

OPERATORS MANUAL AND PARTS CATALOG

FOR

RDJC

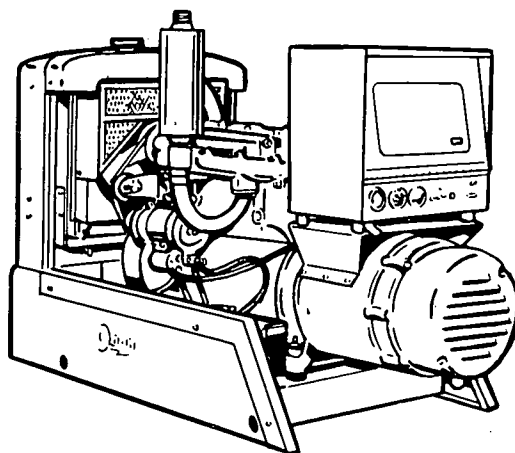
SERIES

ELECTRIC GENERATING SETS

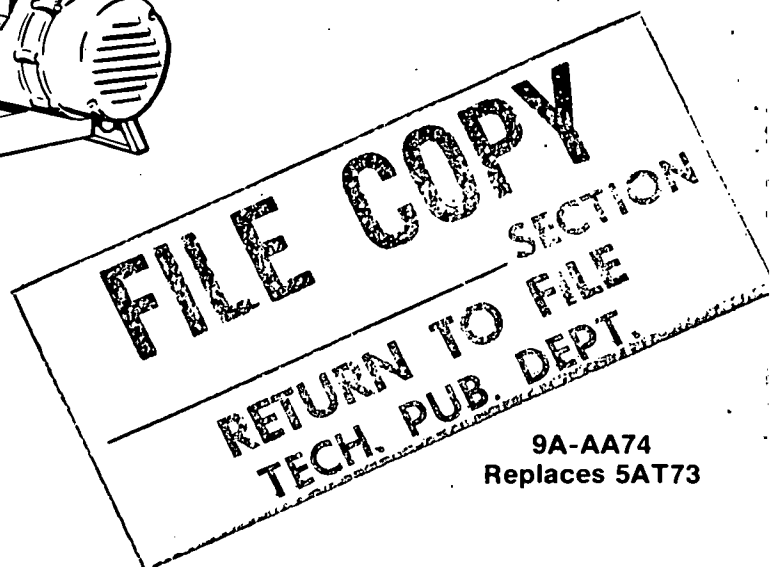
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INTRODUCTION

THIS OPERATOR'S MANUAL CONTAINS INFORMATION PERTAINING TO THE OPERATION AND MAINTENANCE OF YOUR UNIT.

WE SUGGEST YOU KEEP THE MANUAL AND THE WIRING DIAGRAM WHICH ACCOMPANIES EVERY UNIT AND REFER TO IT WHEN MAKING EQUIPMENT ADJUSTMENTS OR ORDERING PARTS. ADDITIONAL COPIES ARE AVAILABLE FOR A NOMINAL CHARGE FROM YOUR DISTRIBUTOR.

WHEN ORDERING PARTS, REMEMBER TO INCLUDE THE MODEL, SPECIFICATION LETTER, AND SERIAL NUMBER LOCATED ON THE UNIT NAMEPLATE. THIS IS ESSENTIAL TO ENSURE THE CORRECT PART IS SHIPPED TO YOU.

FOR REPAIR SERVICE, CONTACT YOUR AUTHORIZED SERVICE REPRESENTATIVE.

WARNING

TO AVOID POSSIBLE PERSONAL INJURY OR EQUIPMENT DAMAGE, A QUALIFIED ELECTRICIAN OR AN AUTHORIZED SERVICE REPRESENTATIVE MUST PERFORM INSTALLATION AND ALL SERVICE.

SAFETY PRECAUTIONS

The following symbols in this manual signal potentially dangerous conditions to the operator or equipment. Read this manual carefully. Know when these conditions can exist. Then, take necessary steps to protect personnel as well as equipment.

WARNING Onan uses this symbol throughout this manual to warn of possible serious personal injury.

CAUTION This symbol refers to possible equipment damage.

Fuels, electrical equipment, batteries, exhaust gases and moving parts present potential hazards that could result in serious, personal injury. Take care in following these recommended procedures.

- **Use Extreme Caution Near Gasoline, Gaseous Fuel And Diesel Fuel. A constant potential explosive or fire hazard exists.**

Do not fill fuel tank near unit with engine running. Do not smoke or use open flame near the unit or the fuel tank.

Be sure all fuel supplies have a positive shutoff valve.

Fuel lines must be of steel piping, adequately secured and free from leaks. Do not use copper piping on flexible lines as copper becomes hardened and brittle. Use black pipe on natural gas or gaseous fuels, not on gasoline or diesel fuels. Piping at the engine should be approved flexible line.

Have a fire extinguisher nearby. Be sure extinguisher is properly maintained and be familiar with its proper use. Extinguishers rated ABC by the NFPA are appropriate for all applications. Consult the local fire department for the correct type of extinguisher for various applications.

- **Guard Against Electric Shock**

Remove electric power before removing protective shields or touching electrical equipment. Use rubber insulative mats placed on dry wood platforms over floors that are metal or concrete when around electrical equipment. Do not wear damp clothing (particularly wet shoes) or allow skin

surfaces to be damp when handling electrical equipment.

Jewelry is a good conductor of electricity and should be removed when working on electrical equipment.

Use extreme caution when working on electrical components. High voltages cause injury or death.

Follow all state and local electrical codes. Have all electrical installations performed by a qualified licensed electrician.

- **Do Not Smoke While Servicing Batteries**

Lead acid batteries emit a highly explosive hydrogen gas that can be ignited by electrical arcing or by smoking.

- **Exhaust Gases Are Toxic**

Provide an adequate exhaust system to properly expell discharged gases. Check exhaust system regularly for leaks. Ensure that exhaust manifolds are secure and not warped.

Be sure the unit is well ventilated.

- **Keep The Unit And Surrounding Area Clean.**

Remove all oil deposits. Remove all unnecessary grease and oil from the unit. Accumulated grease and oil can cause overheating and subsequent engine damage and may present a potential fire hazard.

Dispose of oily rags. Keep the floor clean and dry.

- **Protect Against Moving Parts.**

Avoid moving parts of the unit. Loose jackets, shirts or sleeves should not be permitted because of the danger of becoming caught in moving parts.

Make sure all nuts and bolts are secure. Keep power shields and guards in position.

If adjustments *must* be made while the unit is running, use extreme caution around hot manifolds, moving parts, etc.

Do not work on this equipment when mentally or physically fatigued.

GENERAL INFORMATION

MODEL IDENTIFICATION

Instructions in this manual may refer to a specific model of generating set; identify the model by referring to the MODEL and SPEC (specification) NO. as shown on the set nameplate. Electrical characteristics are shown on the lower portion of the set nameplate.

How to interpret MODEL and SPEC NO.

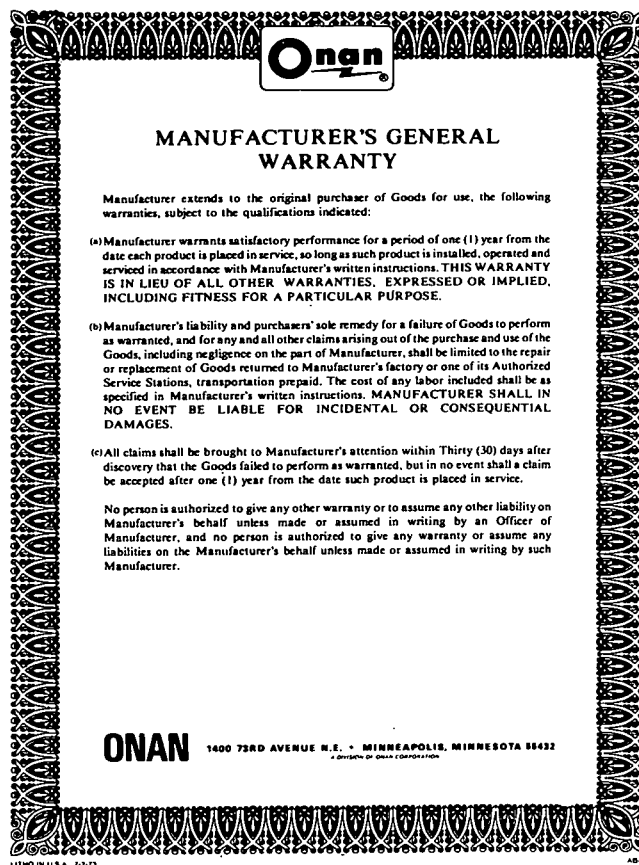
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1. Factory code for general identification.
2. Specific Type:
C - Indicates reconnectable.
R - REMOTE type. Electric starting. For permanent installation, can be connected to optional accessory equipment for remote or automatic control of starting and stopping.
3. Factory code for optional equipment.
4. Specification (Spec) letter (advances when factory makes production modifications).

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IMPORTANT...RETURN WARRANTY CARD ATTACHED TO UNIT

SPECIFICATIONS

GENERAL

Nominal dimensions of set (inches)

Unhoused	40-1/8 h x 27 w x 62 lg
Housed	40-1/8 h x 27 w x 73-13/16 lg

Weight (Nominal)

Unhoused	1120 lb.
Housed	1220 lb.

ENGINE DETAILS

Number cylinders (vertical in-line)	4
Displacement (cubic inch)	120
Cylinder bore	3-1/4 inch
Piston stroke	3-5/8 inch
Compression ratio	19 to 1
RPM (for 60 Hertz)	1800
RPM (for 50 Hertz)	1500
Exhaust connection (pipe tapped)	1-1/2 inch
Governor	Internal Flyball Type (Externally Adjustable)
Air cleaner type	Dry
Diesel fuel lift (maximum feet)	6
Oil filter	Full Flow Type

CAPACITIES AND REQUIREMENTS

Battery voltage	12 Volt
Battery size (AC plant)	
SAE group 1H	2 in Series
Amp/hr, SAE 20-hr (nominal)	105
Starting by solenoid shift starter with over-running clutch	yes
Centrifugal start-disconnect switch	yes
Battery charge rate amperes (normal)	2
Charge ammeter scale	5-0-5
*Oil capacity in U.S. quarts (refill)	6
Water capacity (radiator cooled)	12 quarts
Ventilation required (cfm at 1800 rpm)	
Engine	2750
Generator	120
Combustion	64

GENERATOR DETAILS

Output is rated at unity power factor load on these models	1 Phase
Output is rated at 0.8 power factor on these models	3 Phase
Rating (AC output in watts)	
60 Hertz - Continuous Standby	15,000
50 Hertz - Continuous Standby	12,500
AC voltage regulation	Plus or Minus 3%
AC frequency regulation	5%
Generator type	Revolving Field
120/240 Volt single phase model reconnectible	Yes
Broad range 3-phase 12-lead reconnectible (Begin Spec AA)	Yes
Excitation (Prior to Spec AA)	Static Exciter
Excitation (Begin Spec AA)	Brushless Exciter

* - Plus 1/2 quart for new filter.

DIMENSIONS AND CLEARANCES

All clearances given at room temperature of 70° F.
All dimensions in inches unless otherwise specified.

	Minimum	Maximum
CAMSHAFT		
Bearing Journal Diameter, Front.....	2.500	2.505
Bearing Journal Diameter, Rear	1.1875	1.1880
Bearing Clearance Limit	.0015	.0030
End Play, Camshaft.....	.007	.039
Cam Tappet Diameter	.8725	.8730
Cam Tappet Hole Diameter	.8755	.8765
CONNECTING RODS		
Large Bore Diameter.....	2.1871	2.1876
Small Bore Diameter.....	1.044	1.045
Distance Center Large Bearing Bore to Small Bore	5.998	6.002
Clearance, Bearing-to-Crankshaft	.001	.003
CYLINDER		
Cylinder Diameter Limits.....	3.4995	3.5005
CRANKSHAFT		
Main Bearing Journal Diameter.....	2.2437	2.4445
Main Bearing Clearance	.0030	.0043
Connecting Rod Journal Diameter.....	2.0600	2.0605
Rod Bearing Clearance	.0019	.0038
End Play, Crankshaft	.010	.015
PISTON		
Piston Clearance to Cylinder Wall (Measure 90° to Pin, Just Below Oil Ring Groove)	.0055	.0075
PISTON PIN		
Piston Clearance	Thumb Push Fit	
Connecting Rod Bushing	.0002	.0007
PISTON RINGS		
Piston Ring Gap	.010	.020
Ring Width, Top	.0925	.0935
2nd	.0925	.0935
3rd.....	.0925	.0935
VALVE, INTAKE (Stellite Faced)		
Stem Diameter	.3405	.0415
Guide Clearance	.0015	.0030
Valve Face	42°	
VALVE, EXHAUST (Stellite Faced)		
Stem Diameter	.3405	.3415
Guide Clearance	.0025	.0045
Valve Face	45°	

VALVE GUIDE

Length	1-25/32	
Outside Diameter	.4690	.4695
Inside Diameter (After Reaming)		
Exhaust	.344	.345
Intake	.342	.343
Cylinder Block Bore Diameter	.467	.468

VALVE SEATS (Stellite)

Valve Seat Bore		
Diameter	1.361	1.362
Depth (From Cylinder Head Face)	.433	.439
Seat Insert Outside Diameter	1.364	1.365
Seat Width	3/64	1/16
Seat Angle	45°	
Available Oversizes	.002, .005, .010, .025	

VALVE SPRINGS

Load, Valve Open	87.2 lbs.	97.2 lbs.
Load, Valve Closed	45 lbs.	49 lbs.

TUNE-UP SPECIFICATIONS

Cylinder Head Bolt Torque, lbs.-ft.	44-46
Glow Plug Torque, lbs.-ft.	10-15
Valve Clearances	
Intake	.011"
Exhaust	.016"
Centrifugal Switch	.040"
Start-Disconnect Switch	.020"

.025"

DESCRIPTION

GENERAL

An Onan RDJC Series electric generating set consists of a four-cylinder, in-line diesel engine and a 15.0KW (12.0KW for 50 Hertz) alternating current generator with standard or optional equipment as ordered.

ENGINE

The RDJC engine has 120 cubic inch piston displacement, 19 to 1 compression ratio, and is radiator-cooled. Basic measurements and other details are listed under Specifications.

AC GENERATOR

The YD generators beginning with Spec AA (Figure 1) are four-pole, revolving field, brushless exciter models of drip-proof construction. Generator design includes both single and three-phase, 60 and 50 hertz type generators. The generator rotor connects directly to the engine crankshaft with a tapered shaft and key. The generator is fastened to the engine by the rotor-through-stud which passes through the rotor shaft; it has a nut on the outside of the end bell. A

centrifugal blower, on the front end of the rotor shaft, circulates the generator cooling air which is drawn in through the end bell cover, over the rotor, and discharged through an outlet at the blower end.

A ball bearing in the end bell supports the outer end of the rotor shaft. The end bell and generator stator housing are attached by four-through-studs which pass through the stator assembly to the engine-generator adapter. The brushless exciter stator mounts in the end bell while the exciter rotor and its rotating rectifier assemblies mount on the generator rotor shaft.

The basic operation of the generator and voltage regulator involves the stator, voltage regulator, exciter field and armature, a full wave bridge rectifier, and the generator rotor. Residual magnetism in the generator rotor and a permanent magnet embedded in one exciter field pole begin the voltage build-up process as the generator set starts running. Single-phase AC voltage, taken from one of the stator

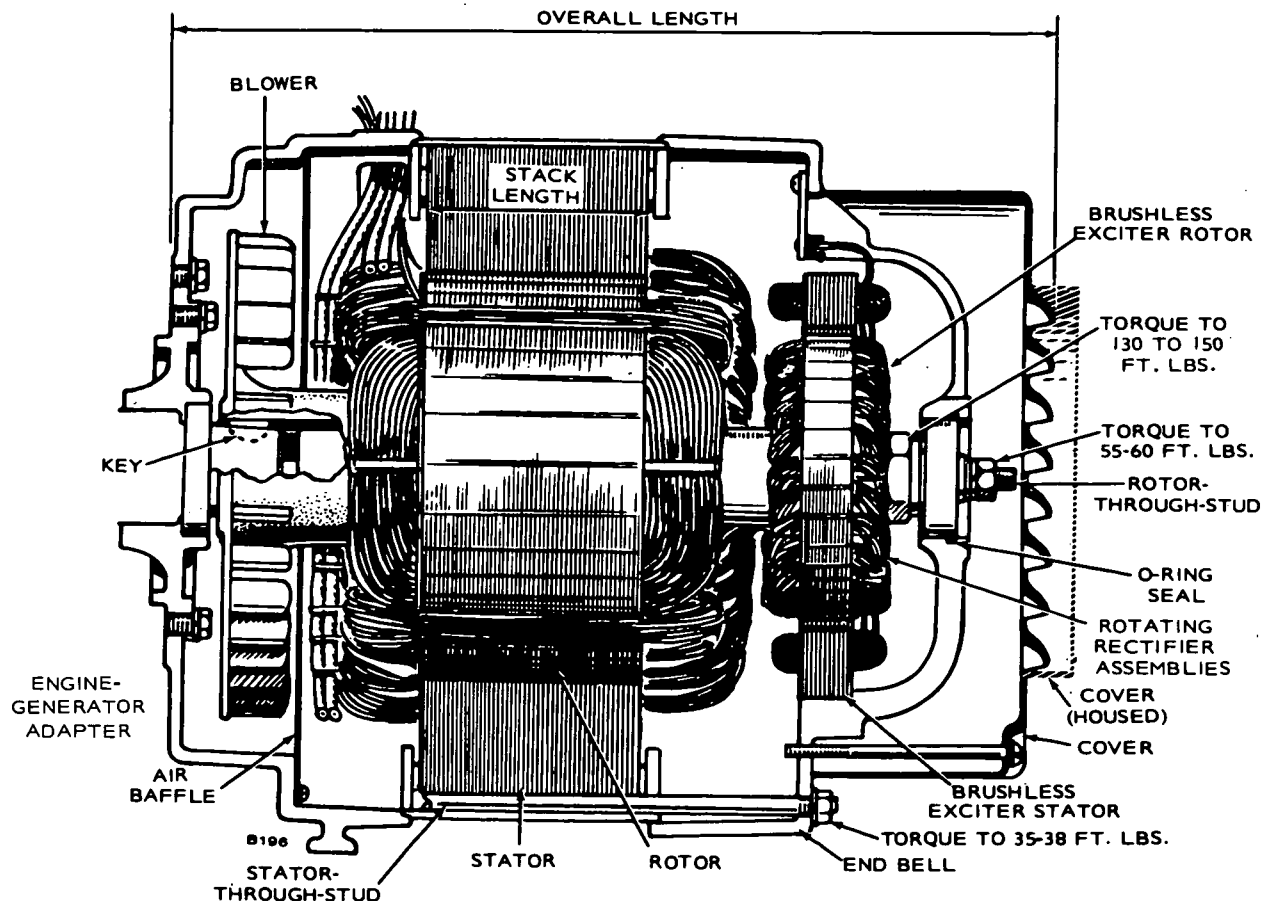


FIGURE 1. GENERATOR (CUTAWAY VIEW)

windings, is fed to the voltage regulator as a reference voltage for maintaining the generator output voltage. The AC reference voltage is converted to DC by a silicon controlled rectifier bridge on the voltage regulator printed circuit board and fed into the exciter field windings. The exciter armature produces three-phase AC voltage that is converted to DC by the rotating rectifier assembly. The resultant DC voltage excites the generator rotor winding to produce the stator output voltage for the AC load.

The generator rotor also produces AC voltage (19 to 21 volts) in the charging winding of the stator which is converted to direct current for battery charging.

VOLTAGE REGULATOR (Spec AA)

The line-voltage regulator on the J-series generator sets is an all solid state device; that is, no relays or tubes are needed. Basic components of the voltage regulator are:

- Printed circuit board VR21
- Voltage reference transformer T21
- Commutating reactor CMR21
- Field circuit breaker CB21
- Voltage adjust rheostat R22 (Optional)

Figure 2 shows the above components in a typical control box on radiator cooled electric generating sets.

CONTROLS

The standard radiator-cooled, diesel powered generating set control box has an upper and a lower instrument panel door, Figure 3. Standard control components include a battery charge rate DC ammeter, a RUN-STOP-REMOTE switch, HEATER switch, OIL PRESSURE gauge, WATER TEMPERATURE gauge, a CRANKING LIMITER and a field circuit breaker. Optional controls that may be added on the upper door panel include three AC ammeters, an AC voltmeter, a running time HOUR meter, a phase selector switch, a 50 or 60 Hertz frequency meter, line circuit breakers, and a voltage regulator adjust knob. Optional controls that may be added on the lower panel door include a PLANT FAILED TO START fault lamp, and three fault indication lamps for LOW OIL PRESSURE, HIGH WATER TEMPERATURE, and OVERSPEED with their associated push button reset switches.

CONTROL PANEL COMPONENTS

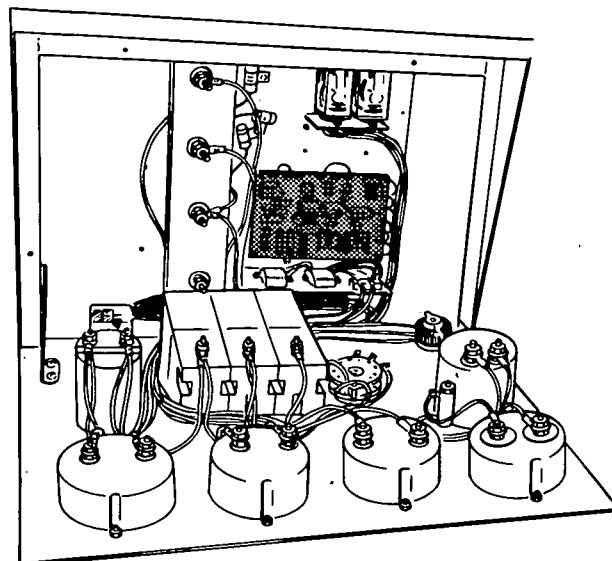
Controls and instruments on the RDJC series control panels vary according to the customers purchase order. The following is a brief description of typical components located on the panels.

Standard:

Run-Stop-Remote Switch: Starts and stops the unit locally or from a remote location.

Preheat Switch: Controls manifold heater and glow plugs.

Battery Charge Rate DC Ammeter: Indicates the battery charging current.



VOLTAGE REGULATOR
LOCATION

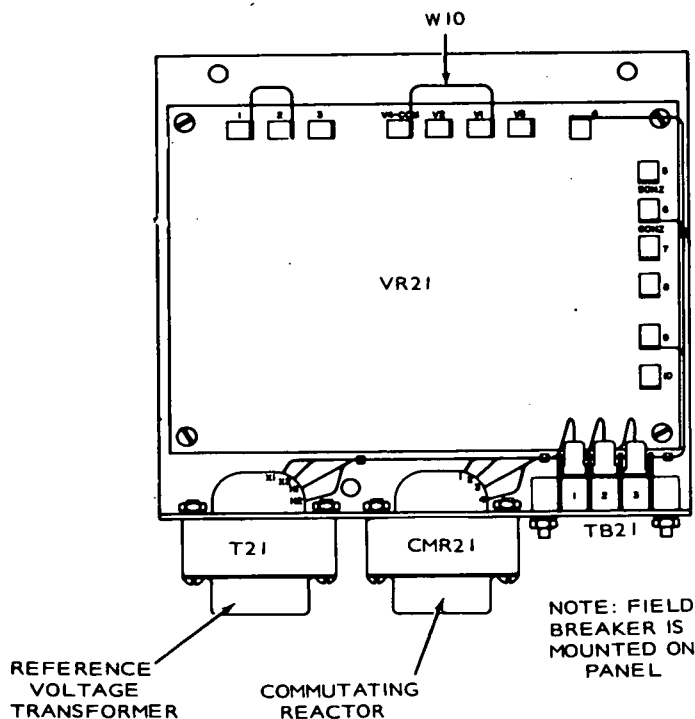


FIGURE 2. VOLTAGE REGULATOR

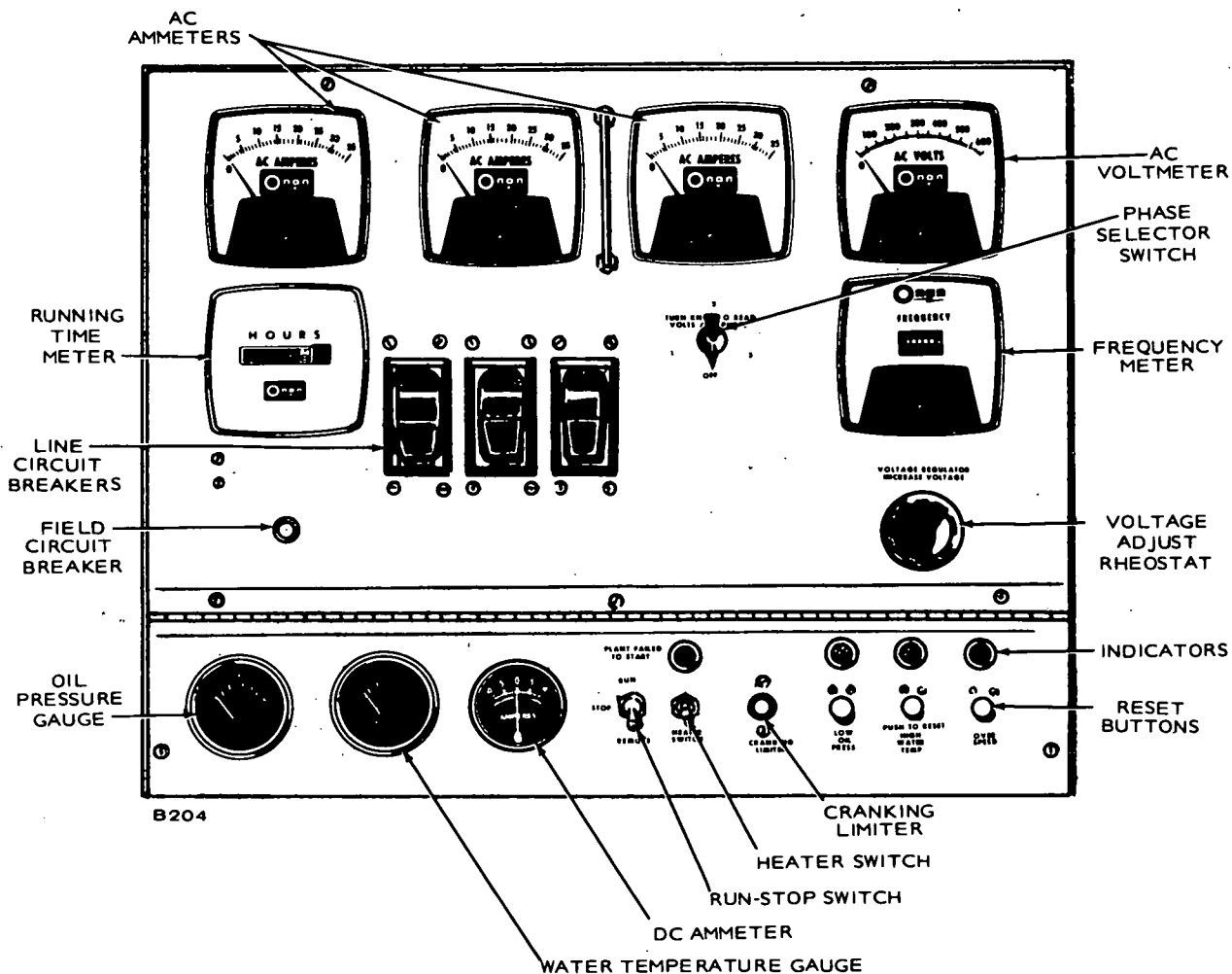


FIGURE 3. TYPICAL RADIATOR-COOLED SET CONTROL PANEL

Field Circuit Breaker: Provides generator exciter and regulator protection from overheating in the event of certain failure modes of the generator, exciter and voltage regulator.

Oil Pressure Gauge: Indicates pressure of lubricating oil in engine (wired to a sensor unit located on the engine).

Water Temperature Gauge: Indicates temperature of circulating coolant in engine. (Wired to a sensor unit located on the engine.)

Cranking Limiter: Thermally actuated device limits cranking time to between 45 and 90 seconds depending on the ambient temperature. Red pushbutton pops out and cannot be reset until one minute has elapsed.

Optional:

AC Voltmeter: Indicates AC generator output voltage.

Voltmeter Phase Selector Switch: Selects the phases of the generator output to be measured by the AC voltmeter.

Voltage Adjust Rheostat: Provides approximately plus or minus 5% adjustment of the rated output voltage.

Running Time Meter: Registers the total number of hours to 1/10th that the unit has run. Use it to keep a record for periodic servicing. Time is accumulative; meter cannot be reset.

Frequency Meter: Indicates the frequency of the generator output in hertz. It can be used to check engine speed. (Each hertz equals 30 rpm.)

Warning Lights: Four red indicator lights give warning of:

1. Plant failed to start.
2. Overspeed.
3. Low oil pressure.
4. High engine temperature.

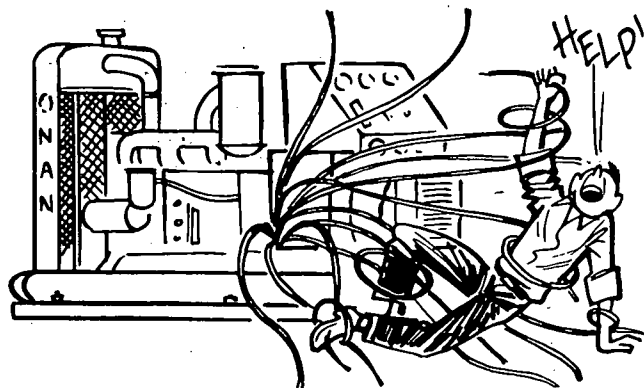
Three reset pushbuttons permit restarting after trouble is corrected.

Line Circuit Breakers: Protects generator line overloads.

VOLTAGE RECONNECTION WITH OPTIONAL INSTRUMENTS

The optional AC instruments on the control panel (such as voltmeters, ammeters, and running time meters) are installed for use with specific nameplate voltages. Control components may have to be changed to match new current ratings when field reconnection for other voltage codes or voltages are made.

CAUTION To prevent instrument damage, contact your Onan Service Center for required instrument changes, new wiring diagrams, proper specification number, and voltage before attempting to reconnect a generator with instruments on the control panel.



INSTALLATION

GENERAL

Installations must be considered individually, however, the following installation guidelines should be followed. Installations must conform to local building codes, fire ordinances and other local, state or federal regulations. See Figure 4.

Installation requirements to consider.

1. Level mounting surface.
2. Adequate cooling air.
3. Adequate fresh induction air.
4. Discharge of circulated air.
5. Discharge of exhaust gases.
6. Electrical connections.
7. Fuel connections.
8. Accessibility for operation and servicing.
9. Vibration isolation.
10. Noise levels.

LOCATION

Provide a location that is protected from the weather and is dry, clean, dust free and well ventilated. If practical, install inside a heated building for protection from extremes in weather conditions.

The air discharge side of set requires 3 inches clearance from wall to permit set to rock on its mounts; at least 24 inches clearance is required around all other sides for service accessibility.

MOUNTING

A permanent installation needs a sturdy, level mounting base of concrete, heavy wood or structural steel, preferably raised to aid oil changing and operation. Set may be bolted in position if desired. Allow at least 24 inch clearance on all sides of the set for convenience in servicing.

Mobile applications (as in trucks or trailers) must be securely bolted down to prevent shifting in transit. Extra support for the vehicle flooring may be necessary. On all installations, carefully assemble the mounting cushions, washers and spacer bushing. The spacer bushing prevents compression of the snubber (upper rubber cushion). Place the cushions under the engine and generator mounting feet, using cushions with higher number (part number is shown on cushion) on generator (heavier) end. Space the 3/8-inch diameter mounting bolts in floor or base with distances between hole centers as follows: Engine end — 11 inches; generator end — 10-1/2 inches; and engine-to-generator — 21 inches.

CAUTION

Be sure there is at least 1/2-inch clearance between oil filter and end of mounting bolt to avoid puncturing the filter.

VENTILATION

Generator sets create a considerable amount of heat which must be removed by proper ventilation. Outdoor installation can rely on natural air circulation, but mobile and indoor installations need properly sized and positioned vents for the required air flow. See Specifications for air requirements at 1800 rpm.

Cooling air travels from the rear of the set to the front end. Locate the room or compartment air inlet where most convenient, preferably to the rear of the set. The inlet opening should be at least as large as the radiator area.

Engine heat is removed by a pusher fan which blows cooling air out through the front of the radiator. The cooling air outlet should be directly in front of the radiator and as close as is practical. The opening size should be at least as large as the radiator area. A duct of canvas or sheet metal may be used between the radiator and the air outlet opening. Ducts prevent recirculation of heated air.

Generator cooling air is discharged from the engine-to-generator-adapter on the left side of the engine.

In cold weather a means of restricting the air flow can be provided to keep the room or compartment temperature at a normal point.

On city water cooled sets, the conventional radiator is not used and a constant water flow cools the engine. Ventilation is seldom a problem, but sufficient air movement and fresh air must be available to properly cool the generator and support combustion in the engine. For small compartments, a duct larger than the generator outlet opening is recommended to remove heated air from the generator to the outside. Limit bends and use radius type elbows where needed. A large, well ventilated compartment or room does not require a hot air duct. Water cooled exhaust manifolds are recommended.

CITY WATER COOLING (OPTIONAL)

Connections on the engine are 3/8-inch pipe. A solenoid shut-off valve and a manual supply valve are furnished but not installed. The solenoid valve is coordinated with the engine control to shut off the water supply when set is not in use.

The manual supply valve is adjusted to control water rate-of-flow for proper cooling with a minimum flow of water. Final adjustment should be made under the maximum load the set will carry with the engine thoroughly warmed up and water temperature stabilized.

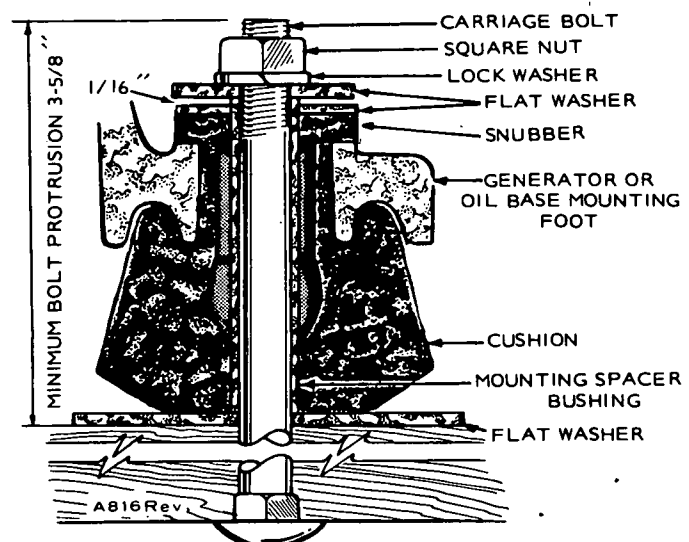
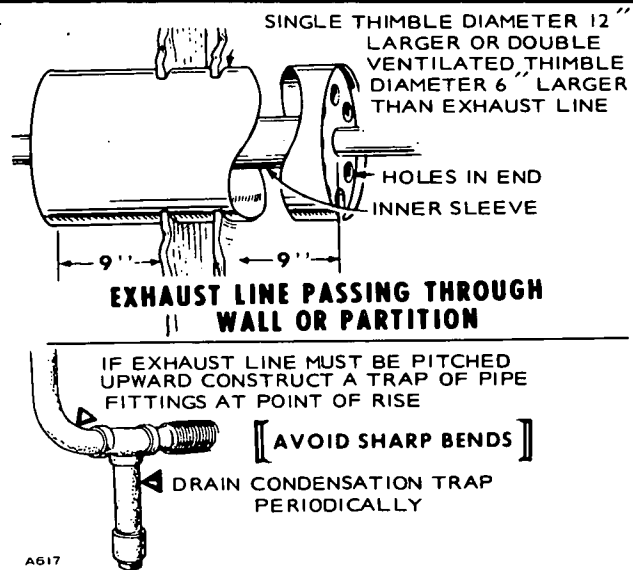
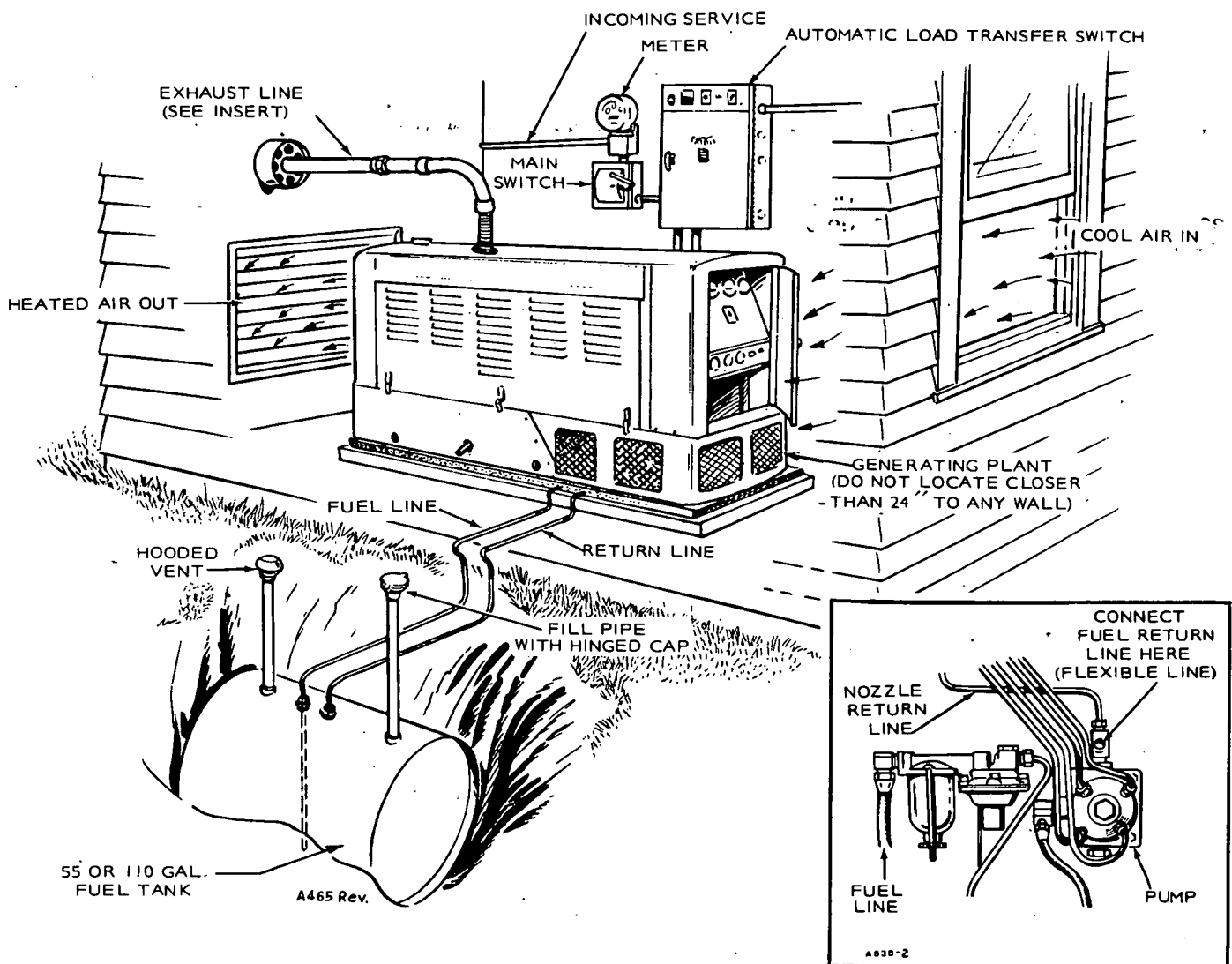


FIGURE 4. TYPICAL INSTALLATION

HEAT EXCHANGER COOLING (OPTIONAL)

This is a closed cooling system commonly referred to as fresh water cooling, Figure 5. Water circulated through the engine is termed fresh water, hot water, jacketed water, etc. Water circulated through the heat exchanger only is called raw water, sea water, cold water, discharged water, city water, etc. This system (with anti-freeze coolant) is recommended where freezing hazards exist or where the owner wants to prevent salt water problems.

Two conditions prevail: (1) Factory installed heat exchanger, and (2) Customer installed Onan heat exchanger kit. Get details from Onan.

CAUTION For field installation of heat exchanger kit, do not use existing neoprene impeller water pump for hot water side of cooling system. Heat or soluble oil (in many rust inhibitors and anti-freezes) will damage the impeller. Always connect the neoprene impeller pump to the cold water side. Use a centrifugal metal impeller water pump (Oberdorfer 1-GP, or equal) in the hot water side. Drive it with a belt from the set's power takeoff. Use an expansion tank in the hot water side.

On early models with heat exchangers, the discharged water leaves at the exhaust manifold. On later models, discharged water leaves at the heat ex-

changer and then to exhaust system water inlet. Supply line connections in both systems are the same. Refer to the instructions for standard systems in this section.

Fill closed cooling systems with clean, alkali-free water, to the proper level in the expansion tank. Add an approved rust inhibitor to the coolant. If the coolant is anti-freeze, test it periodically.

Install a new zinc "pencil" (Figure 5) which screws into raw water inlet end of heat exchanger, every two months or as inspection dictates.

CAUTION Use an expansion tank in the closed water system to maintain proper water level by preventing overflow and loss of coolant when the engine heats up.

Use a centrifugal metal impeller water pump (Oberdorfer 1-GP, or equal) in the hot water side. Drive it with a belt from the engine power takeoff.

Fill closed cooling systems with clean, alkali-free water, to the proper level in the expansion tank. Add an approved rust inhibitor to the coolant. If the coolant is anti-freeze, test it periodically.

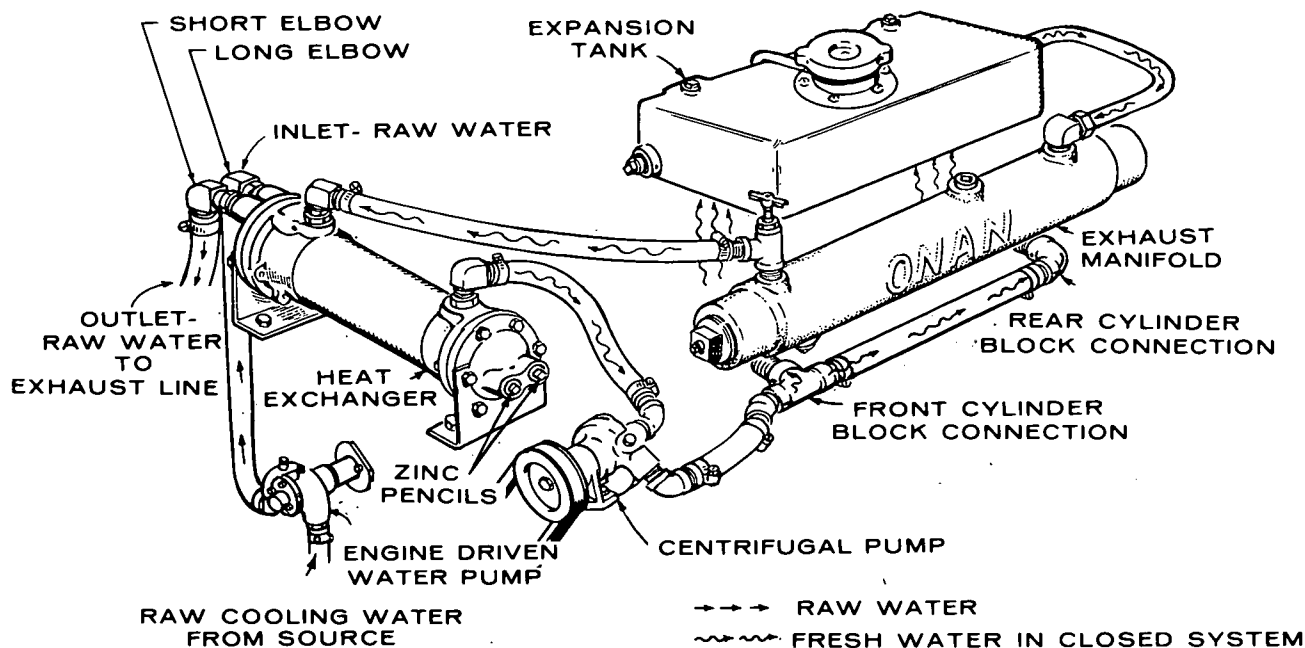


FIGURE 5. HEAT EXCHANGER PLUMBING

EXHAUST

Exhaust installations are subjected to various detrimental conditions, such as extreme heat, infrequent operation, light operating loads, and etc. Therefore, regular and frequent inspections are necessary to ensure that the exhaust system remains fume-tight and safe for operation.

WARNING Utilizing exhaust manifold heat to warm a room or compartment occupied by people is not recommended due to possible leaking of harmful exhaust gases.

WARNING Pipe **POISONOUS** exhaust gas outside enclosure. Inhalation of exhaust gases can result in serious injury or death.

Pipe exhaust gases outside any enclosure. The exhaust outlet is 1-1/2-inch pipe size. Locate the exhaust outlet far from the air inlet to avoid gases re-entering the enclosure. Use flexible tubing to connect between the engine exhaust and any rigid pipe extension. Shield the line if it passes through a combustible wall, Figure 4. If bends are necessary, use sweeping (large radius) elbows. If pitched upward install a condensation trap at point of rise. Increase one pipe size for each additional 10 feet in length.

FUEL TANK AND LINES

Where a separate fuel tank is used, install the fuel tank so that the bottom of the tank will be less than 6 feet below the fuel pump. The top of the fuel supply tank must be below the fuel pump to prevent siphoning if a system leak occurs. For servicing put a valve at the tank. Where the fuel is shared, do not connect to an existing line at a point above the fuel supply level. This avoids starving the engine.

WARNING The fuel system should meet applicable codes. Always use flexible tubing between engine and the fuel supply to avoid line failure and leaks due to vibration. Fuel leaks create fire and explosion hazards and waste fuel.

If fuel lift exceeds 6 feet, install an auxiliary electric fuel pump near the fuel supply. See Wiring Diagram for installation connection.

Use approved flexible fuel line next to the engine. Diesel engines require a fuel supply line and a separate fuel return line. Install the fuel supply line from the supply tank to the inverted flare male elbow mounted in the inlet of the fuel pump. Install the fuel return line from the injection pump bleeder valve to the supply tank, Figure 6.

WARNING Fuel leakage in or around the generator compartment is a fire and explosive hazard. Therefore, the ventilation system must remove accumulated fuel vapors prior to starting the engine and continuously remove hazardous fumes during operation. Ventilation blowers should be wired to operate automatically whenever the generator is running.

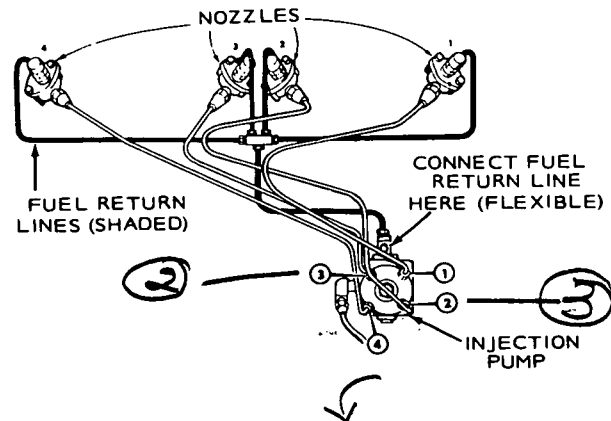


FIGURE 6. FUEL SYSTEM

WARNING Do not use galvanized lines, fittings, or fuel tanks in underground portions of the fuel system. Hazardous fuel leaks may be caused by electrolytic corrosion from moisture and chemicals in the soil (galvanism). Some safety ordinances prohibit the use of galvanized materials in fuel systems and the use of threaded cast iron fittings as well.

CAUTION Carefully clean all fuel system components before putting the unit in operation. Any dirt or contamination may cause major damage to the fuel injection system.

OIL DRAIN

Extend to suit installation. Oil base has a 1/2 inch pipe tapped hole.

ELECTRICAL CONNECTIONS

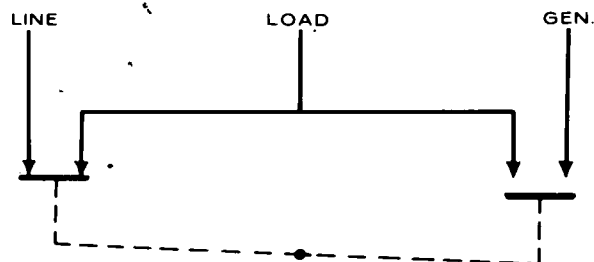
The nameplate on the generator set shows the electrical output rating of the generator in watts, volts, and hertz. The wiring diagram, shipped with the generator set, shows the electrical circuits and connections needed during installation.

Meet all applicable electrical code requirements. Work should be done by a qualified serviceman or electrician because the installation will be inspected.

LOAD WIRES

The control box (junction box) has knock out sections to accommodate load wires. Use flexible conduit and stranded load wires near the set to absorb vibration. Use sufficiently large insulated wires. Strip insulation from wire ends as necessary for clean connections. Connect each load wire to the proper generator output lead inside the set box. Insulate bare ends of ungrounded wires. Use bolt provided on control box to connect the generator ground lead and load wire. Install a fused main switch (or circuit breaker) between the generator and load. If a test-run indicates wrong rotation of 3 phase motors in the load circuit, switch the connections at any two generator terminals.

Standby: If the installation is for standby service, install a double-throw transfer switch (either manual or automatic type) to prevent feeding generator output into the normal power source lines and to also prevent commercial power and generator output from being connected to the load at the same time. Instructions for connecting an automatic load transfer switch is included with such equipment. See Figure 7.



NOTE: SHOWN WITH LINE CONNECTED TO LOAD.

FIGURE 7. LOAD TRANSFER SWITCH

Balance All Loads: Divide the loads equally between output leads. Current loads for any one output lead must not exceed nameplate rating.



Overloading can damage the generator windings. Divide the loads equally between output leads.

Single Phase Loads on Three Phase Generators: Any combination of single phase and three phase loading can be used at the same time as long as the current for any output lead does not exceed the generator nameplate rating.

Output Lead Markings: Leads on revolving field generators are marked T¹, T², etc. These identifying marks also appear on the wiring diagram.

SWITCHBOARD

A wall mounted switchboard containing ammeters, a voltmeter, and circuit breakers is optional. When used, the following connections apply:

1. Connect one ungrounded (hot) generator lead to the unused terminal on each ammeter.
2. Connect the generator lead and load wires which are to be grounded to the ground stud on the switchboard.
3. Connect one ungrounded (hot) load wire to the unused terminal on each circuit breaker.
4. On sets that generate more than one voltage (example: 120/240), the voltmeter should be wired to indicate the higher of the two voltages.

RECONNECTIBLE GENERATORS, BEGIN SPEC AA

The factory ships all special order sets with instruments on the control panels completely wired for the voltage code or voltage specified on the customers purchase order. Standard sets without instruments are shipped with the T¹-T⁴ or T¹-T¹² output leads separated in the output box. These single phase and broad range generators are connectible or later reconnectible to provide any of the output voltages shown in Figure 8.

Code 3C or 53C Reconnectible Generators: The single phase, 60 and 50 Hertz generators have output leads T¹, T², T³, and T⁴ available for making the single phase voltage and load connections shown in Figure 8 at the installation site. Grounding procedure should comply with local codes.

Code 18R or 518R Reconnectible Generators: The three phase, broad range, 60 and 50 Hertz 12 lead generators have output leads T¹ through T¹² available for making several single and three phase voltage load connections shown in Figure 8. Grounding procedure should comply with local codes.

When connecting the output leads, be sure to connect jumper W10 on the voltage regulator printed circuit board between terminal V⁴ (common) and V¹, V², or V³ as listed on the reconnection diagram.

A broad range generator is capable of generating numerous different output voltages as indicated by the reconnection diagram.

Code 9X Generators: These special order three phase, 60 Hertz, 4 wire, generators are prewired at the factory to provide 347/600 VAC. Output leads T¹, T², T³, and T⁰ are available for connection to the load wires. See connection diagram. Grounding procedure should comply with local electrical codes.

GENERATORS PRIOR TO SPEC AA

Revolving field generators, used with the RDJC series prior to Spec AA, have four leads. Connections for these generators are shown in Figure 9.

Reconnectible Single Phase Generators: Code 3C models, such as RDJC-3C are reconnectible for use as 120/240 volt 3 wire; 120 volt two wire; or 240 volt 2 wire units (Figure 8) except when optionally equipped with a meter panel.

Delta Generators: On these generators, T⁰ is the center tap between T¹ and T²; T⁰ is normally not grounded but may be grounded if required.

Grounding: A number 8 or larger wire should be used to connect the generator housing to a rod or pipe that penetrates into moist earth. If a solderless connector is not provided on the generator, connect the ground wire at the battery ground stud on the engine.

NAMEPLATE VOLTAGE CODE	VOLTAGE	PHASE	FREQUENCY	CONNECT W10 JUMPER WIRE FROM V4 TO:	GENERATOR CONNECTION	GENERATOR CONNECTION SCHEMATIC DIAGRAM	LOAD TO GENERATOR CONNECTION WIRING DIAGRAM
3C	120/240	1	60	V1		A	CONNECT X1 TO VR21-5 FOR 50 HERTZ AND X1 TO VR21-6 FOR 60 HERTZ GENERATORS.
53C	120/240	1	50	V1		B	
	115/230	1	50	V2		C	
	110/220	1	50	V3			
18	120/208	3	60	V1	PARALLEL WYE		
	127/220	3	60	V2			
	139/240	3	60	V4			
518	110/190	3	50	V1			
	115/200	3	50	V2	SERIES WYE		
	120/208	3	50	V3			
	127/220	3	50	V4			
18	240/416	3	60	V1			
	254/440	3	60	V2	SERIES DELTA		
	277/480	3	60	V4			
518	220/380	3	50	V1			
	230/400	3	50	V2			
	240/416	3	50	V3	DOUBLE DELTA		
	254/440	3	50	V4			
18	120/240	3	60	V1			
518	110/220	3	50	V1			
	115/230	3	50	V2	PARALLEL DELTA		
	120/240	3	50	V3			
18	120/240	1	60	V1			
518	110/220	1	50	V1			
	115/230	1	50	V2	WYE		
	120/240	1	50	V3			
18	120	1	60	V1			
518	110	1	50	V1			
	115	1	50	V2	WYE		
	120	1	50	V3			
9X	347/600	3	60	V4			
B20C							

FIGURE 8. GENERATOR WIRING AND CONNECTION DIAGRAMS

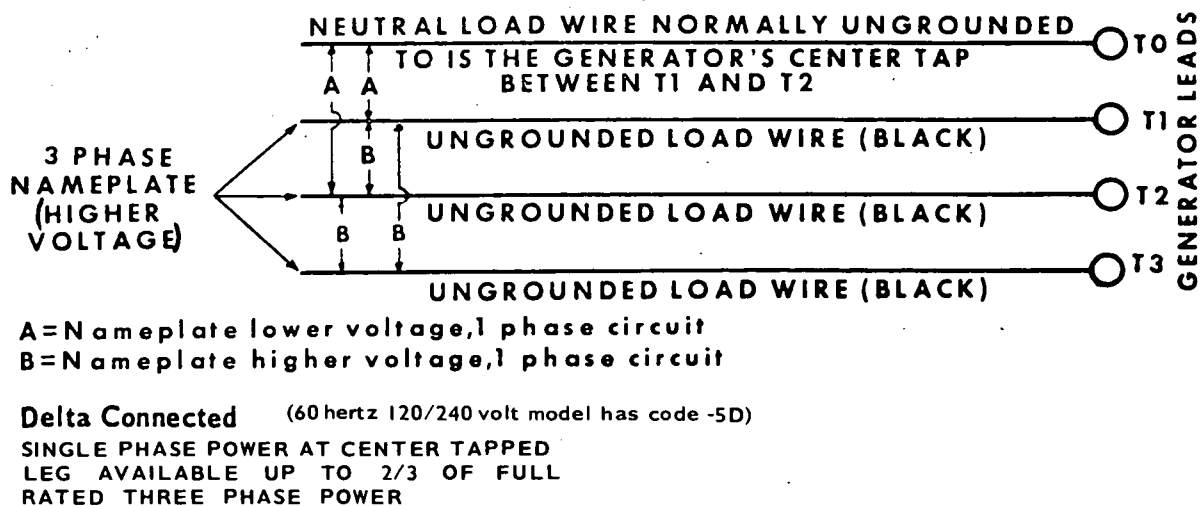
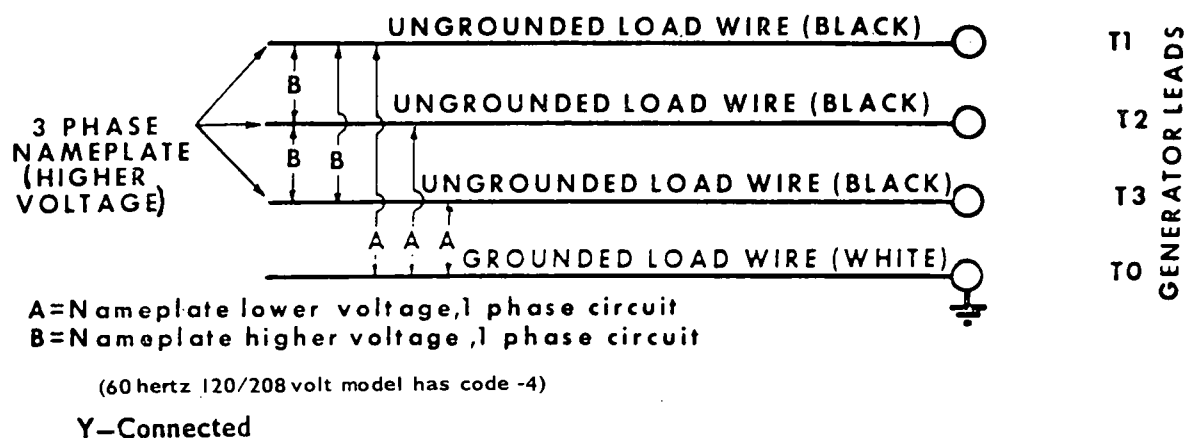
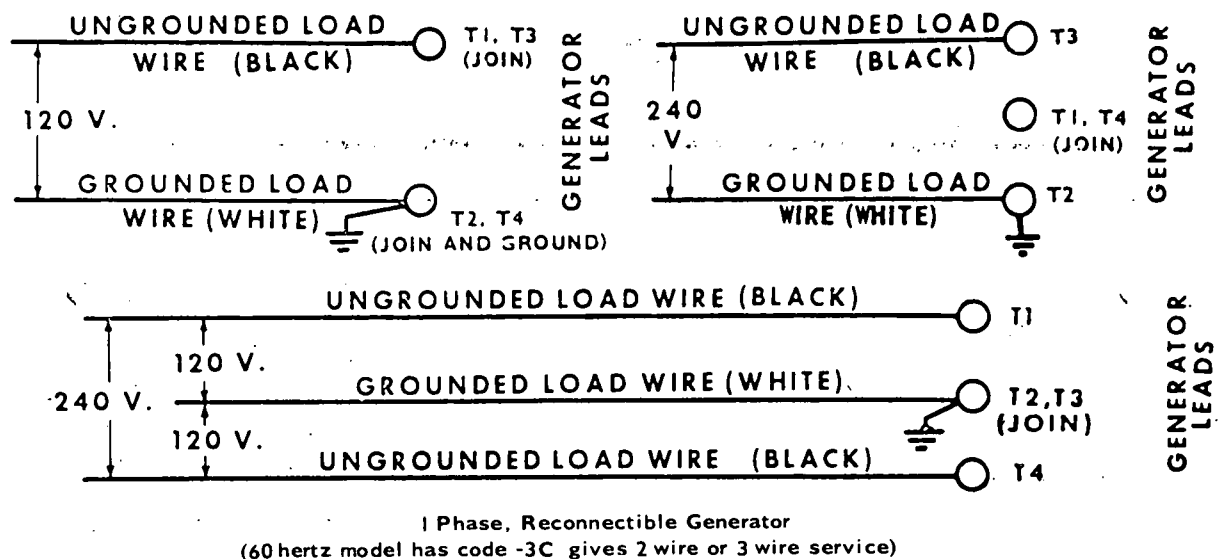


FIGURE 9. LOAD WIRE CONNECTIONS

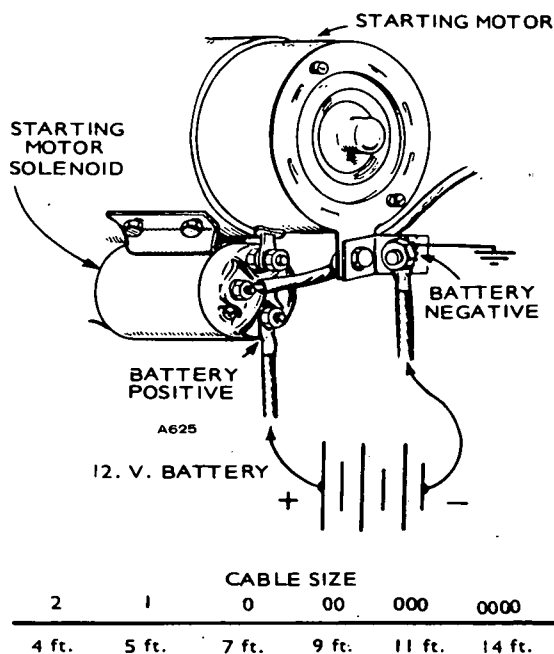


FIGURE 10. BATTERY CONNECTION

BATTERY CONNECTIONS

The battery is connected for negative (-) ground, Figure 10. Be sure all battery connections are secure.

Battery polarity must agree with the rectifier located in the control box. If battery ground must be changed, reverse the rectifier connection in the control box.

CAUTION If battery polarity is reversed, damage will occur within 3 minutes while stopped or 5 seconds while running. Alternator windings will be damaged almost instantly if battery charging circuit is shorted between resistor R21 and the R1 end of the charging winding.

See Specifications for minimum 12 volt battery requirements. Connect battery positive (+) to starter engaging solenoid terminal post, Figure 10. Connect battery negative (-) to a good ground on the engine.

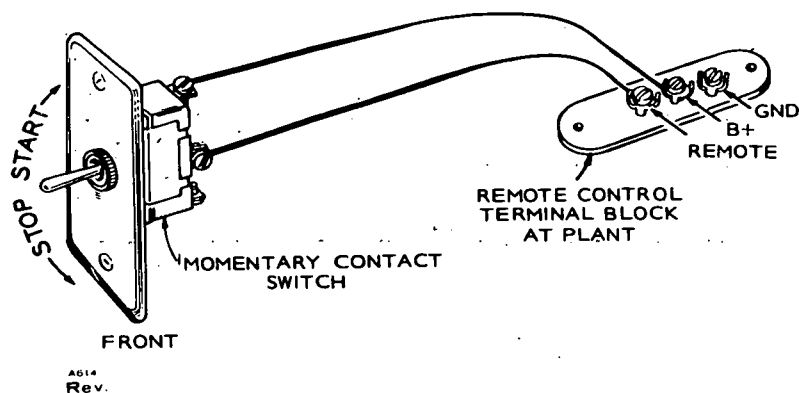
Sets may be equipped for 24 volt cranking and battery charging circuit. Battery connections are similar to 12 volt connections. Provide two 12 volt batteries connected in series (one battery negative to the other battery positive).

OPTIONAL ALARM

The GND terminal on the remote control terminal block is for a customer supplied alarm at a remote location to warn of emergency shutdown. Refer to Wiring Diagram for proper voltages.

REMOTE START-STOP SWITCH (Optional)

For remote control starting and stopping, use 2-wires to connect the remote switch single-pole double-throw, momentary contact (center-off type), to the terminal block marked B+ and remote in control box using wire sizes as listed in Figure 11.



WIRE SIZE	DISTANCE
#18	to 900 ft.
#16	to 1500 ft.
#14	to 2400 ft.
#12	to 3700 ft.

FIGURE 11. REMOTE CONTROL SWITCH.

OPERATION

PRE-STARTING

Preparations for the initial and each additional starting operation should include careful checks of the oil, fuel, cooling, and electrical systems. The cylinder air housing door should be closed with all air shrouds in place.

Before generator set is put in operation, check all components for mechanical security. If an abnormal condition, defective part, or operating difficulty is detected, repair or service as required. The generator set should be kept free of dust, dirt, and spilled oil or fuel. Be sure proper operating procedure is followed.

Crankcase Oil: Use an oil with the API designation CD/SD or CD/SE. However, to reduce oil consumption to a normal level in the shortest time possible on a new or rebuilt engine, use CC oil for the first fill only (50 hours). Then use the recommended oil only. Select the correct SAE grade oil by referring to the following:

Above 30°F	SAE 30
0°F to 30°F	SAE 10W or 5W-30
Below 0°F	SAE 5W-30

Multigrade oils are recommended for temperature of 30°F and below, but they are not recommended for temperatures above 30°F. When adding oil between oil changes, it is preferable to use the same brand as various brands of oil may not be compatible when mixed together.

Recommended Fuel: Although number 2 diesel fuel gives the best economy for most operating conditions, number 1 diesel fuel can be used:

1. When ambient temperatures are below 32°F;
2. During long periods of light engine load; or,
3. If preferred by user.

Use low sulfur content fuel having a pour point (ability to filter) of at least 10°F below the lowest expected temperature. Keep the fuel clean and protected from adverse weather. Leave some room for expansion when filling the fuel tank.

CAUTION Due to the precise tolerances of diesel injection systems, it is extremely important the fuel be kept clean. Dirt in the system can cause severe damage to both the injection pump and the injection nozzles.

Bleed air from fuel system as follows: Disconnect the fuel return line. See Figure 12. Operate the hand priming lever on diaphragm type fuel transfer pump until there are no air bubbles in fuel flowing from the fuel return line fitting. Then connect the fuel return line.

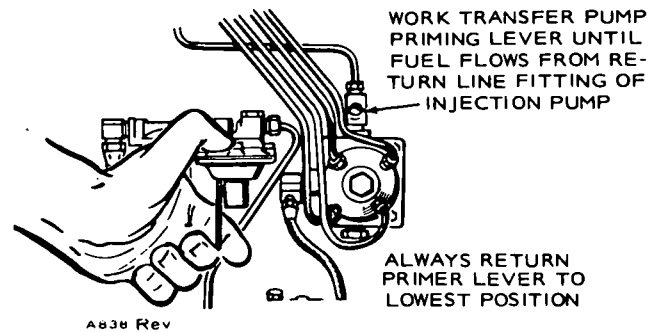


FIGURE 12. PRIMING FUEL SYSTEM

If the camshaft's pump lobe is up, crank engine one revolution to permit hand priming. When finished, return priming lever inward (disengaged position) to permit normal pump operation.

Radiator: See Specifications for water capacity. Check to see that the radiator drain valve is closed and cylinder block drain plug is tight. Fill the radiator with clean, soft (alkali free) water such as rain water. The use of a good rust and scale inhibitor is recommended.

If the set will be exposed to freezing temperatures, use a standard anti-freeze solution. Use the correct proportion of anti-freeze as recommended by the anti-freeze manufacturer, to protect to at least 10°F below the lowest expected temperature.

AC Generator: Periodic inspections, that coincide with engine oil changes will ensure good performance.

STARTING SEQUENCE

The starting and stopping (Figure 13) sequence shows the manual, mechanical, and electrical events required for satisfactory start, run, and stop cycles.

PRE-HEATING AND STARTING

Extremes in starting temperatures may require additional preheating. If engine fails to start quickly, rest engine several seconds and repeat starting sequence applying preheat for a longer interval using heater switch.

If the set control has a reset button, push it to reset only after a shutdown resulting from oil pressure failure occurs. Find the cause before restarting the engine.

To prevent false starts, hold on start switch until the centrifugal switch automatically disengages starter motor.

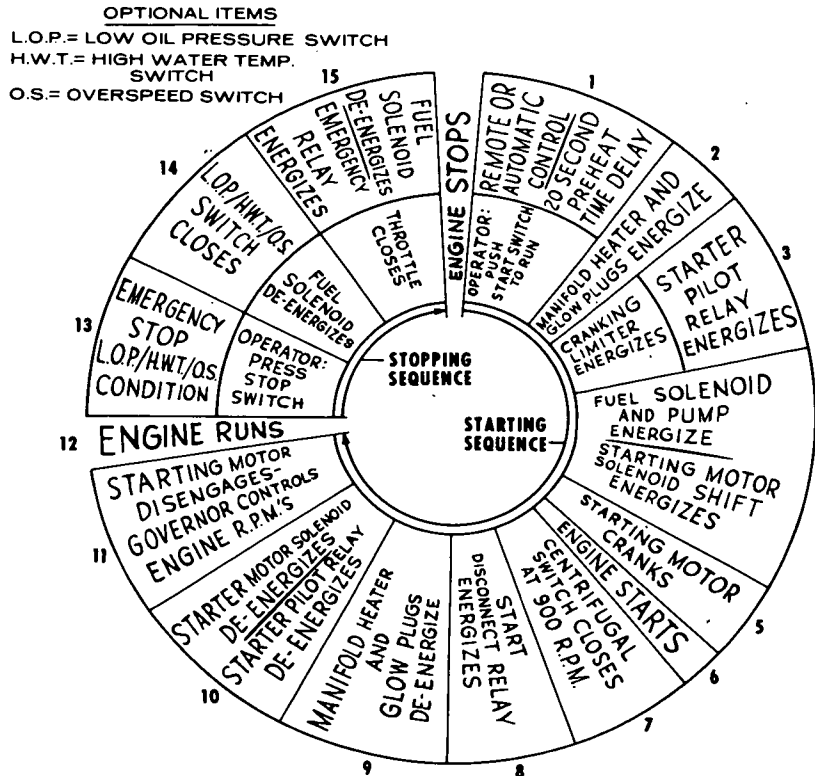


FIGURE 13. OPERATING CYCLE

Push the RUN-STOP-REMOTE switch to its RUN position (engine will preheat and crank in about 20 seconds). After engine starts, see that the oil pressure gauge reads at least 20 psi. Relief valve pressure is not adjustable.

When starting set from a remote station, the switch on the set control must be in its REMOTE position.

When engine comes up to speed, cranking will automatically stop through the centrifugal switch and start-disconnect relay. If the engine fails to start in from 45 to 120 seconds, the cranking limiter will trip and cranking will stop. If this occurs on the initial start or from other conditions such as out of fuel, remedy the cause. Wait one minute before resetting the cranking limiter and reattempting to start.

Make sure centrifugal switch closes during speed buildup (about 900 rpm's).

CAUTION Do not apply overvoltage to the starting circuit at any time. Overvoltage will destroy the glow plugs and air heater in 2 to 3 seconds. If it becomes necessary to use an additional source of power to start the set — use a 12 volt battery connected in parallel.

AUTOMATIC STARTING AND STOPPING

Separate controls may be used for automatic start

and stop, but must provide engine preheating.

The automatic control has a time delay relay to preheat glow plugs and the manifold heater for about 20 seconds before cranking occurs. The time delay relay prevents immediate engagement of the starter in case the load is reapplied before the engine stops.

STOPPING

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

APPLYING LOAD

If practicable, allow set to warm up before connecting a heavy load. Continuous generator overloading may cause high operating temperatures that can damage the windings. The generator can safely handle an overload temporarily, but for normal operation, keep the load within nameplate rating. The exhaust system may form carbon deposits during operation at light loads; apply full load occasionally before shut-down to prevent excessive carbon accumulations.

Try to connect the load in steps instead of full load at one time. Most installations use a line switch that must be closed to connect a portion of the load.

SAFETY DEVICES

In case of dangerously high coolant (water) temperature or low oil pressure, the cutoff switch stops the unit. After an emergency stop, investigate and correct the cause. Press reset button before restarting.

BREAK-IN PROCEDURE

The unit should be run in the following sequence:

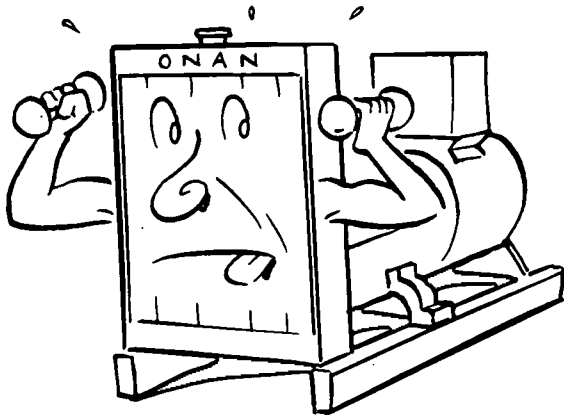
1. One half hour at 1/2 load.
2. One half hour at 3/4 load.
3. Full load.

Continuous running under one half load during the first few hundred hours usually results in poor piston ring seating, causing higher than normal oil consumption and blowby.

Drain and replace the crankcase oil after 50 hours of operation; drain while the engine is still hot.

EXERCISE STANDBY PLANTS

Infrequent use results in hard starting. Operate standby sets at least 30 minutes each week. Run longer if battery needs charging.



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 set to a warm location or apply heated air (never use open flame) externally until oil flows freely.
2. Use fresh fuel. Protect against moisture condensation.
3. Keep fuel system clean, and batteries in a well charged condition.
4. Partially restrict cool air flow but use care to avoid overheating.
5. Use additional preheat time before cranking. Between 30°F and 55°F preheat for one minute; below 30°F preheat for two minutes. At low temperatures, if engine won't start after cranking one minute, repeat preheating step.

6. If freezing temperature is anticipated during stopped periods and engine is not protected with anti-freeze, drain radiator and engine block. Attach warning tag to refill before operation.

HIGH TEMPERATURES

1. See that nothing obstructs air flow to and from set.
2. Be sure set location is properly ventilated.
3. Check level of battery electrolyte frequently and add approved water when necessary to maintain proper level.
4. Keep cooling system clean, radiator filled and see that fan belt tension is properly adjusted.

DUST AND DIRT

1. Keep set clean. Keep cooling fins free of dirt, etc.
2. Service air cleaner. See Maintenance Schedule.
3. Change crankcase oil every 100 operating hours.
4. Keep oil and fuel in dust-tight containers.
5. Keep governor linkage clean.

HIGH ALTITUDE

Maximum power will be reduced approximately 4 percent for each 1000 feet above sea level, after the first 1000 feet.

ENGINE RATINGS

Ratings apply to altitudes up to 1000 feet, standard cooling, normal ambients and with No. 2 Diesel fuel. Consult nearest Onan service center or factory for operating characteristics under other conditions.

OUT-OF-SERVICE PROTECTION

The natural lubricating qualities of No. 2 diesel fuel should protect a diesel engine for at least 30-days when unit is not in service. To protect a set that will be out of service for more than 30 days, proceed as follows:

1. Run set until thoroughly warm; generator under at least 50 percent load.
2. Shut down engine and drain oil base while still warm. Refill and attach a warning tag indicating viscosity of oil used.

8. Disconnect batteries and remove from vessel. Service batteries by maintaining liquid level and using a trickle charger to maintain voltage.

CAUTION Discharged batteries are subject to severe damage if exposed to freezing temperatures. Store all batteries in a fully charged condition and maintain charge during storage.

9. Provide a suitable cover for the entire unit.

RETURNING THE SET TO OPERATION

1. Remove cover and all protective wrapping. Remove plug from exhaust outlet.
2. Check warning tag on oil base and verify that oil viscosity is still correct for existing ambient temperature.
3. Clean and check battery. Measure specific gravity (1.260 at 77°F [25°C]) and verify level to be at split ring. If specific gravity is low, charge until correct value is obtained. If level is low, add distilled water and charge until specific gravity is correct. DO NOT OVERCHARGE.

WARNING Do not smoke while servicing batteries. Explosive gases are emitted from batteries in operation. Ignition of these gases can cause severe personal injury.

4. Check that fuel lines and fittings are secure, without leaks.
5. Service cooling system with clean fresh water. Prime water pump and see that all air is bled from cooling system. If anti-freeze was left in closed type cooling system, check level and service as required.
6. Connect batteries.
7. Verify that no loads are connected to generator.
8. Start engine.
9. Avoid contact with scalding hot water which can cause severe burns.
10. Check all gauges to be reading correctly. Unit is ready for service.

HEAT EXCHANGER FILLING

Improper filling of the heat exchanger (Figure 14) can cause overheating of the engine. Therefore, to prevent this possibility, follow these instructions whenever adding coolant to the heat exchanger.

1. Remove fill cap.
2. Open fill vent valve (turn counterclockwise).
3. Remove vent plug
4. Fill with coolant until vents begin to overflow.
5. Close fill vent valve (turn clockwise).
6. Replace vent plug
7. Replace fill cap.
8. Operate unit 10 minutes at full load; watch for leaks.
9. Shut down unit.

WARNING After running unit 10 minutes, the closed cooling system is pressurized and hot. Open the 14 pound pressure cap slowly to vent pressure.

10. Slowly open pressure cap and check water level.
11. Fill system to top with coolant.

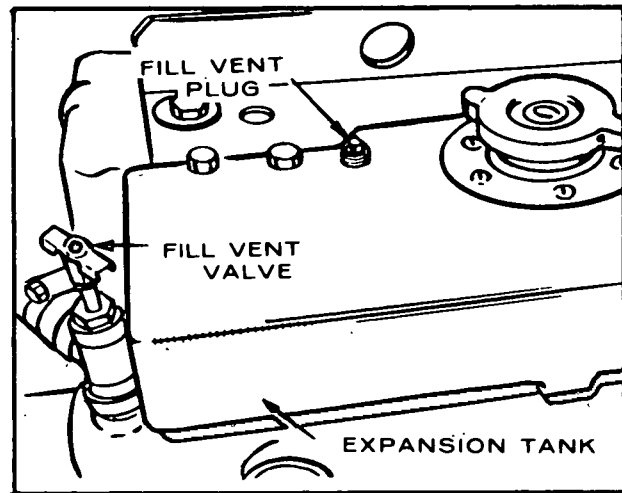


FIGURE 14. FILLING HEAT EXCHANGER

ADJUSTMENTS

CENTRIFUGAL SWITCH

The start-disconnect centrifugal switch (Figure 15) is located on the gear cover on the side of the engine above the oil filter. The switch opens when the engine stops and closes when engine speed reaches about 900 rpm. If necessary, loosen the stationary contact and adjust the point gap at 0.040 inch. Replace burned or faulty points.

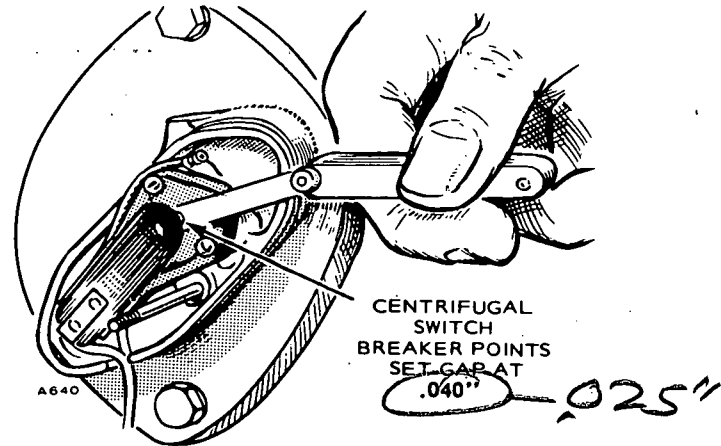


FIGURE 15. ADJUSTING BREAKER POINTS

multiplied by 30, on a 4 pole generator, thus 1800 rpm give 60 hertz frequency. Preferred speed does not vary more than 3 hertz from no-load to full-load operation. Be sure throttle, linkage, and governor mechanism operate smoothly.

Speed Adjustment: To change the governor speed, change the spring tension by turning the governor spring nut (Figure 16). Turn the nut clockwise (more spring tension) to increase RPM and counterclockwise to reduce governed speed. Hold a tachometer against flywheel cap screw.

Sensitivity Adjustment: To adjust governor sensitivity (no load to full load speed droop) turn the sensitivity adjusting ratchet accessible through a covered access hole on the side of the blower housing. On city water cooled units, counterclockwise gives more sensitivity (less speed drop when full load is applied), clockwise gives less sensitivity (more speed drop). On radiator cooled units clockwise gives more sensitivity when full load is applied; counterclockwise gives less sensitivity. If the governor is too sensitive, a rapid hunting condition occurs (alternate-increasing and decreasing speed). Adjust for maximum sensitivity without hunting. After sensitivity adjustment, the speed will require readjustment. After adjusting the governor, replace the knockout plug in the blower housing and secure speed stud lock nut.

CHARGE RATE ADJUSTMENT

The adjustable resistor slide tap (in the charging circuit) is set to give approximately 2 ampere charging rate. For applications requiring frequent starts, check battery specific gravity periodically and, if necessary, increase the charging rate slightly (move slide tap nearer ungrounded lead) until it keeps the

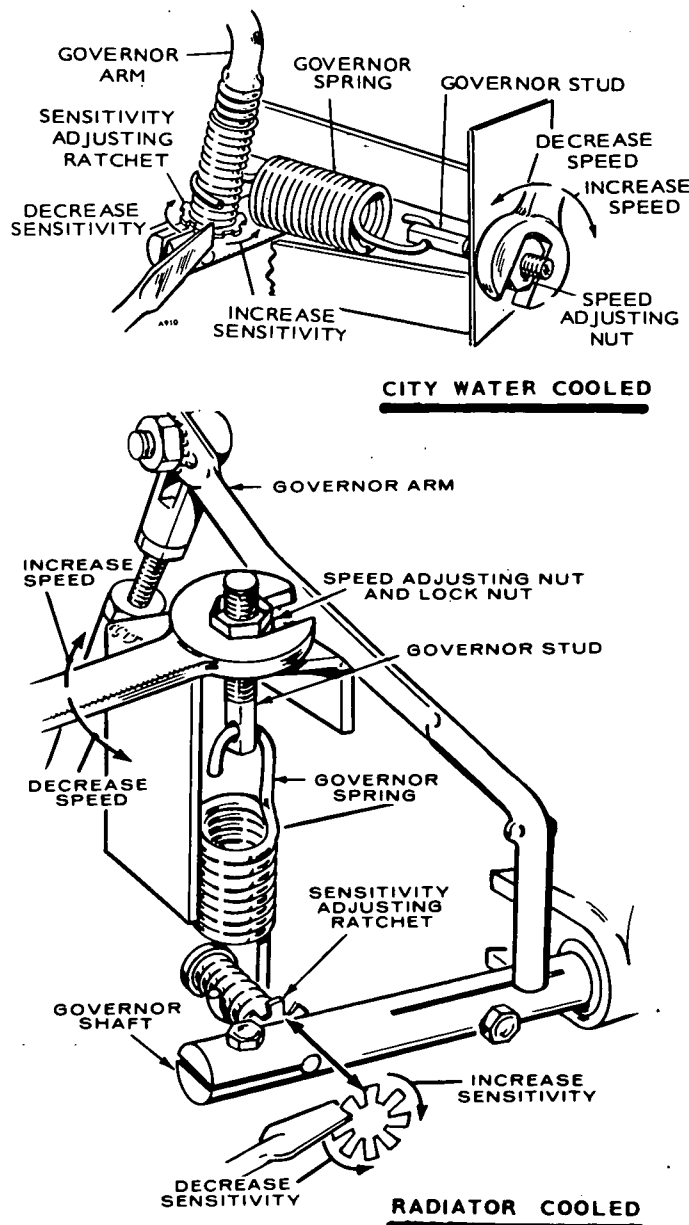


FIGURE 16. ADJUSTING GOVERNOR

battery charged. Adjust only when plant is stopped. Avoid overcharging. The resistor is located in the generator air outlet.

FAN BELT

To adjust the fan belt, loosen the nut on the belt tightener pulley shaft. Move the shaft left or right in the elongated slot in pulley mounting bracket until a deflection of 1/2-inch is obtained when about 15 pounds of force is applied at a point midway between the fan pulley and belt tightener pulley. Be sure to tighten nut securely.

SERVICE AND MAINTENANCE

GENERAL

Follow a regular schedule of inspection and servicing, based on operating hours (Table 1). Keep an accurate logbook of maintenance, servicing, and operating time. Use the running time meter (optional equipment) to keep a record of operation and servicing. Regular service periods are recommended for normal service and operating conditions. For continuous duty, extreme temperature, etc., service more frequently. For infrequent use, light duty, etc., service periods can be lengthened accordingly. Refer to Figures 17 and 18 for engine maintenance information.

WARNING

Before commencing any maintenance work on the engine, generator, control panel, automatic transfer switch or associated wiring, disconnect batteries. Failure to do so could result in damage to the unit or serious personal injury in the event of inadvertent starting.

Operator should periodically make a complete visual inspection with set running at rated load. Some of the things to check for are as follows:

1. Check all fuel and oil lines for possible leakage.
2. Inspect exhaust lines and mufflers for possible leakage and cracks.
3. Periodically or daily, drain moisture from condensation traps.
4. Inspect air shrouds for leaks and security. Be sure cooling fins are clean.
5. Inspect electrical wires and connections for security and fray damage.

If generator requires major repair or servicing, contact an authorized Onan dealer or distributor.

AC GENERATOR

Periodic inspections that coincide with engine oil changes will ensure good performance.

BEGIN SPEC AA.

When inspecting the rotating rectifier assembly, make sure diodes are free of dust, dirt and grease. Excessive foreign matter on these diodes and heat sinks will cause the diodes to overheat and will result in their failure. Blow out the assembly periodically, with filtered, low pressure air. Also check to see that diodes and leadwires are properly torqued. The diodes should be torqued to 25 in. lb. or finger tight plus a quarter turn. See Figure 1.

BATTERIES

Check the condition of the starting batteries at least every two weeks. See that connections are clean and tight. A light coating of non-conductive grease will retard corrosion at terminals. Keep the electrolyte at the proper level above the plates by adding distilled water. Check specific gravity; recharge if below 1.280.

MAINTENANCE SCHEDULE

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

TABLE 1.
OPERATOR AND SERVICE MAINTENANCE SCHEDULE

HOURS OF OPERATION	MAINTENANCE TASK
8	• Inspect generator set • Check fuel supply, see Note 1 • Check oil level, see Figure 17.
50 (more often in dusty conditions)	• Check air cleaner, see Figure 17
100	• Clean governor linkage, see Figure 17. • Change crankcase oil • Drain fuel condensation traps in lines and filters, see Note 1
200	• Clean crankcase breather, see Figure 17. • Replace oil filter • Check battery condition
500 Call Onan serviceman	• Check start-disconnect circuit • Check generator slip rings and brushes (prior to Spec AA) on older sets; replace if worn to 5/16" • Check valve clearances
600	• Change primary filter, Figure 18.
2000 Call Onan serviceman	• Grind valves (if required) • Clean holes in rocker box oil line • Check nozzle spray pattern, see Note 2 • Clean generator • Replace baffle in pulsation filter, Figure 17.
3000	• Change secondary fuel filter
5000 Call Onan serviceman	• General overhaul (if required) see Note 3

NOTE 1. Water or foreign material in fuel can ruin the injection system. If daily inspection shows water or excessive dirt in sediment bowl fuel, handling and storing facilities should be checked and situation corrected. Primary and secondary fuel filters must be replaced following correction of fuel contamination problem.

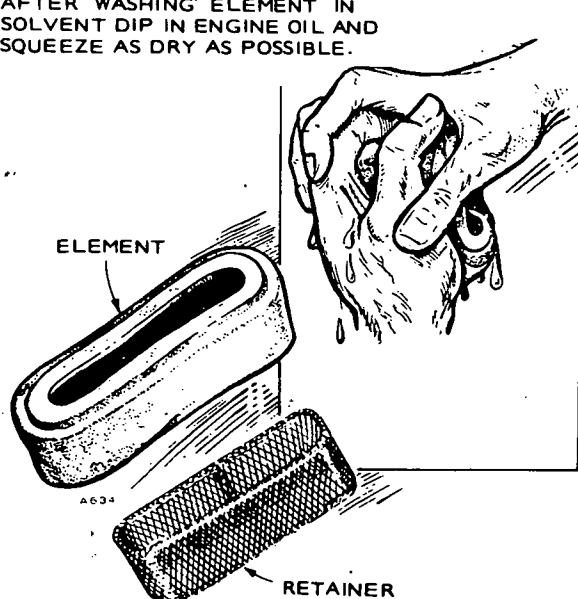
2. This service must be conducted by trained diesel injection equipment personnel with suitable test facilities. Omit this service until these conditions can be met.

3. Tighten head bolts and adjust valve clearance after first 50 hours on an overhauled engine.

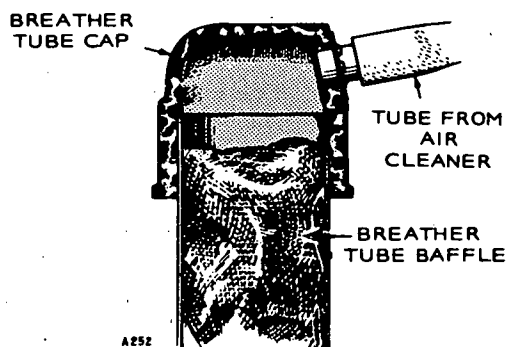
OIL FILTER CHANGE

Place pan under old filter and remove by screwing counterclockwise. Clean filter mounting area. Install new filter, oil filter gasket and screw filter on clockwise until gasket touches mounting base, then tighten 1/2 turn.

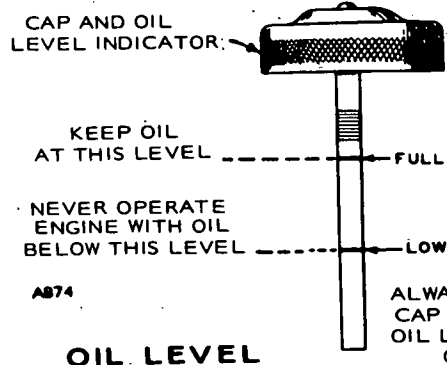
AFTER WASHING ELEMENT IN SOLVENT DIP IN ENGINE OIL AND SQUEEZE AS DRY AS POSSIBLE.



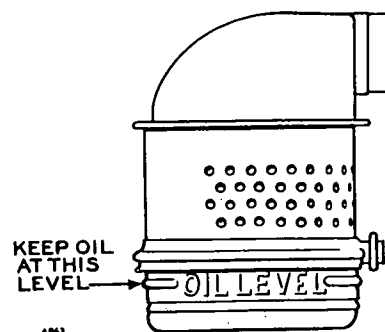
MOISTENED FOAM TYPE AIR CLEANER



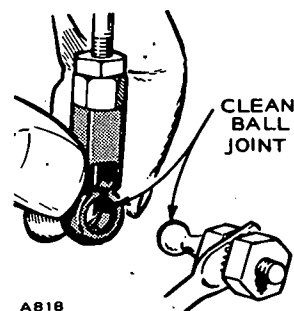
CRANKCASE BREATHER SPEC. A AND B ONLY



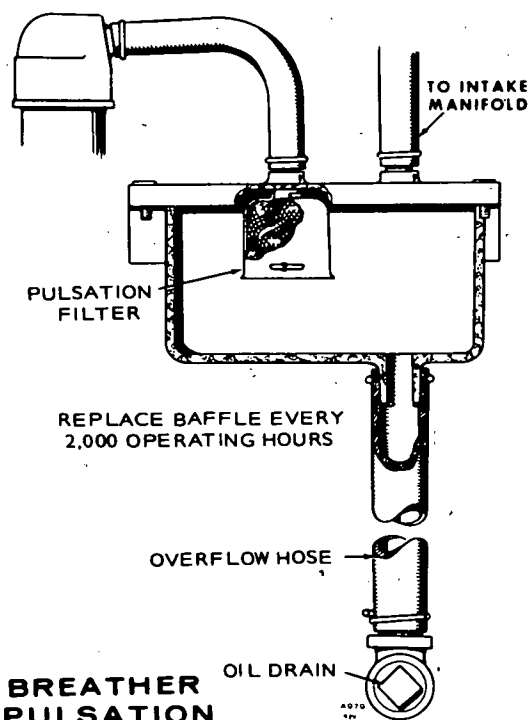
ALWAYS REPLACE CAP TIGHTLY, OR OIL LEAKAGE MAY OCCUR.



OIL BATH AIR CLEANER

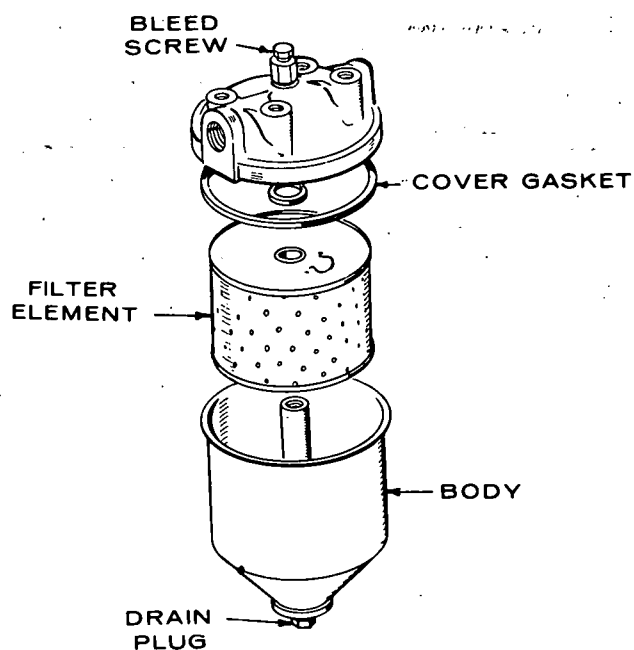


BALL JOINT

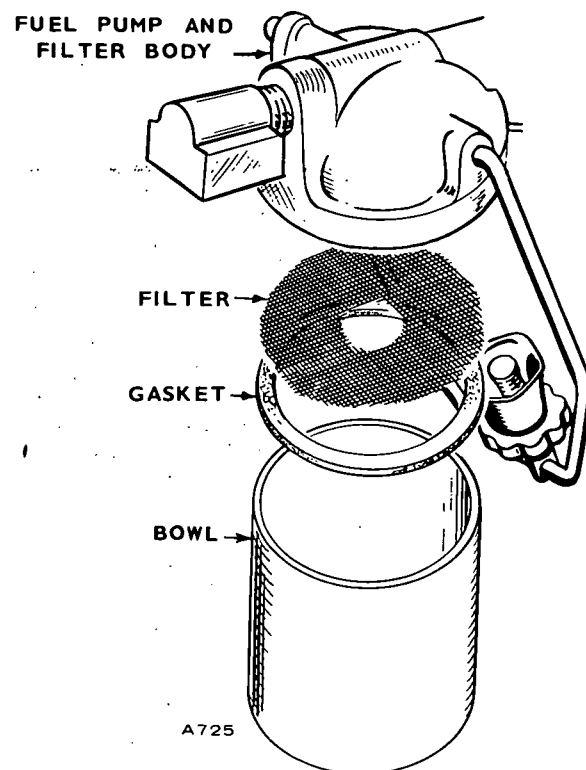


BREATHING PULSATION DAMPER SPEC S ONLY

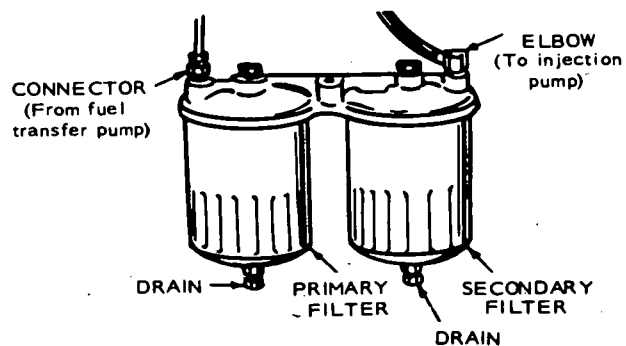
FIGURE 17. GENERAL MAINTENANCE



SECONDARY FUEL FILTER (PRIOR TO SPEC S)



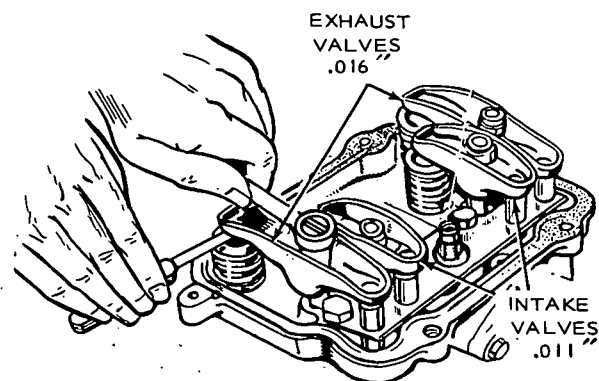
FUEL PUMP SEDIMENT BOWL



CAUTION Drain plug on fuel filters can tolerate only a limited amount of torque. Use two wrenches in combination for breaking plug loose and for final tightening.

B208

DUAL FUEL FILTER SYSTEM (BEGIN SPEC S)



VALVE CLEARANCES

FIGURE 18. GENERAL MAINTENANCE

PARTS CATALOG

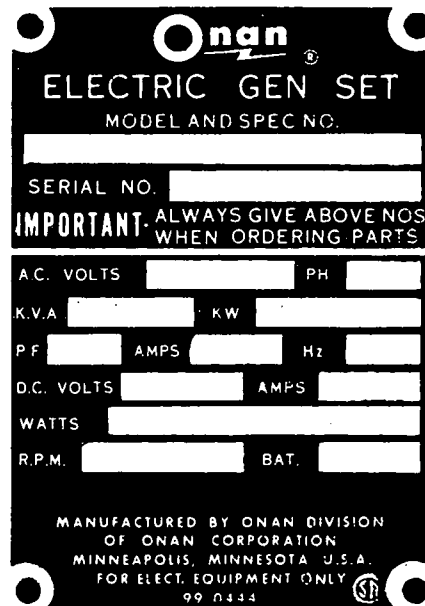
INSTRUCTIONS FOR ORDERING REPAIR PARTS

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.



The image shows a rectangular nameplate form for an Onan Electric Generator Set. At the top is the Onan logo, followed by the text "ELECTRIC GEN SET" and "MODEL AND SPEC NO." with a blank line for entry. Below this is "SERIAL NO." with another blank line. A bolded "IMPORTANT" section states: "ALWAYS GIVE ABOVE NOS. WHEN ORDERING PARTS". The form contains several fields for technical specifications: "A.C. VOLTS" and "PH" (Phase), "K.V.A." and "KW", "P.F." (Power Factor), "AMPS" and "Hz" (Hertz), "D.C. VOLTS" and "AMPS", "WATTS", "R.P.M." (Revolutions Per Minute), and "BAT." (Battery). At the bottom, it states "MANUFACTURED BY ONAN DIVISION OF ONAN CORPORATION MINNEAPOLIS, MINNESOTA U.S.A. FOR ELECT. EQUIPMENT ONLY" followed by the number "99 0444" and a small circular logo.

For handy reference, insert YOUR generating set 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 RDJC Generating Sets as listed below. Parts are arranged in groups of related items and are identified by a reference. Part illustrations are typical. Using the MODEL and SPEC NO. from the set nameplate, select the Parts Key No. (1, 2, etc. in the last column) that applies to your set Model and Spec No. This Parts Key No. represents parts that differ between models. Right and left sides are determined by FACING the engine end (front) of the unit.

GENERATING SET DATA TABLE

MODEL & SPEC †	COOLING SYSTEM	ELECTRICAL DATA					PARTS KEY NO.
		WATTS	VOLTS	HERTZ	WIRE	PHASE	
12.5RDJC-53CR/*	Radiator	12500	120/240	50	**	1	1
12.5RDJC-57R/*	Radiator	12500	220/380	50	4	3	
12.5RDJC-518R/*	Radiator	12500	★	50	12	3	
15.0RDJC-3CR/*	Radiator	15000	120/240	60	**	1	1
15.0RDJC-4R/*	Radiator	15000	120/208	60	4	3	
15.0RDJC-4XR/*	Radiator	15000	277/480	60	4	3	
15.0RDJC-5DR/*	Radiator	15000	120/240	60	4	3	
15.0RDJC-9XR/*	Radiator	15000	347/600	60	4	3	
15.0RDJC-18R/*	Radiator	15000	★	60	12	3	
12.5RDJC-53CR/*	City Water Cooled	125000	120/240	50	**	1	2
12.5RDJC-57R/*	City Water Cooled	125000	220/380	50	4	3	
12.5RDJC-518R/*	City Water Cooled	125000	★	50	12	3	
15.0RDJC-3CR/*	City Water Cooled	15000	120/240	60	**	1	2
15.0RDJC-4R/*	City Water Cooled	15000	120/208	60	4	3	
15.0RDJC-4XR/*	City Water Cooled	15000	277/480	60	4	3	
15.0RDJC-5DR/*	City Water Cooled	15000	120/240	60	4	3	
15.0RDJC-9XR/*	City Water Cooled	15000	347/600	60	4	3	
15.0RDJC-18R/*	City Water Cooled	15000	★	60	12	3	

* - The Specification Letter advances (A to B, B to C, . . . Z to AA, etc.) with manufacturing changes. A Specification Number, other than 1, designates customer option(s).

** - These generators have four load wires which are reconnectable for 120 volt, 2 wire service or 240 volt, 2 wire service of 120/240 volt, 3 wire service. NOTE: Previously, the C designation was not used in the model.

★ - Reconnectable sets beginning Spec AA, refer to figure on Generator Wiring, *Installation* section.

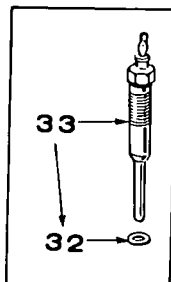
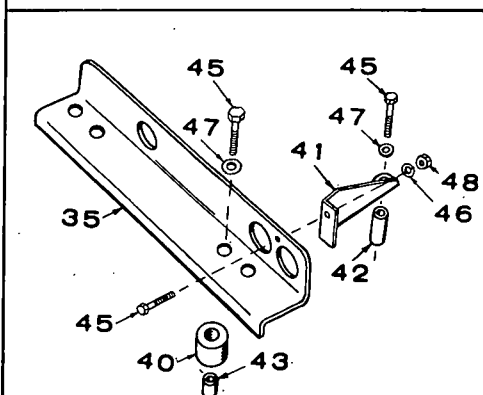
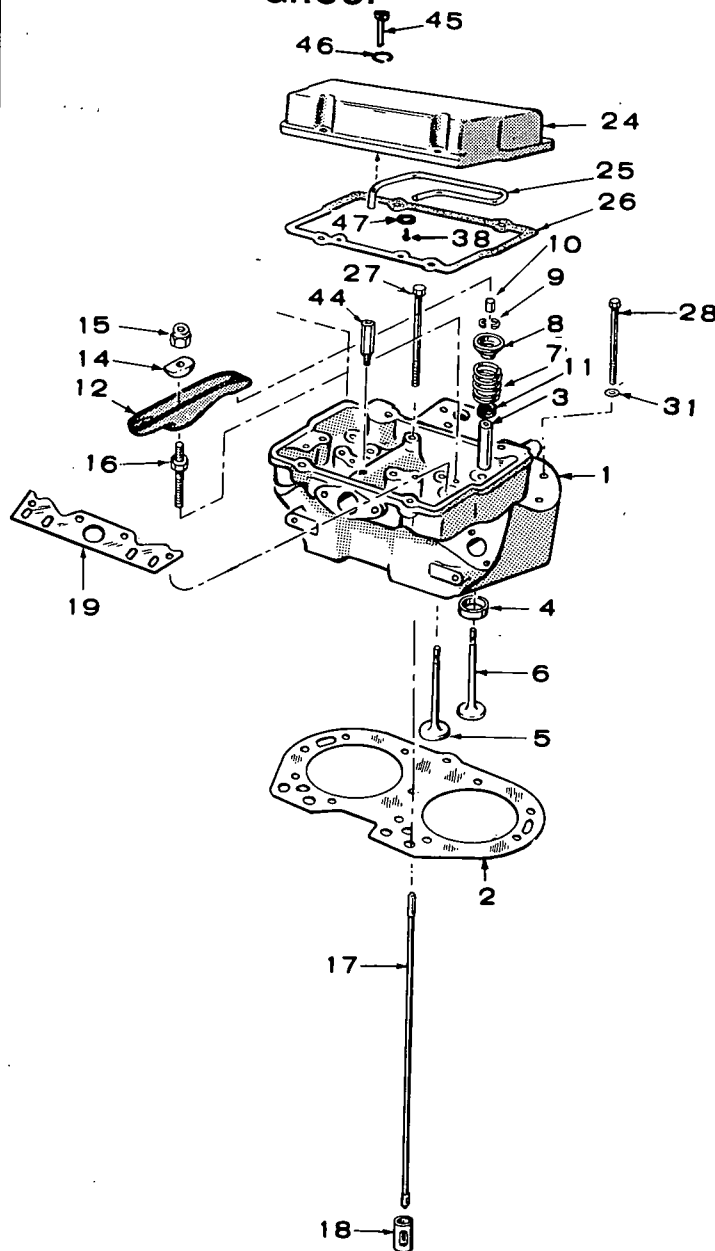
† - New model designation shown, begin during 1969. Previously, designations used a zero in place of the decimal in the KW rating. EXAMPLE: 12.5RDJC was formerly 12RDJC and 15.0RDJC was formerly 15RDJC.

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	BLOCK ASSEMBLY (Includes Parts Marked * Plus Tappets)		
	110-1407	1	Key 1
	110-1344	1	Key 2
2	101-0337	1	*Plate, Rear Bearing (Less Plate (Includes Bearing Plate Washers)
4	BEARING, PRECISION MAIN - FRONT OR REAR		
	101-0359	2	*Standard
	101-0359-02	2	.002" Undersize
	101-0359-10	2	.010" Undersize
	101-0359-20	2	.020" Undersize
	101-0359-30	2	.030" Undersize
4A	BEARING, HALF, PRECISION MAIN - CENTER		
	101-0361	2	*Standard
	101-0361-02	2	.002" Undersize
	101-0361-10	2	.010" Undersize
	101-0361-20	2	.020" Undersize
	101-0361-30	2	.030" Undersize
4B	101-0342	2	*Bolt, Center Bearing Housing
4C	516-0149	2	*Pin, Center Bearing Housing
5	516-0072	4	*Pin, Thrust Washer
6	104-0420	2	*Washer, Crankshaft Thrust
7	101-0363	1	*Bearing, Precision Cam - Front (Standard Only)
8	101-0365	1	*Bearing, Precision Cam - Rear (Standard Only)
8A	101-0364	1	*Bearing, Precision Cam - Center (Standard Only)
9	*TUBE, CRANKCASE OIL		
	120-0586	1	Front
	120-0585	1	Rear
10	517-0053	1	*Plug, Expansion Rear Cam Opening
11	*PLUG, CYLINDER BLOCK EXPANSION (Order by Size)		
	517-0059	As Req.	1-7/16"
	517-0096	As Req.	1-9/16"
	517-0097	As Req.	1-3/4"
12	509-0086	1	*Seal, Crankshaft Rear
13	805-0019	6	*Bolt, Rear Bearing (3/8-16 x 1-1/4")
14	TUBE, OIL FILL		
	123-0681	1	Spec A through R
	123-1086	1	Begin Spec S
15	123-0667	1	Gasket, Oil Fill
16	CAP AND INDICATOR		
	123-0698	1	Spec A through R
	123-1056	1	Begin Spec S
17	123-0191	1	Gasket, Cap
18	123-0787	1	Cap, Breather Tube - Spec A Through S
19	123-0645	1	*Tube, Breather - Spec A Through S
20	526-0245	6	*Washer, Bearing Plate
21	123-0865	2	Baffle, Breather Tube and Pulsation Damper - Spec S († Only Spec A through R)
22	BASE, OIL		
	102-0476	1	Spec A Only
	102-0539	1	Begin Spec B
23	102-0475	1	Gasket, Oil Base
24	520-0650	4	Stud, Vibration Mount - Spec A Only
25	101-0356	1	*Housing, Center Main Bearing (Includes Pins)
27	516-0141	2	*Pin, Gear Cover Locating
28	402-0036	4	Mount, Upper Vibration (Cylindrical Shaped) Spec A Only
29	MOUNT, LOWER VIBRATION (CYLINDRICAL SHAPED) - SPEC A ONLY		
	402-0038	2	Engine End
	402-0251	2	Generator End

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
30	BUSHING, VIBRATION MOUNT SPACER		
	402-0046	4	Spec A Only
	402-0290	4	†Begin Spec B
32	CUSHION, vibration (cone shaped) - BEGIN SPEC B		
	402-0285	2	Engine End
	402-0286	2	Generator End
33	402-0282	4	†Snubber, Shock Mounting - Begin Spec B
34	526-0014	4	†Washer (29/64" I.D. x 1-1/2" O.D. x 1/8") - Only with Cone Shaped Cushions
35	†WASHER (ONLY WITH CONE SHAPED CUSHIONS)		
	526-0195	4	29/64" I.D. x 3/4" O.D. x 1/8"
	526-0198	As Req.	5/8" I.D. x 1-1/2" O.D. x 1/16"
36	800-0081	4	†Screw, Vibration Mount - Begin Spec B - Key 1
38	505-0100	2	†Nipple, Oil Drain
39	504-0011	1	Valve, Oil Drain
40	503-0197	1	Clamp, Hose
41	503-0316	1	Hose, Oil Drain
42	505-0266	2	*Plug (3/8"), Cylinder Block
43	505-0449	1	Nipple (1/4 x 6"), Water Drain
44	505-0027	1	Coupling (1/4"), Water Drain
45	502-0153	1	Plug (1/4"), Water Drain - Brass
46	505-0681	1	Nipple, Oil Drain - Spec S Only
47	123-1061	1	Damper, Breather Pulsation - Spec A Only
48	503-0564	1	Hose, Overflow - Pulsation Damper - Spec S Only
49	503-0197	2	Clamp, Overflow Hose - Spec S Only
50	123-1045	1	Cover, Breather Pulsation Damper - Spec S Only
51	516-0177	1	Pin, Cotter - Baffle Retainer - Spec S Only
52	123-1049	1	Gasket, Breather Pulsation Damper - Spec S Only
53	503-0563	1	Hose, Damper Cover to Intake Manifold - Spec S Only
54	503-0562	1	Hose, Damper Cover to Breather Cap - Spec S Only
55	503-0170	4	Clamp, Hose - Breather Pulsation - Spec S Only
56	505-0682	1	Tee, Oil Drain - Spec S Only
57	505-0683	1	Nipple, Half - Damper Hose to Oil Drain - Spec S Only
58	517-0103	1	*Plug, Breather Hose in Crankcase - Begin Spec T
59	102-0558	1	Heater, Oil Base (Optional)
60	526-0035	2	*Washer, Flat - Center Main Bearing Housing - Key 1
61	SCREW, HEX CAP		
	800-0072	10	Oil Base Mounting
	800-0026	2	Oil Fill Tube Mounting
62	WASHER, LOCK		
	850-0055	10	Oil Base Mounting
	850-0055	4	†Set Mounting
	850-0045	2	Oil Fill Tube Mounting
63	816-0212	4	†Bolt, Carriage - Set Mounting - Key 2
64	862-0004	4	†Nut, Hex - Set Mounting - Key 2
	HARDWARE SET, SET MOUNTING (INCLUDES PARTS MARKED †)		
	402-0356	4	Key 1
	402-0291	4	Key 2

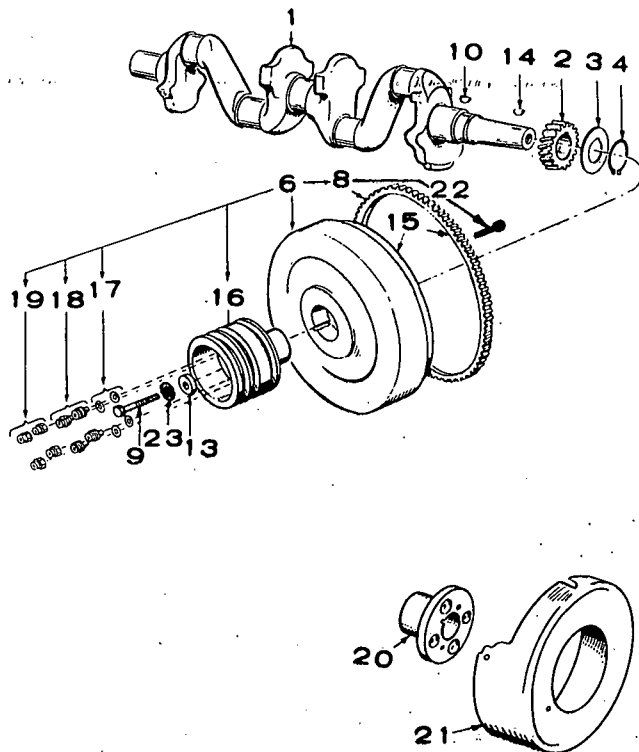
* - Parts included in the Cylinder Block Assembly.
† - Parts included in Set Mounting Set.

CYLINDER HEAD, VALVE AND ROCKER GROUP

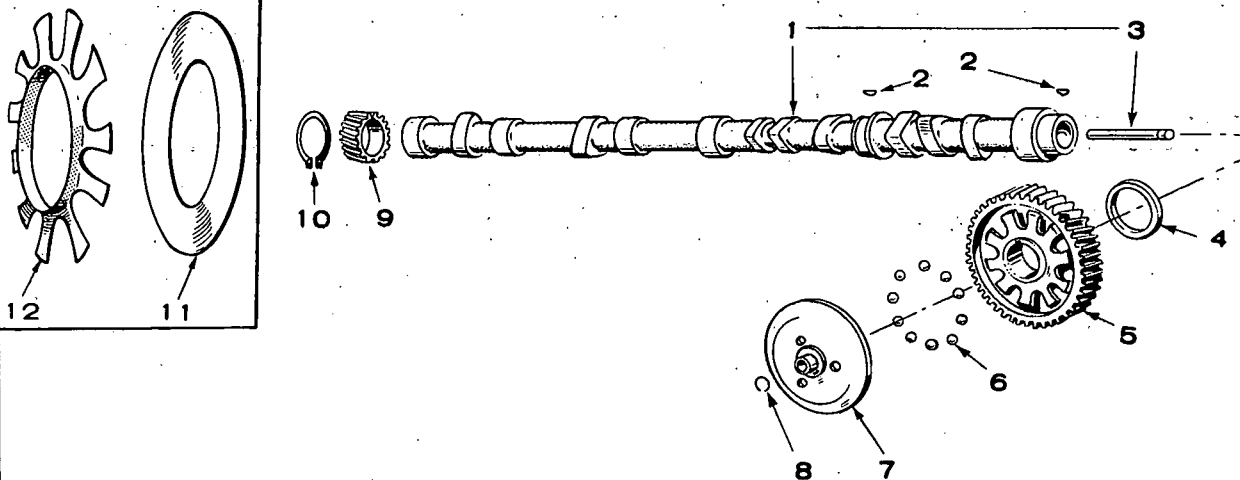


REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	HEAD, CYLINDER (INCLUDES VALVE SEAT INSERTS, VALVE GUIDES AND PUSH ROD GUIDES)		
	110-1859	2	Key 1
	110-1857	2	Key 2 (Without Heat Exchanger)
	110-1855	2	Key 2 (With Heat Exchanger)
2	110-1852	2	Gasket, Head
3	110-1501	8	Guide, Valve
4	INSERT, VALVE SEAT — INTAKE AND EXHAUST (STELLITE)		
	110-1268	8	Standard
	110-1268-02	8	.002" Oversize
	110-1268-05	8	.005" Oversize
	110-1268-10	8	.010" Oversize
	110-1268-25	8	.025" Oversize
5	110-1320	4	Valve, Intake
6	110-1278	4	Valve, Exhaust (Stellite)
7	110-1221	8	Spring, Valve
8	110-1220	8	Retainer, Valve Spring
9	110-0858	16	Lock, Valve Spring Retainer
10	110-0859	8	Cap, Valve Stem
11	509-0090	4	Seal, Oil - Intake Valve (Includes Retaining Rings)
12	ARM, ROCKER		
	115-0128	4	Exhaust
	115-0129	4	Intake
14	115-0127	8	Ball, Rocker Arm
15	115-0150	8	Locknut, Rocker Arm
16	115-0152	8	Stud, Rocker Arm
17	115-0149	8	Rod, Valve Push (Steel)
18	TAPPET, VALVE		
	115-0132	8	Spec A through N
	115-0195	8	Begin Spec P
19	115-0196	2	Guide, Push Rod
24	115-0197	2	Cover, Rocker
25	120-0628	2	Line, Oil - Rocker Cover
26	115-0130	2	Gasket, Rocker Cover
27	110-1264	10	Screw (3/8-16 x 4-1/4") - Cylinder Head
28	800-0501	14	Screw (3/8-16 x 3-3/8") - Cylinder Head
31	526-0174	14	Washer, Cylinder Head
32	110-0546	4	Gasket, Glow Plug
33	333-0106	4	Plug, Glow (Includes Gasket) - 12 Volt
35	403-0690	1	Bracket, Lifting (Unhoused Sets)
38	809-0042	2	Screw, Oil Line - Rocker Cover
40	402-0361	2	Cushion, Vibration (Unhoused) - Key 2
41	403-0890	1	Brace, Lifting Bracket (Unhoused) - Key 2
42	403-0826	1	Spacer, Lifting Bracket (Unhoused) - Key 2
43	402-0362	2	Bushing, Spacer (Unhoused) - Key 2
44	123-1140	2	Standpipe, Breather - Begin Spec T
45	SCREW, HEX CAP		
	800-0030	8	Rocker Cover Mounting (5/16-18 x 1-1/4")
	800-0094	2	Lifting Bracket Mounting (1/2-13 x 2")
	800-0025	1	Brace to Lifting Bracket (5/16-18 x 5/8")
	800-0038	1	Brace Mounting (5/16-18 x 3-1/4")
46	WASHER, LOCK		
	850-0045	8	Rocker Cover Mounting (5/16")
	850-0045	2	Brace Mounting (5/16")
47	WASHER, FLAT		
	526-0100	2	Lifting Bracket Mounting
	526-0130	2	Oil Line Mounting
48	862-0015	1	Nut, Hex - Brace to Lifting Bracket Mounting

CRANKCASE AND FLYWHEEL GROUP



REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	104-0464	1	Crankshaft
2	104-0418	1	Gear, Crankshaft
3	104-0416	1	Washer, Gear Retainer
4	518-0188	1	Ring, Lock
6	FLYWHEEL, INCLUDES RING GEAR & HUB ASSY.		
	104-0548	1	Key 1
	104-0556	1	Key 2
8	104-0423	1	Gear, Ring
9	800-0500	1	Screw (7/16-14 x 5-1/2") - Flywheel Mounting
10	515-0001	1	Key, Crankshaft Gear
13	526-0185	1	Washer, Flywheel Mounting
14	515-0153	1	Key, Flywheel to Crankshaft
15	104-0547	1	Flywheel (Includes Ring Gear, Less Hub)
16	104-0546	1	Hub & Pulley, Flywheel - Key 1
17	526-0187	4	Spacer & Washer Assembly, Hub to Flywheel
19	115-0150	4	Nut (3/8-24), Hub to Flywheel
20	134-1401	1	Hub, Flywheel - Key 2
21	GUARD, FLYWHEEL - KEY 2		
	104-0594	1	Models Without Heat Exchanger
	104-0510	1	Models With Heat Exchanger
22	801-0054	4	Screw (3/8-24 x 2") - Flywheel Hub
23	850-0055	1	Washer (7/16"), Lock - Flywheel Mounting

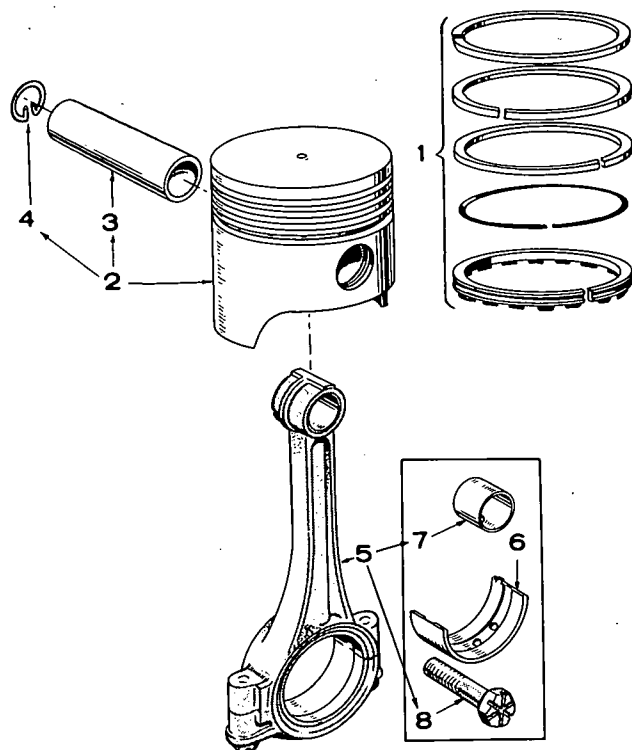


CAMSHAFT GROUP

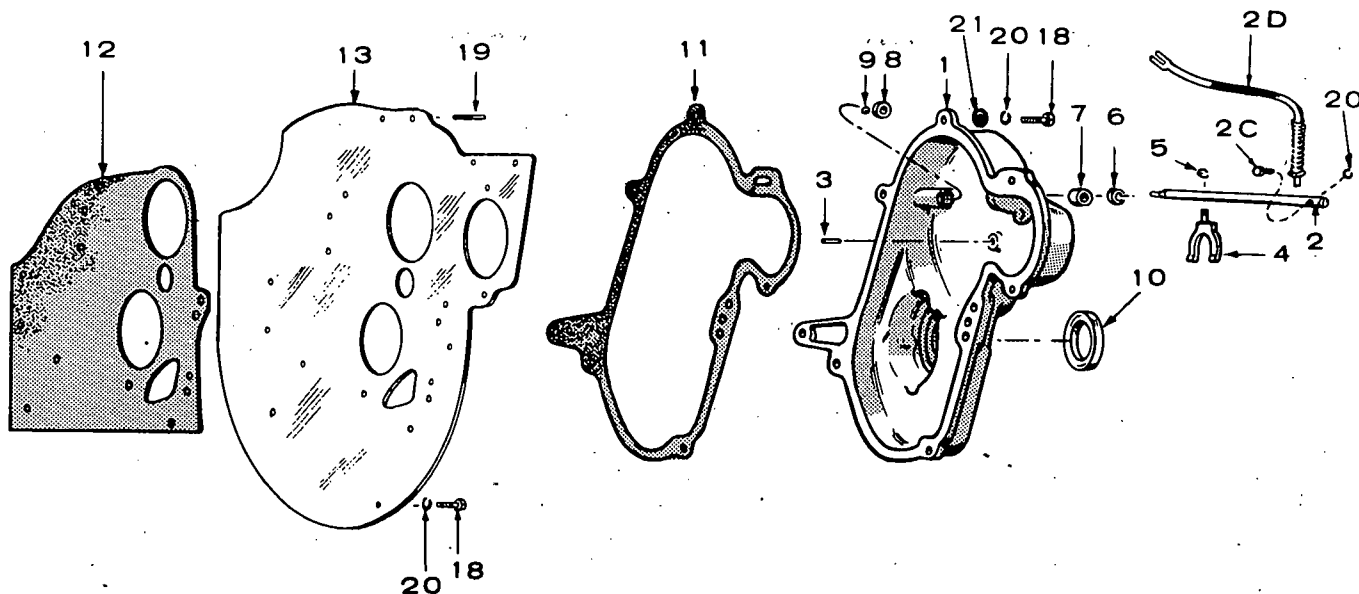
REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	CAMSHAFT, INCLUDES PIN		
	105-0240	1	Spec A through N
	105-0274	1	Begin Spec P
2	515-0001	2	Key - Camshaft Gear and Injection Pump
3	150-0075	1	Pin, Camshaft Center
4	105-0205	1	Washer, Thrust
5	105-0218	1	Gear, Camshaft (Includes Spacer and Plate)

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
6	510-0046	10	Ball, Fly Governor
7	150-0775	1	Cup, Governor
8	150-0078	1	Ring, Center Pin
9	147-0142	1	Gear, Injection Pump Drive
10	518-0195	1	Ring, Injection Pump Drive Gear
11	150-0773	1	Plate, Governor Flyball
12	150-0779	1	Spacer, Governor Flyball

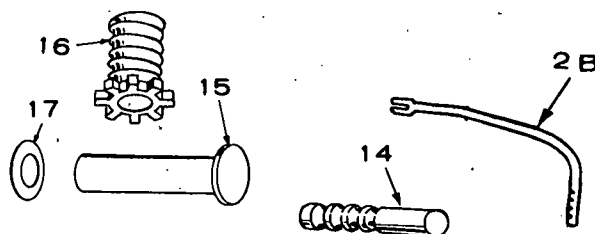
PISTON AND CONNECTING ROD GROUP



REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	RING SET		
	113-0130	4	Standard
	113-0130-05	4	.005" Oversize
	113-0130-10	4	.010" Oversize
	113-0130-20	4	.020" Oversize
	113-0130-30	4	.030" Oversize
	113-0130-40	4	.040" Oversize
2	PISTON AND PIN (INCLUDES PIN RETAINING RINGS)		
			Spec A through N
	112-0103	4	Standard
	112-0103-05	4	.005" Oversize
	112-0103-10	4	.010" Oversize
	112-0103-20	4	.020" Oversize
	112-0103-30	4	.030" Oversize
	112-0103-40	4	.040" Oversize
			Begin Spec P
	112-0109	4	Standard
	112-0109-05	4	.005" Oversize
	112-0109-10	4	.010" Oversize
	112-0109-20	4	.020" Oversize
	112-0109-30	4	.030" Oversize
	112-0109-40	4	.040" Oversize
3	112-0093	4	Pin, Piston
4	112-0085	8	Ring, Retaining - Pin
5	114-0168	4	Rod Assembly, Connecting (Forged)
6	BEARING HALF, CONNECTING ROD		
	114-0164	8	Standard
	114-0164-02	8	.002" Undersize
	114-0164-10	8	.010" Undersize
	114-0164-20	8	.020" Undersize
	114-0164-30	8	.030" Undersize
7	114-0170	8	Bushing, Piston Pin Connecting Rod - Semifinished
8	805-0012	8	Bolt (5/16-24 x 1-13/16"), Place



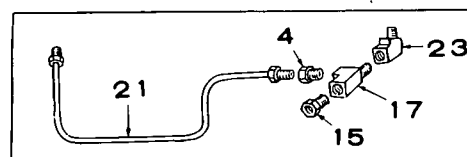
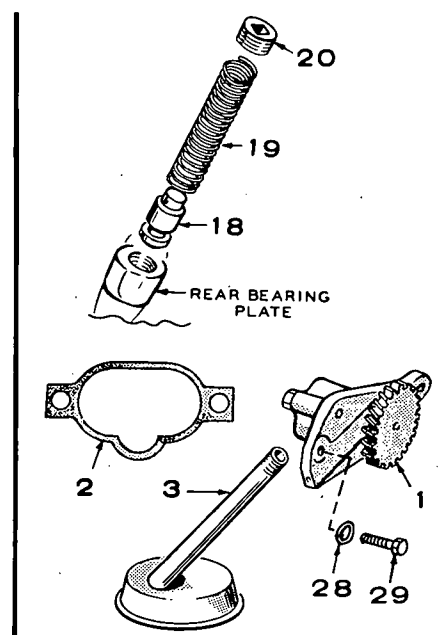
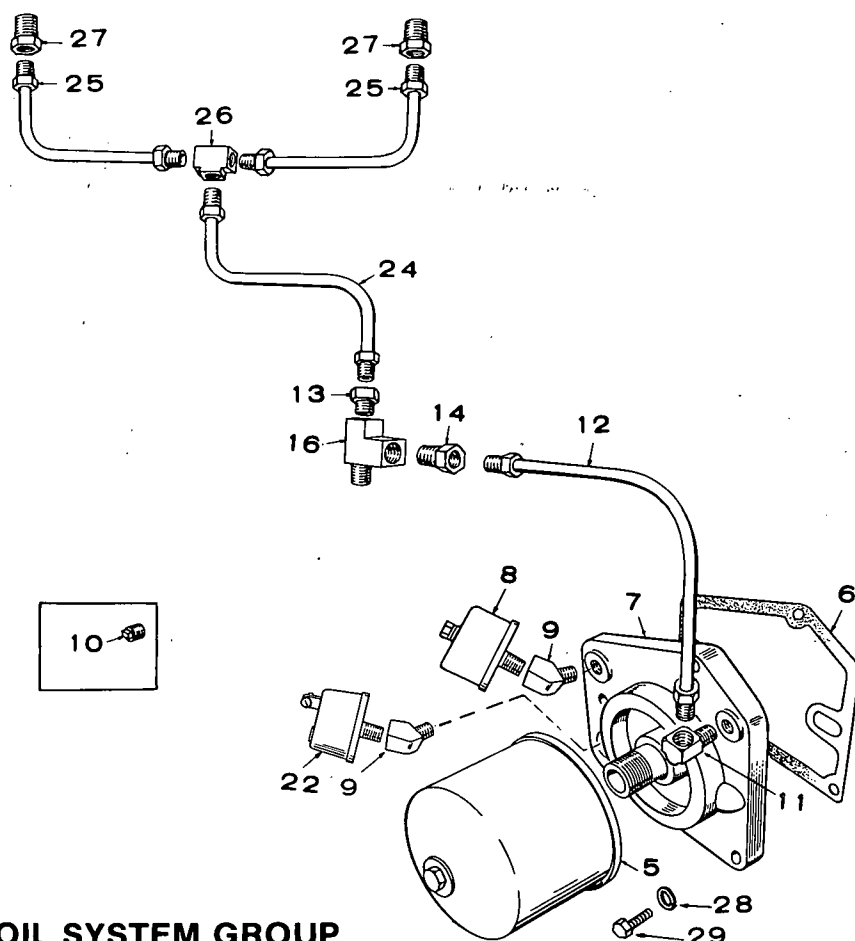
GEAR COVER GROUP



REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	COVER ASSEMBLY, GEAR-COMplete (Includes Parts Marked *)		
	103-0278	1	Key 1 - Spec A through Q
	103-0307	1	Key 1 - Begin Spec R
	103-0277	1	Key 2
2	*SHAFT, GOVERNOR		
	150-0901	1	Key 1
	150-0838	1	Key 2
2B	150-0847	1	Arm, Governor - Spec A through Q
2B	150-1228	1	Arm, Governor - Key 1 - Begin Spec R
2C	815-0176	1	*Screw (#8-32 x 1/2")
2D	150-1095	1	Arm Assembly Governor (Includes Spring, Hub and Washer) - Key 2 - Begin Spec R
3	516-0111	1	*Pin, Governor Cup Stop
4	150-0777	1	*Yoke, Governor
5	518-0129	1	*Ring, Yoke Retaining
6	509-0088	1	*Seal, Governor Shaft
7	510-0048	1	*Bearing (1/2") - Shaft
8	510-0082	1	*Bearing (1/4") - Shaft
9	510-0043	1	*Ball, Governor Shaft Thrust
10	509-0087	1	*Seal
11	103-0251	1	Gasket, Gear Cover

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
12	103-0218	1	Gasket, Backplate
13	103-0228	1	Backplate
14	150-0900	1	Arm, Governor Spring Control - Key 1 - Spec A through Q
15	150-1154	1	*Pin, Governor Shaft Hub - Key 1 - Begin Spec R
16	150-1160	1	*Hub, Governor Shaft - Key 1 - Begin Spec R
17	150-1155	1	*Washer, Spring - Governor Shaft - Key 1 - Begin Spec R
18	SCREW, HEX CAP		
	110-0879	4	Gear Cover Mounting (5/16-18 x 1-1/4")
	800-0028	1	Gear Cover Mounting (5/16-18 x 1")
	800-0026	1	Backplate Mounting
19	815-0347	2	Screw, Countersunk - Backplate Mounting
20	WASHER, LOCK		
	850-0045	1	Backplate Mounting
	850-0045	5	Gear Cover Mounting
	850-0025	2	*Governor Shaft Mounting
21	526-0115	5	Washer, Flat - Gear Cover Mounting

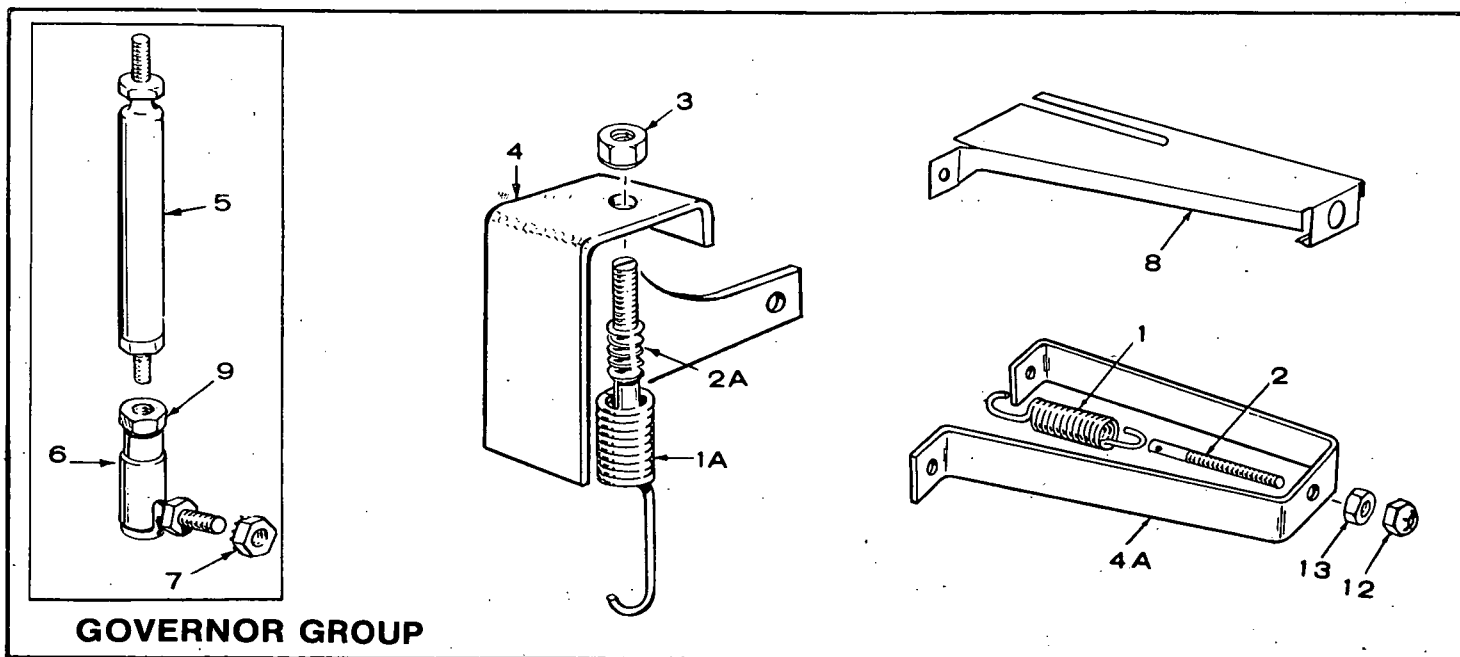
* - Included in Gear Cover Assembly.



OIL SYSTEM GROUP

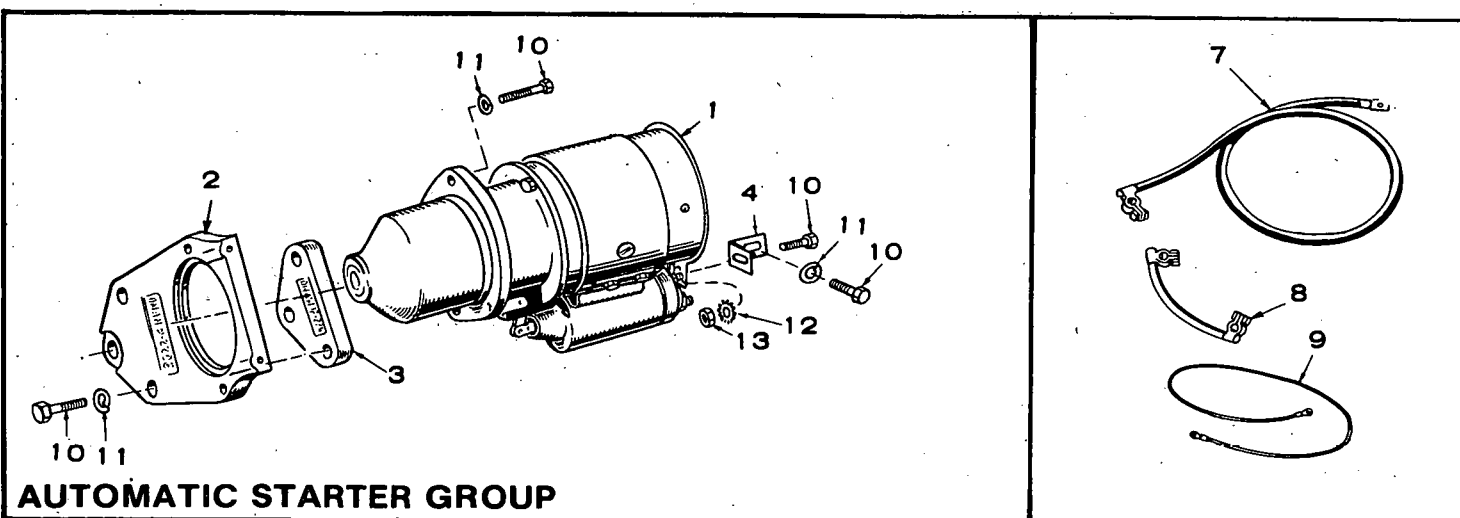
REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	120-0547	1	Pump Assembly, Oil
2	120-0580	1	Gasket Kit, Oil Pump
3	120-0551	1	Cup Assembly, Oil Pump Intake
4	502-0097	1	Connector - Front Cylinder Head Tee to Rear Cylinder Head Line
5	122-0185	1	Filter, Oil
6	122-0188	1	Gasket, Oil Adapter
7	122-0182	1	Adapter Assembly, Oil Filter
8	193-0108	1	Sender, Oil Pressure Gauge
9	502-0053	2	Elbow (45°), Street - (1) Oil Gauge Sender (1) Low Oil Pressure Switch
10	505-0057	2	Plug (1/8"), Pipe (Units Without Lopko)
11	ELBOW — OIL LINE TO ADAPTER		
	502-0019	1	Spec A through N
	502-0037	1	Begin Spec P
12	LINE — ADAPTER TO INJECTION PUMP TEE		
	120-0582	1	Spec A through N
	120-0636	1	Begin Spec P
13	CONNECTOR, INVERTED MALE - INJECTION PUMP LUBRICATION TEE		
	502-0030	1	Spec A through N
	502-0097	1	Begin Spec P
14	CONNECTOR, INVERTED MALE - INJECTION PUMP LUBRICATION TEE		
	502-0030	1	Spec A through N
	502-0274	1	Begin Spec P (Restricted)
15	CONNECTOR, INVERTED MALE — FRONT CYLINDER HEAD TEE		
	502-0030	1	Spec A through N
	502-0097	1	Spec P through S
16	502-0242	1	Tee, Restricted - Injection Pump Lubrication

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
17	502-0282	1	Tee, Restricted - Front Cylinder Head - Spec A through S
18	120-0539	1	Valve, Oil By-Pass
19	120-0555	1	Spring, By-Pass Valve
20	505-0274	1	Plug, Pipe - Countersunk - Oil By-Pass
21	LINE, OIL — REAR CYLINDER HEAD		
	120-0575	1	Spec A through N
	120-0635	1	Spec P through S
22	309-0169	1	Switch, Low Oil Pressure Cutoff (Optional) - Not used on Pennsylvania Approved Sets
23	502-0053	1	Elbow (45°), Street - Cylinder Head Tee - Spec A through S
24	LINE, OIL — INJECTION PUMP TEE TO CYLINDER HEAD TEE		
	120-0583	1	Spec A through N
	120-0630	1	Spec P through S
	120-0697	1	Begin Spec T
25	120-0695	2	Line, Oil - Cylinder Head - Begin Spec T
26	502-0373	1	Tee, Inverted Flare - Begin Spec T
27	CONNECTOR, INVERTED MALE — CYLINDER HEAD		
	502-0097	1	Rear - Spec A through N
	502-0281	1	Rear - Begin Spec P
	502-0281	1	Front - Begin Spec T
28	WASHER, LOCK		
	850-0045	2	Oil Pump Mounting (5/16")
	850-0045	3	Oil Filter Adapter Mtg. (5/16")
29	SCREW, HEX CAP		
	800-0030	2	Oil Pump Mtg. (5/16-18 x 1-1/4")
	800-0028	3	Oil Filter Adapter Mounting (5/16-18 x 1")



REF. NO.	REF. NO.	QTY. USED	PART DESCRIPTION
1	150-1084	1	Spring, Governor - Begin Spec R
1A	150-0821	1	Spring, Governor - Spec A through Q
2	150-1082	1	Stud, Governor Adjustment - Begin Spec R
2A	150-0822	1	Stud, Governor Adjustment - Spec A through Q
3	NUT, ADJUSTING 104-0091	1	Spec A through Q
	862-0003	1	Begin Spec R
4	BRACKET, GOVERNOR ADJUSTING — KEY 1 150-0902	1	Spec A through Q
	150-1105	1	Begin Spec R

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
4A	BRACKET, GOVERNOR — KEY 2 150-0810	1	Spec A through Q
	150-1103	1	Begin Spec R
5	LINK, GOVERNOR 150-0874	1	Spec A through Q
	150-1131	1	Begin Spec R
6	JOINT, BALL 150-0974	2	Spec A through Q
	150-1358	1	Governor Arm - Begin Spec R
	150-0939	1	Injection Pump - Begin Spec R
7	870-0131	2	Nut, Joint
8	150-0823	1	Cover, Governor Spring Control - Key 2
9	870-0053	2	Nut (10-32)
12	PALNUT, LOCKING 870-0130	1	Spec A through Q (3/8-24)
	870-0133	1	Begin Spec R (3/8-16)
13	871-0010	2	Nut, Locking - Governor Link

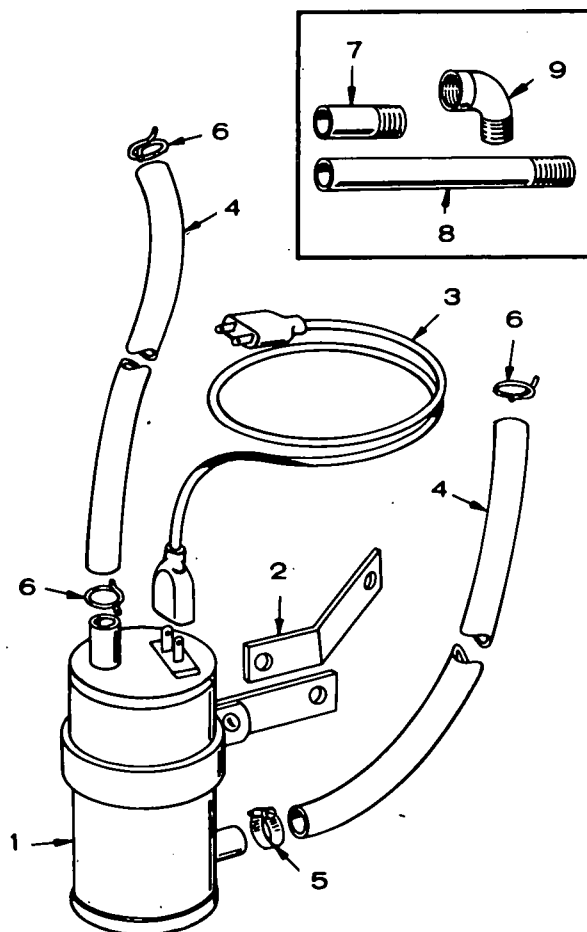


REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	191-0324	1	*Motor, Starter (12 Volt)
2	191-0512	1	Flange, Starter Mounting
3	191-0365	1	Spacer, Starter Flange
4	191-0365	1	Bracket, Starter
7	416-0021	2	Cable, Battery
8	416-0133	1	Cable, Battery Jumper
9	336-1364	1	Lead, Starter to Heater Relay
10	SCREW, HEX CAP		
	800-0051	2	Starter Motor to Flange (3/8-16 x 1-1/4")
	800-0054	3	Starter Motor Flange Mounting (3/8-16 x 2")

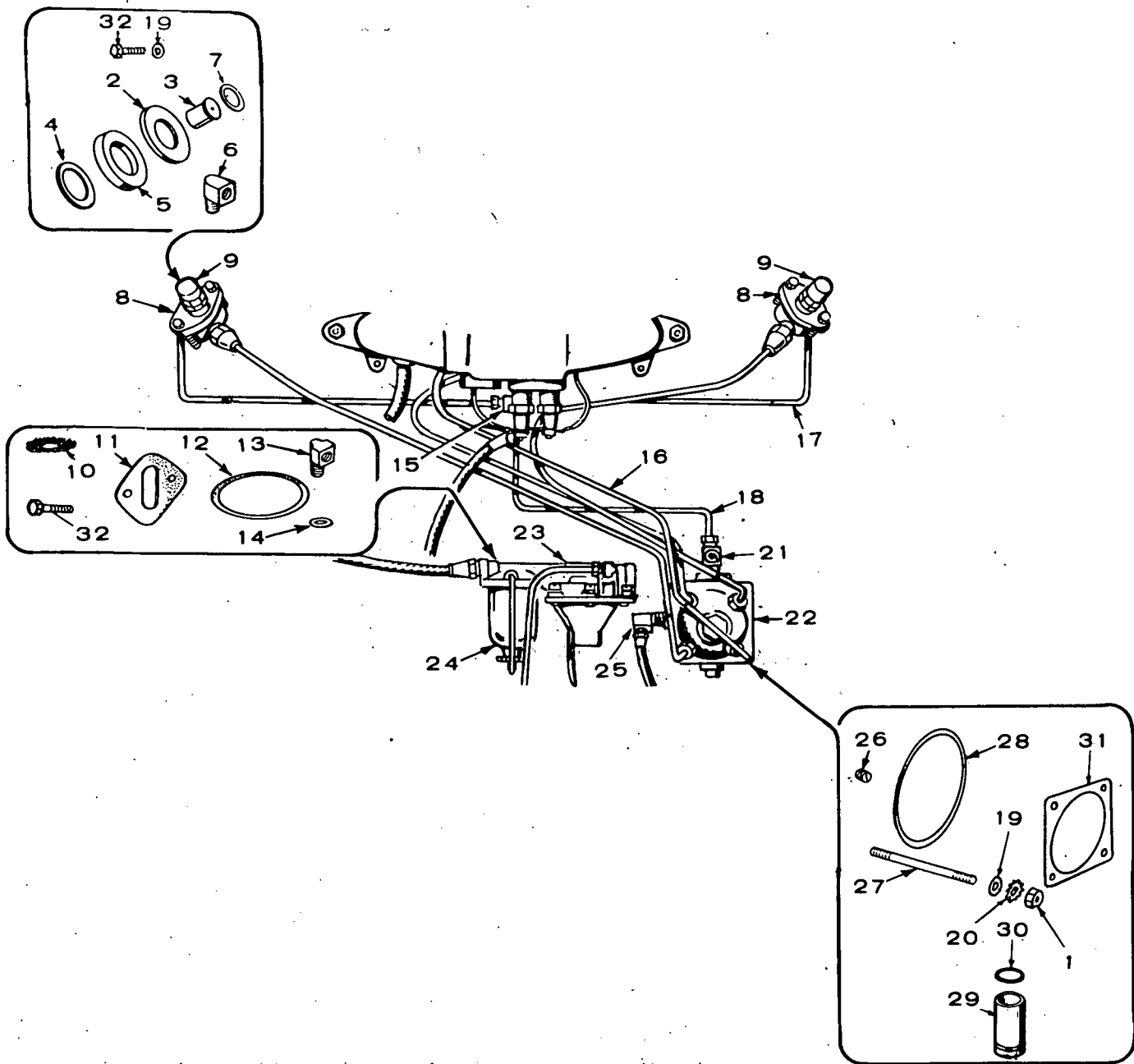
REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
	800-0046	1	Support Bracket to Starter Motor (3/8-16 x 1/2")
	800-0052	2	Support Mounting (3/8-16 x 1-1/2")
11	WASHER, LOCK		
	850-0050	2	Starter Motor to Flange (3/8")
	850-0050	3	Starter Motor Flange Mounting (3/8")
	850-0050	2	Support Mounting (3/8")
12	856-0010	1	Washer, Shakeproof - Bracket to Starter Motor
13	864-0003	1	Nut (3/8-16) - Support Bracket to Starter Motor

WATER JACKET HEATER GROUP

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	333-0054	1	Heater, Water Jacket
2	130-0755	1	Bracket, Heater
3	(Part of Reference #1)		
4		2	Cord, Heater Hose (Order 30" of Bulk Hose #503-0386)
5	503-0183	1	Clamp, Hose - Lower Heater
6	503-0197	3	Clamp, Hose
7	505-0135	1	Nipple, Half
8	505-0273	1	Nipple, Half
9	502-0075	1	Elbow, Street



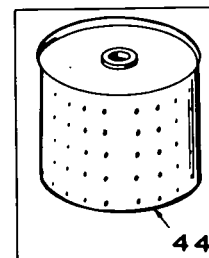
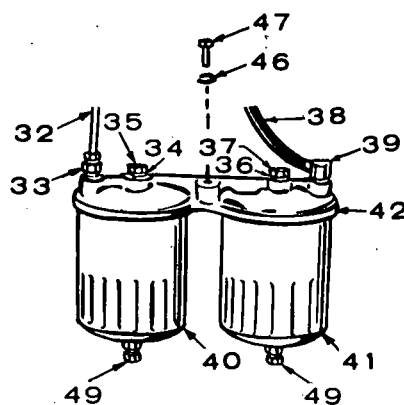
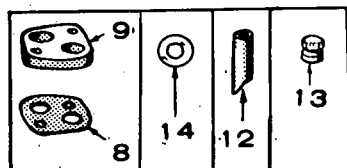
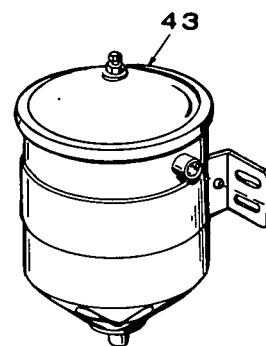
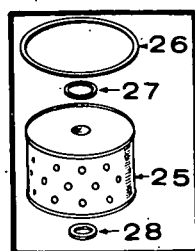
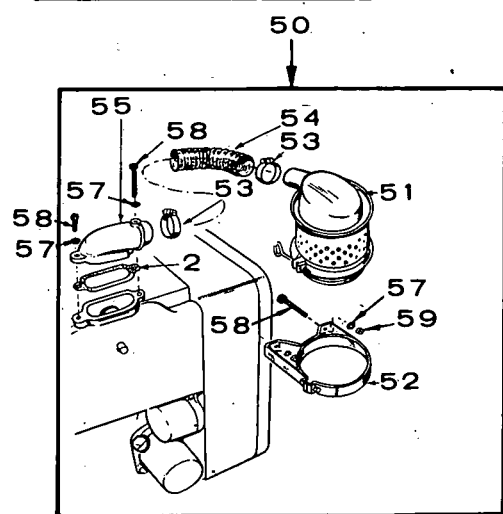
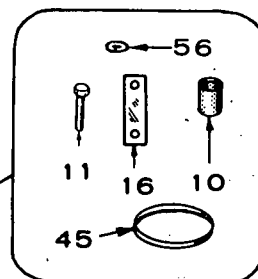
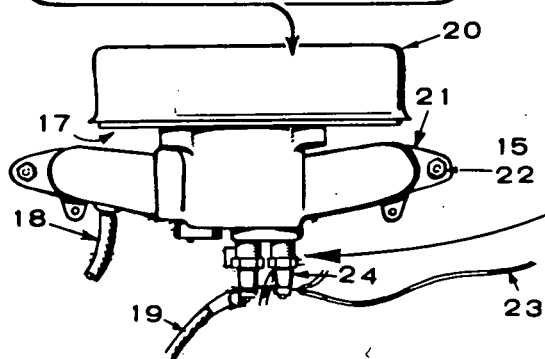
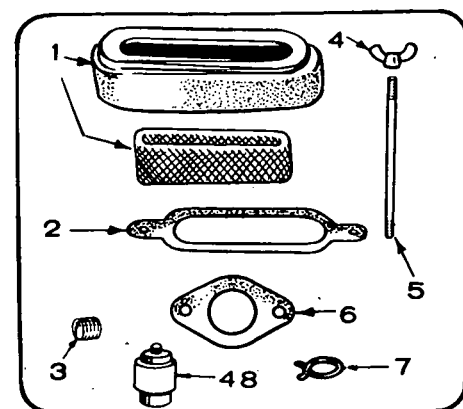
FUEL TRANSFER PUMP AND INJECTION SYSTEM GROUP



REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	862-0015	4	Nut, Injection Pump Mounting (5/16-18)
2	147-0043	4	Gasket, Nozzle Heat Shield (Asbestos)
3	147-0134	4	Nozzle Only (Component of Nozzle & Holder Assembly)
4	110-0419	4	Gasket, Shield to Head (Copper)
5	147-0044	8	Shield, Nozzle Heat (Steel)
6	ELBOW, NOZZLE — FUEL RETURN LINE		
	502-0065	2	Inverted (45°)
	502-0002	2	Street (90°)
7	147-0243	4	Gasket, Nozzle
8	147-0141	4	Flange, Injection Nozzle Holddown
9	147-0136	4	Nozzle & Holder Assembly
10	149-0463	1	Screen, Fuel Pump Filter
11	149-0792	1	Gasket, Fuel Transfer Pump Mounting
12	149-0517	1	Gasket, Fuel Pump Bowl
13	502-0002	2	Elbow - Fuel Pump Inlet & Outlet
14	526-0065	2	Washer, Fuel Pump Mounting
15	502-0245	1	Adapter - Return Lines
16	LINE, INJECTION PUMP TO NOZZLE (INCLUDES FITTING)		
	149-0917	1	#1 Cylinder - Spec A Only
	149-0963	1	#1 Cylinder - Spec B through P
	149-1150	1	#1 Cylinder - Begin Spec R
	149-0918	1	#2 Cylinder - Begin Spec A Only
	149-0964	1	#2 Cylinder - Spec B through P
	149-1151	1	#2 Cylinder - Begin Spec R
	149-0919	1	#3 Cylinder - Spec A Only
	149-0965	1	#3 Cylinder - Spec B through P
	149-1152	1	#3 Cylinder - Begin Spec R
	149-0920	1	#4 Cylinder - Spec A Only
	149-0966	1	#4 Cylinder - Spec B through P
	149-1153	1	#4 Cylinder - Begin Spec R
17	LINE, NOZZLE FUEL RETURN		
			#1 Cylinder
	149-0909	1	Spec A through N (16-7/16")
	149-1060	1	Begin Spec P (19-1/8")
			#2 and #3 Cylinders
	149-0908	2	Spec A through N (16-7/16")
	149-1059	2	Begin Spec P (12-3/8")
			#4 Cylinder
	149-0910	1	Spec A through N (16-7/16")
	149-1061	1	Begin Spec P (19-5/16")
18	LINE, INJECTION PUMP TO FUEL RETURN LINES TEE		
	149-0949	1	Spec A through N
	149-1062	1	Begin Spec P
19	WASHER, FLAT		
	526-0122	8	Nozzle and Holder Mounting
	526-0022	4	Injection Pump Mounting

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
20	850-0045	4	Washer (5/16") - Lock - Injection Pump Mounting
21	147-0183	1	Valve, Bleeder, Injection Pump (Repl. 147-0162) - Included in Injection Pump
22	PUMP, INJECTION 147-0231	1	Spec A through Q (Includes Buttons 2, 4, 11, 12, Retaining Ring, Injection Lines and Governor Linkage Ball Joint)
	147-0232	1	Begin Spec R (Includes Buttons 2, 4, 11, 12, Retaining Ring and Governor Linkage Ball Joint)
23	149-1020	1	Pump, Fuel Transfer
24	149-0116	1	Bowl, Fuel Pump (Glass)
25	ELBOW, INJECTION PUMP INLET		
	502-0054	1	Spec A through R
	502-0039	1	Begin Spec S
26	BUTTON, INJECTION PUMP PLUNGER		
	147-0147	1	.119 - Marked 1 or A
	147-0148	1	.116 - Marked 2 or B
	147-0149	1	.113 - Marked 3 or C
	147-0150	1	.110 - Marked 4 or D
	147-0151	1	.107 - Marked 5 or E
	147-0161	1	.104 - Standard Marked 11 or No Mark
	147-0152	1	.101 - Marked 6 or F
	147-0153	1	.098 - Marked 7 or H
	147-0154	1	.095 - Marked 8 or J
	147-0155	1	.092 - Marked 9 or K
	147-0156	1	.089 - Marked 10 or L
	147-0190	1	.122 - Marked 12 or M
	147-0189	1	.125 - Marked 13 or N
	147-0188	1	.128 - Marked 14 or P
	147-0187	1	.131 - Marked 15 or R
	147-0186	1	.134 - Marked 16 or S
27	520-0129	4	Stud, Injection Pump Mounting
28	509-0094	1	Seal, O-Ring - Injection Pump to Crankcase (Included in Injection Pump)
29	147-0182	1	Tappet, Injection Pump (Included in Injection Pump)
30	147-0196	1	Gasket, O-Ring - Injection Pump Tappet (Included in Injection Pump)
31	147-0145	1	Shim Kit, Injection Pump Mtg.
32	SCREW, HEX CAP 114-0171	8	Nozzle and Holder Mounting (5/16-18 x 2")
	800-0027	2	Transfer Pump Mounting (5/16-18 x 7/8")
	149-1046	1	Repair Kit, Fuel Pump (Includes Diaphragm & Gaskets) Does Not Apply for AC Pumps

AIR CLEANER AND FUEL FILTERS GROUP



REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	140-0636	1	Element & Retainer, Air Cleaner
2	140-0584	1	Gasket, Air Cleaner
3	505-0054	1	Plug (1/4"), Pipe - Air Cleaner Adapter & Intake Manifold
4	865-0020	2	Nut, Wing - Air Cleaner
5	520-0621	2	Stud, Air Cleaner
6	154-0733	2	Gasket, Intake Manifold
7	503-0171	2	Clamp, Breather Hose - Spec A through R
8	140-0706	1	Gasket - Manifold Heater Insulator
9	140-0705	1	Plate, Manifold Heater Mtg.
10	508-0103	2	Sleeve, Insulator Manifold Heater Mounting
11	114-0023	2	Screw (1/4-20 x 1-1/4") - Manifold Heater Mounting
12	123-1113	1	Tube, Nylon, Breather Hose to Manifold - Spec A through S
13	505-0180	1	Plug, Intake Manifold
14	508-0102	2	Washer, Insulator Mica - Manifold Heater Mounting
15	STUD, INTAKE MANIFOLD		
	520-0011	2	5/16 x 1-7/16"
	520-0338	2	5/16 x 2-7/8"
16	332-0829	1	Strap, Jumper - Air Heater
17	140-0595	1	Pan, Air Cleaner
18	503-0416	1	Hose, Breather - Spec A through R - NOTE: See Crankcase and Oil Base Group - Spec S Only.
19	336-1229	1	Lead, Air Heater to Solenoid in Control
20	140-1194	1	Cover, Air Cleaner
21	154-1378	1	Manifold, Intake
22	870-0137	4	Nut, Intake Manifold Mounting (5/16-24)
23	LEAD — GLOW PLUG TO AIR HEATER		
	336-1314	1	#1 Cylinder (10-1/4") - Round Terminal
	336-1313	2	#2 and #3 Cylinder (5-1/4") - Round Terminal
	336-1505	2	#2 and #3 Cylinder (5-1/4") - Blade Terminal
	334-0030	1	#4 Cylinder (18") - Round Terminal
	336-1504	2	#1 and #4 Cylinder (12-1/4") - Blade Terminal
24	154-0712	2	Heater, Manifold (Includes Gasket) - 12 Volt
25	149-0428	1	Cartridge, Secondary Fuel Filter - Spec A through R
26	149-0456	1	Gasket, Secondary Filter Bowl to Cover - Spec A through R
27	149-0455	1	Gasket, Secondary Filter - Cartridge to Head - Spec A through R
28	149-0493	1	Gasket, Secondary Filter - Cartridge to Retainer - Spec A through R
29	149-0769	1	Plug, Air Bleed - Secondary Filter - Spec A through R
30	502-0041	2	Elbow, Inverted Male - Secondary Filter Inlet and Outlet - Spec A through R
31	149-0408	1	Filter, Secondary Fuel (Includes Cartridge)

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
32	LINE — FUEL PUMP TO SECONDARY FILTER		
	149-0806	1	Spec A through R
	149-1189	1	Begin Spec S
33	502-0003	1	Connector, Primary Fuel Filter Inlet - Begin Spec S
34	526-0068	1	Washer, Primary Fuel Filter Mounting - Begin Spec S
35	801-0074	1	Screw (7/16-20 x 1-3/4"), Primary Fuel Filter Mounting - Begin Spec S
36	526-0066	1	Washer, Secondary Fuel Filter Mounting - Begin Spec S
37	801-0053	1	Screw (3/8-24 x 1-3/4"), Secondary Fuel Filter Mounting - Begin Spec S
38	LINE, FUEL — SECONDARY FILTER TO INJECTION PUMP		
	501-0091	1	Spec A through R
	501-0129	1	Begin Spec S
39	502-0099	1	Elbow, Reducer - Secondary Fuel Filter Outlet - Begin Spec S
40	122-0325	1	Filter, Fuel - Primary - Begin Spec S
41	122-0326	1	Filter, Fuel - Secondary - Begin Spec S
42	149-1185	1	Adapter, Fuel Filters - Begin Spec S
43	149-1078	1	Filter, Fuel - Mounted Between Fuel Tank and Transfer Pump - Spec A through R
44	149-0846	1	Cartridge (For 149-1078 Filter) - Spec A through R
45	517-0104	1	Plug, Core Hole - Intake Manifold - Begin Spec T
46	850-0045	3	Washer (5/16"), Lock - Fuel Filter Adapter Mounting
47	800-0026	3	Screw (5/16-18 x 3/4") - Fuel Filter Adapter Mounting
48	140-0961	1	Indicator, Restriction - Late Models
49	502-0080	2	Plug, Drain - Fuel Filters
50	140-0677	1	Conversion Kit, Oil Bath Air Cleaner - Optional (Includes Parts Marked † Plus Hardware)
51	140-0500	1	†Cleaner, Oil Bath Air
52	140-0519	1	†Band, Air Cleaner
53	503-0365	2	†Clamp, Air Cleaner Hose
54	503-0444	1	†Hose - Air Cleaner to Adapter
55	140-0645	1	†Adapter, Oil Bath Air Cleaner
56	850-0040	2	Washer (1/4"), Lock - Manifold Heater Mounting
57	WASHER, LOCK		
	850-0040	2	†Upper Adapter Mtg. (1/4")
	850-0040	2	†Band Mounting (1/4")
58	SCREW, HEX CAP		
	800-0003	2	†Band Mounting (1/4-20 x 1/2")
58	SCREW, HEX CAP		
	800-0003	2	†Band Mounting (1/4-20 x 1/2")
	800-0007	1	†Upper Adapter Mounting (1/4-20 x 1")
	800-0015	1	†Upper Adapter Mounting (1/4-20 x 3")
59	860-0013	2	†Nut (1/4-20) - Band Mounting

† - Included in optional 140-0677 Oil Bath Air Cleaner Conversion Kit.



<u>REF. NO.</u>	<u>PART NO.</u>	<u>QTY. USED</u>	<u>PART DESCRIPTION</u>
18	131-0138	1	Elbow, Water Outlet
19	502-0036	1	Connector, Inverted Male - By-Pass Line to Housing
20	130-0592	1	Line, Water By-Pass
21	502-0043	1	Elbow, Inverted Male - By-Pass Line to Pump
23	309-0179	1	Switch, High Temperature Cutoff
24	193-0104	1	Sender, Water Temperature Gauge - Engine Unit
25	505-0100	1	Plug (3/8"), Square Head - Water Outlet Housing - NOTE: Early Models Used 1/4" Plug.
26	130-0557	1	Pulley, Idler
27	130-0556	1	Shaft, Idler Pulley
28	510-0025	1	Bearing, Ball
29	518-0210	1	Ring, Snap
30	130-0560	1	Spacer, Idler Pulley
31	BRACKET, IDLER PULLEY	1	Spec A through C (Order 132-0105 Water Pump Kit)
	130-0680	1	*Begin Spec D
32	405-1157	1	Flange, Air Duct Adapter - Optional

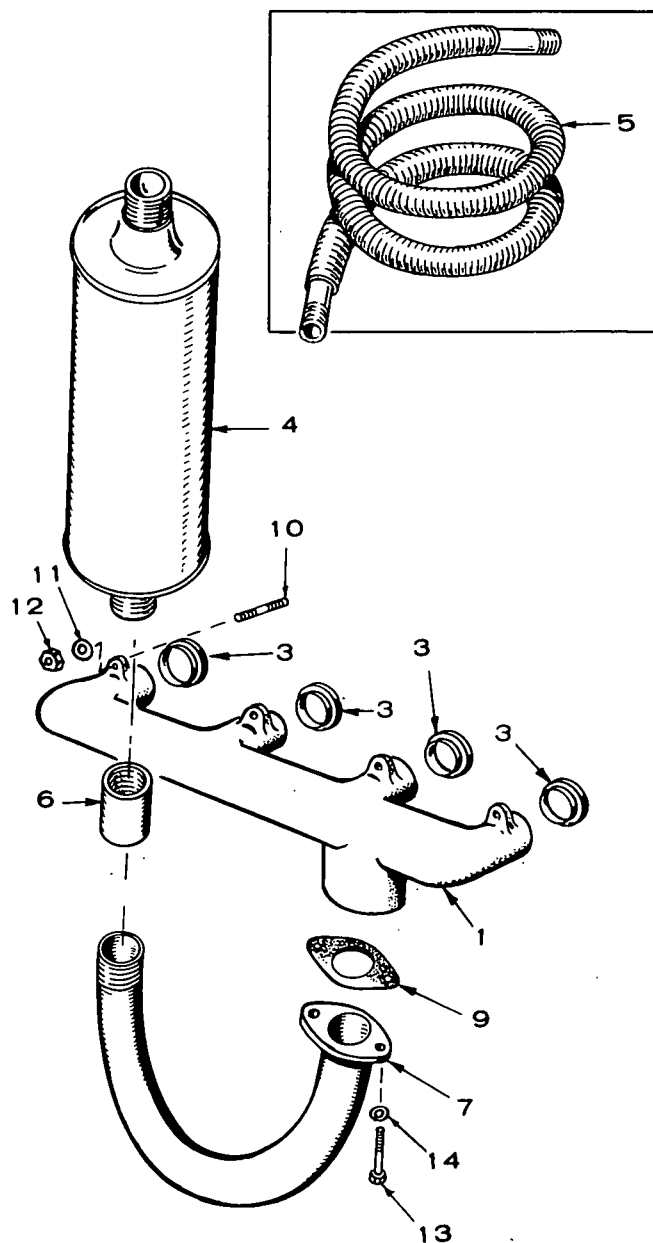
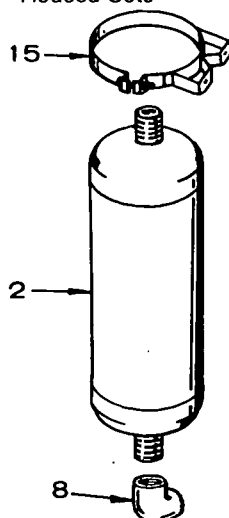
REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
33	SCREW, HEX CAP		
	800-0027	3	Fan Mounting (5/16-18 x 7/8")
	800-0064	2	*Water Pump Housing Mounting (3/8-16 x 4-1/4")
	800-0057	2	Water Pump Housing Mounting (3/8-16 x 2-3/4") - Begin Spec D
	800-0058	2	*Water Pump Housing Mounting (3/8-16 x 3") - Replacement Kit Only
	800-0027	3	Water Pump Mounting (5/16-18 x 7/8")
	800-0031	1	Water Pump Mounting (5/16-18 x 1-1/2")
	800-0030	2	Water Outlet Elbow Mounting (5/16-18 x 1-1/4")
	800-0034	4	Water Outlet Housing Mounting (5/16-18 x 2-1/4")

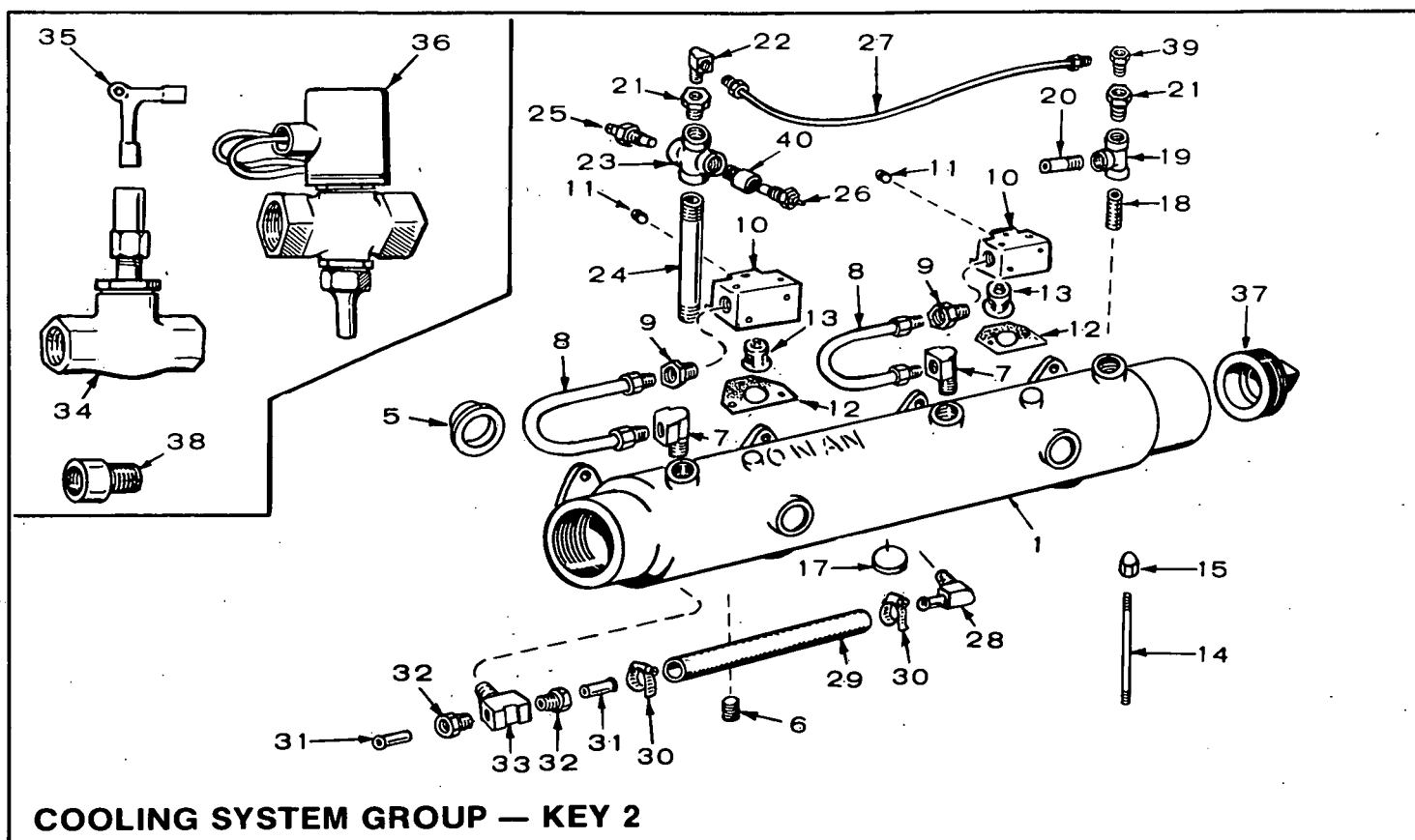
REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
34	WASHER, LOCK		
	850-0060	1	Idler Pulley Mounting (1/2")
	800-0045	4	Water Pump Mounting (5/16")
	850-0045	4	Water Outlet Housing Mounting (5/16")
35	WASHER, FLAT		
	526-0065	3	Fan Mounting (Copper)
	526-0065	2	Water Outlet Elbow Mounting (Copper)
	526-0066	4	Water Pump Housing Mounting (Copper)
	526-0035	1	Idler Pulley Mounting
36	110-0707	1	Nut, Idler Pulley Mounting
	132-0082	1	Repair Kit, Water Pump (Includes Shaft and Bearing, Impeller, Fan, Hub and Gasket)

* - Included in 132-0105 Water Pump Replacement Kit (Spec A through C).

MANIFOLD AND EXHAUST GROUP

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	154-0714	1	Manifold, Exhaust - Key 1
2	155-0360	1	Muffler, Exhaust - Housed Sets
3	154-1057	4	Gasket, Exhaust Manifold
4	155-0456	1	Muffler, Exhaust
5	TUBE, EXHAUST (FLEXIBLE)		
	155-0493	1	Unhoused Sets (36")
	155-0927	1	Housed Sets (10")
6	505-0032	1	Coupling, Pipe (1-1/2") - Exhaust
7	155-0806	1	Tube, Exhaust Outlet - Key 1
8	505-0043	2	Elbow - Housed Sets
9	154-0738	1	Gasket, Exhaust Outlet - Key 1
10	520-0608	8	Stud, Exhaust Manifold Mtg.
11	526-0045	8	Washer (5/16") - Exhaust Manifold Mounting
12	110-0445	8	Nut (5/16-24) - Exhaust Manifold Mounting
13	800-0052	2	Screw (3/8-16 x 1-1/2") - Exhaust Tube Mounting
14	850-0050	2	Washer (3/8"), Lock - Exhaust Tube Mounting
15	140-0078	2	Band, Muffler - Housed Sets



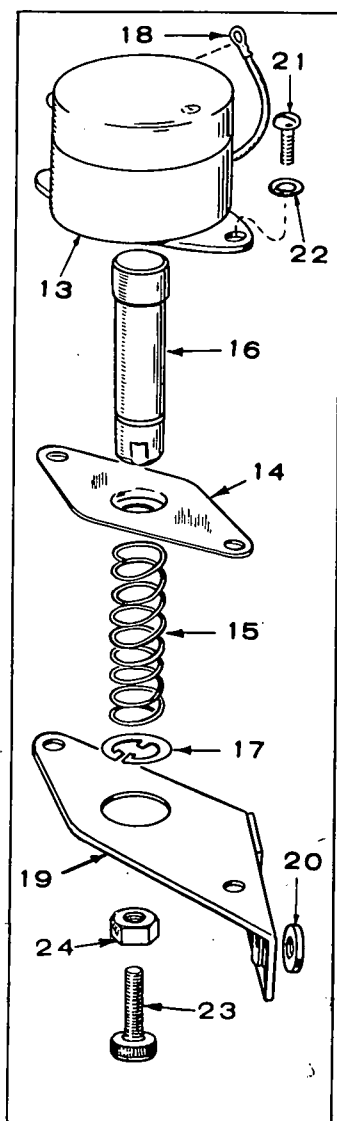
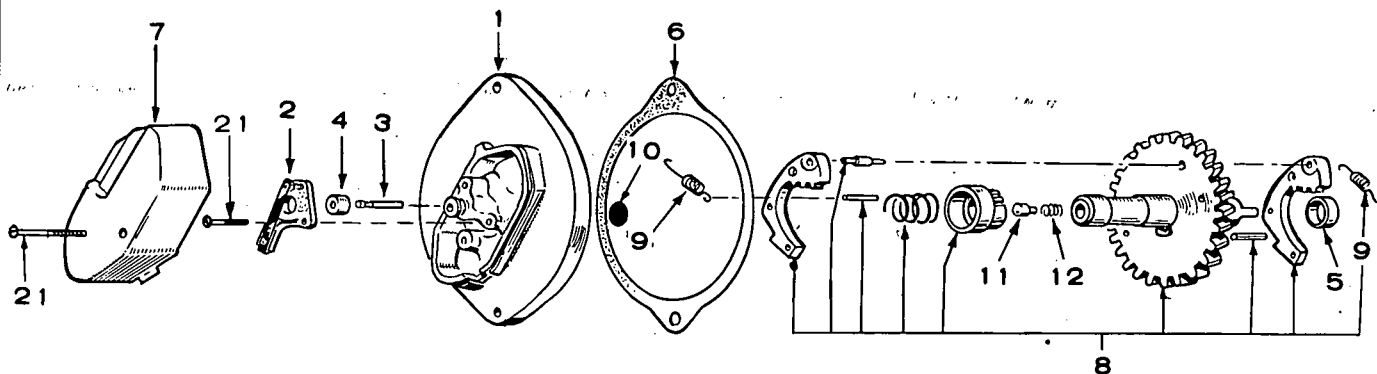


COOLING SYSTEM GROUP — KEY 2

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	154-0723	1	Manifold, Exhaust (Water Cooled)
5	143-1057	4	Gasket - Exhaust Manifold to Head
6	505-0110	1	Plug (3/8"), Pipe - Manifold Water Drain
7	502-0074	2	Elbow, Inverted Male - Manifold Water Line Inlet
8	130-0510	2	Line, Water - Thermostat Cover to Manifold
9	502-0103	2	Connector, Inverted Male - Thermostat Cover Outlet
10	309-0160	2	Cover, Thermostat
11	505-0274	2	Plug (1/8"), Pipe - Countersunk - Thermostat Cover
12	309-0145	2	Gasket, Thermostat Cover
13	309-0130	2	Thermostat
14	520-0143	4	Stud, Thermostat Cover Mtg.
15	869-0002	4	Nut (5/16-24), Acorn - Thermostat
17	517-0041	4	Plug, Expansion - Exhaust Manifold
18	505-0101	1	Nipple (3/8 x 1"), Close Pipe - Exhaust Manifold
19	505-0060	1	Tee (3/8"), Pipe - Exhaust Manifold
20	505-0135	1	Nipple (3/8" x 1-1/2"), Pipe - Exhaust Manifold

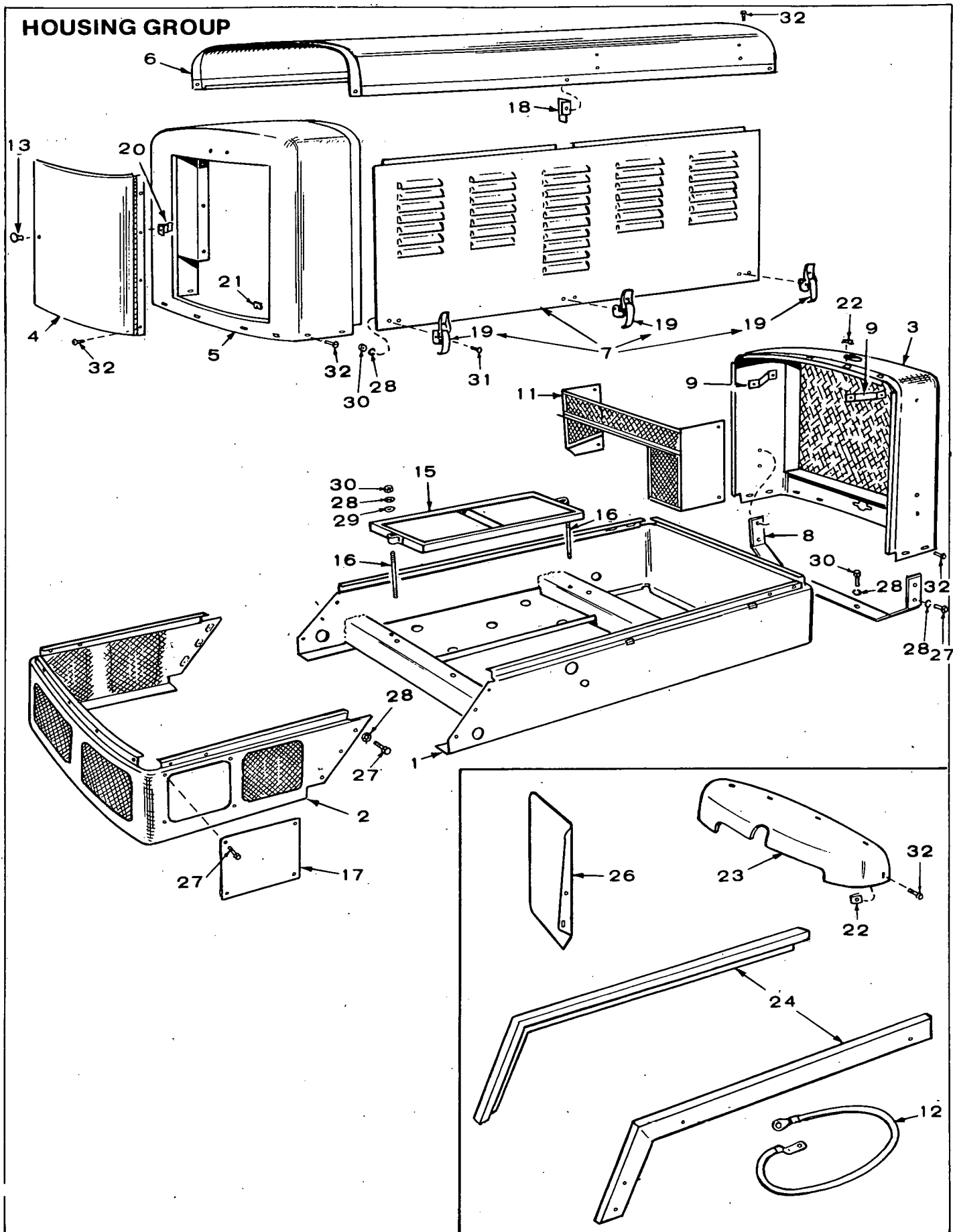
REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
21	505-0016	2	Bushing (3/8 x 1/8"), Reducer - By-Pass LINE
22	502-0037	1	Elbow, By-Pass Line
23	505-0475	1	Cross (3/8"), Pipe
24	505-0224	1	Nipple (3/8" x 4-1/2"), Pipe
25	309-0178	1	Switch, High Water Temperature Cut-off (Not Used on Pennsylvania Approved Sets)
26	193-0104	1	Sender Unit - Water Temperature
27	130-0633	1	Line, Water By-Pass
28	502-0237	1	Elbow, Brass - Water Inlet
29	503-0394	1	Hose (1/2 x 9-5/8"), Rubber - Water Inlet Tee to Elbow
30	503-0183	2	Clamp, Hose - Water Inlet
31	130-0533	2	Adapter, Hose - Water Inlet
32	502-0239	2	Nut, Inverted - Water Inlet
33	502-0247	1	Tee, Male Branch - Water Inlet
34	504-0019	1	Valve, Lockshield
35	504-0020	1	Key, Lockshield
36	307-0833	1	Valve, Solenoid
37	505-0402	1	Plug, Exhaust Manifold End - Begin Spec B
38	309-0081	1	Extension, Water Temperature Sender
39	502-0097	1	Connector, By-Pass Line
40	309-0081	1	Pipe, Extension - Temperature Switch

START — DISCONNECT PLATE AND STOP SOLENOID GROUP



REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	191-0496	1	Plate
2	309-0134	1	Switch Assembly
3	309-0152	1	Plunger, Switch
4	160-1143	1	Diaphragm, Switch Plunger
5	160-0720	1	Spacer, Switch Plate
6	160-0721	1	Gasket, Plate
7	191-0392	1	Cover, Switch Plate
8	191-0388	1	Control Assembly, Switch
9	160-0711	2	Spring, Weight (Included in Switch Control Assembly)
10	160-0806	1	Disc, Thrust Plunger
11	160-0774	1	Plunger, Thrust
12	160-0773	1	Spring, Thrust Plunger
13	307-0628	1	Solenoid, Stopping
14	306-0162	1	Retainer, Solenoid Plunger
15	306-0161	1	Spring, Solenoid Plunger
16	306-0159	1	Plunger, Solenoid
17	518-0203	1	Ring, Snap - Spring Retaining
18	336-0706	1	Lead, Solenoid Ground
19	306-0158	1	Bracket, Solenoid Mounting
20	526-0180	1	Spacer, Solenoid Bracket Mounting
21	SCREW, ROUND HEAD		
	812-0148	2	Solenoid Mounting (1/4-20 x 1/2")
	813-0107	1	Switch Plate Cover Mounting (10-32 x 1-1/4")
	815-0201	2	Switch Assembly Mounting (8-32 x 3/8")
22	850-0040	2	Washer (1/4"), Lock - Solenoid Mounting
23	306-0242	1	Screw, Brass - Solenoid Plunger
24	862-0001	1	Nut (1/4-20) - Solenoid Plunger

HOUSING GROUP



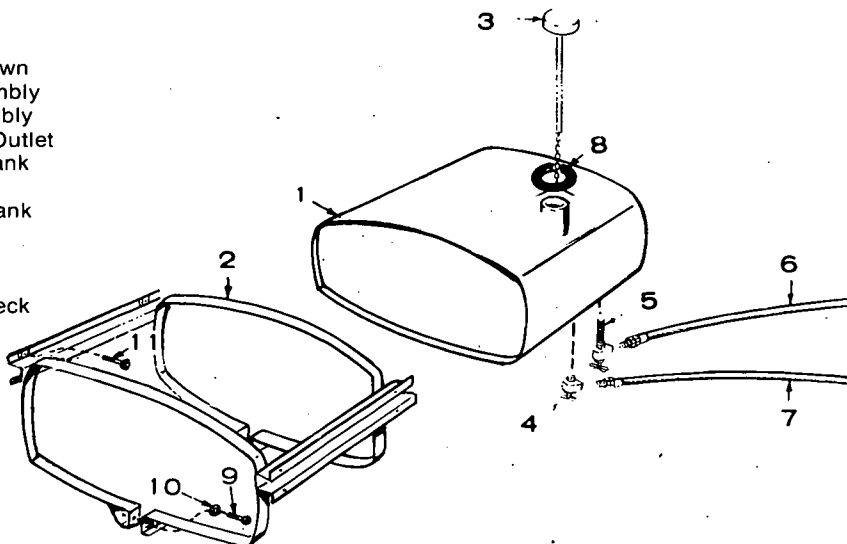
REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
	CHASSIS, MOUNTING		
1	403-0718	1	Front Section
2	403-0477	1	Rear Section - Housed Sets
	PANEL		
3	405-1079	1	Front End (Radiator Grille)
4	405-1080	1	Rear Door - Housed Sets
5	405-1081	1	Rear End (Does NOT include Door) Housed Sets
6	PANEL, TOP (HOUSED SETS)		
	405-1319	1	Units With Engine Mounted Muffler
	405-1632	1	Units With Top Mounted Muffler
7	405-1084	2	Housing Side - Includes Fasteners - Housed Sets
8	130-0396	1	Support, Radiator Mounting
9	130-0397	2	Bracket, Radiator
11	130-0623	1	Guard, Fan
12	336-0476	1	Cable, Ground Strap
13	406-0002	1	Knob, Rear Door Panel - Housed Sets
15	416-0495	1	Frame, Battery Holddown
16	520-0669	2	Stud, Battery Holddown Frame
17	403-0373	1	Panel, Chassis - Housed Sets
18	405-1181	2	Stop, Door - Housed Side Panel - Housed Sets
19	406-0105	6	Fastener, Side Panel - Housed Sets
20	406-0088	1	Catch, Rear Door Panel - Housed Sets
21	870-0106	4	Nut, Speed - Rear Door Panel Mounting - Housed Sets
22	870-0113	As Req.	Nut, Speed Grip - (12) Rear End Panel to Housing Top - Housed Sets (6) Radiator Hood Extension - Unhoused Sets
23	405-1089	1	Extension, Radiator Hood - Unhoused Sets
24	403-0478	1	Edging, Chassis - Right Hand - Unhoused Sets

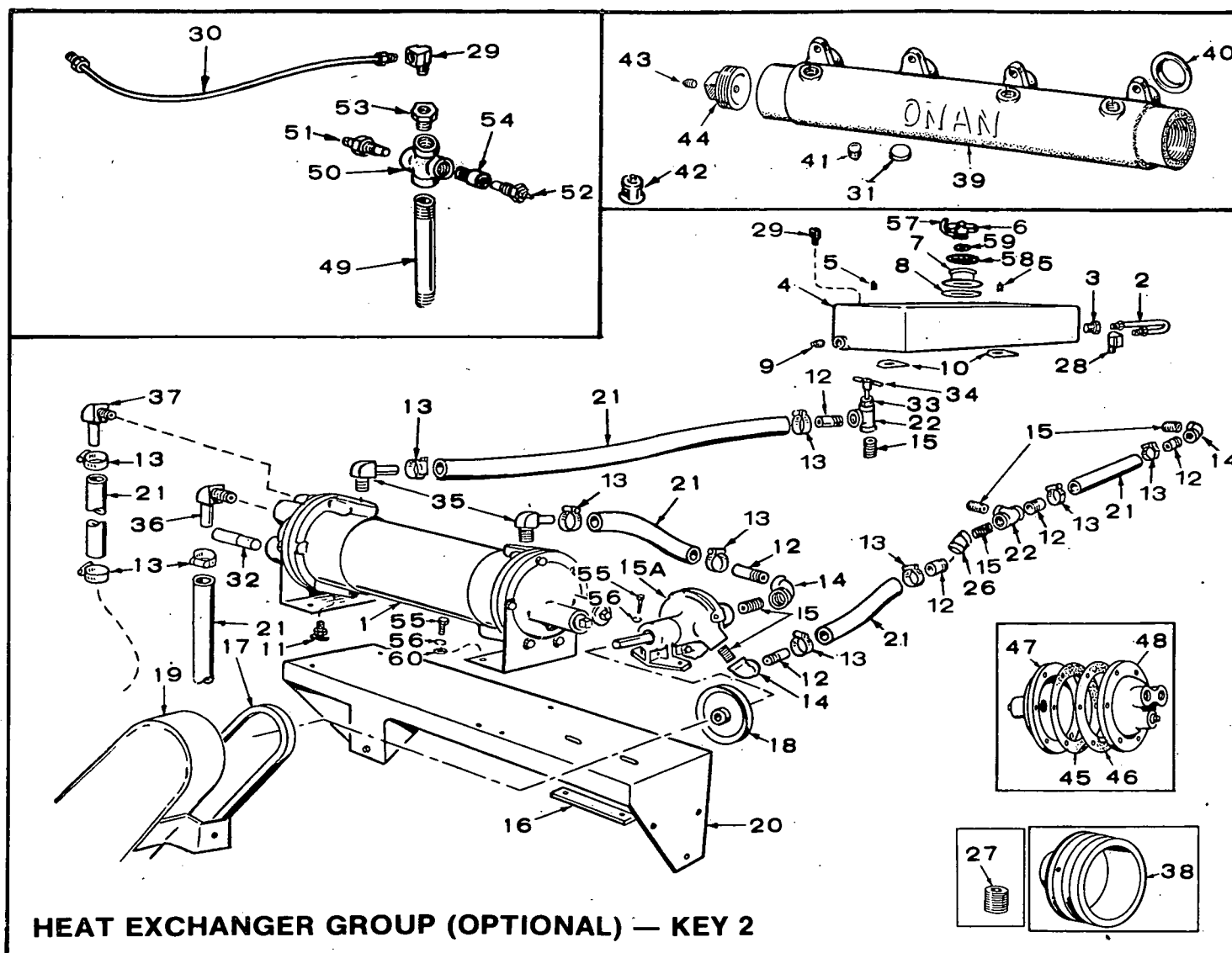
REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
24	403-0479	1	Edging, Chassis - Left Hand - Unhoused Sets
26	155-0848	1	Shield, Muffler Heat
27	SCREW, HEX CAP		
	800-0024	4	Chassis Panel Mounting (5/16-18 x 1/2")
	800-0047	6	Rear Chassis to Front Chassis (3/8-16 x 5/8")
	800-0024	4	Radiator Support Mounting (5/16-18 x 1/2")
	800-0048	4	Fan Guard Mounting (3/8-16 x 3/4")
28	WASHER, LOCK		
	850-0050	6	Rear Chassis to Front Chassis (3/8")
	850-0050	6	Radiator Support Mounting (3/8")
	850-0050	4	Fan Guard Mounting (3/8")
	850-0045	4	Battery Holddown (5/16")
	850-0030	12	Fastener Mounting (#10)
29	526-0024	2	Washer, Flat - Battery Holddown
30	NUT, HEX		
	862-0015	4	Battery Holddown (5/16-18)
	870-0053	12	Fastener Mounting (10-32)
	862-0003	2	Radiator Support Mounting (3/8-16)
31	813-0098	12	Screw, Round Head - Fastener Mounting (10-32 x 3/8")
32	SCREW, TRUSS HEAD		
	821-0006	4	Rear Door Mounting (#14 x 1/2")
	821-0014	8	Rear Panel Mounting (5/16-18 x 1/2")
	821-0014	8	Front Panel Mounting (5/16-18 x 1/2")
	821-0014	12	Top Panel Mounting (5/16-18 x 1/2")
	821-0014	4	Radiator Hood Extension Mtg. (5/16-18 x 1/2")

NOTE: Parts in this group are for both Housed and Unhoused Sets unless otherwise specified.

MOUNTED FUEL TANK GROUP — HOUSED MODELS (OPTIONAL)

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	159-0639	1	Tank, Fuel (15 Gallons)
2	159-0640	1	Band, Fuel Tank Holddown
3	159-0642	1	Cap and Indicator Assembly
4	504-0013	1	Valve and Screen Assembly
			Fuel Shut-Off - Tank Outlet
5	504-0007	1	Valve, Fuel Shut-Off - Tank Inlet (Return Line)
6	501-0078	1	Line, Flex Fuel (20") - Tank to Pump
7	501-0066	1	Line, Flex Fuel (31") - Fuel Return
8	159-0751	1	Gasket, Gas Tank Fill Neck
9	812-0168	2	Screw (1/4-20 x 3-1/2"), Round Head
10	850-0040	2	Washer (1/4"), Lock
11	821-0010	8	Screw (1/4-20 x 1/2"), Self Locking





HEAT EXCHANGER GROUP (OPTIONAL) — KEY 2

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	130-0624	1	Exchanger, Heat
2	130-0575	1	Line, Water - Expansion Tank to Exhaust Manifold
3	502-0103	1	Connector, Inverted Male - Expansion Tank Outlet
4	130-0646	1	Tank, Expansion
5	502-0080	2	Plug, Expansion Tank Fill Vent
6	130-0589	1	Cap, Pressure
7	130-0590	1	Neck and Adapter, Expansion Tank Cap
8	130-0519	1	Gasket, Neck and Adapter
9	502-0155	1	Plug (3/8")
10	309-0145	2	Gasket, Thermostat Chamber
11	504-0003	1	Valve, Drain
12	502-0258	6	Nipple (3/8" x 2"), Hose Connector
13	503-0183	9	Clamp (1-1/16")
13	503-0446	2	Clamp (25/32")
14	502-0263	3	Elbow (90° - 3/8")
15	502-0085	6	Nipple (3/8")
15A	132-0110	1	Pump, Centrifugal Water - Less Pulley (See Separate Group for Components)
16	131-0130	1	Bar, Pump Holddown
17	511-0067	1	Belt, Centrifugal Water Pump

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
18	512-0042	1	Pulley, Centrifugal Water Pump
19	130-0591	1	Guard, Belt
20	BRACKET, HEAT EXCHANGER AND GOVERNOR SPRING		
	130-0587	1	Spec A through Q
	130-0692	1	Begin Spec R
21	503-0463	1	Hose (3/4" I.D. x 54"), Rubber - Total Length Required for All Hoses Except Raw Water Pump
21	503-0285	1	Hose (1/2" I.D. x 14"), Rubber - Raw Water Pump to Heat Exchanger
22	502-0257	2	Tee (3/8")
26	502-0298	1	Elbow (45°)
27	505-0266	1	Plug (3/8") - Exhaust Manifold
28	502-0074	1	Elbow, Inverted Male - Manifold Water Line Inlet
29	502-0037	2	Elbow
30	130-0813	1	Line - Heat Exchanger to Cylinder Head
31	517-0041	4	Plug, Expansion
32	130-0626	2	Pencil, Zinc (Included in Heat Exchanger)
33	502-0049	1	Bushing (3/8 x 1/8"), Reducer
34	504-0006	1	Valve - Air Bleed Manifold Outlet

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
35	502-0300	2	Elbow, Brass - Heat Exchanger Fresh Water Hoses
36	502-0302	1	Elbow, Brass - Heat Exchanger Raw Water Inlet Hose
37	502-0237	1	Elbow, Brass - Heat Exchanger Raw Water Outlet Hose
38	104-0546	1	Pulley, Flywheel
39	154-0723	1	Manifold, Exhaust (Water Cooled)
40	154-1057	4	Gasket - Exhaust Manifold to Head
41	505-0110	1	Plug (3/8"), Pipe - Manifold Water Drain
42	309-0130	2	Thermostat
43	502-0080	1	Plug (1/8"), Square Head Brass - Manifold End Plug (Used on Some Early Models)
44	505-0402	1	Plug, Exhaust Manifold End
45	130-0729	1	Gasket - Heat Exchanger Fresh Water End
46	130-0730	1	Gasket - Heat Exchanger Raw Water End
47	130-0731	1	Bonnet - Heat Exchanger Fresh Water

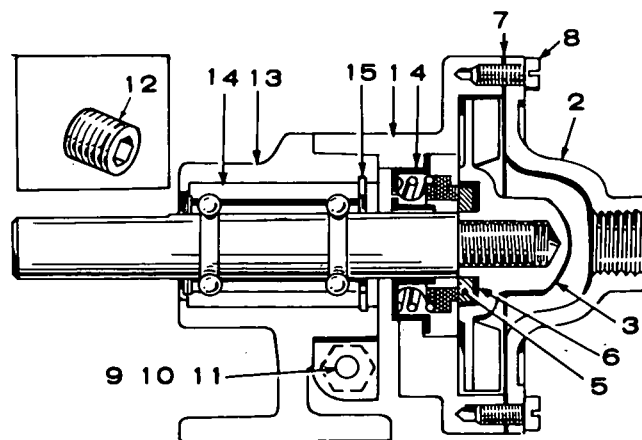
REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
48	130-0732	1	Bonnet - Heat Exchanger Raw Water
49	505-0224	1	Nipple (3/8 x 4-1/2"), Pipe
50	505-0475	1	Cross (3/8"), Pipe
51	309-0178	1	Switch, High Water Temperature Cut-off
52	193-0104	1	Sender Unit, Water Temperature
53	505-0016	1	Bushing (3/8" x 1/8"), Reducer
54	309-0081	1	Extension, Pipe - Temperature Switch
55	SCREW, HEX CAP 800-0005	2	Water Pump Mounting (1/4-20 x 5/8")
	800-0004	4	Heat Exchanger Mounting (1/4-20 x 3/4")
56	WASHER, LOCK 850-0040	2	Water Pump Mounting (1/4")
	850-0040	4	Heat Exchanger Mounting (1/4")
57	503-0679	1	Hose, Overflow
58	130-0892	1	Stiffener, Filler Neck
59	821-0005	6	Screw (10-32 x 1/2") Self Locking
60	526-0158	4	Washer (1/4"), Flat

WATER PUMP PARTS GROUP (132-0110) - OPTIONAL

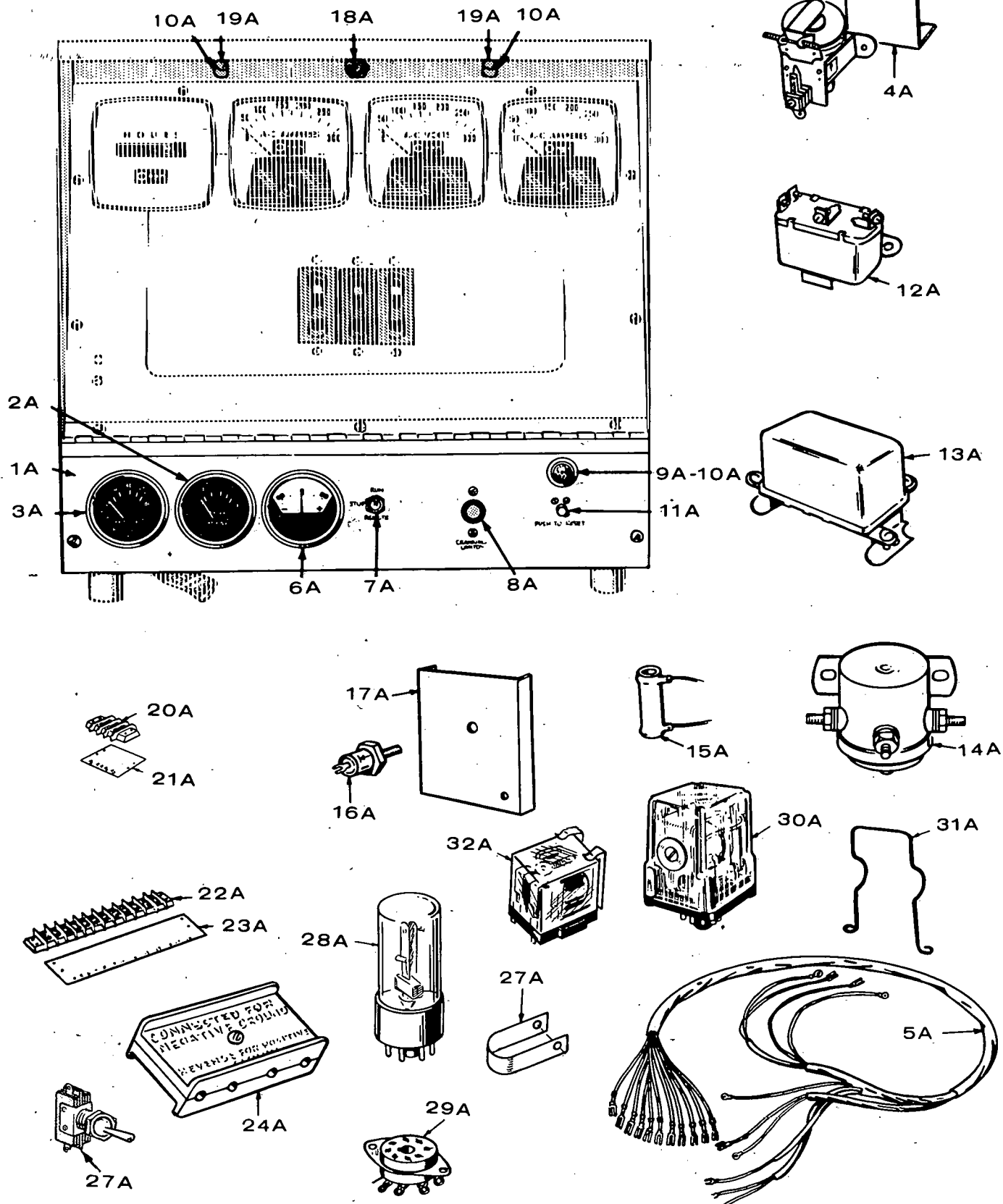
NOTE: This pump used on sets with heat exchanger only.

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
	132-0110	1	Pump, Water - Complete
	132-0111	1	Repair Kit (Includes Parts Marked *)
1	132-0136	1	Body, Pump
2	132-0137	1	Cover, Pump
3	132-0114	1	*Impeller
4	132-0101	1	*Seal
5	132-0091	1	*Face, Wear
6	132-0092	1	*Seat, Seal
7	132-0112	1	*Gasket, Cover
8	132-0113	6	*Screw, Cover
9	132-0138	1	Screw, Cap
10	132-0139	1	Lockwasher
11	132-0140	1	Nut, Hex
12	132-0141	1	Plug, Drain
13	132-0142	1	Pedestal
14	132-0089	1	*Shaft and Bearing Assembly
15	132-0132	1	Ring, Snap

* - Parts included in the 132-0111 Repair Kit.

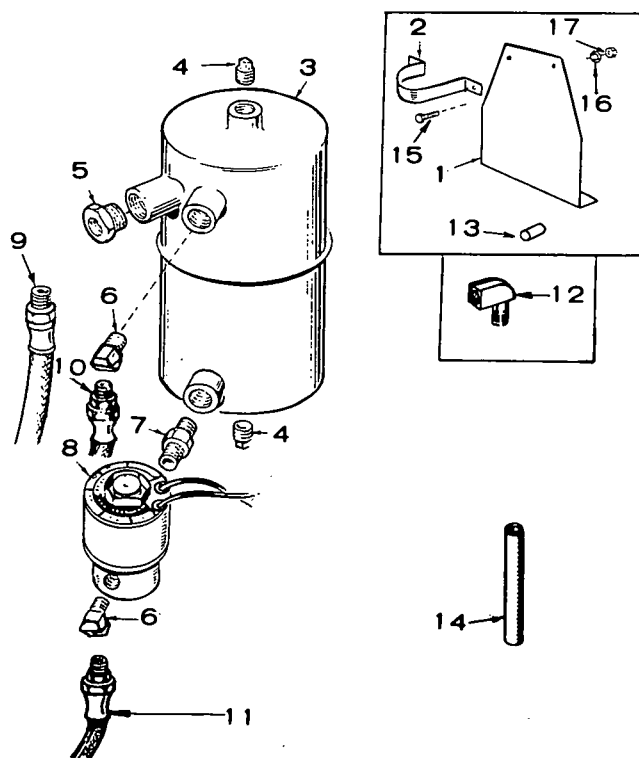


CONTROL GROUP (ENGINE INSTRUMENTS PORTION)



REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1A	PANEL ONLY, LOWER		
	301-2124	1	Standard Units
	301-2125	1	Units With 4 Signal Lights
	301-2895	1	Pennsylvania Approved Units
2A	193-0106	1	Gauge, Water Temperature
3A	193-0107	1	Gauge, Oil Pressure
4A	301-1685	1	Bracket, Time Delay Relay Mounting (Used Only With Low Oil Pressure Cutoff Switch)
5A	338-0298	1	Harness, Wiring - Engine to Control
6A	302-0446	1	Ammeter, Charge
7A	SWITCH, SELECTOR		
	308-0220	1	All Units Except Pennsylvania Approved - Begin Spec U (Run-Stop)
	308-0068	1	Pennsylvania Approved Units - Begin Spec U (Run-Remote)
8A	320-0104	1	Switch, Cranking Limiter
9A	322-0069	As Req.	Receptacle, Signal Light (Red) - Not Used on Pennsylvania Approved Units
10A	322-0004	As Req.	Bulb, Signal and Panel Light
11A	307-0655	As Req.	Relay, Emergency Latching - Not Used on Pennsylvania Approved Units
12A	307-0052	1	Relay, Start-Disconnect
13A	307-0597	1	Relay, Ignition
14A	307-0514	2	Relay - (1) Starter Pilot (1) Manifold Heater
15A	304-0192	1	Resistor (3-Ohm, 10 Watt) - Cranking Limiter

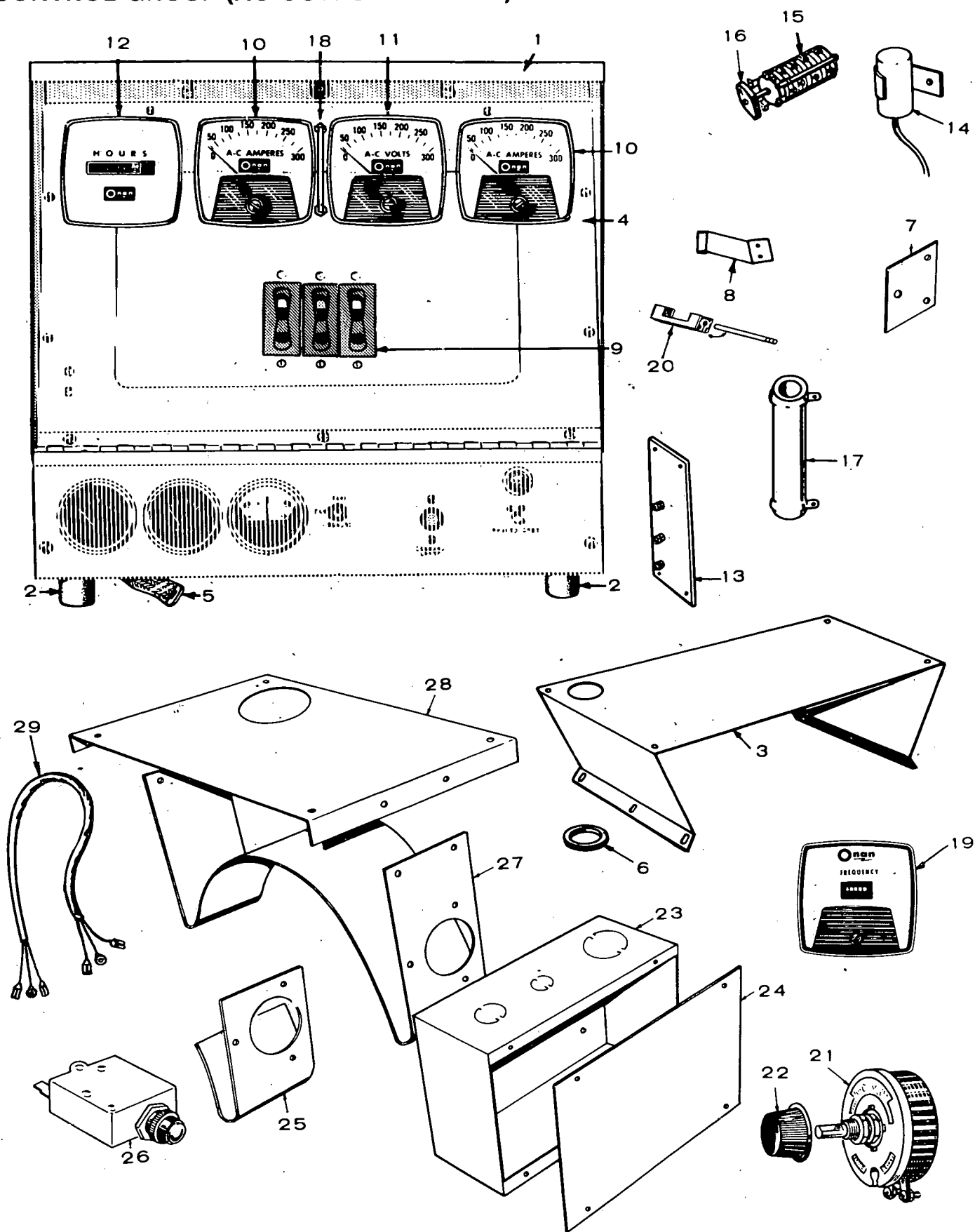
REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
16A	305-0235	1	Rectifier, Charge (10-Amp, 100 Volt Peak)
17A	305-0254	1	Bracket, Rectifier Mounting
18A	308-0002	1	Switch, Panel Light
19A	322-0072	2	Receptacle, Panel Light
20A	332-0611	1	Block, Terminal (3 Place)
21A	332-1009	1	Strip, Marker (GRD, B+, REMOTE)
22A	BLOCK, TERMINAL		
	332-0607	1	Standard Units
	332-1005	1	Units With 4 Signal Lights
	332-0795	1	Pennsylvania Approved Units
23A	STRIP, BLOCK MARKER		
	332-0608	1	Standard Units - Begin Spec C
	332-0642	1	Standard Units - Spec A and B
	332-1006	1	Units With 4 Signal Lights
	332-0862	1	Pennsylvania Approved Units
24A	332-0750	1	Kit, Polarity Marker - Spec A through N
25A	307-0388	1	Relay, Time Delay - Used Only With Low Oil Cutoff Switch
26A	416-0096	1	Clip, Harness Support
27A	308-0037	1	Switch, Manifold Heater
28A	RELAY, TIME DELAY PREHEAT		
	307-0645	1	Above 60F (20 sec)
	307-0658	1	60F to 30F (60 sec)
29A	323-0052	As Req.	Socket, Emergency Latching Relay
30A	307-0819	1	Relay, Low Engine Temperature
31A	307-0778	1	Spring, Low Engine Temperature Relay Holddown



REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	159-0826	1	Bracket, Tank Mounting (Two Quart Tank)
2	159-0825	1	Clamp, Tank Mounting (Two Quart Tank)
3	159-0746	1	Tank, Reservoir (Two Quart Tank)
4	505-0057	2	Plug
5	159-0705	1	Reducer, Restricted
6	502-0053	2	Elbow (45°), Male
7	502-0082	1	Nipple - Solenoid Valve to Tank
8	307-0565	1	Valve (12 Volt), Solenoid
9	501-0005	1	Line, Fuel - To Fuel Tank
10	501-0008	1	Line, Fuel - Tank to Fuel Pump
11	501-0008	1	Line, Fuel - Tank to Carburetor
12	502-0002	2	Elbow, Inverted Flare
13	159-0761	2	Spacer
14	503-0427	1	Sleeve (4"), Rubber
15	800-0005	2	Screw (1/4-20 x 3/4") - Bracket Mounting
16	850-0040	2	Washer (1/4"), Lock - Bracket Mounting
17	860-0013	2	Nut (1/4-20) - Bracket Mounting

RESERVOIR (DAY) TANK GROUP — OPTIONAL EQUIPMENT

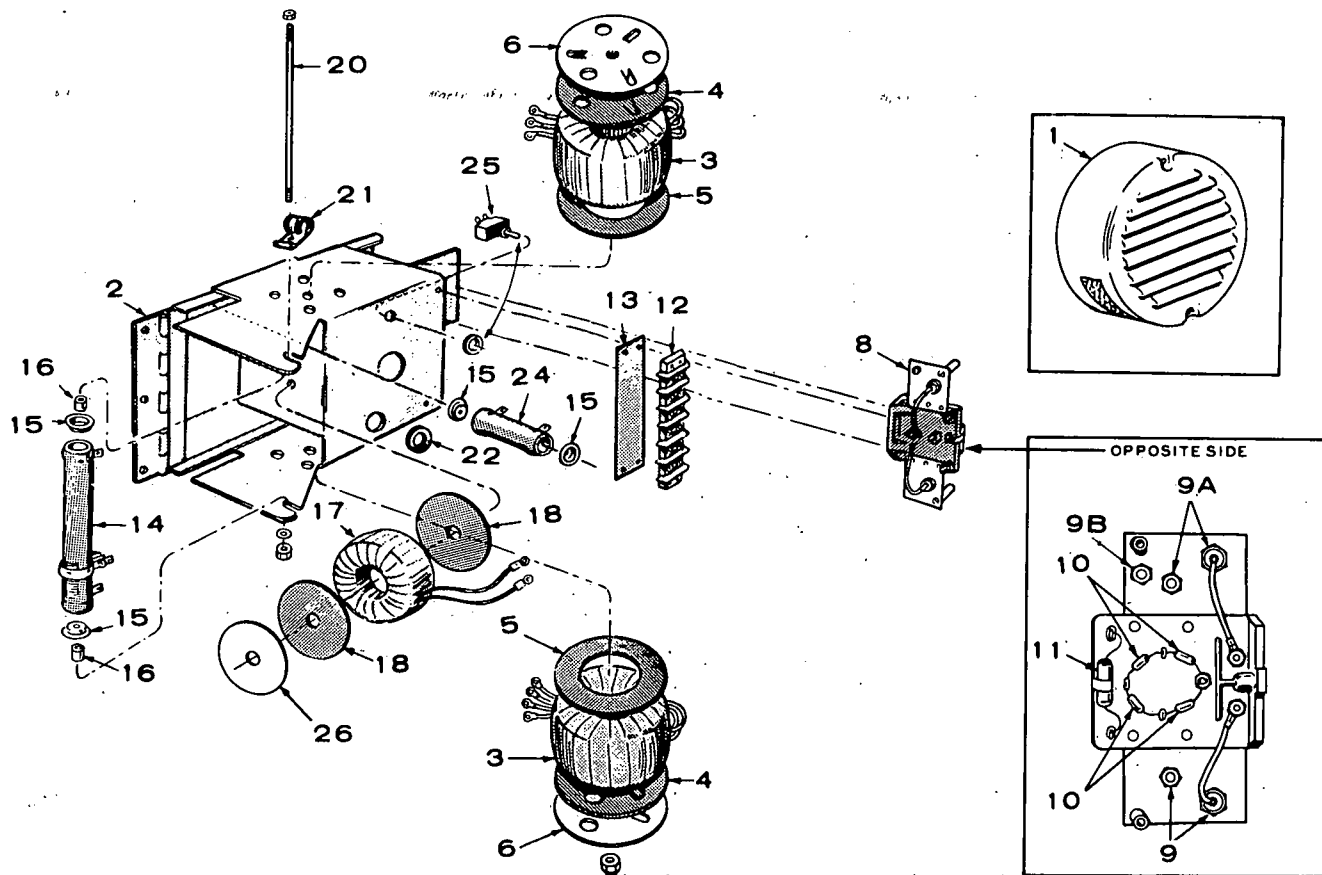
CONTROL GROUP (AC OUTPUT PORTION)



REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	301-2115	1	Box Only, Control
2	402-0078	4	Rubber Mounting - Unhoused Sets
3	301-2106	1	Bracket, Control Box Mounting (Unhoused Sets) - Spec A through Z
4		1	Panel Only, Upper
5	STRAP, GROUND (Unhoused Sets Only)		
	337-0044	1	Spec A through Z
	337-0046	1	Begin Spec AA
6	GROMMET, RUBBER		
	508-0063	2	For 2-3/4" Hole - Unhoused Uses 1
	508-0183	1	For 1-3/4" Hole - Output Box
7	301-0648	1	Plate, Ground - Spec A through Z
8	301-1914	1	Bracket, Panel Stop
9	BREAKER, CIRCUIT (Check Original Part - Select According to Amperage and Voltage)		
	320-0153	As Req.	40 Amp., 240 Volt (Single Pole)
	320-0198	As Req.	45 Amp., 240 Volt (Single Pole)
	320-0052	As Req.	50 Amp., 240 Volt (Single Pole)
	320-0195	As Req.	55 Amp., 240 Volt (Single Pole)
	320-0021	As Req.	60 Amp., 240 Volt (Single Pole)
	320-0366	As Req.	65 Amp., 240 Volt (Single Pole)
	320-0148	As Req.	70 Amp., 240 Volt (Single Pole)
	320-0367	As Req.	75 Amp., 240 Volt (Single Pole)
	320-0251	As Req.	100 Amp., 240 Volt (Single Pole)
	320-0486	As Req.	20 Amp., 480 Volt (3 Pole Companion)
	320-0487	As Req.	25 Amp., 480 Volt (3 Pole Companion)
	320-0488	As Req.	30 Amp., 480 Volt (3 Pole Companion)
	320-0514	As Req.	15 Amp., 600 Volt (3 Pole Companion)
	320-0459	As Req.	20 Amp., 600 Volt (3 Pole Companion)
10	AMMETER, AC (Check Scale - Select Accordingly)		
	302-0460	As Req.	Scale Reads 0-20
	302-0418	As Req.	Scale Reads 0-30
	302-0444	As Req.	Scale Reads 0-35
	302-0419	As Req.	Scale Reads 0-50
	302-0458	As Req.	Scale Reads 0-80
	302-0410	As Req.	Scale Reads 0-150
	302-0411	As Req.	Scale Reads 0-200
11	VOLTMETER, AC (Check Scale - Select Accordingly)		
	302-0421	1	Scale Reads 0-300
	302-0422	1	Scale Reads 0-600
	302-0423	1	Scale Reads 0-750
12	METER, RUNNING TIME (Check Meter Face for Part Number)		
	302-0465	1	120 Volt, 60 Hertz
	302-0466	1	220 Volt, 60 Hertz
	302-0467	1	480 Volt, 60 Hertz
	302-0468	1	120 Volt, 50 Hertz
	302-0469	1	220 Volt, 50 Hertz
	302-0470	1	480 Volt, 50 Hertz

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
13	332-0513	1	Block, Terminal - 4 Place
14	312-0058	As Req.	Condenser (.1 Mfd.), Filter Spec A through Z
15	308-0012	1	Switch, Selector - Voltmeter, 3 Phase Sets
16	303-0076	1	Knob, Selector Switch - 3 Phase Sets
17	304-0536	1	Resistor, Fixed (9000-Ohm, 50 Watt) - Running Time Meter - 600 Volt Sets
18	301-2727	1	Handle, Control Panel
19	METER, FREQUENCY (Check Meter Face for Part Number)		
	302-0213	1	100-150 Volt, 60 Hertz
	302-0221	1	200-250 Volt, 60 Herz
	302-0716	1	480 Volt, 60 Hertz
	302-0717	1	600 Volt, 60 Hertz
	302-0234	1	100-150 Volt, 50 Hertz
	302-0256	1	200-250 Volt, 60 Hertz
	302-0825	1	480 Volt, 50 Hertz
	302-0788	1	600 Volt, 50 Hertz
20	BAR, CIRCUIT BREAKER TIE		
	320-0187	1	Used with 3 Circuit Breakers
	320-0202	1	Used with 2 Circuit Breakers
21	303-0197	1	Rheostat (2500-Ohm, 25 Watt) - Units with Voltage Adjustment - Begin Spec AA
22	303-0032	1	Knob, Rheostat - Units with Voltage Adjustment - Begin Spec AA
23	301-3682	1	Box, Output - Begin Spec AA
24	301-0856	1	Cover, Output Box - Begin Spec AA
25	301-3720	1	Bracket, Output Box (Housed Only) - Begin Spec AA
26	320-0505	1	Breaker, Circuit - Voltage Regulator - Begin Spec AA
27	301-3715	1	Saddle, Control Box Mounting (Unhoused Only) - Begin Spec AA
28	301-3716	1	Plate, Control Mounting (Unhoused Only) - Begin Spec AA
29	338-0763	1	Harness, Wiring - Voltage Regulator to Circuit Breaker - Begin Spec AA

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



GENERATOR GROUP — EXCITER PORTION

NOTE: 06SX1N1B used on all 60 Hertz sets, Spec A through N.

06SX1N1B used on 60 Hertz, 120/240 Volt and 277/480 Volt, 3 Phase sets, Begin Spec P.

06SX1N3B used on all 60 Hertz sets except 120/240 Volt and 277/480 Volt, 3 Phase sets Begin Spec P.

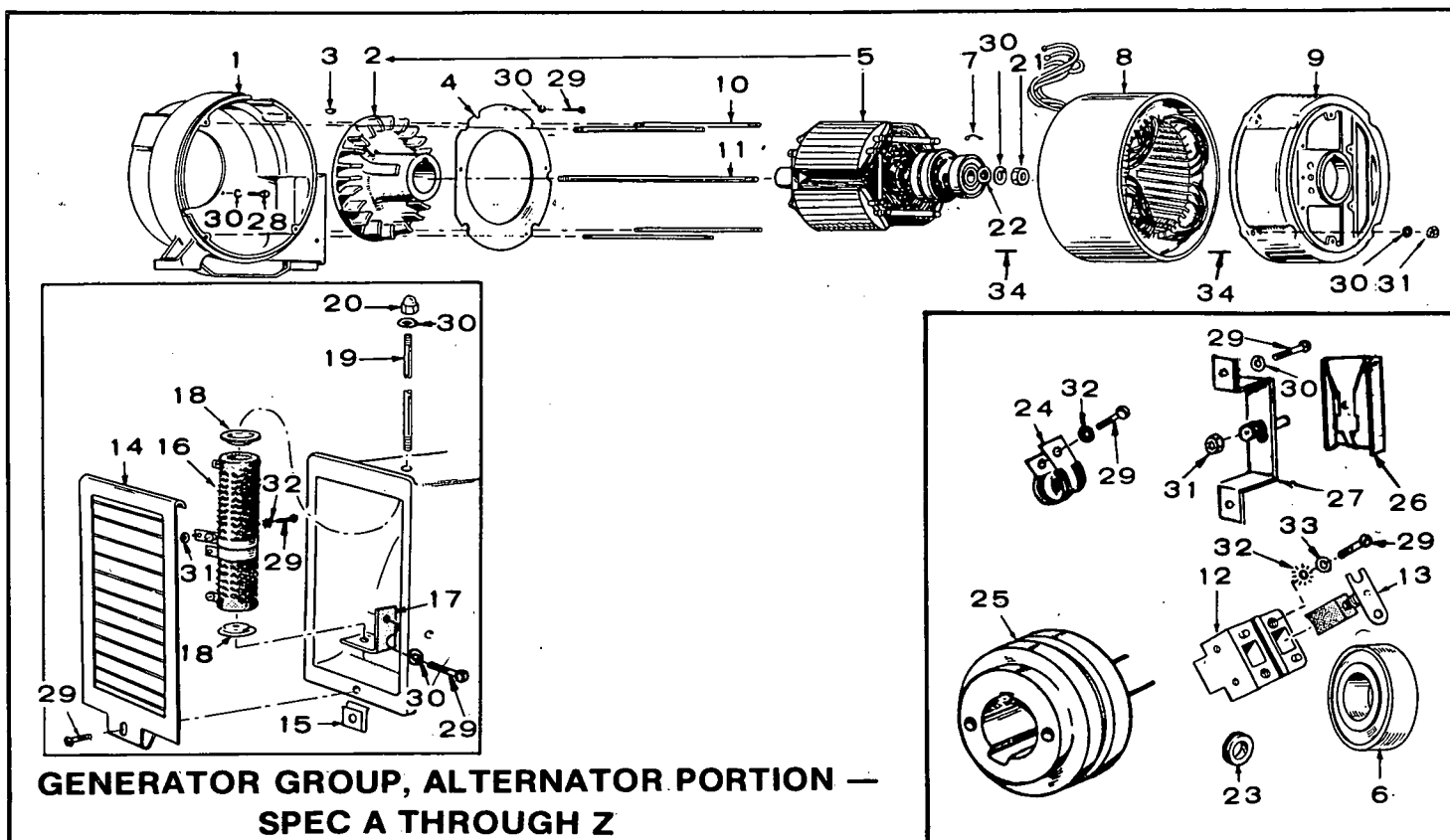
06SX51N1B used on all 50 Hertz sets Spec A through N.

06SX51N3B used on all 50 Hertz sets Begin Spec P.

Check set nameplate for Magneciter number and use correct column.

REF. NO.	QTY. USED	PART DESCRIPTION	PART NUMBER			
			06SX1N1B	06SX1N3B	06SX51N1B	06SX51N3B
	1	Exciter Complete (Less Cover)	209-0008	209-0010	209-0012	209-0013
	1	Cover, Exciter	234-0185	234-0185	234-0185	234-0185
2	1	Panel Only, Exciter	234-0188	234-0188	234-0188	234-0188
3	2	Reactor, Gate	315-0102	315-0102	315-0104	315-0104
4	2	Gasket, Gate Reactor Mounting, Outer	232-1553	232-1553	232-1553	232-1553
5	2	Gasket, Gate Reactor Mounting, Inner	232-1551	232-1551	232-1551	232-1551
6	2	Retainer, Gate Reactor	232-1552	232-1552	232-1552	232-1552
8	1	Rectifier Assembly, Resistor & Complete	305-0264	305-0388	305-0264	305-0388
9	2	Rectifier Only, Power Field, Negative	305-0238	305-0238 ★	305-0238	305-0238 ★
9A	2	Rectifier Only, Power Field, Positive	305-0239	305-0239	305-0239	305-0239
9B	1	Rectifier, Field Flash		305-0239		305-0239
10	4	Rectifier, Voltage Control	305-0240	305-0240	305-0240	305-0240
11	1	Resistor, Included in Rectifier Assembly (150-Ohm, 5 Watt)	304-0512	304-0512	304-0512	304-0512
12	1	Block, Terminal	332-0745	332-0745	332-0745	332-0745
13	1	Strip, Block Marker	332-0746	332-0925	332-0746	332-0925
14	1	Resistor, Tapped, 500-Ohm (425 Fixed, 75 Adj.)	304-0527	304-0527	304-0527	304-0527
15	4	Washer, Resistor Centering	304-0015	304-0015	304-0015	304-0015
16	2	Spacer, Resistor Mounting	232-1474	232-1474	232-1474	232-1474
17	1	Reactor, Voltage Control	315-0100	315-0100	315-0105	315-0105
18	2	Gasket, Voltage Control Reactor	232-1548	232-1548	232-1548	232-1548
20	1	Stud (or Screw), Tapped Resistor Mounting	520-0641	520-0641	520-0641	520-0641
21	1	Clip, Tinnerman	332-0050	332-0050	332-0050	332-0050
22	1	Grommet, Rubber, For 7/8" Hole	508-0008	508-0008	508-0008	508-0008
24	1	Resistor, Fixed (250-Ohm, 25-Watt)	304-0510	304-0510	304-0510	304-0510
25	1	Switch, Residual Reset	308-0175		308-0175	
26	1	Washer, Retainer, Voltage Control Reactor	526-0173	526-0173	526-0173	526-0173

★ - Later models use Quantity of 3.



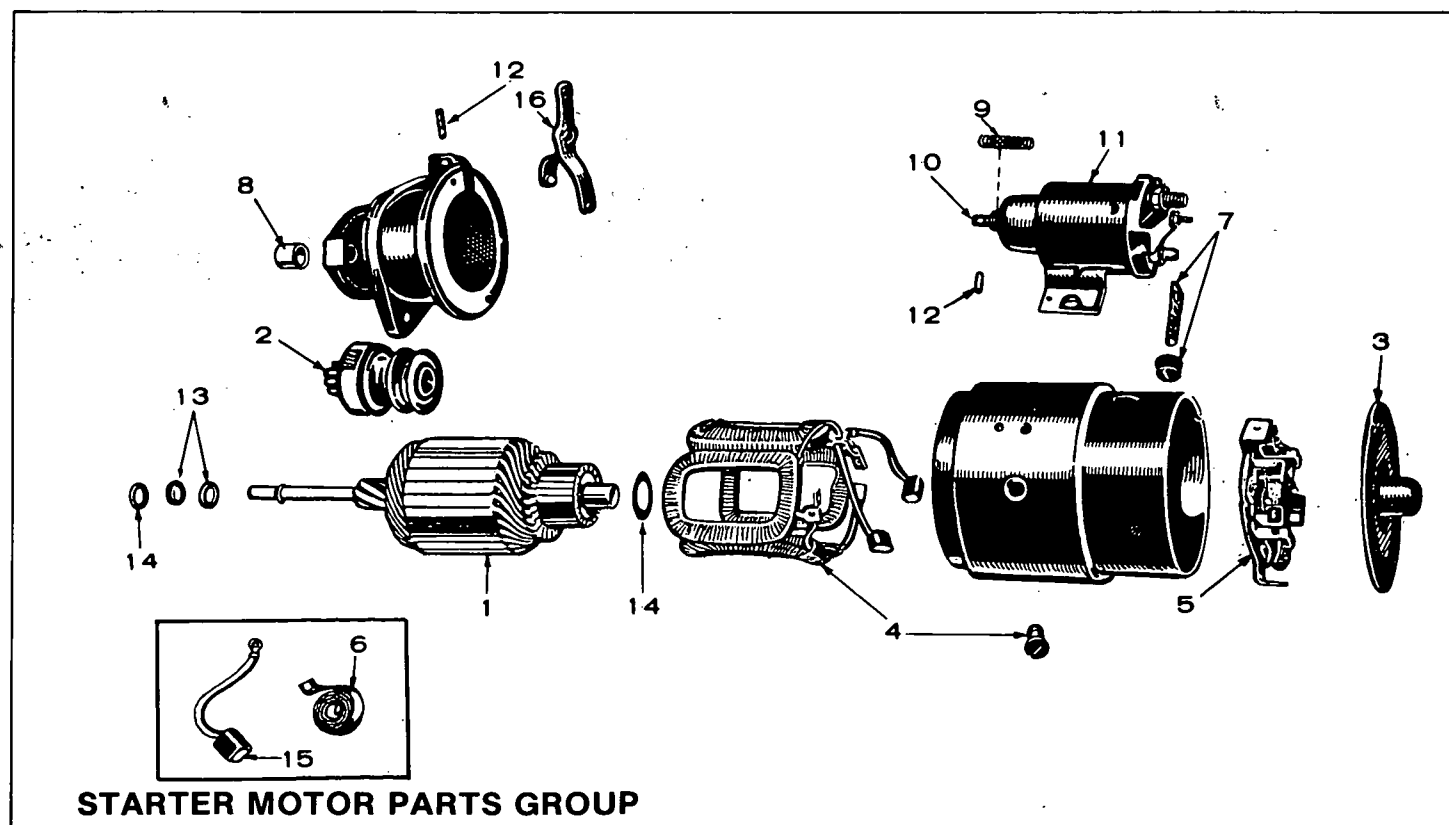
REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	ADAPTER, ENGINE TO GENERATOR		
	231-0096	1	Spec A Only
	231-0112	1	Spec B through Z
2	205-0064	1	Blower, Generator
3	515-0006	1	Key, Blower
4	234-0162	1	Baffle, Generator Air
5	201-1122	1	Rotor Assembly, Wound (Includes Bearing and Blower)
6	510-0047	1	Bearing, Rotor
7	232-0596	1	Clip, Bearing, Stop
8	*	1	Stator Assembly, Wound
9	BELL, END - ALTERNATOR TO EXCITER		
	211-0146	1	Sets Without Overspeed Switch
	211-0152	1	Sets With Overspeed Switch
10	520-0640	4	Stud, Generator Through
11	520-0615	1	Stud, Rotor Through
12	212-1064	2	Block, Collector Ring Brush
13	214-0059	4	Brush, Collector Ring
14	234-0199	1	Cover, Air Outlet
15	870-0177	1	Clip, Air Outlet Cover
16	304-0500	1	Resistor, Tapped Adjustable
17	232-1565	1	Bracket, Resistor Mounting
18	304-0006	2	Washer, Resistor Centering
19	520-0620	1	Stud, Resistor Mounting
20	866-0001	1	Nut, Resistor Mounting (1/4-20)
21	870-0203	1	Nut, Rotor Stud (7/16-20)
22	232-0200	1	Washer, Rotor Stud
23	GROMMET, RUBBER		
	508-0095	1	Air Baffle
	508-0112	1	Test Outlet
24	332-0050	1	Clip, Brush Wires
25	204-0061	1	Collector Ring
26	150-0956	1	Switch Assembly, Overspeed - Optional (Not Used on Pennsylvania Approved Sets)

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
27	150-0958	1	Bracket and Point Assembly, Overspeed - Optional (Not Used on Pennsylvania Approved Sets)
28	SCREW, HEX CAP		
	800-0050	2	Adapter Mounting (3/8-16 x 1")
	800-0051	2	Adapter Mounting (3/8-16 x 1-1/4")
29	SCREW, ROUND HEAD		
	812-0102	1	Air Outlet Cover Mounting (10-24 x 5/8")
	813-0100	2	Overspeed Switch Mounting (10-32 x 1/2")
	812-0085	4	Brush Block Mounting (8-32 x 1-1/8")
	811-0098	1	Brush Wires Clip Mounting (10-32 x 3/8")
	812-0150	1	Resistor Mounting Bracket (1/4-20 x 5/8")
	811-0098	1	Tapped Adjustable Resistor Mounting (10-32 x 3/8")
	813-0098	5	Generator Air Baffle Mounting (10-32 x 3/8")
30	WASHER, LOCK		
	850-0050	4	Adapter Mounting (3/8")
	850-0055	1	Rotor Stud (7/16")
	850-0045	4	Generator Through Stud (5/16")
	850-0030	2	Overspeed Switch Mounting (#10)
	850-0045	5	Generator Air Baffle Mounting (#10)
	850-0040	2	Resistor Bracket and Resistor Mounting (1/4")
31	NUT		
	868-0004	1	Overspeed Switch (7/16-20)
	862-0015	4	Generator Through Stud (5/16-18)
	871-0010	1	Tapped Adjustable Resistor Mounting (10-32)

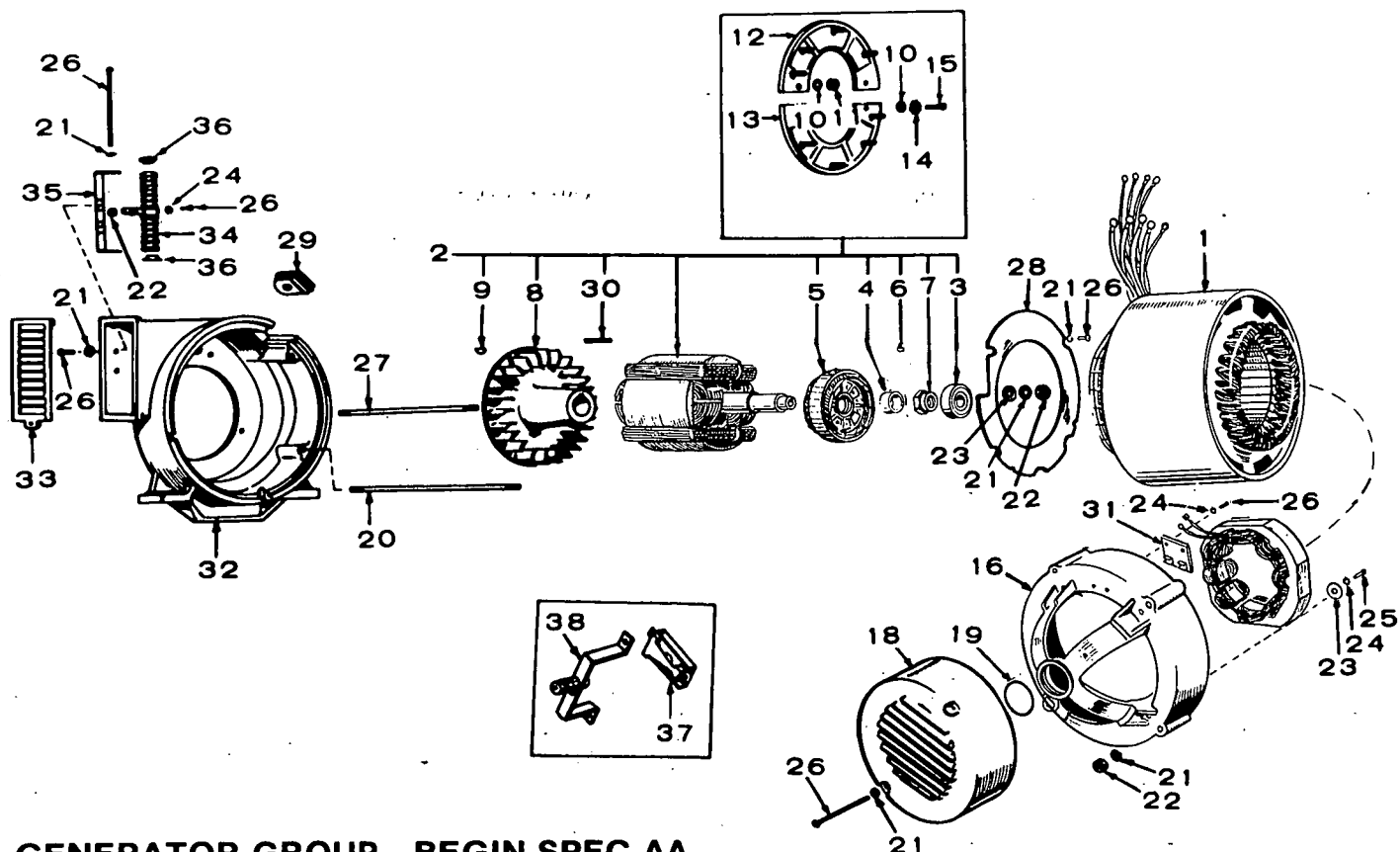
REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
32	WASHER, SHAKEPROOF		
	856-0002	4	Brush Block Mounting (#8)
	856-0003	1	Brush Wires Clip Mtg. (#10)
	856-0003	1	Tapped Adjustable Resistor Mounting (#10)

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
33	526-0049	4	Washer, Flat - Brush Block Mounting
34	516-0083	2	Pin, Roll (3/8-5/8") - Alignment

* - Refer to 'factory giving complete Model, Spec and Serial Number.



REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
	191-0324	1	Motor Assembly, Starting
1	191-0712	1	Armature
2	191-0432	1	Clutch
3	191-1023	1	Head Assembly, Commutator End
4	191-1024	1	Coil Package, Field
5	191-1025	1	Plate Assembly, Brush
6	191-1020	1	Spring Set, Brush (Set of 4)
7	191-1026	1	Connector Package
8	191-0497	1	Bearing (Bronze), Drive End
9	191-1027	1	Spring, Plunger
10	191-1028	1	Core Assembly, Moving
11	191-0433	1	Switch, Solenoid
12	191-1029	1	Yoke Parts Package
13	191-1030	1	Stop and Lock Ring Package, Pinion
14	191-1031	1	Thrust Washer Package, Armature (Use as Required)
15	191-0434	1	Brush Set, Service
16	191-1032	1	Yoke



GENERATOR GROUP - BEGIN SPEC AA

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	*	1	Stator, Wound
2	201-2158	1	Rotor Assembly, Wound (Includes Parts Marked †)
3	510-0112	1	†Bearing, Rotor
4	232-2398	1	†Spacer, Bearing
5	201-2151	1	†Rotor, Exciter - Wound
6	515-0094	1	†Key, Exciter Rotor
7	870-0284	1	†Nut, Exciter Rotor Locking
8	205-0105	1	†Fan, Generator
9	515-0103	1	†Key, Fan
10	526-0008	12	†Washer, Flat
11	870-0131	8	†Nut, Hex (#10-32)
12	358-0069	1	†Rectifier Assembly (Positive)
13	358-0070	1	†Rectifier Assembly (Negative)
14	853-0008	4	†Washer, Shakeproof (#10)
15	813-0100	4	†Screw, Round Head (#10-32 x 1/2")
16	211-0237	1	Bell, End
17	220-2009	1	Stator, Exciter - Wound
18	COVER, END BELL		
	234-0185	1	Unhoused Sets
	234-0223	1	Housed Sets
	234-0498	1	Housed and Unhoused Sets With Overspeed Switch
19	509-0094	1	Seal, Bearing ("O" Ring)
20	520-0798	4	Stud, Generator Through
21	WASHER, LOCK		
	850-0050	4	Generator Through Stud (3/8")
	850-0040	2	End Bell Cover Mounting (1/4")
	850-0040	2	Resistor Bracket Mounting (1/4")
	850-0055	1	Rotor Through Stud (7/16")
	850-0040	1	Resistor Through Screw (1/4")
	850-0030	4	Air Baffle Mounting (#10)

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
22	NUT, HEX 862-0011	4	Generator Through Stud (3/8-16)
	870-0203	1	Rotor Through Stud (7/16-20)
	871-0010	1	Resistor Tap (#10)
23	WASHER, FLAT		
	526-0260	2	Exciter Stator Mounting
	232-0200	1	Rotor Through Stud
24	WASHER, SHAKEPROOF		
	853-0013	2	Exciter Stator Mounting (1/4")
	853-0008	2	End Bell Cover Mounting (#10)
	856-0003	1	Resistor Tap (#10)
25	800-0004	2	Screw, Hex Cap - Exciter Stator Mounting (1/4-20 x 5/8")
26	SCREW, ROUND HEAD		
	812-0165	2	End Bell Cover (1/4-20 x 4-1/2")
	813-0100	2	End Bell Cover Mounting (#10-32 x 1/2")
	813-0098	4	Baffle Mounting (#10-32 x 3/8")
	800-0004	2	Resistor Bracket Mounting (1/4-10 x 5/8")
	812-0169	1	Resistor Through (1/4-20 x 5-1/2")
	811-0098	1	Resistor Tap (#10-32 x 3/8")
27	520-0790	1	Stud, Rotor Through
28	234-0462	1	Baffle, Air
29	GROMMET, RUBBER		
	508-0112	1	2-3/4" x 1-7/8" (Lead Outlet)
	508-0095	1	25/32 x 21/32"
30	515-0006	1	†Key, Fan
31	232-2418	1	Board, Connection
32	231-0171	1	Adapter, Generator
33	234-0492	1	Cover, Air Outlet

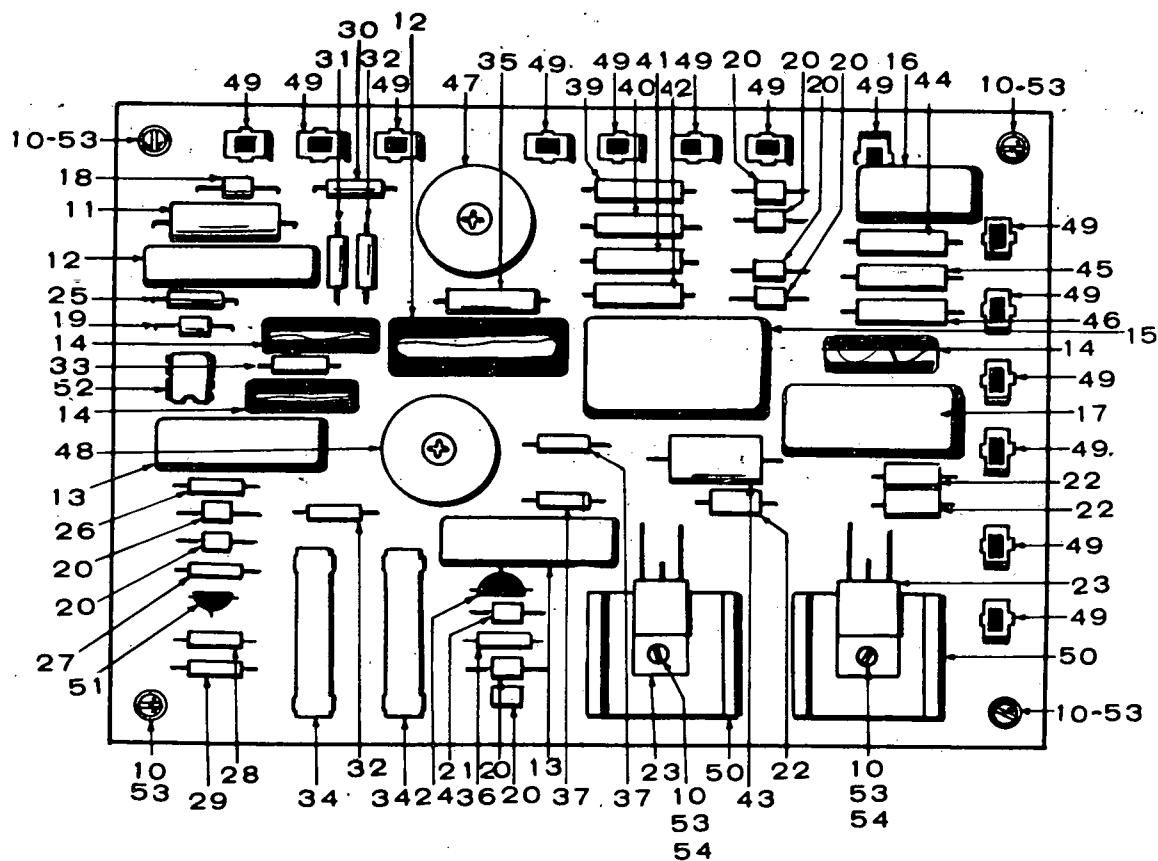
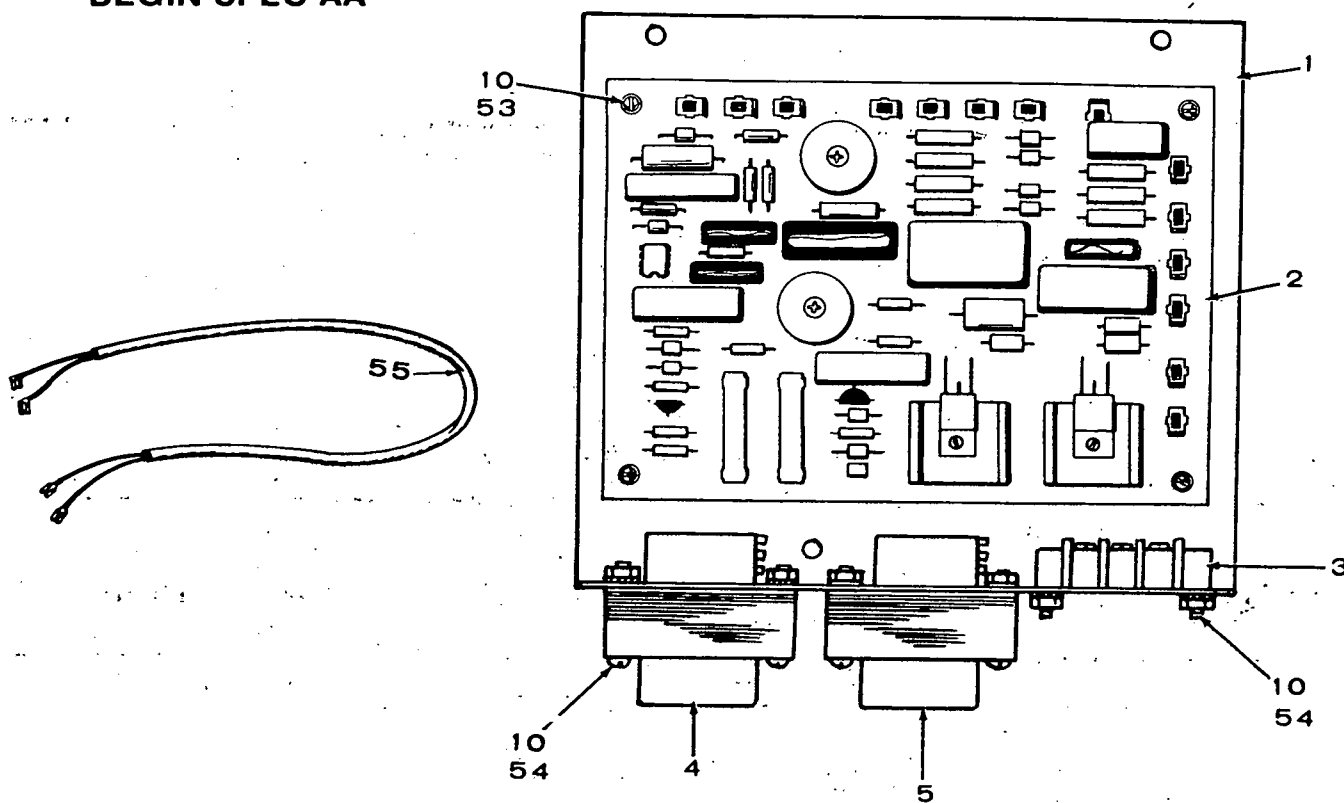
<u>REF. NO.</u>	<u>PART NO.</u>	<u>QTY. USED</u>	<u>PART DESCRIPTION</u>	<u>REF. NO.</u>	<u>PART NO.</u>	<u>QTY. USED</u>	<u>PART DESCRIPTION</u>
34	RESISTOR, TAPPED (ADJUSTABLE)			37	150-0956	1	Switch Assembly - Overspeed
	304-0500	1	For Sets with 12 or 24 Volt DC				Optional
	304-0534	1	For Sets with 32 Volt DC	38	150-1446	1	Bracket and Point Assembly
35	232-2399	1	Bracket, Resistor Mounting				Overspeed and Optional
36	304-0006	2	Washer, Centering - Resistor Mounting				
				* - Refer to Factory giving complete Model and Spec Number.			
				† - Included in the Rotor Assembly.			

SERVICE KITS AND MISCELLANEOUS

NOTE: For other kits, refer to the group for the part in question.

<u>PART NO.</u>	<u>QTY. USED</u>	<u>PART DESCRIPTION</u>
98-1100	1	Decal Kit
168-0100	1	Gasket Kit, Engine
522-0212	1	Overhaul Kit, Set - Spec A through R
522-0264	1	Overhaul Kit, Set - Begin Spec S
TOUCH-UP PAINT (Pressurized Can)		
525-0137	1	Metallic Green (16 oz.)
525-0306	1	Non-metallic Green (13 oz.)

VOLTAGE REGULATOR GROUP
- BEGIN SPEC AA



REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
	305-0534	1	Regulator Assembly, Voltage (Complete) - Includes Parts Marked †
1	301-3719	1	†Panel, Voltage Regulator Mounting
2	300-1006	1	†Board Assembly, Regulator (Includes Parts Marked *)
3	332-1655	1	†Strip, Terminal
5	315-0386	1	†Transformer, Voltage Reference
6	315-0391	1	†Reactor
10	SCREW, ROUND HEAD		
	812-0068	4	†Reactor and Transformer Mounting (6-32 x 1")
	812-0061	4	†Regulator Board Mounting (#6-32 x 3/8")
	812-0063	2	†Terminal Strip Mounting (#6-32 x 1/2")
	812-0029	2	†Heat Sink Mounting on Regulator Board (#4/40 x 3/8")
11	356-0039	1	†Capacitor, Electrolytic (100 Mfd., 10 Volt)
12	355-0006	2	†Capacitor (.47 Mfd., 100 Volt)
13	355-0005	2	†Capacitor (.22 Mfd., 200 Volt)
14	355-0015	3	†Capacitor (.1 Mfd., 200 Volt)
15	355-0016	1	†Capacitor (1 Mfd., 100 Volt)
16	355-0031	1	†Capacitor (.39 Mfd., 100 Volt)
17	355-0017	1	†Capacitor (.47 Mfd., 400 Volt)
18	359-0036	1	†Diode (5.6 Volt)
19	359-0025	1	†Diode, Zener (20 Volt)
20	357-0004	8	†Rectifier, Diode (400 Milliamp, 400 Volt)
21	359-0026	3	†Diode, Zener (18 Volt)
22	357-0021	3	†Rectifier, Diode
23	365-0002	2	†Rectifier, Gate - Control
24	361-0003	1	†Transistor, Unijunction
25	350-0423	1	†Resistor (33,000-Ohm, 1/2 Watt)
26	350-0443	1	†Resistor (220,000-Ohm, 1/2 Watt)
27	350-0447	1	†Resistor (330,000-Ohm, 1/2 Watt)
28	350-0398	1	†Resistor (3,000-Ohm, 1/2 Watt)
27	350-0466	1	†Resistor (2 Megohm, 1/2 Watt)
30	351-0744	1	†Resistor, Film (1,740-Ohm, 1/4 Watt)

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
31	350-0445	1	†Resistor (270,000-Ohm, 1/2 Watt)
32	350-0435	2	†Resistor (100,000-Ohm, 1/4 Watt)
33	350-0459	1	†Resistor (1 Megohm, 1-1/2 Watt)
34	353-0048	2	†Resistor, Wire Wound (4,000-Ohm, 5 Watts)
35	351-0521	1	†Resistor, Film (12,100-Ohm, 1/4 Watt)
36	350-0363	1	†Resistor (100-Ohm, 1/2 Watt)
37	350-0351	2	†Resistor (180,000-Ohm, 1/2 Watt)
39	351-0332	1	†Resistor, Film (28,000-Ohm, 1/4 Watt)
40	351-0240	1	†Resistor, Film (3,090-Ohm, 1/4 Watt)
41	351-0211	1	†Resistor, Film (1,530-Ohm, 1/4 Watt)
42	351-0234	1	†Resistor, Film (2,670-Ohm, 1/4 Watt)
43	350-0973	1	†Resistor (820-Ohm, 2 Watt)
44	350-0512	1	†Resistor (10-Ohm, 1/2 Watt)
45	351-0353	1	†Resistor, Film (46,400-Ohm, 1/4 Watt)
46	351-0349	1	†Resistor, Film (42,200-Ohm, 1/4 Watt)
47	303-0168	1	†Potentiometer (2,500-Ohm)
48	303-0164	1	†Potentiometer (8,000-Ohm)
49	332-1511	13	†Terminal, Stake Tab
50	363-0069	2	†Sink, Heat
51	362-0017	1	†Transistor, NPN
52	367-0005	1	†Circuit, Integrated
53	853-0003	4	†Washer, Shakeproof - Regulator Board - Mounting (#6)
	NUT, HEX		
54	870-0183	4	†Reactor and Transformer Mounting (#6-32)
	860-0003	2	†Heat Sink Mounting (#4/40)
	870-0183	2	Terminal Strip Mounting (#6-32)
55	338-0762	1	Harness, Wiring - Voltage Regulator to Exciter Stator
56	350-0355	1	†Resistor (47-Ohm, 1/2 Watt)

† - Included in 305-0534 Voltage Regulator Assembly.
 * - Included in 300-1006 Regulator Board 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. With proper installation and operation, regular maintenance and periodic repair service, the equipment will provide reliable 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 satisfactory performance of the product 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 to perform as warranted.

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 not covered by warranty will be charged to the owner. The Onan'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, and does not cover incidental or consequential damages.

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.

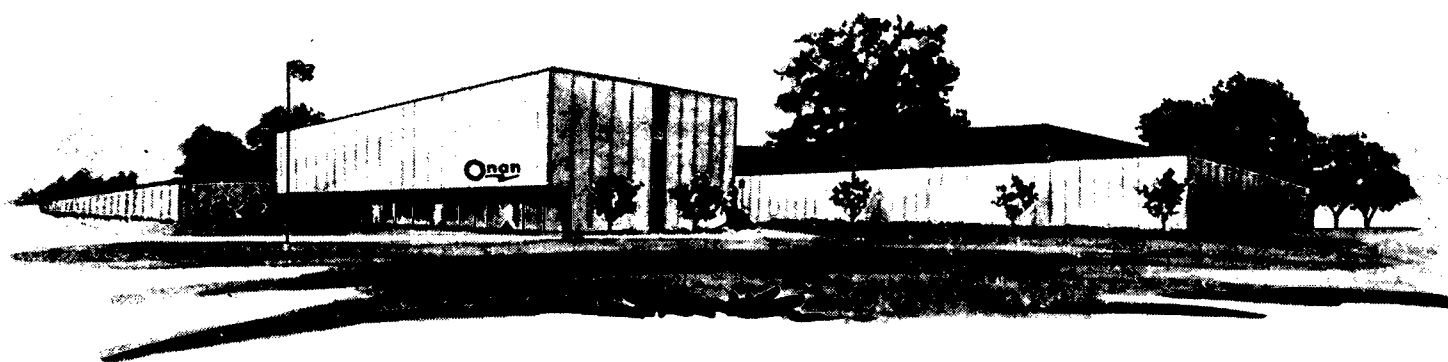
INSTALLATION

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-22B
Replaces 23B054 and MSS-22A
Rev. 7-2-73



ONAN 1400 73RD AVENUE N.E. • MINNEAPOLIS, MINNESOTA 55432
A DIVISION OF ONAN CORPORATION

