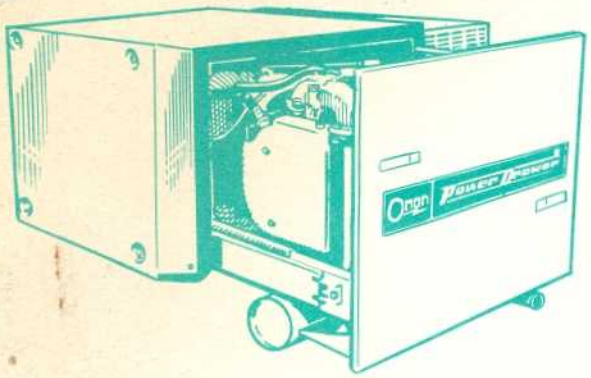


OPERATORS MANUAL AND PARTS CATALOG

Onan®

4000 WATT CAPACITY

POWER DRAWER

RV ELECTRIC POWER PLANT

•

BF Series

•

965-0315

Printed in U.S.A.

6A73

TO THE OWNER

Welcome to the growing family of *Onan Power*....We are proud to have you as a customer.

Read this manual carefully and observe all safety rules within. Operating instructions, adjustments and periodic maintenance procedures are given so that you....the owner, can keep your unit running like new and expect many years of dependable service from it. Remember....any machine, regardless of design or type, will perform only in relation to the services it receives.

If your plant needs special attention, ask your Onan dealer for assistance; the Onan Parts and Service Organization has been factory-trained to provide up-to-date know-how for keeping your power plant "on the road".

TABLE OF CONTENTS

GENERAL INFORMATION

YOUR MANUAL

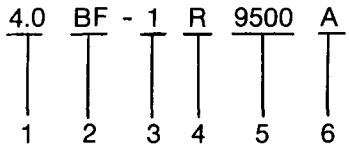
This manual contains instructions to properly install, operate and maintain your "Power Drawer" electric generating plant. When ordering parts or requesting information always supply the complete MODEL and SPECIFICATION as shown on the Onan nameplate (See "MODEL DESIGNATION" following). This information is necessary to identify your plant among the many models manufactured by Onan.

CAUTION **Onan uses this symbol throughout the text to warn of possible equipment damage.**

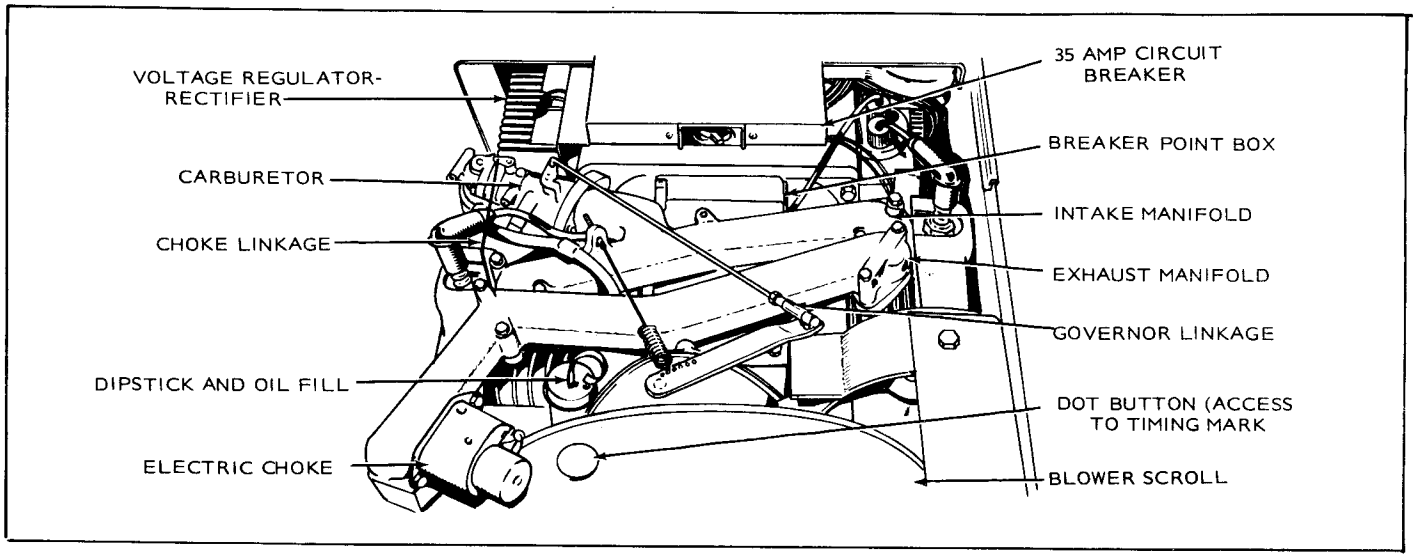
WARNING **This symbol is used to warn of any possible personal injury.**

MODEL DESIGNATION

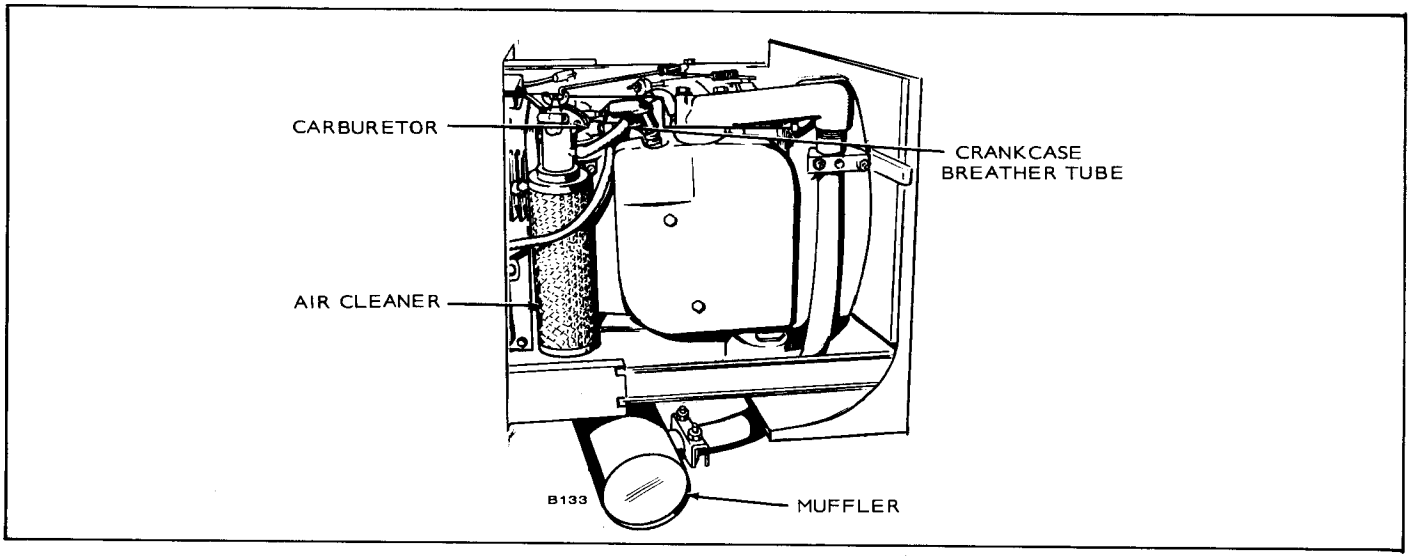
The following typical model number is broken down into code segments used by Onan.



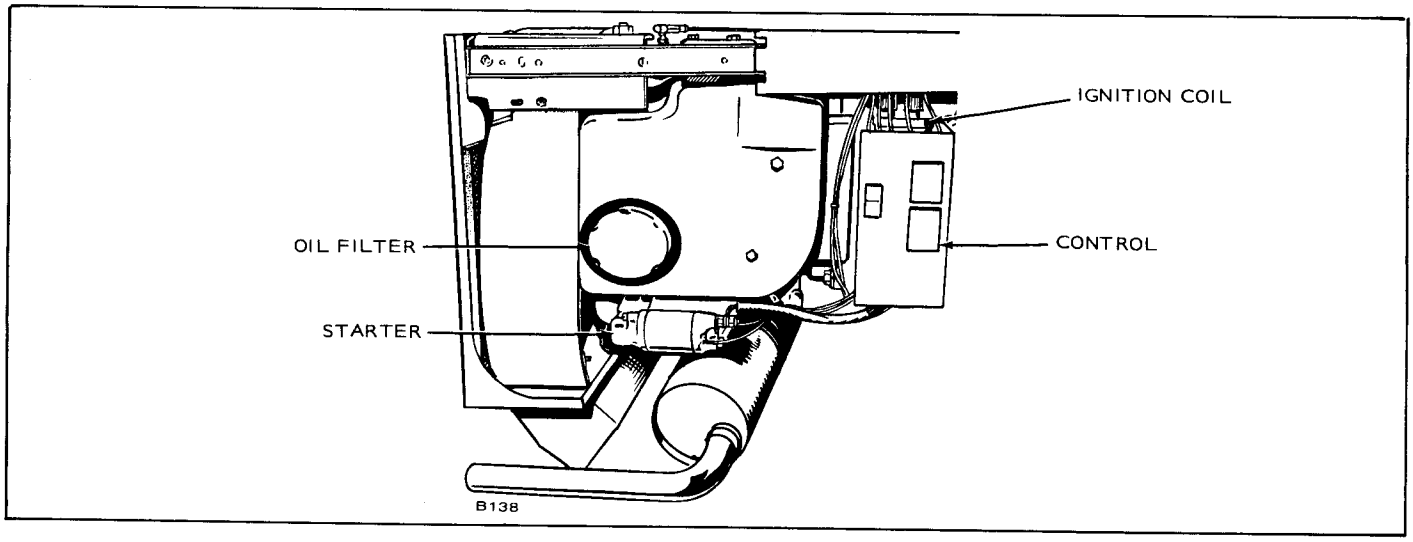
1. Indicates kilowatt rating.
2. Series identification.
3. Voltage code of the generator, 1 = 120 volts.
4. Method of starting: R - remote electric starting.
5. Factory code for designating optional equipment, if any.
6. Specification letter which advances when the factory makes production modifications.



TOP VIEW



LEFT SIDE



RIGHT SIDE

SPECIFICATIONS

ENGINE

Manufacturer	Onan
Design	Four Cycle, Air Cooled, L Head
Fuel	Gasoline
Fuel Pump	12V, Electric
Cylinders	Two
Bore	3-1/8 Inch
Stroke	2-5/8 Inch
Oil Capacity	3 Quarts
(With Filter Change)	3-1/2 Quarts
Battery Voltage	12 Volt Battery Size (Above 0°F Operation)45 Amp/hr Min.
Battery Charging System	10 Ampere, Flywheel Alternator
Starting System	Solenoid Shift

GENERATOR

Manufacturer	Onan
Design	Revolving Armature, Four Pole, 1800rpm
60 Hertz Recreational Vehicle Rating	4000 Watts (4KW)
Voltage	120 Volts
Current Rating	33 Amperes
Phase	Single
Wire	Two

PROTECTION

Generator	35 or 40 Ampere Circuit Breaker
Control (Remote Wiring)	5 Ampere Fuse

TUNE-UP SPECIFICATIONS

Spark Plug Gap	.020 Inch
Breaker Point Gap (Cold Setting)	.025 Inch
Ignition Timing Reference (Cold, Static)	** 26° BTC
Tappet Adjustment (Engine Cold)	
Intake	.003 Inch
Exhaust	.010 Inch

** Ignition Timing is permanently set at 26°BTC. If breaker points are set properly (.025" Cold), no additional timing is necessary.

INSTALLATION

For the most efficient operation and ease of servicing, this power plant must be installed properly. Since all factors (electrical, fuel, etc.) must be considered before actual installation, read this entire section before installing.

COMPARTMENT LOCATION

The surrounding area of the installation must have provisions for a supporting frame if there isn't a floor or base already existing. Before deciding on the exact location for the compartment, keep in mind the area required for fuel and electrical connections at the rear of compartment.

1. Choose area with the best possible mounting supports.
2. Installation area must be separated from living quarters by vapor-tight walls.

MOUNTING

Mounting hole dimensions are shown in outline drawing (shipped loose with unit). Use 3/8-16 UNC-2B cap screws with grounding (star) washers for securing plant housing to recreational vehicle. If split locking washers or other locking methods are used, electrically bond the unit to chassis with an 8 gauge wire jumper.

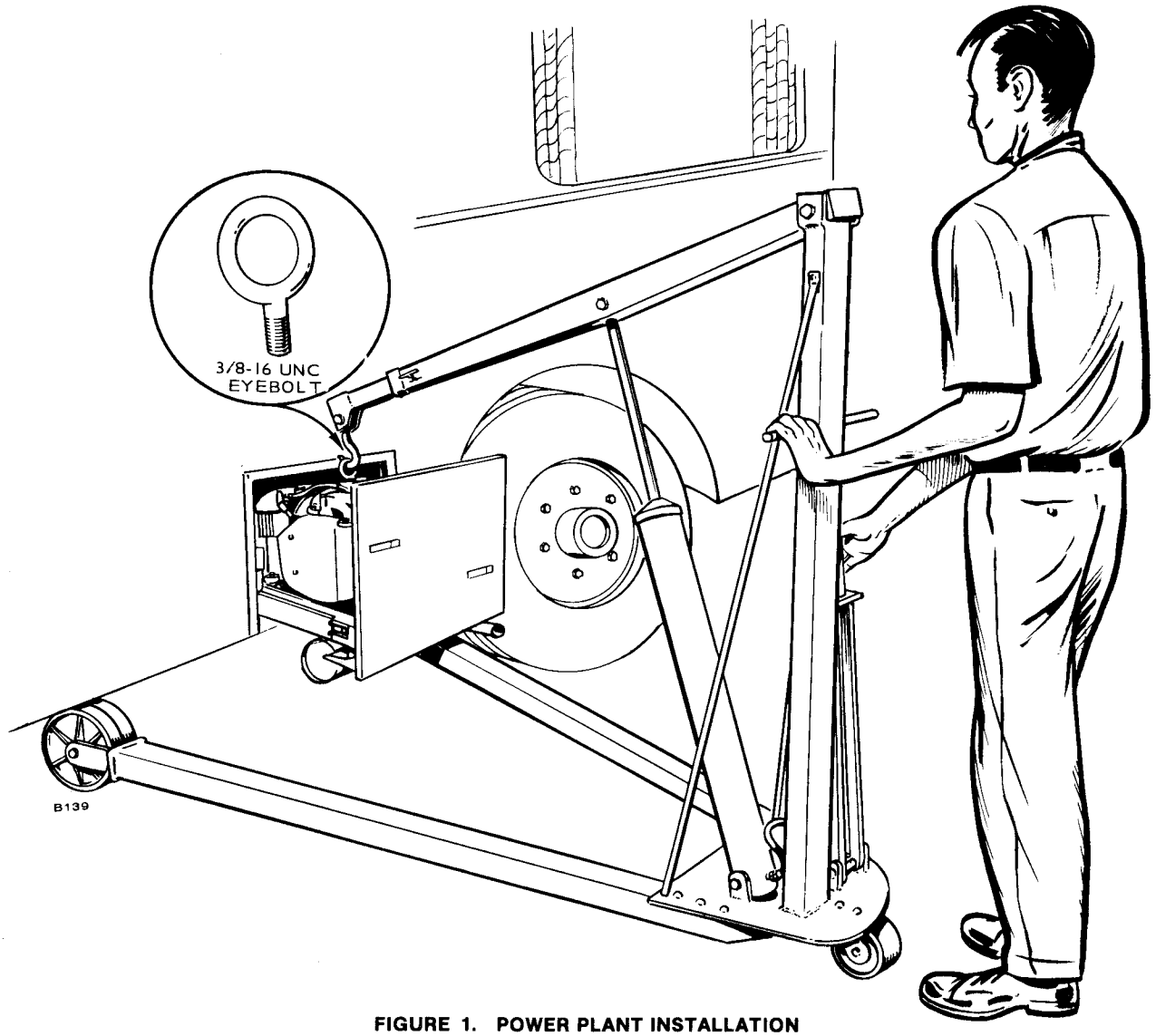


FIGURE 1. POWER PLANT INSTALLATION

1. Electric plant and battery should be mounted to withstand vibration and shock, for over-the-road conditions.
2. Channel, box or angle iron can be used for the supporting frame.
3. Plant must be properly grounded to vehicle frame.

CAUTION **Don't use a sheet metal base or thin plate without a supporting frame.**

A 3/8-16 threaded hole in intake manifold provides for a lifting eye. Use this as a lifting point when installing in vehicle. Pull unit out just far enough to use lifting eye before hoisting (Figure 1).

WARNING **Personal injury may result if unit is opened all the way without being secured.**

BATTERY

Connect the battery positive cable to (+) lug and battery negative cable to (-) lug. Battery connection lugs are located on rear of housing as shown in Figure 2. Use sufficiently sized battery cables according to the length of their run as shown in Table below.

If operating the recreational vehicle in ambient temperatures above 0° F and battery is kept charged by frequent running of the electric power plant, a single, 12 volt battery of 45 amp/hr capacity minimum is sufficient.

FUEL LINE

The rear of the compartment (Figure 2) provides a 1/8 NPTF fuel connection.

1. Use annealed copper or seamless steel tubing and flared connections.
2. Keep fuel lines away from exhaust areas.
3. Use nonferrous metal straps without sharp edges to secure fuel lines.

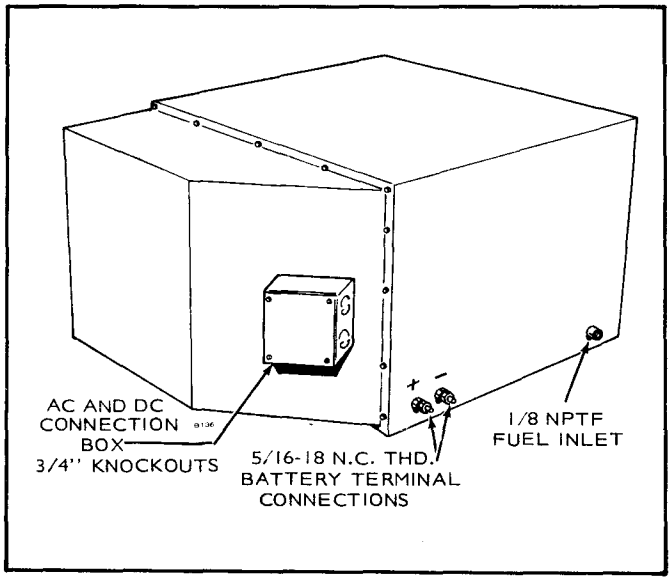


FIGURE 2. EXTERNAL CONNECTIONS

RECOMMENDED BATTERY CABLES

CABLE LENGTH IN FEET	CABLE SIZE
0-08	2
8-10	1
10-12	0
12-16	00
16-20	000
20-24	0000

Fuel line from rear of compartment to power plant is flexible to allow movement when plant is pulled out on its rails. Check lines and fittings periodically to ensure against fuel leaks.

SHARING FUEL TANK SUPPLY

If the electric power plant has to be connected to the vehicle supply tank, do not tee off the vehicle supply line unless absolutely necessary. Teed lines often result with the more powerful vehicle fuel pump starving the electric plant when both are running. If the electric plant gets its fuel from the vehicle tank, it is usually done either of two ways:

1. Installing a new outlet in the fuel tank. If the fuel tank has an unused outlet, use it. See Figure 3.
2. Installing a special fitting at the tank outlet so two dip tubes can be fitted in the tank (Figure 4).
3. Make generator pickup tube shorter to prevent generator from using up all the gasoline when vehicle is stationary, thereby preventing the starting of vehicle engine.

WARNING **Attempting to weld on a fuel tank, empty or not, is dangerous!**

USING VEHICLE TANK AND SHARING FUEL LINE

If a tee in the main vehicle fuel line is the only solution, locate it as near as possible to the fuel tanks. Some manufacturers use this system exclusively but they design the complete fuel system around the combined fuel draw requirements of both electric plant and vehicle engines.

Operating the electric plant from a tee in the main fuel line can cause erratic operation. The plant's fuel pump has neither the capacity nor the power to overcome the draw of vehicle engine fuel pump.

To determine if the plant will starve for fuel, test the unit after installation, first with the plant and vehicle engines running under load, then with the plant running alone. If the plant starves with the vehicle engine running under heavy load and high temperatures, the difficulty can sometimes be corrected by installing larger fuel lines between the tank and tee.

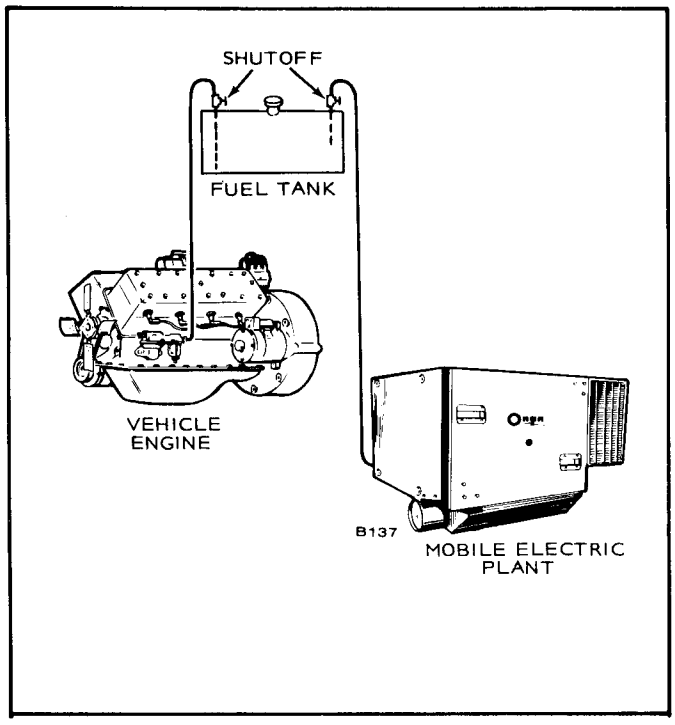


FIGURE 3. SINGLE TANK FUEL SYSTEM

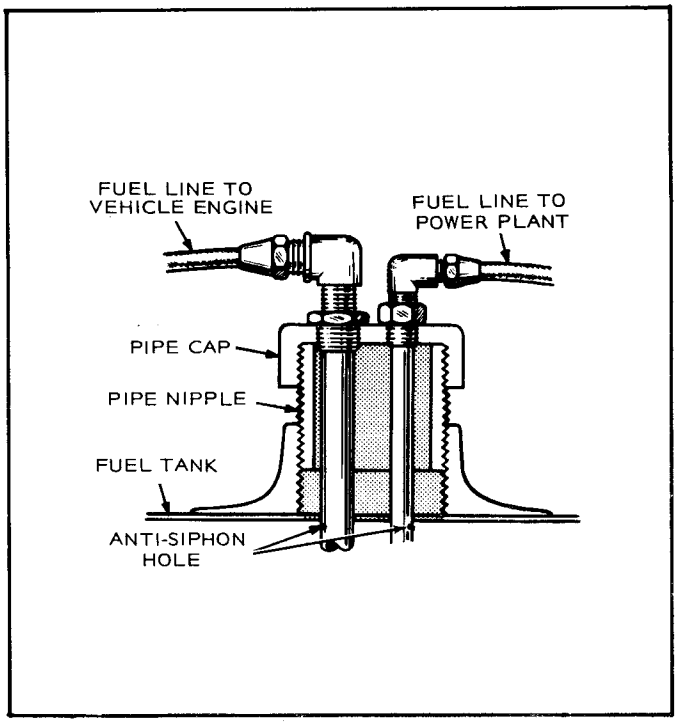


FIGURE 4. INSTALLATION OF SECOND DIP TUBE IN TANK OUTLET

FUEL FILTERS

Some Onan electric plants with electric fuel pumps have phenolic filters in the base of the pump. Additional filters in the fuel line are unnecessary unless unusual operating conditions exist.

LOAD CONNECTIONS

1. Plant load wires L1 and L2 terminate within the junction box. L1 is the "hot" wire and L2 is grounded. Connect and join wires within this junction box in an approved manner.
2. Wires must be adequate size, properly insulated and supported.
3. Mount switches and controls securely to prevent damage from vibration and road shocks. All switches must be vibration proof to prevent accidental opening or closing while the vehicle is in motion.
4. All wiring must meet applicable local electrical codes. Have a qualified electrician install and inspect the wiring.

Onan recommends using multistrand wire, enclosed in flexible metal conduit ("Greenfield"), as feeder conductors, from electric plant to vehicle distribution box. Many installers use multistrand wire throughout the vehicle to reduce danger of breakage from vibration. Check your local codes.

GENERATOR PROTECTION

A 35 or 40 amp circuit breaker is installed on top of unit to protect generator from overloading and to protect feeder conductors between electric plant and vehicle distribution box.

EXHAUST

Observe the following when connecting exhaust system to muffler.

1. Use automotive type connections and clamps.
2. Terminate exhaust outlet at perimeter of vehicle so DEADLY exhaust fumes will not enter vehicle.

CAUTION **Don't connect plant exhaust to vehicle exhaust system.**

REMOTE CONTROLS

Onan has two optional remote control stations designed specifically for the "Power Drawer" electric power plant. One includes a start-stop switch and indicator light (Figures 5 and 6). The other one includes a start-stop switch with indicator light, a running time meter, and a battery condition meter (Figures 7 and 8).

Installing Onan Remote Switch

1. Cut hole in motor home panel (Figure 5) to accommodate remote switch.
2. Open the electric plant compartment and thread leads (#18 wire or larger) from the compartment (cut small hole if needed) into the inside of motor home; run lead ends from inside through hole cut in panel.

WARNING **To prevent noxious gases from entering the interior of the motor home, seal any openings made in the plant compartment for the lead wires.**

3. Connect leads from printed circuit board terminals to remote control terminals as shown in Figure 6.

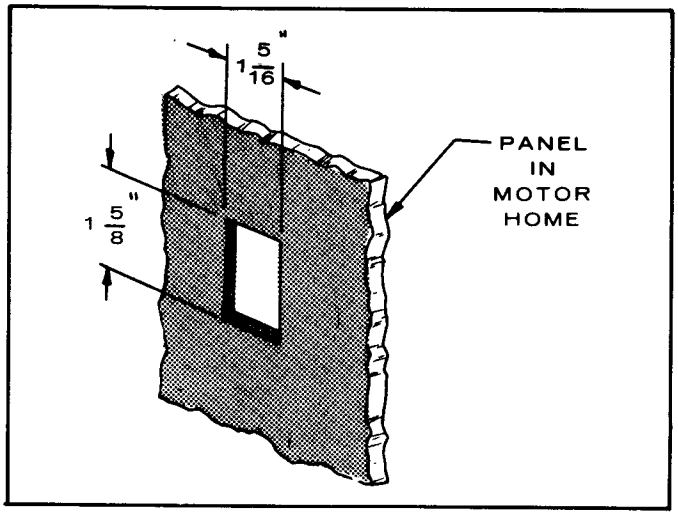
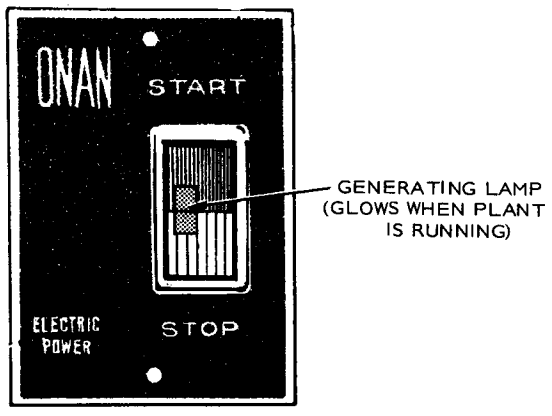
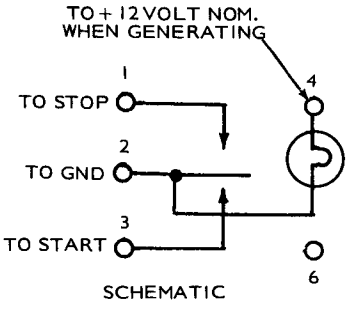


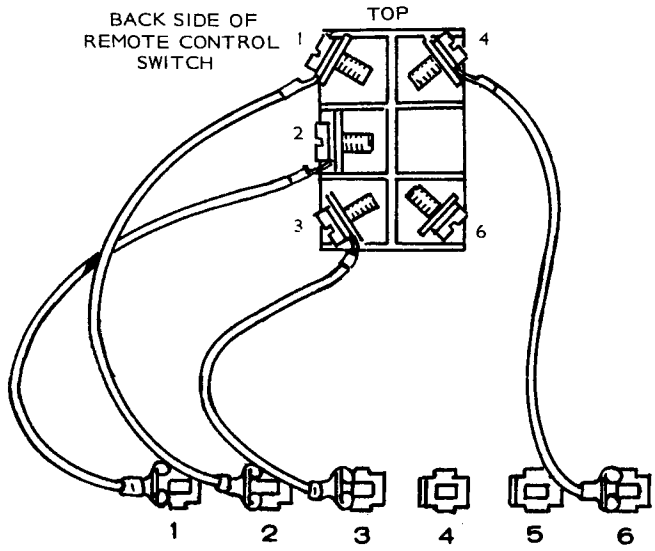
FIGURE 5. MOTOR HOME CUTOUT

NOTE: Terminal numbers are stamped on the back of remote control panel. Figure 6 schematic shows actual layout of terminals looking at the rear of remote control switch.

4. Insert remote control into cutout and secure with #5 wood screws included with switch.







PRINTED CIRCUIT BOARD TERMINAL	SWITCH TERMINAL	FUNCTION
1	2	Ground
2	1	Stop
3	3	Start
6	4	Generating Lamp

FIGURE 6. REMOTE CONTROL SWITCH (300-0985)

Installing Deluxe Remote Control Assembly

1. To measure wall cutout for the remote control switch, see Figure 7.
2. Open the electric plant compartment. Connect #18 wire or larger to the printed circuit board on the generator as shown in Figure 8. Thread these leads through the plant compartment to the inside of the motor home. (If necessary, cut a small hole in the compartment for these leads.) Run the lead ends from inside the motor home through the wall cutout.
3. Connect the leads to the remote control terminals as illustrated in Figure 8.

NOTE: Terminal numbers are stamped on the back of the remote control panel.

4. Insert the remote control switch into the wall cutout and secure with #5 wood screws (shipped with the Assembly).

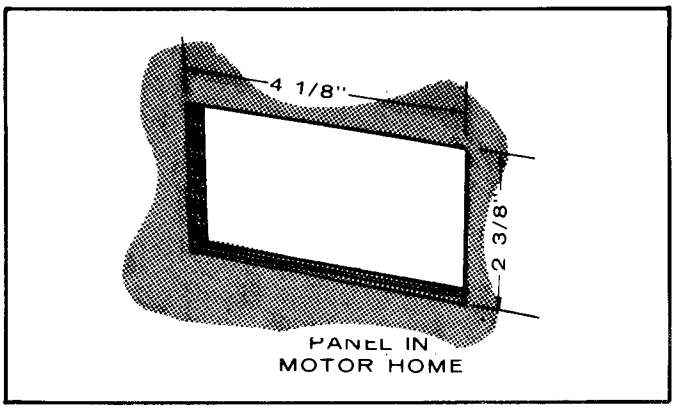
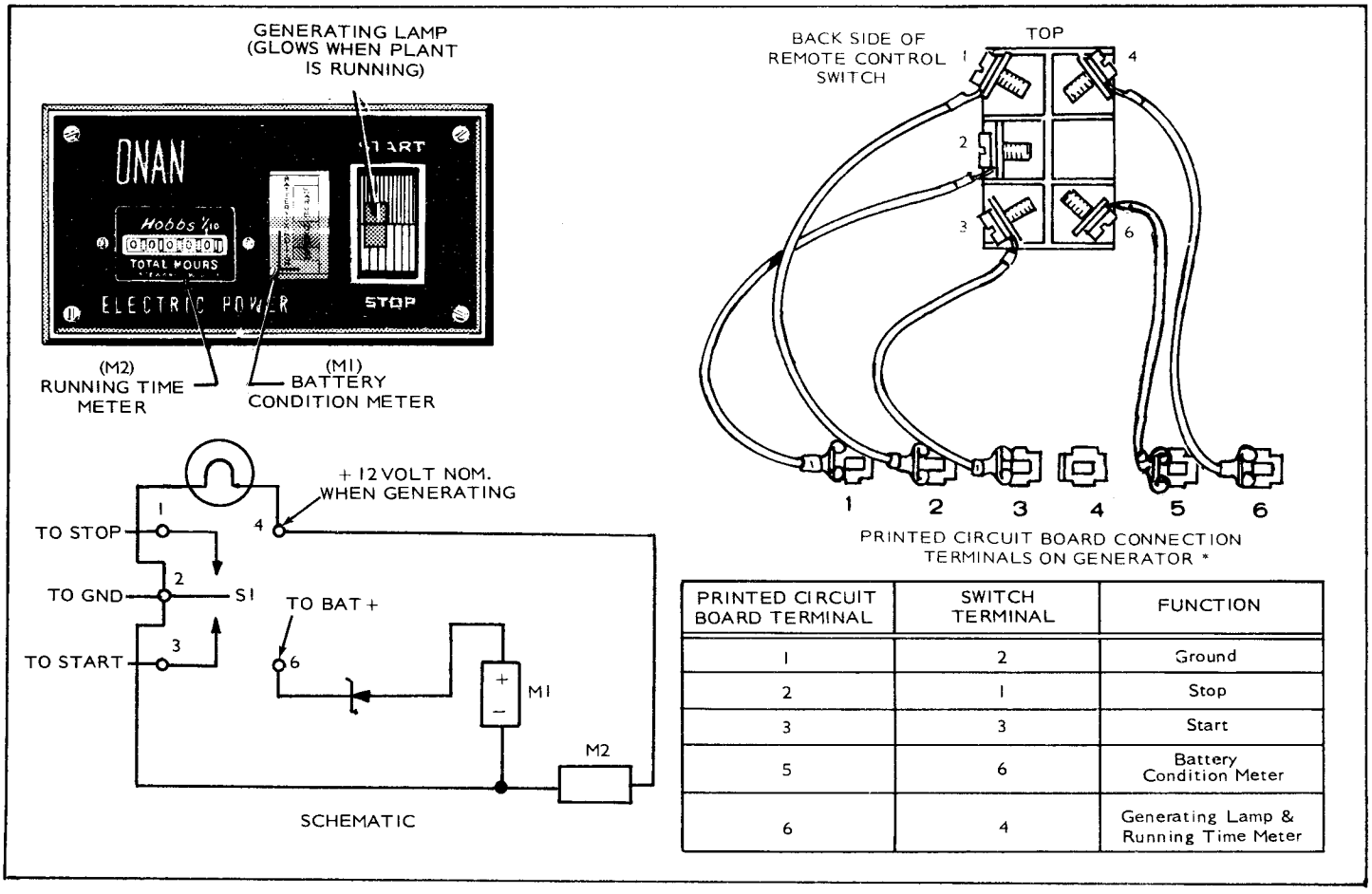


FIGURE 7. MOTOR HOME CUTOUT

WARNING **To prevent noxious gases from entering the interior of the motor home, seal any openings made in the plant compartment for the lead wires.**



PRINTED CIRCUIT BOARD TERMINAL	SWITCH TERMINAL	FUNCTION
1	2	Ground
2	1	Stop
3	3	Start
5	6	Battery Condition Meter
6	4	Generating Lamp & Running Time Meter

FIGURE 8. DELUXE REMOTE CONTROL (300-0986)

The following can be used if individual owners intend to install their own switches-indicators. Do not exceed any load ratings.

Remote Start-Stop Switch: A remote start-stop switch can be connected to terminals 1 and 3 for start and terminals 1 and 2 for stop. This requires a single pole, double throw (SPDT) momentary closed switch rated at 5 amperes, such as Onan No. 308-0341 switch. Use no. 18 wire or larger with this switch (up to 100 feet).

Remote Voltmeter: A voltmeter can be connected to terminals 1 (-) and 5 (+). Terminal 5 is battery positive. This voltmeter will read the battery voltage.

Running Time Meter: A 0-40 volt DC running time meter, such as Onan no. 302-0885, can be connected to terminals 1 (-) and 6 (+) to indicate the total running time of the power plant. These terminals are rated 12 volts and a maximum load of 1 ampere.

Remote Low Oil Pressure Lamp: A remote low oil pressure lamp can be connected to terminals 5 and 4. This lamp, lighted by a low oil pressure condition, remains lighted until the stop button is pushed or the battery supply is disconnected. Check oil level and refill to proper level. Maximum allowable lamp current is 0.5 ampere.

FUSE PROTECTION

A 5 amp fuse, installed on control board, protects the board from shorts in the remote wiring. If fuse is blown it can be replaced (after correcting trouble) by removing cover on control and replacing with an identical 5 ampere fuse.

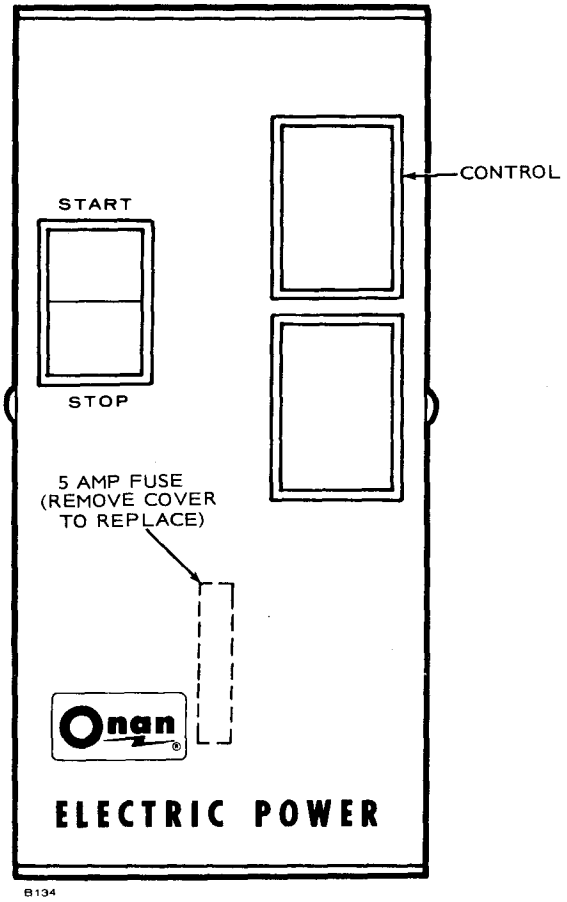
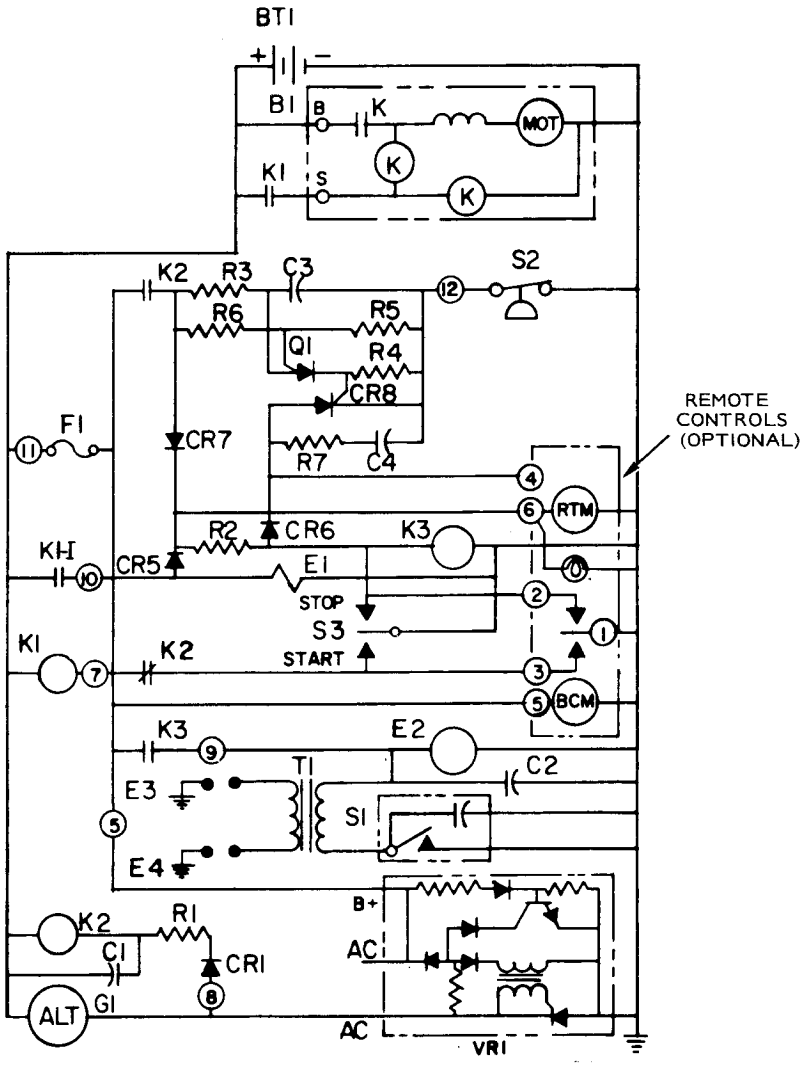


FIGURE 9. FUSE LOCATION

SCHEMATIC



BTI . . . Battery
BI . . . . Starter
EI . . . . Electric Choke
E2. . . . Fuel Pump
E3, E4 . Spark Plugs
FI . . . . 5 amp. Fuse
GI . . . . Alternator
KI . . . . Start Solenoid
SI . . . . Breaker Box
S2 . . . . Low Oil Pressure Switch
S3 . . . . Start-Stop Switch
TI . . . . Ignition Coil
VRI . . . Voltage Regulator
RTM . . Running Time Meter (Opt.)
BCM . . Battery Condition Meter (Opt.)

FIGURE 10. TYPICAL CONTROL SYSTEM SCHEMATIC

CONTROL SYSTEM TROUBLESHOOTING GUIDE

NOTE: *Use the schematic wiring diagram (shown on left) to help trace problems.*

CONTROL SYSTEM TROUBLESHOOTING GUIDE

CONDITION / PROBABLE CAUSE	Cranks Slowly	Cranks - No Start	Fails to Crank	Runs 3-4 Seconds	Runs and Surges	Fails to Run	Does Not Stop	Stops	No Stop in Low Oil	Low Charging
Bad Battery Connection	●		●							
Low Battery - BTI	●		●							
Faulty Starter - BI	●		●							
Faulty Start Solenoid - KI		●	●							
Faulty Alternator - GI					●		●			●
Faulty Ign. - TI Coil, SI Points		●					●			
Faulty Fuel Pump - E2		●			●		●			
Faulty LOP Switch - S2				●			●	●		
Faulty Choke - EI		●				●				
Grounded LOP Circuit				●						
Low or No Fuel		●			●	●	●			
Low Oil Level				●			●			
Faulty Regulator - VRI										●
Printed Circuit Board Faults										
Fuse Out - FI		●				●		●		
Faulty Disconnect Circuit		●				●				
Faulty Stop Switch - S3							●			
Faulty Contacts - K2		●	●			●				
Faulty Relay - K3		●								
Faulty LOP Circuit				●					●	

OPERATION

BEFORE STARTING

Safety Latch: After pressing left and right latches, unit will pull out on its slide rails about 3-4 inches. A safety latch (located on right side near the top), just inside of front panel, must be pressed to allow unit to slide all the way out. This safety latch also prevents unit from accidental opening when driving.

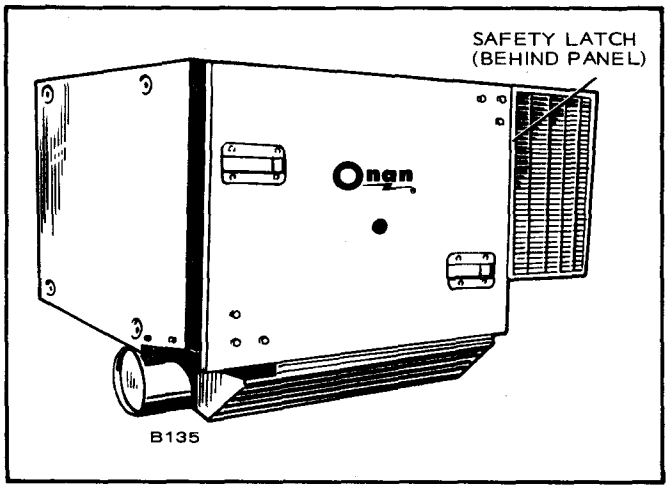


FIGURE 11. POWER PLANT ACCESS

Crankcase Oil: Be sure the crankcase has been filled with oil to the "FULL" mark on the oil level indicator. Use a good quality oil with the API (American Petroleum Institute) designation SE or SE/CC.

TEMPERATURE	RECOMMENDED OIL
Above 30° F	SAE 30 or 10W40
0° F to 30° F	SAE 5W30 or 10W40
Below 0° F	SAE 5W30

Fill engine with oil through dipstick tube.

Recommended Fuel: Use clean, fresh, no-lead or low-lead gasoline. Regular grade gasoline may also be used, but DO NOT use highly leaded premium types of fuel.

For new engines, the most satisfactory results are obtained by using nonleaded gasoline. For older engines that have previously used leaded gasoline, heads must be taken off and all lead deposits removed from engine before switching to nonleaded gasoline.

CAUTION **If lead deposits are not removed from engine before switching from leaded to nonleaded gasoline, preignition could occur causing severe damage to the engine.**

STARTING AND STOPPING

Push start switch to crank the engine. Release the switch after the engine starts. Allow the plant to warm up before applying a load.

CAUTION **Do not operate starter for more than 30 seconds or serious damage may result.**

To stop, press the start-stop switch to the stop position. If the plant has been running with a full load connected, disconnect the load and allow it to run for a few minutes before pushing stop switch.

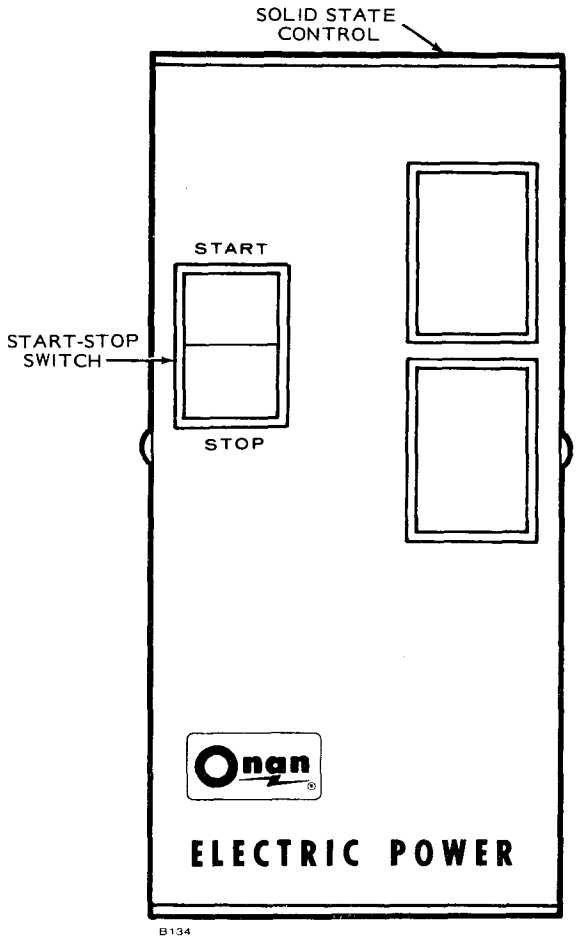


FIGURE 12. PLANT-MOUNTED START-STOP SWITCH

APPLYING LOAD (Break-In)

When applying the load to a new or reconditioned plant, it should be applied gradually in about four steps; each step of not less than 30 minutes running time. Start with 1/4 load, then 1/2, 3/4 and full load.

BATTERY CHARGING

The battery charge rate is controlled by a charge regulator. The regulator is set to allow the proper rate of charge at operating speed.

ELECTRICAL OUTPUT

The plant's output is taken from a 120 volt AC receptacle, through the wiring in the distribution box. The wiring provides for 120 volts, with the total load not to exceed 33 amperes.

CAUTION **Do not install any outlets between generator and distribution panel.**

PROTECTION

A circuit breaker, mounted on the plant, will disconnect the load if current exceeds maximum plant rating. If breaker trips, remove part of the load before resetting.

POWER REQUIREMENTS FOR APPLIANCES

APPLIANCE OR TOOL	APPROXIMATE RUNNING WATTAGE
Refrigerator	600-1000
Electric broom	200-500
Coffee percolator	550-700
Electric frying pan	1000-1350
Hair dryer	350-500
Electric stove (per element)	350-1000
Electric iron	500-1200
Radio	50-200
Electric water heater	1000-1500
Space heater	1000-1500
Electric blanket	50-200
Television	200-600
Electric drill	250-750
Battery Charger	Up to 800
Electric water pump	500-600
Air Conditioner	600-2000
Converter	300-350

HIGH TEMPERATURES

1. See that nothing obstructs air flow to and from the power plant.
2. Keep cooling fins clean. Air housings should be properly installed and undamaged.

LOW TEMPERATURES

1. Use correct SAE No. oil for temperature conditions. Change oil only when engine is warm.
2. Use fresh fuel. Protect against moisture condensation by keeping tank full.
3. Keep fuel system clean and batteries in a well charged condition.

WARNING **Do not use discharged air from blower scroll for compartment heating. Poisonous gas fumes may be present.**

DUST AND DIRT AT A HIGH LEVEL

1. Keep unit clean. Keep cooling system clean.
2. Service air cleaner as frequently as required, by road conditions.
3. Change crankcase oil and filter more often than recommended under normal operating conditions.
4. Keep governor and choke linkage clean.
5. Clean sand and dirt from slide rails with an air hose as necessary. *Never oil slide rails;* dust and dirt will build up faster.
6. Clean out bottom of housing and inlet duct as necessary.

OUT-OF-SERVICE PROTECTION

Protect a unit that will be out-of-service for more than 30 days as follows:

1. Run unit until thoroughly warm.
2. Turn off fuel supply and run until unit 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 one ounce (two tablespoons) of rust inhibitor (or SAE #50 oil) into each cylinder. Crank engine slowly (by hand) several times. Install spark plug.
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 entire unit. Coat rustable parts with a light film of grease or oil.
9. *Disconnect battery* and follow standard battery storage procedure.

ADJUSTMENTS

BREAKER POINTS (Cold Setting)

To maintain maximum efficiency from the unit, change the breaker points every 200 hours of operation. Proceed as follows when engine is cold:

1. Remove the two screws and the cover on the breaker box.
2. Remove the two spark plugs so engine can be easily rotated by hand. Check condition of spark plugs at this time.
3. Remove mounting nut (A) and pull the points out of the box just far enough so screw (B) can be removed and leads disconnected.
4. Remove screw (C) and replace condenser with a new one.
5. Replace points with a new set but do not completely tighten mounting nut (A).
6. Remove the dot button on blower housing. This provides an access to view timing mark.
7. Rotate the engine clockwise (facing flywheel) by hand until the 26° BTC mark on gear cover aligns with mark on flywheel. Turn another 1/4 turn (90°) to ensure points are fully open.
8. Using a screwdriver inserted in notch (D) on the right side of points, turn points until gap measures .025" with a flat thickness gauge. (Be sure feeler is clean.) Tighten mounting screw and recheck gap.

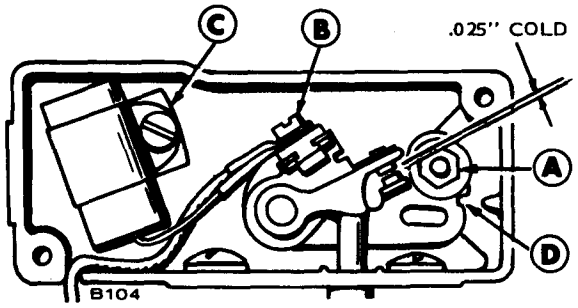


FIGURE 13. BREAKER POINT ADJUSTMENT

CARBURETOR

The carburetor has a main fuel (power) adjustment and an idle fuel adjustment. The main adjustment affects operation under heavy load conditions. Idle adjustment affects operation under light or no load conditions. Under normal circumstances, factory carburetor adjustments should not be disturbed. If the adjustments have been disturbed, turn needles off their seats, 1 to 1-1/2 turns to permit starting. Then, readjust them for smooth operation.

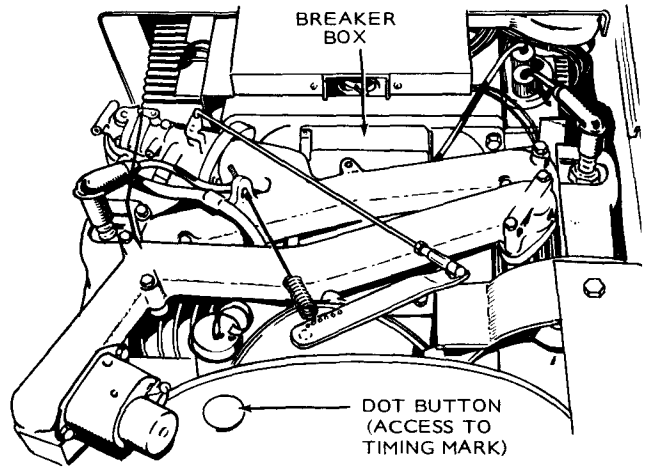


FIGURE 14. BREAKER BOX AND TIMING MARK LOCATION

CAUTION **Forcing the needle against its seat will damage it. The needle does not completely shut off fuel when turned fully in.**

Set the throttle stop screw (located on carburetor throttle lever) with no load connected to plant. Turn stop so it just touches adjustment screw; then turn adjustment screw (with stop still touching it) until unit is running at 1500 rpm. When stop is released, governor will then control no load speed at 1850 to 1890 rpm. Before final adjustment, allow the engine to warm up. Make the idle adjustment under no load. Open the main jet until the engine runs smooth under acceleration with no load. Slightly more fuel may be needed (open about 1/4 turn further) when sudden load is applied or if operating in very cold weather.

If the engine develops a "hunting" condition (alternate increase and decrease of engine speed), try correcting by opening the main adjusting needle a little more. Do not open more than 1/2 turn beyond the maximum power point.

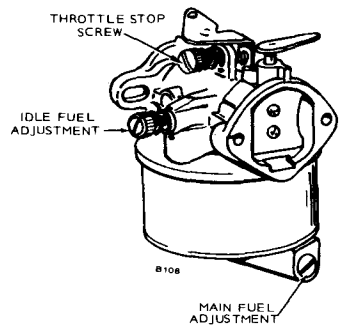


FIGURE 15. CARBURETOR ADJUSTMENTS

GOVERNOR ADJUSTMENTS (See Figure 16)

Before making governor adjustments, run the unit 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.

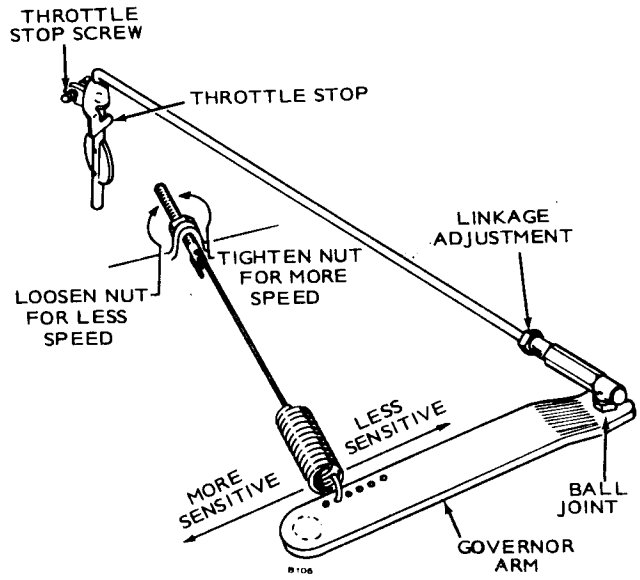
1. Adjust the carburetor idle needle with no load connected.
2. Adjust the carburetor main jet for the best fuel mixture while operating the set with a full rated load connected.
3. Adjust the length of the governor linkage and check linkage and throttle shaft for binding or excessive looseness.
4. Adjust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

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 unit operating at no load, adjust the tension of the governor spring. Refer to the Voltage Chart and the Speed Chart. 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 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 spring toward the governor shaft.



VOLTAGE CHART FOR CHECKING GOVERNOR REGULATION	120 VOLT 1 PHASE 2 WIRE
MAXIMUM NO-LOAD VOLTAGE	126
MINIMUM FULL-LOAD VOLTAGE	110

SPEED CHART FOR CHECKING GOVERNOR REGULATION	
MAXIMUM NO-LOAD SPEED (RPM)	1890
HERTZ (CURRENT FREQUENCY)	63
MINIMUM FULL-LOAD SPEED (RPM)	1770
HERTZ	59

FIGURE 16. GOVERNOR ADJUSTMENTS

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

To decrease sensitivity, shift the spring 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.

MAINTENANCE

Regularly scheduled maintenance is the key to lower operating costs and longer service life for the unit. The following schedule can be used as a guide. However, actual operating conditions under which a unit is run should be the determining factor in establishing a maintenance schedule. When operating in very dusty or dirty conditions, some of the service periods may have to be reduced. Check the condition of the crankcase oil, the filters, etc. frequently until the proper service time periods can be established.

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

PERIODIC MAINTENANCE SCHEDULE

SERVICE THESE ITEMS	AFTER EACH CYCLE OF INDICATED HOURS					
	8	50	100	200	400	1000
General Inspection	x1					
Check Oil Level	x					
Check Battery Electrolyte Level		x				
Change Crankcase Oil			x1			
Check Air Cleaner			x1			
Check Spark Plugs			x4			
Check Breaker Points			x3			
Clean Cooling Fins				x1		
Change Oil Filter				x1		
Replace Breaker Points				x2		
Clean Crankcase Breather				x2		
Replace Air Cleaner				x1		
Remove Carbon From Heads				x2		
Adjust Tappets					x2	
Fuel Filter - Clean					x3	
Check Generator Brushes		x5				x
Complete Reconditioning (If Required)						x2

x1 Perform more often in extremely dusty conditions.
x2 For detailed maintenance, contact your dealer.
x3 Replace if necessary.
x4 Replace at beginning of season.
x5 Check at this time if operating vehicle in extremely dusty conditions.

OIL LEVEL

Check the oil level daily or at least every eight hours of operating time. Check more often on a new unit as oil consumption is higher until piston rings seat properly.

OIL CHANGE

Initial oil change should be made after the first 25 hours of operation; change every 50 to 100 hours after that. If operating in extremely dusty or cold weather conditions, change oil more frequently.

The engine's oil capacity is 3 quarts, 3-1/2 if replacing oil filter. Do not mix brands nor grades of motor oil. Use a good quality oil with the designation SE/CC (former designation was MS, MS/DG. If necessary to add oil between changes, use the same brand and grade of oil already used.

The oil drain plug is located on the bottom side of engine oil base. Plant must be pulled out on its slide rails to gain access.

OIL FILTER

Change the crankcase oil filter at least every 200 hours; change more often in extremely dusty conditions. The filter is located on the right side of engine (facing compartment). Remove by turning counterclockwise with a filter wrench. Before installing new filter, coat the gasket on the filter's base with a light film of new oil. Install by turning counterclockwise until a light friction is noted, then turn an additional 1/4 to 1/2 turn.

CAUTION **Do not over-tighten filter as damage may occur to rubber gasket which will cause filter to leak. Be sure to install sealing ring around outside of filter; this ring is an air seal to prevent cooling air loss.**

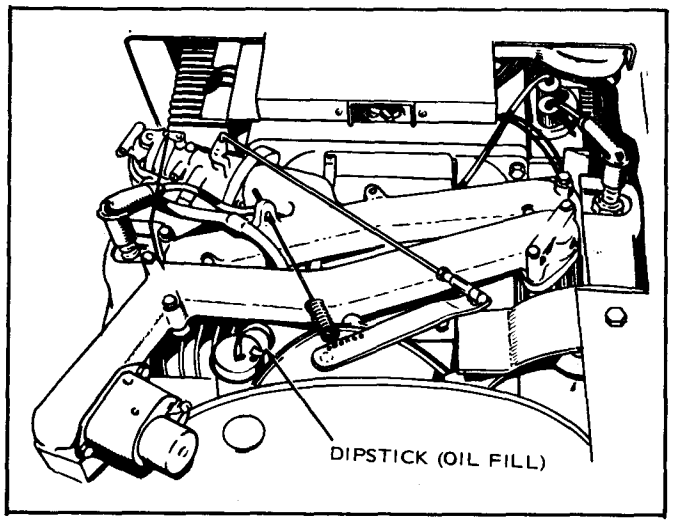


FIGURE 17. DIPSTICK LOCATION (TOP VIEW)

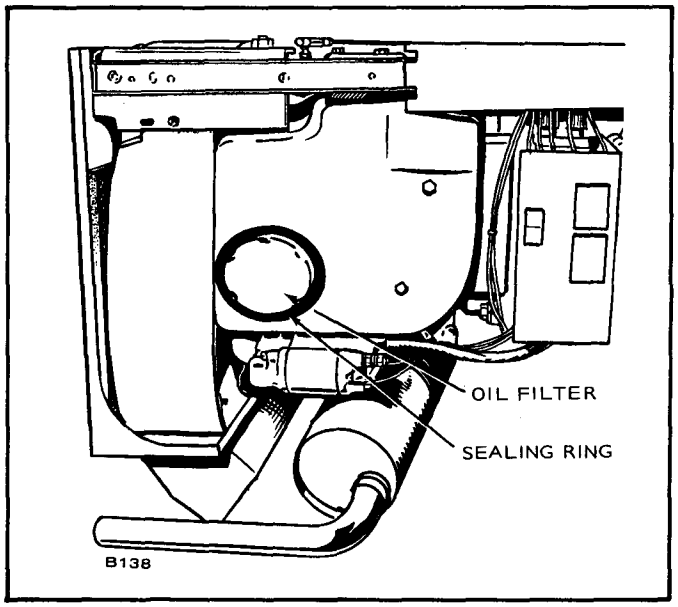


FIGURE 18. OIL FILTER LOCATION (RIGHT SIDE)

FUEL PUMP FILTER ELEMENT

If unit has an electric fuel pump with filter element, check every 400 hours or sooner. Remove fuel pump mounting screws and turn off hex nut on base of pump. If element appears dirty, replace with a new one. Be sure to replace gaskets when reassembling.

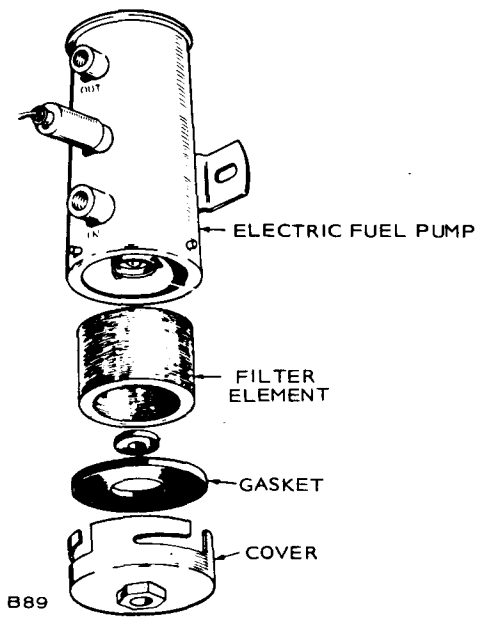


FIGURE 19. FUEL PUMP FILTER ELEMENT

CARBURETOR BOWL

Remove carburetor bowl from carburetor every 400 hours and clean screen in solvent. Blow out with low pressure, compressed air and reassemble, making sure gaskets are in place; replace with new gasket if necessary, a leaky one can cause starting problems because of air leaks.

GOVERNOR

The governor controls the engine speed by opening or closing the throttle according to the load taken off the plant. Every 50 operating hours check governor linkage for freedom of movement through its entire travel. Clean and lubricate ball joint with lubricating graphite.

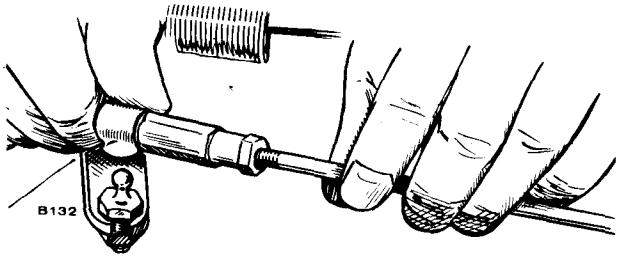


FIGURE 20. GOVERNOR LINKAGE

SPARK PLUGS

Check, clean and reset spark plugs every 100 operating hours. Replace spark plugs that show signs of fouling or electrode erosion. It is recommended that spark plugs be replaced at the beginning of each new season (once a year).

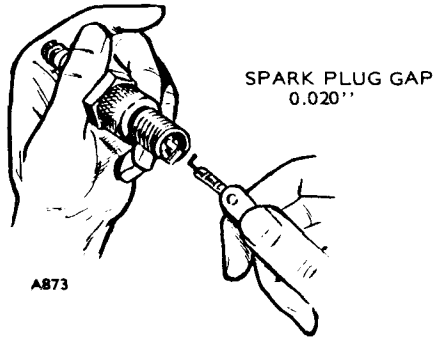


FIGURE 21. SPARK PLUGS

COOLING SYSTEM

The power plant is cooled by a flywheel blower fan which pulls air over the cylinders and cooling fins. The air path is directed by sheet metal shrouds and plates. These shrouds and plates must always be installed properly so unit does not overheat.

Check and clean (if necessary) the cooling fins at least every 200 hours of operation. Remove any dust, dirt or oil which may have accumulated. Check compartment air inlet and power plant air outlet for buildup of dirt, chaff, etc.

AIR CLEANER ELEMENT

Check and clean element at least every 100 hours. Loosen wing nut to remove. Clean by tapping base lightly on a flat surface. Replace element at least every 200 operating hours; clean or replace more often in dusty conditions.

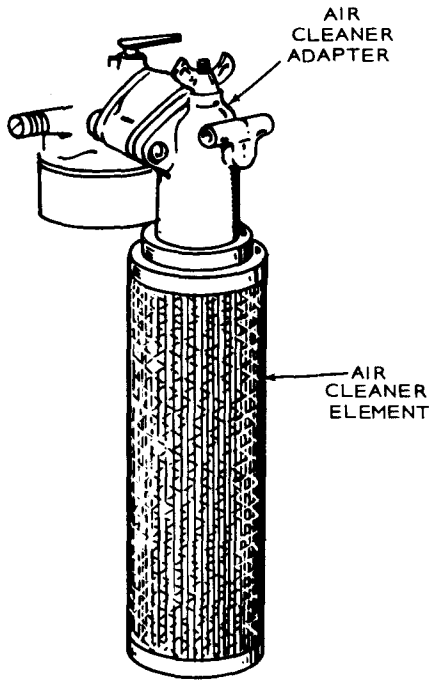


FIGURE 22. AIR CLEANER ELEMENT

BATTERY INSPECTION

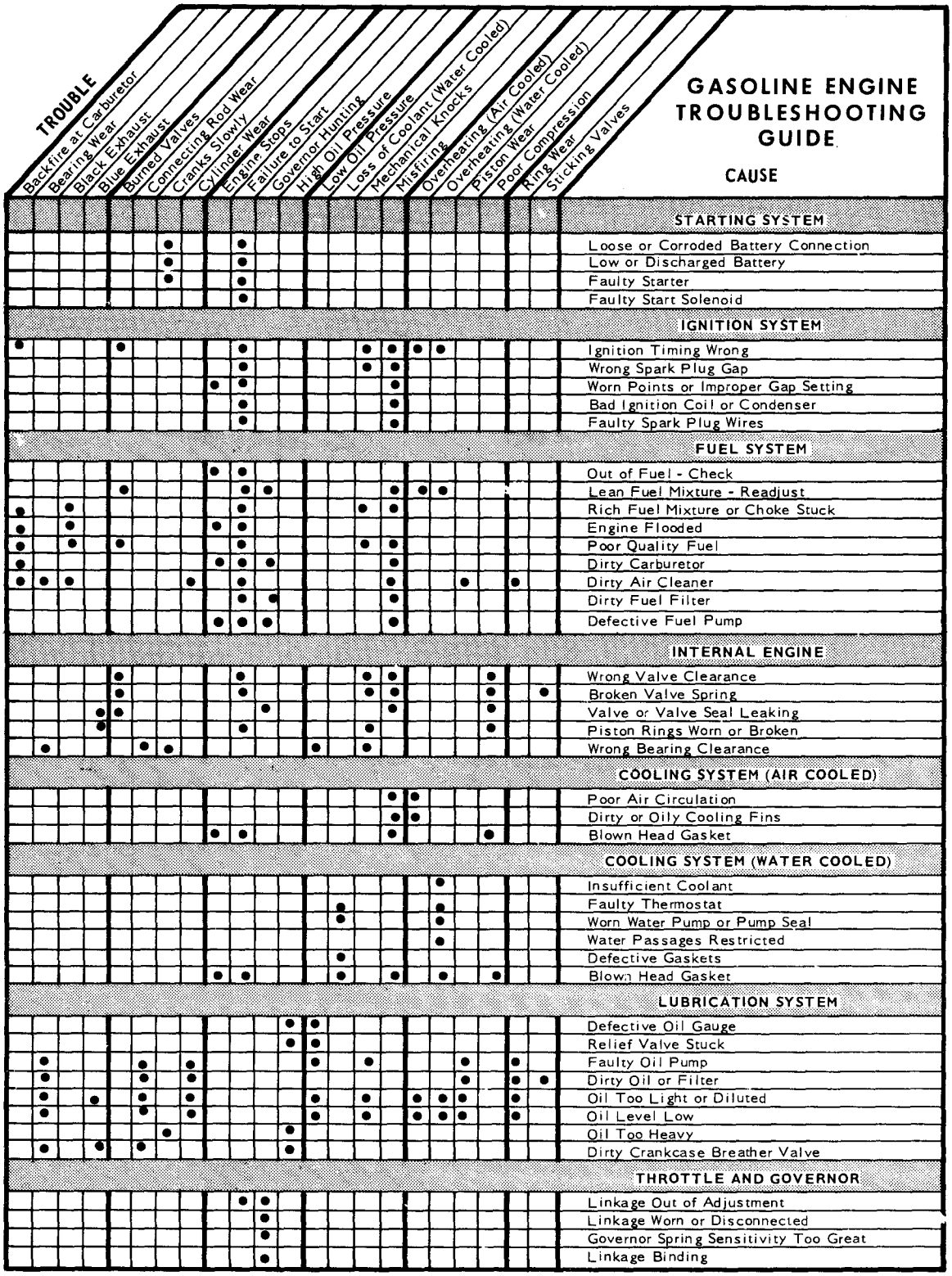
Check battery cells with a hydrometer. The specific gravity reading should be approximately 1.280 at 80° F.

If one or more cells are low on water, add distilled water and recharge.

Keep the battery case clean and dry. An accumulation of moisture will lead to a more rapid discharge and battery failure.

Keep the battery terminals clean and tight. After making connections, coat the terminals with a light application of petroleum jelly or grease to retard corrosion.

GASOLINE ENGINE TROUBLESHOOTING GUIDE



PARTS CATALOG

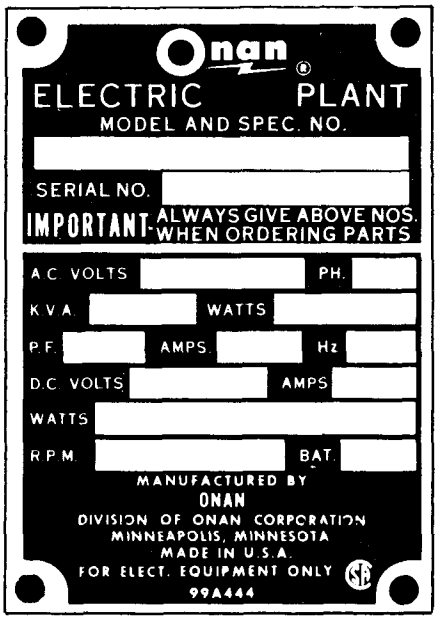
INSTRUCTIONS FOR ORDERING REPAIR PARTS

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.



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.

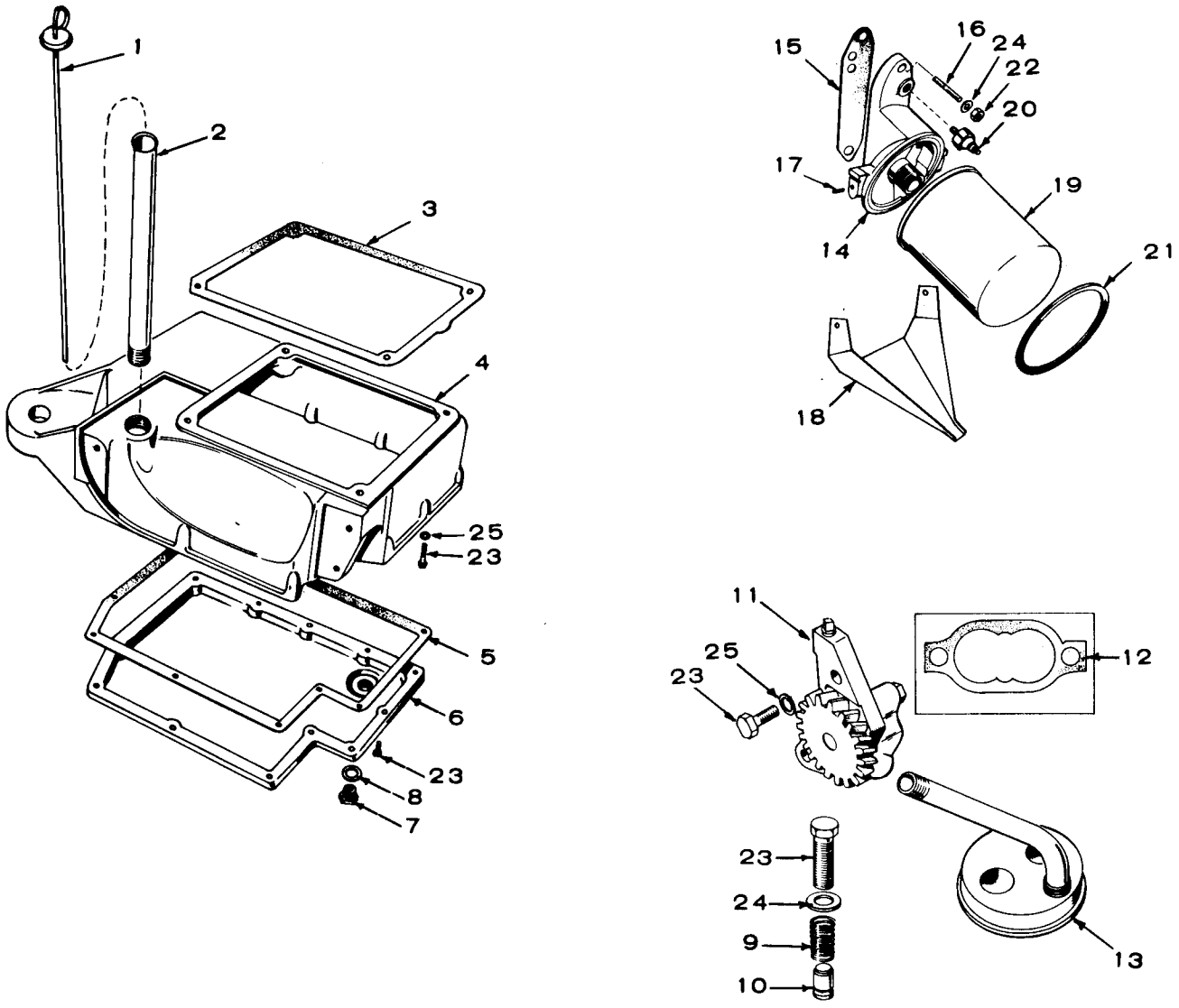
For current parts prices, consult your Onan Dealer, Distributor or Parts and Service Center.

"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 4.0BF power plant for recreational vehicles. Parts are arranged in groups of related items. Each illustrated part is identified by a reference number corresponding to the same reference number following the illustration. Parts illustrations are typical. 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 power plant.

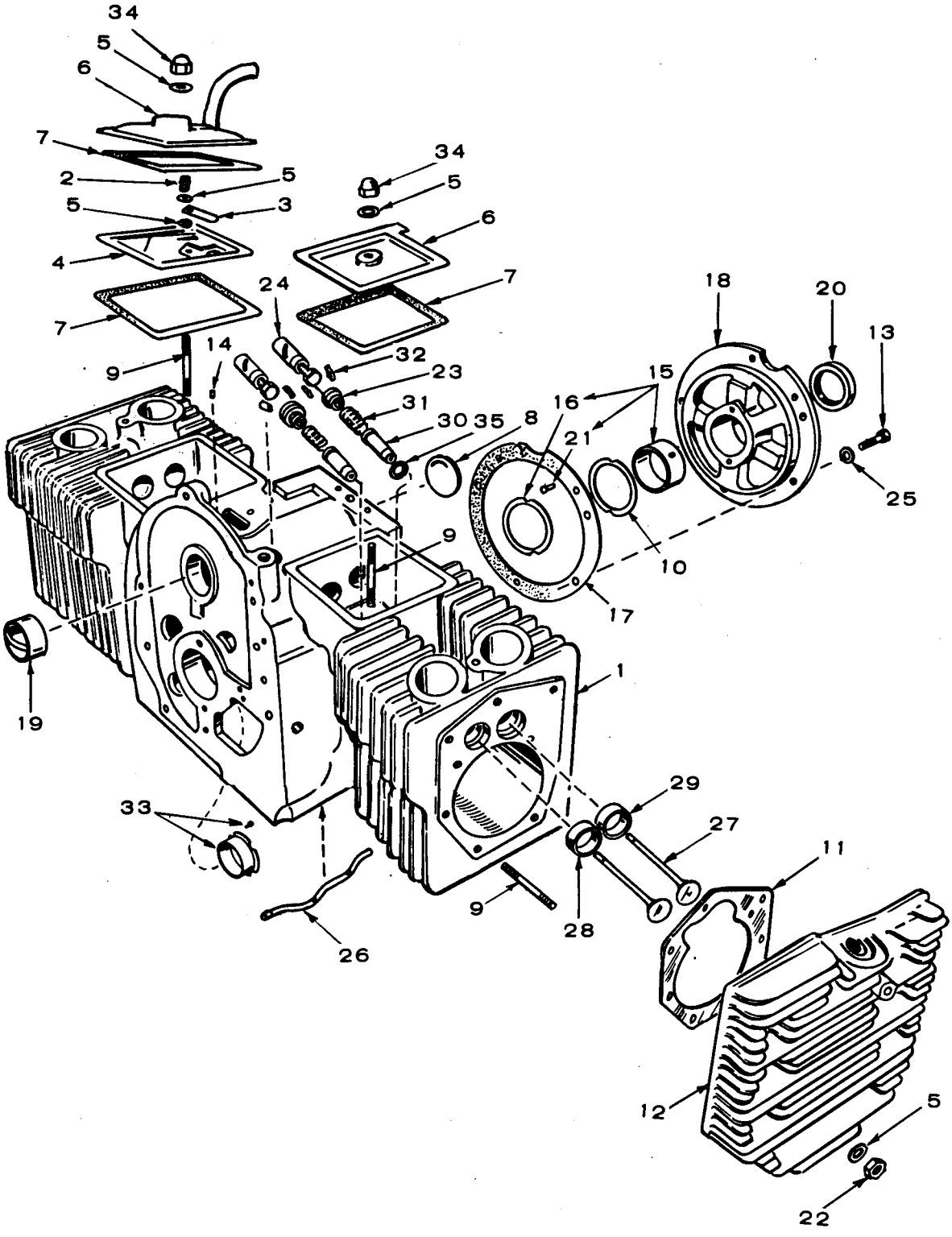
The Specification Letter advances (A to B, B to C, etc.) with manufacturing changes.



OIL SYSTEM GROUP

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	123-1164	1	Cap and Indicator, Oil Fill
2	123-1208	1	Tube, Oil Fill
3	102-0693	1	Gasket, Oil Base Mounting
4	102-0711	1	Base, Oil
5	102-0715	1	Gasket, Oil Pan
6	102-0713	1	Pan, Oil
7	102-0716	1	Plug, Oil Drain
8	102-0743	1	Gasket, Oil Drain Plug
9	120-0140	1	Spring, Oil By-Pass Valve
10	120-0398	1	Valve, Oil By-Pass
11	120-0491	1	Pump, Oil - Complete (**NOTE:** Internal parts not sold separately)
12	120-0161	1	Gasket Kit, Oil Pump
13	120-0713	1	Intake, Oil Pump (Includes Cup, Screen and Pipe)
14	122-0320	1	Adapter, Oil Filter
15	122-0321	1	Gasket, Oil Filter Adapter
16	520-0824	2	Stud, Oil Filter Adapter and Mounting Foot
17	516-0072	2	Pin, Drive - Oil Filter Drain
18	122-0360	1	Drain, Oil Filter
19	122-0338	1	Filter, Oil - Spin-On
20	309-0237	1	Switch, Low Oil Pressure
21	122-0347	1	Seal, Oil Filter - Air
22	110-0445	2	Nut, Oil Filter Adapter Mounting (5/16-18)
23	SCREW, HEX CAP		
	815-0293	13	Oil Pan Mounting (1/4-20 x 3/4")
	800-0007	2	Oil Pump Mounting (1/4-20 x 1")
	800-0052	4	Oil Base Mounting (3/8-16 x 1-1/2")
	801-0050	1	Oil By-Pass Valve (3/8-24 x 1")
24	WASHER, FLAT		
	526-0065	2	Oil Filter Adapter Mounting, Copper (5/16")
	526-0066	1	Oil By-Pass Valve, Copper (3/8")
25	WASHER, LOCK		
	850-0050	4	Oil Base Mounting (3/8")
	850-0040	2	Oil Pump Mounting (1/4")

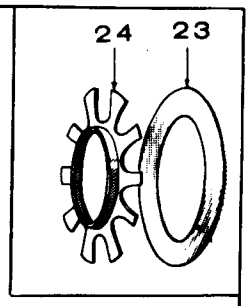
CYLINDER BLOCK GROUP

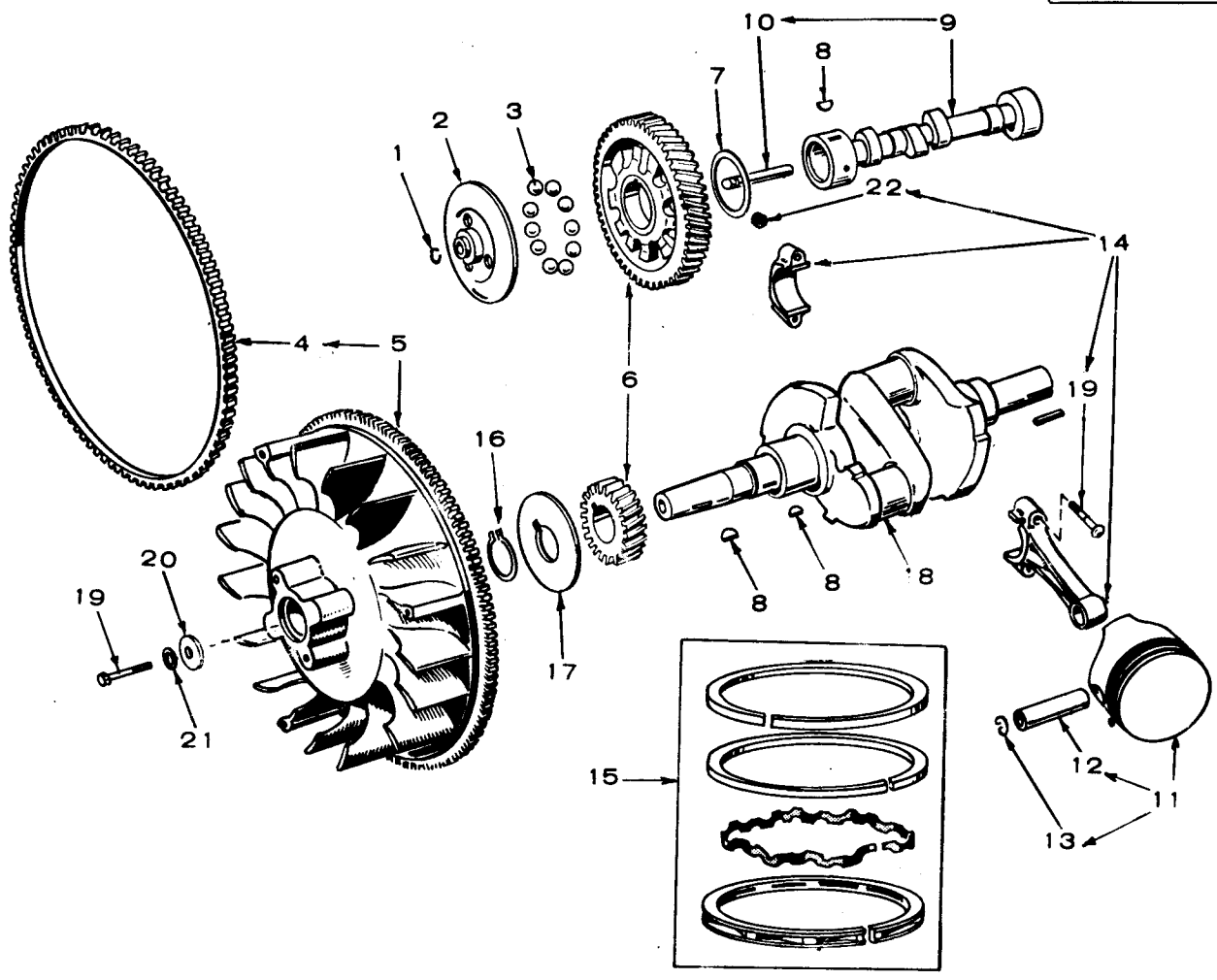


REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	110-1975	1	Block Assembly, Cylinder (Includes parts marked *)
2	123-1174	1	Spring, Breather Valve
3	123-1175	1	Valve, Breather
4	123-1225	1	Baffle, Breather
5	WASHER, FLAT		
	526-0018	2	Breather Valve (1/4" - Steel)
	526-0063	2	Valve Compartment Cover (1/4" - Copper)
	526-0122	18	Cylinder Head Studs (5/16" - Steel)
6	COVER, VALVE COMPARTMENT		
	110-1960	1	Cover with Tube for Breather Hose (L.H.)
	110-1879	1	Cover without Tube for Breather Hose (R.H.)
7	110-1921	3	Gasket, Valve Cover
8	517-0048	1	*Plug, Camshaft Expansion
9	STUD		
	520-0424	6	Cylinder Head (5/16 x 2-5/16")
	520-0759	12	Cylinder Head (5/16 x 2-1/16")
	520-0757	2	Valve Compartment Cover (1/4 x 2-1/16")
10	104-0776	As Req.	*Shim, Rear Bearing Plate (.005")
11	110-1920	2	Gasket, Cylinder Head
12	HEAD, CYLINDER		
	110-1924	1	Right Side (#2 Cylinder)
	110-1925	1	Left Side (#1 Cylinder)
13	800-0051	5	Screw, Hex Cap - Bearing Plate Mounting (3/8-16 x 1-1/4")
14	517-0120	1	*Plug, Impulse Hole
15	BEARING, CRANKSHAFT - REAR		
	101-0420	1	*Standard
	101-0420-02	1	.002" Undersize
	101-0420-10	1	.010" Undersize
	101-0420-20	1	.020" Undersize
	101-0420-30	1	.030" Undersize
16	104-0575	2	*Washer, Crankshaft Bearing Thrust
17	101-0415	1	*Gasket, Bearing Plate
18	101-0439	1	*Plate, Rear Bearing (Excludes Bearing)
19	101-0405	2	Bearing, Camshaft (Precision)
20	509-0041	1	*Seal, Bearing Plate
21	516-0072	4	*Pin, Main Bearing Stop
22	110-0445	18	Nut, Hex - Cylinder Head (5/16-24)
23	110-0904	4	Rotocap, Valve Spring
24	TAPPET, VALVE		
	115-0006	4	Standard
	115-0006-05	4	.005" Oversize
25	850-0050	5	*Washer, Lock - Rear Bearing Plate (3/8")
26	120-0706	1	*Tube, Crankcase Oil
27	VALVE		
	110-1808	2	Intake
	110-1809	2	Exhaust
28	INSERT, VALVE SEAT - EXHAUST		
	110-0245	2	*Standard
	110-0245-02	2	.002" Oversize
	110-0245-05	2	.005" Oversize
	110-0245-10	2	.010" Oversize
	110-0245-25	2	.025" Oversize
29	INSERT, VALVE SEAT - INTAKE		
	110-0197	2	*Standard
	110-0197-02	2	.002" Oversize
	110-0197-05	2	.005" Oversize
	110-0197-10	2	.010" Oversize
	110-0197-25	2	.025" Oversize
30	110-1935	4	*Guide, Valve
31	110-0539	4	Spring, Valve
32	110-0639	8	Lock, Valve and Spring Retainer
33	BEARING, CRANKSHAFT - FRONT		
	101-0432	1	*Standard
	101-0432-02	1	.002" Undersize
	101-0432-10	1	.010" Undersize
	101-0432-20	1	.020" Undersize
	101-0432-30	1	.030" Undersize
34	866-0001	2	Nut, Acorn - Valve Compartment Cover (1/4-20)
35	110-0068	2	*Gasket, Valve Guide (Intake)

* - Included in 110-1975 Cylinder Block Assembly.

CRANKSHAFT, FLYWHEEL, CAMSHAFT AND PISTON GROUP

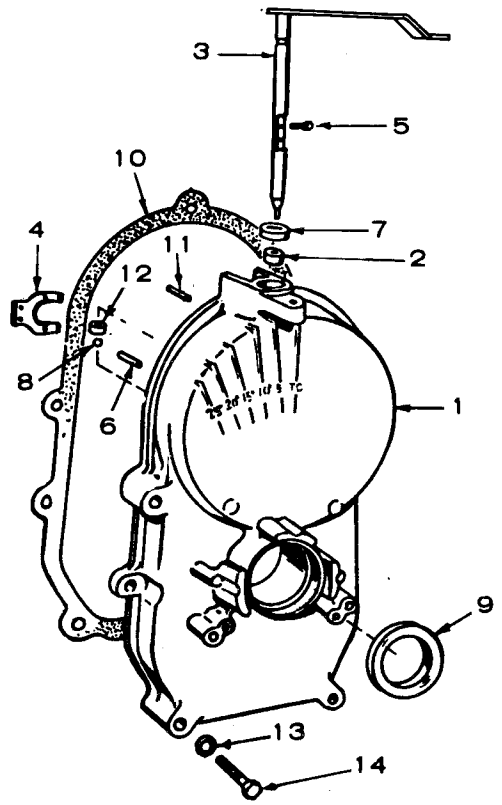




REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	150-0078	1	Ring, Camshaft Center Pin
2	150-0612	1	Cup, Governor
3	510-0015	10	Ball, Fly - Governor
4	104-0779	1	Gear, Ring - Flywheel
5	134-2590	1	Flywheel (Includes Ring Gear and Magnet Ring)
6	105-0353	1	Gear Set, Timing (Includes Camshaft and Crankshaft Gears)
7	105-0004	1	Washer, Camshaft Gear Thrust
8	KEY		
	515-0001	1	Camshaft Gear Mounting
	515-0001	1	Crankshaft Gear Mounting
	515-0002	1	Flywheel Mounting
9	105-0376	1	Camshaft (Includes Center Pin)
10	150-0075	1	Pin, Camshaft Center
11	PISTON AND PIN (INCLUDES RETAINING RINGS)		
	112-0123	2	Standard
	112-0123-05	2	.005" Oversize
	112-0123-10	2	.010" Oversize
	112-0123-20	2	.020" Oversize
	112-0123-30	2	.030" Oversize
	112-0123-40	2	.040" Oversize
12	112-0122	2	Pin, Piston
13	518-0311	4	Ring, Piston Pin Retaining
14	ROD ASSEMBLY, CONNECTING		
	114-0225	2	Standard
	114-0225-10	2	.010" Undersize
	114-0225-20	2	.020" Undersize
	114-0225-30	2	.030" Undersize

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
15	RING SET, PISTON		
	113-0159	2	Standard
	113-0159-05	2	.005" Oversize
	113-0159-10	2	.010" Oversize
	113-0159-20	2	.020" Oversize
	113-0159-30	2	.030" Oversize
	113-0159-40	2	.040" Oversize
16	518-0014	1	Lock, Crankshaft Gear Washer
17	104-0043	1	Washer, Crankshaft Gear Retaining
18	104-0804	1	Crankshaft
19	SCREW, HEX CAP		
	114-0228	4	Connecting Rod (Special)
	104-0170	1	Flywheel Mounting (7/16-14 x 4")
20	526-0017	1	Washer, Flat - Flywheel Mounting
21	850-0055	1	Washer, Lock - Flywheel Mounting
22	870-0137	4	Nut, Hex - Connecting Rod Cap (Self Locking)
23	150-0077	1	Plate, Governor Ball
24	150-1257	1	Spacer, Governor Ball

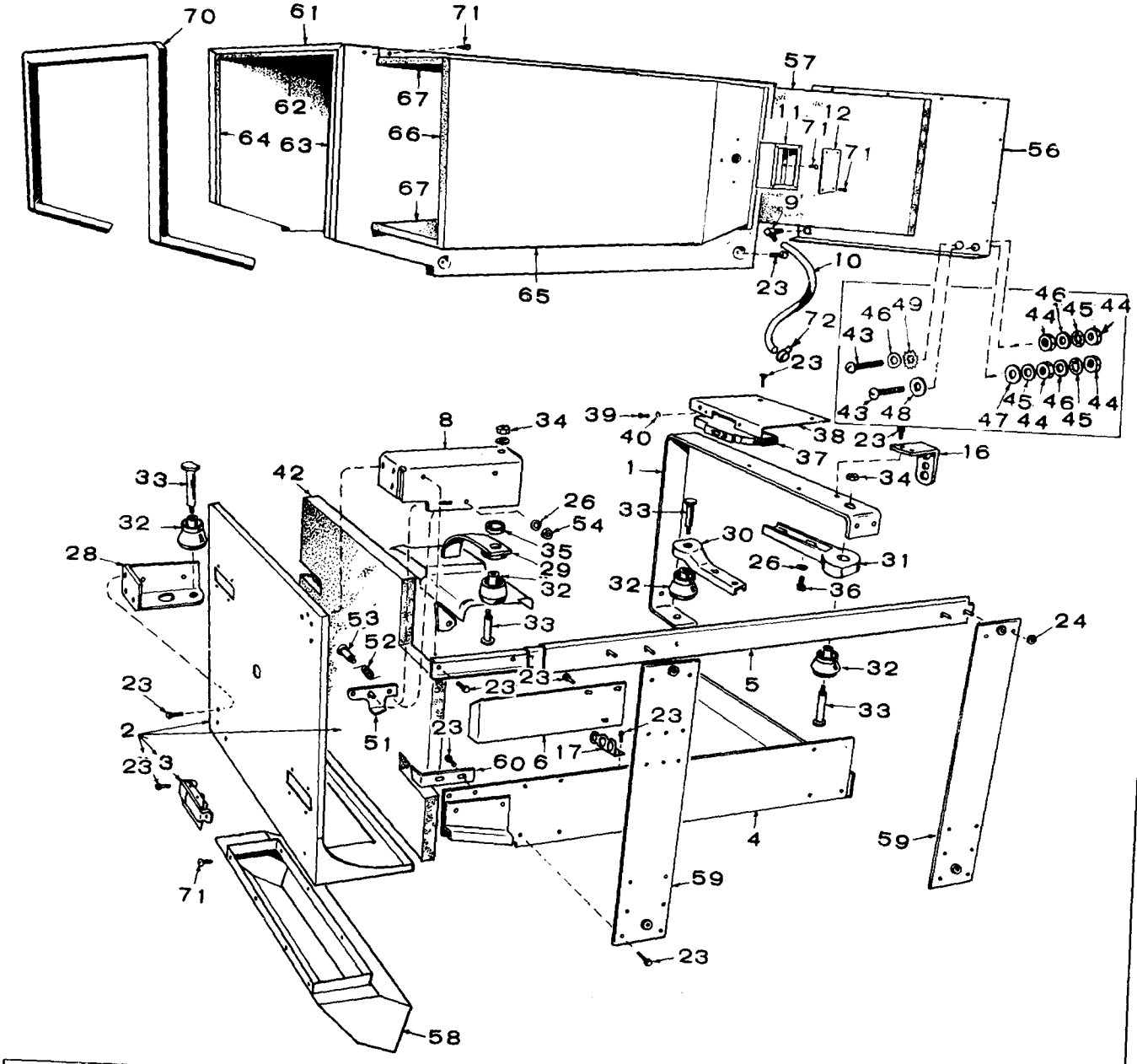
GEAR COVER GROUP

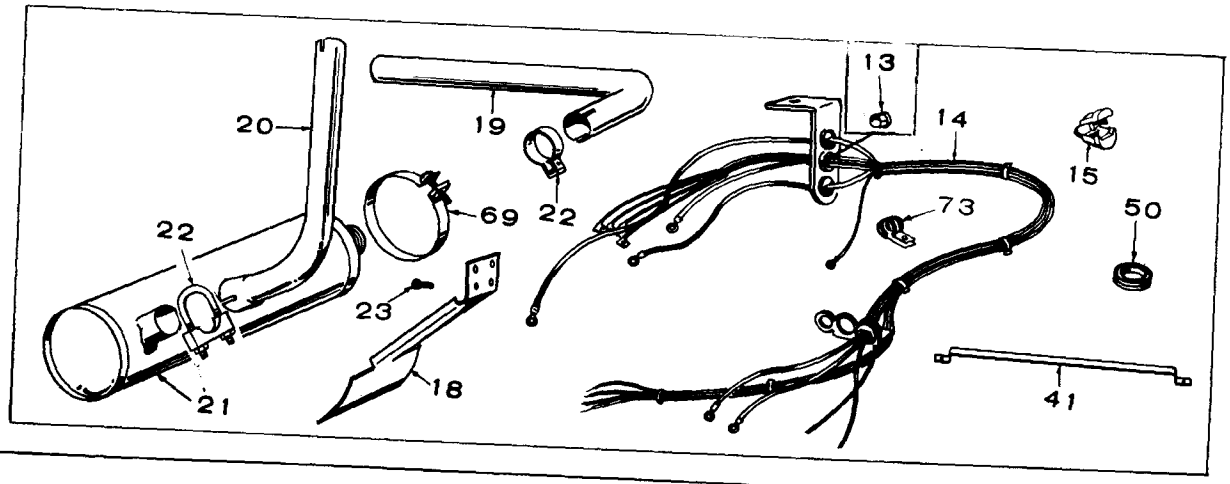


REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	103-0417	1	Cover Assembly, Gear (Includes parts marked *)
2	510-0013	1	*Bearing, Governor Shaft (Upper)
3	150-1375	1	*Shaft and Arm Assembly - Governor
4	150-1187	1	*Yoke, Governor Shaft
5	815-0046	2	*Screw, Yoke Retaining
6	516-0130	1	*Pin, Governor Cup Stop
7	509-0008	1	*Seal, Oil - Governor Shaft
8	510-0014	1	*Ball, Bearing - Governor Shaft
9	509-0040	1	*Seal, Gear Cover
10	103-0408	1	Gasket, Gear Cover Mounting
11	516-0011	2	Pin, Gear Cover (5/16 x 1-1/8")
12	510-0008	1	*Bearing, Governor Shaft (Lower)
13	850-0045	5	Washer, Lock - Gear Cover Mounting (5/16")
14	SCREW, HEX CAP - GEAR COVER MOUNTING		
	800-0032	4	5/16-18 x 1-3/4"
	800-0034	1	5/16-18 x 2-1/4"

* - Included in 103-0417 Gear Cover Assembly.

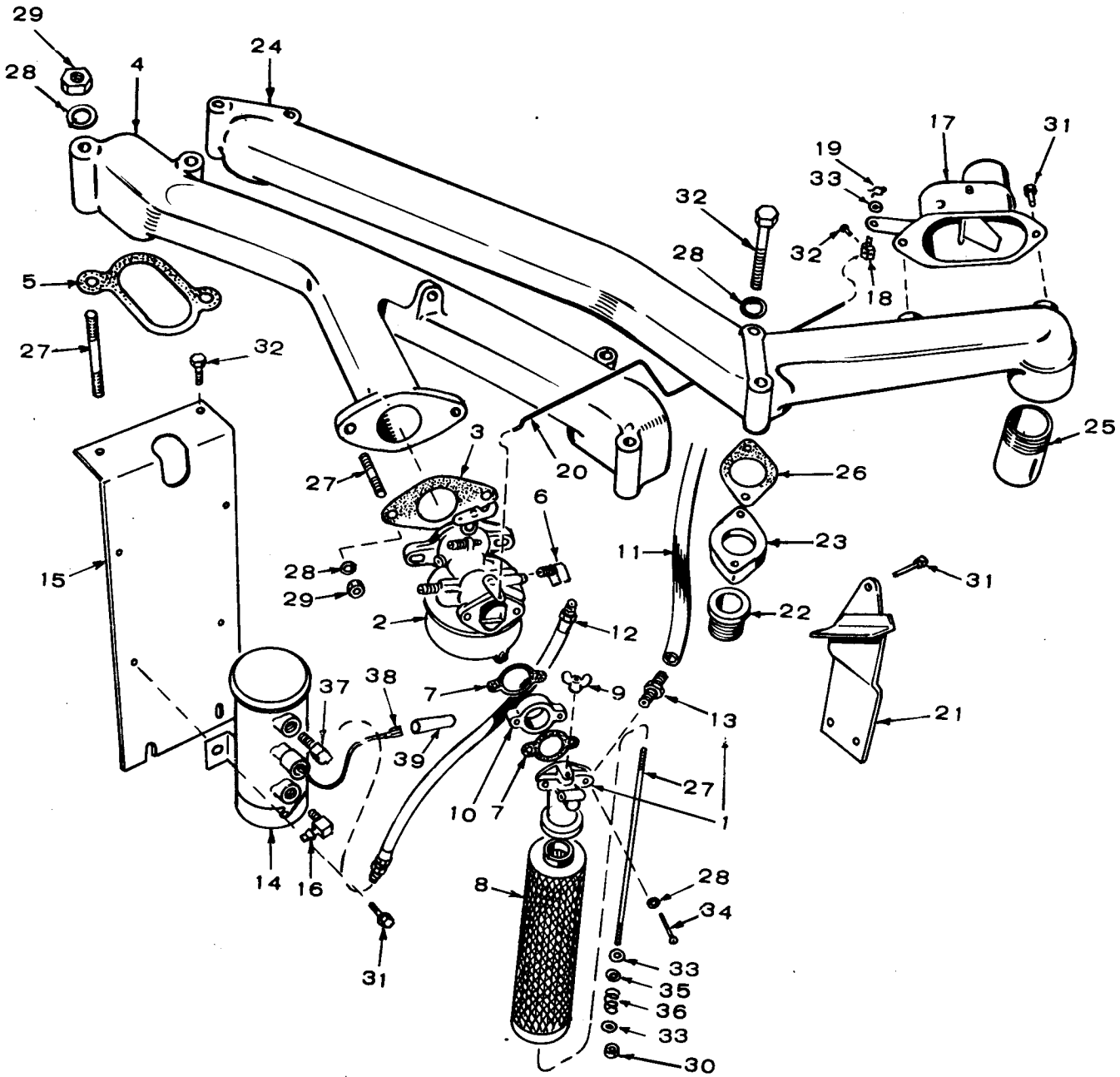
CHASSIS GROUP





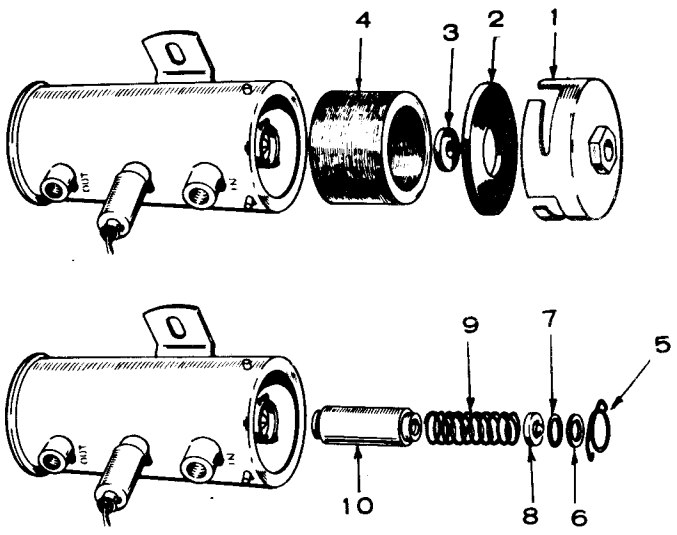
REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	405-1960	1	Yoke, Generator Support
2	405-1965	1	Door, Slide Out (Includes Latches and Insulation)
3	406-0372	2	Latch, Door
4	405-2028	1	Base, Mounting
5	405-2074	2	Slide
6	405-1956	2	Bracket, Latch Strike
8	403-1026	1	Bracket - Engine Mounting
9	502-0313	1	Connector Elbow - Fuel Line
10	503-0687	1	Hose, Fuel
11	301-3639	1	Box, Junction
12	301-3640	1	Cover, Junction Box
13	331-0102	1	Bushing (Part of Wiring Harness)
14	338-0711	1	Harness, Wiring - Chassis
15	508-0179	4	Relief, Strain (Part of Wiring Harness)
16	301-3612	1	Bracket, Harness Mounting (Part of Wiring Harness)
17	301-3613	1	Bracket, Harness Mounting (Part of Wiring Harness)
18	155-1238	1	Bracket, Muffler Hanger
19	155-1265	1	Tube, Exhaust Extension
20	155-1223	1	Tube, Exhaust
21	155-1222	1	Muffler, Exhaust
22	CLAMP, EXHAUST		
	155-1244	1	1.38" Diameter
	155-1015	2	1.62" Diameter
23	SCREW, HEX CAP - SELF LOCKING		
	815-0261	6	Striker Catch Mounting (1/4-20 x 1/2")
	815-0261	16	Hanger Bracket Mounting (1/4-20 x 1/2")
	815-0261	6	Door Mounting (1/4-20 x 1/")
	815-0261	3	Wiring Harness Brackets Mounting (1/4-20 x 1/2")
	815-0389	2	Safety Catch Strike Mounting (1/4-20 x 3/8")
	815-0261	2	Circuit Breaker Bracket Mounting (1/4-20 x 1/2")
	815-0261	2	Muffler Bracket Mounting (1/4-20 x 1/2")
	815-0376	8	Door Latch Mounting (#10-32 x 3/4")
	815-0261	8	Cover, Mounting (1/4-20 x 1/2")
24	870-0212	9	Nut, Self Locking - Slide Rail Mounting (1/4-20)
26	WASHER, LOCK		
	850-0050	4	Generator Support Mounting (3/8")
	850-0038	1	Safety Latch Mounting (1/4")
28	403-1027	1	Bracket, Engine End - Left Side
29	403-1019	1	Foot Assembly, Engine Mounting - Right Side
30	232-2363	1	Support Generator - Left Side
31	232-2364	1	Support Generator - Right Side
32	402-0283	4	Cushion, Mount
33	402-0412	4	Bolt, Cushion Mounting
34	870-0281	4	Nut, Self Locking - Cushion Mounting
35	402-0413	2	Spacer, Cushion Mounting - Engine End - Right Side
36	800-0051	4	Screw, Hex Cap - Generator Support (3/8-16 x 1-1/4")
37	320-0153	1	Breaker, Circuit
38	405-2003	1	Bracket, Circuit Breaker Mounting
39	812-0059	2	Screw, Round Head - Circuit Breaker Mounting (#6-32 x 1/4")
40	850-0020	2	Washer, Lock - Circuit Breaker Mounting (#6)
41	405-2007	1	Bracket, Fuel Line Return
42	405-1964	1	Insulation, Door
43	810-0181	2	Screw, Round Head Brass - Battery Cable Terminal (5/16-18 x 1-1/4")
44	871-0025	4	Nut, Hex Brass - Battery Cable Terminals (5/16-18)
45	854-0017	3	Washer, Internal Shakeproof - Battery Cable Terminals (5/16")
46	526-0054	3	Washer, Flat - Battery Cable Terminals (5/16")
47	508-0019	1	Washer, Fibre - Battery Cable Terminals (5/16")
48	508-0181	1	Washer, Fibre - Battery Cable Terminals (5/16")
49	856-0008	1	Washer, External - Internal Shakeproof - Battery Cable Terminals (5/16")
50	508-0008	1	Grommet, Battery Cable Through Pan
51	405-2008	1	Lever, Safety Latch
52	405-2081	1	Spring, Safety Stop Latch
53	150-1146	1	Screw, Lever Engage
54	115-0025	1	Nut, Hex - Safety Latch (1/4-28)
56	405-1963	1	Panel, Rear Housing (Includes Insulation)
57	405-1993	1	Insulation, Rear Panel
58	405-2089	1	Duct, Exhaust Air
59	405-1946	4	Bracket, Hanger
60	405-1957	1	Striker, Safety Catch
61	405-1962	1	Cover, Generator Set (Includes Insulation)
62	405-1990	1	Insulation, Cover Top
63	405-1991	1	Insulation, Cover Right Side
64	405-1992	1	Insulation, Cover Left Side
65	405-2053	1	Duct Assembly (Includes Insulation)
66	405-2055	1	Insulation, Duct (Side)
67	405-2056	2	Insulation, Duct (Top and Bottom)
69	503-0681	2	Clamp, Muffler
70	SEAL, WEATHER PROOF		
		1	Door (Order 59" of Bulk Seal Number 895-0150)
		1	Bottom Panel (Order 22" of Bulk Seal Number 895-0151)
71	SCREW, SHEET METAL		
	815-0335	11	Duct Assembly Mounting (#10)
	815-0335	10	Back Panel Mounting (#10)
	815-0335	8	Outlet Duct Mounting (#10)
	815-0335	4	Outlet Box Mounting (#10)
	809-0044	4	Outlet Box Cover Mounting (#10)
72	503-0685	2	Clamp, Fuel Line
73	CLAMP, HARNESS		
	332-1553	1	1"
	332-1554	1	1/2"

FUEL SYSTEM GROUP



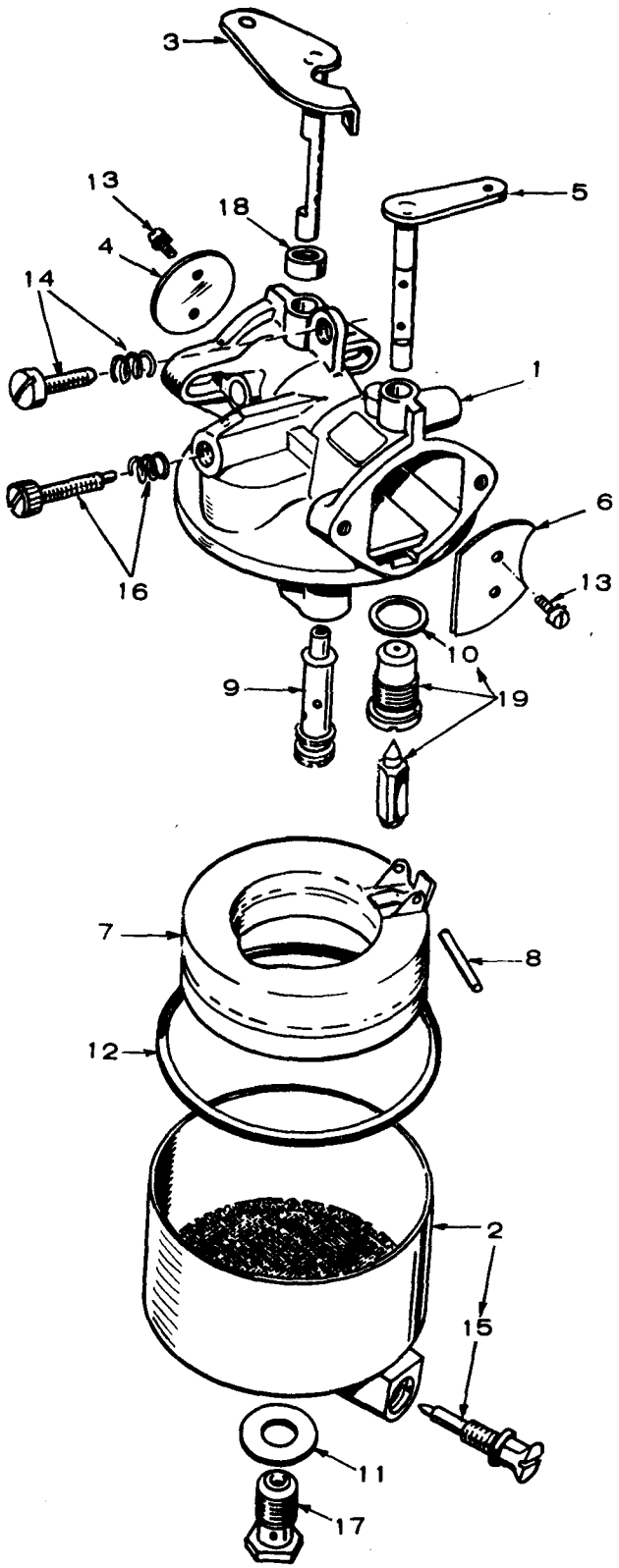
REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	140-1223	1	Adapter, Air Cleaner (Includes Breather Hose Adapter)
2	146-0169	1	Carburetor
3	141-0078	1	Gasket, Carburetor Mounting
4	154-1517	1	Manifold, Intake
5	154-1446	2	Gasket, Intake Manifold
6	502-0020	1	Elbow, Carburetor Inlet
7	145-0446	2	Gasket, Air Cleaner Adapter
8	140-1220	1	Element, Air Cleaner
9	865-0022	1	Nut, Wing - Air Cleaner
10	146-0163	1	Spacer, Carburetor to Air Cleaner Adapter
11	503-0670	1	Hose, Breather
12	501-0003	1	Line, Fuel
13	502-0193	1	Adapter, Breather Hose
14	149-0650	1	Pump, Fuel
15	149-1316	1	Bracket, Fuel Pump and Regulator Mounting
16	502-0313	1	Elbow, Fuel Pump Inlet
17	153-0223	1	Choke, Sisson
18	152-0155	1	Swivel, Choke Linkage
19	516-0059	1	Pin, Cotter - Choke Swivel
20	153-0451	1	Linkage, Choke
21	155-1237	1	Bracket, Muffler
22	154-1536	2	Nipple, Exhaust
23	154-1537	2	Flange, Exhaust Manifold Mounting
24	154-1518	1	Manifold, Exhaust
25	505-0755	1	Nipple, Exhaust Manifold Outlet
26	154-1526	2	Gasket, Exhaust Manifold
27	STUD		
	520-0758	4	Intake Manifold Mounting
	520-0823	1	Air Cleaner Mounting
	520-0326	2	Carburetor Mounting
28	WASHER, LOCK		
	850-0025	2	Air Cleaner Adapter Mounting (#8)
	850-0040	2	Carburetor Mounting (1/4")
	850-0045	4	Intake Manifold Mounting (5/16")
	850-0045	4	Exhaust Manifold Mounting (5/16")
29	NUT, HEX		
	862-0015	4	Intake Manifold Mounting (5/16-18)
	115-0025	2	Carburetor Mounting (1/4-28)
30	861-0008	1	Nut, Square - Air Cleaner Mounting (#10-32)
31	SCREW, SELF LOCKING		
	821-0009	2	Fuel Pump Mounting (1/4-20 x 3/8")
	821-0009	2	Choke Mounting (1/4-20 x 3/8")
	821-0010	1	Muffler Bracket Mounting (1/4-20 x 1/2")
	821-0018	1	Muffler Bracket Mounting (1/4-20 x 5/8")
32	SCREW, HEX CAP		
	815-0261	4	Fuel Pump and Regulator Bracket Mounting (#10-32 x 5/16")
	800-0033	4	Exhaust Manifold Mounting (5/16-18 x 2")
	815-0381	1	Choke Swivel (#8-32 x 5/16")
33	WASHER, FLAT		
	526-0006	1	Choke Swivel
	526-0008	2	Air Cleaner Mounting
34	812-0087	2	Screw, Round Head - Air Cleaner Adapter Mounting (#8-32 x 1-1/2")
35	508-0017	1	Washer, Fibre - Air Cleaner Element Mounting
36	405-2010	1	Spring, Air Cleaner Element Mounting
37	502-0002	1	Elbow, Fuel Pump Outlet
38	332-0529	1	Terminal, Fuel Pump Lead
39	332-0556	1	Connector, Fuel Pump Lead

FUEL PUMP PARTS GROUP



REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
	149-0650	1	Pump, Fuel (Complete)
1	149-1453	1	Cover
2	149-1446	1	Gasket, Cover
3	149-1447	1	Magnet
4	149-1445	1	Filter
5	149-1448	1	Retainer, Cup and Plunger
6	149-1449	1	Washer, Cup Gasket
7	149-1450	1	Gasket, Spring Cup
8	149-1451	1	Spring Cup and Valve
9	149-0767	1	Spring, Plunger Return
10	149-1452	1	Plunger

CARBURETOR PARTS GROUP



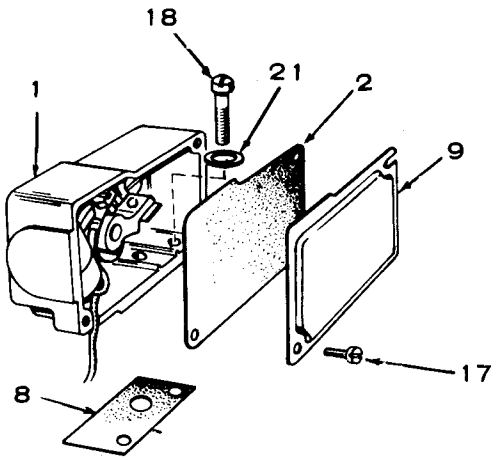
REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
	146-0169	1	Carburetor Assembly (Complete)
1	146-0170	1	Body, Carburetor
2	146-0171	1	Bowl Assembly (Includes Power Needle and Screen)
3	146-0172	1	Shaft, Throttle
4	146-0173	1	Valve, Throttle
5	146-0174	1	Shaft, Choke
6	146-0175	1	Valve, Choke
7	146-0176	1	Float Assembly
8	146-0111	1	•Shaft, Float
9	146-0181	1	Nozzle
10	146-0182	1	*Gasket, Valve Seat
11	146-0183	2	*Gasket, Bowl Nut
12	146-0184	1	*Gasket, Body to Bowl
13	146-0142	4	Screw and Washer Assembly
14	146-0186	1	Spring and Screw, Adjusting
15	146-0187	1	•Needle Assembly - Power
16	146-0116	1	•Needle Assembly - Idle
17	146-0177	1	Retainer, Bowl
18	146-0178	1	Seal, Throttle Shaft
19	146-0179	1	•Float Valve Seat and Gasket Assembly
	141-0078		*Gasket, Mounting Flange
	146-0185	1	•Kit, Gasket (Includes Parts Marked *)
	146-0180	1	*Kit, Repair (Includes Parts Marked •)

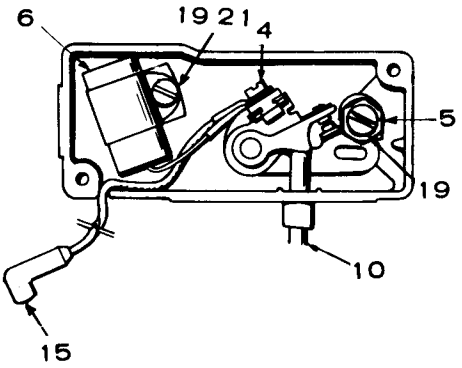
* - Parts contained in the 146-0185 Gasket Kit.
• - Parts contained in the 146-0180 Repair Kit.

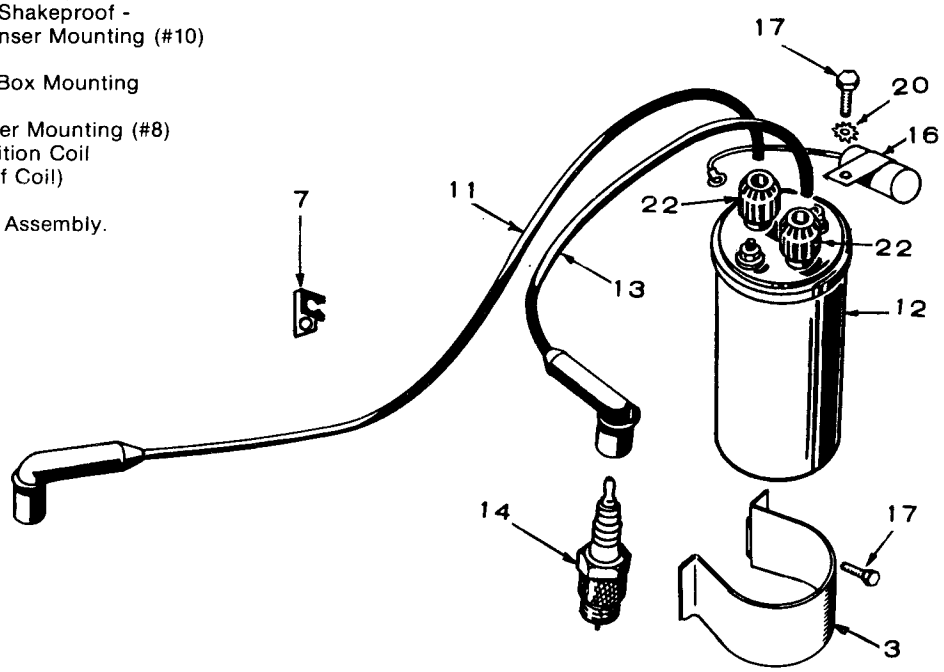
IGNITION GROUP

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	160-1158	1	Box Assembly, Breaker (Includes parts marked *)
2	160-1148	1	*Gasket, Breaker Box Cover
3	166-0603	1	Clamp, Coil Mounting
4	160-1154	1	*Point Set, Breaker
5	870-0221	1	*Nut, Breaker Point Mounting (#8-32)
6	312-0069	1	*Condenser, Breaker Points
7	167-0188	1	Clip, Spark Plug Cables
8	160-1150	1	Gasket, Breaker Box Mounting
9	160-1149	1	*Cover, Breaker Box
10	160-1151	1	Plunger
11	167-1461	1	Cable, Spark Plug (8-1/2")
12	166-0535	1	Coil, Ignition
13	167-1548	1	Cable, Spark Plug (21")
14	167-0245	2	Plug, Spark
15	336-2132	1	*Lead Assembly, Points to Coil
16	312-0017	1	Condenser, Ignition
17	SCREW, HEX CAP		
	815-0352	2	*Breaker Box Cover Mounting (#8-32 x 3/8")
	815-0379	1	Condenser Mounting (#10-32 x 1/2")
	815-0179	1	Coil Clamp Mounting (#10-32 x 3/8")
18	815-0373	2	Screw, Fillister Phillips Head-Breaker Box Mounting (1/4-20 x 5/8")
19	SCREW, SLOTTED PAN HEAD		
	815-0358	1	*Condenser Mounting (#8-32 x 3/8")
	815-0046	1	*Breaker Points Mounting (#8-32 x 3/8")
20	856-0003	1	Washer, Shakeproof - Condenser Mounting (#10)
21	WASHER, LOCK		
	850-0040	2	Breaker Box Mounting (1/4")
	850-0025	1	*Condenser Mounting (#8)
22	166-0604	2	Cap, Ignition Coil (Part of Coil)

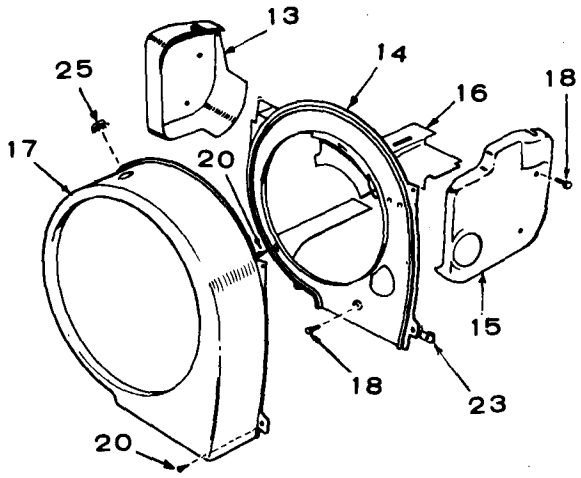
* - Included in 160-1158 Breaker Box Assembly.

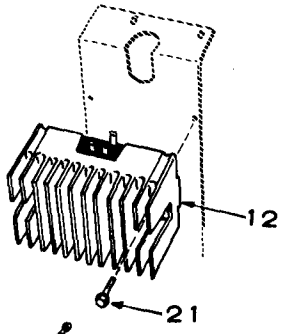


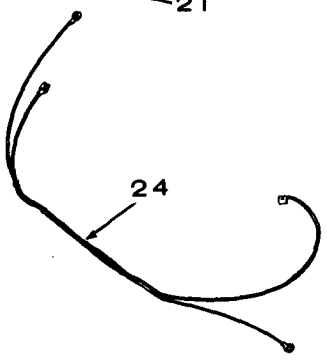


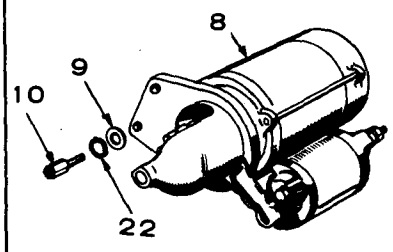


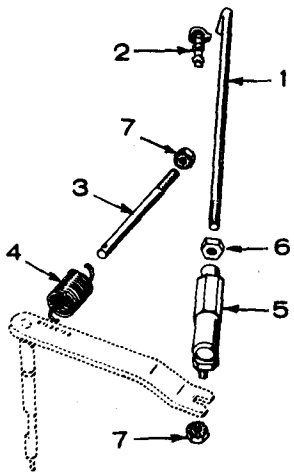
GOVERNOR, STARTER, CHARGING ALTERNATOR AND BLOWER HOUSING GROUP

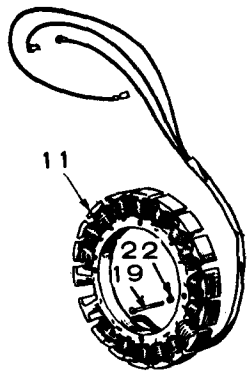




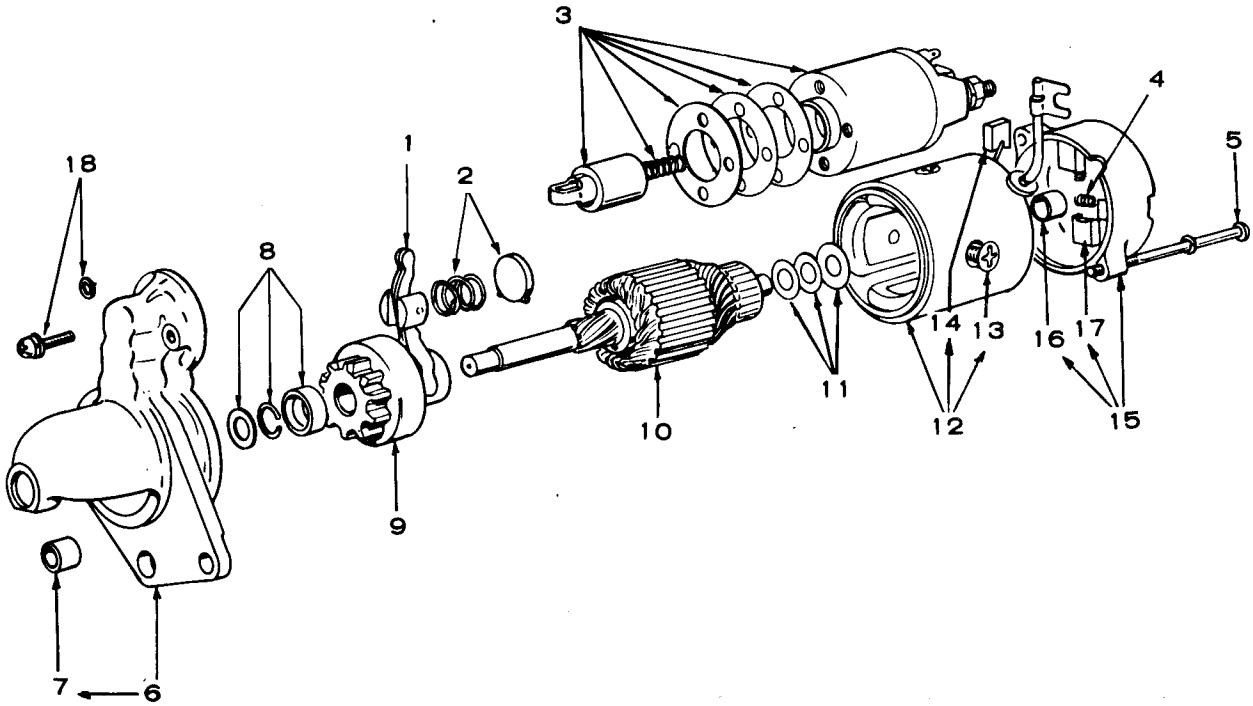






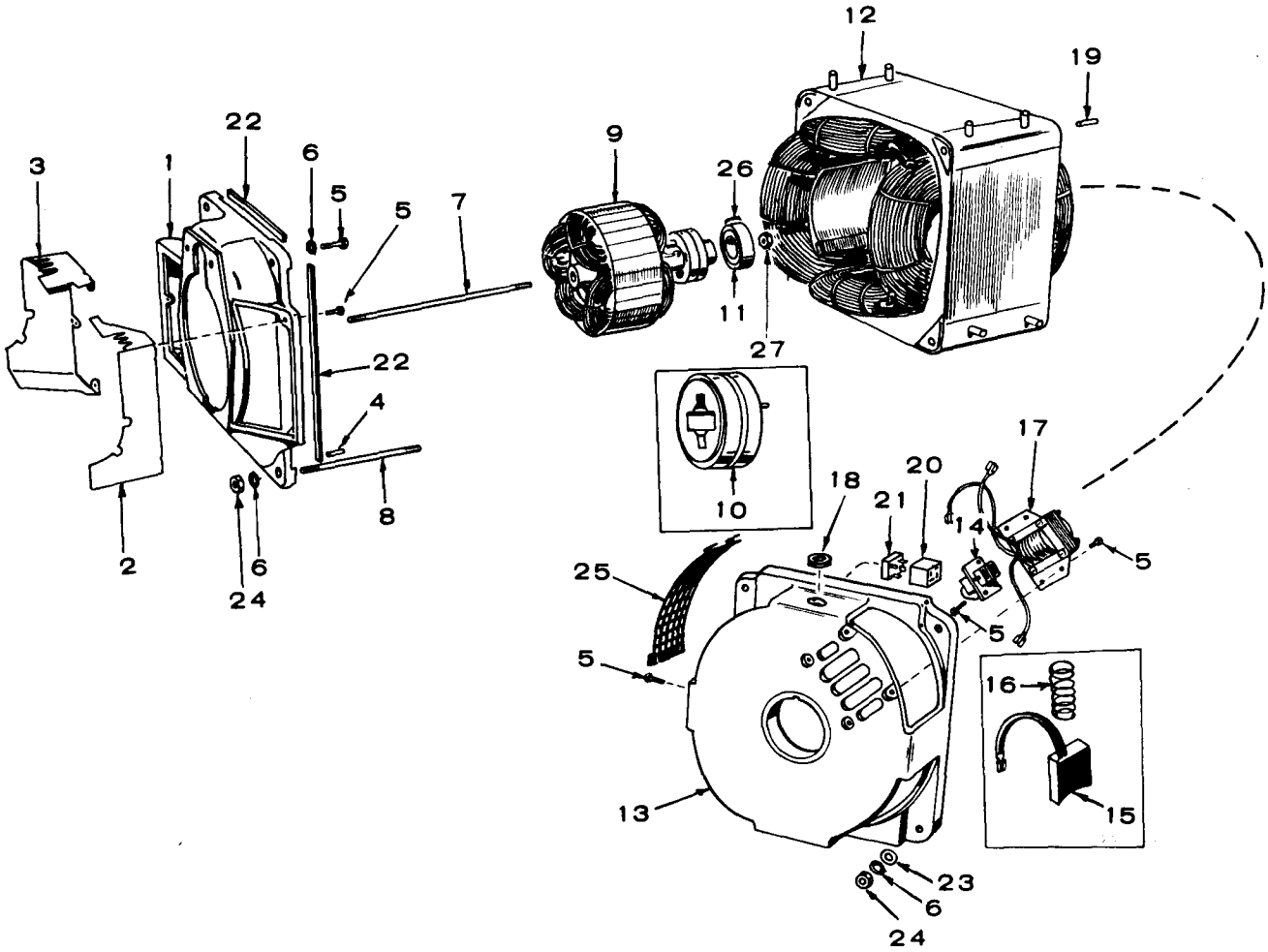


REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	150-1377	1	Rod, Governor Control
2	518-0004	1	Clip, Governor Control Rod
3	150-0694	1	Stud, Governor Adjusting
4	150-0098	1	Spring, Governor
5	150-0639	1	Joint, Ball - Governor
6	870-0188	1	Palnut, Governor Rod
7	870-0131	2	Nut, Keps - Governor Ball Joint and Adjusting Stud
8	191-0915	1	Motor, Starting (**NOTE:** For components - see separate group)
9	526-0113	2	Washer, Flat, Starter Mounting
10	134-2592	2	Stud, Starter Motor, Muffler Bracket and Scroll Mounting
11	191-0931	1	Stator, Charging Alternator
12	191-0886	1	Regulator, 12 Volt
13	134-2565	1	Housing, Cylinder Air - Left Side
14	134-2570	1	Scroll, Blower Housing
15	134-2564	1	Housing, Cylinder Air - Right Side
16	134-2567	1	Baffle, Cylinder Air - Right Side
17	134-2569	1	Cover, Blower Housing Scroll
18	SCREW, HEX CAP		
	815-0261	4	Cylinder Air Housing Mounting (1/4-20 x 7/16")
	815-0261	2	Scroll Mounting (1/4-20 x 7/16")
19	813-0108	3	Screw, Round Head - Stator Mounting (#10-32 x 1-1/2")
20	SCREW, SHEET METAL		
	809-0059	4	Scroll Cover Mounting
	809-0059	4	Scroll Mounting
21	821-0018	2	Screw, Self Locking - Regulator Mounting (1/4-20 x 5/8")
22	WASHER, LOCK		
	850-0030	3	Stator Mounting (#10)
	850-0045	2	Starter Motor Mounting (5/16")
23	CLIP, SPEED NUT		
	870-0106	4	Scroll Cover Mounting
	870-0106	4	Scroll Mounting
24	338-0709	1	Harness, Wiring - Alternator
25	517-0035	1	Plug, Dot Button - Scroll Cover



STARTING MOTOR PARTS GROUP

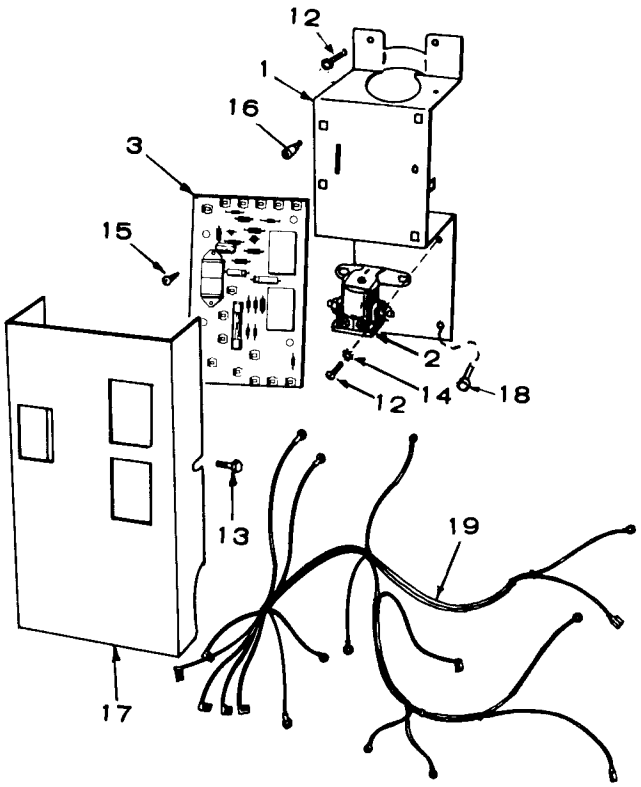
REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
	191-0915	1	Motor, Starting
1	191-0965	1	Lever Assembly
2	191-0966	1	Spring Set
3	191-0967	1	Switch Assembly
4	191-0968	2	Spring, Brush
5	191-0969	2	Bolt, Through
6	191-0970	1	Bracket Assembly, Front (Includes Bearing)
7	191-0971	1	Bearing, Front
8	191-0972	1	Stopper Set, Pinion
9	191-0973	1	Clutch Assembly
10	191-0974	1	Armature
11	191-0975	1	Washer Set
12	191-0976	1	Yoke Assembly (Includes Brush and Screws)
13	191-0977	4	Screw, Flat Head Machine
14	191-0978	1	Brush (+)
15	191-0979	1	Rear Bracket Assembly (Includes Bearing and Brush)
16	191-0980	1	Bearing, Rear
17	191-0981	1	Brush (-)
18	191-0982	1	Screw Set

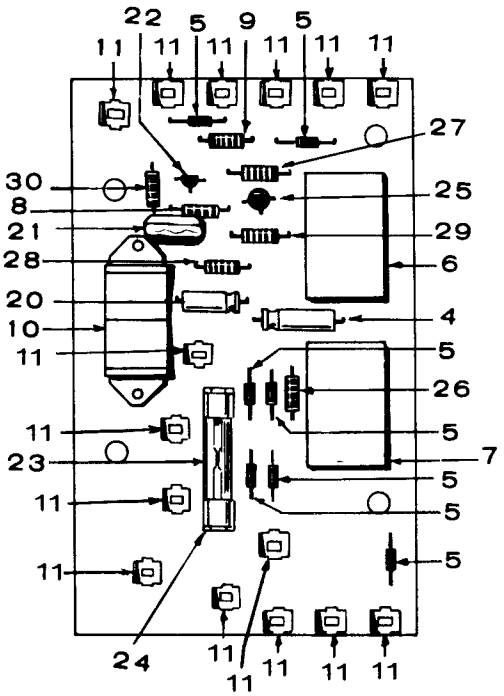


GENERATOR GROUP

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	231-0162	1	Adapter, Control
2	232-2365	1	Duct, Generator Air (Right Side)
3	232-2366	1	Duct, Generator Air (Left Side)
4	516-0182	4	Pin, Roll - Generator Adapter
5	SCREW, HEX HEAD		
	815-0340	6	Air Duct Mounting (#10-32 x 3/8")
	800-0051	4	Adapter Mounting (3/8-16 x 1-1/4")
	815-0359	4	Brush Block Mounting (#10-32 x 7/8")
	815-0374	1	Rectifier Mounting (#8-32 x 1-1/4")
	815-0359	4	Reactor Mounting (#10-32 x 7/8")
6	WASHER, LOCK		
	850-0050	4	Adapter Mounting (3/8")
	850-0045	8	Generator Through Stud (5/16")
7	520-0783	1	Stud, Rotor Through
8	520-0731	4	Stud, Generator Mounting
9	201-1986	1	Armature Assembly, Wound (Includes Bearing and Collector Ring)
10	204-0115	1	Ring, Collector
11	510-0047	1	Bearing, Ball
12	220-1857	1	Frame and Stator, Wound
13	211-0224	1	Bell, End
14	212-0351	2	Block Assembly (Includes Brushes and Springs)
15	214-0096	4	Brush
16	212-1232	4	Spring, Brush
17	315-0380	1	Reactor, Compounding
18	508-0178	1	Grommet, Output Leads
19	516-0182	4	Pin, Roll
20	305-0519	1	Plug, Rectifier Bridge
21	305-0517	1	Bridge, Rectifier
22	232-2368	4	Seal, Generator to Adapter
23	526-0115	4	Washer, Flat - Generator Through Stud
24	862-0015	8	Nut, Hex - Generator Through Stud
25	234-0461	3	Screen, End Bell
26	232-0596	1	Clip, Generator Bearing Stop
27	870-0273	1	Nut, Rotor Through Stud

CONTROL GROUP



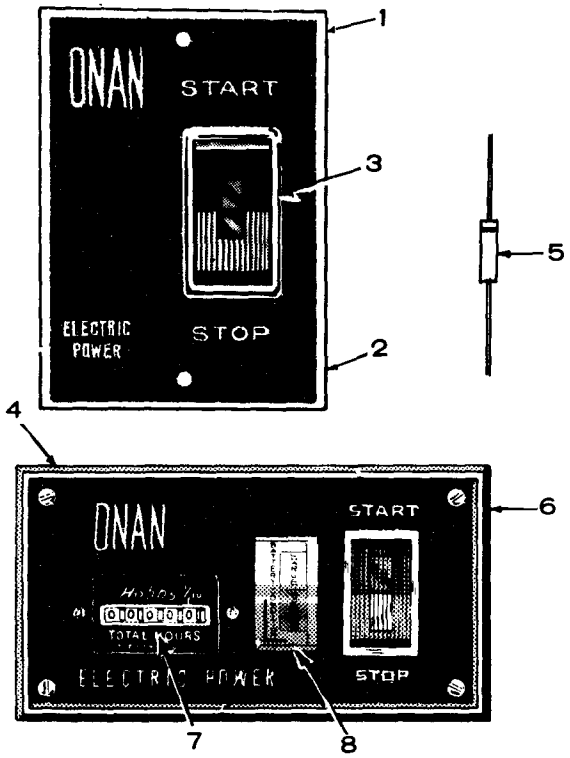


REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	301-3596	1	Bracket, Control and Coil Mounting
2	307-0845	1	Relay - Start Solenoid
3	300-0944	1	Control Assembly (Includes Parts Marked *)
4	356-0058	1	*Capacitor (100Mfd., 15 VDC)
5	357-0004	7	*Rectifier, Silicon
6	307-1197	1	*Relay, Start Disconnect
7	307-1196	1	*Relay, Engine Stop
8	350-0524	1	*Resistor (100-Ohm, 1/2 Watt)
9	350-0526	1	*Resistor (330-Ohm, 1/2 Watt)
10	308-0320	1	*Switch
11	332-1511	15	*Tab, Stake
12	812-0146	2	Screw, Round Head - Start Solenoid Mounting (1/4-20 x 3/8")
13	815-0379	2	Screw, Hex Head - Control Cover Mounting (#10 x 1/2")
14	853-0013	2	Washer, Shakeproof - Start Solenoid Mounting
15	815-0382	4	Screw, Sheet Metal - Control to Bracket (#8 x 1")
16	870-0280	4	Nut, Insulating - Control to Bracket
17	301-3597	1	Cover, Control
18	815-0261	4	Screw, Control Bracket Mounting - Hex Cap (#10-32 x 5/16")
19	338-0697	1	Harness, Wiring - Control to Engine
20	356-0046	1	*Capacitor (5Mfd., 25 Volt)
21	355-0025	1	*Capacitor (.1Mfd., 100 Volt)
22	364-0011	1	*Rectifier, Gate Control (8 Amp., 30 Volt)
23	321-0181	1	*Fuse, 5 Amp
24	321-0163	2	*Clip, Fuse Holder
25	361-0006	1	*Transistor, Unijunction
26	350-0370	1	*Resistor (200-Ohm, 1/2 Watt)
27	350-0568	1	*Resistor (470 K Ohm, 1/2 Watt)
28	350-0421	1	*Resistor (27 K Ohm, 1/2 Watt)
29	350-0416	1	*Resistor (16 K Ohm, 1/2 Watt)
30	350-0325	1	*Resistor (2.7-Ohm, 1/2 Watt)

* - Parts included in the 300-0944 Control Assembly.

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
	168-0123	1	Gasket Kit, Carbon Removal
	168-0126	1	Gasket Kit, Engine
	522-0268	1	Overhaul Kit

REMOTE CONTROL GROUP-
OPTIONAL EQUIPMENT



REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	300-0985	1	Control Assembly, Remote (Includes Parts Marked +)
2	301-3566	1	+Panel, Control
3	308-0341	1	*+Switch, Rocker
4	300-0986	1	Control Assembly, Deluxe Remote (Includes Parts Marked *)
5	359-0008	1	*Diode, Zener
6	301-3606	1	*Panel, Control
7	302-0885	1	*Meter, Running Time
8	302-0888	1	*Meter, Battery Voltage

+ - Included in 300-0985 Control Assembly.
* - Included in 300-0986 Control Assembly.

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 Distributors or their Approved and Registered Service Dealers. A complete listing of these Onan Authorized Parts and Service Centers is provided in our brochure F-115, a copy of which is supplied with each Onan Product. These Onan Authorized Service Centers have trained service personnel, parts stock, and the necessary facilities and tools for the service and repair of Onan equipment.

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 Distributors in whose territory the equipment is located. These Distributors and their Approved or Registered 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

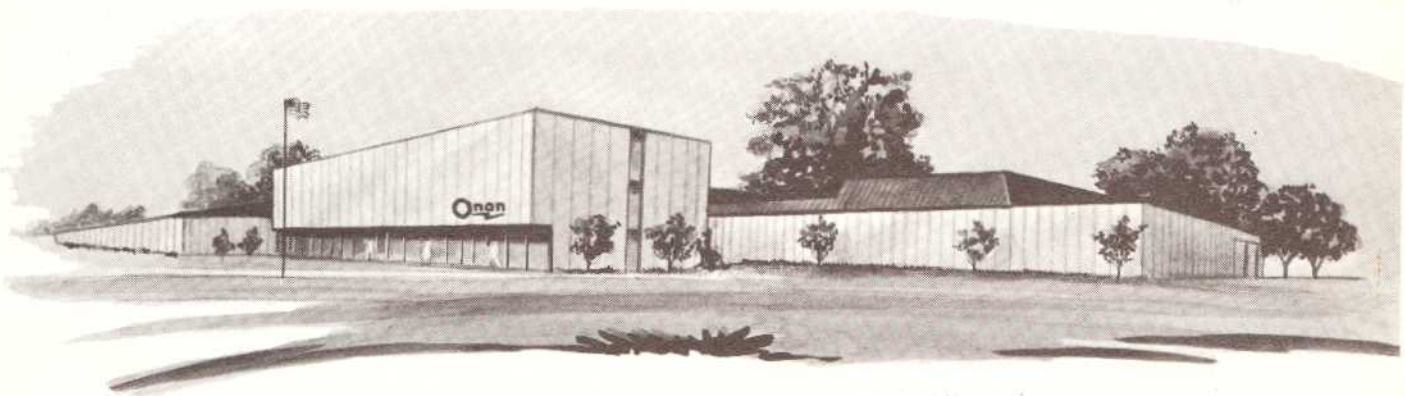
Installation is extremely important and all Onan Products should be installed in accordance with the manufacturer's recommendations. If the owner experiences any difficulty with such items as mounting, ventilation, exhaust location, fuel lines, wiring, etc., he should immediately contact the company from whom he purchased the equipment so that corrective action can be taken. Although the Onan Authorized Distributor and his Approved or Registered Service Dealers 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-22A
Replaces 23B054
Rev. 11-1-71

Power on Demand
for the Fun Things in Life



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