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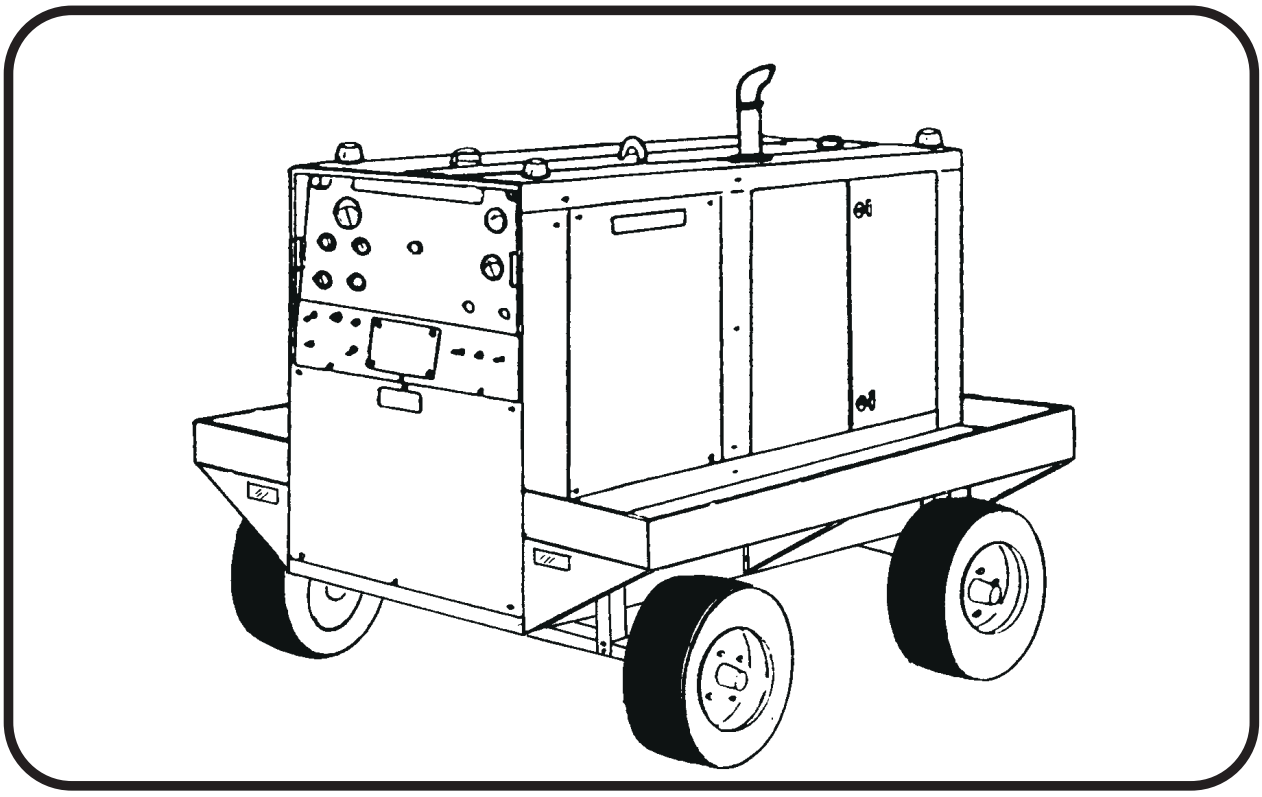
HOBART®
GROUND POWER

Operation and Maintenance Manual

Jet-Ex 4D
Generator Sets



Series 7003A-3 and
Series 7003B-3

Hobart Brothers Company
Airport Systems Group
Ground Power Equipment
Troy, Ohio
U.S.A.

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Section 1. Safety Instructions and Warnings

WARNING

ELECTRIC SHOCK can **KILL**. Do not touch live electrical parts.

ELECTRIC ARC FLASH can injure eyes, burn skin, cause equipment damage, and ignite combustible material. **DO NOT** use power cables to break load and prevent tools from causing short circuits.

IMPROPER PHASE CONNECTION, PARALLELING, OR USE can damage this and attached equipment

Important: **Protect all operating personnel. Read, understand, and follow all instructions in the Operating/Instruction Manual before installing, operating, or servicing the equipment. Keep the manual available for future use by all operators.**

1. General

Equipment that supplies electrical power can cause serious injury or death, or damage to other equipment or property. The operator must strictly observe all safety rules and take precautionary actions. Safe practices have been developed from past experience in the use of power source equipment. While certain practices below apply only to electrically-powered equipment, other practices apply to engine-driven equipment, and some practices to both.

2. Shock Prevention

Bare conductors, or terminals in the output circuit, or ungrounded, electrically-live equipment can fatally shock a person. Have a certified electrician verify that the equipment is adequately grounded and learn what terminals and parts are electrically **HOT**. Avoid hot spots on machine. Use proper safety clothing, procedures, and test equipment.

The electrical resistance of the body is decreased when wet, permitting dangerous currents to flow through it. When inspecting or servicing equipment, do not work in damp areas. Stand on a dry rubber mat or dry wood, use insulating gloves when dampness or sweat cannot be avoided. Keep clothing dry, and never work alone

a. Installation and Grounding of Electrically Powered Equipment

Equipment driven by electric motors (rather than by diesel or gasoline engines) must be installed and maintained in accordance with the National Electrical Code, ANSI/NFPA 70, or other applicable codes. A power disconnect switch or circuit breaker must be located at the equipment. Check the nameplate for voltage, frequency, and phase requirements. If only 3-phase power is available, connect any single-phase rated equipment to only two wires of the 3-phase line. **DO NOT CONNECT** the equipment grounding conductor (lead) to the third live wire of the 3-phase line, as this makes the equipment frame electrically **HOT**, which can cause a fatal shock.

Always connect the grounding lead, if supplied in a power line cable, to the grounded switch box or building ground. If not provided, use a separate grounding lead. Ensure that the current (amperage) capacity of the grounding lead will be adequate for the worst fault current situation. Refer to the National Electrical Code ANSI/NFPA 70 for details. Do not remove plug ground prongs. Use correctly mating receptacles.

b. Output Cables and Terminals

Inspect cables frequently for damage to the insulation and the connectors. Replace or repair cracked or worn cables immediately. Do not overload cables. Do not touch output terminal while equipment is energized.

c. Service and Maintenance

(1) This equipment must be maintained in good electrical and mechanical condition to avoid hazards stemming from disrepair. Report any equipment defect or safety hazard to the supervisor and discontinue use of the equipment until its safety has been assured. Repairs should be made by qualified personnel only.

(2) Before inspecting or servicing electrically-powered equipment, take the following precautions:

(3) Shut **OFF** all power at the disconnecting switch or line breaker before inspecting or servicing the equipment.

(4) Lock switch **OPEN** (or remove line fuses) so that power cannot be turned on accidentally.

(5) Disconnect power to equipment if it is out of service.

(6) If troubleshooting must be done with the unit energized, have another person present who is trained in turning off the equipment and providing or calling for first aid.

3. Fire and Explosion Prevention

Fire and explosion are caused by electrical short circuits, combustible material near engine exhaust piping, misuse of batteries and fuel, or unsafe operating or fueling conditions.

a. Electrical Short Circuits and Overloads

Overloaded or shorted equipment can become hot enough to cause fires by self destruction or by causing nearby combustibles to ignite. For electrically-powered equipment, provide primary input protection to remove short circuited or heavily overloaded equipment from the line.

b. Batteries

Batteries may explode and/or give off flammable hydrogen gas. Acid and arcing from a ruptured battery can cause fires and additional failures. When servicing, do not smoke, cause sparking, or use open flame near the battery.

c. Engine Fuel

Use only approved fuel container or fueling system. Fires and explosions can occur if the fuel tank is not grounded prior to or during fuel transfer. Shut unit **DOWN** before removing fuel tank cap. **DO NOT** completely fill tank, because heat from the equipment may cause fuel expansion overflow. Remove all spilled fuel **IMMEDIATELY**, including any that penetrates the unit. After clean-up, open equipment doors and blow fumes away with compressed air.

4. Toxic Fume Prevention

Carbon monoxide - Engine exhaust fumes can kill and cause health problems. Pipe or vent the exhaust fumes to a suitable exhaust duct or outdoors. Never locate engine exhausts near intake ducts of air conditioners.

5. Bodily Injury Prevention

Serious injury can result from contact with fans inside some equipment. Shut **DOWN** such equipment for inspection and routine maintenance. When equipment is in operation, use extreme care in doing necessary trouble-shooting and adjustment. Do not remove guards while equipment is operating.

6. Medical and First Aid Treatment

First aid facilities and a qualified first aid person should be available for each shift for immediate treatment of all injury victims. Electric shock victims should be checked by a physician and taken to a hospital immediately if any abnormal signs are observed.

EMERGENCY FIRST AID

Call physician immediately. Seek additional assistance. Use First Aid techniques recommended by American Red Cross until medical help arrives.

IF BREATHING IS DIFFICULT, give oxygen, if available, and have victim lie down. FOR ELECTRICAL SHOCK, turn off power. Remove victim; if not breathing, begin artificial respiration, preferably mouth-to-mouth. If no detectable pulse, begin external heart massage. CALL EMERGENCY RESCUE SQUAD IMMEDIATELY

7. Equipment Precautionary Labels

Inspect all precautionary labels on the equipment monthly. Order and inspect all labels that cannot be easily read.

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Introduction

This manual contains operation and service information for 28.5 V DC Generator sets identified as **Jet-Ex 4D**. These units are available as stationary, skid- mounted units, or they may be trailer-mounted for portability. Both versions are available with 14 V DC output capability.

The primary purpose of the manual is to provide information and instructions to experienced operators, electricians, and mechanics who are not familiar with this equipment. The intent of the manual is to guide and assist operators and maintenance personnel in the proper use and care of the equipment.

Read the instructions before starting the unit. Learn to use the manual and to locate information contained in it.

The Table of Contents, which follows this Introduction, lists all Chapters, Sections, and the paragraph titles within each Section. The location of each listing is identified by Chapter, Section and page number.

Each Chapter is divided into as many Sections as necessary. Sections are always referred to by a combination Chapter-Section number, for example: 2-3 refers to Chapter 2, Section 3.

The material within each Section is divided into main subjects with applicable paragraph headings and sub-headings as required. For example, a portion of the Description Section might logically follow this arrangement and paragraphing:

Section 1. Description

1. Engine, Generator and Controls

a. Interior Panel

(1) Protective devices

a. Overload relay

(2) Contactors

Page numbers do not run consecutively throughout the manual. Each page is identified by the Chapter-Section number in which it appears, and by a page number within the Chapter-Section. Therefore, the first page in each Section is page 1. These identifying numbers appear in the lower, outside corner of each page. Each page also bears a date located in the corner opposite the page number. This date is either that of original issue, or of the latest revision. Any revision to the original text is identified by a heavy black line in the left-hand margin. Illustrations follow a numbering system similar to page numbering. The first Figure in each Section is Figure 1.

All tables, charts and diagrams, as well as illustrations, are identified by Figure numbers to avoid confusion.

The general location of any particular information can be found quickly by running through the Table of Contents. For example: to locate any adjustment information, a quick look at the Table of Contents shows that “Adjustment / Test” is located in Chapter 2, Section 3, *(shown as 2-3)*.

Portions of the text are referred to by identifying the paragraph in which the referenced material may be found. When referenced material is located in the same Chapter/Section as the reference, only the paragraph identification is given, for example: *(Ref. Para. 1, A)* means that the material is to be found in paragraph 1, A, of the same Section.

When referenced material is located in another Chapter/Section, both the Chapter and Section numbers and the paragraph identification are given, for example: *(Ref. 1-2, Para. 1, A)* means that the referenced material is located in Chapter-Section 1-2, and paragraph 1,a. within that Chapter-Section.

Components shown in illustrations, and the illustrations themselves, are referenced in a similar manner. When this type of reference is made, the item number of the part and the Figure number in which it appears are given, for example: *(2, Fig.3)* refer to item number 2 in illustration Figure 3 of the same Chapter/Section.

When a referenced figure appears in another Chapter/Section, the reference will include the Chapter/Section number, for example: *(2-3, 1, Fig. 4)* tells the user that the information is in Chapter/Section 2-3, and to refer to item 1 in Figure 4.

Once a Figure number reference has been established, the Figure number is not repeated and only the item numbers of the parts involved are referenced, for example: “Loosen screw *(2, Fig.6)* slide out connector *(4)*, and remove brush *(6)*.

When an item number is referenced without a Figure number, it always applies to the last preceding Figure number mentioned in the text.

A collection of manufacturer’s literature is supplied as part of the information package.

If you have any questions concerning your **Hobart Power Systems Group** equipment, you are invited to contact our Service Department by mail, telephone, or FAX.

Write: Hobart Brothers Company
Airport Systems Group
Ground Power Division
Service Department
Troy, Ohio 45373
U.S.A.

Call: (937) 332-5060 (Service Assistance)

(937) 332-5050 (Replacement Parts)

FAX: (937) 332-5121

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Section 2. Description

1. General

The two **Jet-Ex 4D** units covered in this manual *(Figure 1)* are diesel engine driven, self-contained, trailer-mounted generator sets manufactured by **Hobart Brothers Company, Ground Power Division, Troy, Ohio U.S.A.** They are identified by specification numbers 7003A-3 and 7003B-3.

The basic generator set is designed to generate and deliver 28.5 volts DC power to an aircraft when its on-board generators are shut down. In addition to providing continuous, regulated power to the aircraft, the unit is designed for starting any fixed-wing aircraft or helicopter which is equipped with an external 28.5 volt DC power receptacle (see page 3 for complete Specifications and Capabilities).

The Specification 7003B-3 generator set is virtually identical to the Specification 7003A-3 generator set, except that it has a Furnas contactor and a different air cleaner.

2. Special Features

The “Soft-Start” current limiting feature, recommended by most aircraft engine manufacturers, provide the operator with controls to limit the inrush current to the aircraft engine’s starter. When the operator presets this control, the generator will provide constant voltage to the preset current value. As more current is applied beyond the preset current value, the voltage will decrease to a minimum of 14 volts DC, after which the voltage will remain constant as more current may be delivered beyond the preset current value. Limiting inrush current is recommended by most engine manufacturers to protect the aircraft engine’s starter shear section. The current limiting control is continuously adjustable from 300 amperes, which is recommended for helicopter and small turbine starting, to 2000 amperes, required for starting larger aircraft engines when the control is turned fully clockwise.

A four-wheel trailer is available to add mobility to the generator set. It is equipped with pneumatic rubber tires, a drawbar for towing, and hand lever-operated, parking brake. It also includes fenders, bumpers and cable trays. This option is available from Hobart Brothers as Part No.181000-1.

A water heater kit is installed inside the enclosure and is connected to the cooling system of the diesel engine. Its purpose is to keep the coolant warm when the engine is shut down for extended periods of time in cold weather and permit the engine to start quickly.

A fuel/water separator, attached to the side of the engine, replaces the standard prefilter. This special filter removes water/condensation along with any solid contaminants from the fuel.

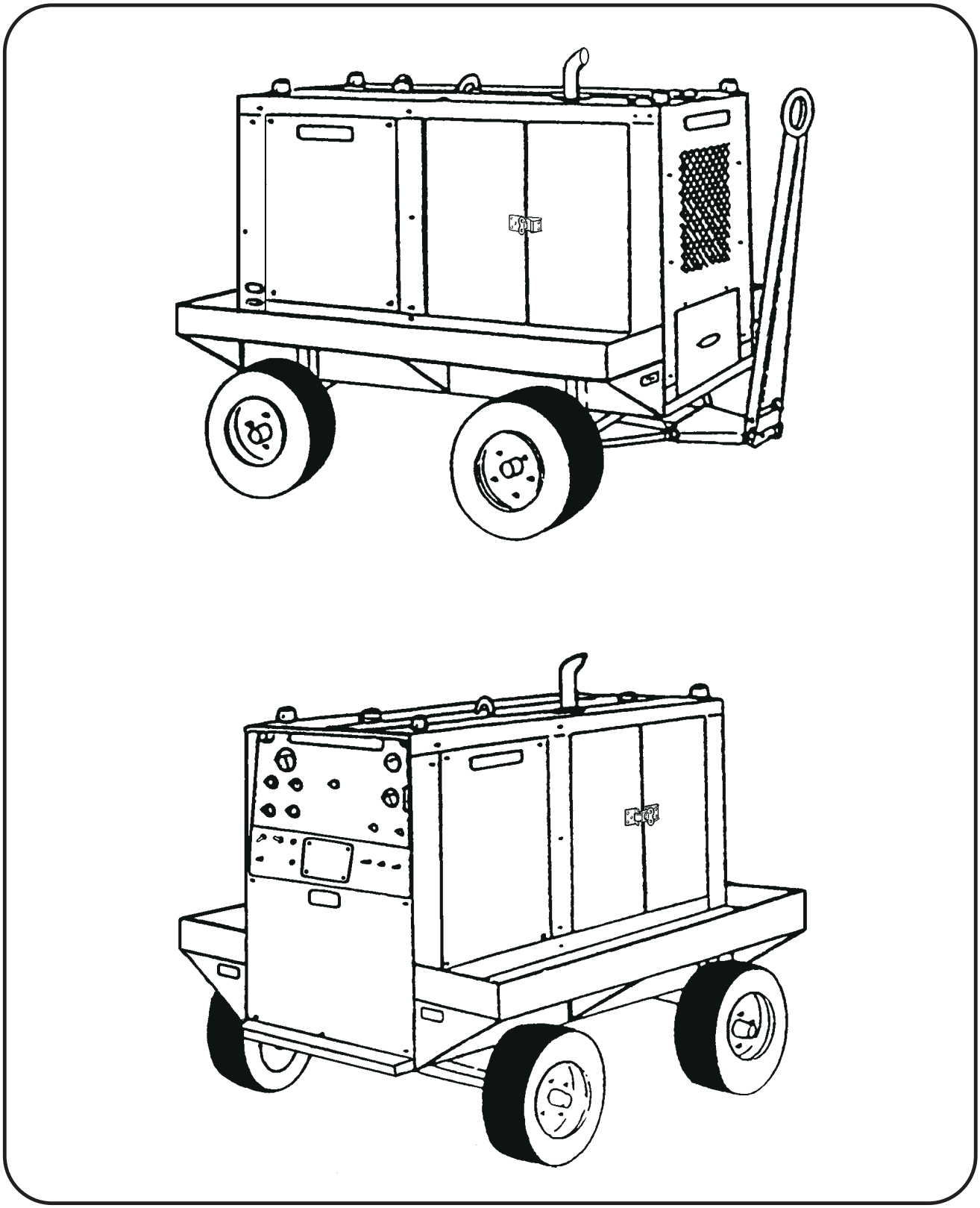
3. Orientation

The radiator end of the Jet-Ex 4D is the front. Right and left are determined by standing at the rear of the unit, facing it. The control panel is located at the rear.

4. Identification

Each generator set has an Identification plate attached inside the hinged control panel door. This nameplate lists the machines Model No. **(Jet-Ex 4D)**, Specification No., Serial No., and electrical rating.

If any of the options described in paragraph 2.b. are included, they will be listed by name and part number on a separate option nameplate located next to the Identification plate.



Jet-Ex 4DP Generator Set
Figure 1

Unit with Trailer, Fenders & Cable Tray	
Length	75.5 inches (1918 mm)
Width	58 inches (1473 mm)
Height	63.75 inches (1632 mm)
Weight (dry fuel tank)	2410 pounds (1093 kg)
Ground Clearance	7.5 inches (191 mm)
Generator	
Output Power Rating	15.7 kW
Voltage	28.5 volts DC
Rated Load Capacity	550 amperes continuous at 28.5 volts DC
Starting Current Capacity	200 amperes maximum
Current Limiting Capability	300 to 2000 amperes, continuously adjustable
Operating Speed	2000 RPM
Engine	
Manufacturer	Perkins Diesel
Model	4.236
Type	4-cylinder, 4-stroke, direct injection
Fuel	ASTM D975 66T Numbers 1D or 2D
Displacement	236 cubic inches (3.68 liters)
Rated Power at 2000 RPM	70 Horsepower
Oil Capacity (without filter change)	8 quarts (7.57 liters)
Coolant Capacity	3.5 U.S. gallons
Electrical System	12 volt DC, negative ground
Governed Speed at No Load	2000 +/- 50 RPM
Idle Speed	1000 +/- 50 RPM
Fuel Tank Capacity	21.5 U.S. gallons (81.4 liters)
Protective Devices	
Generator	**Engine**
28.5 volt overvoltage module trips at 32 to 34 volts.	Water Temperature Switch opens engine circuit at 225 F.
14 volt overvoltage module trips at 18 to 20 volts.	Low Oil Pressure Swiych opens at 20 PSI (138 kPa).

5. Canopy

The standard canopy is a sheet metal enclosure which protects the engine, generator, and electrical controls. It has two hinged doors on each side at the front to provide access for service and maintenance. Panels at the rear provide access to the generator. The left rear panel has a round hole in it to permit viewing the fuel gage mounted in the fuel tank.

6. Engine, Generator, and Controls

a. General

Refer to Figure 2. The engine *(4)* and generator *(9)* are mounted on a welded steel frame *(20)*. A fuel tank support *(21)* located at the rear of the unit supports the fuel tank *(7)* and provides a mounting frame for the load contactor (14) and output terminals. The radiator *(1)* is mounted to the front canopy. A heavy U-bolt is attached to the centrally located lifting yoke *(5)* for moving the generator set with a crane or hoist.

b. Engine

(1) General

The engine used in the Jet-Ex 4D generator set is a Perkins four-cylinder, four-stroke, direct injection diesel engine. It has a 236 cubic inch *(3.86 liter)* cylinder displacement and a 16:1 compression ratio. Engine firing order is 1-3-4-2.

A spring-loaded relief valve in the pump limits maximum pressure in the system. A full-flow oil filter *(12, Figure 2)* cleans the entire output of the pump before it enters the oil distributing system. A valve in the filter provides a bypass to an oil gallery in case the filter becomes clogged. A low oil pressure switch is mounted on the engine block as a protective device. The primary ignition circuit is wired through the contacts of this switch, which closes at 20 PSI *(138 kPa)*. This prevents the engine from running if oil pressure will not build up, and also shuts down the engine if oil pressure drops radically during operation. (See Figure 2 and the engine operator's manual for engine specifications).

The generator and engine are mounted on a welded steel skid, and are enclosed by a sheet metal canopy that bolts to the skid. Access to engine serviceable components *(oil filter, air cleaner, and rectifier assembly, etc.)* is through two doors at the front on each side of the machine.

Two removable panels to the right side and one to the left rear allow access to the other components such as the load contactor and output terminals. The rear panel is removable and permits access to the rectifier assembly.

(2) Cooling fan

The cooling fan on the engine is designed to blow air out through the radiator rather than to draw it in. This prevents hot air, heated by the engine, from entering the generator.

(3) Fuel system

The fuel system consists of an 2l.5-gallon *(81.4 liters)* tank *(7, Figure 2)* with all the necessary fittings and hoses.

(4) Alternator and regulator

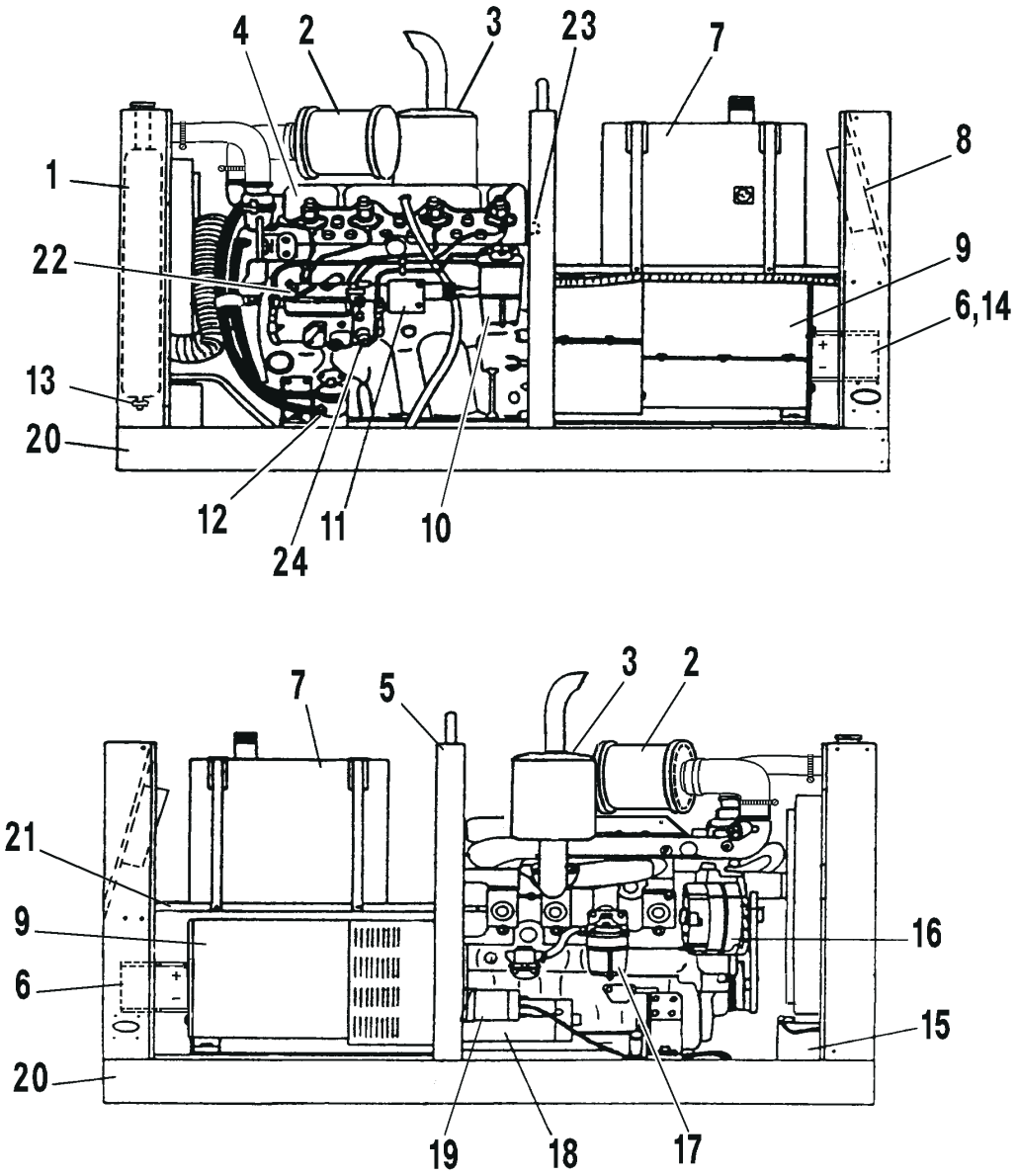
The battery charging alternator *(16, Figure 2)* is rated at 62 amperes on Series 7003 generator sets. The voltage regulator is an integral part of each of the alternator.

(5) Starter relay

The starter relay *(19, Figure 2)* is mounted on the starter motor *(18)*, on the right side of the engine.

(6) Exhaust muffler *(3, Figure 2)*

This muffler helps deaden audible noise from the engine's exhaust.



1. Radiator
2. Air cleaner
3. Muffler
4. Engine
5. Lifting yoke
6. Rectifier assembly
7. Fuel tank
8. Control panel
9. Generator
10. Fuel filter
11. Throttle control solenoid
12. Oil filter
13. Drain cock & switch
14. Load contactor
15. Batteries
16. Alternator
17. Fuel filter
18. Starter
19. Starter relay
20. Frame
21. Fuel tank support
22. Engine governor
23. Water temperature sender
24. Oil pressure sender

Generator Set Components
Figure 2

7. Generator

The generator *(9, Figure 2)* is a multi-phase, synchronous salient pole, revolving field, AC generator whose output is rectified. The output is rectified by a rectifier assembly *(6)* made up of twelve rectifiers connected into a full wave configuration. The generator is self-excited and receives excitation from a three phase full wave rectified stator winding. One positive and one negative brush in contact with slip rings supply controlled excitation current from the stator winding through the voltage regulator to the rotating field winding. The voltage regulator controls the excitation current and maintains a constant output voltage. Access to the brushes is through holes in the anti-drive end bracket. The rotor is supported at the anti-drive end *(slip ring end)* by a single-row ball bearing. The drive end is connected to the engine fly-wheel by a flexible disc and hub coupling assembly and is supported by the engine main bearings. A radial-blade fan of formed and welded sheet metal construction is mounted on the coupling hub and draws cooling air over the generator windings.

Air enters through the anti-drive end of the generator and is discharged through openings in the flywheel housing at the drive end, to cool the rectifier assembly above it. The generator housing assembly, which contains the generator stator, is bolted to the engine flywheel housing.

8. Control Panel Assembly

a. General

The hinged control panel *(8, Figure 2)* houses and provides mounting facilities for controls, monitoring instruments, voltage regulator, relays, etc. The panel is mounted at the rear of the canopy. The controls are accessible behind a hinged Lexan cover.

b. Lights

Two panel lights *(7, Figure 3)* provide illumination for instruments and controls. One green pilot light (12) glows when the output load contactor is closed, and another one *(14)* glows green when the engine is running.

c. Monitoring instruments

The voltmeter *(6, Figure 3)* indicates generator output voltage, and the ammeter *(5)* displays generator current.

A tachometer *(2)* displays the engine speed in RPM. This instrument receives its operating signal from the alternator.

A water temperature gauge *(3)* indicates the engine coolant temperature and is actuated by a temperature sender *(23, Figure 2)* mounted on the engine's water jacket.

An oil pressure gauge *(1, Figure 3)* displays the pressure in the engine's lubrication system. It is operated by a sender *(24, Figure 2)* mounted on the engine block.

The ammeter *(19, Figure 3)* indicates the rate of charge or discharge in the engine's 12 volt DC electrical system.

The hourmeter *(15)* records the total hours of engine operation for scheduling maintenance.

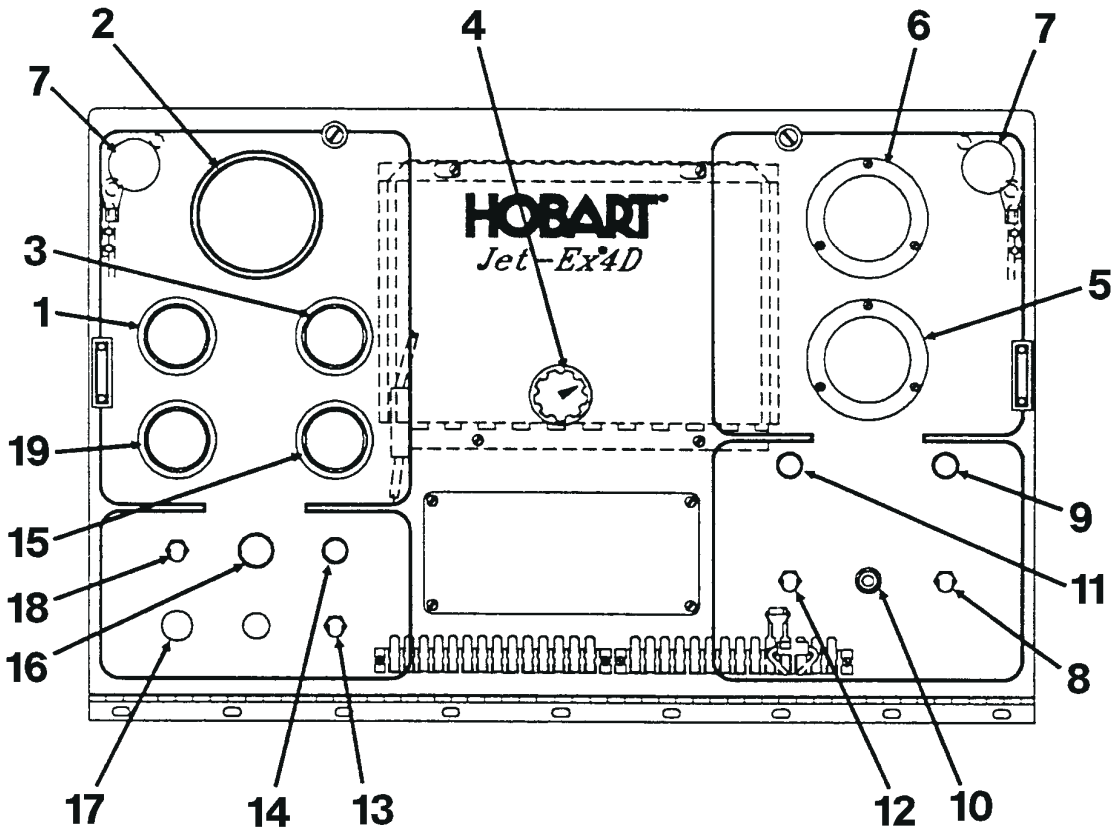
d. Potentiometer

The current limiting potentiometer *(4)* is used to select the starting current recommended for various aircraft. The current limiting setting is continuously adjustable from 300 to 2000 amperes.

e. Switches

The contactor control switch *(11, Figure 3)* is a three-position toggle switch used to close and open the output load contactor. The top **CLOSE** position is spring-loaded and is held momentarily until the contactor closed light *(12)* glows, then it is released to the center **ON**

position. In this position the switch provides holding current to the load contactor to keep it closed. Protective devices in the load contactor circuit provide protection against overvoltage by opening the load contactor if that condition occurs. In the bottom **OFF** position, the contactor is opened. The push-to-build-up-voltage switch *(10)* is a momentary contact pushbutton switch which flashes the generator fields with 12 volt engine circuit when flashing the fields.



1. Oil Pressure Guage
2. Tachometer
3. Water Temperature Guage
4. Current Limit Control
5. Ammeter *(Generator)*
6. Voltmeter
7. Panel Light
8. Panel Lights Switch
9. Panel Lights Fuse
10. Push-To-Build-Up-Voltage Switch
11. Contactor Closed Switch
12. Contactor Closed Light
13. Speed Control Switch
14. Engine On Light
15. Hourmeter
16. Engine Control Switch
17. Engine Circuit Fuse
18. Engine Circuit
19. Ammeter *(Engine)*

Control Panel Assembly
Figure 3

The panel lights switch *(8, Figure 3)* turns the lights *(7)* on and off. The engine start switch *(16)* is a momentary contact pushbutton which closes the starter relay *(8, Figure 2)* and cranks the engine. This switch is operable only when the engine switch *(18)* is held in its top spring-loaded **START** position.

The engine switch *(18)*, when released from its top **START** position after the engine starts, will return to center **RUN** position. The engine **ON** light *(14)* will glow as long as the switch is in **RUN** position. In the bottom **STOP** position, the switch will stop the engine and the light *(14)* will go out.

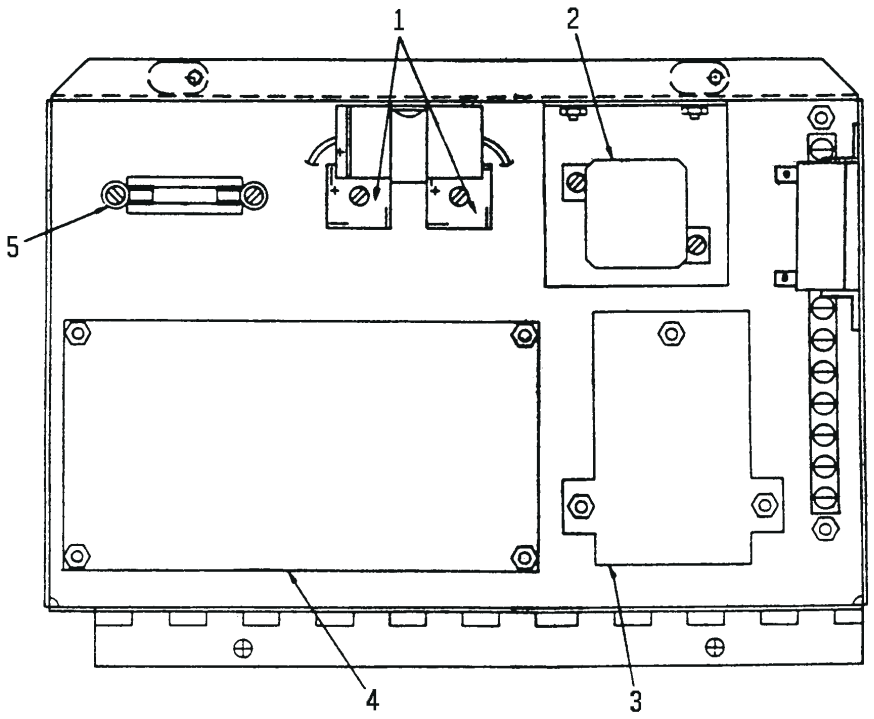
Refer to Figure 3. The speed control switch, *(13)* is a two-position toggle switch wired to an idling device on the engine. In the **IDLE** position, used for starting, the engine speed is controlled approximately. In the Rated RPM position, engine speed is controlled to approximately 2000 RPM.

f. Fuses

Three cartridge-type fuses protect the engine ignition circuit, the panel lights circuit, and the voltage regulator. The engine circuit fuse *(13, Figure 3)* is rated at 20 amperes, the panel lights fuse *(9)* at 10 amperes, and the voltage regulator fuse *(4, Fig. 4)* at 10 amperes.

g. Voltage regulator

Refer to Figure 4. The voltage regulator *(1)* is a solid-state device which regulates the 28.5 volt DC generator output after the voltage is built up.



1. Excitation Rectifiers
2. Voltage Sensing Relay
3. Overvoltage Relay
4. Voltage Regulator
5. Voltage Regulator Fuse

Voltage Regulator Support
Figure 4

h. Overvoltage module

The overvoltage relay *(2)* is a solid-state protective device on a printed circuit board. A normally closed relay in the circuit is wired into the load contactor coil circuit. An overvoltage condition causes the relay contacts to open, which in turn prevents the contactor from closing, or opens the load contactor and discontinues the power delivery. The overvoltage module is adjusted to trip at 32 to 34 volts DC in 2 to 10 seconds.

i. Resistor and diode assembly

This network, which is mounted on a terminal strip behind the control panel, protects the load contactor hold circuit against excessive current draw when the generator is delivering power.

j. Excitation rectifiers

Two diode bridge rectifiers, CR418 and CR418, *(3, Fig. 4)* convert an AC voltage from the generator armature to the DC voltage needed for the generator revolving field.

k. Voltage sensing relay

Voltage sensing relay K406 *(5, Fig. 4)* is a safety device which automatically opens the grounding circuit of the revolving field to prevent excessive voltage build-up if the push-to-build-up-voltage switch is held in too long, or if it is pushed in after voltage is built up.

9. Contactor

The load contactor, which is mounted behind the control panel on the fuel tank support, provides a safe and convenient means of connecting and disconnecting the generator from the load. Initial power for closing the load contactor is supplied by the generator through the spring-loaded momentary contacts of the contactor control switch *(11, Figure 3)*. Holding power, to keep the contactor closed, passes through the normally open auxiliary contacts in the load contactor.

10. Output Terminals

The output terminal panel is mounted inside the unit just behind the control panel. The positive terminal is the A2 terminal of the load contactor, and the negative terminal is to the right of the load contactor.

11. Rectifier Assembly

This assembly consists of two aluminum heat sinks with twelve diodes on each heat sink. The rectifier assembly converts the AC output of the generator to 28.5 VDC.

12. Ammeter Shunt

The ammeter shunt is connected in the generator's negative output circuit. It supplies a small voltage proportional to output current for operation of the generator ammeter *(5, Fig. 3)* and for sensing output current for the current limit circuit of the voltage regulator *(1, Fig. 4)*. This shunt is mounted on the negative heat sink of the rectifier assembly *(6, Fig. 2)*.

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Section 3. Preparation for Use, Storage or Shipping

1. Preparation for Use

a. General

The generator set is shipped with an empty fuel tank. After the fuel tank filled and the generator set inspected, the generator set is ready for use.

CAUTION

Read operating instructions in Section 1-4 before operating the unit.

b. Inspection/Check

Inspect the unit completely prior to operation.

(1) Remove crating, blocking, banding, ties, and other securing and protective material. After shipping carton is removed, remove the four carton supports from the bases of the clearance lights. Then install the attached clearance light lenses in their bases.

(2) Inspect exterior for shipping damage such as broken glass, damaged sheet metal, etc.

(3) Open canopy door and inspect interior for foreign material such as rags, tools or shipping papers.

(4) Check fuel, coolant, and oil hoses and connections for visible leaks. If leaks are discovered, correct by tightening hose clamps, tube fittings, etc., as required.

(5) Check security of attaching and retaining hardware.

(6) Check the following for sufficient quantity.

a. Fuel

Fuel tank capacity is 21.5 gallons (81.4 liters).

b. Engine coolant

The radiator cap is located above the front canopy, Coolant level should be approximately one inch below the filler neck. Allow a sufficient capacity for coolant expansion.

CAUTION

Be sure the cooling system antifreeze solution is adequate to protect below lowest temperature expected.

c. Engine lubricating oil

The oil level dipstick is located on the right side of the engine. Refer to Perkins User's andbook for oil recommendations.

(7) **Output Cable Installation**

Units are normally supplied without a generator-to-aircraft cable.

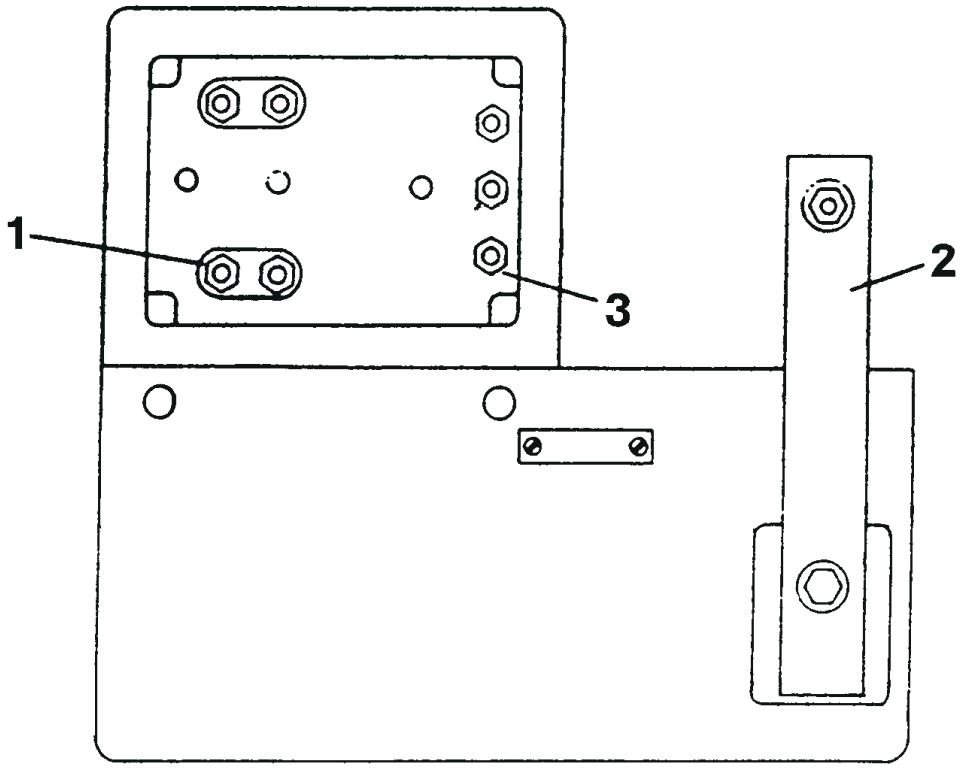
a. Cable requirements

- Cable length is determined by the customer's requirements. It is recommended that the cable be no longer than 30 feet (9 m). The cable should be two conductor with lug-type terminals on one end and an AN-2551 plug connector on the other.
- The recommended single conductor sizes for 28.5 volt DC, continuous rated amperage and 90^{o} C *(194 ^{o}F)* rise is as follows: for 285 amperes use 2/0 size for 385 amperes use 4/0 size for 530 amperes use 350 MCM size

NOTE: Some operators may wish to add a second cable assembly with M5-25019 plug connector for starting aircraft such as Jetstar and Sabre liner.

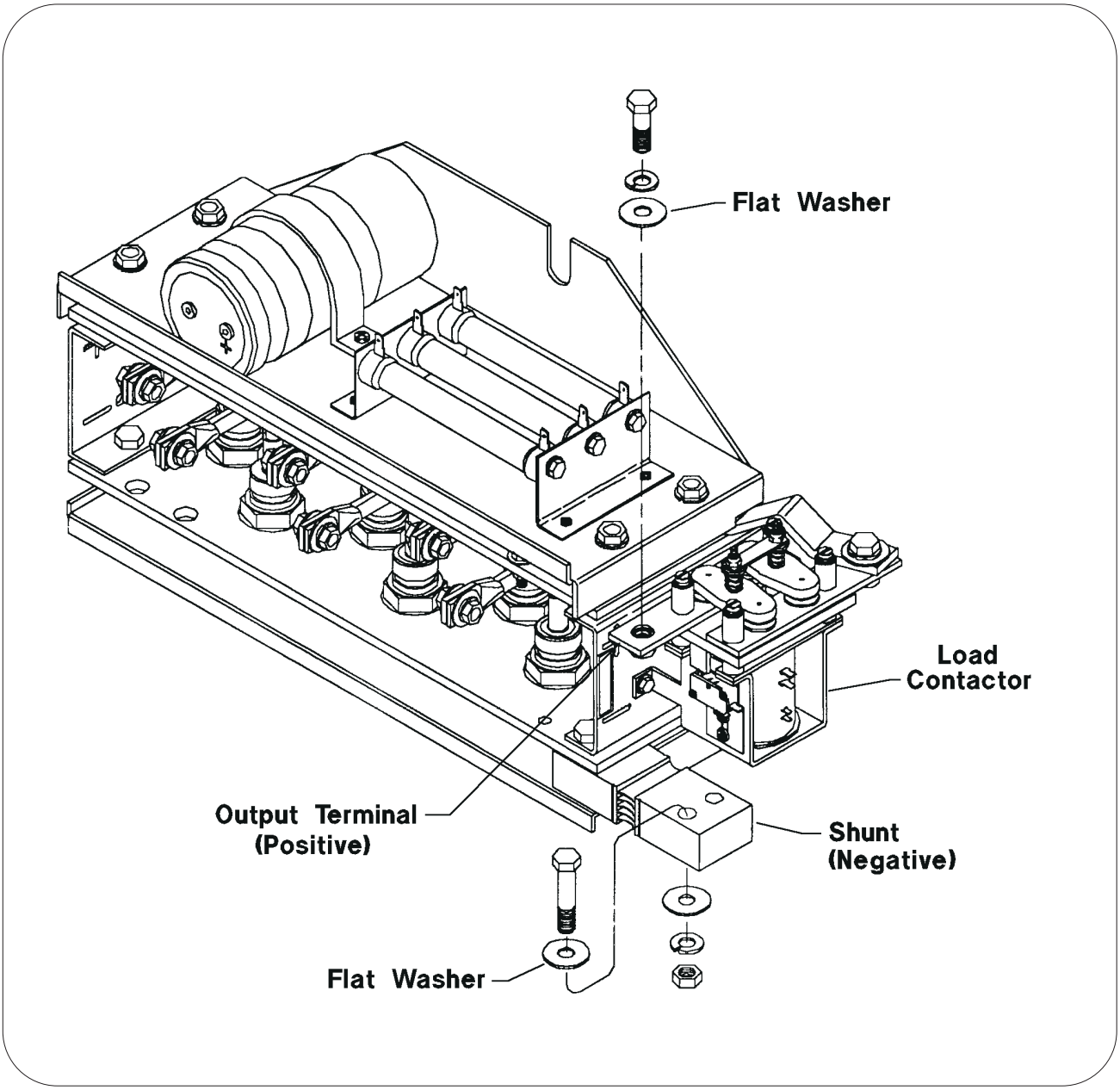
b. Cable connection

- Remove the screws that secure the lower panel (below control panel). Set the panel aside.
- Loosen the output cable clamp and thread the lugged end of the output cable through the opening in the side of the unit.
- Connect the POSITIVE cable lead to the output terminal on the contactor. Connect the NEGATIVE cable lead to the shunt. ALWAYS place the lead under the flat washer shown.
- Tighten the cable clamp and install the lower panel.
- Store cables in cable tray provided on top of fender, or on hangers on side of canopy if fenders are not used.



1. Positive Output Connection
2. Negative Output Connectioon
3. Load Contactor

28-Volt Output Terminal Panel: Specification 7003A-3
Figure 1



Output Cable Connections: Specification 7003B-3
Figure 2

2. Preparation for Storage

When a generator set is to be stored or removed from operation, special precautions should be taken to protect the internal and external parts from rust and corrosion.

a. General

The unit should be prepared for storage as soon as possible after being removed from service.

Storage should be in a building which is dry and which may be heated during winter months.

Moisture absorbing chemicals are available for use where excessive packaged and sealed if moisture absorbing chemicals are to be effective.

b. Temporary Storage

When storing the unit for one month, prepare as follows:

(1) Lubricate the unit completely in accordance with instructions in Section 2-2. This will include changing engine oil, and filter elements.

(2) Make certain the cooling system antifreeze solution is adequate to protect below the lowest temperatures expected during the storage period.

(3) Clean the exterior of the engine with fuel oil and dry with clean cloths and compressed air.

(4) Seal all engine openings. Use a waterproof, vaporproof material that is strong enough to resist puncture damage from air pressure.

c. Long Time Storage

(1) Engine Protection

The Jet-Ex 4D generator set may be stored for long periods if the engine is given proper protection from rust and corrosion. Refer to the Perkins Diesel Users Handbook (Series 4.236) for proper procedures to be followed.

(2) Generator Protection

To protect the generator and other electrical components, the complete unit should be packaged, using moisture proof packaging and sealing materials. Place packages of moisture absorbing chemicals, such as silica-gel, in the unit before packaging.

WARNING

Place warning tags in several places to make certain that the individual who takes the unit out of storage is warned that engine oil and coolant have been drained.

(3) Battery Care

Remove battery and store in a cool dry place. Store the battery on wood rather than directly on cement or metal.

3. Preparation for Shipping

Prepare the unit for shipping as follows:

- Seal all engine openings to prevent the entrance of water, dirt, and dust.
- Disconnect battery cables.
- Drain all fuel from tank and fuel lines as required by carrier rules.
- Crate the unit solidly to prevent damage to instruments, glass, and sheet metal.

Section 4. Operation

1. General

This section contains information and instructions for the safe and efficient operation of the generator set. Operating instructions are presented in a step-by-step sequence of procedures to be followed in supplying power to an aircraft.

NOTE: Read ALL of the operating instructions before attempting to operate the equipment.

WARNING

Ear protection may be necessary when working close to this equipment.

2. Operating the Generator Set

a. Pre-start Inspection

(1) Always be sure there is sufficient oil and coolant in the engine.

(2) Be sure the fuel shutoff valve is open. The valve is located at the fuel tank outlet. Observe the fuel gage. Make certain of sufficient fuel to complete the job to be done.

(3) If the unit is trailer mounted and is not connected to a tow vehicle, be sure the parking brake is applied and that the drawbar is raised and locked in the vertical position. Raising the drawbar to the vertical position automatically applies the brakes, and they will be released when the drawbar is lowered.

(4) Open the engine compartment doors and inspect interior for rags, tools, and foreign material.

b. Pre-start Instructions

In all probability, the unit will be moved from one location to another many times during its lifetime of service. Therefore, the following steps should be taken to optimize maximum efficient operation.

(1) Check the supply of fuel, crankcase oil and radiator coolant. See Perkins Engine User's Manual for specifications.

(2) Inspect the unit thoroughly to be sure it is in proper working order. Check all fuel lines and wire connections to be certain they are secure. Tighten any loose screws, nuts or bolts.

(3) Wipe off the entire unit and clean the air passages, control panel and other hard to reach places with compressed air not over 25 psi *(172 kPa)*.

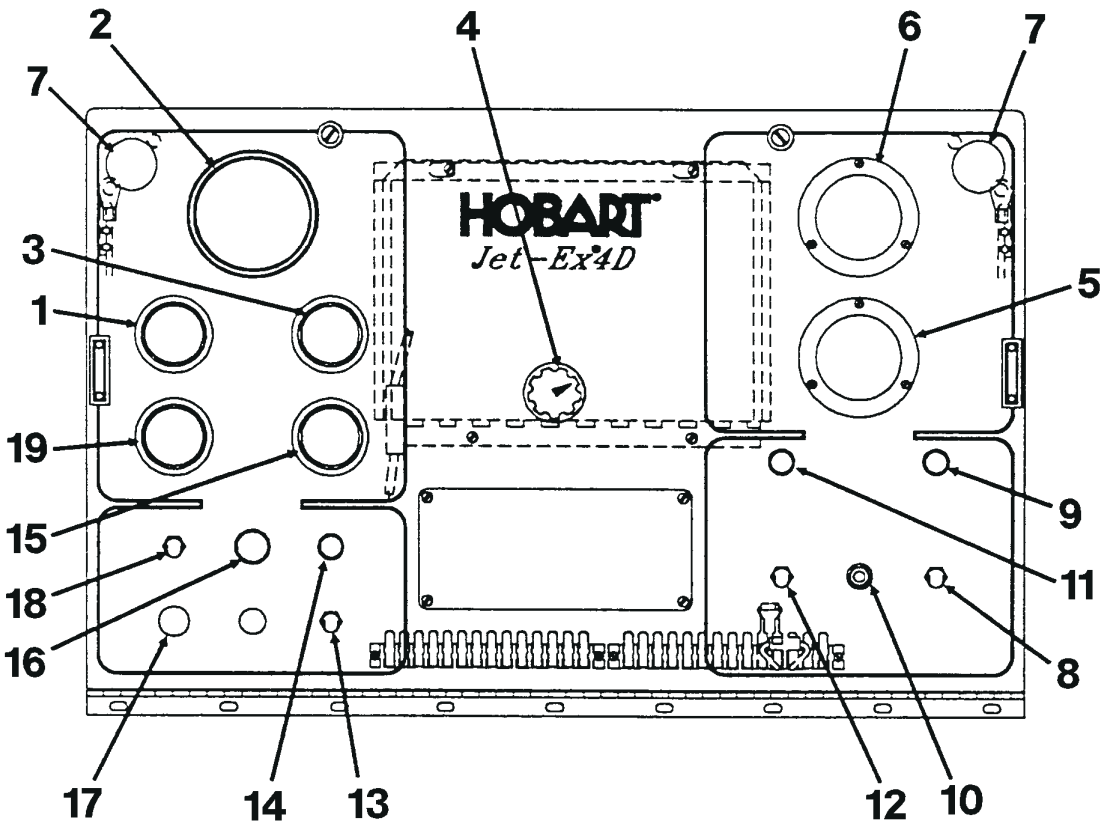
(4) Make sure that no loose bars, tools, parts, etc., are in or on any part of the engine as they could cause serious damage to the engine, generator, or personal injury to anyone standing nearby.

(5) If the unit is operated indoors, make sure that an exhaust line is properly connected to the engine exhaust system, and discharged out of doors. Avoid short bends or reduction in line sizes in exhaust pipes. Locate the unit so as to necessitate the shortest possible exhaust line to insure the least amount of back-pressure on the engine. Back-pressure can cause engine damage and loss of power.

(6) Check the electrical system to make sure the connections are secure and properly connected. Check the battery electrolyte level.

(7) Check air cleaner service indicator, and replace air cleaner element if indicator window is red.

(8) Check the fuel/water separator and drain any water and/or solid contaminants if necessary. (See Section 2-3, Servicing the Fuel Filter).



1. Oil Pressure Guage
2. Tachometer
3. Water Temperature Guage
4. Current Limit Control
5. Ammeter *(Generator)*
6. Voltmeter
7. Panel Light
8. Panel Lights Switch
9. Panel Lights Fuse
10. Push-To-Build-Up-Voltage Switch
11. Contactor Closed Switch
12. Contactor Closed Light
13. Speed Control Switch
14. Engine On Light
15. Hourmeter
16. Engine Control Switch
17. Engine Circuit Fuse
18. Engine Circuit
19. Ammeter *(Engine)*

Control Panel Assembly
Figure 1

c. Starting The Engine

Make sure that all Prestarting Instructions have been carried out, and reference to Initial Preparation For Use has been checked for operating details.

NOTE: When operating in cold weather environments, read Adverse Weather Precautions before starting the generator set.

(1) Check engine oil, fuel and coolant levels.

(2) Place speed control switch *(13)* in **IDLE** *(down)* position.

CAUTION

If the engine stalls or falters in starting, wait three or four seconds before re-engaging starter. This will prevent possible damage to starter or the engine. DO NOT Operate the starter for periods longer than 15 seconds at a time. An interval of at least two minutes should be allowed between cranking periods to protect the starter from overheating.

(3) Hold engine **START-RUN-STOP** switch (19) in **START** position.

(4) Press and hold **ENGINE START** pushbutton (17). Release as soon as engine starts.

(5) Release engine **START-RUN-STOP** switch (19) to RUN position when oil pressure builds up.

(6) Observe engine RPM on the tachometer, and observe engine for excessive vibration. Idle speed should be 1000 RPM + 50 RPM. If there is excessive vibration, adjust engine idle speed, gradually increasing or decreasing it - whichever is necessary - until vibration is reduced. For idle speed adjustment procedure, refer to Section 2-3, Para. 2,b, (4).

(7) Allow engine to warm up before applying a load.

WARNING

The engine' s entire exhaust system will get very hot and cause severe burns if touched.

d. Generator Operation

(1) Place speed control switch *(13)* in **RATED RPM** *(up)* position. Engine speed will be 2000 RPM.

(2) Press **BUILD UP VOLTAGE** pushbutton *(10)*. Generator will produce rated voltage.

(3) Adjust **STARTING CURRENT** rheostat *(4)* if necessary.

(4) Deliver Power

(5) Connect output cable to **AIRCRAFT**.

(6) Hold **CONTACTOR** switch *(11)* in CLOSE position. Release to **ON** position as soon as green **CONTACTOR CLOSED** light *(12)* comes on.

(7) Stop Operation Shutdown

(8) Place **CONTACTOR** switch *(11)* in **OFF** position. Light *(12)* should go off to indicate load contactor has opened and power is no longer available at the aircraft.

(9) Place speed control switch *(13)* in **IDLE** (down) position. Allow engine to run for 2 to 3 minutes.

(10) Disconnect output cable from aircraft receptacle and store cable in cable trays or on cable hangers as the case may be.

(11) Place **START-RUN-STOP** switch *(19)* in **STOP** position.

e. Adverse Weather Precautions

(1) Cold weather operation

Operation of engine-driven units at sub-zero temperatures requires special precautions and extra servicing from both operation and maintenance personnel if poor performance or total functional failure is to be avoided. Consult Maintenance and Operator's Manual and recommendations below.

(2) Fuel system

Keep system clean and free from water which may collect in a low spot in the fuel line and freeze, plugging the line. Fuel tanks should be kept **FULL** to prevent water condensation from the air above the fuel.

(3) Fuel

Keep fuel storage tanks or drums as full as possible to avoid condensation of moisture from the air above the fuel. After filling or moving fuel containers, allow fuel to settle before using. Never draw fuel from the extreme bottom of the container. Strain all fuel to remove any foreign matter. When operating outdoors, take steps to prevent the entry of snow, water and ice into the fuel containers.

(4) Cooling system

Prior to cold weather, drain and flush the cooling system to remove accumulations of rust and sediment. Mix and add antifreeze solution, check the cooling system connections for leaks. Add a can of rust inhibitor to the radiator when system is winterized. This will keep system cleaner and furnish lubrication for the water pump.

The engine is equipped with a water heater kit, which operates off of 115V AC, 50 or 60 cycle line current, by plugging in the power cord located at the left, rear side of the unit. The heater is connected to the engine cooling system between the engine block and the inlet side of the radiator. Heated coolant is circulated through the cooling system by a thermal siphoning action. A thermostat automatically turns the heater **ON** at 120°F (49°C) and **OFF** at 140°F (60°C).

CAUTION

DO NOT operate the heater while the engine is running. The heater is to be used only when the engine is shut down for extended periods of time in cold weather.

(5) Lubrication

Drain the crankcase *(preferably when warm after running)* and fill with a lighter grade of oil. See Engine Oil Recommendations chart in the Perkins Engine User's Manual for recommended viscosity for various atmospheric temperatures. In cold weather, drain oil more frequently. Water condenses and collects quickly, mixes with the oil and increases deposits to form a sludge. Check oil frequently for this condition. Water in crankcase or oil lines may freeze and cause serious damage to the oil pump, or shut off the oil supply.

(6) Electrical system

In cold weather, the most efficient electrical system is needed to start the cold engine. Check the entire system for loose connections or indication of bad wiring or shorted conditions.

(7) Battery

Battery efficiency decreases sharply with lower temperatures. Maintain the specific gravity of the battery between 1.275 and 1.300 *(fully charged condition)*. Make sure of full charge before attempting to start engine in sub-zero conditions.

f. Operation in Hot and Humid Conditions

(1) Cooling system

Maintain a more frequent check of the coolant level in the radiator.

(2) Battery

The specific gravity and proper level of the battery electrolyte should be maintained. Observe recommendations in the Perkins Diesel User's Manual for proper care of the battery.

g. Operation in Extremely Dusty Conditions

If unit is to be operated under dusty, out-of-door conditions, place in a sheltered area. Take advantage of any natural barriers which may offer protection from blowing dust. If the installation is more than temporary, erect a protection shield.

(1) Fuel system

Change the fuel filter at prescribed intervals and keep fuel containers covered and protected against dust entry.

(2) Oil filter and air cleaner

These both need more frequent attention under dusty conditions, Check air cleaner daily. Replace oil filter cartridge as needed.

(3) Crankcase

The crankcase oil level will bear close attention. Dusty conditions tend to load crankcase oil with dirt. Watch for dirty and gritty oil conditions, and change oil more frequently as required.

h. Operation in Salt Water Areas

(1) Canopy

Wash canopy regularly to remove salt film. Repaint any damaged places and oil the side panel hinges regularly.

(2) Covering

To protect the engine and generator as much as possible from salt water atmosphere, keep the side panels on the canopy closed, when not in use. It is advisable to keep the unit covered with a tarpaulin, if available, while in operation. Salt water should be wiped from the engine, and all terminals and connections in the electrical system wiped dry. Keep all linkage oiled.

(3) Brushes

The brushes of the generator should be inspected regularly to make certain that they are free in the holders. Lift the brushes in the brusholders about every two days to insure their freedom to slide within the holder. Wipe dry all the parts that can be reached, and use compressed air, if available, to dry the parts of the generator that cannot otherwise be reached. See **MAINTENANCE** for brush care.

(4) Field coils

The fields should be dried as thoroughly as possible. If they have become damp, proceed with recommended procedure in **MAINTENANCE** section.

(5) Battery terminals

Thoroughly clean the battery terminals and connections. Coat terminals and connections with petroleum jelly to retard corrosion.

i. Miscellaneous

Once a month, oil hinges on the engine compartment doors and the hinged plexiglas cover.

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Chapter 2. Servicing/Troubleshooting

Section 1. Maintenance Inspection/Check

1. General

To make certain that generator set is always in good operating condition, it must be inspected, maintained, and lubricated regularly and systematically.

WARNING

Stop operations at once if a serious or possibly dangerous fault is discovered.

2. Maintenance Schedule

a. General

Figure 1 provides a suggested schedule for periodic checks and services. Refer to Section 2-2 for lubrication requirements.

b. Maintenance Schedule Check Sheet

It is strongly recommended that the customer use a maintenance schedule check sheet. The check sheet will provide a record of maintenance specific operation.

c. Time Intervals

The schedule is based on both hours of operation and calendar intervals. These two intervals are not necessarily the same. The calendar period is included to make certain services are performed regularly when equipment is being operated infrequently, or at manufacturer's recommendations. Perform all services on a "whichever comes first" basis.

NOTE: Refer to the **Perkins Diesel User's Manual** for detailed engine maintenance information.

3. Engine and Related Components

See the Perkins Diesel User's Manual for Series 4.236 engines.

4. Inspection and Cleaning

Every day, check for oil, coolant, or fuel leaks. Also check for loose electrical connection. Check oil pressure with engine running at rated RPM *(2000)*. Do not operate engine if oil pressure is less than 15 psi. Wipe accumulated water off from all electrical connections and instruments. Make sure that the alternator ammeter is not discharging, which indicates that the battery is being charged.

Every week, wipe off accumulated dust, dirt and oil from the engine and generator. Check all parts for loose connections and wear. If arcing has occurred at any electrical connections, recondition them and securely refasten. Check engine oil and coolant levels.

Recommended Service Intervals	**10 hrs. or Daily**	100 hrs. or 2 Weeks	**200 hrs. or 1 Month**	**400 hrs. or 2 Months**	**800 hrs. or 6 Months**
Engine					
Check oil level		X			
Check coolant level		X			
Check fuel quantity		X			
Check gages and instruments for prpoer operation		X			
Change engine oil			X		
Change oil filter			X		
Check and tighten drive belts		X			
Clean and inspect exterior of radiator					X
Check exhuast system					X
Check cooling system					X
Check and adjust idle speed					X
Check and refill cooling system	**(Twice yearly, summer and winter)**				
Check//Replace fuel filter	X				X
Clean engine					X
Electrical System (12V DC)					
Check lights		X			
Check charging rate		X			
Check battery water level				X	
Check battery state of charge					X
Check wiring and connections					X
Check all instruments and gages					X
Check battery terminals and connectors					X
Electrical system (28.5V DC)					
Check indicating light		X			
Check operation of all instruments, meters, etc.				X	
Check generator brushes for length, cleanliness and free operation					X
Check slip rings for smoothness and clealiness					X
Check the entire unit					X
Check overvoltage protection				X	
Check all wiring connections					X
Trailer (Option)					
Lubricate					X
Check tire inflation					X
Check and adjust wheel bearings					X
Lubricate wheel bearings					X
Check brake tension				X	

Inspection/Check/Maintenance Schedule
Figure 1

Every month, check generator for amperage and voltage output. Blow out generator windings with compressed air, not over 25 psi *(172 kPa)* pressure or remove with a suction-type cleaner with a non-metalic nozzle. If windings should become slightly damp, use space heaters or electrical light bulbs to effectively dry out the windings. If dampness is excessive, apply external heat under a canvas cover, well vented. Heating should not exceed 194^{o} F *(90 ^{o} C)*.

Pound out any dents in the canopy. Sand, prime, and repaint any dented or rusted spots.

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Section 2. Troubleshooting Procedures

1. General

Troubleshooting is an orderly process of checking and eliminating possible causes of trouble until the exact cause of a trouble is found. As a rule, the best place to start looking for the cause of a trouble in a circuit is at the source of power. Continue testing and checking the circuit, step-by-step, in an orderly manner, until the cause of trouble is located. See connection and schematic diagrams.

2. Troubleshooting Chart

a. Description

The troubleshooting chart lists information under three headings:

(1) Trouble, symptom, and condition,

(2) Probable cause

(3) Test, check and remedy

b. Use of the Troubleshooting Chart

Read the trouble symptoms and conditions before proceeding to causes and remedies. For example, at the beginning of the troubleshooting chart under **ENGINE**, the first trouble listed is: “Engine will not start. Starter will **NOT** crank engine.” If the starter WILL crank the engine, then obviously this is not your symptom and condition. Go the next trouble and symptom directly below. If the starter will **NOT** crank the engine, look to the right under **PROBABLE CAUSE** and **TEST**, **CHECK, AND REMEDY** and find the various things which could cause the trouble and what to do to check and remedy them.

3. Equipment for Troubleshooting

A good quality, multi-scale voltmeter is the only instrument required similar clips, will be required. The 12 volt engine electrical system may be used for a 12 volt DC power source.

WARNING

Loose garments, neckties, and other hanging items must not be worn by personnel near the fan or other exposed moving parts of this equipment while it is running. Also, avoid contact with live electrical parts. Death or serious injury could result!

4. Diagrams

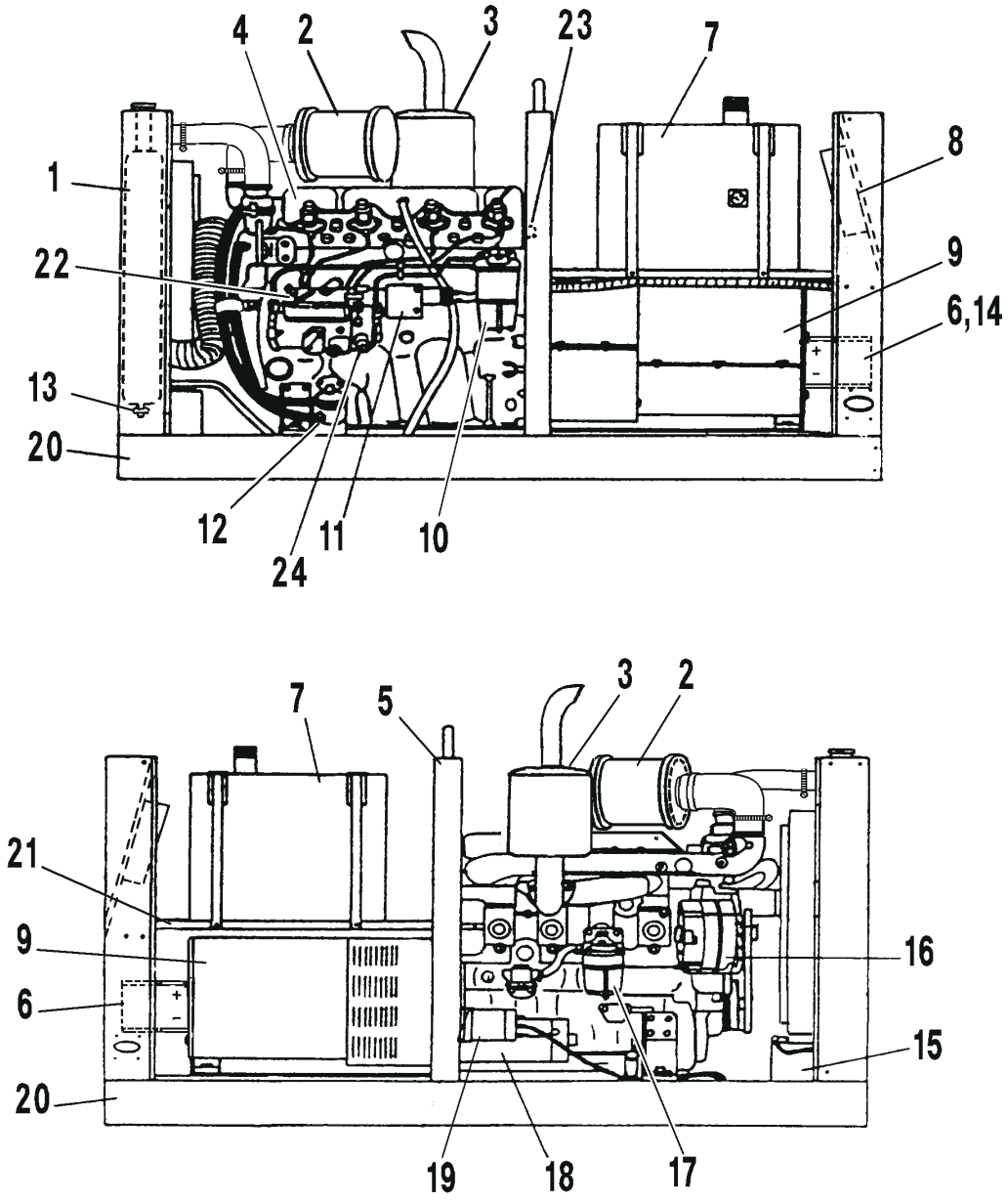
For each of the the generator sets covered by this manual an electrical schematic and connection diagram is provided in the Manufacturers Literature chapter of this manual. These diagrams can be very helpful in troubleshooting. Components shown in the diagram are identified by reference designators *(or item names in some instances)*. A legend appearing on the diagram identifies each reference designator by its full item name. For example, the symbol K403 identifies the overvoltage relay, and M406 identifies the voltmeter.

5. Illustrations

To aid maintenance personnel with troubleshooting, three illustrations are provided in this section, showing the locations of various components of the generator set.

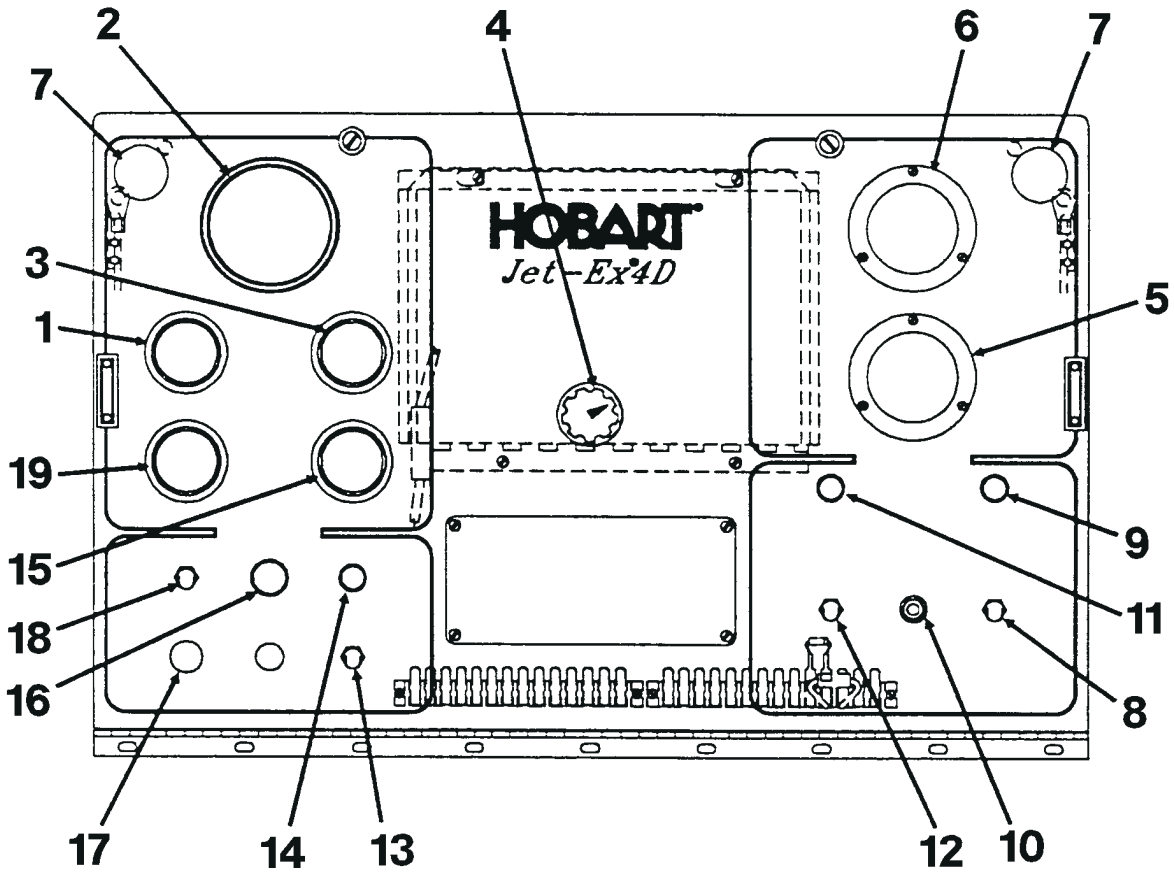
6. Connections and Wiring

Before condemning any electrical component, check all connections and wiring which could affect its operation. In many instances a component may be non-functional simply because it is not receiving power because of a loose connection or a poor ground. In most cases throughout the troubleshooting chart, it will be assumed that connections and wiring have been checked.



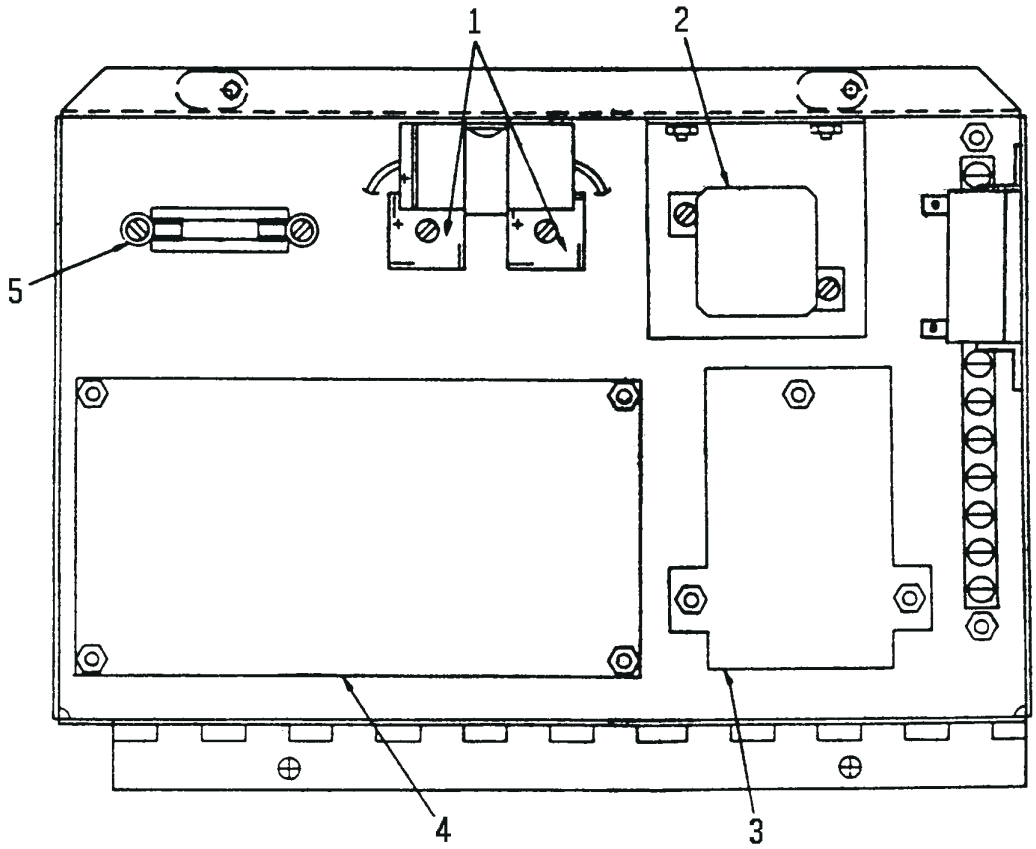
1. Radiator
2. Air cleaner
3. Muffler
4. Engine
5. Lifting yoke
6. Rectifier assembly
7. Fuel tank
8. Control panel
9. Generator
10. Fuel filter
11. Throttle control solenoid
12. Oil filter
13. Drain cock & switch
14. Load contactor
15. Batteries
16. Alternator
17. Fuel filter
18. Starter
19. Starter relay
20. Frame
21. Fuel tank support
22. Engine governor
23. Water temperature sender
24. Oil pressure sender

Generator Set Components
Figure 1



1. Oil Pressure Guage
2. Tachometer
3. Water Temperature Guage
4. Current Limit Control
5. Ammeter *(Generator)*
6. Voltmeter
7. Panel Light
8. Panel Lights Switch
9. Panel Lights Fuse
10. Push-To-Build-Up-Voltage Switch
11. Contactor Closed Switch
12. Contactor Closed Light
13. Speed Control Switch
14. Engine On Light
15. Hourmeter
16. Engine Control Switch
17. Engine Circuit Fuse
18. Engine Circuit
19. Ammeter *(Engine)*

Control Panel Assembly
Figure 2



1. Excitation Rectifiers
2. Voltage Sensing Relay
3. Overvoltage Relay
4. Voltage Regulator
5. Voltage Regulator Fuse

Voltage Regulator Support
Figure 3

Engine and Controls

Trouble, Symptom and Condition	Probable Cause	Test, Check, and Remedy
1. Engine will not start. Starter will not crank engine.	**a.** Batteries discharged, sure this voltage is reaching or loose battery or ground connection.	Check battery connections and check voltage across battery. Voltage should be approximately 12.8 VDC. starter relay input terminal. If battery and connections are good, proceed to **Step b.**
	b. Engine push button start switch *(S401)* defective.	Momentarily connect a jumper between the hot side of the starter relay *(L401)* and the start switch terminal on the starter relay (yellow-blue) wire. If the starter operates, check pushbutton start switch *(17, Fig. 2)*. Replace faulty switch. If starter doesn't crank, proceed to **Step c.**
	c. Defective starter relay *(L401)*.	Momentarily connect a large capacity jumper cable between the hot side of the starter relay *(19, Fig. 1)* and the starter input terminal. If the starter attempts to crank the engine, the starter solenoid is defective. Replace it. If engine still won't crank, proceed to **Step d**.
	d. Defective starter *(B401)*.	If starter did not attempt to operate in Step C above, the starter is defective. Replace starter. If starter did attempt to operate, but couldn't turn engine, proceed to **Step e**.
	e. Internal engine seizure.	**CAUTION:** Make certain that engine start switch is in "stop" position so that engine does not start. Use a socket wrench on the front crankshaft pulley to try to turn engine by hand. If engine will not turn, internal damage is indicated.

Engine and Controls (continued)

Trouble, Symptom and Condition	Probable Cause	Test, Check, and Remedy
Engine wll not start. Starter will not crank engine *(continued).*		**NOTE:** If engine is overcharged with ether for cold weather starting, it could seize up. If so, wait approx. 1/2 hour until it will be possible to turn engine.
2. Engine will not start. Starter **DOES** crank engine.	**a.** Engine circuit fuse *(F402)* blown -or-	Replace engine circuit fuse*(18, Fig. 2)*. Use type AGC-2O fuse.
	b. Fuel valve at tank closed, or no fuel in tank, engine has lost its prime -or-	Check and correct as required.
	c. Defective engine start switch *(S404)* -or-	Check for 12-V DC from terminal 4 of S404 in “START” position. If 12-V DC is not measured, replace defective switch.
	d. Defective fuel valve solenoid *(L404)*.	Attempt to start engine while applying 12-V DC to the fuel valve solenoid. If the engine starts, the solenoid is defective, and should be replaced. If engine still doesn’t start, proceed to **Step e.**
	e. Defective fuel pump.	Check fuel pump according to instructions in the **Perkins Diesel User’s Manual.**
3. Engine starts then stops.	**a.** Fuel not turned on.	Turn on fuel shutoff valve.
	b. Defective oil pressure switch *(S403)* located on engine block.	Connect a jumper wire across the “C” and “No” terminals of oil pressure switch. Start engine and check oil pressure. If it is below 10 PSI *(69 kPa)* shut down the engine and check lubrication system for leaks. Check also the oil pump. If oil pressure comes up to normal and the engine continues to run, the oil pressure switch is defective. Replace oil pressure switch.
4. Engine starts then stops when engine switch *(S404)* is released to “ON” position.	**a.** Open overtemperature switch *(S402)* or defective engine switch *(S404)*.	Place a clip-lead jumper wire on the water temperature switch terminals and check for normal operating temperature. If engine then starts properly, replace water temperature switch. If not, replace engine switch.

Engine and Controls (continued)

Trouble, Symptom and Condition	Probable Cause	Test, Check, and Remedy
Engine starts then stops when engine switch *(S404)* is released to "ON" position *(continued).*	**b.** Choked fuel filter, restriction in air cleaner, or air in fuel system.	Check for these faults according to instructions in **Perkins Diesel User's Manual**.
5. Engine does not attain normal idle RPM, or idles too fast.	**a.** Idle speed set either too high or too low.	Adjust idle speed to approximately 1000 $^{+}$ 50 RPM.
	b. Loose throttle linkage	If solenoid core is pulled into the full throttle solenoid *(L403)* when S406 is in **RATED RPM** position, check for loose control rod between solenoid and throttle. Tighten if required. If solenoid core does not pull in, proceed to **Step c**.
	c. Defective full throttle solenoid *(L403)*.	Check for l2-V-DC across two terminals of solenoid when S406 is in **RATED RPM** position. If l2-V DC is measured, but solenoid core does not pull in, replace the solenoid.
6. Engine will not run at rated speed *(2000 RPM)*	**a.** Speed control switch (S406) defective.	If engine will not go from idle to rated speed when speed control switch *(13, Fig. 2)* is in **RATED RPM** position, turn off engine and take resistance measure- ments at speed control switch terminals with switch in the **RATED SPEED** position. Zero resistance should be measured between terminals having red-blue and orange yellow wires. Replace speed control switch if measurement is improper.
7. Engine lacks power.	**a.** Insufficient air to engine.	Check and service air cleaner for clogged condition. Replace as required.
	b. Restricted exhaust system.	Check exhaust pipe for restrictions. Check muffler for clogged condition. Replace as required.
	c. Low compression.	Check compression in all cylinders according to **Perkins Engine User's Manual.**

Engine and Controls (continued)

Trouble, Symptom and Condition	Probable Cause	Test, Check and Remedy
8. Engine Overheats.	**a.** Dirt or sludge in Coolant	Drain coolant, flush radiator, put in clean coolant. Refer to **Perkins Engine User's Manual** in Chapter 5 for instructions.
	b. Debris and dirt in radiator core.	Clean radiator core carefully. Refer to **Perkins Engine User's Manual.**
	c. Fan belt slips or is broken.	Tighten belt or replace as required

Generator and Controls

Trouble, Symptom and Condition	Probable Cause	Test, Check, and Remedy
1. Generator will not build up voltage at all when push-to-build-up voltage switch *(S407)* is operated. Engine running normally.	**a.** Flashing power not reaching generator revolving field *(L406)*.	Check as follows:
	b. Defective push-to-build-up-voltage switch *(S407)* contacts stuck in open position	Momentarily connect two jumper leads across the push-to-build-up-voltage switch; one lead across the terminals on the left side and the other lead across the terminals on the right side. If the voltage builds up, replace switch.
	c. Defective diode *(CR401)*	Use ohmmeter to check diode on back of push-to -build-up-voltage switch. Replace diode if defective.
	d. Excessive brush wear, or poor contact of brushes to slip rings.	Check brushes closely for excessive wear and check brush contact with slip rings. Replace brushes make sure that brush contact with slip rings is proper.
	e. Voltage sensing relay *(K406)* defective. Relay contact 1-7 or 3-9 stuck in open position	Connect a jumper lead between pins 1 and 3 on voltage sensing relay *(2, Fig. 3)*. If voltage then builds up when switch S407 is pushed, voltage sensing relay is defective and must be replaced. If voltage sensing relay is good, proceed to Step f.
	f. Generator revolving field *(L406)* defective.	Locate yellow and red-orange wires on the right terminal strip at lower rear of control panel. Disconnect the yellow and red-orange wires which go down to the generator. *(Refer to connection diagram 180435 Chapter 5)*. Measure resistance between these two wires should be 6 to 8 ohms. If reading indicates an open, short or lower than normal resistance, proceed to **Step g.**

CAUTION

DO NOT operate the generator set to deliver power to an aircraft when any protective device or other component is jumpered.

Generator and Controls (continued)

Trouble, Symptom and Condition	Probable Cause	Test, Check, and Remedy
Generator will not build up voltage at all when push-to-build-up voltage switch *(S407)* is operated. Engine running normally (continued).	**g.** Defective generator armature *(G402)*	If check of the generator revolving field *(Step f. above)* revealed no trouble, the generator stator is defective. Send unit to overhaul.
2. Generator builds up to only a low voltage while push-to-build-up voltage. Switch is depressed.	**a.** Generator voltage regulator fuse *(F403)* blown.	Replace voltage regulator fuse *(5, Fig. 3)*. Resume operation of generator set to see if problem is corrected. If not, proceed to **Step b.**
	b. Defective control winding rectifier	Check control winding rectifiers *(3, Fig. 3)* with an ohmmeter to see if they are good. If either rectifieris defective, replace it. If both rectifiers are good, proceed to **Step c.**
	c. Generator voltage regulator *(VR4O2)* defective.	Replace voltage regulator *(1, Fig. 3)*.
3. Generator builds too high a voltage.	**a.** Defective voltage regulator *(VR4O2)*.	Replace voltage regulator *(2, Fig. 3)* with a voltage regulator known to be good, and resume operation of generator set. If new voltage regulator produces normal operating voltage, send old voltage regulator to factory for service.
4. Load contactor will not close when contactor close switch*(S408)* is operated. Engine running normally, voltage normal, no load applied to output cable.	**a.** Defective contactor close switch *(S408)*.	Momentarily connect a jumper lead between terminals 4 and 5 *(red and yellow-red wires)* on the contactor close switch *(11, Fig. 2)*. If the load contactor closes momentarily, replace contactor close switch.
	b. Defective load contactor *(K402)*.	If load contactor *(14, Fig. 1)* will not close when contactor close switch is jumpered, it is likely that the contactor is defective. Replace contactor.
	c. Overvoltage relay *(K403)* defective.	Connect a jumper lead between terminals T and P on the overvoltage relay *(2, Fig. 3)*. If contactor will now close, replace overvoltage relay.

Generator and Controls (continued)

Trouble, Symptom and Condition	Probable Cause	Test, Check, and Remedy
5. Load contactor opens as soon as contactor close switch is released from its top *(spring-loaded)* position	**a.** Defective contactor close switch *(S408)*.	Connect a jumper lead between terminals 1 and 2 *(orange-red and yellow-red wires)* on the contactor close switch *(11, Fig. 2)*. If the load contactor now remains closed, replace contactor close switch.
	b. Defective resistor R406 *(located in back of control panel, on right terminal strip at bottom of panel. See connection diagram 180435)*.	Using an ohmmeter, check resistor R406 for proper resistance *(7.5 ohms)*. If an open circuit is indicated, replace resistor.
	c. Defective diode *(CR4O2)*.	This diode is also located on the right terminal strip at bottom rear of the control panel. Using an ohmmeter, check this diode for an open circuit. If diode is defective, replace it.
	d. Load contactor *(K402)* defective.	If no fault was found in steps 4-a, b, and c above, the load contactor *(22, Fig. 1)* is defective. Replace load contactor.
6. Load contactor opens during power delivery.	**a.** Contactor opening could have been normal because of an overvoltage condition.	Resume operation and closely observe voltmeter *(6, Fig. 2)* for evidence of overvoltage. *If contactor opens* when no overvoltage condition exists, proceed to **Step b**.

Generator and Controls (continued)

Trouble, Symptom and Condition	Probable Cause	Test, Check, and Remedy
Load contactor opens during power delivery. *(continued)*	**b.** Overvoltage relay *(K403)* defective.	Check overvoltage relay by operating the machine under load and gradually raising voltage at the voltage regulator *(4, Fig. 3)* while observing voltmeter *(6, Fig. 2)*. Start with a low voltage *(25V DC)* and gradually increase voltage until relay functions to open load contactor.
	c. Overvoltage board out of adjustment.	If relay trips at less than 32-V DC, adjust potentiometer (P1) on the overvoltage board *(3, Fig. 3)*. If this does not correct problem, return old board to factory for service.
	d. Load contactor *(K402)* defective.	If no fault was found in **Step b or c,** replace load contactor *(14, Fig.1)*
7. Output current cannot be limited by operating current limiting potentiometer	**a.** Defective current limiting potentiometer *(R402)*	Shut down engine and check current limiting potentiometer (4, Fig. 2) with an ohmmeter. To do this, disconnect the plug (P404) from the regulator board (4, Fig. 3) and take resistance measurements from pin 2 to pin 9 and then from pin 2 to pin 10 on the plug. For each measurement, slowly turn potentiometer through its entire range, while observing the ohmmeter readings. Resistance should be from 0-10kΩ. Replace if necessary. If it isn't defective, proceed to **Step b.**
	b. Defective voltage regulator *(VR4O2)*.	Replace voltage regulator with one known to be good, and then operate the generator set under sufficient load to observe current limiting. If current limiting potentiometer now controls current properly, send old voltage regulator to factory for service.

Section 2. Maintenance Procedures

1. General

A suggested Maintenance Schedule is provided in Section 1 of this Chapter. Each step of the schedule is also covered in general in Section 1. This Section covers maintenance in more detail where necessary.

WARNING

Stop operation immediately if a serious or possibly dangerous fault is discovered.

2. Lubrication

a. General

Proper lubrication is one of the most important steps in good maintenance procedure. Proper lubrication means the use of correct lubricants and adherence to a proper time schedule. Lubrication points, frequency of lubrication, and recommended lubricants

b. Lubrication Chart

Lubrication points are illustrated and identified by name on Lubrication Chart, Figure 1. Number symbols used to designate the kind of lubricant required and the specification recommended are identified in Figure 2. Letter symbols used to designate the normal lubrication period are identified in Figure 3.

c. Generator

The 28.5 volt DC generator requires **NO** lubrication. The armature is sealed at the factory for lifetime, maintenance free operation. The front end of the armature is supported by the engine main bearings.

d. Generator Controls

Generator controls and instruments require no periodic lubrication. A few drops of oil may be required on door hinges occasionally to insure free and quiet operation.

e. Engine

Although the engine and its accessories require no more attention than any other similar installation, they still inherently require a major portion of the generator set lubrication and maintenance. Recommendations regarding engine lubrication have been taken from the Perkins Diesel Users Manual for Series 4.236 engines.

(1) Lubrication Schedule

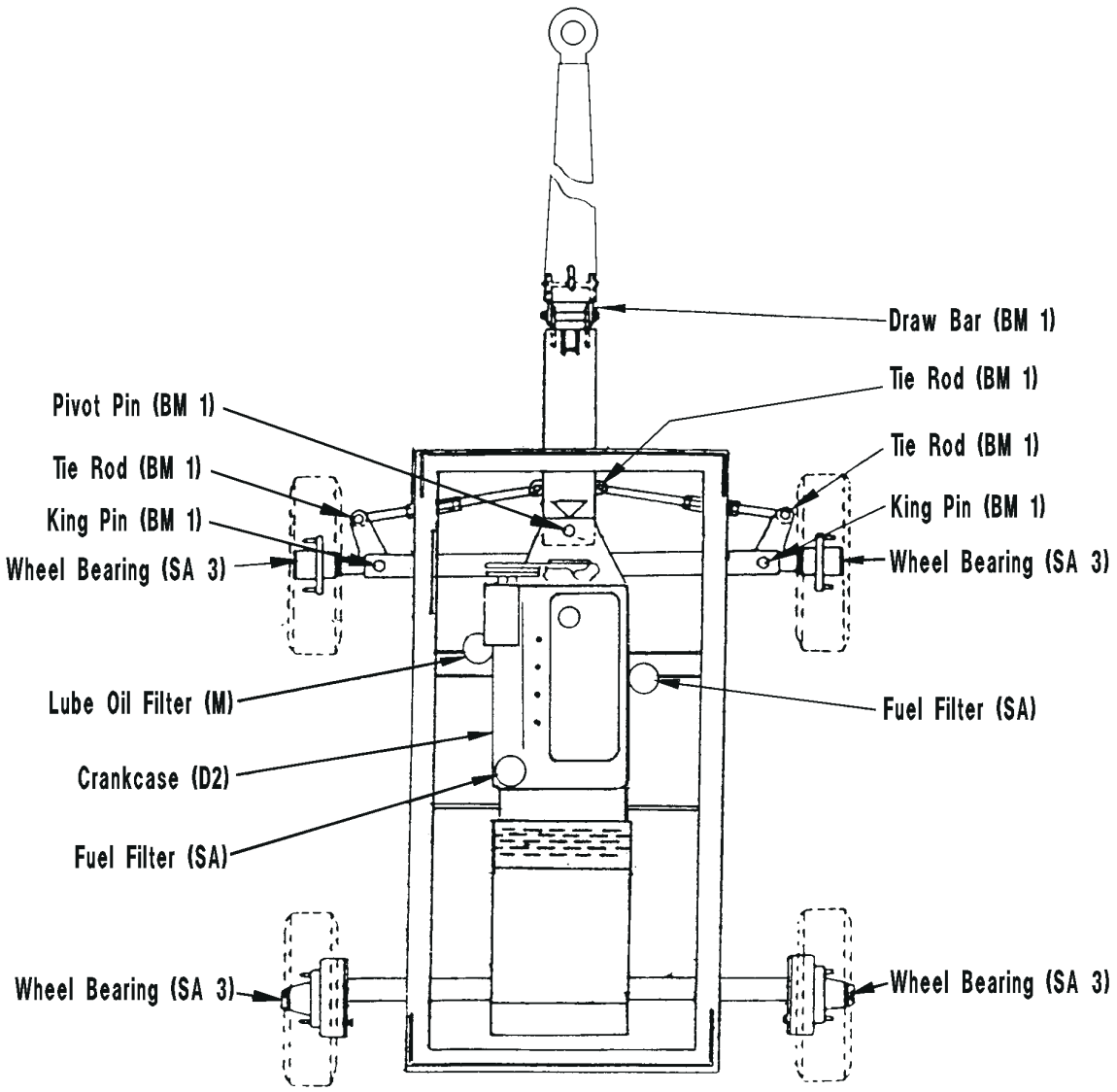
Time schedules indicated on the Lubrication Chart, Figure 1, are approximate. They are based on average operating conditions. It may be necessary to lubricate more frequently under severe operating conditions such as: low engine temperature, high oil temperature, intermittent operation, or dusty conditions. However, time intervals should not exceed those indicated in the chart without careful evaluation.

(2) Oil Specification

The use of quality lubricating oil, combined with proper oil drain and filter change intervals are important factors in extending engine life. Lubricating oils must be equal to the U.S. Ordnance specification MIL-L-46152 or MIL-L-2104C. Lubricating oils for use in Perkins diesel engines must have a minimum viscosity index of 80.

(3) Oil viscosity

Always insure that the correct viscosity grade of lubricating oil is used for the temperature range in which the engine will operate as shown in Figure 3.



Lubrication Chart
Figure 1

(4) Change lubrication engine oil (100 hours)

Oil should be changed after each 100 hours of engine operation. The generator set is equipped with an hourmeter which records actual engine operating time. The ideal time to change oil is soon after a power delivery run when the engine is at operating temperature.

NOTE: If lubricating oil is drained immediately after the unit has been run for some time, most of the sediment will be in suspension in the oil and will drain without clinging to the internal surfaces.

Symbol	Name	Specification	Notes
1	Grease, Automotive and Industrial	Federal VV-G-632	Sinclair LItholene Industrial No.2; Mobile-Mobilplex 47 or equivalent.
2	Oil, Engine, Heavy Duty	MIL-L-46152 or MIL-L-2104C	See Perkins Engine User's Handbook for recommended oil viscosity
3	Grease, Automotive	Military MIL-G-10924B	Wheel bearings

Lubricants
Figure 2

Ambient Temperature Range	Viscosity #
0 F (-18 C) to 30 F (-1 C)	10W
30 F (-1 C) to 80 F (27 C)	15W/40
Above 80 F (27 C)	15W/40

Temperature and Oil Viscosity Chart
Figure 3

Symbol	Time Interval
D	10 hours or Daily
BW	100 hours or Biweekly
M	200 hours or Monthly
BM	400 hours or Bimonthly
SA	800 hours or Semiannually

Symbols and Time Intervals
Figure 4

CAUTION

DO NOT use solvents as flushing oils in running engines.

(5) Change oil as follows:

a. Provide a container for catching used oil. Capacity should be greater than 2 gallons.

b. Remove drain plug located in oil pan. Allow sufficient time for oil to drain from valve train, timing gear case, etc., before reinstalling plug.

c. Change oil filter while oil is draining, see Para. 2, E, (5) below.

d. Clean drain plug and reinstall. **DO NOT** over-tighten.

e. Remove filler cap on valve cover and refill crankcase with new, clean oil of proper specification and viscosity, (*see Para. 2, E, (2) and Figure 4)* 7 quarts are required when oil filter is changed.

f. Start engine and allow it to idle. Oil pressure should come up to normal quickly. Check for oil leaks at filter and drain plug.

g. Stop engine. Allow several minutes for oil to drain to crankcase, then check oil level. It should be at **FULL** mark on dipstick.

h. Check hourmeter and record time of oil change.

i. Change engine oil filter (100 hours)

j. Place a container under the oil filter to catch oil drippings.

k. Loosen filter with a special oil filter removal wrench. Several types are available. Discard oil filter.

l. Coat the gasket on the new filter with oil.

m. Place the new filter in position on the cylinder block and spin on until the gasket contacts the adapter face; then hand tighten another 1/2 turn. Do not over-tighten.

n. Start engine and check filter gasket for leaks.

3. Servicing the Air Cleaner

Refer to Figure 5. The air cleaner is a dry type with replaceable filter cartridges. A definite time schedule for changing the filter cartridge cannot be determined because of varying operating conditions. Change the filter cartridge when the red indicator “flag” becomes fully visible in the viewing chamber *(9)* and locks in that position. Change the cartridge as follows:

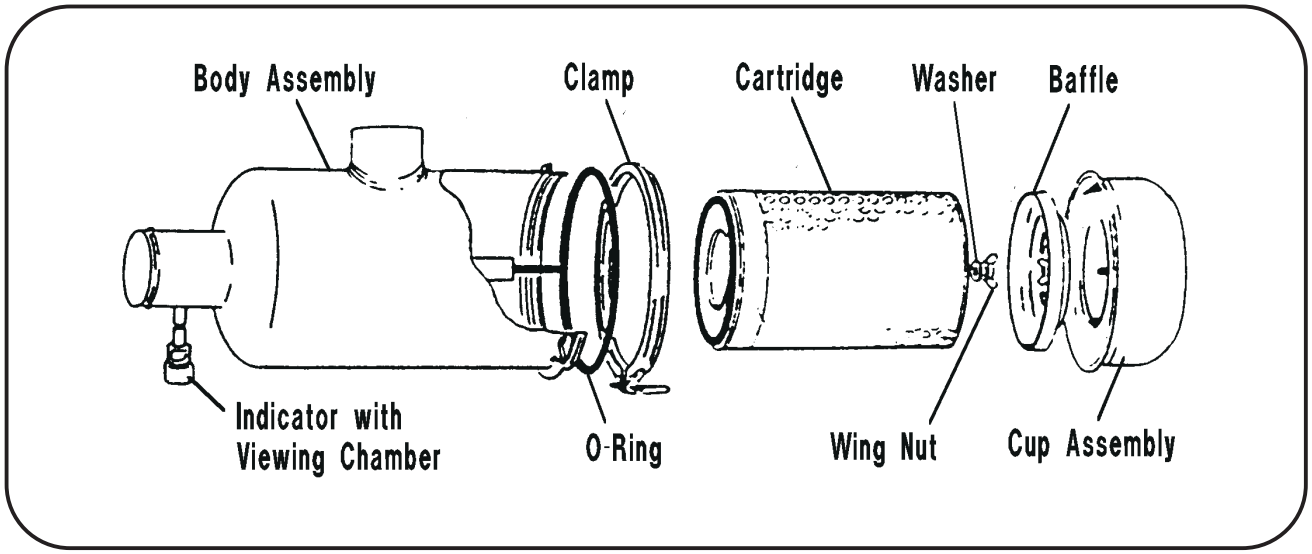
a. Cartridge Removal

(1) Open left front canopy door to gain access to the air cleaner.

(2) Remove clamp assembly from air cleaner, and remove cup assembly with the baffle.

(3) Remove wing nut and washer gasket.

(4) Remove cartridge, and replace it with a new cartridge.



Air Cleaner Cartridge Replacement
Figure 5

CAUTION

DO NOT attempt to clean or re-use the old air cleaner cartridge.

(5) Inspect the interior of the cleaner housing. Make certain that it is free from all foreign material.

b. Cartridge Installation

(1) Carefully install the new cartridge into the housing. Avoid bumping the cartridge tubes against the housing sealing flange. Seat the cartridge properly within the housing. Press all edges and corners of the cartridge firmly with fingers to make a positive air seal against the sealing flange of the housing.

CAUTION

UNDER NO circumstances should the cartridge be pounded or struck in the center to affect a seal.

(2) Lock the cartridge in place with the washer gasket and the wing nut. Then install the baffle into the cup assembly and fasten it to the end of body with clamp. Tighten clamp *(3)* down in place.

4. Servicing the Fuel Filter

Refer to Perkins Diesel User's Handbook in Chapter 6 for instructions on removal and replacement of fuel filter elements. The glass bowl on the fuel/water separator should be checked daily for the presence of water or solid contaminants and drained.

a. Draining the Fuel/Water Separator Bowl

(1) Place a suitable container, large enough to hold a pint of fluid, under the separator bowl.

(2) Loosen the vent cap.

(3) Loosen the drain valve. It is not necessary to remove it. Close the drain valve when the bowl is empty.

(4) Reprime the unit by loosening the primer pump knob and lifting it up and down. Continue priming until fuel purges from the vent. Tighten the pump knob and vent cap.

b. Replacing the Filter Element

(1) Place a container, large enough to hold a pint of fluid, under the filter.

(2) Loosen the vent cap and drain valve to drain fuel from the the filter assembly.

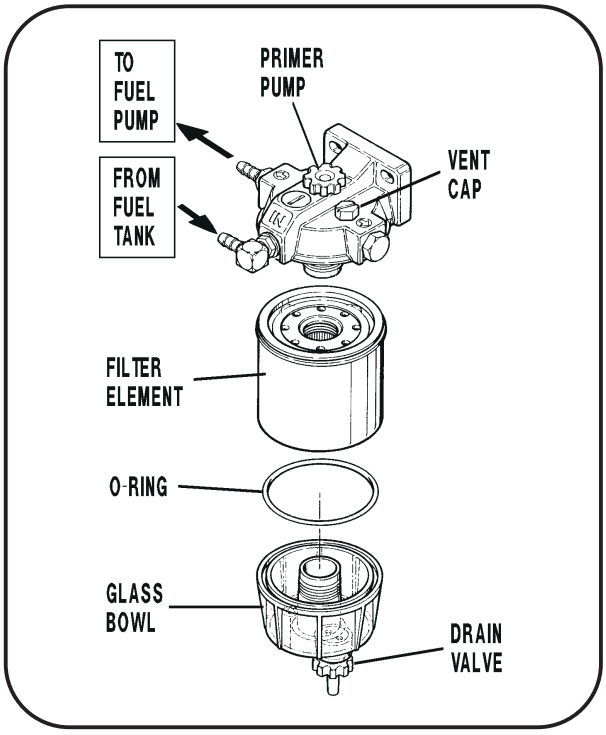
(3) Remove the filter element with the drain bowl attached.

(4) Separate the drain bowl from the filter element. Properly dispose the filter element.

(5) Clean the bowl, o-ring groove and o-ring.

(6) Lubricate the o-ring and the gasket on top of the new filter element with clean diesel fuel.

(7) Place the o-ring in the groove in the top of the glass bowl, then attach the glass bowl to the filter element.



Fuel/Water Separator
Figure 6

(8) Spin the bowl/element assembly back onto the filter head.

(9) Loosen the pump knob and prime the filter until fuel purges from the vent.

(10) Close the pump knob and vent cap.

5. Drive Belt Service

Check all drive belts and adjust if necessary each 200 hours. Refer to Perkins Diesel User's Manual in Chapter 6 for proper procedures.

6. Engine Cooling System

NOTE: Refer to the Perkins Diesel User's Manual in Chapter 6 for detailed instructions on servicing the engine's cooling system.

During warm weather operation, when plain water is used as a coolant, the cooling system MUST be protected against rust by a rust inhabiter additive. During cold weather operation the system MUST be protected against freezing. The system should NEVER be operated on plain water, without a rust inhabiter or antifreeze.

WARNING

When removing the cap from a very hot radiator, cover the cap with a thick cloth and turn it slowly counterclockwise to the first stop. When pressure is completely released, press downward and finish removing cap.

CAUTION

DO NOT add coolant to an extremely hot engine. This can result in a cracked block or cylinder head.

a. Rust Inhibitor

Use only a corrosion inhibitor that is compatible with aluminum. Do not use inhibitors labeled as "acid neutralizer".

b. Antifreeze

A permanent type *(Ethylene Glycol)* antifreeze is recommended for use in the cooling system. The coolant, when mixed as equal parts of water and the recommended antifreeze, will provide protection to -35 degrees F.

7. Battery Service

a. General

Two 12-volt batteries connected in parallel supply power for operation of the engine electrical system, clearance and panel lights, and for flashing the generator.

b. Battery Location and Accessibility

The battery is located in a tray directly beneath the cooling fan at the front of the unit. These battery is easily accessible for service by removing two 1/4-inch wing nuts and lifting out the battery access panel at the bottom front of the unit.

c. Battery Care

(1) Never allow a battery which has been removed from a unit to sit on concrete, ground, or metal, unless proper insulation is provided. A wooden platform or board will provide sufficient insulation.

(2) Maintain stored batteries in a charged condition,

(3) Be sure the battery is fastened securely in the compartment to avoid damage from vibration.

(4) Maintain battery fluid at proper level.

(5) Keep battery terminal posts and lead cable connectors clean.

WARNING

Never allow sparks or open flame near batteries. avoid spilling electrolyte on hands or clothing.

d. Liquid Level

The electrolyte in each cell should be above the plates at all times to prevent battery failure. Check the level of the electrolyte every two weeks. When electrolyte level is low, add pure distilled water. Do not use hydrant water or any water which has been in contact with a metal container. Acid should never be added except by a skilled battery man.

CAUTION

Never add any special battery dopes, solutions, or powders.

NOTE It is especially important to keep the battery at full charge for cold weather operation. Add distilled water to the battery in freezing temperatures only when the engine is to operate for several hours, to thoroughly mix the water and the electrolyte, or damage to the battery will result from the water freezing.

e. Cleaning the Battery

If the top of the battery is dirty, they may be cleaned with a brush dipped in ammonia or soda solution. Disconnect lead connectors from battery posts. Vent plugs should be tightened to prevent cleaning solution from entering cells. Clean battery as required, using brush and cleaning solution. Flush off the batteries with clean water. Special terminal cleaning tool. Make certain that vent holes in filler caps are not clogged.

f. Testing a Battery

Tests are made on a battery to determine the state of charge and also its condition. The results of these tests show whether the battery is good, needs recharging, or must be replaced. If a battery has failed, is low in charge, or requires water frequently, the reason for the condition must be found and corrected. Visually inspect the battery before testing, to determine if it has been damaged. Moisture on the outside of the case, or low fluid level in one or more cells indicates possible battery damage *(cracked case, etc.)*. The battery may be tested by two methods. A battery-starter Tester may be used to determine the battery's ability to deliver current. A battery hydrometer test determines the charge condition of the battery.

- Test with Battery-Starter Tester

  Connect battery to the tester according to instructions furnished with the instrument. Test battery according to tester instructions. If the test determines that the battery has acceptable voltage, this indicates that the battery has output capacity and will accept a charge if required.

- Test with Hydrometer

  a. Remove filler caps and check the specific gravity of the electrolyte in each cell. If specific gravity is 1.230 or below, add water if necessary and charge the battery until it is fully charged. A fully charged battery will give a specific gravity reading of 1.265 to 1.285. The specific gravity of a fully discharged battery may range from 1.140 down to 1.120.

NOTE: The battery is fully charged when all cells are gassing freely, and the specific gravity ceases to rise for three successive readings taken at hourly intervals.

b. If the battery starter test indicated that battery voltage was below the acceptable voltage value, test each cell with the hydrometer. If the difference in specific gravity readings between any two cells is 50 points (0.050) or more, the battery isn't satisfactory for service and should be replaced.

8. Generator Maintenance

a. General

The only maintenance service required for the generator will be the cleaning and replacement of the brushes and cleaning the slip rings.

b. Brush Service

If inspection reveals that brushes are gummy or sticking in the brusholders, they should be removed and cleaned. Clean both the brushes and brusholders. Use a good, **SAFE**, commercial cleaner. **DRY ALL PARTS THOROUGHLY**. Be sure brushes can move freely in brusholders.

WARNING

DO NOT use a flammable solvent. DO NOT use steam cleaner, or soaps and detergents under pressure.

c. Generator Revolving Field Brush Replacement

(1) Disconnect leads *(Fig. 7)* from connectors on brusholder caps.

CAUTION

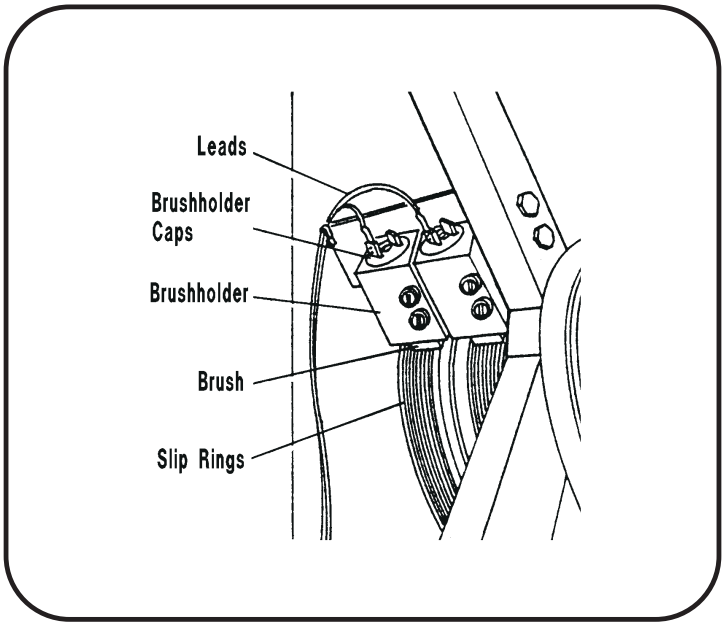
When removing the lead wires, do so one at a time and replace each brush accordingly, to insure that the lead wires are put pack onto the proper brushes.

(2) Lift brush from brushholder for inspection. If brushes are worn unevenly or are shorter than 7/16 inch *(11 mm)*, replace them.

(3) Inspect slip rings whenever brushes are removed for servicing brushes or brusholders. Note surface conditions of rings. Surface should appear smooth and clean. Scoring or roughness of slip rings may be caused by grit or abrasive substance in brushes, or by oil on the rings. Moderately rough slip rings can be smoothed by holding grade 00 flint paper against their surface while the rings are revolving slowly. If the rings are badly scored, the unit must be sent to an overhaul facility for repair. After cleaning slip rings, blow dirt and grit out of the unit with compressed air. Do not use over 25 psi *(172 kPa)* air pressure to blow dirt out.

(4) Slip new brushes into brusholder guides, and place caps on top, and screw them into the guides to a “bottomed” position. The spring attached to the brush will determine the pressure at which the brush contacts the slip rings.

(5) To fit new brushes to the slip rings, lay a strip of No. 00 sand-paper, smooth side down, on slip ring surface, and draw the sandpaper in the direction of rotation of the slip ring, lifting the brush on the return stroke. Continue until the brushes have same curvature as the slip rings. Blow all carbon dust out of the machine using not over 25 psi *(172 kPa)* air pressure.



Generator Revolving Field Brushes
Figure 7

Section 4. Adjustment/Test

1. General

The adjustments and test procedures presented below are required after major repairs, parts replacement, or long storage.

2. Testing the Generator Set

Test values listed below will result when the generator set is operating properly. If your test results are not within the limits shown, perform the applicable troubleshooting procedures given in Chapter 3.

If major repairs have been made or if critical components have been replaced, make sure that the applicable adjustments have been made before testing the generator set. Adjustment procedures are described in Para. 3 of this Section.

a. Pre-operational Test Procedures

(1) Open engine compartment doors and inspect the interior for rags, tools, and other foreign materials.

(2) Check engine oil level.

(3) Check coolant level.

(4) Check battery water level.

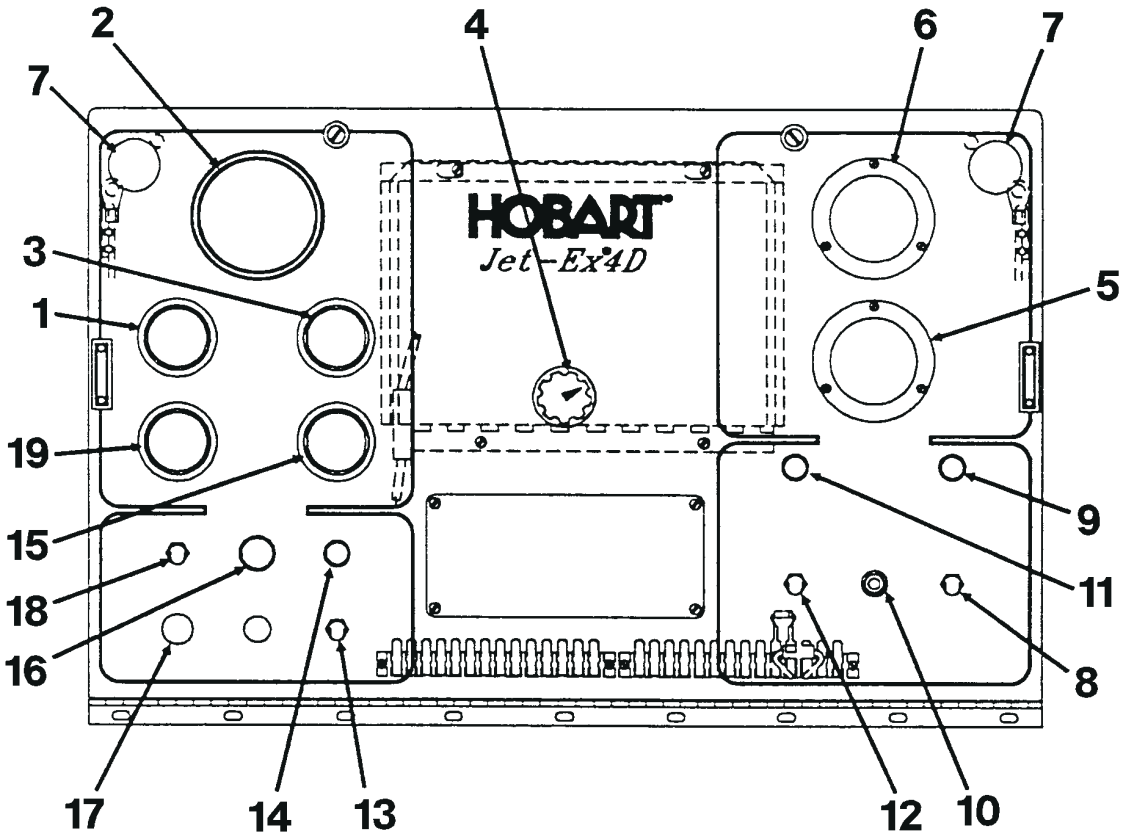
(5) Check for sufficient fuel.

(6) Check drive belts. Each belt should have approximately 1/2 inch *(13 mm)* slack.

(7) Inspect all wiring for possible trouble spots such as loose wires or terminals, frayed insulation, obvious shorts, etc.

(8) Check panel lights, panel light switch, and fuse.

(9) Connect cables from generator output terminals to a load bank. Use cables of the same size and length as those used in service, preferably No. 2/0, not more than 30 feet *(9 m)* long.



1. Oil Pressure Gauge
2. Tachometer
3. Water Temperature Gauge
4. Current Limit Control
5. Ammeter *(Generator)*
6. Voltmeter
7. Panel Light
8. Panel Lights Switch
9. Panel Lights Fuse
10. Push-To-Build-Up-Voltage Switch
11. Contactor Control Switch
12. Contactor Closed Light
13. Speed Control Switch
14. Engine On Light
15. Hourmeter
16. Engine Start Switch
17. Engine Circuit Fuse
18. Engine Circuit Switch
19. Ammeter *(Engine)*

Operating Controls and Indicators
Figure 1

b. Operational Tests

(1) Start the engine as described in 1-3; Para. 3 *(a)*, and let it warm at idle speed.

(2) Inspect for oil, fuel and coolant leaks.

(3) Check the engine ammeter *(20, Fig. 1)* for a slight charge. Check oil pressure gauge *(1).* It should read 35 to 60 psi *(241 to 414 kPa)*. Check coolant temperature gauge. It should read 180 to 200 deg. F *(82 to 93 deg. C.)* when engine is hot.

(4) Observe engine RPM on the tachometer, and observe engine for excessive vibration. Idle speed should be 1000 RPM $^{+}$ 50 RPM. If there is excessive vibration within this range, adjust engine idle speed, gradually increasing or decreasing it - whichever is necessary - until vibration is reduced. Refer to Figure 2 below. To adjust idle speed, loosen idle speed retaining nut and adjust idle speed screw on throttle assembly to raise idle speed, while observing tachometer and observing engine vibration. turning idle speed screw **INWARD** increases idle speed, and turning it **OUTWARD** decreases idle speed. When vibration has been satisfactorily reduced, tighten idle speed retaining nut.

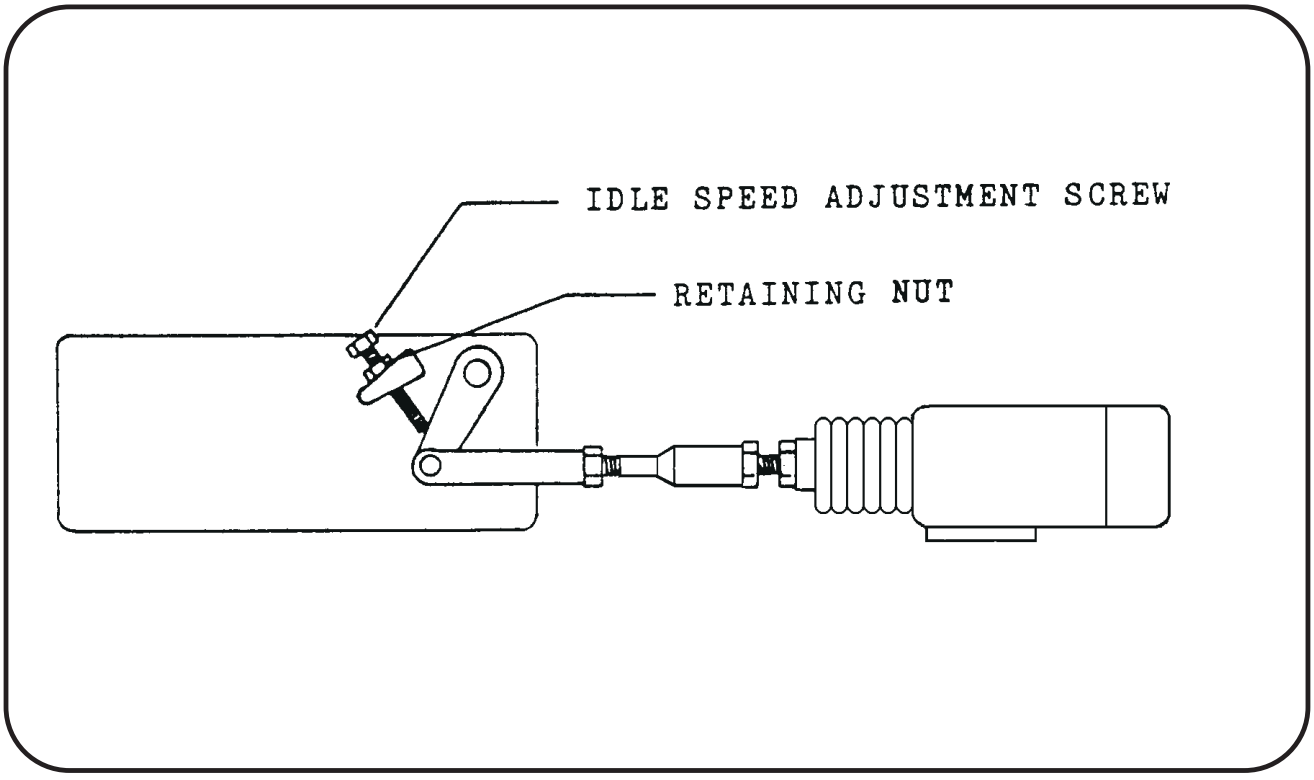
(5) Check engine RPM's at operating speed: 2000 RPM

(6) Depress the **PUSH TO BUILD UP VOLTAGE** Switch to build up output voltage of generator.

(7) Set current limit control *(4, Figure 1)* to maximum, full clockwise, position.

(8) Adjust the load bank for a load of 550 amperes.

(9) Place the contactor control switch *(11)* in the **CLOSE** position. **CONTACTOR CLOSED** light *(12)* will glow and the contactor will close. Release the switch to the center **ON** position. The tachometer *(2)* will indicate 1950 $^{+}$ 25 RPM.



Idle Speed Adjustment
Figure 2

(10) Disconnect the load bank and check the overvoltage protection by adjusting voltage regulator potentiometer R46 *(1, Fig. 3)* to increase the voltage. The overvoltage relay will trip and open the load contactor at 32 to 34 volts in 2 to 10 seconds.

(11) Readjust the voltage to 28.5 volts, connect the load bank, set it at 550 amperes, and close the contactor.

(12) Remove load bank and check voltage regulation at no load. Voltage will be 28.5 volts. Reconnect load bank and check voltage regulation with load bank set at 137, 275, 413, 550, and 660 amperes and check voltage at each setting. Voltage will be 28.5 $^{+}$ 1 volts at each different load.

(13) With current limit control *(4)* set to 2000, apply 600 to 700 amperes load to the generator and then set the current limit control *(4)* to 400. Current displayed on ammeter *(6)* will be 400 $^{+}$ 40 amperes.

NOTE: Voltage will not drop below 12 volts.

(14) Set current limit control to 2000 and apply 1200 amperes load. Then set current limit control to 1000. Current displayed on ammeter will be 1000 $^{+}$ 100 amperes and voltage will not drop

(15) Restart the engine, check the instruments as directed in step *(3)*, and check the entire generator set for unusual vibration and noises.

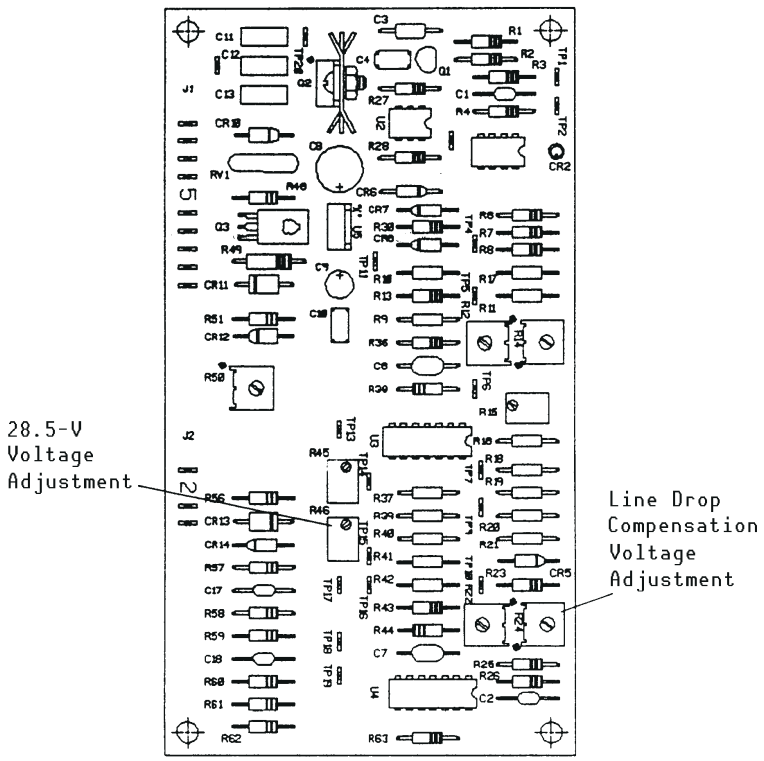
3. Voltage Regulator Adjustment

a. 28.5 Volt Adjustment

(1) The regulating voltage, in the 28.5 volt range, is determined by the position of the wiper arm of the multi-turn potentiometer R46 clockwise *(CW)* rotation increases the voltage level at which the unit operates. Conversely, counterclockwise *(CCW)* rotation decreases the voltage level.

b. Line Drop Compensation

(1) Line drop compensation allows the voltage at the load end of the output cable to remain constant despite the voltage drop associated with the output cable. Clockwise *(CW)* rotation of the single-turn potentiometer *(R24)* increases the compensation. This potentiometer should be set for flat regulation of voltage at the load end of the output cable when delivering rated load current.



Voltage Regulator Adjustment
Figure 3

Chapter 3. Overhaul/Major Repair

There is no overhaul or major repair information available other than what is mentioned in Chapter 2, Servicing/Troubleshooting.

For repair information on the engine assembly, refer to the Perkin s User's Manual.

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HOBART GROUND POWER

Chapter 4. Illustrated Parts List

Table of Contents

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Section 2. Vendor Codes

1. Explanation of Vendor Code List

The following list is a compilation of vendor codes with names and addresses for suppliers of purchased parts listed in this publication. The codes are in accordance with the Federal Supply Codes for Manufacturer's Cataloging Handbook H4-l, and are arranged in numerical order. Vendor codes are inserted in the nomenclature column of the parts list directly following the item name and description. In the event a manufacturer does not have a vendor code, the name and address of the manufacturer will at the end of the listing in alphabetical order.

Code	Vendor's Name and Address
02231	**Anchor Rubber Company,** 840 S. Patterson Blvd. Dayton, Ohio 45402
03504	**Clark Equipment**, 324 E. Dewey Buchanan, MI 49107
04713	**Motorola Inc.**, Semiconductor Products Div. Phoenix, Arizona 85008
05277	**Westinghouse Electric Corp.**, Semi Conductor Div., Hill Street Youngwood, Pennsylvania 15697
07525	**Blackstone Corp.**, 111 Allen St. Jamestown, NW 14701
08452	**Westinghouse**, P.O. Box 300 Sykesville, MD 21784
1L906	**Arden Industrial Products**, 200 S. Owasso Blvd., St. Paul, MN 55164
1Y498	**FB Wright**, 100 E. Wilson Bridge Rd., Worthington, OH 43085
10988	**J.I. Case Co**., 700 Satet St., Racine, WI 53404
11702	**Syracuse Rubber**, 1135 S. Sycamore, Syracuse, IN 46567
13445	**Cole-Herse**, 20 Old Colony Ave. Boston, MA 02127
13446	**Perkins Engines**, Inc. 32500 Van Born Road Wayne, MI 48184
13704	**Multiflex Seals, Inc**., 16 E. Lafayette St. Hackensack, NJ 07601
14655	**Cornell Dubilier**, 209 W. Central St. Natick, MA 01760
15605	**Eaton Corporation**, 4201 N. 27th St., Milwaukee, Wisconsin 53216
16476	**Datcon Instrument Co.**, P.O. Box 128, East Petersburg, PA 17520
16764	**General Motors Corp.**, Delco-Remy Div., 2401 Columbus Ave., P.O. Box 2439 Anderson, IN 46018
18265	**Donaldson Co.**, P.O. Box 1299, Minneapolis, Minn 55440
24161	**Gates Rubber Co.**, 5610 Crawfordsville Rd., Suite 2002, Speedway, IN 46224
26659	**HB Instrument Co.**, American and Bristol St., Philadelphia, PA 19140
28478	**Deltrol Controls**, 2745 S. 19th St., Milwaukee, WI 53215

Code	Vendor's Name and Address
3M915	**General Fasteners Co.**, 11820 Globe Rd., Livonia, MI 48150
3S708	**Tridon Tennessee, Inc.**, P.O. Box 65, Smyrna, TN 37167
31211	**Motorola Automotive & Electronics Group**, 1303 E. Algonquin Road, Schaumburg, IL 60196
31510	**Mainline Supply Co.**, Inc., 905 E. Third St., Dayton, OH 45402
31695	**Facet Ent. Inc.**, US. No. 1 Bypass South, Henderson, NC 27536
33518	**Detroit Diesel Corp**., 515 11th St. NE, Canton, OH 44707
33955	**Teleflex, Inc.**, 1816 57th St., Sarasota, FL 33580
4N430	**Weatherhead Div. of Dana**, 31000 Telegraph Rd., Birmingham, MI 48010
44655	**Ohmite Mfg. Co.**, 3601 W. Howard St., Skokie, IL 60076
46992	**Phoenix Electric**, 3625 N. Halstead St., Chicago, IL 60613
49234	**Protecto Seal Co.**, 225 W. Foster Avenue, Bensenville, IL 60106
5P059	**Tech Products Corp**., 5030 Linden Ave., Dayton, OH 45432
5Z126	**Gateway Products Corp.**, 10 Power St., Leominster, MA 01453
5Z152	**Cable Components**, 20875 Enterprise Ave., Brookfield, WI 53005
51377	**Kysor of Cadillac**, 1100 Wright St., Cadillac, MI 49601
51589	**ST - SEMICON, INC.**, 415 N. College Ave., Bloomington, Indiana 47401
53035	**Hoover-NSK Bearing Co.**, 3861 Research Park Drive, P.O. Box 1507, Ann Arbor, MI 48106
55752	**Racor Division of Parker-Hannifin Co.**, P.O. Box 3208, Modesto,CA 95353
56289	**Sprague Electric Co.**, 87 Marshall St., No. Adams, Mass 01247
57448	**Allis Chalmers Corp.**, 275 Ridgeway Avenue, P.O. Box 1367, Aurora, Illinois 60507
59993	**International Rectifier**, 233 Kansas St., El Segundo, CA 90245
6K870	**Murray Corp**., 29501 Greenfield Rd., Southfield, Mi 48076
60741	**Triplett Electrical Instrument Company,** 286 Harmon Road, Bluffton, Ohio 45817
61864	**TRW-Inc. United Carr Div.**, 31 Burlington Nall Rd., Burlington, MA 01803
7S696	**Essex Group, Power Conductor Div.**, HWY 52, Lafayette, IN 47905
70411	**Anderson Brass Co.**,100 S. Campbell Ave., Detroit, MI 48209

Code	Vendor's Name and Address
71400	**Bussman Div. of McGraw-Edison Co.**, 114 Old State Rd., St. Louis, MO 63178
74400	**Hobbs Division of Stewart-Warner Corp.,** P.O. Box 19424, Springfield, IL 62794
74465	**Hoof Products**, 4051 W. 5lst St., Chicago, IL 60632
74559	**Carling Switch Co.,** 505 New Park Ave., West Hartford, CT 06110
75175	**K-D Lamp Co.,** 1910 Elm St., Cincinnati, OH 45210
76700	**Nelson Muffler Corp.,** P.O. Box 428, Stoughton, WI 53589
77313	**PRP Plastic Products**, 200 Beech St., Urbana, OH 43078
77343	**Potter & Brumfield, Inc.,** 200 Richland Creek Drive, Princeton, IN 47671
78189	**Illinois Tool Works Inc.,** St. Charles Rd., Elgin, IL 60120
78225	**Stant Manufacturing Co.,** 1620 Columbia Ave., Connersville, IN 47331
78377	**SCP Inc.,** 9115 George Ave., Cleveland, OH 44105
78388	**Synchro-Start Products, Inc**., 8109 N. Lawndale Ave., P.O. Box 147 Skokie, IL 60076-9990
78940	**United Air Cleaners,** 9705 S. Cottage Grove Ave., Chicago, IL 60628
79409	**Woodhead Daniel Co**., 3411 Woodhead Dr., Northbrook, IL 60062
8P583	**All Phase Electric Supply**, 2100 Clinton Ave. NW, Huntsville, AL 35804
81640	**Eaton Corp**., 2074 Whitfield Ave. E., Sarasota, FL 33580
82445	**Abex Corp. Signal-Stat Div.**, 1200 Commerce Ave., Union, NJ 11211
83613	**Kirkhill Inc.,** 12021 S. Woodroof Ave., Downey, CA 90241
88136	**Trombetta Corp.**, 1633 E. North Ave., Milwaukee, WI. 53202
9L925	**Hamilton Avnet**, 4940 Research Dr., Huntsville, AL 35805
91636	**Curtis**, 34999 Curtis Blvd., Eastlake, OH 44094
94177	**Modine Mfg. Co**., 1500 Dekoven Ave., Racine, WI 53401
94222	**Southco Inc.,** 210 N. Brinton Lk. Rd., Concordville, PA 19331
96152	**Borg Warner Corp.**, 2195 S. Elwin Rd., Decatur, IL 62525
No Number	**Pipe & Supplies Inc.**, 329 E. Poplar St., Sidney, OH 45365

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Section 1. Introduction

1. General

The illustrated Parts List identifies, describes, and illustrates main assemblies, sub-assemblies, and detail parts of Jet-Ex 4D Generator Sets manufactured by **Hobart Brothers Company, Power Systems Division, Troy, Ohio 45373** and identified by **Specification Number 7003A-3** and **Specification Number 7003B-3.**

2. Purpose

The purpose of this list is to provide parts identification and descriptive information to maintenance and provisioning personnel for use in provisioning, requisitioning, purchasing, storing, and issuing of spare parts.

3. Arrangement

Chapter 4 is arranged as follows:

Section 1 - Introduction

Section 2 - Vendor Codes

Section 3 - Illustrated Parts List

Section 4 - Numerical Index

4. Explanation of Parts List

a. Contents

The parts list contains a breakdown of the equipment into groups, assemblies, subassemblies, and detail parts. All parts of the equipment are listed except:

(1) Standard hardware items *(attaching parts)* such as nuts, screws, washers, etc., which are available commercially.

(2) Bulk items such as wire, cable, sleeving, tubing, etc., which are also commercially available.

(3) Permanently attached parts which lose their identity by being welded, soldered, riveted, etc., to other parts, weldments, or assemblies.

b. Parts List Form

This form is divided into six columns. Beginning at the left side of the form and proceeding to the right, columns are identified as follows:

(1) “FIGURE-ITEM NO.” Column

This column lists the figure number of the illustration applicable to a particular parts list and also identifies each part in the list by an item number. These item numbers also appear on the illustration. Each item number on an illustration is connected to the part to which it pertains by a leader line. Thus the figure and item numbering system ties the parts list to the illustrations and vice versa. The figure and index numbers are also used in the numerical index to assist the user in finding the illustration of a part when the part number is known.

(2) “HOBART PART NUMBER” Column

ALL part numbers appearing in this column are Hobart numbers. In all instances where the part is a purchased item, the vendor’s identifying five-digit code and his part number will appear in the “Nomenclature” column. Parts manufactured by Hobart reflect no vendor code or part number in the “NOMENCLATURE” column.

(3) “AIRLINE PART NUMBER” Column

This column will appear blank as sent from Hobart Brothers, Ground Power. However it may used for entering part numbers common to the individual customer.

(4) “NOMENCLATURE” Column

The item identifying name appears in this column. The indenture method is used to indicate item relationship. Thus, components, of an assembly are listed directly below the assembly and indented one space. Vendor codes and part numbers for purchased parts are shown in this column. Hobart modification to vendor items is also noted in this column.

(5) “EFF” (Effective) Column

This column is used to indicate the applicability of parts to different models of equipment. When more than one model of equipment is covered by the parts list, there are some parts which are used only on one model. This column is used for insertion of a code letter “A”, “B”, etc., to indicate these parts and to identify the particular model they are used on.

Parts coded “A” are used only on Specification 7003A-3 generator sets.

Parts coded “B” are used only on Specification 7003B-3 generator sets.

Uncoded parts are used for both specifications.

(6) “UNITS PER ASSEMBLY” Column

This column indicates the quantity of parts required for an assembly or subassembly in which the part appears. This column does not necessarily reflect the total used in the complete end item.

Section 3. Parts List

1. Explanation of Parts List Arrangement

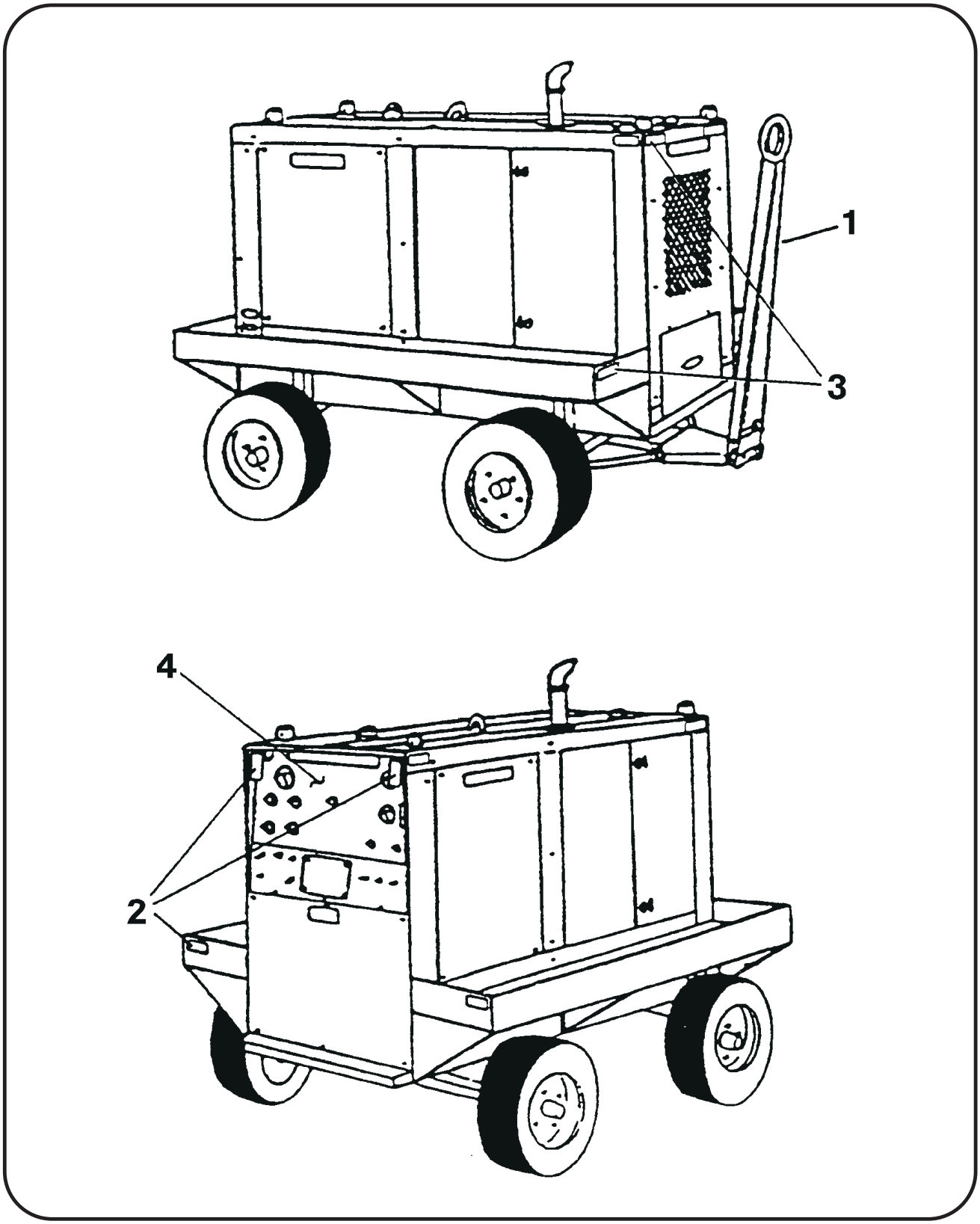
The parts list is arranged so that the illustration will appear on a left-hand page and the applicable parts list will appear on the opposite right-hand page. Unless the list is unusually long, the user will be able to look at the illustration and read the parts list without turning a page.

2. Symbols and Abbreviations

The following is a list of symbols and abbreviations used in the parts list.

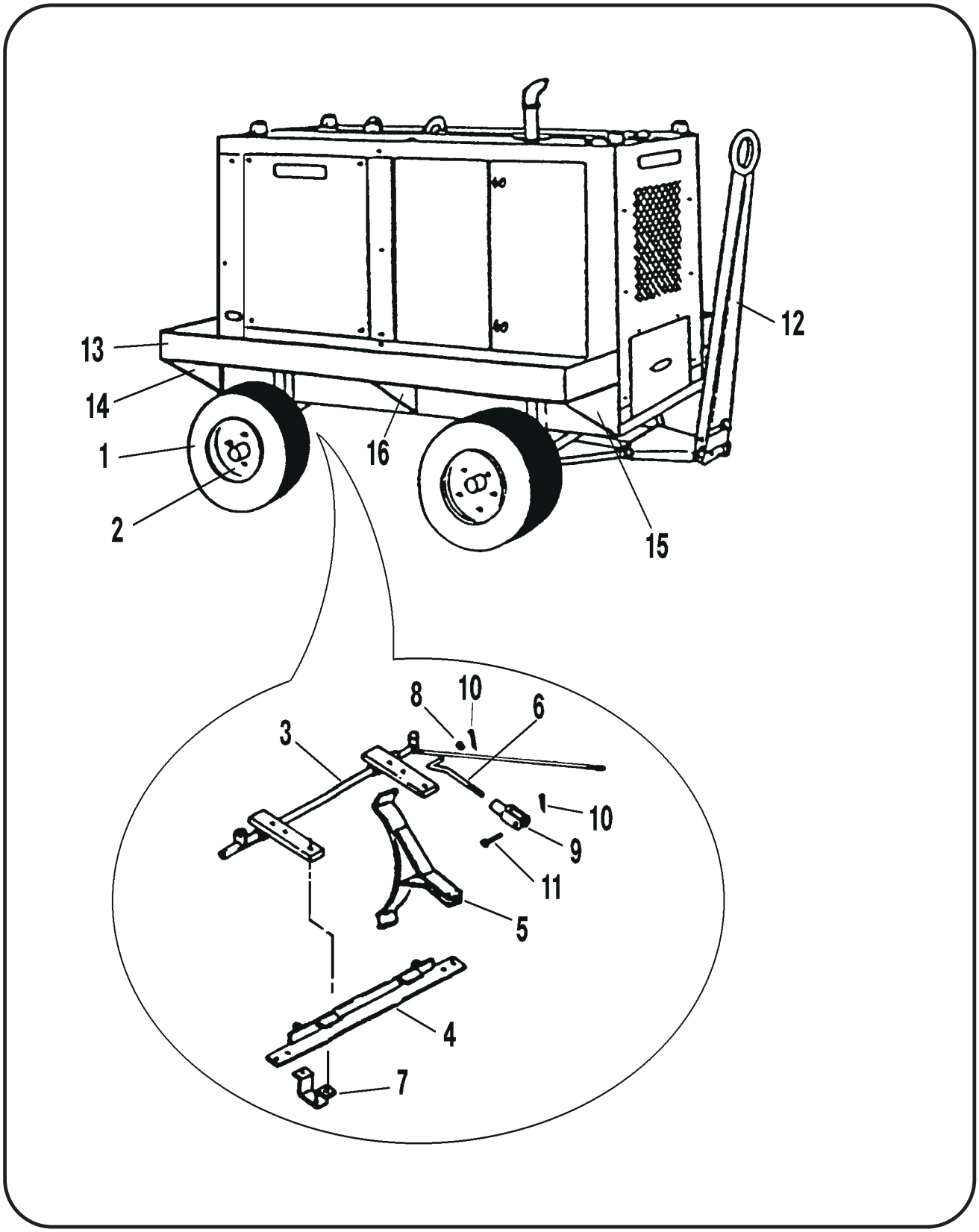
***** - item not illustrated
A, or AMP - ampere
AC - alternating current
AR - as required
DC - direct current
Fig. - Figure
hd. - head
hex - hexagon
Hz - Hertz *(cycles-per-second)*
I.D. - inside diameter
IN - inch
kVA - kilovolt-ampere
uF - microfarad
No. - number
OM - Owners Manual
PRV - peak reverse voltage
PSI - pounds per square inch
Ref - reference *(the item has been listed previously)*
TM - Technical Manual
v - volt *(when used as a prefix to a five-digit number, indicates vendor code)*

NOTE: An item which does not reflect an index number is an assembly which is not illustrated in its assembled state, or it is similar (right-hand, left-hand, top, etc.) to an item which is illustrated.



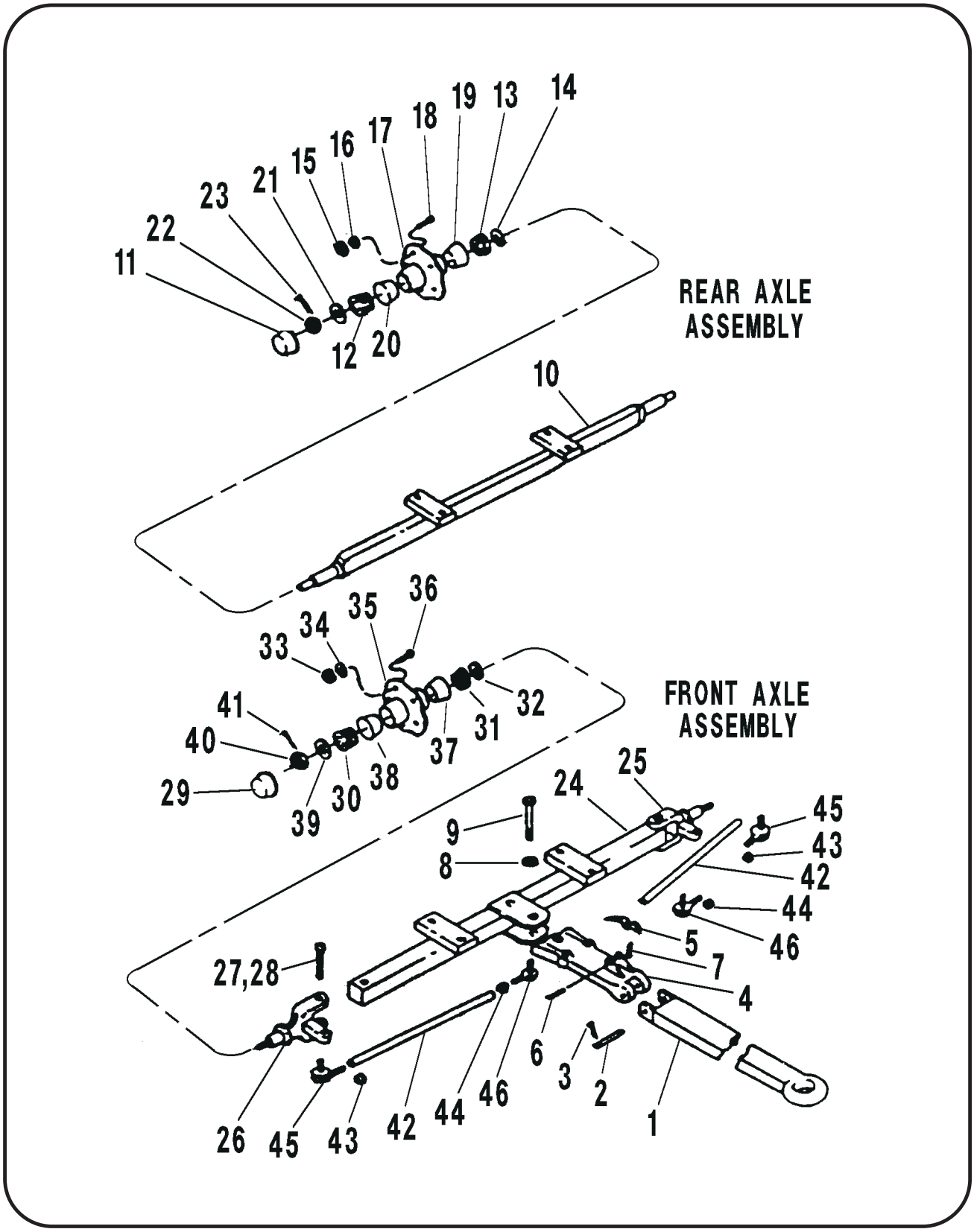
Generator Set w/ Portable Mounting
Figure 1

FIGURE & ITEM NO.	HOBART PART NO.	AIRLINE PART NO.	NOMENCLATURE 1 2 3 4 5 6 7	EFF	QTY
1-	**7003A-3**		**GENERATOR SET W/ PORTABLE MTG.**	**A**	**1**
	7003B-3		GENERATOR SET W/ PORTABLE MTG.	B	1
1- 1	181000-6		. TRAILER, ASSY. (See Fig. 2)	A	1
	181000-9		. TRAILER, ASSY. (See Fig. 2)	B	1
1- 2	408556-2		. REFLECTOR, AMBER (FRONT)	A	6
1- 3	408556-1		. REFLECTOR, RED (REAR)	A	6
	282554-1		. KIT, REFLECTOR	B	1
1- 4	181851		. CONTROL PANEL ASSY. (See Fig. 4)		1
*	84B-1078		. LABEL, OPERATING INSTRUCTIONS		1
*	81B-1064		. LABEL, ENGINE DRIVE		1
*	400435		. LABEL, NAMEPLATE, 28V		1
*	402987		. NAMEPLATE, HOBART		3
*	83A-1103		. REEL, GROUNDING, V79409, NO. 143050		1
*	402025-3		. CABLE, OUTPUT		1
*	404469-3		. COVER, PROTECTIVE, POLYETHYLENE		REF
*	181014		. CARTON, SHIPPING		REF
*	484634		. BLOCK, CHOCK		REF
*	80LF508		. PAINT, WHITE		REF
*	283621		. HANDLE, GRIP		1



Trailer w/Fenders and Cable Trays
Figure 2

FIGURE & ITEM NO.	HOBART PART NO.	AIRLINE PART NO.	NOMENCLATURE 1 2 3 4 5 6 7	QTY
2-	**181000-6**		**TRAILER W/FENDERS & CABLE TRAYS**	**1**
2- 1	85B-1013		. WHEEL ASSY., V05404, NO. 12DC400D	4
2- 2	85A-1040		. RIM, 4" WIDE BASE, V05404, NO. 2036415251	1
*	181256		. KNOB, BRAKE LEVER	1
—-	181005		. BRAKE, ASSEMBLY	1
2- 3	181004		. . LEVER, BRAKE MOUNT ASSY.	1
2- 4	181001		. . BRAKE, SHOE ASSY.	1
2- 5	HF-1882A		. . SHOE, BRAKE ASSY.	2
2- 6	484250		. . ROD, ADJUSTING, BRAKE	2
2- 7	484254		. . BRACKET, MTG., BRAKE SHOE ANGLE	2
2- 8	W-11242-12		. . WASHER, FLAT, 1/2", STEEL	2
2- 9	400954		. . CLEVIS, ADJUSTING, BRAKE, V10988, NO. 144256	2
2-10	W-11338-5		. . PIN, COTTER, 1/8 X 1, STEEL	4
2-11	401468		. . PIN, CLEVIS	2
2-12	181849		. TRAILER ASSEMBLY (See Fig. 3)	1
*	486270-10		. LABEL, WARNING (COMPOSITE)	1
2-13	181006		. FENDER, RIGHT	1
*	181007		. FENDER, LEFT	1
*	181225		. BUMPER, REAR	1
2-14	181009		. BRACKET, MTG., FENDER (LF &RR)	2
2-15	181010		. BRACKET, MTG., FENDER (RF & LR)	2
2-16	181013		. BRACKET, MTG., FENDER (LEFT CENTER)	1
*	181011		. BRACKET, MTG., FENDER (RIGHT CENTER)	1



Trailer Assembly
Figure 3

FIGURE & ITEM NO.	HOBART PART NO.	AIRLINE PART NO.	NOMENCLATURE 1 2 3 4 5 6 7	QTY
3-	**181849**		**TRAILER ASSEMBLY (For NHA, See Fig. 2)**	**1**
3- 1	79A-1075		. DRAWBAR ASSY., V22938, NO. 6-3502	1
3- 2	79A-1057		. HINGE PIN, V22938, NO. 5416	1
3- 3	76A-1171		. COTTER PIN, V22938, NO. 4800-6	2
—-	79A-1045		. CENTER ARM ASSY., V22938, NO. 1-3854	1
3- 4	79A-1046		. . CENTER ARM, V22938, NO. 3854	1
3- 5	404529		. . LATCH PEDAL, V22938, NO. 3855	1
3- 6	404530		. . ROLL PIN, V22938, NO. 5000-1	1
3- 7	404528		. . SPRING, V22938, NO. 4006	1
3- 8	79A-1047		. FLAT WASHER, V22938, NO. 4701-3	1
3- 9	79A-1048		. CENTER PIN, V22938, NO. 5400-5	1
—-	85A-1017		. AXLE, REAR ASSY., V22938, NO. 1-363-2001	1
3-10	NO NUMBER		. . AXLE, REAR, BEAM WELDMENT, V22938	1
—-	85A-1019		. . HUB ASSY., REAR AXLE, V22938, NO. 7-3601	2
3-11	85A-1020		. . . CAP, GREASE, V22938, NO. 6301	1
3-12	85A-1021		. . . BEARING, CONE, OUTER, V22938, NO. 6051	1
3-13	85A-1022		. . . BEARING, CONE, INNER, V22938, NO. 6050	1
3-14	85A-1023		. . . SEAL, GREASE, V22938, NO. 6300	1
3-15	85A-1024		. . . NUT, STUD, V22938, NO.4603-1	5
3-16	80A-1059		. . . LOCKWASHER, V22938, NO. 4700-5	5
—-	85A-1025		. . HUB, STUD & CUP ASSY., V22938, NO.3601-1	1
3-17	85A-1026		. . . HUB, V22938, NO. 3601	1
3-18	85A-1027		. . . STUD, WHEEL, V22938, NO. 6251-10	5
3-19	85A-1028		. . . CUP, BEARING, INNER, V22938, NO. 6155	1
3-20	85A-1029		. . . CUP, BEARING, OUTER, V22938, NO. 6156	1
3-21	85A-1030		. . . . WASHER, SPINDLE, V22938, NO. 4701-10	2
3-22	85A-1031		. . . . NUT, SPINDLE, V22938, NO. 4600-1	2
3-23	80A-1052		. . . . PIN, COTTER, V22938, NO. 4800-5	2
—-	85B-1032		. . . AXLE, FRONT ASSY., V22938, NO. 1-363-205-1	1
3-24	NO NUMBER		. . . . AXLE, FRONT BEAM ASSY., V22938	1
3-25	85A-1034		. . . . SPINDLE & KNUCKLE ASSY.*(LEFT),* V22938, NO. 1-3800	1
3-26	85A-1035		. . . . SPINDLE & KNUCKLE ASSY. *(RIGHT),* V22938, 3NO. 2-3800	1
3-27	84A-1081		. . . . PIN, KING, V22938, NO. 5401	1
3-28	84A-1082		. . . . PIN, ROLL, 3/8 X 2", V22938, NO. 5000-6	1
—-	85A-1019		. . . . HUB ASSY., FRONT AXLE, V22938, NO. 7-3601	2
3-29	85A-1020		. . . . . CAP, GREASE, V22938, NO. 6301	1
3-30	85A-1021		. . . . . BEARING, CONE, OUTER, V22938, NO. 6051	1
3-31	85A-1022		. . . . . BEARING, CONE, INNER, V22938, NO. 6050	1
3-32	85A-1023		. . . . . SEAL, GREASE, V22938, NO. 6300	1
3-33	85A-1024		. . . . . NUT, STUD, V22938, NO. 4603-1	5
3-34	85A-1059		. . . . . LOCKWASHER, V22938, NO. 4700-5	5
—-	85A-1025		. . . . . HUB, STUD & CUP ASSY., V22938, NO. 3601-1	1
3-35	85A-1026		. . . . . HUB, V22938, NO. 3601	1

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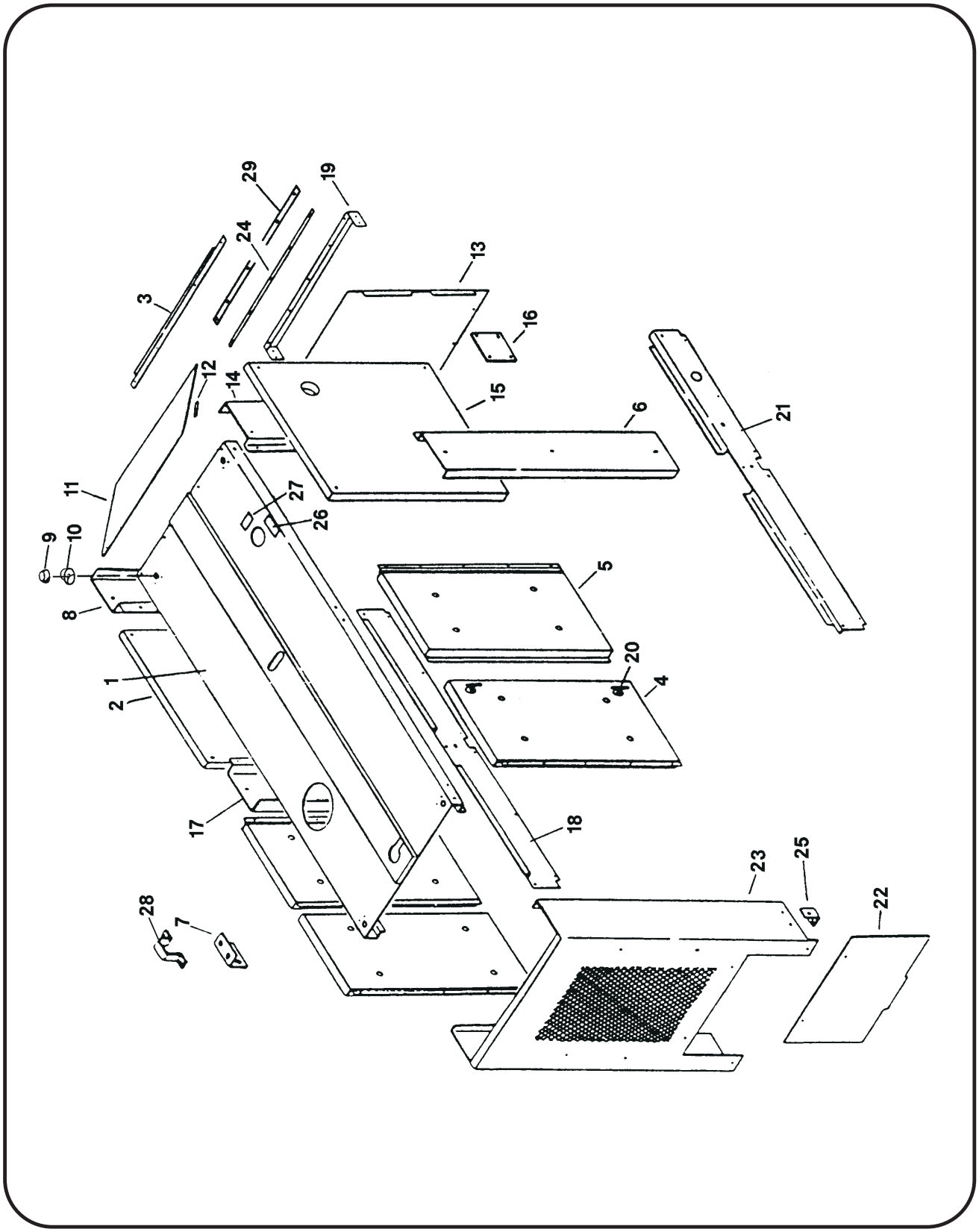
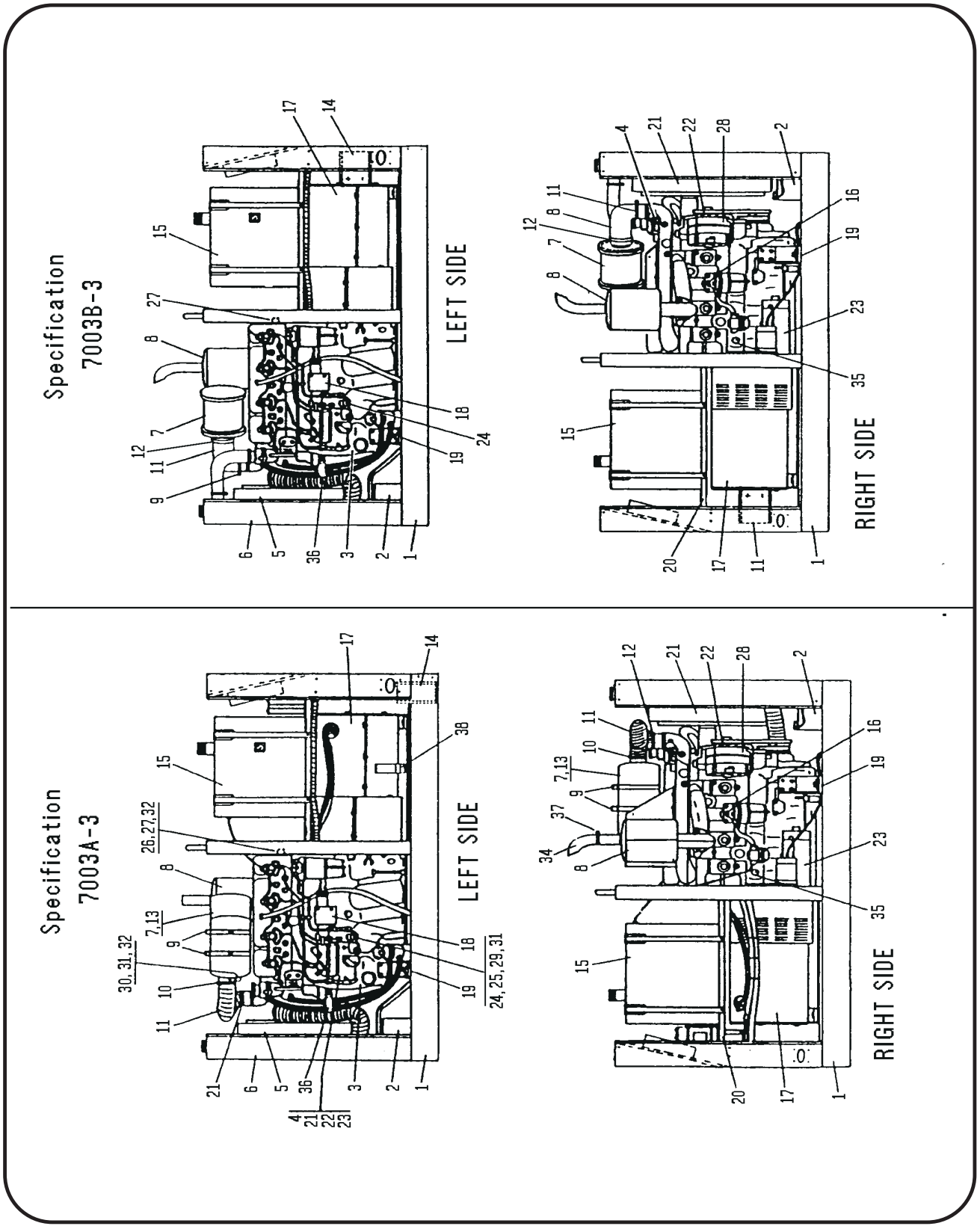
FIGURE & ITEM NO.	HOBART PART NO.	AIRLINE PART NO.	NOMENCLATURE 1 2 3 4 5 6 7	QTY
3-	**181849**		**TRAILER ASSEMBLY (CONTINUED)**	**1**
3-36	85A-1027		. . . . . STUD, WHEEL, V22938, NO. 6251-10	5
3-37	85A-1028		. . . . . CUP, BEARING, INNER, V22938, NO. 6155	1
3-38	85A-1029		. . . . . CUP, BEARING, OUTER, V22938, NO. 6156	1
3-39	85A-1030		. . . . WASHER, SPINDLE, V22938, NO. 4701-10	2
3-40	85A-1031		. . . . NUT, SPINDLE, V22938, NO. 4600-1	2
3-41	80A-1052		. . . . PIN, COTTER, V22938, NO. 4800-5	2
—-	NO NUMBER		. . . TIE ROD ASSY., V22938	2
3-42	85A-1038		. . . . TUBE, V22938, NO. 3900-197	2
3-43	79A-1051		. . . . NUT, JAM, R.H., V22938, NO. 4602-1	2
3-44	79A-1052		. . . . NUT, JAM, L.H., V22938, NO. 4602-2	2
3-45	79A-1053		. . . . BALL JOINT, R.H. W/NUT, V22938, NO. 3950-1	2
3-46	79A-1054		. . . . BALL JOINT, L.H. W/NUT, V22938, NO. 3950-2	2
*	79A-1035		. . . LUBE FITTING, V22938, NO. 5801	8
*	76A-1183		. . . LUBE FITTING, V22938, NO. 5800	10



Canopy Assembly
Figure 4

FIGURE & ITEM NO.	HOBART PART NO.	AIRLINE PART NO.	NOMENCLATURE 1 2 3 4 5 6 7		QTY
4-	**181852A**		**CANOPY ASSY (For NHA See Fig. 1)**		**1**
4- 1	181211		. PANEL, TOP, ASSY.	**A**	1
	282644		. PANEL, TOP, ASSY.	**B**	1
4- 2	282626-1		. PANEL, GEN. LEFT, ASSY.		1
4- 3	489217		. STOP, CONTROL PANEL		1
4- 4	489258		. DOOR, CANOPY, ASSY.		2
4- 5	489259		. DOOR, CANOPY, ASSY.		2
4- 6	489270		. PANEL, CENTER, LEFT, CANOPY		1
4- 7	488640		. BRACKET, OUTPUT CABLE ASSY.		1
4- 8	489167		. SUPPORT, CONTROL PANEL, LT. ASSY.		1
4- 9	408556		. LIGHTS, CLEARANCE, V75175, NO. 525-0101		4
4-10	181316		. GUARD, LIGHTS		4
—-	281967		. COVER, CONTROLS ASSY.		1
4-11	488592		. . COVER, LEXAN		1
4-12	181152		. . PLATE, MAGNETIC CATCH		2
*	181263		. . LABEL, OPERATING INSTRUCTIONS		1
*	403091-9		. PLUG, HOLE, PLASTIC, V5Z152, No. DP-1250		1
4-13	489235		. PANEL, LOWER REAR		1
4-14	489168		. SUPPORT, CONTROL PANEL, RT ASSY.		1
4-15	489224		. PANEL, GEN. RIGHT., ASSY.		1
4-16	488799		. COVER, OUTPUT CABLES		1
4-17	489810		. PANEL, CENTER, RIGHT, CANOPY		1
4-18	489230		. PANEL, SIDE, RT, REAR ASSY.		1
4-19	489220		. SUPPORT, CONTROL PANEL		1
4-20	81B-1019		. LATCH, T-HANDLE, V94222		4
4-21	489229		. PANEL, SIDE, LT.		1
4-22	489156		. PANEL, ACCESS, BATTERY		1
4-23	489158		. PANEL, FRONT		1
4-24	489577		. SPACER, CONTROL PANEL HINGE		1
4-25	488633		. SUPPORT, FRONT PANEL		2
*	407366		. LABEL, CAUTION INSUFFICIENT COOLING		1
*	81B-1063		. LABEL, HOT WATER & STEAM		1
*	84A-1071		. LABEL, ACCESS PANEL		1
*	406001		. LABEL, DANGER, MOVING PART		2
*	402987		. NAMEPLATE, HOBART		1
4-26	406000		. LABEL, ENGINE FUEL		1
4-27	76B-1148		. LABEL, DIESEL		1
4-28	7J-422-0		. CLAMP, OUTPUT CABLE		1
*	400435		. NAMEPLATE, 28-V		1
*	180015		. STRAP, BACKUP, COVER CONTROLS		1
*	181179		. SHIELD, RAIN, MUFFLER		1
4-29	181161		. STRAP, REINFORCING, HINGE		1

*** Not Illustrated**



Generator Set without Canopy
Figure 5

FIGURE & ITEM NO.	HOBART PART NO.	AIRLINE PART NO.	NOMENCLATURE 1 2 3 4 5 67		QTY
5-	No Number		GENERATOR SET WITHOUT CANOPY (For NHA See Fig. 1)		REF
5- 1	489151		. FRAME, MOUNTING ASSY. (See Fig. 17)		1
5- 2	281881-1		. BATTERY, 12-V (See Fig 10)	A	2
	402087-1		. BATTERY, 12-V (See Fig 10)	B	2
5- 3	408409		. ENGINE, DIESEL, V13446, TYPE 4.236		1
5- 4	No Number		. GOVERNOR, ENGINE		1
5- 5	489641		. GUARD, BELT, LEFT		1
5- 6	No Number		. COOLING SYSTEM (See Fig. 13)		1
5- 7	406651		. AIR CLEANER, V18265, NO. FWG-06-5295	A	1
	282569		. AIR CLEANER, V13215, NO. ECC06-5002	B	1
5- 8	408458		. MUFFLER, V76700, NO. U-49115	A	1
	282388		. MUFFLER, V76700, NO. U-49115	B	1
5- 9	406538		. BRACKET, MOUNTING, AIR CLEANER V18265, NO. PPPOO-7192	A	2
	282570		. BRACKET, MOUNTING, AIR CLEANER	B	
5-10	W-10869-7		. CLAMP, HOSE, V35708, NO. H5-36		1
5-11	406974		. HOSE, AIR CLEANER	A	1
	282571		. HOSE, AIR CLEANER	B	1
5-12	W-10869-5		. CLAMP, HOSE, V35708, NO. MH-12		1
	402433		. CLAMP, HOSE		1
5-13	408436		. FILTER, AIR CLEANER, V18265, NO. 18-1052	A	1
5-14	281321		. RECTIFIER ASSEMBLY (See Fig. 14)	A	1
	282235		. RECTIFIER ASSEMBLY (See Fig. 14)	B	1
5-15	No Number		. FUEL SYSTEM (See Fig. 11)		1
5-16	359985		. BRACKET, FUEL FILTER		1
5-17	489661		. GENERATOR ASSEMBLY (See Fig. 18)		1
5-18	282220		. FULL THROTTLE SOLENOID ASSEMBLY (For Details See Fig. 9)		1
5-19	489114		. SUPPORT, ENGINE, ASSY		2
5-20	489554		. SUPPORT, FUEL TANK (For Details See Fig. 8)	A	1
5-21	489639		. GUARD, BELT, RIGHT		1
5-22	405099		. FAN, ALTERNATOR, V16764, NO. 800612		1
*	181098		. BRACKET, MTG., ALTERNATOR		1
*	181099		. SPACER, ALT. BRACKET		1
*	181100		. SPACER, SCREW, ALTERNATOR		1
*	492098		. BRACKET, SUPPORT, WIRE, ALTERNATOR		1
5-23	407706		. MOTOR,STARTER, V16764, NO. 1998383		1

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FIGURE & ITEM NO.	HOBART PART NO.	NOMENCLATURE 1 2 3 4 5 6 7	QTY
5-		*(Continued)*	
*	403618-6	. BELT, FAN, V24161, No. 9002-2050	1
*	406149	. FAN, ENGINE, V13446, No. 31257017	1
5-24	403809-2	. SWITCH, OIL PRESSURE, V51377, No. C-25900-10	1
5-25	78B-1118-1	. SENDER, OIL PRESSURE, V16476, No. 02504	1
5-26	79B-1119-1	. SENDER, TEMPERATURE, V16476, No. 02019	1
5-27	403782-0	. SWITCH, WATER TEMPERATURE, V51377, NO. 1002-4880-33	1
5-28	78B-1010	. DIODE, ALTERNATOR, V72582, NO. 05100420	1
5-29	W-10910-0	. TEE, STREET, BRASS, V4N430, NO. 3700X2	1
5-30	W-10119-1	. COUPLING, PIPE, STEEL, 1/8", V5Z126	1
5-31	W-10750-2	. NIPPLE, PIPE 1/8 x 1-1/2", V5Z126	2
5-32	W-7814-4	. BUSHING, PIPE, STEEL, 1/2 x 3/8", V5Z126	1
5-33	406768-1	. INDICATOR, RESTRICTION, V18265, NO. RBX00-2251	1
5-34	180957	. ELBOW, EXHAUST	1
5-35	5CW-1932-0	. DRAIN, BLOCK, V4N430, NO. 145	1
5-36	80A-1117	. CLAMP, HOSE, V33518, NO.00672772	1
5-37	404154-8	. CLAMP, ELBOW EXHAUST	1
*	W-11095-2	. BOLTS, STARTER, NYLOK, V3M915, NO. M4DS-616-28Z, GRADE 5	3
*	281398	. SHROUD, RECTIFIER, ASSY.	1
5-38	489431	. CAPACITOR, ASSEMBLY	1
*	405278-6	. . CAPACITOR, 41000 MFD, 75VDC	1
*	361052-9	. . CLAMP, MTG., CAPACITOR	1
*	488800	. . SUPPORT, CAPACITOR	1
*	350488-94	. . INSULATOR, CAPACITOR	1

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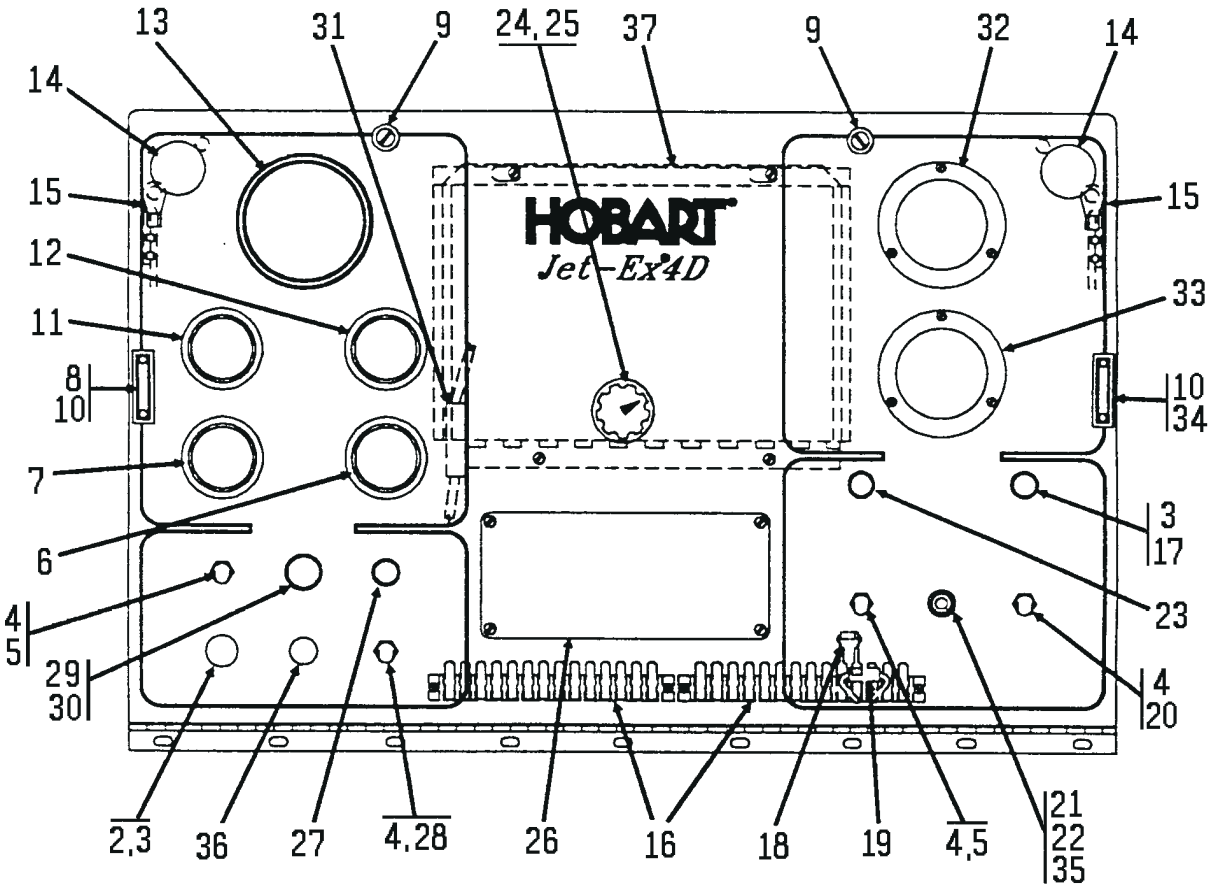
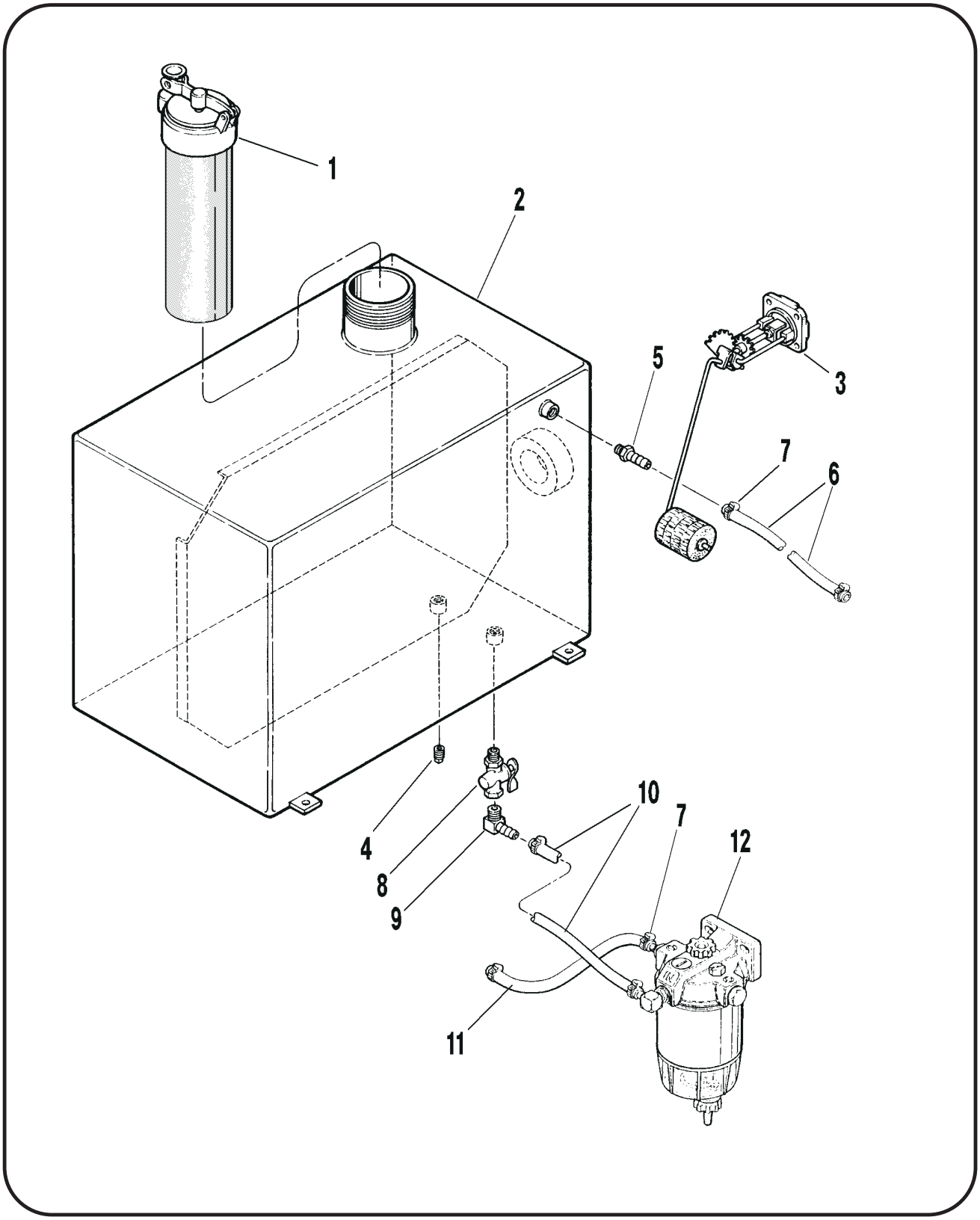


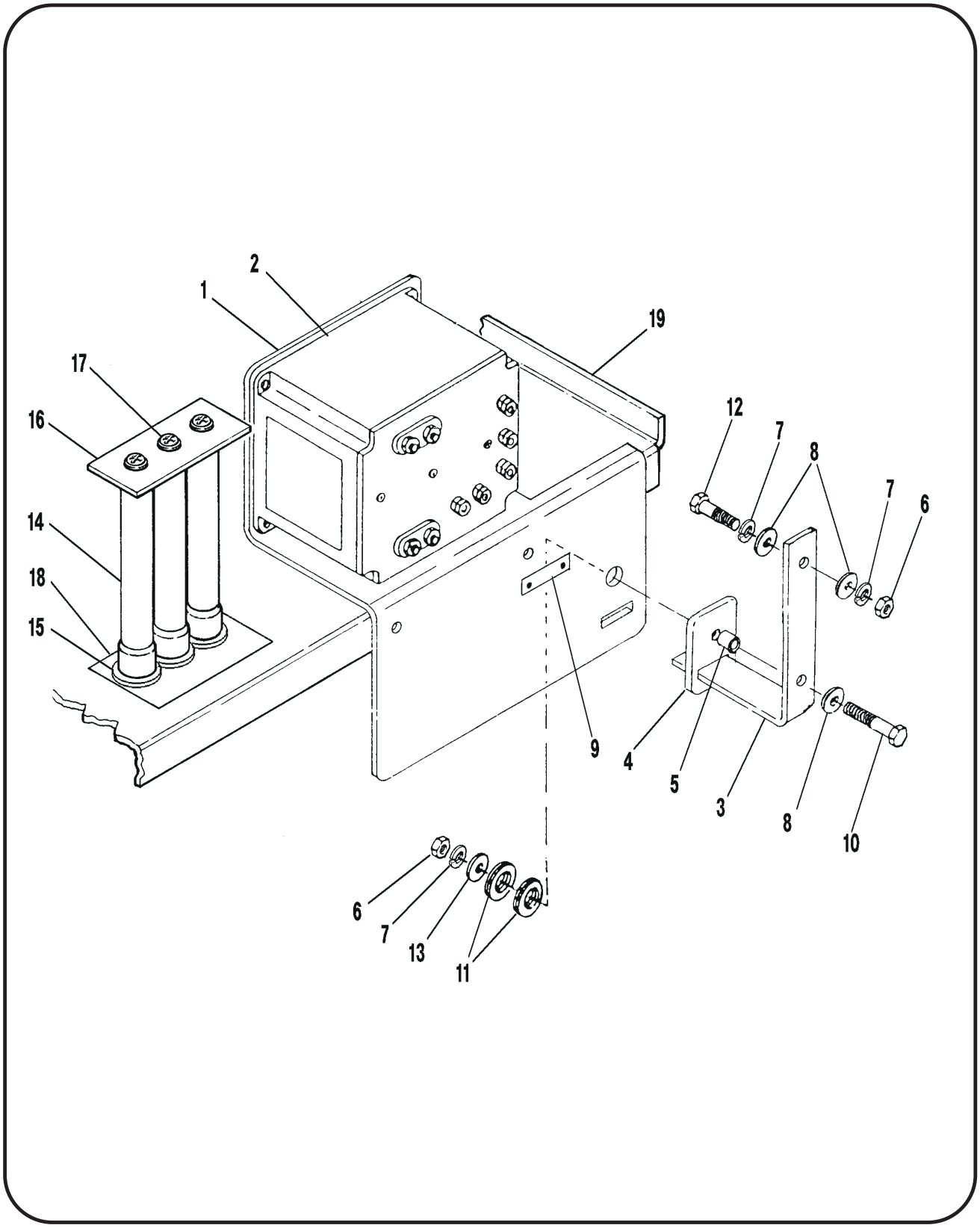
Control Panel
Figure 6

FIGURE & ITEM NO.	HOBART PART NO.	AIRLINE PART NO.	NOMENCLATURE 1 2 3 4 5 6 7	QTY
6-	**181851**		**PANEL , CONTROL, ASSY (For NHA See Fig. 1)**	**REF**
6- 1	181252		. PANEL, CONTROL, ASSY.	1
6- 2	W-11166-5		. FUSE, AGC, 20A, V71400, TYPE SFE	1
6- 3	402658		. HOLDER, FUSE,V71400, TYPE HKP-HH	2
6- 4	406040		. BOOT, TOGGLE SWITCH, V13074, NO. H-1031A	4
6- 5	404856		. SWITCH, TOGGLE, V81640, NO. 8860K5	2
6- 6	181358		. GAUGE, HOURMETER, V74400, NO. 80001	1
6- 7	78A-1115-1		. AMMETER, V16476, NO. 06354	1
6- 8	489219		. SUPPORT, MAGNET, LEFT	1
6- 9	76A-1115		. LATCH, ADJUSTABLE, V94222, NO. 48-99-126-11	2
6-10	403127		. CATCH, MAGNETIC, V94222, NO.02-10-210-10	2
6-11	78A-1117-1		. GAUGE, OIL PRESSURE, V16476, NO. 06340	1
6-12	78A-1116-1		. GAUGE, WATER TEMP., V16476, NO. 06343	1
6-13	408596-1		. TACHOMETER, V11287, NO. 71076-00	1
6-14	84B-1003		. LIGHT, PANEL, 12V, V77977, NO. 431W	2
6-15	389535-3		. SUPPORT, ROPE, HINGED DOOR	2
6-16	401937-8		. BLOCK, TERMINAL, V91636, NO. GBSY-14-TB29	2
6-17	W-11166-3		. FUSE, AGC, 10A., V71400	1
6-18	489658-5		. DIODE, ASSY.	1
6-19	180591-2		. RESISTOR, 5W, ASSY.	1
6-20	402662		. SWITCH, TOGGLE, DPST, V74559, NO. 2GK71-73	1
6-21	20RT-353-1		. DIODE, CONTROLLED, AVALANCHE, V51589, NO. ST-230ECAN	1
6-22	25MS-156		. BUS, JUMPER	1
6-23	180913-2		. LIGHT, PILOT, GREEN, 28V.	1
6-24	16DA-2162		. KNOB, RHEOSTAT, V44655, NO. 5150	1
6-25	401428-1		. POTENTIOMETER, 10K OHM, 2W., V44655, NO. CMU-1031	1
6-26	488598		. COVER, 14V., *(Option)*	1
6-27	180913-1		. LIGHT, PILOT, ENGINE, GREEN, 12V.	1
6-28	402682		. SWITCH, TOGGLE, 3 PDT, V74559, NO. HLA-211-73	1
6-29	30GH-1119		. SWITCH, PUSHBUTTON, V13445, NO. 9095-05	1
6-30	406815		. BOOT, PUSHBUTTON SWITCH, V13445, NO. 83280	1
6-31	180135		. PLUG, HARNESS	1
6-32	400642-3		. VOLTMETER, DC, V60741, NO. D-1007819T81	1
6-33	400641-12		. AMMETER, V60741, NO. 0-2000	1
6-34	489218		. SUPPORT, MAGNET, RIGHT	1
*	405608		. CLIP, WIRE	2
6-35	Y-971		. SWITCH, PUSHBUTTON, V15605, NO. 810865NR	1
6-36	403091-5		. PLUG, HOLE, 5/8	1
6-37	280691		. BOX, PC BOARD, ASSY. (See Fig. 7)	1



P.C. Board Box Assembly
Figure 7

FIGURE & ITEM NO.	HOBART PART NO.	AIRLINE PART NO.	NOMENCLATURE 1 2 3 4 5 6 7	QTY
7-	**280691**		**BOX, PC BOARD, ASSY. (For NHA, See Fig. 6)**	**1**
7- 1	406003-2		. STRIP, TERMINAL, QUICK CONNECT	1
7- 2	W-11112-1		. SCREW, #10-24 x 1/2, RD. HD., MH., ST.	1
7- 3	180289		. BOARD, PC, OVERVOLTAGE ASSY.	1
7- 4	84A-1075		. MOUNT, RUBBER, 5P059, NO. 51083, 50 DURO	7
7- 5	W-11254-2		. WASHER, LK., STD. #8	14
7- 6	W-11245-15		. WASHER, FL., BRS. #8	7
7- 7	W-11287-3		. NUT, #8-32, SCR, MH, HEX, ST.	14
7- 8	181022-1		. BOARD, PC, REGULATOR	1
7- 9	W-11434-1		. HOLDER, FUSE	1
7-10	W-11166-3		. FUSE, AGC, 10A, V8P583	1
7-11	W-11110-3		. SCREW, #6-32 x 3/8, RD. HD. MH. ST.	8
7-12	W-11254-1		. WASHER, LK, STD, #6	14
7-13	W-11287-2		. NUT, #6-32, SCR, MH, ST	14
7-14	404065-2		. RECTIFIER, SILICON	2
7-15	W-11110-6		. SCREW, #6-32 x 3/4, RD. HD. MH. ST.	2
7-16	W-4541D		. RESISTOR, 100 OHM, 25 WATT	1
7-17	W-10051-14		. CLAMP, WIRE, PLASTIC	1
7-18	W-11110-4		. SCREW, #6-32 x 1/2, RD. HD, MH. ST.	4
7-19	180593-1		. CAPACITOR, 0.1 MFD, 400V DC	1
7-20	181039		. BRACKET, RELAY, SOCKET, MTG.	1
7-21	403056-4		. RELAY, ENCLOSED, 24V DC, V77343	1
7-22	403055-2		. SOCKET, RELAY, KUP, V77343, NO.27E067	1
7-23	180591-1		. RESISTOR, 2 WATT ASSY.	1
7-24	280327		. BOX, PC BOARD, ASSY.	1
7-25	400828-2		. TIE, WIRE, PLASTIC	15
7-26	180963		. WIRE CHART	1
7-27	489658-6		. DIODE, ASSY., V9L925, NO.WBR100350 TVA1620	1
7-28	402461-5		. CAPACITOR, 100 MFD, 350V DC	1
7-29	41546		. SLEEVING, PLASTIC, BLACK, V7S696	4-1/2"
7-30	402197-1		. TERMINAL, QUICK DISCONNECT	2
7-31	W-11254-3		. WASHER, LK, STD, #10	1
7-32	W-11287-4		. NUT, #10-24, SCR, MH, HEX, ST.	1
7-33	280686		. INSULATOR, WALL, BOX	1
7-34	903520		. COMPOUND, RTV	0.5 oz.
7-35	W-11245-3		. WASHER, FL, #10, BRS.	1
7-36	402665-1		. HOUSING RECEPTACLE	2



Fuel Tank Support Assembly
Figure 8

FIGURE & ITEM NO.	HOBART PART NO.	AIRLINE PART NO.	NOMENCLATURE 1 2 3 4 5 6 7	QTY
8-	**281397**		**SUPPORT, FUEL TANK, ASSY.**	**REF**
—-	489196-1		. PANEL, TERMINAL, OUTPUT, ASSY.	1
8- 1	489195		. . PANEL, OUTPUT	1
8- 2	84C-1092		. . CONTACTOR, 28-V, V26659, NO. JGA6003A	1
8- 3	489199		. . BUS, TERMINAL	1
8- 4	5CW-975		. . BUSHING, INSULATOR, V77313	1
8- 5	5CW-2127		. . BUSHING, V1Y498	1
8- 6	W-11242-10		. . WASHER, FLAT, 3/8, ST	3
8- 7	W-11254-6		. . WASHER, LOCK, 3/8, ST	4
8- 8	W-11278-5		. . NUT, 3/8-16, HEX, ST	2
8- 9	400435		. . NAMEPLATE, 28-V	1
8-10	W-11097-31		. . SCREW, 3/8-16 X 1-3/4, HHC, ST	1
8-11	5CW-976A		. . WASHER, INSULATOR, V1Y498	2
8-12	W-11097-3		. . SCREW, 3/8-16 X 1-1/4, HHC, ST	1
8-13	W-11242-18		. . WASHER, FLAT, 3/8, ST	1
8-14	405154-6		. RESISTOR, 10-OHM, 100W, V44655, NO. 0957	3
8-15	16DA-3493		. INSULATOR, WASHER	6
8-16	489579		. BRACKET, RESISTOR	1
8-17	W-11114-12		. SCREW, 1/4-20 x 7-1/4", RD. HD. ST.	3
*	W-11242-5		. WASHER, FLAT, 1/4, ST.	3
*	W-11254-4		. WASHER, LOCK, 1/4, ST.	3
*	W-11278-7		. NUT, HEX, 1/4-20, ST.	3
8-18	489580		. INSULATOR, RESISTOR	1
8-19	281332		. SUPPORT, FUEL TANK	1

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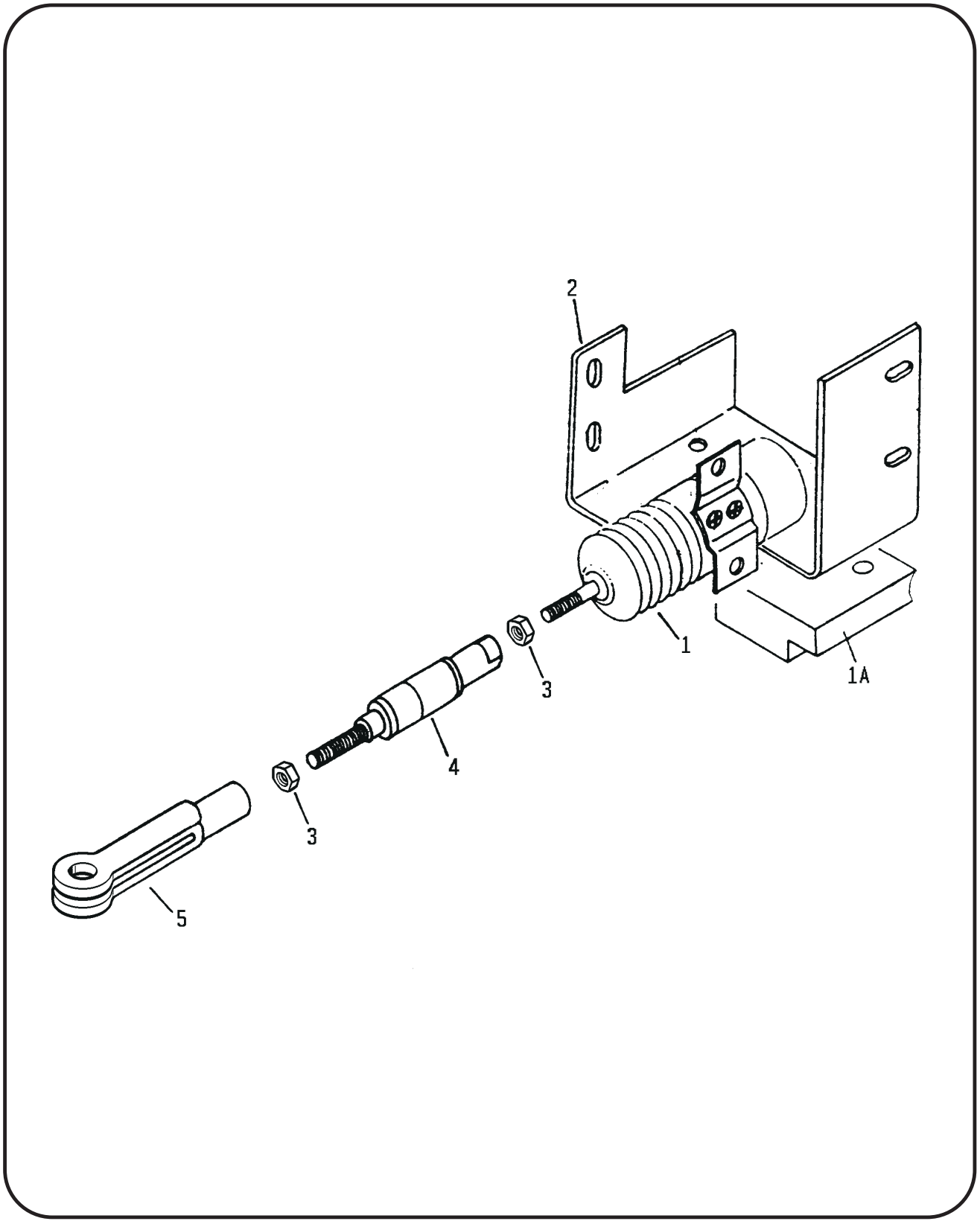

Full Throttle Solenoid
Figure 9

FIGURE & ITEM NO.	HOBART PART NO.	AIRLINE PART NO.	NOMENCLATURE 1 2 3 4 5 6 7	QTY
9-	**489564**		**SOLENOID, FULL THROTTLE, ASSY.**	**REF**
9- 1	408557		. SOLENOID, ASSY., V88136, NO. P610-A1	1
9-1a	408559		. . MODULE, ELECTRONIC, V88136, NO. SS12-30A	1
9- 2	180413		. SUPPORT, SOLENOID	1
9- 3	W-11280-3		. NUT, 1/4-28, HEX, FULL, ST.	2
9- 4	DELETED			
9- 5	408534		. FITTING, SWIVEL SPRING, V78388, NO. SA-3157-AB	1
9- 6	12CW-2146		. YOKE, CLEVIS, V03504, NO. 4-J-4200	1
*	W-11562		. PIN, CLEVIS	1

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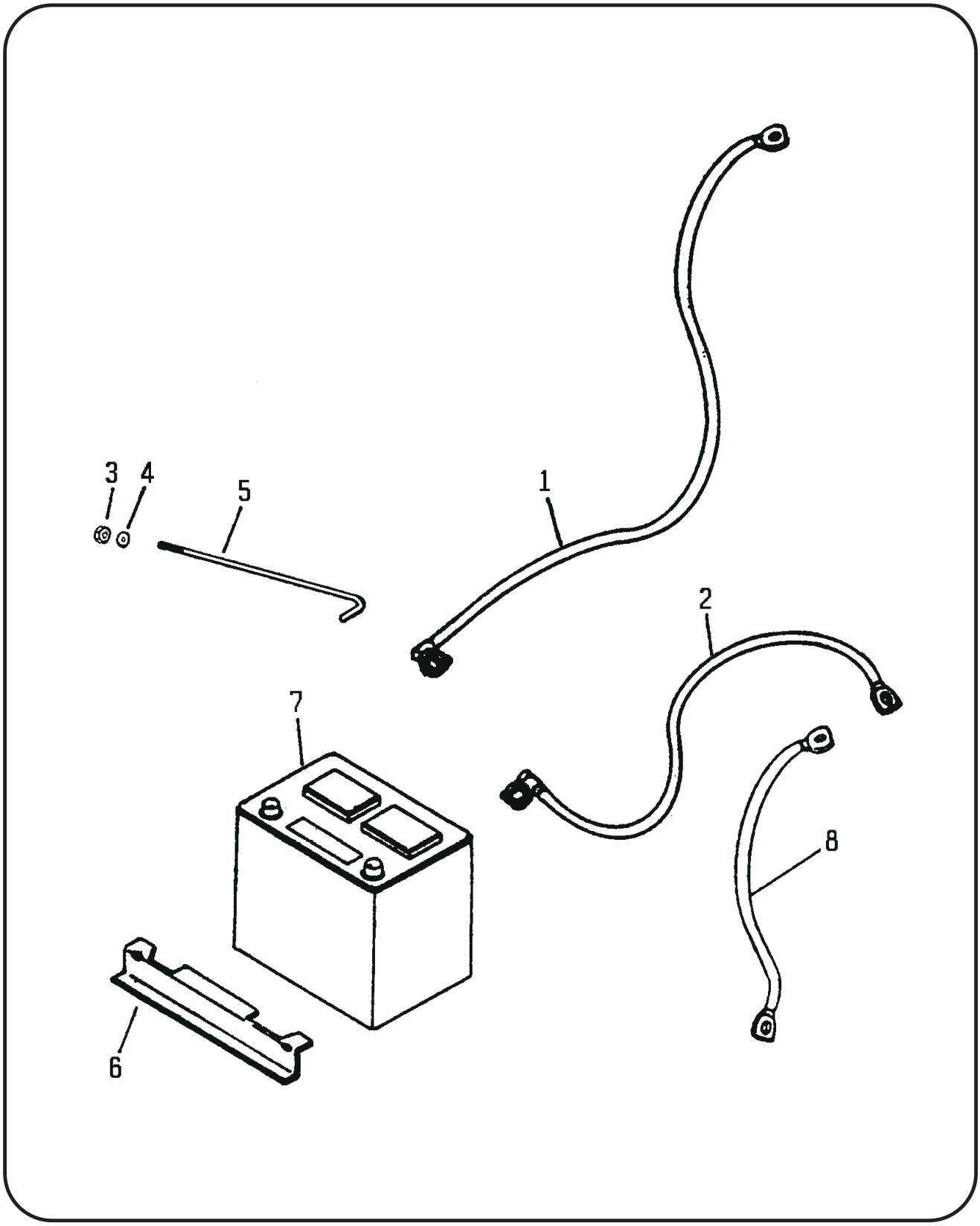
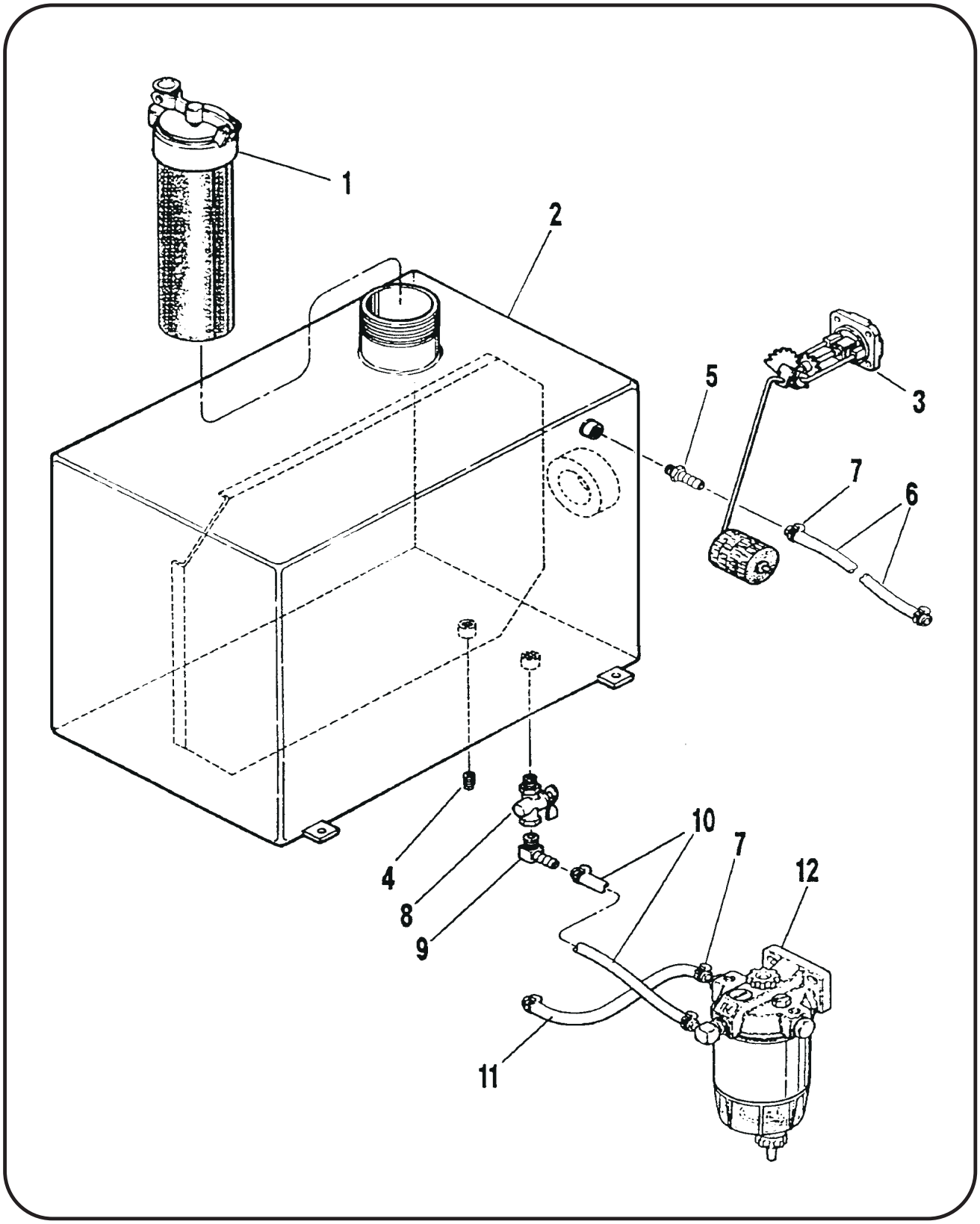


Battery Installation
Figure 10

FIGURE & ITEM NO.	HOBART PART NO.	AIRLINE PART NO.	NOMENCLATURE 1 2 3 4 5 6 7	EFF	QTY
10-	**No Number**		**BATTERY INSTALLATION (For NHA See Fig. 5)**		**REF**
10- 1	388827-13		. CABLE ASSEMBLY *(Positive)*	A	1
	388827-18		. CABLE ASSEMBLY *(Positive)*	B	1
10- 2	388828-1		. CABLE ASSEMBLY *(Negative)*		1
10- 3	No Number		. NUT, PLAIN, HEX, 5/16-18		2
10- 4	No Number		. WASHER, FLAT, 5/16 IN.		4
10- 5	491687		. ROD, BATTERY CLAMP		2
10- 6	491962-1		. CLAMP, BATTERY		1
10- 7	281881-1		. BATTERY, 12V		2
10- 8	W-9360-229		. CABLE, BONDING		1



Fuel System
Figure 11

FIGURE & ITEM NO.	HOBART PART NO.	AIRLINE PART NO.	NOMENCLATURE 1 2 3 4 5 6 7	QTY
11-	**No Number**		**FUEL SYSTEM (For NHA See Fig. 5)**	**REF**
11- 1	76A-1152		. CAP, FUEL TANK, V49234, NO. 1275 TYPE B	1
11- 2	281988		. TANK, FUEL, STAINLESS, ASSY.	1
—-	281345		. . TANK, FUEL, STAINLESS	1
11- 3	5CW-3420-1		. . GUAGE, FUEL	1
11- 4	281301-3		. . PLUG, PIPE, 1/8-27	1
11- 5	402927-1		. CONNECTOR, MALE, V4N430	1
11- 6	491889-1		. HOSE, RUBBER, 15" LONG	6
11- 7	W-10869-14		. CLAMP, HOSE, V3S708, NO.350-00H-012	1
11- 8	402265		. VALVE, 1/4 TURN SHUTOFF	1
11- 9	405091-1		. ELBOW, MALE, BARBED	1
11-10	355325-4		. HOSE, RUBBER, 36" LONG	1
11-11	355325-6		. HOSE, RUBBER, 6" LONG	1
11-12	281972		. FILTER, FUEL/WATER, V55752, NO. 220R (See Fig. 12)	1

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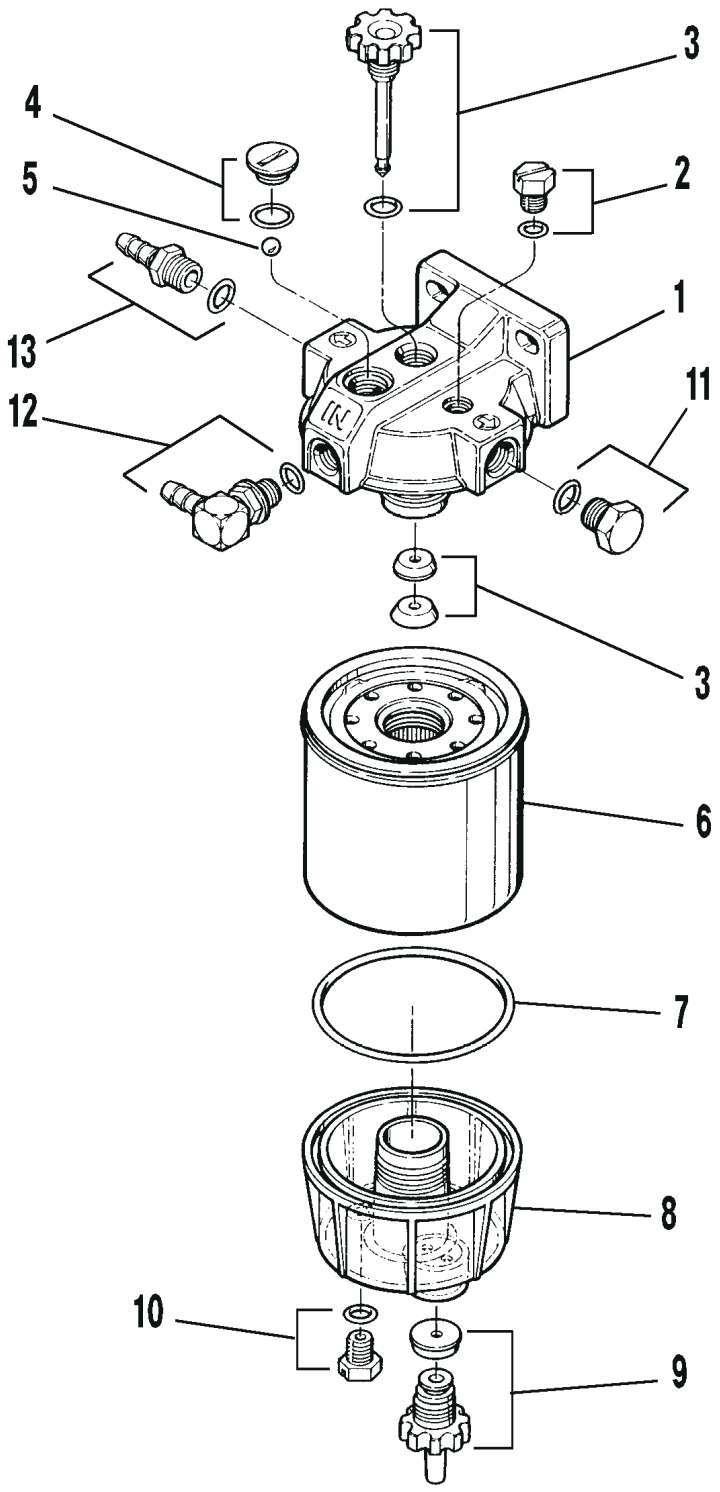
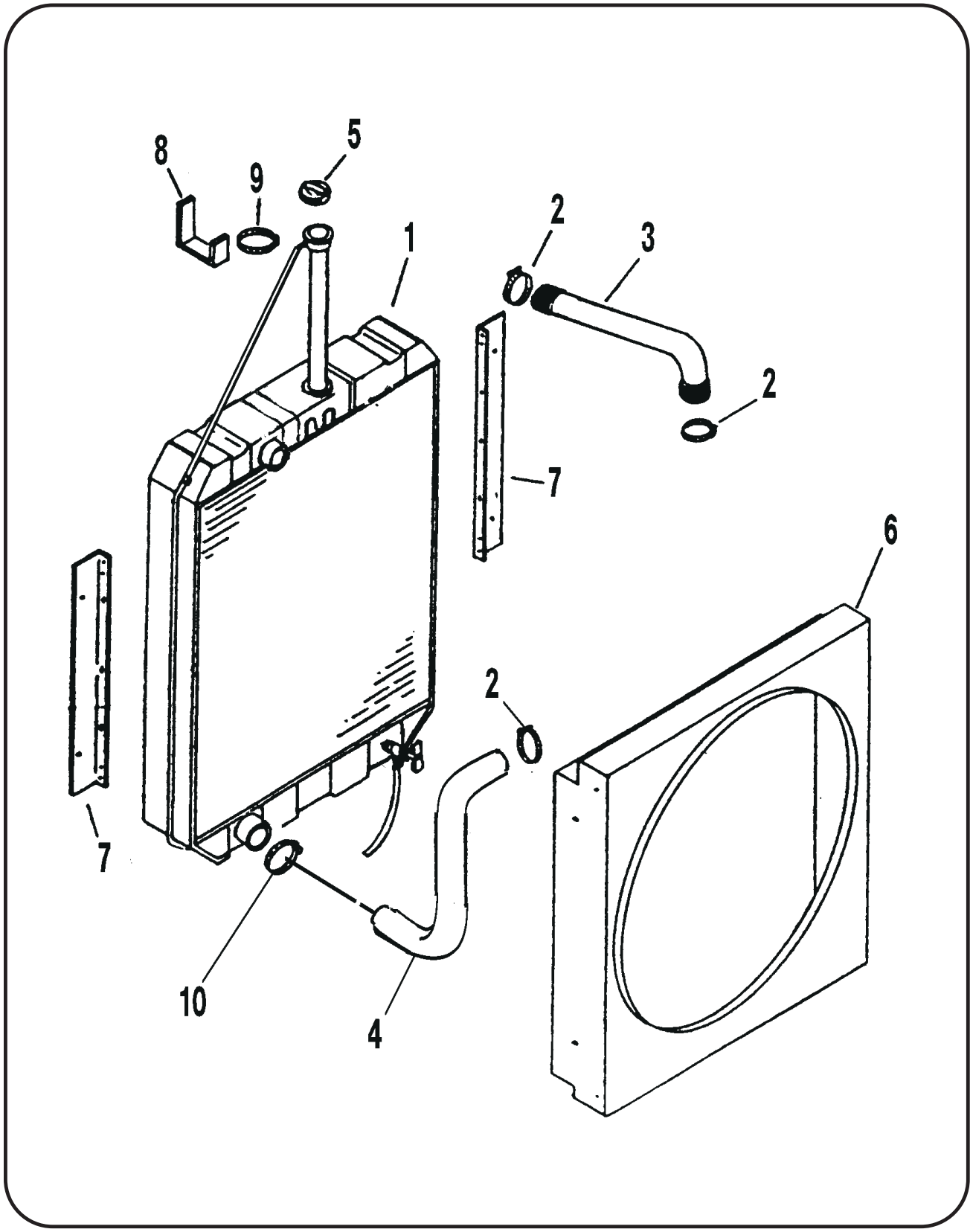


Filter, Fuel/Water Separator
Figure 12

FIGURE & ITEM NO.	HOBART PART NO.	AIRLINE PART NO.	NOMENCLATURE 1 2 3 4 5 6 7	QTY
12-	**281972**		**FILTER, FUEL/WATER SEPARATOR (For NHA See Fig. 11)**	**REF**
12- 1	RK20002		. KIT, HEAD (SAE PORTS, 9/19 x 18 W/O-RING)	1
12- 2	RK20003		. KIT, PLUG, VENT ASSEMBLY	1
12- 3	RK20025		. KIT, PUMP KNOB/SHAFT ASSEMBLY	1
12- 4	RK20011		. KIT, CAP, CHECK BALL ASSEMBLY	1
12- 5	RK20010		. KIT, CHECK BALL	1
12- 6	R24S		. ELEMENT, 2 MICRON SEPARATOR	1
12- 7	RK20016		. O-RING, BOWL/CAN	1
12- 8	RK20017		. KIT, CLEAR BOWL	1
12- 9	RK20019		. KIT, KNOB, DRAIN ASSEMBLY	1
12-10	RK20126		. PLUG, 1/2-20 SAE, PLASTIC	1
12-11	RK20127		. PLUG, FUEL PORT, 1/4-18 NPT	1
12-12	9010-HF-6-5/6		. FITTING, HOSE, ELBOW, PROGRESSIVE BARB	1
12-13	9020-HF-6-5/6		. FITTING, HOSE, STRAIGHT, PROGRESSIVE BARB	1
12-14	RK20075		. KIT, SEAL REPLACEMENT	1
12-15	RK20076		. KIT, KNOB & SEAL REPLACEMENT	1

NOTE: All part numbers listed in the assembly above, belong to the original vendor (Racor).



Cooling System
Figure 13

FIGURE & ITEM NO.	HOBART PART NO.	AIRLINE PART NO.	NOMENCLATURE 1 2 3 4 5 6 7	QTY
13-	No Number		COOLING SYSTEM (For NHA See Fig. 5)	REF
13- 1	281423-1		. RADIATOR, ASSY.	1
13- 2	W-10869-12		. CLAMP, V3S708, NO. 610-024-102	3
13- 3	406655		. HOSE, TOP, RADIATOR, V24161	1
13- 4	281874		. HOSE, RADIATOR, LOWER, V24161	1
13- 5	405743		. CAP, FILLER, V78225, NO. AAX-0418	1
13- 6	489121		. SHROUD, FAN ASSY.	1
13- 7	489122		. SUPPORT, RADIATOR	2
*	351541		. LABEL, CAUTION, FAN	1
*	401842		. TAG, ATTENTION, ENGINE COOLING	1
*	400902		. ANTI-FREEZE, QUART	7
13- 8	489533		. SUPPORT, RADIATOR NECK	1
13- 9	W-10869-2		. CLAMP, RADIATOR NECK, V6K870, NO. 5720 HS 20	1
13-10	W-10869-3		. CLAMP, HOSE, RAD. OUT, V3S708, NO.610-032-102	1

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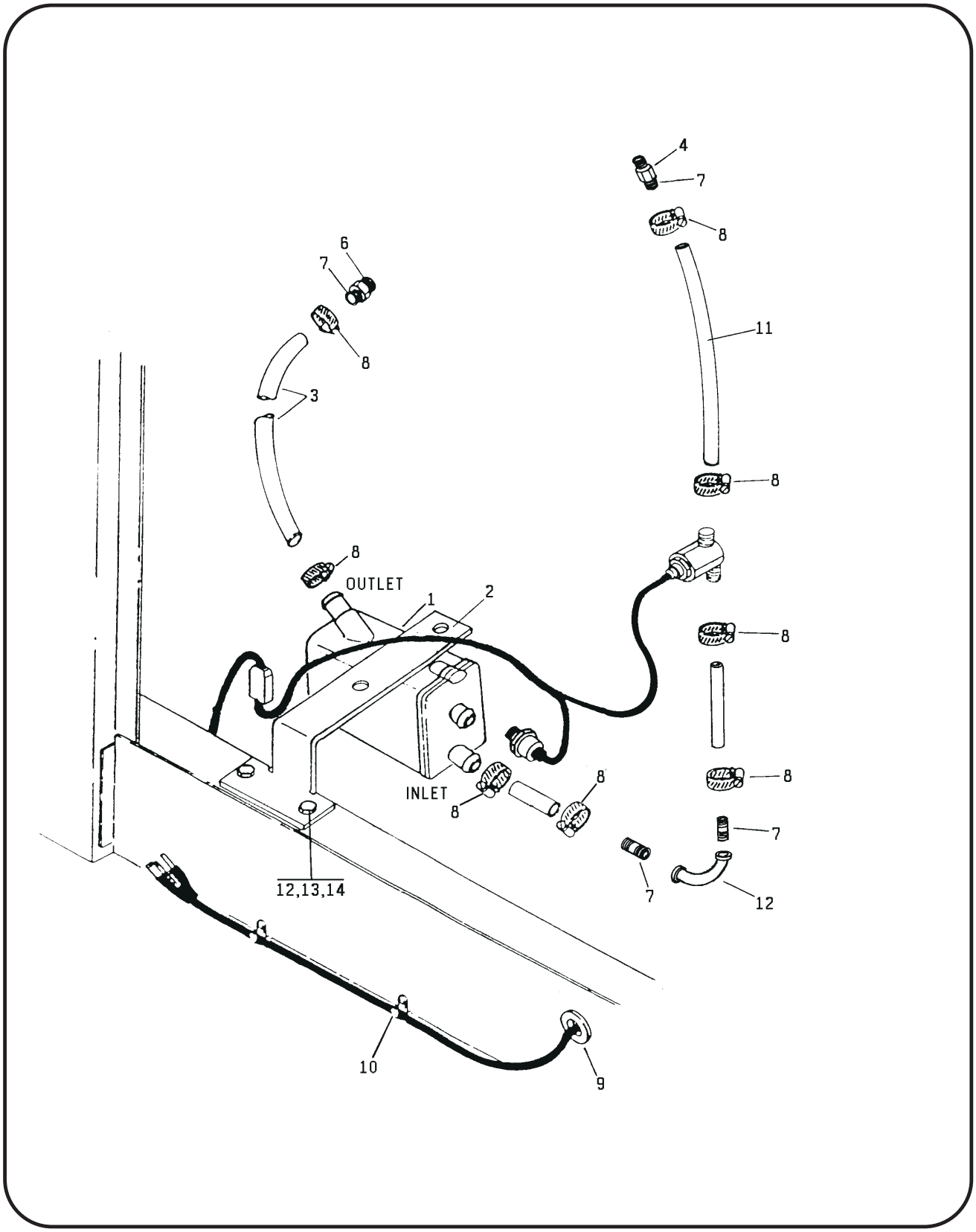
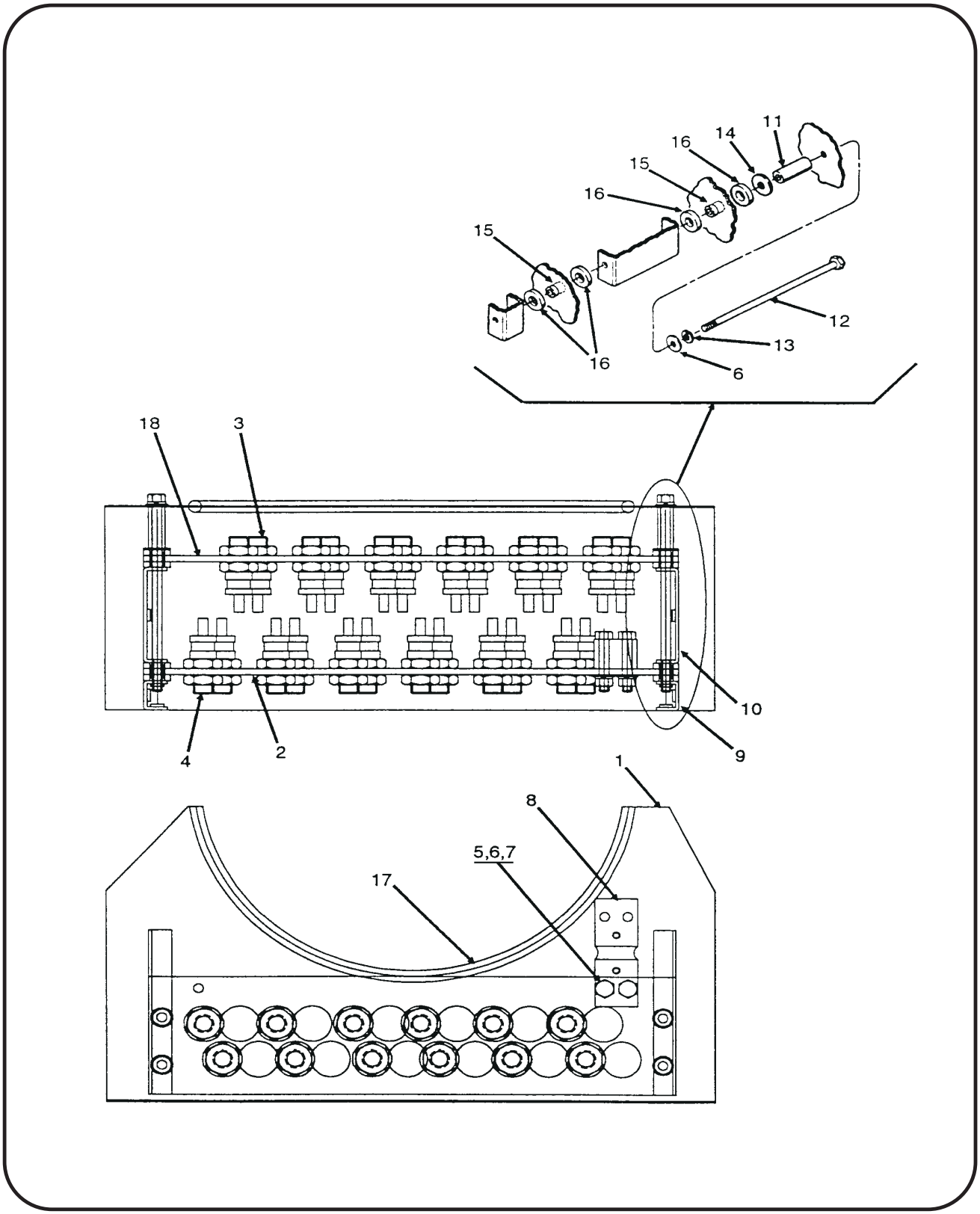


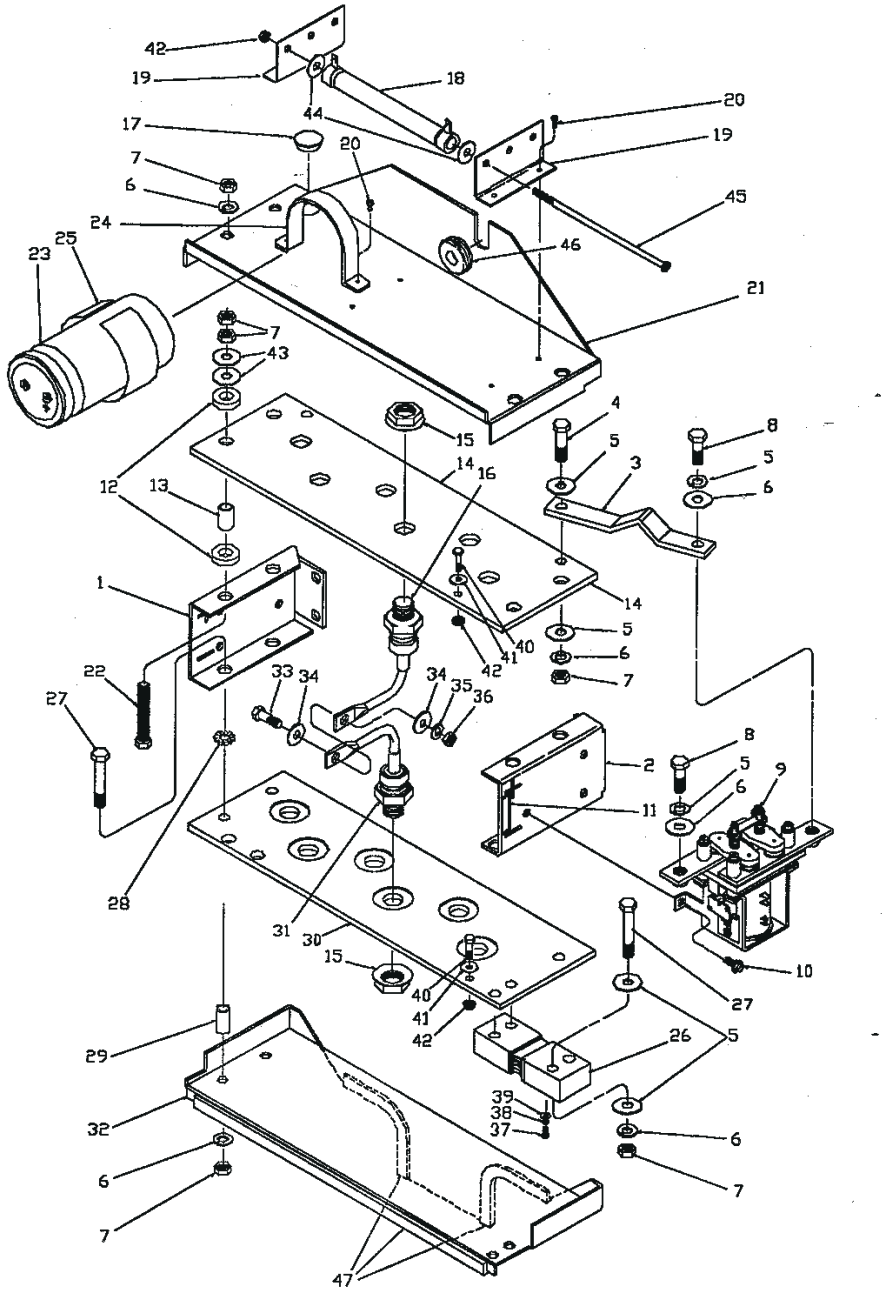
Water Heater Installation Kit
Figure 14

FIGURE & ITEM NO.	HOBART PART NO.	AIRLINE PART NO.	NOMENCLATURE 1 2 3 4 5 6 7	QTY
14-	**180360**		**WATER HEATER INSTALLATION KIT**	**REF**
14- 1	408641		. HEATER, WATER, V95408, NO. VH101-T12	1
14- 2	180629		. BRACKET, MTG., WATER HEATER	1
14- 3	56537		. HOSE, CONNECTION, HEATER OUTLET, 5/8 I.D.	32"
14- 4	W-10882-2		. ADAPTER, PIPE, 3/8 x 1/4	1
14- 5	W-10890-2		. ELBOW, PIPE, 3/8	1
14- 6	W-7814-4		. BUSHING, 1/2" PIPE TO 3/8" PIPE	1
14- 7	404214		. FITTING, PIPE NIPPLE, 3/8" PIPE TO 5/8" HOSE	4
14- 8	W-10869-1		. CLAMP, HOSE, V3S708, NO.610-012-102	8
14- 9	402037-23		. GROMMET, RUBBER, V11702	1
14-10	76A-1130		. CLAMP, HEATER CORD, V1L906, NO. CDV 1011	3
14-11	56537		. HOSE CONNECTION, HEATER INLET, 5/8 I.D.	12’
14-12	W-11097-3		. SCREW, 3/8-16 x 1-1/4, HHC	2
14-13	W-11254-6		. WASHER, 3/8, LOCK	2
14-14	W-11278-5		. NUT, 3/8-16, HEX	2



Rectifier Assembly
Figure 15

FIGURE & ITEM NO.	HOBART PART NO.	AIRLINE PART NO.	NOMENCLATURE 1 2 3 4 5 6 7		QTY
15-	**281464**		**RECTIFIER ASSEMBLY (For NHA See Fig. 5)**	**A**	**1**
15- 1	281342		. GUARD, RECTIFIER	A	1
15- 2	281466		. HEAT SINK, RECTIFIER, NEGATIVE	A	1
15- 3	W-10931-3		. RECTIFIER, SIL., POS. BASE, V59993, NO. IN4049		12
15- 4	W-10933-3		. RECTIFIER, SIL., NEG. BASE, V59993, NO.IN4049R		12
15- 5	W-11097-7		. SCREW, HHC, ST., 3/8-16 X 2 1/2"	A	2
15- 6	W-11254-6		. WASHER, LOCK, STD., 3/8"		6
15- 7	W-11278-5		. NUT, HEX, ST., 3/8"		2
15- 8	180065		. SHUNT		1
15- 9	281324		. BRACKET, MOUNTING, HEAT SINK	A	2
15-10	488840		. BRACKET, MOUNTING, HEAT SINK	A	2
15-11	281325		. SPACER, RECTIIFIER	A	4
15-12	W-11097-42		. SCREW, HHC, ST., 3/8-16 X 8"	A	4
15-13	W-11242-10		. WASHER, FLAT, ST., 3/8"	A	4
15-14	W-11242-18		. WASHER, FLAT, ST., 3/8"	A	4
15-15	AW-626		. BUSHING, INSULATING, V1Y498		8
15-16	A-25		. WASHER, INSULATING, V7E613		16
15-17	491184-9		. INSULATOR, SHOCK	A	1
15-18	282465		. HEAT SINK, RECTIFIER, POSITIVE	A	1



Rectifier Assembly
Figure 15A

FIGURE & ITEM NO.	HOBART PART NO.	AIRLINE PART NO.	NOMENCLATURE 1 2 3 4 5 6 7	EFF	QTY
15A-	**282235**		**RECTIFIER ASSY. (For NHA See Fig. 5)**	**B**	**REF**
15A - 1	282238		. BRACKET, MTG., HEAT SINK, LEFT	B	1
15A - 2	282241		. BRACKET, MTG., HEAT SINK, RIGHT	B	1
15A - 3	282563		. BUS, POSITIVE, 28.5 V	B	1
15A - 4	W-11097-3		. SCREW, HHC, 3/8-16 x 2-1/2"	B	4
15A - 5	W-11242-10		. WASHER, FLAT, 3/8	B	8
15A - 6	W-11254-8		. WASHER, LOCK, 3/8		15
15A - 7	W-11278-5		. NUT, HEX, 3/8-16		19
15A - 8	W-11097-2		. SCREW, HHC, 3/8-16 x 1"	B	2
15A - 9	282120-1		. CONTACTOR, DC, 28.5 V, V23826, #42L109151	B	1
15A -10	W-11236-4		. SCREW, HEX HD, SF-TAP, 1/4-20 x 1/2	B	3
15A -11	400435		. LABEL, 28 VOLTS	B	1
15A -12	A-25		. WASHER, INSULATING		8
15A -13	AW-626		. BUSHING, INSULATING		4
15A -14	282237		. HEAT SINK, RECTIFIER, POSITIVE	B	1
15A -15	400149-1		. NUT, SPRING, DISHED, 3/4-16	B	12
15A -16	W-10931-3		. RECTIFIER, POS., BASE, V12293, #IN4049		6
*	361182-2		. SLEEVING, DIODE	B	12
15A -17	403091		. PLUG, HOLE, PLASTIC	B	1
15A -18	405154-6		. RESISTOR, 10OHM, 100 WATT	B	3
15A -19	282835		. BRACKET, MTG., RESISTOR	B	2
15A -20	W-11231-1		. SCREW, PAN HD. SF-TAP, #8-18 x 3/8"	B	8
15A -21	282236		. SHROUD, AIR, TOP, RECTIFIER	B	1
*	40201		. INSULATION, STRIP, NEOPRENE, 1/8 x 1/2"	B	2 ft.
15A -22	W-11097-22		. SCREW, HHC, 3/8-16 x 2-1/2"	B	4
15A -23	405278-6		. CAPACITOR, 41000MFD, 75 VDC,		
			V22751, #75-95	B	1
15A -24	282830		. CLAMP, CAPACITOR	B	1
15A -25	350488-94		. INSULATOR, CAPACITOR	B	1
15A -26	180065		. SHUNT, 2000 AMP		1
15A -27	W-11097-7		. SCREW, HHC, 3/8-16 x 2"	B	6
15A -28	W-11263-6		. WASHER, LOCK, IET, 3/8	B	5
15A -29	180600		. SPACER, SHROUD	B	3
15A -30	282239		. HEAT SINK, RECTIFIER, NEGATIVE	B	1
15A -31	W-10933-3		. RECTIFIER, NEG., BASE, V12293, #IN4049R		6
15A -32	282240		. SHROUD, AIR, BOTTOM, RECTIFIER	B	1
15A -33	5CW-1308-0		. SCREW, HHC, 5/16-18 x 2-1/2"	B	6
15A -34	W-11242-6		. WASHER, FLAT, 5/16	B	12

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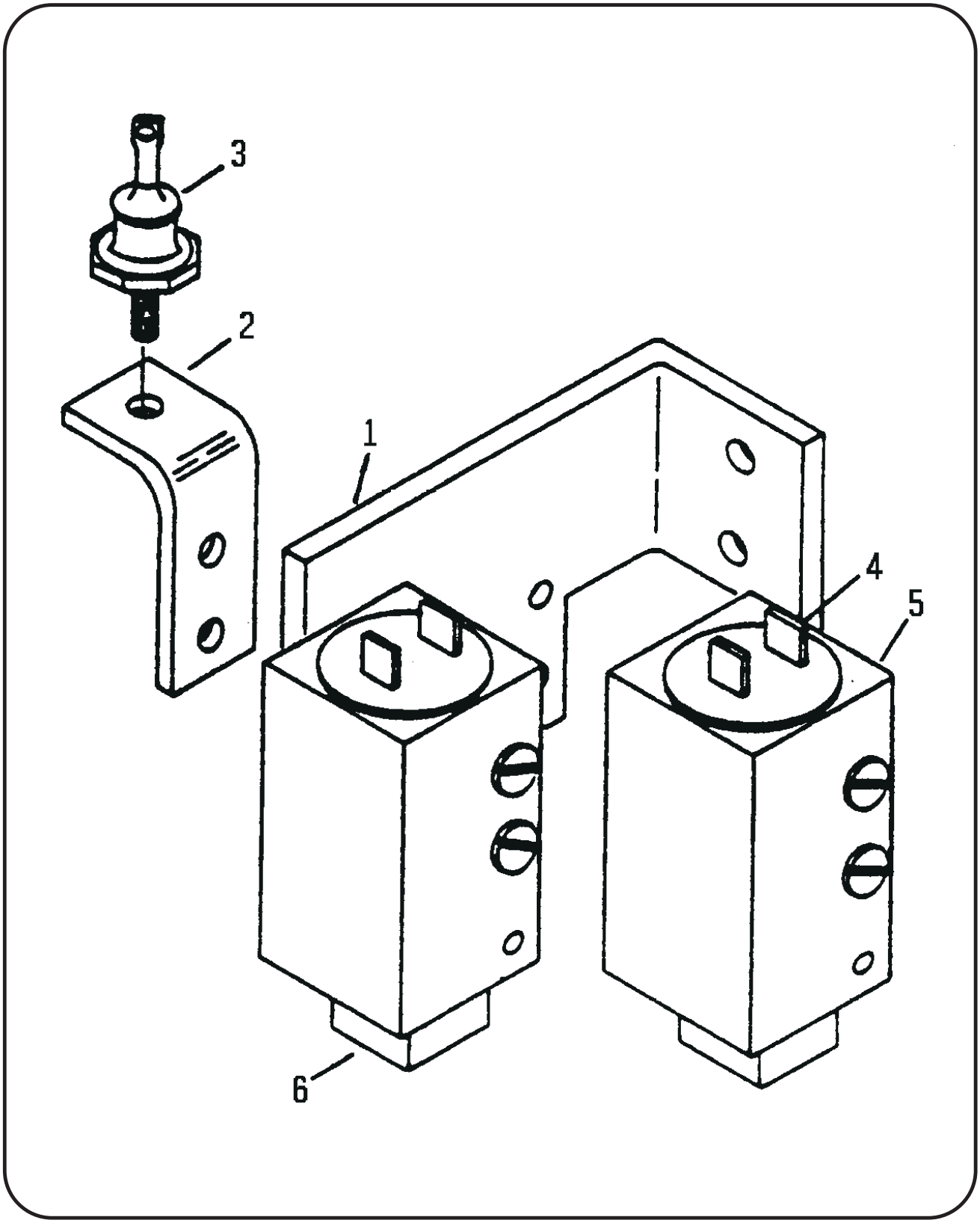
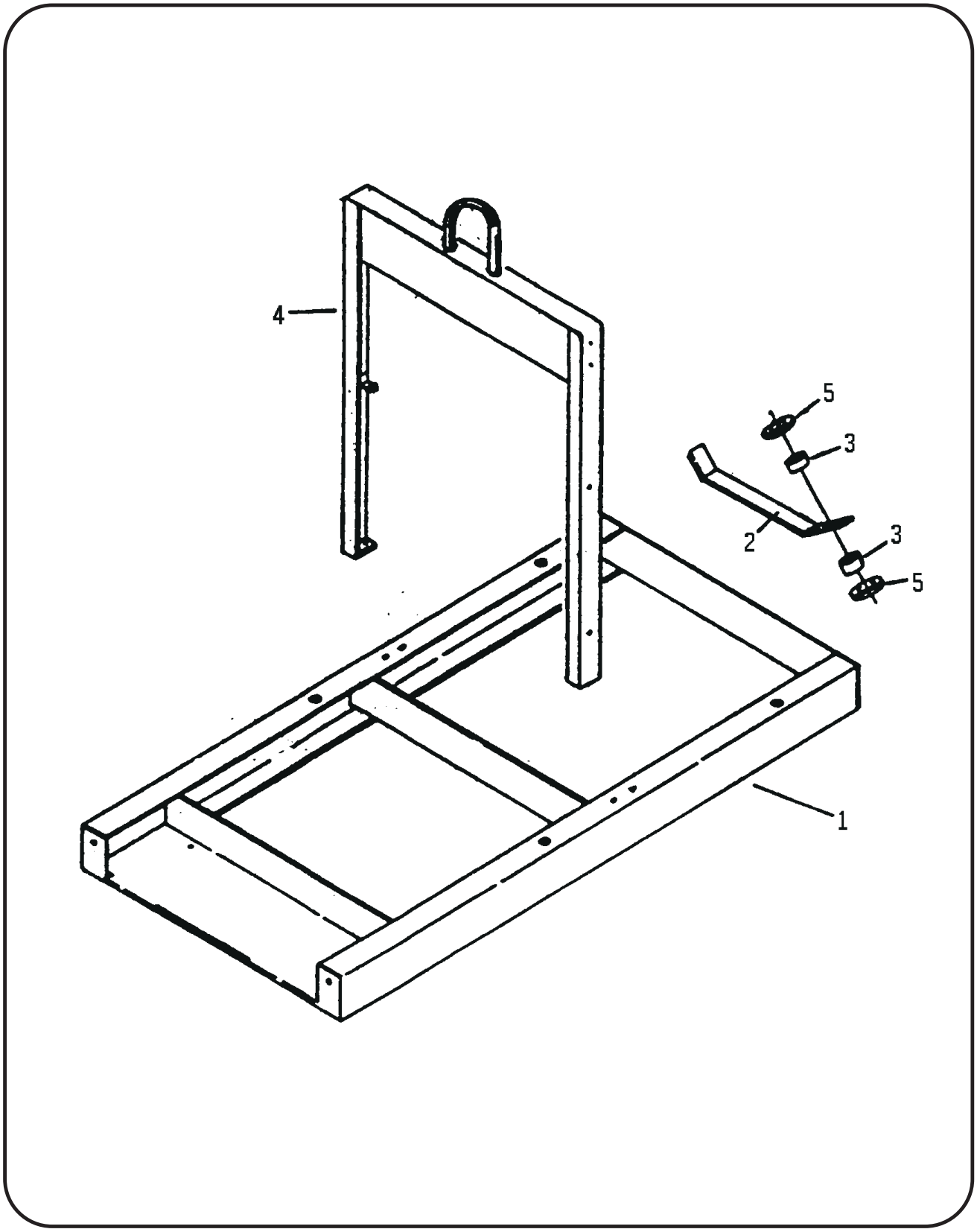
FIGURE & ITEM NO.	HOBART PART NO.	AIRLINE PART NO.	NOMENCLATURE 1 2 3 4 5 6 7	EFF	QTY
15A -	**282235**		**RECTIFIER ASSY. (Continued)**	**B**	
15A -35	W-11254-5		. WASHER, LOCK, 5/16	B	6
15A -36	W-11278-6		. NUT, HEX, 5/16-18	B	6
15A -37	W-11111-9		. SCREW, RHM, #8-32 x 1/4"	B	2
15A -38	W-11254-2		. WASHER. LOCK, #8	B	2
15A -39	W-11245-3		. WASHER, FLAT, #10	B	2
15A -40	402119-4		. SCREW, HHC, 1/4-20 x 3/4"	B	2
15A -41	W-11242-5		. WASHER, FLAT, 1/4	B	2
15A -42	50MS-732-0		. NUT, KEPS, 1/4	B	5
15A -43	W-11242-18		. WASHER, FLAT, 3/8	B	8
15A -44	16DA-3493		. WASHER, INSULATING	B	6
15A -45	W-11114-12		. SCREW, RD. HD .MACH., 1/4-20 x 7-1/4"	B	3
15A -46	402037-4		. GROMMET, RUBBER	B	1
15A -47	50964		. TRIM, 1/16", BLACK	B	23-1/2"
*	282568		. WIRE CHART	B	REF



Brushholder Assembly
Figure 16

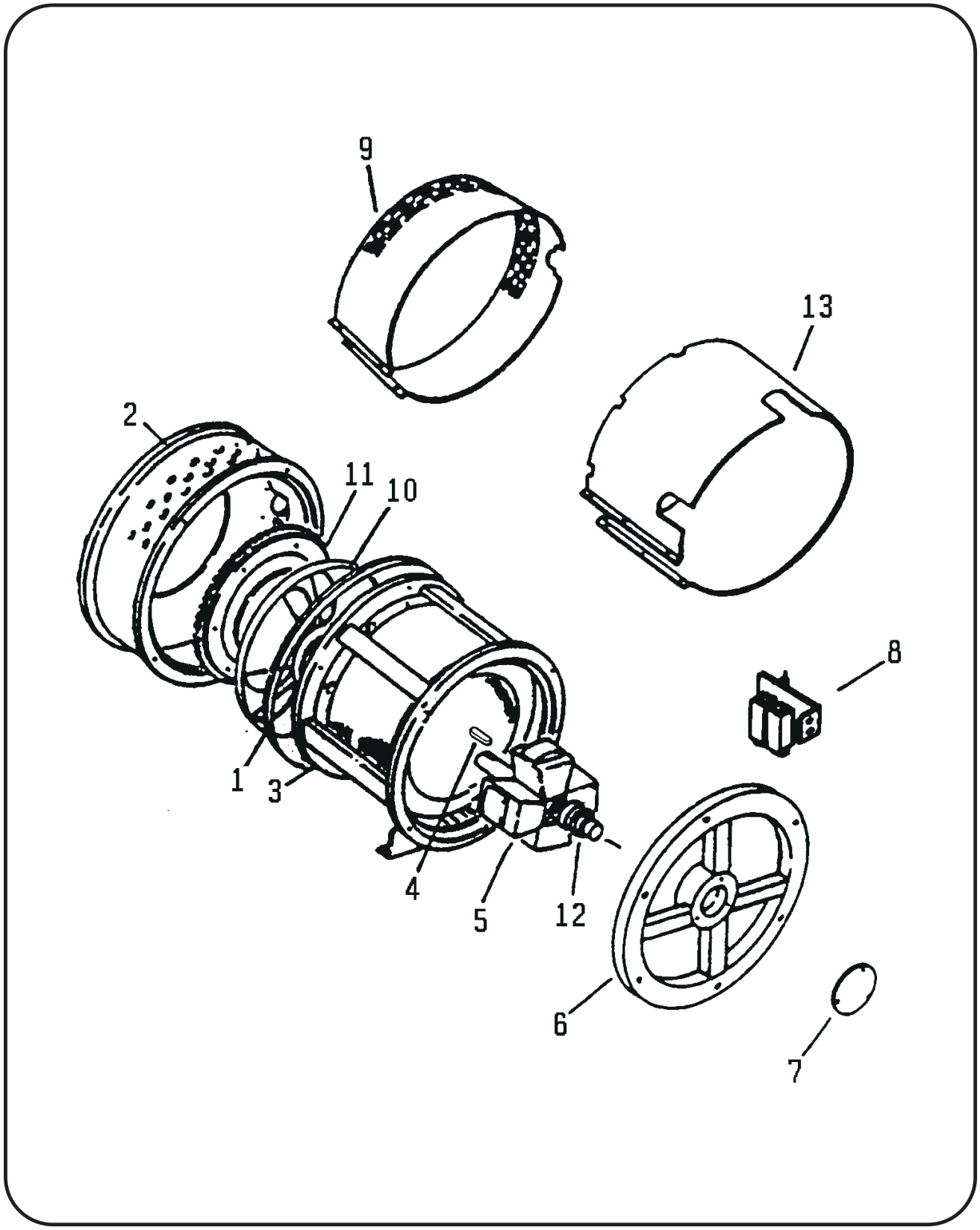
FIGURE & ITEM NO.	HOBART PART NO.	AIRLINE PART NO.	NOMENCLATURE 1 2 3 4 5 6 7	QTY
16-	**488784**		**BRUSHHOLDER, ASSY. (For NHA See Fig. 18)**	**1**
16- 1	488562		. BRACKET, MTG., BRUSHHOLDER	1
16- 2	488628		. BRACKET, MTG, DIODE	1
16- 3	408999-1		. DIODE, SILICON, 30A, POS. ,V08452	1
16- 4	402531		. CAP, BRUSHHOLDER, V46992, NO. DE-55	2
16- 5	402530		. GUIDE, BRUSHHOLDER, V46992, NO. 661-D-23	2
16- 6	402788		. BRUSH, A.C., V78377, NO. 443E	2



Lifting Yoke & Frame Assembly
Figure 17

FIGURE & ITEM NO.	HOBART PART NO.	AIRLINE PART NO.	NOMENCLATURE 1 2 3 4 5 6 7	QTY
17-	**No Number**		**FRAME, LIFTING YOKE ASSY. (For NHA See Fig. 1)**	**1**
17- 1	489151		. FRAME, MOUNTING	1
17- 2	180543		. BAR, MTG., GENERATOR	1
17- 3	406254-3		. MOUNT, SHOCK, GENERATOR (RED), V5P059	2
17- 4	489203		. YOKE, LIFTING	1
17- 5	491799		. WASHER, SHOCK MOUNT	6
*	W-11102-1		. . SCREW, 5/8-11 X l", HHC. ST.	4
*	W-11254-10		. . WASHER, LOCK, 5/8, ST.	4
*	W-11280-12		. . NUT, HEX, 5/8-11, ST.	4
*	406254-2		. MOUNT, SHOCK ENGINE (GREEN), V5P059	2

*** Not Illustrated**



Generator Assembly
Figure 18

FIGURE & ITEM NO.	HOBART PART NO.	AIRLINE PART NO.	NOMENCLATURE 1 2 3 4 5 6 7	QTY
18-	**281333**		**GENERATOR, ASSY.**	**1**
18- 1	491784		. RING, ADAPTER	1
18- 2	489077-1		. HOUSING, FLYWHEEL	1
18- 3	488557-5		. HOUSING & STATOR ASSY.	1
18- 4	489135		. KEY - COUPLING	1
18- 5	180776		. ARMATURE, ASSY.	1
18- 6	488555-1		. HOUSING, BEARING ASSY.	1
18- 7	5J-260-0		. CAP, BEARING	1
18- 8	488784		. BRUSHHOLDER ASSY. (For Details See Fig. 16)	1
18- 9	489086		. COVER, FLYWHEEL HOUSING	1
18-10	489123		. COUPLING & FAN ASSY.	1
*	489125		. . COUPLING, GEN. TO GEN. ASSY.	1
*	181166		. . SCREW, CAP, HH, 3/8-24 X 1, NYLOK	8
*	W-11254-5		. . WASHER, LOCK, STD., 3/8	8
*	85C-1004-2		. . BUSHING, SPLIT TAPER	1
18-11	No Number		. FLYWHEEL - (Supplied w/Engine)	1
18-12	W-10072-63		. BEARING, BALL, SINGLE ROW, RADIAL, V53035, NO. 6207DDUC3ElBT3	1
18-13	281688		. COVER, GENERATOR HOUSING	1
*	493384-9		. TUBE, Z-FLEX, STATOR LEAD	6
*	493384-10		. TUBE, Z-FLEX, STATOR LEAD	6

*** Not Illustrated**

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Section 4. Numerical Index

1. 1. Explanation of Numerical Index

The purpose of this index is to assist the user in finding the illustration and description of a part when the part number is known. Part numbers are arranged in numeric-alpha sequence. Thus, any part number beginning with the number 1 would be located at or near the beginning of the index list. Like-wise, a part number beginning with a letter would be listed near the end of the list. The figure number and item number location of the part is directly opposite the part. If the part is used in more than one place, each location is listed.

Figure-Item No.	Part Number
9-6	12CW-2146
6-24	16DA-2162
8-15	16DA-3493
4- 28	180015
15-8, 15A-26	180065
6-31	180135
7-3	180289
14-0	180360
9-2	180413
17-2	180543
7-23	180591-1
6-19	180591-2
7-19	180593-1
15A-29	W180600
14-2	180629
18-5	180776
6-27	180913-1
6-23	180913-2
5-34	180957
7-26	180963
1-1	181000-6
2-4	181001
2-3	181004
2-2	181005
2-13	181006
2-13	181007
2-14	181009
2-15	181010
2-16	181011

Figure-Item No.	Part Number
2-16	181013
1-4	181014
7-8	181022-1
7-20	181039
5-22	181098
5-22	181099
5- 22	181100
4-12	181152
4-29	181161
18-10	181166
4-28	181179
4-1	181211
2-13	181225
6-1	181252
2-2	181256
4-12	181263
4-10	181316
6-6	181358
2-12	181849
3-0	181849
1-4, 6-0	181851
4-0	181852A
6-21	20RT-353-1
6-22	25MS-156
7-24	280327
7-33	280686
6-37, 7-0	280691

Figure-Item No.	Part Number
11-4	281301-3
5-14	281321
15-18	281323
15-9	281324
15-11	281325
8-19	281332
18-0	281333
15-2	281336
15-1	281342
11-2	281345
8-0	281397
5-37	281398
13-1	281423-1
18-13	281688
13-4	281874
5-2	281881-1
10-7	281881-1
4-10	281967
11-12	281972
12-0	281972
11-2	281988
15A-9	282120-1
5-18	282220
15A-0	282235
15A-21	282236
15A-14	282237
15A-1	282238
15A-30	282239
15A-32	282240
15A-2	282241
15A-3	282563
15A-24	282830
15A-19	282835
4- 2	282626-1
1-0	283621
6-29	30GH-1119
5-38, 15A-25	350488-94
13-7	351541

Figure-Item No.	Part Number
11-10	355325-4
11-11	355325-6
5-16	359985
5-38	361052-9
15A-16	361182-2
10-1	388827-13
10-2	388828-1
6-15	389535-3
15A-15	400149-1
1-4, 15A-11	400435
4-28	400435
8-9	400435
6-33	400641-12
6-32	400642-3
7-25	400828-2
13-7	400902
2-9	400954
6-25	401428-1
2-11	401468
13-7	401842
6-16	401937-8
15A-21	40201
1-4	402025-3
14- 9	402037-23
15A-40	402119-4
7-30	402197-1
11-8	402265
7-28	402461-5
16-5	402530
16-4	402531
6-3	402658
6-20, 6-28	402662
7-36	402665-1
16-6	402788
11-s5	402927-1
1-4, 4-25	402987

Figure-Item No.	Part Number
7-22	403055-2
7-21	403056-4
6-36	403091-5
4-12	403091-9
6-10	403127
5-23	403618-6
5-27	403782-0
5-24	403809-2
7-14	404065-2
5-37	404154-8
14-7	404214
1-4	404469-3
3-7	404528
3-5	404529
3-6	404530
6-5	404856
11-9	405091-1
5-22	405099
8-14, 15A-18	405154-6
5-38,15A-23	405278-6
6-34	405608
13-5	405743
4-26	406000
4-25	406001
7-1	406003-2
6-4	406040
5-23	406149
17-5	406254-2
17-3	406254-3
5-9	406538
5-7	406651
13-3	406655
5-33	406768-1
6-30	406815
5-11	406974
4-25	407366
5-23	407706
5-3	408409

Figure-Item No.	Part Number
5-13	408436
5-8	408458
9-5	408534
4-9	408556
1-3	408556-1
1-2	408556-2
9-1	408557
9-1a	408559
6-13	408596-1
14-1	408641
16-3	408999-1
7-29	41546
2-6	484250
2-7	484254
1-4	484634
2-12	486270-10
18-6	488555-1
18-3	488557-5
16-1	488562
4-11	488592
6-26	488598
16-2	488628
4-25	488633
4-7	488640
16-0	488784
18-8	488784
4-16	488799
5-38	488800
15-10	488840
18-2	489077-1
18-9	489086
5-19	489114
13-6	489121
13-7	489122
18-10	489123
18-10	489125
18-4	489135
5-1	489151

Figure-Item No.	Part Number
17-1	489151
4-22	489156
4-23	489158
4-8	489167
4-14	489168
8-1	489195
8-0	489196-1
8-3	489199
17-4	489203
4-3	489217
6-34	489218
6-8	489219
4-19	489220
4-15	489224
4-21	489229
4-18	489230
4-13	489235
4-4	489258
4-5	489259
4-6	489270
5-38	489431
13-8	489533
5-20	489554
9-0	489564
4-24	489577
8-16	489579
8-18	489580
5-21	489639
5-5	489641
6-18	489658-5
7-27	489658-6
5-17	489661
4-17	489810
15-17	491184-9
10-5	491687
18-1	491784
17-5	491799
11-6	491889-1

Figure-Item No.	Part Number
10-6	491962-1
5-22	492098
18-13	493384-10
18-13	493384-9
14-3	56537
14-11	56537
15A-33	5CW-1308-0
15A-42	50MS-732-0
5-35	5CW-1932-0
8-5	5CW-2127
11-3	5CW-3420-1
8-4	5CW-975
8-11	5CW-976A
18-7	5J-260-0
6-9	76A-1115
14-10	76A-1130
11-1	76A-1152
3-3	76A-1171
3-46	76A-1183
4-27	76B-1148
6-7	78A-1115-1
6-12	78A-1116-1
6-11	78A-1117-1
5-28	78B-1010
5-25	78B-1118-1
3-46	79A-1035
3-3	79A-1045
3-4	79A-1046
3-8	79A-1047
3-9	79A-1048
3-43	79A-1051
3-44	79A-1052
3-45	79A-1053
3-46	79A-1054
3-2	79A-1057
3-1	79A-1075
5-26	79B-1119-1
4-28	7J-422-0

Figure-Item No.	Part Number
3-23	80A-1052
3-41	80A-1052
3-16	80A-1059
5-36	80A-1117
1-4	80LF508
4-20	81B-1019
4-25	81B-1063
1-4	81B-1064
1-4	83A-1103
4-25	84A-1071
7- 4	84A-1075
3-27	84A-1081
3-28	84A-1082
6-14	84B-1003
1- 4	84B-1078
8- 2	84C-1092
3-9	85A-1017
3-10	85A-1019
3-11, 3-29	85A-1020
3-12, 3-30	85A-1021
3-13, 3-31	85A-1022
3-14, 3-32	85A-1023
3-15, 3-33	85A-1024
3-16	85A-1025
3-17, 3-35	85A-1026
3-18, 3-36	85A-1027
3-19, 3-37	85A-1028
3-20	85A-1029
3-38	85A-1029
3-21, 3-39	85A-1030
3-22	85A-1031
3-40	85A-1031
3-25	85A-1034
3-26	85A-1035
3-42	85A-1038

Figure-Item No.	Part Number
2-2	85A-1040
3-34	85A-1059
2-1	85B-1013
3-23	85B-1032
18-10	85C-1004-2
12-12	9010-HF-6-5/6
12-13	9020-HF-6-5/6
7-34	903520
15-16, 15A-12	A-25
15-15, 15A-13	AW-626
2-5	HF-1882A
12-6	R24S
12-1	RK20002
12-2	RK20003
12-5	RK20010
12-4	RK20011
12-7	RK20016
12-8	RK20017
12-9	RK20019
12-3	RK20025
12-14	RK20075
12-15	RK20076
12-10	RK20126
12-11	RK20127
7-17	W-10051-14
18-12	W-10072-63
5-30	W-10119-1
5-31	W-10750-2
14-8	W-10869-1
13-2	W-10869-12
11-7	W-10869-14
13-9	W-10869-2
13-10	W-10869-3
5-12	W-10869-5
5-10	W-10869-7
14-4	W-10882-2

Figure-Item No.	Part Number
14-5	W-10890-2
5-29	W-10910-0
15-3, 15A-16	W-10931-3
15-4, 15A-31	W-10933-3
5-37	W-11095-2
15-5	W-11097-19
15A-8	W-11097-2
14-12, 15A-4	W-11097-3
8-12	W-11097-3
15A-27	W-11097-7
15A-22	W-11097-22
8-10	W-11097-31
15-12	W-11097-42
17-5	W-11102-1
7-11	W-11110-3
7-18	W-11110-4
7-15	W-11110-6
15A-37	W-11111-9
7-2	W-11112-1
8-17	W-11114-12
7-10	W-11166-3
6-17	W-11166-3
6-2	W-11166-5
15A-20	W-11231-1
15A-10	W-11236-4
8-17, 15A-41	W-11242-5
15A-34	W11242-6
8-6	W-11242-10
15-13	W-11242-10
2-8	W-11242-12
8-13	W-11242-18
15-14	W-11242-18
7-6	W-11245-15
7-35, 15A-39	W-11245-3
7-12	W-11254-1
17-5	W-11254-10
7-5, 15A-38	W-11254-2
7-31	W-11254-3

Figure-Item No.	Part Number
8-17	W-11254-4
18-, 15A-35	W-11254-5
	W-11254-6
8-7, 14-13, 15-6	W-11254-6
15A-6	W-11254-8
15A-28	W-11263-6
14-14, 15-7, 8-8	W-11278-5
15A-36	W11278-6
8-17	W-11278-7
17-5	W-11280-12
9-3	W-11280-3
7-13	W-11287-2
7-7	W-11287-3
7-32	W-11287-4
2-10	W-11338-5
7-9	W-11434-1
9-5	W-11562
7-16	W-4541D
14-6	W-7814-4
5-32	W-7814-4
10-8	W-9360-229
6-35	Y-971

Chapter 5. Manufacturer's Literature

The following manufacturer's literature can be found in the front cover of the manual:

Perkins Users Handbook & Warranty Information:

Perkins Engines, Inc.
P.O. Box 697
32500 Van Born Rd.
Wayne, Michigan 48184

Hobart Diagrams

180436	Schematic Diagram: Specification 7003A-3	Figure 1
281329	Connection Diagram: Specification 7003A-3	Figure 2
282560	Schematic Diagram: Specification 7003B-3	Figure 3
282561	Connection Diagram: Specification 7003B-3	Figure 4

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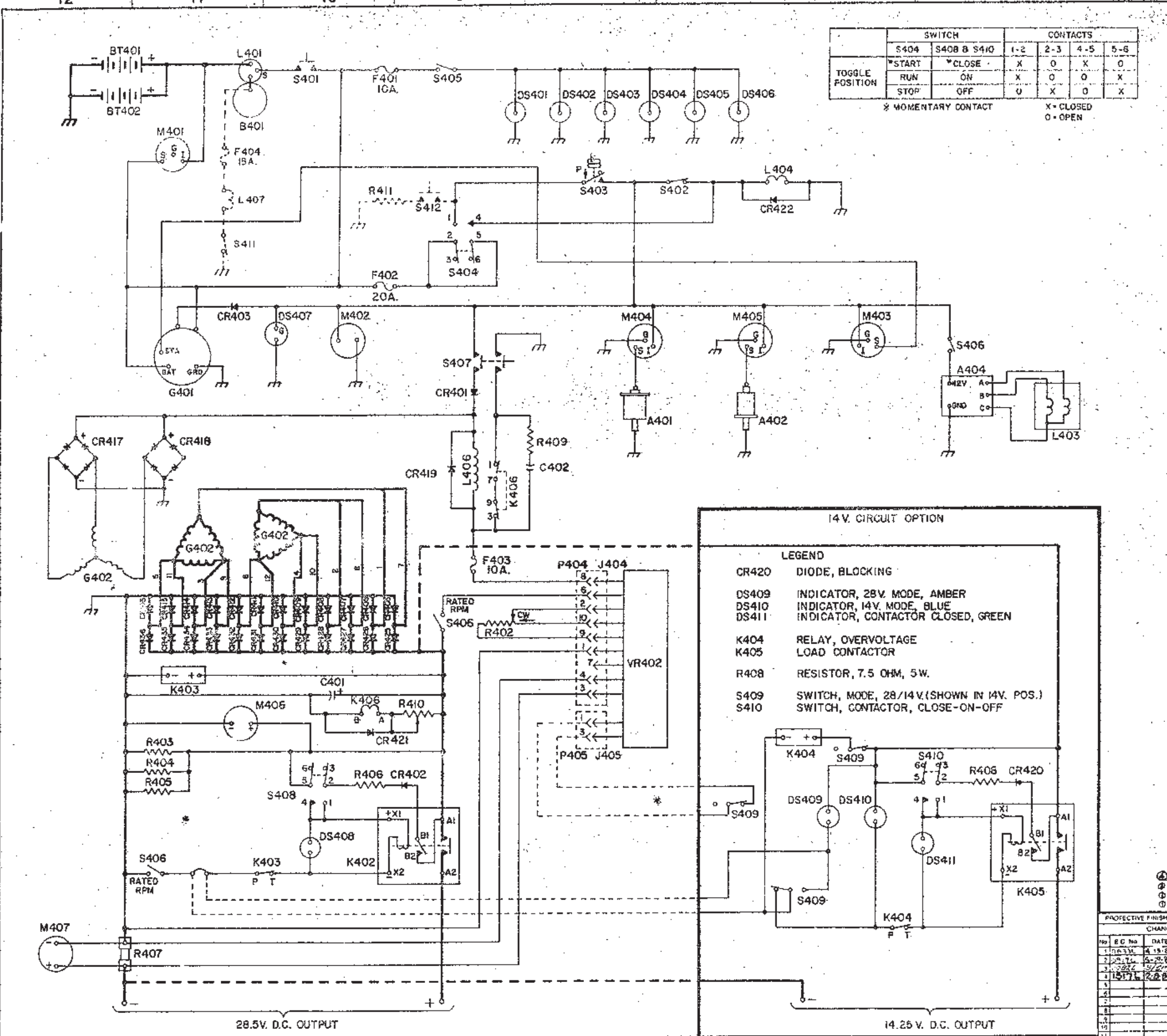


TOGGLE POSITION	SWITCH S404	SWITCH S408 & S410	CONTACTS 1-2	CONTACTS 2-3	CONTACTS 4-5	CONTACTS 5-6
	*START	*CLOSE	X	O	X	O
	RUN	ON	X	O	O	X
	STOP	OFF	O	X	O	X

* MOMENTARY CONTACT
X = CLOSED
O = OPEN

LEGEND

A401 SENDER, WATER TEMPERATURE
A402 SENDER, OIL PRESSURE

A404 MODULE, ELECTRONIC
B401 STARTER, ENGINE
BT401, BT402 BATTERY, 12V.

C401 CAPACITOR, 41,000 MFD, 75V.
C402 CAPACITOR, 0.1 MFD., 400V DC

CR401-CR403 DIODE, BLOCKING
CR405-CR416 DIODE, NEGATIVE
CR425-CR436 DIODE, POSITIVE
CR417, CR418 RECTIFIER, CONTROL WINDING
CR419, CR421, CR422 DIODE, FLY-BACK

DS401, DS402 LIGHT, ILLUMINATING, WHITE
DS403-DS406 LIGHT, MARKER, AMBER
DS407 INDICATOR, ENGINE RUNNING, GREEN
DS408 INDICATOR, CONTACTOR CLOSED, GREEN

F401 FUSE, LIGHTS, 10A.
F402 FUSE, ENGINE CIRCUIT, 20A.
F403 FUSE, VOLTAGE REGULATOR, 10A.
F404 FUSE, COLD WEATHER START, 15A. (WHEN FURN.)
G401 ALTERNATOR, ENGINE, 12V.
G402 GENERATOR STATOR

J404, J405 RECEPTACLE, VOLTAGE REGULATOR

K402 LOAD CONTACTOR
K403 RELAY, OVERVOLTAGE
K406 RELAY, VOLTAGE SENSING

L401 SOLENOID, STARTER
L403 SOLENOID, FULL THROTTLE
L404 SOLENOID, FUEL VALVE
L406 FIELD, REVOLVING, GENERATOR
L407 SOLENOID, VAVLE, COLD WEA. START (WHEN FURN.)
M401 AMMETER, BATTERY
M402 RUNNING TIME METER
M403 TACHOMETER
M404 GAUGE, WATER TEMPERATURE
M405 GAUGE, OIL PRESSURE
M406 VOLTMETER, GENERATOR
M407 AMMETER, GENERATOR

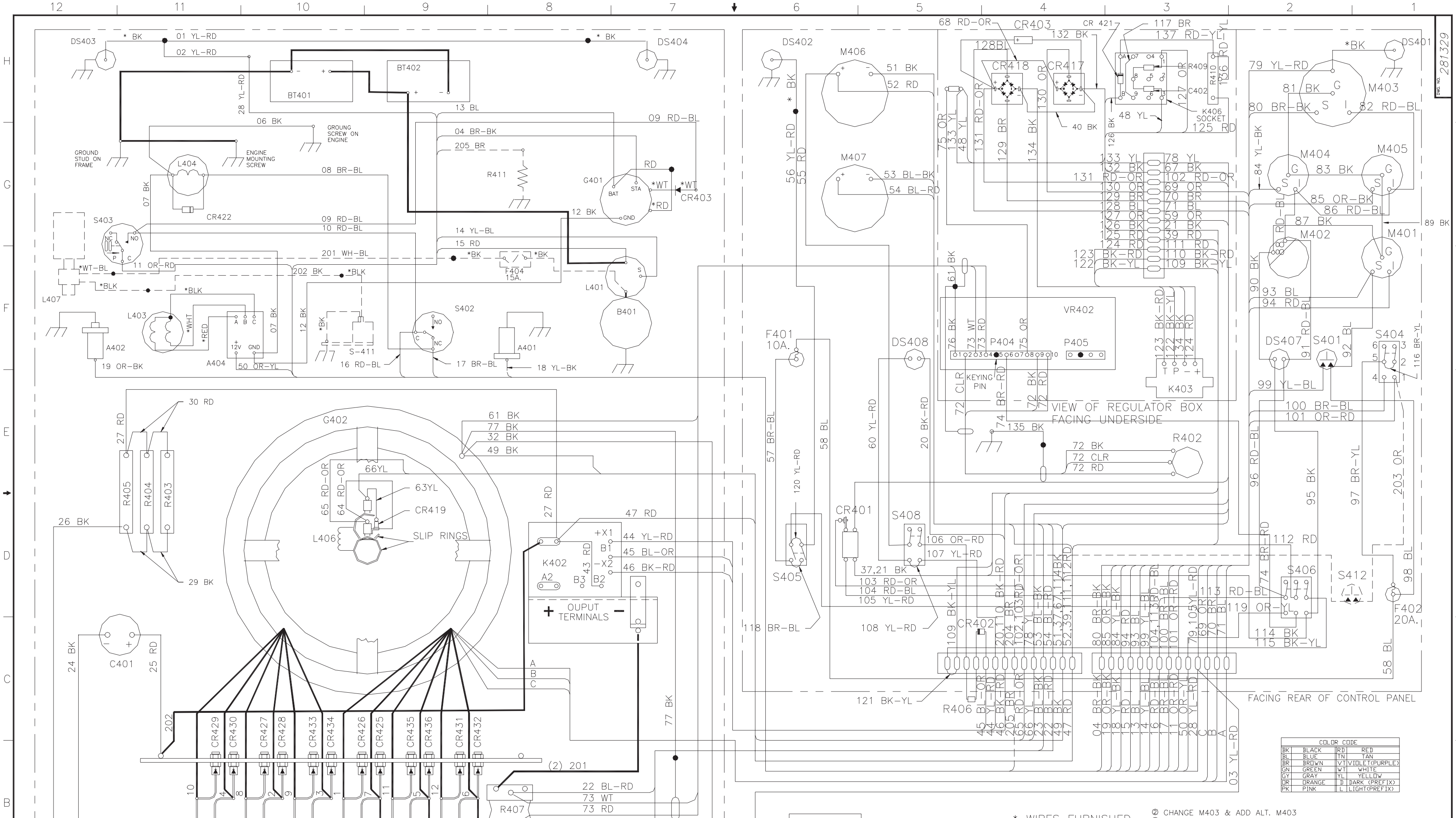
P404, P405 PLUG, VOLTAGE REGULATOR
R411 GLOW PLUG, THERMOSTART (WHEN FURN.)
R402 POTENTIOMETER, CURRENT LIMITING, 10K. OHM, 2W.
R403-R405 RESISTOR, 10 OHM, 100W.
R406 RESISTOR, 7.5 OHM, 5W.
R407 SHUNT, AMMETER
R409 RESISTOR, 10 OHM, 2W.
R410 RESISTOR, 100 OHM, 25 W.
S401 SWITCH, PUSHBUTTON, ENGINE START
S402 SWITCH, WATER TEMPERATURE
S403 SWITCH, OIL PRESSURE
S404 SWITCH, ENGINE, START-RUN-STOP
S405 SWITCH, ILLUMINATING LIGHTS
S406 SWITCH, SPEED CONTROL (SHOWN IN "IDLE" POSITION)
S407 SWITCH, PUSHBUTTON, PUSH-TO-BUILD-UP-VOLTAGE
S408 SWITCH, CONTACTOR, CLOSE-ON-OFF
S411 SWITCH, ENGINE TEMP. SENSOR (WHEN FURN.)
S412 SWITCH, PUSHBUTTON, THERMOSTART (WHEN FURN.)
VR402 VOLTAGE REGULATOR, GENERATOR

(4) G402 WAS GENERATOR ARMATURE
(3) CHANGED DIRECTION OF ARROW ...
(2) ADDED R411 & S412
(1) ADD R410

CHANGE RECORD					
No	E.C. No.	DATE	No	E.C. No.	DATE
1	06330	4-15-80	13		
2	09-74	6-29-82	14		
3	09822	9/2/86	15		
4	15171	2-8-89	16		

WHERE USED: NEXT ASSY S-6854-1 · NO REQ — · USED ON JET-EX40

DIAGRAM, SCHEMATIC
JET-EX40
DWN BWH 1-26-87
469611
HOBART BROS. CO. TROY, OHIO 45373 U.S.A.
0
180436



COLOR CODE			
BK	BLACK	RD	RED
BL	BLUE	TN	TAN
BR	BROWN	VT	VIOLET(PURPLE)
GN	GREEN	WT	WHITE
GY	GRAY	YL	YELLOW
OR	ORANGE	D	DARK (PREFIX)
PK	PINK	L	LIGHT(PREFIX)

② CHANGE M403 & ADD ALT. M403
① MOVE WIRE ON S405 & CHANGE CABLES.

HOBART POWER SYSTEMS GROUP HOBART
Ground Power Division Troy, Ohio U.S.A.

COMPUTER GRAPHICS INFORMATION		No.	E.C. No.	DATE	No.	E.C. No.	DATE	DISTRIBUTION	
FILE NAME	281329	1	2079L	12-5-89	6			G2AYF	8-89
FILE LOCATION	PSG-ENG	2	2127L	1-18-90	7			G2 TEST	
SOFTWARE VER.	REL 10	3			8			G2 S	
PLOT DATE	5-15-89	4			9			SERVICE	
		5			10				

COMM. CLS. 149C — QUANT. U.M. — FINISH CODE NONE
DESIGNED DAS — WHERE USED S-7003A — NO. REQ. 1 — MAT. NO. — MAT. SPEC. DIAGRAM
DRAWN DAS DATE 5-15-89
CHECKED DWF DATE 8-16-89
RECORDS DATE
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCE ON FRACTIONAL ± DECIMAL .00 ± .01 .000 ± .003 ANGLES ± 30'
TITLE: DIAGRAM, CONNECTION
SIZE D 281329 REV
SCALE: FULL — LT. H — SHEET 1 of 2

DWG. NO. 281329

A401	SENDER, WATER TEMPERATURE
A402	SENDER, OIL PRESSURE
A404	MODULE, ELECTRONIC
B401	STARTER, ENGINE
BT401,BT402	BATTERY, 12 V.
C401	CAPACITOR, 41,000 MFD., 75 V.
C402	CAPACITOR, 0.1 MFD., 400 V.DC
C403	CAPACITOR, 100 MFD., 350 V.DC
CR401–CR403	DIODE, BLOCKING
CR405–CR416	DIODE, NEGATIVE
CR425–CR436	DIODE, POSITIVE
CR417,CR418	RECTIFIER, CONTROL WINDING
CR419,CR421, CR422	DIODE, FLYBACK
DS401,DS402	LIGHT, ILLUMINATING, WHITE
DS403–DS406	LIGHT, MARKER, AMBER
DS407	INDICATOR, ENGINE RUNNING, GREEN
DS408	INDICATOR, CONTACTOR CLOSED, GREEN
F401	FUSE, LIGHTS, 10 A.
F402	FUSE, ENGINE CIRCUIT, 20 A.
F403	FUSE, VOLTAGE REGULATOR, 10 A.
F404	FUSE, COLD WEATHER START, 15 A. (WHEN FURN.)
G401	ALTERNATOR, ENGINE, 12 V.
G402	GENERATOR ARMATURE
J404,J405	RECEPTACLE, VOLTAGE REGULATOR
K402	LOAD CONTACTOR
K403	RELAY, OVERVOLTAGE
K406	RELAY, VOLTAGE SENSING
L401	SOLENOID, STARTER
L403	SOLEMOID, FUEL THROTTLE
L404	SOLENOID, FUEL VALVE
L406	FIELD, REVOLVING, GENERATOR
L407	SOLENOID, VALVE, COLD WEATHER START (WHEN FURN.)
M401	AMMETER, BATTERY
M402	RUNNING TIME METER
M403	TACHOMETER
M404	GUAGE, WATER TEMPERATURE
M405	GUAGE, OIL PRESSURE
M406	VOLTMETER, GENERATOR
M407	AMMETER, GENERATOR
P404,P405	PLUG, VOLTAGE REGULATOR
R402	POTENTIOMETER, CURRENT LIMITING, 10 K.OHM, 2W.
R403–R405	RESISTOR, 10 OHM, 100W.
R406	RESISTOR, 7.5 OHM, 5W.
R407	SHUNT, AMMETER
R409	RESISTOR, 10 OHM, 2W.
R410	RESISTOR, 100 OHM, 25W.
R411	GLOW PLUG, THERMOSTART (WHEN FURN.)
S401	SWITCH, PUSHBUTTON, ENGINE START
S402	SWITCH, WATER TEMPERATURE
S403	SWITCH, OIL PRESSURE
S404	SWITCH, ENGINE, START–RUN–STOP
S405	SWITCH, ILLUMINATING LIGHTS
S406	SWITCH, SPEED CONTROL (SHOWN IN "IDLE" POSITION)
S407	SWITCH, PUSHBUTTON, PUSH–TO–BUILD–UP–VOLTAGE
S408	SWITCH, CONTACTOR, CLOSE–ON–OFF
S411	SWITCH, ENGINE TEMP. SENSOR (WHEN FURN.)
S412	SWITCH, PUSHBUTTON, THERMOSTART (WHEN FURN.)
VR402	VOLTAGE REGULATOR, GENERATOR

DWG. NO. 281329

HOBART POWER SYSTEMS GROUP HOBART
Ground Power Division Troy, Ohio U.S.A.

COMPUTER GRAPHICS INFORMATION	
FILE NAME	281329-2
FILE LOCATION	PSG-ENG
SOFTWARE VER.	REL 10
PLOT DATE	5-18-89

No.	E.C. No.	DATE	No.	E.C. No.	DATE
1			6		
2			7		
3			8		
4			9		
5			10		

DISTRIBUTION

COMM. CLS. 149C | QUANT. U.M. | FINISH CODE NONE

WHERE USED	NO. REQ.
S-7003A	1

MAT. NO. | MAT. SPEC. DIAGRAM

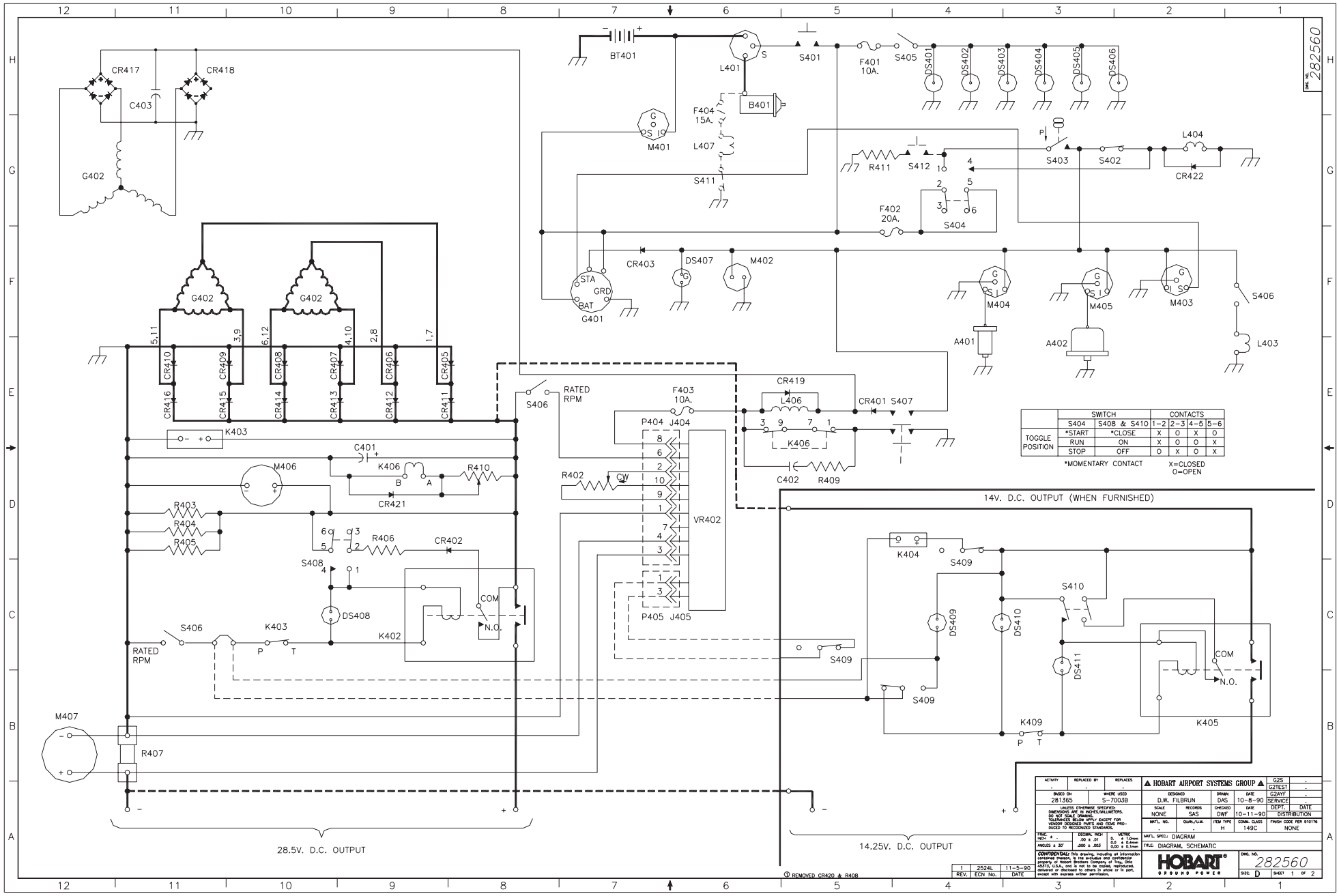
DESIGNED	DAS
DRAWN	DAS
DATE	5-18-89
CHECKED	
DATE	
RECORDS	
DATE	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCE ON
FRACTIONAL ± | DECIMAL .00 ± .01, .000 ± .003 | ANGLES ± 30'

TITLE: DIAGRAM, CONNECTION

SIZE C | 281329 | REV

SCALE: FULL | I.T. H | SHEET 2 OF 2


CR417
CR418
C403
G402
BT401
L401
S401
F401
10A.
S405
DS401
DS402
DS403
DS404
DS405
DS406
B401
F404
15A.
M401
L407
S411
R411
S412
S403
S402
L404
CR422
F402
20A.
S404
CR403
DS407
M402
STA
GRD
BAT
G401
M404
M405
M403
S406
L403
A401
A402
CR410
CR409
CR408
CR407
CR406
CR405
CR416
CR415
CR414
CR413
CR412
CR411
5,11
3,9
6,12
4,10
2,8
1,7
K403
C401
M406
K406
R410
CR421
R403
R404
R405
R406
CR402
S408
DS408
COM
N.O.
K402
RATED
RPM
P
T
M407
R407
28.5V. D.C. OUTPUT
F403
10A.
CR419
L406
CR401
S407
R402
CW
C402
R409
P404
J404
P405
J405
VR402
14V. D.C. OUTPUT (WHEN FURNISHED)
K404
S409
S410
DS409
DS410
DS411
K409
K405
14.25V. D.C. OUTPUT
SWITCH
CONTACTS
S404
S408 & S410
1-2
2-3
4-5
5-6
TOGGLE POSITION
*START
*CLOSE
RUN
ON
STOP
OFF
*MOMENTARY CONTACT
X=CLOSED
O=OPEN
REMOVED CR420 & R408
1
2524L
11-5-90
REV.
ECN No.
DATE
HOBART AIRPORT SYSTEMS GROUP
G2S
G2TEST
G2AYF
SERVICE
DEPT.
DISTRIBUTION
BASED ON
281365
WHERE USED
5-7003B
DESIGNED
D.W. FILBRUN
DRAWN
DAS
DATE
10-8-90
SCALE
NONE
RECORDS
SAS
CHECKED
DWF
DATE
10-11-90
MAT'L. NO.
QUAN./U.M.
ITEM TYPE
H
COMM. CLASS
149C
FINISH CODE PER 910176
NONE
MAT'L. SPEC.: DIAGRAM
TITLE: DIAGRAM, SCHEMATIC
CONFIDENTIAL: This drawing, including all information contained thereon, is the exclusive and confidential property of Hobart Brothers Company of Troy, Ohio 45373, U.S.A., and is not to be copied, reproduced, published or disclosed to others in whole or in part, except with express written permission.
HOBART GROUND POWER
DWG. NO.
282560
SIZE: D
SHEET 1 OF 2

DWG. NO. 282560

LEGEND:

A401	SENDER, WATER TEMPERATURE
A402	SENDER, OIL PRESSURE
B401	STARTER, ENGINE
BT401	BATTERY, 12 V.
C401	CAPACITOR, 41,000 MFD., 75 V.
C402	CAPACITOR, 0.1 MFD., 400 V.DC
C403	CAPACITOR, 100 MFD., 350 V.DC
CR401–CR403	DIODE, BLOCKING
CR405–CR410	DIODE, NEGATIVE
CR411–CR416	DIODE, POSITIVE
CR417,CR418	RECTIFIER, CONTROL WINDING
CR419,CR421, CR422	DIODE, FLYBACK
DS401,DS402	LIGHT, ILLUMINATING, WHITE
DS403–DS406	LIGHT, MARKER, AMBER
DS407	INDICATOR, ENGINE RUNNING, GREEN
DS408	INDICATOR, CONTACTOR CLOSED, GREEN
F401	FUSE, LIGHTS, 10 A.
F402	FUSE, ENGINE CIRCUIT, 20 A.
F403	FUSE, VOLTAGE REGULATOR, 10 A.
F404	FUSE, COLD WEATHER START, 15 A. (WHEN FURN.)
G401	ALTERNATOR, ENGINE, 12 V.
G402	GENERATOR STATOR
J404,J405	RECEPTACLE, VOLTAGE REGULATOR
K402	LOAD CONTACTOR
K403	RELAY, OVERVOLTAGE
K406	RELAY, VOLTAGE SENSING
L401	SOLENOID, STARTER
L403	SOLENOID, FULL THROTTLE
L404	SOLENOID, FUEL VALVE
L406	FIELD, REVOLVING, GENERATOR
L407	SOLENOID, VALVE, COLD WEATHER START (WHEN FURN.)
M401	AMMETER, BATTERY
M402	RUNNING TIME METER
M403	TACHOMETER
M404	GUAGE, WATER TEMPERATURE
M405	GUAGE, OIL PRESSURE
M406	VOLTMETER, GENERATOR
M407	AMMETER, GENERATOR
P404,P405	PLUG, VOLTAGE REGULATOR
R402	POTENTIOMETER, CURRENT LIMITING, 10 K.OHM, 2W.
R403–R405	RESISTOR, 10 OHM, 100W.
R406	RESISTOR, 7.5 OHM, 5W.
R407	SHUNT, AMMETER
R409	RESISTOR, 10 OHM, 2W.
R410	RESISTOR, 100 OHM, 25W.
R411	GLOW PLUG, THERMOSTART (WHEN FURN.)
S401	SWITCH, PUSHBUTTON, ENGINE START
S402	SWITCH, WATER TEMPERATURE
S403	SWITCH, OIL PRESSURE
S404	SWITCH, ENGINE, START–RUN–STOP
S405	SWITCH, ILLUMINATING LIGHTS
S406	SWITCH, SPEED CONTROL (SHOWN IN "IDLE" POSITION)
S407	SWITCH, PUSHBUTTON, PUSH–TO–BUILD–UP–VOLTAGE
S408	SWITCH, CONTACTOR, CLOSE–ON–OFF
S411	SWITCH, ENGINE TEMP. SENSOR (WHEN FURN.)
S412	SWITCH, PUSHBUTTON, THERMOSTART (WHEN FURN.)
VR402	VOLTAGE REGULATOR, GENERATOR

14V. KIT LEGEND:

DS409	INDICATOR, 28V. MODE, AMBER
DS410	INDICATOR, 14V. MODE, BLUE
DS411	INDICATOR, CONTACTOR CLOSED, GREEN
K404	RELAY, OVERVOLTAGE
K405	LOAD CONTACTOR
S409	SWITCH, MODE, 28/14V. (SHOWN IN 14V POSITION)
S410	SWITCH, CONTACTOR, CLOSE–ON–OFF

① REMOVED CR420 & R408

REV.	ECN No.	DATE
1	2524L	11–5–90

ACTIVITY	REPLACED BY	REPLACES
.	.	.

BASED ON	WHERE USED
180436	S–7003B

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES/MILLIMETERS. DO NOT SCALE DRAWING. TOLERANCES BELOW APPLY EXCEPT FOR VENDOR DESIGNED PARTS AND ITEMS PRODUCED TO RECOGNIZED STANDARDS.

FRAC. INCH ± .	DECIMAL INCH .00 ± .01	METRIC 0. ± 1.0mm
ANGLES ± 30'	.000 ± .003	0.0 ± 0.4mm 0.00 ± 0.1mm

HOBART AIRPORT SYSTEMS GROUP

DESIGNED	DRAWN	DATE
D.W. FILBRUN	DAS	10–8–90

SCALE	RECORDS	CHECKED	DATE
NONE	.	.	.

MAT'L. NO.	QUAN./U.M.	ITEM TYPE	COMM. CLASS
.	.	H	149C

MAT'L. SPEC.: DIAGRAM

TITLE: DIAGRAM, SCHEMATIC

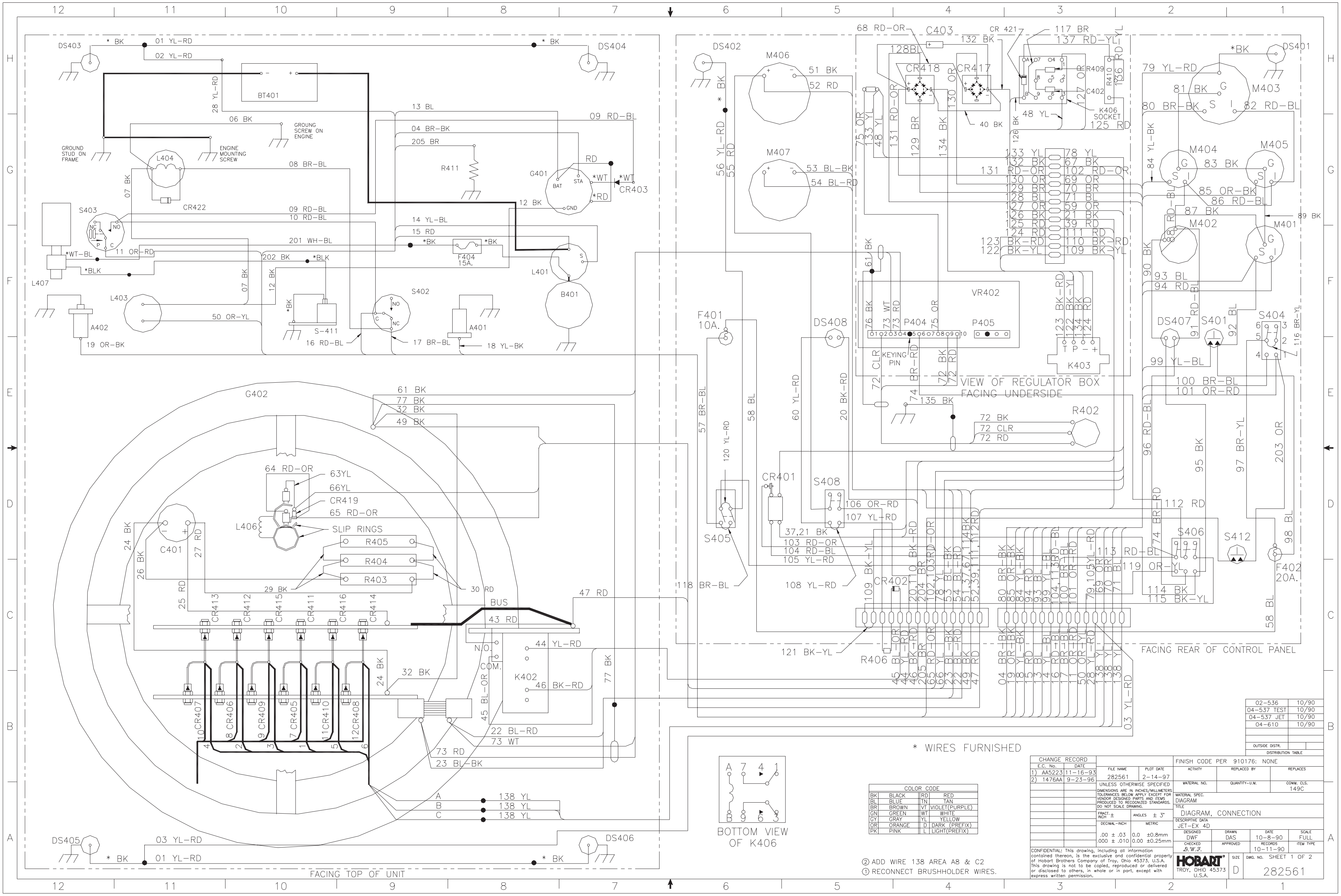
HOBART® GROUND POWER

DWG. NO. 282560

SIZE: C SHEET 2 OF 2

G2S	.	
G2TEST	.	
G2AYF	.	
SERVICE	.	
DEPT.	DATE	
DISTRIBUTION		

FINISH CODE PER 910176: NONE



FACING TOP OF UNIT
FACING REAR OF CONTROL PANEL
VIEW OF REGULATOR BOX FACING UNDERSIDE
BOTTOM VIEW OF K406
* WIRES FURNISHED
COLOR CODE
BK BLACK
BL BLUE
BR BROWN
GN GREEN
GY GRAY
OR ORANGE
PK PINK
RD RED
TN TAN
VT VIOLET(PURPLE)
WT WHITE
YL YELLOW
D DARK (PREFIX)
L LIGHT(PREFIX)
② ADD WIRE 138 AREA A8 & C2
① RECONNECT BRUSHHOLDER WIRES.
CHANGE RECORD
E.C. No. DATE
1) AA5223 11-16-93
2) 1476AA 9-23-96
FILE NAME 282561
PLOT DATE 2-14-97
FINISH CODE PER 910176: NONE
UNLESS OTHERWISE SPECIFIED
TITLE DIAGRAM, CONNECTION
DESCRIPTIVE DATA JET-EX 4D
DESIGNED DWF
DRAWN DAS
DATE 10-8-90
SCALE FULL
RECORDS 10-11-90
HOBART TROY, OHIO 45373 U.S.A.
SIZE D
SHEET 1 OF 2
282561
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DWG. NO. 282561

LEGEND:

A401	SENDER, WATER TEMPERATURE
A402	SENDER, OIL PRESSURE
B401	STARTER, ENGINE
BT401	BATTERY, 12 V.
C401	CAPACITOR, 41,000 MFD., 75 V.
C402	CAPACITOR, 0.1 MFD., 400 V.DC
C403	CAPACITOR, 100 MFD., 350 V.DC
CR401–CR403	DIODE, BLOCKING
CR405–CR410	DIODE, NEGATIVE
CR411–CR416	DIODE, POSITIVE
CR417,CR418	RECTIFIER, CONTROL WINDING
CR419,CR421, CR422	DIODE, FLYBACK
DS401,DS402	LIGHT, ILLUMINATING, WHITE
DS403–DS406	LIGHT, MARKER, AMBER
DS407	INDICATOR, ENGINE RUNNING, GREEN
DS408	INDICATOR, CONTACTOR CLOSED, GREEN
F401	FUSE, LIGHTS, 10 A.
F402	FUSE, ENGINE CIRCUIT, 20 A.
F403	FUSE, VOLTAGE REGULATOR, 10 A.
F404	FUSE, COLD WEATHER START, 15 A. (WHEN FURN.)
G401	ALTERNATOR, ENGINE, 12 V.
G402	GENERATOR STATOR
J404,J405	RECEPTACLE, VOLTAGE REGULATOR
K402	LOAD CONTACTOR
K403	RELAY, OVERVOLTAGE
K406	RELAY, VOLTAGE SENSING
L401	SOLENOID, STARTER
L403	SOLENOID, FULL THROTTLE
L404	SOLENOID, FUEL VALVE
L406	FIELD, REVOLVING, GENERATOR
L407	SOLENOID, VALVE, COLD WEATHER START (WHEN FURN.)
M401	AMMETER, BATTERY
M402	RUNNING TIME METER
M403	TACHOMETER
M404	GUAGE, WATER TEMPERATURE
M405	GUAGE, OIL PRESSURE
M406	VOLTMETER, GENERATOR
M407	AMMETER, GENERATOR
P404,P405	PLUG, VOLTAGE REGULATOR
R402	POTENTIOMETER, CURRENT LIMITING, 10 K.OHM, 2W.
R403–R405	RESISTOR, 10 OHM, 100W.
R406	RESISTOR, 7.5 OHM, 5W.
R407	SHUNT, AMMETER
R409	RESISTOR, 10 OHM, 2W.
R410	RESISTOR, 100 OHM, 25W.
R411	GLOW PLUG, THERMOSTART (WHEN FURN.)
S401	SWITCH, PUSHBUTTON, ENGINE START
S402	SWITCH, WATER TEMPERATURE
S403	SWITCH, OIL PRESSURE
S404	SWITCH, ENGINE, START–RUN–STOP
S405	SWITCH, ILLUMINATING LIGHTS
S406	SWITCH, SPEED CONTROL (SHOWN IN "IDLE" POSITION)
S407	SWITCH, PUSHBUTTON, PUSH–TO–BUILD–UP–VOLTAGE
S408	SWITCH, CONTACTOR, CLOSE–ON–OFF
S411	SWITCH, ENGINE TEMP. SENSOR (WHEN FURN.)
S412	SWITCH, PUSHBUTTON, THERMOSTART (WHEN FURN.)
VR402	VOLTAGE REGULATOR, GENERATOR

REV.	ECN No.	DATE

ACTIVITY	REPLACED BY	REPLACES	▲ HOBART AIRPORT SYSTEMS GROUP ▲
.	.	.	
BASED ON: 281329	WHERE USED: S–7003B		
UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES/MILLIMETERS. DO NOT SCALE DRAWING. TOLERANCES BELOW APPLY EXCEPT FOR VENDOR DESIGNED PARTS AND ITEMS PRODUCED TO RECOGNIZED STANDARDS.			
FRAC. ± . / INCH ± . / ANGLES ± 30'	DECIMAL INCH .00 ± .01 / .000 ± .003	METRIC 0. ± 1.0mm / 0.0 ± 0.4mm / 0.00 ± 0.1mm	

DESIGNED: D.W. FILBRUN		DRAWN: DAS	DATE: 10–8–90		
SCALE: NONE	RECORDS: .	CHECKED: .	DATE: .	DEPT.	DATE
				DISTRIBUTION	
MAT'L. NO.: .	QUAN./U.M.: .	ITEM TYPE: H	COMM. CLASS: 149C	FINISH CODE PER 910176: NONE	
MAT'L. SPEC.: DIAGRAM					
TITLE: DIAGRAM, CONNECTION					

HOBART® GROUND POWER

DWG. NO. 282561

SIZE: C SHEET 2 OF 2

HOBART GROUND POWER

Unusual Service Conditions

This information is a general guideline and cannot cover all possible conditions of equipment use. The specific local environments may be dependent upon conditions beyond the manufacturer's control. The manufacturer should be consulted if any unusual conditions of use exist which may affect the physical condition or operation of the equipment.

Among such conditions are :

1. Exposure to:

Combustible, explosive, abrasive or conducting dusts.

Environments where the accumulation of lint or excessive dirt will interfere with normal ventilation.

Chemical fumes, flammable or explosive gases.

Nuclear radiation.

Steam, salt-laden air, or oil vapor.

Damp or very dry locations, radiant heat, vermin infestation, or atmospheres conducive to fungus growth.

Abnormal shock, vibration or mechanical loading from external sources during equipment operation.

Abnormal axial or side thrust imposed on rotating equipment shafts.

Low and/or high ambient temperatures.

2. Operation at:

Voltages above or below rated voltage.

Speeds other than rated speed.

Frequency other than rated frequency.

Standstill with rotating equipment windings energized.

Unbalanced voltages.

Operation at loads greater than rated.

3. Operation where low acoustical noise levels are required.

4. Operation with:

Improper fuel, lubricants or coolant.

Parts or elements unauthorized by the manufacturer.

Unauthorized modifications.

5. Operation in poorly ventilated areas.

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