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## Installation and Maintenance Manual

Please retain this manual for future reference.

# ***Viking 400***

## ***Self-Contained Heater***



*For your safety: Do not use this heater in  
a space where gasoline or other liquids  
having flammable vapors are stored.*

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## SAFETY SUMMARY

### 1. DEFINITIONS.

The following definitions apply to WARNINGS and CAUTIONS found throughout this manual.

#### **WARNING**

An operating or maintenance procedure, practice, condition, statement, etc., which if not strictly observed, could result in injury, death, or long-term health hazards to personnel.

#### **CAUTION**

An operating or maintenance procedure, practice, condition, statement, etc., which, if not strictly observed, could result in damage to or destruction of equipment, or loss of mission effectiveness.

### 2. GENERAL PRECAUTIONS.

The following are general safety precautions not related to any specific procedure and therefore do not appear elsewhere in this manual. These are recommended precautions personnel shall understand and apply during many phases of operation and maintenance.

### 3. KEEP AWAY FROM LIVE CIRCUITS.

Operating personnel shall observe all safety regulations at all times. Do not replace components inside the equipment when potentially lethal voltages are present. Turn off system power before making/breaking electrical connections. Regard any exposed connector, terminal board, or circuit board as a possible hazard. Components which retain a charge shall be discharged only when grounding does not result in equipment damage. If a test connection to energized equipment is required, make the test equipment ground connection before probing the voltage or signal to be tested.

### 4. RESUSCITATION.

Personnel working with or near high voltages or hazardous materials shall be familiar with modern methods of resuscitation.

### 5. DO NOT WEAR JEWELRY.

Remove rings, watches, and other metallic objects which may cause shock or burn hazards.

### 6. DO NOT SERVICE OR ADJUST ALONE.

Personnel shall not under any circumstances reach into or enter any enclosure for the purpose of servicing or adjusting the equipment without immediate presence or assistance of another person capable of rendering aid.

### 7. HAZARDOUS MATERIALS WARNINGS.

Warnings for hazardous materials in this manual are designed to warn personnel of hazards associated with such items. For each hazardous material used, a Material Safety Data Sheet (MSDS), or equivalent, is required to be provided. All personnel shall have ready access to MSDS, or equivalent, for hazardous materials which they handle or use, or to which they are exposed.

#### **WARNING**

- Diesel fuel, jet fuel, and kerosene present an extreme explosion and fire hazard. Be careful when opening fuel containers and connecting fuel lines. Make sure fuel lines are securely connected and free of leaks. Always store fuel in properly marked containers.
- Never refuel a hot or running heater. The heater must be turned off and allowed to cool before refueling. Fuel spilled on a hot heater may ignite and cause serious injury to personnel.
- Follow proper refueling procedures and use appropriate equipment. Avoid overfilling fuel tank. Fuel spills must be wiped away with a clean cloth. Refuel only in a well-ventilated area away from open flame, arcing equipment, ignition sources, or excessive heat. Do not operate heater in explosive atmospheres. Always use correct type fuel.
- Do not attempt to perform maintenance on any part while engine and/or electric motors are running.



**WARNING**

- Cleaning solvents may be flammable. To prevent fire or explosion, do not bring open flame or sparks near solvents. Clean parts in a well-ventilated area.
- The Viking can generate enough heat in certain locations to cause severe burns upon physical contact. Allow the heater to cool before touching.
- The multi-fuel engine body, engine exhaust, and heater exhaust areas become hot enough during operation to cause severe burns. Avoid contact with muffler and related parts during repair actions. Allow heater and engine to cool before performing maintenance on engine body, exhaust areas, and/or combustion parts.
- Hot crankcase oil can cause severe burns if spilled or splashed on skin. Allow engine to cool and wear protective clothing/equipment when removing the oil drain plug.
- Never operate Viking in an enclosed area unless exhaust gases are piped outside. Make sure heater is operated in a well-ventilated location. Engine and heater burner exhaust fumes contain carbon monoxide gas, which is odorless, colorless, and poisonous. Exposure to carbon monoxide can cause symptoms of headache, dizziness, loss of muscular control, drowsiness, and coma. Severe exposure can cause brain damage and death. If exhaust odors and/or exposure symptoms are present, remove affected personnel to fresh air, keep them warm and (if necessary) administer artificial respiration. Immediately ventilate personnel areas.
- Jet fuels and diesel fuels are extremely toxic. Wear protective clothing/equipment and refuel only in well-ventilated areas. Avoid contact with skin, eyes, and clothing. Do not breathe vapors. Do not use open flame or excessive heat. If you become dizzy, get fresh air immediately and obtain medical aid. If contact with eyes and/or skin is made, immediately flush with clean water and get medical aid for eyes immediately.
- Cleaning solvents can be highly toxic to skin, eyes, and respiratory tract. Avoid inhalation of fumes and repeated or prolonged skin exposure. Wash exposed skin thoroughly with soap and water. Use in well-ventilated area away from open flame or excessive heat.
- Cleaning solutions may contain strong chemicals that can cause burns or other injury if used improperly. Read and heed all warning labels before using.
- Excessive lifting can severely injure personnel because of muscle strains and foot injuries caused by dropped objects. Never work alone when unpacking or packing containers. One person should not attempt to lift more than 40 pounds and two-person lifts should be limited to no more than 70 pounds. One and two-person lifts should be reduced as weight of part to be moved increases.
- During operation, Viking produces noise levels that can cause injury to unprotected ears. Hearing protection must be worn when Viking is in operation. Failure to wear hearing protection can result in injury to personnel.

**CAUTION**

- Do not allow anyone under equipment suspended from a lifting device. Keep hands and body clear of lift arms, swivels, and rotating equipment.
- Serious injury can occur if heavy equipment is moved without sufficient personnel to do the job. Use proper physical lifting procedures or use a suitable lifting device. Wear safety shoes, gloves, and other appropriate protective clothing.
- During operation, fuel system lines are pressurized. Disassembly of a part/lines under pressure can cause serious injury. Exercise caution while loosening fuel lines since they may contain pressure. Cover fittings and place container underneath before loosening. Fuel under pressure can penetrate skin and cause blood poisoning or a serious skin infection.
- Only forklifts with 48 inch tines, a minimum, shall be used to lift. Lifts may be done from either side of heater, with tines bracketing tire. Ensure tines extend completely under opposite frame. The heater may be fork lifted from the front end when tongue is in raised position and after ensuring tines extend completely under heater main axle. Do not attempt to lift from rear of. The forward position will cause heater to tip over to front and fork lift tines may damage fuel tank.

## CHAPTER 1 GENERAL EQUIPMENT DESCRIPTION

### 1.1 INTRODUCTION.

1.1.1 This chapter provides information about major characteristics and capabilities of the Viking 400 (Figure 1-1).

### 1.2 PURPOSE OF NGH.

1.2.1 The Viking is capable of burning multi-fuel (JP-8, JP-8+100, DL-1, DL-2, Jet A, Jet A-1, JP-4, and JP-5) to produce heat outdoors for the following purposes:

1.2.3 The Viking may be operated inside a building but exhaust gases must be conducted outside by means of a suitable exhaust vent system. Do not apply a forced-draft (suction) type exhaust system directly to heat exchanger exhaust. Utilize an exhaust hood (Table 2-1) or locally manufacture an exhaust vent adapter to mate with facilities exhaust venting system. The exhaust vent adapter must provide a minimum of 6 inches of free air space prior to entrance of forced draft exhaust vent system.

### 1.3 CAPABILITIES AND FEATURES.

1.3.1 The basic design features an electric power transmission with no direct mechanical contact between the engine and heating unit, a separate electric motor-driven oil burner with separate blower for combustion air, and an electric motor-driven heater fan. Combustion air supply to the oil burner is drawn through the power pack compartment.

1.3.2 The Viking has the following characteristics and capabilities:

- Fully enclosed, self-contained unit.
- Trailer-mounted, ground portable.
- Multi-fuel engine and heater.
- Alternator.
- Three temperature settings: High/Med/Low. Refer to Table 1-1 for temperature ranges.

### 1.4 DESCRIPTION.

1.4.1 The multi-fuel engine burns diesel or jet fuel

and drives a 110/120 Volt, 60 Hz alternator that powers a separate oil burner and combustion air blower.

1.4.2 When heat is called for, the burner starts and maintains combustion in the combustion chamber. Hot gases are routed through the heat exchanger and exhaust stack then into open atmosphere. Upon reaching operating temperature, a control thermostat activates the electric blower motor forcing a stream of heated, uncontaminated air through flexible ducts to the space to be heated. Major components of the are shown in Figure 1-2.

**Table 1-1. Model Equipment Data**

Manufacturer .....	Heat Wagon
Model .....	Viking 400
Heated Air Output Net:	
Maximum .....	400,000 BTUH @ -65°F ambient
Heated Air Temperature Range (average):	
High Capacity .....	270-305°F
Medium Capacity .....	210-245°F
Low Capacity .....	150-185°F
Hot Air Delivery Rate: .....	
Nominal .....	@ -65°F ambient
Fuels .....	DL-1, DL-2, Jet A, Jet A1, JP4, JP-5, JP-8, and JP-8+100
Fuel Tank Capacity: .....	52 gallons
Operating Time .....	15 hours @ -25°F ambient on High setting
Overall Dimensions:	
Length .....	64.6 inches
Height .....	59 inches
Width .....	56.4 inches
Shipping Cubit .....	125 cu. ft.
Weight (empty) .....	960 lbs.
Prime Mover:	
Multi-Fuel Engine .....	6 hp
Engine Speed.....	3750 rpm
Burner Nozzle Size .....	2.75 gph, 80° SS Cone

### 1.5 ENCLOSURE.

1.5.1 GENERAL. Key components of the Viking enclosure are explained in the following paragraphs and illustrated in Figure 1-1. For clarification purposes, sides of the NGH are identified as follows:

- FRONT – The towing end.
- REAR – The engine access end.
- RIGHT – The heat outlet side.
- LEFT – The control panel side.

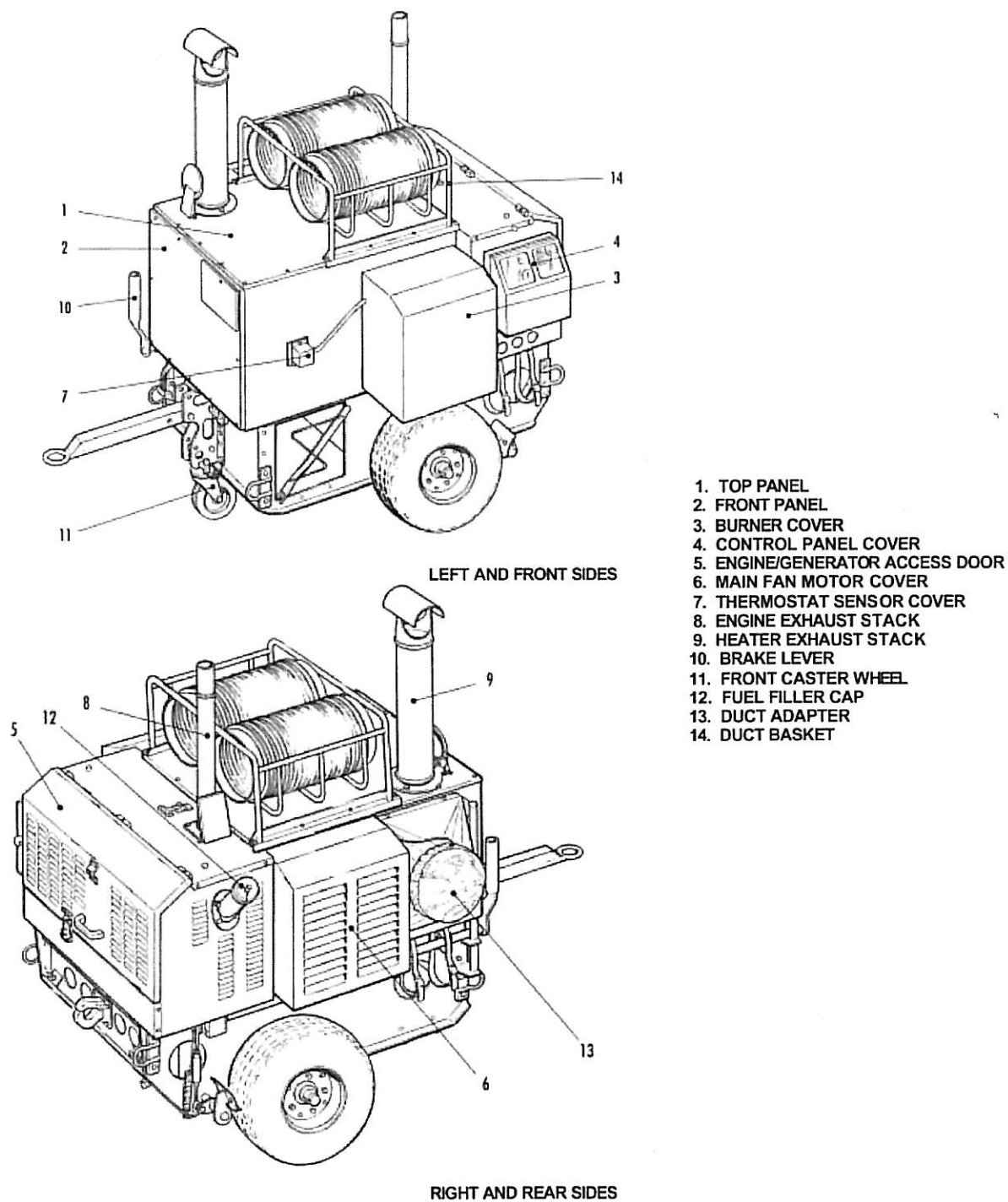
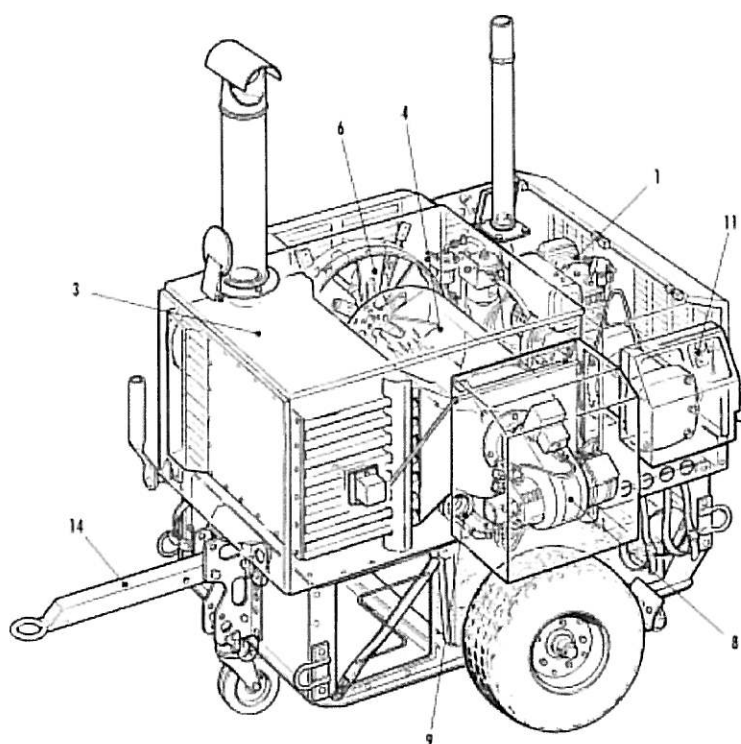
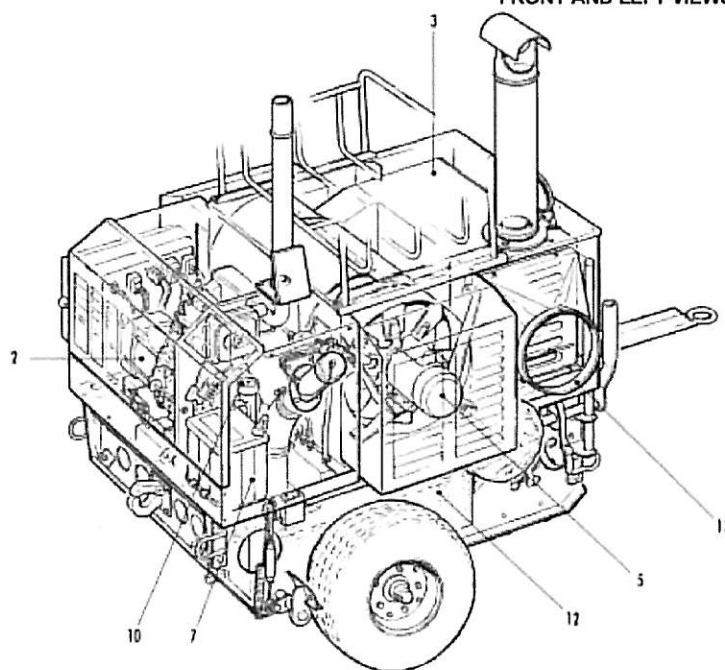


Figure 1-1. Front and Rear Views



FRONT AND LEFT VIEWS



REAR AND RIGHT VIEWS

Figure 1-2. Major Components

**1.5.2 COVERS.** Sheet metal covers protect internal components of the Viking from open environments. Covers for the burner and fan are easily removable, allowing easy access to the major components. Hinged panels are on the control panel and engine compartment. These hinged panels allow the to be started, operated, and shut down with all covers in place.

**1.5.3 BRAKES.** A hand-operated brake lever (10), located on the front right side, engages mechanisms that lock against the two rear tires to hold in place when not being towed.

**1.5.4 TRAILER CHASSIS.** Overall design concept is modular. All major components are easily accessible for maintenance and can be easily removed and installed. The trailer chassis is designed for easy maneuverability; the center of gravity is about three inches in front of the wheel axle, resulting in a low tow bar weight. The full-swivel, folding front wheel (11) allows for easy positioning of the heater.

## **1.6 MAJOR OPERATIONAL COMPONENTS.**

**1.6.2 BURNER CHAMBER AND HEAT EXCHANGER ASSEMBLY.** Combustion air and fuel are mixed at the burner head. The burner (8) utilizes a separate fan for combustion air which allows for optimal adjustments of air/fuel ratio independent from the main air fan and air duct back pressure. The fuel/air mixture is burned inside a large combustion chamber (4) allowing all fuel particles to be burned before entering the heat exchanger, and ensuring a clean combustion with virtually no coking. Heated air is delivered by the main air fan around the combustion chamber and through the heat exchanger (3) ports, completely separated from combustion fumes. Heated air is delivered to the duct adapter while combustion fumes exit through the exhaust outlet at the top.

**1.6.3 BURNER UNIT** (Burner Unit Combustion Air Blower, High Pressure Fuel Pump, Electronic Igniter, Ignition Points, Nozzle, and Controls). The burner (8) is rated at 3450 rpm and features a unique combustion head that assures positive flame retention under a variety of operating conditions. The solid-state, high-voltage igniter receives power from the alternator. Heater control unit and burner control unit primary controls are located inside the control panel box. These parts control the cycling of the burner unit and main fan motor. The igniter produces an electric arc between the ignition points at the burner head. The arc ignites the atomized fuel spray produced by the high-pressure fuel pump and fuel nozzle.

**1.6.4 MAIN AIR FAN/MOTOR.** The main air fan is powered by a 1700-rpm electric motor (5) rated at 120V/60Hz and receives power from the alternator. A heater control unit controls the fan motor. Normally, the fan will not start before the temperature inside the heater has reached a set level, allowing for a rapid temperature rise in the heated air. However, an electric timer function is also programmed in the thermostat to ensure fan operation starts at a predetermined time. The heater control unit also controls the after-cooling function of the main air fan (6). After turning off the heater, the fan will run until the heater cools to a safe level then stop automatically.

**1.6.5 MULTI-FUEL DIESEL ENGINE.** The diesel engine (1) is rated at 6 hp @ 3750 rpm and is capable of powering an AC alternator with an output of 3200 watts at sea level. Switching to different types of approved fuels may require engine adjustment. In the event of a dead battery, a pull-start capability exists (Refer to T.O. 38G1-90-1).

**1.6.6 ALTERNATOR.** The alternator (2) provides 120 volts, 60 Hz, 3,200 Watts of power to the electrical systems. As an alternative, ground power of 110-120 Volts, 60 Hz can also be used to run the heater.

**1.6.7 BATTERY.** A marine/automotive type maintenance-free battery (7), employing starved electrolyte technology, supplies power to the engine's 12 VDC electrical system. The battery meets MIL-B-18013 specification.

**1.6.8 FUEL TANK.** An all-metal 52 gallon fuel tank (12)

**1.6.9 FUEL GAGE.** A mechanical, float-type, fuel gage (10) is located inside the power pack compartment. It shows the amount of fuel in the fuel tank and can be easily viewed while refueling the fuel tank. Switching on the main control panel light turns on a light inside the power pack compartment.

**1.6.10 CONTROL PANEL.** The control panel (11) contains the following engine controls: ignition switch, battery charge indicator, oil pressure alarm light, preheating signal light, voltmeter, engine hour meter, and the engine shut-off button. For operating the heater, the following controls are provided: Heat control switch, burner failure indicator, burner failure reset button, and heater hour meter. The digital display for output air temperature also indicates heater status of operation. A centrally located panel light with an on-off switch is also provided. All circuit breaker reset buttons are located in the main control panel.

## 1.7 OPTIONAL ITEMS.

1.7.2 FORKLIFT CHANNELS. A forklift channel kit can be installed based on organizational requirements. Kit contents are listed in Table 1-2.

1.7.2.1 Serial numbers 2112-04-2356 and higher have factory drilled holes to accommodate forklift channel installation (A, B, C and D, Figure 1-3). Note the following:

- The front channel is fixed beneath the trailer side panels (1 and 2, Figure 6-5).
- The rear channel is fixed beneath the trailer side panels and supported to the trailer rear panel (4, Figure 6-5).

1.7.2.2 Serial number 2112-04-2355 and lower require holes be drilled to accomplish forklift channel installation. Use the following procedure and drilling pattern.

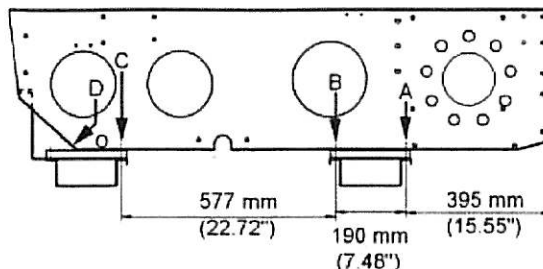


Figure 1-4. Forklift Channel Kit Drilling Pattern

1. Drill bolt holes (Line A, B and C) using a 10 mm (3/8 in.) diameter drill for both Viking trailer side panels according to above pattern length-wise.
2. Drill holes middle of the lower bend of the trailer panel.

### NOTE

Viking brake assembly spring (10, Figure 68) and bottom loop have to be moved to new location D when assembling rear forklift channel.

3. Drill new hole D using a 5 mm (3/16 in.) diameter drill for the spring loop about 15 mm (0.6 in.) backward from original position. Install spring loop at this place.

Table 1-2. Forklift Channel Kit Contents

Index	Part Number	Description	Qty
-	2112-440	Forklift Channel Kit	N/A
1	2112-441	Bottom Plate, Channels	2
2	2112-442	Top Plate, Front Channel	1
3	2112-443	Top Plate, Rear Channel	1
4	2112-445	Support Plate, Rear Channel	1
5	2112-93215	Bolt (M8×45)	8
6	2112-93422	Washer (M8)	42
7	2112-93504	Nut, Lock (M8)	21
8	2112-93212	Bolt (M8×25)	13

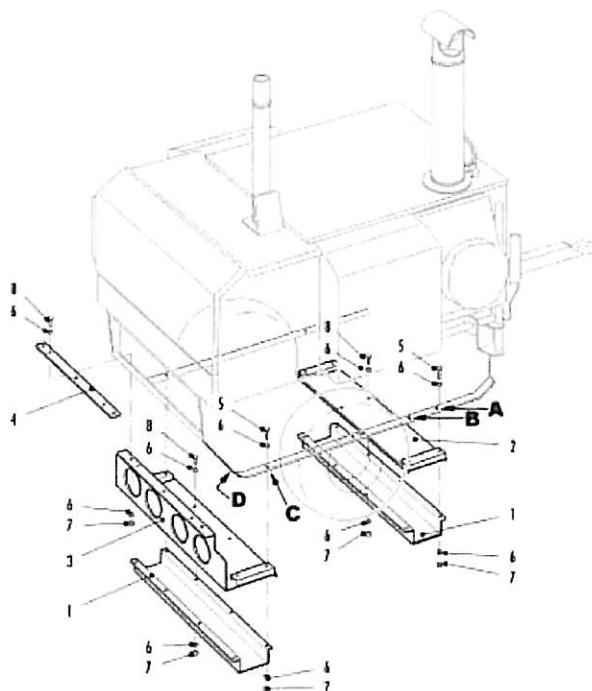


Figure 1-3. Forklift Channel Kit (Option) Installation



Table 2-2. Consumables List

Index No.	Nomenclature	Part Number	Specification	CAGE
1	Alcohol, Isopropyl	Commercial	TT-I-735	81349
2	Cloth, Cleaning		MIL-C-85043	81349
3	Cloth, Emery (various sizes)			
4	Fuel, Diesel		VV-F800	81349
5	Fuel, Jet	Mobil DelVac 1 Synthetic 5W-40W API SJ	MIL-H-5624, MIL-T-83133	81349
6	Grease, Bearing		MIL-G-10924	81349
7	Oil, Lubricating (engine)			
8	Oil, Machine			
9	Paint	Loc-Tite Red	FED-STD-595	81349
			MIL-C-83286	
10	Primer			81349
11	Sealant			
12	Solvent, Detergent	Commercial	PD-680, Type II or PD-220	81349
13	Tape, Masking (1 Inch Wide)			
14	Filter, Engine Air		NSN 2940013104495	81349
15	Filter, Engine Oil		NSN 2910014556202	81349
16	Filter, Engine Fuel	R12T	NSN 4330013749147	81349

2. Place two 12-inch ducts into duct basket. Store 6-inch ducts and 1/3 adapter in duct compartment in front part of trailer frame. Close duct compartment latch.

3.5.1.2 For an older Viking equipped with duct poles on left side of each unit prepare as follows:

1. Turn duct poles to their outermost position. Compress all ducts to minimum length and secure with hook and loop provided inside each duct.
2. Place two 12-inch ducts on duct poles. Store 6-inch ducts and 1/3 adapter in duct compartment in front part of trailer frame. Close duct compartment latch.

### 3.5.2 AIR DUCT STOWAGE FOR AIR TRANSPORT.

1. Compress all ducts to minimum length and secure with hook and loop provided inside each duct. Push both 12-inch ducts into duct compartment. Close duct compartment latch.
2. Secure one 6-inch duct in left rear side of trailer frame with two straps provided. Secure remaining two 6-inch ducts to right front side of trailer frame with two straps provided. Secure 1/3 duct adapter to front of trailer frame with one strap provided.

3.5.3 EXHAUST STACK STOWAGE. For towing, storage and air transport, place heater exhaust stack on pole provided for that purpose in right front corner of heater. The engine exhaust stack, having a smaller diameter, is stowed on same pole inside heater exhaust stack.

## CHAPTER 4 OPERATING INSTRUCTIONS

### 4.1 GENERAL.

### 4.2 THEORY OF OPERATION.

4.2.1 GENERAL. The following text describes the operation cycle of the Viking when operating with self-generated power. For all startup and shutdown procedures refer to paragraph 4.5.

4.2.2 OPERATION SEQUENCE. Viking operation is divided into two separate operating groups: the Engine/Alternator with a 12 VDC control system, producing 120 VAC to run all heater/combustion components and the Heater section parts required to produce heated air. The only functional contact between these two groups is the 120 VAC power supply cable. For operation or testing of the heater/combustion group either the diesel engine or 120 VAC, 60Hz, 25 Amp min. power may be utilized (refer to paragraph 4.5). The engine/alternator group can be tested separately, without operating the heater/combustion group.

4.2.3 ENGINE/ALTERNATOR GROUP (POWER PACK). The multi-fueled engine start procedure is initiated by pushing **engine reset bar** to reset engines manual stop lever. This allows fuel to flow to engine injection pump through engine shutoff valve. When necessary, the ignition switch must be turned to **preheat** position. This heats preheat coil inside preheat block, heating intake air. Once preheating is completed, the ignition switch has to be turned to **start** position to energize starter solenoid and crank engine. Engine preheating continues while ignition switch is in **start** position. Once engine starts ignition switch must be released and it returns **on** position.

4.2.3.1 During operation, engine functions can be monitored at the control panel by charge and oil alarm lights and engine hour meter and system voltage gauge. The charge indicator light is wired to the voltage regulator circuitry and monitors the status of battery charging. When illuminated this light indicates the battery is not being charged. The oil indicator light is wired to the engine oil pressure switch. When illuminated this light indicates insufficient oil pressure for continued engine operation. The engine hour meter is wired to the 12 VDC control circuitry and records engine operating hours when the engine start

switch is in the on position. The system voltage gauge measures voltage produced by the alternator. The voltage has a direct relationship to engine RPM. When the engine operates correctly, the voltage must read between 110 and 140 VAC.

4.2.2.2 The alternator rotor is coupled directly to the engine crankshaft. When the heater main switch is in the off position there is no electrical load on the alternator, and thus no parasitic load on the engine during startup. When the engine has reached its governed operating speed of 3600 RPM, and is warmed up, the alternator is ready to produce the 120 VAC 60 Hz power necessary to power the heater/combustor group components.

### 4.2.4 HEATER/COMBUSTION GROUP.

4.2.4.1 The heater is activated by turning the heat control switch to either low, med, or high heat. Selecting a heat setting activates the heater control unit (HCU), which monitors the status of combustion components through thermostatic sensors. The HCU operates on 24 VAC, produced by the alternator and stepped down by the transformer.

4.2.4.2 When a heat setting is selected, the HCU compares the reading of the outlet air sensor with the programmed values of the HCU. If the sensor temperature is lower than the programmed value (which is always the case during initial startup), the HCU energizes the fuel burner motor and spark igniter through the auxiliary burner relay (K2) and activates the burner control unit (BCU). The fuel burner motor in turn activates the combustion air fan and the high-pressure fuel injection pump of the burner.

4.2.4.3 Once activated, the BCU performs a 3 to 4 second self test of all its functions, then opens two fuel valves on the fuel burner. The high-pressure injection pump forces fuel through the injection nozzle, where the fuel is atomized and sprayed into the combustion chamber. The constant spark between the igniter electrodes ignites atomized fuel.

4.2.4.4 After ignition, the BCU monitors combustion through a photocell located inside the burner tube. If a flame is not established within 15 seconds (the photocell "sees" no light) after the fuel valves are opened, the BCU closes the alarm contacts and the burner failure light on the control panel is illuminated. If the flame is lost during normal operation for more than 1.2 seconds, the BCU will perform a 65 second safety recycle and start the burner again.

4.2.4.5 Once constant flame is established, the HCU monitors temperature inside the heater body through the chamber sensor (SFC). When the inside temperature reaches 140°F the HCU starts the main air fan through contactor K1. If the temperature is not reached within 45 seconds, the HCU will start the fan through a timer function. The main air fan now produces a steady airflow to the heater and the outlet air adapter.

4.2.4.6 The HCU continues to monitor temperature in the outlet air through the SBC. When the upper limit of the selected temperature setting is reached, the HCU deactivates the BCU. The BCU in turn closes the fuel valves on the burner and the flame is extinguished. The main air fan continues operating, cooling the heat exchangers surfaces until the outlet air temperature falls below the lower limit. The HCU senses this through the SBC and the combustion cycle is repeated. During the heating operation the control panel display provides a constant reading of the outlet air temperature.

4.2.5 VENT ONLY MODE. The Viking can be operated in a vent only mode by turning the heat control switch to the vent position. The HCU starts the main air fan through contactor K1. Unheated air flow for ventilation will be maintained as long as the heat control switch remains in the vent position.

4.2.6 STOP HEATING. To stop the heating operation, turn the heat control switch to stop. The HCU will deactivate the BCU, which closes the fuel valves which extinguishes the flame. The combustion components are still very hot, so to avoid damage and deterioration to these components, the HCU has an after-cooling function. The HCU monitors the chamber sensor temperature and will keep the main air fan operating until the chamber has cooled to 113°F. During the after-cooling period the display reads AFC. Once the temperature has reached safe levels and the HCU deactivates the main air fan, the display will read "off". This indicates it is safe to shut off the engine.

4.2.7 SHUT DOWN. To shut down the engine, depress the engine shut-off button on the control panel. This activates a solenoid which pulls the engine shut-off valve plunger, cutting fuel flow to the engine injection pump.

4.2.8 TRAILER GROUP. The trailer group forms the chassis of the Viking consisting of the main axle with wheels, trailer frame, towbar, folding front support wheel, pintle hook, accessories compartment and fuel tank located in the trailer frame.

### 4.3 MAIN COMPONENT GROUP FUNCTIONS.

4.3.1 POWER GENERATING GROUP OPERATING PRINCIPLES. Refer to Figure 4-1 during the following

explanations of how the Viking power generation system operates.

4.3.1.1 **Multi-Fuel Engine.** The multi-fuel engine (1) is set into operation by a ignition switch on the control panel (9). The ignition switch has a preheat position for use in temperatures below 32° F. A built-in starter motor sets the engine in operation.

4.3.1.2 **Alternator.** The alternator (2) is directly attached to the multi-fuel engine. The alternator produces 3,200 watts of electric power, 120 Volt 60 Hz at 3,600 rpm. This electric power is used to drive all electric functions of the NGH combustion group.

4.3.1.3 **Fuel System.** The Viking fuel system (refer to Figure 4-10) consists of an all-metal 52-gallon fuel tank fitted with a mechanical float-type fuel gage, a refill tube, and an air vent line. The fuel tank provides fuel for the NGH engine and burner operations. A fuel transfer pump draws fuel from the fuel tank and pumps it through a fuel filter to the multi-fuel engine. A fuel return line exists between the engine and the fuel tank. The Heater Fuel Burner has a separate high-pressure injection pump. This pump draws fuel from the fuel tank through a preheat coil (to assist with cold weather operation) and a burner fuel filter, then pumps the fuel through two fuel solenoid valves to the burner nozzle. A fuel return line exists between the burner fuel pump and the fuel tank. The fuel system is designed so if fuel is running out, the burner will run out of fuel first and the engine will continue to run to cool the heater.

4.3.2 COMBUSTION COMPONENT GROUP. Refer to Figures 4-1 through 4-3 during the following explanation of the combustion group.

4.3.2.1 **Fuel Burner.** The Fuel Burner (8, Figure 4-1) is a standard, commercial fuel burner slightly modified for use. It consists of an electric motor to drive the combustion air fan and the high-pressure fuel injection pump, and ignition transformer, all of which are visible outside of the burner.

4.3.2.1.1 Fuel ignition points and fuel nozzle, together with the photocell, are located inside the burner tube which is inside the combustion chamber. A separate burner control unit (BCU) is located inside the heater's main control box. The burner electric motor, two each solenoid valves (OV), and the ignition transformer are all controlled by the heater control unit (HCU) and the (BCU). When the HCU is activated for heat, the BCU starts the motor and ignition, and, after a safe purge period, energizes the solenoid valves to the open position allowing the fuel to flow through the nozzle into the combustion chamber. The valves close when the upper limit of air outlet temperature has been reached.

4.3.2.1.2 The burner is operated under the constant spark ignition system. The electric motor driving the injection pump and combustion air blower is running constantly when the heater control switch is set in any of the heating positions (LOW-MED-HIGH). The uninterrupted airflow through the combustion chamber is a safety feature: the chamber is always purged free from residual fuel. Setting the fuel injection pressure to 175 PSI and adjusting the combustion air for best performance (see maintenance instructions) brings the combustion efficiency and cleanliness to an optimum.

#### NOTE

The fuel pressure shall never be adjusted above given value of 175 PSI.

4.3.2.1.3 The RPM of the motor has no direct bearing on the injection pressure. The pressure is controlled by a pressure valve and remains constant at set value provided the engine is operating correctly (refer to paragraph 4.2.3.1 for required voltage readout)

4.3.2.1.4 Regardless of the selected output temperature range (LOW-MED-HIGH), the injection pump pressure is always constant. Different output temperatures are maintained automatically by cycling the burner on and off accordingly, controlled by the HCU. Refer to Table 4-1.

**4.3.2.2 Combustion Chamber.** The Viking 400 combustion chamber (4, Figure 41) houses the fuel burner tube and provides the burner exhaust route for exhaust gases. The flame is contained inside the burner chamber; only the hot exhaust gases exit the chamber to the heat exchanger.

**4.3.2.3 Photocell.** Located inside the burner tube is a photocell (19, Figure 69) that monitors the existence of flame inside the combustion chamber. The photocell is mounted on a holder and wired to the BCU. Resistance of the photocell varies by intensity of the light present. When cadmium sulphide in the photocell is exposed to light, its

normally high resistance becomes very low. The reduced resistance of the photocell in presence of light is used to verify presence of flame. This is one of the safety features of the BCU. For testing photocell refer to paragraph 5.8.10.2.

**4.3.2.4 Heat Exchanger.** Hot combustion exhaust gases pass through the heat exchanger (3, Figure 41) during burner operation. The thermal energy is conducted and transferred into the discharge air, which is blown through the heat exchanger channels by the main air fan. The exhaust gases remain completely separated from the heated air and exit through the exhaust opening and exhaust duct extension into open air.

**4.3.2.5 Main Heater Fan.** The heater fan (6, Figure 4-1) operates at 1400-1900 CFM and forces heated air through the heater housing, around the burner chamber, and through the heat exchanger ports. Thermal energy is transferred from the hot surfaces of the combustion components into the circulating air. The heated air is directed to where required via flexible ducts. The electric motor driving the fan is a 120 Volt 60 Hz motor running at 1700 rpm.

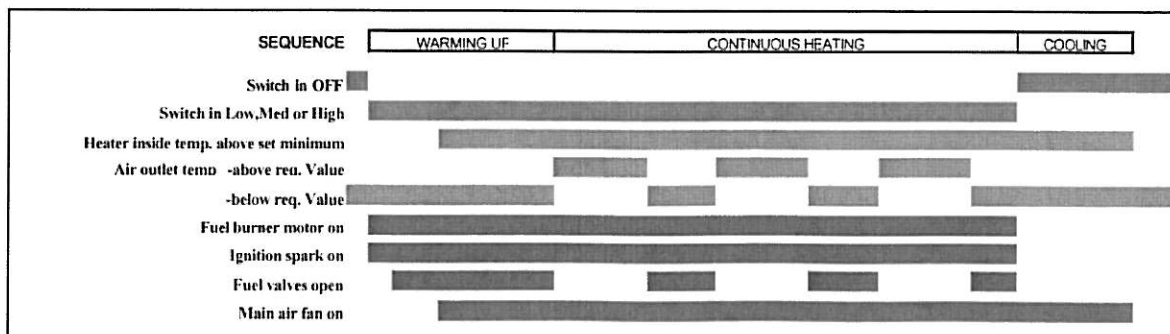
**4.3.3 CONTROLS GROUP.** Refer to Figures 4-6 through 4-9 during the following explanation of the controls group.

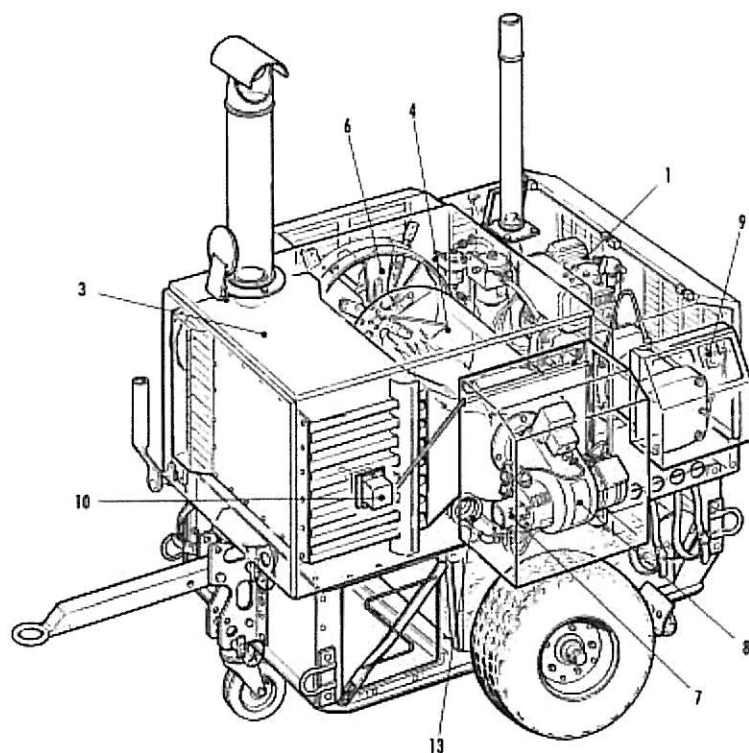
**4.3.3.1 Electrical System.** A battery powered 12 VDC system is used for starting, operating, and controlling the power pack functions. An alternator powered 120 VAC, 60 Hz electrical system operates and controls the heating functions. Alternatively, external 110-120 VAC, 60 Hz power supply can be used to power the heater functions.

**4.3.3.2 Main Control Box.** The main control box includes all main control components, both 12 VDC and 120 VAC, required for the function of the power pack and the heater. Refer to Figure 44 for the following control panel components.

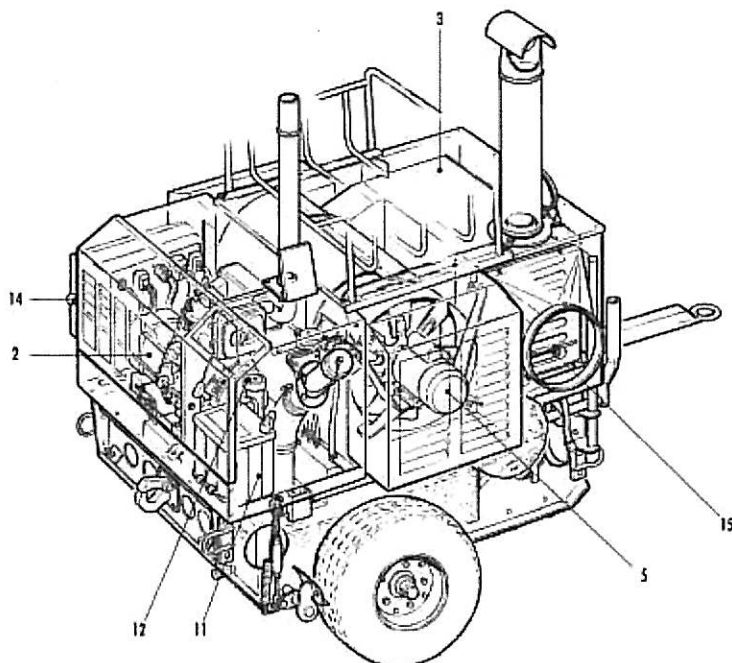
Table 4-1 - Fuel Burner Operation Cycles

The Diagram shows the automatic operation sequences of fuel burner components during starting, two full operation cycles, and shutting off the heater.





FRONT AND LEFT SIDE



REAR AND RIGHT SIDE

1. ENGINE
2. ALTERNATOR
3. HEAT EXCHANGER
4. COMBUSTION CHAMBER
5. MAIN AIR FAN MOTOR
6. MAIN AIR FAN
7. BURNER FUEL PUMP
8. BURNER
9. CONTROL PANEL
10. SENSOR BOX
11. BATTERY
12. FUEL GAGE
13. FUEL PREHEAT COIL
14. ENGINE RESET BAR
15. THERMOSTATIC SENSOR

Figure 4-1. Major Operating Components



4.3.3.2.1 Panel Light switch. Illuminates control panel and fuel level gauge (in engine compartment).

4.3.3.2.2 Engine/Alternator Controls:

4.3.3.2.2.1 Ignition Switch. Controls engine preheating, start up and shuts off the 12 volt engine control circuit.

4.3.3.2.2.2 Engine Reset Bar. Resets engine shutoff valve prior to engine start-up (Fig. 4-1, Ind. 14).

4.3.3.2.2.3 Battery Charge Indicator Light. Illuminates if the battery is not being charged and, if the engine is not running indicates the 12 volt circuitry has not been shut off by the ignition switch.

4.3.3.2.2.4 Preheat Indicator Light. Illuminates when the engine preheat function is switched on.

4.3.3.2.2.5 Oil Alert Indicator Light. Illuminates when sufficient oil pressure is not present.

4.3.3.2.2.6 Voltmeter. Displays voltage (120 volt nominal) produced by the alternator or provided by an outside source.

4.3.3.2.2.7 Engine Hour meter. Displays hours of engine operation.

4.3.3.2.2.8 Engine Shutoff. Activates fuel solenoid, shutting off fuel flow to the engine, shutting the engine off.

4.3.3.2.3 Heater Controls (120 Volt AC 60 Hz Circuit):

4.3.3.2.3.1 Heat Control Switch (S1). Used to select "LOW", "MED" or "HIGH" temperature settings or "VENT" for unheated air flow only. Combustion begins once a temperature setting is selected. Combustion cycles are controlled by HCU and BCU.

4.3.3.2.3.2 Outlet Air Temperature/Heater Status Display. Displays outlet air temperature in 10°F increments. Also displays messages about heater status. Refer to Control Panel Display Messages paragraph 4.3.3.3.2.3 for details.

4.3.3.2.3.3 Burner Failure Indicator Light. Illuminates during the burner "ON" cycle if the photocell does not detect the presence of a flame.

4.3.3.2.3.4 Burner Failure Reset Button. Reactivates the burner in case of a flame failure.

4.3.3.2.3.5 Heater Hour meter. Displays total number of hours of heating system operation.

### 4.3.3.3 Active Control Components.

4.3.3.3.1 Heater Control Unit (HCU). The HCU is located inside the main control box. The HCU is a microprocessor-equipped control unit that controls cycling of the burner and main air fan according to the heater control switch setting and signals received from the outlet air sensor (SBC) and chamber sensor (SFC). The HCU is also connected to a digital display that indicates outlet temperature, function, and failure messages. Overheat shutoff is also a function of the HCU.

4.3.3.3.2 HCU Functions and Switching Points.

4.3.3.3.2.1 Chamber Sensor (SFC) Functions. The SFC is located on the left side of the heater, with the sensor tip located close to the heat exchanger ports next to the fuel burner. By monitoring the chamber sensor, the HCU performs the following operational and safety features.

4.3.3.3.2.1.1 After any of the three temperature setting has been selected by the heat control switch, the HCU activates the main air fan ON at chamber sensor temperature 140°F or 45 seconds after burner is started, whichever occurs first. The main air fan is switched on through contactor (K1).

#### **CAUTION**

If main air fan fails to operate when temperature reaches 140° F, for a period of 45 seconds or longer, turn main heater switch to "stop", cool unit then determine cause of malfunction.

4.3.3.3.2.1.2 When the operator has turned the heater off by switching the heater main switch to "stop", the HCU switches the main air fan off at 113°F chamber temperature at completion of the after-cooling period.

4.3.3.3.2.1.3 Protective Overheating Switch-off. (occurs when airflow is blocked by kinked duct or blocked main air fan buvers). When the chamber temperature reaches 212° F, the HCU shuts off the burner. Forced fan cooling continues until the chamber has cooled down. The burner will re-ignite automatically. An error signal is not displayed.

4.3.3.3.2.2 Air Outlet Sensor Functions (SBC). Senses outlet air temperature.

4.3.3.3.2.2.1 Low Capacity Temperature Control. When the heater main switch is placed in "LOW" position, the HCU cycles the burner off and on to keep the outlet temperature at an average between 150-185° F.

4.3.3.3.2.2.2 Medium Capacity Temperature Control. When the heater main switch is placed in "MED" position, the HCU cycles the burner off and on to keep the outlet temperature at an average between 210-245°F.

4.3.3.3.2.2.3 High Capacity Temperature Control. When the heater main switch is placed in "HIGH" position, the HCU cycles the burner off and on to keep the outlet temperature at an average between 270-305°F.

4.3.3.3.2.2.4 Error Overheat Limit is set at 347°F outlet air temperature. When actuated, the HCU shuts the burner off and the forced fan cooling continues. Blinking "HI" error signal will display.

4.3.3.3.2.3 Control Panel Display Messages.

4.3.3.3.2.3.1 "OFF" – Heat Control Switch in "stop" position (Engine running or outside power source connected). Heater cool/cold. The burner is off. Main air fan is off after cooling. Engine can be shut down.

4.3.3.3.2.3.2 "AFC" – Heat Control Switch turned from HIGH, MED, or LOW output setting to "stop" position. Aftercooling in process. Main air fan on. DO NOT stop the engine before the display shows "OFF."

4.3.3.3.2.3.3 "FAN" – Heat Control Switch in "vent" position. Main air fan is blowing. No heating; burner off.

4.3.3.3.2.3.4 "LO" – Heat Control Switch in the "HIGH/MED/LOW." Air outlet temperature 39°F or less. The burner is on but has not yet raised the temperature above 39° F.

4.3.3.3.2.3.5 "LO" (Blinking) – Burner has been on for at least five minutes and air outlet temperature is below 32° F. Probable cause of this condition is either sensor/sensor wiring problem or burner failure. RESET by turning the Heat Control Switch momentarily to the "stop" position.

4.3.3.3.2.3.6 "HI" (Blinking) – Error outlet air overheating (347°F or above) situation, or sensor/sensor wiring problem. Forced main air fan cooling occurs. RESET by turning the Heat Control Switch momentarily to the "stop" position.

#### NOTE

LO and/or HI (Blinking) error message situations can be corrected by turning heat control switch momentarily to "stop" position, then back to heating position. If this procedure does not resolve problem, refer to troubleshooting chart.

4.3.3.3.3 Burner Control Unit (BCU). The BCU is located inside the main control box. The BCU is a microprocessor-equipped control unit which controls the functions and safety of the fuel burner. For enhanced safety, the NGH burner operates under a "constant spark/constant rotation" principle. There is a constant flow of air through the combustion chamber. The combustion is cycled by opening and closing the two solenoid valves (OV) on the burner. The constant flushing of the combustion chamber and constant ignition ensures fuel will not collect without ignition and cause an explosion hazard.

4.3.3.3.3.1 BCU Functions. The main function of the BCU is COMBUSTION SAFETY. For that purpose, various operations are automatically performed by the BCU.

4.3.3.3.3.1.1 Self Test. At the beginning of each burner cycle (when heat is called for by the HCU), the BCU performs a 3-4 second self-test of its functions before activating the solenoid valves (OV) to open for fuel ignition.

4.3.3.3.3.1.2 Trial for Ignition (TFI). After opening the solenoid valves, the BCU monitors the reading of the photocell located inside the fuel burner. If a flame is not established within 15 seconds after opening of the valves, the BCU will go into a "lockout" state, close the solenoid valves and illuminate the burner failure indication light. Reset by momentarily pressing the burner failure reset button on the control panel.

#### NOTE

If NGH has run out of fuel, burner failure light may illuminate during first start-up after refueling. Reset as above. Resetting once or twice will allow burner injection pump to bleed itself automatically.

4.3.3.3.3.1.3 Latch-up. If control locks out and is reset three (3) times during the same burner cycle, a latch-up state will occur. To reset the latch-up, push and hold the burner reset button down for 40 to 60 seconds, then release. The burner will restart automatically.

4.3.3.3.3.1.4 Loss of Flame. If, after a successful TFI, the flame is lost during normal burner "on" cycle for more than 1 to 2 seconds, the BCU will perform a 65 second recycle period and restart. Loss of flame may occur if there are air or water bubbles in the fuel, clogged nozzle, etc.

4.3.3.3.3.2 BCU Function Indicators. There are two indicator LED's on the BCU, visible only after opening the control box cover. For testing and troubleshooting see paragraph 5.8.10.1

4.3.4 TRAILER GROUP. The Viking 400 trailer group consists of the following parts (Refer to Figure 6-5).

- Main Wheels and Axle Assembly.
- Trailer Frame Assembly (left and right side carriers and front and rear beams).
- Towbar and Front Wheel Assembly.
- Engine Mounting Frame.
- Fuel Tank Bracket and Strap Assembly.
- Pintle Hook.

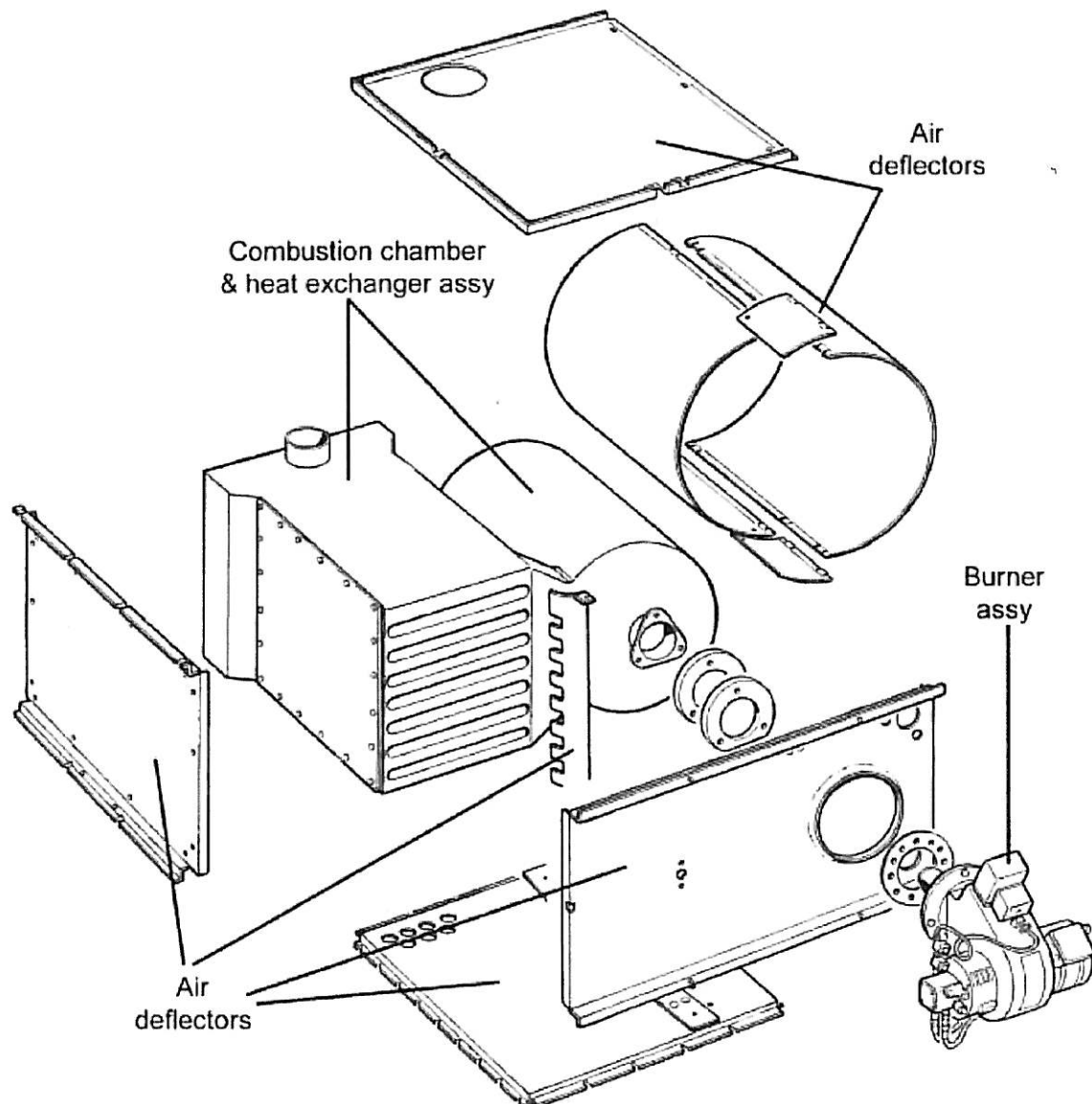


Figure 4-2. Combustion Key Components

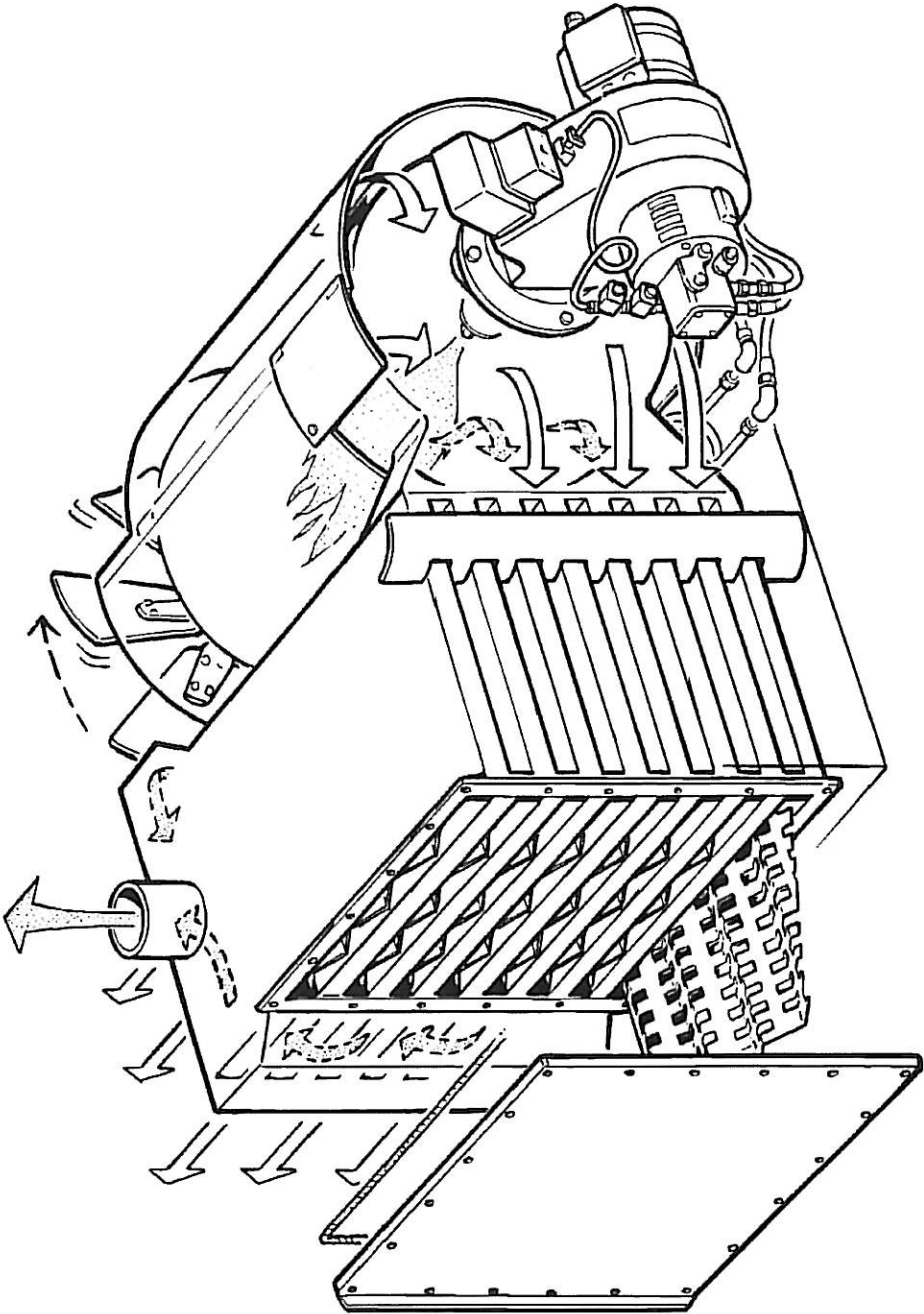


Figure 4-3. Combustion Air Flow

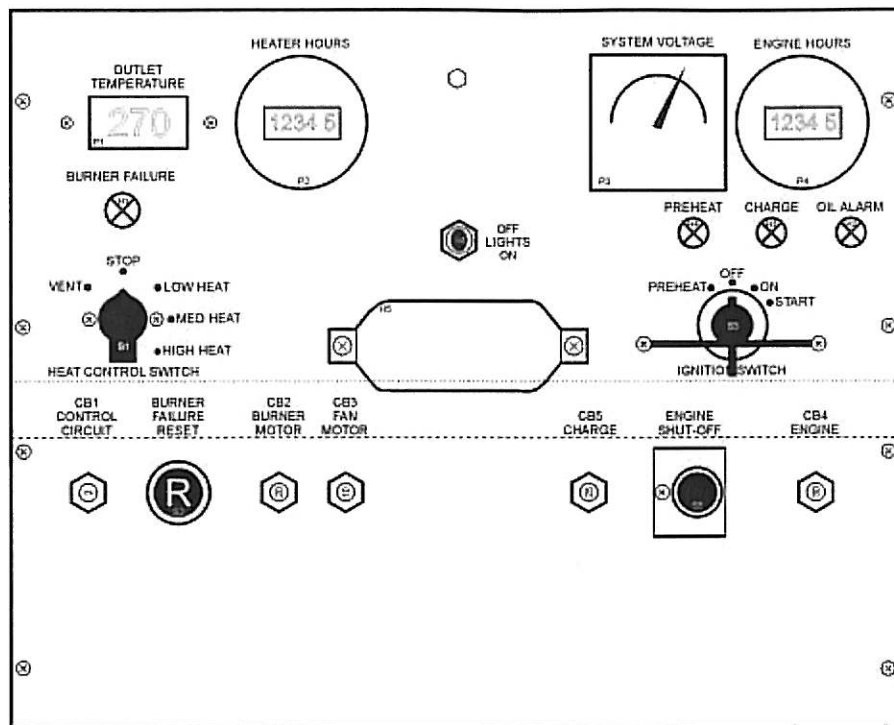


Figure 4-4. Control Panel (Front View)

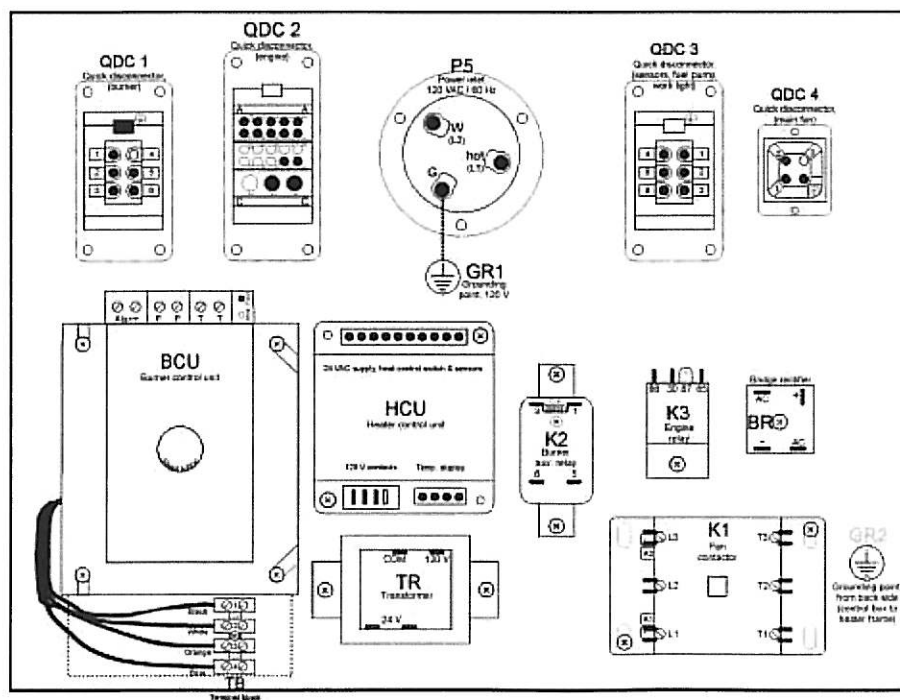


Figure 4-5. Control Panel (Rear View)

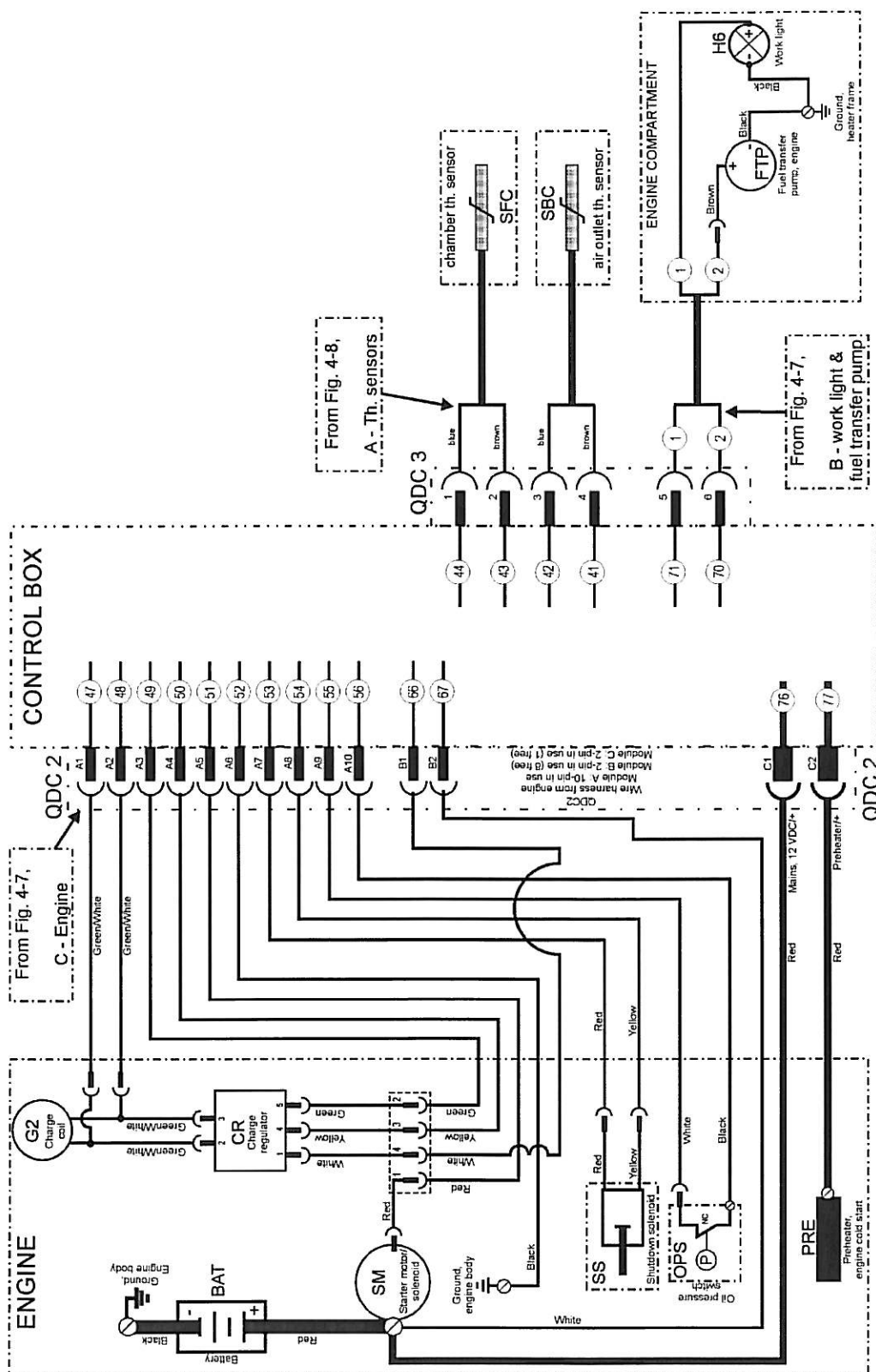


Figure 4-6. Engine/Alternator 12 VDC Electrical Schematic



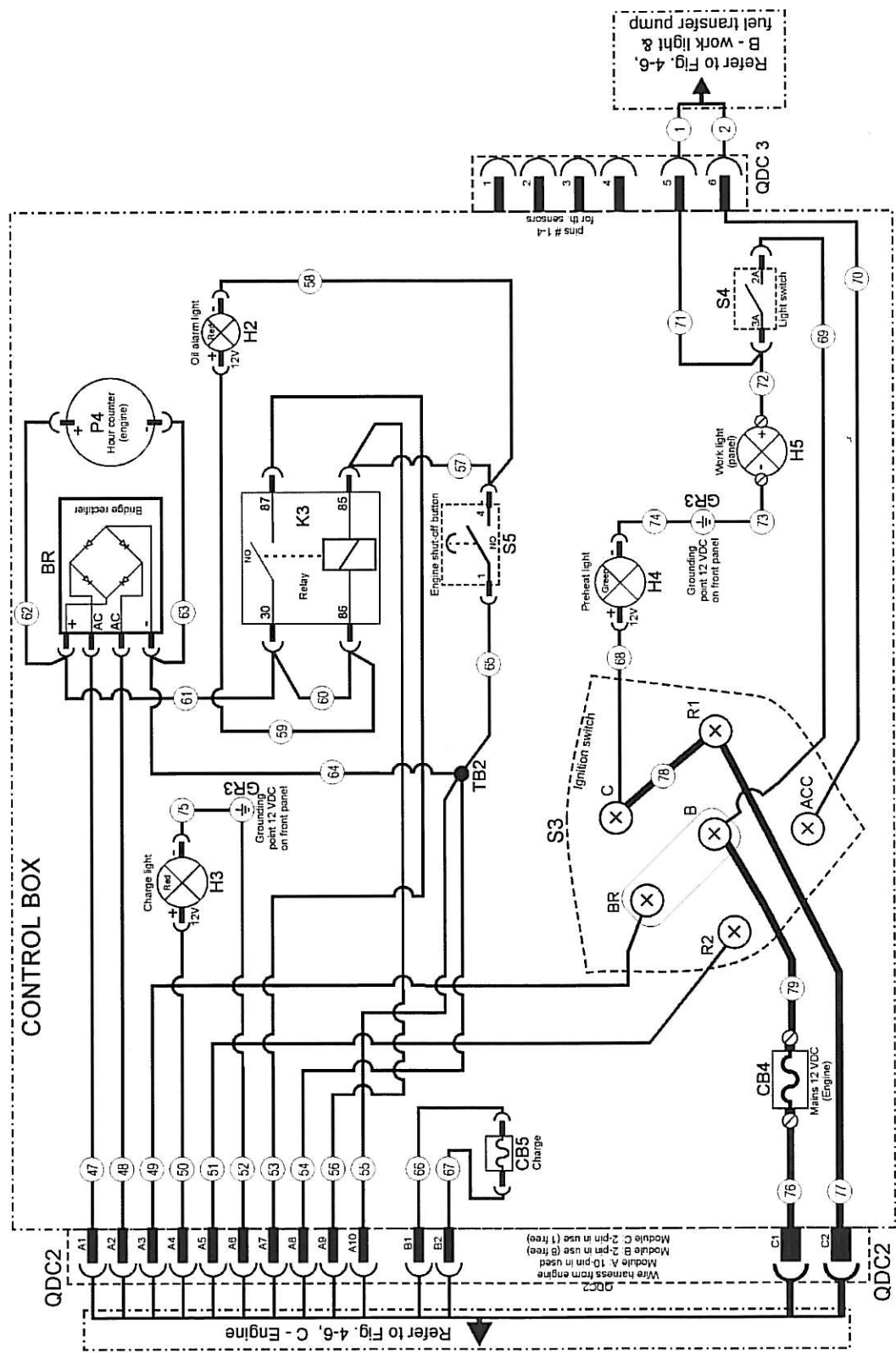
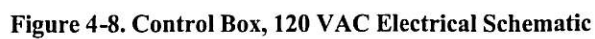


Figure 4-7. Control Box, 12 VDC Electrical Schematic



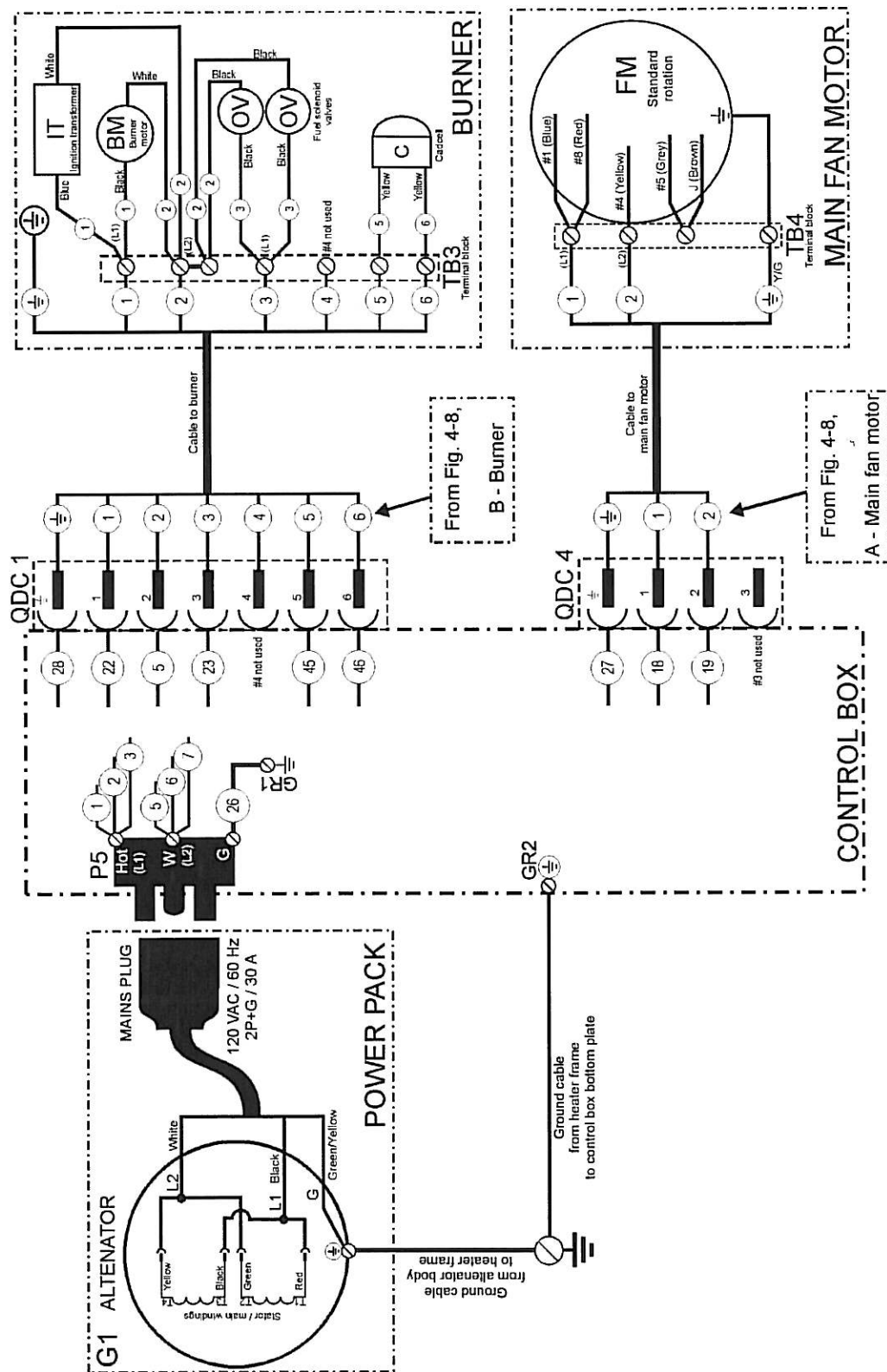


Figure 4-9. 120 VAC Wiring Cables/Quick Disconnects

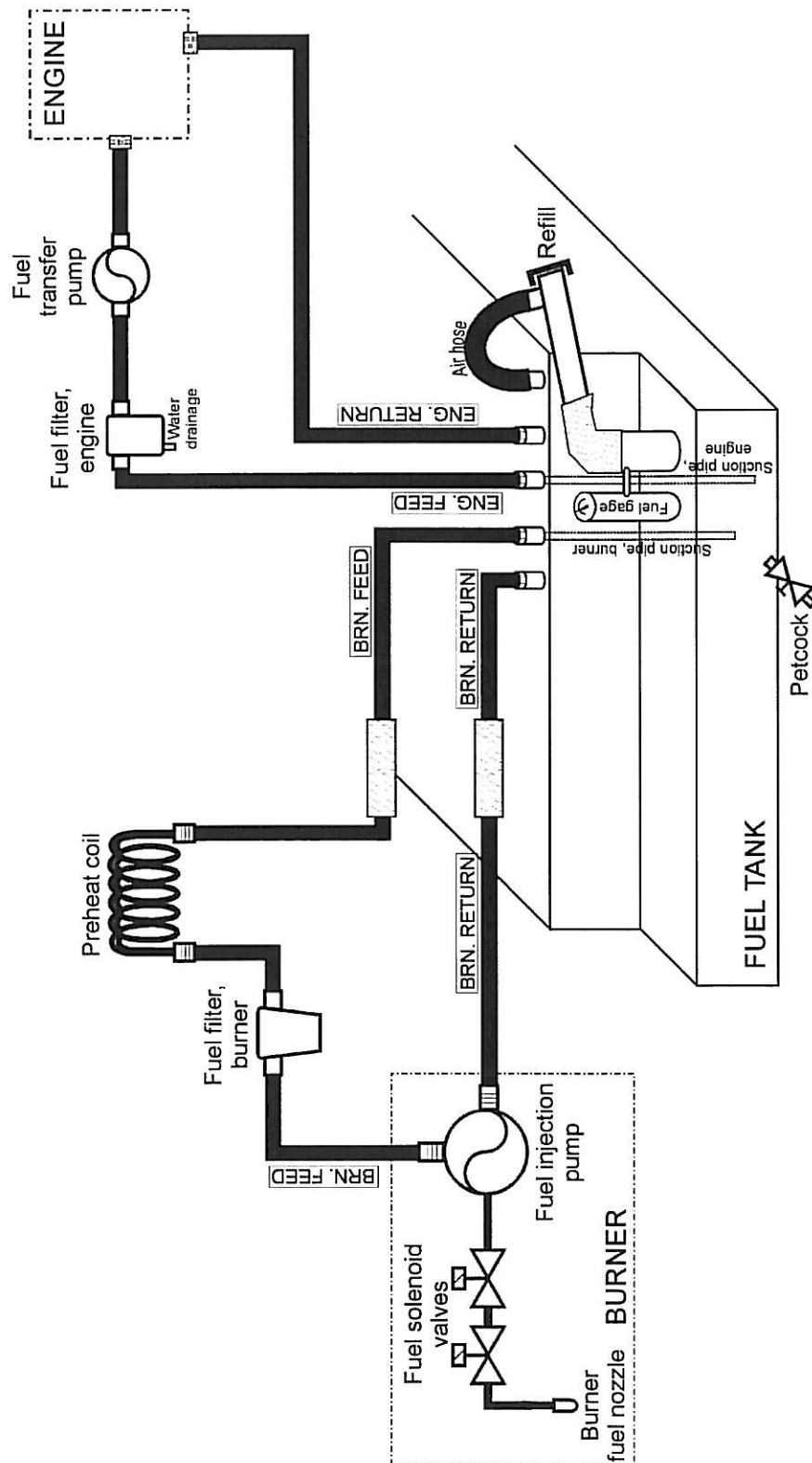


Figure 4-10. NGH Fuel System Diagram

#### 4.4 PRE-START INSTRUCTIONS.

##### **WARNING**

The Viking 400 is unsafe for operation in explosive atmospheres.

4.4.1 OPERATING CONTROLS AND INDICATORS. Opening the access panel on the left rear side provides access to the panel controls and indicators illustrated in Figure 4-4.

4.4.2 PRELIMINARY ADJUSTMENTS. Before operating the Viking 400, perform the following:

1. Select as level a location as possible. Out-of-level should not exceed eight degrees.
2. Set parking brakes.
3. If required, turn on panel light switch to illuminate engine compartment.
4. Check engine oil level.

##### **NOTE**

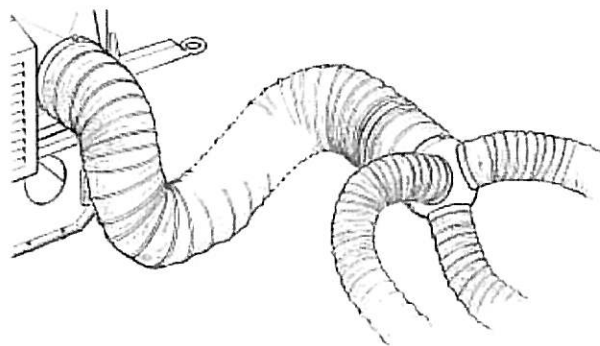
Remove yellow oil filler cap and allow oil level to settle before checking with dipstick.

5. Check fuel level (12, Figure 4-1) to ensure fuel supply is sufficient for planned duration of operation.
6. Do not operate heater without at least one 12-inch duct, or adapter with three 6 inch ducts installed, except during maintenance.
7. Connect air ducts between heater and space to be heated as shown in Figure 4-11.

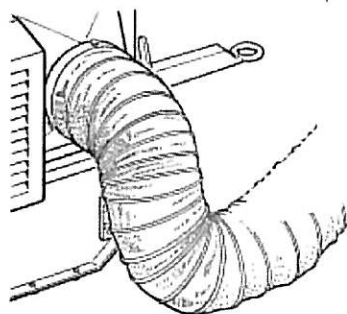
##### **NOTE**

Kinks in the air ducts impede airflow. Position ducts to avoid sharp bends or kinks.

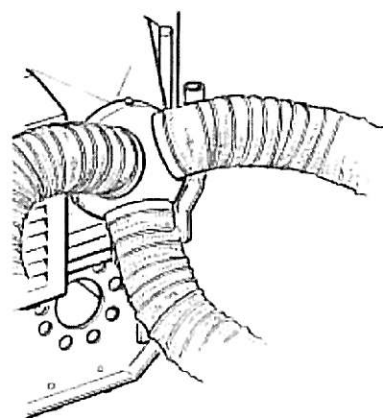
8. Install exhaust stacks.



12 INCH WITH ADAPTER AND 3x6 INCH DUCTS  
(6" DUCTS NOT INCLUDED IN FACTORY DELIVERY )



SINGLE 12 INCH DUCT



DUCT ADAPTER WITH THREE 6 INCH DUCTS  
(6" DUCTS NOT INCLUDED IN FACTORY DELIVERY )

Figure 4-11. Duct Attachment

## 4.5 OPERATION.

### WARNING

If Viking is operated inside a building, exhaust gases must be conducted to outside by means of a suitable exhaust vent system. Do not apply a forced-draft (suction) type exhaust system directly to heat exchanger exhaust. Utilize an exhaust hood (Table 2-1) or locally manufacture an exhaust vent adapter to mate with facilities exhaust venting system. The exhaust vent adapter must provide a minimum of 6 inches of free air space prior to entrance of forced draft exhaust vent system. Failure to comply could result in death or serious injury.

### CAUTION

- Do not allow Viking engine to run until fuel tank is dry and engine stops due to fuel starvation. Serious damage can occur from extended priming.
- Wear proper ear protection when operating Viking. Failure to comply can result in injury.
- Comply with Viking Pre-Start Instructions (paragraph 4.4) prior to operating Viking. Failure to comply can result in equipment damage.
- Immediately press engine Shut-Off button on control panel to prevent serious damage to engine in event of an emergency.

#### 4.5.1 ENGINE START-UP.

### CAUTION

- Do not use any type of starting aid. Failure to adhere to this will result in serious damage to engine.
- If ambient air temperature is 0°F or above and engine fails to start within 10 seconds of engaging starter, release ignition switch and wait a minimum of 15 seconds before attempting to start again. If ambient air temperature is -1°F to -9°F, engage starter motor for no more than one minute. If ambient air temperature is -10°F or lower, engage starter motor for no more than two continuous minutes. Failure to adhere to this could result in damage to starter motor and engine.

### NOTE

If ambient temperature is below 32°F, it will be necessary to hold ignition switch in "Preheat" position for a minimum of 45 seconds.

**4.5.1.1 Start-up Using Ignition Switch.** Open control panel cover (4, Figure. 1-1) and proceed as follows:

1. Push engine reset bar (14, Figure 4-4) to engage engine start lever.
2. Ensure exhaust stacks are installed.
3. Turn ignition switch to start engine. Do not release ignition switch from "START" position until engine is running.

**4.5.1.2 Start-Up Using Recoil Starter.** Open control panel cover (4, Figure. 1-1) and engine/generator access door (5, Figure 1-1) then proceed as follows

1. Push engine reset bar (14, Figure) to engage engine start lever.
2. Ensure exhaust stacks are installed.
3. Turn ignition switch to "on" position to start fuel transfer pump.
4. Pull recoil starter handle grip slowly until it feels tight to pull then let it back slowly.
5. Turn decompression lever (red lever at top of engine) to "non-compression" position. The decompression lever returns automatically when recoil starter handle is pulled.
6. Grip recoil starter handle with both hands and give a good, strong pull.

#### 4.5.2 HEATER START-UP.

### NOTE

Altitude changes can affect burner performance. Closely monitor ignition during initial start-up, and deployments requiring an altitude change.

1. Verify system voltage (120V) at voltmeter. Allow engine to run for one full minute prior to applying a load.



2. Turn Heat Control Switch to desired position as described in the following.

- a. Vent Mode. For unheated ventilating air.
- b. Low Heat. For 150°F-185°F output air.
- c. Med Heat. For 210°F-245°F output air.
- d. High Heat. For 270°F-305°F conditioned air.

3. Close and latch main control panel cover.

4. Heater will now operate automatically. Ensure there is enough fuel in fuel tank for planned operation period.

4.5.3 HEATER SHUT DOWN. Refer to Figure 4-4 and proceed as follows:

**CAUTION**

Do not stop engine until outlet temperature display message reads "OFF."

**NOTE**

Viking has an automatic after cooling function for combustion section. Main air fan will continue to operate until combustion section reaches a pre-set temperature.

- 1. Turn Heat Control Switch to "STOP".
- 2. Depress engine shut-off button.
- 3. Turn ignition switch to "OFF".
- 4. Turn off panel light.
- 5. Close and latch control panel cover.

**CAUTION**

Do not turn off the fuel supply or use the decompression lever to stop the engine. Doing so will damage the valve seats.

4.5.4 EMERGENCY/MANUAL SHUT DOWN. In the event of an emergency or electrical failure, raise engine access door (5, Figure 1-1) and depress engine stop lever.

4.5.5 ELECTRICAL START-UP.

- 1. Complete Pre-Start Instructions, Paragraph 4.4. Paragraph 4.4.2, step 5 may be omitted for electrical operation.
- 2. Raise Engine Access Door.
- 3. Disconnect 30 amp electrical twist-lock plug from power inlet (P5) on rear of control box.
- 4. Attach an external 120 VAC, 60Hz, 25 Amps min. power supply to power inlet (P5) on rear of control box.

**NOTE**

For details on external power cord assembly refer to Table 2-1.

- 5. Operate Viking in accordance with paragraph 4.5.2.

4.6 ELECTRICAL SHUT DOWN.

**CAUTION**

Do not disconnect external power supply until outlet temperature display message reads, "OFF" and main air fan has shut off automatically.

**NOTE**

Viking has an automatic after cooling function for combustion section. Main air fan will continue to operate until combustion section reaches a pre-set temperature.

- 1. Open main control panel cover.
- 2. Turn heater control switch to "STOP".
- 3. Raise engine access door.
- 4. Disconnect external power supply from connector (P5) on back of control box.
- 5. Connect 30 amp electrical twist-lock plug from alternator to P5 on back of control box.
- 6. Close engine access door.

## CHAPTER 5

### MAINTENANCE INSTRUCTIONS

**WARNING**

- Viking burner and engine must be turned off and allowed to cool before opening any covers for cleaning. Ensure adequate ventilation when using cleaning solvents. Avoid prolonged breathing of vapors and minimize skin contact. Wear approved personnel protective clothing and equipment.
- Compressed air used for cleaning purposes will not exceed 30 psi, and then only with approved personnel protective equipment.

5.2.2 EXTERNAL CLEANING. Clean externally of dust, dirt, and other impurities using a mild cleaning detergent. The NGH can be pressure washed externally. Avoid pointing pressurized water spray upward into louvers of engine compartment or fan cover walls. Also, do not direct pressurized spray on control panel cabinet and/or exhaust outlets.

5.2.3 INTERNAL CLEANING. To clean engine compartment, open engine cover hatch and brush dirt and dust from components using a soft bristle brush (a 3-inch paint brush is ideal).

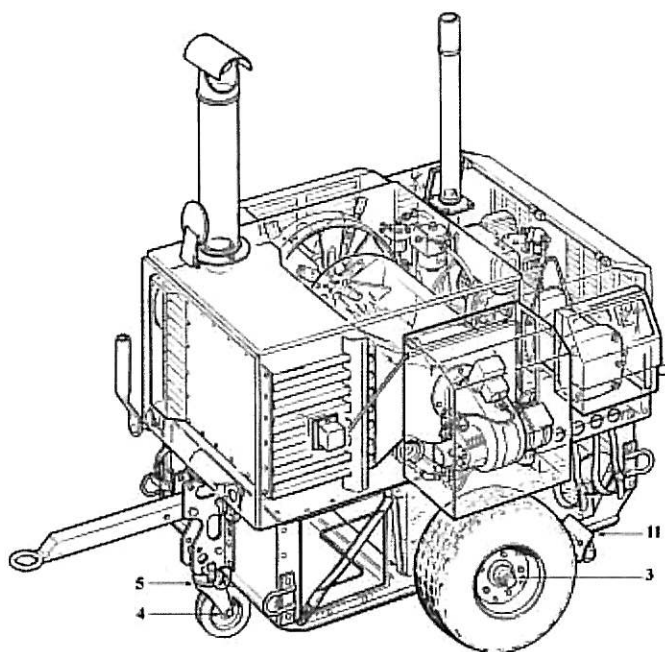
**CAUTION**

Do not pressure wash combustion chamber or heat exchanger.

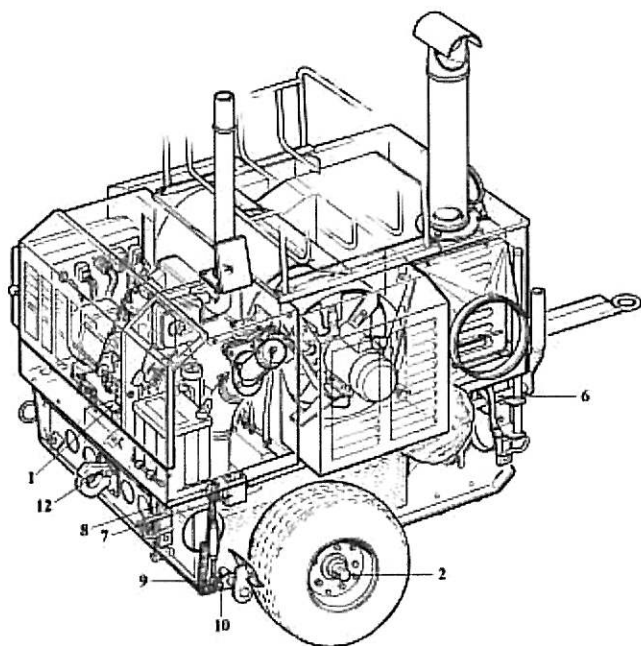
5.2.2.1 Dirt and dust can be blown away using compressed air, with a cleaning cloth (2, Table 2-2).

5.2.2.2 To clean inside of heat exchanger, remove front cover of heater, heat shield and exchanger cleaning cover. Pull out baffles from heat exchanger pockets. Loosen carbon deposits with a stiff brush and remove with vacuum cleaner.

5.2.2.3 The burner chamber does not normally require cleaning. However, to clean burner chamber, remove fuel burner. Loosen carbon deposits with a stiff wire brush and remove with vacuum cleaner. To clean burner and fan, remove burner and fan covers then clean parts with a cleaning cloth (2, Table 2-2).



Front and Left Side View



Rear and Right Side View

INDEX	ITEM	LUBRICANT
1	ENGINE CRANKCASE	ENGINE OIL
2	WHEEL BEARINGS, RIGHT	GREASE
3	WHEEL BEARINGS, LEFT	GREASE
4	CASTER WHEEL BEARING	MACHINE OIL
5	CASTER WHEEL SWIVEL BEARING	MACHINE OIL
6	BRACKET, FRONT, PARKING BRAKE	MACHINE OIL
7	BRACKET, REAR, PARKING BRAKE	MACHINE OIL
8	LINKAGE, UPPER, BRAKE ROD	MACHINE OIL
9	LINKAGE, LOWER, BRAKE ROD	MACHINE OIL
10	SLEEVE BEARING, BRAKE, RIGHT	MACHINE OIL
11	SLEEVE BEARING, BRAKE, LEFT	MACHINE OIL
12	PINTLE HOOK	MACHINE OIL
13	HINGE POINT (AS APPLICABLE)	MACHINE OIL

Figure 5-1. Lubrication Points

Table 5-1. Preventative Maintenance

OPERATION	MAINTENANCE PERIOD (Elapsed time since last maintenance)						
	Daily	20 Hours	100 Hours	500 Hours	1000 Hours	Six Months	12 Months
Engine Head Bolt Tightening				X			
Check/Add Engine Oil	X						
Change Engine Oil		X (1st)		X (2 <sup>nd</sup> and subsequent)			
Change Oil Filter				X			
Change Air Filter (Paper)				X			
Clean Engine Fuel Filter				X			
Change Engine Fuel Filter					X		
Check Injection Nozzle				X			
Check Injection Pump				X			
Check Valve Clearance of Intake and Exhaust Valves		X (1st)		X			
Check Access Covers/Panels							X
Check Air Ducts							X
Check Air Duct Adapter							X
Check Battery						X	
Check Caster Wheel						X	
Check Tires/Pressure						X	
Check Fuel Hoses/Lines/Fittings							X
Check Fuel Tank							X
Check Axle Assembly							X
Check Air Fan							X
Check Torque of Burner Flange Bolts (Ind. 34, Fig 6-9). Torque 160 inch pounds (1.8 kgm)			X				
Inspect/Replace Burner Ignitor Points				X			
Check Burner Head/Nozzle			X				
Replace Burner Nozzle					X		
Check Heater Combustion	X						
Check Burner CAD Cell						X	
Check Burner Fuel Filter				X			
Check Combustion Chamber							X
Check Heat Exchanger							X
Inspect/Replace Heat Exchanger Gasket				X			X
Perform CO Test						X	
Check Wheel Bearings/Hubs							X
Check Parking Brake Assy						X	

Table 5-2. Troubleshooting Chart (Sheet 1 of 4)

Trouble	Probable Cause	Remedy
<b>Engine Problems</b>		
Starter motor will not crank engine	<ol style="list-style-type: none"> <li>1. Battery discharged or defective.</li> <li>2. Battery discharged – charging system defective.</li> <li>3. Terminals dirty or loose.</li> <li>4. Wiring defective.</li> <li>5. Starter motor or solenoid defective.</li> <li>6. Start switch defective.</li> <li>7. Engine defective (seized).</li> </ol>	<ol style="list-style-type: none"> <li>1. Check battery and charge or replace.</li> <li>2. Check and charge battery. Isolate and repair fault.</li> <li>3. Check, clean, and tighten terminals.</li> <li>4. Inspect wiring and repair or replace.</li> <li>5. Test and repair or replace.</li> <li>6. Check and replace.</li> <li>7. Replace engine.</li> </ol>
Engine will not start or hard to start <ul style="list-style-type: none"> <li>• No fuel flow to fuel injection pump</li> <li>• No fuel flow through deliver valve of pump</li> <li>• Fuel not adjusted or injection not normal</li> </ul>	<ol style="list-style-type: none"> <li>1. Incorrect starting procedure.</li> <li>2. Fuel tank empty.</li> <li>3. Fuel filter clogged.</li> <li>4. Air in fuel pump.</li> <li>5. Delivery valve dirty or defective.</li> <li>6. Governor linkage adjustment incorrect.</li> <li>7. Fuel pump plunger defective.</li> <li>8. Nozzle valve sticking or worn.</li> <li>9. Injection pressure incorrect.</li> <li>10. Nozzle injection hole clogged.</li> </ol>	<ol style="list-style-type: none"> <li>1. Use correct starting procedure.</li> <li>2. Check fuel tank and fill.</li> <li>3. Check fuel filter and clean or replace.</li> <li>4. Prime and bleed air from system.</li> <li>5. Check and clean or replace.</li> <li>6. Check and adjust.</li> <li>7. Replace plunger and barrel (set).</li> <li>8. Clean or replace.</li> <li>9. Check and adjust with adjusting shims.</li> <li>10. Clean or replace.</li> </ol>
Pressure leak in cylinder head: <ul style="list-style-type: none"> <li>• Leak in intake and exhaust valves</li> <li>• Leak around fuel injection valve</li> <li>• Leak through gasket</li> <li>• Leak in crankcase</li> </ul>	<ol style="list-style-type: none"> <li>1. Valve head clearances incorrect.</li> <li>2. Valve seat or valve guides worn.</li> <li>3. Injection valve retainer not tighten properly.</li> <li>4. Heat insulating gasket defective.</li> <li>5. Cylinder head not tighten properly.</li> <li>6. Cylinder head gasket broken.</li> <li>7. Poor-quality lubricating oil.</li> <li>8. Piston ring sticking.</li> <li>9. Broken/worn piston ring.</li> <li>10. Broken piston ring lands or worn ring groove.</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace engine.</li> <li>2. Replace engine.</li> <li>3. Tighten or torque parts.</li> <li>4. Replace engine.</li> <li>5. Tighten or torque parts.</li> <li>6. Replace gasket.</li> <li>7. Change oil.</li> <li>8. Replace Engine.</li> <li>9. Replace Engine.</li> <li>10. Replace Engine.</li> </ol>
Engine starts, but soon stops or fires intermittently	<ol style="list-style-type: none"> <li>1. Water in fuel.</li> <li>2. Fuel filter partially blocked.</li> <li>3. Injector nozzle valve sticking.</li> <li>4. Air in fuel system.</li> <li>5. Air filter dirty.</li> <li>6. Valves sticking or not seating properly.</li> <li>7. Cylinder head gasket defective.</li> <li>8. Piston rings stuck in piston grooves.</li> <li>9. Cylinder or piston defective.</li> <li>10. Exhaust pipe obstructed.</li> <li>11. Fuel incorrect.</li> <li>12. Fuel leaks.</li> <li>13. Faulty injector.</li> </ol>	<ol style="list-style-type: none"> <li>1. Drain and flush fuel system then fill with clean fuel.</li> <li>2. Replace filter element. Clean fuel bowl.</li> <li>3. Clean or replace.</li> <li>4. Bleed fuel system.</li> <li>5. Replace air filter.</li> <li>6. Replace Engine.</li> <li>7. Replace gasket.</li> <li>8. Replace Engine.</li> <li>9. Replace Engine.</li> <li>10. Clean or replace.</li> <li>11. Drain and flush fuel system then fill with correct fuel.</li> <li>12. Check fuel lines. Tighten, repair, or replace.</li> <li>13. Replace nozzle or injector.</li> </ol>

Table 5-2. Troubleshooting Chart (Sheet 2)

Trouble	Probable Cause	Remedy
<b>Engine Problems (Continued)</b>		
Engine starts, but soon stops or fires intermittently	14. Injector pump timing incorrect. 15. Faulty injector pump. 16. Fuel line(s) kinked.	14. Time injector pump. 15. Replace injector pump. 16. Check and replace defective fuel lines.
Sudden Stop	1. Fuel tank empty. 2. Injector blocked or stuck. 3. Fuel line broken or cut. 4. Engine defective.	1. Fill fuel tank then bleed fuel system. 2. Replace injector. 3. Check fuel line and replace if damaged. 4. Replace engine.
Engine over-speeds	1. Governor lever adjustment incorrect. 2. Governor weight defective.	1. Check and adjust governor lever. 2. Check and repair or replace.
Overheating	1. Cooling system defective. 2. Valve clearance excessive. 3. Engine oil grade incorrect. 4. Injection pump timing incorrect.	1. Check cooling system is in good order and airflow is not obstructed. 2. Replace engine. 3. Drain oil and refill engine with correct type of oil to level mark. 4. Adjust timing.
Engine will not shut down using stop button	1. Voltage regulator defective or wet. 2. Oil pressure switch defective. 3. Relay (K3) defective. 4. Stator defective.	1. Repair or replace. 2. Repair or replace. 3. Repair or replace. 4. Repair or replace.
Abnormal engine exhaust smoke. Color: Black	1. Internal engine parts (pistons, crank bearings, etc.) seizure. 2. Fuel incorrect. 3. Injector timing too slow. 4. Nozzle sticking. 5. Nozzle valve seat worn or damaged. 6. Injection pressure too low. 7. Injection hole clogged.	1. Replace engine. 2. Drain and flush fuel system then fill with correct fuel. 3. Adjust by removing adjusting shims. 4. File or replace nozzle. 5. File or replace nozzle. 6. Replace injector pump. 7. Wash hole or replace nozzle.
Abnormal engine exhaust smoke. Color: Bluish-White	1. Fuel quality low. 2. Injection timing too slow. 3. Nozzle valve worn or damaged. 4. Injection pressure too low. 5. Injection hole clogged. 6. Air cleaner oil bath has too much oil. 7. Air filter element clogged. 8. Engine oil level too high. 9. Engine oil viscosity too low. 10. Engine cylinder defective (piston and/or rings, cylinder liner worn).	1. Drain and flush fuel system then fill with correct fuel. 2. Adjust by removing adjusting shims. 3. File or replace nozzle. 4. Replace injector pump. 5. Wash hole or replace nozzle. 6. Check oil level and reduce to oil line. 7. Replace air filter element. 8. Check oil level and reduce to correct level. 9. Drain and replace with correct type of oil. 10. Replace engine.
<b>Fuel Burner Problems</b>		
Fuel burner does not start	1. No power to control. 2. Burner control in lockout (Burner Failure Light is ON). 3. CAD cell dirty or defective. 4. Burner motor assembly seizing.	1. Check for proper alternator voltage or reset burner motor circuit breaker. 2. Press burner failure reset button for 1 second. 3. Clean and test CAD cell. Replace if defective. 4. Disassemble burner. Check fuel pump and electric motor. Replace if defective.

Table 5-2. Troubleshooting Chart (Sheet 3)

Trouble	Probable Cause	Remedy
<b>Fuel Burner Problems (Continued)</b>		
Fuel burner does not start (Burner Failure light not ON)	1. No power to burner control unit. 2. Burner motor defective.	1. Check power from alternator. 2. Check burner motor for failure or ice in burner fuel pump. Repair or replace.
Burner ignites, but shuts down after 15 seconds (Burner Failure light is ON)	1. CAD cell is dirty or defective. 2. Fuel line defective (air leak). 3. Fuel nozzle defective. 4. Airflow excessive. 5. Fuel solenoids (OV) stuck closed. 6. Ignitor module defective. 7. Excessive back pressure (heater exhaust blocked).	1. Clean and test CAD cell. Ensure it is properly inserted. Replace if required. 2. Check fuel line is undamaged. Replace if required. Check connectors and fittings are tight. Bleed fuel system if required. 3. Clean fuel nozzle to remove clogs or replace. 4. Adjust air shutter. 5. Clean or replace. 6. Clean or replace. 7. Remove blockage. Readjust combustion head and air shutter if required.
<b>NOTES</b> When Burner Failure Light is ON for any reason, push Burner Failure Reset button to Restart. After two unsuccessful attempts to start heater by resetting burner, Burner Control Unit will go into lock-out. Press reset button and hold for one minute to allow control unit to perform a self-test and reset		
Burner starts with a loud "Puff" or fails to start	1. Fuel/air mixture to lean.	1. Adjust burner air setting and/or burner injector pump pressure.
Burner produces black or dark gray smoke. Soot collecting inside exhaust stack	1. Fuel/air mixture to rich.	1. Adjust burner air setting and/or burner injector pump pressure.
<b>Heater Problems</b>		
Control panel display shows blinking LO	1. Burner start failure.	1. Reset by turning Heater Main Switch momentarily to STOP position then back to heating position.
Control panel display shows blinking HI	1. Overheating condition.	1. Allow main air fan to run for about five minutes to cool down burner section. Reset by turning Heater Main Switch to STOP position then back to heating position.
Control panel display shows blinking LO. Resetting Heater Main Switch does not correct problem	1. HCU defective. 2. Chamber thermostatic sensor (SFC) defective.	1. Replace HCU. 2. Test SFC. and replace sensor and restraint if defective (para 5.8.9).
Fan of heater does not start when supply voltage is OK	1. Circuit breaker (control circuit, burner motor, or fan control) tripped off.	1. Reset circuit breaker.
Control Panel Display shows blinking HI. Heater main switch reset does not correct problem <b>NOTE</b> For HCU and thermostatic sensor functions, refer to para 4.3.3.3.	1. HCU defective. 2. Air outlet thermostatic sensor defective.	1. Replace HCU. 2. Test SBC. Replace sensor and restraint if defective (para 5.8.9).



Table 5-2. Troubleshooting Chart (Sheet 4)

Trouble	Probable Cause	Remedy
<b>Heater Problems (Continued)</b>		
Incorrect or fluctuating air temperature Maximum heat output not obtainable	1. HCU or air outlet thermostatic sensor defective. 2. Fuel system leak. 3. Burner fuel pressure too low. 4. Burner fuel injection pump defective. 5. Clogged or worn burner nozzle.	1. Replace HCU or air temperature sensor. 2. Inspect fuel lines. Replace damaged fuel lines. Tighten loose fitting or connections. 3. Adjust fuel pressure to 175 PSI. 4. Inspect and replace. 5. Inspect and replace.
<b>Alternator Problems</b>		
No voltage from alternator, with no load when starting	1. Loss of residual magnetism. One rotor diode failure or short circuit. 2. Capacitor defective. 3. One rotor diode failure or short circuit. 4. Loose connections or short circuit in winding.	1. Apply a battery 4.5V to capacitor terminals. Load alternator and run engine at nominal speed for a few seconds. 2. Replace. 3. Replace two diodes on rotor. 4. Check resistance of coils. Replace if damaged.
Low alternator voltage (<80%) with no load	1. Engine speed too low. 2. Rotor diode failure or short circuit. 3. Short circuit in winding.	1. Adjust engine speed IAW T.O. 38G1-90-1 (Alternator frequency 62 Hz). 2. Replace two diodes on rotor short circuit. 3. Check resistance of coils. Replace if damaged.
Alternator voltage too high, without load	1. Engine speed too high.	1. Adjust engine speed per TO 38G1-90-1 (Alternator frequency 62 Hz.).
Alternator voltage correct with no load, low with load	1. One rotor diode failure or short circuit. 2. Engine speed drops.	1. Change two diodes on rotor. 2. Check value of load (Amp draw).
Alternator overheats	1. Ventilator holes partially blocked.	1. Dismantle and clean stator.

## 5.6 REMOVAL AND DISASSEMBLY.

5.6.1 GENERAL. Except as otherwise noted, the Illustrated Parts Breakdown (IPB) will serve as the reference for part location and identification in the following procedures. In general, complete disassembly is not required for all maintenance and repair.

### WARNING

Never attempt removal of parts from Viking until heater has been allowed to cool and battery has been disconnected.

## 5.6.2 REMOVAL OF COVERS.

1. Remove main air fan cover (21, Figure 6-3), as follows:

- a. Remove bolts (18), lock washers (19), and flat washers (20) from main air fan cover (21).
  - b. Lift main air fan cover (21) from lip (25).
2. Remove fuel burner cover (43) as follows:
    - a. Release latch (41) from fuel burner cover (43).
    - b. Lift fuel burner cover (43) from lip (47).
  3. Remove bolts (1), lock washers (2), flat washers (3) and duct basket (4) from top cover (5).
  4. Remove bolts (13), lock washers (14), flat washers (15), mobility placard (17) and front panel (16).
  5. Remove top cover (80) and compartment hatch (57) as follows:

- a. Remove rubber stop (81), bolts (74), lock nuts (76), and flat washers (75) from left side of top cover (80).
- b. Remove bolts (74), lock nuts (76), and flat washers (75) from right side of top cover (80).
- c. Remove bolt (77), lock washer (78), and flat washer (79) from top cover (80).
- d. Loosen, but do not remove, seven bolts (1) from rear side of top cover (5).
- e. Lift and pull backwards to remove top cover (80) and compartment hatch (57).

#### 5.6.3 TOWBAR HITCH AND CASTER ASSEMBLY.

1. Remove detent pin (19, Figure 66). Remove lock nut (8), washer (7), bolt (6) and towbar hitch (9) from bracket (5).
2. Remove caster assembly (17) as follows:
  - a. Place jack stands under front corners of trailer.
  - b. Remove detent pin (18). Remove lock nut (12), washer (11), bolt (10), wheel block (13) and caster assembly (17) from bracket (5).
  - c. Remove lock nut (16), flat washer (15), bolt (14) and wheel block (13) from caster assembly (17).

#### 5.6.4 BATTERY AND BATTERY MOUNTING.

1. Remove nuts (104, Figure 6-5), washers (105) and battery cables (106 and 107) from terminals of battery (108). Remove negative cable first to prevent arcing.
2. Remove lock nut (109), washer (110) and battery clamp (111).
3. Slide battery (108) from under two fixed battery clamps and remove from battery tray (112).

#### 5.6.5 CONTROL BOX ASSEMBLY.

1. Remove battery cables (paragraph 5.6.4).
2. Remove four plugs on wiring harnesses (59, 60, 61 and 39, Figure 6-13) and twist-lock plug from mating connectors on plate assembly (42).
3. Remove ground wire (64) from plate assembly (42).
4. Remove top and bottom bolts (94, Figure 63), lock

washers (95) and flat washers (96) from cover bracket (93).

5. Remove control box assembly (Figure 6-12).

**5.6.5.1 Front Panel.** Remove bolts (1, Figure 6-12), lock washers (2) and front panel (3). Disassemble as follows:

1. Remove ignition switch (37) as follows:
  - a. Remove screws (35) and lock washers (36) from key retaining bar (38). Remove key retaining bar (38) with key.
  - b. Remove wires from ignition switch (37).
  - c. Remove retaining nut, flat washers and ignition switch (37) from front panel (3).
2. Remove engine hour meter (13) or heater hour meter (14) as follows:
  - a. Remove wires from hour meter (13 or 14).
  - b. Pull retaining clamp (13 or 14) from rear of hour meter. Remove hour meter from front panel (3).
3. Remove display assembly (5) as follows:
  - a. Remove display wiring harness from heater control unit (13, Figure 6-13).
  - b. Remove screws (4, Figure 6-12), washers (6), lock nuts (7) and display assembly (5) from front panel (3).
4. Remove volt meter (8) as follows:
  - a. Remove wires from volt meter (8).
  - b. Remove nuts, retaining bar, and volt meter (8) from front panel (3).
5. Remove heat control switch (33) as follows:
  - a. Loosen setscrew then remove switch knob (32) from heat control switch (33).
  - b. Remove wires from heat control switch (33).
  - c. Remove screws (33) and heat control switch (33) from front panel (3).
6. Remove panel light (31) as follows:
  - a. Remove screws (24), lock washers (25) and panel light reflector (26) from texts plate (44).

- b. Remove light dome, retainer and panel light bulb (30) from front panel (3).
  - c. Remove wires, screws (27), flat washers (28) and nuts (29) from light assembly block.
  - d. Remove panel light (31) from front panel (3).
7. Remove panel light switch (34) as follows:
- a. Remove quick disconnects from rear of panel light switch (34).
  - b. Remove retaining nut (34) and panel light switch (34) from front panel (3).
8. Remove indicators (9, 10, 11, or 12) as follows:
- a. Remove wires from indicator (9, 10, 11, or 12).
  - b. Depress locking wings and remove indicator (9, 10, 11, or 12) from front panel (3).
9. Remove circuit breakers (19, 20, 21, 22, or 23) as follows:
- a. Remove wires from circuit breaker (19, 20, 21, 22, or 23).
  - b. Remove retaining nut then pull circuit breaker (19, 20, 21, 22, or 23) from front panel (3).
10. Remove nut (15) and burner failure reset button (15) from front panel (3).
11. Remove engine shut-off button (16) as follows:
- a. Remove quick disconnects from rear and chrome shroud from front of engine shut-off button (16).
  - b. Pull shroud out together with red actuator then remove assembly from front panel (3).
  - c. Remove screw (17), button guard (18) and engine shut-off button (16) from front panel. (3).
- 5.6.5.2 Control Box Bottom Panel Assembly.** Remove front panel (3, Figure 6-12). Disassemble as follows:
1. Remove burner control unit (3, Figure 6-13) and related parts as follows:
- a. Remove wires from terminal board of burner control unit (3) and from burner control unit (3) and terminal block (6).
  - b. Remove screws (1), lock washers (2) and burner control unit (3) from plate assembly (42).
  - c. Remove nuts (5), screws (4) and terminal block (6) from support bracket (7). Remove support bracket (7) from plate assembly (42).
2. Remove heater control unit (13) as follows:
- a. Remove quick disconnects from heater control unit (13).
  - b. Remove screws (11), lock washers (12) and heater control unit (13) from plate assembly (42).
3. Remove transformer (10) as follows:
- a. Remove wires from transformer (10).
  - b. Remove screws (8), lock washers (9) and transformer (10) from plate assembly (42).
4. Remove fan contactor (25) as follows:
- a. Remove wires from fan contactor (25).
  - b. Remove screws (23), lock washers (24) and fan contactor (25) from plate assembly (42).
5. Remove burner failure control relay (16) as follows:
- a. Remove wires from burner failure control relay (16).
  - b. Remove screws (14), lock washers (15) and burner control relay (16) from plate assembly (42).
6. Remove engine relay (19) as follows:
- a. Remove wires from engine relay (19).
  - b. Remove screw (17), lock washer (18) and engine relay (19) from plate assembly (42).
7. Remove bridge rectifier (22) as follows:
- a. Remove wires from bridge rectifier (22).
  - b. Remove screw (20), lock washer (21) and bridge rectifier (22) from plate assembly (42).
8. Remove power inlet (58) as follows:
- a. Remove wires from power-inlet (58).

- b. Remove screws (56), lock washers (57) and power inlet (58) from panel assembly (42).
9. Remove quick disconnect (28) as follows:
- a. Loosen screws from QDC female module then pull insert out from housing and remove wires.
  - b. Remove screws (26), lock washers (27) and quick disconnect (28) from plate assembly (42).
10. Remove quick disconnect (31) as follows:
- a. Loosen screws from QDC female module then pull insert out from housing and remove wires.
  - b. Remove screws (29), lock washers (30) and quick disconnect (31) from plate assembly (42).
11. Remove quick disconnect (33) as follows:
- a. Remove screw and washer from side of housing then pull female insert out and remove wires.
  - b. Remove screw (32), washer (34), lock nut (35), and quick disconnect (33) from plate assembly (42).
12. Remove quick disconnect (38) as follows:
- a. Loosen screws in module frame from back of plate assembly (42) then remove wires from each end in control box.
  - b. Carefully pull module and all wires out from housing of QDC (38).
  - c. Remove screws (36), lock washers (37) and quick disconnect (38) from plate assembly (42).
13. Remove and disassemble light assembly (32, Figure 6-3) as follows:
- a. Remove light dome from light assembly (32). Remove wires and bulb.
  - b. Remove screws (30), lock nuts (31) and base of light assembly (32) from bracket (29).

**WARNING**

To avoid personal injury, be sure fuel system pressure has been removed before performing these procedures.

#### 5.6.6 FUEL FILTER ASSEMBLY AND TRANSFER PUMP.

1. Remove and disassemble engine fuel filter assembly (7, Figure 6-14) as follows:
  - a. Open drain valve (12) and drain fuel from fuel filter assembly (7) into a suitable container.
  - b. Disconnect inlet and outlet fuel hoses and drain fuel into a suitable container.
  - c. Remove bolts (1), lock washers (2), washers (3) and retaining bracket (4).
  - d. Remove fuel filter assembly (7) from mounting bracket (5).
  - e. Remove fittings (6) from fuel filter assembly (7).
  - f. Unthread filter cartridge (9) from filter housing (8). Remove bowl (11) and o-ring bowl (10) from filter cartridge (9). Remove drain valve (12) from bowl (11).
2. Remove fuel transfer pump (31) as follows:
  - a. Remove bolt (27), lock washer (28), flat washer (29) and negative wire from clamp (30).
  - b. Remove positive wire from fuel transfer pump (31).
  - c. Remove clamp (30) and fuel transfer pump (31).
  - d. Remove inlet and outlet fuel lines fuel transfer pump (31) and drain fuel into a suitable container.
  - e. Remove fittings (32 and 33) from fuel transfer pump (31).

#### 5.6.7 BURNER FUEL FILTER ASSEMBLY.

1. Remove burner fuel filter assembly (20, Figure 6-14) as follows:
  - a. Disconnect fuel hoses from fittings (18 and 19). Drain fuel into a suitable container.
  - b. Remove bolts (13), lock washers (14), washers (15) and retaining bracket (16).
  - c. Remove burner fuel filter assembly (20) from mounting bracket (17).
  - d. Remove fittings (18 and 19) from burner fuel filter assembly (20). Drain any fuel into a suitable container.

2. Disassemble burner fuel filter assembly (20) as follows:

- a. Unthread filter bowl (26) from filter housing (21).
- b. Remove metal filter screen (24) from filter bowl (26).
- c. Remove o-ring bowl (22) and gaskets (23 and 25).

5.6.8 FUEL BURNER COMBUSTION HEAD ASSEMBLY AND FUEL NOZZLE.

1. Loosen screws on side of igniter (18, Figure 6-9) and open igniter (18).
2. Remove hose assembly (7) from elbow (8).
3. Loosen retaining nut (11). Lift and remove yoke (10) from adjusting screw (9) then pull out combustion head assembly.
4. Remove nozzle (14) from adapter assembly (13).

5.6.9 FUEL BURNER ASSEMBLY.

1. Remove fuel burner assembly (Figure 6-9) as follows:

- a. Remove burner power cable quick-disconnect (39, Figure 6-13) from back of control box.
- b. Mark then remove fuel hoses from burner pump assembly (1, Figure 6-9). Drain fuel into a suitable container.
- c. Remove bolts (34), lock washers (35), flat washers (36) and tube/flange assembly (37) from heater enclosure.
- d. Remove burner assembly.
- e. Remove gasket (38) from tube/flange assembly (37).

2. Disassemble fuel burner assembly as follows:

- a. Remove hose assembly (7), adapter assembly (13), ring assembly (15), and electrode assembly (16 and 17) from burner housing (33).
- b. Remove wires (#2 and #3) and solenoid wiring from terminal strip in junction box (24).
- c. Remove oil valves (5) and pump (1) from burner housing (33).

- d. Remove screw, lock washer, nut, and air band (2) from burner housing (33).
- e. Remove nut (22), washer (21), screw (20), clamp assembly (23) and junction box (24) from end of motor (30).
- f. Remove screws (28), washers (29), split tube (27), motor (30), blower wheel (31), and coupling (32) from burner housing (33).

5.6.10 PUMP.

1. Remove battery cables (paragraph 5.6.4).
2. Remove burner power cable quick-disconnect (39, Figure 6-13) from back of control box.
3. Remove flex hose (7, Figure 6-9) from fuel valve elbow (6).
4. Mark then remove fuel lines from pump (1).
5. Remove connectors (25), hoses (26) and solenoid wiring from junction box (24).
6. Remove bolts, lock washers and pump (1) from burner housing (33).
7. Remove fuel valves (5) and nipples (4) from pump (1).

5.6.11 FUEL VALVES.

1. Remove battery cables (paragraph 5.6.4).
2. Remove burner power cable quick-disconnect (39, Figure 6-13) from back of control box.
3. Remove flex hose (7, Figure 6-9) from fuel valve elbow (6).
4. Mark then remove fuel lines from pump (1).
5. Remove connectors (25), hoses (26) and solenoid wiring from junction box (24).
6. Remove nipples (4) and harnesses from fuel valves (5).

5.6.12 MAIN AIR FAN MOTOR.

1. Remove battery cables (paragraph 5.6.4).
2. Remove fan power cable quick-disconnect (61, Figure 6-13) from back of control box.
3. Remove fan cover (paragraph 5.6.2.1).

4. Disconnect power cable from main air fan motor (55, Figure 6-4).
5. Remove cable clamps (60) from braces (50 and 51).
6. Support motor (55). Remove bolts (47) and lock washers (48) from mount (49) and braces (50 and 51).
7. Remove motor (55), with blade (56) mount (49) and braces (50 and 51) attached, from fan housing (64). Remove motor as follows:
  - a. Loosen setscrew in blade (56) then remove blade (56) from motor (55).
  - b. Remove nuts (54), washers (53), bolts (52) and motor (55) from mount (49).
8. Remove bolts (61), lock washers (62), flat washers (63) and steel fan ring (64) from enclosure (90).

#### 5.6.13 GENERATOR SET.

1. Remove battery cables (paragraph 5.6.4).
2. Remove engine access door assembly (paragraph 5.6.2.5).
3. Remove quick disconnects from main control panel.
4. Remove alternator grounding cable (11, Figure 610) from chassis.
5. Remove shut-down solenoid (8, Figure 615) and oil pressure switch (3) wires.
6. Disassemble engine stop/run assembly as necessary to release stop cable (9, Figure 6-15) from engine end.
7. Disconnect inlet and outlet fuel lines from engine (plug or seal open fuel lines).
8. Remove heat panels (120 and 121, Figure 65) from engine compartment.
9. Remove bolts (84) and lock washers (85) from mount pads (86 and 87).
10. Remove bolts (80), flat washers (81) and lock nuts (83) from shock mount (82).
11. Lift generator set about two feet with lifting bar (20, Figure 610). Remove remaining wiring (starter motor, pre-heater, charge regulator, etc.) from back side of generator set.

12. Remove generator set from chassis.

#### 5.6.14 ALTERNATOR ASSEMBLY.

1. Remove alternator assembly (Figure 6-10) from engine as follows:
  - a. Remove bolts (13) from fan bracket (21) mounted on engine. See also Figure 5-2.
  - b. Carefully remove housing (15) and stator (16). Remove bolts (17 and 19), lock washers (18), lifting eye (20) and fan bracket (21).
  - c. Remove nut (22) and bolt (23) from end of engine crank shaft.
  - d. Support rotor (26) in one hand. Use a hide mallet to strike one pole face to loosen rotor (26) from crank shaft. Refer to Figure 5-3.
  - e. Remove bolts (17), lock washers (18) and flange (28) from side of engine.
2. Install alternator assembly on engine as follows:
  - a. Install flange (28) on engine with bolts (17) and lock washers (18). Tighten bolts to a torque of 190 inch pounds (2.2 kgm). Refer to Figure 5-3.
  - b. Mount rotor (26) on engine crankshaft then thread bolt (23) into crankshaft (long thread into crankshaft). Install lock nut (22) and tighten to a torque of 11.6 – 12.3 foot pounds (1.6 – 1.7 kgm). Refer to Figure 5-4.

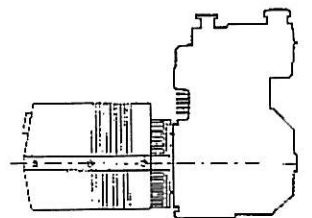


Figure 5-2. Alternator Removal

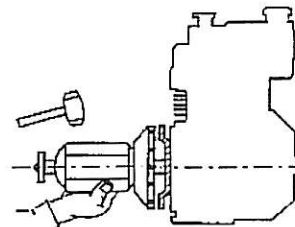
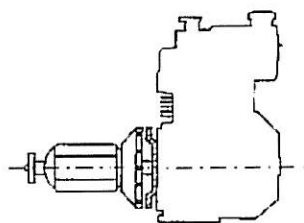


Figure 5-3. Rotor Removal



**Figure 5-4. Alternator Installation**

- c. Mount bracket (21, Figure 6-10) and lifting eye (20) on flange (28) with bolts (17 and 19) and lock washer (18). Tighten bolts (17 and 19) to a torque of 190 inch-pounds (2.2 kgm). Refer to Figure 5-4.
- d. Mount stator (16) and housing (15) with bolts (13) and lock washers (14). Tighten bolts (13) to a torque of 6.5 foot pounds (0.899 kgm).

#### 5.6.15 FUEL TANK.

1. Disconnect and remove battery (paragraph 5.6.4).
2. Drain fuel from fuel tank into a suitable container.
3. Remove fuel lines (1, 2, 3 and 4, Figure 6-7), clamps (5), filler hose (6), clamps (7) and air vent hose (8). Plug or seal open fuel lines.
4. Raise Viking and place one jack stand at each corner of frame.
5. Remove axle assembly (28, Figure 6-5) (paragraph 5.6.18).
6. Remove brake assembly (paragraph 5.6.17).

#### **CAUTION**

Fuel tank is heavy. Support tank to prevent dropping prior to removing tank straps.

7. Remove support cross braces (15, Figure 65) from beneath chassis.
8. Remove lock nuts (9, Figure 67) and washers (10) from fuel tank support straps (11) at rear end of chassis.
9. Remove lock nuts (12), flat washers (13) and bolts (14) from fuel tank support straps at front end of chassis. Remove straps (11) and bushings (15) from chassis.

10. Lower fuel tank (16) and remove from chassis.

#### 5.6.16 COMBUSTION CHAMBER AND HEAT EXCHANGER (Figure 6-4).

1. Remove top cover assembly (paragraph 5.6.2.3).
2. Remove front panel assembly (paragraph 5.6.2.4).
3. Remove burner cover (paragraph 5.6.2.2.).
4. Remove bolts (38), lock washers (39) and front deflector (40).

#### **WARNING**

Air deflector sheet metal is sharp. Wear protective gloves when handling.

5. Remove bolts (1), lock washers (2) and flat washers (3). Remove bolts (4), lock washers (5) and heated air deflector (6).
6. Remove bolts (27), flat washers (28), lock washers (30), lock nuts (31) from heat exchanger bracket (29).
7. Remove bolt (7), lock washer (8), bolts (10), lock washers (11) and flat washers (12) and heated air deflector (13).
8. Remove bolt (10), lock washer (11), flat washer (12) and heated air deflector (14).
9. Remove bolt (17), lock washer (18) and air deflector (19). Turn air deflector (19) counterclockwise to free lips from heat exchanger ports. Carefully lift up on air deflector (19).
10. Remove nut (26) and thermostatic sensor (25). Withdraw thermostatic sensor (25) prior to removal of heat exchanger/combustion chamber assembly (32).
11. Remove burner assembly (paragraph 5.6.9).
12. Remove gaskets (16) from between heat exchanger/combustion chamber assembly (32) and enclosure (90).



**WARNING**

- Heat exchanger/combustion chamber assembly is heavy. Use suitable lifting device or three people to move parts. Use a sling routed through topmost heat exchanger pocket to lift.
  - Support heater from rear by using jack stands before lifting combustion chamber and heat exchanger.
13. Remove bolts (83), lock washers (84), flat washers (85) and adjustment plates (86 and 87) from brackets (88 and 89).
  14. Lift combustion chamber flange off metal lip at burner port and allow heat exchanger/combustion chamber assembly (32) rest on bottom of compartment.
  15. Rotate (lift) heat exchanger end of assembly up to a vertical position.
  16. Lift heat exchanger/combustion chamber assembly (32) up and out of compartment.
  17. Remove heat exchanger baffle (37) as follows:

**WARNING**

Heat exchanger baffle sheet metal is sharp. Wear protective gloves when handling.

- a. Remove front panel (paragraph 5.6.2.4).
- b. Remove bolts (38), lock washers (39) and front air deflector (40).
- c. Remove brass nuts (33) and washers (34). Pull out heat exchanger plate (35). Leave gasket (36) on heat exchanger/combustion chamber assembly (32).
- d. Remove heat exchanger baffles (37).

5.6.17 Parking Brake Assembly.

1. Chock wheels and release brake lever (31, Figure 6-8).
2. Remove bolts (1), flat washers (2), lock nuts (3) and brake sleeve (8).
3. Remove lock nuts (9 and 13), flat washers (10 and 14), spring (15), turnbuckle assembly (17) and bushings (11) from brake rod assemblies (12 and 31).

4. Remove rod assembly (12) from chassis.
5. Remove lock nut (21), washer (20), bolt (19) and brake rod brace (22) from brake rod support (26).
6. Remove lock nuts (29), flat washers (28), bolts (27) and brake rod brace (30) from brake rod support (36).
7. Slide brake rod assembly (31) out of brake rod supports (26 and 36).

5.6.18 AXLE ASSEMBLY.

**CAUTION**

Do not place jack stands under fuel tank to support Viking.

1. Raise Viking and place one jack stand at each corner.
2. Remove lug nuts (33, Figure 6-5), tires (38) and wheel assemblies (36) from hubs (44).
3. Remove bolts (25), flat washers (26) and lock nuts (27) from both ends of axle assembly (28).

**WARNING**

Axle assembly is heavy and must be supported with a floor jack before removing attaching parts.

4. Remove lock nuts (14), washers (13) and bolts (12) from both ends of axle assembly (28) then lower axle assembly (28) from NGH.

5.6.18.1 Spindles and Hubs.

1. Raise Viking and place one jack stand at each corner.
2. Remove lug nuts (33), tires (38) and wheel assemblies (36) from hubs (44).
3. Remove lock nuts (31), washers (30), bolts (29), hub (44) and spindle (32) from axle assembly (28).

5.6.19 ENGINE. For engine disassembly, refer to T.O. 38G1-90-1.

## 5.7 REPAIR.

### WARNING

Welding operations produce heat, highly toxic fumes, injurious radiation, metal slag, and airborne particles. Protection equipment consisting of welding goggles with proper tinted lenses, apron/jacket, and welder's boots required. Good general ventilation is normally adequate.

5.7.1 WELDING. Cracks in structural members and wear from abrasion may be repaired by welding, utilizing proper shop practices.

## 5.8 ASSEMBLY, ADJUSTMENT, AND INSTALLATION.

### 5.8.1 GENERAL.

5.8.1.1 Except as otherwise indicated, the exploded-views in the Illustrated Parts Breakdown, Chapter 6, are used as reference for part identification and location in these procedures.

5.8.1.2 Unless otherwise specified, standard assembly and adjustment practices are to be used. For engine assembly, and adjustment procedures, refer to T.O. 38G1-90-1.

### 5.8.2 FUEL FILTER ASSEMBLY AND TRANSFER PUMP.

1. Assemble and install fuel filter assembly (7, Figure 6-14) as follows:
  - a. Insert o-ring (10) into groove of bowl (11). Hand thread bowl (11) on to bottom of filter cartridge (9) until tight. Install drain valve (12) in bowl (11).
  - b. Thread filter cartridge (9) on to filter housing (8).
  - c. Thread fittings (6) into filter housing (8).
  - d. Place fuel filter assembly (7) in slots of mounting bracket (5).
  - e. Install retaining bracket (4) on top of fuel filter assembly (7) and align holes. Insert bolts (1), with lock washers (2) and washers (3) installed, through retaining bracket (4) and tighten.
  - f. Connect inlet and outlet fuel lines to fittings (6).

2. Install fuel transfer pump (31) as follows:

- a. Thread fittings (32 and 33) into fuel transfer pump (31).
- b. Install fuel transfer pump (31) in clamp (30).
- c. Insert bolt (27), with lock washer (28), flat washer (29) and negative wire installed, through clamp (30) and tighten.
- d. Thread inlet and outlet fuel lines into fuel transfer pump (31).
- e. Connect positive wire to fuel transfer pump (31).

### 5.8.3 BURNER FUEL FILTER ASSEMBLY.

1. Assemble burner fuel filter assembly (20) as follows:

- a. Install filter screen (24), gaskets (23 and 25) and o-ring bowl (22) in filter bowl (26).
- b. Thread filter bowl (26) on to filter housing (21).
- c. Thread fittings (18 and 19) into filter housing (21).

2. Install burner fuel filter assembly (20) as follows:

- a. Install fuel filter assembly (20) in slots of bracket (17).
- b. Install bracket (16) on top of fuel filter assembly (20) and align holes. Insert bolts (13), lock washers (14) and flat washers (15) through bracket (16) and tighten.
- c. Attach fuel hoses to fittings (18 and 19).

5.8.4 CONTROL BOX ASSEMBLY. For electrical connections, refer to Figures 4-7 and 4-8.

#### 5.8.4.1 Front Panel. Assemble as follows:

1. Install ignition switch (37, Figure 6-12) as follows:
  - a. Install ignition switch (37) with flat washers in front panel (3). Install retaining nut and tighten.
  - b. Install key retaining bar (38) with key. Install screws (35) and lock washers (36) and tighten.
  - c. Attach wiring to ignition switch (37).

2. Install engine hour meter (13) or heater hour meter (14) as follows:
  - a. Place hour meter (13 or 14) on front panel (3) then install retaining clamp (13 or 14) on rear.
  - b. Attach wiring to hour meter (13 or 14).
3. Install display assembly (5) as follows:
  - a. Place display assembly (5) in position on front panel (3) then install screws (4), washers (6) and lock nuts (7) and tighten.
  - b. Attach display assembly wiring harness to heater control unit (13, Figure 6-13).
4. Install volt meter (8, Figure 6-12) as follows:
  - a. Place volt meter (8) on front panel (3) then install retaining bar and nuts.
  - b. Attach wiring to volt meter (8).
5. Install heat control switch (33) as follows:
  - a. Attach wiring to heat control switch (33).
  - b. Install heat control switch (33) on front panel (3) and secure with screws (33).
  - c. Install switch knob (32) on heat control switch (33) and tighten set screw.
6. Install panel light (31) as follows:
  - a. Install panel light (31) on front panel (3). Install screws (27), flat washers (28) and lock nuts (29) and tighten.
  - b. Install panel light bulb, retainer and light dome or front panel (3).
  - c. Install texts plate (44) and panel light deflector (26) on front panel. Install screws (24) with lock washers (25) and tighten.
  - d. Attach wiring to light assembly block.
7. Install panel light switch (34) as follows:
  - a. Install panel light switch (34) in front panel (3). Install retaining nut (34) and tighten.
  - b. Attach quick disconnects to panel light switch (34).

8. Install indicators (9, 10, 11, or 12) as follows:
  - a. Install indicator (9, 10, 11, or 12) into front panel (3) until locking wings engage.
  - b. Attach wiring to indicator (9, 10, 11, or 12).
9. Install circuit breakers (19, 20, 21, 22, or 23) as follows:
  - a. Install circuit breaker (19, 20, 21, 22, or 23) in front panel (3). Install retaining nut and tighten.
  - b. Attach wiring to circuit breaker (19, 20, 21, 22, or 23).
10. Install burner failure reset button (15) in front panel (3) then install nut and tighten.
11. Install engine shut-off button (16) as follows:
  - a. Install button guard (18) on front panel (3). Install screw (17) and tighten.
  - b. Install engine shut-off button (16), shroud and red actuator on front panel (3).
  - c. Attach wiring to engine shut-off button (16).

**5.8.4.2 Control Box Bottom Panel Assembly.** Assemble as follows:

1. Install burner control unit (3, Figure 6-13) as follows:
  - a. Place burner control unit (3) on support bracket (7) so terminals are on top with four colored wires passing through hole on left side of support bracket (7).
  - b. Insert screws (1) with lock washers (2) through parts and tighten to plate assembly (42).
  - c. Attach four colored wires from BCU (3) terminal board (6) and five red input wires to terminal board of BCU (3).
2. Install heater control unit (13) as follows:
  - a. Install heater control unit (13) on plate assembly (42). Install screws (11) with lock washers (12) and tighten.
  - b. Attach quick-disconnects to heater control unit (13).

3. Install transformer (10) as follows:
  - a. Install transformer (10) on plate assembly (42). Install screws (8) with lock washers (9) and tighten.
  - b. Attach wiring to transformer (10).
4. Install fan contactor (25) as follows:
  - a. Install fan contactor (25) on bottom plate (42). Install screws (23) with lock washers (24) and tighten.
  - b. Attach wiring to fan contactor (25).
5. Install burner failure control relay (16) as follows:
  - a. Install burner failure control relay (16) on plate assembly (42). Install screws (14) with lock washers (15) and tighten.
  - b. Attach wiring to burner failure control relay (16).
6. Install engine relay (19) as follows:
  - a. Install engine relay (19) on plate assembly (42). Install screw (17) with lock washer (18) and tighten.
  - b. Attach wiring to engine relay (19).
7. Install bridge rectifier (22) as follows:
  - a. Attach wiring to bridge rectifier (22).
  - b. Install bridge rectifier (22) on plate assembly (42). Install screw (20) with lock washer (21) and tighten.
8. Install power inlet (58) as follows:
  - a. Install power inlet (58) on plate assembly (42). Install screws (56) with lock washers (57) and tighten.
  - b. Attach wiring to power inlet (58).
9. Install quick disconnect (28) as follows:
  - a. Install quick disconnect (28) on plate assembly (42). Install screws (26) with lock washers (27) and tighten.
  - b. Attach wiring then install insert on connector housing. Install screws and tighten.
10. Install quick disconnect (31) as follows:
  - a. Install quick disconnect (31) on plate assembly (42). Install screws (29) with lock washers (30) and tighten.
  - b. Attach wiring then install module on connector housing. Install screws and tighten.
11. Install quick disconnect (33) as follows:
  - a. Install quick disconnect (33) on plate assembly (42). Install screws (32), with lock washers (34), lock nuts (35) and tighten.
  - b. Attach wiring then install module on connector housing. Install screw and washer from side of housing and tighten.
12. Install quick disconnect (38) as follows:
  - a. Install quick disconnect (38) on plate assembly (42). Install screws (36) with lock washers (37) and tighten.
  - b. Attach wiring then install module on connector housing. Install screws and tighten.
  - c. Attach wiring to each part in control box as required.
13. Install suspension retainers (48) and lock nuts (49) on top of control box frame (50).
14. Place assembled front panel (3, Figure 6-12) on control box assembly. Install screws (1) with lock washers (2) and tighten.
15. Install control box assembly as follows:
  - a. Install control box assembly in cover bracket (93, Figure 6-3). Install bolts (94) with lock washers (95) and flat washers (96) in cover bracket (93) and tighten.
  - b. Attach ground wire (64, Figure 6-13) to back of control box assembly.
  - c. Attach four plugs on wiring harnesses (59, 60, 61, and 39) and twist-lock plug to mating connectors on plate assembly (42).
16. Assemble and install lamp assembly (32, Figure 6-3) as follows:
  - a. Install base of light assembly (32) on bracket (29). Install screws (30) with lock nuts (31) and tighten.

- b. Attach wiring and install bulb to base of light assembly (32).
- c. Press light dome into place on base of light assembly (32).

#### 5.8.5 COMBUSTION CHAMBER AND HEAT EXCHANGER.

##### **WARNING**

- The combustion chamber/heat exchanger assembly weighs approximately 100 pounds. Use a suitable lifting device or 3 or more people to safely install the combustion chamber/heat exchanger.
  - Wear protective gloves when handling air deflector sheet metal.
1. Lift assembly (32, Figure 6-4) in a vertical position with heat exchanger up.
  2. Position assembly over enclosure and lower, resting combustion chamber flange on metal lip at burner port.
  3. Rotate heat exchanger end down allowing it to rest in its proper position.
  4. Install gaskets (16) between combustion chamber and burner port.
  5. Install burner assembly (paragraph 5.8.6).
  6. Install rear heat deflector (14, Figure 6-4) around combustion chamber. Install bolt (10), with lock washer (11) and flat washer (12) and tighten.
  7. Install front heat deflector (13) around combustion chamber and deflector bottom plate (15). Install bolt (10), with lock washer (11) and flat washer (12) and tighten.
  8. Attach top halves of front and rear heat deflectors to each other. Install deflector plate (9), bolt (7) and lock washer (8).
  9. Install heat exchanger bracket (29). Install bolts (27), with flat washers (28), lock washers (30) and nuts (31) and tighten.

##### **CAUTION**

Ensure air deflector (19) is installed correctly. An improperly installed or missing air deflector will cause airflow to be inadequate and result in severe overheating of heat exchanger. Failure to comply with this caution voids all combustion component warranties.

10. Install air deflector (19) by installing peg into slot at bottom of compartment. Turn air deflector clockwise to insert deflector lips into heat exchanger ports. Install bolt (17), with lock washer (18) and tighten.
11. Assemble heat deflectors (13 and 14) together with top air deflector (6). Install bolts (1), with lock washers (2) and flat washers (3), and tighten.
12. Install top air deflector, bolts (4) and lock washers (5).
13. Install front deflector (40), bolts (38) and lock washers (39).
14. Install front panel assembly (paragraph 5.8.16).
15. Install top cover assembly (paragraph 5.8.16).

##### **CAUTION**

The length of protruding lips in air adjustment plates define correct opening for airflow between heat exchanger end and air adjustment plates. Disregarding installation instructions voids combustion component warranty and may result in severe combustion component damage.

16. Install air adjustment plates (86 and 87, Figure 6-4) on brackets (88 and 89). Install bolts (83) with lock washers (84) and flat washers (85) and tighten. To adjust air adjustment plates, refer to paragraph 5.9.8).
17. Install burner cover (paragraph 5.8.16).

#### 5.8.5.1 Heat Exchanger Baffles. Assemble as follows:

##### **WARNING**

Air deflector and baffle sheet metal is sharp. Wear protective gloves when handling.

1. Push baffles (37, Figure 6-4) into heat exchanger slots. Ensure position of baffles is as shown in Figure 6-4 with left side of baffle aligned with left edge of slot opening.
2. Install heat exchanger plate (35). Install brass nuts (33) with flat washers (34) and tighten. Ensure gasket (36) is intact and aligned with heat exchanger flange.
3. Install front air deflector (40). Install bolts (38) with lock washers (39) and tighten.

#### 5.8.6 FUEL BURNER ASSEMBLY.

1. Install coupling (32, Figure 6-9), blower wheel (31) and motor assembly (30) on burner housing (33).
2. Install air tube/flange assembly (37).
3. Attach burner junction box (24) with clamp assembly (23) to motor assembly (30).
4. Install air band (2) on burner housing.
5. Attach fuel solenoid valves (5) and fuel pump assembly (1) to burner assembly.
6. Install electrode assembly (16 and 17), retention ring assembly (15), and nozzle line (13) in burner housing.
7. Insert air tube/flange assy in burner housing with air tube against shoulder in housing. Install setscrew and tighten.
8. Loosen clamping screw on retention ring assembly (15), slide retention ring off adapter then install fuel nozzle. Install and tighten proper nozzle (14) (Table 5-3) in adapter. Be careful not to damage electrode insulators or bend electrodes.
9. Replace retention ring assembly, slipping one riveted arm through 1/8-inch gap between electrode ends. Top arm should be straight up. Also ensure retention ring clamp is tight against shoulder on adapter then tighten clamping screw.
10. Check electrode settings specified as follows: 1/8-inch gap, 1/4-inch gap above nozzle centerline, and 1/4-inch ahead of nozzle tip. Refer to Figure 5-5.
11. Swing open igniter (18), and slide nozzle line assembly into burner housing (33) and air tube/flange assy (37).
12. Place nozzle line yoke (10) in groove of adjusting screw (9). Install check nuts (11) and tighten.

13. Swing igniter (18) to closed position and fasten.

#### 5.8.6.1 Viking 400 Fuel Burner. Install as follows:

1. Slide end of air tube into combustion chamber opening. Insert bolts (34, Figure 6-9), with lock washers (35) and washers (36), through flange and into combustion group enclosure then tighten bolts to a torque of 160 inch pounds (1.8 kgm)
2. Connect flared fitting on braided fuel line (7) to nozzle line and tighten. Fuel pump is set @ 175 psi. For adjustment, refer to paragraph 5.9.5.

#### 5.8.7 BURNER FUEL PUMP.

1. Install bolts, lock washers and burner fuel pump (1, Figure 6-9) on burner housing. Tighten bolts to a torque of 130 inch pounds (1.5 kgm).
2. Install solenoid valves (5, Figure 6-9) to fuel pump.
3. Install braided fuel line (7) to solenoid valve elbow (6).

#### NOTE

Fuel burner uses a two-pipe system. When replacing fuel pump, insert delivered 1/16" by-pass plug to return port before attaching fuel lines.

4. Install two fuel lines to fuel pump.

#### 5.8.8 MAIN AIR FAN (Figure 6-4).

1. Assemble main air fan as follows:

- a. Install fan motor (55) on fan motor brackets (49, 50 and 51). Install bolts (52), with flat washers (53) and lock nuts (54), and tighten.
- b. Install air fan blade (56) on fan motor shaft then tighten set screw.

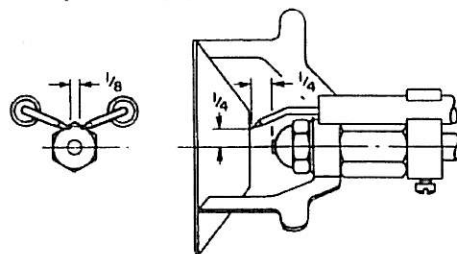
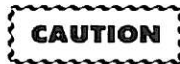


Figure 5-5. Igniter Gap Settings

2. Install main air fan as follows:



Ensure fan clearance is .140" +/- .010.

- a. Install steel fan ring (64) on housing with ring seam aligned with left or right hand slot in housing. Install bolts (61), with lock washers (62) and flat washers (63), and tighten.
- b. Attach fan motor brace assembly to housing. Install bolts (47), with lock washers (48), and tighten.
- c. Connect fan motor wiring harness to main control box socket.
- d. Attach cable clamps (60) to fan motor braces.

5.8.9 WHEEL ASSEMBLY. To assemble and disassemble wheel components, refer to Technical Order 1-1A-15.

#### 5.8.10 FUEL TANK.

1. Remove engine/generator cover, if required.
2. Raise Viking off ground and place a jack stand at each corner.



Fuel tank is heavy. Ensure tank is empty and use suitable lifting device to lift tank into place.

3. Lift fuel tank into place from beneath Viking.
4. Install fuel tank support straps (11, Figure 6-7). Rubber pads and strips (23) must be in place and adhered to tank surface. Two long strips (24) must be adhered to tank straps.
5. Install tank straps to tank braces (35). Install bolts (14) with bushings (15), washers (13) and lock nuts (12), and tighten.
6. Install rear end of tank straps (11), lock nuts (9) and washers (10) to rear end of Viking and tighten.
7. Install brake assembly (paragraph 5.8.12).
8. Install and secure support cross braces (15, Figure 6-5) at front and rear of heater.

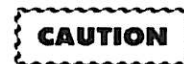
9. Install axle assembly (paragraph 5.8.13).

10. Install rear wheel assemblies.

11. Install fuel lines (1, 2, 3 and 4), filler hose (6), and air vent hose (8). Refer to Figure 6-7, sheet 2 for correct installation.

12. Install engine/generator cover (paragraph 5.8.16).

5.8.10.1 Fuel Tank Repair. Repair small pin holes or cracks in fuel tank as follows:



Fuel tank can not be repaired by welding. Use epoxy patch or soldering only.

1. Drain fuel to below holes or cracks. Remove paint, and clean area using crocus or emery cloth (3, Table 2-2)
2. Mix and apply epoxy patch to damaged area. Allow to cure in accordance with manufacturer's instructions.
3. Refill fuel tank. Check for leaks in or near repaired area(s).

#### 5.8.11 TOWBAR AND CASTER ASSEMBLY.

1. Place towbar (9, Figure 6-6) in position. Install bolt (6), washer (7), and lock nut (8) and tighten. Install locking T-pin (19).
2. Install caster assembly (17) as follows:
  - a. Install caster assembly (17) and wheel block (13). Install lock nut (16), flat washer (15) and bolt (14) and tighten.
  - b. Position caster assembly (17) on frame. Install bolt (10), washer (11), and lock nut (12) and tighten.
  - c. Install locking T-pin (18).

#### 5.8.12 PARKING BRAKE.

1. Install right side brake rod/handle assembly (31, Figure 6-8) into brake rod brackets (26 and 36).
2. Install brace (30) in front brake rod bracket (36). Install lock nuts (29), flat washers (28) and bolts (27) and tighten.



3. Install brace (22) in right rear brake rod bracket (26). Install bolt (19), washer (20) and lock nut (21) and tighten.
4. Install turnbuckle assembly (16 and 17) and spring (15).
5. Install bushings (11), flat washers (10 and 14) and lock nuts (9 and 13) on lower and upper brake rod (12 and 31).
6. Install brake sleeve adjustment assembly (7 and 8) on brake rod (12).
7. Install bolts (1), washers (2) and lock nuts (3) on left rear brake rod sleeve assembly (8) and tighten.

## 5.8.13 AXLE ASSEMBLY.

**CAUTION**

The axle assembly is heavy. Use suitable lifting device to lift axle assembly into place.

1. Raise Viking and place a jack stand under each corner.
2. Lift axle assembly (28, Figure 65) into place. Install bolts (25), flat washers (26), lock nuts (27) and bolts (12), flat washers (13) and lock nuts (14) on both end of axle assembly (28).
3. Install right and left wheel assemblies. Refer to Technical Order 1-1A-15, for details.
4. Lift Viking off jack stands, remove jack stands, and lower Viking.

## 5.8.14 BATTERY AND BATTERY MOUNTING.

**NOTE**

Red battery cable is attached to positive (+) terminal. Black battery cable is attached to negative (-) terminal. Be sure terminals are clean and securely connected. To prevent arcing, connect red battery cable first.

1. Place battery (108, Figure 6-5) on battery tray (112).
2. Install battery hold down clamp (111), flat washer (110) and lock nut (109) and tighten.
3. Connect battery cables (106 and 107) to battery terminals. Install nuts (104), with washers (105), and tighten.

## 5.8.15 GENERATOR SET.

1. Use lifting bar (20, Figure 6-10) to place engine/alternator assembly about two feet above chassis. Attach engine harness wiring to starter motor, pre-heater, charge regulator, etc. on back generator set.
2. Place engine end mount pads (86 and 87, Figure 6-5) on shock mounts (82). Install bolts (84) with lock washers (85) and tighten.
3. Install bolts (80), flat washers (81) and lock nuts (83).
4. Install upper and rear partition panels (120 and 121) in engine compartment.
5. Assemble engine Stop/Run cable assembly as necessary to lock stop cable on engine end.
6. Attach shutdown solenoid and oil pressure switch wires.
7. Attach alternator grounding cable (11, Figure 6-10) to chassis.
8. Attach inlet and outlet fuel lines to engine fuel ports.
9. Install engine access door assembly (paragraph 5.8.16). Check engine exhaust curve (109, Figure 6-3) is lined up in middle of opening in engine exhaust bracket (51). Reposition generator set, if necessary.
10. Attach quick disconnects to rear of control panel.
11. Connect battery cables (paragraph 5.8.14).

## 5.8.16 COVERS INSTALLATION.

1. Place upper lip of air fan cover (21, Figure 63) on panel lip (25) above air fan assembly. Install bolts (18), with lock washers (19) and flat washers (20) in bottom of cover and tighten.
2. Place upper lip of burner assembly cover (43) on panel lip (47) above burner assembly. Install locking rubber latch (41) on underside of burner cover (43).
3. Place top cover (5) and duct basket (4) in position. Install bolts (1) with lock washers (2) and washers (3), and tighten.
4. Place front panel (16) and mobility placard (17) in position. Install bolts (13), with lock washers (14) and washers (15), and tighten.

5. Install engine/generator covers as follows:

- a. Place top cover (80) and hatch (57) in position. Tighten bolts (1) on top cover (5).
- b. Install screw (77), with lock washer (78) and flat washer (79), in top cover (80) and tighten.
- c. Install bolts (74), washers (75) and lock nuts (76) on left and on right sides of engine/generator cover.
- d. Install door stop (81) in left side of panel (above control panel). Install washer (75) and lock nut (76).

## 5.9 TESTING AND ADJUSTING.

### WARNING

Failure to comply with these adjusting procedures may result in a personnel hazard or cause severe damage to NGH.

### NOTE

Failure to repair, maintain, or adjust NGH according to instructions voids all warranties.

**5.9.1 GENERAL.** The Viking will perform satisfactorily only if the various components are operating properly. The following paragraphs provide procedures for testing and adjusting these components.

**5.9.2 BURNER COMBUSTION.** Combustion efficiency and safety inside the Viking combustion chamber is the most important area of Viking performance and equipment safety. The cleanliness of combustion, efficiency, and reliable ignition are all highly dependant on the fuel/air mixture ratio produced by the fuel burner. The following conditions will require an adjustment of the fuel/air mixture:

**5.9.2.1 Rich Fuel Mixture.** Too much fuel in relation to volume of combustion air. Combustion will be incomplete because all fuel molecules do not reach oxygen. This results in "sooting" or "coking" and will cause carbon deposits buildup on the inner walls of combustion components and excess CO in the exhaust. Light visible smoke coming from the stack of a properly warmed up Viking is a clear sign of a rich fuel mixture.

**5.9.2.2 Lean Fuel Mixture.** Insufficient fuel in relation to combustion air. At worst, this can cause combustion components to explode as a result of fuel fumes collected inside the chamber and not being immediately ignited. A loud "puff" at every ignition is a clear sign of a lean fuel mixture.

**5.9.2.3 Afterburning.** Occurs when the burner has been turned to off position. If afterburning occurs, it indicates fuel valves haven't fully closed or there are air leaks in fuel feed line to burner. Isolate and repair as necessary.

## 5.9.3 FUEL/AIR RATIO ADJUSTMENT.

**5.9.3.1 General.** The amount of fuel delivered to the combustion chamber can be varied through changing the size of the fuel nozzle and by adjusting burner injection pump pressure. The design and size of the combustion chamber defines the maximum allowable amount of fuel injected. The maximum for the is 2.75 US GAL. per hour nozzle and 175 PSI pump pressure.

### NOTE

Exceeding these values voids the combustion component warranty.

**5.9.3.2 Adjustment.** The amount of combustion air delivered to the combustion chamber can be adjusted. This can be done with two different adjustments:

- Adjusting size of combustion air intake openings by turning air band (2, Figure 6-9)
- Adjusting free opening (dimension "A" in Figure 5-6) between air cone and retention ring (15) located at end of burner tube.

**5.9.3.3 Retention Ring and Air Shutter Adjustments.** Retention ring position ahead of air cone is adjustable from zero (flush) to 1-1/8 inches (Dimension "A" in Figures 5-6 and 5-7). Adjust retention ring and air shutter using the following procedures.

1. Turn adjusting screw (9, Figure 6-9) in (clockwise) to increase distance "A" ahead. This distance is indicated by scale on nozzle line across corners on sides of channel guiding nozzle line. Each division is 1/16". For details and to ensure correct adjustment, refer to Figure 5-7 and Table 5-3.
2. While turning air band (2, Figure 6-9) around openings in burner housing, make sure free area of openings is about 90 percent (about 1 9/16 inches). To confirm proper adjustment of air shutter, refer to Figure 6-9 and Table 5-3.

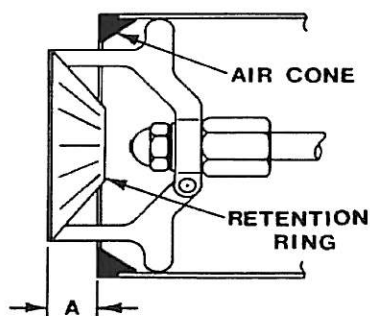


Figure 5-6. Burner Head Adjustment

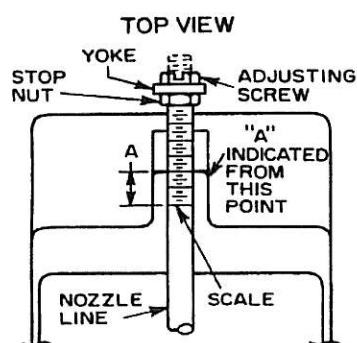


Figure 5-7. Retention Ring Adjustment

### WARNING

Do not open air shutter or increase retention ring distance "A" any more than required to get a minimum reading on smoke tester. Excessive air in combustion chamber may cause insecure ignition and result in a combustion chamber explosion.

### NOTE

Due to lower oxygen content at higher altitudes, it may become necessary to adjust air setting after altitude change to allow more air to enter combustion chamber.

- Set air shutter and retention ring position for operational altitude. If fire is a little too rich, move combustion head forward by increasing dimension "A" shown in Figures 5-6 and 5-7. A very slight change is usually enough. Run a smoke test (paragraph 5.9.14). The combustion mixture should be a little on the rich side to ensure a safe and secure ignition. On smoke tester scale, aim for between zero and 1.

- Check for good ignition and clean cut-off. If cut-off continues to be poor, look for air leaks in suction line and correct them.

Table 5-3. Retention Ring and Air Shutter Adjustment

Injection Pump Pressure PSI	Nozzle GPH	Retention Ring Setting, Inches on Scale, Dimension "A"	Air Shutter Opening (Percent)
175	2.75	1/8"	90

5.9.4 IGNITION POINT ADJUSTMENT. Adjust ignition points as shown in Figure 5-5.

5.9.5 BURNER FUEL PUMP ADJUSTMENT.

### CAUTION

The Viking is designed to operate with burner fuel pump pressure set at 175 PSI. Exceeding this pressure setting and can result in equipment damage and voids all warranty claims.

- With heater off, remove pressure gage outlet plug as shown in Figure 5-8.
- Connect pressure gage (0 – 200 PSI range) to pressure gage outlet port.
- Start heater according to proper starting instructions. Set heater switch to either LOW, MED or HIGH.
- Check fuel pressure reading on pressure gage. If reading does not reflect 175 PSI, adjust fuel pressure to 175 PSI by turning pump pressure adjustment screw.
- Turn heater off as described in operating procedures.
- Remove fuel pressure gage. Install and secure pressure gage outlet plug.

### WARNING

- Testing procedures must be followed accurately to avoid a false reading of carbon monoxide content.
- Heaters used on a seasonal basis shall be tested for CO in outlet air prior to being placed in service. If the heating season lasts longer than six months, a second test will be required. Heaters used throughout the year shall be CO tested every six months. Additional tests shall be made any time contamination is suspected.

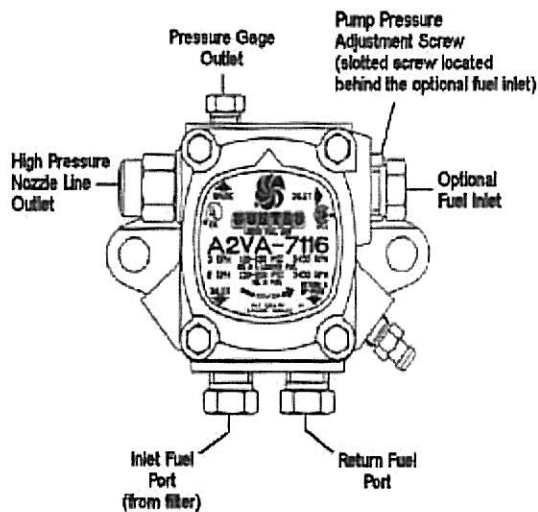


Figure 5-8. Burner Fuel Pump

5.9.6 CARBON MONOXIDE TEST. To measure carbon monoxide (CO) content in heated air output, follow instructions provided with tester. The CO reading shall be less than 20 ppm.

#### 5.9.7 ALTERNATOR TESTING.

##### 1. Measure resistance of various coils as follows:

- a. Remove end metal cover (3, Figure 6-10).
- b. Remove capacitor wires and check resistance of auxiliary phase as shown in Figure 5-9. Value shall be 2.0 ohms.
- c. Remove wires of connector and check resistance at main windings. Value shall be 0.65 ohms.

##### 2. Check alternator rotor as follows:

- a. Remove fixing screws (17 and 19, Figure 6-10) of stator frame to flange mounted on engine. Remove complete frame (16).

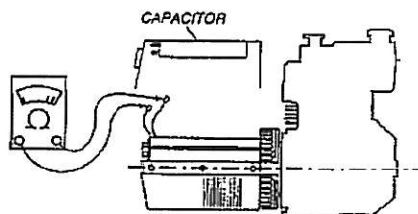


Figure 5-9. Alternator Test 1

- b. Unsolder wires from diodes (25) and check resistance of each winding as shown in Figure 5-10. Values shall be: primary 0.57 ohms and secondary 1.9 ohms.

##### 3. Check alternator diodes as follows:

- a. Remove screws (17, Figure 6-10) of stator frame to flange mounted on engine.
- b. Unsolder a wire from one side of diodes (25).
- c. Check with ohmmeter in both directions as shown in Figure 5-11. It shall read infinite resistance in one direction and a nominal value in the other.

##### 4. Check alternator capacitor as follows:

### WARNING

The following procedures must be done with power on which results in a potential for electrical shock.

- a. Remove top metal cover (3, Figure 6-10).
- b. Disconnect capacitor wires.
- c. Read current with an ammeter as shown in Figure 5-12. Value shall be 2.7 amps @ 240 Vac and 1.35 amps @ 120 Vac.

#### 5.9.8 AIR ADJUSTMENT PLATES SETTING.

### CAUTION

The air adjustment plates define correct opening for airflow between heat exchanger and air adjustment plates. Disregarding the installation instructions may result in serious equipment damage and voids combustion component warranty.

1. Install air adjustment plates (86 and 87, Figure 6-4) on brackets (88 and 89). Install bolts (83), with lock washers (84) and flat washers (85), and tighten.
2. The protruding lips (A, Figure 5-13) next to bolt groove (C) have to touch heat exchanger end wall (B). Push four plates firmly into place against heat exchanger and tighten bolts.

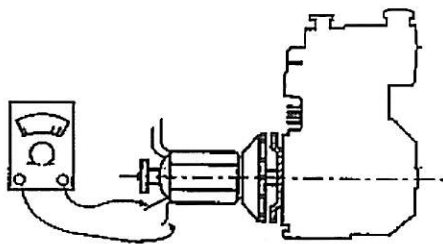


Figure 5-10. Alternator Test 2

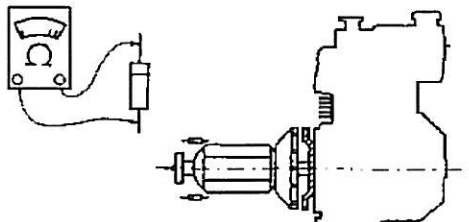


Figure 5-11. Alternator Test 3

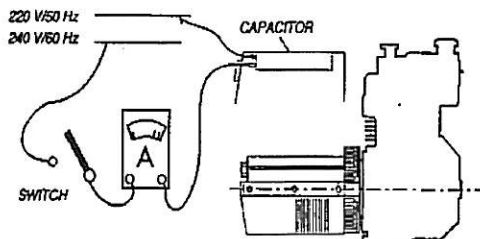


Figure 5-12. Alternator Test 4

## 5.9.9 TEMPERATURE SENSORS TESTING.

**CAUTION**

Failure to comply with sensor position dimensions given may result in overheating and equipment damage.

1. Disconnect sensor and work light quick-disconnect (60, Figure 6-13) behind control box.
2. Identify pins connected to their respective sensors. To identify pins and wires, refer to Figure 4-6.
3. Measure temperature at applicable sensor and compare resistance readings with readings in Table 5-4. If resistance is not within  $\pm 5$  percent of table value, replace sensor and sensor restraint to secure proper locking of sensor. Repeat the test.

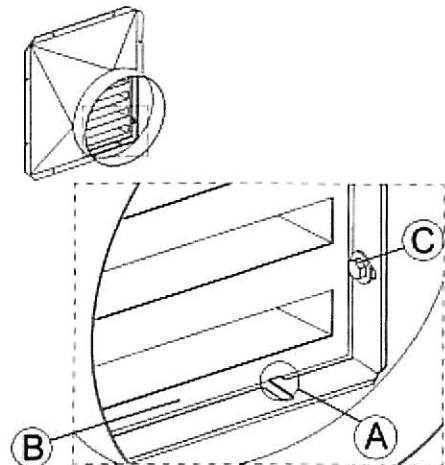


Figure 5-13. Air Adjustment Plate

4. Install chamber sensor (SFC) to dimension A =  $1 \frac{1}{4}$ " (32 mm) as shown in Figure 5-14. Install outlet air sensor (SBC) to dimension B =  $3 \frac{1}{2}$ " (90 mm) as shown in Figure 5-15. Tighten sensor restraints (24 and 81, Figure 6-4). If damaged, replace sensor restraints.

## 5.9.10 BURNER CONTROL UNIT AND PHOTOCELL TESTING.

**WARNING**

The control box contains wiring with high voltage. Use extreme caution when running heater with control box panel open to avoid personal injury.

**5.9.10.1 Burner Control Unit Testing.** Burner control unit functions can be checked by observing amber and red LEDs located on BCU. The control box front plate (3, Figure 6-12) must be open with components exposed and unit must be operating.

1. With engine running, or power (120 Vac, 60Hz) being provided from an outside source to the NGH, start heater by switching to LOW, MED, or HIGH heat.
2. For 3 to 4 seconds, a solid amber light will be on. This is burner control unit self-test period. Burner control unit will then open fuel valves on burner.
3. If a flame is not established within 15 seconds, a lockout will occur which is indicated by a solid ON red LED. To simulate a No Flame failure, disconnect wires from one oil valve on burner. Lockout should occur.

4. To reset burner control unit from lockout, press red button on burner control unit for one second.

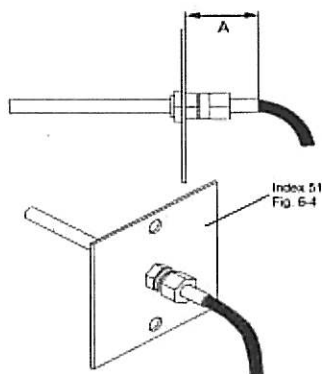


Figure 5-14. Sensor (SFC) Adjustment

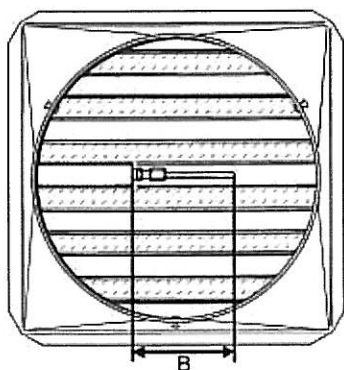


Figure 5-15. Sensor (SBC) Adjustment

#### NOTE

If burner control unit is locked out and reset three times without establishing a flame, a latch-up will occur. This is indicated by solid on red and amber LEDs.

5. To reset burner control unit from Latch-Up, push and hold reset button until red and amber LEDs start blinking on and off alternatively. Continue holding down reset button until both LEDs are off. Release reset button and burner control unit will restart.
6. If flame is lost during a normal run of burner, burner control unit will close valves after 1-2 seconds. A 65 second recycle period begins, indicated by a blinking red LED. The burner control unit will start burner, as in (2) above, after recycle period is over. Flame loss can also be simulated, using extreme caution, by disconnecting solenoid wires of one fuel valve on burner during ON cycle. This will cause flame to go off and burner control unit to function as explained.

7. Power loss during normal operation will cause burner to shut off safely and restart from (2) when power is restored.

#### 5.9.10.2 Photocell Testing. Test photocell as follows:

1. Pull photocell (19, Figure 6-9) out to remove from socket.
2. Connect ohmmeter to contacts of photocell (19).
3. Cover photocell (19) completely to block out light: Resistance shall be at least 50,000 Ohms (50k Ohms).
4. Expose photocell (19) to normal room lighting: Resistance shall be less than 10,000 Ohms (10k Ohms).

#### 5.9.11 PARKING BRAKE ADJUSTMENT.

#### NOTE

To achieve optimal parking brake setting, adjust brake pads separately using the following procedure.

1. Ensure parking brake lever is disengaged.
2. Loosen adjustment retaining nut (18, Figure 68) on upper end of turnbuckle (17).
3. Turn turnbuckle (17) clockwise to tighten brake tension or counterclockwise to loosen brake tension.
4. With parking brake disengaged, push right side brake pad (12) forward towards tire as far as it moves freely. Remove slack caused by levers. Turn turnbuckle (17) to adjust right side brake pad clearance from tire to about 0.6 inches.
5. Tighten turnbuckle adjustment retaining nut (18).
6. Loosen adjustment groove bolt (4) in left side brake pad.
7. With parking brake disengaged, push left side brake pad (7) forward towards tire as far as it moves freely. Remove slack caused by levers. Turn brake pad to adjust left side brake pad clearance from tire to about 0.3 inches. This will cause left pad to have a slight advance against right to compensate for brake shaft torsion.
8. Tighten adjustment groove bolt (4) in left side brake pad (7).



9. Apply brake to ensure proper tension is achieved on both wheels. Readjust is necessary.

#### NOTE

After brake adjustment, make sure pads do not touch tires when brake is disengaged (lever vertical).

#### 5.9.12 BRIDGE RECTIFIER TESTING.

5.9.12.1 When engine is running normally, charge coil is supplying about 30 to 40 Vac to bridge rectifier (reading is taken from AC-pins). Check and test functionality of Bridge Rectifier (22, Figure 6-13) as follows.

1. Remove bridge rectifier (22) from control box.
2. Use a power source to input 24 Vac to AC-pins. Use a voltmeter to measure DC volt reading from +/- pins.
3. Verify output volts are about same value as input volts. If not within  $\pm 5\%$  of input value, replace bridge rectifier (22).

#### 5.9.13 HEATER CONTROL UNIT TEST.

#### WARNING

The following procedures must be done with power on and represent a danger of electrical shock.

#### NOTE

To identify electrical connectors and pins, refer to Figure 4-8, Electrical Schematic.

1. Detach quick-disconnect 10-pin module from heater control unit (13, Figure 6-13).
2. Measure voltage at transformer pins 9 and 10. Reading shall be  $24 \pm 2.4$  Vac.
3. Detach quick-disconnect 3-pin module from heater control unit (13).
4. Measure voltage is present between pins 1 (Phase L1) and Phase L2. Reading shall be  $120 \pm 12$  Vac.
5. Check heat control switch (S1) wiring is connected according to electrical schematic.
6. Turn heat control switch to VENT. Main air fan shall operate. If it does, go to step 7. If not, proceed as follows:

- a. Measure voltage from fan contactor coil terminals A1 & A2. If there is 120 Vac, heater control unit is operating. If not, replace heater control unit.

- b. Check fan contactor operation.

7. Turn heat control switch to HIGH TEMP. Burner shall start. If it does, go to next test. If not, proceed as follows:

- a. Measure voltage from terminal block (6, Figure 6-13) terminal 1 and phase L2. If there is 120 Vac, heater control unit is operating. If not replace heater control unit.

- b. Check burner control unit (paragraph 5.9.10).

#### 5.9.14 VIKING COMBUSTION TESTING WITH SMOKE TESTER.

##### 5.9.14.1 Principle of Smoke Testing.

5.9.14.1.1 A low oxygen content indicates insufficient combustion air in the chamber and results in an uncompleted combustion of carbon particles in the fuel. The excess carbon content of the fuel converts into soot (floating carbon particles in exhaust). Increasing the amount of air blown into combustion chamber adds oxygen and allows all fuel particles to be combusted.

5.9.14.1.2 The Smoke Tester samples combustion by drawing exhaust gas through a filter paper. Uncombusted carbon particles collect on the surface of the filter, forming a smoke spot. The shade of grey of the spot can be compared with a chart to detect combustion completeness.

5.9.14.1.3 Too much combustion air in relation to the amount of fuel injected into combustion chamber causes unstable combustion conditions. Excess air may blow fuel past the ignition electrodes and delay ignition, causing fuel vapor collected inside combustion chamber to explode.

5.9.14.1.4 The Smoke Tester cannot detect excess air. The spot will show clean, no coloration. This is why adjustment of combustion must always be started with a low air volume, showing a definitive grey spot then gradually approach the goal as explained below.

**5.9.14.2 Testing Instructions.** Testing heater combustion exhaust with a smoke tester is a simple way to analyze combustion efficiency and verify a correct fuel/air ratio. To adjust, proceed as follows:



**WARNING**

- Failure to comply with these adjusting procedures may cause a personnel hazard or severe damage to equipment. Failure to repair, maintain, or adjust Viking according to instructions voids all warranties.
- Never apply direct draft to exhaust of heater. This can cause personnel injury or equipment damage.
- A lean mixture can cause combustion components to explode as a result of fuel fumes collected inside chamber and not being immediately ignited. This will create the risk of injury or death to personnel or equipment damage.

**NOTE**

- Make sure correct injection nozzle is used and injection pump pressure does not exceed 175 PSI.
  - Heater can be operated with utility power or on-board power pack for these adjustments.
1. Adjust fuel injection pressure, retention ring, and air shutter (paragraph 5.9.5).
  2. Start heater outside in open air or under a special overhead exhaust vent hood (Table 2-1).
  3. Turn heater control switch to HIGH. Allow heater to warm up at least ten minutes to reach a stable operating condition.
  4. Loosen clamp screw of smoke tester and place a filter paper strip in slot then tighten clamp screw as shown in Figure 5-16.
  5. Place sampling tube in exhaust stack extension of heater as shown in Figure 5-17.
  6. Pull smoke tester handle through ten full strokes as shown in Figure 5-17. **IMPORTANT:** Make sure burner is ON (flame is burning). The burner automatically cycles between on and off, controlled by sensors and heater control unit.
  7. Remove sampling tube from exhaust, loosen clamp screw and remove filter paper.

8. Match shade of smoke spot on filter paper closest spot on Burner Smoke Scale (RR776) by viewing spot through windows in center of comparison spots on chart as shown in Figure 5-18. Proceed as follows:

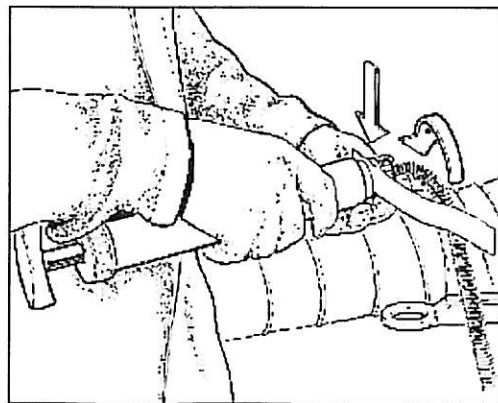
- Spot on paper faint grey shade between zero (0) and one (1). Combustion is correct; no adjustment required.
- No trace on paper. Lean mixture: Too much air flowing into combustion. Adjust as noted in paragraph 5.8.14.3.
- Spot on paper to dark. Rich mixture. Combustion air volume to low. Adjust as noted in paragraph 5.8.14.3.

**5.9.14.3 Viking Combustion Adjustment.** The quickest way to get combustion adjusted correctly is to adjust air too low first for a rich mixture. This will produce a clearly distinguishable dark spot on filter paper. Gradually open air band and repeat smoke test between each adjustment correct shade is produced. When Viking combustion adjustment is required, refer to paragraphs 5.9.3 and 5.9.14. Proceed as follows.

1. With a lean mixture, reduce air volume by closing air shutter band of burner about 0.50 inch. Repeat smoke test.
2. With a rich mixture, increase air volume by opening air shutter band of burner in increments of 0.125 inch. Repeat smoke test.

**5.9.14.4 Flue gas properties.** During test run of Viking at the factory, the combustion is adjusted using an electronic flue gas analyzer. If flue gas analyzer is available, the factory recommended values for combustion performance @ sea level are:

- CO<sub>2</sub>-reading: between 11.5 ... 12.2 %.
- O<sub>2</sub>-reading: between 4.0 ... 4.8 %



**Figure 5-16. Setting Smoke Tester**

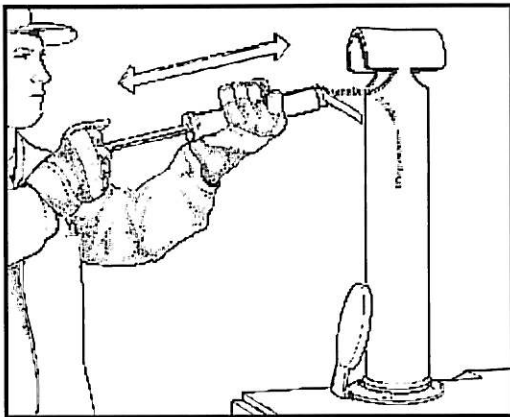


Figure 5-17. Using Smoke Tester

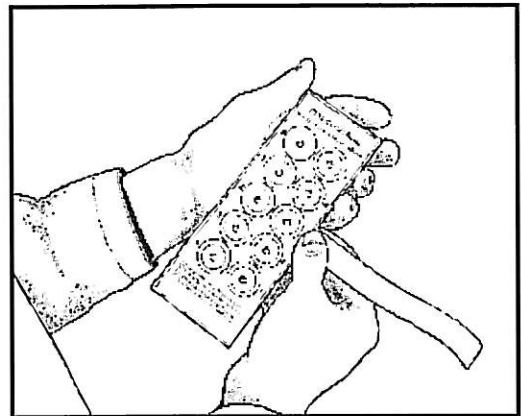


Figure 5-18. Comparison of Test Results

Table 5-4. Testing Chart for Electronic Thermostat Sensors

T (degC)	T (degF)	R (Ohms)	T (degC)	T (degF)	R (Ohms)
-50	-58	803	105	221	1404
-45	-49	823	110	230	1423
-40	-40	843	115	239	1442
-35	-31	862	120	248	1460
-30	-22	882	125	257	1479
-25	-13	902	130	266	1498
-20	-4	922	135	275	1517
-15	5	941	140	284	1535
-10	14	961	145	293	1554
-5	23	980	150	302	1573
0	32	1000	155	311	1591
5	41	1020	160	320	1609
10	50	1039	165	329	1628
15	59	1058	170	338	1646
20	68	1078	175	347	1665
25	77	1097	180	356	1683
30	86	1117	185	365	1701
35	95	1136	190	374	1719
40	104	1155	195	383	1737
45	113	1175	200	392	1755
50	122	1194	205	401	1773
55	131	1213	210	410	1791
60	140	1232	215	419	1809
65	149	1252	220	428	1826
70	158	1271	225	437	1844
75	167	1290	230	446	1862
80	176	1309	235	455	1879
85	185	1328	240	464	1897
90	194	1347	245	473	1914
95	203	1366	250	482	1931
100	212	1385	255	491	1948

## NOTES

PT-1000 Sensor Resistance Values as a function of Sensor Temperature.

Temperatures stated in degrees Celsius (C) and degrees Fahrenheit (F).

## CHAPTER 6 ILLUSTRATED PARTS BREAKDOWN

### 6.1 SCOPE.

6.1.1 This chapter illustrates and lists the assemblies, subassemblies, and detail parts comprising the New Generation Heater (Viking). Figure 6-1 summarizes the use of this illustrated parts breakdown (IPB). Additional details are given in the following paragraphs.

index, separated by a slash (/). For example, 8-67/3 indicates the callout is figure 8, index 67 on sheet 3.

### 6.3 MAINTENANCE PARTS LIST.

6.3.1 Beginning with figure 6-2 and its associated parts list, the Viking is broken down into major components, assemblies and detail parts, each figure and listing comprising a maintenance parts list (MPL). In general, parts are listed in disassembly order as described in Chapter 5. In some instances, assemblies are shown as assembled on one figure and as an exploded view on another figure. In these cases, the parenthetical note in the parts list, "(See figure X for breakdown)" refers to the illustration and parts list on which the detail parts are to be found. The parenthetical note, "(see figure X for NHA)" – that is the next higher assembly – indicates the figure and list where the item is shown and listed in assembled form.

6.3.2 The following paragraphs discuss the content of the columns in the Maintenance Parts list (MPL).

**6.3.2.1 Figure & Index/Sheet No.** This column provides the figure, index and sheet numbers used to key a part or assembly listed in the MPL to its location in the illustration. The index numbers are arranged in numerical order to reflect the sequence of disassembly, except where drawing order prevents disassembly sequence from being maintained. Index numbers are assigned to each part in order to determine an exact location for each part and to allow for cross referencing between the illustration and the parts list text. Index numbers that are not illustrated are listed with a dash (-) preceding the index number and a footnote on each page will explain that parts so identified are not illustrated. When more than one illustration sheet is required to show the detail parts of an assembly or installation, the applicable illustration sheet will follow the

**6.3.2.4 Description.** The nomenclature of the components, assembly or part, corresponding to the nomenclature on the manufacturer's drawing, is given in the description column. The noun name is listed first followed by modifiers and descriptive information to completely identify the part. Attaching parts are identified by (AP) immediately following the noun name and modifiers in this column. Parts listed in the maintenance parts list are indented to show next higher assembly/installation (NHA) relationship. To determine the NHA of a part or assembly, note the column in which the first word of the description appears. The first item directly above which appears one column to the left (except for attaching parts) is the NHA. The following example shows an installation or assembly starting on the extreme left position (first indent) and continues down into succeeding columns until the last detail is reached.

#### 1 2 3 4 5 6 DESCRIPTION

Title

End Item, component, major assembly

. Detail parts for end item, component, major assembly

. Assembly

. Attaching parts for assembly (AP)

.. Detail parts for assembly

.. Subassemblies

.. Attaching parts for subassemblies (AP)

... Detail parts for subassemblies

... Sub-subassemblies

... Detail parts for sub-subassemblies

.... Detail parts for sub-subassemblies

**6.3.2.5 Units Per Assy.** This column lists the number of units required per assembly or subassembly. Quantities specified in this column are not necessarily the total quantities used per end item. Where items have been

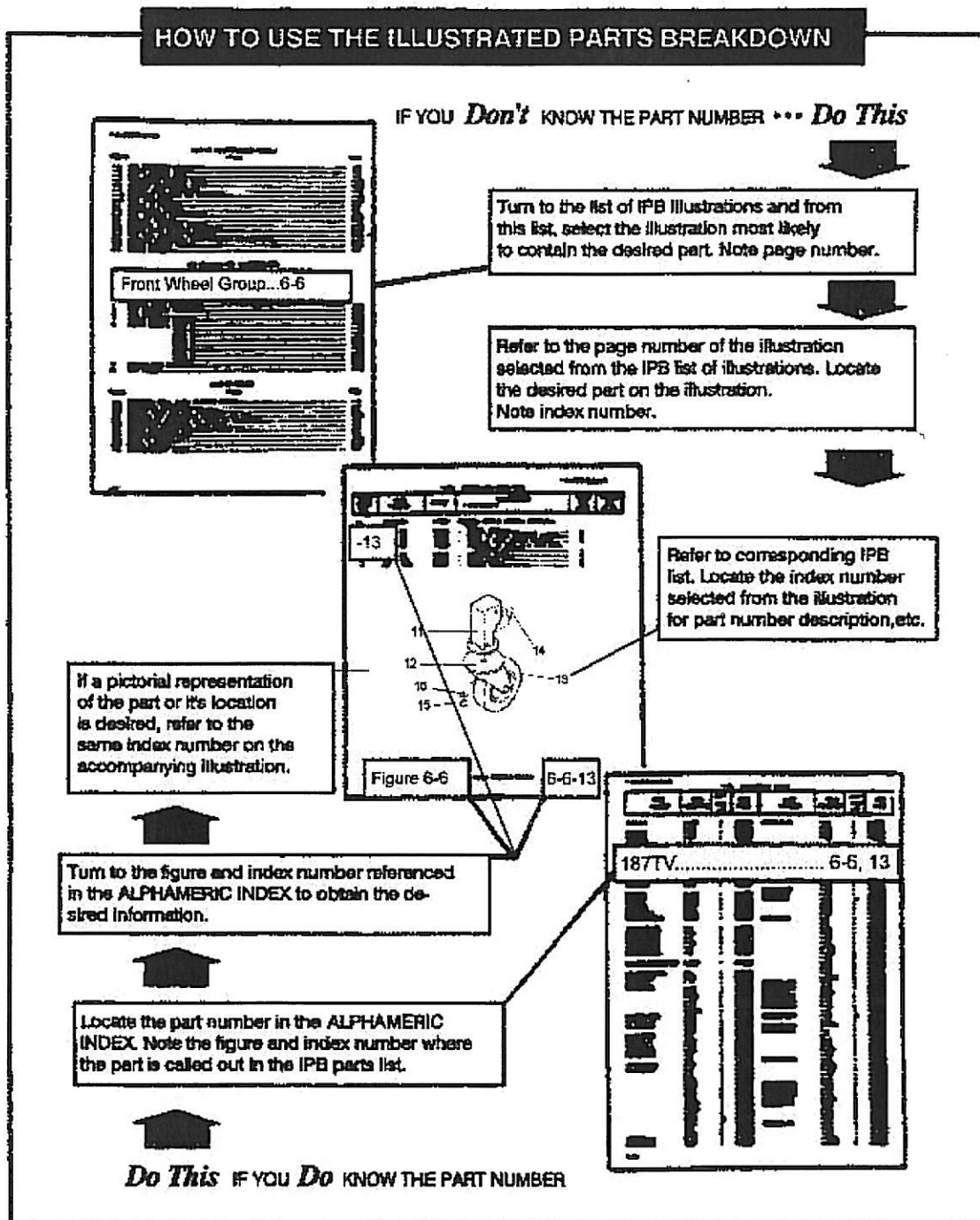


FIGURE 6-1. HOW TO USE THE IPB

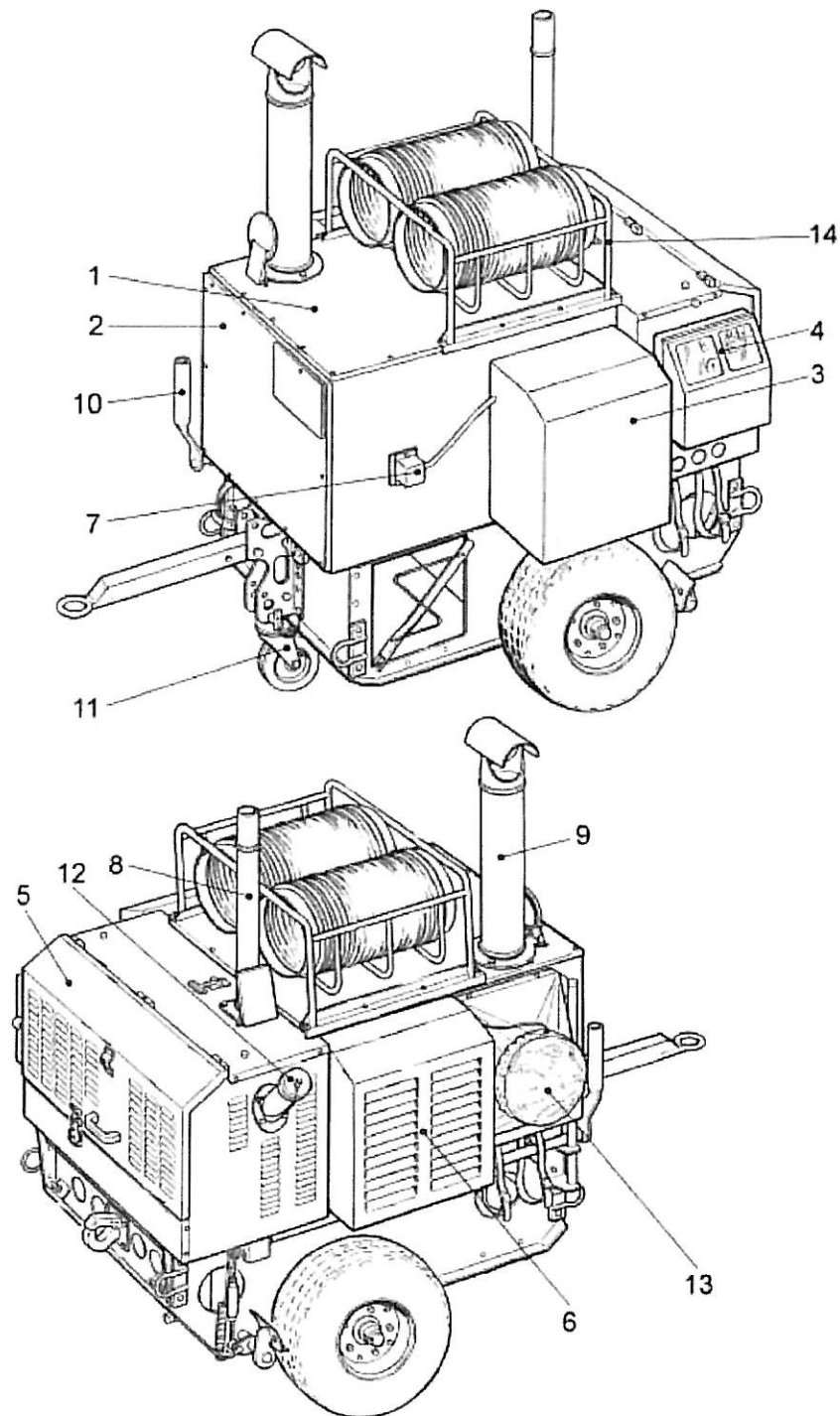


FIGURE 6-2. PORTABLE DIESEL HEATER VIKING 400

FIGURE INDEX/ SHT NO.	PART NUMBER	CAGE	DESCRIPTION	UNITS PER ASSY	USEABLE ON CODE	SMR CODE
			1 2 3 4 5 6 7			
6-2	2112	SB808	HEATER ASSEMBLY .....	1		PFOFF
1	2112-218	SB808	. PANEL, TOP .....	1		PAOZZ
2	2112-219	SB808	. PANEL, FRONT .....	1		PAOZZ
3	2112-3031	SB808	. COVER, BURNER .....	1		PAOZZ
4	2112-3032	SB808	. COVER, MAIN CONTROL PANEL .....	1		PAOZZ
5	2112-3027	SB808	. DOOR, POWER PACK ACCESS.....	1		PAOZZ
6	2112-3030	SB808	. COVER, MAIN FAN .....	1		PAOZZ
7	2112-100	SB808	. COVER, THERMOSTAT SENSOR.....	1		PAOZZ
8	2112-245	SB808	. STACK, ENGINE EXHAUST.....	1		PAOZZ
9	2112-3040	SB808	. STACK, HEATER EXHAUST .....	1		PAOZZ
10	2112-3006	SB808	. LEVER, BRAKE.....	1		PAOZZ
11	2112-74500	SB808	. WHEEL ASSY., CASTER, FRONT.....	1		PAOZZ
12	2112-80421	SB808	. CAP, FUEL FILLER.....	1		PAOZZ
13	2112-69300	SB808	. ADAPTER, AIR DISCHARGE.....	1		PAOZZ
14	2112-450	SB808	. DUCT BASKET (NOTE 1) .....	1		PBOZZ

**NOTE:**

1. DUCT BASKET (14, FIGURE 6-2) IS FACTORY INSTALLED BEGINNING WITH SERIAL NUMBER 2112-04-2356. FOR PART NUMBER REFER TO DUCT BASKET (4, FIGURE 6-3).



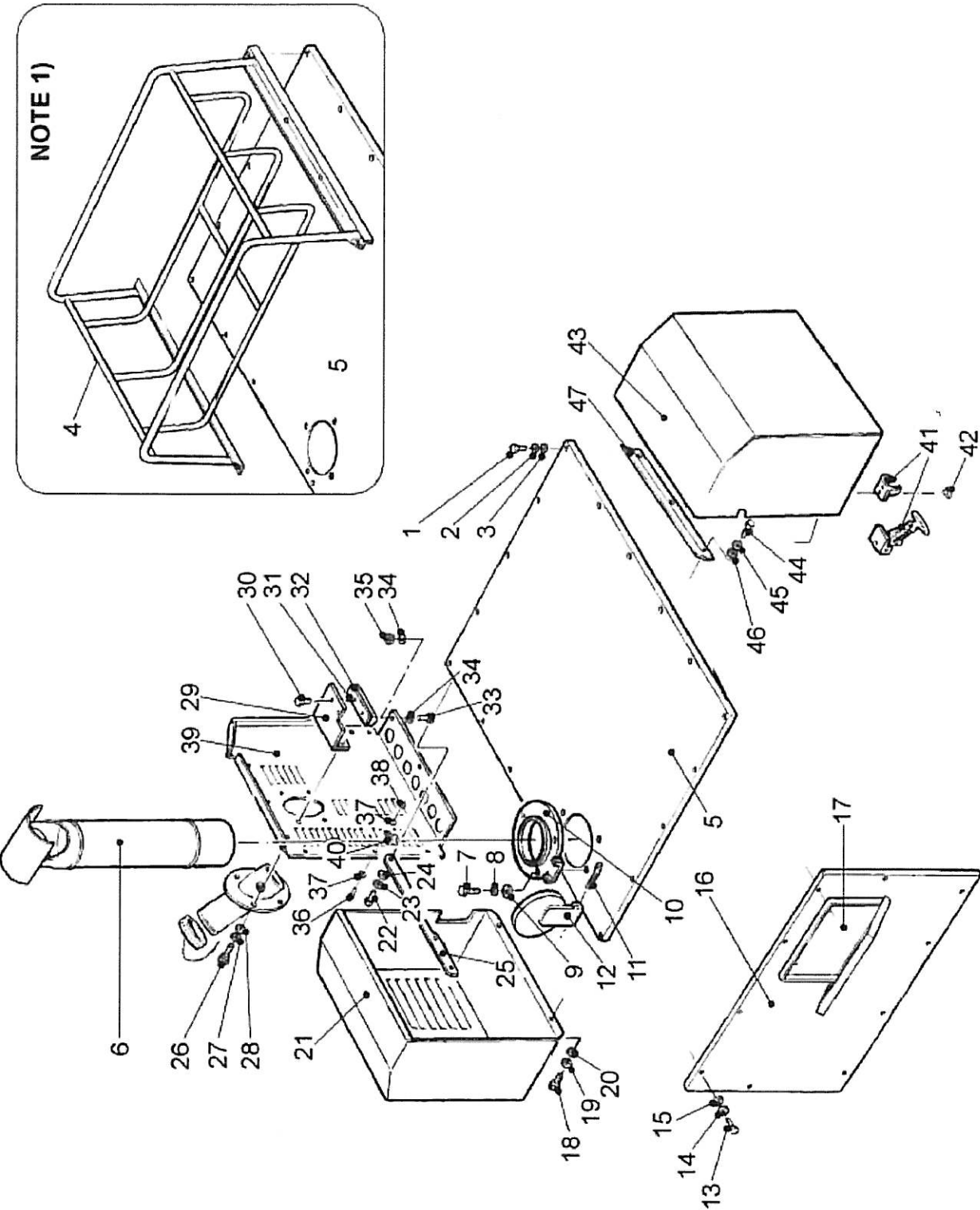


FIGURE 6-3. PANELS/COVERS (SHEET 1 OF 2)

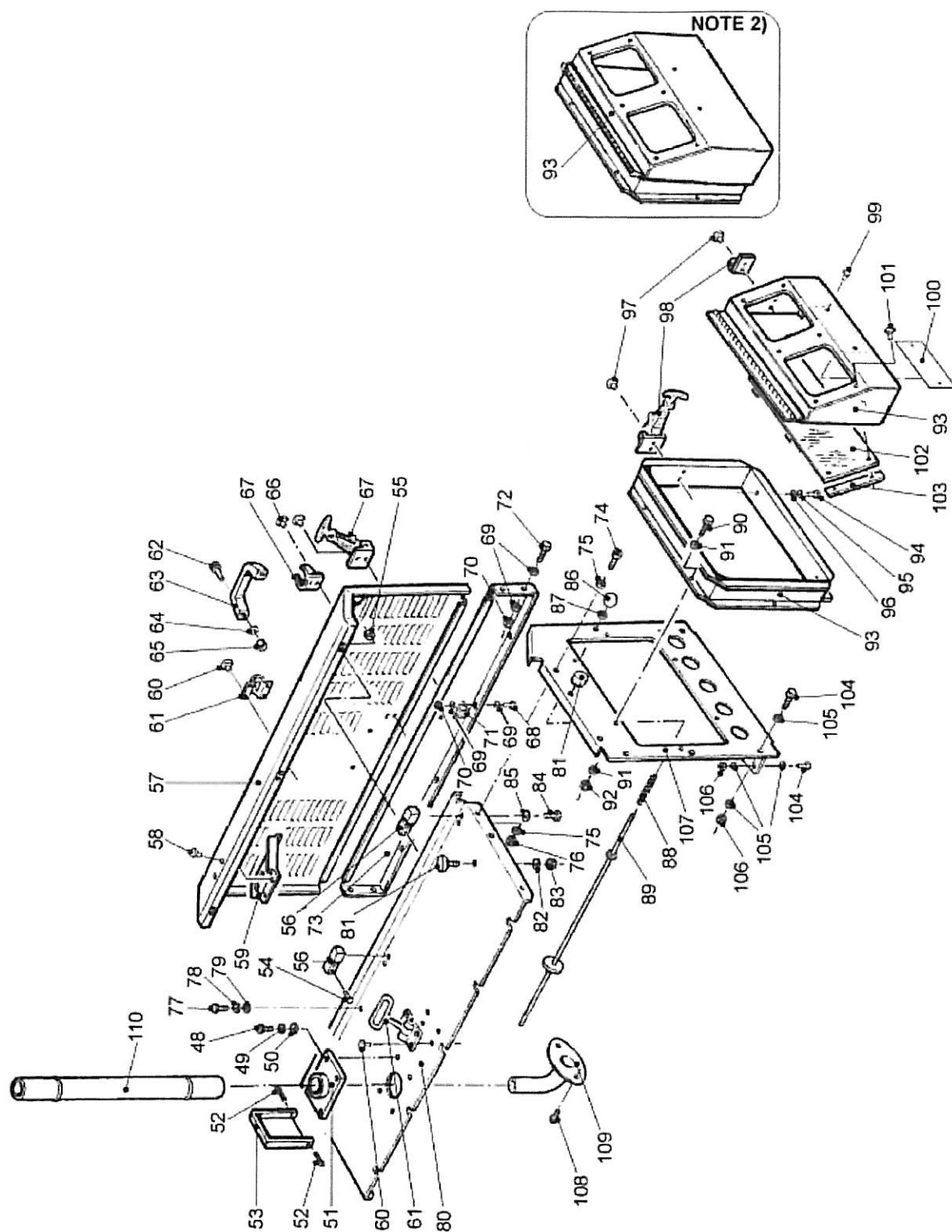


FIGURE 6-3. PANELS/COVERS (SHEET 2)

FIGURE INDEX/ SHT NO.	PART NUMBER	CAGE	DESCRIPTION	UNITS PER ASSY	USEABLE ON CODE	SMR CODE
			1 2 3 4 5 6 7			
6-3-	NO NUMBER	SB808	PANELS/COVERS .....	REF		XC
1/1	2112-93204	SB808	. BOLT, M6×30 .....	18		PAOZZ
2/1	2112-93483	SB808	. WASHER, Lock, M6 .....	18		PAOZZ
3/1	2112-93412	SB808	. WASHER, M6 .....	18		PAOZZ
4/1	2112-450	SB808	. DUCT BASKET (NOTE 1) .....	1		PBOZZ
5/1	2112-218	SB808	. COVER, Top, Combustion Group .....	1		PAOZZ
6/1	2112-3040	SB808	. STACK, Heater Exhaust .....	1		PAOZZ
7/1	2112-93201	SB808	. BOLT, M6×16 .....	3		PAOZZ
8/1	2112-93483	SB808	. WASHER, Lock, M6 .....	3		PAOZZ
9/1	2112-93419	SB808	. WASHER, Flat, M6-OD25 mm .....	3		PAOZZ
10/1	2112-3025	SB808	. BRACKET, Heater Exhaust .....	1		PAOZZ
11/1	2112-93802	SB808	. PIN, Cotter .....	1		PAOZZ
12/1	2112-3026	SB808	. LID, Heater Exhaust .....	1		PAOZZ
13/1	2112-93204	SB808	. BOLT, M6×30 .....	10		PAOZZ
14/1	2112-93483	SB808	. WASHER, Lock, M6 .....	10		PAOZZ
15/1	2112-93412	SB808	. WASHER, M6 .....	10		PAOZZ
16/1	2112-219	SB808	. PANEL, Front .....	1		PAOZZ
17/1	2112-3039	SB808	. MOBILITY PLACARD, Assy .....	1		PBOZZ
18/1	2112-93201	SB808	. BOLT, M6×16 .....	2		PAOZZ
19/1	2112-93483	SB808	. WASHER, Lock, M6 .....	2		PAOZZ
20/1	2112-93416	SB808	. WASHER, Flat, M6-OD20 mm .....	2		PAOZZ
21/1	2112-3030	SB808	. COVER, Main Air Fan .....	1		PAOZZ
22/1	2112-93201	SB808	. BOLT, M6×16 .....	4		PAOZZ
23/1	2112-93483	SB808	. WASHER, Lock, M6 .....	4		PAOZZ
24/1	2112-93412	SB808	. WASHER, M6 .....	4		PAOZZ
25/1	2112-204	SB808	. LIP, Retaining, Fan Cover .....	1		PAOZZ
26/1	2112-93201	SB808	. BOLT, M6×16 .....	2		PAOZZ
27/1	2112-93483	SB808	. WASHER, Lock, M6 .....	2		PAOZZ
28/1	2112-93413	SB808	. WASHER, Flat, M6-OD15 mm .....	2		PAOZZ
29/1	2112-243	SB808	. BRACKET, Lamp .....	1		MFO
30/1	2112-93322	SB808	. SCREW, M4×12 .....	2		PAOZZ
31/1	2112-93501	SB808	. NUT, Lock, M4 .....	2		PAOZZ
32/1	2112-44300	SB808	. LAMP ASSY .....	1		PAOZZ
----	2112-44310	SB808	. BULB (Not Illustrated) .....	1		PAOZZ
33/1	2112-93201	SB808	. BOLT, M6×16 .....	3		PAOZZ
34/1	2112-93412	SB808	. WASHER, M6 .....	6		PAOZZ
35/1	2112-93503	SB808	. NUT, Lock, M6 .....	3		PAOZZ
36/1	2112-93201	SB808	. BOLT, M6×16 .....	3		PAOZZ
37/1	2112-93412	SB808	. WASHER, M6 .....	6		PAOZZ
38/1	2112-93503	SB808	. NUT, Lock, M6 .....	3		PAOZZ
39/1	2112-215	SB808	. PANEL, Fuel Filler Neck .....	1		PAOZZ
40/1	2112-82904	SB808	. CLAMP, Electrical Cable .....	1		PAOZZ
41/1	2112-3034	SB808	. LATCH ASSY, Burner Cover .....	1		PAOZZ
42/1	2112-93722	SB808	. RIVET, Pop .....	2		PAOZZ
43/1	2112-3031	SB808	. COVER, Fuel Burner .....	1		PAOZZ
44/1	2112-93201	SB808	. BOLT, M6×16 .....	3		PAOZZ
45/1	2112-93483	SB808	. WASHER, Lock, M6 .....	3		PAOZZ
46/1	2112-93412	SB808	. WASHER, M6 .....	3		PAOZZ
47/1	2112-209	SB808	. LIP, Retaining Burner Cover .....	1		PAOZZ
48/2	2112-93203	SB808	. BOLT, M6×25 .....	4		PAOZZ
49/2	2112-93483	SB808	. WASHER, Lock, M6 .....	4		PAOZZ
50/2	2112-93412	SB808	. WASHER, M6 .....	4		PAOZZ
51/2	2112-3024	SB808	. BRACKET, Engine Exhaust .....	1		PAOZZ
52/2	2112-93801	SB808	. PIN, Cotter .....	2		PAOZZ
53/2	2112-273	SB808	. LID, Engine Exhaust .....	1		PAOZZ
54/2	2112-93305	SB808	. SCREW, M5×18 .....	6		PAOZZ
55/2	2112-93502	SB808	. NUT, Lock, M5 .....	6		PAOZZ
56/2	2112-82660	SB808	. HINGE, Door .....	3		PAOZZ
57/2	2112-3027	SB808	. HATCH, Eng/Gen Compartment .....	1		PAOZZ
58/2	2112-93702	SB808	. RIVET, Pop .....	3		PAOZZ

FIGURE INDEX/ SHT NO.	PART NUMBER	CAGE	DESCRIPTION	UNITS PER ASSY	USEABLE ON CODE	SMR CODE
			1 2 3 4 5 6 7			
6-3-						
59/2	2112-225	SB808	. TRAY, Document .....	1		PAOZZ
60/2	2112-93722	SB808	. RIVET, Pop .....	8		PAOZZ
61/2	2112-4100	1T8G7	. LATCH, Door .....	1		PAOZZ
62/2	2112-93315	SB808	. SCREW, M6×20 .....	2		PAOZZ
63/2	2112-80102	SB808	. HANDLE, Door .....	1		PAOZZ
64/2	2112-93416	SB808	. WASHER, Flat, M6-OD20 mm .....	2		PAOZZ
65/2	2112-93503	SB808	. NUT, Lock, M6 .....	2		PAOZZ
66/2	2112-93722	SB808	. RIVET, Pop .....	4		PAOZZ
67/2	2112-80210	SB808	. LATCH ASSY, Rubber, Door .....	1		PAOZZ
68/2	2112-93203	SB808	. BOLT, M6×25 .....	1		PAOZZ
69/2	2112-93412	SB808	. WASHER, M6 .....	16		PAOZZ
70/2	2112-93503	SB808	. NUT, Lock, M6 .....	8		PAOZZ
71/2	2112-82900	SB808	. CLAMP, Electrical Cable .....	1		PAOZZ
72/2	2112-93201	SB808	. BOLT, M6×16 .....	7		PAOZZ
73/2	2112-226	SB808	. PANEL, Rear .....	1		PAOZZ
74/2	2112-93201	SB808	. BOLT, M6×16 .....	5		PAOZZ
75/2	2112-93412	SB808	. WASHER, M6 .....	11		PAOZZ
76/2	2112-93503	SB808	. NUT, Lock, M6 .....	6		PAOZZ
77/2	2112-93201	SB808	. BOLT, M6×16 .....	1		PAOZZ
78/2	2112-93483	SB808	. WASHER, Lock, M6 .....	1		PAOZZ
79/2	2112-93412	SB808	. WASHER, M6 .....	1		PAOZZ
80/2	2112-220	SB808	. COVER, Top, Engine Compartment .....	1		PAOZZ
81/2	2112-36830	SB808	. STOP, Rubber .....	3		PAOZZ
82/2	2112-93412	SB808	. WASHER, M6 .....	3		PAOZZ
83/2	2112-93503	SB808	. NUT, Lock, M6 .....	3		PAOZZ
84/2	2112-93302	SB808	. SCREW, M5×8 .....	6		PAOZZ
85/2	2112-93402	SB808	. WASHER, Flat, M5-OD15 mm .....	6		PAOZZ
86/2	2112-82320	SB808	. KNOB .....	1		PAOZZ
87/2	2112-36809	SB808	. GROMMET .....	1		PAOZZ
88/2	2112-93901	SB808	. SPRING .....	1		PAOZZ
89/2	2112-230	SB808	. ROD ASSY, Engine Reset .....	1		PAOZZ
90/2	2112-93201	SB808	. BOLT, M6×16 .....	6		PAOZZ
91/2	2112-93412	SB808	. WASHER, M6 .....	12		PAOZZ
92/2	2112-93503	SB808	. NUT, Lock, M6 .....	6		PAOZZ
93/2	2112-3032	SB808	. BRACKET/COVER, Control Box (NOTE 2) .....	1		PAOZZ
94/2	2112-93268	SB808	. BOLT, M6×10 .....	4		PAOZZ
95/2	2112-93483	SB808	. WASHER, Lock, M6 .....	4		PAOZZ
96/2	2112-93412	SB808	. WASHER, M6 .....	4		PAOZZ
97/2	2112-93722	SB808	. RIVET, Pop .....	3		PAOZZ
98/2	2112-80200	SB808	. LATCH ASSY, Control Box Cover .....	1		PAOZZ
99/2	2112-93702	SB808	. RIVET, Pop .....	2		PAOZZ
100/2	2112-18060	SB808	. PLACARD, Short Instructions .....	1		PAOZZ
101/2	2112-93702	SB808	. RIVET, Pop .....	6		PAOZZ
102/2	2112-212	SB808	. WINDOW .....	1		MFO
103/2	2112-193	SB808	. BRACKET, Window .....	3		MFO
104/2	2112-93201	SB808	. BOLT, M6×16 .....	5		PAOZZ
105/2	2112-93412	SB808	. WASHER, M6 .....	10		PAOZZ
106/2	2112-93503	SB808	. NUT, Lock, M6 .....	5		PAOZZ
107/2	2112-216	SB808	. PANEL, Main Control Box .....	1		PAOZZ
108/2	2112-93212	SB808	. BOLT, M6×25 .....	2		PAOZZ
109/2	2112-247	SB808	. ENGINE EXHAUST, Curve .....	1		PAOZZ
110/2	2112-245	SB808	. STACK, Engine Exhaust .....	1		PAOZZ

## NOTES:

1. DUCT BASKET (4, FIGURE 6-3) IS FACTORY INSTALLED BEGINNING WITH SERIAL NUMBER 2112-04-2356 AND IS OPTIONAL REPLACEMENT FOR DUCT STORAGE POLES (129, FIGURE 6-4) ON SERIAL NUMBERS 2112-04-2355 AND BELOW.
2. FULLY ENCLOSED BRACKET/COVER ASSEMBLY (93, FIGURE 6-3); FOR CONTROL BOX FACTORY INSTALLED BEGINNING WITH SERIAL NUMBER 2112-04-2356 AND OPTIONAL REPLACEMENT ITEM FOR SERIAL NUMBERS 2112-04-2355 AND BELOW.

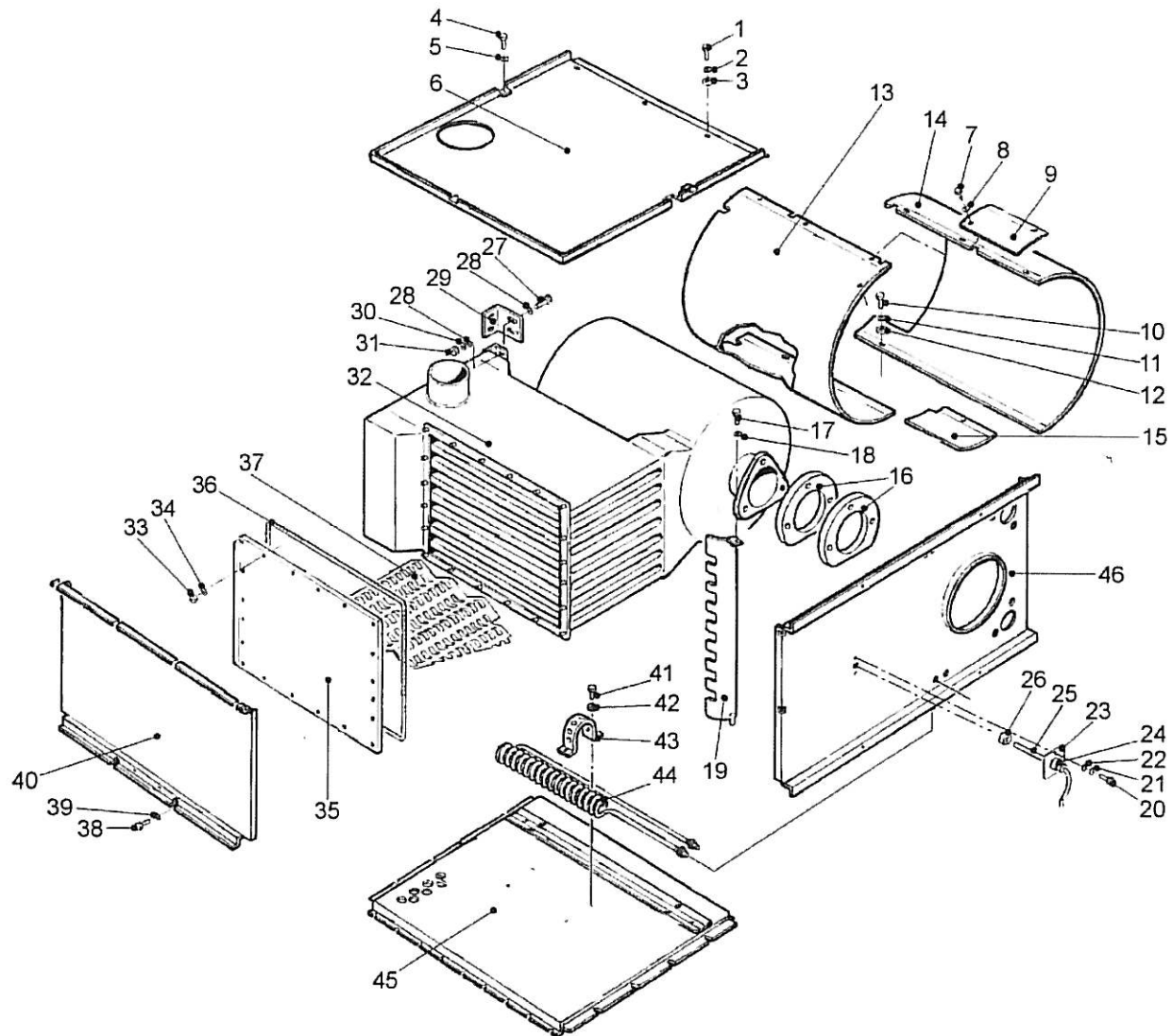


FIGURE 64. ENCLOSURE GROUP (SHEET 1 OF 2)

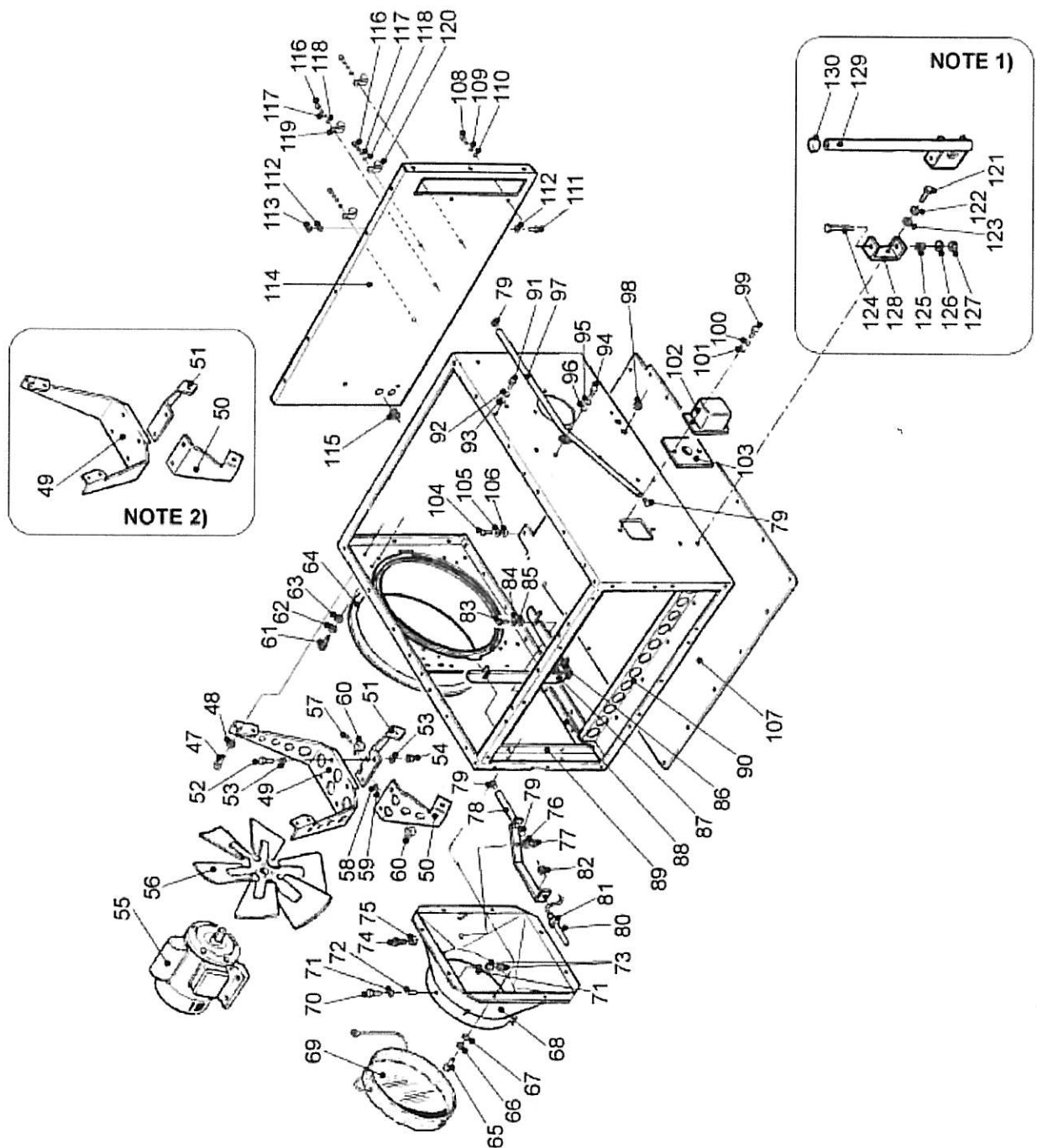


FIGURE 64. ENCLOSURE GROUP (SHEET 2)

FIGURE INDEX/ SHT NO.	PART NUMBER	CAGE	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USEABLE ON CODE	SMR CODE
6-4-	NO NUMBER	SB808	ENCLOSURE GROUP	REF		XC
1/1	2112-93201	SB808	. BOLT, M6×16 .....	4		PAOZZ
2/1	2112-93483	SB808	. WASHER, Lock, M6 .....	4		PAOZZ
3/1	2112-93416	SB808	. WASHER, Flat, M6-OD20 mm .....	4		PAOZZ
4/1	2112-93201	SB808	. BOLT, M6×16 .....	3		PAOZZ
5/1	2112-93483	SB808	. WASHER, Lock, M6 .....	3		PAOZZ
6/1	2112-120	SB808	. DEFLECTOR, Heated Air .....	1		PAOZZ
7/1	2112-93201	SB808	. BOLT, M6×16 .....	1		PAOZZ
8/1	2112-93483	SB808	. WASHER, Lock, M6 .....	1		PAOZZ
9/1	2112-126	SB808	. PLATE, Deflector, Heated Air .....	1		PAOZZ
10/1	2112-93201	SB808	. BOLT, M6×16 .....	3		PAOZZ
11/1	2112-93483	SB808	. WASHER, Lock, M6 .....	3		PAOZZ
12/1	2112-93413	SB808	. WASHER, Flat, M6-OD15 mm .....	3		PAOZZ
13/1	2112-129	SB808	. DEFLECTOR, Heated Air (Front) .....	1		PAOZZ
14/1	2112-128	SB808	. DEFLECTOR, Heated Air (Rear) .....	1		PAOZZ
15/1	2112-127	SB808	. PLATE, Deflector, Heated Air .....	1		PAOZZ
16/1	2112-86710	SB808	. GASKET .....	2		PAOZZ
17/1	2112-93201	SB808	. BOLT, M6×16 .....	1		PAOZZ
18/1	2112-93483	SB808	. WASHER, Lock, M6 .....	1		PAOZZ
19/1	2112-3010	SB808	. DEFLECTOR, Air .....	1		PAOZZ
20/1	2112-93201	SB808	. BOLT, M6×16 .....	2		PAOZZ
21/1	2112-93483	SB808	. WASHER, Lock, M6 .....	2		PAOZZ
22/1	2112-93412	SB808	. WASHER, M6 .....	2		PAOZZ
23/1	2112-103	SB808	. PLATE, Sensor .....	1		MFO
24/1	2112-65900	SB808	. RESTRAINT, Th. Sensor .....	1		PAOZZ
25/1	2112-20592	SB808	. SENSOR, Thermostatic .....	1		PAOZZ
26/1	2112-66506	SB808	. NUT, Retaining, Th. Sensor, 1/8"NPS .....	1		PAOZZ
27/1	2112-93211	SB808	. BOLT, M8×25 .....	4		PAOZZ
28/1	2112-93425	SB808	. WASHER, Flat, M8-OD24 mm .....	8		PAOZZ
29/1	2112-85	SB808	. BRACKET, Heat Exchanger .....	1		MFO
30/1	2112-93484	SB808	. WASHER, Lock, M8 .....	4		PAOZZ
31/1	2112-93514	SB808	. NUT, M8 .....	4		PAOZZ
32/1	2112-3011	SB808	. HEAT EXCHANGER/COMBUSTION CHAMBER ASSEMBLY .....	1		PBOZZ
33/1	2112-93523	SB808	. NUT, Brass, M6 .....	20		PAOZZ
34/1	2112-93494	SB808	. WASHER, Stainless, M6-OD18 mm .....	20		PAOZZ
35/1	2112-81	SB808	. PLATE, Heat Exchanger .....	1		PAOZZ
36/1	2112-2005	SB808	. GASKET (length 83 in. / 2.1 m) .....	1		PBOZZ
----	2112-86250	SB808	. GASKET, Full Roll (164 ft / 50 m) .....	--		PBOZZ
37/1	2112-82	SB808	. BAFFLE, Heat Exchanger .....	8		PAOZZ
38/1	2112-93201	SB808	. BOLT, M6×16 .....	2		PAOZZ
39/1	2112-93483	SB808	. WASHER, Lock, M6 .....	2		PAOZZ
40/1	2112-124	SB808	. DEFLECTOR, Heated Air, Front .....	1		PAOZZ
41/1	2112-93200	SB808	. BOLT, M6×12 .....	4		PAOZZ
42/1	2112-93483	SB808	. WASHER, Lock, M6 .....	4		PAOZZ
43/1	2112-91	SB808	. BRACKET, Support .....	2		PAOZZ
44/1	2112-3016	SB808	. COIL, Pre-Heat .....	1		PAOZZ
45/1	2112-3035	SB808	. DEFLECTOR, Heated Air, Bottom .....	1		XB
46/1	2112-123	SB808	. DEFLECTOR, Heated Air, Burner .....	1		XB
47/2	2112-93211	SB808	. BOLT, M8×20 .....	6		PAOZZ
48/2	2112-93484	SB808	. WASHER, Lock, M8 .....	6		PAOZZ
49/2	2112-87	SB808	. MOUNT, Main Air Fan Motor (Note 2) .....	1		PBOZZ
50/2	2112-88R	SB808	. BRACE, Mount, Air Fan (R/S) (Note 2) .....	1		PBOZZ
51/2	2112-88L	SB808	. BRACE, Mount, Air Fan (L/S) (Note 2) .....	1		PBOZZ
52/2	2112-93212	SB808	. BOLT, M8×25 .....	4		PAOZZ
53/2	2112-93425	SB808	. WASHER, Flat, M8-OD24 mm .....	8		PAOZZ
54/2	2112-93504	SB808	. NUT, Lock, M8 .....	4		PAOZZ
55/2	2112-4200	1T8G7	. MOTOR, Main Air Fan .....	1		PBOZZ



FIGURE INDEX/ SHT NO.	PART NUMBER	CAGE	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USEABLE ON CODE	SMR CODE
6-4-						
56/2	2112-16500	SB808	. BLADE, Fan .....	1		PBOZZ
57/2	2112-93201	SB808	. BOLT, M6×16 .....	2		PAOZZ
58/2	2112-93412	SB808	. WASHER, M6 .....	2		PAOZZ
59/2	2112-93503	SB808	. NUT, Lock, M6 .....	2		PAOZZ
60/2	2112-82902	SB808	. CLAMP, Electric Cables .....	2		PAOZZ
61/2	2112-93201	SB808	. BOLT, M6×16 .....	4		PAOZZ
62/2	2112-93483	SB808	. WASHER, Lock, M6 .....	4		PAOZZ
63/2	2112-93416	SB808	. WASHER, Flat, M6-OD20 mm .....	4		PAOZZ
64/2	2112-99	SB808	. HOUSING, Fan .....	1		PAOZZ
65/2	2112-93201	SB808	. BOLT, M6×16 .....	8		PAOZZ
66/2	2112-93483	SB808	. WASHER, Lock, M6 .....	8		PAOZZ
67/2	2112-93413	SB808	. WASHER, Flat, M6-OD15 mm .....	8		PAOZZ
68/2	2112-69300	SB808	. HOUSING, Air Outlet .....	1		PAOZZ
69/2	2112-2011	SB808	. ADAPTER COVER, Hood Assy .....	1		PAOZZ
70/2	2112-93324	SB808	. SCREW, M4×20 .....	3		PAOZZ
71/2	2112-93404	SB808	. WASHER, M4 .....	6		PAOZZ
72/2	2112-302	SB808	. BUSHING .....	3		PAOZZ
73/2	2112-93534	SB808	. NUT, M4 .....	6		PAOZZ
74/2	2112-93201	SB808	. BOLT, M6×16 .....	1		PAOZZ
75/2	2112-93413	SB808	. WASHER, Flat, M6-OD15 mm .....	1		PAOZZ
76/2	2112-93483	SB808	. WASHER, Lock, M6 .....	1		PAOZZ
77/2	2112-93503	SB808	. NUT, Lock, M6 .....	1		PAOZZ
78/2	2112-3012	SB808	. BRACKET, Sensor .....	1		PBOZZ
79/2	2112-36818	SB808	. BUSHING, Silicone .....	4		PAOZZ
80/2	2112-20591	SB808	. SENSOR, Thermostatic .....	1		PAOZZ
81/2	2112-65900	SB808	. RESTRAINT, Th. Sensor .....	1		PAOZZ
82/2	2112-66506	SB808	. NUT, Retaining, Th. Sensor, 1/8"NPS .....	1		PAOZZ
83/2	2112-93201	SB808	. BOLT, M6×16 .....	8		PAOZZ
84/2	2112-93483	SB808	. WASHER, Lock, M6 .....	8		PAOZZ
85/2	2112-93413	SB808	. WASHER, Flat, M6-OD15 mm .....	8		PAOZZ
86/2	2112-279	SB808	. PLATE, Air Adjustment .....	2		PAOZZ
87/2	2112-280	SB808	. PLATE, Air Adjustment .....	2		PAOZZ
88/2	2112-281	SB808	. BRACKET .....	2		MFO
89/2	2112-282	SB808	. BRACKET .....	2		MFO
90/2	2112-71	SB808	. ENCLOSURE, Combustion Group .....	1		XB
91/2	2112-93201	SB808	. BOLT, M6×16 .....	4		PAOZZ
92/2	2112-93483	SB808	. WASHER, Lock, M6 .....	4		PAOZZ
93/2	2112-93412	SB808	. WASHER, M6 .....	4		PAOZZ
94/2	2112-93201	SB808	. BOLT, M6×16 .....	1		PAOZZ
95/2	2112-93412	SB808	. WASHER, M6 .....	1		PAOZZ
96/2	2112-93483	SB808	. WASHER, Lock, M6 .....	1		PAOZZ
97/2	2112-3014	SB808	. SENSOR, Conduit .....	1		PAOZZ
98/2	2112-66505	SB808	. NUT, Retaining, Preheat Coil, 1/4"NPS .....	2		PAOZZ
99/2	2112-93201	SB808	. BOLT, M6×16 .....	2		PAOZZ
100/2	2112-93483	SB808	. WASHER, Lock, M6 .....	2		PAOZZ
101/2	2112-93412	SB808	. WASHER, M6 .....	2		PAOZZ
102/2	2112-100	SB808	. COVER, Sensor .....	1		PAOZZ
103/2	2112-101	SB808	. BRACE, Sensor .....	1		PBOZZ
104/2	2112-93201	SB808	. BOLT, M6×16 .....	5		PAOZZ
105/2	2112-93483	SB808	. WASHER, Lock, M6 .....	5		PAOZZ
106/2	2112-93412	SB808	. WASHER, M6 .....	5		PAOZZ
107/2	2112-125	SB808	. PANEL, Enclosure (Bottom) .....	1		XB
108/2	2112-93201	SB808	. BOLT, M6×16 .....	8		PAOZZ
109/2	2112-93483	SB808	. WASHER, Lock, M6 .....	8		PAOZZ
110/2	2112-93412	SB808	. WASHER, M6 .....	3		PAOZZ

FIGURE INDEX/ SHT NO.	PART NUMBER	CAGE	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USEABLE ON CODE	SMR CODE
6-4-						
111/2	2112-93201	SB808	. BOLT, M6×16 .....	2		PAOZZ
112/2	2112-93412	SB808	. WASHER, M6 .....	4		PAOZZ
113/2	2112-93503	SB808	. NUT, Lock, M6 .....	2		PAOZZ
114/2	2112-221	SB808	. PANEL, Enclosure (Rear) .....	1		XB
115/2	2112-36840	SB808	. BUSHING, Cable .....	2		PAOZZ
116/2	2112-93201	SB808	. BOLT, M6×16 .....	4		PAOZZ
117/2	2112-93483	SB808	. WASHER, Lock, M6 .....	4		PAOZZ
118/2	2112-93412	SB808	. WASHER, M6 .....	4		PAOZZ
119/2	2112-82900	SB808	. CLAMP, Fuel Line .....	3		PAOZZ
120/2	2112-82901	SB808	. CLAMP, Engine Wiring Harness .....	1		PAOZZ
121/2	2112-93201	SB808	. BOLT, M6×16 (NOTE 1) .....	4		PAOZZ
122/2	2112-93483	SB808	. WASHER, Lock, M6 (NOTE 1) .....	4		PAOZZ
123/2	2112-93412	SB808	. WASHER, M6 (NOTE 1) .....	4		PAOZZ
124/2	2112-93208	SB808	. BOLT, M6×110 (NOTE 1) .....	2		PAOZZ
125/2	2112-93902	SB808	. SPRING (NOTE 1) .....	2		PAOZZ
126/2	2112-93413	SB808	. WASHER, Flat, M6-OD15 mm (NOTE 1) .....	2		PAOZZ
127/2	2112-93503	SB808	. NUT, Lock, M6 (NOTE 1) .....	2		PAOZZ
128/2	2112-276	SB808	. POLE, Bracket (NOTE 1) .....	2		PAOZZ
129/2	2112-3015	SB808	. POLE, Duct Storage (NOTE 1) .....	2		PAOZZ
130/2	2112-36819	SB808	. PLUG, Plastic (NOTE 1) .....	2		XB

**NOTES:**

- FIGURE 6-4, INDEXES 121 ... 130, DUCT STORAGE POLE ASSEMBLIES; STARTING FROM SERIAL NUMBER 2112-04-2356 THESE ITEMS HAVE BEEN REMOVED AND REPLACED WITH DUCT BASKET (4, FIGURE 6-3).
- MOUNT AND BRACES FOR FAN MOTOR (49, 50 AND 51, FIGURE 6-4); STARTING FROM SERIAL NUMBER 2112-04-2356

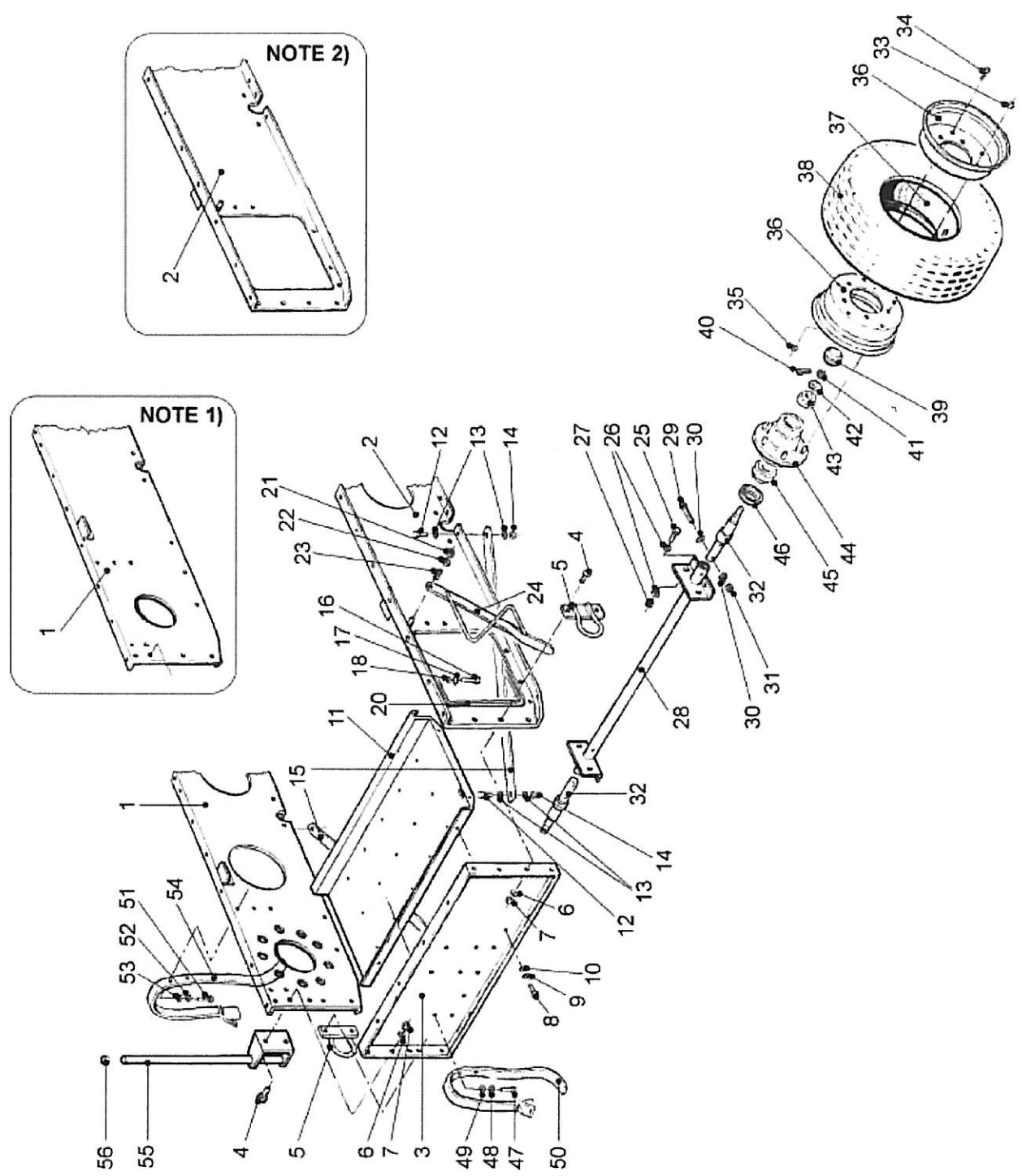


FIGURE 6-5. TRAILER/RUNNING GEAR GROUP (SHEET 1 OF 2)

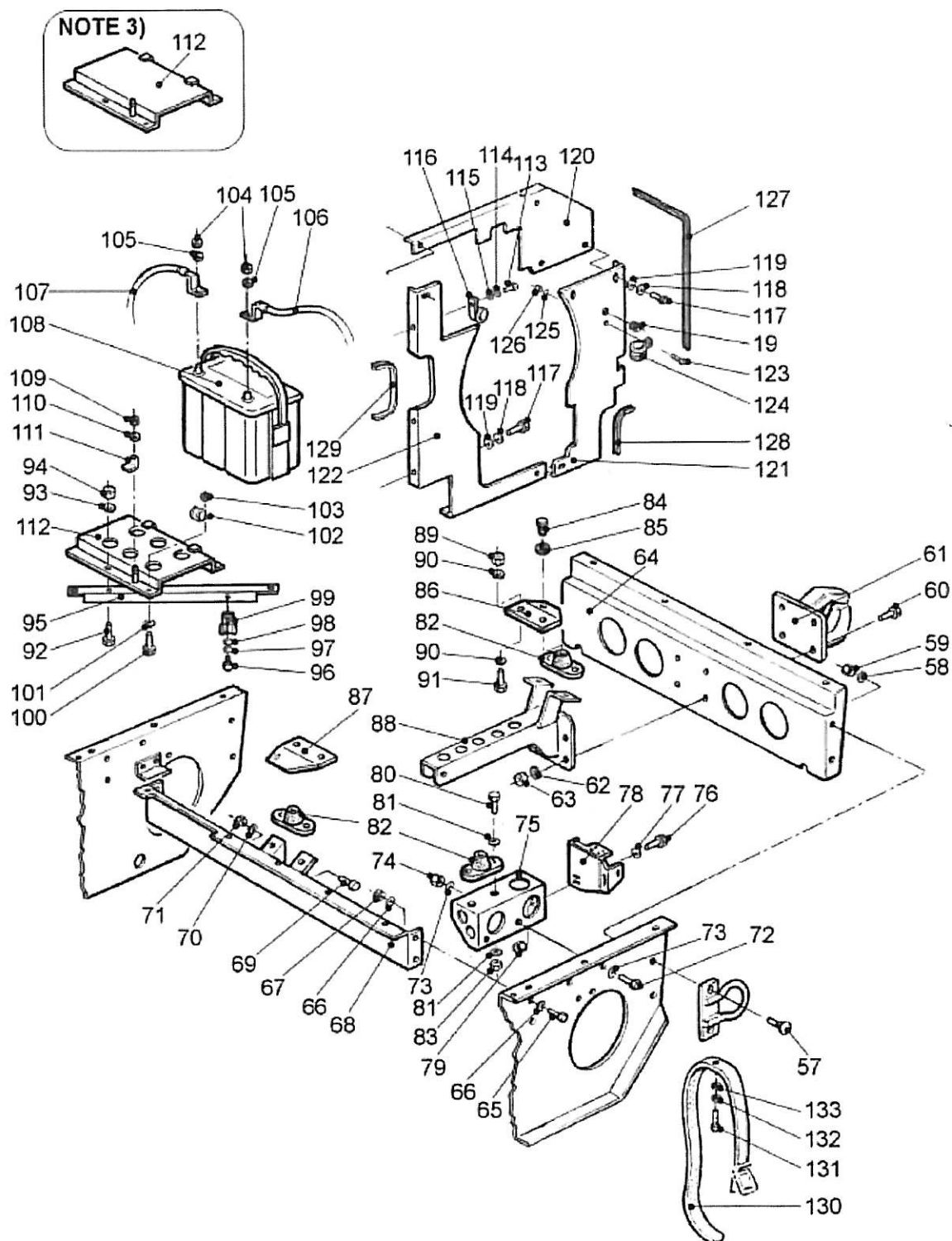


FIGURE 6-5. TRAILER AND RUNNING GEAR GROUP (SHEET 2)

FIGURE INDEX/ SHT NO.	PART NUMBER	CAGE	DESCRIPTION	UNITS PER ASSY	USEABLE ON CODE	SMR CODE
			1 2 3 4 5 6 7			
6-5-	NO NUMBER	SB808	TRAILER/RUNNING GEAR GROUP	REF		XC
1/1	2112-3017	SB808	. PANEL, Trailer (R/S) (NOTE 1) .....	1		PAOZZ
2/1	2112-3018	SB808	. PANEL, Trailer (L/S) (NOTE 2) .....	1		PAOZZ
3/1	2112-7	SB808	. PANEL, Trailer (Front) (NOTE 3) .....	1		PAOZZ
4/1	2112-93212	SB808	. BOLT, M8×25 .....	9		PAOZZ
5/1	2112-19	SB808	. RING, Tiedown .....	4		PBOZZ
6/1	2112-93425	SB808	. WASHER, Flat, M8-OD24 mm .....	9		PAOZZ
7/1	2112-93504	SB808	. NUT, Lock, M8 .....	9		PAOZZ
8/1	2112-93202	SB808	. BOLT, M6×20 .....	6		PAOZZ
9/1	2112-93483	SB808	. WASHER, Lock, M6 .....	6		PAOZZ
10/1	2112-93412	SB808	. WASHER, M6 .....	6		PAOZZ
11/1	2112-21	SB808	. PANEL, Duct, Storage, Bottom .....	1		PAOZZ
12/1	2112-93212	SB808	. BOLT, M8×25 .....	6		PAOZZ
13/1	2112-93422	SB808	. WASHER, M8 .....	12		PAOZZ
14/1	2112-93504	SB808	. NUT, Lock, M8 .....	6		PAOZZ
15/1	2112-11	SB808	. BAR, Support .....	2		PAOZZ
16/1	2112-93212	SB808	. BOLT, M8×25 .....	18		PAOZZ
17/1	2112-93484	SB808	. WASHER, Lock, M8 .....	18		PAOZZ
18/1	2112-93422	SB808	. WASHER, M8 .....	18		PAOZZ
19/2	2112-36809	SB808	. GROMMET .....	1		PAOZZ
20/1	2112-2009	SB808	. INSULATOR (length 51.2 in./1.3 m) .....	1		PAOZZ
----	2112-86135	SB808	. INSULATOR, Full Roll (164 ft / 50 m) .....	--		
21/1	2112-93504	SB808	. NUT, Lock, M8 .....	1		PAOZZ
22/1	2112-93422	SB808	. WASHER, M8 .....	1		PAOZZ
23/1	2112-93902	SB808	. SPRING .....	1		PAOZZ
24/1	2112-22	SB808	. BAR, Retaining .....	1		MFO
25/1	2112-93212	SB808	. BOLT, M8×25 .....	4		PAOZZ
26/1	2112-93427	SB808	. WASHER, Flat, M8-OD24 mm .....	8		PAOZZ
27/1	2112-93504	SB808	. NUT, Lock, M8 .....	4		PAOZZ
28/1	2112-24	SB808	. AXLE ASSEMBLY .....	1		PBOZZ
29/1	2112-93226	SB808	. BOLT, M10×65 .....	4		PAOZZ
30/1	2112-93435	SB808	. WASHER, M10 .....	8		PAOZZ
31/1	2112-93505	SB808	. NUT, Lock, M10 .....	4		PAOZZ
32/1	2112-4313	1T8G7	. SPINDLE .....	2		PAOZZ
33/1	2112-4306	1T8G7	. NUT, Lug, ½"-20 .....	10		PAOZZ
34/1	2112-4307	1T8G7	. BOLT, 3/8"-24×3/4" .....	16		PAOZZ
35/1	2112-4308	1T8G7	. NUT, Lock, 3/8"-24 .....	16		PAOZZ
36/1	2112-4305	1T8G7	. WHEEL ASSY .....	2		PAOZZ
37/1	2112-4303	1T8G7	. TUBE, Inner .....	2		PAOZZ
38/1	2112-4304	1T8G7	. TIRE, 6.00×9.00 .....	2		PAOZZ
39/1	2112-4302	1T8G7	. CAP, Dust .....	2		PAOZZ
40/1	2112-4301	1T8G7	. PIN, Cotter, 3/16"×2" .....	2		PAOZZ
41/1	2112-4309	1T8G7	. NUT, Retaining, ¾"-16 .....	2		PAOZZ
42/1	2112-4317	1T8G7	. WASHER, Flat, ¾"-OD 1 ½" .....	2		PAOZZ
43/1	2112-4310	1T8G7	. BEARING, Outer .....	2		PAOZZ
44/1	2112-4311	1T8G7	. HUB .....	2		PAOZZ
45/1	2112-4312	1T8G7	. BEARING, Inner .....	2		PAOZZ
46/1	2112-4316	1T8G7	. SEAL, Grease .....	2		PAOZZ
47/1	2112-93201	SB808	. BOLT, M6×16 .....	2		PAOZZ
48/1	2112-93483	SB808	. WASHER, Lock, M6 .....	2		PAOZZ
49/1	2112-93416	SB808	. WASHER, Flat, M6-OD20 mm .....	2		PAOZZ
50/1	2112-154	SB808	. STRAP, Duct Adapter .....	1		PAOZZ
51/1	2112-93201	SB808	. BOLT, M6×16 .....	4		PAOZZ
52/1	2112-93483	SB808	. WASHER, Lock, M6 .....	4		PAOZZ
53/1	2112-93416	SB808	. WASHER, Flat, M6-OD20 mm .....	4		PAOZZ
54/1	2112-154	SB808	. STRAP, Ducts .....	2		PAOZZ
55/1	2112-3022	SB808	. POLE, Exhaust Stack, Storage .....	1		PAOZZ

FIGURE INDEX/ SHT NO.	PART NUMBER	CAGE	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USEABLE ON CODE	SMR CODE
6-5-						
56/1	2112-36819	SB808	. PLUG, Plastic .....	1		PAOZZ
57/2	2112-93212	SB808	. BOLT, M8×25 .....	4		PAOZZ
58/2	2112-93425	SB808	. WASHER, Flat, M8-OD24 mm .....	4		PAOZZ
59/2	2112-93504	SB808	. NUT, Lock, M8 .....	4		PAOZZ
60/2	2112-93232	SB808	. BOLT, M12×45 .....	4		PAOZZ
61/2	2112-4300	1T8G7	. PINTLE HOOK ASSEMBLY .....	1		PAOZZ
62/2	2112-93442	SB808	. WASHER, M12 .....	4		PAOZZ
63/2	2112-93506	SB808	. NUT, M12 .....	4		PAOZZ
64/2	2112-3019	SB808	. PANEL, Trailer (Rear) .....	1		PAOZZ
65/2	2112-93212	SB808	. BOLT, M8×25 .....	4		PAOZZ
66/2	2112-93425	SB808	. WASHER, Flat M8-OD24 mm .....	8		PAOZZ
67/2	2112-93504	SB808	. NUT, M8 .....	4		PAOZZ
68/2	2112-3020	SB808	. BEAM, Support .....	1		PAOZZ
69/2	2112-93221	SB808	. BOLT, M10×20 .....	2		PAOZZ
70/2	2112-93435	SB808	. WASHER, M10 .....	2		PAOZZ
71/2	2112-93505	SB808	. NUT, M10 .....	2		PAOZZ
72/2	2112-93212	SB808	. BOLT, M8×25 .....	2		PAOZZ
73/2	2112-93425	SB808	. WASHER, Flat, M8-OD24 mm .....	4		PAOZZ
74/2	2112-93504	SB808	. NUT, Lock, M8 .....	2		PAOZZ
75/2	2112-38	SB808	. BRACKET, Alternator Support .....	1		PBOZZ
76/2	2112-93200	SB808	. BOLT, M6×12 .....	2		PAOZZ
77/2	2112-93412	SB808	. WASHER, M6 .....	2		PAOZZ
78/2	2112-41	SB808	. BRACKET, Solenoid .....	1		PBOZZ
79/2	2112-93503	SB808	. NUT, Lock, M6 .....	2		PAOZZ
80/2	2112-93212	SB808	. BOLT, M8×25 .....	6		PAOZZ
81/2	2112-93422	SB808	. WASHER, M8 .....	12		PAOZZ
82/2	17529000	1T8G7	. MOUNT, Shock .....	3		PBOZZ
83/2	2112-93504	SB808	. NUT, Lock, M8 .....	6		PAOZZ
84/2	26302006	1T8G7	. BOLT, .500"-UNF x 1.25" .....	3		PAOZZ
85/2	WLM-8	1T8G7	. WASHER, Lock, .500 .....	3		PAOZZ
86/2	2112-27	SB808	. PAD, Mount, Right .....	1		PBOZZ
87/2	2112-23	SB808	. PAD, Mount, Left .....	1		PBOZZ
88/2	2112-3021	SB808	. BEAM, Support .....	1		PAOZZ
89/2	2112-93505	SB808	. NUT, Lock, M10 .....	4		PAOZZ
90/2	2112-93435	SB808	. WASHER, M10 .....	8		PAOZZ
91/2	2112-93227	SB808	. BOLT, M10×50 .....	4		PAOZZ
92/2	2112-93201	SB808	. BOLT, M6×16 .....	1		PAOZZ
93/2	2112-93412	SB808	. WASHER, M6 .....	1		PAOZZ
94/2	2112-93503	SB808	. NUT, Lock, M6 .....	1		PAOZZ
95/2	2112-63	SB808	. BEAM, Support .....	1		MFO
96/2	2112-93202	SB808	. BOLT, M6×20 .....	1		PAOZZ
97/2	2112-93483	SB808	. WASHER, Lock, M6 .....	1		PAOZZ
98/2	2112-93412	SB808	. WASHER, M6 .....	1		PAOZZ
99/2	2112-82905	SB808	. CLAMP, Fuel Line .....	1		PAOZZ
100/2	2112-93203	SB808	. BOLT, M6×25 .....	1		PAOZZ
101/2	2112-93412	SB808	. WASHER, M6 .....	1		PAOZZ
102/2	2112-82900	SB808	. CLAMP, Electric Cable .....	1		PAOZZ
103/2	2112-93503	SB808	. NUT, Lock, M6 .....	1		PAOZZ
104/2	2112-4202	0UJ55	. NUT, Stainless Steel, 3/8"-16 .....	2		PAOZZ
105/2	2112-4203	0UJ55	. WASHER, Stainless Steel, 3/8" .....	2		PAOZZ
106/2	108448-02	1T8G7	. CABLE, Negative .....	1		PAOZZ
107/2	108448-01	1T8G7	. CABLE, Positive .....	1		PAOZZ
108/2	8016-103	0UJ55	. BATTERY .....	1		PAOZZ
109/2	2112-93504	SB808	. NUT, Lock, M8, Battery Clamp .....	1		PAOZZ
110/2	2112-93422	SB808	. WASHER, , M8, Battery Clamp .....	1		PAOZZ

FIGURE INDEX/ SHT NO.	PART NUMBER	CAGE	DESCRIPTION	UNITS PER ASSY	USEABLE ON CODE	SMR CODE
			1 2 3 4 5 6 7			
6-5-						
111/2	2112-61	SB808	. CLAMP, Battery .....	1		PAOZZ
112/2	2112-60	SB808	. TRAY, Battery (NOTE 4) .....	1		PAOZZ
113/2	2112-93201	SB808	. BOLT, M6×16 .....	1		PAOZZ
114/2	2112-93483	SB808	. WASHER, Lock, M6 .....	1		PAOZZ
115/2	2112-93412	SB808	. WASHER, M6 .....	1		PAOZZ
116/2	2112-82902	SB808	. CLAMP, Fuel Line .....	1		PAOZZ
117/2	2112-93201	SB808	. BOLT, M6×16 .....	7		PAOZZ
118/2	2112-93483	SB808	. WASHER, Lock, M6 .....	7		PAOZZ
119/2	2112-93412	SB808	. WASHER, M6 .....	7		PAOZZ
120/2	2112-252	SB808	. PANEL, Heat .....	1		PBOZZ
121/2	2112-250	SB808	. PANEL, Heat .....	1		PBOZZ
122/2	2112-251	SB808	. PANEL, Heat .....	1		PBOZZ
123/2	2112-93201	SB808	. BOLT, M6×16 .....	1		PAOZZ
124/2	2112-82905	SB808	. CLAMP, Fuel Line .....	1		PAOZZ
125/2	2112-93412	SB808	. WASHER, M6 .....	1		PAOZZ
126/2	2112-93503	SB808	. NUT, Lock, M6 .....	1		PAOZZ
127/2	2112-2006	SB808	. INSULATOR (length 16.5 in. / 420 mm) .....	1		PAOZZ
128/2	2112-2007	SB808	. INSULATOR (length 9 in. / 230 mm) .....	1		PAOZZ
129/2	2112-2008	SB808	. INSULATOR (length 7.9 in. / 200 mm) .....	1		PAOZZ
----	2112-86136	SB808	. INSULATOR, Full Roll (164 ft / 50 m) .....	--		
130/2	2112-155	SB808	. STRAP, Duct .....	2		PAOZZ
131/2	2112-93201	SB808	. BOLT, M6×16 .....	2		PAOZZ
132/2	2112-93483	SB808	. WASHER, Lock, M6 .....	2		PAOZZ
133/2	2112-93416	SB808	. WASHER, Flat, M6-OD20 mm .....	2		PAOZZ

## NOTES:

- FIGURE 6-5, INDEX 1, TRAILER PANEL (R/S); STARTING FROM SERIAL NUMBER 2112-04-2356
- FIGURE 6-5, INDEX 2, TRAILER PANEL (L/S); STARTING FROM SERIAL NUMBER 2112-04-2356
- FIGURE 6-5, INDEX 3, TRAILER FRONT PANEL; STARTING FROM SERIAL NUMBER 2112-03-1332 SHEET METAL HAS CHANGED FOR HEAVIER GAUGE (3,0 MM). ALSO SEE 13, FIGURE 6-6 AND NOTE 1.
- FIGURE 6-5, INDEX 112, BATTERY TRAY; STARTING FROM SERIAL NUMBER 2112-04-2356



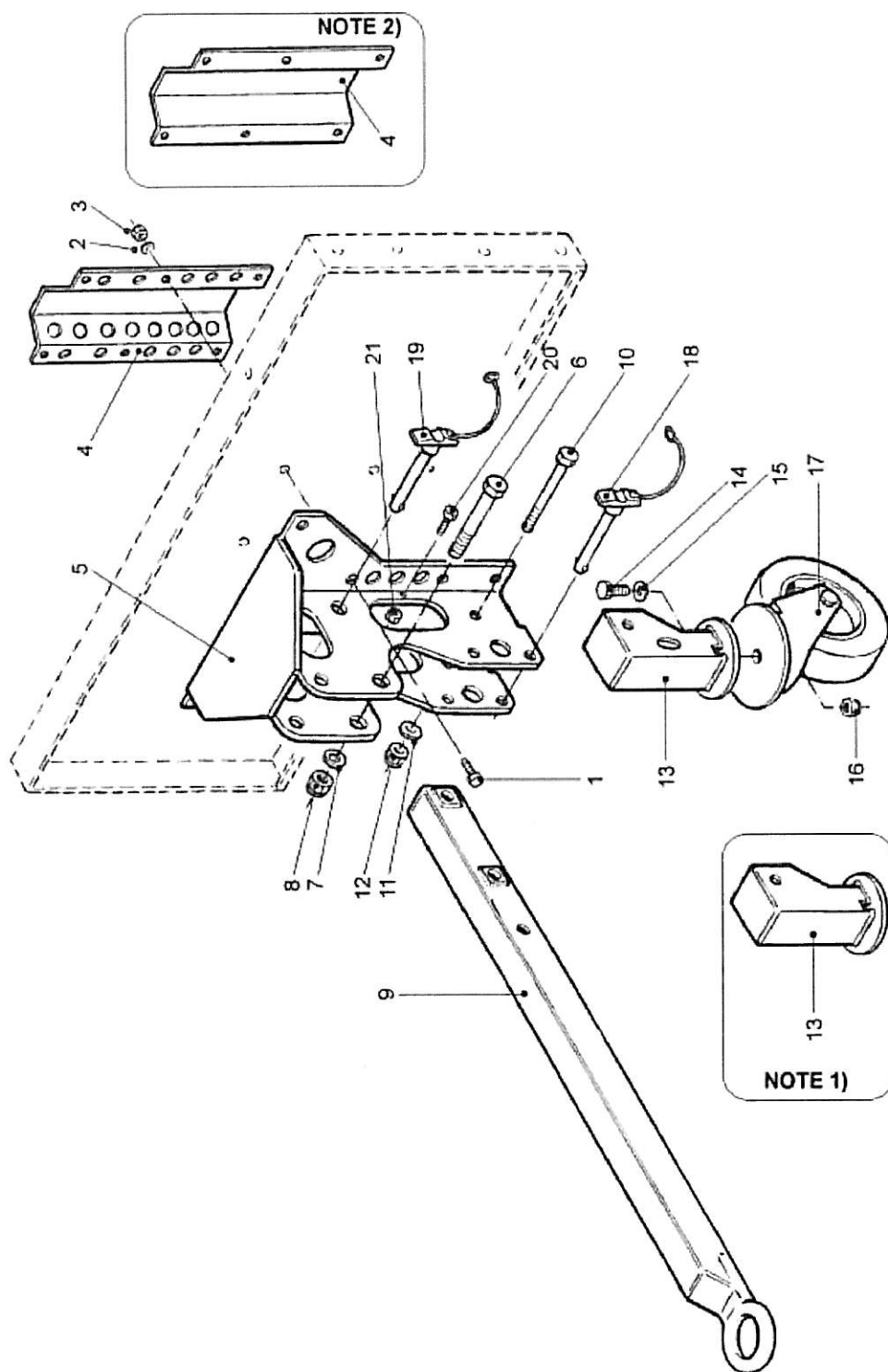


FIGURE 6-6. TOWBAR/FRONT WHEEL GROUP

FIGURE INDEX/ SHT NO.	PART NUMBER	CAGE	DESCRIPTION	UNITS PER ASSY	USEABLE ON CODE	SMR CODE
			1 2 3 4 5 6 7			
6-6-	NO NUMBER	SB808	TOWBAR/FRONT WHEEL GRP	REF		XC
1	2112-93222	SB808	. BOLT, M10×25 .....	10		PAOZZ
2	2112-93435	SB808	. WASHER, M10 .....	10		PAOZZ
3	2112-93505	SB808	. NUT, Lock, M10 .....	10		PAOZZ
4	2112-31	SB808	. BRACKET, Brace (NOTE 2) .....	1		PAOZZ
5	2112-3007	SB808	. BRACKET, Towbar/Wheel .....	1		PAOZZ
6	2112-93246	SB808	. BOLT, M16×110 .....	1		PAOZZ
7	2112-93452	SB808	. WASHER, M16 .....	1		PAOZZ
8	2112-93507	SB808	. NUT, Lock, M16 .....	1		PAOZZ
9	2112-3008	SB808	. HITCH, Towbar .....	1		PAOZZ
10	2112-93235	SB808	. BOLT, M12×90 .....	1		PAOZZ
11	2112-93442	SB808	. WASHER, M12 .....	1		PAOZZ
12	2112-93506	SB808	. NUT, Lock, M12 .....	1		PAOZZ
13	2112-3009	SB808	. BLOCK, Wheel (NOTE 1) .....	1		PAOZZ
14	2112-93243	SB808	. BOLT, M16×50 .....	1		PAOZZ
15	2112-93452	SB808	. WASHER, M16 .....	1		PAOZZ
16	2112-93507	SB808	. NUT, Lock, M16 .....	1		PAOZZ
17	2112-74500	SB808	. CASTER ASSY .....	1		PAOZZ
18	2112-4315	1T8G7	. PIN, Detent, Ø1/2" .....	1		PAOZZ
19	2112-4314	1T8G7	. PIN, Detent, Ø5/8" .....	1		PAOZZ
20	2112-93323	SB808	. SCREW, M4×16 .....	1		PAOZZ
21	2112-93501	SB808	. NUT, Lock, M4 .....	1		PAOZZ

**NOTES:**

- SERIAL NUMBERS BETWEEN 2112-01-0001 ... 2112-03-1331; ORIGINALLY USED DESIGN FOR WHEEL BLOCK (13, FIGURE 6-6). A NEW REINFORCED WHEEL BLOCK IS FACTORY INSTALLED FROM SERIAL NUMBER 2112-03-1332 ON. SEE ADVISORY.
- BRACKET, BRACE (4, FIGURE 6-6); STARTING FROM SERIAL NUMBER 2112-04-2356.

**MAINTENANCE ADVISORY:** WHEN REPLACING OLD DESIGN WHEEL BLOCK (PN 2112-3009) WITH A NEW REINFORCED WHEEL BLOCK, REPLACEMENT OF FRONT PANEL WITH A NEW, THICKER PANEL (3, FIGURE 6-5 – PN 2112-7) IS REQUIRED.

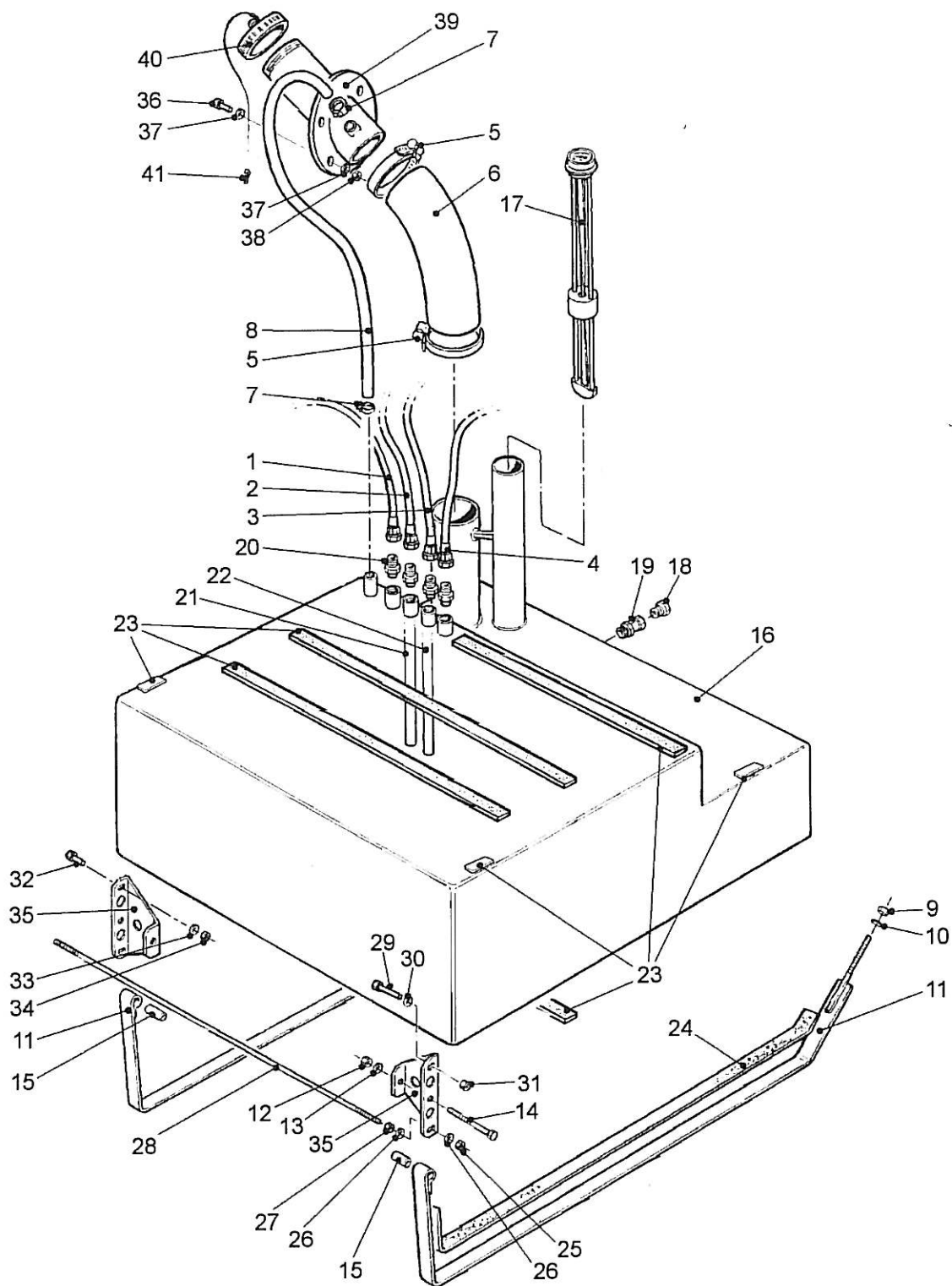


FIGURE 6-7. FUEL SYSTEM (SHEET 1 OF 2)

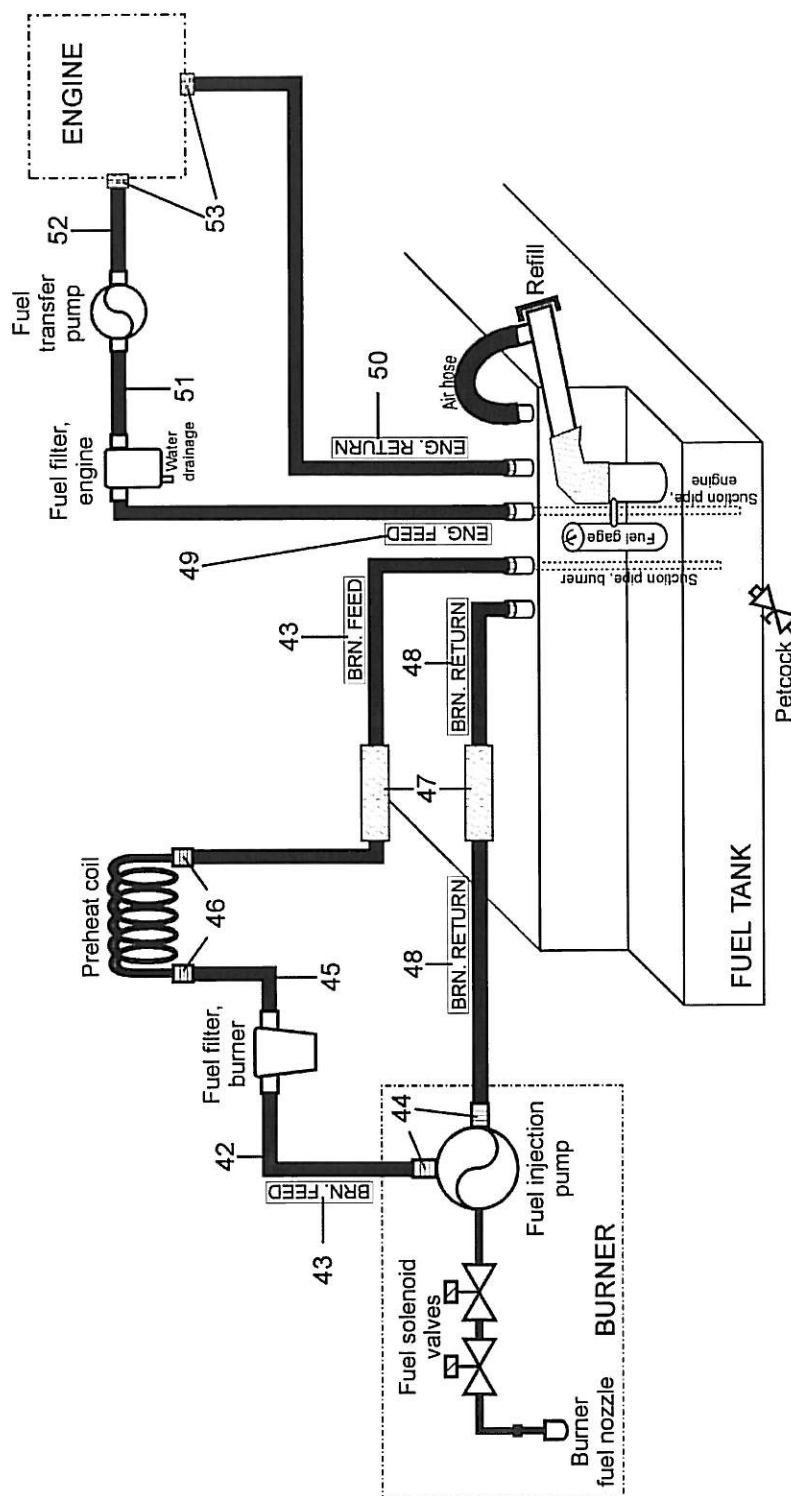


FIGURE 6-7. FUEL SYSTEM (SHEET 2)

FIGURE INDEX/ SHT NO.	PART NUMBER	CAGE	DESCRIPTION	UNITS PER ASSY	USEABLE ON CODE	SMR CODE
			1 2 3 4 5 6 7			
6-7-	NO NUMBER	SB808	FUEL TANK ASSEMBLY	REF		XC
1/1	2112-4413	1T8G7	FUEL LINE, Engine Return .....	1		PAOOO
2/1	2112-4412	1T8G7	FUEL LINE, Engine Feed .....	1		PAOOO
3/1	2112-4414	1T8G7	FUEL LINE, Burner Feed .....	1		PAOOO
4/1	2112-4414	1T8G7	FUEL LINE, Burner Return .....	1		PAOOO
5/1	2112-69951	SB808	CLAMP .....	2		PBOZZ
6/1	2112-2001	SB808	HOSE, Filler .....	1		PBOZZ
7/1	2112-69962	SB808	CLAMP .....	2		PAOZZ
8/1	2112-2002	SB808	HOSE, Air Vent .....	1		PBOZZ
9/1	2112-93504	SB808	NUT, Lock, M8 .....	2		PAOZZ
10/1	2112-93422	SB808	WASHER, M8 .....	2		PAOZZ
11/1	2112-143	SB808	STRAP, Tank .....	2		PBOZZ
12/1	2112-93505	SB808	NUT, Lock, M10 .....	2		PAOZZ
13/1	2112-93435	SB808	WASHER, M10 .....	2		PAOZZ
14/1	2112-93228	SB808	BOLT, M10×100 .....	2		PAOZZ
15/1	2112-148	SB808	BUSHING .....	2		PBOZZ
16/1	2112-135	SB808	TANK ASSY., Fuel .....	1		PBOZZ
17/1	2112-4400	1T8G7	GAGE, Fuel .....	1		PBOZZ
18/1	2112-65261	SB808	PLUG, Petcock .....	1		PAOZZ
19/1	2112-67006	SB808	PETCOCK, Fuel Tank .....	1		PAOZZ
20/1	2112-4410	1T8G7	FITTING, Straight, 1/4"NPT×1/4"SAE .....	4		PAOZZ
21/1	2112-149	SB808	SUCTION PIPE, Engine Feed .....	1		PBOZZ
			(length 14.17 in. / 360 mm)			
22/1	2112-150	SB808	SUCTION PIPE, Burner Feed .....	1		PBOZZ
			(length 13.98 in. / 355 mm)			
23/1	2112-2004	SB808	PAD ASSY, Rubber, Adhesive .....	1		PBOZZ
24/1	2112-2003	SB808	STRAP, Rubber, Adhesive .....	2		PBOZZ
25/1	2112-93504	SB808	NUT, Lock, M8 .....	2		PAOZZ
26/1	2112-93422	SB808	WASHER, Flat, M8 .....	4		PAOZZ
27/1	2112-93514	SB808	NUT, M8 .....	2		PAOZZ
28/1	2112-10	SB808	ROD, Support .....	1		MFO
29/1	2112-93215	SB808	BOLT, M8×45 .....	1		PAOZZ
30/1	2112-93422	SB808	WASHER, M8 .....	1		PAOZZ
31/1	2112-93504	SB808	NUT, Lock, M8 .....	1		PAOZZ
32/1	2112-93212	SB808	BOLT, M8×25 .....	1		PAOZZ
33/1	2112-93422	SB808	WASHER, M8 .....	1		PAOZZ
34/1	2112-93504	SB808	NUT, Lock, M8 .....	1		PAOZZ
35/1	2112-144	SB808	BRACE, Tank .....	2		PBOZZ
36/1	2112-93201	SB808	BOLT, M6×16 .....	2		PAOZZ
37/1	2112-93413	SB808	WASHER, Flat, M6-OD15 mm .....	4		PAOZZ
38/1	2112-93503	SB808	NUT, Lock, M6 .....	2		PAOZZ
39/1	2112-3028	SB808	FILLER NECK, Fuel .....	1		PBOZZ
40/1	2112-80421	SB808	CAP, Fuel .....	1		PAOZZ
41/1	2112-93801	SB808	PIN, Cotter .....	1		PAOZZ
42/2	2112-4419	1T8G7	FUEL LINE, Filter To Burner .....	1		PAOOO
43/2	2112-18030	SB808	TAG ASSY, Fuel Lines .....	2		MFO
44/2	2112-4425	1T8G7	FITTING, 45 Deg, 1/4" NPT×1/4"SAE .....	2		PAOZZ
45/2	2112-4418	1T8G7	FUEL LINE, Preheat Coil To Filter .....	1		PAOOO
46/2	2112-4402	1T8G7	FITTING, 90 Deg, 1/4"FNPT×1/4"SAE .....	2		PAOZZ
47/2	2112-4204	1T8G7	CONDUIT, Plastic, Fuel Line .....	2		MFO
48/2	2112-18040	SB808	TAG ASSY, Fuel Lines .....	2		MFO
49/2	2112-18010	SB808	TAG ASSY, Fuel Lines .....	1		MFO
50/2	2112-18020	SB808	TAG ASSY, Fuel Lines .....	1		MFO
51/2	2112-4416	1T8G7	FUEL LINE, Engine Filter To Pump .....	1		PAOOO
52/2	2112-4417	1T8G7	FUEL LINE, Pump To Engine .....	1		PAOOO
53/2	2112-5300	1T8G7	CLAMP, Engine Fuel Lines .....	2		PAOZZ

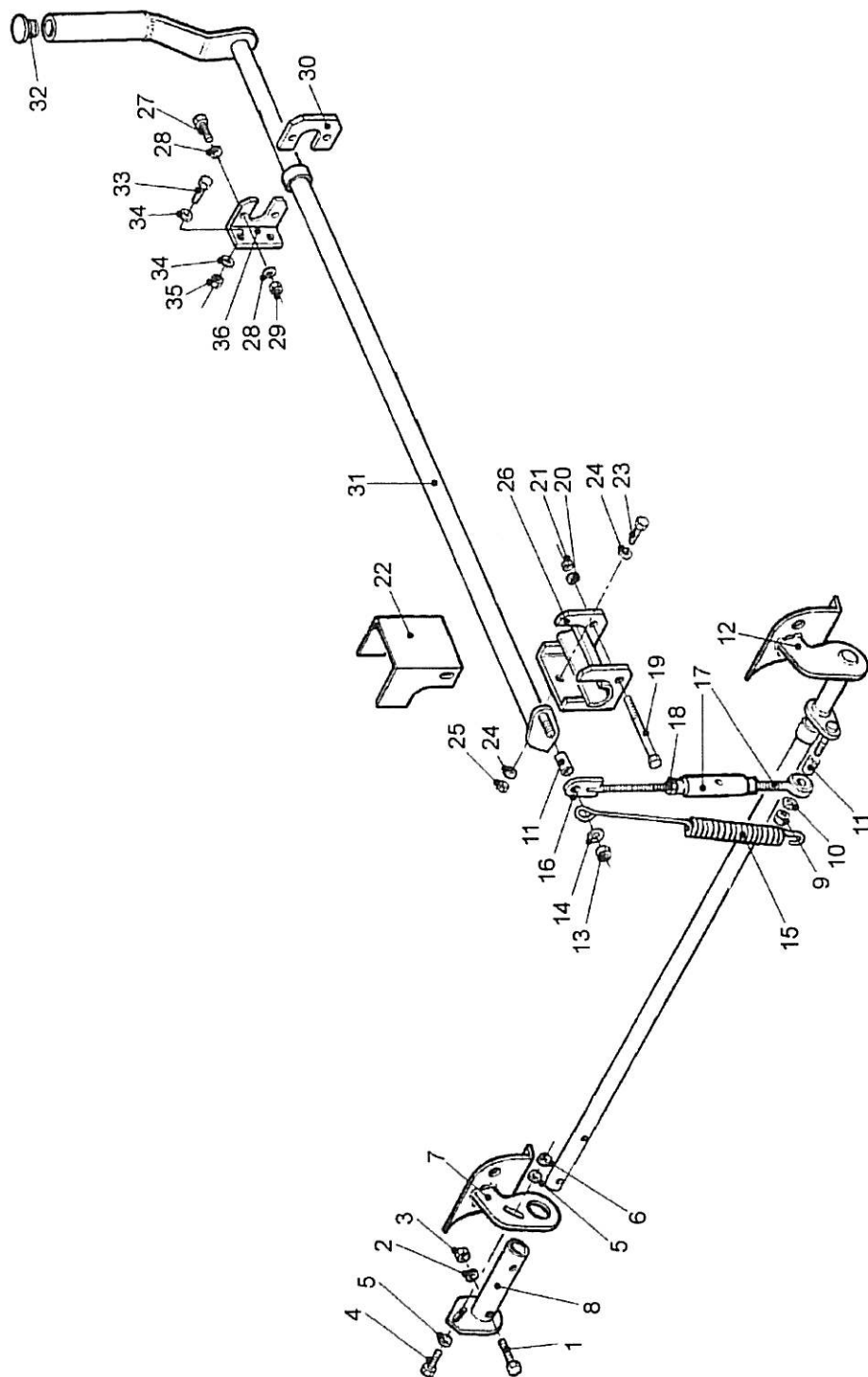


FIGURE 6-8. BRAKE ASSEMBLY

FIGURE INDEX/ SHT NO.	PART NUMBER	CAGE	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USEABLE ON CODE	SMR CODE
6-8-	NO NUMBER	SB808	BRAKE ASSEMBLY	REF		XC
1	2112-93205	SB808	. BOLT, M6×40 .....	2		PAOZZ
2	2112-93412	SB808	. WASHER, M6 .....	2		PAOZZ
3	2112-93503	SB808	. NUT, Lock, M6 .....	2		PAOZZ
4	2112-93212	SB808	. BOLT, M8×25 .....	1		PAOZZ
5	2112-93425	SB808	. WASHER, Flat, M8-OD24 mm .....	2		PAOZZ
6	2112-93504	SB808	. NUT, Lock, M8 .....	1		PAOZZ
7	2112-3001	SB808	. BRAKE (L/S) .....	1		PBOZZ
8	2112-3023	SB808	. SLEEVE, Brake .....	1		PBOZZ
9	2112-93504	SB808	. NUT, Lock, M8 .....	1		PAOZZ
10	2112-93425	SB808	. WASHER, Flat, M8-OD24 mm .....	1		PAOZZ
11	2112-301	SB808	. BUSHING .....	2		PBOZZ
12	2112-3002	SB808	. ROD ASSY., Brake .....	1		PBOZZ
13	2112-93504	SB808	. NUT, Lock, M8 .....	1		PAOZZ
14	2112-93425	SB808	. WASHER, Flat, M8-OD24 mm .....	1		PAOZZ
15	2112-93900	SB808	. SPRING .....	1		PBOZZ
16	2112-3003	SB808	. ROD, Turnbuckle Assy .....	1		PBOZZ
17	2112-93100	SB808	. TURNBUCKLE ASSY, Adjusting .....	1		PBOZZ
18	2112-93514	SB808	. NUT, Check, M8, Turnbuckle .....	1		PAOZZ
19	2112-93218	SB808	. BOLT, M8×65 .....	1		PAOZZ
20	2112-93422	SB808	. WASHER, M8 .....	1		PAOZZ
21	2112-93504	SB808	. NUT, Lock, M8 .....	1		PAOZZ
22	2112-177	SB808	. BRACE, Brake Rod .....	1		PBOZZ
23	2112-93211	SB808	. BOLT, M8×20 .....	2		PAOZZ
24	2112-93422	SB808	. WASHER, M8 .....	4		PAOZZ
25	2112-93504	SB808	. NUT, Lock, M8 .....	2		PAOZZ
26	2112-3004	SB808	. SUPPORT, Brake Rod .....	1		PBOZZ
27	2112-93211	SB808	. BOLT, M8×20 .....	2		PAOZZ
28	2112-93422	SB808	. WASHER, M8 .....	4		PAOZZ
29	2112-93504	SB808	. NUT, Lock, M8 .....	2		PAOZZ
30	2112-173	SB808	. BRACE, Brake Rod .....	1		PBOZZ
31	2112-3006	SB808	. ROD ASSY., Brake .....	1		PBOZZ
32	2112-36819	SB808	. PLUG, Plastic .....	1		PAOZZ
33	2112-93211	SB808	. BOLT, M8×20 .....	2		PAOZZ
34	2112-93422	SB808	. WASHER, M8 .....	4		PAOZZ
35	2112-93504	SB808	. NUT, Lock, M8 .....	2		PAOZZ
36	2112-3005	SB808	. SUPPORT, Brake Rod .....	1		PBOZZ



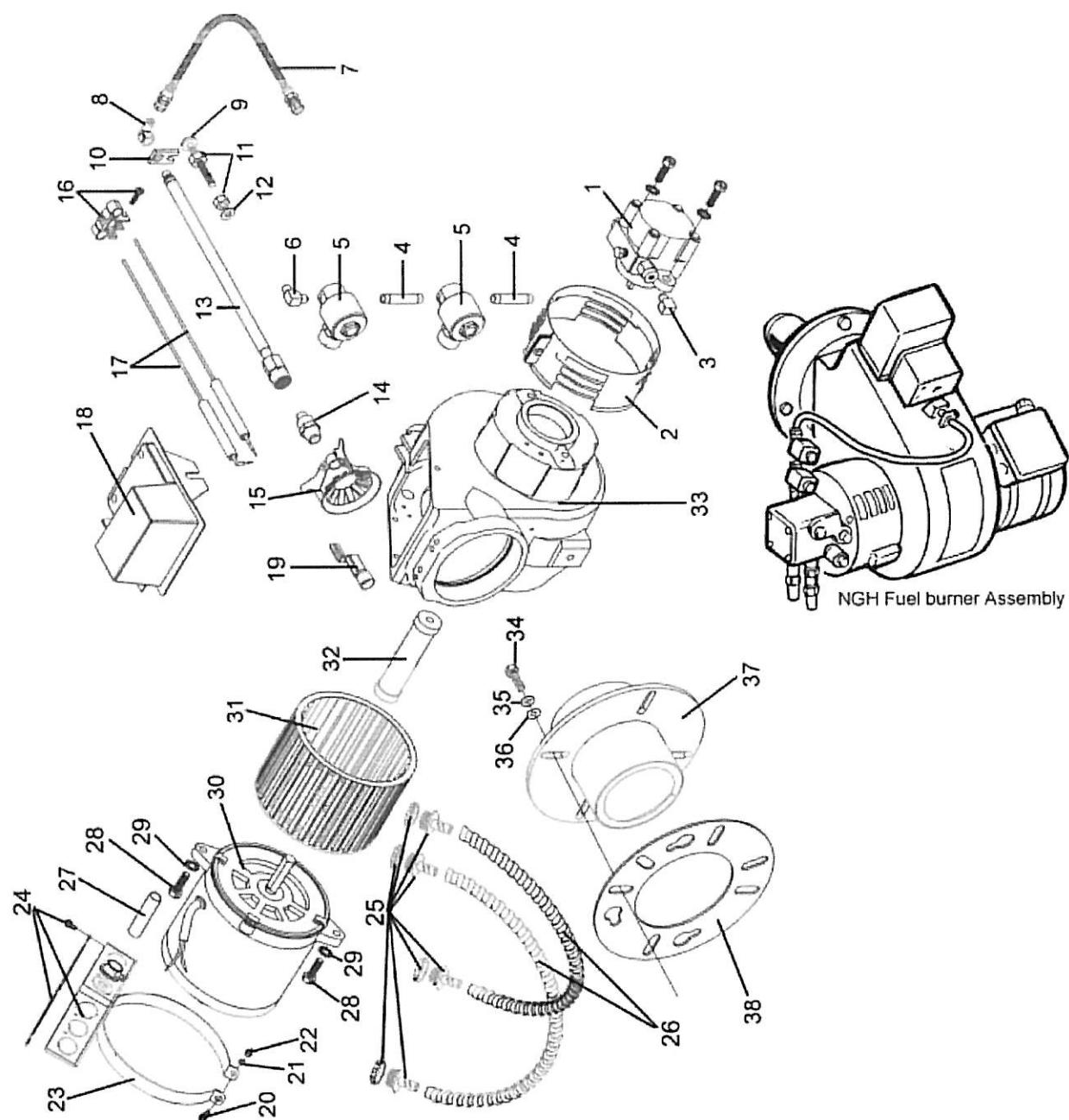
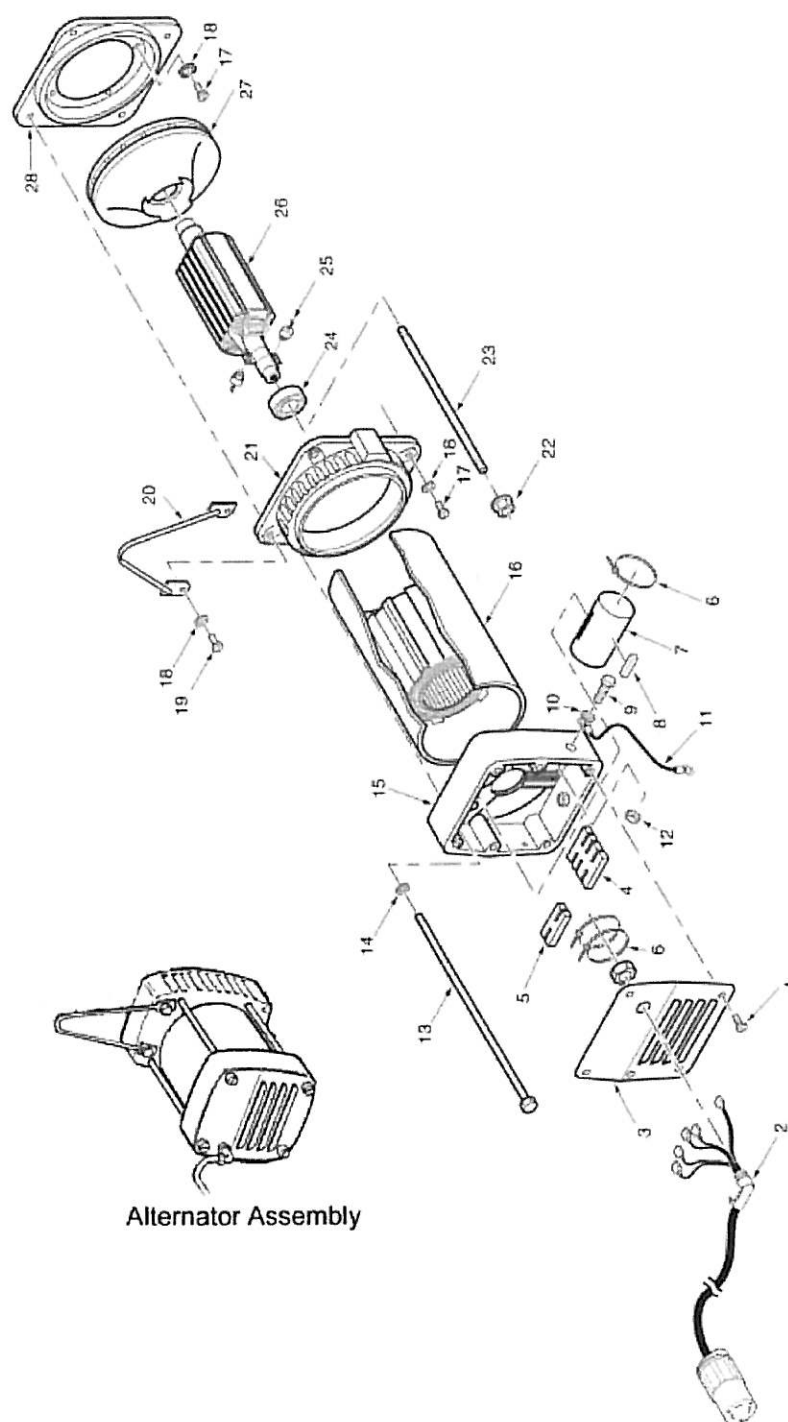


FIGURE 6-9. FUEL BURNER ASSEMBLY

FIGURE INDEX/ SHT NO.	PART NUMBER	CAGE	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USEABLE ON CODE	SMR CODE
6-9-	9833200HPS1	1T8G7	FUEL BURNER ASSEMBLY .....	1		PBOOO
1	27938	1T8G7	. PUMP, Single Stage .....	1		PBOZZ
2	47001	1T8G7	. AIR BAND, Four Slot .....	1		PBOZZ
3	118-2671-001	1T8G7	. ELBOW, Street 1/8" NPTF×1/8" NPTM.....	1		PAOZZ
4	44560	1T8G7	. NIPPLE, Brass, 1/8" NPTM×1-5/8" .....	2		PAOZZ
5	40857	1T8G7	. VALVE, Fuel, (Fuel Solenoid) .....	2		PAOZZ
6	29678	1T8G7	. ELBOW, Flare, 1/8" NPTM×1/4" .....	1		PAOZZ
7	620-7256-012	1T8G7	. HOSE ASSEMBLY, 12" .....	1		PBOZZ
8	29694	1T8G7	. ELBOW, Flare, 1/8" NPTF×1/4" .....	1		PAOZZ
9	47167	1T8G7	. SCREW, Adjusting, Combustion Hd. ....	1		PBOZZ
10	54916	1T8G7	. YOKE, Adj, Combustion Head .....	1		PBOZZ
11	28357	1T8G7	. NUT, Retaining, 3/8"-16 .....	2		PAOZZ
12	30684	1T8G7	. WASHER, Lock, 3/8" .....	2		PAOZZ
13	98642	1T8G7	. ADAPTER ASSY, Nozzle Line .....	1		PBOZZ
14	92031	1T8G7	. NOZZLE, 2.75 GPH × 80SS Hago .....	1		PAOZZ
15	55715	1T8G7	. RING ASSEMBLY, Retention .....	1		PBOZZ
16	23135S	1T8G7	. BRACKET ASSEMBLY, Electrode .....	1		PBOZZ
17	76158	1T8G7	. ELECTRODE ASSEMBLY .....	2		PBOZZ
18	410000SC	1T8G7	. IGNITOR, Constant Duty .....	1		PBOZZ
19	1440700K	1T8G7	. PHOTOCELL, With Bracket Assy .....	1		PAOZZ
20	30692	1T8G7	. SCREW, 1/4"-20×1.00" .....	1		PAOZZ
21	30478	1T8G7	. WASHER, Lock, 1/4" .....	1		PAOZZ
22	28100	1T8G7	. NUT, Square, 1/4"-20 .....	1		PAOZZ
23	44859	1T8G7	. CLAMP ASSEMBLY, Junction Box .....	1		PBOZZ
24	COMM	1T8G7	. BOX, Junction .....	1		PBOZZ
25	98651	1T8G7	. CONNECTOR, 3/8" BX × 1/2" .....	4		PBOZZ
26	82941	1T8G7	. HOSE, BX Sheath 3/8"×16-1/2" .....	2		PBOZZ
27	34405	1T8G7	. TUBE, Split .....	1		PBOZZ
28	97015	1T8G7	. BOLT, 5/16"-18×1.25" .....	2		PBOZZ
29	31179	1T8G7	. WASHER, Lock, 5/16" .....	2		PAOZZ
30	27656	1T8G7	. MOTOR, Induction, 115VAC/60 Hz .....	1		PBOZZ
31	28563	1T8G7	. WHEEL, Blower .....	1		PBOZZ
32	28720	1T8G7	. COUPLING, Motor To Pump .....	1		PAOZZ
33	45724	1T8G7	. HOUSING, Burner, Complete .....	1		XA
34	2112-93225	SB808	. BOLT, M10×45 .....	3		PAOZZ
35	2112-93485	SB808	. WASHER, Lock, M10 .....	3		PAOZZ
36	2112-93435	SB808	. WASHER, M10 .....	3		PAOZZ
37	98640	1T8G7	. TUBE/FLANGE ASSY, Air, Welded .....	1		PBOZZ
38	40212	1T8G7	. GASKET, 7-3/4" Universal .....	1		PBOZZ



Alternator Assembly

FIGURE 6-10. ALTERNATOR ASSEMBLY

FIGURE INDEX/ SHT NO.	PART NUMBER	CAGE	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USEABLE ON CODE	SMR CODE
6-10-	099723-05	1T8G7	ALTERNATOR ASSEMBLY .....	1		PB000
1	099701-01	1T8G7	. SCREW, M5×10 mm .....	6		PAOZZ
2	103885-01	1T8G7	. CORD SET 2.5" .....	1		PBOZZ
3	099844-02	1T8G7	. COVER, End .....	1		XA
4	099863-01	1T8G7	. BLOCK, Terminal, 4 Position .....	1		XA
5	099863-02	1T8G7	. BLOCK, Terminal, 2 Position .....	1		XA
6	109499-01	1T8G7	. STRAP, Tie, Nylon .....	3		PAOZZ
7	27003001S	1T8G7	. CAPACITOR .....	1		PBOZZ
8	099892-01	1T8G7	. PAD, Foam .....	1		XB
9	108587-01	1T8G7	. SCREW, M6×12 mm .....	1		PAOZZ
10	109481-01	1T8G7	. WASHER, Lock, M6 .....	1		PAOZZ
11	14138001	1T8G7	. STRAP, Ground .....	1		MFO
12	109480-01	1T8G7	. NUT, Lock, M6 .....	1		PAOZZ
13	099847-06	1T8G7	. BOLT, M6×187, Stator .....	4		XB
14	110336-01	1T8G7	. WASHER, Lock, M6 .....	4		PAOZZ
15	099843-01	1T8G7	. HOUSING .....	1		XA
16	099840-06	1T8G7	. STATOR .....	1		XA
17	100328-02	1T8G7	. BOLT, M8×25 mm .....	6		PAOZZ
18	108586-01	1T8G7	. WASHER, Lock, M8 .....	8		PAOZZ
19	110115-01	1T8G7	. BOLT, M8×35 mm .....	2		PAOZZ
20	103312-01	1T8G7	. EYE, Lifting .....	1		MFO
21	27003002	1T8G7	. BRACKET, Fan .....	1		XA
22	2700101S	1T8G7	. NUT, Rotor, M8 .....	1		PAOZZ
23	099842-05	1T8G7	. BOLT, Draw, M8 / .312-24 × 183 mm .....	1		PBOZZ
24	27003003	1T8G7	. BEARING .....	1		XB
25	27003012S	1T8G7	. DIODE .....	2		PBOZZ
26	099839-06	1T8G7	. ROTOR .....	1		XA
27	27003008	1T8G7	. FAN .....	1		XB
28	101839-01	1T8G7	. FLANGE, Engine .....	1		XB

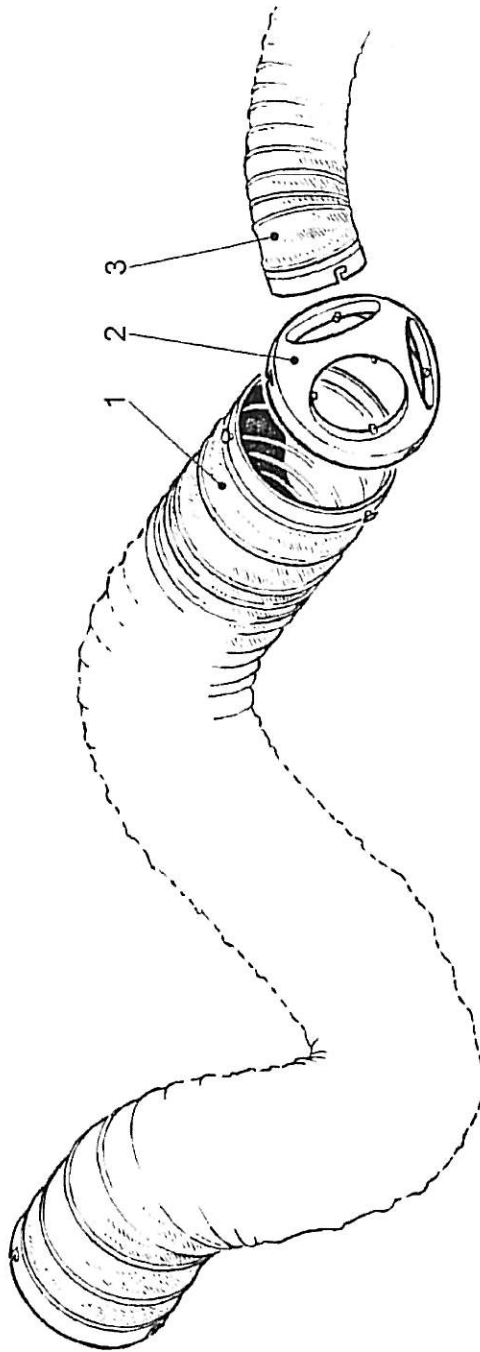


FIGURE 6-11. DUCTS/ADAPTER

FIGURE INDEX/ SHT NO.	PART NUMBER	CAGE	DESCRIPTION	UNITS PER ASSY	USEABLE ON CODE	SMR CODE
			1 2 3 4 5 6 7			
6-11-	NO NUMBER		DUCTS/ADAPTERS	REF		XC
	1 2112-4500	1T8G7	. DUCT, 15 Ft, 12" Diameter .....	2		PBOZZ
	2 2112-4501	1T8G7	. ADAPTER, Duct .....	1		PAOZZ
	3 2112-4502	1T8G7	. DUCT, 15 Ft, 6" Diameter ..... (NOTE 1)	3		PAOZZ

## NOTE:

1. 6" DUCTS NOT INCLUDED IN FACTORY DELIVERY OF HEATER.

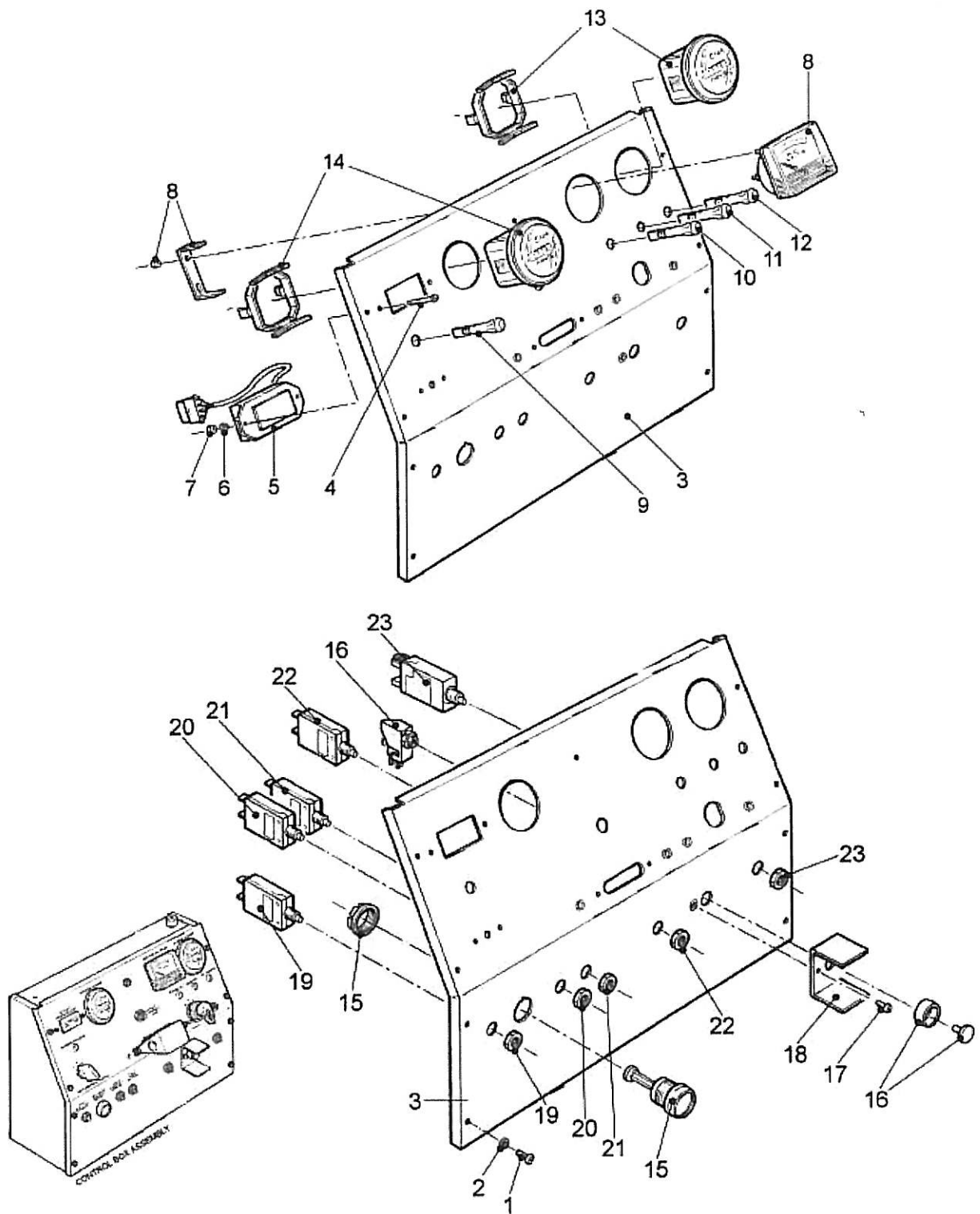


FIGURE 6-12. CONTROL BOX ASSEMBLY (SHEET 1 OF 2)



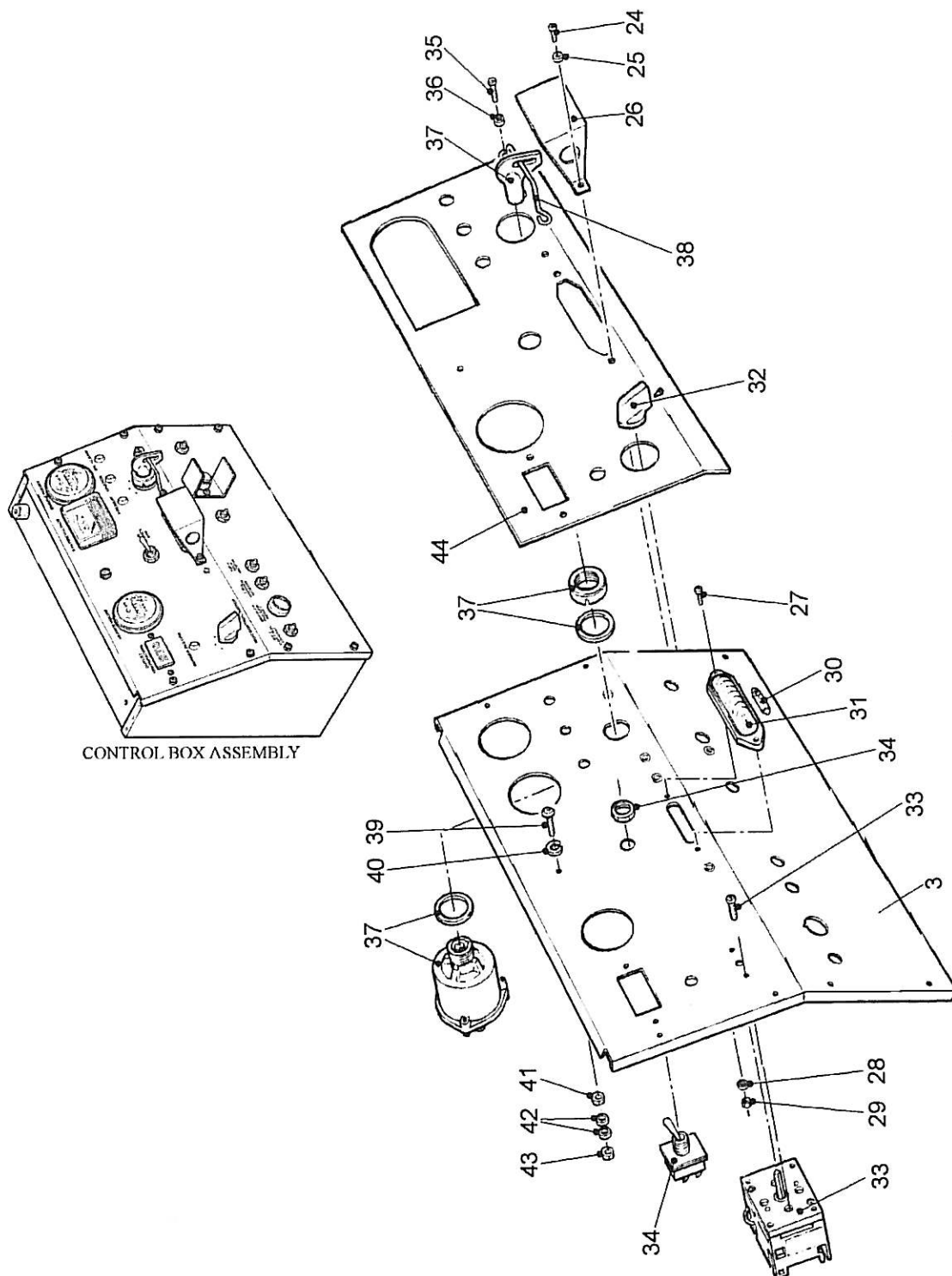
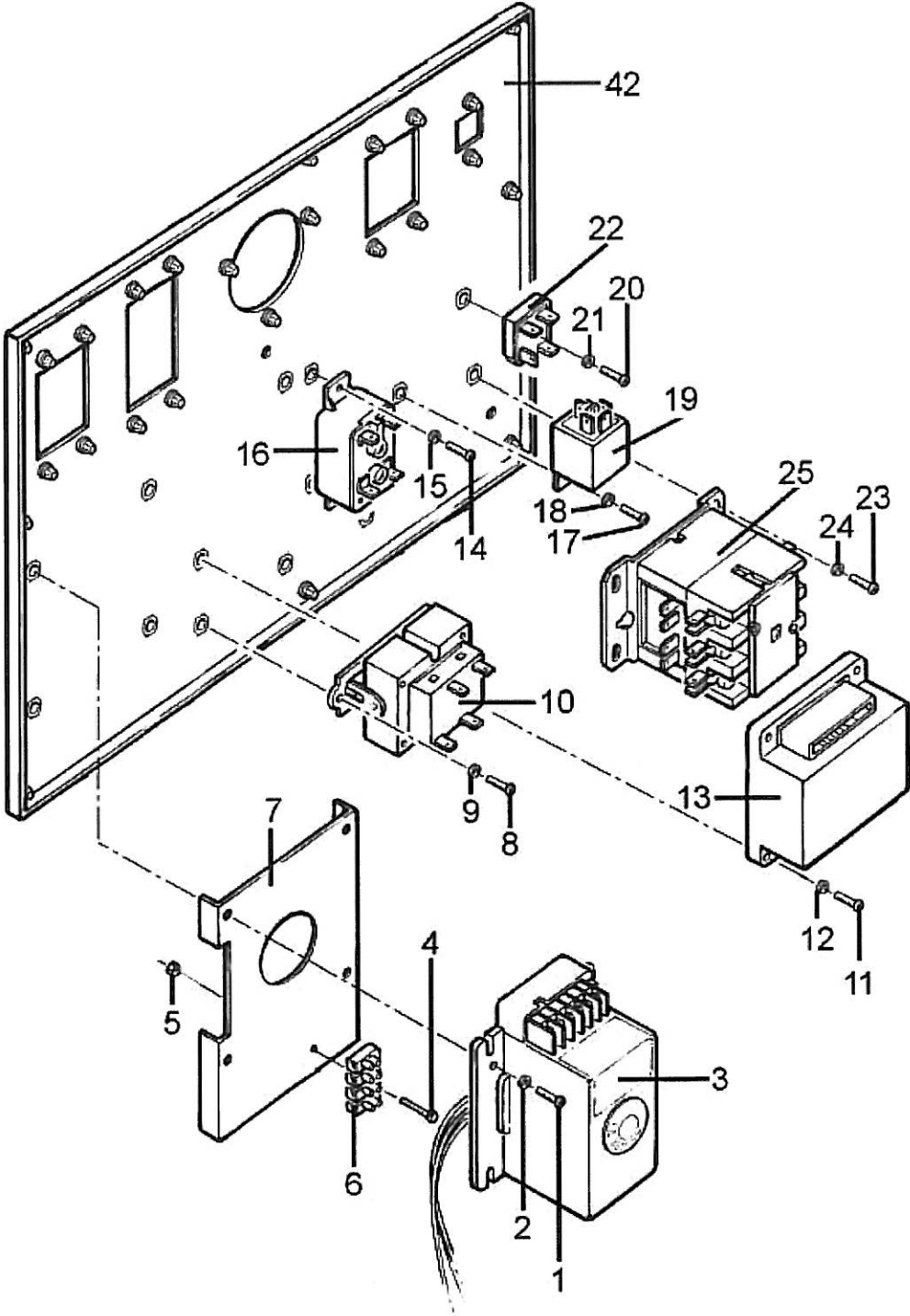


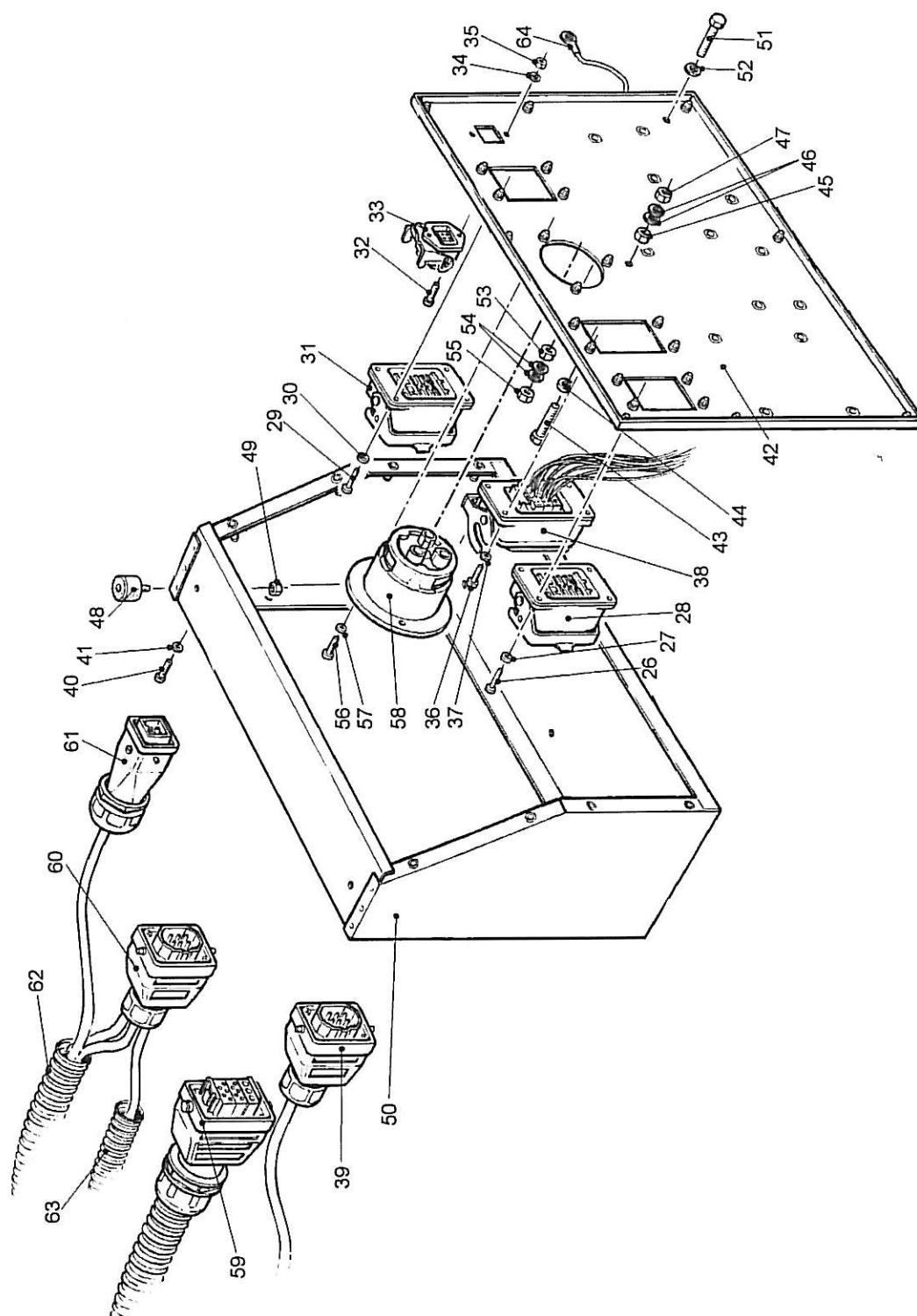
FIGURE 6-12. CONTROL BOX ASSEMBLY (SHEET 2)

FIGURE INDEX/ SHT NO.	PART NUMBER	CAGE	DESCRIPTION	UNITS PER ASSY	USEABLE ON CODE	SMR CODE
			1 2 3 4 5 6 7			
6-12-	2112-1000	SB808	CONTROL BOX ASSEMBLY .....	1		PBOOO
1/1	2112-93195	SB808	. BOLT, M4×12 .....	8		PAOZZ
2/1	2112-93481	SB808	. WASHER, Lock, M4 .....	8		PAOZZ
3/1,2	2112-199	SB808	. PANEL, Front, Control Box .....	1		PBOZZ
4/1	2112-93333	SB808	. SCREW, M3×12 .....	2		PAOZZ
5/1	2112-20593	SB808	. DISPLAY ASSEMBLY .....	1		PBOZZ
6/1	2112-93400	SB808	. WASHER, M3 .....	2		PAOZZ
7/1	2112-93533	SB808	. NUT, Lock, M3 .....	2		PAOZZ
8/1	2112-48000	SB808	. METER, Volt .....	1		PBOZZ
9/1	2112-44420	SB808	. INDICATOR, Burner Failure .....	1		PAOZZ
10/1	2112-44400	SB808	. INDICATOR, Preheat .....	1		PAOZZ
11/1	2112-44410	SB808	. INDICATOR, Charge .....	1		PAOZZ
12/1	2112-44410	SB808	. INDICATOR, Oil Alarm .....	1		PAOZZ
13/1	2112-49010	SB808	. METER, Hour, Engine .....	1		PBOZZ
14/1	2112-49000	SB808	. METER, Hour, Heater .....	1		PBOZZ
15/1	2112-1001	SB808	. BUTTON, Burner Failure Reset .....	1		PBOZZ
16/1	2112-26810	SB808	. BUTTON, Engine Shut-Off .....	1		PBOZZ
17/1	2112-93322	SB808	. SCREW, M4×12 .....	1		PAOZZ
18/1	2112-196	SB808	. GUARD, Button .....	1		PAOZZ
19/1	2112-38700	SB808	. BREAKER, Circuit, Control .....	1		PAOZZ
20/1	2112-38720	SB808	. BREAKER, Circuit, Burner .....	1		PAOZZ
21/1	2112-38710	SB808	. BREAKER, Circuit, Fan .....	1		PAOZZ
22/1	2112-38730	SB808	. BREAKER, Circuit, Charge .....	1		PAOZZ
23/1	2112-38740	SB808	. BREAKER, Circuit, Engine .....	1		PAOZZ
24/2	2112-93322	SB808	. SCREW, M4×12 .....	2		PAOZZ
25/2	2112-93481	SB808	. WASHER, Lock, M4 .....	2		PAOZZ
26/2	2112-195	SB808	. REFLECTOR, Panel Light .....	1		PAOZZ
27/2	2112-93334	SB808	. SCREW, M3×12 .....	2		PAOZZ
28/2	2112-93400	SB808	. WASHER, M3 .....	2		PAOZZ
29/2	2112-93533	SB808	. NUT, Lock, M3 .....	2		PAOZZ
30/2	2112-44210	SB808	. BULB, Panel Light .....	1		PAOZZ
31/2	2112-44200	SB808	. PANEL Light .....	1		PAOZZ
32/2	2112-1010	SB808	. KNOB, Heat Control Switch .....	1		PAOZZ
33/2	2112-26350	SB808	. SWITCH, Heat Control .....	1		PBOZZ
34/2	2112-26800	SB808	. SWITCH, Panel Light .....	1		PAOZZ
35/2	2112-93322	SB808	. SCREW, M4×12 .....	2		PAOZZ
36/2	2112-93481	SB808	. WASHER, Lock, M4 .....	2		PAOZZ
37/2	26557-07120	1PZR7	. SWITCH, Ignition .....	1		PBOZZ
38/2	2112-213	SB808	. KEY, Retaining Bar .....	1		PAOZZ
39/2	2112-93209	SB808	. BOLT, M5×20 .....	1		PAOZZ
40/2	2112-93482	SB808	. WASHER, M5 .....	1		PAOZZ
41/2	2112-93502	SB808	. NUT, Lock, M5 .....	1		PAOZZ
42/2	2112-93465	SB808	. WASHER, Lock, M5 .....	2		PAOZZ
43/2	2112-93535	SB808	. NUT, M5 .....	1		PAOZZ
44/2	2112-186	SB808	. PLATE, Texts .....	1		PBOZZ



**BOTTOM PANEL – INSIDE VIEW**

**FIGURE 6-13. CONTROL BOX BOTTOM PANEL ASSEMBLY (SHEET 1)**

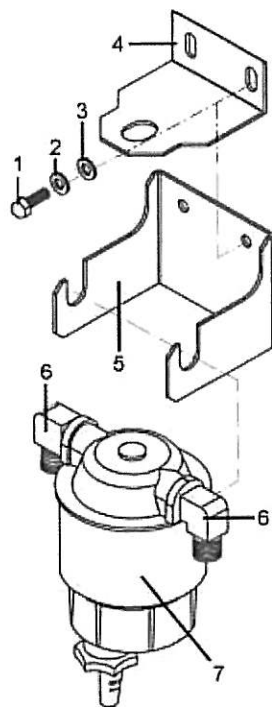


**BOTTOM PANEL – REAR VIEW**

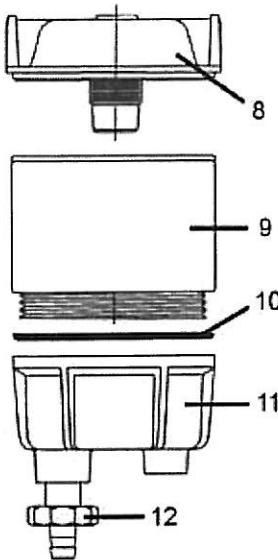
**FIGURE 6-13. CONTROL BOX BOTTOM PANEL ASSEMBLY (SHEET 2)**

FIGURE INDEX/ SHT NO.	PART NUMBER	CAGE	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USEABLE ON CODE	SMR CODE
6-13-	NO NUMBER	SB808	CONTROL BOX BOTTOM PANEL	REF		XC
1/1	2112-93326	SB808	. SCREW, M4×30 .....	4		PAOZZ
2/1	2112-93481	SB808	. WASHER, Lock, M4 .....	4		PAOZZ
3/1	50REVA3	1T8G7	. CONTROL UNIT, Burner .....	1		PBOZZ
4/1	2112-93333	SB808	. SCREW, M3×12 .....	1		PAOZZ
5/1	2112-93533	SB808	. NUT, Lock, M3 .....	1		PAOZZ
6/1	2112-1011	SB808	. BLOCK, Terminal .....	1		PAOZZ
7/1	2112-3036	SB808	. BRACKET, Support, BCU .....	1		PBOZZ
8/1	2112-93322	SB808	. SCREW, M4×12 .....	2		PAOZZ
9/1	2112-93481	SB808	. WASHER, Lock, M4 .....	2		PAOZZ
10/1	2112-28500	SB808	. TRANSFORMER .....	1		PAOZZ
11/1	2112-93324	SB808	. SCREW, M4×20 .....	2		PAOZZ
12/1	2112-93481	SB808	. WASHER, Lock, M4 .....	2		PAOZZ
13/1	2112-20590	SB808	. CONTROL UNIT, Heater .....	1		PBOZZ
14/1	2112-93322	SB808	. SCREW, M4×12 .....	2		PAOZZ
15/1	2112-93481	SB808	. WASHER, Lock, M4 .....	2		PAOZZ
16/1	2112-25880	SB808	. RELAY, Burner Failure Control .....	1		PAOZZ
17/1	2112-93322	SB808	. SCREW, M4×12 .....	1		PAOZZ
18/1	2112-93481	SB808	. WASHER, Lock, M4 .....	1		PAOZZ
19/1	2112-25870	SB808	. RELAY, Engine .....	1		PAOZZ
20/1	2112-93324	SB808	. SCREW, M4×20 .....	1		PAOZZ
21/1	2112-93481	SB808	. WASHER, Lock, M4 .....	1		PAOZZ
22/1	2112-25860	SB808	. RECTIFIER, Bridge .....	1		PBOZZ
23/1	2112-93322	SB808	. SCREW, M4×12 .....	2		PAOZZ
24/1	2112-93481	SB808	. WASHER, Lock, M4 .....	2		PAOZZ
25/1	2112-22500	SB808	. CONTACTOR, Fan .....	1		PAOZZ
26/2	2112-93324	SB808	. SCREW, M4×20 .....	4		PAOZZ
27/2	2112-93481	SB808	. WASHER, Lock, M4 .....	4		PAOZZ
28/2	2112-1002	SB808	. QUICK DISCONNECT ASSY. (QDC1) .....	1		PBOZZ
29/1	2112-93324	SB808	. SCREW, M4×20 .....	4		PAOZZ
30/1	2112-93481	SB808	. WASHER, Lock, M4 .....	4		PAOZZ
31/2	2112-1003	SB808	. QUICK DISCONNECT ASSY. (QDC3) .....	1		PBOZZ
32/2	2112-93333	SB808	. SCREW, M3×12 .....	2		PAOZZ
33/2	2112-1004	SB808	. QUICK DISCONNECT ASSY. (QDC4) .....	1		PBOZZ
34/2	2112-93400	SB808	. WASHER, M3 .....	2		PAOZZ
35/2	2112-93533	SB808	. NUT, Lock, M3 .....	2		PAOZZ
36/2	2112-93324	SB808	. SCREW, M4×20 .....	4		PAOZZ
37/2	2112-93481	SB808	. WASHER, Lock, M4 .....	4		PAOZZ
38/2	2112-1005	SB808	. QUICK DISCONNECT ASSY. (QDC2) .....	1		PBOZZ
39/2	2112-1006	SB808	. HARNESS, Wiring, Burner .....	1		PBOZZ
40/2	2112-93322	SB808	. SCREW, M4×12 .....	8		PAOZZ
41/2	2112-93481	SB808	. WASHER, Lock, M4 .....	8		PAOZZ
42/1,2	2112-3033	SB808	. PLATE ASSY, Bottom .....	1		PBOZZ
43/2	2112-93202	SB808	. BOLT, M6×20, Ground Point .....	1		PAOZZ
44/2	2112-93412	SB808	. WASHER, M6 .....	1		PAOZZ
45/2	2112-93503	SB808	. NUT, Lock, M6 .....	1		PAOZZ
46/2	2112-93466	SB808	. WASHER, Lock, M6 .....	2		PAOZZ
47/2	2112-93536	SB808	. NUT, M6 .....	1		PAOZZ
48/2	2112-36820	SB808	. RETAINER, Suspension .....	4		PAOZZ
49/2	2112-93503	SB808	. NUT, Lock, M6 .....	4		PAOZZ
50/2	2112-3037	SB808	. FRAME, Control Box .....	1		PBOZZ
51/2	2112-93202	SB808	. BOLT, M6×20, Ground Point .....	1		PAOZZ
52/2	2112-93412	SB808	. WASHER, M6 .....	1		PAOZZ
53/2	2112-93503	SB808	. NUT, Lock, M6 .....	1		PAOZZ
54/2	2112-93466	SB808	. WASHER, Lock, M6 .....	2		PAOZZ
55/2	2112-93536	SB808	. NUT, M6 .....	1		PAOZZ

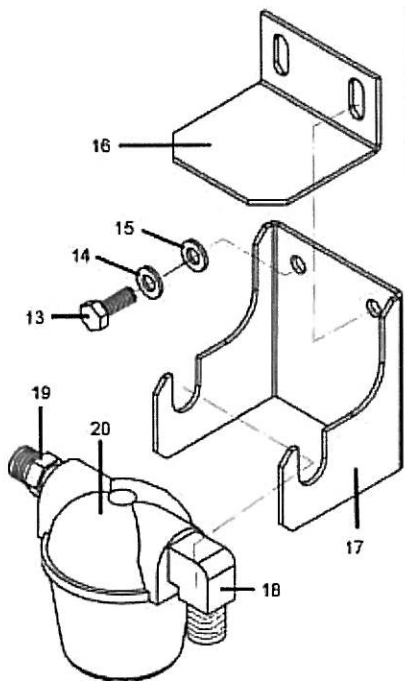
FIGURE INDEX/ SHT NO.	PART NUMBER	CAGE	DESCRIPTION	UNITS PER ASSY	USEABLE ON CODE	SMR CODE
			1 2 3 4 5 6 7			
6-13-	56/2	2112-93322	SB808 . SCREW, M4×12 .....	3		PAOZZ
	57/2	2112-93481	SB808 . WASHER, Lock, M4 .....	3		PAOZZ
	58/2	2112-34000	SB808 . IN-LET, Power .....	1		PBOZZ
	59/2	2112-1007	SB808 . HARNESS, Wiring, Engine .....	1		PBOZZ
	60/2	2112-1008	SB808 . HARNESS, Wiring, Work light, Sensor .....	1		PBOZZ
	61/2	2112-1009	SB808 . HARNESS, Wiring, Fan .....	1		PBOZZ
	62/2	2112-4206	1T8G7 . CONDUIT, Plastic, Electric Cables .....	1		PBOZZ
	63/2	2112-4205	1T8G7 . CONDUIT, Plastic, Electric Cable .....	1		PBOZZ
	64/2	2112-1013	SB808 . WIRE, Ground .....	1		MFO



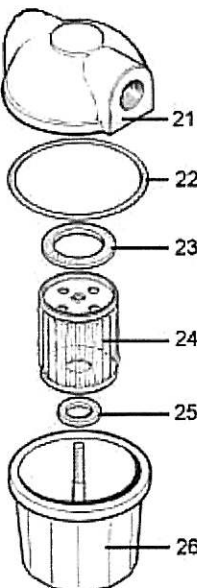
ENGINE FILTER AND BRACKET



ENGINE FILTER ASSY (7) BREAKDOWN



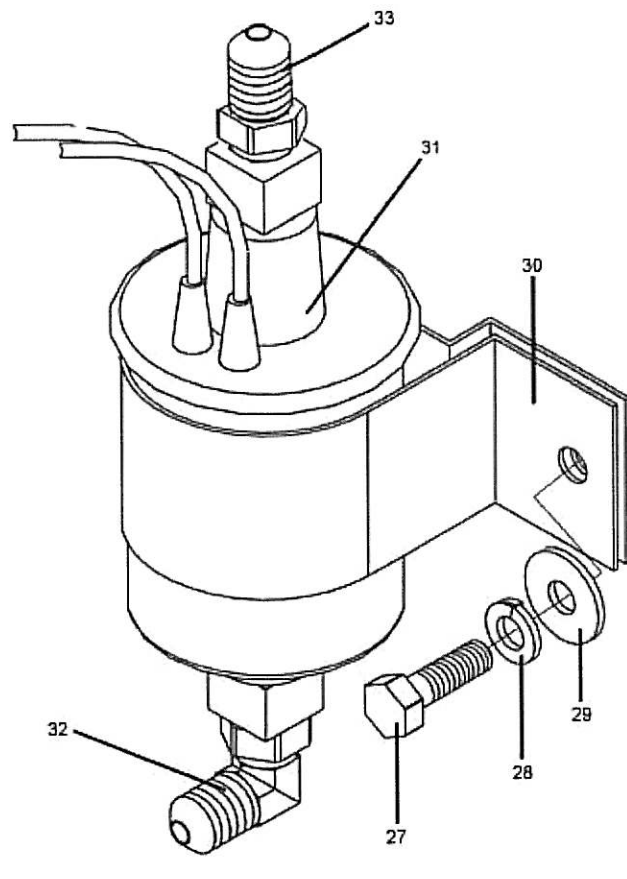
BURNER FILTER AND BRACKET



BURNER FILTER ASSY (20) BREAKDOWN

FIGURE 6-14. FUEL TRANSFER PUMP AND FUEL FILTERS (SHEET 1 OF 2)





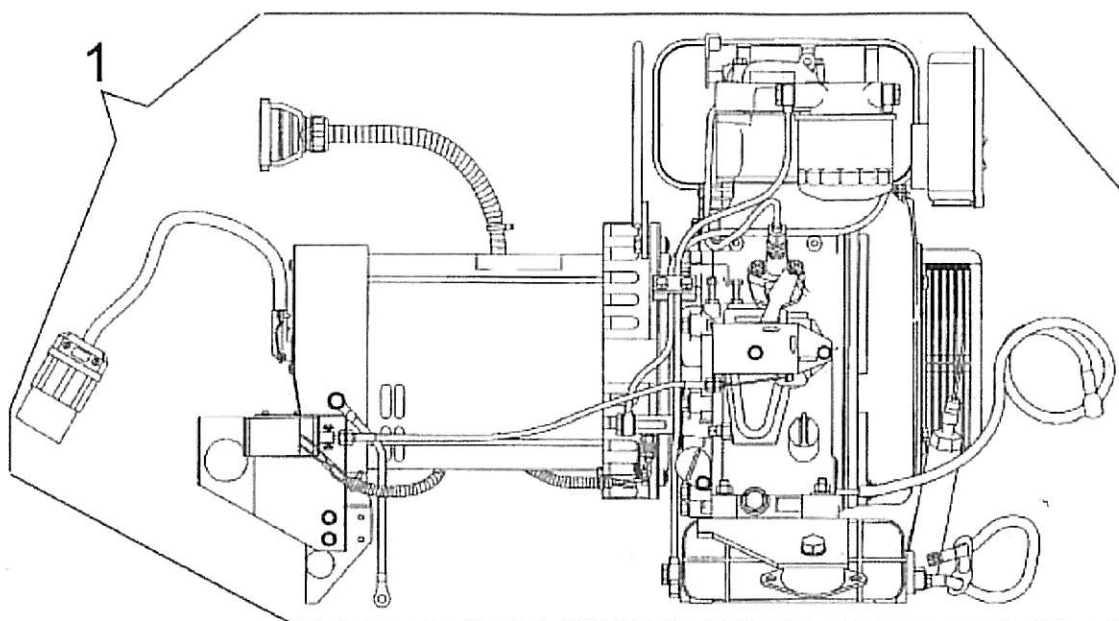
FUEL TRANSFER PUMP AND BRACKET

FIGURE 6-14. FUEL TRANSFER PUMP AND FUEL FILTERS (SHEET 2)

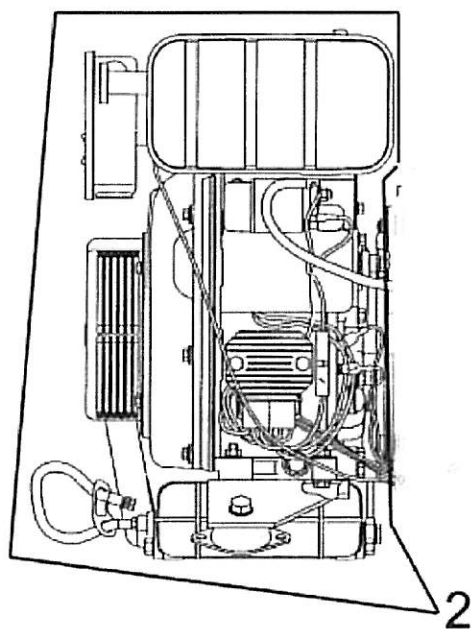
FIGURE INDEX/ SHT NO.	PART NUMBER	CAGE	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USEABLE ON CODE	SMR CODE
6-14-	NO NUMBER	SB808	ENGINE AND BURNER FUEL FILTERS AND FUEL TRANSFER PUMP	REF		XC
1/1	2112-93202	SB808	. BOLT, M6×20 .....	2		PAOZZ
2/1	2112-93483	SB808	. WASHER, Lock, M6 .....	2		PAOZZ
3/1	2112-93412	SB808	. WASHER, M6 .....	2		PAOZZ
4/1	2112-240	SB808	. BRACKET, Retaining .....	1		PBOZZ
5/1	2112-244	SB808	. BRACKET, Mounting .....	1		PBOZZ
6/1	2112-4409	1T8G7	. FITTING, 90 Deg., 1/4" NPT×1/4" SAE .....	2		PAOZZ
7/1	140R-10	55752	. FUEL FILTER ASSEMBLY, Engine .....	1		PAOOO
8/1	RK10177	55752	. HOUSING, Filter .....	1		XA
9/1	R12T	55752	. CARTRIDGE, Filter, 10 Micron .....	1		PAOZZ
10/1	RK10012	55752	. BOWL, O Ring .....	1		PAOZZ
11/1	RK10193	55752	. BOWL, Plastic, Sediment .....	1		XA
12/1	RK30476	55752	. VALVE, Drain .....	1		PAOZZ
13/1	2112-93202	SB808	. BOLT, M6×20 .....	2		PAOZZ
14/1	2112-93483	SB808	. WASHER, Lock, M6 .....	2		PAOZZ
15/1	2112-93412	SB808	. WASHER, M6 .....	2		PAOZZ
16/1	2112-241	SB808	. BRACKET, Retaining .....	1		PBOZZ
17/1	2112-246	SB808	. BRACKET .....	1		PBOZZ
18/1	2112-4409	1T8G7	. FITTING, 90 Deg., 1/4" NPT×1/4" SAE .....	1		PAOZZ
19/1	2112-4410	1T8G7	. FITTING, Straight, 1/4" NPT×1/4" SAE .....	2		PAOZZ
20/1	2112-4411	1T8G7	. FUEL FILTER ASSEMBLY, Burner .....	1		PBOOO
21/1	2112-4403	1T8G7	. HOUSING, Filter .....	1		XA
22/1	2112-4406	1T8G7	. BOWL, ORing .....	1		PBOZZ
23/1	2112-4407	1T8G7	. GASKET, Filter Screen Top .....	1		PBOZZ
24/1	2112-4405	1T8G7	. SCREEN, Filter, Metal, 60 Micron .....	1		PAOZZ
25/1	2112-4408	1T8G7	. GASKET, Filter Screen Bottom .....	1		PBOZZ
26/1	2112-4404	1T8G7	. BOWL, Filter, Metal .....	1		XA
---	2112-4426	1T8G7	. SPARES KIT, Burner Fuel Filter (NOTE 1) ...	1		PBOZZ
27/2	2112-93202	SB808	. BOLT, M6×20 .....	1		PAOZZ
28/2	2112-93483	SB808	. WASHER, Lock, M6 .....	1		PAOZZ
29/2	2112-93413	SB808	. WASHER, Flat, M6-OD15 mm .....	1		PAOZZ
30/2	2112-4420	1T8G7	. CLAMP .....	1		PBOZZ
31/2	2112-4423	1T8G7	. PUMP, Fuel Transfer .....	1		PBOZZ
32/2	2112-4422	1T8G7	. FITTING, 90 Deg., 1/8" NPT×1/4" SAE .....	1		PAOZZ
33/2	2112-4421	1T8G7	. FITTING, Straight, 1/8" NPT×3/8" SAE .....	1		PAOZZ

**NOTE:**

1. SPARES KIT FOR BURNER FUEL FILTER INCLUDES ITEMS 22, 23, 24 AND 25. THEY ARE NOT AVAILABLE SEPARATELY.

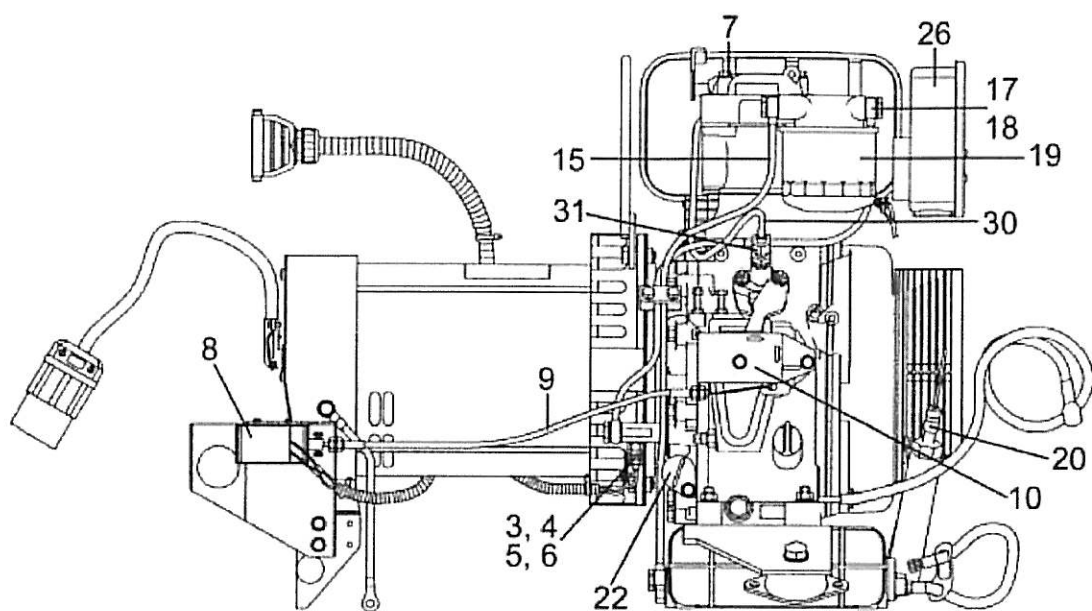


GENERATOR SET, COMPLETE ASSEMBLY (FRONT VIEW)

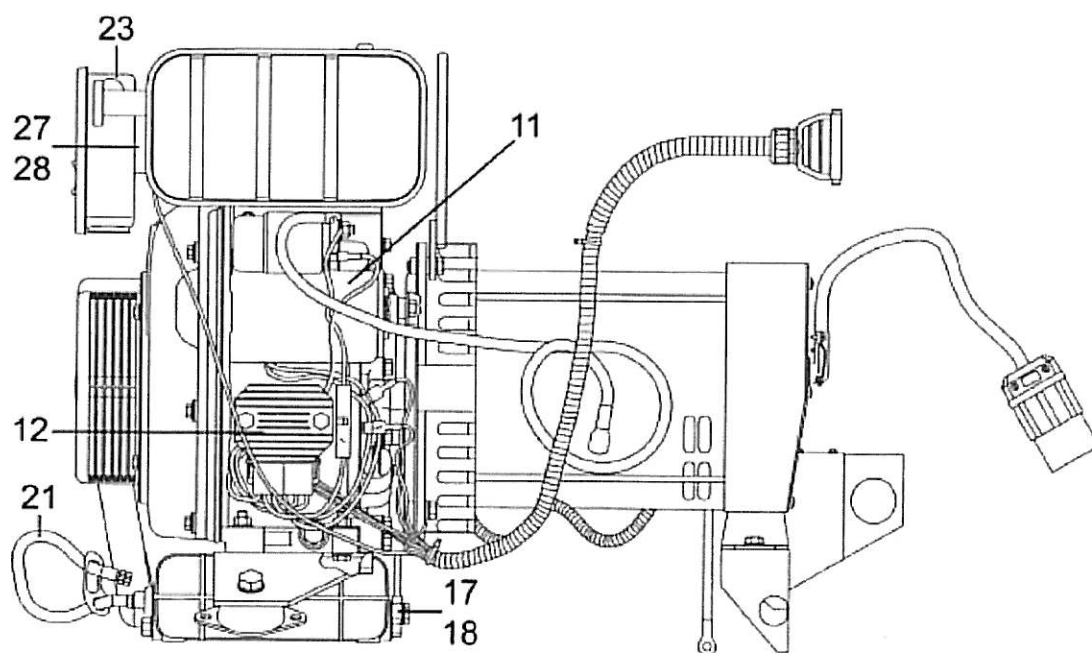


ENGINE (BACK VIEW)

FIGURE 6-15. GENERATOR SET ASSEMBLY (SHEET 1)



Front view



BACK VIEW

FIGURE 6-15. GENERATOR SET ASSEMBLY (SHEET 2)

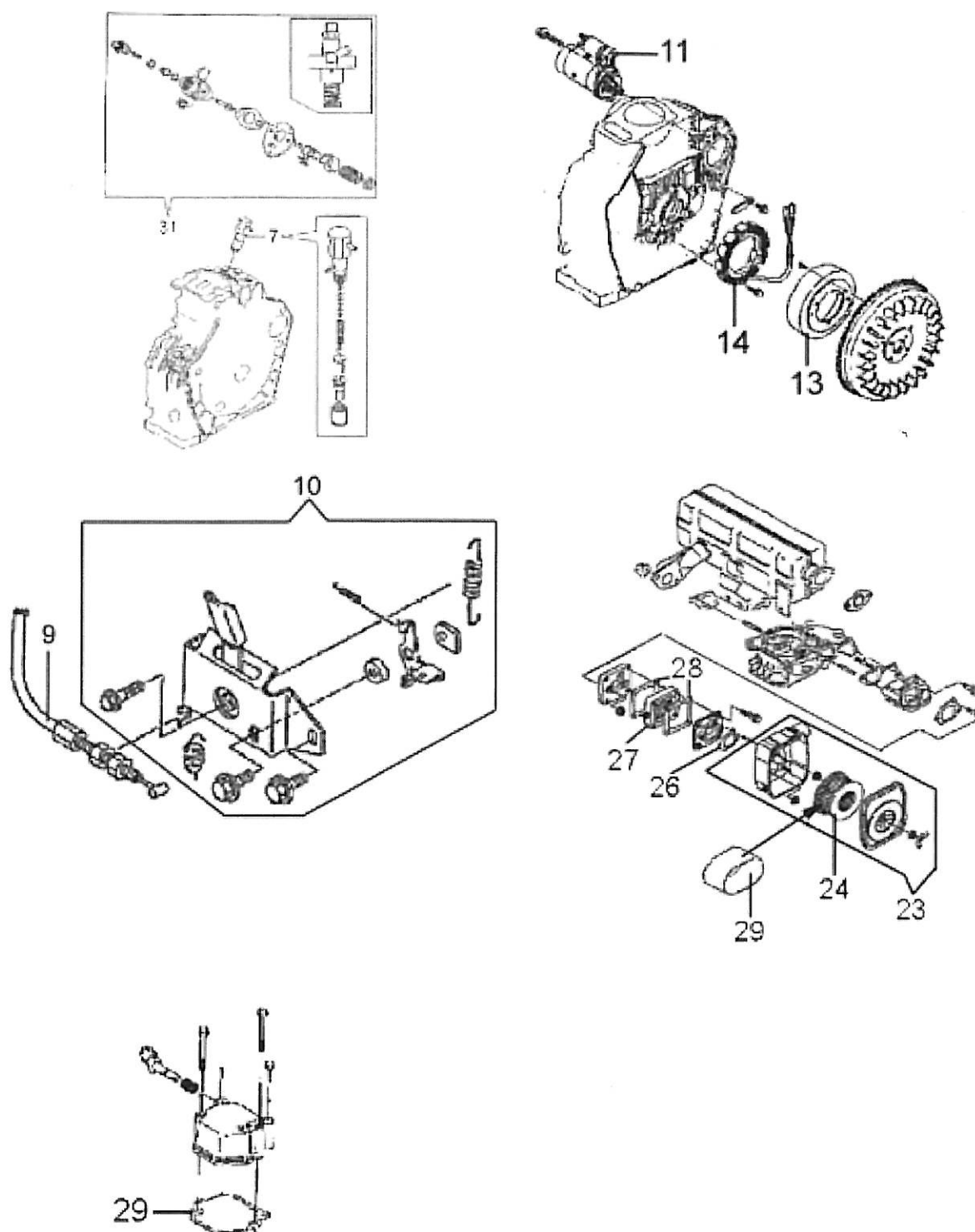


FIGURE 6-15. GENERATOR SET ASSEMBLY (SHEET 3)

FIGURE INDEX/ SHT NO.	PART NUMBER	CAGE	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USEABLE ON CODE	SMR CODE
6-15-			GENERATOR SET ASSEMBLY	REF		
1/1	NGYJP8	1T8G7	.. GENERATOR/ENGINE SET, Complete Assembly .....	1		PAOOO
2/1	099934-02	1PZR7	.. ENGINE, Complete Assembly .....	1		PBOOO
			(for details refer to TO38G1-90-1)			
3/2	114250-39450	1PZR7	.. OIL PRESSURE SWITCH .....	1		PBOZZ
4/2	183366-08290	1PZR7	.. RUBBER WASHER, Oil Pressure Switch .....	1		PBOZZ
5/2	183366-39460	1PZR7	.. INSULATION JOINT, Oil Pressure Switch .....	1		PBOZZ
6/2	171022-39470	1PZR7	.. EARTH TERMINAL, Oil Pressure Switch .....	1		PBOZZ
7/2,3	714870-53100	1PZR7	.. VALVE ASSEMBLY, Fuel Injector .....	1		PBOZZ
8/2	183266-91690	1PZR7	.. STOP SOLENOID, Engine .....	1		PBOZZ
9/2,3	2112-4600	1T8G7	.. CABLE ASSEMBLY, Engine Stop .....	1		PBOZZ
10/2,3	2112-2013	SB808	.. SPEED CONTROL & GOVERNOR SPRINGS, Complete Kit .....	1		PBOZZ
11/2,3	114362-77011	1PZR7	.. 12 V STARTER WITH SOLENOID .....	1		PBOZZ
12/2	119660-77710	1PZR7	.. VOLTAGE REGULATOR .....	1		PBOZZ
13/3	114351-78840	1PZR7	.. WHEEL DYNAMO, 15 AMP (Inside Engine Block) .....	1		PBOZZ
14/3	114351-78830	1PZR7	.. STATOR, 15 AMP (Inside Engine Block) .....	1		PBOZZ
15/2	114354-39510	1PZR7	.. PIPE LUBE OIL .....	1		PBOZZ
16/2	114354-39520	1PZR7	.. PIPE LUBE OIL .....	1		PBOZZ
17/2	23857-060000	1PZR7	.. BANJO BOLT (Bolt M6 Joint) .....	4		PBOZZ
18/2	23414-120000	1PZR7	.. GASKET 12 ROUND - 10/PK .....	8		PBOZZ
19/2	129150-35150	1PZR7	.. OIL FILTER, 90 x 80L .....	1		PAOZZ
20/2	114354-34140	1PZR7	.. DIPSTICK LUBE OIL .....	1		PBOZZ
21/2	106106-02	1T8G7	.. OIL DRAIN TUBE .....	1		PBOZZ
22/2	114699-01760	1PZR7	.. CAP ASSY OIL FILLER .....	2		PBOZZ
23/2,3	183366-12510M	1PZR7	.. CLEANER ASSY AIR CUSTOM .....	1		PBOZZ
24/3	114250-12581	1PZR7	.. ELEMENT AIR CLEANER .....	1		PAOZZ
25/3	114250-12580F	1PZR7	.. FOAM A/F WRAP .....	1		PAOZZ
26/3	114250-12211	1PZR7	.. GASKET, Air Cleaner .....	1		PBOZZ
27/2,3	129100-77500	1PZR7	.. AIR HEATER .....	1		PBOZZ
28/2,3	129100-77510	1PZR7	.. GASKET, Air Heater .....	2		PBOZZ
29/3	114250-11311	1PZR7	.. GASKET, Bonnet .....	1		PBOZZ
30/2	114350-59800	1PZR7	.. FUEL PIPE .....	1		PBOZZ
31/2,3	783350-51740	1PZR7	.. PUMP ASSY, Fuel Injection .....	1		PBOZZ