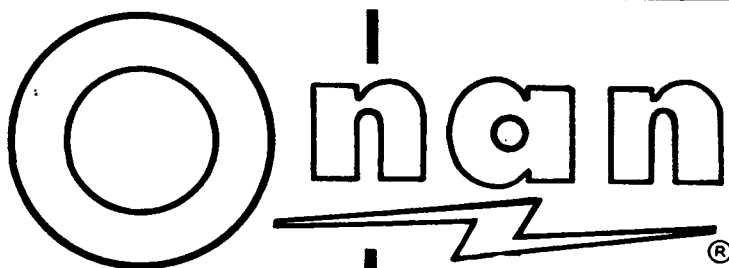


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**OPERATORS MANUAL
AND
PARTS CATALOG**

FOR

**DFT
DFU
DFV**

SERIES

ELECTRIC GENERATING SETS

960-1001 (1/76)
Supplementary Parts List

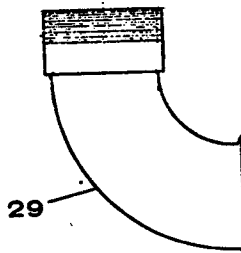
Parts in this list apply to the DFV Generating Sets beginning Spec G. Use these in place of or in addition to those shown in the Operator's Manual and Parts Catalog 960-0308.

NOTE: Parts are not illustrated that are similar in appearance to those in main parts catalog.

<u>REF. NO.</u>	<u>PART NO.</u>	<u>QTY USED</u>	<u>PART DESCRIPTION</u>
	100-1405	1	Engine Replacement (Cummins VT12-700GS) <u>General Description</u> Includes: Complete cylinder block, fuel pump, fuel filter, air cleaner, starter, radiator, fan blades, fan belt, flywheel, flywheel housing, water pump, front engine support, oil pan, oil cooler, generator belt, alternator belt tightener, fan guard, exhaust manifold, radiator grille Excludes: Throttle control, ammeter, oil pressure gauge, water temperature sender oil pressure sender, water temperature gauge, generator, voltage regulator NOTE: Replacement engine is for Spec I Generator Sets, for all other Specs, Refer to Factory.

MISCELLANEOUS ENGINE PARTS GROUP

<u>REF. NO.</u>	<u>PART NO.</u>	<u>QTY. USED</u>	<u>PART DESCRIPTION</u>
29	155-1035	1	Elbow, exhaust outlet



GENERAL INFORMATION

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INTRODUCTION

This manual includes instructions for the installation, operation, maintenance and parts of the DFT, DFU and DFV electric generating sets. Identify your model by referring to the MODEL AND SPECIFICATION NO. as shown on the Onan nameplate. Electrical characteristics are shown on the lower portion of the nameplate.

How to interpret MODEL and SPEC NO.

400.0 DFV 4XR / 1 E

1	2	3	4	5
---	---	---	---	---

1. Indicates kilowatt rating.
2. Factory code for SERIES identification.
3. Combines with numbers 1 and 2 to identify model. Indicates output voltage, method of starting: E - ELECTRIC starting, R - REMOTE electric starting.
4. Factory code for designating optional equipment.
5. Specification letter. (Advances when factory makes production modifications.)

If it is necessary to contact a dealer or the factory regarding the set, always mention the complete Model, Spec No. and Serial No., as given on the Onan nameplate. This nameplate information is necessary to properly identify your set among the many types manufactured. Refer to the engine nameplate when requesting information from its manufacturer.

Electric generating sets are given a complete running test under various load conditions and are thoroughly checked before leaving the factory. Inspect your set closely for loose or missing parts and any damage which may have occurred in shipment. Tighten loose parts, replace missing parts and repair any damage before putting set in operation.

ELECTRIC GENERATING SET DESCRIPTION

The electric generating set is a complete unit consisting of an AC generator driven by a diesel engine. It also includes controls and accessories as ordered.

Engine:

The engines used are Cummins V-12 cylinder as described in their manual. Refer to specifications on following page. The specific engine used may have variations due to optional equipment available.

Brushless AC Generator: The complete generator consists of a brushless, 4 pole revolving field alternator and a rotating rectifier exciter with a solid state transistorized voltage regulator. The alternating current output is generated in the stator winding of the generator, attached to the rear portion of the engine. The alternator's rotating field, attached directly to the engine flywheel, turns at engine speed. The speed at which the rotor turns determines the current frequency, thus the 60 hertz set must operate at 1800rpm and the 50 hertz set at 1500rpm. The outer end of the rotor turns in a large ball bearing fitted into the end frame.

Exciter-Regulator: The rotating rectifier exciter provides for almost constant AC output voltage over a wide range of load conditions. It is used for providing excitation current (DC) to the rotating field of the generator. The improved design of this brushless unit simplifies servicing and maintenance by eliminating parts which are subject to normal wear, such as brushes, slip rings and commutator.

A solid-state transistorized voltage regulator system works in conjunction with the exciter.

	<u>DFT Series</u>	<u>DFU Series</u>	<u>DFV Series</u>
ENGINE DETAILS			
Engine Manufacturer	Cummins	Cummins	Cummins
Engine Series	V-1710-P500	VT-1710-P635	VT-1710-P635
Number of Cylinders	V-12	V-12	V-12
Displacement (cubic inch)	1710	1710	1710
BHP at 1800rpm	463	580	638
Compression Ratio	15:1	14.1:1	14.1:1
Bore	5-1/2	5-1/2	5-1/2
Stroke	6	6	6
Fuel Used	No. 2 Diesel	No. 2 Diesel	No. 2 Diesel
Battery Voltage	24 volts	24 volts	24 volts
SAE Battery Group (Two 12 volt, 225 amp/hr.) ★	8D	8D	8D
Starting Method	Solenoid Shift	Solenoid Shift	Solenoid Shift
Ampere Rating of Battery Charging Alternator	35 amp	35 amp	35 amp
Exhaust Connection (National Pipe Thread)	4 inch (two)	3-1/2 inch (two)	3-1/2 inch (two)
Diesel Fuel Inlet Connection	7/8 inch-14	7/8 inch-14	7/8 inch-14
	45° Male SAE	45° Male SAE	45° Male SAE

GENERATOR DETAILS

Power Factor	0.8	0.8	0.8
60 Hertz Rating, Continuous Standby	300 KW	350 KW	400 KW
50 Hertz Rating, Continuous Standby	250 KW	290 KW	330 KW
AC Voltage Regulation	±2%	±2%	±2%
60 Hertz RPM	1800	1800	1800
50 Hertz RPM	1500	1500	1500

CAPACITIES AND REQUIREMENTS

Oil Change	18 Gal.*	18 Gal.*	18 Gal.*
Total Coolant Capacity, Radiator Cooled Models	37-1/2 Gal.	37-1/2 Gal.	37-1/2 Gal.
Total Coolant Capacity, Heat Exchanger Cooled Models	35 Gal.	35 Gal.	35 Gal.
Generator Cooling Air Required, CFM at 1800rpm	3000	3000	3000
Engine Combustion Air Required, CFM at 1800rpm	830	1100	1200
Engine Cooling Air Required with Radiator, CFM at 1800rpm	30,400	31,500	32,500
Engine Cooling Air Required with Heat Exchanger, CFM at 1800rpm	5000	6000	6750
Total Air Requirements for Radiator Cooled Models **	34,230	35,600	36,700
Total Air Requirements for Heat Exchanger Cooled Models	8830	10,100	10,950

* - Add 3 gallons when changing filters.

** - Radiator cooled models must have a compartment air inlet duct 1-1/2 times larger in total usable area than the radiator discharge area. See Typical Installation.

★ - If operating in temperatures below 25°F, use two, (Type 3D) 300 amp/hr. batteries.

CURRENT RATINGS

VOLTAGE CODE (60 HERTZ)	VOLTAGE	PHASE	WIRE	MAXIMUM CURRENT OUTPUT (Amperes)		
				300.0DFT	350.0DFU	400.0DFV
4R	120/208	3	4	1042	1215	1390
5DR*	120/240	3	4	904	1054	1204
7XR	240/416	3	4	521	608	695
6DR*	240/480	3	4	452	527	602
4XR	277/480	3	4	452	527	602
9XR	347/600	3	4	361	421	482

* - Single phase power can be taken up to 2/3 of nameplate rating.

INSTALLATION

GENERAL

Installations must be considered individually. Use these instructions as a general guide. Meet regulations of local building codes, fire ordinances, etc., which may affect installation details. Refer to Onan Technical Bulletin T-030.

Installation points to consider include:

- Adequate engine cooling air.
- Adequate generator cooling air.
- Adequate fresh induction air.
- Discharge of circulated air.
- Discharge of exhaust gases.
- Electrical connections.
- Fuel connections.
- Coolant connections.
- Accessibility for operation.
- Accessibility for servicing.
- Level mounting surface.

LOCATION

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

MOUNTING

These units mount on a rigid skid base which provides proper support and vibration damping. For convenience in draining crankcase oil and general servicing, units can be mounted on raised pedestals (at least 6" high). If mounting in a trailer or for other mobile applications, bolt securely in place. Extra support for the vehicle flooring may be necessary. Bolting down is recommended for stationary installations.

CAUTION

The generator support must be aligned to the skid base to prevent premature generator bearing failure. Failure to do so could void the warranty. Align the generator support to the skid base according to the following instructions.

1. Set the unit on its mounting foundation using vibration isolators between skid base and foundation (Figure 1). Secure the skid base to the mounting foundation. Remove the two mounting bolts and shims which secure the generator support to the skid base. Use the mounting bolts as jackscrews by moving the mounting bolts to the threaded holes.
2. Remove the tension from the jackscrews and allow generator to hang free. Using a feeler gauge or a dial indicator, measure the clearance from the top

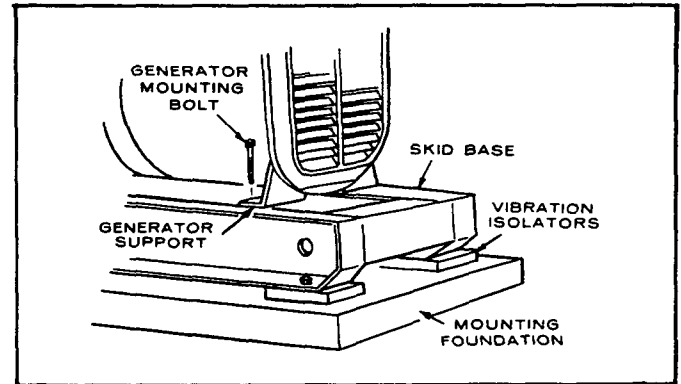


FIGURE 1

surface of the skid base to each generator support mounting surface (Figure 2). To this measured clearance, add .035 inches to each side of the skid base - this total clearance will determine the amount of shims required.

NOTE: *The clearance may be different for each side of the skid base. If there is a great difference, loosen the generator support and realign.*

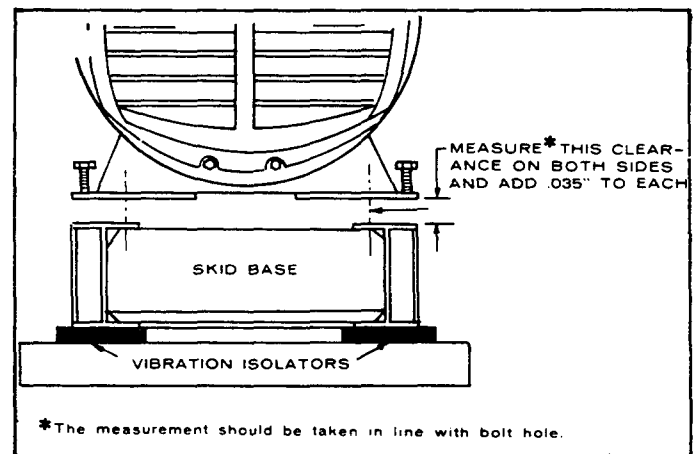


FIGURE 2

3. After determining the proper clearance for each side of the skid base, turn jackscrews in the threaded holes to allow a clearance for placing the shims between skid base and generator support (Figure 3). Lower generator (using jackscrews) and allow to rest on shims. Recheck the total generator clearance, base to support; it must equal the base to support clearance plus the .035 inches.

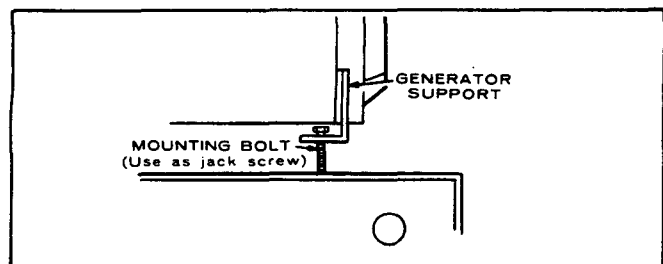


FIGURE 3

4. Remove the jackscrews and install as mounting bolts through generator support, shims and skid base. Secure and lock the mounting bolts in place (Figure 4).

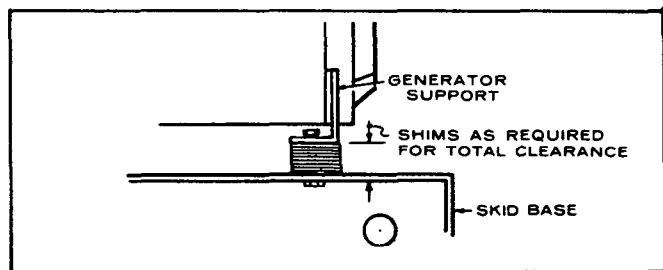


FIGURE 4

VENTILATION

Sets create considerable heat which must be removed by proper ventilation. Outdoor installations rely on natural air circulation but mobile and indoor installations need properly sized and positioned vents for the required air flow.

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 unit. The compartment air inlet area must be 1-1/2 times larger than the radiator duct outlet area.

NOTE: When discussing front and rear of the set, engine end is considered the front, generator end the rear. Right and left sides are determined looking at engine (front) end.

Ventilation For Radiator Cooled Models: Engine heat is removed by a pusher fan which blows cooling air out through the front of the radiator. Locate the cooling air outlet directly in front of the radiator and as close as is practical. Make the opening size at least as large as the radiator area. Use duct of canvas or sheet metal between the radiator and the air outlet opening. The duct will prevent recirculation of heated air.

Ventilation For City Water Cooled Models: On city water cooled sets the conventional radiator is not used. A constantly changing 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, install a duct of equal or larger area than the generator air outlet to remove the heated air from the generator to the outside atmosphere. A larger, well ventilated compartment or room does not require a hot air duct.

Installations made in a small room may require installation of an auxiliary fan (connected to operate only when the unit is running) of sufficient size to assure proper air circulation.

Cold Weather: Provide a means of restricting the air flow in cold weather to keep the room or compartment temperature at a normal point.

COOLING SYSTEM

There are three basic cooling systems used with the DFT, DFU and DFY electric generating sets:

- Radiator Cooling
- Heat Exchanger Cooling
- Standpipe Cooling

Radiator Cooling: Fill the radiator and cooling system with clean, soft water. Use a good rust and scale inhibitor. Check the coolant level several times after engine reaches operating temperature.

In below freezing temperatures, use an ethylene-glycol antifreeze in the recommended portion.

CAUTION If engine is equipped with a cooling system filter, do not use antifreeze with an anti-leak formula. The stop leak element can prevent or retard the coolant flow through the filter, thereby eliminating the filtering process completely.

Heat Exchanger Cooling: The heat exchanger provides a "closed" engine cooling system. Engine coolant flows through a tubed chamber, keeping the coolant separate from the cool, raw water supply. The coolant chamber must be filled for operation, as for a radiator cooled unit.

Use flexible pipe for connecting water supply and outlet flow pipes to engine. Pipe the outlet flow to a convenient drain. Install an electric solenoid valve and a rate-of-flow valve in the water supply line.

The electric solenoid valve opens and allows water flow through the system only when the set is running. See Figure 5.

The rate-of-flow valve (either automatic or manual) provides for the proper flow rate to the engine.

Standpipe Cooling: The standpipe system uses a mixing or tempering tank. Cooling water that circulates through the engine mixes with a source of cool "raw" water. The raw water supply must be free of scale forming lime or other impurities.

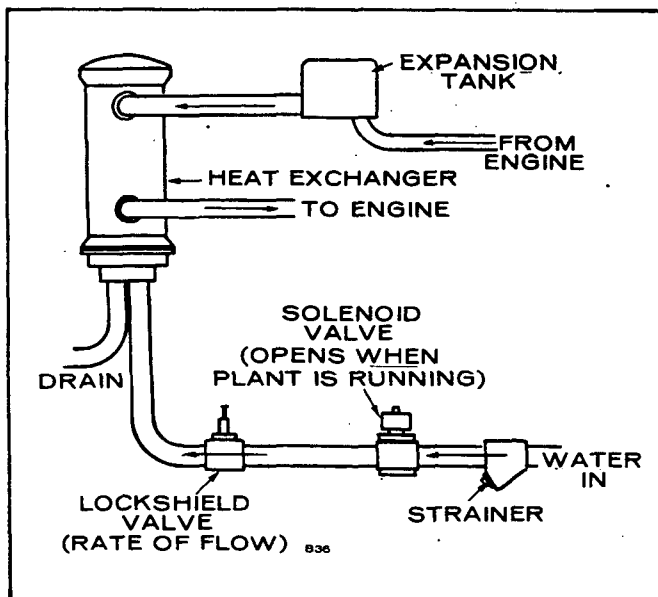


FIGURE 5. TYPICAL HEAT EXCHANGER

Use flexible pipe for connecting water supply and outlet flow pipes to engine. Pipe the outlet flow to a convenient drain. Install an electric solenoid valve and a rate-of-flow valve in the water supply line. The electric solenoid valve opens and allows water flow through the system only when the set is running. See Figure 6.

The rate-of-flow valve (either automatic or manual) provides for the proper flow rate to the engine.

IMPORTANT: Before filling cooling system, check all hardware for security. This includes hose clamps, fittings and connections. Use flexible coolant lines with heat exchanger, standpipe or remote mounting radiator.

EXHAUST

WARNING EXHAUST GAS IS POISONOUS!

1. Pipe exhaust gas outside of enclosed area.
2. Use flexible connection at exhaust manifold.
3. Use pipe at least as large as engine connection.
4. Increase the pipe diameter one size for each additional 10 foot length.
5. Provide adequate support for piping.
6. Use sweeping elbows to reduce back-pressure.
7. Install a vapor trap with a provision for draining on any upward run of exhaust line.
8. Shield or insulate the exhaust line if there is any danger of personnel contact.
9. If line passes through a wall, allow at least 4 inches of clearance around pipe and wrap with asbestos or fireproof material.
10. Install a suitable muffler.
11. Refer to Figure 13.

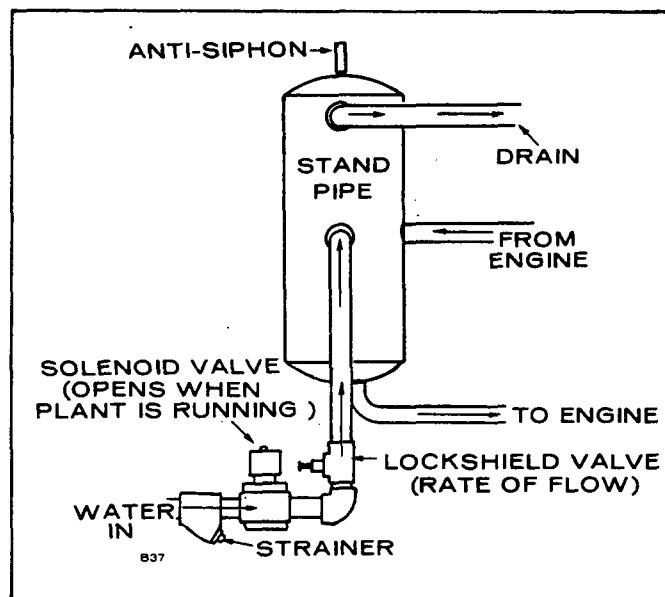


FIGURE 6. TYPICAL STANDPIPE SYSTEM

FUEL CONNECTIONS

Check local regulations governing the installation of a fuel supply tank.

NOTE: In any diesel engine installation, fuel system cleanliness is of utmost importance. Make every effort to prevent moisture or foreign matter from entering the system.

The maximum fuel lift without any horizontal run should not exceed 8 feet. The horizontal run, if the supply tank is level with the fuel pump, should not exceed 12-1/2 feet. Use 5/8" tubing for the fuel supply line. The inlet fitting on the fuel filter is threaded for a 7/8" SAE flared fitting.

Use 1/2" tubing for the fuel return line from the injector manifold; the fitting in the injector manifold is threaded for a 3/4" SAE flared fitting.

The fuel pump return line is threaded for a 5/8" SAE flared fitting. Use 3/8" tubing for the fuel pump return line.

Day Tank: Engines may be equipped with an optional day tank. A float operated switch controls the electric fuel pump (not included with day tank) to maintain the correct fuel level to assure a constant source of fuel. Do not mount the tank on the plant. Mount the tank on a vibration free support below the engine fuel return line. It is advisable that the fuel pump return line be submerged in fuel of the tank (see Figure 14). This prevents filtering during startup due to fuel drain-back from the fuel system into the tank. The tank overflow line to the supply tank is optional, consult local regulations. Refer to the installation instructions included with the tank and Figures 13 and 14.

BATTERY

Twenty-four volt battery current is required for starting purposes. Use two 12volt, type 8D batteries for a normal installation. Connect the batteries in series (negative post of first battery to positive post of second). Note a small wire connected to one of the two larger terminals on the starter magnetic switch. Connect the battery positive cable to this switch terminal. Connect the battery negative cable to a good (paint free) ground on the engine frame. Service the batteries as necessary. See Figure 7.

Infrequent use (as in emergency standby service) may allow the batteries to self-discharge to the point where they cannot start the unit. If installing a load transfer switch that has no built-in charge circuit, connect a separate trickle charger. Onan load transfer controls include such a battery charging circuit.

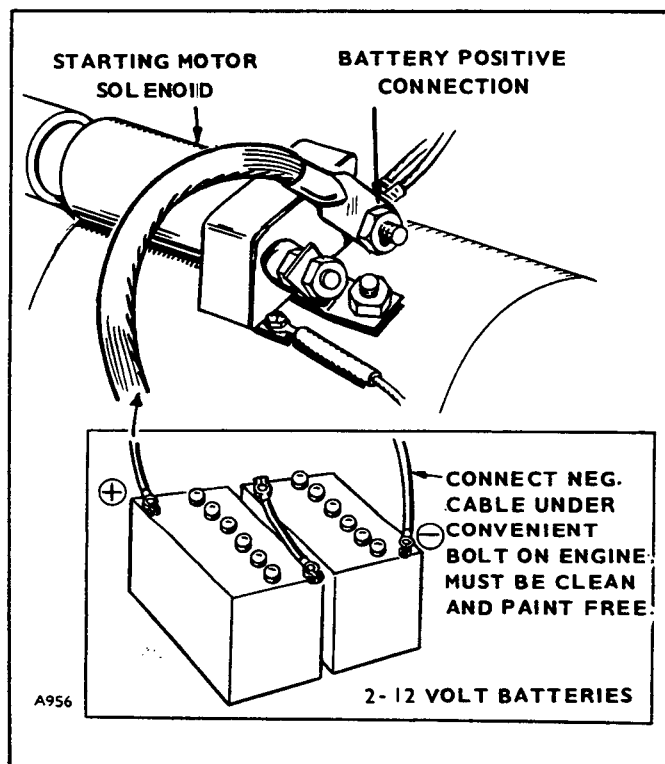


FIGURE 7. BATTERY CONNECTION

REMOTE CONTROL CONNECTIONS

Starting and stopping is through a 2-wire electrical system. To extend this control to one or several remote locations, a terminal block (Figure 8) is provided in the control box. The terminal block is marked ALARM, GROUND, REMOTE and B+. Connect remote starting wires between REMOTE terminal and B+ terminal. If a load transfer or an automatic control is used, follow the instructions supplied with the control. If a single pole, single throw manual switch is used, connect the wires and mount the switch so the engine will run when the switch handle is up; the same as an ordinary light switch. The size wire to use is determined by the plant-to-control distance.

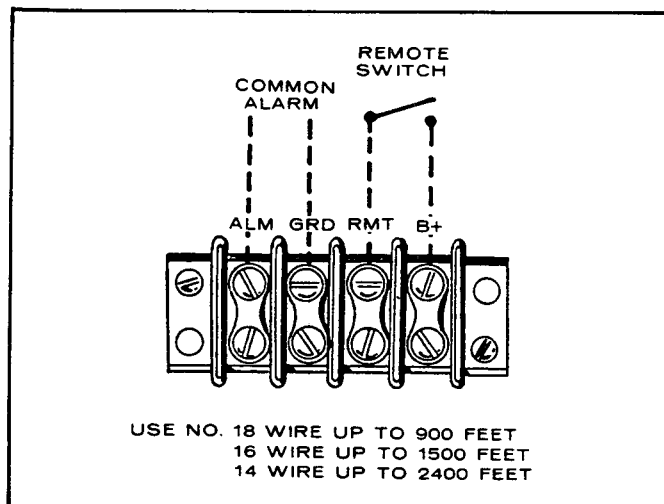


FIGURE 8. REMOTE STARTING

WIRING CONNECTIONS

Most local regulations require that wiring connections be made by a licensed electrician and that the installation be inspected and approved before operation. All connections, wire sizes, etc. must conform to requirements of electrical codes in effect at the installation site.

If the installation is for standby service, a double throw transfer switch must always be used. Connect this switch (either automatic or manual) so that it is impossible for commercial power and generator current to be connected to the load at the same time. Instructions for connecting an automatic transfer switch are included with such equipment.

WARNING

Personnel connecting the generator and any such auxiliary equipment must be fully qualified and understand wiring diagrams, circuits, etc. Always disconnect battery when servicing the controls, generator or transfer switch.

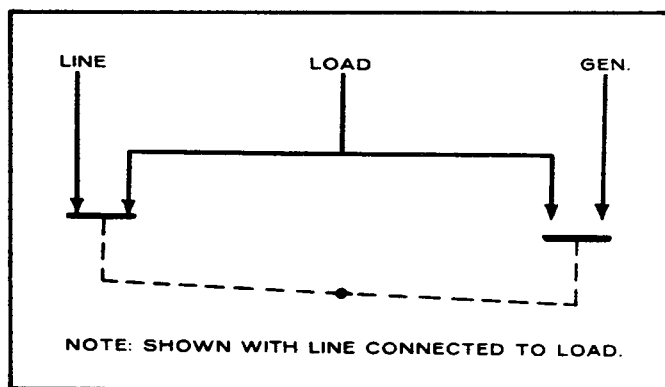


FIGURE 9. LOAD TRANSFER SWITCH

Connect load wires directly to the large terminal bars provided (Figure 10). Some units are "reconnectable" for different voltages and have extra leads. These are preconnected according to the nameplate ratings.

CAUTION Reconnection, for a different output voltage than that shown on the unit nameplate, may involve control panel changes, sometimes of an extensive nature. For specific information, contact the factory. Give the complete information shown on the Onan nameplate, and indicate the desired new voltage.

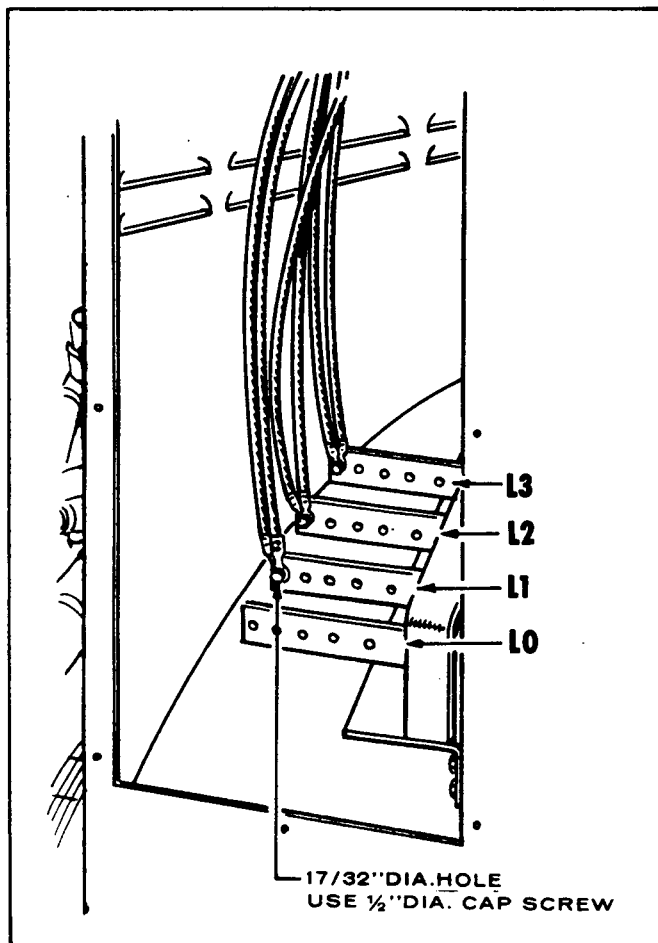


FIGURE 10. LOAD WIRE CONNECTIONS

3 Phase, 4 Wire, Wye Connected Set: The 3 phase, 4 wire set produces single phase current of one voltage and three phase current of a different voltage. The single phase voltage is the lower voltage as noted on the set nameplate, and the three phase voltage is the higher nameplate voltage.

The terminal marked L0 is grounded. For single phase current, connect the neutral (white) load wire to the L0 terminal. Connect the "hot" (black) load wire to any one of the other three terminals – L1, L2 or L3. Three separate single phase circuits are available, with not more than 1/3 the rated capacity of the unit from any one circuit.

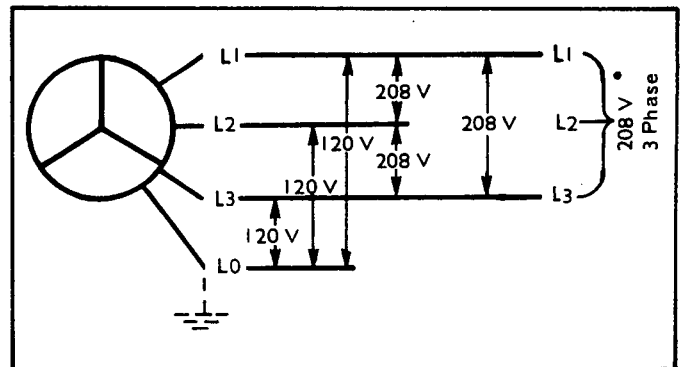


FIGURE 11. 3 PHASE, WYE CONNECTION, 12 LEAD

For 3 phase current, connect separate load wires to each of the terminals L1, L2 and L3. Single phase current is obtained between any two 3 phase terminals.

If using single phase and three phase current at the same time, use care to properly balance the single phase load.

120/240 Volt, 3 Phase, 4 Wire Delta Connected Set: The 3 phase Delta connected set is designed to supply 120 and 240 volt single phase current and 240 volt 3 phase current.

For three phase operation, connect the three load wires to the three terminals L1, L2 and L3 – one wire to each terminal. For 3 phase operation the L0 terminal is not used.

For 120/240 volt, 1 phase, 3 wire operation, terminals L1 and L2 are the "hot" terminals. The L0 terminal is the neutral, which can be grounded if required. For 120 volt service, connect the "hot" (black) load wire to either the L1 or L2 terminal. Connect the neutral (white) wire to the L0 terminal. Two 120 volt circuits are available. Any combination of single phase and three phase loading can be used at the same time as long as no terminal current exceeds the NAMEPLATE rating of the generator. If no 3 phase output is used, usable 1 phase output is 2/3 of 3 phase KVA.

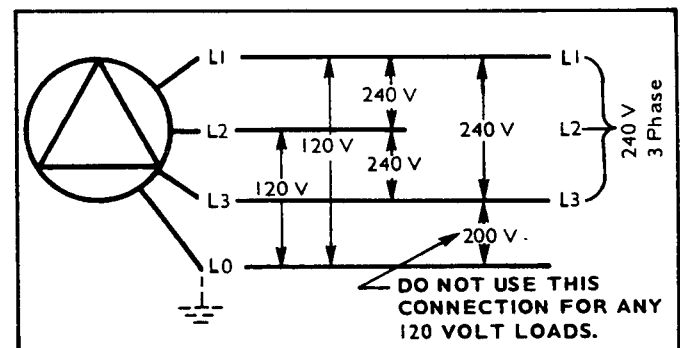


FIGURE 12. 3 PHASE, DELTA CONNECTION, 12 LEAD

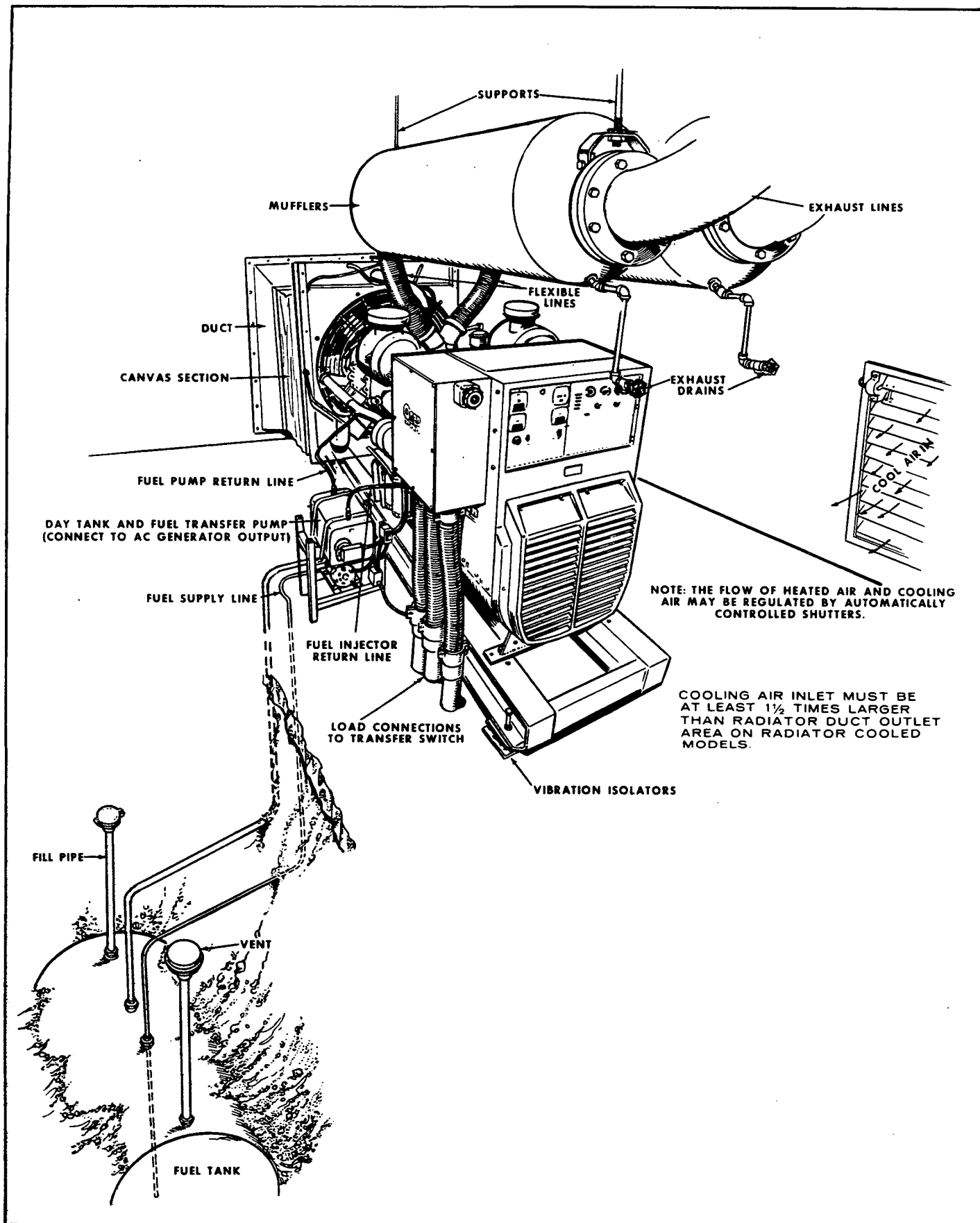


FIGURE 13. TYPICAL INSTALLATION

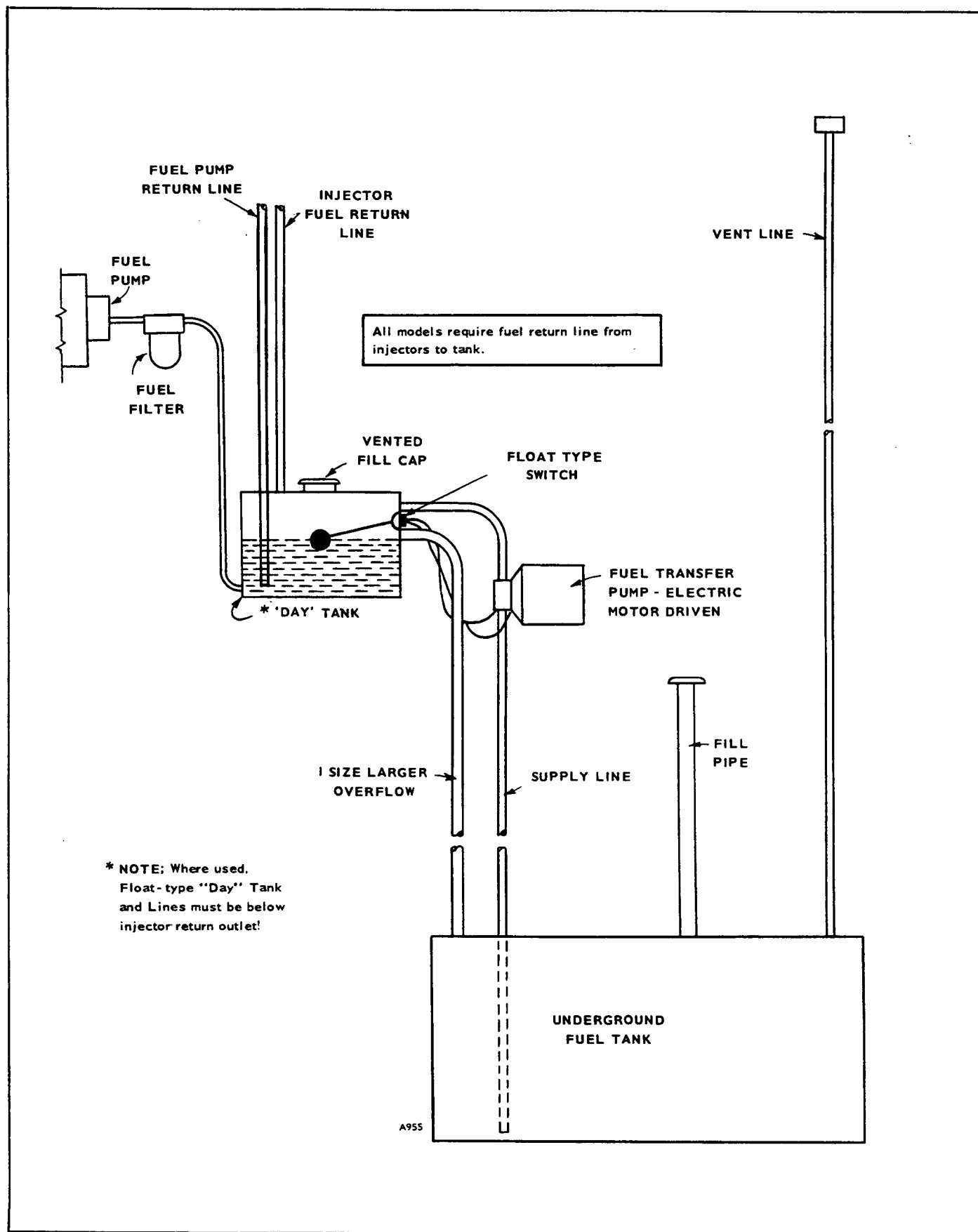


FIGURE 14. "DAY" TANK INSTALLATION

OPERATION

PRE-START INSTRUCTIONS

Crankcase Oil: Refer to the Cummins manual. Note that for average operating conditions, CC/CD oil is recommended. Many oils designated for MS or DG service meet these requirements. Check with the oil supplier.

The capacity of the oil pan is approximately 18 U.S. gallons. However an extra 3 gallons are required for the oil filters. Check the level after 10 to 15 minutes of the initial run.

Do not mix brands nor grades of oil when adding oil to the system.

CAUTION *The engine oil and coolant were drained prior to shipping, and rust inhibiting oil applied to the cylinders. Before operating, fill crankcase with oil and cooling system with coolant.*

Governor Oil: Fill governor sump with the same lubricating oil as used in the engine.

Crankcase Breather Air Cleaner: Service the crankcase breather air cleaner as outlined in the Cummins manual.

Coolant: For units which use either a radiator or heat exchanger (city water cooled), fill the cooling system with clean soft water. Use a good rust and scale inhibitor. If there is any possibility of a radiator cooled set being exposed to freezing temperatures, use antifreeze with an ethylene glycol base.

CAUTION *Do not use antifreeze with an anti-leak formula. This antifreeze can clog cooling system filters.*

On the initial run, check the coolant level several times and add liquid if necessary to compensate for any air pockets which may have formed during filling. Refer to Cummins for additional information.

CAUTION *The electric solenoid valve, used with city water cooled units, should be energized before initial starting to allow coolant chambers to fill with coolant. Use a jumper from the 24 volt battery supply to the electric solenoid.*

If the set is equipped for "city" water cooling, see that the water supply is turned on.

Fuel: Refer to the Cummins manual for fuel oil specifications. Check with the fuel supplier for assurance that the fuel supplied meets the specifications. Make every effort to keep the fuel supply clean.

AC GENERATOR CONTROLS AND EQUIPMENT

The electric instrument panel and equipment will vary according to the model and purchaser options. The following is a brief description of each of the controls and components which are standard items.

AC Ammeter: Indicates load current connected to the generator circuit.

AC Voltmeter: Indicates the voltage of the AC output.

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

Voltmeter-Ammeter Selector Switch: Selects the phase of the generator output which is indicated by the AC ammeter and voltmeter.

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

Running Time Meter: Registers the total number of hours to 1/10th, that the unit has run. Use it to keep a record of periodic servicing.

STANDARD ENGINE CONTROLS AND EQUIPMENT

Engine controls and equipment, which are mounted on the control box, contain components for starting, controlling, and stopping the set. Each of these controls is described below.

Run-Stop-Reset-Remote Switch: Starts and stops the electric generating set and resets the engine monitor at the unit and provides for starting and stopping from a remote location.

Engine Monitor System: This is a printed circuit plug-in module that is the "heart" of the DC control system. It performs the following:

1. Provides a 75 second cranking period.
2. Provides approximately a 12-1/2 second delay for oil pressure buildup.
3. Provides an external contact, lights a fault lamp/lamps, and shuts down the set for these alarm conditions:
 - (a) Overcrank - Engine fails to start after cranking approximately 75 seconds.

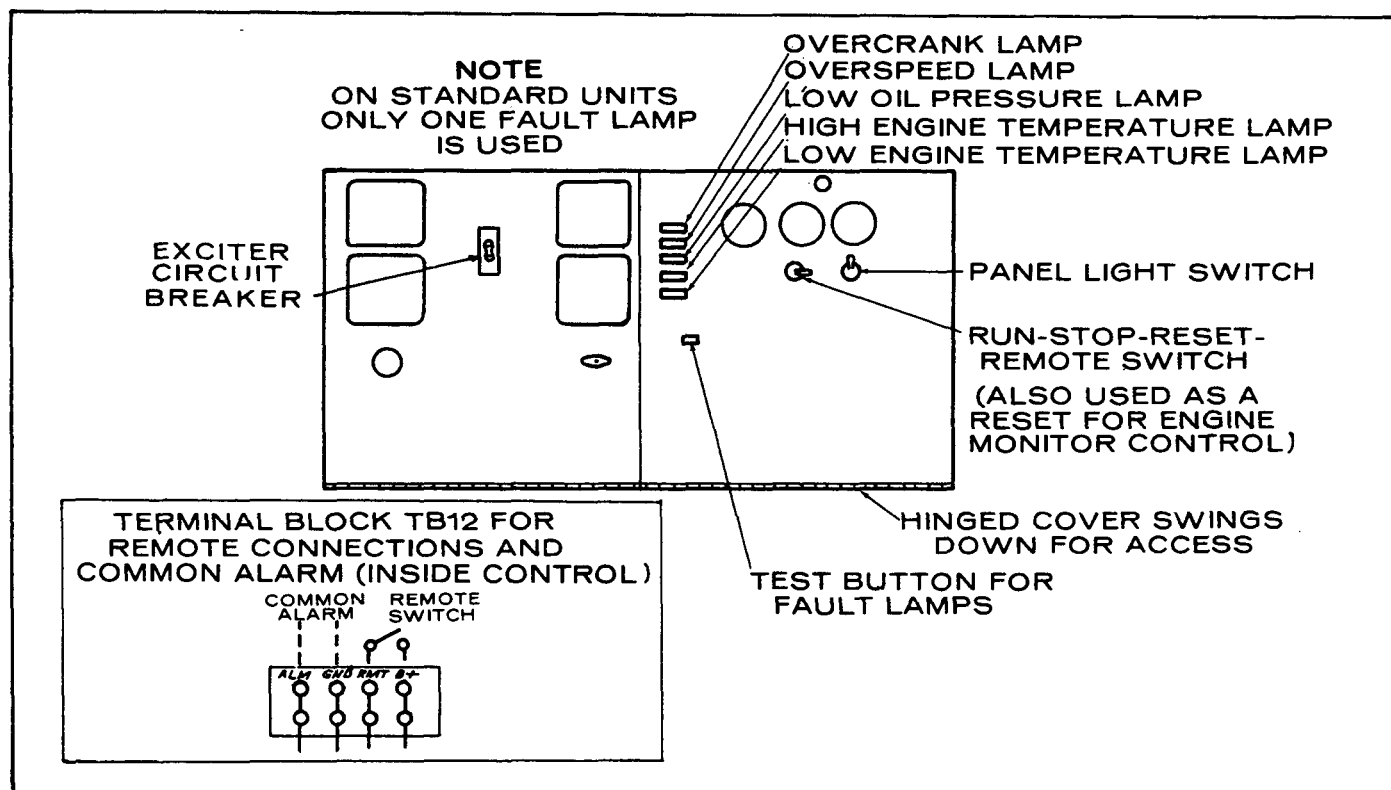


FIGURE 15. TYPICAL CONTROL PANEL

- (b) Overspeed - Engine speed reaches approximately 2100 rpm.
- (c) Low Oil Pressure - Approximately 14 psi.
- (d) High Engine Temperature - Approximately 215°F.

NOTE: On units with only one fault lamp, all four alarms are wired into one common fault lamp; on units with five fault lamps, four have shutdown alarms - the fifth (low engine temperature) lights a fault lamp only.

The engine monitor may be used three ways: Standard, Penn State or Pre-alarm.

The *Standard* monitor shuts the engine down, lights a fault lamp and closes the alarm contact for overcrank, overspeed, low oil pressure and high engine temperature, but only lights a fault lamp for low engine temperature condition.

The *Penn State* monitor shuts the engine down only for overcrank and overspeed.

The *Pre-alarm* monitor shuts the engine down immediately for overcrank and overspeed, but gives an advance warning before shutting down on low oil pressure and high engine temperature. The pre-alarm monitor requires two sensors each for both engine temperature and oil pressure to give the pre-alarm plus shutdown.

Lamp Test Button: Press to determine if fault lamps are working properly.

Standard Cranker: A plug-in circuit that limits the engine cranking time to 75 seconds. If engine fails to start after 75 seconds, the engine monitor lights a fault lamp and opens the cranking circuit.

Cycle Cranker (Optional): Replaces the standard cranker with another plug-in circuit. This circuit automatically provides a 15 second crank time and a 10 second rest time up to a duration of 75 seconds - if engine fails to start after 75 seconds, the engine monitor lights a fault lamp and opens the circuit.

Oil Pressure Gauge: Indicates engine oil pressure. (Wired into a sending unit.)

Water Temperature Gauge: Indicates engine coolant temperature. (Wired into a sending unit.)

Battery Charging DC Alternator: A 24 volt DC, 35 amp output charges the two 12 volt batteries necessary for starting. Also utilizes a mounted voltage regulator.

Battery Charge Rate Ammeter: Indicates the battery charging current.

STARTING UNIT

Move the "run-stop" switch to the "run" position; the engine should start after a few seconds of cranking. If engine fails to start, or starts and runs - then stops, and fault lamp/lamps light, refer to appropriate troubleshooting chart which follows.

TROUBLESHOOTING ENGINE SHUTDOWN SYSTEM
(Units with only one fault lamp)

SYMPTOM	CORRECTIVE ACTION
1. Fault lamp lights and engine stops cranking after approximately 75 seconds.	1. See engine service manual for troubleshooting fuel system, ignition system, etc. After correcting problem, reset the engine monitor by moving "run-stop" switch to "stop-reset" position then back to "run".
2. Fault lamp lights immediately after engine starts.	2. Check for: a. overspeed condition as engine starts. b. high temperature condition. c. faulty high engine temperature sensor or overspeed switch.
3. Fault lamp lights after engine is running.	3. Check the following: a. Oil level-engine will shut down after approximately 12-1/2 seconds if low oil pressure sensor does not open. b. Oil pressure sensor may be defective. c. High engine temperature - caused by low coolant level, faulty thermostat, etc. d. Faulty high engine temperature sensor.
4. Fault lamp lights - no fault condition exists.	4. Be certain that no fault condition exists. Disconnect leads 29, 30 and 31 from TB11 inside control box (refer to wiring diagram). If fault lamp still lights with leads disconnected, remove and replace engine monitor plug-in printed circuit board.

TROUBLESHOOTING ENGINE SHUTDOWN SYSTEM
(Units with five fault lamps)

SYMPTOM	CORRECTIVE ACTION
1. Overcrank fault lamp lights and engine stops cranking after approximately 75 seconds.	1. See engine service manual for troubleshooting fuel system, ignition system, etc. After correcting problem, reset the engine monitor by moving "run-stop" switch to "stop-reset" position then back to "run".
2. Overspeed lamp lights as soon as engine starts.	2. Overspeed condition caused engine to shut down. Check for defective switch on generator endbell.
3. High engine temperature lamp lights as soon as engine starts.	3. Check for defective sensor or actual high temperature condition.
4. Low oil pressure lamp lights after engine is running.	4. Check: a. Oil level - engine will shut down after approximately 12-1/2 seconds if oil pressure is low. b. Oil sensor may be defective.
5. High engine temperature lamp lights after engine is running.	5. Check for: a. Defective thermostat/thermostats. b. Low coolant level. c. Defective high engine temperature sensor.
6. Overspeed lamp lights - no fault condition exists.	6. Be certain that no fault condition exists. Disconnect lead 29 from TB11 inside control box (refer to wiring diagram). If overspeed fault lamp still lights, remove and replace engine monitor plug-in printed circuit board.
7. Low oil pressure fault lamp lights - no fault condition exists.	7. Be certain that no fault condition exists. Disconnect lead 30 from TB11 inside control box (refer to wiring diagram). If low oil pressure lamp still lights, remove and replace engine monitor plug-in printed circuit board.
8. High engine temperature fault lamp lights - no fault condition exists.	8. Be certain that no fault condition exists. Remove lead 31 from TB11 inside control box (refer to wiring diagram). If high engine temperature lamp still lights, remove and replace engine monitor plug-in printed circuit board.
9. When pressing test lamp button, one or more fault lamps do not light.	9. Fault lamp/lamps burned out - replace.

WATER FLOW

If the unit is city water (pressure) cooled, but without the optional flow (automatic) regulator, check the rate of water flow. At installation, a hand wheel valve was connected in the water supply line. Adjust the valve to provide a flow of water sufficient to keep the water temperature gauge reading within the range of 165°F to 195°F. Excessive water flow is wasteful and expensive - too little flow will cause a rise in coolant temperature and automatic shutdown by the high temperature safety switch.

STOPPING

If conditions permit, disconnect electrical load and allow the unit to run a few minutes at no load. This will allow it to cool off slightly, and may prevent an excessive temperature rise when the unit stops and ventilation ceases. Press the RUN-STOP switch to its STOP position to stop the unit.

BATTERY, HOT LOCATION

Batteries will self discharge very quickly when installed where the ambient temperature is consistently above 90°F, such as in a boiler room. To lengthen battery life dilute the electrolyte from its normal 1.280 specific gravity reading at full charge to a 1.225 reading. The cranking power is reduced slightly when the electrolyte is so diluted, but if the temperature is above 90°F, this should not be noticed. The lengthened battery life will be worth the effort.

1. Fully charge the battery.
2. With the battery still on charge, draw off all the electrolyte above the plates in each cell. **DO NOT ATTEMPT TO POUR OFF!** Use a hydrometer or filler bulb. Avoid skin or clothing contact with the electrolyte and dispose of it in a safe manner.
3. Refill each cell with distilled water, to normal level.
4. Continue charging for one hour at a 4 to 6 ampere rate.
5. Test each cell. If the specific gravity is still above 1.225, repeat steps 2, 3 and 4 until the reading is reduced to 1.225. Usually, repeating steps twice is sufficient.

NO LOAD OPERATION

Periods of no load operation should be held to a minimum. After about four hours of continuous no load operation, the injection nozzles may become fouled and require servicing. If it is necessary to keep the engine running for long periods of time when no electrical output is required, best engine performance will be obtained by connecting a "dummy" electrical load. Such a load could consist of heater elements, etc.

EXERCISE PERIOD

If the unit is used infrequently, such as in standby service, start and operate for at least 30 minutes once a week. This exercise period keeps engine parts lubricated and ensures easy emergency starts.

OUT-OF-SERVICE PROTECTION

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

1. Run set until thoroughly warm.
2. Drain oil from oil base while still warm. Refill and attach a warning tag stating oil viscosity used.
3. Remove each injector. Pour one ounce (two tablespoons) of rust inhibitor (or SAE #10 oil) into each cylinder. Install injector.
4. Service air cleaners as outlined in Cummins manual.
5. Clean governor linkage and protect by wrapping with a clean cloth.
6. Plug exhaust outlets to prevent entrance of moisture, bugs, dirt, etc.
7. Wipe entire unit. Coat parts susceptible to rust with a light film of grease or oil.
8. If battery is used, disconnect and follow standard battery storage procedure.
9. Provide a suitable cover for the entire unit.

HIGH TEMPERATURES

1. See that nothing obstructs air flow to-and-from the unit.
2. Keep cooling system clean.
3. Use correct SAE No. oil for temperature conditions.

LOW TEMPERATURES

1. Use correct SAE No. oil for temperature conditions. Change oil only when engine is warm.
2. Use fresh fuel. Protect against moisture condensation.
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. Utilize tank heater (if so equipped).
6. Refer to Cummins manual for additional information.
7. If unit is installed where temperatures are below 25°F, use two (Type 3D) 300 amp-hr batteries.

DUST AND DIRT

1. Keep set clean. Keep cooling system free of dirt, etc.
2. Service air cleaners frequently.
3. Change crankcase oil every 100 operating hours.
4. Keep oil and fuel in dust-tight containers.
5. Keep injector pump linkage clean.

HIGH ALTITUDE

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

GENERAL MAINTENANCE

GENERAL

Follow a definite schedule of inspection and servicing, based on operating hours. Use the running time meter to keep a record of operation and servicing. Service periods are 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.

ENGINE

Refer to the Cummins engine manual for details and periodic maintenance.

CONNECTIONS (FUEL, EXHAUST, ETC.)

Operator should periodically make a complete visual inspection of the unit while 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 drain moisture from condensation traps.
4. Inspect water lines and connections for leaks and security.
5. Inspect electrical wires for security.

ENGINE SPEED

Generator frequency is a direct ratio to the engine speed. Engine speed is controlled by the built-in governor of the fuel injection pump. The original factory governor setting should not be disturbed. However, in case of pump repair, the governor can easily be reset.

1. See that the injection pump is properly timed to the engine. Refer to the Cummins engine manual.
2. Refer to instructions in Cummins manual for governor adjustment. Adjust engine speed to 1800 rpm for 60 hertz operation and 1500 rpm for 50 hertz operation. Use an accurate tachometer for determining engine speed settings, or a frequency meter connected to AC generator output terminals. Multiply frequency by 30 to obtain engine speed.

EXAMPLE: 30×61 (hertz) equals 1830 rpm.

BATTERIES

Check the condition of the starting batteries at least every two weeks. See that connections are clean and tight. A light coating of grease or asphalt paint will retard corrosion at terminals. Keep the electrolyte at the proper level above the plates by adding distilled water.

BATTERY CHARGING DC ALTERNATOR

This information is presented for field use only. If a major repair is needed, contact your local authorized dealer.

Brush Assembly Removal (Figure 16)

1. Remove the three No. 10-24 screws which fasten voltage regulator to DC alternator. Remove regulator to gain access to phenolic cover, disconnecting leads as required.
2. Remove the two No. 8-32 screws on phenolic cover and lift out cover and gasket.
3. Pull brush assembly straight up and lift out.
4. For reassembly, reverse procedure.

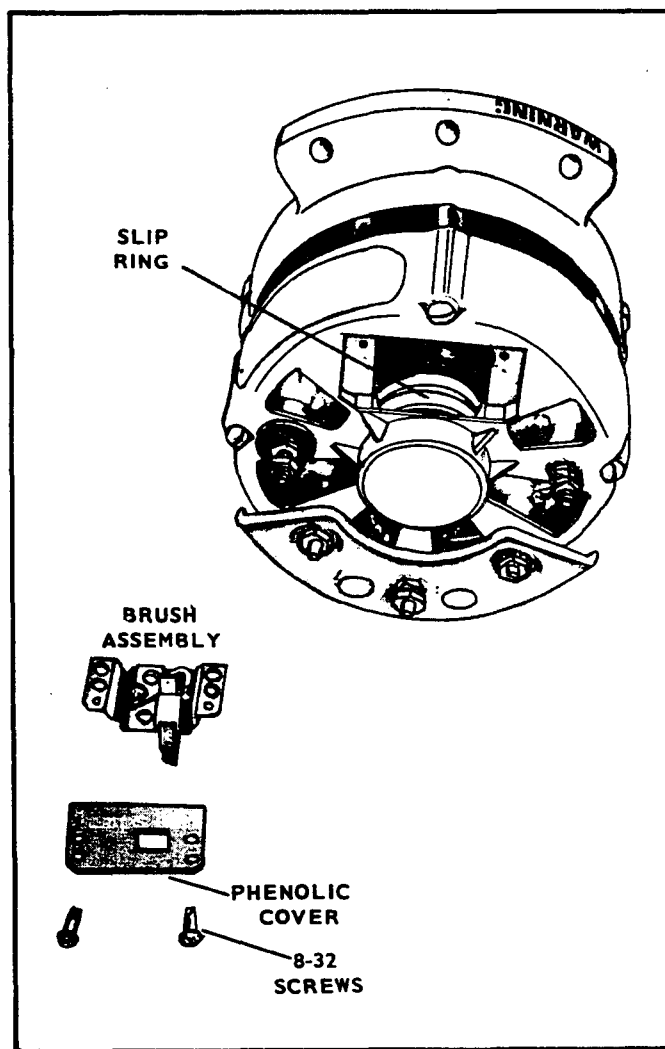


FIGURE 16. DC ALTERNATOR BRUSH REMOVAL

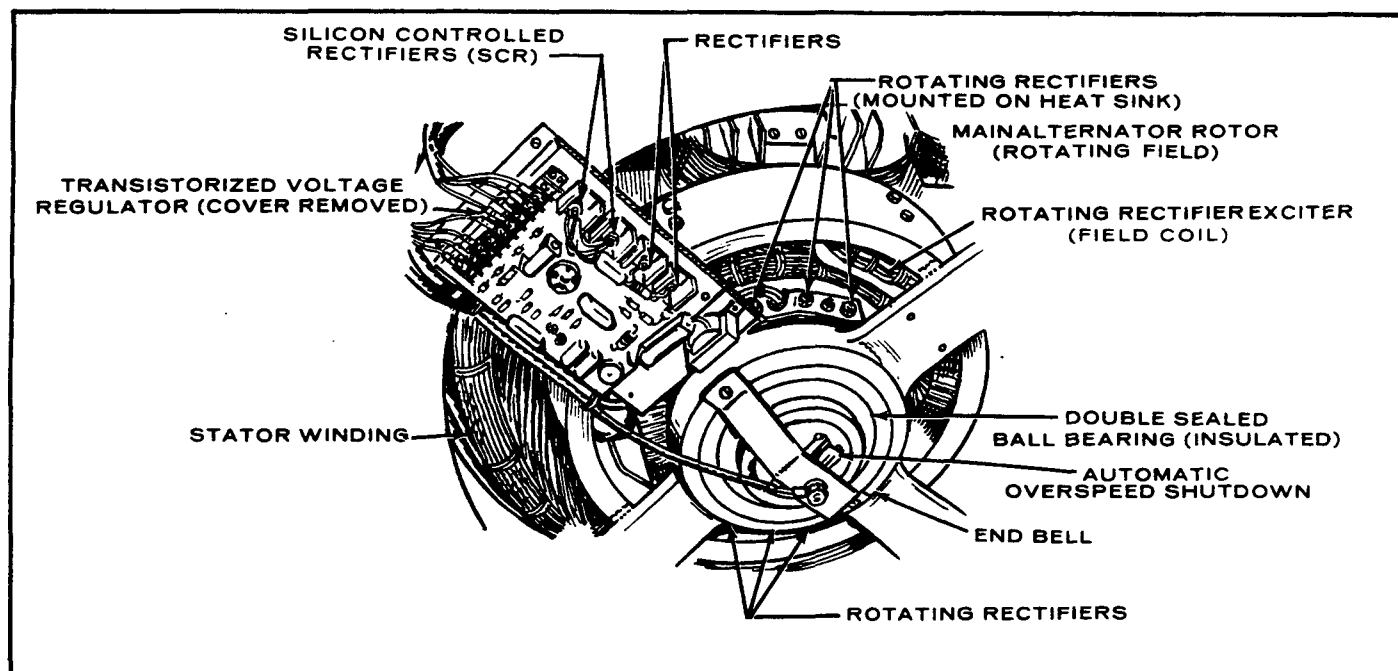


FIGURE 17. GENERATOR END VIEW

AC GENERATOR

The alternator normally requires very little servicing. Periodic inspection, to coincide with engine oil changes, will ensure continued good performance.

Alternator Bearing: This bearing is prelubricated and double-sealed. The outside bearing retainer is electrically insulated from the end bell to prevent shaft currents.

Inspect the bearing (with the set running) for rotation every 1000 hours.

If using the set for "prime power", replace the bearing every 10,000 hours or 2 years. If using the set for

"standby operation", replace the bearing every 5 years. Deterioration of the bearing grease due to oxidation makes this replacement necessary.

Inspection and Cleaning: Inspect the rotating rectifier assembly to make sure diodes are kept 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 the assembly out periodically with filtered, low pressure air. Also check to see that diodes are properly torqued 20-25 in. lbs.

NOTE: If AC generator requires repair, contact your nearest authorized Onan distributor or dealer.

PARTS CATALOG

INSTRUCTIONS FOR ORDERING

REPAIR PARTS

ONAN PARTS

All parts in this list are Onan parts. For Onan parts or service, contact the dealer from who you purchased this equipment or your nearest authorized service station. To avoid errors or delay in filling your order, please refer to the Onan nameplate and give the complete Model and Spec No. and Serial No.

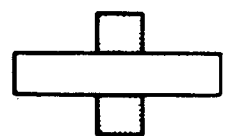
SERIAL NO.
MODEL AND SPEC. NO.

ELECTRIC				PLANT	
MODEL AND SPECIFICATION NO.				SERIAL NO.	
IMPORTANT MENTION BRIDGE NUMBER AND GEN. DATA NO. WHEN ORDERING PARTS (SEE BRIDGE ABOUT THIS PLATE)					
RATINGS AT SEA LEVEL BASED ON FUEL CHECKED BELOW:					
GASOLINE		DIESEL FUEL			
STAND BY	KW		KVA		AMPS
CONTINUOUS	KW		KVA		AMPS
A.C. VOLTS		CYCLES		PHASE	P.F.
EXCITER		GEN. DATA			
R.P.M.		USE		VOLT BATTERY-NEGATIVE GROUND	
MANUFACTURED BY ONAN DIVISION OF STURGEON CORPORATION MINNEAPOLIS 14 MINNESOTA MADE IN U.S.A.					

CUMMINS PARTS

All Cummins parts must be ordered from the Cummins Engine Company, Inc., Columbus, Indiana or their authorized Cummins distributor or dealer.

When ordering parts or requesting service information, refer to the Cummins Engine Nameplate and supply Cummins with all information stated on the engine nameplate.

CUMMINS		CUMMINS ENGINE COMPANY, INC. COLUMBUS, INDIANA, U.S.A.			
SBM NO.		MODEL		ENG NO.	
				OTHER REF. NO.	

This catalog applies to the standard DFT, DFU and DFV plants as listed below. These plants are powered by a Cummins engine (see Cummins Manual). Engine parts modified or added by Onan will be in this list and have Onan part numbers. These supersede similar parts listed in the Cummins manual. Onan parts are arranged in groups of related items and are identified by a reference. All parts illustrations are typical. Using the Model and Spec No. from the plant nameplate, select the Parts Key No. (1, 2, etc., in the last column) that applies to your plant. This Parts Key No. represents parts that differ between models. Unless otherwise mentioned, parts are interchangeable. Right and left plant sides are determined by facing the front end of the engine.

PLANT DATA TABLE

MODEL AND SPEC NO. *	ELECTRICAL DATA					PARTS KEY NO.
	WATTS	VOLTS	HERTZ	WIRE	PHASE	
300DFT-4R8/ 300DFT-4XR8/ 300DFT-7XR8/ 300DFT-5DR8/ 300DFT-6DR8/ 300DFT-9XR8/	300,000 300,000 300,000 300,000 300,000 300,000	120/208 277/480 240/416 120/240 240/480 347/600	60 60 60 60 60 60	4 4 4 4 4 4	3 3 3 3 3 3	1
250DFT-57R8/	250,000	220/380	50	4	3	1
350DFU-4R8/ 350DFU-4XR8/ 350DFU-7XR8/ 350DFU-5DR8/ 350DFU-6DR8/ 350DFU-9XR8/	350,000 350,000 350,000 350,000 350,000 350,000	120/208 277/480 240/416 120/240 240/480 347/600	60 60 60 60 60 60	4 4 4 4 4 4	3 3 3 3 3 3	2
290DFU-57R8/	290,000	220/380	50	4	3	2
400DFV-4R8/ 400DFV-4XR8/ 400DFV-7XR8/ 400DFV-5DR8/ 400DFV-6DR8/ 400DFV-9XR8/	400,000 400,000 400,000 400,000 400,000 400,000	120/208 277/480 240/416 120/240 240/480 347/600	60 60 60 60 60 60	4 4 4 4 4 4	3 3 3 3 3 3	3
330DFV-57R8/	330,000	220/380	50	4	3	3

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

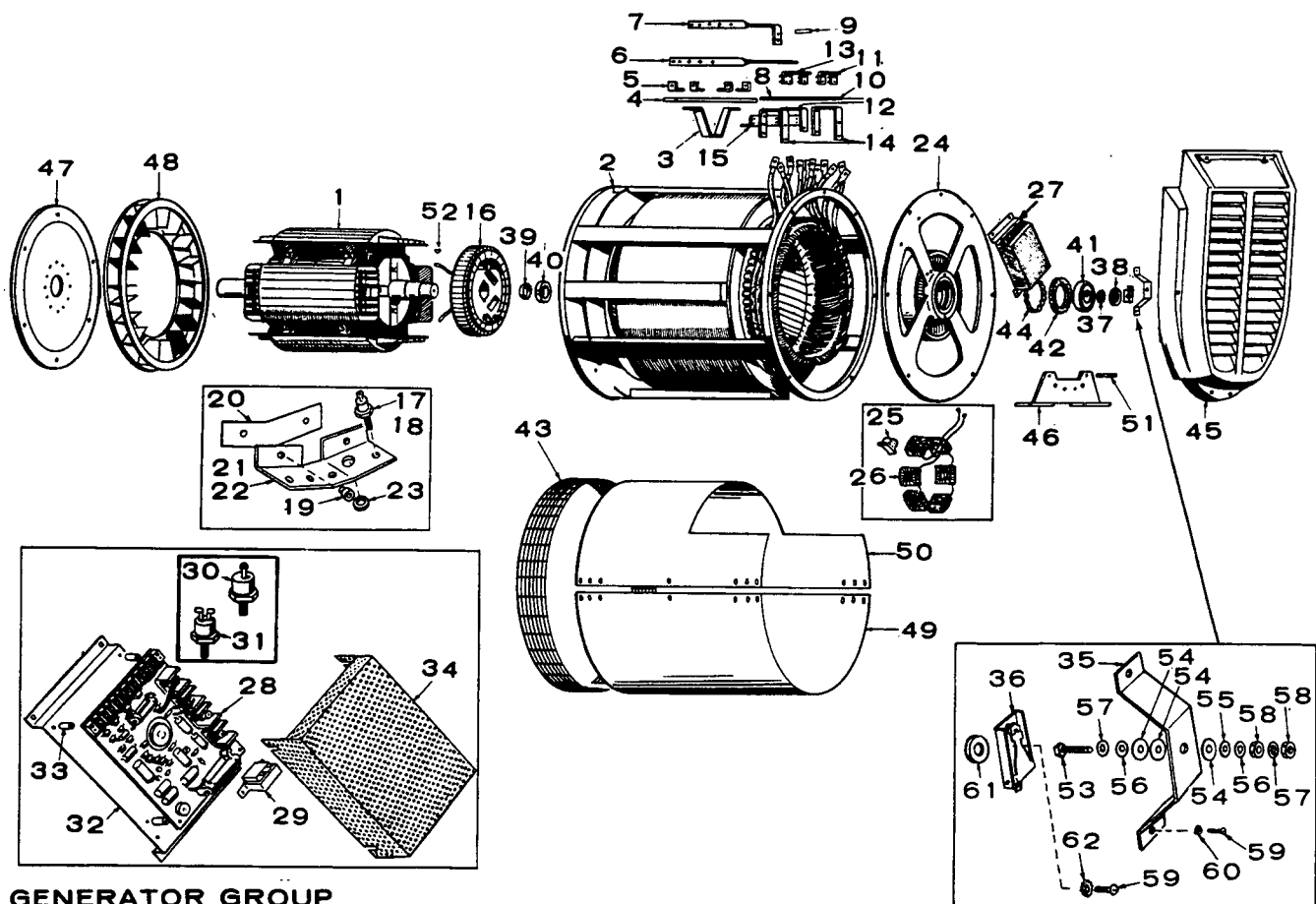
REPLACEMENT ENGINES

PART NO.	DESCRIPTION	
100-0663	DFT PLANTS	Cummins Engine Company Model V12-5251P — Spec A Only
100-0768		Cummins Engine Company Model V1710-P500 — Begin Spec B
100-0664	DFU PLANTS	Cummins Engine Company Model V12-6351P — Spec A Only
100-0769		Cummins Engine Company Model VT-1710-P635 — Begin Spec B
100-0665	DFV PLANTS	Cummins Engine Company Model V12-7001P — Spec A Only
100-0770		Cummins Engine Company Model VT-1710-P700 — Spec B and C
100-0769		Cummins Engine Company Model VT-1710-P635 — Begin Spec D

GENERAL DESCRIPTION

Includes — Complete Cylinder Block, Fuel Pump (24 Volt); Air Cleaner; Fuel Filter; Oil Filter (Full Flow); Starter Motor (24 Volt); Governor (Woodward SG-5%); Fan Blades; Fan Belt; Fan Guard; Flywheel; Flywheel Housing; Water Pump; Engine Supports; Oil Pan; Oil Cooler; Exhaust Manifold; Alternator Belt Tightener.

Excludes — Alternator; Alternator Mounting Brackets; Alternator Belt; Temperature Sender; Oil Pressure Sender.



GENERATOR GROUP

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	*	1	Rotor Assembly, Wound
2	*	1	Stator Assembly, Wound
3	232-1994	1	Bracket, Bus Bar Support
4	232-1997	1	Board, Insulating - Bus Bar Support
5	232-1992	4	Bracket, Bus Bar
6	232-1996	1	Bar, Bus
7	232-2001	3	Bar, Bus
8	232-1995	1	Board, Insulating - Terminal
9	520-0693	16	Stud, Terminal Board
10	232-1998	1	Board, Insulating - Terminal
11	232-1990	3	Bar, Bus
12	232-2000	1	Bracket, Terminal Board Mounting
13	232-1991	1	Bar, Bus
14	232-1999	2	Bracket, Terminal Board Mounting
15	315-0302	1	Shelf, Current Transformer
16	ROTOR ASSEMBLY, EXCITER (WOUND)		
	201-1501	1	Key 1
	201-1501	1	60 Hertz - Key 2, 3
	201-1549	1	50 Hertz - Key 2, 3
17	358-0011	3	Rectifier, Positive Stud
18	358-0012	3	Rectifier, Negative Stud
19	508-0124	4	Bushing, Shoulder - Heat Sink Mounting
20	232-1985	2	Insulator, Heat Sink Mounting
21	363-0025	1	Sink, Heat - Rectifier (Positive)
22	363-0033	1	Sink, Heat - Rectifier (Negative)
23	508-0093	2	Grommet, Heat Sink
24	*	1	Bell, End
25	221-0153	6	Shoe, Pole - Exciter
26	222-1693	1	Coil Assembly, Field (Set of 6 Coils)

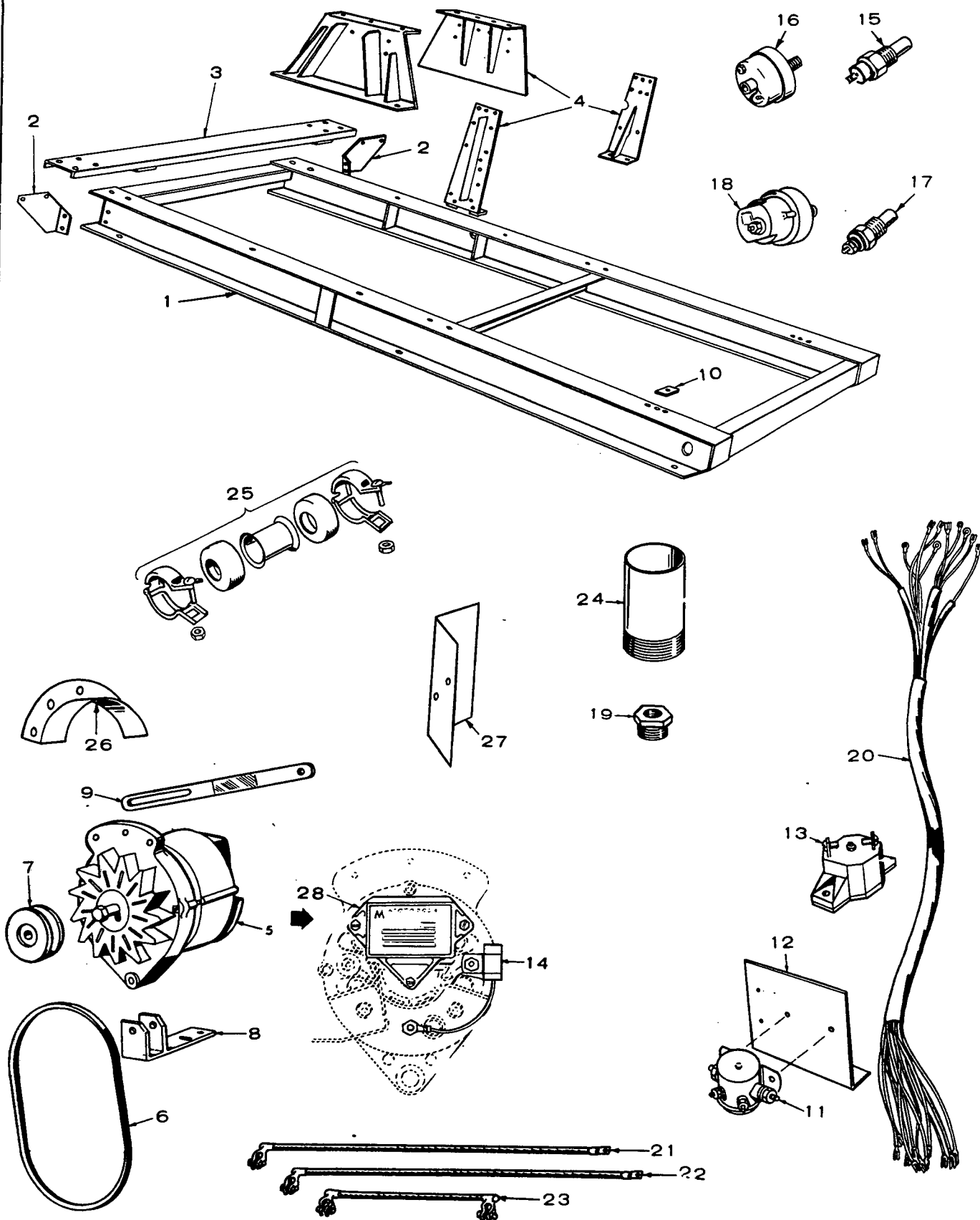
REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
27	305-0455	1	Regulator, Voltage
28	332-1160	1	Board Assembly, Printed Circuit
29	315-0301	1	Inductor
30	RECTIFIER, VOLTAGE REGULATOR		
	358-0015	1	300 Volt, 12 Ampere - Negative Base
	358-0016	1	300 Volt, 12 Ampere - Positive Base
31	364-0006	2	Rectifier, Gate Controlled 300 Volt, 5.5 Ampere - Negative Base
32	305-0454	1	Chassis, Voltage Regulator
33	305-0458	4	Spacer, Printed Circuit Board Mounting
34	305-0456	1	Cover, Voltage Regulator
35	150-1194	1	Bracket, Overspeed Switch
36	150-0717	1	Switch Assembly, Overspeed
37	510-0093	1	Lockwasher, Bearing
38	510-0091	1	Locknut, Bearing
39	510-0094	1	Lockwasher, Bearing
40	510-0092	1	Locknut, Exciter
41	510-0090	1	Bearing
42	232-1923	1	Ring, Bearing Holder
43	234-0272	1	Cover, Fan
44	232-1924	1	Spring, Bearing Holder
45	232-1973	1	Grille, End Bell
46	232-1957	1	Support, Generator End
47	232-1880	1	Disc, Rotor Drive
48	205-0076	1	Fan, Generator
49	BAND, STATOR - BOTTOM		
	234-0278	1	Key 1
	234-0278	1	Prior to Spec C - Key 2

<u>REF NO.</u>	<u>PART NO.</u>	<u>QTY. USED</u>	<u>PART DESCRIPTION</u>
	234-0277	1	Begin Spec C - Key 2
	234-0279	1	Prior to Spec C - Key 3
	234-0278	1	Begin Spec C - Key 3
50	BAND, STATOR - TOP		
	234-0288	1	Key 1
	234-0288	1	Prior to Spec C - Key 2
	234-0287	1	Begin Spec C - Key 2
	234-0289	1	Prior to Spec C - Key 3
	234-0288	1	Begin Spec C - Key 3
51	520-0692	2	Stud, Generator Support
52	515-0162	1	Key, Exciter Rotor
53	150-0723	1	Contact, Overspeed Switch
54	508-0018	3	Washer, Insulating - Overspeed Switch
55	508-0006	1	Washer, Insulating - Overspeed Switch
56	526-0052	2	Washer, Flat (Steel) - Overspeed Switch
57	854-0014	2	Washer, Shakeproof - Overspeed Switch

<u>REF NO.</u>	<u>PART NO.</u>	<u>QTY. USED</u>	<u>PART DESCRIPTION</u>
58	871-0016	2	Nut, Hex - Overspeed Switch
59	SCREW, ROUND HEAD		
	812-0148	2	Overspeed Switch Bracket to End Bell
	812-0189	1	Overspeed Switch to Rotor
60	850-0040	2	Washer, Lock - Overspeed Switch to End Bell
61	526-0030	1	Washer, Flat - Overspeed Switch to Rotor
62	856-0010	1	Washer, Shakeproof - Overspeed Switch to Rotor

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

MISCELLANEOUS ENGINE PARTS GROUP



REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	BASE, MOUNTING		
	403-0803	1	Spec A Only
	403-0867	1	Begin Spec B
2	BRACE, RADIATOR MOUNTING		
	130-0709	1	Right Hand - Spec A Only
	130-0710	1	Left Hand - Spec A Only
3	SUPPORT, RADIATOR		
	130-0711	1	Spec A Only
	130-0758	1	Begin Spec B
4	BRACKET, ENGINE MOUNT		
	403-0843	1	Left Front - Spec A Only
	403-0844	1	Right Front - Spec A Only
	403-0845	1	Left Rear - Spec A Only
	403-0846	1	Right Rear - Spec A Only
5	191-0688	1	*Alternator, Charge
6	511-0037	1	Belt, Alternator Drive
7	191-0624	1	Pulley, Alternator
8	191-0697	1	Bracket, Alternator Mounting
9	191-0101	1	Bracket, Alternator Adjusting
10	SHIM, GENERATOR TO MOUNTING BASE		
	232-1817	As Req. .062"	
	232-1489	As Req. .0598"	
	232-1490	As Req. .0359"	
11	307-0061	1	Solenoid, Starting

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
12	306-0220	1	Bracket, Solenoid Mounting
13	320-0240	1	Breaker, Circuit - Starting Circuit
14	312-0058	1	Condenser, Alternator
15	309-0178	1	Switch, High - Temperature
16	309-0064	1	Switch, Low - Oil Pressure
17	193-0100	1	Sender, Water Temperature
18	193-0195	1	Sender, Oil Pressure
19	BUSHING, REDUCER		
	505-0021	1	3/4 to 1/2"
	505-0131	1	3/4 to 3/8"
20	338-0459	1	Harness, Engine
21	416-0444	1	Cable, Battery - Positive
22	416-0445	1	Cable, Battery - Negative
23	416-0446	1	Cable, Jumper
24	505-0456	2	Nipple, Exhaust
25	505-0654	2	Exhaust Coupling
26	191-0725	1	Guard, Alternator Belt
27	309-0246	1	Shield, Heat - High Temperature
			Switch
28	191-0733	1	Regulator, Voltage (Part of Alternator)

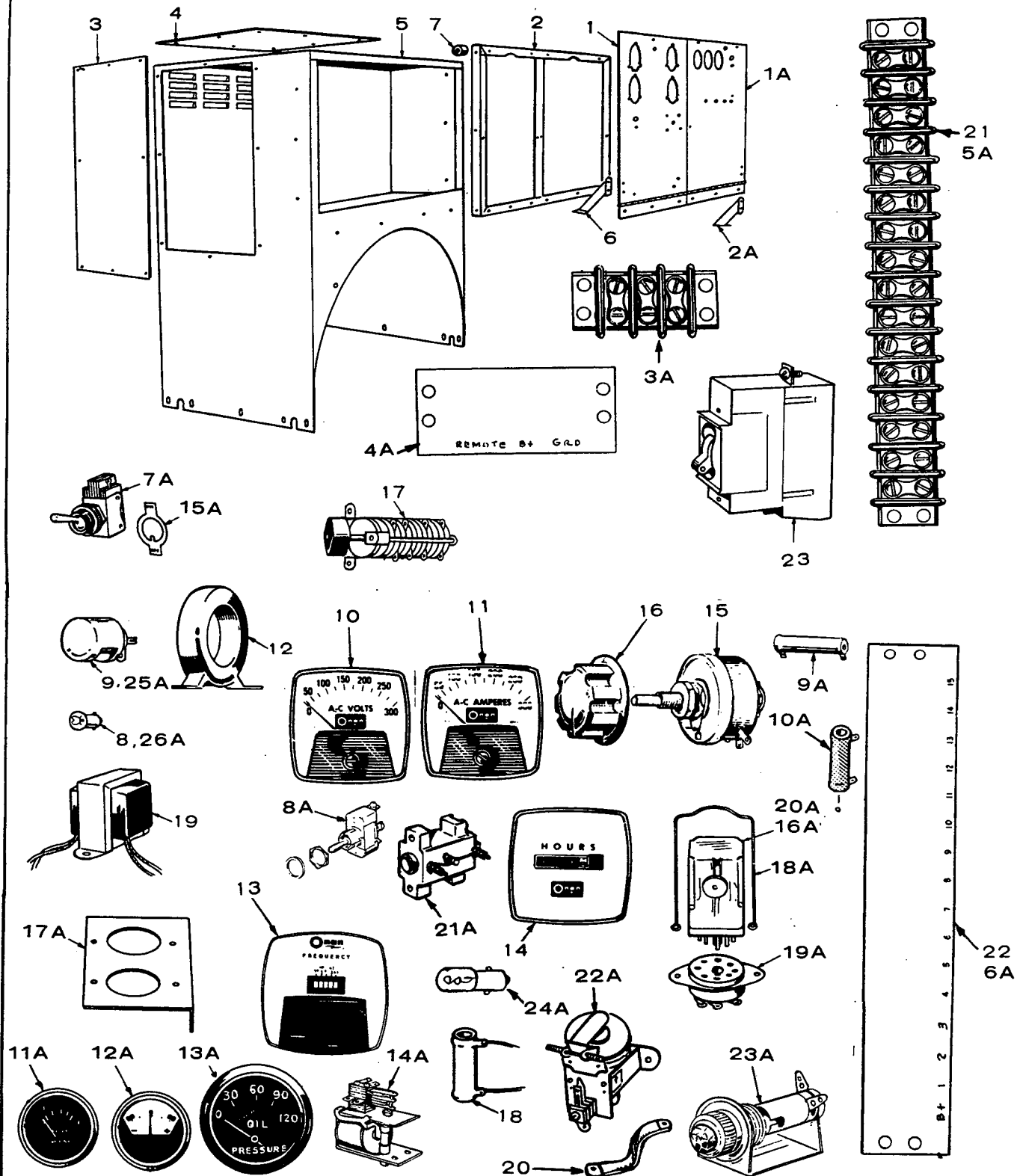
* - For components not listed, check nameplate and contact your nearest Motorola dealer.

CONTROL GROUP (ENGINE INSTRUMENTS PORTION)

NOTE: This group (Engine Instruments Portion) applies to the following Specs:

DFT - Spec A through B
DFU - Spec A through C
DFV - Spec A through D

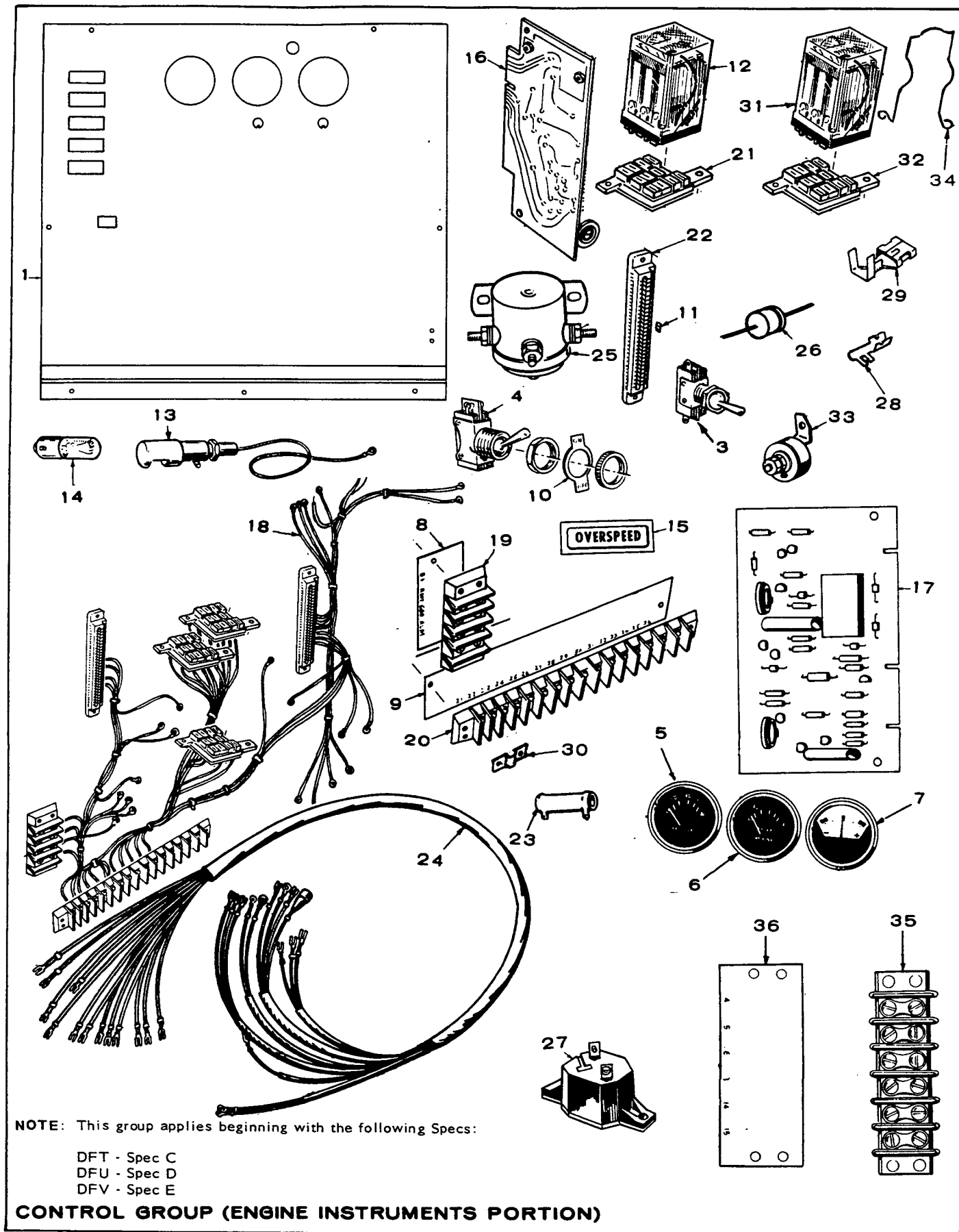
CONTROL GROUP (AC OUTPUT PORTION)



REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	301-2908	1	Panel, Control
2	301-2906	1	Frame, Control Panel Mounting
3	301-2905	2	Plate, Control Box - Side
4	301-2904	1	Plate, Control Box - Top
5	301-2903	1	Box, Control
6	301-1914	1	Bracket, Panel Stop
7	402-0070	6	Mount, Rubber - Control Box Frame
8	322-0081	1	Lamp, Panel
9	322-0073	1	Receptacle, Panel Lamp
10	VOLTMETER, AC (Check Voltmeter Scale - Select According to Rating)		
	302-0421	1	Scale Reads 0-300
	302-0422	1	Scale Reads 0-600
11	AMMETER, AC (Check Ammeter Scale - Select According to Rating)		
	302-0605	1	Scale Reads 0-400
	302-0414	1	Scale Reads 0-500
	302-0415	1	Scale Reads 0-750
	302-0416	1	Scale Reads 0-1000
	302-0640	1	Scale Reads 0-1200
	302-0641	1	Scale Reads 0-1500
12	TRANSFORMER, CURRENT (Check Transformer Nameplate - Select According to Rating)		
	302-0609	3	Transformer Nameplate Reads 400/5 (Use with 0-400 Ammeter)
	302-0547	3	Transformer Nameplate Reads 500/5 (Use with 0-500 Ammeter)
	302-0471	3	Transformer Nameplate Reads 750/5 (Use with 0-750 Ammeter)
	302-0589	3	Transformer Nameplate Reads 1000/5 (Use with 0-1000 Ammeter)
	302-0643	3	Transformer Nameplate Reads 1200/5 (Use with 0-1200 Ammeter)
	302-0644	3	Transformer Nameplate Reads 1500/5 (Use with 0-1500 Ammeter)
13	METER, FREQUENCY		
	302-0213	1	120 Volt, 60 Hertz
	302-0234	1	120 Volt, 50 Hertz
	302-0221	1	240 Volt, 60 Hertz
	302-0256	1	240 Volt, 50 Hertz
	302-0716	1	480 Volt, 60 Hertz
	302-0825	1	480 Volt, 50 Hertz
	302-0717	1	600 Volt, 60 Hertz
	302-0788	1	600 Volt, 50 Hertz
14	METER, RUNNING TIME		
	302-0465	1	120/208 Volt, 60 Hertz
	302-0465	1	120/240 Volt, 60 Hertz
	302-0466	1	240/416 Volt, 60 Hertz

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
	302-0467	1	277/480 Volt, 50 Hertz
	302-0465	1	347/600 Volt, 60 Hertz
	302-0468	1	120/208 Volt, 50 Hertz
	302-0468	1	120/240 Volt, 50 Hertz
	302-0469	1	240/416 Volt, 50 Hertz
	302-0470	1	277-480 Volt, 50 Hertz
	302-0468	1	347/600 Volt, 50 Hertz
15	303-0111	1	Rheostat, Voltage Adjustment
16	303-0032	1	Knob, Rheostat
17	308-0022	1	Switch, Voltage & Current Selector
18	304-0305	1	Resistor, Adjustable - 45,000-Ohm, 10 Watt (277/480 Volt)
19	TRANSFORMER, POTENTIAL		
	315-0032	1	120/208 Volt and 120/240 Volt
	315-0036	1	277/480 Volt and 240/480 Volt
	315-0067	1	347/600 Volt and 240/416 Volt
20	337-0044	1	Strap, Ground
21	332-0795	1	Block, Terminal (16 Place)
22	332-1134	1	Strip, Terminal Block Marker (1 through 16)
23	320-0431	1	Breaker, Circuit (2 Amp)
1A	301-2907	1	Panel, Control
2A	301-2951	1	Bracket, Panel Stop
3A	332-0611	1	Block, Terminal
4A	332-0762	1	Strip, Terminal Block Marker
5A	332-0795	1	Block, Terminal
6A	332-0862	1	Strip, Terminal Block Marker
7A	308-0002	1	Switch, Panel Light
8A	308-0138	1	Switch, Run-Stop-Remote
9A	304-0262	1	Resistor, 50-Ohm, 10 Watt
10A	304-0066	1	Resistor, 10-Ohm, 50 Watt
11A	193-0112	1	Gauge, Water Temperature
12A	302-0061	1	Ammeter, Charge
13A	193-0194	1	Gauge, Oil Pressure
14A	307-0655	1	Relay, Shutdown
15A	308-0003	1	Plate, On-Off Switch
16A	307-0820	1	Relay, Fuel Solenoid
17A	301-2393	1	Bracket, Relay Mounting
18A	307-0778	2	Spring, Relay Holddown
19A	323-0052	2	Socket, Relay
20A	307-0820	1	Relay, Start Disconnect
21A	320-0104	1	Relay, Cranking
22A	307-0899	1	Relay, Oil Pressure
23A	322-0069	1	Receptacle, Emergency Lamp
24A	322-0017	1	Lamp, Emergency
25A	322-0073	1	Receptacle, Panel Lamp
26A	322-0081	1	Lamp, Panel

* - Order by description, giving complete Model, Spec and Serial number from Onan nameplate.



REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	PANEL ONLY, ENGINE CONTROL		
	301-3400	1	For One Fault Light
	301-3401	1	For Five Fault Lights (Opt.)
3	308-0138	1	Switch, Selector
4	308-0002	1	Switch, Panel Light
5	193-0194	1	Gauge, Oil Pressure
6	193-0106	1	Gauge, Water Temperature
7	302-0061	1	Ammeter, Charge (30-0-30)
8	332-1239	1	Strip, Marker (B+, Remote, Gnd. Alm)
9	332-1241	1	Strip, Marker (21 through 36)
10	308-0003	1	Plate, Switch (On-Off)
11	332-1276	4	Plug, Keying (3 used on Sets With Five Fault Lights)
12	307-1056	2	Relay (1) Start Disconnect (1) Ignition
13	322-0149	1	Holder, Lamp
14	322-0017	1	Lamp, Panel
15	LAMP, FAULT		
	322-0129	1	Standard Sets
	322-0119	1	Overcrank (Optional)
	322-0123	1	Overspeed (Optional)
	322-0120	1	Low Oil Pressure (Optional)
	322-0121	1	High Engine Temperature (Opt.)
	322-0122	1	Low Engine Temperature (Opt.)
16	CONTROL, CRANKER		
	300-0751	1	Standard Cranker
	300-0715	1	Cycle Cranker (Opt.) - (See Separate Group for Components)
17	MONITOR, ENGINE CONTROL (See Separate Group for Components)		
	300-0680	1	Sets With One Fault Light - Std.
	300-0682	1	Sets With Five Fault Lights - Optional

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
18	HARNESS ASSEMBLY, WIRING - CONTROL (Includes Parts Marked *)		
	338-0617	1	Sets With One Fault Light - Std.
	338-0618	1	Sets With Five Fault Lights - Optional
19	332-0537	1	*Block, Terminal - 4 Place
20	332-0795	1	*Block, Terminal - 16 Place
21	323-0765	2	*Socket, Relay - 11 Place
22	332-1271	2	*Housing, Printed Circuit Board Terminal
23	304-0262	1	Resistor, Oil Pressure Gauge
24	338-0621	1	Harness Assembly, Wiring - Engine to Control
25	307-0061	1	Relay, Starter Pilot
26	357-0004	1	Rectifier, Diode (Part of Standard Cranker Control)
27	320-0240	1	Breaker, Circuit
28	332-1269	As Req.	*Terminal, PC Board
29	332-1280	As Req.	*Terminal, Crimp
30	332-1043	1	*Jumper, Terminal - Std. Sets
31	307-1143	1	Relay, Starter Protection
32	323-0764	1	*Socket, Relay - 8 Place
33	193-0189	1	Resistor, Water Temp. Gauge
34	307-1157	3	Spring, Relay Holddown
35	332-0699	1	Block, Terminal (6-Place) - Sets with Five Fault Lights (Optional)
36	332-1240	1	Strip, Marker (53 through 58) - Sets With Five Fault Lights (Optional)

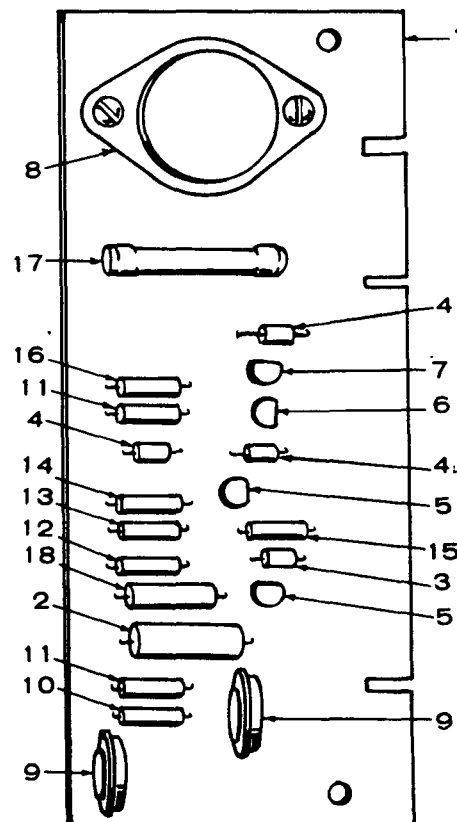
* - Included in Control Wiring Harness Assembly.

CONTROL CYCLE CRANKER GROUP (Optional Equipment)

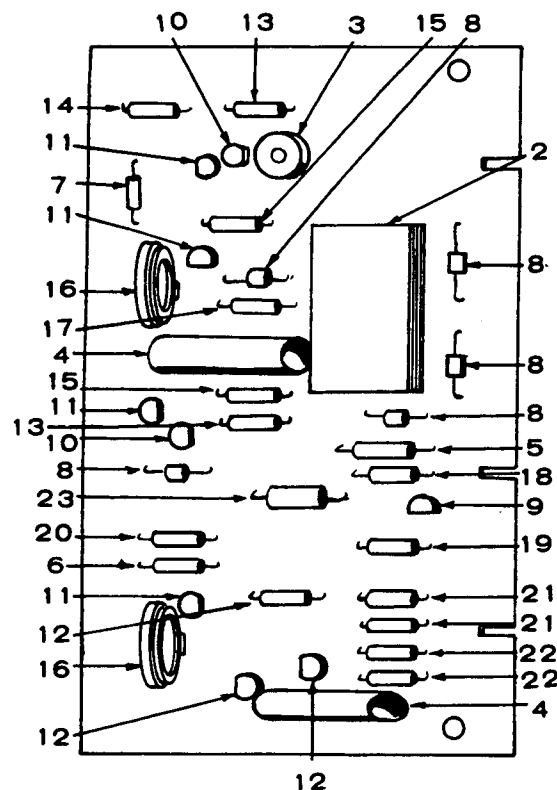
NOTE: This group applies beginning with the following Specs:

DFT - Spec C
DFU - Spec D
DFV - Spec E

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	300-0715	1	Control, Cycle Cranker - Complete
2	356-0039	1	Capacitor, Electrolytic (100Mfd.)
3	359-0027	1	Diode, Zener (7.5 Volts)
4	357-0004	3	Rectifier, Diode
5	362-0008	2	Transistor, Signal
6	362-0017	1	Transistor
7	362-0026	1	Transistor, Signal
8	362-0019	1	Transistor, Power
9	303-0171	2	Potentiometer (100,000-Ohm)
10	350-0560	1	Resistor, Fixed (1 Megohm)
11	350-0548	2	Resistor, Fixed (10,000-Ohm)
12	350-0558	1	Resistor, Fixed (68,000-Ohm)
13	350-0420	1	Resistor, Fixed (24,000-Ohm)
14	350-0546	1	Resistor, Fixed (6,800-Ohm)
15	350-0534	1	Resistor, Fixed (680-Ohm)
16	350-0500	1	Resistor, Fixed (1.0-Ohm)
17	352-0158	1	Resistor, Fixed (5 Watt, 50-Ohm)
18	355-0010	1	Capacitor, Dielectric (.0022 Mfd., 100 Volt)



ENGINE CONTROL MONITOR GROUP (Standard sets with one fault light)



NOTE: This group applies beginning with the following Specs:

DFT - Spec C
DFU - Spec D
DFV - Spec E

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	300-0680	1	Monitor Assembly Complete - Engine Control
2	307-1076	1	Relay
3	350-0548	1	Resistor (10,000-Ohm)
4	355-0005	2	Capacitor (22 Mfd.)
5	356-0040	1	Capacitor (10 Mfd.)
6	356-0030	1	Capacitor (1 Mfd.)
7	359-0027	1	Diode, Zener
8	357-0004	5	Rectifier, Diode
9	364-0011	1	Rectifier, Gate Control
10	361-0003	2	Transistor
11	362-0025	2	Transistor, Field Effect
12	362-0027	2	Transistor, Silicon
13	350-0536	2	Resistor (1,000-Ohm)
14	350-0534	1	Resistor (680-Ohm)
15	350-0552	1	Resistor (22,000-Ohm)
16	303-0169	1	Potentiometer
17	350-0576	1	Resistor (2.2 Megohm)
18	350-0505	1	Resistor (2.7-Ohm)
19	350-0517	1	Resistor (27-Ohm)
20	350-0587	1	Resistor (18 Megohm)
21	350-0529	2	Resistor (270-Ohm)
22	350-0544	2	Resistor (4,700-Ohm)
23	350-0980	1	Resistor (510-Ohm, 2 Watt)
24	350-0380	1	Resistor (510-Ohm, 1/2 Watt)
25	362-0031	1	Transistor, Field Effect
26	303-0182	1	Potentiometer

ENGINE CONTROL MONITOR GROUP (Sets with five fault lights)-OPTIONAL

NOTE: This group applies beginning with the following Specs:

DFT - Spec C
DFU - Spec D
DFV - Spec E

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	300-0682	1	Monitor Assembly Complete - Engine Control
2	307-1076	2	Relay
3	350-0548	1	Resistor (10,000-Ohm)
4	355-0005	6	Capacitor (22 Mfd.)
5	356-0040	1	Capacitor (10 Mfd.)
6	356-0030	1	Capacitor (1 Mfd.)
7	359-0027	1	Diode, Zener
8	357-0004	15	Rectifier, Diode
9	364-0011	4	Rectifier, Gate Control
10	361-0003	2	Transistor
11	362-0025	2	Transistor, Field Effect
12	362-0027	8	Transistor, Silicon
13	350-0536	2	Resistor (1,000-Ohm)
14	350-0534	1	Resistor (680-Ohm)
15	350-0552	1	Resistor (22,000-Ohm)
16	303-0169	1	Potentiometer
17	350-0576	1	Resistor (2.2 Megohm)
18	350-0505	4	Resistor (2.7-Ohm)
19	350-0587	1	Resistor (18 Megohm)
20	350-0529	8	Resistor (270-Ohm)
21	350-0544	8	Resistor (4,700-Ohm)
22	350-0980	1	Resistor (510-Ohm, 2 Watt)
23	350-0380	2	Resistor (510-Ohm, 1/2 Watt)
24	362-0031	2	Transistor, Field Effect
25	303-0182	1	Potentiometer
26	303-0182	1	Potentiometer
27	308-0280	1	Switch, Push Button

