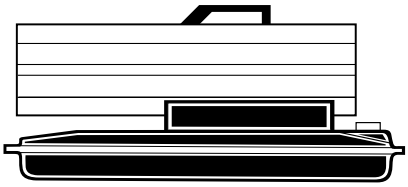
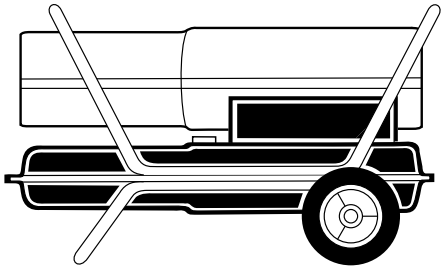
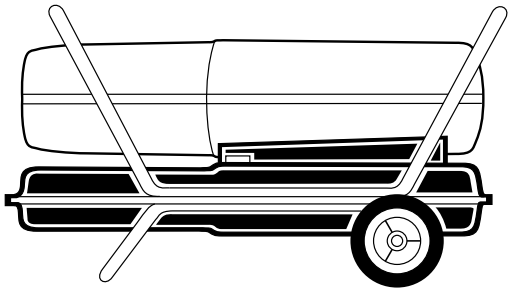
MASTER®

PORTABLE FORCED AIR HEATERS

OWNER'S MANUAL







Heater Sizes: 30,000 70,000 90,000 150,000 BTU/Hr

IMPORTANT

Read and understand this manual before assembling, starting or servicing heater. Improper use of heater can cause serious injury. Keep this manual for future reference.

CONTENTS

SAFETY INFORMATION

⚠ WARNINGS

IMPORTANT: Read this owner's manual carefully and completely before trying to assemble, operate, or service this heater. Improper use of this heater can cause serious injury or death from burns, fire, explosion, electrical shock, and carbon monoxide poisoning.

⚠ DANGER

Carbon monoxide poisoning may lead to death!

Carbon Monoxide Poisoning: Early signs of carbon monoxide poisoning resemble the flu, with headaches, dizziness, or nausea. If you have these signs, the heater may not be working properly. **Get fresh air at once!** Have heater serviced. Some people are more affected by carbon monoxide than others. These include pregnant women, persons with heart or lung disease or anemia, those under the influence of alcohol, and those at high altitudes.

Make certain you read and understand all warnings. Keep this manual for reference. It is your guide to safe and proper operation of this heater.

- Use only kerosene or No. 1 fuel oil to avoid risk of fire or explosion. Never use gasoline, naphtha, paint thinners, alcohol, or other highly flammable fuels.
- Never use heater where gasoline, paint thinner, or other highly flammable vapors are present.
- Follow all local ordinances and codes when using heater.
- Use only in well-vented areas. Provide at least a three-square foot (2800 square cm) opening of fresh, outside air for each 100,000 BTU/Hr of rating.
- Use only in places free of flammable vapors or high dust content.
- Use only with the electrical voltage and frequency specified on model plate.
- Use only a three-prong, grounded (earthed) extension cord.
- Minimum heater clearances from combustibles:
  Outlet: 8 Ft. (250 cm) Sides, Top, and Rear: 4 Ft. (125 cm)
- Locate heater on a stable and level surface while hot or running or a fire may occur.
- When moving or storing heater, keep heater in a level position or fuel spillage may occur.
- Keep children and animals away from heater.
- Unplug heater when not in use.
- When used with thermostat, heater may start anytime.
- Never use heater in living or sleeping areas.
- Never block air inlet (rear) or air outlet (front) of heater.
- Never move, handle, refuel, or service a hot, operating, or plugged-in heater.
- Never attach duct work to front or rear of heater.

PRODUCT IDENTIFICATION

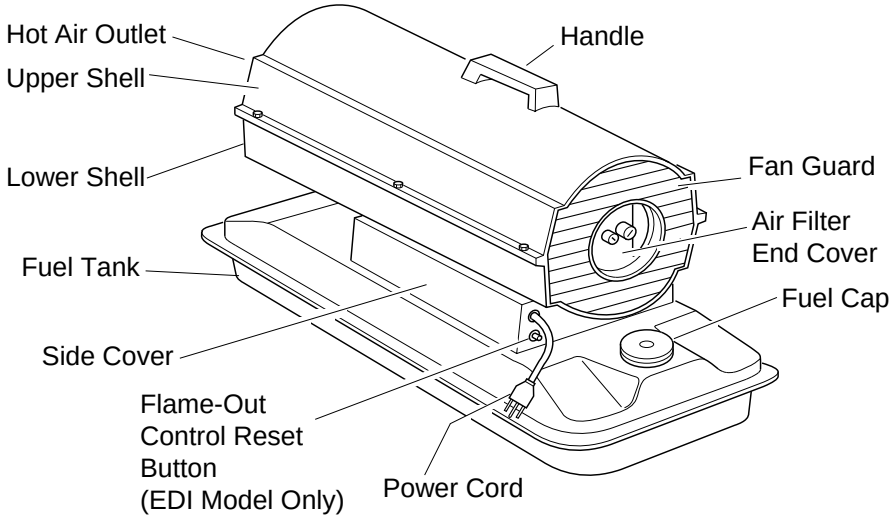


Figure 1 - 30/70,000 BTU/Hr Models

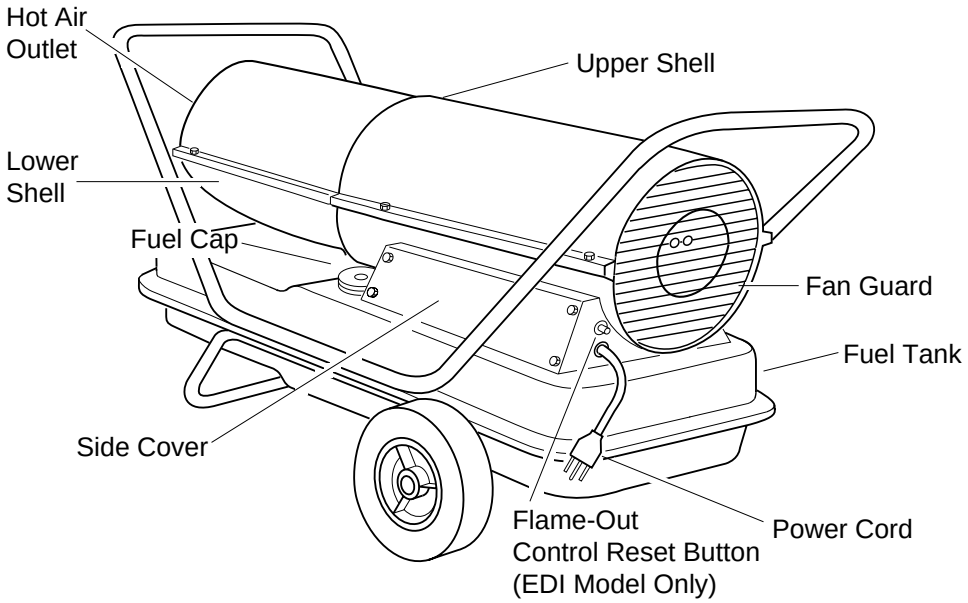


Figure 2 - 90,000 BTU/Hr Model

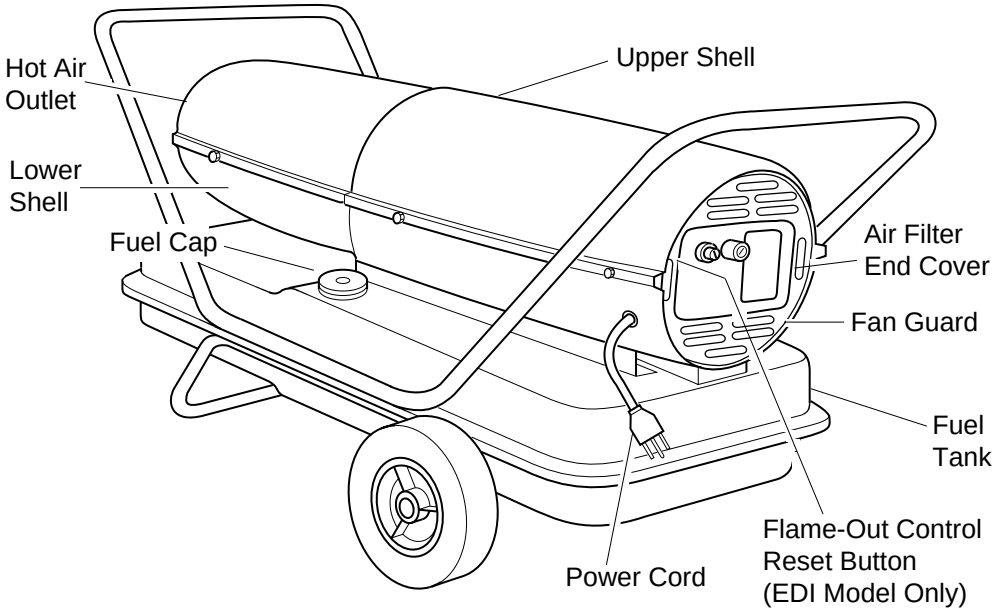


Figure 3 - 150,000 BTU/Hr Model

UNPACKING

1. Remove all packing items applied to heater for shipment.
2. Remove all items from carton.
3. Check items for any shipping damage. If heater is damaged, promptly inform dealer where you bought heater.

ASSEMBLY

(For 90,000 and 150,000 BTU/Hr Models Only)

These models are furnished with wheels and handles. Wheels, handles, and the mounting hardware are found in the shipping carton.

Tools Needed

- Medium Phillips Screwdriver
- 3/8" Open or Adjustable Wrench
- Hammer

1. Slide axle through wheel support frame. Install wheels on axle. *IMPORTANT:* When installing wheels, point extended hub of wheels toward wheel support frame (see Figure 4).
2. Place cap nuts on axle ends. Gently tap with hammer to secure.
3. Place heater on wheel support frame. Make sure air inlet end (rear) of heater is over wheels. Line up holes on fuel tank flange with holes on wheel support frame.
4. Place front handle and rear handle on top of fuel tank flange. Insert screws through handles, fuel tank flange, and wheel support frame. Attach nut finger tight after each screw is inserted.
5. After all screws are inserted, tighten nuts firmly.

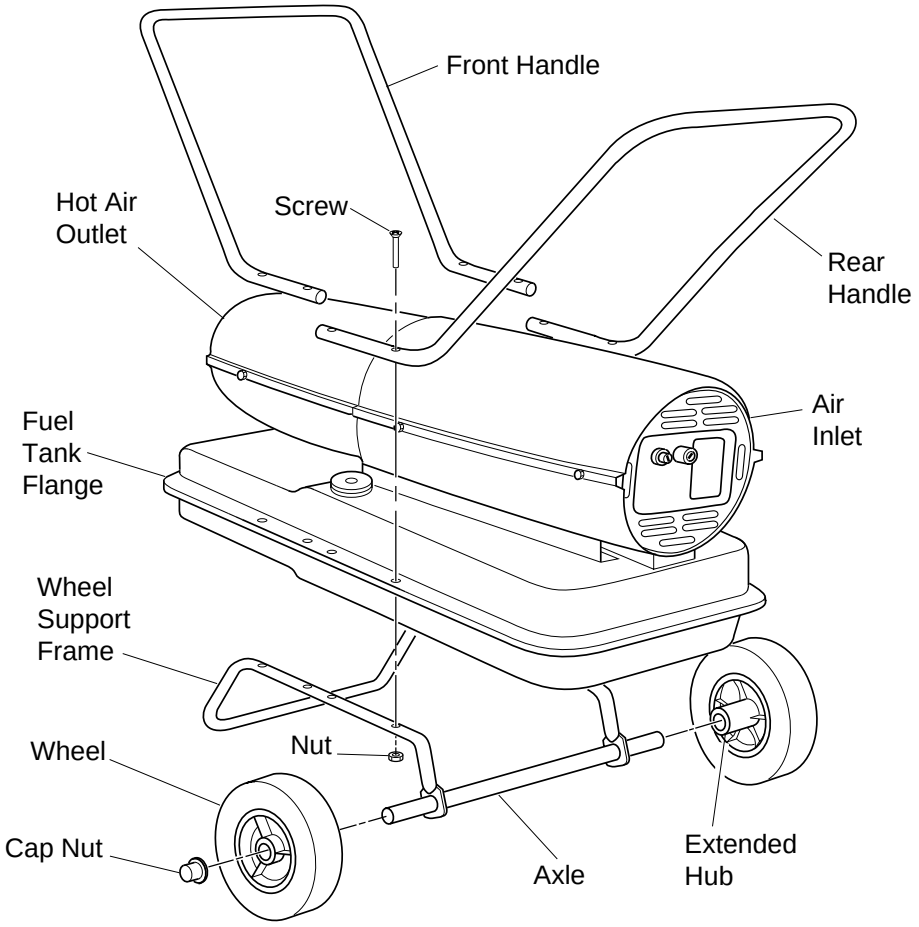


Figure 4 - Wheel and Handle Assembly, 90/150,000 BTU/Hr Models Only

THEORY OF OPERATION

The Fuel System: The air pump forces air through the air line. The air is then pushed through the burner head nozzle. This air causes fuel to lift from the tank. A fine mist of fuel is sprayed into the combustion chamber.

The Air System: The motor turns the fan. The fan pushes air into and around the combustion chamber. This air is heated and provides a stream of clean, hot air.

The Ignition System: The electronic ignitor sends voltage to the spark plug. The spark plug ignites the fuel and air mixture.

The Flame-Out Control System (EDI Models Only): This system causes the heater to shut down if the flame goes out.

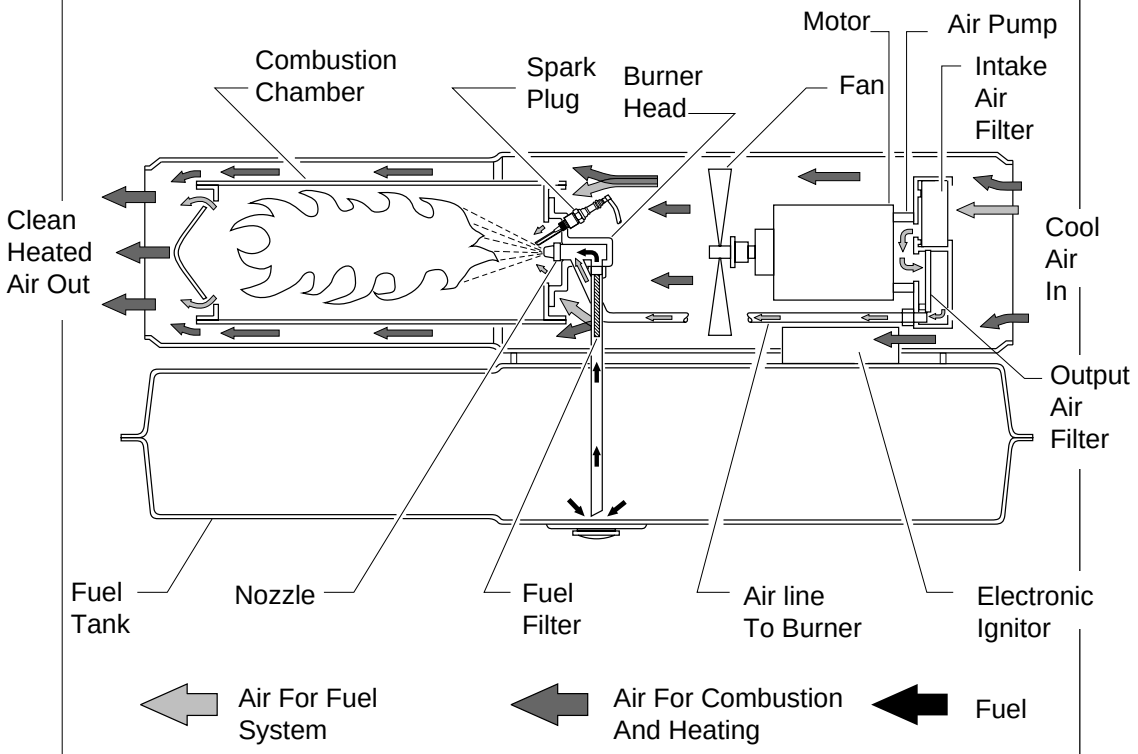


Figure 5 - Cross Section Operational View

FUELS

⚠ WARNING

Use only kerosene or No. 1 fuel oil to avoid risk of fire or explosion. Never use gasoline, naphtha, paint thinners, alcohol or other highly flammable fuels.

Do not use heavy fuels such as No. 2 fuel oil or No. 2 Diesel. Using heavy fuels will result in:

- clogged fuel filter and nozzle
- carbon build up on spark plug
- use of non-toxic anti-icer in fuel during very cold weather

IMPORTANT: Use a KEROSENE ONLY container. Be sure storage container is clean. Foreign matter such as rust, dirt, or water will cause the flame-out control to shut down heater (EDI models only). Foreign matter may also require you to clean fuel system often.

VENTILATION

⚠ WARNING

Follow the minimum fresh, outside air ventilation requirements. If proper fresh, outside air ventilation is not provided, carbon monoxide poisoning can occur. Provide proper fresh, outside air ventilation before running heater.

Provide a fresh air opening of at least three square feet (2800 square cm) for each 100,000 BTU/Hr rating. Provide extra fresh air if more heaters are being used.

Example: A 150,000 BTU/Hr heater requires one of the following:

- a two-car garage door raised six inches (15.24 cm)
- a single-car garage door raised nine inches (22.86 cm)
- two, thirty-inch (76.20 cm) windows raised twelve inches (30.48 cm)

OPERATION

⚠ WARNING

Review and understand the warnings in the Safety Information Section. They are needed to safely operate this heater. Follow all local codes when using this heater.

To Start Heater

1. Follow all ventilation and safety information.
2. Fill fuel tank with kerosene or No. 1 fuel oil.
3. Attach fuel cap.
4. Plug power cord of heater into standard 230 volt/50 hertz, grounded (earthed) outlet. Use an extension cord if needed. Use only a three-prong, grounded (earthed) extension cord.

   Extension Cord Wire Size Requirements

   Up to 100 feet (30.5 meters) long, use 16 AWG (1.0 mm^2) conductor
   101 to 200 feet (30.6 to 61 meters) long, use 14 AWG (1.5 mm^2) conductor

   Heater will start when power cord is plugged into outlet. If not, push in flame-out control reset button (EDI models only; see Figures 6 thru 8).

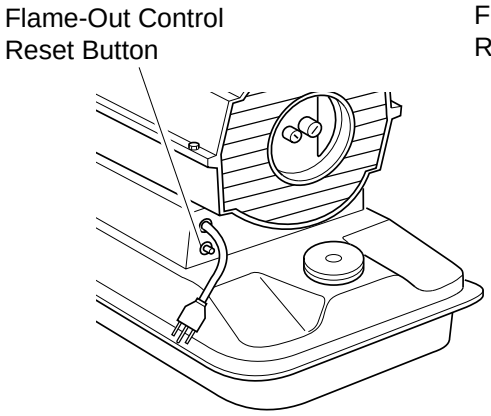


Figure 6 - Flame-Out Control Reset Button, 30/70,000 BTU/Hr EDI Models

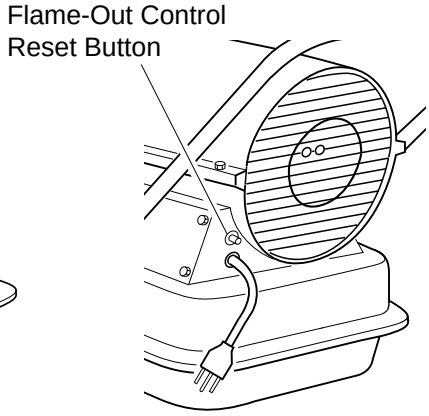


Figure 7 - Flame-Out Control Reset Button, 90,000 BTU/Hr EDI Model

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OPERATION
Continued

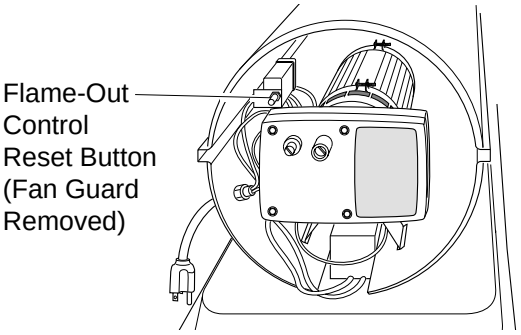


Figure 8 - Flame-Out Control Reset Button, 150,000 BTU/Hr EDI Model

To Stop Heater

1. Unplug power cord from outlet.

To Restart Heater

1. Wait 2 minutes after stopping heater.
2. Repeat steps under *To Start Heater*, page 7.

STORAGE

1. Drain fuel tank.
   Note: Some models have drain plug on underside of fuel tank. If so, remove drain plug to drain all fuel. If heater does not have drain plug, drain fuel through fuel cap opening. Be sure all fuel is removed.
2. Replace drain plug if used.
3. Add one gallon (4 liters) of clean kerosene to fuel tank.
4. Attach fuel cap.
5. Move heater forwards and backwards to stir fuel.
6. Remove fuel cap or drain plug and drain fuel tank. Be sure all fuel is removed.
7. Replace fuel cap or drain plug. Properly dispose of old and dirty fuel.
8. Store heater in dry place. Make sure storage place is free of dust and corrosive fumes.

IMPORTANT: Do not store kerosene over summer months for use during next heating season. Using old fuel could damage heater.

PREVENTATIVE MAINTENANCE SCHEDULE

⚠ WARNING

Never service heater while it is plugged in, operating, or hot. Severe burns and electrical shock can occur.

Item	How Often	How To
Fuel tank	Flush every 150-200 hours of operation or as needed.	See *Storage* above.
Air output and lint filters	Replace every 500 hours of operation or once a year.	See *Air Output, Air Intake, and Lint Filters*, page 14.
Air intake filter	Wash and dry with soap and water every 500 hours of operation or as needed.	See *Air Output, Air Intake, and Lint Filters*, page 14.
Fuel filter	Clean twice a heating season or as needed.	See *Fuel Filter*, pages 10 and 11.

Continued

Continued

Item	How Often	How To
Spark plug	Clean and regap every 600 hours operation or replace as needed.	See *Spark Plug*, pages 12 and 13.
Fan blades	Clean every season or as needed.	See *Fan*, page 19.
Motor	Not required/permanently lubricated	

TROUBLE-SHOOTING

⚠ WARNING

Never service heater while it is plugged in, operating, or hot. Severe burns and electrical shock can occur.

OBSERVED FAULT	POSSIBLE CAUSE	REMEDY
Heater ignites, but flame-out control shuts off heater after a short period of time (EDI models only).	Wrong pump pressure	See *Pump Pressure Adjustment*, page 14.
	Dirty air output, air intake, and lint filters	See *Air Output, Air Intake and Lint Filters*, page 14.
	Dirty fuel filter	See *Fuel Filter*, pages 10 and 11.
	Dirt in nozzle	See *Nozzle*, pages 15 thru 17.
	Dirty photocell lens	Clean photocell lens.
	Bad flame-out control	Replace flame-out control.
Heater will not ignite, but motor runs for a short period of time.	Wrong pump pressure	See *Pump Pressure Adjustment*, page 14.
	Carbon deposits on spark plug and/or improper gap	See *Spark Plug*, pages 12 and 13.
	Dirty fuel filter	See *Fuel Filter*, pages 10 and 11.
	Dirt in nozzle	See *Nozzle*, pages 15 thru 17.
	Water in fuel tank	Drain and flush fuel tank with clean kerosene. See *Storage*, page 8.
	⚠ WARNING: High voltage!	
	Electronic ignitor not grounded (earthed)	Make sure electronic ignitor mounting is tight.
	Bad electronic ignitor	Replace electronic ignitor.
Motor does not start when heater is plugged in, fan rotates slowly or does not turn.	Flame-out control not reset (EDI models only)	Reset flame-out control button, see Figures 6 thru 8, pages 7 and 8.
	Binding pump rotor	If fan is hard to turn, see *Pump Rotor*, page 18.

SERVICE PROCEDURES

Upper Shell Removal

1. Remove screws along each side of heater using 5/16" nut-driver. These screws attach upper and lower shells together.
2. Lift upper shell off.
3. Remove fan guard.

⚠ WARNING

Never service heater while it is plugged in, operating, or hot. Severe burns and electrical shock can occur.

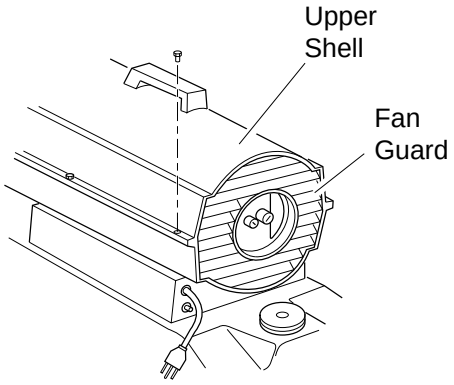


Figure 9 - Upper Shell Removal, 30/70,000 BTU/Hr Models

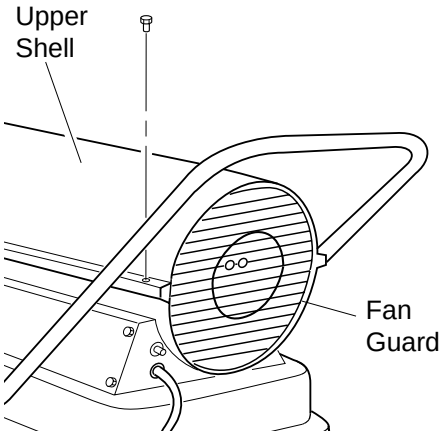


Figure 10 - Upper Shell Removal, 90,000 BTU/Hr Model

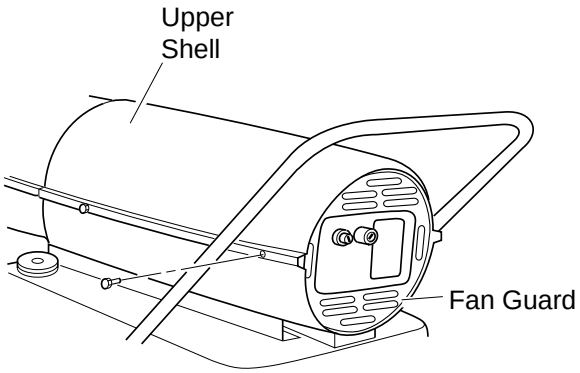


Figure 11 - Upper Shell Removal, 150,000 BTU/Hr Model

Fuel Filter

(30/70,000 BTU/Hr Models)

1. Remove side cover screws using 5/16" nut-driver.
2. Remove side cover.
3. Pull rubber fuel line off fuel filter neck.
4. Carefully pry bushing and fuel filter out of fuel tank.
5. Wash fuel filter with clean fuel and replace in tank.
6. Attach rubber fuel line to fuel filter neck.
7. Replace side cover.

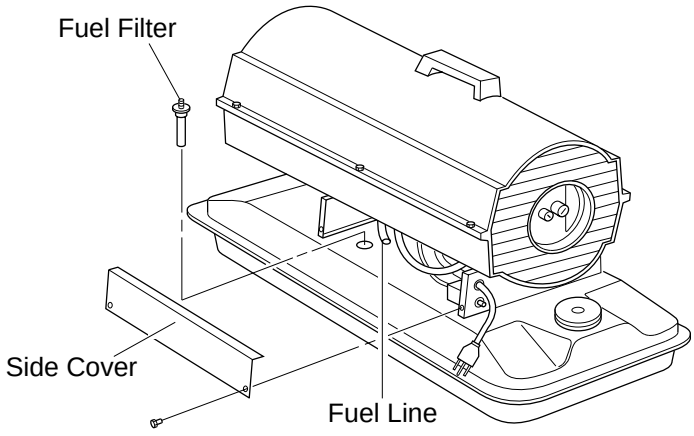


Figure 12 - Fuel Filter Removal, 30/70,000 BTU/Hr Models

Fuel Filter

(90,000 BTU/Hr Model)

1. Remove side cover screws using 5/16" nut-driver.
2. Remove side cover.
3. Pull upper fuel line off fuel filter neck.
4. Carefully pry bushing, lower fuel line, and fuel filter out of fuel tank.
5. Wash fuel filter with clean fuel and replace in tank.
6. Attach upper fuel line to fuel filter neck.
7. Replace side cover.

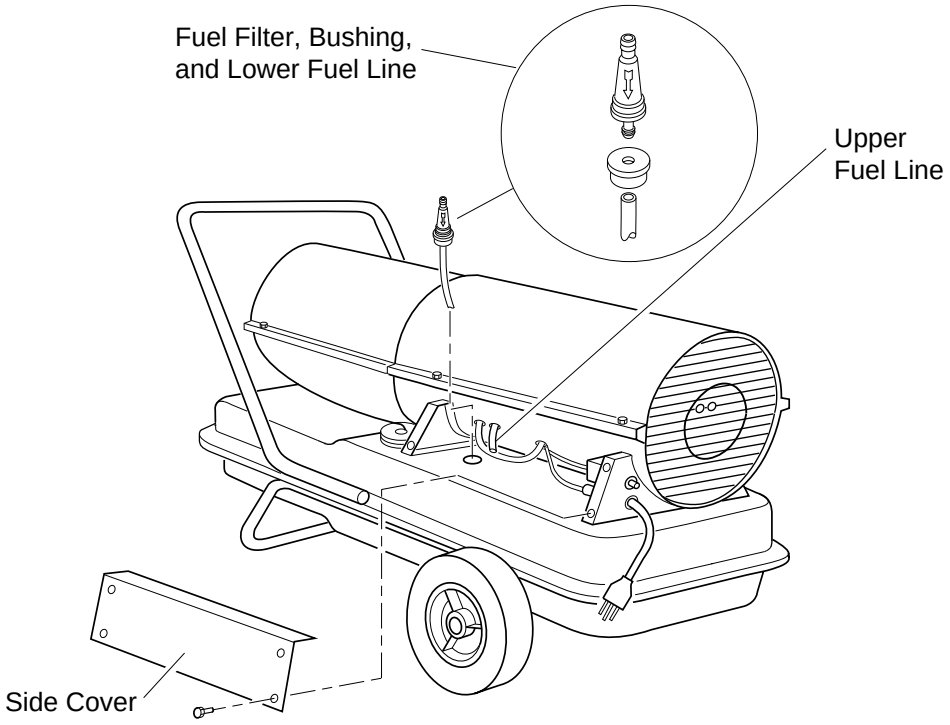


Figure 13 - Fuel Filter Removal, 90,000 BTU/Hr Model

Fuel Filter

(150,000 BTU/Hr Model)

1. Remove upper shell (see page 10).
2. Remove fan (see page 19).
3. Loosen flare nut using 3/4" open-end wrench. Push fuel tube down, away from burner head. Fuel filter is located inside of fuel tube.
4. Lift out fuel filter.
5. Wash fuel filter with clean fuel and replace in fuel tube.
6. Connect fuel tube to burner head. Attach flare nut until nut seats against fuel tube and fitting. Tighten 1/4 turn more using 3/4" open-end wrench (100-130 inch-pounds/11.3-14.7 n-m).
7. Replace fan (see page 19).
8. Replace fan guard and upper shell.

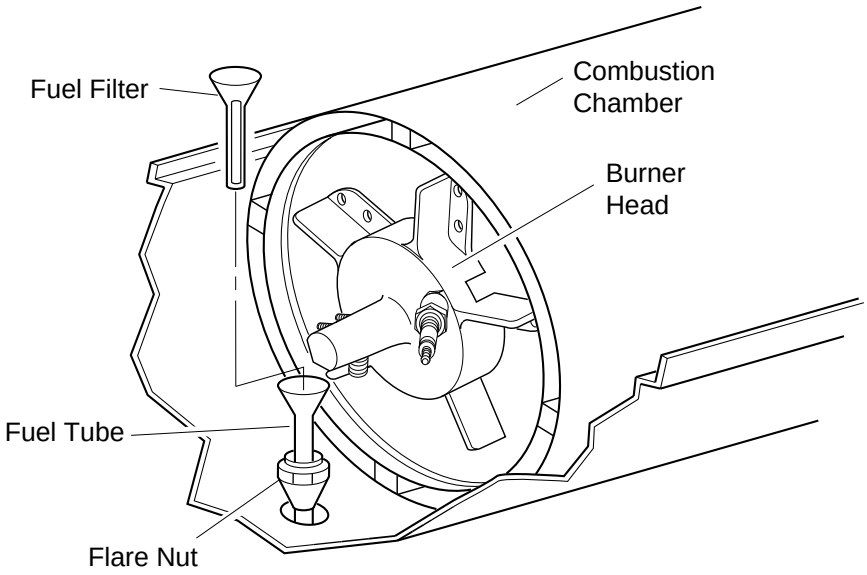


Figure 14 - Fuel Filter Removal, 150,000 BTU/Hr Model

Spark Plug

(30,000 BTU/Hr Model)

1. Remove upper shell (see page 10).
2. Remove fan (see page 19).
3. Remove fuel and air line hoses from nozzle assembly.
4. Remove spark plug wire from spark plug.
5. Remove two screws using 5/16" nut-driver and remove burner strap.
6. Place hex-body of spark plug into vise and tighten.
7. Remove spark plug mounting nut using 11/16" open-end wrench.
8. Remove burner strap from spark plug.
9. Clean and regap spark plug electrodes to .055" (1.4 mm) gap.
10. Replace burner strap onto spark plug. Rotate burner strap to position spark plug electrodes (see Figure 17).
11. Tighten spark plug with spark plug mounting nut.
12. Release hex-body of spark plug from vise.
13. Replace burner strap onto combustion chamber.
14. Attach spark plug wire to spark plug.
15. Attach fuel and air line hoses to nozzle assembly.
16. Replace fan (see page 19).
17. Replace fan guard and upper shell.

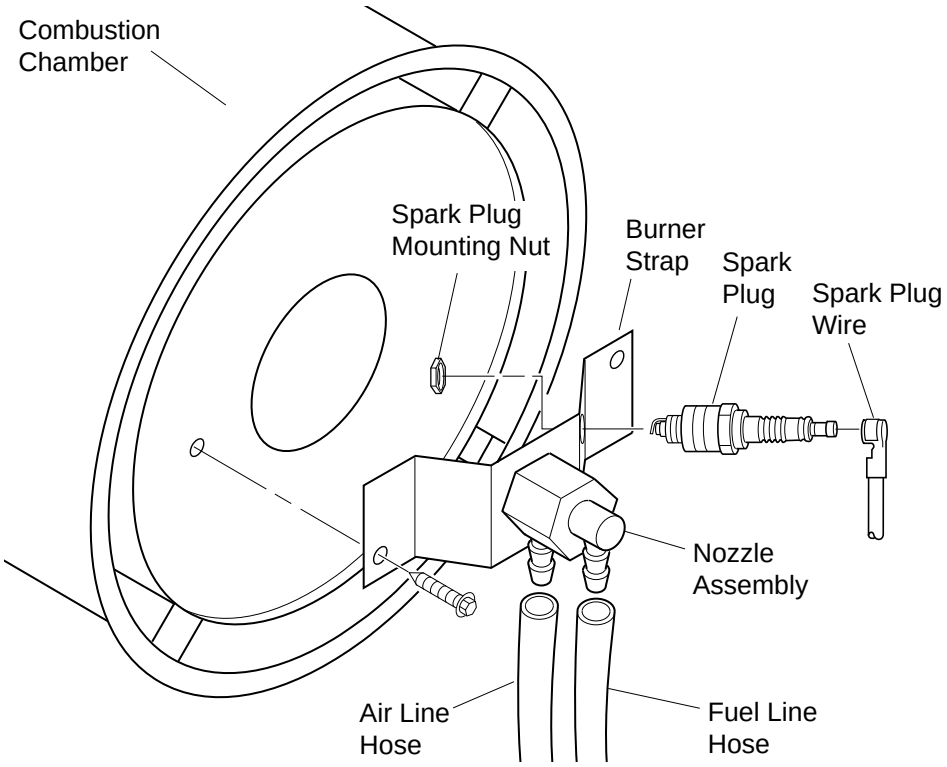


Figure 15 - Spark Plug Removal, 30,000 BTU/Hr Model

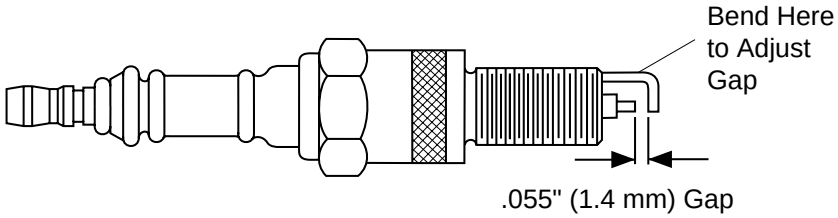


Figure 16 - Spark Plug Gap, 30,000 BTU/Hr Model

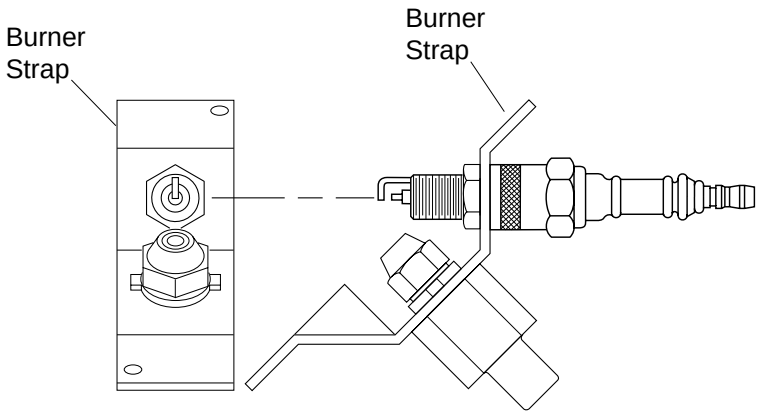


Figure 17 - Spark Plug Rotation, 30,000 BTU/Hr Model Only

Spark Plug

(70/90/150,000 BTU/Hr Models)

1. Remove upper shell (see page 10).
2. Remove fan (see page 19).
3. Remove spark plug wire from spark plug.
4. Remove spark plug from burner head using 13/16" open-end wrench.
5. Clean and regap spark plug electrodes to .055" (1.4 mm) gap.
6. Install spark plug in burner head.
7. Attach spark plug wire to spark plug.
8. Replace fan (see page 19).
9. Replace fan guard and upper shell.

(70/90,000 BTU/Hr Model Shown)

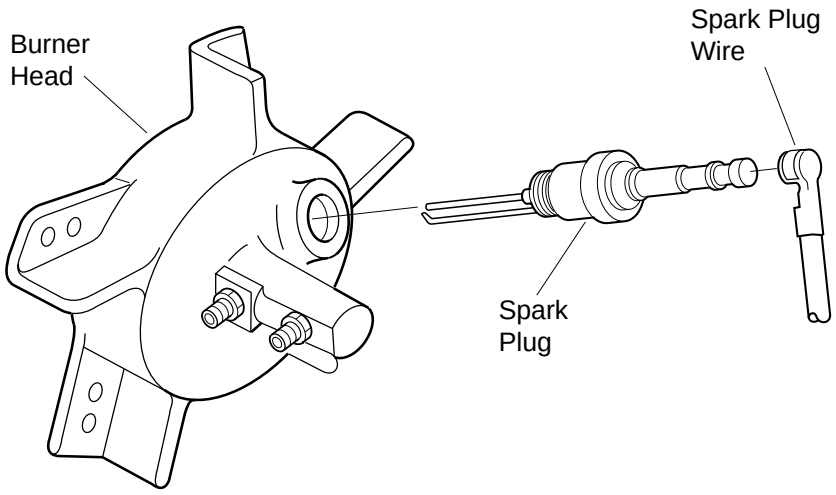


Figure 18 - Spark Plug Removal, 70/90/150,000 BTU/Hr Models

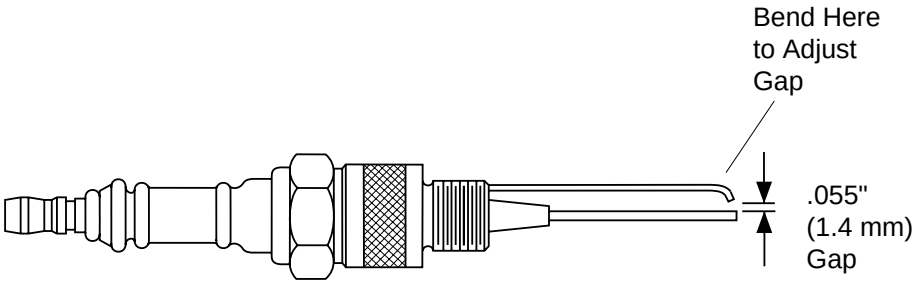


Figure 19 - Spark Plug Gap, 70/90/150,000 BTU/Hr Models

Air Output, Air Intake, and Lint Filters

1. Remove upper shell (see page 10).
2. Remove filter end cover screws using 5/16" nut-driver.
3. Remove filter end cover.
4. Replace air output and lint filters.
5. Wash or replace air intake filter (see *Preventative Maintenance Schedule,* page 8).
6. Replace filter end cover.
7. Replace fan guard and upper shell.

IMPORTANT: Do not oil filters

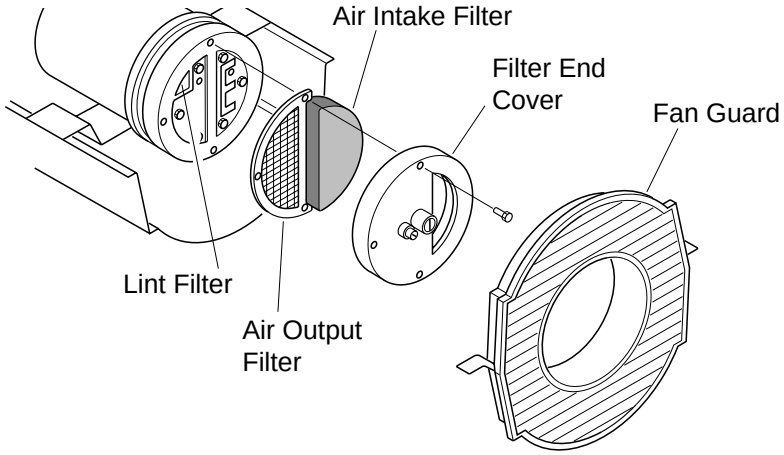


Figure 20 - Air Output, Air Intake, and Lint Filters, 30/70,000 BTU/Hr Models

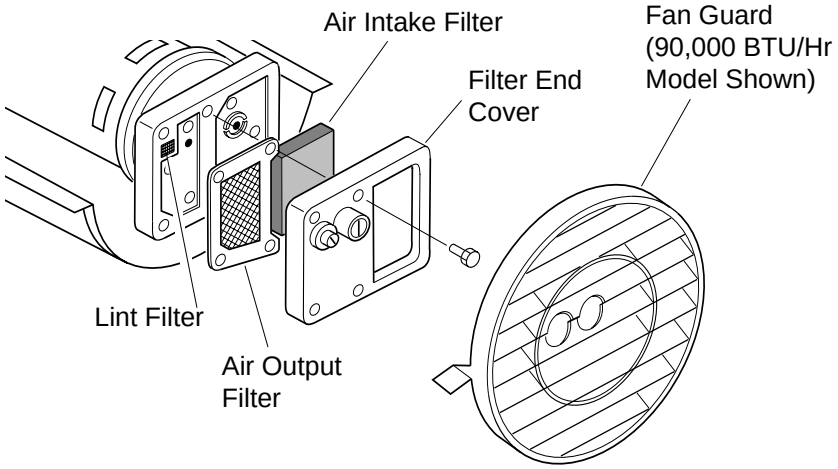


Figure 21 - Air Output, Air Intake, and Lint Filters, 90/150,000 BTU/Hr Models

Pump Pressure Adjustment

1. Remove pressure gauge plug from filter end cover.
2. Install accessory pressure gauge (part number HA1180).
3. Start heater (see *Operation*, page 7). Allow motor to reach full speed.
4. Adjust pressure. Turn relief valve to right to increase pressure. Turn relief valve to left to decrease pressure. See specifications at right for correct pressure for each model.
5. Remove pressure gauge. Replace pressure gauge plug in filter end cover.

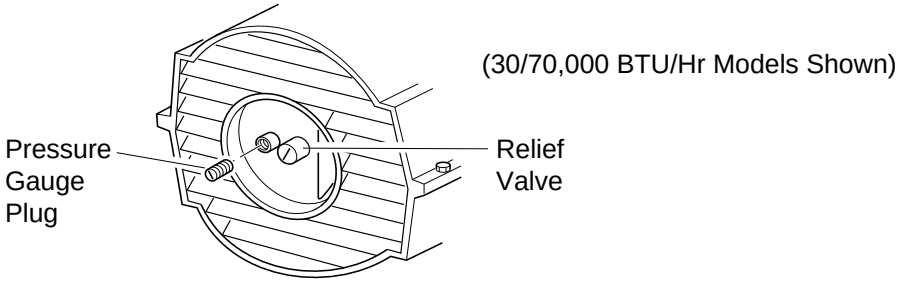


Figure 22 - Pressure Gauge Plug Removal

Model	Pump Pressure
30,000 BTU/Hr	2.6 PSI
70,000 BTU/Hr	3.8 PSI
90,000 BTU/Hr	4.4 PSI
150,000 BTU/Hr	4.9 PSI

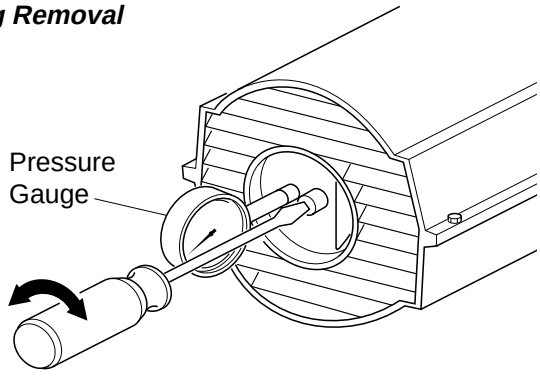


Figure 23 - Adjusting Pump Pressure

Nozzle

(30,000 BTU/Hr Model)

1. Remove upper shell (see page 10).
2. Remove fan (see page 19).
3. Remove fuel and air line hoses from nozzle assembly.
4. Turn nozzle assembly 1/4 turn to left and pull toward motor to remove.
5. Place plastic hex-body into vise and lightly tighten.
6. Carefully remove nozzle from the nozzle adapter using 5/8" socket wrench.
7. Blow compressed air thru face of nozzle. This will free any dirt in nozzle area.
8. Inspect nozzle seal for damage.
9. Replace nozzle into nozzle adapter until nozzle seats. Tighten 1/3 turn more using 5/8" socket wrench (40-45 inch-pounds/4.5-5.1 n-m).
10. Attach nozzle assembly to burner strap.
11. Attach fuel and airline hoses to nozzle assembly.
12. Replace fan (see page 19).
13. Replace fan guard and upper shell.

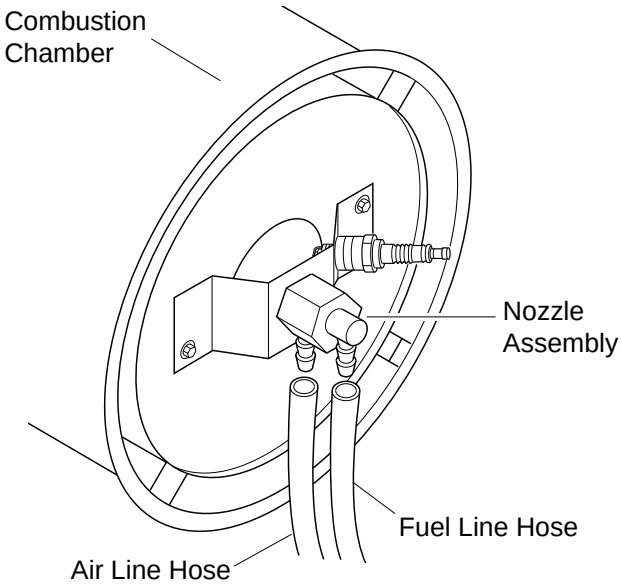


Figure 24 - Removing Air and Fuel Line Hoses, 30,000 BTU/Hr Model

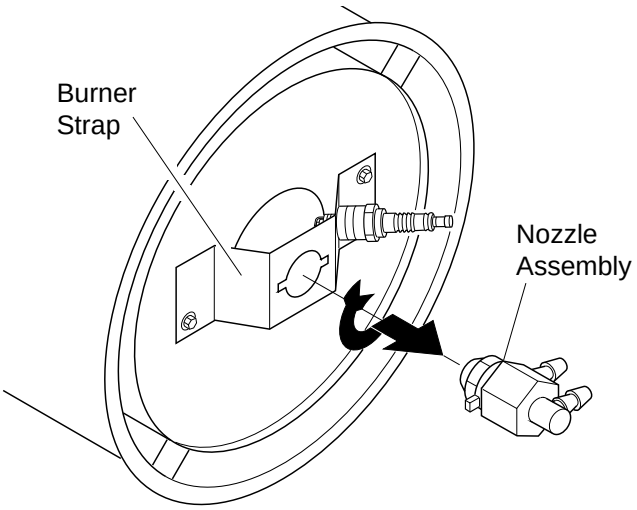


Figure 25 - Removing Nozzle Assembly, 30,000 BTU/Hr Model

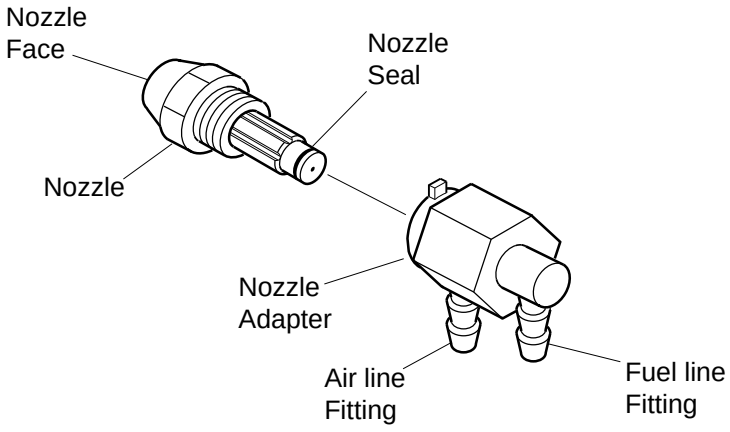


Figure 26 - Nozzle and Nozzle Adapter, 30,000 BTU/Hr Model

Nozzle

(70/90,000 BTU/Hr Models)

1. Remove upper shell (see page 10).
2. Remove fan (see page 19).
3. Remove fuel and air line hoses from burner head.
4. Remove spark plug wire from spark plug.
5. Remove spark plug from burner head using 13/16" open-end wrench.
6. Remove three screws using 5/16" nut-driver and remove burner head from combustion chamber.
7. Place burner head into vise and lightly tighten.
8. Carefully remove nozzle from burner head using 5/8" socket wrench (see Figure 28).
9. Blow compressed air thru face of nozzle. This will free any dirt in nozzle area.
10. Inspect nozzle seal for damage.
11. Replace nozzle into burner head and tighten firmly (80-110 inch-pounds/9.1-12.4 n-m).
12. Attach burner head to combustion chamber.
13. Install spark plug in burner head.
14. Attach spark plug wire to spark plug.
15. Attach fuel and airline hoses to burner head.
16. Replace fan (see page 19).
17. Replace fan guard and upper shell.

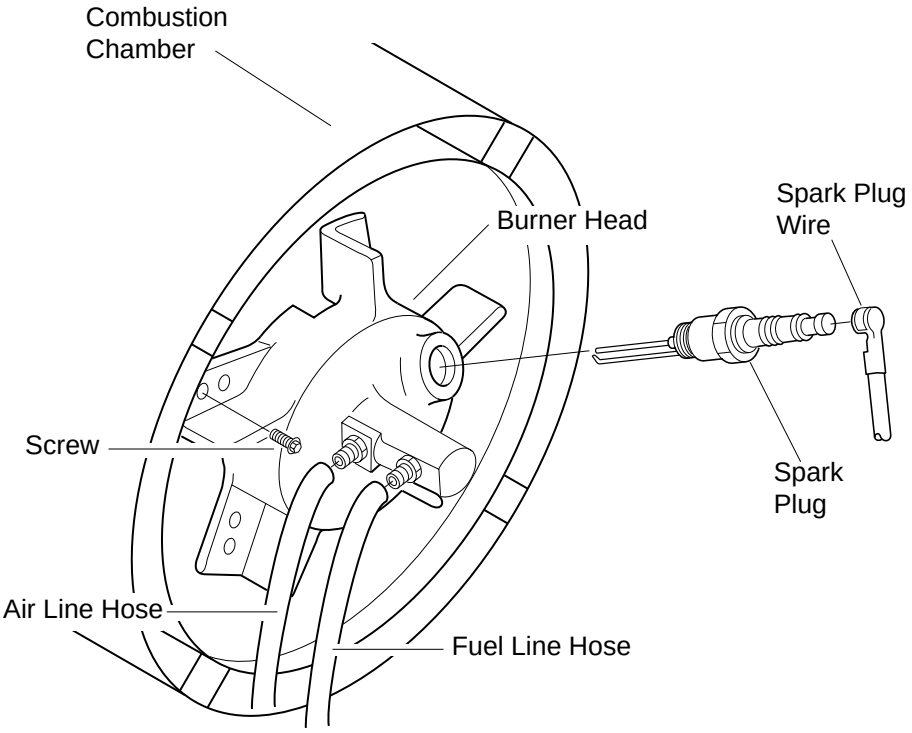


Figure 27 - Removing Burner Head, 70/90,000 BTU/Hr Models

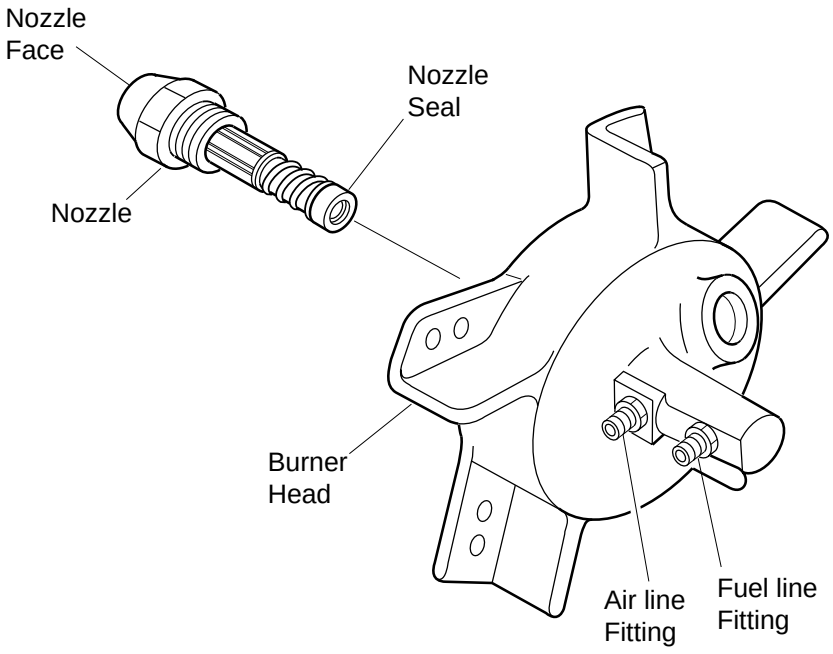


Figure 28 - Removing Nozzle, 70/90,000 BTU/Hr Models

Nozzle

(150,000 BTU/Hr Model)

1. Remove upper shell (see page 10).
2. Remove fan (see page 19).
3. Remove spark plug wire from spark plug.
4. Remove spark plug from burner head using 13/16" open-end wrench.
5. Loosen flare nut using 3/4" open-end wrench. Push fuel tube down.
6. Remove air line hose from burner head.
7. Remove three screws using 5/16" nut-driver and remove burner head from combustion chamber.
8. Place burner head into vise and lightly tighten.
9. Carefully remove nozzle from burner head using 5/8" socket wrench (see Figure 30).
10. Blow compressed air thru face of nozzle. This will free any dirt in nozzle area.
11. Inspect nozzle seal for damage.
12. Replace nozzle into burner head and tighten firmly (80-110 inch-pounds/9.1-12.4 n-m).
13. Attach burner head to combustion chamber.
14. Install spark plug in burner head.
15. Attach spark plug wire to spark plug.
16. Attach fuel tube and airline hose to burner head. Attach flare nut until nut seats against fuel tube and fitting. Tighten 1/4 turn more using 3/4" open-end wrench (100-130 inch-pounds/11.3-14.7 n-m).
17. Replace fan (see page 19).
18. Replace fan guard and upper shell.

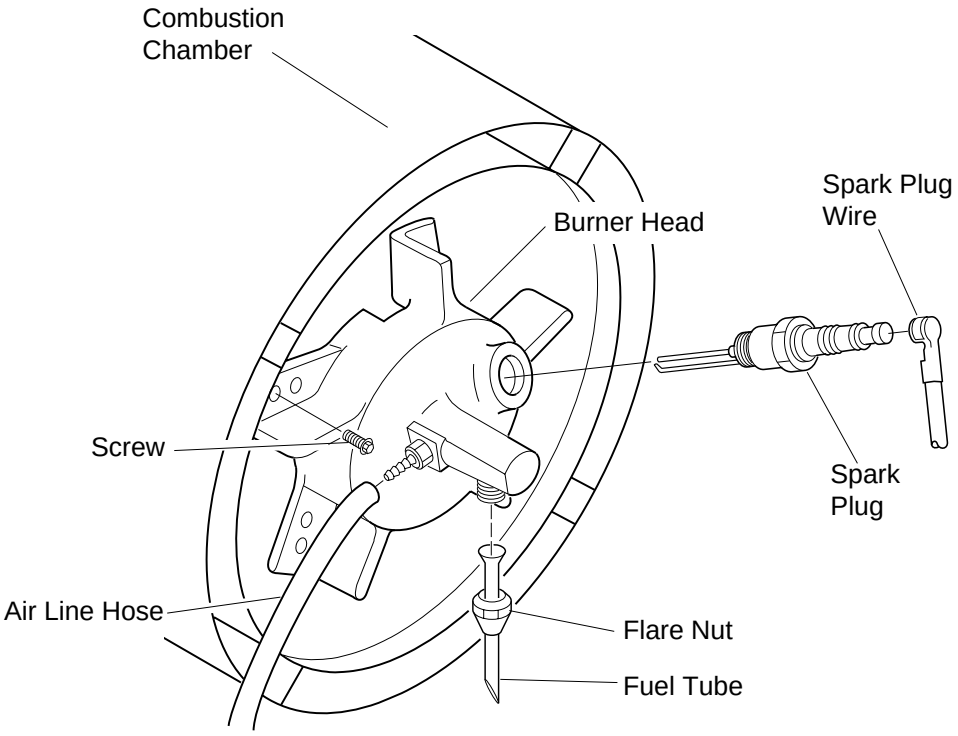


Figure 29 - Removing Burner Head, 150,000 BTU/Hr Model

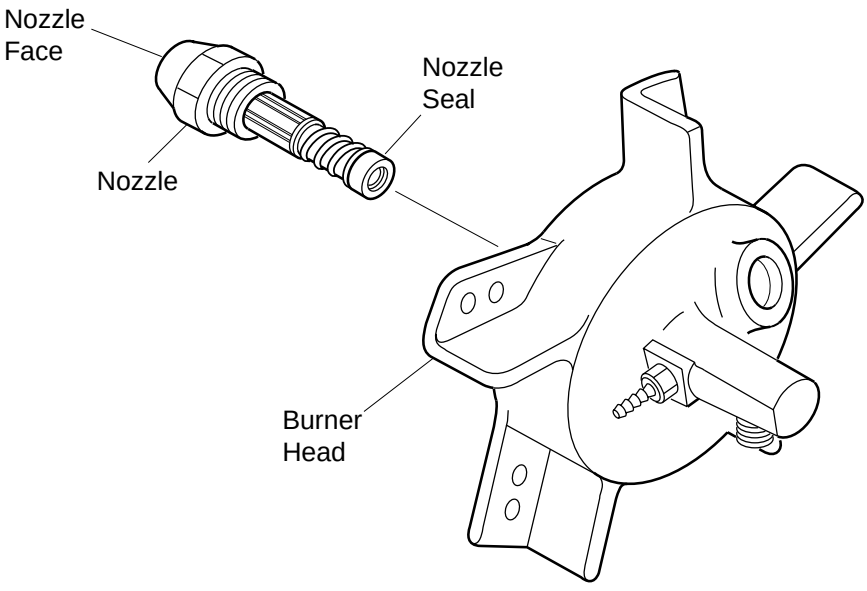


Figure 30 - Removing Nozzle, 150,000 BTU/Hr Model

Pump Rotor

(Procedure if rotor is binding)

1. Remove upper shell (see page 10).
2. Remove filter end cover screws using 5/16" nut-driver.
3. Remove filter end cover and air filters.
4. Remove pump plate screws using 5/16" nut-driver.
5. Remove pump plate.
6. Remove rotor, insert, and blades.
7. Check for debris in pump. If debris is found, blow out with compressed air.
8. Install insert and rotor.
9. Check gap on rotor. Adjust to .003"/.004" (.076/.101 mm) if needed (see Figure 33).

Note: Rotate rotor one full turn to insure the gap is .003"/.004" (.076/.101 mm) at tightest position. Adjust if needed.

10. Install blades, pump plate, air filters, and filter end cover.
11. Replace fan guard and upper shell.
12. Adjust pump pressure (see page 14).

Note: If rotor is still binding, proceed as follows.

13. Perform steps 1 thru 6 above.
14. Place fine grade sandpaper (600 grit) on flat surface. Sand rotor lightly in "figure 8" motion four times (see Figure 34).
15. Reinstall insert and rotor.
16. Perform steps 10 thru 12 above.

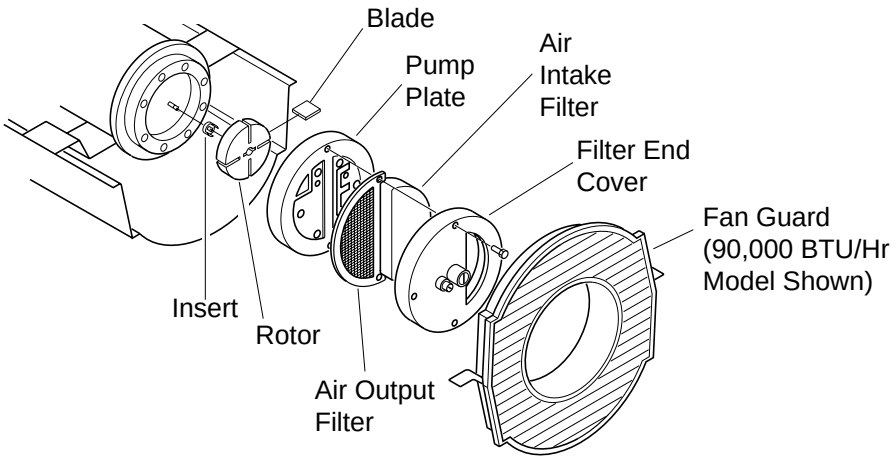


Figure 31 - Rotor Location, 30/70,000 BTU/Hr Models

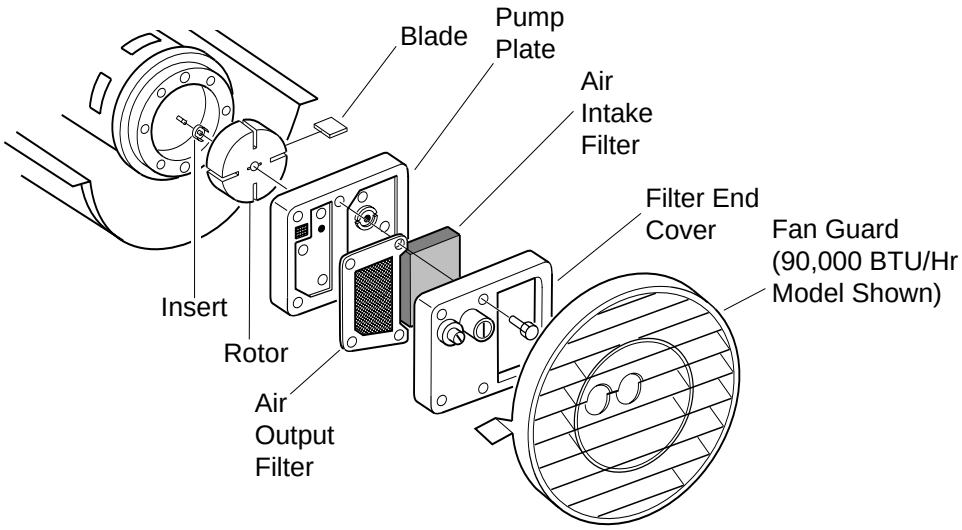


Figure 32 - Rotor Location, 90/150,000 BTU/Hr Models

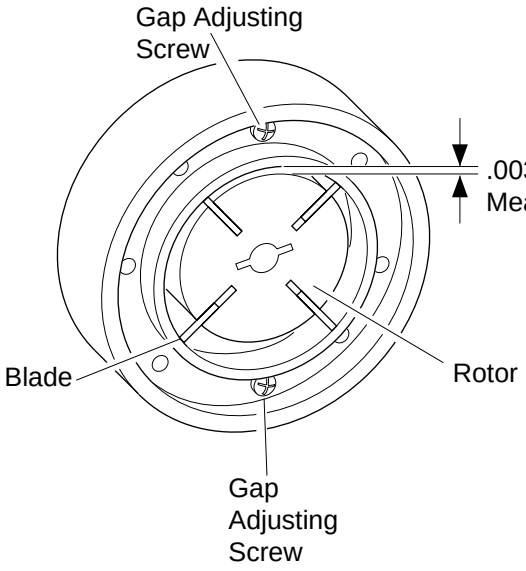


Figure 33 - Gap Adjusting Screw Locations

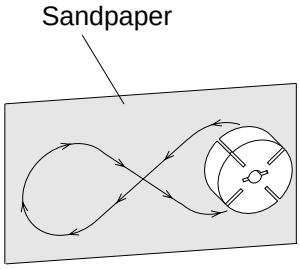


Figure 34 - Sanding Rotor

Fan

IMPORTANT: Remove fan from motor shaft before removing motor from heater. The weight of the motor resting on the fan could damage the fan pitch.

1. Remove upper shell (see page 10).
2. Use 1/8" allen wrench to loosen setscrew which holds fan to motor shaft.
3. Slip fan off motor shaft.
4. Clean fan using a soft cloth moistened with kerosene or solvent.
5. Dry fan thoroughly.
6. Replace fan on motor shaft. Place fan hub flush with end of motor shaft (see Figure 36).
7. Place setscrew on flat of shaft. Tighten setscrew firmly (40-50 inch-pounds/ 4.5-5.6 n-m).
8. Replace fan guard and upper shell.

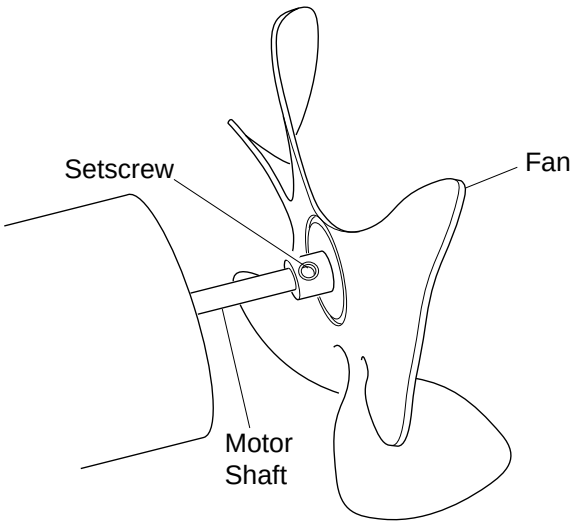


Figure 35 - Fan, Motor Shaft, and Setscrew Location

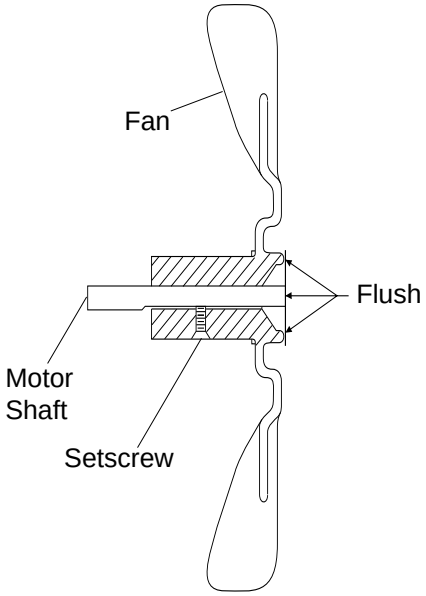


Figure 36 - Fan Cross Section

SPECIFICATIONS

Output Rating (BTU/Hr)	30,000	70,000	90,000	150,000
Fuel	Use Only Kerosene or No. 1 Fuel Oil			
Fuel Tank Capacity (U.S. Gal./Liters)	3.0/11.35	5.0/18.92	9.0/34.06	13.5/51.09
Fuel Consumption (Gal. Per Hr./Liters Per Hr.)	.23/.87	.49/1.85	.66/2.5	1.10/4.16
Electric Requirements	230 V/50 Hz (Same All Models)			
Amperage (Normal Run)	.8	1.0	1.58	1.5
Hot Air Output (CFM/CMM)	140/3.96	225/6.36	425/12	600/17
RPM	1425	2850	2850	2850

WIRING DIAGRAMS

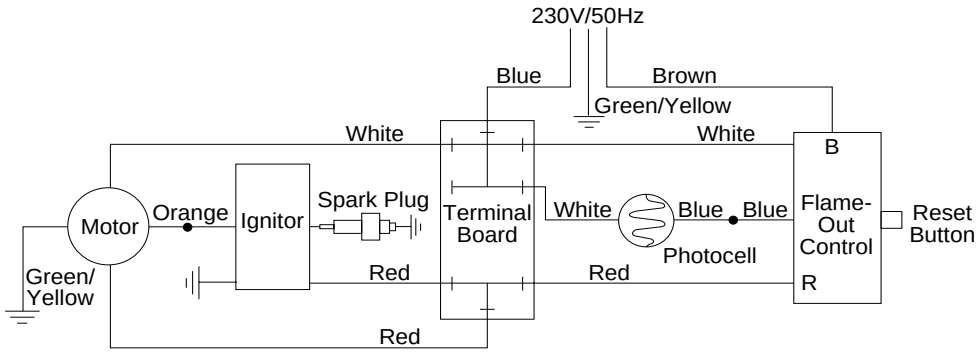


Figure 37 - Wiring Diagram, 30,000 BTU/Hr EDI Model

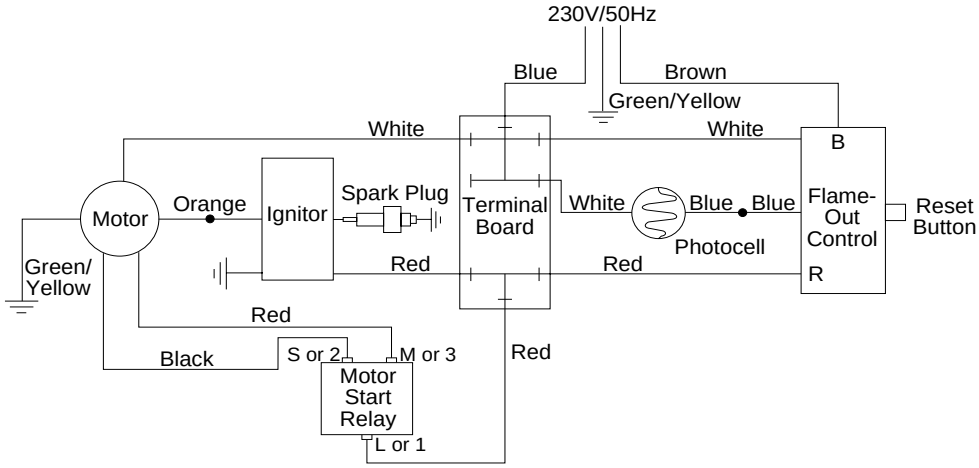


Figure 38 - Wiring Diagram, 70/90,000 BTU/Hr EDI Models

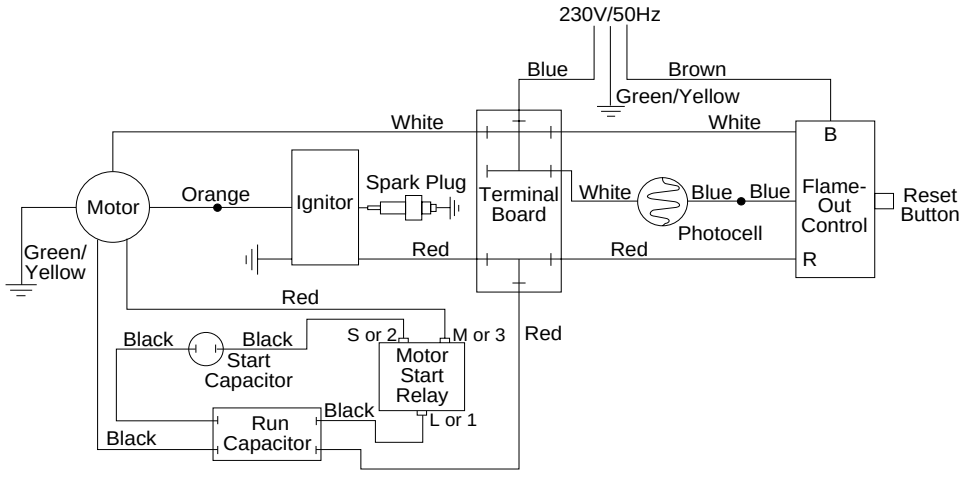


Figure 39 - Wiring Diagram, 150,000 BTU/Hr EDI Model

WIRING DIAGRAMS

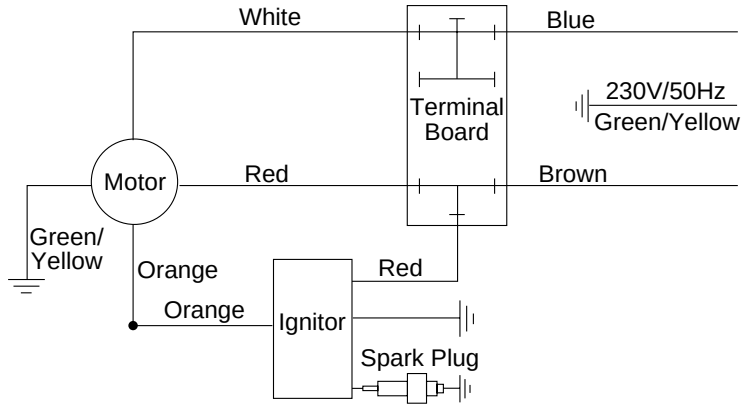


Figure 40 - Wiring Diagram, 30,000 BTU/Hr EEI Model

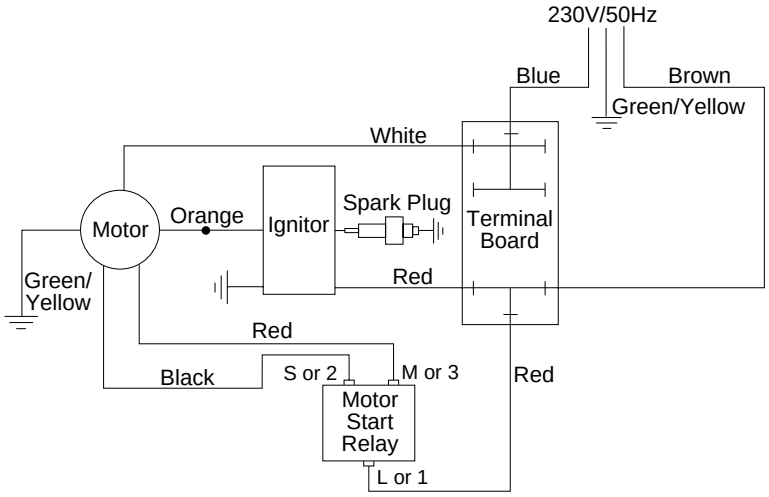


Figure 41 - Wiring Diagram, 70/90,000 BTU/Hr EEI Models

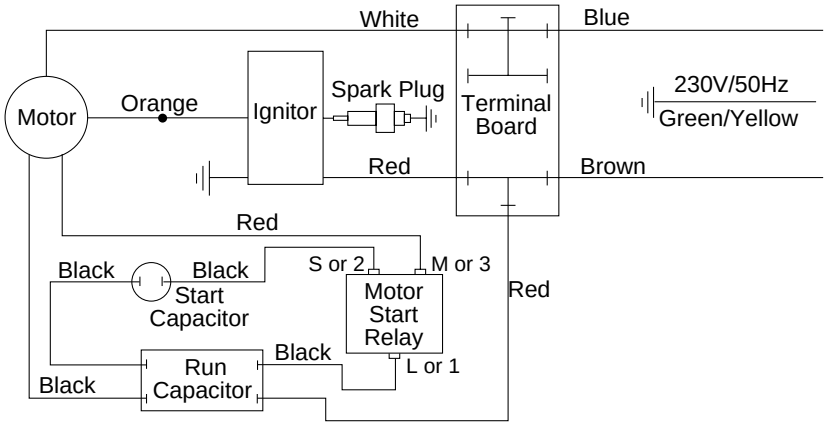
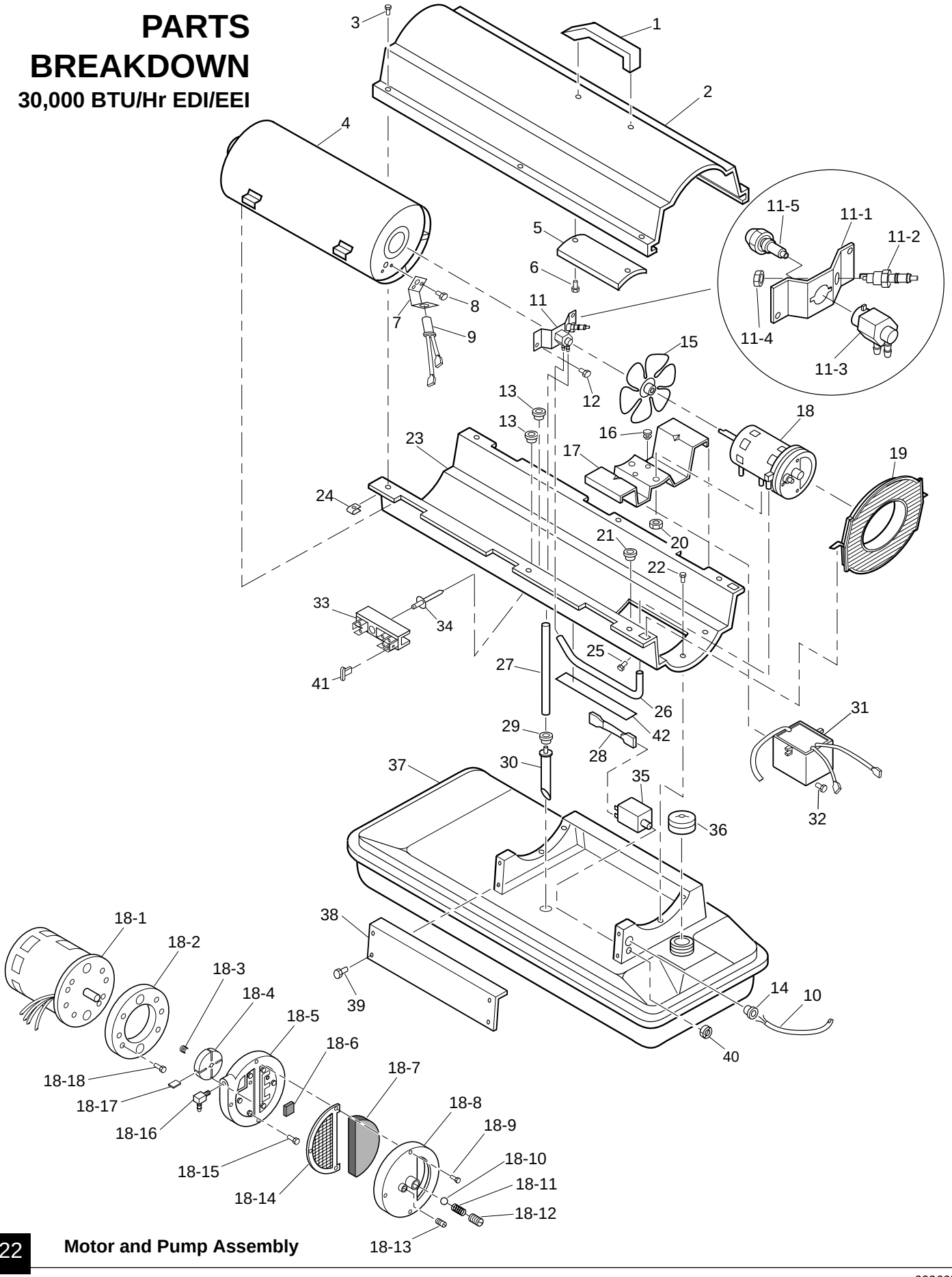


Figure 42 - Wiring Diagram, 150,000 BTU/Hr EEI Model

ILLUSTRATED PARTS BREAKDOWN

30,000 BTU/Hr EDI/EEI



Motor and Pump Assembly

PARTS LIST

30,000 BTU/Hr EDI/EEI

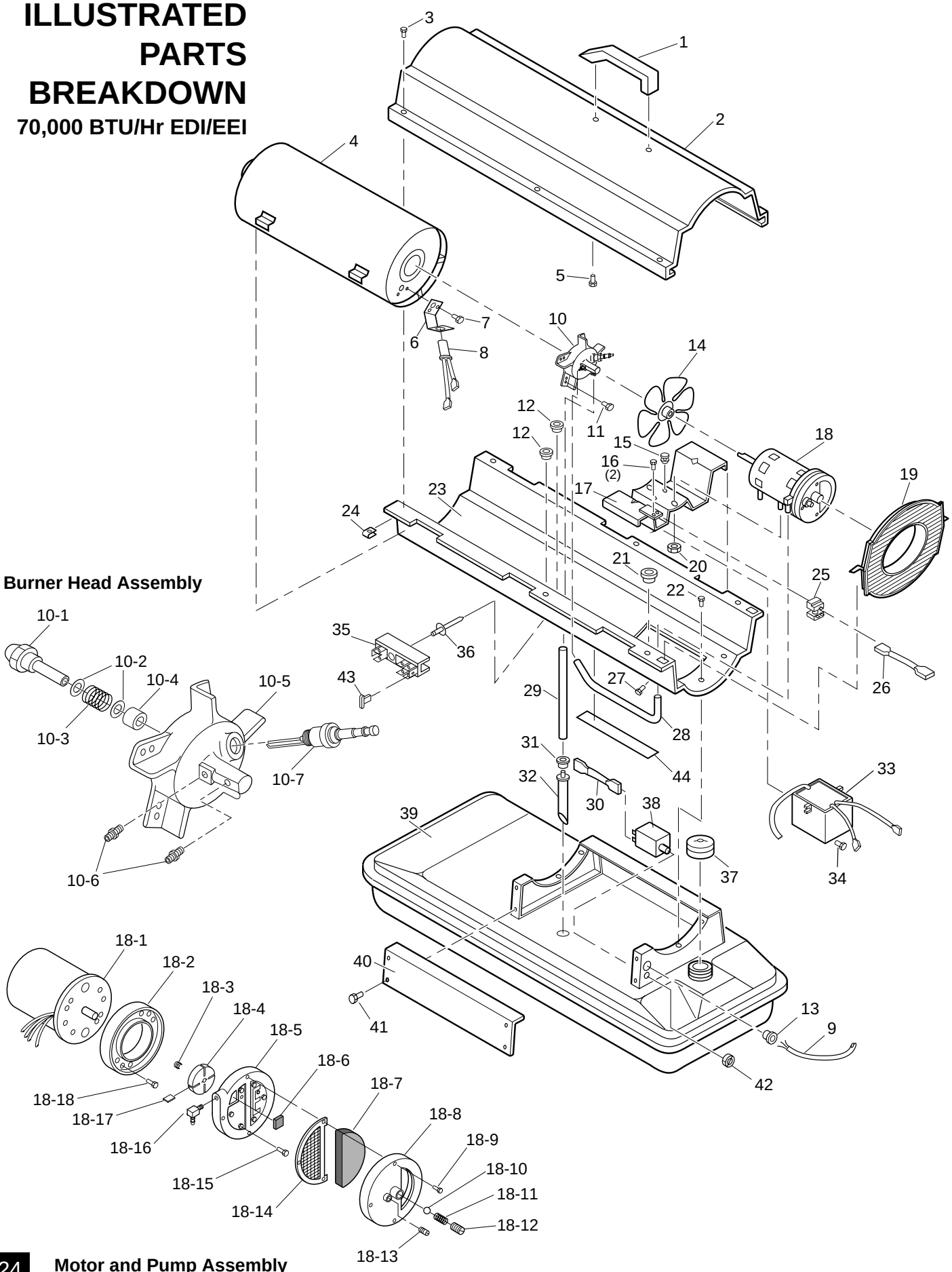
This list contains replaceable parts used in your heater. When ordering parts, be sure to provide the correct model and serial numbers (from the model plate), then the part number and description of the desired part.

KEY NO.	PART NUMBER	PART DESCRIPTION	QTY. EDI	QTY. EEI
1	M51104-01	Handle	1	1
2	098511-54	Upper Shell	1	1
3	M15823-27	Screw, #10-16 x 1/2"	6	6
4	098512-05	Combustion Chamber	1	1
5	M51108-01	Heat Shield	1	1
6	M11084-29	Screw, #10-16 x 3/4"	2	2
7	M16660	Photocell Bracket	1	—
8	M10908-2	Screw, #6-32 x 3/8"	2	—
9	HA3019	Photocell Assembly	1	—
10	079673-03	Power Cord	1	—
	M15779-27	Power Cord	—	1
11	**	Burner Strap Assembly	1	1
11-1	097124-01	Bracket	1	1
11-2	M29835-2	Spark Plug	1	1
11-3	079980-01	Nozzle Adapter	1	1
11-4	M29824	Nut, 14mm	1	1
11-5	M29681	Nozzle	1	1
12	M11084-26	Screw, #10-16 x 3/8"	2	2
13	M30865-02	Bushing	2	1
14	M11143-1	Strain Relief Bushing	1	1
15	M30884	Fan	1	1
16	M50631	Rubber Bumper	2	2
17	098138-01	Motor Bracket	1	1
18	**	Motor and Pump Assembly	1	1
18-1	098642-02	Motor (230V/50Hz)	1	1
18-2	M8645-2	Pump Body	1	1
18-3	M22009	Insert	1	1
18-4	M22456-2	Rotor	1	1
18-5	M29608	End Pump Cover	1	1
18-6	M29632	Lint Filter	1	1
18-7	M29633	Intake Filter	1	1
18-8	M29609	End Filter Cover	1	1
18-9	M12461-31	Screw, #10-32 x 1"	3	3
18-10	M8940	Steel Ball (1/4" Dia.)	1	1
18-11	M10993-1	Pressure Relief Spring	1	1
18-12	M27694	Adjusting Screw	1	1
18-13	M22997	Plug	1	1
18-14	M29612-01	Output Filter	1	1
18-15	M12461-32	Screw, #10-32 x 1 1/8"	6	6
18-16	M50016	Elbow, 90° (Barb Fitting)	1	1
18-17	M8643-2	Blade	4	4
18-18	FHPF3-6C	Screw, #10-32 x 3/4"	2	2
19	M51105-01	Fan Guard	1	1
20	NTC-4C	Hex locknut	2	2
21	M50104-02	Bushing (wires)	1	1
22	M11084-26	Screw, #10-16 x 3/8"	6	6
23	098511-12	Lower Shell	1	1
24	M11271-8	Clip Nut	6	6
25	M15823-37	Screw, #8-18 x 1/4"	1	1
26	M29652-04	Rubber Airline	1	1
27	M29652-05	Fuel Line	1	1
28	M16841-57	Wire Assembly (red 8 1/2")	1	—
29	M10990-3	Rubber Bushing	1	1
30	M50876-04	Fuel Filter Assembly (Includes bushing)	1	1
31	098557-07	Electronic Ignitor	1	1
32	M11084-29	Screw, #10-16 x 3/4"	2	2
33	099125-02	Terminal Board	1	1
34	099157-01	Rivet	1	1
35	097630-02	Flame-Out Control	1	—
36	097702-01	Fuel Tank Cap	1	1
37	098513-23	Fuel Tank	1	1
38	M50899-03AA	Side Cover	1	1
39	M11084-26	Screw, #10-16 x 3/8"	2	2
40	099177-01	Hex Nut	1	—
41	078918-01	Terminal Board Tab Cap	1	2
42	097785-01	Vinyl Foam Gasket	1	—
PARTS AVAILABLE - NOT SHOWN				
	M18053	Filler Neck Screen	1	1
	097649-01	Tradename Decal	1	1
	098234-46	General Info. Decal	1	—
	098493-01	General Info. Decal	—	1

**Not available as an assembly, order parts separately.

ILLUSTRATED PARTS BREAKDOWN

70,000 BTU/Hr EDI/EEI



Motor and Pump Assembly

PARTS LIST

70,000 BTU/Hr EDI/EEI

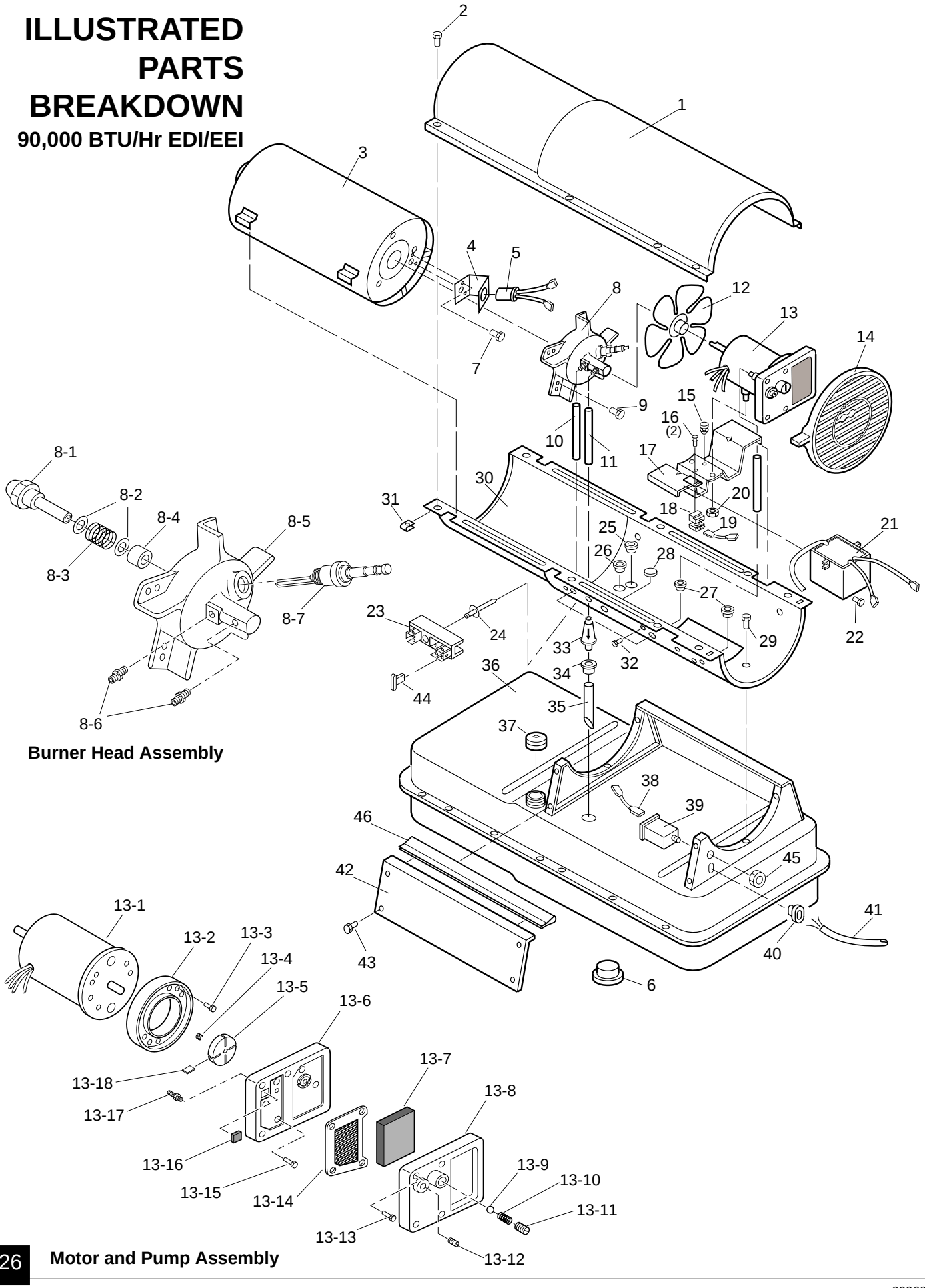
This list contains replaceable parts used in your heater. When ordering parts, be sure to provide the correct model and serial numbers (from the model plate), then the part number and description of the desired part.

KEY NO.	PART NUMBER	PART DESCRIPTION	QTY. EDI	QTY. EEI
1	M51104-01	Handle	1	1
2	098511-54	Upper Shell	1	1
3	M15823-27	Screw, #10-16 x 1/2"	6	6
4	098512-12	Combustion Chamber	1	1
5	M11084-29	Screw, #10-16 x 3/4"	2	2
6	M16660	Photocell Bracket	1	—
7	M10908-2	Screw, #6-32 x 3/8"	2	—
8	HA3019	Photocell Assembly	1	—
9	079673-03	Power Cord	1	—
	M15779-27	Power Cord	—	1
10	**	Burner Head Assembly	1	1
10-1	M50880-01	Nozzle	1	1
10-2	M10659-1	Nozzle Seal Washer	2	2
10-3	M10809-1	Nozzle Seal Spring	1	1
10-4	M8882	Nozzle Seal Sleeve	1	1
10-5	M51098-02	Burner Head Body	1	1
10-6	M50820-01	Barb Fitting	2	2
10-7	M10962-2	Spark Plug	1	1
11	M11084-27	Screw, #10-16 x 1/2"	3	3
12	M30865-02	Bushing	2	1
13	M11143-1	Strain Relief Bushing	1	1
14	097026-01	Fan	1	1
15	M50631	Rubber Bumper	2	2
16	M12461-13	Screw, #8-32 x 1/4" (holds relay in position)	2	2
17	098138-01	Motor and Relay Bracket Assembly	1	1
18	**	Motor and Pump Assembly	1	1
18-1	098782-02	Motor (230V/50Hz)	1	1
18-2	079975-01	Pump Body	1	1
18-3	M22009	Insert	1	1
18-4	M22456-1	Rotor	1	1
18-5	M29608	End Pump Cover	1	1
18-6	M29632	Lint Filter	1	1
18-7	M29633	Intake Filter	1	1
18-8	M29609	End Filter Cover	1	1
18-9	M12461-31	Screw, #10-32 x 1"	3	3
18-10	M8940	Steel Ball (1/4" Dia.)	1	1
18-11	M10993-1	Pressure Relief Spring	1	1
18-12	M27694	Adjusting Screw	1	1
18-13	M22997	Plug	1	1
18-14	M29612-01	Output Filter	1	1
18-15	M12461-31	Screw, #10-32 x 1"	6	6
18-16	M50016	Elbow, 90° (Barb Fitting)	1	1
18-17	M8643	Blade	4	4
18-18	FHPF3-2C	Screw, #10-32 x 1/4"	2	2
19	M51105-01	Fan Guard	1	1
20	NTC-4C	Hex locknut	2	2
21	M50104-02	Bushing (wires)	1	1
22	M11084-26	Screw, #10-16 x 3/8"	6	6
23	098511-12	Lower Shell	1	1
24	M11271-8	Clip Nut	6	6
25	098136-02	Relay (motor start)	1	1
26	M16841-58	Wire Assembly (red 9 1/2")	1	1
27	M15823-37	Screw, #8-18 x 1/4"	1	1
28	M29652-04	Rubber Airline	1	1
29	079973-01	Fuel Line	1	1
30	M16841-57	Wire Assembly (red 8 1/2")	1	—
31	M10990-3	Rubber Bushing	1	1
32	M50876-05	Fuel Filter Assembly (Includes bushing)	1	1
33	098557-07	Electronic Ignitor	1	1
34	M11084-29	Screw, #10-16 x 3/4"	2	2
35	099125-02	Terminal Board	1	1
36	099157-01	Rivet	1	1
37	097702-01	Fuel Tank Cap	1	1
38	097630-02	Flame-Out Control	1	—
39	098513-24	Fuel Tank	1	1
40	M50899-03AA	Side Cover	1	1
41	M11084-26	Screw, #10-16 x 3/8"	2	2
42	099177-01	Hex Nut	1	—
43	078918-01	Terminal Board Tab Cap	1	3
44	097785-01	Vinyl Foam Gasket	1	—
PARTS AVAILABLE - NOT SHOWN				
	M18053	Filler Neck Screen	1	1
	097649-01	Tradename Decal	1	1
	098234-47	General Info. Decal	1	—
	098493-01	General Info. Decal	—	1

**Not available as an assembly, order parts separately.

ILLUSTRATED PARTS BREAKDOWN

90,000 BTU/Hr EDI/EEI



Burner Head Assembly

Motor and Pump Assembly

PARTS LIST

90,000 BTU/Hr EDI/EEI

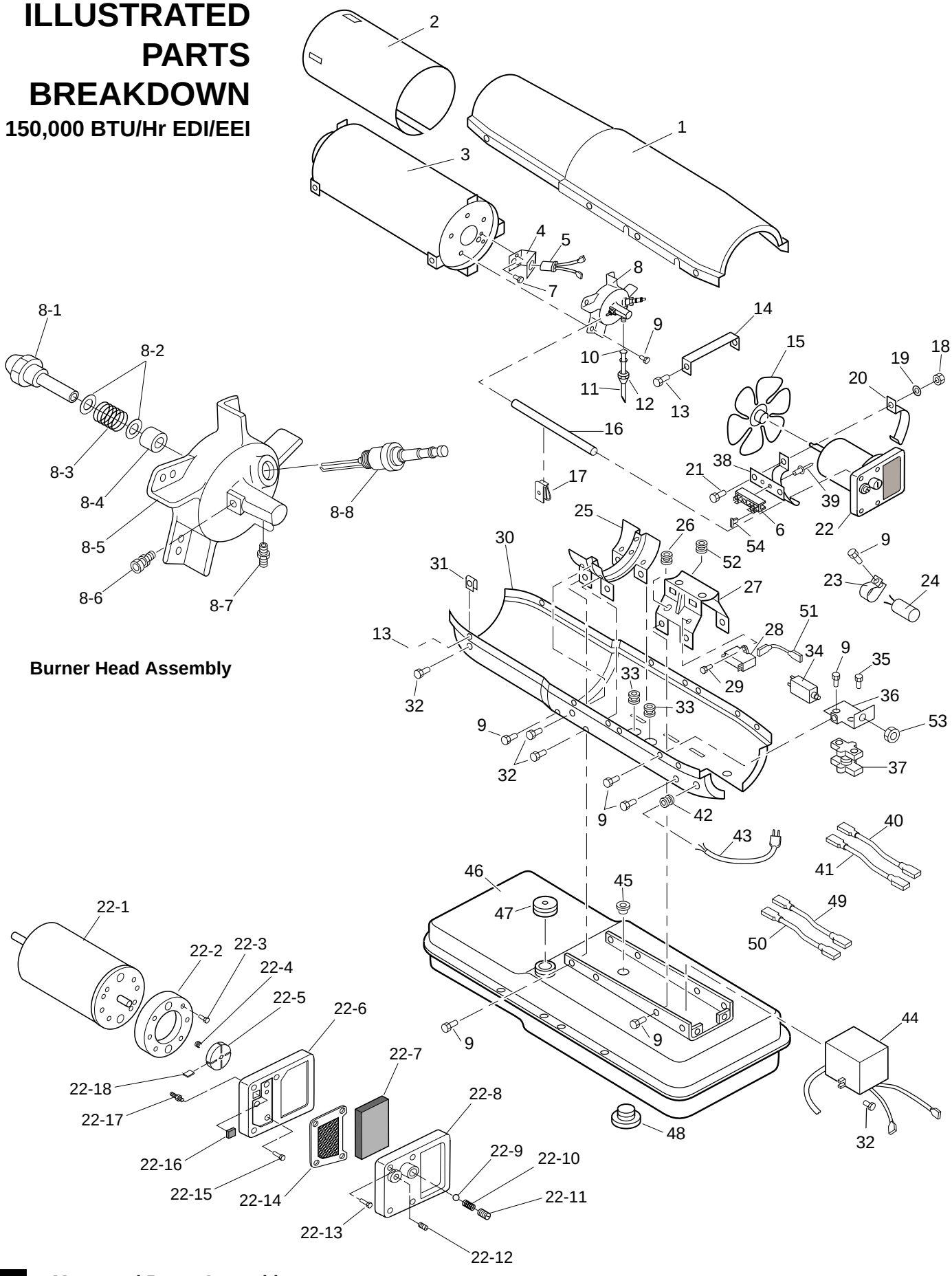
This list contains replaceable parts used in your heater. When ordering parts, be sure to provide the correct model and serial numbers (from the model plate), then the part number and description of the desired part.

KEY NO.	PART NUMBER	PART DESCRIPTION	QTY. EDI	QTY. EEI
1	098511-61	Upper Shell	1	1
2	M15823-27	Screw, #10-16 x 1/2"	6	6
3	098512-07	Combustion Chamber	1	1
4	M16660	Photocell Bracket	1	—
5	HA3019	Photocell Assembly	1	—
6	M27417	Drain Plug	1	1
7	M10908-2	Screw, #6-32 x 3/8"	2	—
8	**	Burner Head Assembly	1	1
8-1	M23103	Nozzle	1	1
8-2	M10659-1	Nozzle Seal Washer	2	2
8-3	M10809-1	Nozzle Seal Spring	1	1
8-4	M8882	Nozzle Seal Sleeve	1	1
8-5	M50924-03	Burner Head Body	1	1
8-6	M50820-02	Barb Fitting	2	2
8-7	M10962-2	Spark Plug	1	1
9	M11084-27	Screw, #10-16 x 1/2"	3	3
10	M50814-06	Air Line	1	1
11	M51345-01	Fuel Line	1	1
12	097293-01	Fan	1	1
13	**	Motor and Pump Assembly	1	1
13-1	098783-02	Motor (230V/50Hz)	1	1
13-2	079975-01	Pump Body	1	1
13-3	FHPF3-2C	Screw, #10-32 x 1/4"	2	2
13-4	M22009	Insert	1	1
13-5	M22456-1	Rotor	1	1
13-6	M50545	End Pump Cover	1	1
13-7	M12179	Intake Filter	1	1
13-8	M16545	End Filter Cover	1	1
13-9	M8940	Steel Ball (1/4" Dia.)	1	1
13-10	M10993-1	Pressure Relief Spring	1	1
13-11	M27694	Adjusting Screw	1	1
13-12	M22997	Plug	1	1
13-13	M12461-31	Screw, #10-32 x 1"	4	4
13-14	M12244-1	Output Filter	1	1
13-15	M12461-31	Screw, #10-32 x 1"	6	6
13-16	M11637	Lint Filter	1	1
13-17	M50820-02	Barb Fitting	1	1
13-18	M8643	Blade	4	4
14	M51114-01	Fan Guard	1	1
15	M50631	Rubber Bumper	2	2
16	M12461-13	Screw, #8-32 x 1/4"	2	2
17	098138-02	Motor and Relay Bracket Assembly	1	1
18	098136-04	Relay (motor start)	1	1
19	M16841-59	Wire Assembly (red 13 1/2")	1	1
20	NTC-4C	Hex locknut	2	2
21	098557-07	Electronic Ignitor	1	1
22	M11084-29	Screw, #10-16 x 3/4"	2	2
23	099125-02	Terminal Board	1	1
24	099157-01	Rivet	1	1
25	M30865-02	Bushing	1	1
26	M30865-02	Bushing	1	—
27	M50104-01	Bushing	2	2
28	099213-01	Button Plug	1	1
29	M11084-27	Screw, #10-16 x 1/2"	6	6
30	098511-02	Lower Shell	1	1
31	M11271-8	Clip Nut	6	6
32	M15823-37	Screw, #8-18 x 1/4"	1	1
33	M51150-01	Fuel filter	1	1
34	M10990-3	Rubber Bushing	1	1
35	M51151-01	Fuel Line	1	1
36	098513-21	Fuel Tank	1	1
37	097702-01	Fuel Tank Cap	1	1
38	M16841-57	Wire Assembly (red 8 1/2")	1	—
39	097630-02	Flame-Out Control	1	—
40	M11143-1	Strain Relief Bushing	1	1
41	079673-03	Power Cord	1	—
	M15779-27	Power Cord	—	1
42	M51077-01AA	Side Cover	1	1
43	M11084-27	Screw, #10-16 x 1/2"	4	4
44	078918-01	Terminal Board Tab Cap	1	3
45	099177-01	Hex Nut	1	—
46	097468-01	Edge Liner	1	—
PARTS AVAILABLE - NOT SHOWN				
	M18053	Filler Neck Screen	1	1
	097650-01	Tradename Decal	1	1
	098234-45	General Info. Decal	1	—
	098493-01	General Info. Decal	—	1

**Not available as an assembly, order parts separately.

ILLUSTRATED PARTS BREAKDOWN

150,000 BTU/Hr EDI/EEI



Burner Head Assembly

Motor and Pump Assembly

PARTS LIST

150,000 BTU/Hr EDI/EEI

This list contains replaceable parts used in your heater. When ordering parts, be sure to provide the correct model and serial numbers (from the model plate), then the part number and description of the desired part.

KEY NO.	PART NUMBER	PART DESCRIPTION	QTY. EDI	QTY. EEI
1	098511-58	Upper Shell	1	1
2	098068-01	Heat Deflector	1	1
3	098512-02	Combustion Chamber	1	1
4	M16660	Photocell Bracket	1	—
5	HA3019	Photocell Assembly	1	—
6	099125-02	Terminal Board	1	1
7	M10908-2	Screw, #6-32 x 3/8"	2	—
8	**	Burner Head Assembly	1	1
8-1	M18022	Nozzle	1	1
8-2	M10659-1	Nozzle Seal Washer	2	2
8-3	M10809-1	Nozzle Seal Spring	1	1
8-4	M8882	Nozzle Seal Sleeve	1	1
8-5	M50924-01	Burner Head Body	1	1
8-6	M50820-02	Barb Fitting	1	1
8-7	079685-01	Male Connector	1	1
8-8	M10962-2	Spark Plug	1	1
9	M11084-27	Screw, #10-16 x 1/2"	18	18
10	M19630	Fuel Filter	1	1
11	M16790-12	Fuel Tube	1	1
12	M50660-05	Flared 45° Nut	1	1
13	M15823-27	Screw, #10-16 x 1/2"	10	10
14	M16871	Retainer Strap	1	1
15	M17920	Fan	1	1
16	M50814-03	Air Line	1	1
17	M50873-01	Clip	9	9
18	NPC-4C	Hex Nut, 1/4-20	2	2
19	WLM-4C	Lockwasher, 1/4"	2	2
20	M16661	Motor Clamp	4	4
21	M51043-01	Bolt, 1/4-20 x 1 1/2"	2	2
22	**	Motor and Pump Assembly	1	1
22-1	098784-02	Motor (230V/50Hz)	1	1
22-2	M8645-3	Pump Body	1	1
22-3	FHPF3-7C	Screw, #10-32 x 7/8"	2	2
22-4	M22009	Insert	1	1
22-5	M22456-3	Rotor	1	1
22-6	M50545	End Pump Cover	1	1
22-7	M12179	Intake Filter	1	1
22-8	M16545	End Filter Cover	1	1
22-9	M8940	Steel Ball (1/4" Dia.)	1	1
22-10	M10993-1	Pressure Relief Spring	1	1
22-11	M27694	Adjusting Screw	1	1
22-12	M22997	Plug	1	1
22-13	M12461-31	Screw, #10-32 x 1"	4	4
22-14	M12244-1	Output Filter	1	1
22-15	M12461-34	Screw, #10-32 x 1 1/2"	6	6
22-16	M11637	Lint Filter	1	1
22-17	M50820-02	Barb Fitting	1	1
22-18	M8643-3	Blade	4	4
23	M12651-1	Capacitor Clamp	1	1
24	M12650-3	Capacitor	1	1
25	M12828	Shell Support Bracket	1	1
26	M30865-04	Open/Closed Bushing	1	1
27	M16645	Motor Support Bracket	1	1
28	M51357-01	Capacitor (Run)	1	1
29	M15823-39	Screw, #8-18 x 1/2"	1	1
30	098511-101	Lower Shell	1	1
31	M11271-8	Nut Clip	9	9
32	M11084-29	Screw, #10-16 x 3/4"	8	8
33	M50104-03	Shorty Bushing	2	1
34	097630-02	Flame-Out Control	1	—
35	M12461-13	Screw, #8-32 x 1/4"	2	2
36	097060-01	Mounting Bracket	1	1
37	M12462-13	Relay-Motor Start	1	1
38	099607-01	Terminal Board Bracket	1	1
39	099157-01	Rivet	1	1
40	M9900-183	Wire Assembly (black 6")	1	1
41	M9900-184	Wire Assembly (black 15")	1	1
42	M11143-1	Strain Relief Bushing	1	1
43	M15779-27	Power Cord	—	1
	079673-03	Power Cord	1	—
44	098557-07	Electronic Ignitor	1	1
45	M10990-3	Rubber Bushing	1	1
46	098513-08	Fuel Tank	1	1
47	097702-01	Fuel Tank Cap	1	1
48	M27417	Drain Plug	1	1
49	079010-14	Wire Assembly (red 8 7/8")	1	1
50	M9900-77	Wire Assembly (black 15")	1	1
51	M16841-57	Wire Assembly (red 8 1/2")	1	—
52	M30865-02	Open/Closed Bushing	1	1

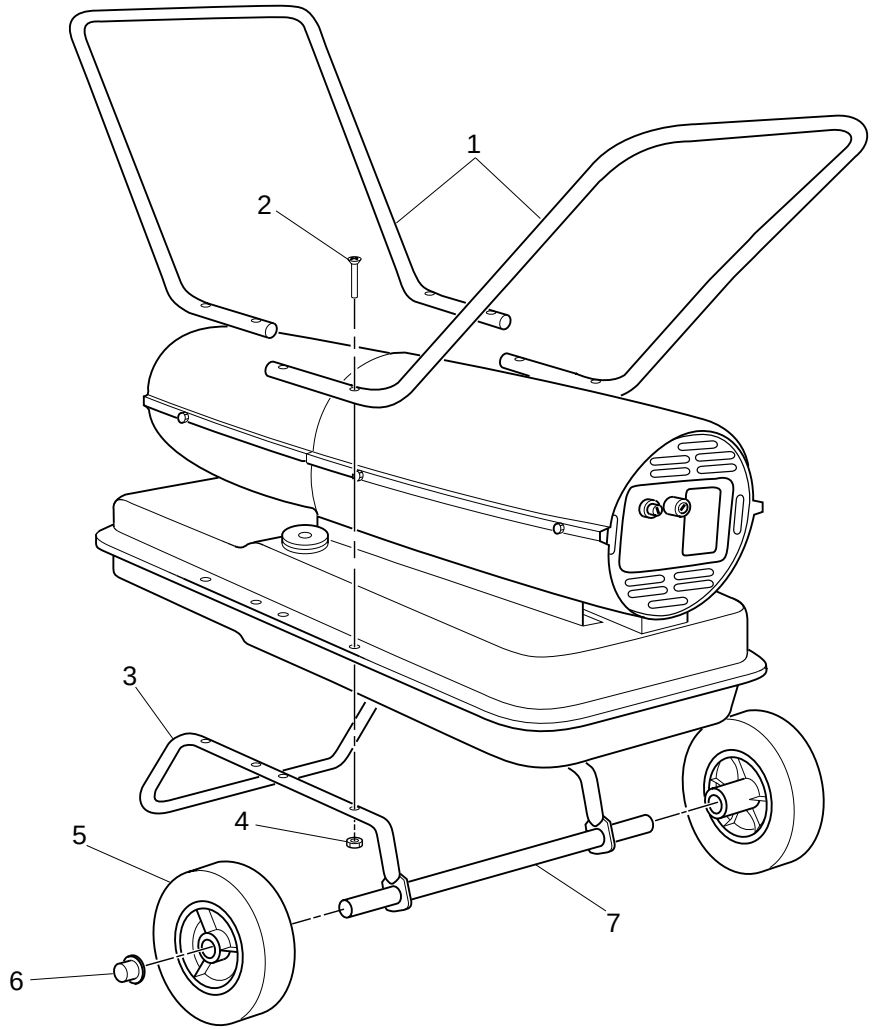
PARTS AVAILABLE - NOT SHOWN

	M50140	Fan Guard	1	1
	097650-01	Tradename Decal	1	1
	M18053	Filler Neck Screen	1	1
	098235-22	General Info. Decal	1	—
	098493-01	General Info. Decal	—	1
	078918-01	Terminal Board Tab Cap	1	3

**Not available as an assembly, order parts separately.

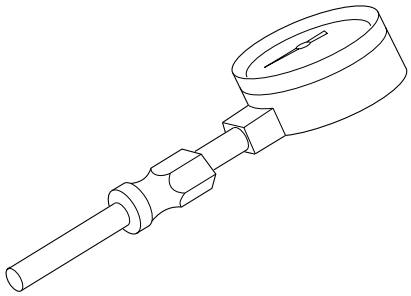
WHEELS AND HANDLES FOR 90,000 AND 150,000 BTU/Hr EDI/EEI MODELS

KEY NO.	PART NUMBER	PART DESCRIPTION	90,000 EDI/EEI QTY.	150,000 EDI/EEI QTY.
1	HA2203	Handles	2	—
	HA2205	Handles	—	2
2	M12345-33	Screw, #10-24 x 1 3/4"	8	8
3	M12342-3	Wheel Support Frame	1	—
	M12831-3	Wheel Support Frame	—	1
4	NTC-3C	Hex Nut, #10-24	8	8
5	097896-01	Wheel	2	2
6	M28526	Cap Nut	2	2
7	M51015-01	Axle	1	—
	M16801-2	Axle	—	1

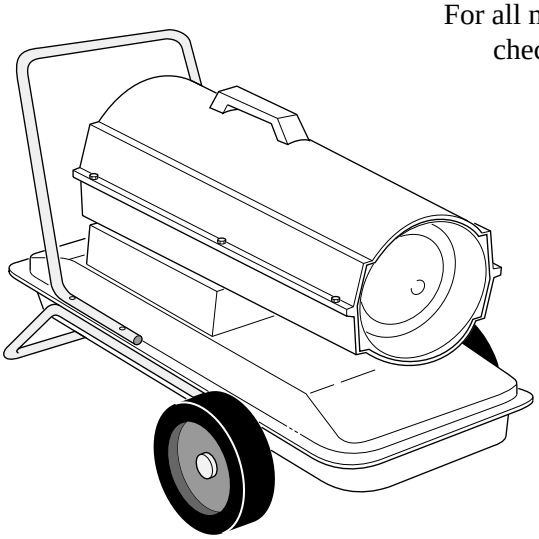


ACCESSORIES

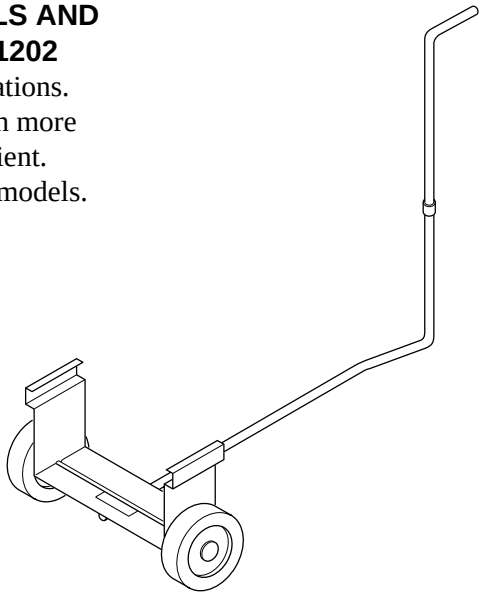
Purchase accessories from your local dealer.



AIR GAUGE KIT - HA1180
For all models. Special tool to check pump pressure.



HEAVY DUTY WHEELS AND HANDLE KIT - HA1202
For heavy duty applications. Makes your heater even more portable and convenient. For 30/70,000 BTU/Hr models.



STANDARD WHEELS AND HANDLE KIT - HA1206
Makes heater even more portable and convenient. Easy to assemble. For 30/70,000 BTU/Hr models.

WARRANTY AND REPAIR SERVICE

CERTIFICATE OF GENERAL EQUIPMENT - LIMITED 90 DAY WARRANTY

DESA International warrants new Products sold by it to be free from defects in material or workmanship for a period of ninety days after date of delivery to the first user and subject to the following conditions:

DESA International's obligation and liability under this Warranty is expressly limited to repairing or replacing at DESA International's option, any parts which appear to DESA International upon inspection to have been defective in material or workmanship when shipped from the factory. Such parts shall be provided at no cost to the user, at the business establishment of any factory authorized service center or the factory during regular working hours. The Warranty shall not apply to component parts or accessories of Products not manufactured by DESA International and which carry the warranty of the manufacturer thereof, or to normal maintenance (such as pressure adjustments) or to normal maintenance parts (such as filters and spark plugs). Replacement or repair parts installed in the Product covered by this Warranty are warranted only for the remainder of this Warranty as if such parts were original components of said Product. DESA INTERNATIONAL MAKES NO OTHER EXPRESS WARRANTY. TO THE EXTENT PERMITTED BY LAW DESA INTERNATIONAL MAKES NO IMPLIED WARRANTY AND MAKES NO WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE. IN ANY EVENT IMPLIED WARRANTIES INCLUDING THOSE OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE LIMITED TO THE DURATION OF THIS EXPRESS WARRANTY.

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We reserve the right to amend these specifications at any time without notice. The only Warranty applicable is our standard written Warranty. We make no other Warranty, expressed or implied.

A Service Manual is available by writing to the Technical Service Department at:

DESA INTERNATIONAL
Corporate Headquarters
2701 Industrial Drive
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Bowling Green, Kentucky 42102-9004
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