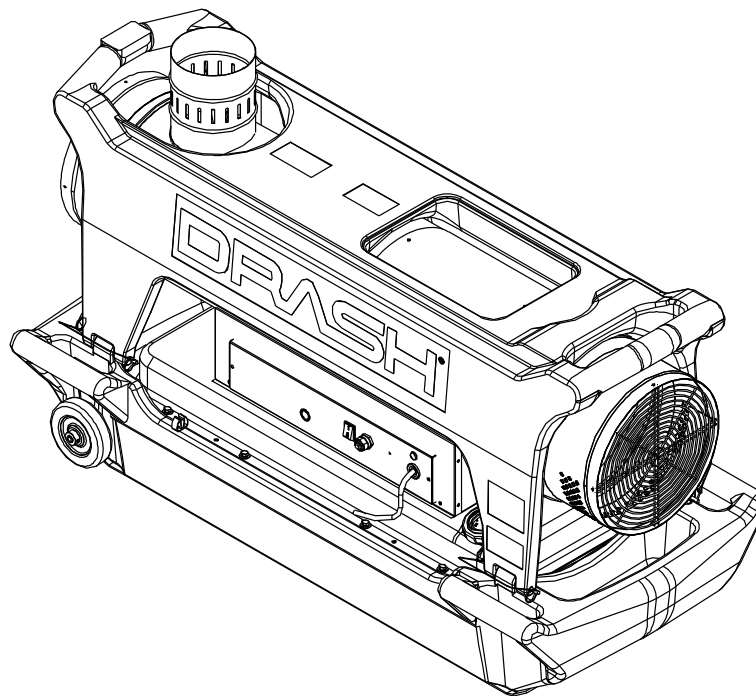


DRASH[®]

D-1000B HEATER

Outdoor Use Only

OPERATIONS & MAINTENANCE MANUAL



DHS SYSTEMS^{LLC}

ISO 9001: 2000 Registered
Quality Management System

33 Kings Highway, Orangeburg, NY 10962

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Phone: 845-359-6066
Fax: 845-365-2114
Hotline: 800-977-3647
Web: www.drash.com
Email: drash@drash.com

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1. GENERAL

1.1 Scope

This Operator's Manual describes the safe operation and field maintenance of the DRASH D-1000B heater.

1.2 Receipt of the D-1000B Heater

Once the heater has been uncrated, immediately write the model and serial number in the space provided below.

Model Number _____

Serial Number _____

Inspect for signs of obvious or concealed freight damage. If damage exists, immediately file a claim with the transportation company. Be sure that all damaged parts are replaced and that the mechanical and electrical problems are corrected prior to operation of the unit. If you require service, contact DHS Logistics (Phone 800-GO-DRASH (800-463-7274), Fax 845-365-2114, or Email drash@drash.com). Please have the model and serial number available for all service calls.

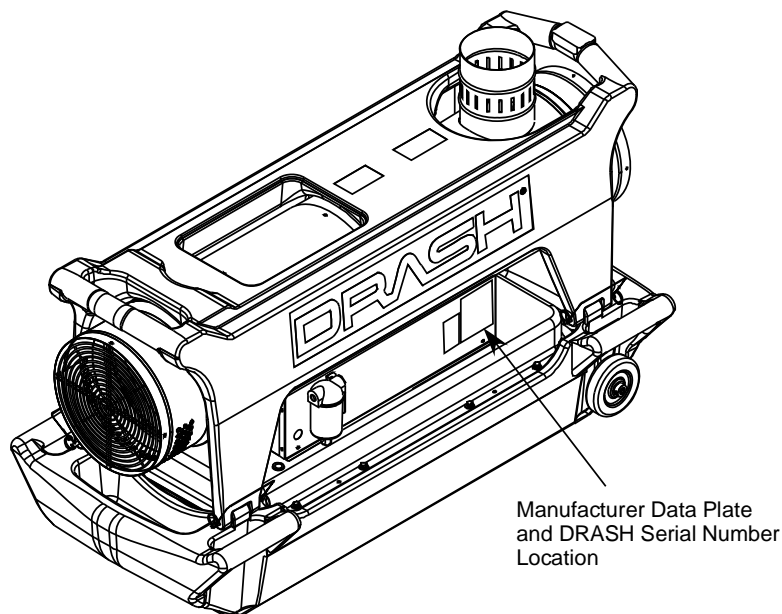


Figure 1-1 – Model & Serial Number Location

1.3 Equipment Description

WARNING!
THIS EQUIPMENT IS INTENDED FOR OUTDOOR USE ONLY

The D-1000B is rugged, lightweight, rust resistant, shock proof and easy to operate and maintain, providing nearly 100,000 BTUs/hr of dry, clean heat at a rate of 880 CFMs. The heater includes an electronic control system that monitors for high-heat conditions and flameout, and operates on 120V, 60Hz. The D-1000B heater is a compact and mobile, indirect fuel fired air heater which burns JP8 and Diesel fuel. The heater contains a stainless steel dual Combustion Chamber, a Fuel Pump and an Electric Motor. A fan, which is mounted on the forward side of the motor, propels additional air into the combustion chamber as well as around the outside of the chamber. The air which flows around the chamber is heated through contact with the chamber exterior walls and is sent out of the heater. The air used in the chamber for combustion is expelled through the exhaust stack. The D-1000B heater was designed for simple maneuverability (wheel-able and equipped with snow slides) and is stackable for maximum storage efficiency.

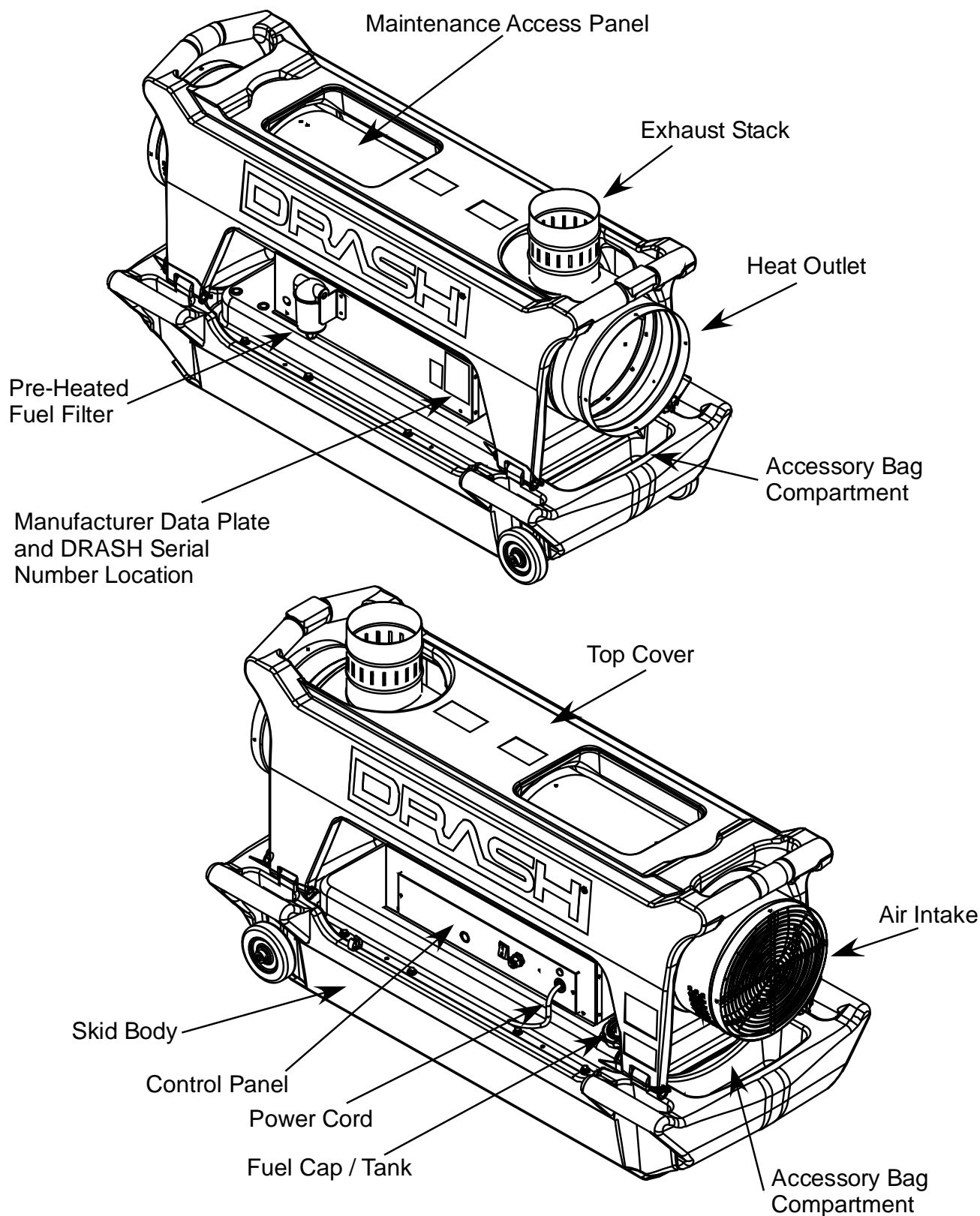


Figure 1-2 - D-1000B Heater

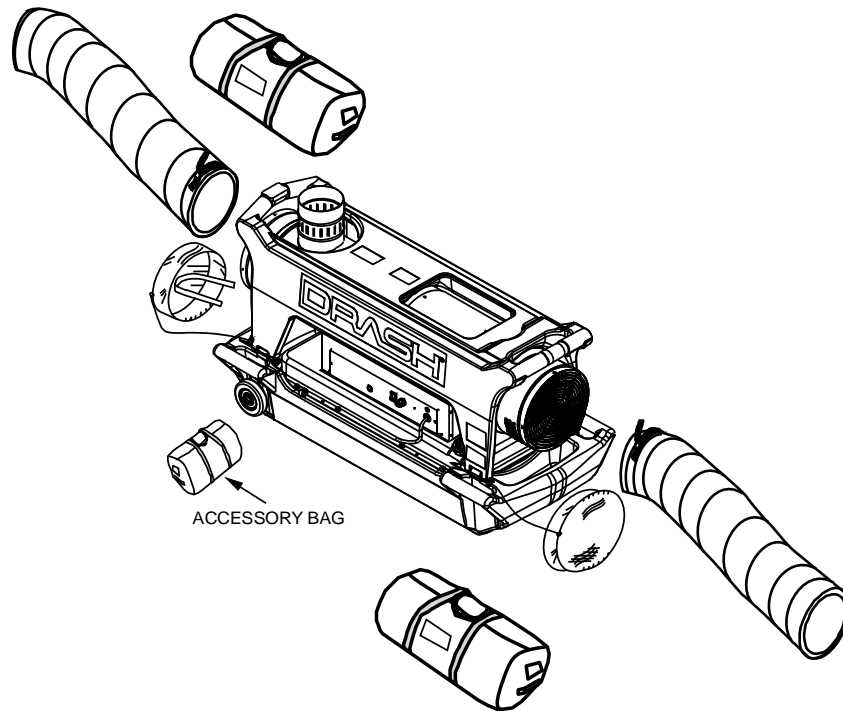


Figure 1-3 – Heater Duct Connection

1.4 Major Components

1.4.1 Shell

The D-1000B Heater features a two-piece, molded polymer composite outer body that is rust-resistant and shock proof. The upper cover quickly detaches for service to the combustion chamber, electric motor, or fuel pump assembly by removing four pins as shown in Figure 5-1.

1.4.2 Fuel Tank

The fuel tank is made of steel and is corrosion proof. The fuel tank has an internal fuel level indicator gauge cap and a drain plug located underneath the fuel tank. The fuel tank capacity is 10.8 US Gallons (40.8 Liters) Use JP8 or Diesel fuel when filling the fuel tank.

1.4.3 Combustion Chamber

The D-1000B has a dual combustion chamber made of stainless steel and is fully welded to provide clean warm air. The heater is equipped with fifteen seconds pre-ventilation cycle to “clean” the combustion chamber. After switching the heater off, a post ventilation time is electronically set by a control flame box to lower the combustion chamber temperature. This *free* heat is blown into the area.

1.4.4 Burner Head

The burner head contains the fuel nozzle, dual electrodes, ignition cables and a flame detector.

1.4.5 Electric Motor

The electric motor drives the fuel pump assembly and a fan which propels additional air into the combustion chamber.

1.4.6 Control System

The D-1000B heater has an electronically control system located in a watertight panel mounted on the side of the unit. The control panel consists of a 3-positioned switch for power, normal operation and thermostat operation, an outlet to connect the remote thermostat / CO detector and a reset button. The control system utilizes a safety shut-off switch if flame is not detected, a high temperature switch if ducts become blocked and a safety shut-off switch upon detecting 100ppm of Carbon Monoxide content.

1.4.7 Performance

With a watertight control panel, the D-1000B heater was designed to operate in all different types of environmental conditions. A pre-heated fuel filter allows heater to work continuously in extreme low temperatures. When operating the D-1000B heater, the noise level when measured at a distance of 3 feet (0.92 meters) from the control panel is 76dB. With the remote thermostat / CO detector attached, the heater may be operated remotely from within the shelter. The D-1000B has a fuel consumption rate of 0.81 US Gallon per hour (3.07 liters per hour), approximately 12 hrs of continuous run-time without refueling.

1.4.8 Auxiliary Equipment

Each D-1000B heater will include the following auxiliary equipment:

- An exhaust stack.
- Two heater ducts (supply and return); 12" dia x 15' L (0.3m dia x 4.5m length) with transport bags.
- A remote control Thermostat / CO (Carbon Monoxide) Detector with a 26 foot (7.9m) power cord.
- An Operational and Maintenance Manual.

1.5 Specifications

Color: Green

Overall Dimensions:

Length: 53.2 inches (1.4 meters).

Width: 23.8 inches (0.6 meters).

Height: 32.3 inches (0.8 meters) with exhaust stack installed 29.5 inches (0.7 meters without exhaust stack).

Flue Diameter: 5.9 inches (14.9cm).

Weights:

Dry: 165 lbs (75kg) (without accessories).

Wet: 242 lbs (109.7kg).

Heater Ducts: 27 lbs (12.2kg) each.

Input Power:

Power Supply: 120V, 60Hz (Variable Voltage: 220V, 50Hz; 110V, 50Hz).

Power Consumption: 520W.

Fuse: 10A.

Heat Input Capacity: 110,000 BTU/hr.

Air Flow: 880 CFM.

Nozzle: 0.55 GPH - 80°B.

Pump Pressure: 170 psi.

Operable Temperature:

Range: -40°F to 40°F (-40°C to 4.5°C).

Fuel System:

Tank Capacity: 10.8 US Gallon (40.8 liters).

Fuel Types: JP8 or Diesel.

Certification:

CSA B140.0-03 & B140.8-1967 Certified.

UL 733 Compliant.

2. SAFETY

2.1 Scope

This chapter contains general information for the safe operation and maintenance of the D-1000B heater.

The cautions and warnings point out known conditions that are potentially hazardous. However, no manual can cover every possible situation. If in doubt, contact DHS.

Before calling DHS for assistance, please identify the heater by its DRASH assigned serial number, (see **Section 1.2 Receipt of your D-1000B Heater**) or the serial number is located on the Manufacturer decal (see Figure 1-1).

Service and repairs should be performed only by authorized DHS technicians.

DHS Systems Contact Information

Phone: 800-977-3647

Fax: 845-365-2114

Email: drash@drash.com

2.2 Qualified Personnel

For the purposes of this manual, a qualified person is one who is familiar with this manual, the operation of the specific equipment and the hazards involved in operation and maintenance. This manual is not intended to be a substitute for proper training. We strongly recommend that operators receive training directly from DHS.

IMPORTANT

READ ALL OF THE INFORMATION CONTAINED IN THIS MANUAL BEFORE OPERATING THE HEATER.

2.3 Signal Words and Labels

Signal words and labels are used throughout this manual. The words and symbols convey the following advice:

2.3.1 Danger

Danger refers to immediate hazards that will result in severe personal injury or death.

2.3.2 Warning

Warning refers to a hazard or unsafe method or practice that may result in severe personal injury or death.

2.3.3 Caution

Caution refers to a hazard or unsafe method or practice that may result in equipment damage or personal injury.

2.3.4 Important

Important refers to a hazard or unsafe method or practice that can result in equipment damage.

2.4 General Precautions

PLEASE REMEMBER SAFETY FIRST. If you are not sure of the instructions or procedures, contact MilSys before continuing.

This manual emphasizes the safety precautions necessary during the operation and maintenance of your heater. Each section has caution and warning messages. These messages are for your safety and the safety of the equipment involved. If any of the cautions or warnings is not readily understood, contact DHS using the contact information shown above before proceeding.

When an abnormal condition is observed and procedures in the manual do not specifically cover the condition, work should be stopped. Contact DHS for assistance. An authorized DHS technician will provide guidance on the abnormal condition before any work can be continued.

2.4.1 Heater

The following safety precautions should be observed:

- The D-1000B heater **must** be used **OUTDOORS ONLY**.
- Always follow local ordinances and codes when using this heater.
- Always remove the fabric covers from each end of the heater before operating.
- Operate the heater **outdoors**; upright with the exhaust stack attached and away from flammable or explosive materials (the minimum distance must be 6.5 feet (2 meters)).
- Ensure fire extinguisher / equipment is readily available.
- Unplug heater when not in use.

Before performing any maintenance or repair work, you **must**:

- Turn the power switch to the off position.
- Wait for the heater to cool down.
- Unplug the heater from the power supply.

These safety precautions are necessary to prevent serious personal injury or death.

- Keep the heater enclosure clean and cleared of any debris within the shell.
- Ensure the stack and ducts are clear of any obstructions that would restrict airflow.
- **Do not operate** heater without the top cover properly installed.
- **Do not operate** the heater without the fan properly installed.
- Ensure your body and clothing stay clear of all moving parts.
- Immediately stop the heater and fix any fuel leaks.
- **Do not perform** maintenance while the heater is operating.

CAUTION

Keep all solvents, cleaners or flammable liquids away. Adequate ventilation must be available. Avoid breathing vapors. Avoid fire, explosion, and any other health hazards. Always use protective equipment to prevent personal injuries to the head, face, eyes, hands, and feet.

2.4.2 Safety Protections

The D-1000B heater has the following safety devices installed:

- **Flame Detector Safety Shut-off Switch:** In case of the flame extinguishing, the safety shut-off switch will cut in and stop the heater; at the same time the reset button will illuminate (See Figure 4-1, Item #1).
- **High Temperature Limit Switch:** If the heater ducts become blocked (exceeding 250°F / 121°C), the high temperature limit switch shuts down the heater.
- **CO Safety Shut-off Switch:** This safety shut-off switch will shut down the heater upon detecting 100 PPM of Carbon Monoxide.
- **Thermostatic Safety Switch (TSS):** When the heater is switched off, the TSS assures that the fan continues to run until the surface temperature of the combustion chamber drops, assuring a safe restart.
- **Fan Pressure Switch:** When the fan stops working, this device disables ignition and cuts fuel supply.

3. STORAGE & TRANSPORT

3.1 Scope

The D-1000B heater is designed for **outdoor use only**. No special packaging is required for storage or transport.

3.1.1 Transport and Storage

IMPORTANT

The owner of the Heater is responsible for investigating local ordinances, applicable laws, codes and regulations concerning the transportation of JP8 or Diesel fuel.

Before the D-1000B heater is transported or placed in storage, the heater **must** be totally cooled off. Before moving the heater, the heater's power switch must be in the OFF (0) position and unplugged. Ensure the following equipment is installed and attached to the heater before transporting or storing.

- Store the exhaust stack inside the fabric cover with straps which covers the heat outlet.
- Protective (fabric) covers are placed on the air inlet and heat outlet area.
- Repack and place the Accessory Bag with the Operator's Manual and Remote Thermostat / CO Detector into the accessory bag compartment, (see Figure 1-2).
- Ensure the fuel cap is securely tightened.

3.2 Storage

3.2.1 Before storing

Always repack the accessory bag with the operators' manual and remote thermostat / CO detector before storage. Place the exhaust stack inside the fabric cover with straps and secure exhaust stack with straps. Reinstall all protective covers and replace accessories bag into compartment in the base of the heater, (see Figure 1-2). Drain the fuel from the tank using the following steps:

1. Remove the four quick release pins.
2. Remove the top cover.
3. Carefully lift the heater up and remove the skid body.
4. Using a suitable container, remove drain plug and drain fuel. (You may need to lift the opposite end from drain plug to ensure all fuel is drained).
5. Reinstall drain plug.
6. Lift the heater and place back into the skid body.
7. Reinstall top cover and four quick release pins.

3.2.2 After storing

1. Remove all fabric covers and Accessories Bag from heater.
2. Install exhaust stack.
3. Add fuel; run the heater outdoors in accordance to the start up procedures for 10 minutes.
4. Service heater if any problems are noted.

3.3 Shipping

Before shipping the D-1000B heater, ensure the power switch is in the OFF (0) position (the center position), the exhaust stack is securely fastened inside the heat outlet fabric cover, the operators' manual and remote thermostat / CO detector are placed inside the Accessories Bag and placed in the base of the heater. Ensure all protective covers are in place. This heater should be shipped in an enclosed box and securely fastened to a pallet.

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4. OPERATIONS

4.1 General

The following chapter contains general information for operating the D-1000B heater.

CAUTION
Outdoor Use Only

4.2 Control Panel

Operation of the D-1000B heater requires the usage of the control panel shown in Figure 4.1

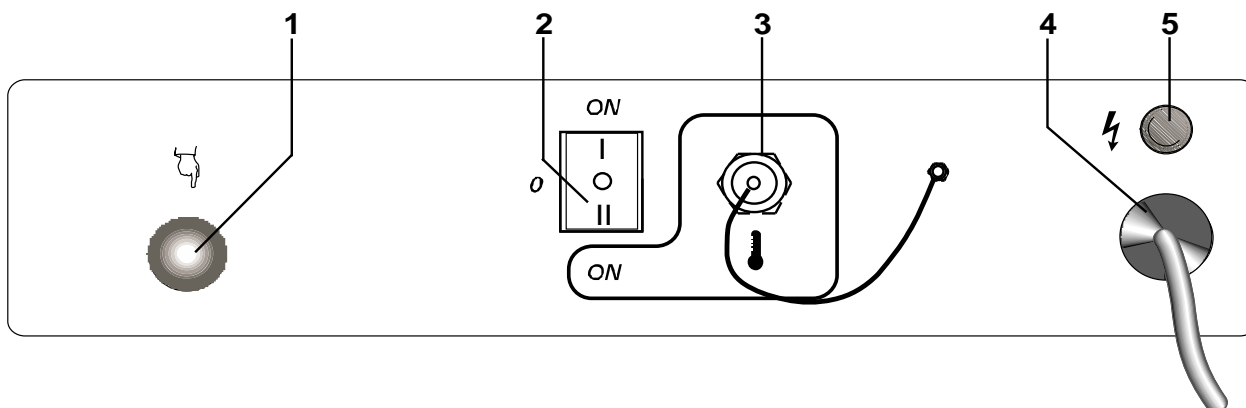


Figure 4-1 - Control Panel Layout

Table 4-1 – Control Panel

Item	Function	Description
1	Reset Button	Press the reset button to reset a lockout condition.
2	Power Switch	Three positioned switch, controls power to the unit.
3	Receptacle (Thermostat / CO Detector)	Receptacle for thermostat usage, remotely.
4	Power Cord	120V, 60Hz.
5	Power Indicator Light	Illuminates when power is applied.

4.3 Start Up Procedure for Normal Operations

1. Remove protective fabric covers from each end and check for debris
2. Remove exhaust stack from heat outlet fabric cover.
3. Remove the operators' manual and the thermostat / CO detector from the accessories bag.
4. Install exhaust stack.
5. Inspect fuel level and fill if necessary (use Diesel fuel or JP8).
6. Install the ducts and secure ducts by tightening strap. Minimize any bends. Keep ducts straight.
7. Connect heater to a 120V, 60Hz grounded power supply; ensure the power indicator light (5) is illuminated.
8. **If using**, the remote thermostat / CO detector connect the cord's plug into receptacle (3), set the temperature, and place the power switch (2) in the ON (II) position.
9. If **not** using the remote thermostat / CO detector, place the power switch (2) in the ON (I) position.

Start up procedures for Normal Operation (Cont)**NOTE**

When the heater is started for the first time or is started after the fuel tank has been completely emptied, the flow of fuel to the burner may be impaired by air in the system. In this case, the control box will cut out the heater and it will be necessary to restart the starting procedures once or twice by depressing the reset button (1).

10. If the heater fails to start, press the reset button (1) to reset the lock-out condition.
11. If heater fails to start after three attempts, check the Troubleshooting Section 7 of this Operator's manual.

4.4 Start Up Procedures for Cold Weather Operations**CAUTION**

Fill the fuel tank approximately halfway using an "Arctic Blend" of Diesel fuel. This is a critical step considering that as the ambient temperature drops to 32°F (0°C), it will begin to cloud as a result of the paraffin in the fuel solidifying. As the temperature drops below 32°F (0°C), the molecules combine into solids, large enough to be stopped by the filter, preventing fuel flow. This is known as the gel point, and generally occurs about 15°F (-9.5°C) below the cloud point. Untreated (ordinary) diesel fuel must therefore **NOT** be used.

1. Connect heater to a 120V, 60Hz grounded power supply for 15 minutes to pre-heat fuel filter.
2. Remove protective fabric covers from each end and check for debris.
3. Remove exhaust stack from heat outlet fabric cover.
4. Remove the operators' manual and the thermostat / CO detector from the accessories bag.
5. Install exhaust stack.
6. Install the ducts and secure ducts by tightening strap. Minimize any bends. Keep ducts straight
7. **If using**, the remote thermostat / CO detector connect the cord's plug into receptacle (3), set the temperature, and place the power switch (2) in the ON (II) position.
8. If **not** using the remote thermostat / CO detector, place the power switch (2) in the ON (I) position.
9. If the heater fails to start, press the reset button (1) to reset the lock-out condition.
10. If heater fails to start after two attempts, check the Troubleshooting section of the Operator's manual.

4.5 Shut Down Procedure

1. Place the power switch (2) to the OFF (0) position or **if used** set the thermostat to the lowest setting. By placing the power switch in the OFF (0) position or setting the thermostat to the lowest setting, the flame will go out, but the fan continues to spin for approximately 90 seconds cooling the combustion chamber.

CAUTION
Surfaces and pieces may be hot.

2. Remove the exhaust stack and heater duct. (Ensure items are cool before removing).
3. Repack the exhaust stack inside the heat outlet fabric cover.
4. Repack operator's manual and remote thermostat / CO detector into the accessories bag.
5. Return the accessory bag to its compartment in the base of the heater.
6. Repack heater ducts into transport bag.
7. Replace protective fabric covers on each end of the heater.

4.6 Filling the Fuel Tank

WARNING!
DO NOT USE GASOLINE. USING ANY UNAPPROVED FUELS FOR THE HEATER COULD RESULT IN DAMAGE TO THE HEATER, VOID WARRANTY AND / OR PERSONAL INJURY.

Ensure the power switch is in the OFF (0) position. It is recommended to allow **5 minutes** for the D-1000B heater to cool before refueling.

1. Unplug the power cord from the power supply.
2. Unscrew the fuel cap and refuel the heater. (Use Diesel fuel).
3. Reinstall the fuel cap. Clean any spills that may have occurred.
4. Reconnect the heater to the power supply; resume heater usage by placing the power switch (2) to the ON (II) position if using the remote thermostat or to the ON (I) position if not using the remote thermostat.

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5. MAINTENANCE, and REPAIR PROCEDURES

5.1 General

This chapter contains general information for operator-level, qualified personnel. A qualified person is one who is familiar with this manual, the operation of the D-1000B heater; the hazard involved in its operation and maintenance, and has been certified by the DHS Training Program. This chapter also describes the procedures for both periodic and daily maintenance.

Periodic maintenance at the five-year interval is not covered in this manual; maintenance at this interval should be performed by authorized DHS technicians. Maintenance and service contracts can be arranged with DHS Logistics. Parts for maintenance and service can also be obtained from DHS Logistics. Please contact DHS for more information (Phone: 800-GO-DRASH (800-463-7274), Fax: 845-365-2114 or Email: drash@drash.com).

This manual is not intended to be a substitute for proper training. We strongly recommend that operators receive training directly from DHS.

The cautions and warnings point out known conditions that are potentially hazardous. Note that no manual can cover every possible situation. If in doubt, contact DHS Logistics.

Before calling DHS for assistance, please identify the heater by its DRASH serial number. The serial number is located on the control panel side of the heater as shown in Figure 1-1.

Only authorized DHS technicians should perform Service and Repairs beyond the scope of this manual.

5.2 Maintenance

This section describes preventive and regular maintenance schedules. Preventive and regular maintenance will ensure a long trouble free life to your heater.

5.2.1 Periodic Maintenance

Periodic maintenance of the heater is necessary and must be part of the daily routine of operating the heater. Maintenance activities should be performed at the following periodic intervals:

5.2.2 Daily Maintenance

Check the following points prior to starting the heater:

- Ensure that both protective fabric covers have been removed.
- Inspect both ends and the exhaust stack port for any debris. Remove debris.
- Install heater ducts, secure by tightening strap. Minimize any bends. Keep ducts straight.
- Verify fuel tank is full.
- Verify that the exhaust stack is properly installed.

5.2.3 50 Hour Maintenance

After every 50 hours of operation, perform the following maintenance.

- Remove, disassemble and inspect the pre-heated fuel filter.
- Clean the fuel filter with clean fuel.
- Remove top cover and clean the heaters' exterior.
- Loosen and slide the maintenance access panel rearward.
- Using compressed air, clean the interior area.
- Clean the fan blade.
- Check for leaks.
- Remove burner assembly, clean and check electrode setting; adjust according to **Section 5.4.9.**

5.2.4 Annual Maintenance

- Check all nuts, bolts, fittings, and connections for looseness. Tighten as required.
- Clean or replace the fuel filter.
- Drain and flush the fuel tank.
- Remove burner assembly, clean, and adjust electrode setting.
- Remove and replace fuel nozzle.

5.3 Servicing the Fuel Tank

During regular scheduled maintenance and or when the fuel tank becomes contaminated or dirty, the fuel tank can be cleaned by removing the drain plug and draining the fuel. Using approximately 4 Gallons (15 liters) of clean Diesel fuel, the fuel tank may be flushed.

If a leak is detected, the fuel tank is a non-repairable item, it **must** be replaced. For information on how to replace the fuel tank, please contact DHS.

5.4 Repairs Procedures

5.4.1 General Access

To gain internal access to the motor assembly, combustion chambers, and the burner head, remove the four pins that secure the top cover to the skid body as shown in Figure 5-1. Remove top cover. Loosen and slide the maintenance access panel rearward.

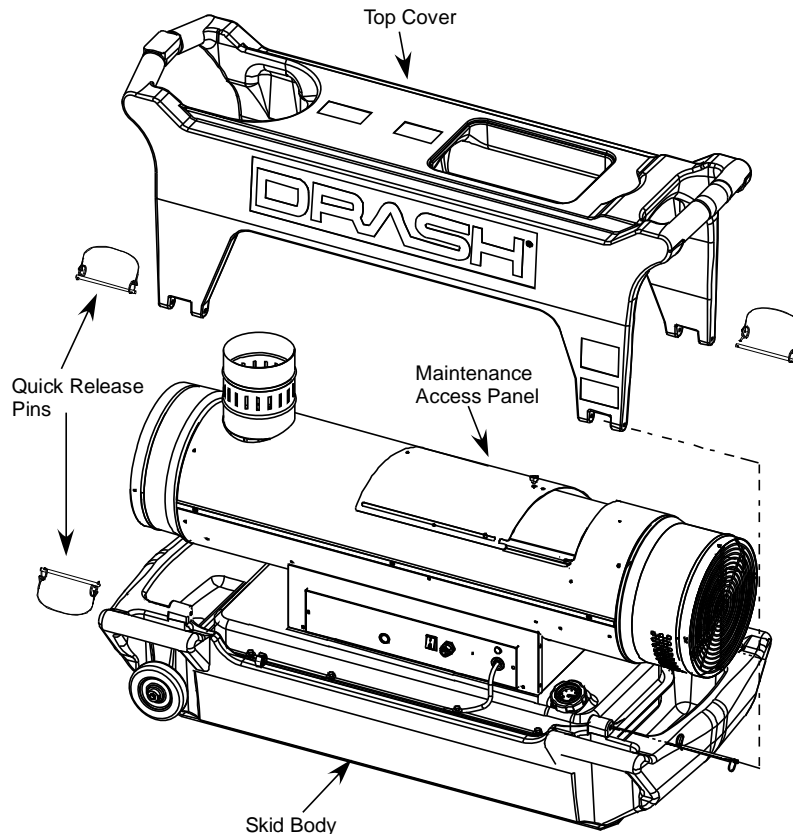


Figure 5-1 – General Access to Heater

NOTE!

In the following Repair Procedures, the numbers in parentheses refer to item numbers listed in Chapter 8, Illustrated Parts Breakdown diagram on page 8-1 or otherwise noted.

5.4.2 Removal and Installation Electric Motor Assembly**5.4.2.1 Removal procedures:**

1. Disconnect power cord and allow heater to cool.
2. Remove the four quick release pins as shown in Figure 5-1; remove top exterior cover.
3. Using an 8mm nut driver, remove the upper heat shield (05) by removing six screws (79) and two sheet metal screws (78). Remove heat shield and set aside.
4. Using a 4mm Allen wrench, loosen set screw (92) and remove fan blade (15).
5. Disconnect the three wires from the fuel solenoid (71).
6. Using a 15mm open end wrench, loosen and disconnect the fuel supply line (22B) from fuel filter and fuel return line (22A) to the fuel tank at the fuel pump (70) (see Figure 5-6).
7. Using a 13mm open end wrench, loosen and disconnect the fuel feed hose (65) at the fuel pump to the burner head (61).
8. Using a 2.5mm Allen wrench, loosen (**DO NOT REMOVE**) three set screws on the fuel pump collar to the back of the electric motor; remove fuel pump (70) from electric motor (10).
9. Using a Phillips screwdriver, loosen and remove two control panel mounting screws (81); pull out the control panel assembly (29) from the base (30) to expose the terminal boards.
10. Trace the electric motor power harness (black covered (white, black and yellow with green stripe wire) into control panel. Disconnect and remove three wires; white wire (#5), black wire (#6) from the terminal board (47), and the yellow and green stripe ground wire from the small terminal board (46) as shown in Figure 5-2.

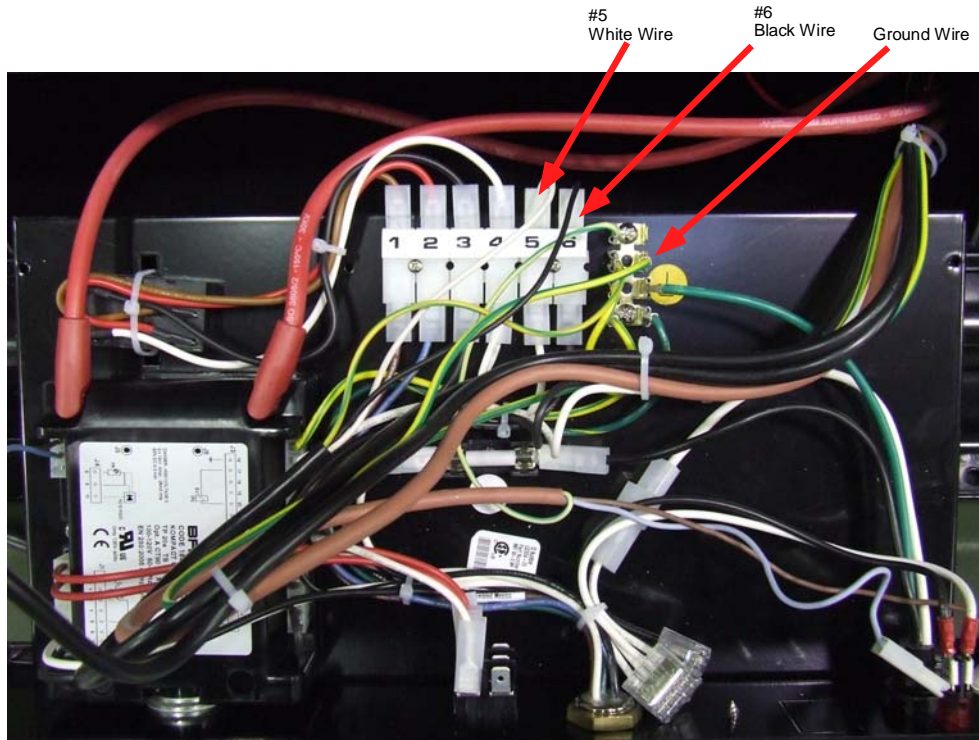


Figure 5-2 – Control Panel Terminal Board

Electric Motor Removal Procedures (Cont)

11. Slide the plastic cover off the capacitor (11) and disconnect two female terminal couplers. (See Figure 5-3).
12. Using a 13mm socket wrench, loosen and remove the mount nut and lock washer; remove capacitor (11).
13. Using an 8mm nut driver, loosen and remove four screws (78) securing the motor assembly plate (12).
14. Remove the electric motor (10) from the lower heat shield assembly (6).
15. Turn the electric motor (10) and plate assembly (12) upside down.
16. Using a 8mm nut driver, loosen and remove four electric motor mounting screws (79) and four spring washers (80); remove unserviceable electric motor.

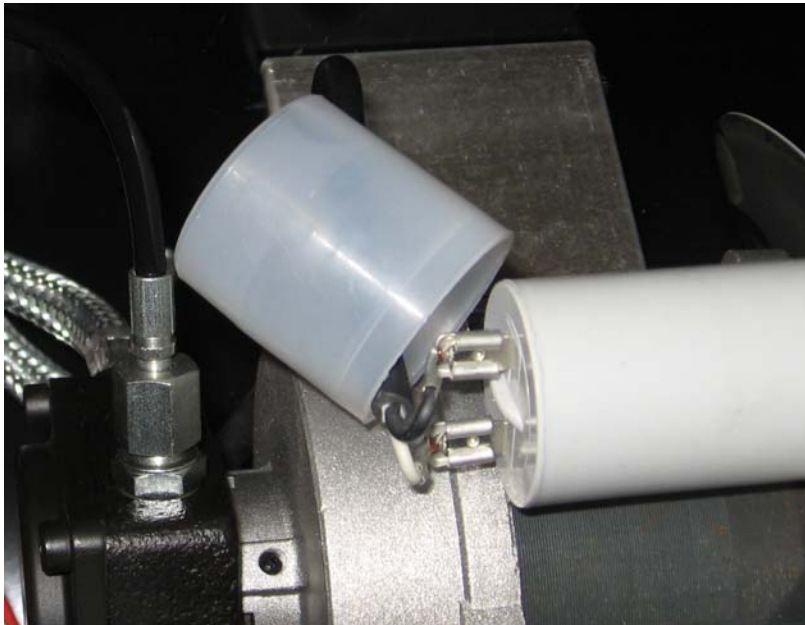


Figure 5-3 - Capacitor Wire Connections

5.4.2.2 Installation procedures:

1. Place serviceable electric motor (10) onto the motor assembly plate (12) and reinstall four mounting screws (79) and four spring washers (80). Using an 8mm nut driver tighten hardware.
2. Install motor assembly plate (12) into lower heat shield (6).
3. Using an 8mm nut driver reinstall four screws (78) and tighten.
4. Using a 13mm socket wrench, reinstall capacitor (11) to the electric motor (10) install and tighten the lock washer and nut.
5. Reconnect two female terminal couplers from the electric motor (10) to the capacitor (11) and reinstall the plastic cover as shown in Figure 5-4.
6. Position fuel pump (70) behind electric motor (10) aligning tabs on the plastic coupler to the slots inside the electric motor as shown in Figure 5-6 and Figure 5-7. Push in until fuel pump (70) is seated against the electric motor (10).
7. Using a 2.5mm Allen wrench, tighten the three set screws on the fuel pump collar to the electric motor (10).
8. Using a 13mm open end wrench, connect and tighten the fuel feed hose (65) from the burner head (61) to fuel pump (70).
9. Using a 15mm open end wrench, connect and tighten the fuel supply line (22B) from fuel filter and fuel return line (22A) to fuel tank at the fuel pump (70).
10. Install fan blade (15) and ensure it is flush with the forward end of the shaft.

IMPORTANT!

Fan blade must be positioned correctly on the electric motor shaft to ensure correct balance of the fan.

11. Using a 4mm Allen wrench, tighten set screw (92) to secure the fan blade (15) in place.
12. Feed the electric motor power harness through lower heat shield into the control panel.
13. Reconnect the electric motor power harness' three wires; white wire (#5), black wire (#6) on the terminal board (47), and the yellow with green stripe, ground wire on the small terminal board (46) (see Figure 5-2).
14. Reinstall the control panel assembly (29). Using a Phillips screwdriver, install and tighten two control panel mounting screws (81).
15. Reinstall upper heat shield (05).
16. Using an 8mm nut driver install and tighten six screws (79) and two sheet metal screws (78).
17. Reinstall top exterior cover and install the four quick release pins (see Figure 5-1).
18. Connect power cord to a ground power supply.
19. Perform an operational test and check for leaks. (See Chapter 6).

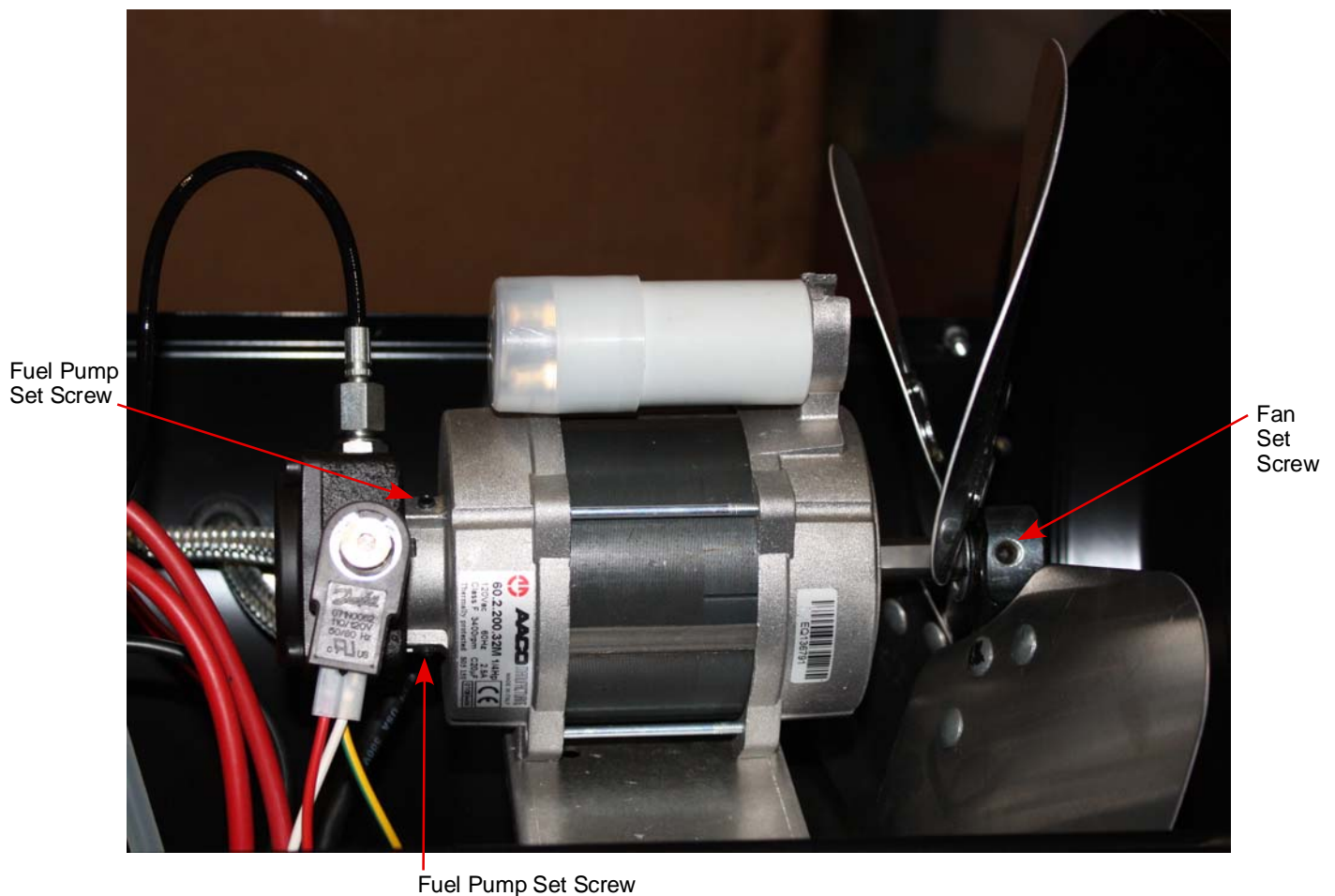


Figure 5-4 - Electric Motor Assembly

5.4.3 Removal and Installation of the Condenser (Capacitor)

5.4.3.1 Removal procedures:

1. Disconnect power cord from the power source. Allow heater to cool.
2. Using an 8mm nut driver, remove two middle screws from the maintenance access panel (7) and loosen four corner screws (78).
3. Slide maintenance access panel (7) rearward.
4. Slide the plastic cover off the capacitor (11) and disconnect two female terminal couplers as shown in Figure 5-3.
5. Using a 13mm socket wrench, loosen and remove the nut and lock washer.
6. Remove capacitor (11) from electric motor (10).

5.4.3.2 Installation procedures:

1. Install capacitor (11) onto the electric motor (10).
2. Using a 13mm socket wrench, install lock washer and nut. Tighten hardware.
3. Reconnect the two female terminal couplers and slide plastic cover over terminals.
4. Slide maintenance access panel (7) forward.
5. Using an 8mm nut driver, install two middle screws (78) and tighten all remaining hardware.
6. Test heater in accordance with operations manual. (See Chapter 6).

5.4.4 Removal and Installation of Fuel Filter

5.4.4.1 Removal procedures:

1. Disconnect power cord from the power source. Allow heater to cool.
2. Using a 19mm open end wrench, loosen and remove pre-heat probe from bottom of fuel filter assembly
3. Using a 10mm open end wrench, remove bolt, washer and o-ring from top of fuel filter assembly.
4. Using a suitable container, collect the fuel when removing the fuel filter assembly.
5. Remove, clean and inspect filter and discard all gaskets.

5.4.4.2 Installation procedures:

1. Install new fuel filter cartridge (76) and new O-ring from kit (75).

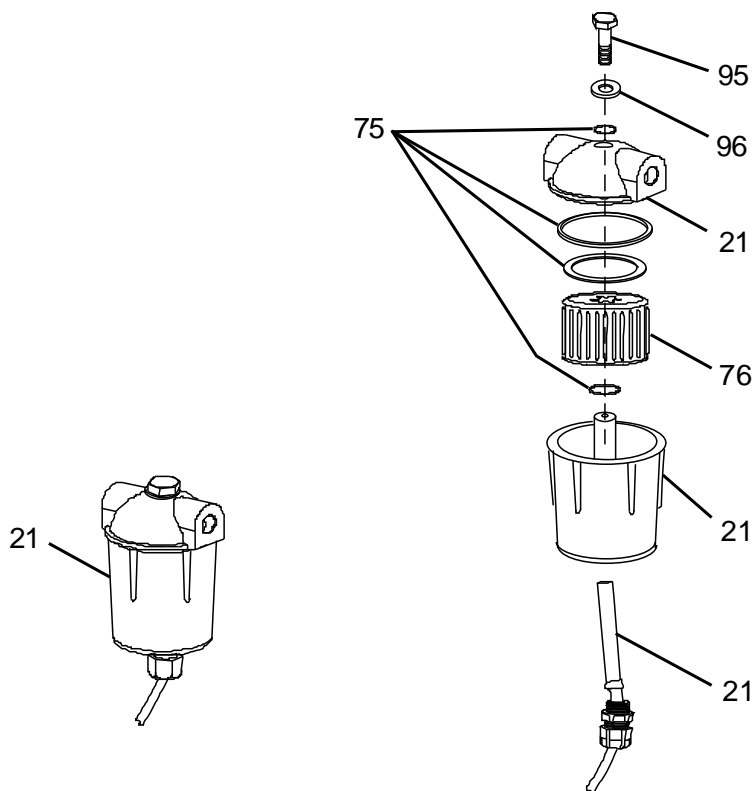


Figure 5-5 - Fuel Filter Assembly

2. Fill the fuel filter assembly with clean diesel fuel.
3. Place the fuel filter assembly into housing and install bolt, washer and new o-ring from kit (75).
4. Using a 10mm open end wrench, tighten the fuel filter assembly mount bolt.
5. Insert pre-heat probe into bottom of fuel filter assembly and tighten using a 19mm open end wrench.
6. Wipe up any fuel spills.
7. Connect heater to a power supply.
8. Test heater in accordance with operations manual (see Chapter 6) and check for fuel leaks.

5.4.5 Removal and Installation of Fuel Pump Assembly

5.4.5.1 Removal Procedures:

1. Disconnect power cord from power source and allow heater to cool.
2. Remove four quick release pins and remove top cover (see Figure 5-1).
3. Using a 8mm nut driver, remove the upper heat shield (05) by removing six screws (79) and two sheet metal screws (78); remove heat shield and set aside
4. Disconnect the fuel solenoid leads.
5. Using a 4mm Allen wrench, loosen and remove fuel solenoid cap nut (71A) and wave washer (71B) as shown in Figure 5-6.
6. Using a 13mm open end wrench, loosen and disconnect the fuel feed hose (65) at the fuel pump (70).
7. Using a 15mm open end wrench, loosen and disconnect the fuel supply line (22B) from fuel filter and fuel return line (22A) to the fuel tank at the fuel pump (70) (see Figure 5-6).
8. Using a 2.5mm Allen wrench, loosen (**DO NOT REMOVE**) three set screws on the fuel pump collar (see Figure 5-4); remove fuel pump from electric motor assembly.

5.4.5.2 Installation Procedures

1. Using a 15mm open end wrench, connect and tighten the fuel supply line (22B) from fuel filter and fuel return line (22A) to fuel tank at the fuel pump (70) (see Figure 5-6).
2. Using a 13mm open end wrench, connect and tighten the fuel feed hose (65) from the burner head (61) to fuel pump (70).
3. Using a 4mm Allen wrench, attach fuel solenoid (71) wave washer (71B) and cap nut (71A) as shown in Figure 5-6.
4. Positioned fuel pump (70) behind electric motor (10) aligning tabs on the plastic coupler to the slots inside the electric motor as shown in Figure 5-6 and Figure 5-7. Push in until fuel pump (70) is seated against the electric motor (10).
5. Using a 2.5mm Allen wrench, tighten three set screws on the fuel pump collar to secure the fuel pump (70) to the electric motor (10) (see Figure 5-4).
6. Reconnect the fuel solenoid leads.
7. Install heat shield (05).
8. Using an 8mm nut driver install and tighten six screws (79) and two sheet metal screws (78).
9. Install the top cover and four quick release pins as shown in Figure 5-1.
10. Test heater in accordance with the operations manual (see Chapter 6) and check for fuel leaks.

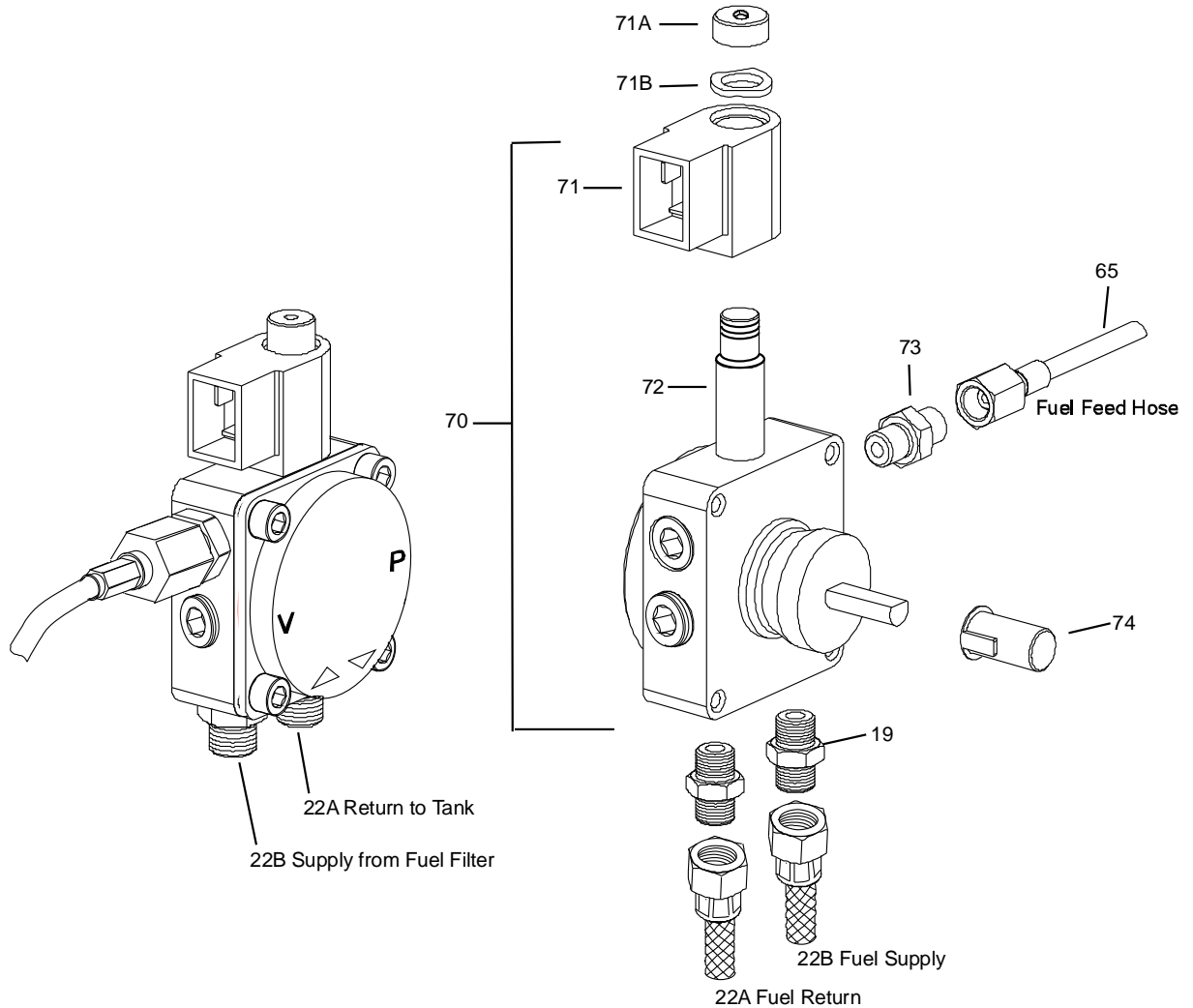


Figure 5-6 – Fuel Pump

5.4.6 Removal, Inspection and Installation of Electric Motor / Fuel Pump Coupling

5.4.6.1 Removal Procedures;

1. Disconnect power cord from power source and allow heater to cool.
2. Remove four quick release pins and remove top cover (see Figure 5-1).
3. Using a 8mm nut driver, remove the upper heat shield (05) by removing six screws (79) and two sheet metal screws (78); remove heat shield and set aside.
4. Disconnect the fuel solenoid leads.
5. Using a 15mm open end wrench, loosen and disconnect at fuel pump (70) the fuel supply line (22B) from the fuel filter and fuel return line (22A) to the fuel tank (see Figure 5-6).
6. Using a 13mm open end wrench, loosen and disconnect at the fuel pump the fuel feed hose (65) to burner head (61).
7. Using a 2.5mm Allen wrench, loosen (**DO NOT REMOVE**) three set screws on the fuel pump collar (see Figure 5-4); remove fuel pump from electric motor assembly.

5.4.6.2 Inspection Procedures:

1. Remove the fuel pump plastic coupler (74) (see Figure 5-6).
2. Inspect the plastic coupler (74) for wear, cracks, chips or any other defects to render unserviceable condition.
3. Replace or install (if required) the plastic coupler (74) by aligning flat of shaft with tab inside the coupler.

5.4.6.3 Installation Procedures

1. Positioned fuel pump assembly behind electric motor assembly aligning tabs on the plastic coupler to the slots inside the electric motor as shown in Figure 5-6 and Figure 5-7.
2. Using a 2.5mm Allen wrench, tighten three set screws on the fuel pump collar to secure the fuel pump to the electric motor assembly (see Figure 5-4).
3. Using a 13mm open end wrench, connect and tighten the fuel feed hose (65) from the burner head (61) to fuel pump (70).
4. Using a 15mm open end wrench, connect and tighten the fuel supply line (22B) from fuel filter and fuel return line (22A) to the fuel tank at the fuel pump (70).
5. Reconnect the fuel solenoid leads.
6. Install heat shield (05).
7. Using an 8mm nut driver install and tighten six screws (79) and two sheet metal screws (78).
8. Install the top cover and four quick release pins as shown in Figure 5-1.
9. Test heater in accordance with the operations manual (see Chapter 6) and check for leaks.

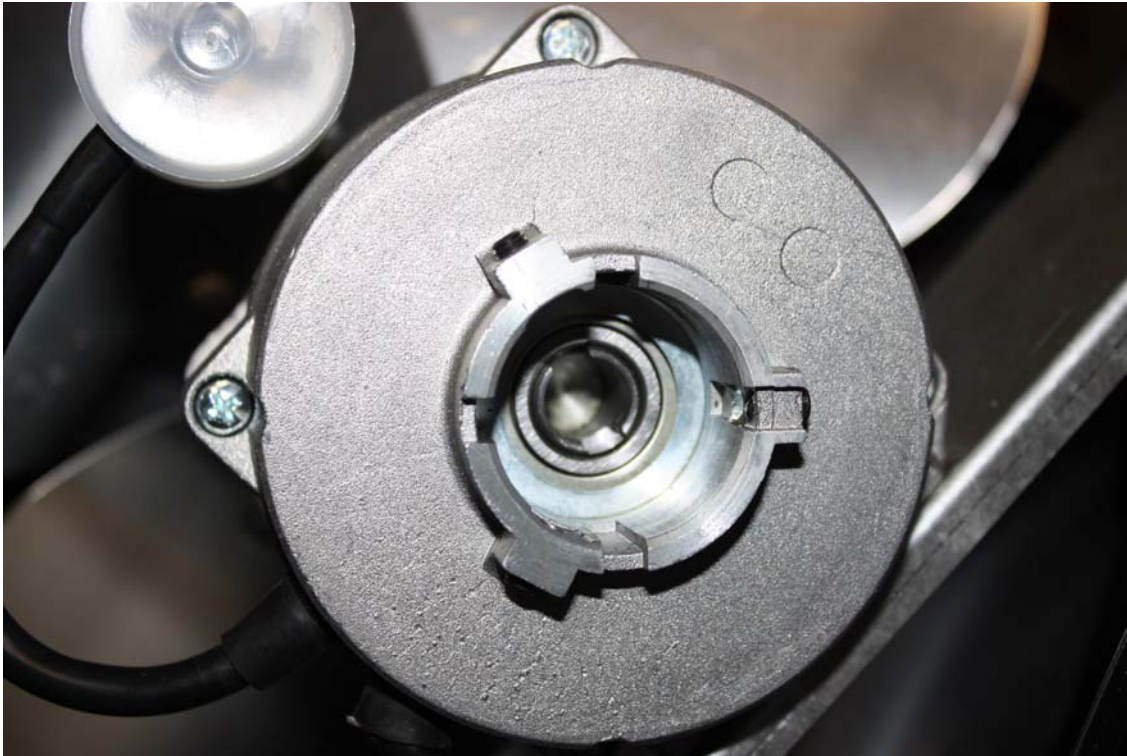


Figure 5-7 - Electric Motor Internal Shaft

5.4.7 Removal and Installation of Fuel Solenoid

5.4.7.1 Removal Procedures:

1. Disconnect power cord and allow heater to cool.
2. Using an 8mm nut driver, remove two middle screws from the maintenance access panel (7) and loosen four corner screws (78).
3. Slide maintenance access panel (7) rearward.
4. Disconnect the fuel solenoid wire leads (red, white, and yellow with green stripe).
5. Using a 4mm Allen wrench, loosen and remove fuel solenoid cap nut (71A) and wave washer (71B) as shown in Figure 5-6.
6. Remove fuel solenoid (71) off of fuel pump.

5.4.7.2 Installation procedures:

1. Install new fuel solenoid (71) onto the fuel pump assembly (See Figure 5-8).
2. Install wave washer (71B) and cap nut (71A) as shown in Figure 5-6.
3. Using a 4mm Allen wrench, tighten cap nut (71A).
4. Reconnect electrical leads to fuel solenoid.
5. Using an 8mm nut driver, install two middle screws on the maintenance access panel (7) and tighten four corner screws (78).
6. Test heater in accordance with the operations manual. (See Chapter 6).

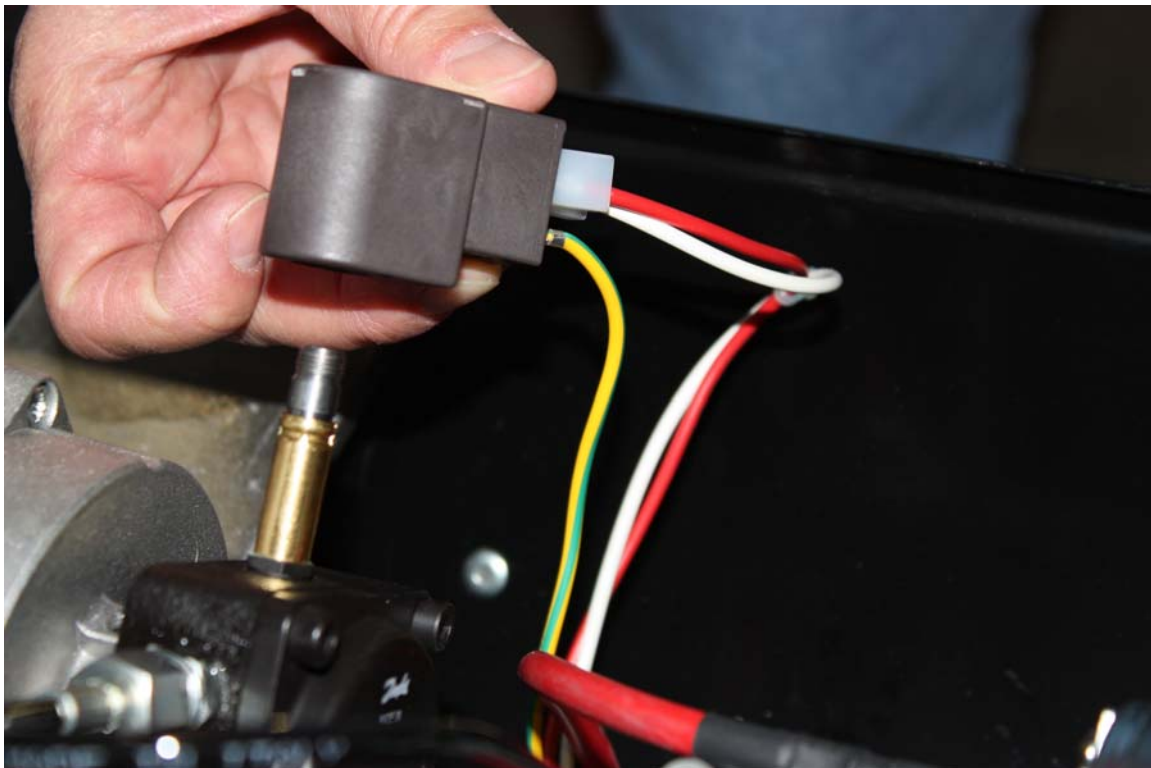


Figure 5-8 – Fuel Solenoid Installation

5.4.8 Removal and Installation of Fuel Nozzle

5.4.8.1 Removal procedures:

1. Disconnect power cord from power source and allow heater to cool.
2. Remove four quick release pins and remove top cover (see Figure 5-1).
3. Using a 8mm nut driver, remove the upper heat shield (05) by removing six screws (79) and two sheet metal screws (78); remove heat shield and set aside.
4. Disconnect ground wire (103) from terminal lug (94) on combustion head (40).
5. Using a 13mm open end wrench, loosen and removed fuel feed hose (65) from nozzle holder (60).
6. Disconnect photocell lead (66), gently pulling straight back from flame detector holder (93).
7. Disconnect both H.T. ignition cables (64) from electrodes (63).
8. Rotate burner flange (61) counter-clockwise to align tabs with slots on the burner flange. Remove burner flange (61) from combustion head (40).
9. Using a 19mm open end wrench, hold Nozzle holder (60) and with a 15mm open end wrench remove nozzle (59).

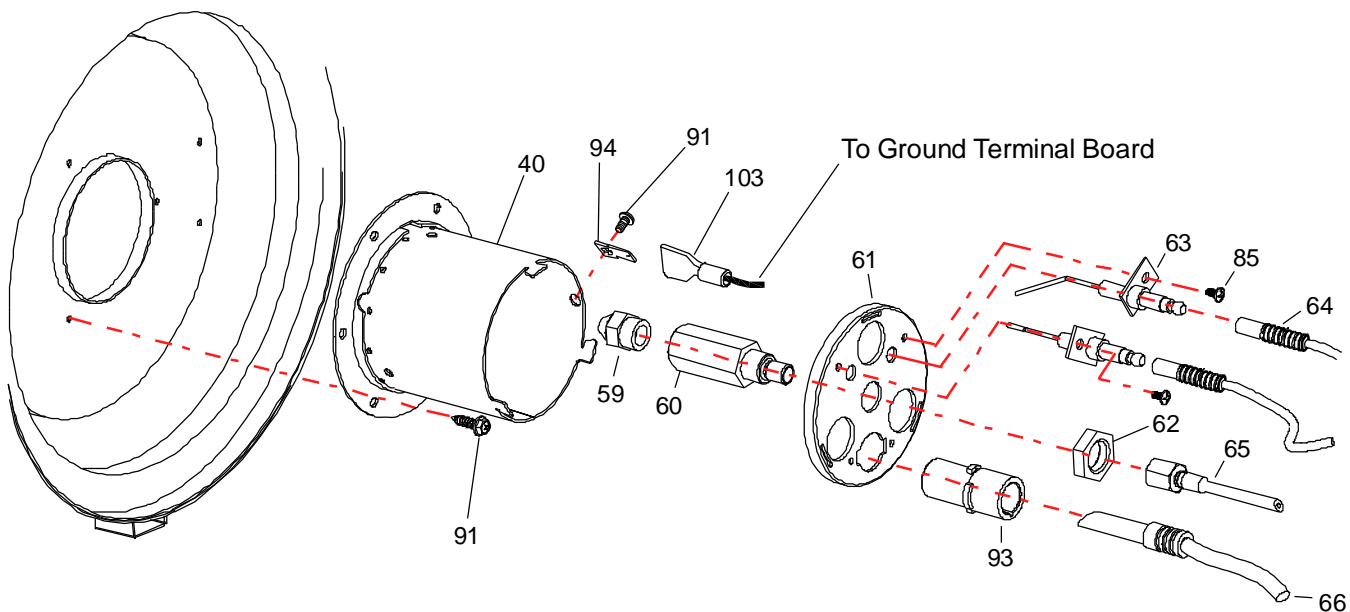


Figure 5-9 – Burner Head & Nozzle Assembly

5.4.8.2 Installation procedures:

1. Install the new nozzle (59) into nozzle holder (60).
2. Using a 19mm open end wrench, hold nozzle holder (60) and with a 15mm open end wrench tighten nozzle (59).
3. Align slots in burner flange (61) with tabs on the combustion head (40). Rotate burner flange (61) clockwise to lock tabs.
4. Reconnect H.T. ignition cables (64) to both electrodes (63).
5. Reconnect photocell lead (66) into flame detector holder (93) by aligning rubber tab on photocell lead with slot in of the flame detector holder, 3 o'clock position. Ensure photocell lead is seated.
6. Reconnect and tighten fuel feed hose (65) to the nozzle holder (60) using a 13mm open end wrench.

Fuel Nozzle Installation Procedures (Cont)

7. Reconnect ground wire (103) to the terminal lug (94) on combustion head (40).
8. Install heat shield (05). Using an 8mm nut driver install and tighten six screws (79) and two sheet metal screws (78) to secure heat shield.
9. Install the top cover and four quick release pins as shown in Figure 5-1.
10. Test heater in accordance with the operations manual. (See Chapter 6).

5.4.9 Removal, Installation and Gap Adjustment Procedures for Ignition Electrodes

5.4.9.1 Electrode Removal procedures:

1. Disconnect power cord from power source and allow heater to cool.
2. Remove four quick release pins and remove top cover (see Figure 5-1).
3. Using an 8mm nut driver, remove the upper heat shield (05) by removing six screws (79) and two sheet metal screws (78); remove heat shield and set aside.
4. Disconnect both H.T. ignition cables (64) from electrodes (63) (see Figure 5-9).
5. Using a Phillips head screwdriver loosen and remove two screws (85). Remove the both electrodes (63).
6. Rotate burner flange (61) counter-clockwise to align tabs with slots on the burner flange. Remove burner flange (61) from combustion head (40).

5.4.9.2 Electrode Installation procedures

1. Install electrodes (63) into the burner flange (61).
2. Using a Phillips head screwdriver install and tighten two screws (85) to secure the electrodes (63).
3. To achieve the required gap of 3mm, refer to **Step 5.4.9.3** before proceeding with installation procedures.
4. Align slots in burner flange (61) with tabs on the combustion head (40). Rotate burner flange (61) clockwise to lock tabs.
5. Reconnect H.T. ignition cables (64) onto the electrodes (63) (see Figure 5-9).
6. Install upper heat shield (05). Using an 8mm nut driver install and tighten six screws (79) and two sheet metal screws (78).
7. Install the top cover and four quick release pins as shown in Figure 5-1.
8. Test heater in accordance with the operations manual. (See Chapter 6).

5.4.9.3 Electrode Gap Adjustment procedures:

1. Electrodes may be adjusted to achieve the required gap of 3mm after the electrodes have been securely fastened
2. Using a feeler gauge ensure the electrode tips are set at 3mm centered on the nozzle (59) as shown in Figure 5-10. If required, electrode tips may be adjusted by hand.

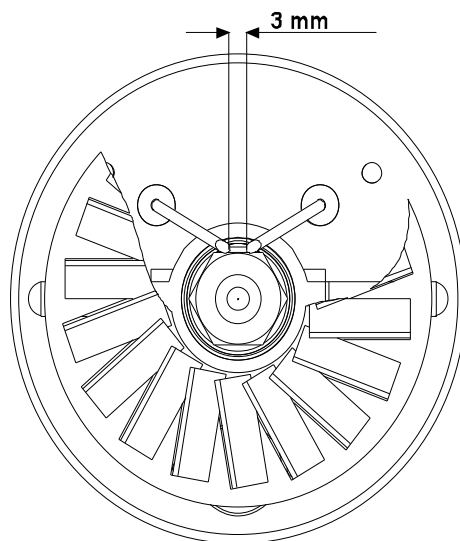


Figure 5-10 – Ignition Electrode Gap Adjustments

5.4.10 Removal and Installation of the Ignition Control Assembly

5.4.10.1 Removal procedures:

1. Disconnect power cord from power source and allow heater to cool.
2. Remove four quick release pins and remove top cover (see Figure 5-1).
3. Using a 8mm nut driver, remove the upper heat shield (05) by removing six screws (79) and two sheet metal screws (78); remove heat shield and set aside.
4. Using a Phillip head screwdriver, remove two screws (81) securing control panel assembly (29). Pull assembly straight out and lay down exposing Ignition Control Assembly (53) and electrical wires.
5. Disconnect four quick disconnect wire connectors from ignition control assembly as shown in Figure 5-11.
6. Disconnect both H.T. ignition cables (64) from ignition control assembly (53).
7. Using a Phillips head screwdriver, remove two screws (88) securing from ignition control assembly (53) to control panel assembly (29).
8. Remove ignition control assembly (53).

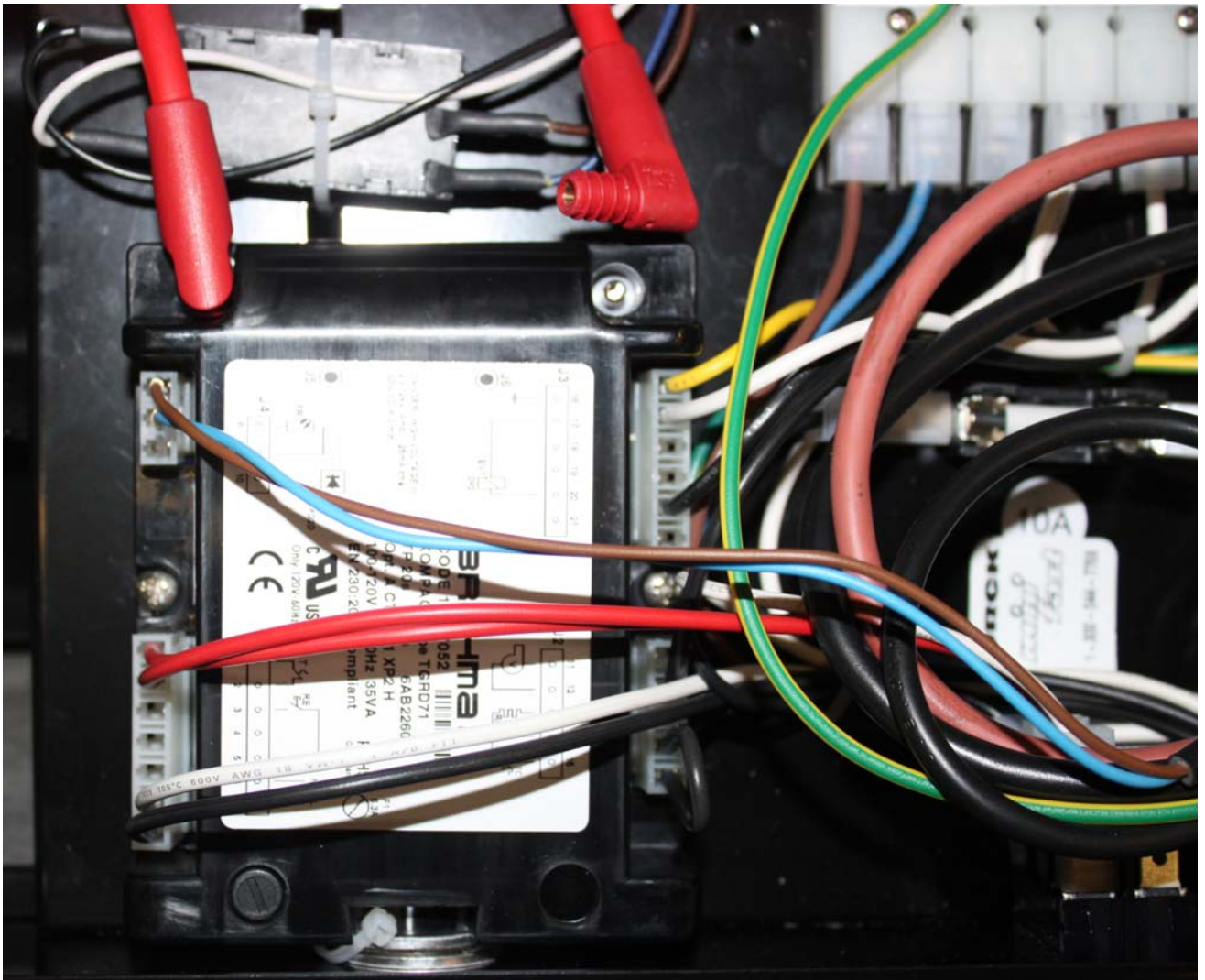


Figure 5-11 – Ignition Control Assembly and H. T. Ignition Cables

5.4.10.2 Installation procedures:

1. Install new ignition control assembly (53) onto control panel assembly (29).
2. Using a Phillips head screwdriver, install and tighten two screws (88) securing ignition control assembly (53) to control panel assembly (29).
3. Reconnect two H.T. ignition cables (64) to the ignition control assembly as shown in Figure 5-11.
4. Reconnect four quick disconnect connectors to ignition control assembly.
5. Slide control panel assembly (29) back into base (30). Ensure that electrical wires do not get pinched when sliding control panel assembly into base.
6. Using a Phillip head screwdriver, install and tighten two screws (81) securing control panel assembly (29) to base.
7. Install upper heat shield (05).
8. Using an 8mm nut driver, install and tighten six screws (79) and two sheet metal screws (78).
9. Install the top cover and four quick release pins as shown in Figure 5-1.
10. Test heater in accordance with the operations manual. (See Chapter 6).

5.4.11 Removal and Installation of H.T. Ignition Cables**5.4.11.1 Removal procedures:**

1. Disconnect power cord from power source and allow heater to cool.
2. Remove four quick release pins and remove top cover (see Figure 5-1).
3. Using a 8mm nut driver, remove the upper heat shield (05) by removing six screws (79) and two sheet metal screws (78); remove heat shield and set aside.
4. Using a Phillip head screwdriver, remove two screws (81) securing control panel assembly (29). Pull assembly straight out and lay down exposing internal components and electrical wires.
5. Disconnect both H.T. ignition cables (64) from ignition control assembly (53) (see Figure 5-11).
6. Disconnect both H.T. ignition cables (64) from electrodes (63) (see Figure 5-9).
7. Gently pull each H.T. ignition cables through lower heat shield (06) into base (30).
8. Discard H.T. ignition cables.

5.4.11.2 Installation procedures:

1. Feed new H.T. ignition cables up through base (30) and into lower heat shield (06).
2. Connect both H.T. ignition cables (64) to electrodes (63) (see Figure 5-9).
3. Connect both H.T. ignition cables (64) to ignition control assembly (53) (see Figure 5-11).
4. Slide control panel assembly (29) back into base (30). Ensure that electrical wires do not get pinched when sliding control panel assembly into base.
5. Using a Phillip head screwdriver, install and tighten two screws (81) securing control panel assembly (29) to base.
6. Install upper heat shield (05).
7. Using an 8mm nut driver, install and tighten six screws (79) and two sheet metal screws (78).
8. Install the top cover and four quick release pins as shown in Figure 5-1.
9. Test heater in accordance with the operations manual. (See Chapter 6).

5.4.12 Removal and Installation of the Photocell

5.4.12.1 Removal procedures:

1. Disconnect power cord from power source and allow heater to cool.
2. Remove four quick release pins and remove top cover (see Figure 5-1).
3. Using a 8mm nut driver, remove the upper heat shield (05) by removing six screws (79) and two sheet metal screws (78); remove heat shield and set aside.
4. Using a Phillip head screwdriver, remove two screws (81) securing control panel assembly (29). Pull assembly straight out and lay down exposing internal components and electrical wires.
5. Pull photocell (66) straight back out of flame detector holder (93) (see Figure 5-9).
6. Disconnect quick disconnect wire connector (blue and brown wire connector) from ignition control assembly (53) (see Figure 5-11).
7. Gently pull photocell lead through lower heat shield (06) into base (30).
8. Discard photocell.

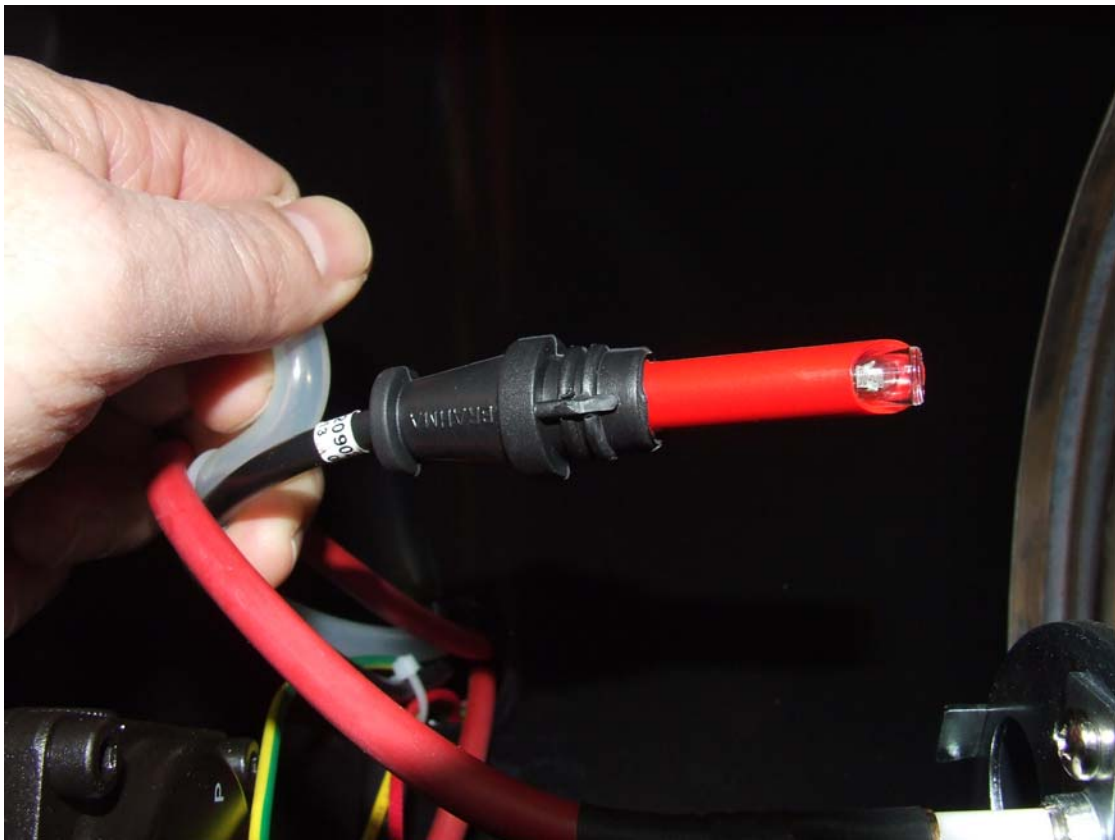


Figure 5-12 – Photocell

5.4.12.2 Installation procedures:

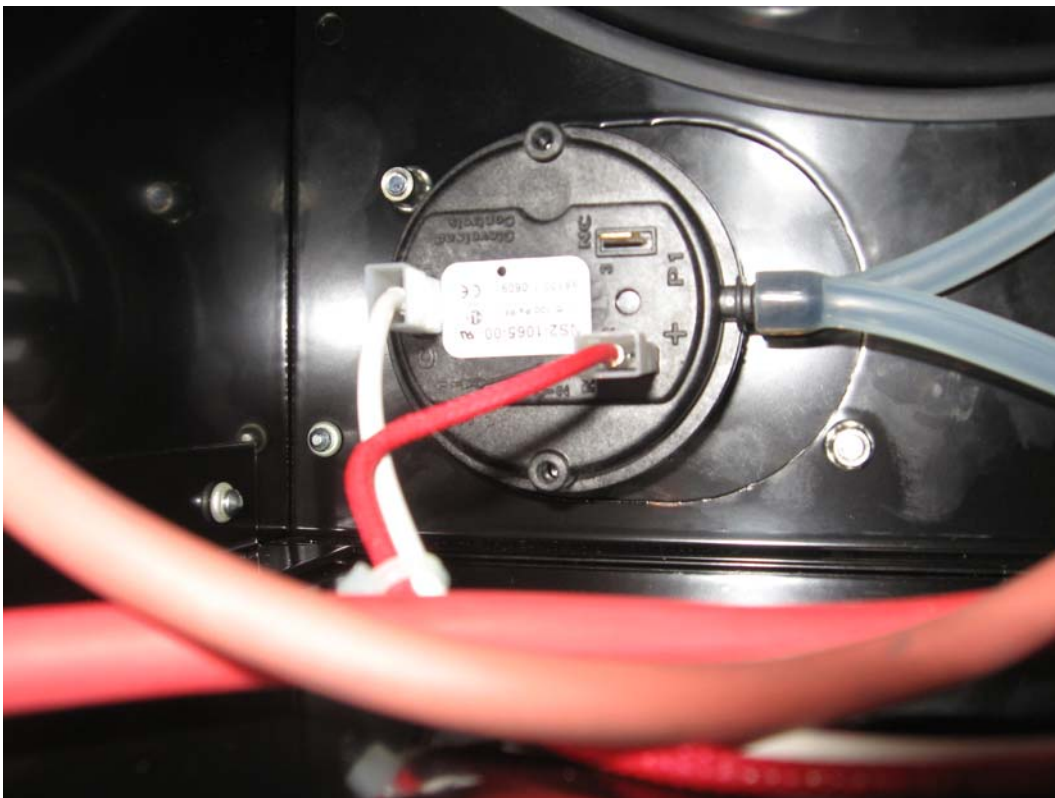
1. Install new photocell lead through base (30) up into lower heat shield (06).
2. Install photocell lead (66) into flame detector holder (93) by aligning rubber tab on photocell lead with slot in of the flame detector holder, 3 o'clock position. Ensure photocell lead is seated. (See Figure 5-12).
3. Connect quick disconnect wire connector (blue and brown wire connector) onto ignition control assembly (53) (see Figure 5-11).

Installation of Photocell procedures (Cont)

4. Slide control panel assembly (29) back into base (30). Ensure that electrical wires do not get pinched when sliding control panel assembly into base.
5. Using a Phillip head screwdriver, install and tighten two screws (81) securing control panel assembly (29) to base.
6. Install upper heat shield (05).
7. Using an 8mm nut driver, install and tighten six screws (79) and two sheet metal screws (78).
8. Install the top cover and four quick release pins as shown in Figure 5-1.
9. Test heater in accordance with the operations manual. (See Chapter 6).

5.4.13 Removal and Installation of the Pressure Switch**5.4.13.1 Removal procedures:**

1. Disconnect power cord from power source and allow heater to cool.
2. Remove four quick release pins and remove top cover (see Figure 5-1).
3. Using a Phillip head screwdriver, remove two screws (81) securing control panel assembly (29). Pull assembly straight out and lay down exposing internal components and electrical wires.
4. Using an 8mm nut driver, remove two screws (79) securing pressure switch bracket (99) to base (30).
5. Pull pressure switch assembly and bracket (99) out of base.
6. Disconnect the red and white wire connector from back of the pressure switch (43) (see Figure 5-13).
7. Disconnect two silicone hoses (31) (see Figure 5-13) from the side of the pressure switch (43).
8. Using a Philips head screwdriver, remove two screws (100) securing pressure switch (43) to bracket (99).
9. Discard pressure switch.

**Figure 5-13 – Pressure Switch**

5.4.13.2 Installation procedures:

1. Install new pressure switch (43).
2. Using a Philips head screwdriver, install and tighten two screws (100) through bracket (99) securing pressure switch (43).
3. Connect two silicone hoses (31) (see Figure 5-13) to the side of the pressure switch (43).
4. Connect the red and white wire connector to the back of the pressure switch (43) (see Figure 5-13).
5. Install pressure switch and bracket assembly into base (30).
6. Using an 8mm nut driver, install and tighten two screws (79) securing pressure switch bracket (99) to base (30).
7. Slide control panel assembly (29) back into base (30). Ensure that electrical wires do not get pinched when sliding control panel assembly into base.
8. Using a Phillip head screwdriver, install and tighten two screws (81) securing control panel assembly (29) to base.
9. Install upper heat shield (05).
10. Using an 8mm nut driver, install and tighten six screws (79) and two sheet metal screws (78).
11. Install the top cover and four quick release pins as shown in Figure 5-1.
12. Test heater in accordance with the operations manual. (See Chapter 6).

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6. TEST PROCEDURES

6.1 Maintenance Repair Test Procedures

1. Remove all protective fabric covers and accessories bag (if attached) from heater.
2. Install exhaust stack.
3. Add fuel if needed.
4. Connect power cord to power source.
5. Start and run heater outdoors in accordance to start up procedures (see **Section 4.3**) for ten minutes.
6. Service heater if any problems and or leaks are noted.

6.2 Thermostat / CO Detector Control Device Test

1. Connect heater to a grounded power supply and start the heater.
2. Attach and hand tighten the Thermostat / CO Detector 5-pin connector to the control panel (see figure 4-1, item #4).
3. Adjust the thermostat to the lowest temperature setting; the heater should turn off.
4. Adjust the thermostat to the desired temperature setting and the heater should turn on.
5. If thermostat/CO detector does not work, turn off heater, loosen and disconnect the 5-pin connector.
6. Replace the thermostat/CO detector control device and repeat step 1 thru step 4.

WARNING

The following two tests, Smoke Test and Fuel Pressure Test, must be ONLY performed by a trained DHS Technician.

6.3 Smoke Test

1. Refer to Chapter 4 for start up procedures; operate heater for five minutes or until combustion chamber is hot.
2. Loosen knurled knob clamp on tester as shown in Figure 6-1.
3. Using a piece of filter paper (included with Smoke Tester), insert the filter paper strip in slot and tighten knurled knob clamp.
4. Insert sampling tube into the exhaust stack.
5. Pull the tester handle through 10 full strokes.
6. Remove sampling tube from the exhaust stack and secure in holder on smoke tester.
7. Loosen knurled knob clamp and remove filter paper. Refer to Table 6-1 for smoke spot color test.
8. Take additional samples, if necessary, insert the same filter paper strip into slot.
9. Position filter paper in slot not to cover the previous smoke spot so that the previous spot is visible outside the slot.
10. Repeat steps 4, 5, 6, and 7 above.

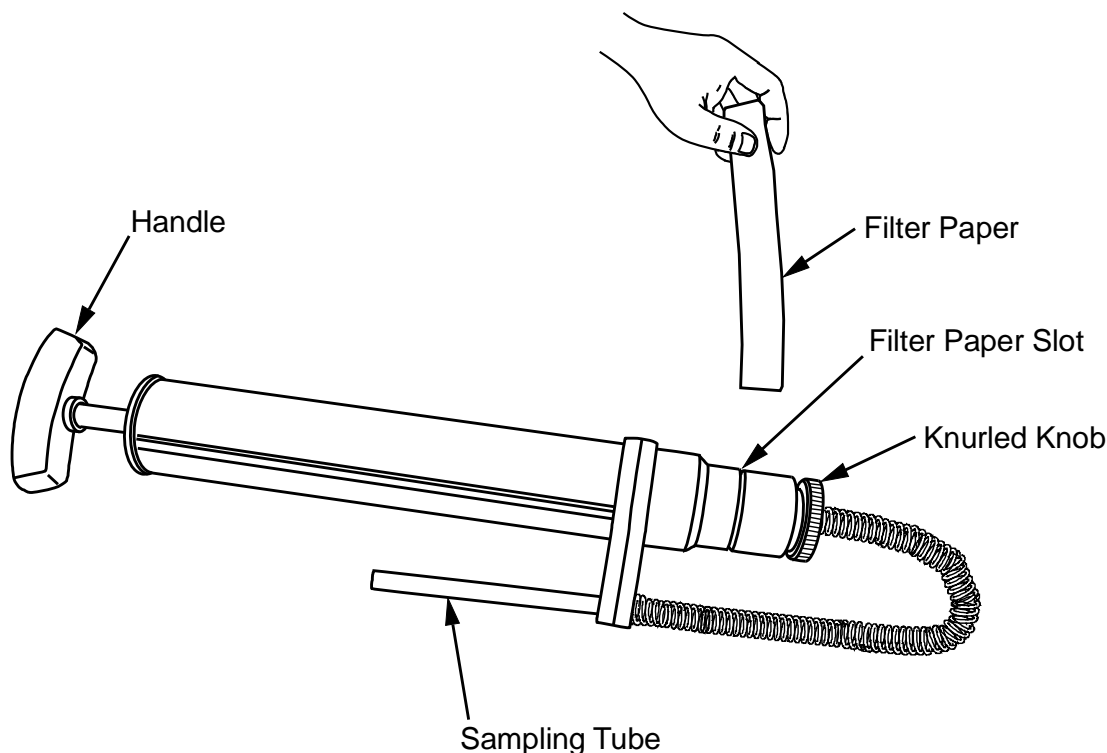


Figure 6-1 - Smoke Tester

Table 6-1 - Smoke Spot

SMOKE SPOT COLOR	CAUSE
Light Gray Smoke	Good – no adjustment required
Yellow or Blue Smoke	Contaminated or Bad Fuel
White Smoke	Excessive Air Flow; No or Low Fuel Pressure, Low Fuel
Black Smoke	(Excessive) Fuel Pressure too High or Restrictive Air Flow (Lack of Air)

6.4 Fuel Pressure Test

1. Refer to Section 5.4.1 to gain internal access to the Fuel Pump.
2. Remove six screws (79) and remove the upper heat shield (05).
3. Using a 7mm Allen wrench, remove screw plug labeled “P” on the side of the fuel pump (70).
4. Attach a M10 MNPT elbow into labeled “P” port on the side of the fuel pump (70) as shown in Figure 6-2.
5. Attach hose from the Pressure Gauge to the quick disconnect end of elbow.
6. Push down on the black tab and insert hose; pull on hose to ensure that it is properly seated.
7. Turn heater on; normal operating pressure is 170 psi, verify the pressure gauge reads 170 psi.
8. If necessary fuel pressure may be adjusted.
9. Using a 7mm Allen wrench, adjust the “V” labeled screw plug clockwise to increase the fuel pressure or counter-clockwise to decrease the fuel pressure. (See Figure 6-2).

NOTE

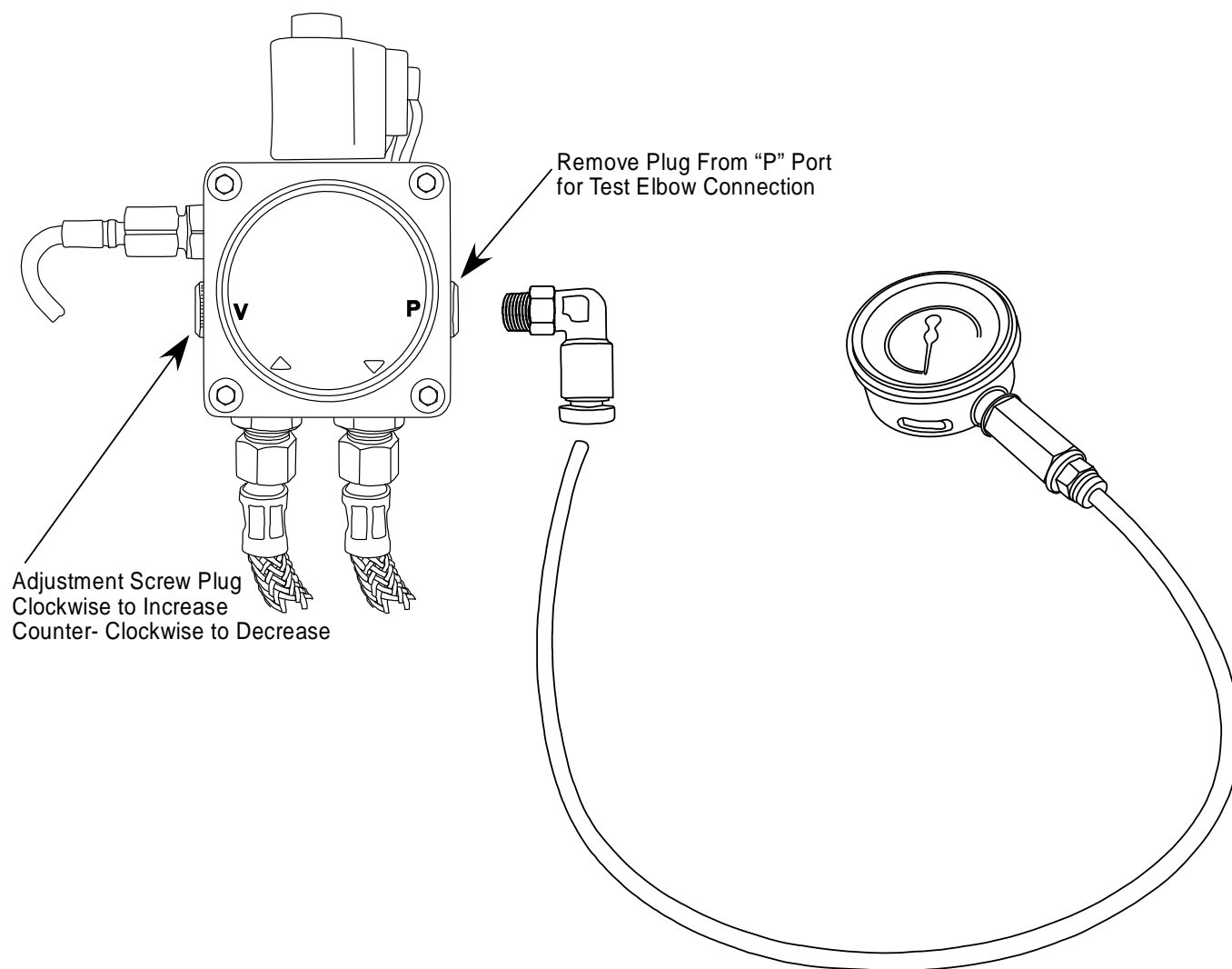
Always start adjustments low and then increase

10. Disconnect pressure gauge hose by pushing down on the black tab at the M10 MNPT elbow and pulling hose out. There may be pressure and or fuel still in the hose; use caution and have a rag or container to collect fuel.

CAUTION

Pressure gauge and hose may be under pressure. Use caution when depressing black tab and removing hose

11. Loosen and remove the M10 MNPT elbow from fuel pump (70).
12. Using a 7mm Allen wrench, reinstall the screw plug into the "P" labeled port on the side of the fuel pump (70).
13. Wipe up any spilled fuel.
14. Install the upper heat shield (05).
15. Install and tighten six screws (79) to secure the upper heat shield (5).
16. Reinstall top cover and four quick release pins.
17. Test heater in accordance with operations manual (see section 6-1) and check for leaks.

**Figure 6-2 - Pressure Gauge Tester**

7. TROUBLESHOOTING

7.1 General

This section provides a systematic approach to locating and correcting malfunctions of the D-1000B heater.

The section is arranged according to the symptoms of the problem. The steps have been arranged to perform the easiest checks first and to prevent further damage when trouble shooting a disabled unit.

The first and perhaps most important step of troubleshooting should be gather as much information as is possible from the person/s that may have been present when failure occurred. Information, such as how long the unit has been operating for, weather conditions and if any protective equipment or device malfunctioned, can help isolate the problem.

WARNING!

Tools, equipment, clothing and your body must stay clear of rotating parts and electrical connectors.

WARNING!

Use special caution when troubleshooting; protective covers and safety devices may be removed or disabled for accessing and performing tests.

WARNING!

Be careful, serious personal injury or death can result from these hazards. Consult qualified personnel with any questions.

7.2 D-1000B Heater

<i>SYMPTOM / FAULT</i>	<i>CAUSE</i>	<i>CORRECTIVE ACTION</i>
• Motor does not start, no ignition	• No electrical power, heater not plugged in.	• Check power source.
		• Connect heater to 120V, 60Hz grounded power supply
		• Check proper positioning and functioning of power switch
		• Check fuse
	• Wrong setting of room thermostat or other control	• Check correct setting of heater control. If using thermostat, make sure selected temperature is higher than room temperature
	• Thermostat or other control defective	• Replace control device
	• Electrical motor defective	• Replace electrical motor
	• Electrical motor bearings defective	
	• Burned out condenser	• Replace condenser

SYMPTOM / FAULT	CAUSE	CORRECTIVE ACTION
• Motor starts, no ignition or cuts out	• Ignition Control Assembly defective	• Check connection of H.T. Ignition Cables to electrodes
		• Check electrodes setting
		• Check electrodes for cleanliness
		• Replace Ignition Control Assembly
	• Pressure Switch defective	• Replace Pressure Switch
	• Photocell defective	• Clean or replace Photocell
	• Not enough or no fuel at all at burner	• Check condition of Electric Motor-Fuel Pump plastic coupling
		• Check fuel line system including fuel filter for possible leaks
		• Clean or replace fuel filter
		• Clean or replace fuel nozzle
	• Solenoid defective	• Check electrical connection
		• Replace solenoid
• Motor starts, heater emits smoke	• Not enough combustion air	• Make sure air inlet and outlet are free of debris
		• Check setting of combustion air flap
		• Clean burner flange
	• Too much combustion air	• Check setting of combustion air flap
	• Fuel contaminated	• Drain and flush fuel tank with clean fuel

8. ILLUSTRATED PARTS BREAKDOWN

8.1 D-1000B Heater Exploded Detail

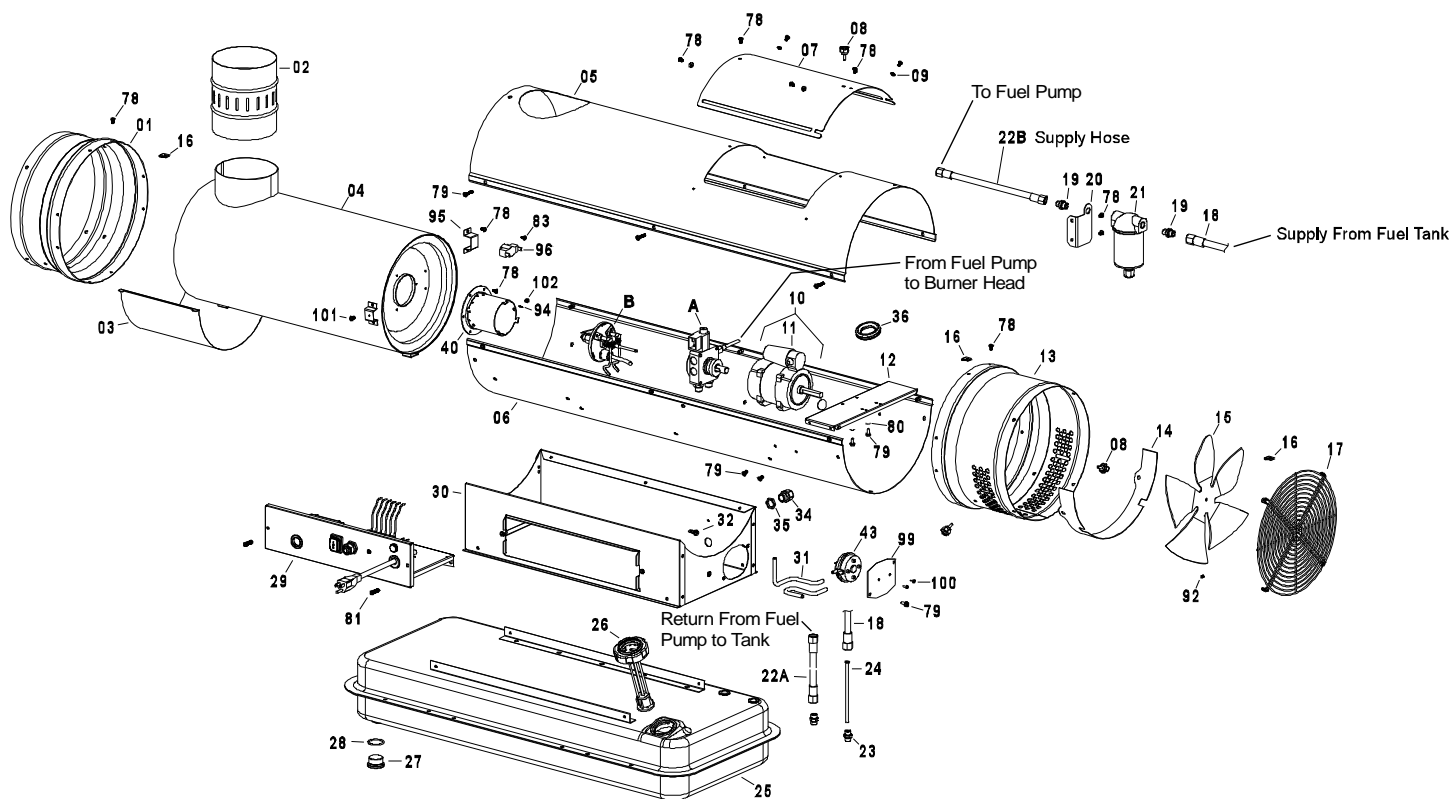


Figure 8-1 - D-1000B Heater Detail

8.2 Burner Head and Nozzle Assembly Exploded View

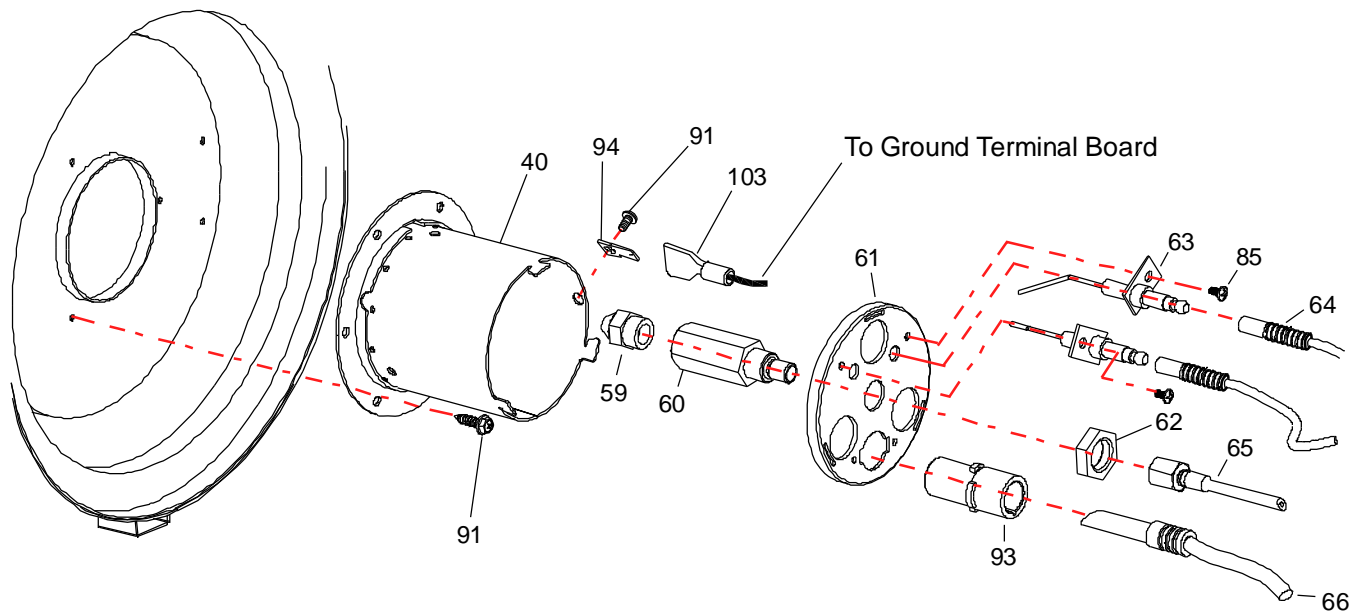


Figure 8-2 – Burner Head and Nozzle Assembly Detail

8.3 Fuel Pump Assembly Exploded View

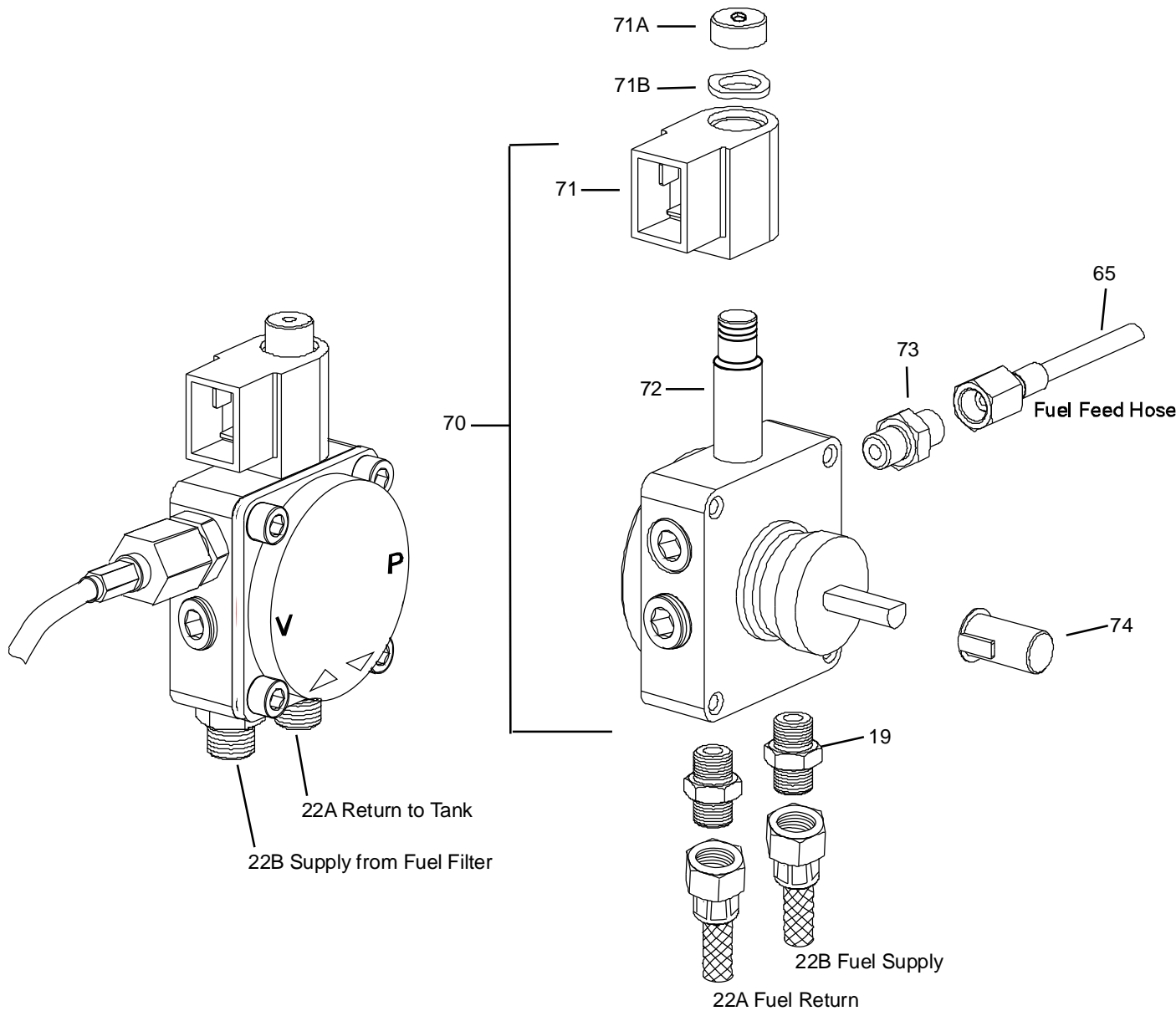


Figure 8-3 – Fuel Pump Assembly Detail

8.4 Pre-Heated Fuel Filter Exploded View

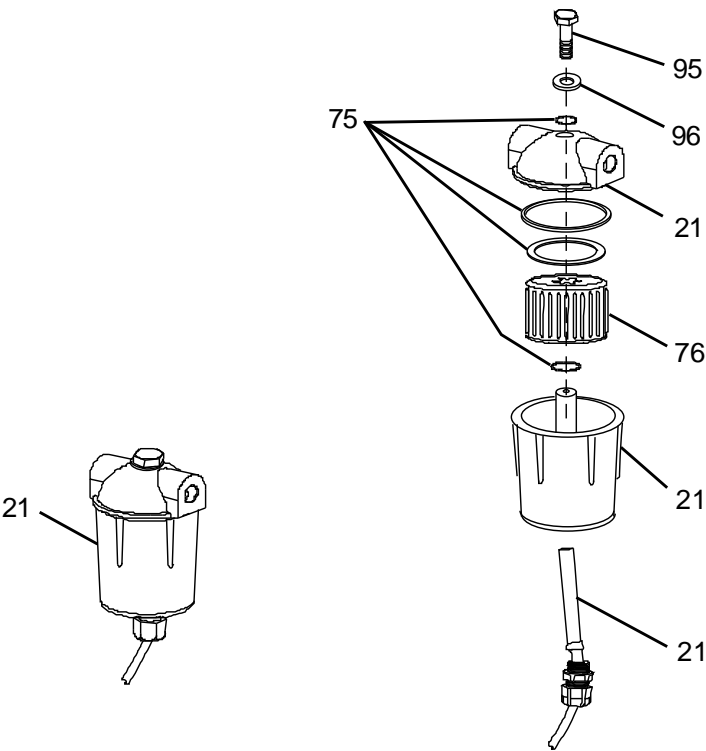


Figure 8-4 – Pre-Heated Fuel Filter Assembly Detail

8.5 Control Panel Assembly Exploded View

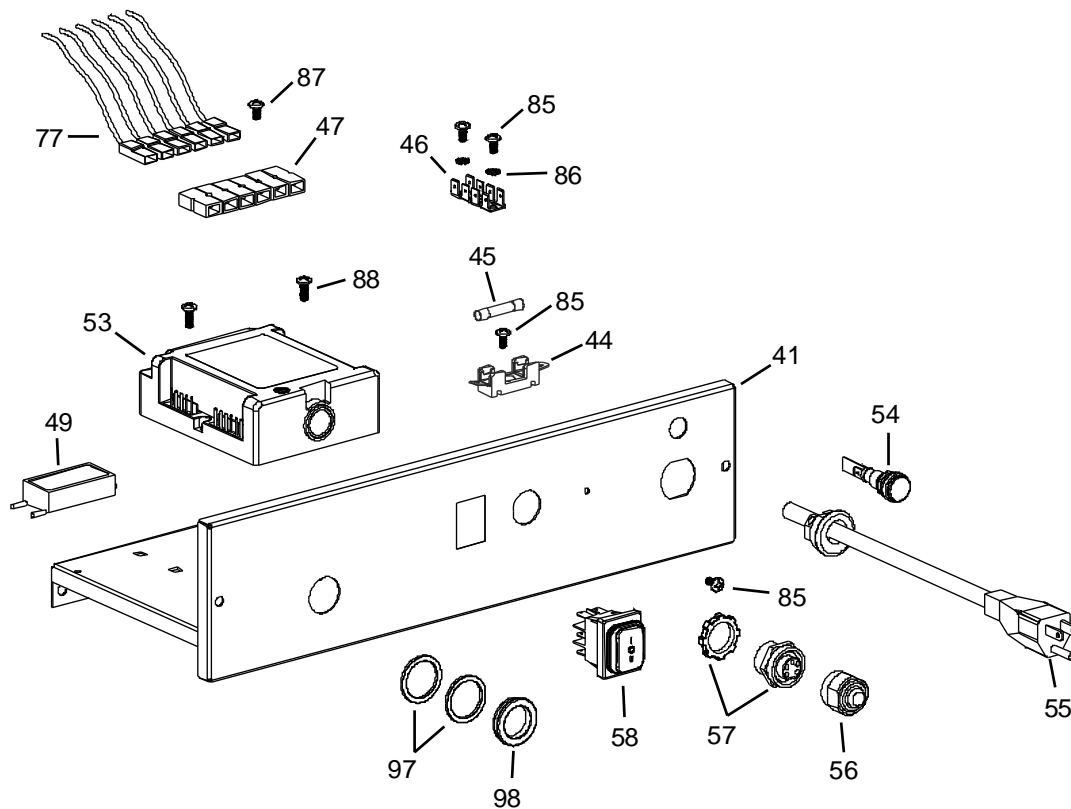


Figure 8-5 – Control Panel Assembly Detail

8.6 Parts List for Exploded View of D-1000B Heater

Table 8-6 – Parts List

ITEM	DHS PN	DHS PART DESCRIPTION	Qty.
1	1003778	Outlet Duct	1
2	1003779	Stack, Exhaust	1
3	1003780	Support, Combustion Chamber	1
4	1003781	Chamber, Combustion	1
5	1003782	Shield, Upper Heat	1
6	1008415	Shield, Lower Heat, Rev B	1
7	1003785	Cover, Access	1
8	1003786	Knob, Thumb Screw M5x15mm	3
9	1003787	Bushing	4
10	1003788	Motor 200W	1
11	1003789	Condenser 20 μ F	1
12	1008416	Plate, Motor Assembly, Rev B	1
13	1003784	Inlet Duct	1
14	1003791	Shutter, Fresh Air	1
15	1003792	Fan	1
16	1003793	Nut, U-Style, Clip-On	8
17	1003794	Grill, Inlet Duct	1
18	1008417	Hose, Braided, 10"L, 1/4" female end	1
19	1003796	Fitting, Nipple Hex, 1/4" NPT	4
20	1003797	Bracket, Fuel Filter	1
21	1003798	Filter, Fuel (Pre-heated)	1
22	1003799	Hose, Braided, 17"L, 1/4" female end	2
23	1003800	Fitting, Nipple Hex, 1/4"M - M12 x 1.75mm	2
24	1003801	Tube, Fuel, 6"L	1
25	1003802	Tank, Fuel 10.8 Gal	1

Parts List for Exploded View of D-1000B Heater Continued:**Table 8-6 – Parts List (Cont)**

ITEM	DHS PN	DHS PART DESCRIPTION	Qty.
26	1003803	Cap, Fuel w/level indicator	1
27	1008418	Plug, Drain M16 x 1.5	1
28	1008419	O-ring Ø16mm x 2,62mm	1
29	1008420	Assembly, Panel Control, Rev B	1
30	1008421	Base, Rev B	1
31	1003808	Tube, Silicone Ø5x900mm	2
32	1008422	Fitting, Connector Straight, 1/8" NPT	1
34	1003811	Holder, Power Cord	1
35	1003812	Nut, Ring for Power Cord	1
36	1003813	Grommet, Rubber Ø35mm	1
40	1008423	Head, Combustion	1
41	1008424	Panel, Control, Rev B	1
42	1003819	Bracket for pressure switch	1
43	1008425	Switch, Pressure	1
44	1003821	Holder, Fuse	1
45	1003822	Fuse (6x30)10A	1
46	1003823	Terminal block	1
47	1003824	Terminal block	1
49	1003826	Transformer ASTRODYNE	1
53	1008426	Assembly, Ignition Control	1

Parts List for Exploded View of D-1000B Heater Continued:**Table 8-6 – Parts List (Cont)**

ITEM	DHS PN	DHS PART DESCRIPTION	Qty.
54	1003831	Light, Power Indicating	1
55	1003832	Cord, Power	1
56	1003833	Cap, w/lanyard	1
57	1003834	Plug, Thermostat (remote)	1
58	1003835	Switch, Power, 3-Position	1
59	1008427	Nozzle 0.55GPH 80°B	1
60	1003837	Holder, Nozzle	1
61	1008428	Flange, Burner, 80mm	1
62	1003839	Nut M14	1
63	1003840	Electrode	2
64	1008429	Cable, Ignition	2
65	1003842	Tube, Micro Fuel	1
66	1008430	Detector, Flame, FC13	1
70	1003847	Pump, Fuel BFP01	1
71	1003848	Coil, Solenoid, BFP11-21	1
71A	Call DHS	(Specialty) Nut, Cap	1
71B	Call DHS	Washer, Wave (for Specialty Nut Cap)	1
72	1003849	Valve, Solenoid	1
73	1003850	Nipple, Hex	1
74	1003851	Coupler, Shaft	1
75	1003852	Kit, O'-Ring, Fuel Filter	1
76	1003853	Filter, Fuel Cartridge	1
77	1008431	Cable, Heater, Wire Harness	1

Parts List for Exploded View of D-1000B Heater Continued:**Table 8-6 – Parts List (Cont)**

ITEM	DHS PN	DHS PART DESCRIPTION	Qty.
78	T270040	Screw, Hex Hd w/Washer, Tapping #10 x ½"L, 18-8 SS	18
79	1004133	Screw, Cap Flange Hex Hd, M5 x 14mm	8
80	1004134	Washer, Spring 5mm, Zinc Plated	2
81	1004135	Screw, Mach Phil Pan Hd, M5 x 20mm	2
83	1004138	Screw, Self-Tap Phil Pan Hd, M4 x 9mm	6
85	1004140	Screw, Tapping Phil Pan Hd, #8 x 3/8"	9
86	1004141	Washer, Tooth Lock, 5mm Zinc Plated	2
87	1004142	Screw, Tapping Phil Pan Hd, #4 x ½"L	1
88	1008432	Screw, Tapping Phil Pan Hd, #8 x ½"L	2
92	1004147	Screw, Set Socket Standard M8 x 8mm	1
93	1008433	Holder, Flame Detector	1
94	1008434	Board, Terminal	1
95	1008435	Bracket, Safety Overheat Switch	1
96	1008436	Switch, Safety Overheat	1
97	1008437	Washer, 23mm ID x 29.5mm OD x 2mm	2
98	1008438	Protection, Reset Button	1
99	1008439	Bracket, Pressure Switch	1
100	1008440	Screw, Tap Phil Pan Head, #6 x 3/8"	2
101	1008441	Screw, Self-tap Pan Head, M4 x 8 x 13mm	3
102	1008442	Screw, Self-tap Pan Head, M4 x 8mm	3
103	T260024	Ground Wire, 16 AWG, 30"L (Burner Flange to Ctrl Panel)	1

8.7 Heater Sub-Assembly, Skid Body and Heater

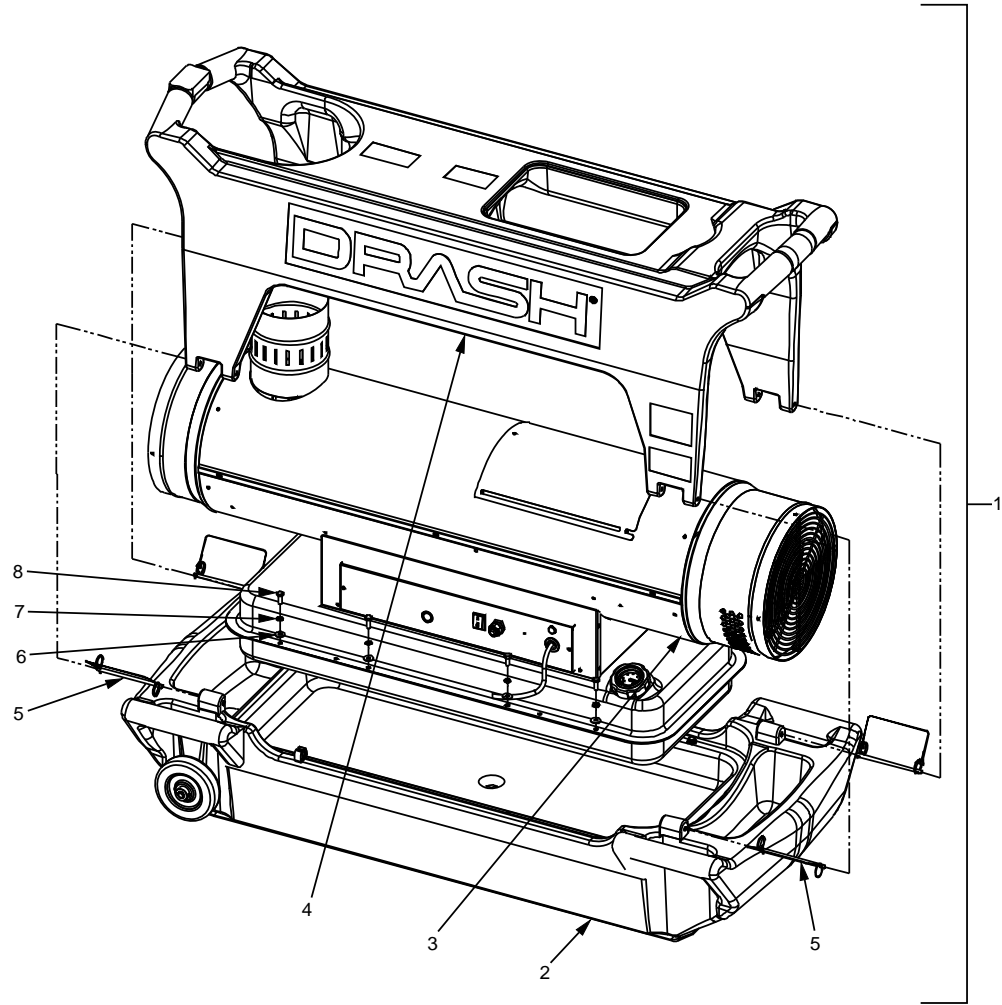


Figure 8-7 – Heater, Skid Body and Heater Sub-Assembly Detail

ITEM	DHS PN	DHS PART DESCRIPTION	Qty.
1	1002814	Heater, D-1000B, BTU 100,000	1
2	1002815	Skid Body Assembly, Heater, D-1000B	1
3	1002774	Heater, D-1000B, BM2	1
4	1002777	Cover, Top, Heater D-1000B	1
5	1002806	Pin, Quick Release, 6"L	4
6	RD300145	Washer, Flat, ¼", 18-8 SS	8
7	RD300495	Washer, Lock, ¼", 18-8 SS	8
8	RD300150	Bolt, Hex Hd, ¼"-20 x ¾"L, 18-8 SS	8

8.8 Skid Body Assembly, Heater D-1000B

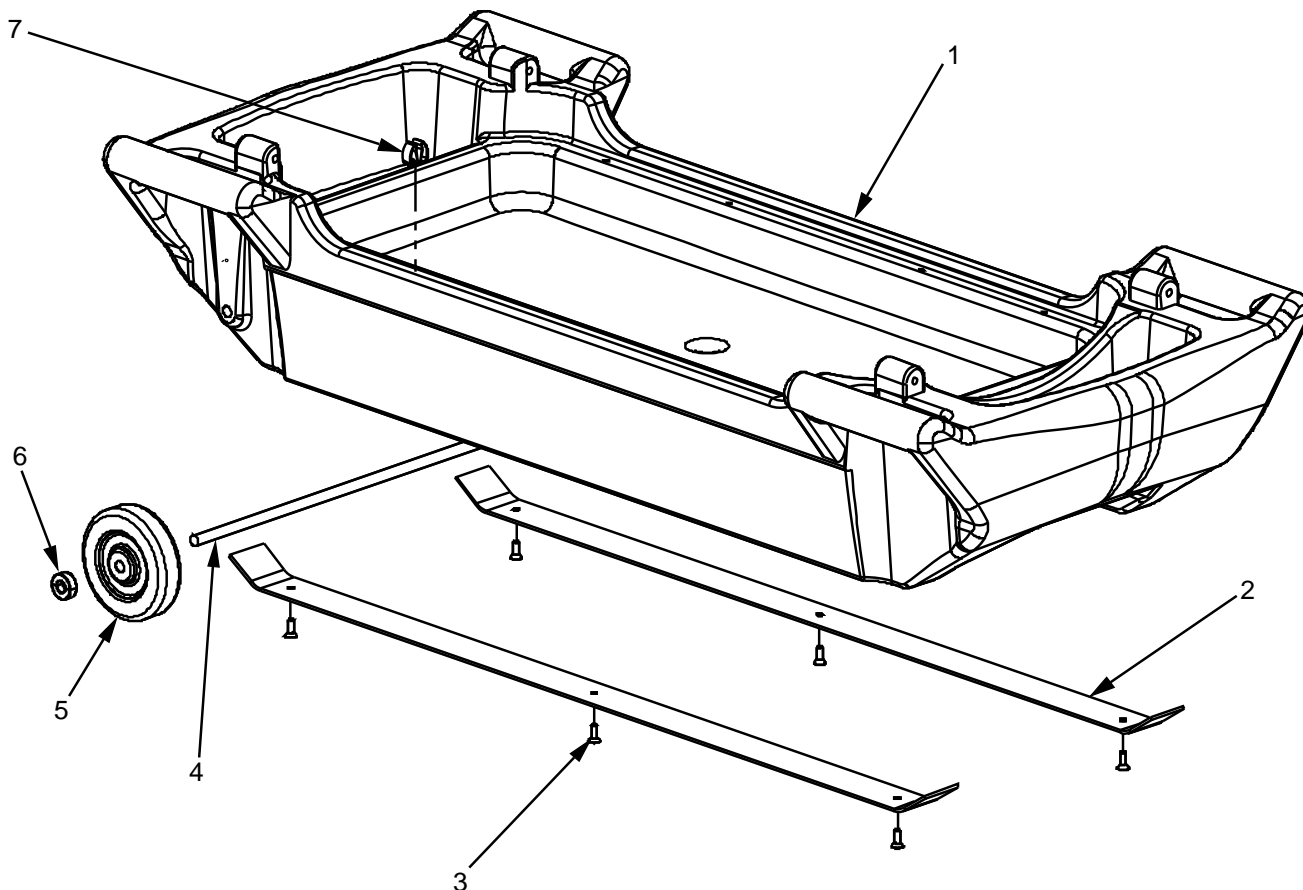


Figure 8-8 – Skid-Body Assembly Detail

ITEM	DHS PN	DHS PART DESCRIPTION	Qty.
1	1002778	Base, Heater D-1000B, Plastic	1
2	1002807	Strip, Wear, Alum, 2 " Wide x 42.5" Long	2
3	1004781	Screw, Cap Flat Hd, ¼"-20 x ¾"L, 18-8 SS	6
4	1002808	Rod, Carbon Steel, ½"OD x 20-1/2"L	1
5	H100088	Wheel, 0.5"dia	2
6	1004785	Collar, Shaft, ½", 1-1/8"dia, Clamp-On	2
7	T230909	Clip, Spring Vinyl Coating	1

8.9 D-1000B Heater Accessories

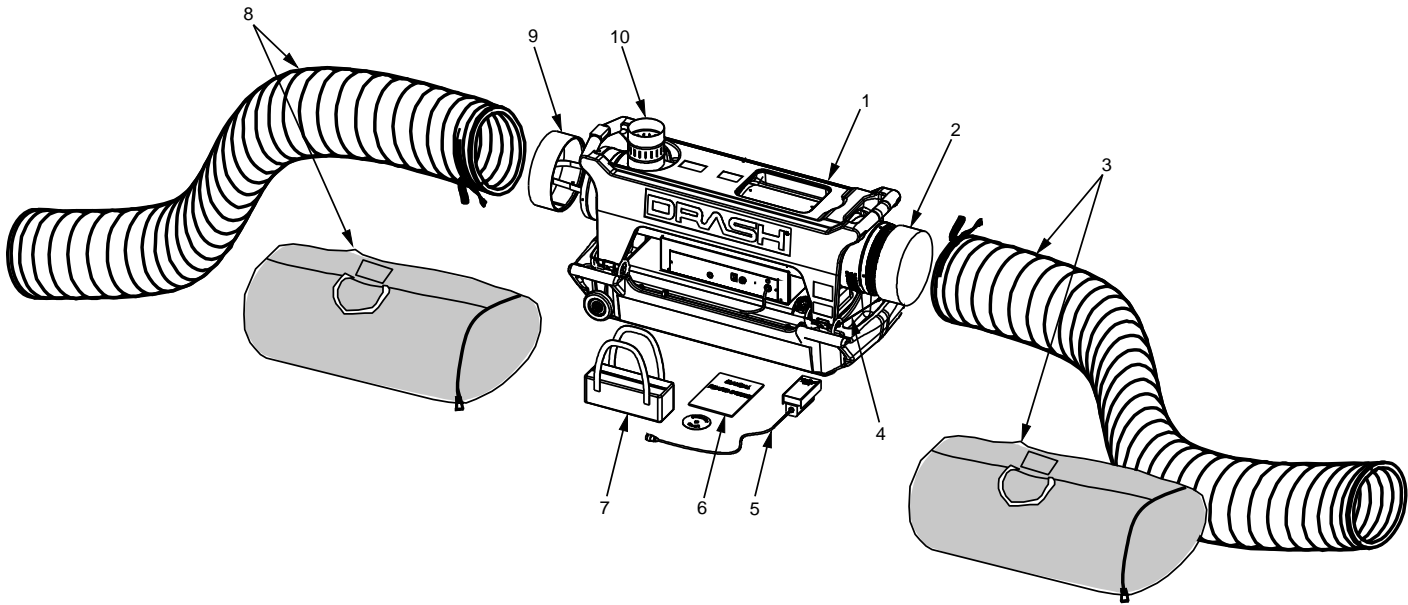


Figure 8-9 – Heater Accessories Details

ITEM	DHS PN	DHS PART DESCRIPTION	Qty.
1	1003581	Heater Sub Assembly, Skid Body & Heater	1
2	T295157G	Cap, Duct, 12.5" dia, Fabric, Green	1
3	H100224	Duct Assembly, Heater Return, 12" dia x 15' L, (Includes Bag)	1
4	T270921	Lanyard, Nylon, Eye/Loop, 8" x 4", Black	2
5	1002812	Thermostat / CO Detector, Remote	1
6	1006395	Operations and Maintenance Manual	1
7	1002816	Accessory Bag	1
8	H100223	Duct Assembly, Insulated, Heater Supply, 12" dia x 15' L, (Includes Bag)	1
9	1004241	Cap, Duct with Strap, 12.5" dia, Fabric, Green	1
10	1003779	Exhaust Stack	1

8.10 Wiring Schematic

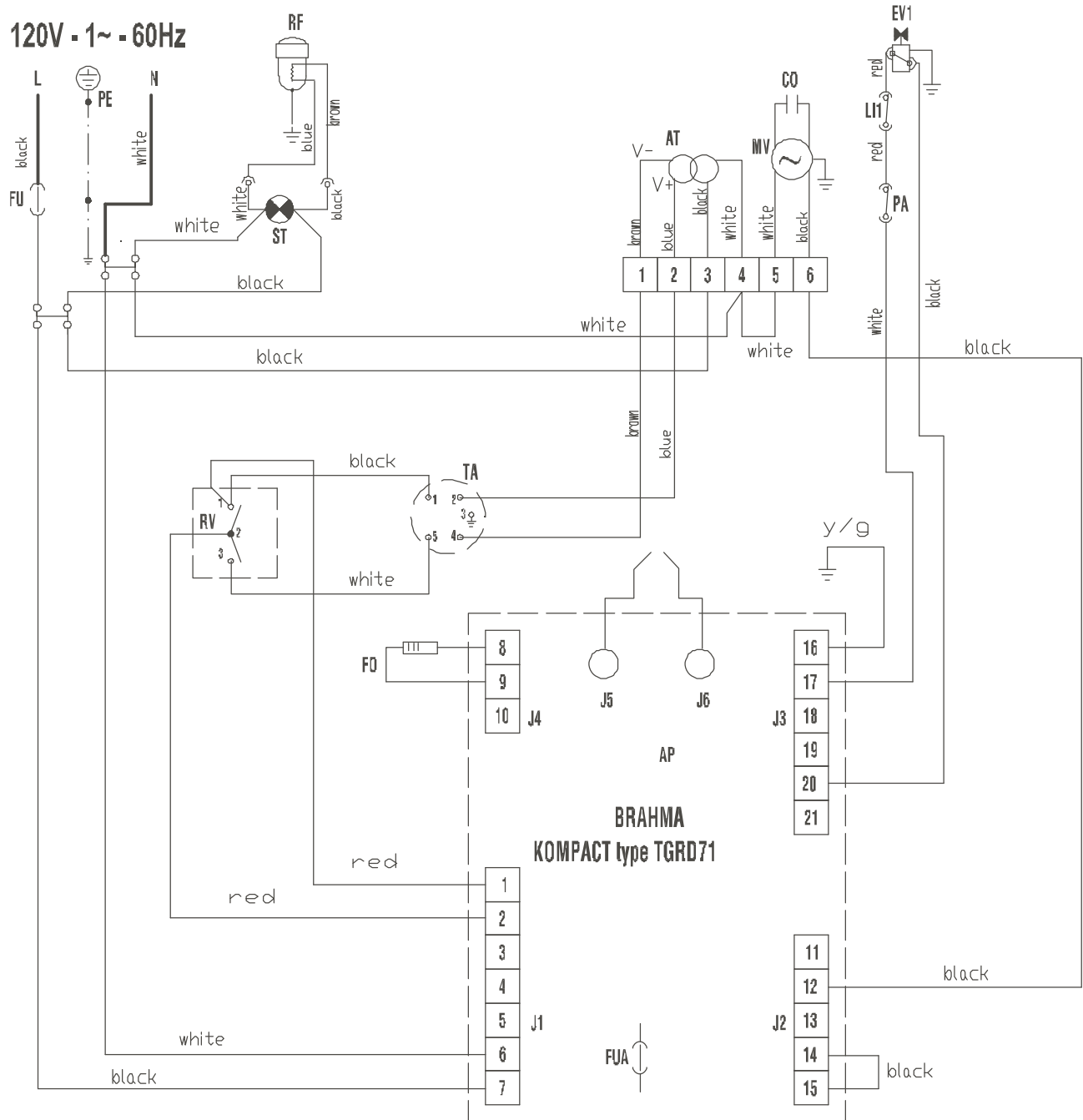


Figure 8-10 – Wiring Schematic

Wiring Schematic (Cont)**Table 8-10 – Wiring Schematic Key**

KEY	CODE
AP	Control Box
TA	Room Thermostat Plug
ST	Electric Pilot Lamp
FU	Fuse
LM	Overheat Thermostat
EV1	Solenoid Valve
RV	Control
IT	Transformer H.V.
FO	Photocell
CO	Condenser
MV	Fan Motor
FUA	Fuse
AT	Transformer
PA	Air Pressure Switch

9. WARRANTY

DHS SYSTEMS LLC LIMITED WARRANTY

DHS Systems LLC provides a limited warranty that all DRASH® (Deployable Rapid Assembly Shelter) products shall be free from defects in materials and workmanship for the period of time shown in the Warranty Schedule below. This warranty shall protect the original purchaser and shall inure to the benefit of any additional end users of the product, but in no event shall the warranty extend for a period of time in excess of that shown in the Warranty Schedule shown below.

WARRANTY SCHEDULE

DRASH Shelters and Shelter Accessories: 60 Months

DRASH UST Trailers and Trailer Accessories: 12 Months

DRASH Heaters and Heater Accessories: 12 Months

DRASH Power Distribution Unit (PDU): 12 Months

The warranty period reflected in the above Warranty Schedule shall begin on the date of original shipment to the original purchaser.

The liability of DHS Systems LLC hereunder is limited to the labor and parts required to repair or replace any defective part or other covered defect in material or workmanship.

Damage due to excessive wear and tear, improper use or carelessness is not covered under this limited warranty. Any attempt to repair a defect by a party not authorized by DHS Systems LLC may void this warranty.

This warranty is contingent upon a) proper operation of the products in accordance with the operating instructions provided and b) proper maintenance and care of the equipment in accordance with the operating instructions provided.

Warranty claims must contain a detailed explanation of the defect and be supported by summary extracts of pertinent service and maintenance records, if applicable. DHS Systems LLC shall have the right to examine the alleged defect and may require the claimant at the claimant's expense, to return the product for such an examination, if practicable. In the event the claim is validated, claimant shall be reimbursed for the cost of shipping the product to DHS Systems LLC. If DHS Systems LLC personnel are required to visit the claimant's site to validate and claim and such claim is not validated, all expenses for travel and accommodations will be charged to the claimant.

Any warranty claims must be filed with DHS Systems LLC within 90 days after the alleged defect has first been identified. All claims must be mailed or faxed to the following:

*DHS SYSTEM LLC
33 Kings Highway
Orangeburg, NY 10962-1802
Attn: Customer Service, Logistics
Phone: 800-977-3647 Fax: 845-365-2114 Email: drash@drash.com*

This warranty is the sole warranty provided for the products listed herein. DHS Systems LLC provides no other express or implied warranty with respect to these products (including but not limited to no implied warranty of merchantability or fitness for a particular purpose).

9.1 Equipment and/or Documentation Feedback Form

RECOMMENDED CHANGE(S) EQUIPMENT / MANUAL

FROM: (PRINT YOUR UNIT'S CORRECT ADDRESS)				DATE SUBMITTED:
PUBLICATION TITLE OPERATIONS AND MAINTENANCE MANUAL for the DRASH D-1000B HEATER				PUBLICATION DATE 01 APRIL 2010
DRASH D-1000B Heater Serial Number			MANUAL P/N: 1006395	
BE EXACT PIN-POINT WHERE IT IS				USE THIS SPACE TO DESCRIBE WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:
PAGE NO	PARAGRAPH	FIGURE NO	TABLE NO	
PRINTED NAME, GRADE OR TITLE, PHONE NUMBER, AND EMAIL ADDRESS				SIGN HERE

(fold)

Return Address:

Place
Stamp
Here

DHS Logistics
33 Kings Highway
Orangeburg, New York 10962

(fold)