adjustment.

SPEED BOOSTER

After satisfactory performance under various loads has been attained by governor adjustments without the booster, the booster can be connected. Connect the booster external spring to the bracket on the governor link (rod). With the plant operating at no load, slide the bracket on the governor link just to the position where there is no tension on the external spring (Figure 12).

Apply a full rated electrical load to the generator. The output voltage should stabilize at nearly the same reading for full load as for no load operation. The speed may remain about the same or increase when the load is applied, resulting in a frequency 1 or 2 hertz higher than the no load frequency (1 hertz is equal to

30rpm for a 4 pole generator). If the rise in frequency is more than 2 hertz, lessen the internal spring tension. If there is a drop in the frequency, increase the booster internal spring tension. To increase the tension, pull out on the spring bracket and more the pin to a different hole.

With the booster disconnected, a maximum drop of 3 hertz from no load to full load is normal. With the booster in operation, a maximum increase of 2 hertz from no load to full load is normal. A drop of 1 hertz at 1/4 load is permissible, giving an overall spread of 3 hertz, maximum.

The effect of the booster is limited by the general condition of the engine. The booster cannot compensate for a loss in engine vacuum caused by leaky valves, worn piston rings, etc.

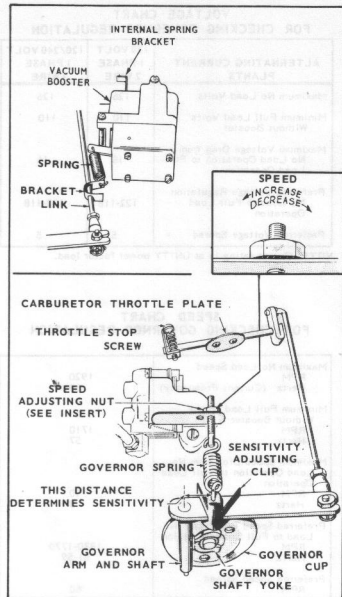


FIG. 12. GOVERNOR AND SPEED BOOSTER

SPEED BOOSTER

After satisfactory performance under various loads has been obtained by governor adjustments without the booster, the booster can be connected. Connect the booster external spring to the bracket on the governor link (Fig. 12). With the plate covering an oil hole, slide the bracket on the governor link into the position where there is no tension on the external spring (Fig. 12).

Apply a full load electrical load to the generator. The output voltage should stabilize to nearly the same reading for full load as for no load operation. The speed may remain about the same or increase when the load is applied, resulting in a frequency 1 or 2 hertz higher than the no load frequency. If there is a

the engine runs at with load idle. The height of linkage connecting the governor arm to the shaft and lever is adjusted by rotating the ball joint. Adjust the spring so that with the engine stopped and governor on the governor spring the clip on the governor bracket does not contact the underside of the ball joint. This setting allows immediate contact for the governor when starting. It also determines level of the governor arm and the throttle ball.

SERVICE AND MAINTENANCE

CRANKCASE OIL

Fill to the "F" mark on the oil level dipstick. Use a good quality detergent oil that meets the API (American Petroleum Institute) service designations SD or SD/CC. Oil should be labeled as having passed the MS sequence tests (also known as the ASTM G-IV sequence tests) and the MIL-L-2104B tests. Use the proper SAE number of oil for the expected temperature conditions. Do not mix brands or grades. Extremely dusty or low temperature conditions require oil change at 50 hours. Oil capacity is 4 U.S. quarts.

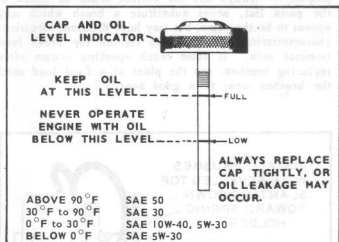


FIG. 13. OIL LEVEL INDICATOR

CRANKCASE BREATHER

Lift off rubber breather cap. Carefully pry valve from cap. Otherwise press hard with both thumbs on top of the cap and fingers below to release valve from rubber cap. Wash this fabric flapper type check valve in a suitable solvent. Dry and install. Position perforated disc toward engine.

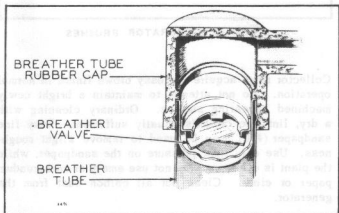


FIG. 14. CRANKCASE BREATHER

AIR CLEANER

Clean screen and cup in a suitable solvent. Refill to level indicated on cup. Use the same type of oil as used in crankcase. Refer to Operator Maintenance Schedule for further recommendations.

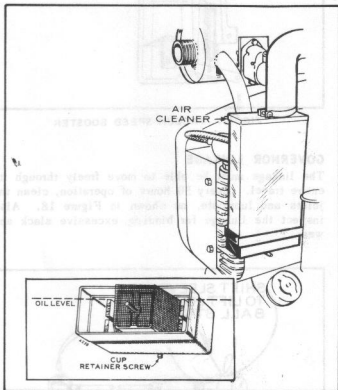


FIG. 15. AIR CLEANER

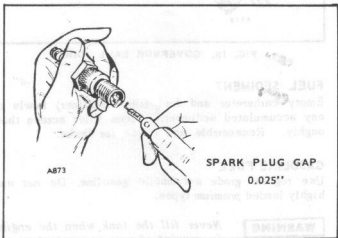


FIG. 16. SPARK PLUG GAP

SPEED BOOSTER

Use a fine wire to clean the small hole in the short vacuum tube which fits into the hole in the top of the engine intake manifold. Do not enlarge this hole. If there is tension on the external spring when the plant is operating at no load or light load, it may be due to improper adjustment, restricted hole in the small vacuum tube, or a leak in the booster diaphragm or gasket.

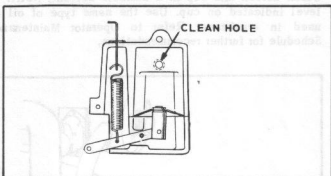


FIG. 17. VACUUM SPEED BOOSTER

GOVERNOR LINKAGE

The linkage must be able to move freely through its entire travel. Every 50 hours of operation, clean the joints and lubricate, as shown in Figure 18. Also inspect the linkage for binding, excessive slack and wear.

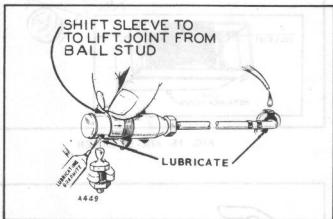


FIG. 18. GOVERNOR BALL JOINTS

FUEL SEDIMENT

Empty carburetor and fuel filter (strainer) bowls of any accumulated sediment. Clean filter screen thoroughly. Reassemble and check for leaks.

GASOLINE FUEL

Use regular grade automobile gasoline. Do not use highly leaded premium types.

WARNING Never fill the tank when the engine is running. Leave some tank space for fuel expansion.

GENERATOR MAINTENANCE

The generator normally needs little care other than a periodic check of the brushes, commutator and collector rings. If a major repair job on the generator should become necessary, have the equipment checked by a competent electrician who is thoroughly familiar with the operation of electric generating equipment.

BRUSH REPLACEMENT

Install new commutator brushes when the old ones are worn to 5/8" in length. The collector ring brush may be used until worn to 5/16" in length. It is not necessary to remove the brush rig to install new brushes. Remove the end cover to expose the brush rig. Brushes and leads are then easily accessible. New brushes are shaped to fit and seldom need sanding to seat properly. Always use the correct brush as listed in the parts list, never substitute a brush which may appear to be the same, but may have different electrical characteristics. Be sure to tighten the brush lead terminal nuts. If some brush sparking occurs after replacing brushes, run the plant at a light load until the brushes wear to a good seat.

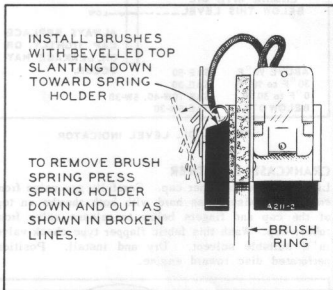


FIG. 19. GENERATOR BRUSHES

Collector rings acquire a glossy brown finish in normal operation. Do not attempt to maintain a bright newly machined appearing surface. Ordinary cleaning with a dry, lint free cloth is usually sufficient. Very fine sandpaper (#00) may be used to remove slight roughness. Use only light pressure on the sandpaper, while the plant is operating. Do not use emery or carborundum paper or cloth. Clean out all carbon dust from the generator.

MAINTENANCE SCHEDULE

Use factory recommended maintenance schedule (based on favorable operating conditions) to serve as a guide to get long and efficient plant life. Neglecting routine maintenance can result in failure or permanent damage

to the plant. Maintenance is divided into two categories:

1. Operator maintenance – performed by the operator.
2. Critical maintenance – performed by qualified service personnel (Onan dealer).

OPERATOR MAINTENANCE SCHEDULE

MAINTENANCE ITEMS	OPERATIONAL HOURS			
	8	50	100	200
Inspect Plant Generally	x			
Check Fuel Supply	x			
Check Oil Level	x			
Service Air Cleaner			x1	
Clean Governor Linkage			x1	
Check Spark Plugs			x	
Change Crankcase Oil			x1	
Clean Crankcase Breather				x
Clean Fuel System				x
Check Battery Electrolyte				x

x1 Perform more often in extremely dusty conditions.

For any abnormalities in operation, unusual noises from engine or generator, loss of power, overheating, etc., contact your ONAN dealer.

CRITICAL MAINTENANCE SCHEDULE

MAINTENANCE ITEMS	OPERATIONAL HOURS			
	200	500	1000	5000
Check Breaker Points	x			
Clean Commutator & Collector Rings	x1			
Check Brushes	x2			
Remove Carbon & Lead		x		
Check Valve Clearance		x		
Clean Carburetor		x		
Clean Generator			x	
Remove & Clean Oil Base			x	
Grind Valves			x	
General Overhaul				x

x1 Perform more often in extremely dusty conditions.

x2 Replace collector ring brushes when worn to 5/16" or less. Replace commutator brushes when worn to 5/8" or less.

CLEARANCES

Spark Plug Gap

0.025"

BOLT TORQUES

Spark Plugs
Cylinder Head
Oil Base Mounting

FT.-LB.

25-30
29-31
43-48

Tappets (Intake & Exhaust)
Ignition Breaker Points Gap
Ignition Timing

0.010" to 0.012"
0.020"
19°BTC

PARTS CATALOG


INSTRUCTIONS FOR ORDERING REPAIR PARTS

For parts or service, contact the dealer from whom you purchased this equipment or refer to your Nearest Authorized Onan Parts and Service Center.

To avoid errors or delay in filling your parts order, please furnish all information requested.

Always refer to the nameplate on your unit:

1. Always give the MODEL and SPEC NO. and SERIAL NO.

	
ELECTRIC PLANT	
MODEL AND SPEC NO.	
SERIAL NO. _____	
IMPORTANT ALWAYS GIVE ABOVE NOS WHEN ORDERING PARTS	
A.C. VOLTS _____	PH _____
K.V.A. _____	WATTS _____
P.F. _____	AMPS _____
D.C. VOLTS _____	AMPS _____
WATTS _____	
GEN. DATA _____	
R.P.M. _____	BAT _____
MANUFACTURED BY ONAN	
<small>DIVISION OF ONAN CORPORATION MINNETONKA, MINNESOTA MADE IN U.S.A. FOR ELECT. EQUIPMENT ONLY</small>	

For handy reference, insert YOUR engine nameplate information in the spaces above.

2. Do not order by reference number or group number, always use part number and description.
3. Give the part number, description and quantity needed of each item. If an older part cannot be identified, return the part prepaid to your dealer or nearest AUTHORIZED SERVICE STATION. Print your name and address plainly on the package. Write a letter to the same address stating the reason for returning the part.
4. State definite shipping instructions. Any claim for loss or damage to your unit in transit should be filed promptly against the transportation company making the delivery. Shipments are complete unless the packing list indicates items are back ordered.

Prices are purposely omitted from this Parts Catalog due to the confusion resulting from fluctuating costs, import duties, sales taxes, exchange rates, etc.

For current parts prices, consult your Onan Dealer, Distributor or Parts and Service Center.

“En esta lista de partes los precios se omiten de proposito, ya que bastante confusion resulto de fluctuaciones de los precios, derechos aduanales, impuestos de venta, cambios extranjeros, etc.”

Consiga los precios vigentes de su distribuidor de productos “ONAN”.

This catalog applies to the standard CCK Mobile Plants as listed below. Parts are arranged in groups of related items. Each illustrated part is identified by a reference number corresponding to the same reference number below the illustration. Parts illustrations are typical. Using the *Model and Spec No.* from the plant nameplate, select the Parts Key No. (1, 2, etc. in the last column) that applies to your plant Model and Spec No. This Parts Key No. represents parts that differ between models. Unless otherwise mentioned in the description, parts are interchangeable between models. Right and left plant sides are determined by *facing* the engine end (front) of the plant.

PLANT DATA TABLE

* MODEL & SPEC NO.	TYPE	ELECTRICAL DATA					PARTS KEY NO.
		WATTS*	VOLTS	HERTZ	WIRE	PHASE	
4.0CCK-1R/ ♂	REMOTE	4000	120	60	2	1	1
4.0CCK-3R/ ♂	REMOTE	4000	120/240	60	3	1	
4.0CCK-3CR/ ♂	REMOTE	4000	120/240	60	†	1	
5.0CCK-1R/ ♂	REMOTE	5000	120	60	2	1	2
5.0CCK-3R/ ♂	REMOTE	5000	120/240	60	3	1	
5.0CCK-3CR/ ♂	REMOTE	5000	120/240	60	†	1	

* - Maximum standby rating is shown. Continuous rating also shown on nameplate.

♂ - The Specification Letter advances (A to B, B to C, etc.) with manufacturing changes.

† - These generators have 4 load wires which are reconnectable for 120 volt 2 wire service, or 240 volt 2 wire service, or 120/240 volt 3 wire service.

★ - New model designations shown, begin during 1969. Previous designations did not use a decimal in the KW rating. EXAMPLE: 4.0CCK was formerly 4CCK and 5.0CCK was formerly 5CCK. Also previously a V was used in the model to designate vacu-flo cooling.

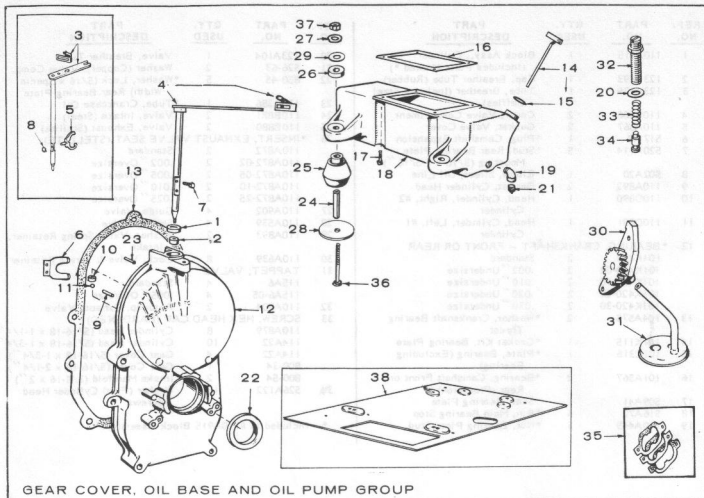
NOTE: Hertz is a unit of frequency equal to one cycle per second.

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION	REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	110A915	1	Block Assy., Cylinder (Includes Parts Marked *)	20	123A104	1	Valve, Breather Tube
2	123B293	1	Cap, Breather Tube (Rubber)	21	526-63	2	Washer (Copper), Valve Comp.
3	123A129	1	Tube, Breather (Includes Steel Baffles)	22	850-45	5	*Washer, Lock (5/16 x Special Width) Rear Bearing Plate
4	110A666	2	Cover, Valve Compartment	23	120A386	1	*Tube, Crankcase Oil
5	110A667	2	Gasket, Valve Cover	24	110B881	2	Valve, Intake (Steel)
6	517-48	1	*Plug, Camshaft Expansion	25	110B880	2	Valve, Exhaust (Stellite)
7	520A114	5	*Stud, Rear Bearing Plate Mounting (5/16 x 1-5/16")	26	*INSERT, EXHAUST VALVE SEAT (STELLITE)		
8	502A20	1	Elbow, Street, Oil Line	110A872-02	2	.002" Oversize	
9	110A892	2	Gasket, Cylinder Head	110A872-05	2	.005" Oversize	
10	110D890	1	Head, Cylinder, Right, #2 Cylinder	110A872-10	2	.010" Oversize	
11	110D891	1	Head, Cylinder, Left, #1 Cylinder	110A872-25	2	.025" Oversize	
12	*BEARING, CRANKSHAFT - FRONT OR REAR			27	110A902	4	*Guide, Valve
101K420	2	Standard		28	110A539	4	Spring, Valve
101K420-02	2	.002" Undersize		29	110A893	2	Washer, Valve Spring Retainer, Intake
101K420-10	2	.010" Undersize		30	110A639	8	Lock, Valve & Spring Retainer
101K420-20	2	.020" Undersize		31	TAPPET, VALVE		
101K420-30	2	.030" Undersize		115A6	4	Standard	
13	104A575	2	*Washer, Crankshaft Bearing Thrust	115A6-05	4	.005" Oversize	
14	101K115	1	*Gasket Kit, Bearing Plate	32	110A904	2	Rotocap, Exhaust Valve
15	101C316	1	*Plate, Bearing (Excluding Bearing)	33	SCREW, HEX HEAD CAP (HARDENED)		
16	101A367	2	*Bearing, Camshaft Front or Rear (Precision)	110A879	8	Cylinder Head (5/16-18 x 1-1/4")	
17	509A41	1	Seal, Bearing Plate	114A22	10	Cylinder Head (5/16-18 x 1-3/4")	
18	516A72	4	*Pin, Main Bearing Stop	114A22	4	Gear Cover (5/16-18 x 1-3/4")	
19	110A445	5	*Nut, Bearing Plate Stud	800-34	1	Gear Cover (5/16-18 x 2-1/4")	
				800-54	2	Intake Manifold (3/8-16 x 2")	
				526A122	18	Washer (Flat) Cylinder Head Screws	

* - Included in #110A915 Block Assembly.

SEAR COVER, OIL BASE AND OIL PUMP GROUP

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION	REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	509A41	1	Seal, Bearing Plate	1	509A41	1	Seal, Bearing Plate
2	516A72	4	*Pin, Main Bearing Stop	2	516A72	4	*Pin, Main Bearing Stop
3	110A445	5	*Nut, Bearing Plate Stud	3	110A445	5	*Nut, Bearing Plate Stud
4	101A367	2	*Bearing, Camshaft Front or Rear (Precision)	4	101A367	2	*Bearing, Camshaft Front or Rear (Precision)
5	101C316	1	*Plate, Bearing (Excluding Bearing)	5	101C316	1	*Plate, Bearing (Excluding Bearing)
6	101K115	1	*Gasket Kit, Bearing Plate	6	101K115	1	*Gasket Kit, Bearing Plate
7	104A575	2	*Washer, Crankshaft Bearing Thrust	7	104A575	2	*Washer, Crankshaft Bearing Thrust
8	101K420-30	2	.030" Undersize	8	101K420-30	2	.030" Undersize
9	101K420-20	2	.020" Undersize	9	101K420-20	2	.020" Undersize
10	101K420-10	2	.010" Undersize	10	101K420-10	2	.010" Undersize
11	101K420-02	2	.002" Undersize	11	101K420-02	2	.002" Undersize
12	101K420	2	Standard	12	101K420	2	Standard
13	*BEARING, CRANKSHAFT - FRONT OR REAR			13	*BEARING, CRANKSHAFT - FRONT OR REAR		
14	502A20	1	Elbow, Street, Oil Line	14	502A20	1	Elbow, Street, Oil Line
15	110A892	2	Gasket, Cylinder Head	15	110A892	2	Gasket, Cylinder Head
16	110D890	1	Head, Cylinder, Right, #2 Cylinder	16	110D890	1	Head, Cylinder, Right, #2 Cylinder
17	110D891	1	Head, Cylinder, Left, #1 Cylinder	17	110D891	1	Head, Cylinder, Left, #1 Cylinder
18	520A114	5	*Stud, Rear Bearing Plate Mounting (5/16 x 1-5/16")	18	520A114	5	*Stud, Rear Bearing Plate Mounting (5/16 x 1-5/16")
19	517-48	1	*Plug, Camshaft Expansion	19	517-48	1	*Plug, Camshaft Expansion
20	110A666	2	Cover, Valve Compartment	20	110A666	2	Cover, Valve Compartment
21	110A667	2	Gasket, Valve Cover	21	110A667	2	Gasket, Valve Cover
22	123B293	1	Cap, Breather Tube (Rubber)	22	123B293	1	Cap, Breather Tube (Rubber)
23	123A129	1	Tube, Breather (Includes Steel Baffles)	23	123A129	1	Tube, Breather (Includes Steel Baffles)
24	110A915	1	Block Assy., Cylinder (Includes Parts Marked *)	24	110A915	1	Block Assy., Cylinder (Includes Parts Marked *)

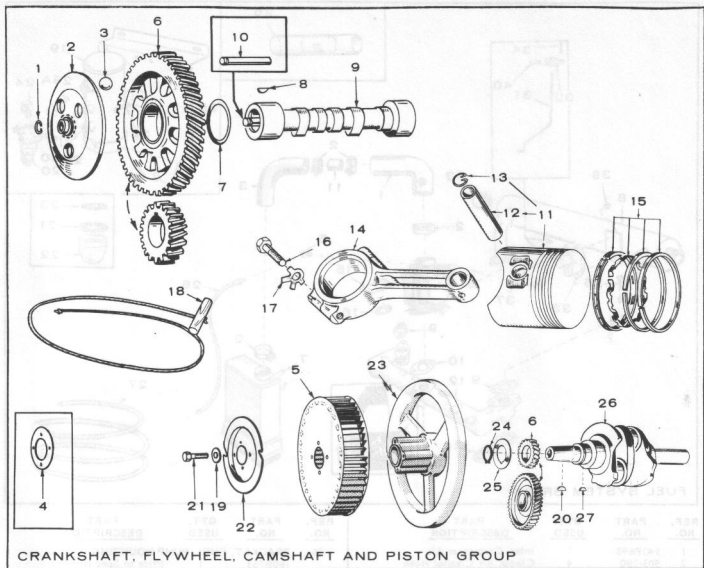


GEAR COVER, OIL BASE AND OIL PUMP GROUP

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	509P8	1	*Seal, Oil - Governor Shaft
2	510P13	1	*Bearing, Governor Shaft Upper
*SHAFT & ARM ASSEMBLY, GOVERNOR (INCLUDES ADJUSTABLE CLIP)			
3	150-710	1	Prior to Spec N
4	150A1286	1	Begin Spec N
*YOKE, GOVERNOR SHAFT			
5	150A620	1	Prior to Spec N
6	150B1187	1	Begin Spec N
7	815-46	2	*Screw (#8-32) - Governor Yoke Mounting - Begin Spec N
8	518-129	1	*Ring, Yoke Retainer "E" - Prior to Spec N
9	516-130	1	*Pin, Governor Cup Stop (In Gear Cover)
10	510A8	1	*Bearing, Governor Shaft, Lower
11	510P14	1	*Ball, Bearing, Governor Shaft
12 COVER ASSEMBLY, GEAR (INCLUDES PARTS MARKED *)			
	103-207	1	Prior to Spec N
	103A357	1	Begin Spec N
13	103B11	1	Gasket, Gear Cover
14	123A489	1	Indicator, Oil Fill
15	123A191	1	Gasket, Oil Fill Cap
16	102B158	1	Gasket, Oil Base Mounting
17	102A455	4	Screw, Cap, Oil Base to Block
18	102A579	1	Base, Oil
19	505-50	1	Elbow, Street - Oil Drain

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
20	526-66	1	Washer, Oil Pressure Relief Valve Adjusting Screw
21	505-56	1	Plug, Oil Drain (1/2)
22	509A40	1	*Seal, Gear Cover
23	516A11	2	Pin, Gear Cover (5/16 x 1/8")
24	402A290	4	Bushing, Spacer, Vibration Mount
25 CUSHION, VIBRATION			
	402B283	2	Engine End
	402B284	2	Generator End
26	402A282	4	Snubber, Shock Mounting
27	526-14	4	Washer (29/64" I.D. x 1-1/2" O.D. x 1/8")
28	526A195	4	Washer (29/64" I.D. x 3-1/4" O.D. x 1/8")
29	526A198	As Req.	Washer (5/8" I.D. x 1-1/4" O.D. x 1/16")
30	120A491	1	Pump, Oil, Complete (Internal Parts Not Sold Separately)
31	120B400	1	Cup, Oil Pump Intake (Includes Pipe, Cup & Screen)
32	120A187	1	Stud Assembly, By-Pass Adjusting (Includes Nut)
33	120A140	1	Spring, By-Pass Valve
34	120A398	1	Valve, By-Pass
35	120K161	1	Gasket Kit, Oil Pump
36	800-82	4	Screw, Hex (7/16-14 x 3-3/4")
37	862-4	4	Nut (7/16-14)
38	403C933	1	Plate, Mounting - Generator Set - Opt.

* - Included in Gear Cover Assembly.



CRANKSHAFT, FLYWHEEL, CAMSHAFT AND PISTON GROUP

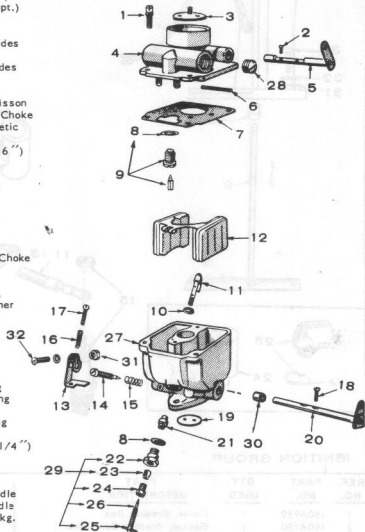
REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION	REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	150A78	1	Ring, Camshaft Center Pin	14	ROD, CONNECTING		
2	CUP, GOVERNOR			114C98	2	Standard	
	150A612	1	Prior to Spec N	114C98-10	2	.010" Undersize	
	150B1116	1	Begin Spec N	114C98-20	2	.020" Undersize	
3	510P15	10	Ball, Governor Fly	114C98-30	2	.030" Undersize	
4	134A911	1	Plate, Blower Wheel - Prior to Spec N	15	RING SET, PISTON		
5	134B565	1	Wheel, Blower	113A152	2	Standard	
6	105-192	1	Gear Set, Timing (Includes Camshaft & Crankshaft Gears)	113A152-10	2	.010" Oversize	
7	105A4	1	Washer, Camshaft Gear Thrust	113A152-20	2	.020" Oversize	
8	515-1	1	Key, Camshaft Gear Mounting	113A152-30	2	.030" Oversize	
9	105-140	1	Camshaft (Includes Center Pin)	113A152-40	2	.040" Oversize	
10	150A75	1	Pin, Camshaft Center	16	110A284	4	Screw, Connecting Rod Cap
11	PISTON & PIN (Includes Retainer Rings)			17	114A111	4	Washer, Connecting Rod Cap Screw Lock
	112A71	2	Standard	18	192A83	1	Rope, Manual Starting
	112A71-10	2	.010" Oversize	19	526A17	1	Washer, Wheel Mounting
	112A71-20	2	.020" Oversize	20	515-2	1	Key, Wheel Mounting
	112A71-30	2	.030" Oversize	21	104A170	1	Screw, Wheel Mounting
	112A71-40	2	.040" Oversize	22	192B272	1	Sheave, Rope
12	PIN, PISTON			23	104D499	1	Flywheel
	112A69	2	Standard	24	518-14	1	Lock, Crankshaft Gear Washer
	112A69-02	2	.002" Oversize	25	104A43	1	Washer, Crankshaft Gear Ret.
13	112A3	4	Ring, Piston Pin Retainer	26	104D578	1	Crankshaft
				27	515-1	1	Key, Crankshaft Gear Mounting

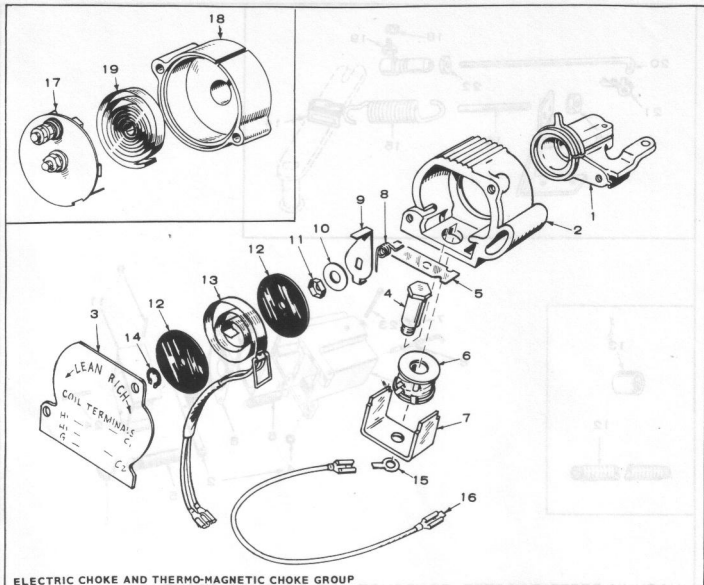
CARBURETOR PARTS GROUP

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
CARBURETOR, GASOLINE			
	142A363	1	Units with Sisson Choke (Std.)
	142A364	1	Units with Electric Choke (Opt.)
	142A483	1	Units with Thermo-Magnetic Choke (Opt.)
	142-33	1	**Gasket Kit, Carburetor (Includes Parts Marked *)
	142K371	1	*Repair Kit, Carburetor (Includes Parts Marked **)
1 SCREW, BOWL COVER			
	815-103	1	#10-24 x 1/2" - Units with Sisson Choke or Thermo-Magnetic Choke
	815-109	2	#10-24 x 5/8" (Thermo-Magnetic Choke Units use Qty. of 3)
2 FLY, CHOKE			
	815-91	2	**Screw, Choke Fly (4-40 x 3/16")
3 SHAFT ASSEMBLY, CHOKE			
	142-55	1	Units with Sisson Choke
	142-37	1	Units with Electric Choke or Thermo-Magnetic Choke
	142-205	1	Sleeve Assy., Choke (Cover)
4 SHAFT ASSEMBLY, CHOKE			
	142-217	1	Units with Sisson Choke
	142-183	1	Units with Electric Choke
	142A468	1	Units with Thermo-Magnetic Choke
	142-39	1	**Shaft, Float
	142-31	1	*Gasket, Body to Bowl
	148A17	2	*Gasket, (1) Float Valve Seat, (1) Main Adj. Needle Retainer
	142-49	1	**Valve & Seat Assembly
	142-32	1	*Gasket, Nozzle
	142-285	1	Nozzle Assembly
	142-361	1	Float & Lever Assembly
	145A8	1	Lever, Throttle Stop
	142-40	1	**Needle, Idle Adjusting
	142-282	1	Spring, Idle Needle Adjusting
	142A35	1	Spring, Throttle Stop Adjusting
	812-63	1	Screw, Throttle Stop Adjusting (#6-32 x 1/2")
	815-72	2	**Screw, Throttle Fly (#4-40 x 1/4")
	142-369	1	Fly, Throttle
	142-368	1	**Shaft Assembly, Throttle
	142-370	1	Nut & Jet, Nozzle
	142-46	1	Retainer, Main Adjusting Needle
	142-206	1	*Packing, Main Adjusting Needle
	142-45	1	Retainer, Main Adj. Needle Pkg.
	516A27	1	Pin, Main Adjusting Needle
	142A41	1	**Needle, Main Adjusting
	142-42	1	Body Assy. (Not Sold Separately)
	505-53	1	Plug, Gas Inlet
	142-42	1	Needle Assy. (Includes Packing, Nut & Retainer)
	142-343	2	Bushing, Throttle Shaft
	870-53	1	Nut, Throttle Stop
	813-102	1	Screw, Throttle Stop Clamp

* Parts contained in Gasket Kit #142-33.

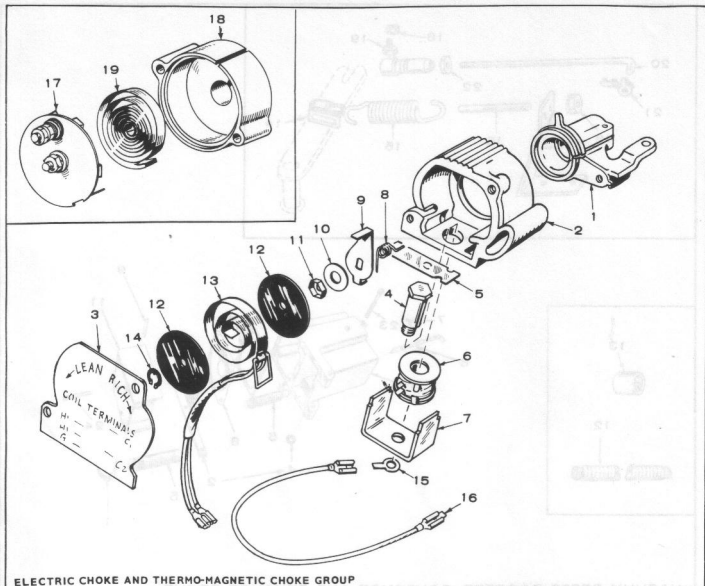
** Parts contained in Repair Kit #142K371.





REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	153B417	1	Adapter, Choke Mounting
2	153D386	1	Body
3	153C389	1	Cover
4	153B391	1	Core, Solenoid
5	153A395	1	Armature
6	307B801	1	Coil, Solenoid Assembly
7	153B392	1	Frame, Solenoid
8	153B418	1	Spring
9	153B390	1	Lever, Thermostat
10	526-18	1	Washer (17/64" I.D. x 5/8" O.D. x 1/16")

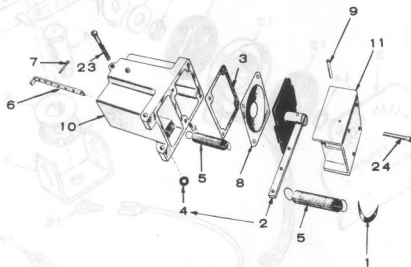
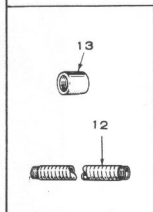
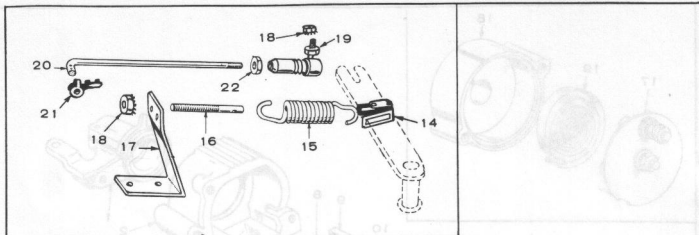
REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
11	870-134	1	Pinnut (1/4-20)
12	153A399	2	Insulator
13	153B400	1	Heater Assembly
14	518P129	1	Ring, Retaining
15	332A876	1	Terminal, Ground
16	LEAD, CHOKE		
	336A1741	1	Choke to Ground
	336A1549	1	Choke Solenoid Ground
17	153A113	1	Cover, Electric Choke
18	153A58	1	Bracket, Electric Choke
19	153A17	1	Element, Bi-Metal, Electric Choke



ELECTRIC CHOKE AND THERMO-MAGNETIC CHOKE GROUP

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	153B417	1	Adapter, Choke Mounting
2	153D386	1	Body
3	153C389	1	Cover
4	153B391	1	Core, Solenoid
5	153A395	1	Armature
6	307B801	1	Coil, Solenoid Assembly
7	153B392	1	Frame, Solenoid
8	153B418	1	Spring
9	153B390	1	Lever, Thermostat
10	526-18	1	Washer (17/64" I.D. x 5/8" O.D. x 1/16")

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
11	870-134	1	Palnut (1/4-20)
12	153A399	2	Insulator
13	153B400	1	Heater Assembly
14	518P129	1	Ring, Retaining
15	332A876	1	Terminal, Ground
16	LEAD, CHOKE		
	336A1741	1	Choke to Ground
	336A1549	1	Choke Solenoid Ground
17	153A113	1	Cover, Electric Choke
18	153A58	1	Bracket, Electric Choke
19	153A17	1	Element, Bi-Metal, Electric Choke



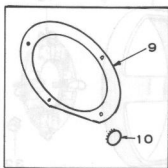
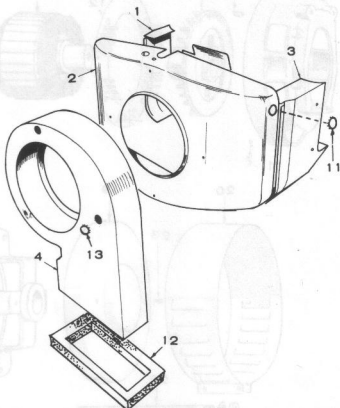
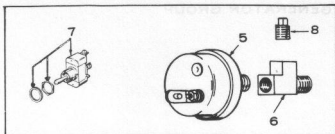
VACUUM SPEED BOOSTER, GOVERNOR AND EXHAUST GROUP

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
	150K433	1	Kit, Vacuum Speed Booster Replacement, Includes Ext. Spring & Mounting Gasket
1	150A430	1	Bracket, Spring to Gov. Link
2	150K434	1	Kit, Diaphragm Replacement, Includes Gaskets
3	150A668	1	Gasket, Diaphragm Plate
4	150A425	1	Gasket, Booster to Manifold
5	150A366	2	Spring, Internal & External
6	150A376	1	Bracket, Internal Spring Adj.
7	516-39	1	Pin, Cotter (3/32 x 5/8")
8	150A666	1	Plate, Diaphragm
9	516A85	1	Pin (3/32 x 3/4") Diaphragm Lever Pivot

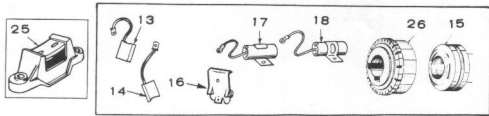
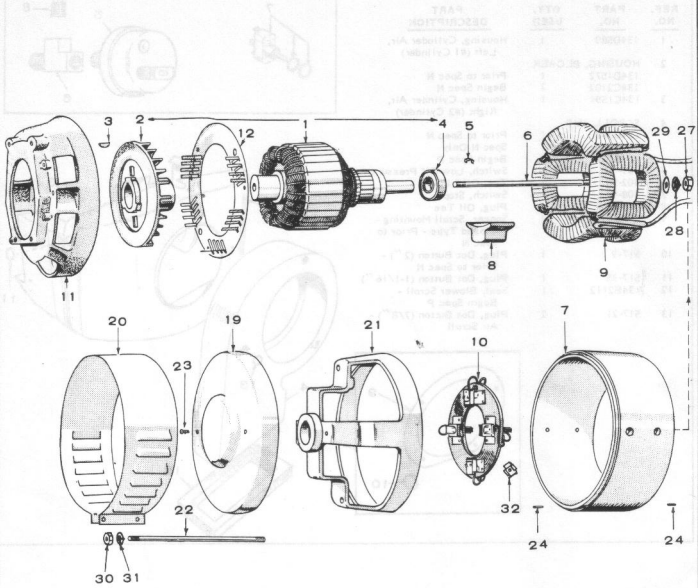
REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
10		1	Housing, Vacuum Booster (Not Sold Separately)
11		1	Cover, Vacuum Booster Housing (Not Sold Separately)
12	155B491	1	Tubing, Flexible Exhaust
13	505-30	1	Coupling (Pipe 1") Exhaust
14	150A678	1	Clip, Governor Sensitivity Adj.
15	150A98	1	Spring, Governor
16	150A96	1	Stud, Governor Speed Adjusting
17	150A159	1	Bracket, Governor Spring
18	870-131	2	Nut, Keps
19	150A639	1	Joint, Ball - Governor Link
20	150A629	1	Link, Governor Arm to Carburetor
21	518-6	1	Clip, Rod End
22	870-53	1	Nut, Hex (#10-32)
23	813-110	2	Screw (#10-32 x 2") - Vacuum Booster Mounting
24	815-148	4	Screw (#8-32 x 7/8") - Cover Mounting

AIR HOUSING GROUP

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	134D589	1	Housing, Cylinder Air, Left (#1 Cylinder)
2	HOUSING, BLOWER		Prior to Spec N Begin Spec N
	134D1572	1	
	134C2102	1	
3	134C1591	1	Housing, Cylinder Air, Right (#2 Cylinder)
4	SCROLL, AIR		Prior to Spec N Spec N Only
	134D768	1	
	134D564	1	
	134B2111	1	Begin Spec P
5	309-10	1	Switch, Low Oil Pressure
6	502-58	1	Tee, Oil Line
7	308-97	1	Switch, Stop
8	505-57	1	Plug, Oil Tee
9	134B761	1	Spacer, Scroll Mounting - Closed Type - Prior to Spec N
10	517-9	1	Plug, Dot Button (2") - Prior to Spec N
11	517-35	1	Plug, Dot Button (1-1/16") - Begin Spec P
12	134B2112	1	Seal, Blower Scroll
13	517-21	2	Plug, Dot Button (7/8") - Air Scroll



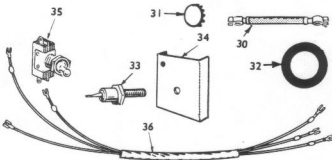
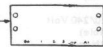
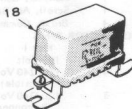
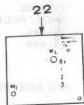
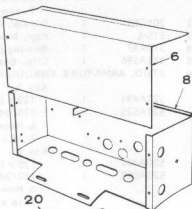
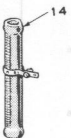
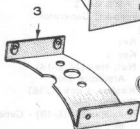
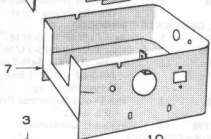
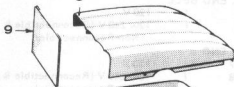
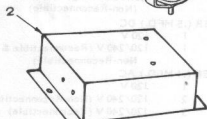
GENERATOR GROUP



REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION	REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	*	1	Armature Assy. (Includes Bearing & Blower)	15	COLLECTOR RING (AC)		
2	205C53	1	Blower, Generator	204A9	1	120 V	
3	515-6	1	Key, Blower to Crankshaft	204A10	1	120/240 V (Non-Reconnectible)	
4	510A47	1	Bearing (Ball) - Armature	204A92	1	120/240 V (Reconnectible)	
5	232A596	1	Clip, Bearing Stop	16	SPRING, BRUSH		
6	STUD, ARMATURE THROUGH		Key 1	212B1105	4	Commutator	
	520A491	1	120 V (7/16 x 14-1/2")	212B1105	4	Collector Ring, 120 V or 120/240 V (Reconnectible)	
	520A525	1	120/240 V (Reconnectible & Non-Reconnectible) 7/16 x 15-7/8"	212B1105	3	Collector Ring, 120/240 V (Non-Reconnectible)	
	520A407	1	120 V (7/16 x 17-3/4")	17	CONDENSER (.5 MFD.) DC		
	520A595	1	120/240 V (Reconnectible & Non-Reconnectible) 7/16 x 19-1/2"	312A17	1	120 V	
7	FRAME ONLY, GENERATOR (Machined & Drilled, Less Coils & Pole Shoes)		Key 2	312A27	1	120/240 V (Reconnectible & Non-Reconnectible)	
	210D244	1	Key 1	18	CONDENSER (.1 MFD.) AC		
	210B238	1	Key 2	312A58	1	120 V	
8	SHOE, POLE, FIELD		Key 1, (4-1/2")	312A58	2	120/240 V (Non-Reconnectible)	
	221A91	4	Key 2, (7-1/2")	312A58	3	120/240 V (Reconnectible)	
	221A90	4	Key 2, (7-1/2")	19	211C99	1	Cover, End Bell
9	*	1	Coil Assembly, Field (Set of 4 Coils)	20	BAND, END BELL		
10	RIG ASSEMBLY, BRUSH		Key 1	234C2	1	120 V	
	212C294	1	120 V	234C5	1	120/240 V (Reconnectible & Non-Reconnectible)	
	212C295	1	120/240 V (Non-Reconnectible)	21	BELL, END		
	212C298	1	120/240 V (Reconnectible)	211D97	1	120 V	
	212C293	1	120 V	211D98	1	120/240 V (Reconnectible & Non-Reconnectible)	
	212C295	1	120/240 V (Non-Reconnectible)	22	STUD, GENERATOR THROUGH		
	212C298	1	120/240 V (Reconnectible)	520A502	2	Key 1 (5/16 x 12-3/16")	
11	231B1006	1	Adapter, Generator to Engine	520A498	2	Key 2 (5/16 x 15-1/16")	
12	232B1256	1	Scroll, Air Baffle	23	815-48	2	Screw, Rd. Hd. Self Tapping (#10-32 x 3/8") End Bell Cover Mounting
13	214A61	4	Brush, Commutator	24	516-103	2	Pin (Roll) Generator Frame - 1/8 x 1/2"
14	BRUSH, COLLECTOR RING		Key 1	25	232D1798	1	Support, Generator
	214A50	4	120 Volt	26	COMMUTATOR (DC)		
	214A56	4	120/240 Volt (Reconnectible)	203A9	1	Key 1	
	214A56	3	120/240 Volt (Non-Reconnectible)	203A127	1	Key 2	
	214A56	4	120 Volt or 120/240 Volt (Reconnectible)	27	862-4	1	Nut, Hex (7/16-14) - Armature Stud
	214A56	3	120/240 Volt (Non-Reconnectible)	28	850-55	1	Washer, Lock (7/16)
	214A56	4	120 Volt or 120/240 Volt (Reconnectible)	29	526-32	1	Washer, Flat
	214A56	3	120/240 Volt (Non-Reconnectible)	30	862-15	2	Nut, Hex (5/16-18) - Generator thru Stud
				31	850-45	2	Washer, Lock (5/16)
				32	212A1214	4	Clamp, Brush Rig

* Order by Description, giving complete Model, Spec and Serial Number.

CONTROL GROUP



REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	307B642	1	Relay, Choke - Prior to Spec N
2	301B2722	1	Relay & Terminal Block - Prior to Spec N
	BRACKET, CONTROL MOUNTING		
3	301B1198	1	Prior to Spec N
4	301B3227	1	Begin Spec N
	COVER, CONTROL BOX		
5	301C1244	1	Prior to Spec N
6	301B3102	1	Begin Spec N
	BOX, CONTROL		
7	301B2723	1	Prior to Spec N
8	301D3228	1	Begin Spec N
9	301B1271	1	Plate, Control Box End - Prior to Spec N
10	308P154	1	Switch, Start-Stop
11	302A58	1	Ammeter, Charge - Prior to Spec N
12	307B253	1	Relay, Stop
13	RESISTOR, FIXED		
	304A251	1	30-Ohm, 5 Watt
	304A344	1	1-Ohm, 24 Watt (3/4 x 2")
	304A60	1	1.72-Ohm, 25 Watt (9/16 x 2") - (Ignition)
14	304A175	1	Resistor, Adjustable (1-Ohm) - (3/4 x 4")
15	CONDENSER (0.1 Mfd.), LOAD TERMINAL SUPPRESSION - PRIOR TO SPEC N		
	312A58	1	120 V
	312A58	2	120/240 V (Non-Reconnectible)
	312A58	3	120/240 V (Reconnectible)
16	312A57	1	Condenser (1 Mfd.) Start Solenoid Suppression
17	REGULATOR, VOLTAGE (CHARGE CIRCUIT)		
	305A1	1	Prior to Spec N
	305B383	1	Begin Spec N
18	307B180	1	Relay, Reverse Current - Prior to Spec N

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
19	332A537	1	Block, Terminal - Remote Control
20	SOLENOID, START		
	307B1046	1	Prior to Spec N
	307B845	1	Begin Spec N
21	332-142	As Req.	Terminal, Solderless STRIP, MARKER (LOAD TERMINAL) - PRIOR TO SPEC N
22	332A540	1	120 V
23	332A539	1	120/240 V (Non-Reconnectible)
24	332A435	1	120/240 V (Reconnectible)
25	STRIP, MARKER (REMOTE)		
	332A763	1	120/240 V (Reconnectible) - Prior to Spec N
	332A566	1	All - Begin Spec N
26	332A609	1	Block, Terminal (2 Place) - Prior to Spec N
27	332A231	1	Block, Terminal (Load) - 120/240 V (Non-Reconnectible) - Prior to Spec N
28	332A254	1	Block, Terminal (Load) - 120/240 V (Reconnectible) - Prior to Spec N
29	416A77	2	Cable, Battery (28")
30	416A4	1	Cable, Battery Jumper
31	517-19	1	Plug, Dot Button (1/2") - Prior to Spec N
32	508-1	3	Grommet, Rubber - Begin Spec N
33	305B235	1	Rectifier - Begin Spec N
34	305A254	1	Sink, Heat (Rectifier Mounting Bracket) - Begin Spec N
35	308P2	1	Switch, Toggle (Manual-Electric Start) - Begin Spec N
36	338B526	1	Harness, Wiring - Begin Spec N
37	332A439	2	Jumper, Load Terminal Block - 120/240 V (Reconnectible) - Prior to Spec N

SERVICE KITS AND MISCELLANEOUS

PART NO.	QTY. USED	PART DESCRIPTION
98C1100	1	Decal Kit
160KB36	1	Ignition Tune-Up Kit
168K103	1	Gasket Kit, Plant (Replaces #168K67)
168K95	1	Gasket Kit, Carbon Removal
412C28	1	Cover, Canvas
522K164	1	Overhaul Kit, Engine
525P90	1	Paint, Touch-Up (Pressurized Can) 12 oz., Mouse Grey Enamel
525P137	1	Paint, Touch-Up (Pressurized Can) 16 oz., Green Enamel

NOTE: For other kits, refer to the Group for the Part in question.

CUSTOMER SERVICES

OWNER'S WARRANTY SERVICE -
ENGINE DRIVEN ELECTRIC GENERATOR SETS,
SEPARATE GENERATORS, INDUSTRIAL ENGINES

QUALITY OF PRODUCT

Onan products are engineered and designed to perform as stated on product nameplate and published specification. Only quality material and workmanship are used in the manufacture of this product. With proper installation, regular maintenance and periodic repair service, the equipment will provide many enjoyable hours of service.

GENERAL WARRANTY PRACTICES

All Onan-manufactured engine-driven electric generator sets, separate generators, and industrial engines are sold with a full one-year warranty. This warranty is issued only to the original user and promises that these products are free from defects in material or factory workmanship when properly installed, serviced, and operated under normal conditions, according to the manufacturer's instructions. The text of the Onan published warranty appears in the Onan Operator's Manual sent with the product.

Warranty Registration: A Warranty Registration card accompanies each Onan Product. This card must be properly filled out and returned to the Onan Factory in order to qualify for warranty consideration as covered in this bulletin. When requesting warranty repair work you must provide the purchase date, Onan model and serial number of the equipment.

Warranty Authorization: Warranty service must be performed by Onan Factory or Onan Authorized Parts and Service Centers or their Approved Service Dealer. A complete listing of Onan Authorized Parts and Service Centers is provided in our brochure F-115, a copy of which is shipped with each Onan Product. The company names which appear in bold face, capital letters, are the Onan Authorized Service Centers responsible for handling parts, service and warranty adjustments of Onan Products. These organizations have Onan factory-trained service personnel, parts stock, and the necessary facilities and tools for the service and repair of Onan equipment. The company names which appear in bold face, small letters, are Approved Service Dealers under the Onan Authorized Parts and Service Center. They have Onan factory-trained personnel and also handle parts, service and warranty.

Material Allowances: Onan will allow credit or furnish free of charge to the Onan Authorized Service Station or his Approved Service Dealer, all genuine Onan parts used in a warranty repair of these products which fail because of defective material or workmanship.

Labor Allowance: Onan will allow warranty repair credit to the Onan Authorized Parts and Service Center and his Approved Dealer at straight time labor when the cause of failure is determined to be defective material or factory workmanship. This labor allowance will be based on the factory's standard time schedule of published flat rate labor allowances, or, otherwise a time judged reasonable by the factory. Repair work other than warranty will be charged to the owner. The Onan Division's Warranty practice does not provide for allowance of expenses such as start-up charges, communication charges, transportation charges, travel time and/or mileage, unit removal or installation expense, cost of fuel, oil, normal maintenance adjustments, tune-up adjustments or parts maintenance items.

Administration: Warranty of Onan Products is administered through Onan Authorized Parts and Service Centers in whose territory the equipment is located. These Service Centers and their approved Onan Service Dealers are authorized to make settlement of all customer warranty claims within the limits of the manufacturer's warranty policy as described herein.

Onan reserves the right to change warranty practices without prior notice.

MAINTENANCE

A Planned Preventive Maintenance Program is extremely important if you are to receive efficient operation and long service life from your Onan unit. Neglecting routine maintenance can result in premature failure or permanent damage to your equipment. The Onan Operator's Manual sent with the product contains recommended maintenance schedules and procedures.

Maintenance is divided into two categories:

1. Operator Maintenance performed by the operator.
2. Critical Maintenance performed only by qualified service personnel.

Regular maintenance will help you avoid sudden and costly repairs in the future. Adequate evidence of this scheduled maintenance must be offered when applying for a warranty claim.

INSTALLATION

Installation is extremely important and all Onan Products should be installed in accordance with the manufacturer's recommendations. If the owner experiences any difficulty with such items as mounting, ventilation, exhaust location, fuel lines, wiring, etc., he should immediately contact the company from whom he purchased the equipment so that corrective action can be taken. Although the Onan Authorized Service Center or his Approved Service Dealer may be able to remedy certain installation difficulties, such repair work is not considered Onan warranty and there will be a charge for this service.

Onan
Minneapolis, Minnesota 55432

MSS-22

Replaces 23B054

Rev. 12-1-69