

SAFETY PRECAUTIONS

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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.

ONAN recommends that you read your manual and become thoroughly acquainted with it and your equipment before you start your unit. These recommendations and the following safety precautions are for your protection.

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.

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

CAUTION This symbol refers to possible equipment damage.

General

- Keep your electric generating set and the surrounding area clean and free from obstructions. Remove any debris from set and keep the floor clean and dry.
- Provide appropriate fire extinguishers and install them in convenient locations. Consult your local fire department for the correct type of extinguisher to use. Do not use foam on electrical fires. Use extinguisher rated ABC by NFPA.
- Make sure that all fasteners on the generating set are secure. Tighten supports and clamps, keep guards in position over fans, driving belts, etc.
- Do not wear loose clothing in the vicinity of moving parts, or jewelry while working on electrical equipment.
 Loose clothing and jewelry can become caught in moving parts. Jewelry can short out electrical contacts; cause shock or burning.
- If adjustment *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.
- Coolants under pressure have a higher boiling point than water. DO NOT open a radiator or heat exchanger pressure cap while the engine is running. Bleed the system pressure first.

Protect Against Moving Parts

Keep your hands away from moving parts.

 Before starting work on the generating set, disconnect batteries. This will prevent starting the set accidentally.

Fuel System

- DO NOT fill fuel tanks while engine is running, unless tanks are outside engine compartment. Fuel contact with hot engine or exhaust is a potential fire hazard.
- DO NOT SMOKE OR USE AN OPEN FLAME in the vicinity of the generator set or fuel tank. Internal combustion engine fuels are highly flammable.
- Fuel lines must be of steel piping, adequately secured, and free from leaks. Piping at the engine should be approved flexible line. Do not use copper piping on flexible lines as copper will work harden and become brittle.
- Be sure all fuel supplies have a positive shutoff valve.

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.
- Use extreme caution when working on electrical components. High voltages cause injury or death. DON'T tamper with interlocks.
- Follow all state and local electrical codes. Have all electrical installations performed by a qualified licensed electrician. Tag open switches.
- 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 expel discharged gases. Check exhaust system regularly for leaks. Ensure that exhaust manifolds are secure and not warped. Do not use exhaust gases to heat a compartment.
- Be sure the unit is well ventilated.

Keep the Unit and Surrounding Area Clean

- Make sure that oily rags are not left on or near the engine.
- 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.



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WARNING

TO AVOID POSSIBLE PERSONAL INJURY OR EQUIPMENT DAMAGE, A QUALIFIED ELECTRI-CIAN OR AN AUTHORIZED SERVICE REPRESENTATIVE MUST PERFORM IN-STALLATION AND ALL SERVICE.

INTRODUCTION

FOREWORD

This manual is applicable to the DYC Series electric generating set, consisting of an ONAN UR generator, driven by an Allis-Chalmers **Application** Engine. See SPECIFICATIONS for generator sizes.

The manual is divided into two sections.

Section 1 provides information on installation, operation and troubleshooting.

Section 2 is a Parts Catalog for ONAN optional and standard equipment.

The manual should be used in conjunction with the Allis-Chalmers engine manual, for specific engine information.

MODEL IDENTIFICATION

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.

90.0	DYC	15R	/ <u>1E</u>
-i		T	T.T
1	2	3	4.5

1. Indicates kilowatt rating (90 kW).

- 2. Factory code for SERIES identification.
- 15 = 60 Hz. Reconnectible
 515 = 50 Hz. Reconnectible
 R—Indicates remote starting feature.
- 4. Factory code for designating optional equipment.
- 5. Specification letter. (Advances when factory makes production modifications.)

When contacting 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 unit among the many manufactured. Refer to the engine nameplate when requesting information from its manufacturer. The Onan nameplate is located on the right side of the generator; the Allis-Chalmers nameplate is on the left hand side of the engine block.

Left side and right side are considered when viewed from the engine or front end of the generating set.

WARNING

ENGINE EXHAUST GAS (CARBON MONOXIDE) IS DEADLY!

Carbon monoxide is an odorless, coloriess gas formed by incomplete combustion of hydrocarbon fuels. Carbon monoxide is a dangerous gas that can cause unconsciousness and is potentially lethal. Some of the symptoms or signs of carbon monoxide inhalation are:

- Dizziness
- Intense Headache
- Weakness and Sleepiness
- Vomiting
 Muscular Twitching
- - Throbbing in Temples

If you experience any of the above symptoms, get out into fresh air immediately.

The best protection against carbon monoxide inhalation is a regular inspection of the complete exhaust system. If you notice a change in the sound or appearance of exhaust system, shut the unit down immediately and have it inspected and repaired at once by a competent mechanic.

SPECIFICATIONS

75 kW

ECN 1772 670-T(ald number 3500 MKII)

ENGINE DETAILS

Engine Manufacturer	Allis-Chalmers
Engine Series	8500 WKTI (Turbocharged)
Number of Cylinders	
Displacement	426-in ³ (6.97 litre)
BHP @ 1800 r/min	162 (121 kw)
Compression Ratio	
Bore	4.25-inch (107.95 mm)
Stroke	5.0-inch (127.0 mm)
Fuel	ASTM No 2 Diesel
Battery Voltage	
Recommended Batteries (Begin Spec G)*	
Two 12-Volt, 74 A.H.	. Fits Standard Battery Rack
Two 12-Volt, 225 A.H Required for use wi	th Automatic Transfer Switch
Starting Method	Solenoid Shift
Governor Regulation	5% No Load—Full Load
Battery Charging Current	35-Amperes
* 75 and 90 kW Models Prior to Spec G use Two 6-volt 135 A.H. batteries.	
GENERATOR DETAILS	
Туре	UR 15 60 Hz
	UR 515 50 Hz
Rating (Watts)	
60 Hertz Continuous Standby	
50 Hertz Continuous Standby	62,500 (78.13 kVA)
AC Voltage Regulation	± 2%
60 Hertz r/min	1800
50 Hertz r/min	1500
Output Rating	0.8 PF
AC Frequency Regulation	3 Hz

CAPACITIES AND REQUIREMENTS

Cooling System, Engine and Radiator	. 34-quarts (32 litres)
Engine Oil Capacity (Filter, Lines, Crankcase)	31-quarts (29.3 litres)
Exhaust Connection (inches pipe thread)	4 (101.6 mm) male

AIR REQUIREMENTS (1800 r/min)

Engine Combustion	250-ft ³ /min (0.11 m ³ /s)
Radiator Cooled Engine	7100-ft ³ /min (3.4 m ³ /s)
Total for Radiator Cooled Model	7350-ft ³ /min (3.5 m ³ /s)
Alternator Cooling Air (1800 r/min)	1000-ft ³ /min (0.5 m ³ /s)
(1500 r/min)	833-ft ³ /min (0.4 m ³ /s)
Fuel Consumption at Rated Load ASTM No. 2 Diesel	.6.7 gal/hr. (25.4 lit/hr)

GENERAL

Height	
Width	
Length	
Approximate Weight (Mass)	

SPECIFICATIONS

90 kW

670T Turbeloged (all #3500 MKU)

ENGINE DETAILS	· · · · ·		
Engine Manufacturer		Allis-Chalmers	5
Engine Series		0=MKII=(Turbocharged)).
Number of Cylinders	•••••••••••••••••••	ε	3
Displacement	••••••	426-in ³ (6.97 litre))
BHP @ 1800 r/min	•••••••••••••••••••	162 (121 KW))
	••••••	15.5.1 4.95 inch (107.05 mm)	1
Bore		4.25-Inch (107.95 Inili)	/
	•••••••••••••••••••••••••		/ 1
Battery Voltage	••••••••		4
Recommended Batteries (Begin Spec G)*		· · · · · · · · · · · · · · · · · · ·	•
Two 12-Volt. 74 A.H.	Fits	Standard Battery Rac	k
Two 12-Volt, 225 A.H	Required for use with Aut	omatic Transfer Switcl	h
Starting Method		Solenoid Shift	t
Governor Regulation		% No Load—Full Load	i
Battery Charging Current		35-Amperes	;. ;
* 75 and 90 kW Models Prior to Spec G use Two 6-volt 135 A.H. batteries.			
GENERATOR DETAILS		· . ·	•
Туре		UR 15 60 Hz	:
	· .	UR 515 50 Hz	:
Rating (Watts)		• •	
60 Hertz Continuous Standby	•••••••••••••••••		}
50 Hertz Continuous Standby	•••••••••••••••••••••••••••••••••••••••	75,000 (93.75 kVA))
	•••••••••••••••••••••••••••••••••••••••	± 2%)
60 Hertz r/min	• • • • • • • • • • • • • • • • • • • •	1800	1
	•••••••••••) :
AC Frequency Regulation	•••••••••••••••••••••••••••••••••••••••		,
	•••••••••••••••••		
CAPACITIES AND REQUIREMENTS			•
Cooling System. Engine and Radiator		34-quarts (32 litres)	
Engine Oil Capacity (Filter, Lines, Crankcase)		31-quarts (29.3 litres))
Exhaust Connection (inches pipe thread)		4 (101.6 mm) male	,
7	· · · · · · · · · · · · · · · · · · ·	•	
AIR REQUIREMENTS (1800 r/min)	· · · · · · · · · · · · · · · · · · ·		
Engine Combustion		300-ft3/min (0.14 m3/s)	ļ
Radiator Cooled Engine		7100-ft ³ /min (3.4 m ³ /s)	:
Total for Radiator Cooled Model	••••••	7400-ft3/min (3.5 m3/s))
Alternator Cooling Air (1800 r/min)		1000-ft ³ /min (0.5 m ³ /s)	ł
(1500 r/min)	••••••	833-ft ³ /min (0.4 m ³ /s))
Fuel Consumption at Hated Load ASTM No. 2 Diesel	•••••••••••••••••••••••••••••••••••••••	8-gal/hr: (30.3 lit/hr))
GENERAL			•
Height		50 5 inches (1.0	
Width	•••••••••••••••••••••••••••••••••••••••	33 0-inches (1.3 m)	ł
Length		85 44-inches (0.04 m)	/ \
Approximate Weight (Mass)		2670-lb (1212 kg)	/ }
			•

SPECIFICATIONS

100 kW

	6 70-TTen forhand (OLA# 3500 MKII)
ENGINE DETAILS	
Engine Manufacturer Engine Series	-3500-MKIF(Furbocharged)
Number of Cylinders. Displacement. BHP @ 1800 r/min. Compression Ratio	
Bore Stroke Fuel Battery Voltage Recommended Batteries (Begin Spec G)*	4.25-inch (107.95 mm) 5.0-inch (127.0 mm) ASTM No 2 Diesel 24
Two 12-Volt, 74 A.H	Fits Standard Battery Rack
Battery Group Starting Method Governor Regulation Battery Charging Current	Two 12-Volt 225 Amp. Hr. Solenoid Shift
	UR 515 50 Hz
Hating (Watts) 60 Hertz Continuous Standby 50 Hertz Continuous Standby AC Voltage Regulation 60 Hertz r/min 50 Hertz r/min S0 Hertz r/min AC Voltage Regulation AC Hertz r/min AC Hertz r/min AC Hertz r/min AC Frequency Regulation	100,000 (125 KVA) 80,000 (100 kVA) ± 2% 1800 1500 0.8 PF 3 Hz
CAPACITIES AND REQUIREMENTS	
Cooling System, Engine and Radiator Engine Oil Capacity (Filter, Lines, Crankcase) Exhaust Connection (inches pipe thread)	
AIR REQUIREMENTS (1800 r/min)	
Engine Combustion Radiator Cooled Engine Total for Radiator Cooled Model	
Alternator Cooling Air (1800 r/min)	
ruei Consumption at Hated Load ASTM No. 2 Diesel.	8.4 gai /nr (31.83 iitres/nr)

GENERAL

Height		 	.5-inches (1.3 m)
Width		 	D-inches (0.84 m)
Length		 	1-inches (2.17 m)
Approximate Weight (I	Mass)	 	2755-lb (1250 kg)

TABLE 1 UR GENERATOR VOLTAGE/CURRENT OPTIONS

75 kW 9	3.75 kVA							
62.5 kW 7	'8.13 kVA							
VOLTS	FREQ	PHASE	AMPERES	DOUBLE DELTA	SERIES DELTA	PARALLEL WYE	SERIES WYE	REF VOLTAGE WIRE (W12) TAP
110/220	50 Hz	1	355*	x				H6
115/230	50 Hz	1 1	340*	x				H6
120/240	60 Hz	1	391*	. x				H5
110/190	50 Hz	3	237			×		H3
115/200	50 Hz	3	226			x	·	H4
120/208	50 Hz	· 3	217			x		H4
120/208	- 60 Hz	3	260	1		x		H3
110/220	50 Hz	3	205		×		· ·	H6 .
127/220	`50 Hz	3	205		-	×	· ·	H5 .
127/220	60 Hz	3	246			×		H4
115/230	50 Hz	3	196		×	· ·		H6
120/240	60 Hz	3	226		×			H5
139/240	60 Hz	3	226			×	1	H5.
220/380	50 Hz	3	119	-		1	×	НЗ
230/400	50 Hz	3	113		•.		×	H4
240/416	50 Hz	3.	108				×	H4
240/416	60 Hz	3	130		ľ		' X	H3
254/440	50 Hz	3	103		· ·		×	H5
254/440	60 Hz	3	123				×	H4
· 277/480	60 Hz	3	113	<u> </u>	· · ·		X	<u>H5</u>
9X								H5—Not
347/600	60 Hz	3	90					Reconnectible

This current value is available only from special long stack units (option B125). A standard 3-phase generator connected into a Double Delta configuration will deliver 2/3 current value shown ($355 \times .66 = 237$ amperes).

TABLE 1A UR GENERATOR VOLTAGE/CURRENT OPTIONS

90 kW 112.5 kVA 75 kW 93.75 kVA

VOLTS	FREQ	PHASE	AMPERES	DOUBLE DELTA	SERIES DELTA	PARALLEL WYE	SERIES WYE	REF VOLTAGE WIRE (W12) TAP
110/220	50 Hz	1	426*	×				H6
115/230	50 Hz	1	408*	x]	H6
120/240	60 Hz	1	469*	× ×		•		H5 ·
110/190	50 Hz	3	285			×		H3
115/200	50 Hz	3	271			X ·		H4
120/208	50 Hz	3	260			X.		H4
120/208	60 Hz	3	312			x		H3
110/220	50 Hz	3	246		X .			H6
127/220	50 Hz	3	246			X.		H5
127/220	60 Hz	3	295			×		H4
115/230	50 Hz	3	235		×		· ·	H6
120/240	60 Hz	3	271		X			H5
139/240	60 Hz	3	271	1		×	1	H5 ¹
220/380	50 Hz	3	142 ·	· .			· X	H3
230/400	50 Hz	3	135				×	H4
240/416	50 Hz	3	130				×	H4
240/416	60 Hz	3	156				×	H3
254/440	50 Hz	3	123				x	H5
254/440	60 Hz	3	148			1	X	H4
277/480	60 Hz	3	135		·		x	H5
9X	1							H5—Not
347/600	60 Hz	3	108					Reconnectible

This current value is available only from special long stack units (option B125). A standard 3-phase generator connected into a Double Delta configuration will deliver 2/3 current value shown (426 x .66 = 284 amperes).

TABLE 1B GENERATOR VOLTAGE/CURRENT OPTIONS

100 kW 12	5 kVA 6	50 Hz						
<u>80 kW 10</u>	<u>0 kVA </u>	50 Hz						
VOLTS	FREQ	PHASE	AMPERES	DOUBLE DELTA	SERIES DELTA	PARALLEL WYE	SERIES WYE	REF VOLTAGE WIRE (W12) TAP
110/220	50 Hz	1	455	×	~			H6
115/230	50 Hz	1	435	x				H6
120/240	60 Hz	1	521	x				H5
110/190	50 Hz	3	304			x		НЗ
115/200	50 Hz	3	289			· x		H4
120/208	50 Hz	3	278			· x		• H4
120/208	60 Hz	3	347			×		НЗ
110/220	50 Hz	3.	262		×			H6
127/220	50 Hz	3	262			×		H5.
127/220	60 Hz	3	328			· × ·		H4
115/230	50 Hz	3	251		×			H6
120/240	60 Hz	3	301		x			H5
139/240	60 Hz	3	301			x		H5
220/380	50 Hz	3	152				×	Н3
230/400	50 Hz	3	144				×	H4
240/416	50 Hz	3	139				×	H4
240/416	60 Hz	3	173				×	H3
254/440	50 Hz	3	131				X	H5
254/440	60 Hz	3	164			· ·	×	H4
277/480	60 Hz	3	150		L		X	H5
9X								H5—Not
347/600	60 Hz	3	120				_	Reconnectible

Single phase current value is available only from special long-stack unit (option B125). A standard 3-phase generator connected into a Double Delta single phase configuration will deliver 2/3 current value shown (i.e. 455 x .667 = 303 amperes)



FIGURE 2. OPTIONAL CONTROL PANEL (FIVE FAULT LAMPS)

DESCRIPTION

GENERAL

An Onan DYC series electric generating set is a complete unit consisting of an engine driven AC generator, with standard and optional controls and accessories as ordered.

ENGINE



The engine on the DYC is an Allis-Chalmers 3500-MKH as described in the engine manual. Basic measurements and requirements will be found under SPECIFICATIONS. For operation, maintenance and service information, consult the Allis-Chalmers manual.

AC GENERATOR

The generator is an ONAN Type UR, 12 lead, 4-pole revolving field, reconnectible, brushless unit. The main rotor is attached directly to the engine flywheel, therefore engine speed determines generator output frequency. The 60 Hz set operates at 1800 r/min, the 50 Hz at 1500 r/min. Excitation is achieved as follows—

Residual alternating current from the stator winding is applied to the voltage regulator, where it is compared with a reference voltage, rectified and returned to the field winding of the exciter. Current then induced in the exciter rotor is rectified and fed into the generator rotor. This induces a current in generator stator which is applied to the load.

CONTROL PANEL

The following is a brief description of each of the standard controls and instruments located on the face of the panel. See Figure 1.

DC Panel

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.)

Battery Charge Rate DC Ammeter: Indicates battery charging current.

Run-Stop/Reset-Remote Switch: Starts and stops the unit locally or from a remote location. Resets engine monitor relay in Stop/Reset position.

Warning Light: Indicates "Fault" in engine operation.

AC Panel

AC Voltmeter: Indicates AC generator output voltage. Dual range instrument: measurement range in use shown on indicator light.

Voltage Regulator: Rheostat, provides approximately plus or minus 5% adjustment of the rated output voltage.

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

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.

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

OPTIONAL EQUIPMENT DC Panel

Warning Lights: Eliminates the one "Fault" light and substitutes five indicator (see Figure 2) lights to give warning of—

- a. Overcrank
- b. Overspeed
- c. Low oil pressure
- d. High engine temperature
- e. Low engine temperature

Operation of these lights will be discussed in conjunction with engine monitor panel.

Reset Switch: Manual reset for engine monitor after malfunction shut-down.

Lamp Test: Press to test warning lamp bulbs (when engine is running only).

AC Panel

AC Ammeter: Indicates AC generator output current. Dual range in use shown on indicator lights.

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

CONTROL PANEL INTERIOR

The only equipments discussed in this section will be those which the operator may have reason to adjust or inspect for service.

Terminal Board (TB) 21: Connection of wire W12 to terminals H3, H4, H5, and H6 is made at this point, to change reference voltage when reconnecting generator for different voltages.

Voltage Regulator, Begin Spec E: Solid state unit, consisting of printed circuit board VR21; an SCR bridge CR21, with a commutating reactor L21 are located in the control panel as part of the voltage regulator system. AC output from generator is controlled at predetermined level regardless of load; regulation is plus or minus 2% from no load to full load, at 0.8 PF.

Engine Monitor: Printed circuit plug-in modules provide the following functions:

- 1. A 75 second cranking period.
- 2. Approximately a 12.5 second time delay for oil pressure buildup.
- 3. An external alarm contact to light a fault lamp and shut down the set for alarm conditions such as:
 - a. Overcrank (failed to start after cranking 75 seconds).

b. Overspeed (engine speed reaches 2100 rpm).

- c. Low oil pressure 14 psi (96.53 kN/m²).
- d. High engine temperature 215° F (102° C).

CAUTION

High Engine Temperature Cutoff will shut down engine in an overheat condition only if coolant level is sufficiently high to physically contact shutdown switch. Loss of coolant will allow engine to overheat without protection of shutdown device, thereby causing severe damage to the engine. It is therefore imperative that adequate engine coolant levels be maintained, to ensure operational integrity of cooling system and engine coolant overheat shutdown protection.

On standard control panels, 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. Refer to Table 2.

Standard Cranking Module: Limits 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.

OPTIONAL MODULES

Cycle Cranker: Plug-in module replaces standard cranking circuit. Automatically provides a 15-second cranktime and a 10-second rest time for three ON and two OFF cycles in 65 seconds. If engine fails to start, after 75-seconds the engine monitor lights a fault lamp and opens the cranking circuit.

Pre-Alarm: Gives advance warning for low oil pressure or high engine temperature. Requires two sensors each for engine temperature and oil pressure.

SYSTEM	FAULT	FAULT LAMP	STOP ENGINE	EXTERNAL ALARM	PRE- ALARM
PENN STATE	Overcrank	×	×	×	
SINGLE LIGHT	Overspeed	x	x	x	
	Low Oil Pressure	x		×	
	High Engine Temperature	×		×	
STANDARD	Overcrank	x	×	x	
SINGLE LIGHT	Overspeed	x	×	x .	
	Low Oil Pressure	· x	×	×	
	High Engine Temperature	×	×	×	
5 LIGHT	Overcrank	x	×	×	
	Overspeed	x	×	X .	
	Low Oil Pressure	X .	· x	×	
	High Engine Temperature	×	×	×	
	Low Engine Temperature	x	_	• •	
5 LIGHT	Overcrank	x	x	x	-
PRE-ALARM	Overspeed	x	x	×	
	Low Oil Pressure	x	+	×	×
	High Engine Temperature	x	*	×	X
	Low Engine Temperature	×			· · · ·

TABLE 2. FAULT LAMP OPTIONS

* - With additional optional sensors.

ENGINE SENSORS

Resistance units and switches in the engine temperature and oil pressure monitoring and shutdown systems are sealed units and are not repairable.

For location, refer to Figures 4 and 5. When changing a sensor, do not substitute, use recommended replacement parts. Resistance units are matched to the gauge they supply, and cut-off switches are closetolerance actuation parts, made for a specific application.



FIGURE 4. ENGINE TEMPERATURE MONITORS



FIGURE 5. OIL PRESSURE MONITORS



12. / /

INSTALLATION

GENERAL

Installations must be considered individually. Use these instructions as a general guide. All installations must meet regulations of state and local building codes, fire ordinances, etc., which may affect installation details. See Figure 6. Refer to ONAN Technical Bulletin T-030 for further installation information.

Requirements to be considered prior to installation:

- 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 installation.
- 8. Water supply (city water cooling).
- 9. Accessibility for operation and servicing.
- 10. Vibration isolation.
- 11. 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 extreme weather conditions.

MOUNTING

Generator sets are mounted on a rigid skid base which provides proper support. The enginegenerator assembly is isolated from the skid base by rubber mounts which provide adequate vibration isolation for normal installations. For installations where vibration control is critical, install additional spring-type isolators between skid base and foundation.

For convenience in general servicing and changing crankcase oil, mount set on raised pedestal at least 6-inches (150 mm) high.

VENTILATION

Generator sets create considerable heat which must be removed by proper ventilation. Outdoor installations rely on natural air circulation but indoor installations need properly sized and positioned vents for the required air flow. See SPECIFICATIONS for the air required to operate with rated load under normal conditions at 1800 r/min.

Radiator set cooling air travels from the rear of the set and is removed by a pusher fan which blows out through the radiator. Locate the air inlet to the rear of the set.

Locate the cooling air outlet directly in front of the radiator and as close as possible. The opening free area must be at least as large as the radiator area. Length and shape of the air outlet duct should offer minimum restriction to air flow. Use a duct of canvas or sheet metal between the radiator and the air outlet opening. The duct prevents recirculation of heated air.

For operation outside a building, a shelter housing with electrically operated louvres is available as an option. Transformers connected across the generator output supply current to the motors.

When the generator is operating, current in the transformers actuate the motors and open the louvres. The louvres are held open for the duration of the set operation, then are closed by return springs when the set is shut down.

City Water cooled sets do not use the conventional radiator. A constantly changing water flow cools the engine. Sufficient air movement and fresh air must be available to properly cool the generator, disperse heat convected off the engine and support combustion in the engine.

Installations require an auxiliary fan (connected to operate only when the unit is running) of sufficient size to assure proper air circulation and evacuation of fumes.

COOLING SYSTEM

Standard Radiator Cooling, uses a set mounted radiator and engine driven pusher type fan to cool engine water jacket. Air travels from the generator end of the set, across the engine and out through the radiator. An integral discharge duct adapter flange surrounds the radiator grille.

Heat Exchanger Cooling (optional), uses a shell and tube type heat exchanger instead of the standard radiator and fan. Engine jacket coolant circulates through the shell side of the heat exchanger, while raw cooling water is pumped through the tubes. Engine coolant and raw water do not mix. This type of cooling separation is necessary when the raw water contains scale forming lime and other impurities.

This system reduces set enclosure airflow and noise levels. Proper operation depends upon a constant supply of raw water for heat removal. The engine coolant side of the system may be protected from freezing the raw water side cannot. See Figure 7 for typical installation.





Standpipe Cooling (optional) substitutes a mixing (tempering) tank for the standard radiator and fan. Cooling water circulating through the engine jacket is mixed with raw water in the tank. Because raw water flows through the engine jacket, it must not contain scale forming impurities or fouling of the engine water will occur. Fouling results in engine overheating and costly repair bills.

This system reduces set enclosure airflow requirements and noise levels. Proper operation is dependent on a constant supply of cooling water. The system cannot be protected from freezing. See Figure 8.



FIGURE 8. STANDPIPE (TYPICAL)

Remote Radiator Cooling (optional), substitutes a remote mounted radiator and an electrically driven fan, for the set mounted components. Removal of the radiator and fan from the set reduces set enclosure airflow requirements and noise levels without forcing dependence on a continuous cooling water supply. The remote radiator system can be completely protected against freezing.

This system must be designed to meet specific requirements of the application.

Water Jacket Heater (optional) may be installed to keep engine coolant warm while engine is shut down. It heats and circulates the coolant within the engine, which reduces start-up time and engine wear caused by cold starts. It is electrically operated and thermostatically controlled.

COOLING CONNECTIONS

The radiator cooled (standard) set does not require any external connections except as discussed under *Ventilation.* Allow clearance around the set for access to service the radiator and fan belts. See Figure 6.

Heat Exchanger and Standpipe cooled sets must be connected to a pressurized supply of cold water. Make connections to the set with flexible pipe to absorb vibration. On the cool water line install a solenoid valve to shut off the flow when the set is shut down and a rate of flow valve to control engine temperature. This valve can be either manual or automatic. Actual rate of flow will depend on inlet water temperature.

Adjust the flow to maintain water temperature between 165° F and 195° F (73.9° C and 90.6° C) while viewing the water temperature gauge.

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

Remote radiator plumbing will vary with installation. All systems must comply with the following conditions—

- 1. Make all connections to the set and to the radiator, with flexible pipe.
- Install an auxiliary circulating pump if the horizontal distance between the engine and pump exceeds 15-feet (4.65 m).
- Install a hot-well system to relieve excess engine water jacket pressure if the top of the radiator is more than 15-feet (4.65 m) above the center-line of the engine crankshaft.



WARNING

Inhalation of exhaust gases can result in death.

Engine exhaust gas must be piped outside building or enclosure. Do not terminate exhaust pipe near inlet vents or combustible materials. An approved thimble (Figure 9) must be used where exhaust pipes pass through walls or partitions. Pitch exhaust pipes downward or install a condensation trap (Figure 10) at the point where a rise in the exhaust system begins. Avoid sharp bends; use sweeping long radius elbows. Provide adequate support for mufflers and exhaust pipes. Refer to Figure 6 for a typical exhaust installation. Shield or insulate exhaust lines if there is danger of personal contact. Allow at least 9-inches (230 mm) of clearance if the pipes run close to a combustible wall or partition. Use a pipe at least as large as the 4 inch (101.6 mm) pipe size outlet of the engine with a flexible portion between the engine and the muffler.



FIGURE 9. EXHAUST THIMBLE



FIGURE 10. EXHAUST CONDENSATION TRAP

Minimum diameters and maximum lengths of pipe are as follows:

Single Exhaust System:

4-inch pipe	 75-feet (23 m)
5-inch pipe	 250-feet (76.2 m)
6-inch pipe	 500-feet (152.4 m)

Maximum permissible exhaust restriction (back pressure) is 13.5-inches H²O (25.4 mm Hg).

FUEL SYSTEM

Allis-Chalmers engines used on the DYC sets are designed for use with ASTM No. 2 Diesel fuel. They will however, operate on diesel fuels within the specifications delineated in the Allis-Chalmers engine manual.

FUEL CONNECTIONS

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

In any diesel engine installation, fuel system cleanliness if of utmost importance. Make every effort to prevent entrance of moisture or contaminants of any kind. Do not use lines or fittings of galvanized material.

A fuel lift in excess of 8-feet (2.44 m) is not recommended without a day tank installation, because of fuel drainage. Horizontal run, if the supply tank is level with the fuel pump should not exceed 25feet (7.6 m). However, a day tank is again recommended.

The fuel inlet is to the transfer pump and is threaded for 1/8-inch pipe. Injector pump return line is common with the injectors' return line, and requires a 1/8inch low pressure hose connection.

Maximum fuel return line restriction is 6.1-inches (155 m) Hg.



FIGURE 11. FUEL SYSTEM

FUEL RETURN LINE B400

DAY TANK

Generator set installations may be equipped with an optional separate fuel day tank. A float operated valve controls fuel flow into the fuel tank. The correct level is maintained to assure a constant source of fuel. It is necessary to install an overflow line between the day tank and main fuel tank. Refer to the installations included with the tank. See Figure 12 for an example of a day tank installation. Tank and lines must be below level of injector pump return outlet.





BATTERY BEGIN. SPEC. G)

Starting the unit requires 24-volt battery current. Use two12-volt (see SPECIFICATIONS) batteries for a normal installation. Connect the batteries in series (negative post of first battery to positive post of second) as in Figure 13. Necessary battery cables are on unit. Service the batteries as necessary. Infrequent unit use (as in emergency standby service) may allow the batteries to self-discharge to the point where they cannot start the unit. If installing an automatic transfer switch that has no built-in charge circuit, connect a separate trickle charger. Onan automatic transfer switches include such a battery charging circuit.

75 kW and 90 kW models prior to Spec G use 12 volt battery current. Use two 6 volt, 135 Amp Hour batteries connected in series for these older models.

WARNING being charged.

Do not smoke while servicing batteries. Lead acid batteries give off explosive gases while



FIGURE 13A. BATTERY CONNECTION

2 12-VOLT 225 AMP/HR BATTERIES

If unit is installed with a transfer switch, a battery installation as shown in Figure 13A. must be used. The batteries are mounted outside the skid.



FIGURE 13. BATTERY CONNECTION

BATTERY, HOT LOCATION

Batteries will self discharge very quickly when installed where the ambient temperature is consistently above 90°F (32.2° C) such as in a boiler room. To lengthen battery life, dilute the electrolyte from its normal 1.275 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 (32.2° C), 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 the electrolyte above the plates in each cell. DO NOT ATTEMPT TO POUR OFF; use an hydrometer or filler bulb and dispose of it in a safe manner. Avoid skin or clothing contact with the electrolyte.
- 3. Refill each cell with distilled water, to normal level.
- 4. Continue charging for 1 hour at a 4 to 6 hour rate.
- 5. Test each cell. If the specific gravity is still above 1.255, repeat steps 2, 3, and 4 until the reading is reduced to 1.225. Usually, repeating steps twice is sufficient.

REMOTE CONTROL CONNECTIONS

Provision is made for addition of remote starting. This is accomplished on a 4 place terminal block situated with the control box. Connect one or more remote switches across remote terminal and B+ terminal as shown in Figure 14. If the distance between the set and remote station is less than 1000-feet (305 m), use No. 18AWG wire; between 1000-feet (305m) and 2000-feet (610m), use No. 16AWG wire.



FIGURE 14. REMOTE START CONNECTION (TB12)

WIRING CONNECTIONS

Most local regulations require 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 load transfer control are included with such equipment.



NOTE: SHOWN WITH LINE CONNECTED TO LOAD.

FIGURE 15. LOAD TRANSFER SWITCH (TYPICAL FUNCTION)

Control Box Connections: The factory ships these 12 lead generators with load connection wires NOT connected together in the control box. These 12 wires are labeled T1 through T12 and must be brought together before making load connections. Proceed as follows:



FIGURE 16. CONTROL BOX (SIDE PANEL REMOVED)

- 1. Remove either right, left or top panel from control box. See Figure 16.
- 2. Connect wires together as shown on panel draw- ping and in Figure 20 according to voltage desired.
- Identify leads connected together, appropriately as L0, L1, L2 or L3 before making load connections.
- Open hinged control panel doors. Connect lead from terminal 63 to correct terminal for voltage desired. These terminals are labeled H2, H3, H4, H5 and H6. See Figure 17.
- 5. Close front panel and secure with 1/4 turn fasteners.
- 6. Connect load wires to generator leads.

Preceding instructions do not apply to models designated 9X; this connection is made at the factory. The installer must only connect load wires.



FIGURE 17. REFERENCE VOLTAGE CONNECTION (TB21)

120/240 Volt, Single Phase, 12 Lead: Terminal connection L0 can be grounded (neutral). For 120 volts, connect the hot load wires to either the L1 and L2 connection, Figure 18. Connect the neutral load wire to the L0 connection. Two 120 volt circuits are thus available, with not more than 1/3 the rated capacity of the set available on either circuit. If using both circuits, be sure to balance the load between them.

For 240 volts, connect one load wire to the L1 connection and the second load wire to the L2 connection. Terminal connection L0 is not used for 240 volt service.

Only 2/3 of rated current is available from this connection.



FÍGURE 18. 120/240 VOLT 1 Ø DOUBLE DELTA

120/240 Volt, 3 Phase, Delta; 12 Lead: The 3 phase Delta connected set is designed to supply 120 and 240 volt, 1 phase current and 240 volt, 3 phase current, Figure 19. For 3 phase operation, connect the three load wires to generator 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 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 1 phase and 3 phase loading can be used at the same time as long as total current does not exceed 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 19. 120/240 V. 3-PHASE DELTA

3 Phase, Wye; 12 Lead: The 3 phase, 4 wire set produces line to neutral voltage and line to line voltage. The line to neutral voltage is the lower voltage as noted on the unit nameplate, and the line to line voltage is the higher nameplate voltage.

For 3 phase loads, connect separate load wires to each of the set terminals L1, L2 and L3. Single phase output is obtained between any two 3 phase terminals as shown in Figure 20.

The terminal marked L0 can be grounded. For 1 phase loads, connect the neutral (white) load wire to the L0 terminal. Connect the black load wire to any one of the other three terminals — L1, L2 or L3. Three separate 1 phase circuits are available, with not more than 1/6 the rated capacity of the set from any one circuit.

If using 1 phase and 3 phase current at the same time, use care to properly balance the 1 phase load, and not to exceed rated line current.

Figure 20 shows load connections for 120/208 voltage. Other voltages are available from either parallel wye or series wye illustration in Figure 21.



FIGURE 20. 120/208 V. 3-PHASE WYE



FIGURE 21. VOLTAGE CONNECTIONS

OPERATION

GENERAL

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

PRESTART SERVICING

Lubrication System: Engine oil was drained prior to shipment. Fill engine to capacities shown. After engine has been run, check dipstick, add oil to bring level to full mark. Record total capacity for future oil changes. For all operating conditions grade CD lubricating oil is recommended for turbocharged engines. Do not mix brands nor grades of lubricating oils.

Oil Viscosity should be as follows:

AMBIENT TEMPERATURE	USE SAE VISCOSITY		
0° F (-17.8° C) and below	10W		
0° F to 32° F (-17.8° C to 0° C)	20-20W		
Above 32° F (0° C)	30W		

Oil Capacities (nominal)

Oil Pan and Filter—31 quarts (29.3 litres) 75, 90 kW Oil Pan and Filter—31 quarts (29.3 litres) 100 kW

Oil quantity dipsticks have dual marking with high and low-level marks: static oil level on one side and engine at low speed marks on opposite side. Be sure to use proper scale (see Figure 21).

Cooling System: Cooling system was drained prior to shipment. Fill cooling system before starting. Nominal capacity is 8.5 gallons (32.17 litres) for 75, 90 kW and 9 gallons (34.11 litres) for 100 kW. For units using either a radiator or heat exchanger (city water cooled), fill the system with clean soft water. Use a good rust and scale inhibitor additive. If a possibility exists of a radiator cooled set being exposed to freezing temperatures, use anti-freeze with an ethylene glycol base. During initial engine run, check the coolant level several times and replenish if necessary to compensate for air pockets which may have formed during filling. Refer to Allis-Chalmers engine manual for additional information.

CAUTION 1. Verify that the electric solenoid valve used with city water cooled sets is open before initial starting of unit to allow coolant chambers to fill. Overheating and damage to the engine could result from noncompliance.

2. 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.

WARNING Be careful when checking coolant under pressure. It is advisable to shut engine down and bleed off pressure before removing pressure cap. Severe burns could result from contact with hot coolant.

Fuel System: Refer to the Allis-Chalmers engine manual for fuel oil specifications. Check with fuel supplier and ensure that fuel supplied meets the specifications. Filter or strain fuel when filling tank. Fuel supply tanks should be kept as nearly full as possible by topping up each time engine is used. Warm fuel returning from the injector pump heats the fuel in the supply tank. If the fuel level is low in cold weather, the upper portion of the tank not heated by returning fuel tends to increase condensation. In warm weather both the supply tank and fuel are warm. Cool night air lowers the temperature of the tank more rapidly than the temperature of the fuel. Again this tends to increase condensation.

Condensate mixing with the sulphur in the fuel forms a sulphurous acid which will corrode and damage the engine. KEEP FUEL CLEAN.

WARNING

DO NOT SMOKE while handling fuel. Diesel fuel is flammable.

Priming Fuel System: Verify that all connections in the fuel system are secure and no leaks exist. Proceed with priming as follows:

- 1. Loosen filter vent screw (Figure 22).
- 2. Using hand pump (Figure 22), prime system until
- fuel flow around filter vent screw is free of bubbles.
- . 3. Secure vent screw and hand pump.

Ensure that hand primer pump is screwed in and secured before attempting to start engine.

Check all connections in fuel system for security, to ensure that pressure will not bleed off when engine is not in use. Pressure should be maintained for immediate starting if unit is on standby service.



FIGURE 22. PRIMING FUEL SYSTEM

BATTERIES

Ensure that the cable connections to the batteries are secure. Coat connections with petroleum based or non-conductive grease to retard formation of corrosive deposits.

Check level of electrolyte to be at split ring mark. Measure specific gravity of electrolyte: SG 1.280 at 80° F (26.7° C). If distilled water has been added or specific gravity is less than 1.280, place batteries on charge until desired reading is reached. Do not over charge.

STARTING

When the preceding service functions have been performed, recheck to verify unit is ready to start.

- 1. Crankcase filled.
- 2: Cooling system filled input solenoid valve open.
- 3. Batteries charged and connected.
- 4. Fuel solenoid valve open.

To start, move the "run-stop/reset-remote" switch to the "run" position. The engine should start after a few seconds of cranking. Immediately after start, observe the oil pressure gauge. Normal oil pressure is between 30 psi (207 kPa) and 55 psi (379 kPa). Check the following gauges:

- 1. DC Ammeter 10 to 30 amperes
- 2. AC Voltmeter AC generator output voltage.
- Frequency Meter AC generator output frequency.

After running 10 minutes under load the water temperature gauge should have stabilzed at 180° F to 195° F (82° C to 90.6° C). On city water cooled units an adjustable valve is connected in the water supply line. Adjust the hand wheel valve to provide a water flow that will keep the water temperature gauge reading within the range of 170° F to 200° F (76.7° C to 93.3° C).

STOPPING

To reduce and stabilize the engine temperatures and prevent turbocharger housing damage, run the engine at no load for three to five minutes before shutting down.

Move the run-stop/reset-remote switch to stop position to shut down the set.

Break-In Note: Run set at 50 percent rated load for the first half-hour of initial operation after reaching operating temperature.

Non-Start: If after a few seconds of cranking engine fails to start, or starts and runs then stops and fault lamp lights, refer to appropriate troubleshooting chart, Table 3 or Table 4.

EXERCISE PERIOD

Generating sets on continuous standby service are required to be operative at full load from a cold start in less than 10-seconds in the event of a power outage.

This imposes severe conditions on the engine. Friction of dry piston rings upon dry cylinder walls causes scuffing and rapid wearing. These can be relieved by exercising the set at least once a week for a minimum time of 30-minutes per exercise period. Preferably, run the set under at least 50 percent load to allow the engine to reach normal operating temperature. This will keep engine parts lubricated, maintain fuel prime, prevent electrical relay contacts from oxidizing and insure easy emergency starts. Onan automatic transfer switches contain an optional exercise switch which, by pre-selection, will start, determine run period and shut down a set on a weekly frequency. For example, the switch can be set for time of start, length of run, A.M. or P.M. and day of week.

After each exercise period, top off fuel tank, check engine for leaks and unit for general condition. Locate cause of leaks (if any) and correct.

TABLE 3.TROUBLESHOOTING ENGINE SHUTDOWN SYSTEM(Engines with only one fault lamp)

SYMPTOM	CORRECTIVE ACTION
 Engine stops cranking and fault lamp lights, after cranking approximately 75 seconds. 	 See engine service manual for troubleshooting fuel system. After correcting problem, reset engine monitor relay by placing Run-Stop/ Reset-Remote switch to Stop/Reset, then back to the required running position.
2. Fault lamp lights immediately after engine starts.	2. Check for: Overspeed condition as engine starts.
 Fault lamp lights and engine shuts down after running for a period. 	 3. Check the following: a. Oil level. Engine will shut down if sensor is closed. b. Check engine manual for troubleshooting oil system. c. High engine temperature. Check coolant level; check water flow (city water cooled systems); check radiator for free air flow, and fan belts for tightness. See engine manual for troubleshooting cooling system. d. Check for faulty oil pressure sensor or faulty high engine temperature sensor.
 Engine runs, shuts down and cranks for 75-seconds. Cranking cycle stops; fault lamp lights. 	4. Check fuel supply.
5. Fault lamp lights, no fault exists.	 To check a no-fault condition, disconnect leads from TB11 terminals 29, 30 and 31. If fault lamp lights with leads disconnected, replace engine monitor board. Reconnect leads.

TABLE 4.TROUBLESHOOTING ENGINE SHUTDOWN SYSTEM
(Units with five fault lamps)

SYMPTOM	CORRECTIVE ACTION
 Overcrank fault lamp lights and engine stops cranking after approximately 75-seconds. 	 See engine service manual for troubleshooting fuel system. After correcting fault, reset engine monitor relay by placing Run-Stop/ Reset-Remote switch to Stop/Reset position, depressing Reset button, then to the required running position.
 Engine runs, shuts down, cranks for 75-seconds, cranking cycle stops, overcrank light ON. 	2. Check fuel supply.
3. *Low oil pressure shutdown.	 3. Check— a. Oil level. Replenish if necessary. b. Sensor. Faulty sensor will shut down engine. c. Refer to engine service manual for troubleshooting guide for oil system.
4. *High engine temperature shutdown.	 4. Check— a. Coolant level. Replenish if necessary. b. City water cooled sets. Check water flow, valves, etc. c. Check sensor; check thermostat. d. Radiator model, check fan belts, radiator for obstructions, etc.
5. Overspeed shutdown.	 Check governor and throttle linkages for freedom of movement. Check overspeed switch.
6. Overspeed light on, no shutdown.	 Disconnect wire at TB11-29. Light on after reset; replace engine monitor board.
 *Low oil pressure light ON. No shutdown. 	 Disconnect wire at TB11-30. Light ON after relay reset. Replace engine monitor board.
8. *High engine temperature light ON. No shutdown.	 Bisconnect wire at TB11-31. Light ON after relay reset. Replace engine monitor board.

*NOTE: Not applicable on Pennsylvania State models.

NO LOAD OPERATION

Periods of no load operation should be held to a minimum. If it is necessary to keep the engine running for long periods of time when no electric output is required, best engine performance will be obtained by connecting a "dummy" electrical load. Such a load could consist of heater elements, etc.

For storage periods of all durations, refer to Allis-

OUT-OF-SERVICE PROTECTION

Chalmers manual.

HIGH TEMPERATURES

- 1. See that nothing obstructs air flow to-and-from the set.
- 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. Connect water jacket heater when set is not running.
- Refer to Allis-Chalmers manual for further information.

Water Jacket Heater: The function of this optional heater is to keep the engine warm enough to assure starting under adverse weather conditions. Connect the heater to a source of power that will be on during the time the engine is not running. Be sure the voltage rating is correct for the heater element rating.



HIGH ALTITUDE

Ratings apply to altitudes up to 1000-feet (304.8m), standard cooling, normal ambients and with No. 2 Diesel fuel. Consult factory or nearest authorized Onan distributor for operating characteristics under other conditions.

Engine horsepower loss is approximately 3 percent for each 1000feet (304.8m) of altitude above sea level for a naturally aspirated engine. Use lower power requirement at high altitudes to prevent smoke, overfueling and high temperatures.

GENERAL MAINTENANCE

GENERAL

Establish and adhere to a definite schedule of maintenance inspection and servicing, application and environment being the governing factors in determining such a schedule. If your set is a prime power application, base your schedule on operating hours. Use the running time meter to log hours run; maintain an accurate record of hours and service for warranty support.

A set on stand-by duty will need servicing at times other than those recommended by Onan and the engine manufacturer. Refer to Allis-Chalmers manual for engine services and maintenance procedures. Adjust your schedule to satisfy the following conditions—

	OPERATIONAL HOURS			
MAINTENANCE ITEMS	8	50	100	200-250
Inspect Set	X8			
Check Fuel	x			
Check Radiator Coolant Level	x			
Check Oil Level	×		L	
Drain Fuel Filter Sediment	×			
Check Air Cleaner (Replace if Required)		x1		
Clean Injector Pump Linkage		x1		
Check Batteries		x4		
Clean and Inspect Crankcase Breather			×	-
Inspect Fan Belt			x2	
Check Cooling System			×3	
Change Crankcase Oil			x1,7	
Replace Oil Filter Element	ļ		x1,7	
Check all Hardware, Fittings, Clamps, Fasteners, etc.			×6	
Clean and Inspect Battery Charging Alternator				· x
Check Starter				×
Check Injection Nozzles				×5
Replace Fuel Filter Elements				x1

OPERATOR MAINTENANCE SCHEDULE

- x1 Or every 3 months. Perform more often in extremely dusty conditions.
- x2 Or every 3 months. Adjust to 1/2 inch depression between pulleys.
- x3 Or every 3 months. Check for rust or scale formation. Flush if necessary.
- x4 Or every 2 weeks.
- x5 Check for proper spray pattern, etc. Refer to the Allis-Chalmers manual.
- x6 Or every 3 months.
- x7 Perform every 3 months or 100 hours, whichever comes first.
- x8 Give unit general inspection. Then with generator set running, visually and audibly check the exhaust system for leaks.
- NOTE: The above schedule is a minimum requirement for your engine. Refer to Allis-Chalmers service manual for recommended service periods.

- Continuous duty (prime power)
- Standby power
- Extremes in ambient temperature
- Exposure to elements
- Exposure to salt water or sea water
- Exposure to dust, sand, etc.

Consult with your ONAN distributor or dealer for a schedule of maintenance and service more suitable to the unique environment and application of your set.

WARNING 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.

AC GENERATOR

There are no brushes, brush springs or collector rings on these generators, therefore they require very little servicing. Periodic inspections, to coincide with engine oil changes, will ensure good performance.

Generator Bearing: Inspect the bearing every 1000 hours with the unit running.

If using the unit for "prime power," replace the bearing every 10,000 hours or two years. If using the set for "standby," replace the bearing every five years.

Check generator voltage. It may be necessary to make a slight readjustment of the voltage rheostat to obtain the preferred voltage at average load.

INSPECTION AND CLEANING

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 30 in. lb. or finger tight plus a guarter turn. Blow dust out of control panel.

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 electrolyte at the proper level above the plates by adding distilled water. Check specific gravity, recharge if below 1.280.

ENGINE SPEED

Generator frequency is in direct ratio to engine speed, which is controlled by the governor.

A Roosa-Master governor is standard equipment on the DYC generator set. High speed and low speed limit stops are set at the Onan testing facility and normally do not require further adjustment, therefore if your set is used on continuous standby service, the governor may never need to be touched. If however the unit is used frequently, adjustment may be required due to wear of internal components. This adjustment is achieved by backing off the high speed stop screw. Screw in the low speed adjusting screw until the generator output frequency meter reads 60 hertz (generator on load). Turn in the high speed adjusting screw until it bottoms; secure the locknuts.





Governor sensitivity is adjusted by rotating an external knurled knob at the rear of the injector pump housing. Turning inward (clockwise) shortens governor control spring making it less sensitive, thereby increasing speed droop. Turning outward (counterclockwise) has opposite effect. Adjustment can be made with engine running. The speed droop is set at the Onan plant to give a regulation of 3 percent to 5 percent from no-load to full-load.

When using the generator frequency meter to determine engine speed, multiply frequency by 30 to calculate engine speed.

Example: 30 x 61 (hertz) = 1830 rpm.

Adjust engine speed to 1800 rpm for 60 hertz sets and 1500 rpm for 50 hertz sets, at full load.

FILTERS

A planned program of regular filter cleaning or replacement will pay dividends in improved engine life operation and reliability.

Air Filter: Service air cleaner and replace element in accordance with instructions in the engine manufacturer's manual. Perform this operation at times specified in the operator maintenance schedule.

Air Restriction indicator (Spec A-F): Located on the duct between air filter and turbocharger to signal condition of the air filter. When the RED signal indicator on the device is fully exposed it is locked in position. At this time the air filter should be serviced.

After servicing air filter, reset indicator by depressing the reset button on top of the unit.

Sets beginning Spec G do not have air restriction indicator.

Oil Filters: Replacement of crankcase lubricating oil and filters is recommended every 100 operating hours, or, on standby generator sets, every three months. These time periods are for ideal situations and must be adjusted lower if conditions warrant. Replace filters at every oil change.

Fuel Filter: Replace fuel filter every 3 months or more often under extremely dusty conditions if used on a standby unit; 200-250 operational hours in continuous service.



FIGURE 25. AIR RESTRICTION INDICATOR



FIGURE 26. OIL FILTERS

CONNECTIONS (Fuel, Exhaust, etc.)

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

- 1. Check all fuel and oil lines for possible linkage.
- 2. Inspect exhaust lines and mufflers for possible linkage and cracks.
- 3. Periodically or daily, drain moisture from condensation traps.
- 4. Inspect water lines and connections for leaks and security.
- 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.



PARTS CATALOG

This catalog applies to the standard DYC Generator Sets as listed below. Parts are arranged in groups of related items. Each illustrated part is identified by a reference number corresponding to the same reference number in the parts list for that group. Parts illustrations are typical. Using the *Model* and *Spec No.* from the nameplate, select the parts from this catalog that apply to your set. Unless otherwise mentioned in the description, parts are interchangeable between models. Right and left sides are determined by *facing* the engine end (front) of the set.

· · · ·	ELECTRICAL DATA				
MODEL AND SPEC NO.	WATTS	VOLTS	HERTZ	WIRE	PHASE
62.5 DYC-515R/*	62,500	£	50	12	1 or 3
75.0 DYC-515R/*	75,000	£	50	12	1 or 3
80.0 DYC-515R/*	80,000	£	50	12	1 or 3
75.0 DYC-9XR/*	75,000	347/600	60	4	3
75.0 DYC-15B/*	75,000	£	60	12	1 or 3
90.0 DYC-9XR/*	90,000	347/600	60	4	3
90.0 DYC-15R/*	90,000	£	60	12	1 or 3
100.0 DYC-9XR/*	100,000	347/600	60	4	3
100.0 DYC-15R/*	100,000	£	60	12	1 or 3

SET DATA TABLE

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

£ - These sets are reconnectible; refer to Specifications (Generator Details) for Electrical Data.

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

REPLACEMENT ENGINE

100-1501Begin Spec G - 62.5 DYC, 75.0 DYC, and 90 DYC (Allis Chalmers Model 3500 MKII - 24 Volt.100-1476Begin Spec G - 80.0 DYC and 100 DYC (Allis-Chalmers Model 3500 MKII, Spec 4035488).

General Description:

Includes—Complete Cylinder Block, Fuel Pump, Fuel Filter, Oil Filter, Governor, Fan Blades (pusher type), Flywheel, Water Pump, Oil Pan, Exhaust Manifold, Fan Belt and Fuel Shut-off Valve.

Excludes—Alternator, Alternator Mounting Brackets, Alternator Belt, Temperature Sender, Oil Pressure Sender, Starter, Radiator, and Air Cleaner.

100-0953 Spec A through E (Allis-Chalmers Model 3500 - 12 Volt. 100-1350 Begin Spec F (Allis-Chalmers Model 3500 MKII - 12 Volt

General Description:

Includes—Complete Cylinder Block, Fuel Pump, Fuel Filter, Oil Filter, Air Cleaner, Governor, Fan Blades (pusher type), Flywheel, Water Pump, Oil Pan, Exhaust Manifold, Fan Belt and Fuel Shut-off Valve.

Excludes—Alternator, Alternator Mounting Brackets, Alternator Belt, Temperature Sender, Oil Pressure Sender, Starter and Radiator.

NOTE: Replacement engine is for standard Spec 1 generator sets. For all other Specs, refer to factory.

INSTRUCTIONS FOR ORDERING REPAIR PARTS

ONAN PARTS

All parts in this list are Onan parts. For Onan parts or service, contact the dealer from whom 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, SERIAL and SPECIFICATION NUMBER.



ALLIS-CHALMERS PARTS

All Allis-Chalmers engine parts must be ordered from your nearest authorized Allis-Chalmers distributor. When ordering parts, refer to the engine nameplate giving the complete engine model, catalog and serial numbers.



NOTICE!

ITEMS REFERENCED AS **OPTIONAL** INDICATE PART IS FACTORY INSTALLED AND MAY NOT BE APPLICABLE TO ALL MODELS. FOR FIELD CONVERSIONS, ADDITIONAL PARTS ARE USUALLY REQUIRED.

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MISCELLANEOUS ENGINE PARTS GROUP (INCLUDES OPTIONALS)



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MISCELLANEOUS ENGINE PARTS GROUP (INCLUDES OPTIONALS)

NO.	. PART NO.	QTY. USED	PART DESCRIPTION
-	SENDER		
	SENDER,	OIL PRESSU	RE .
	193-0244	1	Begin Spec G
_	191-0108	1	Specs A through F
2	SENDER,	COOLANT	EMPERATURE
	193-0247	. 1	Begin Spec G
	193-0109	· 1	Specs A through F
3	309-0178	1	Switch, High Coolant
			Temperature (Pre-Alarm)
4	309-0179	1	Switch High Coolant
-			Temperature (Shut-down)
5	505-0117	2	Bushing Reducer (1/2 NPT v
	000-0111	E.	2/9 NDT) Pagin Case F
6	500 0050	0	S/o NFT) - Begin Spec F
2	502-0053	2	Elbow, Pipe - Begin Spec F
	309-0169	1	Switch, Low Oil Pressure
			(Pre-Alarm)
8	309-0064	1	Switch, Low Oil Pressure
			(Shut-down)
9	505-0061	1	Nipple, Pipe - Oil Pressure
			Sender & Switch - Spec A
			through F
10	505-0059	1	Tee Pine - Oil Pressure
••		•	Sender & Switch - Spoo A
			Sender & Switch - Spec A
	200 0000	4	
11	208-0568	I	Switch, Thermostatic - Low
			Engine Temperature - Optional
12	502-0429	1	Adapter, Pipe - Begin Spec F
13	HOSE, FU	EL-FLEXIBL	E
	501-0003	1	17" Long
	501-0227	1	24" Long - Begin Spec G
	501-0225	1	45" Long - Begin Spec G
14	502-0002	2	Elbow, Pipe - 90° - Fuel Line
15	800-0003	2	Screw Can - Hex Head
	000 0000	-	$(1/A_{-}20 + 1/2'')$
16	850-0040	2	$(1/4-20 \times 1/2)$
17	862 0001	2	Washer, Lock - Spring (1/4)
10	002-0001		NUL, HEX (1/4-20)
10	LPUMP, FU	EL-ELECTR	
	149-0890	1	Begin Spec G (24 Volt)
	149-0554	1	Spec A through F (12 Volt)
19	149-1162	1	Bracket, Mounting - Fuel Pump
20	134-1437	1	Spring - Injection Pump Lever
21	312-0058	1	Capacitor10 Mfd, 400 VDC -
			Spec A through E
22	PULLEY, A	ALTERNATOR	3
	191-1120	1	Begin Spec F
	191-0817	1	Spec A through E
22	800.0061	4	Spec A through E
20	000-0001	1	
~ ~	500 0400		(3/8-16 X 3-3/4")
24	526-0100	1	Washer, Flat (9/16" ID x
			1-3/8" OD x 7/64" Thk)
25	232-2183	1	Spacer, Alternator
26	850-0050	2	Washer, Lock - Spring (3/8")
27	862-0003	1	Nut, Hex (3/8-16")
28	800-0048	1	Screw, Cap - Hex Head
		•	(3/8-16 x 3/4")
29	526-0100	1	Washer Flat (9/16" ID x
	010 0.00	•	$1_{-3/8"} OD \times 7/64"$ Thk)
30	800-0020	4	Serow Con Hex Head
00	000-0023	I	(5/16, 10, 1, 1/0'')
04	050 0045	0	(5/16-16 X 1-1/6)
31	850-0045	2	washer, Lock - Spring (5/16")
32	526-0115	1	Washer, Flat (11/32" ID x
			11/16" OD x 1/16" Thk)
33	191-0101	1	Strap, Adjusting - Alternator
34	191-0791	1	Spacer, Alternator Strap
35	*ALTERNA	TOR (Include	s Fan and Regulator)
	191-0688	1	Begin Spec G (Motorola
			#70D44039B04)
	191-0665	1	Spec A through E (Motorola
	101-0000	I	# 70D44020P
36	101 0705	-	
30	191-0/25	1	
31	SUS-0016	1	Bushing, Reducer
	•		(3/8 NPT x 1/8 NPT)

R	EF. IO.	PART NO.	QTY USE	. PART D DESCRIPTION
28	155-1	1106	1	Elbow Exhaust
20	E02 (100	4	Hose Dubber Oil Drein
39	503-0	0000	1	Hose, Rubber - On Drain
40	503-0	5197	1	Clamp, Hose
41	505-0	0785	1	Nipple, Pipe - Half
40	504 (0011		
42	504-0		1	Valve - Oli Drain
43	505-0	0100	1	NIPPIE, PIPE - Close
				(1/2 NPT X 1-1/8)
44	505-0	J021	1	Bushing, Heducer
				(3/4 NPT X 1/2 NPT)
45	502-0	0390	1	Elbow, Pipe - 90° - Street
			-	(1/2 NPT)
46	504-0	0003	2	Valve, Drain - Engine Block
				Coolant
47	HAR	NESS, WIRI	NG	
	338-0	0601	1	Begin Spec G
	338-0	0539	1	Spec A through F
48	811-0	0103	2	Screw, Machine - Round
				 Head, Brass (#10-32 x 3/4")
49	850-0	0030	2	Washer, Lock - Spring (#10)
50	CIRC	UIT BREAK	(ER	
	320-0	0240	1	Begin Spec G
	320-0	0165	1	Specs A through F
51	809-0	035	1	Screw Tanning - Round Head
•••			•	(#8 x 3/4")
52	508-0	1015	1	Washer Fiber (#8 ID x 7/16" OD
52	500-0	5015	•	v 3/64" Thk)
52	970 (106	4	Nut loculating (#9)
55	0/0-0	0040		Seren Can Hay Hoad
54	000-0	JU48	2	
	050	2040	~	(3/8-10 X 3/4)
55	820-0	0100	2	washer, LOCK - External/
				Internal Tooth (3/8")
56	BHA	CKET, CIHC	UT BE	REAKER MOUNTING
	332-	1382	1	Begin Spec G
	332-	1295	1	Specs A through F
57	336-1	1243	1.	Cable, Electrical
58	416-(0615	1	Cable, Battery - Negative
59	416-0	0614	1	Cable, Battery - Positive
60	416-0	0446	1	Cable, Battery - Jumper
61	800-0	0135	3	Screw, Cap - Hex Head
				(5/8-11 x 2-1/4″)
62	850-0	0070	3	Washer, Lock - Spring (5/8")
63	*STA	RTER		
	191-0	0852	1	Begin Spec G (Delco Remy
				#1113892)
	191-0	0826	1	Specs A through F (Delco Remy
				#1114055)
64	302-0	0753	1	Tang. Drive - Tachometer -
			•	Optional
65	302-0	0750	1	Sender Tachometer - Optional
	VER	NIER THRO		SSEMBLY-OPTIONAL
		udes Parts M	larked -	+)
66	815-6	00037 01031 0104	2 4	Screw Machine - Fillister
00	010-1	0104	2	Head (#8-32 x 5/16")
67	526-0	0052	2	Washor Elat - Brass (17/64" ID
07	520-0	0052	2	Washer, Flat - Drass (17/04 1D
60	150 -	0026		A S/ 10 UD X 1/32 TITK)
60	152-0	0036	1 1	Cusing, Cable
69	152-0	0158	1 4	Swivel
70	152-0	0120	1.4	Cable, Throttle Mounting
71	151-0	0230	1 +	Bracket, Angle - Throttle
				Mounting
	+ - 1	ncluded in C)ptiona	I Vernier Throttle Assembly.
	£ - 9	See Senarate	Groun	for Components
	~ ~ ~			

 For components, contact your nearest Delco Remy Dealer or Delco Remy Division of General Motors Corporation, Anderson, Indiana 46011.

* - For components, contact your nearest Motorola Dealer or Motorola Automotive Products, Inc., 9401 W. Grand Ave., Franklin Park, Illinois 60131.

MISCELLANEOUS ENGINE PARTS GROUP (INCLUDES OPTIONALS)

REF. NO.	NO.	QTY. USED	PART DESCRIPTION
72	*REGULATOR	VOLTAC	SE
	191-0733	1	Begin Spec G
	191-0732	1	Specs A through F (Motorola #RA12N453)
73	800-0007	1	Screw, Cap - Hex Head (1/4-20 x 1") - Begin Spec G
74	850-0040	1	Washer, Lock - Spring (1/4") - Begin Spec G
75	862-0001	2	Nut, Hex (1/4-20) - Begin Spec G
76	856-0006	1	Washer, Lock - EIT (1/4") - Begin Spec G
77	800-0024	1	Screw, Cap - Hex Head (5/16-18 x 1/2")

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REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
78	800-0048	1	Screw, Cap - Hex Head (3/8-16 x 3/4")
79	850-0050	1	Washer, Lock - Spring (3/8")
80	856-0010	2	Washer, Lock - EIT (3/8")
81	526-0029	1	Washer, Flat (25/64" ID x 7/8" OD x 1/16" Thk)
82	505-0104	1	Nipple, Pipe (1/8 x 1-1/2") - Begin Spec G
83	505-0026	1	Coupling, Pipe (1/8) - Begin Spec G
84	SENDER, OI	LTEMPER	ATURE-OPTIONAL
•	193-0249	1	Begin Spec G
	193-0202	1	Specs A through F

 For components, contact your nearest Motorola Dealer or Motorola Automotive Products, Inc., 9401 W. Grand Ave., Franklin Park, Illinois 60131.



CHASSIS GROUP (UNHOUSED SETS)

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION	REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	405-1837	1	Extension, Hood - Radiator	32	402-0371	2	Mount Vibration
2	821-0014	8	Screw, Self-locking - Hex Head (5/16-18 x 1/2")	33	800-0091	4	Screw, Cap - Hex Head
3	870-0113	8	Nut, Clinch (5/16-18)	34	850-0055	. 4	Washer Lock - Spring $(1/2)$
4	405-1836	1	Panel, Radiator (Also used	35	232-2106	2	Bracket Support - Generator
			with Housed Sets)	36	821-0014	6	Screw Self-locking - Her
5	821-0014	8	Screw, Self-locking - Hex		021 0014	Ū	Head /5/16-18 x 1/2")
			Head (5/16-18 x 1/2")	37	870-0020	6	Nut Plate (5/16-18)
6	800-0091	11	Screw, Cap - Hex Head	38	403-0923	1	Trim Chassis - Bight Side
			(1/2-13 x 1-1/4")	39	403-0924	i	Trim Chassis - Left Side
7	850-0060	13	Washer, Lock - Spring (1/2")	40	812-0146	4	Screw Machine - Round Head
8	862-0016	[′] 13	Nut, Hex (1/2-13)		0.200	•	(1/4-20 x 3/8")
9	SUPPORT, I	ENGINE - S	TANDARD - Used on Radiator	41	850-0040	4	Washer Lock - Spring $(1/4)$
	Cooled Sets	;		42	234-0370	1	Grille Inlet Air
	403-1187	1	'Right Side	43	821-0010	7	Screw Self-locking - Hey
	403-1188	1	Left Side		021 0010	•	Head (1/4-20 x 1/2")
9A	SUPPORT, E	ENGINE - C	DPTIONAL - Used on City	44	234-0361	1	Wrapper End Bell - Generator
	Water & Hea	t Exchange	er Cooled Sets	45	821-0014	Å	Screw Self-locking - Her
	403-0921	1	Right Side			-	Head (5/16-18 x 1/2") -
	403-0922	1	Left Side				Control Box Mounting
10	800-0090	2	Screw, Cap - Hex Head	46	815-0350	6	Screw Tapping - Hex Head
			(1/2-13 x 1")		010 0000	U	Slotted (#10-32 x 3/8")
11	800-0520	· 1	Screw, Cap - Special Hex	47	301-3156	1	Panel Blank - Ton (Also
			Head, Unplated (3/4-10 x 1")		, ,		used on Housed Sets)
12	403-0920	1	Bracket - Engine Support	48	815-0350	6	Screw Tanning - Hey Head
13	402-0030	1	Mount, Vibration		010 0000		Slotted (#10-32 x 3/8")
14	865-0007	2	Nut, Wing (5/16-18)	49	301-3156	1	Panel Blank - Loft Side
15	850-0045	2	Washer, Lock - Spring (5/16)	50	815-0350	ė	Screw Tapping - Hey Head
16	526-0115	2	Washer, Flat (11/32" ID x		010 0000	Ū	Slotted (#10-32 x 3/8")
			11/16" OD x 1/16" THK)	51	301-3156	1	Papel Black - Bight Side
17	520-0663	2	Stud (5/16-18 x 3-1/4")	52	301-3192	1	Panel Circuit Breaker - Right
18	416-0480	1	Frame, Hold-down - Battery	02	001 0132	•	Side - Optional (Llead with
19	821-0029	6	Screw, Self-locking - Hex				Line Load Circuit Breaker)
			Head (3/8-16 x 3/4")	53	800-0003	٨	Screw Cap - Hey Head
20	870-0281	6	Nut, Self-locking (3/8-16)	00	000-0000	-	$(1/A_2) \times 1/2$
21	416-0666	1	Tray - Battery	54	526-0018	8	Weeher Elet (17/64" ID v
22	800-0090	1	Screw, Cap - Hex Head	04	020-0010	U	5/8" OD v 1/16" THK)
			(1/2-13 x 1″)	55	850-0040	4	Washer Lock - Spring (1/4)
23	856-0013	1	Washer, Lock - External/	56	862-0001	4	Nut Hey (1/4-20)
			Internal Tooth (1/2)	57	301-3155	1	Housing Control Box
24	800-0091	1.	Screw, Cap - Hex Head	58	508-0001	i	Grommet Bubber
			(1/2-13 x 1-1/4")	00	000 0001	•	(3/4" ID x 1-9/32" OD)
25	856-0013	1	Washer, Lock - External/	59	821-0014	4	Screw Self-locking - Her
			Internal Tooth (1/2)	••	02.0000	•	Head (5/16-18 x 1/2")
26	850-0050	1	Washer, Lock - Spring (1/2)	60	821-0010	1	Screw Self-locking - Her
27	862-0016	1	Nut, Hex (1/2-13)		021 0010	•	Head (1/4-20 v 1/2")
28	337-0090	1	Lead, Electrical - Ground	61	301-3154	1	Saddle - Control Box Housing
			(Flexible)	62	403-0919	1	Chassis - Engine/Generator
29	800-0520	2	Screw, Cap - Special Hex	63	332-1472		
			Head, Unplated (3/4-10 x 1")	00	552-14/5	1	Lug, Terminal - Solderless
30	800-0071	4	Screw, Cap - Hex Head				
			(7/16-14 x 1")				· · ·
31	850-0055	4	Washer, Lock - Spring (7/16)				
		,					

ELECTRIC FUEL PUMP GROUP

REF.	PART	QTY.	PART
NO.	NO.	USED	DESCRIPTION
	PUMP, FUEL		
	149-0890	1	Begin Spec G (24 Volt)
•	149-0554	1	Specs A through F (12 Volt)
1	149-1445	1	Filter
2	149-1447	1	Magnet
3	149-1446	1	Gasket, Cover
4	149-1453	, 1	Cover
5	149-1452	1	Plunger
6	SPRING, PLU	JNGER RE	TURN
	149-0683	1	Begin Spec G
	149-0705	1	Specs A through F
7	149-1451	1	Spring Cup & Valve
8	149-1450	1	Gasket, Spring Cup
9	149-1449	1	Washer, Cup Gasket
10	149-1448	1	Retainer, Cup & Plunger



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COOLING SYSTEM GROUP





REF. NO.	PART NO.	OTY.	PART DESCRIPTION	REF NO	NO.	QTY. USED	PART DESCRIPTION
1	130-0817	1	Radiator - Spec A through E	11	SHROUD, FAN		•
2	130-0449	1	Cap, Radiator		130-0975	1	80.0 DYC and 100 DYC - Begin
3	504-0028	1	Cock, Drain				 Spec G
4	130-0858	. 1	Guard, Fan - Right Hand - Specs A through F		130-1181	1	62.5 DYC, 75.0 DYC and 90.0 DYC - Begin Spec G
5	130-0859	1	Guard, Fan - Left Hand -		130-0976	1	Spec F only
			Specs A through F	12	RADIATOR		
6	503-0593	1	Hose, Rubber - Lower - Spec A through E		130-0961	1.	62.5 DYC, 75.0 DYC and 90.0 DYC - Begin Spec F
7	503-0274	4	Clamp, Hose		130-1161	_ 1 , →	80.0 DYC and 100.0 DYC - Begin Spec G
8	503-0592	· 1	Hose, Rubber - Upper - Spec A through E	13	503-0747	1	Hose, Rubber - Upper - Begin Spec F
9	821-0010	18	Screw, Self-locking - Hex Washer Head (1/4-20 x 1/2")	. 14	503-0746	1	Hose, Rubber - Lower - Begin Spec F
10	405-1182	1	Flange - Air Duct Adapter	15	130-0986	1	Guard, Fan - Begin Spec G
	• •						

AIR CLEANER GROUP-BEGIN SPEC G



REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION				
1	503-0612	4	Clamp, Hose				
2	503-0788	1	Hose, Rubber -				
3	140-1468	1	Connector, Pipe				
4	821-0018	2	Screw, Cap - Hex Head - Locking (1/4-20 x 5/8")				
5	870-0212	2	Nut, Hex - Locking (1/4-20)				
6	140-1465	1	Bracket, Air Cleaner				
7	140-1454	1	Cleaner, Air				
8	140-1467	1.	Elbow, Rubber				
9	821-0016	4	Screw, Cap - Hex Head - Locking (5/16-18 x 3/4")				
10	870-0048	4	Nut, Hex - Locking (5/16-18)				
11	140-1453	2	Band, Air Cleaner Mounting				
12	140-1435	1	Cap, Air Cleaner				
13	140-1455	1	Element, Air Cleaner				

CONTROL GROUP (Engine Section)



CONTROL GROUP (ENGINE SECTION)

REF. NO.	PART NO.	QTY. USED	PART · DESCRIPTION
1	£	1	Panel, Control
2	301-3253	1	Bracket, Control Mounting
3	SWITCH, TOO	GGLE (Re	mote-Stop-Run)
	308-0138	1	Standard Sets
	308-0327	1	Penn-State
4	308-0002	1	Switch, Toggle - Panel Lights -
			Spec A through F
5	GAUGE, OIL I	PRESSUR	RE · ·
	193-0243	1	Begin Spec G
	193-0107	1	Spec A through F
6	GAUGE, WAT	ER TEMP	PERATURE
	193-0245	1	Begin Spec G
	193-0106	1	Specs A through F
7	302-0061	1	Ammeter (30-0-30)
8	332-1239	1	Strip, Marker
9	332-1241	1	Strip, Marker
10	308-0003	1	Plate, Switch (On-Off) -
			Spec A through F
11	332-1276	4	Plug, Key
12	RELAY, STAR	TDISCO	NNECT AND IGNITION
	307-1056	2	Begin Spec G
	307-1058	2	Spec A through F
13	RELAY, STAR	IT SOLEN	IOID
	307-0061	1	Begin Spec G
	307-1031	1	Spec A through F
14	322-0149	1	Light, Panel - Spec A
45	000.0004		through F
15	322-0004	1	Lamp (12 Volt) - Spec A
16	200.0100	4 -	
10	322-0128		Light, Indicator (Fault)
17	CONTROL, C	HANKEH	(See Separate Group for
	Components)		Standard
	200 0751	4	Standard Regin Spee C
	300-0751	4	See Athrough E
	300-0733	1	Spec A through F
	200 0715	4	
	300-0713	4	Seen A through E
10	300-07 14 CONTROL EI		Spec A through F
10	CONTROL, EI	NGINE M	ONITOR (See Separate Groups
	tor Componer	its)	Standard (Sata with ano Fault
			Light)
	300-0680	1	Begin Spec G
	300-0679	1	Spec A through E
	000-0079	•	Ontional (Sets with Five
			Fault Lighte)
	300-0682	1	Begin Spec G
	300-0681	1	Specs A through F
		,	Penn State Models (With one
			Fault Light)
	300-0731	1	Begin Spec G
	300-0730	1	Specs A through F
		• •	

REF. NO.	. PART NO.	QTY. USEC	PART DESCRIPTION
19 _.	£	× .1	Harness, Wiring (Includes Parts Marked †)
20	332-0537	1	tBoard, Terminal (4-Place)
21	332-0795	1	tBoard, Terminal (16-Place)
22	332-0765	2	†Socket, Relay
23	332-1271	2	tHousing, Connector (PC Boards)
24	332-0051	1	Clamp, Loop
25	GAUGE, OIL	TEMPER	ATURE (Optional)
	193-0248	1	Begin Spec G
	193-0187	1	Spec A through F
26	302-0749	1	Tachometer, Electrical (Optional)
27	323-0764	1	+Socket, Relay (Includes Terminals)
28	332-1269	As Reg	†Contact, Electrical
29	332-1280	As Reg	†Terminal. Lug
30	332-1043	1	tJumper
31	307-1061	1	Relay, Starter Motor
			Protection - Begin Spec B
32	332-0699	1	†Board, Terminal (6 Place)
33	332-1240	1	Strip, Marker
34	307-1157	3	Clip, Retaining - Relay
35	193-0250	2	Resistor, Oil Pressure and
			Water Temperature Gauges - Begin Spec G
36	322-0107	1	Light, Indicator (Overcrank)
37	322-0108	1	Light, Indicator (Low Oil Pressure)
38	322-0109	1	Light, Indicator (High Engine Temperature)
39	322-0110	1	Light, Indicator (Low Engine Temperature)
40	322-0111	1	Light, Indicator (Overspeed)
41	322-0112	1	Light, Indicator (High Oil
42	357-0018	1	Diode (400 Milliampere, 400 Volt) - Begin Spec G

† - Included in Wiring Harness.

£ - To Order refer to Factory, giving Model, Spec and Serial Number. Additional data as to quantity of meters, etc. will assist identification.





CONTROL GROUP (AC Output Portion)

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION		REF.	PART	QTY.	
4	201 2159		Boy Control		33		BOARD	DESCRIPTION .
2	SU1-S156	1	Box, Control (Constator	1	00	332-0607	1	+Board Terminal (12 Place)
٤	~ .		Section)			332-0795	1	Board Terminal (12 Flace) -
3	402-0078	4	Mount Vibration			-	•	Optional
4	337-0049	1	Lead. Electrical - Ground		34	323-0764	1	+Socket Bolay (Includes Terminals)
5	320-0431	1	Breaker, Circuit		35	332-1280	As Ben	Terminal Lug
6	MARKER ST	RIP	· · ·		36	315-0384		Beactor - Begin Spec.E
	332-1248	1	Strip, Marker (12 Place)		37	305-0524	1	Bectifier Assembly - Begin Spec F
	332-1242	1	Strip, Marker - Optional		38	320-0307	1	Lock, Handle - Circuit
			(16 Place)					Breaker - Optional (Penn
7	315-0342	. 1	Transformer, Voltage					State Sets)
8	303-0032	1	Knob		39	307-1157	1	Clip, Retaining - Relay
9	303-0076		Knob, Pointer		40	232-2219	1	Filter, Voltage Regulator -
10	209 0010	VIICH	Switch Batany 0 Bala			-		Optional (Includes parts
	308-0012	1	A Position			010 0001		marked +)
	308-0284	1	Switch Botany - 4 Bolo		41	812-0061	4	+Screw, Machine - Round Head
	000 0204	•	4 Position - Optional		40	950 0020	E	(#6-32 X 3/8")
			(Sets with Meter Panel)		42	860-0020	5	+Washer, Lock - Spring (#6)
11	303-0170	1	Rheostat	1	44	312-0189	2	+Bracket Hold-down Canaciter
12	350-0556	1	†Resistor, Composition	i	45	312-0188	1 .	+Canacitor Plastic Dielectric
	•		(47,000-Ohm, 1/2 Watt, 5%)	:			·	Metal Case (15 MED, 440 VAC)
13	VOLTMETE	R	,		46	815-0001	4	+Screw, Machine - Binding
	302-0718	1	(0-300 Volt, 0-600 Volt)					Head, Brass (#6-32 x 1/4")
			Used on 15R & 515R Sets		47	853-0003	4	+Washer, Lock - External Tooth
	302-0779	1	(0-750 Volt) - Used on 9XR Sets					(#6)
14	307-1061	1	Relay, Armature		48	860-0006	4	+Nut, Hex (#6-32)
15	322-0130	1	Light, Indicator - Optional		49	812-0165	2	+Screw, Machine - Round Head
40.1	000 0404		(Lower Scale)		50	204 0407		(1/4-20 x 4-1/2")
16	322-0131	1	Light, Indicator - Optional		51	304-0427	4	+wasner, Shoulder - Centering
17	301-3244	4	(Upper Scale) Bracket Angle, Bolov Socket		52	850-0040	2	+Washer Lock - Spring (1/4)
18	*REGULATO		Sidckel, Aligie - Helay Suckel		53	862-0001	2	+Nut Hex (1/4-20)
10	332-1956	1	Begin Spec G		54	354-0025	2	+Resistor, Wirewound
	332-1268	i	Spec A through F					(10-Ohm, 100 Watts, 5%)
19	£	1	Harness, Wiring (Includes		55	232-2218	1	+Bracket, Angle - Mounting
			parts marked +)					
20	332-0050	1	Clamp, Loop					
21	406-0332	2	Receptacle, Turnbutton					•
		-	Fastener					
22	406-0333	2	Stud, Turnbutton Fastener		+ -	Included in Fi	lter	
23	406-0334	2	Washer, Lock - Turnbutton		+ - 1	ncluded in W	iring Harne	355.
24	508-0001	4	Stud Grommot Bubbor (1.1/16" OD)		* - 8	See Separate	Group for (Components.
25					£ - 1	To order refer	to Factory	, giving Model, Spec and
20	302-0466	1	Meter Time Totalizing -		5	Serial numbe	r from Onar	n nameplate.
	002 0.00	•	60 Hertz					
	302-0469	1	Meter, Time Totalizing -					
•			50 Hertz					
26	ELECTRICA	L FREQUE	NCYMETER					
	302-0221	1	•Meter, Electrical Frequency -					
			60 Hertz					
	302-0256	1	Meter, Electrical Frequency -					
07			50 Hertz				•	• •
21	AMMETER 200 0409	4						
	302-0408	4	Ammeter (0-100) / 5.0DTC-9XR Sets				•	
	302-0410	1	Ammeter (0-200, 0-400) - Duel					
	002-0722	•	Range - DYC-15R & 515R Sets					
28	CURRENT T	RANSFOR	MER					
	302-0608	3	Transformer, Current - Used					
	•		on 15R & 515R Sets					
28A	CURRENT T	RANSFOR	MER					
	302-0079	3	90DYC-9XR and 100DYC-9XR Sets				•	
~-	302-0078	3	75DYC-9XR Sets					
29	BRACKET, A	ANGLE-TP	ANSFORMER MOUNTING					
	302-0764	1	Used on 15R & 515R Sets					•
20	302-0729	1	Used on 9XH Sets -					•
30	302-0235	3	Linner - AVR Soto					
31	302-0236	3	Clamp Retaining Transformer					
			Lower - 9XR Sets					
32	302-0253	As Reo	Shim - Transformer Mounting					
			- 9XR Sets					

GENERATOR GROUP



GENERATOR GROUP

1 800-0003 2 Screw. Cap Hex Head (14-20 x 1/2") 94 520-0724 4 Stud (04-16 x 4/a-16 x 1/8-26/x2) 2 850-004 2 Washer, Lock - Spring (1/4") 35 520-0724 4 Stud (04-16 x 4/a-16 x 1/8-26/x2) 1 160-1075 (1/2 x 1/2) Washer, Lock - Spring (1/4") 35 520-0724 4 Stud (0/a-16 x 4/a-16 x 1/8-26/x2) 1 160-1075 (1/2 x 1/2) Washer, Lock - Spring (1/4") 35 520-0724 4 Stud (0/a-16 x 4/a-16 x 1/8-26/x2) 1 160-1075 (1/2 x 1/2) Particip (1/2 x 1/12") Particip (1/2 x 1/12") 35 520-0724 4 Stud (0/a-16 x 4/a-16 x 1/8-26/x2) 1 160-1076 (1/2 x 1/12") Particip (1/2 x 1/12") 1/2 x 1/12") 35 520-071 (1/2 x 1/12") 35 520-072 (1/2 x 1/12") 35 520-071 (1/2 x 1/12") 35 520-072 (1/2 x 1/12") 35 35 35 35 35 35 35 35 35 35 35 35	REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION	REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
2 850-0400 2 Wesher, Lock - Spring (1/4") 35 520-0726" 4 Surd (3/6-15 X 3/6-15 X 3/6-1	1	800-0003	2	Screw, Cap - Hex Head (1/4-20 x 1/2")	34	520-07 24	4	Stud (3/8-16 x 3/8-16 x 18-29/32")
3 150-1456 1 Contact Assembly - Overspherd Marked () - Begin Spec E Marked () - Begin Spec E 4 Hose, Rubber Hose, Rubber 4 150-0723 1 Pholin, Overspeed Switch 5 533-0611 4 Hose, Rubber 5 877-0250 1 Thui, Impailated - Overspeed Toolin, U/4", 2001 220-1407 Spece A and B 7 853-0013 1 Hwasher, Lock - External Tooth (1/4") 220-1405 1 Bigin Spec C 8 150-1356 1 FBracket, Overspeed Switch 220-1465 1 Bogin Spec C 8 150-1356 1 FBracket, Overspeed Switch 220-1605 1 Bogin Spec C 8 53-0013 4 Washer, Lock - External Tooth (1/4") 220-1605 1 Bogin Spec C 18 53-0013 4 Washer, Lock - String (1/4") 220-1605 1 Bogin Spec A 18 53-0013 4 Washer, Lock - Spring (1/4") 220-1605 1 Bogin Spec A 18 530-0013 4 Washer, Lock - Spring (1/4")	2	850-0040	2	Washer, Lock - Spring (1/4")	35	520-0726	4	Stud (3/8-16 x 3/8-16 x 20-1/16")
Switch (Includes Parts Marked 1) = Begin Spec 2 38 503-6611 4 Hose Rubber 4 150-0723 1 tPoint, Overspeed Switch 37 STATOR, GENERATOR 6 982-0001 2 thui, Haviare, Lock - External Tooth (1/4") 220-200 1 Begin Spec 2 7 953-0013 1 tWasher, Lock - External Tooth (1/4") 220-1457 1 Space A and B 9 VOLTAGE REGULATOR ASSEMBLY - SPEC A through D 220-1457 1 Space A and B 10 800-0009 2 Screw, Cap - Hav Head 220-1457 75.00VC-518R 11 853-0013 4 Washer, Lock - External Tooth (1/4") 220-1457 75.00VC-518R 12 305-0481 2 Spacer, Sleeve 38 652-0011 Washer, Lock - External Tooth (1/4") 38 652-0017 Washer, Lock - Spring (3/8") 4 13 865-0018 4 Soudor C-15R Screw, Cap - Hex Head 4 800-0009 1 Screw, Cap - Hex Head 14 850-0005 4 Washer, Lock - Spring (3/8")	3	150-1456	1	Contact Assembly - Overspeed	00	020 0720	-	Used on 7:5-190 kW Sets
Marked 1) - Begin Spec E 30 Station, GENERATOR, GENERATOR, GENERATOR 5 870-0250 1 Thuit, Insulated - Overspeed Station, Generator 6 862-0020 2 Thuit, Her, (17.20) Begin Spec C 7 500-013 1 Tooth (1/4) Specs A and B 7 500-013 1 Tooth (1/4) Specs A and B 8 150-1356 1 Placeket, Overspeed Switch 220-1457 1 Specs A and B 7 10 800-0009 2 Screw, Cap - Hex Head 220-1457 1 Specs A and B 10 800-0009 2 Screw, Cap - Hex Head 220-1457 1 Specs A and B 11 853-0013 4 Wather, Lock - Spring (3/8") 220-1456 100.00VC-58R 12 305-0481 2 Specs A and B 100.00VC-58R 220-1456 100.00VC-58R 12 305-0481 2 Specs A and B 100.00VC-58R 220-1457 1 Swetch, Newspeed 12 305-0414 Nut, Hex				Switch (Includes Parts	26	502-0611	A	Hose Bubber
4 150-0723 1 1 Point, Overspeed Switch 20 000 1 825-001 2 900 1 820-000 1 820-000 1 820-000 1 820-000 1 820-000 1 820-000 1 820-000 1 820-000 1 820-000 1 820-000 1 820-000 1 820-000 1 820-000 1 820-000 1 820-000 1 820-000 1 820-000 1 820-1600 1 800-000-94R 1 1 800-000-94R 220-1610 1 100.007C-94R 220-1610 1 100.007C-94R 220-1610 100.007C-94R 220-1610 1 100.007C-94R 200-1610 1 <td></td> <td></td> <td></td> <td>Marked †) - Begin Spec E</td> <td>27</td> <td></td> <td></td> <td></td>				Marked †) - Begin Spec E	27			
5 870-0250 1 1 Nut, Insulated - Overspeed Switch 220-2000 1 Bagin Spac C 350-025 6 862-0001 2 1 Nut, Hex (1/4-20) 220-1453 1 Space A and B 75.0DVC-515R 7 533-0013 1 Twasher, Lock - External Tooth (1/4') 220-1453 1 Space A and B 75.0DVC-515R 9 105-0356 1 Tooth (1/4') 220-1457 1 Space A and B 75.0DVC-515R 10 800-0009 2 Sorew, Cap - Hex Head (1/4-20 x 1-1/2") Spec A 220-1605 1 75.0DVC-51R 11 853-0013 4 Washer, Lock - External (1/4-20 x 1-1/2") Spec A 220-1605 1 90.0DVC-15R 12 305-0481 2 Spacer, Slewe 38 812-0189 1 00.0DVC-15R 13 862-0011 4 Nut, Hex - Special, Grade B 39 865-0010 1 Washer, Lock - Spring (3/4") 14 800-0051 1 Ssec, Name, Lock - Spring (3/4") 4 800-0513 1 Washer, Lock - Spring (3/4") 15 860-0079 1 Washer, Lock - Spring (3/4") 1 100.0DVC-15R Spa	4	150-0723	1	†Point, Overspeed Switch	57	317106,6		62 5DYC-515B
Switch Spece A and B 7 853-0013 1 HWasher, Lock - External 220-2001 1 Begin Spec C 8 150-135 1 Haraket, Overspeed Switch 220-1455 1 Spec A and B 9 100-174GE RECULATO Components) 220-1456 1 Spec A 1 10 800-0009 2 Strew, Cap - Hex Head 220-1457 1 75.00VC-3KR 11 853-0013 4 Washer, Lock - External 220-1610 1 100.00VC-3KR 12 305-0481 2 Spec A 38 812-0189 1 Screw, Cap - Hex Head 12 305-0481 2 Spec A, Spec A 38 812-0189 1 Screw, Cap - Hex Head 12 305-0481 4 Washer, Lock - Spring (3/6") 40 150-0717 1 Switch, Overspeed 14 850-0050 4 Washer, Lock - Spring (3/6") 40 150-0717 1 Switch, Overspeed 15 211-0163 1 Bole Overspeed	5	870-0250	1	†Nut, Insulated - Overspeed	•	220-2000	1	Begin Spec C
6 6852-0001 2 fNut, Hex (1/4-20) 75.0007-515R 7 75.0007-515R 220-1458 Speca A and B 8 150-1356 1 Taracket, Overspeed Switch 220-1458 Speca A and B 9 VOLTAGE RECULATOR ASSEMBLY - SPEC Attrough D 220-1605 1 75.0007-515R 10 800-0009 2 Storma Components + Nead 220-1605 1 75.0007-58K 11 853-0013 4 Washer, Lock - External 220-1605 1 90.0007-58K 12 305-0481 2 Spacer, Steeve 28 812-0189 1 00.0007-58K 13 862-0011 4 Washer, Lock - Spring (3/8") 41 800-0011 Washer, Lock - Spring (3/8") 14 800-0025 1 Seal OH - 'OF Ring 38 865-0010 1 Washer, Lock - Spring (3/4") 15 506-0125 1 Seal OH - 'OF Ring 38 800-011 1 Switch, Overspeed 16 506-0125 1 Seal OH - 'OF Ring 1 1 Socrew, Cap - Hex Head, Gade A (10 + 1-1/2") 28 850-0079 1				Switch		220-2000	1	Specs A and B
7 853-0013 1 1 fWasher, Lock - External Tooth (1/4") 220-2001 1 Begin Spec C 8 150-1356 1 1 fBracket, Overspeed Switch 220-1457 1 80.0DVC-515R 9 VOLT AGE REGULATOR ASSEMBLY - SPEC A through D 220-1457 1 75.0DVC-9KR 10 800-0009 2 Screw, Cap - Hex Head 220-1457 1 75.0DVC-9KR 11 853-0013 4 Washer, Lock - External 220-1458 1 90.0DVC-9KR 12 305-0481 2 Space A, Fixernal 220-1458 1 00.0DVC-9KR 13 853-0013 4 Washer, Lock - Spring (3/6") 36 812-0189 1 Screw, Cap - Hex Head 14 805-0050 4 Washer, Lock - Spring (3/6") 40 150-0717 1 Switch, Overspeed 15 211-0155 1 End Bill - Generator 41 800-00513 1 Screw, Cap - Hex Head, Spring (3/4") 16 509-0125 1 Stale All - O'-TRing 42 850-0079 1 Washer, Lock - Spring (3/4") 17 800-0004	6	862-0001	2	†Nut, Hex (1/4-20)		220-1407	•	75.0DYC-515B
Tooth (1/4") 220-1458 Specs A and B 9 VOLTAGE RECULATOR ASSEMBLY - SPEC Attrough D 220-1697 1 80.000X-6.15R 10 800-0009 2 Screw, Cap - Hex Head 220-1605 1 75.00VC-98R 11 853-0013 4 Washer, Lock - External Tooth (1/4") Spec A 220-1606 90.00VC-98R 12 305-0481 2 Screw, Cap - Hex Head 220-1606 1 00.00VC-98R 11 853-0013 4 Washer, Lock - External Tooth (1/4") Spec A 38 812-0189 1 00.00VC-98R 12 305-0481 2 Spacer, Special (Grade 8 39 856-0010 1 11memal Tooth (3/8") 13 882-0011 4 Nut, Hex - Special (Grade 8 39 856-0010 1 Washer, Lock - Spring (3/4") 14 800-0034 Screw, Cap - Hex Head Special Heat Trandol Special Heat Trandol 15 211-0165 1 End Bell - Coenerator 4 800-0018 Special Heat Trandol 16 509-0125 1	7	853-0013	1	†Washer, Lock - External		220-2001	1	Begin Spec C
8 120-1356 1 1 1 120-1356 1 1 200-1867 1 0.007C-515R 1 1 800-0009 2 Screw, Cap - Hex Head 220-1605 1 75.007C-987R 1 1 853-0013 4 Washer, Dor External 220-1605 1 0.007C-515R 1 853-0013 4 Washer, Dor External 220-1605 1 0.007C-58R 1 853-0013 4 Washer, Dor External 220-1605 1 0.007C-58R 1 853-0013 4 Washer, Lock - Spring (3/8") 3 812-0189 1 Screw, Kap - Hex Head 1 850-0050 4 Washer, Lock - Spring (3/8") 40 150-0717 Swetch. Doverspeed 1 Screw, Cap - Hex Head 508-010 1 Washer, Lock - Spring (3/4") 1 850-0003 4 Screw, Cap - Hex Head 42 850-0079 1 Washer, Lock - Spring (3/4") 1 1 Bearing, Ball 100-007-07 100-007-07 100-007-07 100-007-07 110 Washer, Flat 177/64" 17 100	-			Tooth (1/4")		220-1458	1	Specs A and B
9 VOL 1AGE HEGULA 10H ASSEMBLY - SPEC A through D (see Separate Group for Components) 220-1605 1 75.00YC-9XR 10 800-0009 2 Screw, Cap - Hex Head 220-1606 1 90.00YC-9XR 11 853-0013 4 Washer, Lock - External Trough D 220-1610 1 100.0DYC-9XR 12 305-0481 2 Spacer, Sterve 38 812-0189 1 Screw, Machine - Round Head 13 862-0011 4 Nut, Hex - Special, Grade 8 39 856-0010 1 Washer, Lock - External/ (3/8-16 5, 3/4") 14 862-0010 4 Washer, Lock - Spring (3/8") 40 150-0717 Switch, Overspect Screw, Cap - Hex Head 28 556-0010 1 Washer, Lock - Spring (3/8") 15 509-0125 1 Seclive - Brushiess 44 510-0101 "Bearing, Bail 16 509-0125 1 Stator, Excerw, Cap - Hex Head 28 526-0238 1 "Washer, Kock - Spring (3/4") 18 850-004 Washer, Head Stator, Excerw, Cap - Hex Head Stator, Excerw,	8	150-1356	1	†Bracket, Overspeed Switch		220-1987	1	80.0DYC-515R
CSee Separate Group for Components) 220-1457 1 75.00YC-15R 0 800-0009 2 Screw, Cap - Hex Head (1/4-20 x 1-1/2*) Spec A (1/4-20 x 1-1/2*) 220-1458 (220-1610 1 00.00YC-58R 12 305-0481 2 Spacer, Sleeve (3/4-16 x 3/4*) 220-1459 (3/4-16 x 3/4*) 1 Screw, Cap - Hox Head (3/4-16 x 3/4*) 13 862-001 4 Washer, Lock - Spring (3/6*) (1/4-20 x 1-1/2*) 40 150-0717 1 Switch, Overspeed (3/4-16 x 1-1/2*) 14 800-0012 Scal, Oli - O'' Ring (1/4-20 x 1-1/2*) 41 800-0013 1 *Screw, Cap - Hex Head (3/4-16 x 1-1/2*) 17 800-0009 4 Scal, Oli - O'' Ring (1/4-20 x 1-1/2*) 42 850-0079 1 *Washer, Lock - Spring (3/4*) 18 850-0040 4 Washer, Lock - Spring (1/4*) 42 850-0011 *Washer, Lock - Spring (3/4*) 21 850-0040 4 Washer, Lock - Spring (1/4*) 47 201-1729 *Key, Machine	9	VOLTAGEF	REGULAT	OR ASSEMBLY - SPEC A through D		220-1605	1	75.0DYC-9XR
10 800-0009 2 Screw, Cap - Hex Head (1/4-20 x + 1/2") Spec A through D 220-1636 1 90.0DYC-5KR 11 853-0013 4 Washer, Lock - External Tooth (1/4") Spec A 220-1610 100.0DYC-5KR 12 305-0481 2 Spacer, Sleeve 38 812-0189 1 Screw, Machine - Round Head (3/8-16 & 3/4") 14 850-0050 4 Washer, Lock - Spring (3/8") 40 150-0717 Switch, Overspeed 15 211-0185 1 End Bell - Generator (3/4-16 x 1-1/2") 1 800-0003 4 Screw, Cap - Hex Head, (3/4-16 x 1-1/2") Special Heat Treated, (3/4-16 x 1-1/2") 17 800-0003 4 Screw, Cap - Hex Head, (3/4-16 x 1-1/2") 1 Screw, Cap - Hex Head, (3/4-16 x 1-1/2") 18 850-0040 4 Washer, Lock - Spring (1/4") 43 520-0238 1 Washer, Keat, Screw, Cap - Hex Head, (3/4-16 x 1-1/2") 20 114-0023 4 Screw, Cap - Hex Head, (3/4-16 x 1-1/2") 45 510-0151 1 Key Machine - Round Head, (3/4-16 x 1-1/2") 21 14-0023 4		(See Separa	ite Group fo	or Components)		220-1457	1	75.0DYC-15R
(1/4-20 x 1-1/2") Spec A through D 220-1458 1 90.0DYC-15R 11 853-0013 4 Washer, Lock - External Tooth (1/4") Spec A through D 38 812-0189 1 00.0DYC-15R 12 305-0481 2 39 856-0010 1 00.0DYC-3R 13 862-0011 4 Nut, Nex - Special, Grade 8 39 856-0010 Washer, Lock - Sternal/ Internal Tooth (3/8") 14 800-0050 4 Washer, Lock - Spring (3/8") 40 150-0717 1 Switch, Overspeed 15 211-0185 End Beit - Generator 40 150-0717 1 Switch, Overspeed 16 509-0125 1 Scarew, Cap - Hex Head Special Heat Treated, Cok - Spring (3/4") 1/1/10/11 Washer, Lock - Spring (3/4") 19 220-2353 1 Stator, Exciter - Brushless Generator 45 520-2079 1 Washer, Lock - Spring (1/4") 25 526-0014 Washer, Lock - Spring (1/4") 45 510-0101 Bearing, Bail 20 114-0023 4 Washer, Lock - Spring	10	800-0009	2	Screw, Cap - Hex Head		220-1606	່ 1	90.0DYC-9XR
Infolding D 220-1610 1 100.0DYC-9XR 11 853-0013 4 Washer, Lock - External Tooth (1/4") Spec A through D 220-1459 1 100.0DYC-9XR 12 305-0481 2 Spacer, Sleeve (3/3-16) 38 812-0189 1 Screw, Machine - Round Head (3/8-16) 14 852-0011 4 Nut, Hex. Special, Grade 8 (3/3-16) 39 856-0010 1 Washer, Lock - External/ Internal Tooth (3/8") 15 211-0185 1 End Beil - Generator (3/3-16) 40 150-0771 1 Switch, Overspeed 16 900-1025 1 End Beil - Generator (3/3-16) 40 150-0771 1 Washer, Lock - Spring (3/4") 17 800-0029 Vasher, Lock - Spring (1/4") 43 526-0278 Unplated (3/4-10 x 1-1/2") 18 850-004 4 Storew, Cap - Hex Head, (1/4-20 x 1-1/4") 45 510-0101 1 Bearing, Bail 20 114-0023 4 Screw, Cap - Hex Head, (1/4-20 x 1-1/4") 45 510-0101 1 Thexplan, (1/4-20 x 1-1/4") They head				(1/4-20 x 1-1/2") Spec A		220-1458	1	90.0DYC-15R
11 653-0013 4 Washer, Lock - External Tooth (1/4") Spec: A through D 220-1459, Specer, Sleeve 1 100.0DYC-15R (3/8-16 x 3/4") 12 305-0481 2 Spacer, Sleeve 39 656-0010 1 Washer, Lock - External/ Internal Tooth (3/8") 14 850-0050 4 Washer, Lock - Spring (3/8") 40 150-0717 1 Washer, Lock - External/ Internal Tooth (3/8") 15 211-0185 1 End Beli - Generator 39 856-0010 1 "Screw, Cap - Hex Head, Special Heat Treated, Unplated (3/4-10 x 1-1/2") 18 850-0040 Washer, Lock - Spring (1/4") 43 526-0238 1 "Washer, Lock - Spring (3/4") 19 220-2353 1 Stator, Exciter - Brushless Generator 44 510-0101 1 "Bearing, Ball 20 114-0023 4 Screw, Cap - Hex Head, Generator 45 510-0101 "Bearing, Ball 210 114-0023 4 Screw, Cap - Hex Head, Generator 45 510-011 "Bearing, Ball 220 114-0023 4 Screw, Cap - Hex Head, Generator 45 510-011 "Bearing, Ball 220		050 0010		through D		220-1610	1	100.0DYC-9XR
100m (1/4") SpBc A trough D 36 812-0189 1 Screw, Machine - Round Head (3/6-16 × 3/4") 12 305-0481 2 Spacer, Sleeve (3/8-16) 39 856-0010 1 Washer, Lock - External/ Internal Tooth (3/8") 18 850-0050 4 Washer, Lock - Spring (3/8") 40 150-0717 1 Switch, Overspeed 15 211-0185 1 End Beil - Generator 40 150-0717 1 Switch, Overspeed 16 509-0125 1 Seal, Oli - "O" Ring Special Heat Treated, (1/4/2 x 1-1/2") 42 850-0079 1 "Washer, Flat - Steel Alloy (1/3/16" ID x 1'-1/2") 17 800-0009 4 Screw, Cap - Hex Head, (1/4/2 x 1-1/4") 42 850-0079 1 "Washer, Flat - Steel Alloy (1/3/16" ID x 1'-1/2") 18 850-0040 4 Washer, Lock - Spring (1/4") 43 526-0016 "Washer, Flat (1/7/4" x 7/4") 20 114-0023 Spacer, Steeve 48 204-0083 1 "Ring, Collector - Brush Type Generators Only 212-1225 4 Spacer, Steeve 48 <	11	853-0013	4	Washer, Lock - External		220-1459	1	100.0DYC-15R
1000un 13 00000 B62-0011 100000 Special, Garade 8 (3/8-16, 3/4") (3/8-16, 3/4") (3/8-16, 3/4") 14 850-0050 4 Washer, Lock - Spring (3/8") 40 150-0717 1 Wather, Lock - External/ Internal Tooth (3/8") 14 850-0050 4 Washer, Lock - Spring (3/8") 40 150-0717 1 Switch, Overspeed 15 211-0185 1 End Bell - Generator 50-0051 Screw, Cap - Hex Head, Special Heat Treated, Unplated (3/4-10 x 1-1/2") 1 Washer, Lock - Spring (3/4") 18 850-0040 Washer, Lock - Spring (1/4") 43 526-0238 1 "Washer, Lock - Spring (3/4") 19 220-2353 1 Stator, Exciter - Brushless 44 510-010 1 "Bearing, Ball 20 114-0023 4 Screw, Cap - Hex Head, Special Heat Treated 47 201-179 1 "Bononents)- Special Heat Treated 47 201-173 Washer, Flat (7/4" x 1/4") 21 140-023 4 Screw, Cap - Hex Head, Stator, Exciter - Brush 56 50-0101 "Bononents)- Specion 1/14" x 1/4" x 1/4" 21 </td <td></td> <td></td> <td></td> <td>tootn (1/4") Spec :A</td> <td>38</td> <td>812-0189</td> <td>1</td> <td>Screw, Machine - Round Head</td>				tootn (1/4") Spec :A	38	812-0189	1	Screw, Machine - Round Head
12 502-0401 2 502-040 39 856-0010 1 Washer, Lock - External/ Internal Tooth (3/8") 18 850-0050 4 Washer, Lock - Spring (3/8") 40 150-0171 1 Switch, Overspeed 15 211-0185 1 End Beil - Generator 41 800-0513 1 "Screw, Cap - Hex Head, Special Heat Treated, Unplated (3/4-10 x 1-1/2") 10 Special Heat Treated, Unplated (3/4-10 x 1-1/2") 17 800-0009 4 Screw, Cap - Hex Head, Generator 42 850-0079 1 Washer, Lock - Spring (3/4") 19 220-2353 1 Stator, Scater - Hex Head, Generator 45 202-2102 1 "Spacer, Sleeve" 20 114-0023 4 Washer, Flat (7/4" x 1/4" x 7/8") (13/4" x 1/4" x 7/8") (13/4" x 1/4" x 7/8") 21 850-0040 4 Washer, Flat (17/4" 1D x 45 202-2102 1 "Spacer, Sleeve" 21 850-0040 4 Washer, Flat (17/64" 1D x 50" Spacer, Sleeve 48 204-0083 1 "Ring, Collector: Brush 21 850-0040 4 Washer, Flat (17/64" 1D x Specin Hea	12	205 0491	2	Space Slove				(3/8-16 x 3/4")
Internal Tooth (3/8") Internal Tooth (3/8") Internal Tooth (3/8") 14 850-0050 4 Washer, Lock - Spring (3/8") 40 150-0717 1 Switch, Overspeed 15 211-0185 1 End Bell - Generator 41 800-0513 1 "Screw, Cap - Hex Head, Unplated (3/4-10, x 1-1/2") 16 509-0125 1 Seal, Oli - "O" Hing (1/4-20 x 1-1/2") 42 850-0079 1 "Washer, Lock - Spring (1/4") 18 850-0040 4 Washer, Lock - Spring (1/4") 43 526-0238 1 "Washer, Flat - Steel Alloy (13/16" ID X 2" OD X 3/16" Thk) 19 220-2353 1 Stator, Exciter - Brushless Generator 45 510-0101 1 "Bearing, Bail (13/16" ID X 1/4" X 7/8") 20 114-0023 4 Screw, Cap - Hex Head, Special - Heat Treated 45 505-0145 1 "Key, Machine (1/4" x 1/4" X 7/8") 21 850-0040 4 Washer, Flat (17/64" ID X Special Heat Treated 45 605-0018 8 Boit, Heat Yiel X 1/10" X 22 212-1025 4 Spacer, Sleeve Type Generators Only (See Sparate Group for Components) Serew, Cap - Hex Head Grade 8<	13	862-0011	2	Nut Hex - Special Grade 8	. 39	856-0010	1	Washer, Lock - External/
14 850-0050 4 Washer, Lock - Spring (3/8") 40 150-0717 1 Switch, Overspeed 15 211-0185 1 End Beil - Generator 41 800-0513 1 Screw, Cap - Hex Head, Special Heat Treated, (1/4-20 x 1-1/2") 1 42 850-0079 1 "Washer, Lock - Spring (3/4") 18 850-0040 4 Washer, Lock - Spring (1/4") 43 526-028 1 "Washer, Lock - Spring (3/4") 19 220-2353 1 Stator, Exciter - Purshless Generator 44 510-0101 1 "Bearing, Bail 20 114-0023 4 Screw, Cap - Hex Head, Special - Heat Treated 46 515-0145 1 "Key, Machine (1/4" x 1/4" x 7/8") 21 850-0040 4 Washer, Lock - Spring (1/4") 47 201-1739 1 "Rotor Assembly, Exciter - Brush Bail 22 526-0016 4 Washer, Flat (17/64" ID x 56" OD x 1/16" THK) 48 204-0083 1 "Ring, Collector - Brush 23 212-1225 4 Spacer, Sleeve 48 204-0083 1 "Bing, Collector - Brush 24 526-0016<	10	002-0011	-	(3/8-16)				Internal Tooth (3/8")
15 211-0185 End Bell - Generator 41 800-0513 1 *Screw, Cap - Hex Head, Unplated (3/4-10 x 1-1/2") 18 850-0009 4 Screw, Cap - Hex Head (1/4-20 x 1-1/2") 42 850-0079 1 *Washer, Cock - Spring (3/4") 19 220-2353 1 Stator, Exciter - Brushless Generator 44 510-0101 *Bearing, Ball 20 114-0023 4 Screw, Cap - Hex Head, Generator 45 510-0101 *Bearing, Ball 20 114-0023 4 Screw, Cap - Hex Head, (1/4-20 x 1-1/4") 45 510-0101 *Bearing, Ball 20 114-0023 4 Screw, Cap - Hex Head, (1/4-20 x 1-1/4") 45 510-0101 *Bearing, Ball 212-1225 4 Spacer, Sleeve 44 510-0101 *Bearing, Ball Components) 23 212-1225 4 Spacer, Flat (17/64" ID x 9/16" OD x 1/32" THK) 48 204-0083 1 *Ring, Collector - Brush Type Generators Only (See Separate Group for Components) 24 526-0016 4 Washer, Flat (17/64" ID x 9/16" OD x 1/32" THK) 48 805-0018 8 Bolt, Hex Head - Grade 8 (3/8-16 x 1") 25<	14	850-0050	4	Washer Lock - Spring (3/8")	40	150-0717	1	Switch, Overspeed
16 509-0125 1 Seal, Oil - "O", Ring Special Heat Treated, Unplated (3/4-10 x 1-1/2") 17 800-0009 4 Screw, Cap - Hex Head (1/4-20 x 1-1/2") 42 850-0079 1 Washer, Lock - Spring (3/4") 18 850-0040 4 Washer, Lock - Spring (1/4") 43 526-0238 1 Washer, Flat - Steel Alloy (13/16" ID x 2" OD x 3/16" Thk) 19 220-2353 1 Stator, Exciter - Brushless Generator 44 510-0101 1 Bearing, Ball 20 114-0023 4 Screw, Cap - Hex Head, (1/4-20 x 1-1/4") 45 232-2102 1 Spacer, Sleeve 21 850-0040 4 Washer, Flat (17/64" ID x 50 Spacer, Sleeve 1 Theoremator - Brush 23 212-1225 4 Spacer, Sleeve 48 204-0083 1 Ring, Second - Spring (1/4") 24 526-0016 4 Washer, Flat (17/64" ID x 9 805-0018 8 Boit, Hex Head - Grade 8 (3/8-16 x 1") 25 212-0342 1 Ring, Second - Brush 1 Size -0259 8 Boit, Hex Head - Grade 8 (5/8"-11 x 1")	15	211-0185	1	End Bell - Generator	41	800-0513	1	*Screw, Cap - Hex Head,
17 800-0009 4 Screw, Cap - Her Head (1/4-20 x 1-1/2') Unplated (3/4-10 x 1-1/2') 18 850-0040 4 Washer, Lock - Spring (1/4") 43 526-0238 1 'Washer, Flat - Steel Alloy (13/4") 100 x 3/16" Thk) 19 220-2353 1 Stator, Exciter - Brushless Generator 44 510-0101 1 'Bearing, Ball 20 114-0023 4 Screw, Cap - Hex Head, (14-20 x 1-1/4") 45 522-212 1 'Spacer, Sleeve 21 850-0040 4 Washer, Flat Treated (1/4-20 x 1-1/4") 47 201-1739 'Rotor Assembly, Exciter - Brushless Generators Only (See Separate Group for Components) 23 212-1225 4 Spacer, Sleeve 48 204-0083 1 'Ring, Collector - Brush Type Generators Only 24 526-0016 4 Washer, Flat (17/64" ID x 9/16" OD x 1/32" THK) 49 805-0018 8 Boit, Hex Head - Grade 8 (3/8-16 x 1") 25 212-0342 1 Rig Assembly, Brush (Includes Brush and Spring, Brush 51 526-0259 8 'Washer, Flat - Special Hardened Steel (5/8") 26 212-1105 4 'Spring, Brush <td>16</td> <td>509-0125</td> <td>1</td> <td>Seal, Oil - "O" Bing</td> <td></td> <td></td> <td></td> <td>Special Heat Treated,</td>	16	509-0125	1	Seal, Oil - "O" Bing				Special Heat Treated,
118 850-0040 4 Washer, Lock - Spring (1/4") 42 526-0238 1 "Washer, Flat - Stele Alloy (13/16" ID x 2" OD x 3/16" Thk) 19 220-2353 1 Stator, Exciter - Brushless Generator 44 510-0101 1 "Bearing, Ball 20 114-0023 4 Screw, Cap - Hex Head, Generator 45 232-2102 'Spacer, Sleeve 21 850-0040 4 Washer, Lock - Spring (1/4") 47 201-1739 'Rotor Assembly, Exciter - Brushless Generators Only (See Separate Group for Components) 22 526-0016 4 Washer, Flat (17/64" ID x 9 805-0018 8 Boil, Hex Head - Grade 8 (3/8-16 x 1") 24 526-0212 1 Rig Assembly, Brush (Includes Brush and Springs marked +) - Brush Type Generators 51 526-0259 8 Washer, Flat - Special Hardened Steel (5/6") 26 212-1105 4 +Spring, Brush 51 526-0259 8 Washer, Flat - Special Hardened Steel (5/6") 27 214-0046 4 +Brush, Generator 51 526-0259 8 Washer, Flat - Special Hardened Steel (5/6") 28 800-0000 2 Nutex (1/4-20)	17	800-0009	4	Screw, Cap - Hex Head	•			Unplated (3/4-10 x 1-1/2")
18 850-0040 4 Washer, Lock - Spring (1/4") 43 526-0238 1 Washer, Lit 'Steer Alloy'' 19 220-2353 1 Stator, Exciter - Brushless 44 510-0101 * Bearing, Ball 20 114-0023 4 Screw, Cap - Hex Head, Special - Heat Treated (1/4-20 x 1-1/4") 45 232-2102 * Spacer, Sleeve 21 850-0040 4 Washer, Lock - Spring (1/4") 47 201-1739 * Rotor Assembly, Exciter - Brushless Generators Only (See Separate Group for Components) 23 212-1225 4 Spacer, Sleeve 48 204-0083 * Ring, Collector - Brush 24 526-0016 4 Washer, Flat (17/64" ID x 49 805-0018 8 Boit, Hex Head - Grade 8 25 212-1025 4 Spacer, Sleeve 48 204-0083 * Ring, Collector - Brush 26 212-105 4 Hsush and Springs marked +) - Brush and Springs marked +) - Brush Type Generator 50 805-003 8 Boit, Hex Head - Grade 8 (5/8-11 x 1") 27 214-0046 4 * Brush, Generator 53 205-0059 1 * Tisk, Drive - Generator <				(1/4-20 x 1-1/2")	42	850-0079	1	Washer, Lock - Spring (3/4)
19 220-2353 1 Stator, Exciter - Brushiess Generator 114-0023 1 Stator, Exciter - Brushiess Generator 44 510-0101 1 Bearing, Bail 20 114-0023 4 Screw, Cap - Hex Head, Special - Heat Treated (1/4-20 x 1-1/4") 45 232-2102 1 "Spacer, Sleeve (1/4-20 x 1-1/4") 21 850-0040 4 Washer, Lock - Spring (1/4") 47 201-1723 Brushiess Generators Only (See Separate Group for Components) 23 212-1225 4 Spacer, Sleeve 5/6" OD x 1/32" THK) 48 204-0083 1 "Ring, Collector - Brush Type Generators Only (S-8-11 x 1") 24 526-0016 Washer, Flat (17/64" ID x 9/16" OD x 1/32" THK) 48 204-0083 1 "Ring, Collector - Brush Type Generators 25 212-0342 1 Rig Assembly, Brush (Includes Brush and Springs marked +) - Brush Type Generators 50 805-003 8 Boit, Hex Head - Grade 8 (5/8-11 x 1") 26 212-1105 4 Spring, Brush (1/4-20 x 1-1/4") 51 526-0259 8 "Washer, Flat - Special Hardened Steel (5/8") 28 800-0008 2 Screw, Cap - Hex Head (1/4-20 x 1-1/4") 52 232-2078 1	18	850-0040	4	Washer, Lock - Spring (1/4")	43	526-0238	1	"Washer, Flat - Steel Alloy
20 114-0023 4 Screw, Cap - Hex Head, Special - Heat Treated (1/4-20 x 1-1/4") 45 522-2102 1 "Spacer, Sleeve (1/4-20 x 1-1/4") 21 850-0040 4 Washer, Lock - Spring (1/4") 47 201-1739 1 "Rotor Assembly, Exciter - Brushless Generators Only (See Separate Group for Components) 22 526-0018 4 Washer, Flat (17/64" ID x 5/8" OD x 1/16" THK) 48 204-0083 1 "Ring, Collector - Brush Type Generators Only (See Separate Group for Components) 23 212-1225 4 Spacer, Sleeve 48 204-0083 1 "Ring, Collector - Brush Type Generators Only 24 526-0016 4 Washer, Flat (17/64" ID x 9/16" OD x 1/12" THK) 49 805-0018 8 Boit, Hex Head - Grade 8 (3/8-16 x 1") 25 212-0342 1 Rig Assembly, Brush (Includes Brush and Springs marked +)- Brush Type Generators 50 805-0033 8 "Boit, Hex Head - Grade 8 (5/8-11 x 1") 26 212-1105 4 +Spring, Brush Hardened Steel (5/8") 52 232-2078 1 "Disk, Drive - Generator 28 800-0008 2 Screw, Cap - Hex Head Grade 8 52 232-2078 1 "Disk,	19	220-2353	1	Stator, Exciter - Brushless				(13/16 10 X 2 00 X 3/16 11 K)
20 114-0023 4 Screw, Cap - Hex Head, Special - Heat Treated (1/4-20 x 1-1/4") 45 232-2102 1 Special - Heat Treated (1/4-20 x 1-1/4") 45 232-2102 1 Special - Heat Treated (1/4-20 x 1-1/4") 46 515-0145 1 *Key, Machine (1/4" x 1/4" x 7/8") 21 850-0040 4 Washer, Lock - Spring (1/4") (3/6 - 6 x 1/16") 47 201-1739 1 *Rotor Assembly, Exciter - Brushless Generators Only (See Separate Group for Components) 23 212-1225 4 Spacer, Sleeve 48 204-0083 1 *Ring, Collector - Brush Type Generators Only 24 526-0016 4 Washer, Flat (17/64" ID x 9/16" OD x 1/32" THK) 49 805-0018 8 Bolt, Hex Head - Grade 8 25 212-0342 1 Ring Assembly, Brush (Includes Brush and Springs marked +) - Brush Type Generator 50 805-0033 8 *Bolt, Hex Head - Grade 8 26 212-1105 4 *Spring, Brush (1/4-20 x 1-1/4") 51 526-0259 8 *Washer, Flat - Special Hardened Steel (5/8") 28 800-0008 2 Screw, Cap - Hex Head (1/4-20 x 1-1/4") 52 232-2078 1 *Disk, Drive - Generator				Generator	44	510-0101	1	Bearing, Ball
Special - Heat Treated 46 515-0143 1 Key, Machine (D, X, DY, X/YG) 21 850-0040 4 Washer, Lock - Spring (1/4") 47 201-1739 1 Rotor Assembly, Exciter - Brushless Generators Only (See Separate Group for Components) 23 212-1225 4 Spacer, Sleeve 48 204-0083 1 "Ring, Collector - Brush Type Generators Only 24 526-0016 4 Washer, Flat (17/64" ID x 48 204-0083 1 "Ring, Collector - Brush Type Generators Only 24 526-0016 4 Washer, Flat (17/64" ID x 49 805-0018 8 Bolt, Hex Head - Grade 8 9/16" OD x 1/32" THK) 49 805-0033 8 Bolt, Hex Head - Grade 8 (3/8-16 x 1") 26 212-1105 4 +Spring, Brush 51 526-0259 8 "Washer, Flat - Special Hardened Steel (5/8") 28 800-0008 2 Screw, Cap - Hex Head 52 232-2078 1 "Disk, Drive - Generator (1/4-20 x 1-1/4") 54 ROTOR ASSEMBLY (Includes Parts Marked *) 29 850-0040 2	20	114-0023	4	Screw, Cap - Hex Head,	45	232-2102	1	Spacer, Sieeve *Kov Machina $(1/4" \times 1/4" \times 7/8")$
21 850-0040 4 Washer, Lock - Spring (1/4") 4/ 201-1733 1 Brushless Generators Only 22 526-0018 4 Washer, Flat (17/64" ID x See Separate Group for Components): 23 212-1225 4 Spacer, Sleeve 48 204-0083 1 "Ring, Collector - Brush 24 526-0016 4 Washer, Flat (17/64" ID x 49 805-0018 8 Bolt, Hex Head - Grade 8 25 212-0342 1 Rig Assembly, Brush (Includes Brush and Springs marked +) - 50 805-0018 8 Bolt, Hex Head - Grade 8 26 212-1105 4 +Spring, Brush 51 526-0259 8 "Washer, Flat - Special Hardened Steel (5/8") 27 214-0046 4 +Brush, Generator 52 232-2078 1 Disk, Drive - Generator 28 800-0008 2 Screw, Cap - Hex Head 52 232-2078 1 Disk, Drive - Generator 29 850-0040 2 Washer, Lock - Spring (1/4") 53 205-0089 1 "Fan, Centrifugal - Generator 201 1722 1 <td< td=""><td></td><td></td><td></td><td>Special - Heat Treated</td><td>40</td><td>010-0140 001 1720</td><td>1</td><td>*Potor Assembly Exciter -</td></td<>				Special - Heat Treated	40	010-0140 001 1720	1	*Potor Assembly Exciter -
21 850-0040 4 Washer, Lock - Spring (1/4") Status of the second s				(1/4-20 x 1-1/4")	47	201-1739		Brushless Generators Only
22 526-0018 4 Washer, Flat (17/64" ID x Components) 23 212-1225 4 Spacer, Sleeve 48 204-0083 1 "Ring, Collector - Brush 24 526-0016 4 Washer, Flat (17/64" ID x 49 805-0018 8 Boit, Hex Head - Grade 8 25 212-0342 1 Rig Assembly, Brush (Includes Brush and Springs marked +) - Brush Type Generators 50 805-0033 8 *Boit, Hex Head - Grade 8 26 212-1105 4 +Spring, Brush 51 526-0259 8 "Washer, Flat - Special Hardened Steel (5/8")) 27 214-0046 4 +Brush, Generator 52 232-2078 1 *Disk, Drive - Generator 28 800-0008 2 Screw, Cap - Hex Head 53 205-0089 1 *Fan, Centrifugal - Generator 29 850-0040 2 Washer, Lock - Spring (1/4") 54 ROTOR ASSEMBLY (Includes Parts Marked*) 201 1723 1 75.0DYC-515R 201-1722 1 62.5DYC-515R 31 234-0368 1 Screw, Cap - Hex Head 201-1722 1 60.0DYC	21	850-0040	4	Washer, Lock - Spring (1/4")				(See Separate Group for
23 212-1225 4 Spacer, Sieeve 48 204-0083 1 "Ring, Collector - Brush Type Generators Only 24 526-0016 4 Washer, Flat (17/64" ID x 9/16" OD x 1/32" THK) 49 805-0018 8 Bolt, Hex Head - Grade 8 (3/8-16 x 1") 25 212-0342 1 Rig Assembly, Brush (Includes Brush and Springs marked +) - Brush Type Generators 50 805-0033 8 *Bolt, Hex Head - Grade 8 (3/8-16 x 1") 26 212-1105 4 *Spring, Brush 51 526-0259 8 *Washer, Flat - Special Hardened Steel (5/8") 27 214-0046 4 *Brush, Generator (1/4-20 x 1-1/4") 52 232-2078 1 *Disk, Drive - Generator 28 800-0008 2 Screw, Cap - Hex Head (3/8-16 x 1-1/4") 52 232-2078 1 *Disk, Drive - Generator 29 850-0040 2 Washer, Lock - Spring (1/4") 54 ROTOR ASSEMBLY (Includes Parts Marked*) 201-1722 1 62.5DVC-515R 31 234-0368 1 Screw, Cap - Hex Head (3/8-16 x 1-1/4") 201-1722 1 80.0DVC-515R 32 800-0051 8 Screw, Cap - Hex Head (3/8-16 x	22	526-0018	4	Washer, Flat (17/64" ID x				Components)
23 212-1225 4 Spacer, Sleeve Type Generators Only 24 526-0016 4 Washer, Flat (17/64" ID x 9/16" OD x 1/32" THK) 49 805-0018 8 Bolt, Hex Head - Grade 8 (3/8-16 x 1") 25 212-0342 1 Rig Assembly, Brush (Includes Brush and Springs marked +) - Brush Type Generators 50 805-0033 8 *Bolt, Hex Head - Grade 8 (5/8-11 x 1") 26 212-1105 4 +Spring, Brush 51 526-0259 8 *Washer, Flat 1- Special Hardened Steel (5/8") 27 214-0046 4 +Brush, Generator 52 232-2078 1 *Disk, Drive - Generator 28 800-0008 2 Screw, Cap - Hex Head (1/4-20 x 1-1/4") 53 205-0089 1 *Fan, Centrifugal - Generator 30 862-0001 2 Nut, Hex (1/4-20) 201-1722 1 62.5DYC-515R 31 234-0368 1 Screw, Cap - Hex Head (3/8-16 x 1-1/4") 201-1721 1 62.5DYC-515R 32 800-0051 8 Screw, Cap - Hex Head (3/8-16 x 1-1/4") 201-1722 1 75.0DYC-9KR 33 850-00	00	040 4005		5/8" OD x 1/16" THK)	48	204-0083	1	*Ring, Collector - Brush
24 526-0016 4 Washer, Flat (17/54 ID X 9/16 ² OD x 1/32 ² THK) 49 805-0018 8 Boit, Hex Head - Grade 8 (3/8-16 x 1 ²) 25 212-0342 1 Rig Assembly, Brush (Includes Brush and Springs marked +) - Brush Type Generators 50 805-0033 8 Boit, Hex Head - Grade 8 (3/8-16 x 1 ²) 26 212-1105 4 +Spring, Brush 51 526-0259 8 *Washer, Flat - Special Hardened Steel (5/8 ²) 27 214-0046 4 +Brush, Generator (1/4-20 x 1-1/4 ²) 52 232-2078 1 *Disk, Drive - Generator Hardened Steel (5/8 ²) 28 800-0008 2 Washer, Lock - Spring (1/4 ²¹) 54 ROTOR ASSEMBLY (Includes Parts Marked *) 29 850-0040 2 Washer, Lock - Spring (1/4 ²¹) 54 ROTOR ASSEMBLY (Includes Parts Marked *) 30 862-0001 2 Nut, Hex (1/4-20) 201-1722 1 62.50VC-515R 31 234-0368 1 Screw, Cap - Hex Head (3/8-16 x 1-1/4 ²¹) 201-1722 1 80.0DYC-515R 32 800-0050 8 Washer, Lock - Spring (3/8 ²¹) 201-1722 1 Begin Spec B 33 <td>23</td> <td>212-1225</td> <td>4</td> <td>Spacer, Sleeve</td> <td>10</td> <td>201 0000</td> <td></td> <td>Type Generators Only</td>	23	212-1225	4	Spacer, Sleeve	10	201 0000		Type Generators Only
25 212-0342 1 Rig Assembly, Brush (Includes Brush and Springs marked +) - Brush Type Generators 50 805-0033 8 *Bolt, Hex Head - Grade 8 (5/8-11 x 1") 26 212-1105 4 +Spring, Brush Grade +Spring, Brush Grade 50 805-0033 8 *Bolt, Hex Head - Grade 8 (5/8-11 x 1") 26 212-1105 4 +Spring, Brush Grade +Spring, Brush Grade 51 526-0259 8 *Washer, Flat - Special Hardened Steel (5/8") 27 214-0046 4 +Brush, Generator (1/4-20 x 1-1/4") 51 526-0259 8 *Washer, Flat - Special Hardened Steel (5/8") 28 800-0008 2 Screw, Cap - Hex Head (1/4-20 x 1-1/4") 52 232-2078 1 *Disk, Drive - Generator 30 862-0001 2 Nut, Hex (1/4-20) 54 ROTOR ASSEMBLY (Includes Parts Marked *) 201-1722 1 62.5DYC-515R 31 234-0368 1 Screw, Cap - Hex Head (3/8-16 x 1-1/4") 201-1723 1 75.0DYC-9XR 32 800-0050 8 Washer, Lock - Spring (3/8") 201-1722 1 Begin Spec B 33 850-0050 8 Washer	24	520-0016	4	Washer, Flat (17/64" ID X	49	805-0018	8	Bolt, Hex Head - Grade 8
23 212-0342 1 Hig Assembly, Brush (Includes Brush and Springs marked +) - Brush Type Generators 50 805-0033 8 *Boit, Hex Head - Grade 8 (5/8-11 x 1') 26 212-1105 4 +Spring, Brush 51 526-0259 8 *Washer, Flat - Special Hardened Steel (5/8") 27 214-0046 4 +Brush, Generator 52 232-2078 1 *Disk, Drive - Generator 28 800-0008 2 Washer, Lock - Spring (1/4") 53 205-0089 1 *Fan, Centrifugal - Generator 29 850-0040 2 Washer, Lock - Spring (1/4") 54 ROTOR ASSEMBLY (Includes Parts Marked *) 201-1722 1 62.5DYC-515R 201-1723 1 75.0DYC-515R 30 862-0001 2 Nut, Hex (1/4-20) 201-1722 1 62.5DYC-515R 31 234-0368 1 Screw, Cap - Hex Head (3/8-16 x 1-1/4") 201-1722 1 75.0DYC-515R 32 800-0051 8 Washer, Lock - Spring (3/8") 201-1722 1 Begin Spec B 33 850-0050 8 Washer, Lock - Spring (3/8") 201-1722 1	25	212 0242	1	9/16 UD X 1/32 THK) Big Assembly Brush (Includes				(3/8-16 x 1")
26 212-1105 4 +Spring, Brush 51 526-0259 8 *Washer, Flat - Special Hardened Steel (5/8") 27 214-0046 4 +Brush, Generator 52 232-2078 1 *Disk, Drive - Generator 28 800-0008 2 Screw, Cap - Hex Head (1/4-20 x 1-1/4") 53 205-0089 1 *Fan, Centrifugal - Generator 29 850-0040 2 Washer, Lock - Spring (1/4") 54 ROTOR ASSEMBLY (Includes Parts Marked*) 30 862-0001 2 Nut, Hex (1/4-20) 201-1722 1 62.5DVC-515R 31 234-0368 1 Screw, Cap - Hex Head (3/8-16 x 1-1/4") 201-1727 1 80.0DVC-515R 32 800-0051 8 Screw, Cap - Hex Head (3/8-16 x 1-1/4") 201-1722 1 75.0DVC-515R 33 850-0050 8 Washer, Lock - Spring (3/8") 201-1722 1 Begin Spec B 201-1723 1 90.0DYC-9XR 90.0DYC-9XR 90.0DYC-9XR 90.0DYC-9XR 33 850-0050 8 Washer, Lock - Spring (3/8") 201-1723 1 Begin Spec B 201-1723 <td>25</td> <td>212-0342</td> <td>I</td> <td>Rig Assembly, Brush (Includes</td> <td>50</td> <td>805-0033</td> <td>8</td> <td>*Bolt, Hex Head - Grade 8</td>	25	212-0342	I	Rig Assembly, Brush (Includes	50	805-0033	8	*Bolt, Hex Head - Grade 8
26 212-1105 4 +Spring, Brush 51 526-0259 8 *Washer, Flat - Special Hardened Steel (5/8") 27 214-0046 4 +Brush, Generator 52 232-2078 1 *Disk, Drive - Generator 28 800-0008 2 Screw, Cap - Hex Head (1/4-20 x 1-1/4") 53 205-0089 1 *Fan, Centrifugal - Generator 29 850-0001 2 Washer, Lock - Spring (1/4") 54 ROTOR ASSEMBLY (Includes Parts Marked *) 30 862-0001 2 Nut, Hex (1/4-20) 201-1722 1 62.5DYC-515R 31 234-0368 1 Screen, Air Outlet - Generator 201-1723 1 75.0DYC-515R 32 800-0051 8 Screw, Cap - Hex Head (3/8-16 x 1-1/4") 201-1722 1 80.0DYC-515R 33 850-0050 8 Washer, Lock - Spring (3/8") 201-1722 1 Begin Spec B 201-1723 1 Spec A 201-1723 1 Begin Spec B 201-1723 1 Begin Spec B 201-1723 1 Begin Spec B 201-1723 1 Begin Spec A 2				Brush Type Generators				(5/8-11 x 1″)
27 214-0046 4 +Brush, Generator Hardened Steel (5/8") 28 800-0008 2 Screw, Cap - Hex Head 52 232-2078 1 *Disk, Drive - Generator 29 850-0040 2 Washer, Lock - Spring (1/4") 54 ROTOR ASSEMBLY (Includes Parts Marked *) 30 862-0001 2 Nut, Hex (1/4-20) 201-1722 1 62.5DYC-515R 31 234-0368 1 Screen, Air Outlet - 201-1723 1 75.0DYC-515R 32 800-0051 8 Screw, Cap - Hex Head 201-1722 1 80.0DYC-515R 33 850-0050 8 Washer, Lock - Spring (3/8") 201-1722 1 Begin Spec B 201-1723 1 90.0DYC-15R 90.0DYC-15R 90.0DYC-9XR 33 850-0050 8 Washer, Lock - Spring (3/8") 201-1722 1 Begin Spec B 201-1723 1 90.0DYC-9XR 90.0DYC-9XR 90.0DYC-9XR 90.0DYC-15R 201-1727 1 100.0DYC-9XR 201-1727 1 100.0DYC-9XR 201-1724 1 100.0DYC-9XR	26	212-1105	4	+Spring Brush	51	526-0259	8	*Washer, Flat - Special
28 800-0008 2 Screw, Cap - Hex Head (1/4-20 x 1-1/4") 52 232-2078 1 *Disk, Drive - Generator 29 850-0040 2 Washer, Lock - Spring (1/4") 53 205-0089 1 *Fan, Centrifugal - Generator 30 862-0001 2 Nut, Hex (1/4-20) 201-1722 1 62.5DYC-515R 31 234-0368 1 Screw, Cap - Hex Head (3/8-16 x 1-1/4") 201-1723 1 75.0DYC-515R 32 800-0051 8 Screw, Cap - Hex Head (3/8-16 x 1-1/4") 201-1722 1 80.0DYC-515R 33 850-0050 8 Washer, Lock - Spring (3/8") 201-1722 1 Begin Spec B 33 850-0050 8 Washer, Lock - Spring (3/8") 201-1722 1 Begin Spec B 34 90.0DYC-15R 90.0DYC-15R 90.0DYC-9XR 90.0DYC-15R 201-1723 1 Begin Spec B 201-1723 1 Begin Spec A 201-1723 1 Begin Spec B 201-1723 1 Begin Spec A 201-1727 1 100.0DYC-9XR 201-1724 1 100.0DYC-9XR	27	214-0046	4	+Brush Generator				Hardened Steel (5/8")
29 850-0040 2 Washer, Lock - Spring (1/4") 53 205-0089 1 *Fan, Centrifugal - Generator 30 862-0001 2 Nut, Hex (1/4-20) 54 ROTOR ASSEMBLY (Includes Parts Marked*) 31 234-0368 1 Screen, Air Outlet - Generator 201-1722 1 62.5DYC-515R 32 800-0051 8 Screw, Cap - Hex Head (3/8-16 x 1-1/4") 201-1727 1 80.0DYC-515R 33 850-0050 8 Washer, Lock - Spring (3/8") 201-1722 1 75.0DYC-9XR 33 850-0050 8 Washer, Lock - Spring (3/8") 201-1722 1 Begin Spec B 34 90.0DYC-15R 201-1723 1 90.0DYC-9XR 90.0DYC-9XR 90.0DYC-15R 201-1723 1 Begin Spec B 201-1723 1 Begin Spec B 201-1723 1 100.0DYC-9XR 201-1723 1 00.0DYC-9XR 90.0DYC-15R 201-1723 1 Begin Spec A 201-1727 1 100.0DYC-9XR 201-1727 1 100.0DYC-9XR 201-1727 1 100.0DYC-9XR	28	800-0008	2	Screw, Cap - Hex Head	52	232-2078	. 1	*Disk, Drive - Generator
29 850-0040 2 Washer, Lock - Spring (1/4") 54 ROTOR ASSEMBLY (Includes Parts Marked*) 30 862-0001 2 Nut, Hex (1/4-20) 201-1722 1 62.5DYC-515R 31 234-0368 1 Screen, Air Outlet - Generator 201-1723 1 75.0DYC-515R 32 800-0051 8 Screw, Cap - Hex Head (3/8-16 x 1-1/4") 201-1722 1 80.0DYC-515R 33 850-0050 8 Washer, Lock - Spring (3/8") 201-1722 1 Begin Spec B 201-1723 1 Spec A 201-1723 1 Spec A 201-1723 1 Spec B 201-1723 1 Begin Spec B 201-1723 1 90.0DYC-9XR 90.0DYC-9XR 90.0DYC-9XR 90.0DYC-15R 201-1723 1 Begin Spec B 201-1723 1 Begin Spec B 201-1727 1 100.0DYC-9XR 201-1727 1 100.0DYC-9XR 201-1727 1 100.0DYC-9XR 201-1727 1 100.0DYC-9XR			_	$(1/4-20 \times 1-1/4")$	53	205-0089	1	*Fan, Centrifugal - Generator
30 862-0001 2 Nut, Hex (1/4-20) 201-1722 1 62.5DYC-515R 31 234-0368 1 Screen, Air Outlet - Generator 201-1723 1 75.0DYC-515R 32 800-0051 8 Screw, Cap - Hex Head (3/8-16 x 1-1/4") 201-1722 1 80.0DYC-515R 33 850-0050 8 Washer, Lock - Spring (3/8") 201-1722 1 Begin Spec B 201-1723 1 90.0DYC-9XR 90.0DYC-515R 201-1723 1 Begin Spec B 201-1647 1 Spec A 201-1727 1 100.0DYC-9XR 201-1724 1 100.0DYC-15R	29	850-0040	2	Washer, Lock - Spring (1/4")	54	ROTORAS	SSEMBLY (Includes Parts Marked *)
31 234-0368 1 Screen, Air Outlet - Generator 201-1723 1 75.0DYC-515R 32 800-0051 8 Screw, Cap - Hex Head (3/8-16 x 1-1/4") 201-1722 1 80.0DYC-515R 33 850-0050 8 Washer, Lock - Spring (3/8") 201-1722 1 Begin Spec B 201-1723 1 90.0DYC-15R 201-1723 1 Spec A 201-1723 1 Begin Spec B 201-1727 1 100.0DYC-9XR 201-1724 1 100.0DYC-9XR	30	862-0001	2	Nut, Hex (1/4-20)		201-1722	1	62.5DYC-515H
Generator 201-1727 1 80.0DVC-515R 32 800-0051 8 Screw, Cap - Hex Head (3/8-16 x 1-1/4") 201-1722 1 75.0DVC-9XR 33 850-0050 8 Washer, Lock - Spring (3/8") 201-1722 1 Begin Spec B 201-1723 1 90.0DVC-9XR 201-1723 1 90.0DVC-9XR 201-1723 1 Begin Spec B 201-1646 1 Spec A 201-1723 1 Begin Spec B 201-1647 1 Spec A 201-1647 1 Spec A 201-1727 1 100.0DYC-9XR 201-1727 1 100.0DYC-9XR 201-1724 1 100.0DYC-15R	31	234-0368	1	Screen, Air Outlet -		201-1723]	75.00YC-515H
32 800-0051 8 Screw, Cap - Hex Head (3/8-16 x 1-1/4") 201-1/22 1 /5.0DYC-9XH 75.0DYC-15R 33 850-0050 8 Washer, Lock - Spring (3/8") 201-1722 1 Begin Spec B 201-1723 1 90.0DYC-9XR 90.0DYC-15R 90.0DYC-15R 201-1723 1 Begin Spec B 201-1647 1 Spec A 201-1647 1 Spec A 201-1727 1 100.0DYC-9XR 201-1724 1 100.0DYC-15R				Generator		201-1727	1	80.0DYC-515H
(3/8-16 x 1-1/4") 75.00 YC-15R 33 850-0050 8 Washer, Lock - Spring (3/8") 201-1722 1 Begin Spec B 201-1723 1 90.00 YC-95R 90.00 YC-15R 201-1723 1 Begin Spec B 201-1647 1 Spec A 201-1727 1 100.00 YC-95R 201-1724 1 100.00 YC-95R	32	800-0051	8	Screw, Cap - Hex Head		201-1/22	1	
33 850-0050 8 Washer, Lock - Spring (3/8") 201-1722 1 Begin Spec B 201-1646 1 Spec A 201-1723 1 90.0DYC-9XR 90.0DYC-15R 201-1647 1 Begin Spec B 201-1647 1 Spec A 201-1723 1 100.0DYC-9XR 201-1724 1 100.0DYC-15R				(3/8-16 x 1-1/4")				75.00 FC-15R
201-1646 1 Spec A 201-1723 1 90.0DYC-9XR 90.0DYC-15R 201-1723 1 Begin Spec B 201-1647 1 Spec A 201-1727 1 100.0DYC-9XR 201-1724 1 100.0DYC-15R	33	850-0050	8	Washer, Lock - Spring (3/8")	·	201-1722		Begin Spec b
201-1723 1 90.0DYC-9XH 90.0DYC-15R 201-1723 1 Begin Spec B 201-1647 1 Spec A 201-1727 1 100.0DYC-9XR 201-1724 1 100.0DYC-15R				•		201-1646		
201-1723 1 Begin Spec B 201-1647 1 Spec A 201-1727 1 100.0DYC-9XR 201-1724 1 100.0DYC-15R						201-1/23	1	90.0DYC-15R
201-1647 1 Spec A 201-1727 1 100.0DYC-9XR 201-1724 1 100.0DYC-15R					,	201-1723	1	Begin Spec B
201-1727 1 100.0DYC-9XR 201-1724 1 100.0DYC-15R						201-1647	1	Spec A
201-1724 1 100.0DYC-15R						201-1727	1	100.0DYC-9XR
						201-1724	1	100.0DYC-15R

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† - Included in Overspeed Contact Assembly No. 150-1456.
+ - Included in Brush Rig Assembly No. 212-0342.
* - Included in Generator Rotor Assembly.
£ - Refer to Factory giving Complete Model, Spec and Serial Number from nameplate.

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VOLTAGE REGULATOR GROUP

REF.	PART NO.	QTY. USED	PART DESCRIPTION	
۲	CHASSIS AS	SSEMBLY	VOLTAGE REGULATOR	
	(Complete)		• • • • • •	
	305-0491		Brushless Generator (Includes	
			Parts Marked *)	
	305-0489	1	Brush Type Generator (Includes	
			Parts Marked †)	
1	305-0482	1	*†Chassis, Voltage Regulator	
2	358-0029	1	*†Rectifier, Silicon (CR3)	
3	RECTIFIER,	SILICON	CONTROLLED	
•	364-0014	2 `	*Brushless Generator (Q4 & Q5)	
	364-0012	2	†Brush Type Generator (Q4 & Q5)	
4	RECTIFIER,	SILICON		
	358-0035	2	*Brushless Generator (CR1 & CR2)	
	358-0031	2	+Brush Type Generator (CR1 & CR2)	
5	363-0048	3	*†Heat Sink, Rectifier	
6	332-1265	6	*†Insulator, Stand off	-
7	812-0077	6	*†Screw, Roundhead - Heat Sink	
	•		Mtg. (8-32 x 3/8")	
8	853-0005	6	*†Washer, Lock - ET - Heat	
			_ Sink Mtg. (#8) 🖛	
9	812-0077	6	*†Screw, Machine Roundhead -	
			Stand off Insulator Mtg.	
			(#8-32 × 3/8'')	
10	853-0005	6	*†Washer, Lock - ET	
		_	Stand off Insulator Mtg. (#8)	
11	871-0010	3	*†Nut, Hex - Rectifier Mounting	
10	500 0000	~	(CR1, CR2 & CR3) (#10-32)	
12	526-0009	3	"†Washer, Flat (7/32" I.D. x1/2" O.D.	
	•		x 1/16" Thick) - Rectifier Mtg.	
40	050 0000	•	(CR1, CR2 & CR3)	
13	850-0030	3	Twasher, Lock - Spring - Hectifier	
	040 0070	•	Mtg. (CH1, CH2 & CH3) (#10)	
14	812-0079	2	*†Screw, Machine - Roundhead -	
			Rectifier Lead to Heat Sink	
15	500 0040	ġ	(#8-32 x 1/2")	
15	526-0048	2	Twasner, Flat (Brass) (.1/2" I.D.	
16	952 0005	2	x 3/8" O.D. x 1/32" Inick)	•
10	000-0005	2	Twasner, Lock - E1 - Hectifier	•
			Lead to Heat Sink (#8)	

REF. NO.	PART NO.	QTY.	PART DESCRIPTION
17	871-0007	2	*†Nut, Hex - Rectifier Lead to Heat Sink (#8-32)
18	812-0079	1	*†Screw, Machine Roundhead - Terminal Block Lead to Heatsink (#8-32 x 1/2")
19	853-0005	1	*†Washer, Lock - ET - Terminal Block to Heat Sink (#8)
20	871-0007	1	*†Nut, Hex - Terminal Block Lead to Heat Sink (#8-32)
21	508-0002	2	*†Grommet Bubber
22	332-1415	1	*tClamp_Cable
23	332-1266	· ·	*tBlock Terminal
24	812-0081	2	*tScrew Machine - Boundhood
-	0.2.0001	2	Terminal Block Mounting (#8-32 x 5/8")
25	853-0005	2 .	*†Washer, Lock - ET - Terminal Block Mounting (#8)
26	860-0008	2	*†Nut, Hex - Terminal Block Mounting (#8-32)
27	BEACTOR AS	SEMBL	
	315-0343	1	*Brushless Generator
	315-0341	1	+Brush Type Generator
28	812-0077	2	*†Screw, Machine - Roundhead - Beactor Mtg. (#8-32 x 3/8")
29	853-0005	2	*†Washer, Lock - ET - Reactor Mounting (#8)
30	860-0008	2	*†Nut. Hex - Reactor Mtg. (#8-32)
31	150-0723	1	*†Point, Contact - Overspeed Switch
32	862-0001	2	*†Nut, Hex - Contact Point (1/4-20)
33	853-0013	1	*†Washer, Lock - ET Contact Point (1/4)
34	870-0250	2	*†Nut, Insulator - Contact Point (1/4)
35	332-1043	2	*†Jumper - Terminal Block

Parts included in 305-0491 Voltage Regulator.
 Parts included in 305-0489 Voltage Regulator.

EXCITER ROTOR GROUP





REF. NO.	NO.	USED	PART DESCRIPTION	•	REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1.	358-0016	3 ·	Rectifier, Diode - Positive	·.	14	526-0009	4	Washer Flat (7/32" ID v
2	358-0015	3	Rectifier, Diode - Negative				•••	1/2" OD v 1/16" THK
3	870-0053	6	Nut, Hex (#10-32)		12	332-0050	2	
4	850-0030	- 6	Washer, Lock - Spring (#10)		13	508-0124	4	Spacer Stenned
5	508-0093	- 2	Grommet, Rubber	•	14·	508-0156	4	Washer Flat - Fiber
6	813-0100	2	Screw, Machine - Round Head	•	;			(19/64" ID x 1-7/8" OD x 1/8" THK)
	· ·		(#10-32 x 1/2")		15	850-0030	5	Washer, Lock - Spring (#10)
7	526-0008	2	Washer, Flat (13/64"-ID x		16	870-0053	4	Nut. Hex (#10-32)
			7/16" OD x 1/32" THK)		. 17	363-0054	1	Heat Sink, Rectifier -
8	850-0030	2	Washer, Lock - Spring (#10)			· .		Positive
9	870-0053	2	Nut, Hex (#10-32)	• .	18	363-0055	1	Heat Sink, Rectifier -
10	813-0110	.4	Screw, Machine - Round Head	•			•	Negative
			(#10-32 x 2")		19	201-1737	1	Rotor, Exciter

HOUSING GROUP (Housed Sets) - OPTIONAL EQUIPMENT



····· RE	F. PART	QTY. USÉD	DESCRIPTION	RI N	EF. O.	PART NO.	QTY. USED	PART DESCRIPTION
·	HOUSED S parts and ur (Chassis, ore	ETS - OPTIC nhoused set	ONAL (Includes following items indicated in	١				
1	813-0098	16	Screw, Machine - Round	17	870	-0106	3	Nut. Spring Sheet (#14)
· •			Head (#10-32 x 3/8")	18	405	-1777	1	Door. Access - Rear
2	850-0030	16	Washer, Lock - Spring (#10)	19	821	-0014	2	Screw, Self-locking - Hex
3	870-0053	16	Nut, Hex (#10-32)				-	Head (5/16-18 x 1/2")
- 4	406-0105	8	Clamp, Door	20	813	-0098	6	Screw Machine - Bound
5	405-1838	2	Door, Louvered - Engine	5 m			•	Head (#10-32 x 3/8")
		•	Section	21	850	-0030	6	Washer Lock - Spring (#10)
6	405-1838	2	Door, Louvered - Generator	22	405	-1780	1	Panel, Access - Rear
			Section	23	821	-0014	. 4	Screw, Self-locking - Hex
7	821-0014	8	Screw, Self-locking - Hex					Head (5/16-18 x 1/2")
			Head (5/16-18 x 1/2")	24	405-	1775	1	Panel, Housing - Rear
8	821-0016	4	Screw, Self-locking - Hex	25	821-	-0010	8	Screw Solf looking
			Head (5/16-18 x 3/4")				•	Head (1/4-20 x 1/0")
9	870-0113	4	Nut, Clinch (5/16-18)	· 26	403-	0895	2	Plate Cover
10	821-0014	. 6	Screw, Self-locking - Hex	27	800-	0048	6	Screw Can - Hex Hond
	070 0110	•	Head (5/16-18 x 1/2")					(3/8-16 x 3/4")
ļi,	870-0113	6	Nut, Clinch (5/16-18)	28	850-	0050	6	Washer Lock - Spring (2/8)
12	405-177£	. 2	Support, Housing - Center	29	403-	0894	1	Adapter Chassis - Boar
13	405-1839	1	Panel, Housing - Top					icapitol, chassis - Heal
14	406-0157	1	Handle, Latch (with Keys)	· ·				-
15	406-0089	1	Catch, Latch					•
16	821-0006	. 3	Screw, Tapping - Pan Head (#14 x 1/2")					

FUEL TANK AND SUB BASE GROUP - OPTIONAL EQUIPMENT



REF NO	NO.	QTY. USED	PART DESCRIPTION	REF. NO.	PART	QTY. USED	PART DESCRIPTION
1	159-1007	2	Strap, Hold-down - Fuel Tank	·	ATTACHI		
2	502-0005	•1	Elbow		(Select as	Applicable)	
3	501-0196	1	Line, Fuel - Flexible		800-0050	As Read	Screw Can - Hex Head
4	505-0018	1	Bushing, Reducer		• • • • • • •	. Io Moqu	(3/8-16 x 1")
5	415-0318	1	Pipe, Suction		800-0051	As Read	Screw Can - Hey Head
6	505-0334	1 '	Plug, Pipe				$(3/8-16 \times 1-1/4'')$
7	502-0002	· 1 ·	Elbow		800-0091	As Read	Screw Can - Hex Head
8 .	501-0103	1	Line, Fuel - Flexible		·····		$(1/2-13 \times 1-1/4'')$
9	193-0217	1	Gauge, Liquid Level		821-0016	As Reod	Screw Self-locking -
10	159-0020	1.	Cap, Tank				Hex Washer Head
11	505-0247	1	Plug, Pipe				(5/16-18 x 3/4")
12 :	159-1006	1	Tank, Fuel - 58 Gallon		850-0050	As Read	Washer, Lock - Spring (3/8"
13	159-1005	2	Stop, Fuel Tank		850-0060	As Read	Washer Lock - Spring (1/2"
14	403-1009	2	Plate, End - Sub Base	•	526-0219-	As Read	Washer, Elat (17/32" ID x
15	403-1006	1	Base, Sub - Fuel Tank				1" OD x 1/8" THK)
	•	-			862-0003	As Read	Nut. Hex (3/8-16)
					862-0016	As Read	Nut Her (1/2-13)

PRINTED CIRCUIT BOARD ASSEMBLY GROUP (332-1956) BEGIN SPEC G



REF. NO.	PART NO.	QTY. USED	PART	REF. NO.	PART NO.	QTY. USED	PART
	332-1956	1	Board Assembly, Printed - Complete	R11	352-0151	1	Resistor - Fixed 5 Watt, 15.000-Ohm
C1,14	355-0042	2	Capacitor - 47 Mfd, 250 Volt	R12	351-0909	1	Resistor - 1/2 Watt. 90.900-Ohm
C2, C7	355-0043	2	Capacitor - 22 Mfd, 250 Volt	R13	350-0411	1	Resistor - 1/2 Watt, 10 000-Ohm
C3	355-0047	1	Capacitor - 47 Mfd, 400 Volt	B14	350-0443	1	Besistor - 1/2 Watt, 220 000-Ohm
C4, C12	355-0044	2	Capacitor - 47 Mfd, 250 Volt	R15, R27	350-0435	2	Resistor - 1/2 Watt, 100,000-Ohm
C5, C8	355-0046	2	Capacitor - 1 Mfd, 100 Volt	B17	351-0521	1	Resistor Metal Film -
C6	355-0056	1	Capacitor33 Mfd, 250 Volt			•	1/4 Watt 12 100-Ohm
C11	355-0048	1	Capacitor - 1 Mfd, 400 Volt	R18	303-0210	1	Potentiometer - 5 000-Ohm 1/2 Watt
C13	356-0039	1	Capacitor - Electrolytic	B20, 22		•	
			100 Mfd, 10 Volt	29 & 30	351-0520	4	Resistor - 1/4 Watt 28 000-Ohm
CR3				B21	351-0522	1	Besistor - Metal Film -
Thru 11	357-0014	9	Rectifier - Silicon			•	1/4 Watt 5 110-Ohm
CR12	359-0036	1	Diode - Zener 5.6 Volt	R24	351-0523	1	Besistor - Metal Film -
CR13	359-0025	. 1	Diode - Zener 20 Volt	••=•	001 0020	•	1/4 Watt 8 870-Ohm
CB14	359-0026	1	Diode - Zener 18 Volt	B25, B31	350-1011	2	Resistor - 2 Watt 10 000-Obm
F1, F2, F3	321-0204	3	Fuse 1/4 Amp	B26	303-0211		Potentiometer - 1/2 Watt
1C1	367-0005	1	Integrated Circuit		000 0211		100.000-Ohm
Q2	362-0017	1	Transistor - Silicon NPN	R28	350-0568	· •	Resistor - 1/2 Matt 47 Mag Ohm
0 3	361-0004	1	Transistor - Unijunction	TB1	332-1252		Terminal Block
R1	350-0355	1	Resistor - 1/2 Watt, 47-Ohm	CB15	359-0015	1	Diodo Zonor 24 Volt
R2. R3	350-0351	2	Resistor - 1/2 Watt, 33-Ohm		321-0163	6	
R4	350-1075	1	Resistor - 2 Watt. 4.7 Meg-Ohm	K1	307-1063	1	Pelay Magnetic Deed
R5	353-0040	1	Resistor - Fixed 10 Watt.	R9	350-1014	1	Resistor 2 Wett 12 000 Ohm
			270-Ohm	B19	350-1007	1	Resistor - 2 Watt, 13,000-Onm
R6	353-00 39	1	Resistor - Fixed 15 Watt, 5,000-Ohm			. '	
R7	350-0398	1	Resistor - 1/2 Watt, 3,000-Ohm				
R8. R16	350-0447	2	Resistor - 1/2 Watt, 330,000-Ohm				
B10	351-0885	· 1	Resistor - 1/2 Watt 51 100-Ohm				-

ENGINE CONTROL MONITOR GROUP (STANDARD SETS WITH ONE FAULT LIGHT) 24 VOLT - BEGIN SPEC G



QTY. USED

PART NO.

REF. NO. PART DESCRIPTION

	300-0680	1	Printed Circuit Board - Complete
510	303-0182	.1	Potentiometer (1.0 Megohm)
25. 6	362-0031	2	Transistor, Field Effect
33	350-0548	1	Resistor (10,000-Ohm)
R17 .	350-0980	1	Resistor (510-Ohm)
112	350-0380	1.1	Resistor (510-Ohm)
R15, R16	350-0544	· 2	Resistor (4,700-Ohm)
313, 14	350-0529	· 2	Resistor (270-Ohm)
R11 (350-0587	1	Resistor (18 Megohm)
19	350-0517	1	Resistor (27-Ohm)
78 · ·	350-0505	1	Resistor (2.7-Ohm)
75	350-0572	1 .	Resistor (1.0 Megohm)
74	303-0169	1	Potentiometer (3.5 Megohm)
76	350-0552	• 1	Resistor (22,000-Ohm)
32 .	350-0534	1	Resistor (680-Ohm)
R1, R7	350-0536	2	Resistor (1000-Ohm)
Q7, Q8	362-0027	2 ·	Transistor, Silicon
22, 3	362-0025	· 2	Transistor, Field Effect
Q1. Q4	361-0003	2	Transistor
CR6	364-0011	i 1.	Rectifier, Gate Control
ĆR2.3.4.	· ·		
5,7.	357-0004	5	Rectifier, Diode
CR1	359-0027	1	Diode, Zener
C4 . ·	356-0030	1	Capacitor (1 Mfd.)
C3	356-0040	1	Capacitor (10 Mfd.)
C2.5	355-0005	2	Capacitor (.22 Mfd.)
K1	307-1076	1	Relay
			• ·

ENGINE CONTROL MONITOR GROUP (PENN STATE) 24 VOLT - BEGIN SPEC G



NO.	PART NO.	QTY. USED	PART DESCRIPTION
	300-0731	1	Printed Circuit Board, Complete
R11	350-0980	1 ·	Resistor (510-Ohm, 2 Watt)
R8 ·	350-0380	1	Resistor (510-Ohm, 1/2 Watt)
R10	350-0544	1	Resistor (4,700-Ohm)
R9	350-0529	1	Resistor (270-Ohm)
R7	350-0517	1.	Resistor (27-Ohm)
R6	350-0505	1	Resistor (2:7-Ohm)
R5	350-0572	1	Resistor (1.0 Megohm)
R4	303-0169	1	Potentiometer
R3	350-0552	1	Resistor (22,000-Ohm)
R2	350-0534	1	Resistor (680-Ohm)
R1	350-0536	1	Resistor (1000-Ohm)
Q4	362-0027	1	Transistor, Silicon
Q2, Q3	362-0025	2	Transistor, Field Effect
Q1	361-0003	1	Transistor
CR7	364-0011	1	Rectifier, Gate Control
CR2	359-0027	1	Diode, Zener
CR1,3,4,	•		
5,6	357-0004	5	Rectifier, Diode
C3	356-0040	1	Capacitor (10 Mfd.)
C2, 5	355-0005	2	Capacitor (.22 Mfd.)
K1, K2	307-1076	2	Relay

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ENGINE CONTROL MONITOR GROUP — 24 VOLT - OPTIONAL EQUIPMENT (5 Fault Lights) - BEGIN SPEC G



ENGINE CONTROL MONITOR GROUP — 24 VOLT - OPTIONAL EQUIPMENT (5 Fault Lights) - BEGIN SPEC G

REF.		QTY.		REF.	PART NO.	QTY. USED	
NO.		USED	Description	R1	350-0534	1	Hesistor, Composition
	300-0682		Monitor, Engine Control - 24 Volt - Optional (5 Fault	R2	303-0169	1	(680-Ohm, 1/2 Watt, 10%) Potèntiometer (3.5 Megohm
C1	356-0040	1	Light Sets) Capacitor, Electrolytic	R3	350-0572	1	1/4 Watt, 30%) Resistor, Composition
C2	355-0005	1	Capacitor, Plastic Dielectric	R4	350-0517	1	(1 Megohm, 1/2 Watt, 10%) Resistor, Composition
C3	355-0005	1	Capacitor, Plastic Dielectric	R5	350-0536	1	(27-Ohm, 1/2 Watt, 10%) Resistor, Composition
C4	356-0030	1	Capacitor, Electrolytic	R6	350-0548	1	(1000-Ohm, 1/2 Watt, 10%) Resistor, Composition
C5	355-0005	1	Capacitor, Plastic Dielectric	R7	350-0505	1	(10,000-Ohm, 1/2 Watt, 10%) Resistor, Composition
C6	355-0005	1	Capacitor, Plastic Dielectric (.22 Mfd, 200 VDC, 10%)	R8	350-0529	1	(2.7-Ohm, 1/2 Watt, 10%) Resistor, Composition
C7	355-0005	1	Capacitor, Plastic Dielectric (.22 Mfd, 200 VDC, 10%)	R9	350-0544	1	(270-Ohm, 1/2 Watt, 10%) Resistor, Composition
C8	355-0005	1	Capacitor, Plastic Dielectric (.22 Mfd, 200 VDC, 10%)	R10	350-0686	1	(4700-Ohm, 1/2 Watt, 10%) Resistor, Composition
CR1	357-0004	1	Diode, Rectifier (400 MA, 400 Volt)	R11	350-0529	1	(910-Ohm, 1 Watt, 5%) Resistor, Composition
CR2	357-0004	1	Diode, Rectifier (400 MA, 400 Volt)	R12	350-0552	1	(270-Ohm, 1/2 Watt, 10%) Resistor, Composition
CR3	357-0004	1	Diode, Rectifier (400 MA, 400 Volt)	R13	350-0505	1	(22,000-Onm, 1/2 Watt, 10%) Resistor, Composition
CR4	357-0004	1	Diode, Rectifier (400 MA, 400 Volt)	R14	350-0536	1	Resistor, Composition
CR5	357-0004	1	Diode, Rectifier (400 MA, 400 Volt)	R15	303-0182	1	Potentiometer (1 Megohm, 1/2 Watt, 10%)
CR6	357-0004	1	Diode, Rectifier (400 MA, 400 Volt)	R16	350-0517	1	Resistor, Composition
CR7	357-0004	1	Diode, Rectifier (400 MA, 400 Volt)	R17	350-0544	1	Resistor, Composition
CR8	357-0004	1	Diode, Rectifier (400 MA, 400 Volt)	R18	350-0544	1	Resistor, Composition
CH9	359-0027	1	Diode, Zener (1 Watt, 7.5 Volt, 5%)	R19	350-0517	1	Resistor, Composition (27-Ohm 1/2 Watt 10%)
CR10 CR11	364-0011 357-0004	1	Diode, Rectifier Diode, Rectifier	R20	350-0529	1	Resistor, Composition (270-Ohm, 1/2 Watt, 10%)
CR12	357-0004	1	(400 MA, 400 Volt) Diode, Rectifier	R21	350-0380	1	Resistor, Composition. (510-Ohm, 1/2 Watt, 5%)
CR13	357-0004	1	Diode, Rectifier	R22	350-0505	1	Resistor, Composition (2.7-Ohm, 1/2 Watt, 10%)
CR14	357-0004	1	Diode, Rectifier	R23	350-0529	1	Resistor, Composition (270-Ohm, 1/2 Watt, 10%)
CR15	357-0004	1	Diode, Rectifier	R24	350-0529	1	Resistor, Composition (270-Ohm, 1/2 Watt, 10%)
CR16	357-0004	1	Diode, Rectifier (400 MA, 400 Voit)	R25	350-0389	1	Resistor, Composition (1200-Ohm, 1/2 Watt, 5%)
CR17 CB18	364-0011	1	Diode, Rectifier (.8 Amp, 30 Volt)	R26	350-0686	1	Resistor, Composition (910-Ohm, 1 Watt, 5%)
CR19	357-0004	1	Diode, Rectifier (400 MA 400 Volt)	R27	350-0529	1	Resistor, Composition (270-Ohm, 1/2 Watt, 10%)
CR20 CR21	364-0011 357-0004	1	Diode, Rectifier (.8 Amp, 30 Volt)	R28	350-0529	1	Resistor, Composition (270-Ohm, 1/2 Watt, 10%)
K1	307-1076	· · 1	(400 MA, 400 Volt) Belay, Armature (24 Volt)	R29	350-0544	1	Resistor, Composition (4700-Ohm, 1/2 Watt, 10%)
K2 Q1	307-1076 362-0025	1	Relay, Armature (24 Volt) Transistor	R30	350-0505	1	Resistor, Composition (2.7-Ohm, 1/2 Watt, 10%)
Q2 Q3	362-0025 361-0003	1	Transistor Transistor	R31	350-0380	1	Resistor, Composition (510-Ohm, 1/2 Watt, 5%)
Q4 Q5	362-0027 362-0027	1	Transistor Transistor	R32	350-0544	1 .	Resistor, Composition (4700-Ohm, 1/2 Watt, 10%)
Q6 Q7	362-0027 362-0031	1	Transistor Transistor	R33	350-0529	1	Resistor, Composition (270-Ohm, 1/2 Watt, 10%)
Q8 .	362-0031	i	Transistor	R34	350-0517	1	Resistor, Composition
Q9 Q10	361-0003 362-0027	1	Transistor Transistor	R35	350-0980	1	Resistor, Composition
Q11	362-0027	1	Transistor	D36	350 05 40	4	(510-Ohm, 2 Watt, 5%)
Q12	362-0027	1	Transistor	130	330-0340	I.	(2200-Ohm 1/2 Watt 10%)
Q14	362-0027 362-0027	· 1 1	Transistor Transistor	S1	308-0280	1	Switch, Push - DPDT (1A, 28 VDC/.45A, 115 VAC)

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CYCLE CRANKER CONTROL GROUP-24 VOLT-OPTIONAL EQUIPMENT BEGIN SPEC G



REF. NO.	PART NO.	OTY. USED	PART DESCRIPTION
· .	300-0715	1	Printed Circuit Board, Complete
C4	355-0010	· 1.	Capacitor, Composition (.0022 Mfd, 100 Volt DC)
C3	· 356-0045	1	Capacitor, Electrolytic (.25 Mfd, 15 Volt)
C2 -	355-0029	1	Capacitor, Composition (.015 Mfd, 100 Volt)
R11	352-0135	1	Resistor, Fixed (5 Watt, 100-Ohm)
R10	350-0500	1.	Resistor, Fixed - Composition (1.0-Ohm)
R8	350-0534	1	Resistor, Fixed (6.8-Ohm)
R7	350-0546	1	Resistor, Fixed - Composition (6.800-Ohm)
R6	350-0420	1	Resistor, Fixed - Composition (24,000-Ohm)
R5	350-0558	1	Resistor, Fixed - Composition (68,000-Ohm)
R3, R9	350-0548	2	Resistor, Fixed - Composition (10.000-Ohm)
R2	350-0550	、1	Resistor, Fixed - Composition (100,000-Ohm)
R1, R4	303-0171	2	Potentiometer (100,000-Ohm)
Q5	362-0033	1	Transistor, Power
Q4	362-0026	1	Transistor, Signal
Q3	362-0011	1 .	Transistor
Q1, Q2	362-0008	2	Transistor, Signal
CR2,3,4	.357-0004	3	Rectifier, Diode
CR1	. 359-0027	1	Diode, Zener
C1:	356-0039	1	Capacitor, Electrolytic



CRANKER CONTROL GROUP-24 VOLT-STANDARD BEGIN SPEC G



PRINTED CIRCUIT BOARD ASSEMBLY GROUP SPEC A THROUGH F



REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION	REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
тві	332-1252	1	Terminal Block	R6	353-0039	1	Resistor, Fixed (5,000-Ohm,
C1	355-0018	1	Capacitor (.47 Mfd., 100 Volt)	•	•		15 Watt)
C2, C7	355-0005	2 '	Capacitor (.22 Mfd., 200 Volt)	· . R7	350-0398	. 1	Resistor (3,000-Ohm, 1/2 Watt)
C3, C9	355-0017	2	Capacitor (.47 Mfd., 400 Volt)	R8, R16	350-0447	2	Resistor (330,000-Ohm, 1/2 Watt)
C4. C12	355-0006	2	Capacitor (.47 Mfd., 200 Volt)	R9, R10	350-0423	2	Resistor (33,000-Ohm, 1/2 Watt)
C5. C8	355-0016	2	Capacitor (1 Mfd., 100 Volt)	R11 R12	352-0151	. 2	Resistor, Fixed (15,000-
C6	355-0015	1	Capacitor (.1 Mfd., 200 Volt)				Ohm, 5 Watt)
C10	355-0014	-1	Capacitor (:047 Mfd., 200 Volt)	R13	350-1007	1	Resistor (6,800-Ohm, 2 Watt)
C11	355-0020	1	Capacitor (.1 Mfd., 400 Volt)	R14	350-0443	1	Resistor (220,000-Ohm, 2 Watt)
C13	356-0039	1	Capacitor (100 Mfd., 10 Volt)	R15, R27	350-0435	2	Resistor (100,000-Ohm, 1/2 Watt)
CR4 thru 11	357-0014	8	Rectifier, Silicon	R17	351-0521	· 1	Resistor, Metal Film
CR12	359-0016	1	Diode, Zener (6.8 Volt)				(12,100 Ohm, 1/4 Watt)
CR13	359-0025	1	Diode, Zener (20 Volt)	R18	303-0168	. 1	Potentiometer
CR14	359-0026	1	Diode, Zener (18 Volt)	R20, R22	351-0520	2	Resistor, Metal Film
CR15	359-0015	1	Diode, Zener (24 Volt)		•		(28,000-Ohm, 1/4 Watt)
K1	307-1063	1	Relay, Magnetic Reed	R21	351-0522	. 1	Resistor, Metal Film
Q1. Q2	362-0017	2 .	Transistor, Silicon (NPN)				(5,110-Ohm, 1/4 Watt)
Q3	361-0004	1	Transistor, Unijunction	R24	351-0523	1	Resistor, Metal Film
R1. R23	350-0355	2	Resistor (47-Ohm, 1/2 Watt)	•			(8,870-Ohm, 1/4 Watt)
R2. R3	350-0351	2	Resistor (33-Ohm, 1/2 Watt)	R25	350-1011	1	Resistor (10,000-Ohm, 2 Watt)
R4	350-1075	1	Resistor (4.7 Megohm, 2 Watt)	R26	303-0164	1	Potentiometer
R5	353-0040	1	Resistor, Fixed (270-Ohm,	R28	350-0459	, 1	Resistor (1.0 Megohm, 1 Watt)
			10 Watt)	•	517-0127	2	Cover. Potentiometer

(Not Illustrated)

ENGINE CONTROL MONITOR GROUP-12 VOLT-STANDARD SPEC A THROUGH F



REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION	RËF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
	300-0679		Monitor, Engine Control -	R1	350-0536	1	Resistor, Composition
C1			12 Volt (1 Fault Light Sets)	B2	350-0526	1	(1000-Onm, 1/2 Watt, 10%)
C2	255 0005	4	Not used		000-0020	•	(100 Obm 1/2 Math 10%)
02	333-0003	'	(.22 Mfd, 200 VDC, 10%)	[°] R3	350-0548	1	Resistor, Composition
C3	356-0040	1	Capacitor, Electrolytic				(10,000-Ohm, 1/2 Watt, 10%)
			(10 Mfd, 20 Volt)	H4	303-0169	1	Potentiometer
C4	356-0030	1	Capacitor, Electrolytic (1 Mfd, 35 Volt)	R5	350-0572	1	(3.5 Meg Ohm, 1/4 Watt, 30%) Resistor, Composition
C5	355-0005	1	Capacitor, Plastic Dielectric				(1-Meg Ohm, 1/2 Watt, 10%)
			(.22 Mfd, 200 VDC, 10%)	R6	350-0552	1 -	Resistor, Composition
CR1	359-0027	1	Diode, Zener	_			(22,000-Ohm, 1/2 Watt, 10%)
			(1 Watt. 7.5 Volt. 5%)	R7	350-0536	1	Resistor, Composition
CR2	357-0004	_ 1	Diode, Rectifier	54			(1000-Ohm, 1/2 Watt, 10%)
		•	(400 MA, 400 Volt)	H8	350-0505	1	Resistor, Composition
CR3	357-0004`	1	Diode, Rectifier	50	050 05.5		(2.7-Ohm, 1/2 Watt, 10%)
			(400 MA, 400 Volt)	R9	350-0517	1	Resistor, Composition
CR4	357-0004	1	Diode, Rectifier	D10	000 0400		(27-Ohm, 1/2 Watt, 10%)
			(400 MA, 400 Volt)	RIU	303-0169	1	Potentiometer
CR5	357-0004	1	Diode, Rectifier	D11	250 0540		(3.5-Meg Ohm, 1/4 Watt, 30%)
			(400 MA, 400 Volt)	n I I	350-0540	T	Resistor, Composition
CR6	364-0017	1.	Diode, Rectifier	P1 2	250 0500		(10-Meg Ohm, 1/2 Watt, 10%)
007			(8 Amp, 30 Volt)	1112	350-0529	I	Resistor, Composition
CH7	357-0004	1	Diode, Rectifier	P12	250 0500		(270-Ohm, 1/2 Watt, 10%)
	00- 4000		_ (400 MA, 400 Volt)	110	350-0529	1	Hesistor, Composition
K1	307-1039	1	Relay, Armature (12 Volt)	D14	250 0500		(270-Onm, 1/2 Watt, 10%)
	361-0003	1	Transistor	n14	350-0529	1.	Hesistor, Composition
02	362-0025	1	Transistor	D15	250 0540		(270-Onm, 1/2 Watt, 10%)
Q3	362-0025	1	Transistor		350-0540	1	Hesistor, Composition
Q4	361-0003	1	Transistor	DIE	250 0540		(2200-Ohm, 1/2 Watt, 10%)
Q5	362-0025	1	Transistor	n 10	350-0540	1	Resistor, Composition
	362-0025	1	Transistor	D17	250 1100		(2200-Ohm, 1/2 Watt, 10%).
u/	362-0008	1	Transistor		350-1128	1	Hesistor, Composition
U 8	362-0008	. 1	Transistor				(220-Ohm, 2 Watt, 10%)

ENGINE CONTROL MONITOR GROUP-12 VOLT-OPTIONAL EQUIPMENT (5 FAULT LIGHTS) - SPEC A THROUGH F



ENGINE CONTROL MONITOR GROUP-12 VOLT-OPTIONAL EQUIPMENT (5 FAULT LIGHTS) SPEC A THROUGH F

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION	REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
	300-0681		Monitor, Engine Control - 12 Volt - Optional	R2	303-0169	1	Potentiometer (3.5 Megohm, 1/4 Watt. 30%)
. C1	356-0040	1	Capacitor, Electrolytic	R3	350-0572	1	Resistor, Composition
C2	355-0005	1	Capacitor, Plastic Dielectric	R4	350-0517	1	Resistor, Composition (27-Obm 1/2 Watt 10%)
C3	355-0005	1	Capacitor, Plastic Dielectric	R5	350-0536	1	Resistor, Composition (1000-Ohm 1/2 Watt 10%)
C4	356-0030	1	Capacitor, Electrolytic (1 Mfd, 35 Volt)	R6	350-0548	1	Resistor, Composition (10.000-Ohm, 1/2 Watt, 10%)
C5	355-0005	1	Capacitor, Plastic Dielectric	R7	350-0505	1	Resistor, Composition (2.7-Ohm, 1/2 Watt, 10%)
C6	355-0005	1	Capacitor, Plastic Dielectric	R8	350-0529	1	Resistor, Composition (270-Ohm, 1/2 Watt, 10%)
C7	355-0005	1	Capacitor, Plastic Dielectric	R9	350-0540	1 '	Resistor, Composition (2200-Ohm, 1/2 Watt, 10%)
C8	355-0005	1	Capacitor, Plastic Dielectric	R10	350-0380	1	Resistor, Composition (510-Ohm, 1/2 Watt, 5%)
CR1	357-0004	1	Diode, Rectifier	R11	350-0529	1	Resistor, Composition (270-Ohm, 1/2 Watt, 10%)
CR2	357-0004	1	Diode, Rectifier	R12	350-0552	1	Resistor, Composition (22,000-Ohm, 1/2 Watt, 10%)
CR3	357-0004	1	Diode, Rectifier	R13	350-0505	1	Resistor, Composition (2.7-Ohm, 1/2 Watt, 10%)
CR4	357-0004	1	Diode, Rectifier	R14	350-0536	1	Resistor, Composition (1000-Ohm, 1/2 Watt, 10%)
CR5	357-0004	1	Diode, Rectifier	R15	303-0169	1	Potentiometer (3.5 Megohm, 1/4 Watt. 30%)
CR6	357-0004	1	Diode, Rectifier (400 MA, 400 Volt)	R16	350-0517	1	Resistor, Composition (27-Ohm 1/2 Watt, 10%)
CR7	357-0004	1	Diode, Rectifier (400 MA, 400 Volt)	R17	350-0540	1	Resistor, Composition (2200-Ohm 1/2 Watt 10%)
CR8	357-0004	1	Diode, Rectifier (400 MA, 400 Volt)	R18	350-0540	1	Resistor, Composition (2200-Ohm 1/2 Watt 10%)
CR9	359-0027	1	Diode, Zener (1 Watt, 7.5 Volt, 5%)	R19	350-0517	1	Resistor, Composition
CR11	357-0004	1	Diode, Rectifier	R20	350-0529	1	Resistor, Composition
CR12	357-0004	1	Diode, Rectifier	R21	350-0529	1	Resistor, Composition (270-Ohm 1/2 Watt 10%)
CR13	357-0004	1	Diode, Rectifier	R22	350-0505	1	Resistor, Composition (2.7-Ohm 1/2 Watt 10%)
CR14	357-0004	1	Diode, Rectifier	R23	350-0529	1	Resistor, Composition (270-Ohm 1/2 Watt 10%)
CR15	357-0004	1	Diode, Rectifier	R24	350-0529	1	Resistor, Composition (270-Ohm 1/2 Watt 10%)
CR16	357-0004	1	Diode, Rectifier	R25	350-0540	1	Resistor, Composition
CR17	364-0017	1	Diode, Rectifier (8 Amp, 30 Volt)	R26	350-0380	1	Resistor, Composition
CR19	357-0004	1	Diode, Rectifier	R27	350-052 9	1	Resistor, Composition
CR20	364-0017	1	Diode, Rectifier (8 Amp, 30 Volt)	R28	350-0529	1	Resistor, Composition
	207 1020	1	(400 MA, 400 Volt) Relay, Armatura (12 Volt)	R29	350-0540	1	Resistor, Composition
K2	307-1039	1	Relay, Armature (12 Volt) Transistor	R30	350-0505	1	Resistor, Composition
Q2 Q3	362-0025	1	Transistor	R31	. 350-0529	1	Resistor, Composition
Q4 ⁻	362-0008	1	Transistor	R32	350-0540	1	Resistor, Composition
Q6 Q7	362-0008	1	Transistor	R33	350-0529	1 .	Resistor, Composition
Q8	362-0031	1	Transistor	R34	350-0517	1	Resistor, Composition
Q10	362-0008	1	Transistor	R35	350-1128	1	Resistor, Composition
Q12 ·	362-0008 362-0008	1	Transistor	R36	350-0540	1	Resistor, Composition
Q13 Q14	362-0008 362-0008	1 1	Transistor Transistor	S1	308-0280	1	(2200-Onm, 1/2 Watt, 10%) Switch, Push - DPDT
R1	350-0526	1	Resistor, Composition . (100-Ohm, 1/2 Watt, 10%)				(1A, 28 VDC/.45A, 115 VAC)

CRANKER CYCLE CONTROL GROUP—12 VOLT—OPTIONAL EQUIPMENT SPEC A THROUGH F



NO.	PART NO.	QTY. USED	PART DESCRIPTION	REF.	PART NO.	. QTY. USED	PART DESCRIPTION
· .	300-0714		Control, Cranker Cycle -	R1	303-0171	1	Potentiometer (100,000-Ohm, 1/4 Watt)
		•	12 Volt	R2	350-0560	-1	Resistor, Composition
C1 -	356-0039	1	Capacitor, Electrolytic				(0.1 Megohm, 1/2 Watt, 10%)
	•		(100 Mfd, 10 Volt)	.R3	350-0548	1.	Resistor, Composition
C2	355-0029	1	Capacitor, Plastic Dielectric	· .		- ·	(10.000-Ohm, 1/2 Watt: 10%)
		•	(.015 Mfd, 100 VDC, 10%)	R4	303-0171	1.	Potentiometer (100,000-Ohm, 1/4 Watt)
С3	356-0045	1	Capacitor, Electrolytic	R5	350-0558	1	Resistor, Composition
-			(25 Mfd, 15 Volt)				(68,000-Ohm, 1/2 Watt, 10%)
C4	355-0010	1.	Capacitor, Plastic Dielectric	R6	350-0420	1	Resistor, Composition
	· ·		(.0022 Mfd, 100 VDC, 10%)			. •	(24,000-Ohm, 1/2 Watt, 5%)
CR1	359-0027	.1	Diode, Zener	R7	350-0546	1	Resistor, Composition
CR2	357-0004	1	Diode, Rectifier (400 MA, 400 Volt)				(6800-Ohm, 1/2 Watt, 10%)
CR3	357-0004	1	Diode, Rectifier (400 MA, 400 Volt)	R8.	350-0526	. 1	Resistor, Composition
CR4	357-0004	- 1	Diode, Rectifier (400 MA, 400 Volt)	• •		. ·	(150-Ohm, 1/2 Watt, 5%)
H1	812-0061	2 -	Screw, Machine, Round	R9	350-0548	1	Resistor, Composition
			Head (#6-32 x 3/8")				(10,000-Ohm, 1/2 Watt, 10%)
H2	853-0003 -	2	Washer, Lock - External Tooth (#6)	R10	350-0500	1	Resistor, Composition
H3 .	860-0006 -	2	Nut, Hex (#6-32)				(1-Ohm, 1/2 Watt, 10%)
Q1	362-0008	· 1	Transistor	R11	352-0152	· 1	Resistor, Wirewound
Q2	362-0008	1	Transistor				(25-Ohm, 5 Watt <u>,</u> 5%)
Q3	362-0017	1	Transistor	TB1	332-1275	1.	Printed Wiring Board
Q4	362-0026	1	Transistor				· · ·
Q5	362-0033	1	Transistor				· · ·

ENGINE CONTROL MONITOR GROUP-12 VOLT-PENN STATE (1 FAULT LIGHT) SPEC A THROUGH F



REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION	NO.	PART NO.	QTY. USED	PART DESCRIPTION
	300-0730		Monitor, Engine Control -	Q2	362-0025	1	Transistor
			12 Volt (Penn State)	Q3	362-0025	1	Transistor
C1			Not used	Q4	362-0008	1	Transistor
C2 .	355-0005	1	Capacitor, Plastic Dielectric (.22 Mfd, 200 VDC, 10%)	R1	350-0536	1	Resistor, Composition (1000-Ohm, 1/2 Watt, 10%)
C3	356-0040	1	Capacitor, Electrolytic (10 Mfd, 20 Volt)	R2	350-0526	1	Resistor, Composition (100-Ohm, 1/2 Watt, 10%)
C4			Not used	R3	350-0552	1	Resistor, Composition
C5	355-0005	1	Capacitor, Plastic Dielectric				(22.000-Ohm, 1/2 Watt, 10%)
CB1	357-0004	1	(.22 Mfd, 200 VDC, 10%) Diode Bectifier	R4	303-0169	1	Potentiometer (3.5 Megohm, 1/4 Watt 30%)
0	007 0004	•	(400 MA, 400 Volt)	B 5	350-0572	1	Besistor Composition
CB2	359-0027	1	Diode Zener	1.0	000 0012	•	(1 Megohm 1/2 Watt 10%)
0.112	000 0021	•	(1 Watt 7.5 Volt 5%)	R6	350-0505	1	Resistor Composition
CB3	357-0004	1	Diode Bectifier				(27-Ohm 1/2 Watt 10%)
00		•	(400 MA, 400 Volt)	R 7	350-0517	1	Resistor Composition
CB4	357-0004	1	Diode. Rectifier			•	(27-Ohm 1/2 Watt 10%)
		•	(400 MA, 400 Volt)	R8	350-0529	1	Resistor, Composition
CR5	357-0004	1	Diode. Rectifier			•	(270-Ohm, 1/2 Watt 10%)
			(400 MA, 400 Volt)	R9	350-0529	1	Resistor, Composition
CR6	357-0004	1	Diode, Rectifier			-	(270-Ohm, 1/2 Watt, 10%)
			(400 MA, 400 Volt)	R10	350-0540	1	Resistor. Composition
CR7	364-0017	1	Diode, Rectifier				(2200-Ohm, 1/2 Watt, 10%)
			(8 Amp, 30 Volt)	R11	350-0971	1	Resistor, Composition
K1	307-1039	1	Relay, Armature (12 Volt)			•	(220-Ohm, 2 Watt, 5%)
K2	307-1039	1	Relay, Armature (12 Volt)				
Q1	361-0003	1	Transistor			-	

179-0441 INSTALLATION, DAY TANK-OPTIONAL EQUIPMENT SPEC A THROUGH F



REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION	
1	505-0054	1	Plug, Square Head (1/4")	
2	415-0335	- 1	Switch Assembly - Fuel Level	
3	415-0325	1	Tank, Day	•
4	502-0041	· 3	Elbow, Inverted Male	
. 5	501-0008	2	Line, Fuel	
6	501-0015	1	Line, Fuel	• •
7	813-0098	- 1	Screw, Machine - Round Head (#10-32 x 3/8")	
·8	850-0030	. 1	Washer, Lock - Spring (#10)	•
·9·	307-1058	· 1	Relay, 12 Volt	
10	415-0326	1	Cover, Day Tank Control	•
11	307-1157	, 1	Spring, Relay - Holddown	
12	502-0051	1	Coupling	
13	149-0554	1	Pump, Fuel - Electric	
14	821-0018	2.	Screw, Cap - Hex	· · ·
15	870-0212	· 2	Nut, Hex - Locking (1/4-20)	
16	323-0897	· 1	Socket and Leads	
17	870-1183	2	Nut, Hex W/ET (#6-32)	
18	812-0061	. 2	Screw, Machine - Round Head (#6-32 x 3/8")	
19	415-0324	1	Bracket, Tank Mounting	••
.20	415-0323	. 1	Strap, Tank Mounting	•
21	821-0013	2	Screw, Cap - Hex Head Locking (1/4-20 x 1")	
22	402-0070	4	Mount, Rubber	:
23	821-0014	. 8	Screw, Cap - Hex Head (5/16-18 x 1/2")	;
24	505-0110	2 1 - 1	Plug, Square Head (3/8")	

179-0407 INSTALLATION HEAT EXCHANGER COOLING WITH REGULATOR— OPTIONAL EQUIPMENT—SPEC A THROUGH F

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REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION	REF.	PART NO.	QTY. USED	PART DESCRIPTION
1	307-1139	1	Valve, Solenoid (1" NPT) 12 Volt	11	505-0024	1	Bushing, Reducer (1-1/2" NPT x 1" NPT)
2	130-0797	1	Nipple, Assembly (Water Line)	12	813-0098	2	Screw, Machine - Round Head (#10-32 x 3/8")
3	821-0014	0	Head (5/8-16 x 1/2")	13	850-0030	2	Washer (#10)
4	130-049 9	1	Bracket, Heat Exchanger	14	526-0012	2	Washer, Flat (7/32" ID x 3/4" OD x 1/32" THK)
5	505-0041	4	Elbow, Pipe (1" NPT × 90°)	15	130-0862	1	Bracket, Belt Guard
6	505-0004	. 2	Nipple, Pipe - Close (1" NPT x 1-1/2")	16	130-0861	1	Guard, Belt
7	309-0242	1	Valve, Regulating - Water Temperature Control	17	800-0007	. 2	Screw, Cap - Hex Head (1/4-20 x 1")
8	505-0330	2	Nipple, Pipe - Half (1" NPT x 2")	18	850-0040	2	Washer, Lock (1/4")
9	503-0189	2	Clamp, Hose	19	862-0001	2	Nut, Hex (1/4-20)
10		1	Hose Rubber (Order 8" of	20	505-0086	1	Nipple, Pipe (1" NPT x 2-1/2")
10		·	Bulk Hose #503-0361)	21	509-0090	1	Nipple, Pipe (1" NPT x 6")







REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION	REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	504-0090	1	Valve, Globe (1") - Lockshield		505 0004		• Rushing Roducer
2	130-0797	1	Nipple, Assembly, Water Line		505-0024	• •	/1" NPT v 1-1/2" NPT)
3	821-0014	6	Screw, Self-locking - Hex Head (5/16-18 x 1/2")	12	813-0098	2	Screw, Machine - Round Head
4	130-0499	1 1	Bracket, Heat Exchange	13	850-0030	2	Washer, Lock (#10)
5	505-0041	. 2	Elbow Pipe (1" NPT)	14	526-0012	2	Washer, Flat (7/32" ID x
6	505-0004	2	Nipple, Pipe (1" NPT x 1-1/2")		400.0000		3/4" UD X 1/32" THK)
7.	307-1139	1	Valve, Solenoid (1" NPT)	15	130-0862	1	Bracket, Beit Guard Mounting
			12 Voit	16	130-0861	1.	Guard, Beit
8	505-0330	2	Nipple, Pipe - Half	17	800-0007	. 2	Screw, Cap - Hex Head (1/4-20 x 1")
0	502 0100	o .		18	850-0040	2	Washer, Lock (1/4")
9 10	203-0189	1	Hose, Rubber - Order 10-1/2" of Bulk Hose #503-0361	19	862-0001	· 2	Nut, Hex (1/4-20'')



179-0405 INSTALLATION STANDPIPE COOLING WITH REGULATOR-OPTIONAL EQUIPMENT-SPEC A THROUGH F

NO.	NO.	USED	PART DESCRIPTION	REF. , NO.	PART NO.	USED	DESCRIPTION
1	505-0043	1	Elbow, Pipe (1-1/2" x 90°)	14	505-0140	1	Plug, Square Head (1")
2	505-0641	1 1	Nipple, Close (1-1/2 x 6")	15	505-0317	1	Tee, Pipe (1-1/2")
3	504-0028	1	Valve, Drain	16	505-0289	1	Bushing, Reducer (1-1/2 x 1")
4	130-0635	1	Standpipe	17	503-0465	· 4	Clamp, Hose
5	800-0050	4	Screw, Cap - Hex Head	18	130-0861	1	Guard, Belt
			(3/8-16 x 1")	19	505-0130	1	Plug, Square Head (3/4")
6	850-0050	4.	Washer: Lock - Spring (3/8")	20	505-0385	2	Nipple, Half (1-1/2 x 2")
7	130-0860	1	Bracket, Standpipe Mounting	21	821-0014	6	Screw, Cap - Hex Head
8	307-0835	1	Valve, Solenoid - 12 Volt (3/4")		•	-	(5/16-18 x 1/2")
9	505-0102	2	Nipple, Close (3/4 x 1-3/8")	22	504-0062	1	Valve, Vacuum Relief
10	309-0241	1	Valve, Water Temperature	23	503-0639	1	Hose, Rubber
			Control	24	130-0862	1	Bracket, Belt Guard Mounting
11	813-0098	2	Screw, Machine - Round Head	25	503-0746	1	Hose, Rubber
			(#10-32 × 3/8")	26	505-0220	1	Nipple, Close (1-1/2 x 1-3/4")
12	850-0030	2	Washer, Lock - Spring (#10)				
13	505-0402	1	Plug, Square Head (1-1/2")				

179-0404 INSTALLATION STANDPIPE COOLING—OPTIONAL EQUIPMENT SPEC A THROUGH F



REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION	REF. NO.	PART NO.	OTY. USED	PART DESCRIPTION
1	505-0043	2	Elbow, Pipe (1-1/2" x 90°)	14	505-0140	1	Plug, Square Head (1")
2	505-0220	Z	Nipple, Close (1-1/2 × 1-3/4)	15	505-0641	1	Nipple, Fipe $(1-1/2 \times 0^{-1})$
3	504-0028		vaive, Drain	16	505-0289	1	Busning, Reducer (1-1/2.x +)
4	130-0635	1	Standpipe	· 17	503-0465	.4.	Clamp, Hose
5	800-0050	4	Screw, Cap - Hex Head.	18	130-0861	1	Guard, Belt
			(3/8-18 × 1″)	19	505-0130	1	Plug, Square Head (3/4")
6	850-0050	• 4	Washer, Lock - Spring (3/8")	20	505-0385	2	Nipple, Half (1-1/2 x 2")
7	130-0860	1	Bracket, Standpipe Mounting	21	821-0014	6	Screw, Cap - Hex Head
8	307-0835	1.	Valve, Solenoid (12 Volt) -	_ ,	021 0011		Locking (5/16-18 x 1/2")
	•		3/4"	. 22	504-0062	1	Valve, Vacuum Relief
9	505-0102	2 [.]	Nipple, Close (3/4 x 1-3/8")	23	503-0639	1	Hose, Rubber
10	504-0046	1	Valve, Globe	24	130-0862	1	Bracket, Belt Guard Mounting
11	813-0098	2	Screw, Machine - Round Head (#10-32 x 3/8")	25	503-0746	Ť	Hose, Rubber - Flexible
12	850-0030	2	Washer, Lock - Spring (#10)				
13	505-0402	1	Plug, Square Head (1-1/2")			•	

179-2011 INSTALLATION 240 VOLT ENGINE COOLANT HEATER-OPTIONAL EQUIPMENT



REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	504-0003	1	Valve, Drain (1/4")
2	505-0184	1	Tee, Pipe (1/4")
3		1	Adapter, Hose (Part of 333-0073 Heater)
4	503-0183	4	Clamp, Hose
5	333-0073	1	Heater, Engine Coolant
6	850-0060	1	Washer, Lock - Spring (1/2")
7	130-0755	1	Bracket, Heater
8	800-0031	1	Screw, Cap - Hex Head
			(5/16-18 x 1-1/2")
9	526-0115	2	Washer, Flat (11/32" ID x 11/16" OD x 1/16" Thk)
10	856-0008	2	Washer, Lock - EIT (5/16")
11	862-0015	1	Nut, Hex (5/16")
12	332-0942	3	Tie
13	•	1	Hose, Rubber (Order 34" of Bulk Hose #503-0386)
14	333-0057	1	Box, Thermostat
15	333-0056	1	Cover, Thermostat Box
16	332-0672	1	Stud
17	870-0053	2	Nut, Hex (#10-32)
18	850-0030	2	Washer, Lock - Spring (#10)
19	309-0256	1	Thermostat
20	505-0135	1	Nipple, Half (3/8 x 1-1/2")
21	505-0019	1	Bushing, Reducer (1/2 x 3/8")
22	505-0101	1	Nipple, Close (3/8 x 1")
23	800-0191	1	Screw, Cap - Hex Head (1/2-13 x 1-1/4")
24	856-0013	1	Washer, Lock - EIT (1/2")

179-0408 INSTALLATION 110 VOLT WATER JACKET HEATER-OPTIONAL EQUIPMENT



REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	504-0003	1	Valve, Drain
2	505-0184	. 1	Tee, Pipe
3.	856-0013	1	Washer, Lock - EIT (1/2")
4	503-0183	-4	Clamp, Hose
-5	333-0052	1	Heater, Engine
6	850-0060	1	Washer, Lock - Spring (1/2")
7	130-0755	1	Bracket, Water Heater
8	800-0031	1	Screw, Cap - Hex Head (5/16-18 x 1-1/2")
9	526-0115	2	Washer, Flat (11/32" ID x 11/16" OD x 1/16" Thk)
10	856-0008	2	Washer, Lock - EIT (5/16")
11	862-0015	1	Nut, Hex (5/16")
12	332-0942	3	Tie -
13		1	Hose (Order 34" of Bulk Hose #503-0386)
14	333-0012	1.	Box, Thermostat Box
15	333-0013	1	Cover, Thermostat Box
16	520-0446	2	Stud
17	870-0053	2	Nut, Hex (#10-32)
18	850-0030	2	Washer, Lock - Spring (#10)
19	309-0106	1	Thermostat
20	505-0135	1	Nipple, Half (3/8 x 1-1/2")
21	505-0019	1	Bushing, Reducing (1/2 x 3/8")
22	505-0101	1	Nipple, Close (3/8 x 1")
23	800-0091	1	Screw, Cap - Hex Head (1/2-13 x 1-1/4")
179-0385 INSTALLATION EXHAUST MUFFLER (HOUSED SETS) -OPTIONAL EQUIPMENT - BEGIN SERIAL NUMBER K76105495 DURING SPEC F





REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	155-1461	1	Muffler, Exhaust
2	140-0757	2	Band, Muffler
3	505-0171	2	Elbow, Pipe (4" x 90°)
4	155-1278	1	Shield, Muffler - Heat
5	155-1430	4	Spacer, Muffler
6	800-0508	4	Screw, Cap - Hex Head (5/16-18 x 2-3/4")
7	870-0048	4	Nut, Hex - Self Locking (5/16-18)
8	895-0161	1	Asbestos (15 x 2 x 1/16")
9	155-1424	1	Shield, Rain
10	505-041 [.] 1	1	Coupling Pipe (4")
11	155-1460	2	Connector Exhaust (4")
12	155-1458	1	Tubing Elexible
13	503-0591	2	Clamp Hose
14	813-0105	2	Screw, Machine - Round Head (#10-32 x 1")
15	870-0188	2	Nut. Lock (#10-32)
16	505-0824	1	Nipple, Pipe $(4 \times 10 - 1/2'')$
17	155-0789	2	Support, Muffler

179-0385 INSTALLATION EXHAUST MUFFLER (HOUSED SETS) -OPTIONAL EQUIPMENT - SPEC A THROUGH SERIAL NUMBER K76105494 DURING SPEC F



REF. NO.	PART NO.	QTY. USED
. 1	155-1134	1
2	140-0757	2
3.	505-0171	2
4	505-0732	1
5	155-1103	. 1
6	505-0411	1
7	505-0164	1
.8	154-1391	1
·9	526-0172	4
10	155-1060	1
11	800-0028	. 4
12	850-0045	4
13	862-0002	· 4
14:	155-0789	2

PART DESCRIPTION Muffler, Exhaust

Band Elbow, Pipe (4" NPT x 90°) Nipple, Pipe (4" NPT x 8-1/2") Tube, Flexible (4" NPT) Coupling, Pipe (4" NPT) Nipple, Pipe - Close (4" NPT x 2-7/8") Union, Pipe - Flanged (4" NPT) Spacer Shield, Heat Screw, Cap - Hex Head (5/16-18 x 1") Washer, Lock (5/16") Nut (5/16-18") Support, Hood

179-1528 INSTALLATION EXHAUST MUFFLER - CRITICAL (HOUSED SETS) -OPTIONAL EQUIPMENT - BEGIN SERIAL NUMBER K760189084 DURING SPEC F



NO.	NO.	USED	PART DESCRIPTION
1	505-0171	2	Elbow, Pipe (4" x 90°)
2	155-1391	1	Muffler, Exhaust
3	140-0757	2	Clamp, Muffler
4	155-1285	1	Tube, Exhaust
5	505-0824	1	Nipple, Pipe (4 x 10-1/2")
6	505-0411	1	Coupling, Pipe (4")
7	505-0164	1	Nipple, Close (4 x 2-7/8")
8	154-1391	1	Union, Flange
9	155-1430	8	Spacer, Muffler
10 [.]	155-1424	1	Shield, Rain
11	821-0020	4	Screw, Cap - Hex Head -
			Locking (5/16-18 x 7/8")
12	870-0048	8	Nut, Hex - Locking (5/16-18)
13	155-078 9	2	Support, Muffler
14	800-0037	4	Screw, Cap - Hex Head
			(5/16-18 x 3")
15	155-1392	1	Shield, Muffler
16	895-0161	` 1	Asbestos Insulator
17	813-0105	2	Screw, Machine - Round Head (#10-32 x 1")
18	870-0188	2	Nut, Hex - Locking (#10-32)
19	155-1460	2	Connection, Exhaust
20	503-0591	2	Clamp, Hose

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179-1528 INSTALLATION EXHAUST MUFFLER - CRITICAL (HOUSED SETS) OPTIONAL EQUIPMENT - SPEC A THROUGH SERIAL NUMBER K760189083 DURING SPEC F



REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	505-0171	2	Elbow, Pipe (4" x 90°)
2	155-1391	Ť	Muffler, Exhaust
3	140-0757	2	Clamp, Muffler
4	155-0594	1	Tube, Exhaust
5	505-0732	1	Nipple, Pipe (4 x 8-1/2")
6	505-0411	1	Coupling, Pipe (4")
7	505-0164	4	Nipple, Close (4 x 2-7/8")
8	154-1391		Union, Flange
9	526-0172	8	Spacer Muffler
11	821-0020	4	Screw, Cap - Hex Head - Locking (5/16-18 x 7/8")
12	870-0048	8	Nut. Hex - Locking (5/16-18)
13	155-0789	2	Support, Muffler
14	821-0023	4	Screw, Cap - Hex Head - Locking (5/16-18 x 1-1/2")
15	155-1392	· 1	Shield, Muffler

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HARDWARE IDENTIFICATION

Illustrated hardware items are only for identification purposes. All hardware items listed throughout this parts catalog are steel SAE grade five (5) or lower (zinc plated with clear chromate dip) unless parts description indicates differently. All dimensions are in inches.



- Flat washer dimensions given are: Inside Diameter (ID), Outside Diameter (OD) and Thickness (Thk).

BOLT AND SCREW TYPES





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

