KEROSENE FORCED AIR HEATER

User's Manual & Operating Instructions

MODEL NUMBERS:

GAU-PH Series

CONSUMER: READ AND SAVE THESE INSTRUCTIONS



⚠DANGER **GENERAL HAZARD WARNING: READ AND UNDERSTAND ALL OF THE INSTRUCTIONS IN THIS MANUAL BEFORE ASSEMBLING, STARTING, OR SERVICING THE HEATER.** Be sure to comply with the instructions and warnings provided with this heater. Failure to comply can result in fire or explosion that can cause property loss, bodily injury, or loss of life. Only persons who can follow and understand these instructions should operate or service this heater. If you need heater info; such as an operating manual, labels, etcetera, contact Larson Electronics.

⚠DANGER **NOT FOR USE IN RESIDENTIAL LIVING AREAS OR IN ENCLOSED SPACES WITHOUT ADEQUATE VENTILATION. FOR OUTDOOR USE. INDOOR USE PERMITTED ONLY FOR: THE TEMPORARY HEATING OF ADEQUATELY VENTILATED BUILDINGS OR STRUCTURES UNDER CONSTRUCTION, ALTERATION OR REPAIR.** This is an unvented portable heater that uses air (Oxygen) from within the area in which it is used. Failure to provide adequate combustion and ventilation air will result in asphyxiation, carbon monoxide poisoning, bodily injury or death. Refer to "Ventilation" on Page 6.

C SP® US

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SAFETY INFORMATION

⚠WARNING **FIRE, BURN, INHALATION AND EXPLOSION HAZARD.** Keep combustibles such as; building materials, paper or cardboard a safe distance away from the heater as recommended by these instructions. Never use the heater in spaces which contain products such as; gasoline, solvents, paint thinners, dust particles, volatile or airborne combustibles or any unknown chemicals. This is an unvented portable heater. It uses air (Oxygen) from the area in which it is used. Adequate combustion and ventilation air must be provided. Refer to "Ventilation" on page 6. Bulk fuel storage should be a minimum of 25 feet (7.6 m) from heater.

⚠WARNING **DO NOT OPERATE THIS HEATER UNTIL YOU HAVE READ AND THOROUGHLY UNDERSTAND THESE SAFETY AND OPERATING INSTRUCTIONS.**
Failure to comply with the precautions and instructions provided with this heater can result in death, serious bodily injury, property loss or damage from the hazards of fire, soot production, explosions, burns, asphyxiation or carbon monoxide poisoning. Only persons who can read and understand these instructions should use or service this heater.

⚠WARNING **DO NOT START THE HEATER WHEN EXCESS OIL HAS ACCUMULATED.**

⚠WARNING **DO NOT START THE HEATER WHEN THE CHAMBER IS HOT.**

⚠WARNING This product contains chemicals, including lead, which are known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.

MASSACHUSETTS RESIDENTS: Massachusetts state law prohibits the use of this heater in any building which is used in whole or in part for human habitation. Use of this heating device in Massachusetts requires local fire department permit (M.G.L.C. 148, Section 10A).

NEW YORK CITY RESIDENTS: The New York City Fire Code prohibits the storage, handling and use of kerosene fueled heaters for space heating. Any person violating that provision may be punished by a fine up to $10,000 and a term of imprisonment of up to 6 months.

THE INSTALLATION OF THE EQUIPMENT SHALL BE IN ACCORDANCE WITH THE REGULATION OF AUTHORITIES HAVING JURISDICTION AND CSA STANDARD B139.

Look for this icon throughout the manual for helpful tips on how to assemble, use and clean your KFA Heater.

SAFETY INFORMATION (CONT.)

⚠WARNING **RISK OF INDOOR AIR POLLUTION!**

The products described in this manual are kerosene direct-fired, forced air heaters. Kerosene forced air heaters are primarily intended for use for temporary heating of buildings under construction, alteration or repair. Direct-fired means that all of the combustion products of the heater enter the heated space. This appliance is rated at 98% combustion efficiency, but does produce small amounts of carbon monoxide.

⚠DANGER **CARBON MONOXIDE POISONING MAY LEAD TO DEATH!**

Carbon monoxide is toxic. Humans can tolerate only small amounts of carbon monoxide and so precautions should be taken to provide proper ventilation. Failure to provide proper ventilation in accordance with the instructions in this manual can result in death.People with breathing problems should consult a physician before using this heater. Early signs of carbon monoxide poisoning resemble the flu. Symptoms of improper ventilation/carbon monoxide poisoning are:

Headache • Dizziness • Nausea • Dry Mouth Sore Throat • Burning of Nose and Eyes

If you experience any of these symptoms: **GET FRESH AIR AT ONCE!** Have your heater serviced and check for proper ventilation. Some people are more affected by carbon monoxide than others. These include: pregnant women, those with heart or lung problems, anemia or those under the influence of alcohol or at high altitudes.

FOR OUTDOOR USE. INDOOR USE PERMITTED ONLY FOR: The temporary heating of adequately ventilated buildings or structures under construction, alteration or repair. Provide at least a three square foot (2,800 sq cm) opening of outside air for every 100,000 Btu/Hr (29 kW) heater rating. Refer to "Ventilation" on page 6 for further instructions.

⚠WARNING **RISK OF ELECTRIC SHOCK!**

ALWAYS use only the electrical power (voltage and frequency) specified on the model plate of the heater. ALWAYS use only three-prong, grounded outlet and extension cord.

ALWAYS use only 14 AWG or better extension cord.

ALWAYS unplug the heater when not in use.

ALWAYS install the heater so that it is not directly exposed to water spray, rain, dripping water, or wind.

NEVER use fuels such as gasoline, benzine, paint thinners or other oil compounds in this heater.

NEVER refill the heater's fuel tank while the heater is operating or still hot. This heater is EXTREMELY HOT while in operation.

NEVER block air inlet (rear) or air outlet (front).

NEVER use duct work in front or rear of heater.

NEVER move or handle heater while still hot.

⚠WARNING **RISK OF BURNS, FIRE AND EXPLOSION!**

NEVER transport heater with fuel in tank.

NEVER use with an external fuel tank.
Keep all combustible materials away from this heater.

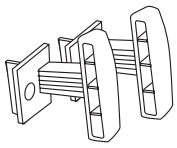
Minimum Clearance From Combustibles		
	45	215
Top	4 ft. (125 cm)	4 ft. (125 cm)
Sides	4 ft. (125 cm)	4 ft. (125 cm)
Front	8 ft. (250 cm)	10 ft. (305 cm)

ALWAYS locate heater on a stable and level surface.

If your heater is equipped with a thermostat, once it is plugged in, it can start at anytime in accordance with the thermostat setting.

⚠WARNING **CAUTION! HOT WHILE IN OPERATION. DO NOT TOUCH. KEEP CHILDREN, ANIMALS, CLOTHING AND COMBUSTIBLES AWAY FROM HEATER.**

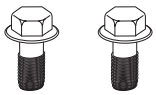
WHAT'S IN THE BOX (45 / 80)



Cord Wraps (Optional)



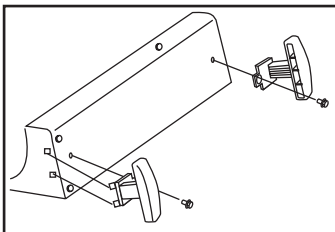
Carry Handle (1)



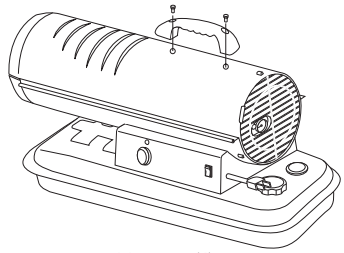
10 mm Screws (2)



15 mm Screws (2)



Shown With Optional Cord Wraps



Heater (1)

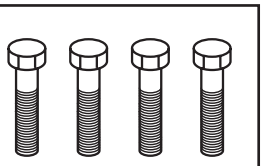
WHAT'S IN THE BOX (140 / 190 / 215)

Tip: Be sure to remove the axle from the side of the Styrofoam packaging.

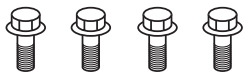
Tip: Use a power screwdriver and locking wrench for easier assembly.

Tools Needed:

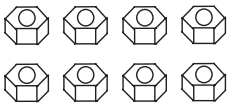
- Phillips Head Screw Driver
- 8 mm open end wrench
- 19 mm open end wrench



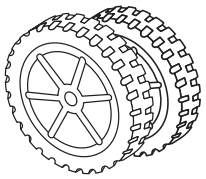
50 mm Screws (4)



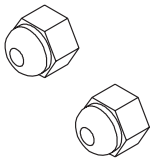
30 mm Screws (4)



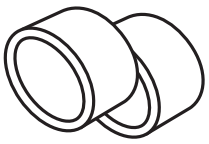
8 mm Nuts (8)



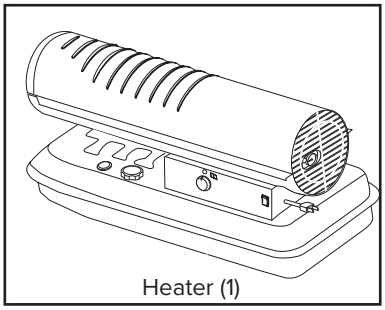
Wheels (2)



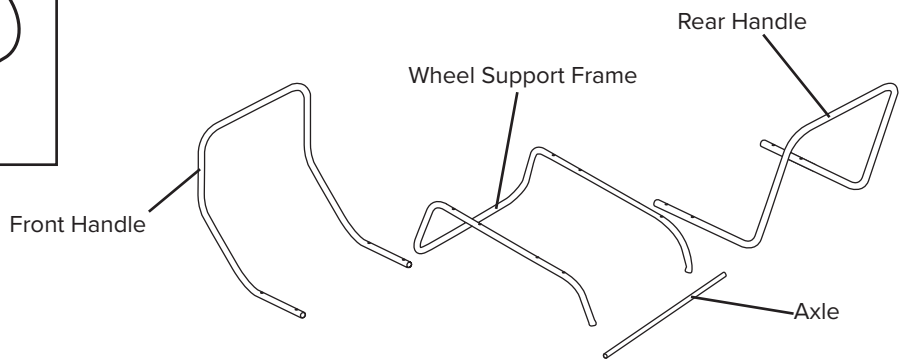
Axle Nuts (2)



Spacers (2)



Heater (1)



- Remove the heater and all packaging materials from the shipping carton

Note: Save the box and packaging materials for future storage.

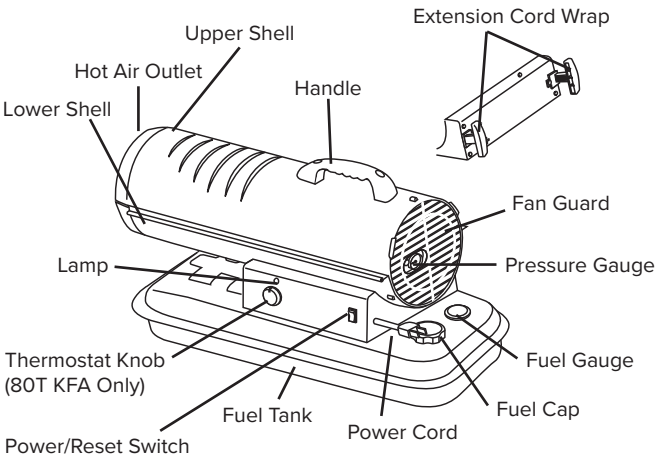
NEVER LEAVE HEATER UNATTENDED WHILE BURNING OR WHILE CONNECTED TO A POWER SOURCE

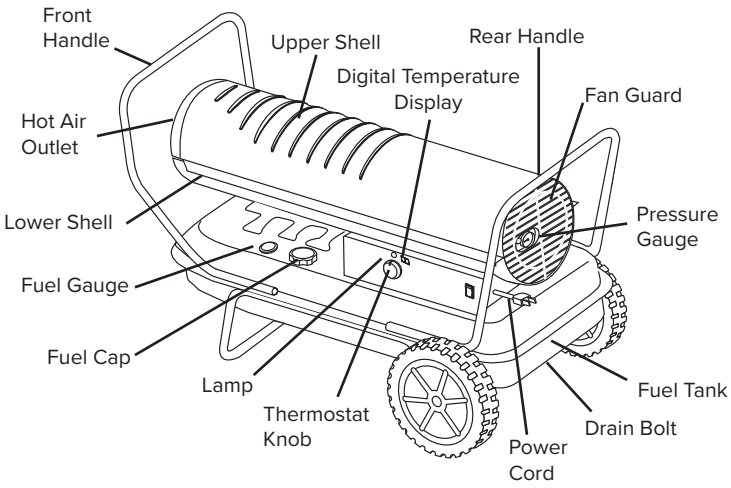
SPECIFICATIONS

Model #	45	80	140	190	215
Rating: Btu/Hr / kW	45,000 / 13.19	80,000 / 23.4	140,000 / 41	190,000 / 55.68	215,000 / 63.01
Fuel Consumption: Gal/Hr / L/Hr	0.35 / 1.32	0.63 / 2.38	1.1 / 4.16	1.42 / 5.38	1.63 / 6.17
Fuel Tank Capacity: Gallons / Liters	5 / 19	5 / 19	10 / 38	13 / 49	13 / 49
Pump Pressure: psi / BAR	3.0 / 0.21	3.8 / 0.26	6.6 / 0.41	8.5 / 0.59	9.0 / 0.62
Volts: AC/Hz	120VAC / 60Hz	120VAC / 60Hz	120VAC / 60Hz	120VAC / 60Hz	120VAC / 60Hz
Amps	1.4	1.5	2.4	2.7	2.8
Phase	Single	Single	Single	Single	Single

Specifications subject to change without notice.

FEATURES





ASSEMBLY INSTRUCTIONS (140 / 190 / 215)

1. Insert axle through holes in wheel support.
2. Slide spacer onto axle.
3. Slide wheel onto axle and hold in place with the axle nuts (see Figure 1).

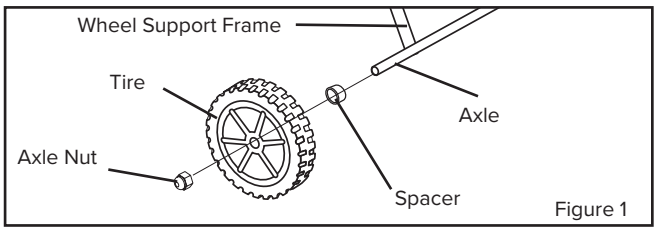
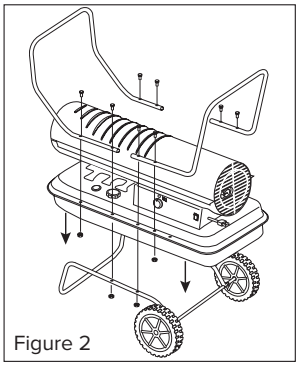


Figure 1

4. Place heater on wheel support and line up holes on the fuel tank lip.
5. Attach front handle with (2) long screws (50 mm) and (2) nuts through the second hole from the front on both sides of the tank lip and wheel support frame and tighten firmly.
6. Insert (2) short screws (30 mm) through the first hole from the front in the tank lip and tighten firmly. Make certain all (4) screws are secure.
7. Attach rear handle with (2) long screws (50 mm) and (2) nuts through the second hole from the rear of the heater on either side (see Figure 2).
8. Tilt the heater up gently so it is resting on the front handle.

NOTE: DO NOT do this if there is fuel in the tank.

9. Remove the wheels to secure the second set of screws through the rear handle.
10. Secure the rear handle with (2) short screws (30 mm) and (2) nuts and tighten firmly.
11. Replace wheels and tighten with the wheel nuts.
12. Tilt heater back down onto wheels and check all screws and nuts to ensure they are secure.


Figure 2

OPERATION

Fueling The Heater:

Kerosene (K-1)
For optimal performance of this heater, it is strongly suggested that K-1 kerosene be used, especially in temperatures lower than 26°F (-3°C). K-1 kerosene has been refined to virtually eliminate contaminants, such as sulfur, which can cause a rotten egg odor during the operation of the heater. Using diesel fuel can cause excess soot production. Do not use Bio-Diesel as this fuel will damage your heater's seals and filter.

- CSA certified for use with K-1 kerosene, no. 1 & no. 2 diesel, JP8/Jet A Fuel, no. 1 and no. 2 fuel oil.

⚠ DANGER **NEVER REFUEL THIS HEATER WHILE IT IS HOT OR OPERATING. FIRE OR EXPLOSION COULD RESULT.**

⚠ CAUTION **NEVER FILL THE FUEL TANK IN-DOORS. ALWAYS FILL THE TANK OUTDOORS. BE SURE THAT THE HEATER IS ON LEVEL GROUND WHEN FUELING, AND NEVER OVERFILL THE TANK.**

⚠ WARNING **DO NOT USE GAS-OLINE OR CRANK-CASE DRAININGS.**

DO NOT use any fuel that is not approved above.

- NEVER use fuel such as, benzene, alcohol, white glass, camp stove fuel, paint thinners, or other oil compounds in this heater. THESE ARE VOLATILE FUELS THAT CAN CAUSE A FIRE OR EXPLOSION.
- NEVER store kerosene in the living space. Kerosene should be stored in a well ventilated area outside the living area.
- NEVER store kerosene in direct sunlight or near a source of heat.
- NEVER use kerosene that has been stored from one season to the next. Kerosene deteriorates over time. OLD KEROSENE WILL NOT BURN PROPERLY IN THIS HEATER.

NOTE: Kerosene should only be stored in a blue container that is clearly marked "Kerosene." Never store kerosene in a red container. Red is associated with gasoline.

Ventilation:

⚠ DANGER

CARBON MONOXIDE POISONING MAY LEAD TO DEATH!

- Risk of indoor air pollution and Carbon Monoxide Poisoning. Use heater only in well ventilated areas.

- Refer to Safety Information on page 3 for information about Carbon Monoxide Poisoning.

- **ALWAYS** provide a fresh air opening in the heated space of at least three square feet (2,800 sq. cm) for each 100,000 Btu / Hr. (29 kW) of heater output. Provide a larger opening if more heaters are being used.

Minimum Ventilation Opening Needed		
45	80	140
1.4 $ft.^2$	2.4 $ft.^2$	4.2 $ft.^2$
1250 cm^2	2230 cm^2	3902 cm^2

Minimum Ventilation Opening Needed	
190	215
5.7 $ft.^2$	6.5 $ft.^2$
5290 cm^2	5990 cm^2

OPERATION (CONT.)

Starting the Heater: (Ignition)

1. Fill the tank with kerosene or other approved fuel until needle on fuel gauge points to “F”.
2. Replace fuel cap and tighten firmly.
3. Connect the heater to a three prong (grounded) power source. You must use a three prong (grounded) extension cord that is at least 6 feet long and is a minimum of 14 AWG rating.

Model 45:

1. Complete steps 1-3 above.
2. Move power switch to “On” position. The power indicator light will illuminate and the heater will ignite.

Stopping / Restarting Heater:

- To stop the heater, move the power switch to the “Off” position and unplug the power cord.
- To restart the heater; wait 10 seconds and follow ignition steps.

TIP: If the heater does not ignite; move switch to “Off” position, check steps 1-3 above and then move switch to “On” position.

Models 80T - 215T:

1. Complete “starting heater ignition” steps 1-3 above
2. Turn thermostat control knob to desired temperature setting. The thermostat set range is from 40 °F to 110 °F.
3. Move power switch to “On” position. The power indicator light and room temperature display will illuminate and heater will ignite.

NOTE: 45-80T models do not have a room temperature display feature.

The room temperature display will indicate the following:

- When the temperature is less than 0 °F the display says “LO”.
- When the temperature is more that 99 °F the display says “HI”.
- Between 0 °F and 99 °F the display shows actual temperature.

Stopping / Restarting Heater:

- To stop the heater, move the power switch to the “Off” position and unplug the power cord.
- To restart the heater; wait 10 seconds and follow ignition steps.

TIP: If the heater does not ignite, the thermostat may be set too low. Turn the control knob to a higher setting until the heater ignites. If the heater does not ignite; move switch to “Off” position, check steps 1-3 above and then move switch to “On” position.

Long Term Storage:

Models 45 - 80T:

1. Use an approved siphon to drain fuel through the fuel cap opening.

Models 140T - 215T:

1. Drain fuel through the drain bolt in the bottom of the fuel tank.
2. To remove the drain bolt, unscrew counterclockwise.
3. Using a small amount of kerosene, rinse and swirl the kerosene inside of the fuel tank, empty the tank fully.
4. To replace the drain bolt; push the drain head fully into the drain hole and screw clockwise.

IMPORTANT: Never store leftover kerosene between seasons, using old fuel can damage heater.

MAINTENANCE

Service:
DO NOT TAMPER WITH THE UNIT. HAVE A COMPETENT SERVICEMAN MAKE ANY NECESSARY ADJUSTMENT OR REPAIRS.

Use only original equipment parts. The use of alternate or third party components can cause unsafe operating conditions and will void your warranty.

We suggest following a maintenance schedule as follows:

FUEL / FUEL TANK:

Flush tank every 200 hours of operation or as needed. DO NOT flush with water; use fresh K-1 kerosene only.

AIR FILTERS:

The air intake filter should be replaced or washed with soap and water and dried thoroughly every 500 hours of operation or less depending on conditions.

The output and lint filters should be replaced every 500 hours of operation or less depending on conditions. (See Figure 4)

NOTE: Use of diesel fuel may require additional maintenance

FAN BLADES:

Blades should be cleaned at least once per heating season, depending on conditions. Remove all accumulated dust and dirt with a damp cloth, taking care not to bend any of the fan blades. Be sure the blades are dry before re-starting the heater.

FUEL FILTER:

The fuel filter should be cleaned at least twice per heating season. Clean the filter by rinsing it in clean K-1 Kerosene. Contaminated fuel could make cleaning the fuel filter necessary immediately.

NOTE: To remove the filter from models 45 - 80T-KFA turn filter 90° clockwise. To remove the filter from models 140T - 215T turn filter 90° counter-clockwise. See Figure 3.

THERMISTER PLACEMENT:

Ensure the thermister wire is in the proper place. The wire should be lying on the bottom shell inside the heater with the plastic end placed under the motor support/motor and away from fan blade.

ROTOR:

The rotor with carbon vanes should be evaluated every heating season. The rotor is behind the air filters. The vanes should be inspected for damage or wear. The rotor should be inspected for damage, chips, wear, cracks.

Check rotor gap: Remove the rear cover. Loosen the two pump ring screws. Lift the pump ring upwards. Insert a 0.1 mm feeler gauge and apply slight downward pressure, enough to offer resistance when attempting to remove gauge. Hand-tighten the two pump ring screws. Re-install the End Pump Cover and the plastic End Filter Cover. Start the heater and adjust to the proper pump pressure.

⚠WARNING **Never service heater while it is plugged in or hot!**

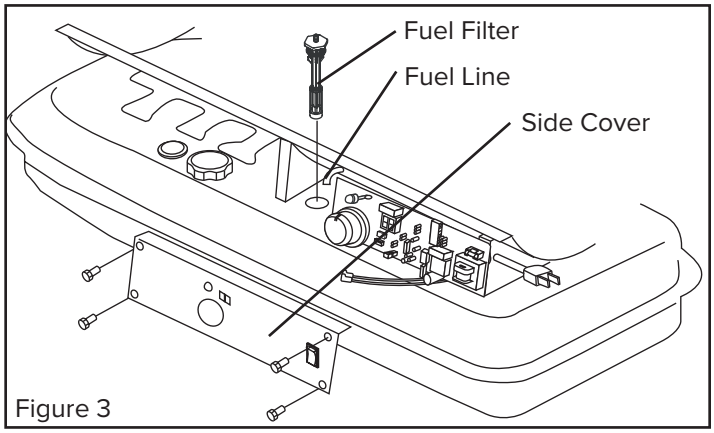


Figure 3

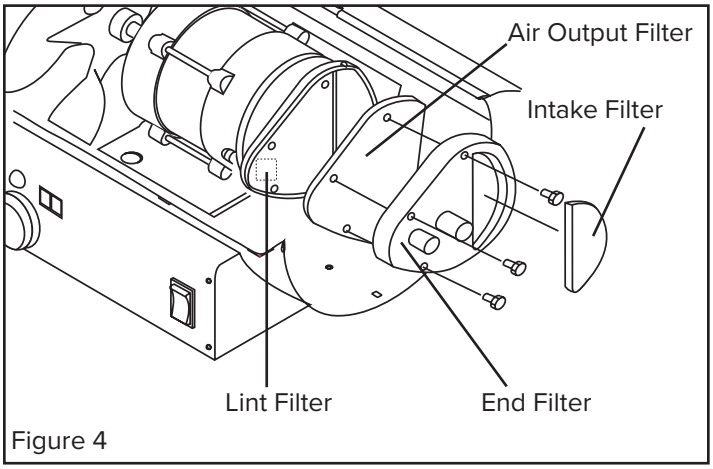


Figure 4

MAINTENANCE (CONT.)

Service (Continued):

SPARK PLUG:
Clean and re-gap every 600 hours of operation, or replace as needed. After removing the spark plug, clean the terminals with a wire brush. Re-gap the terminals to 0.140" (3.5mm). See Figure 5.

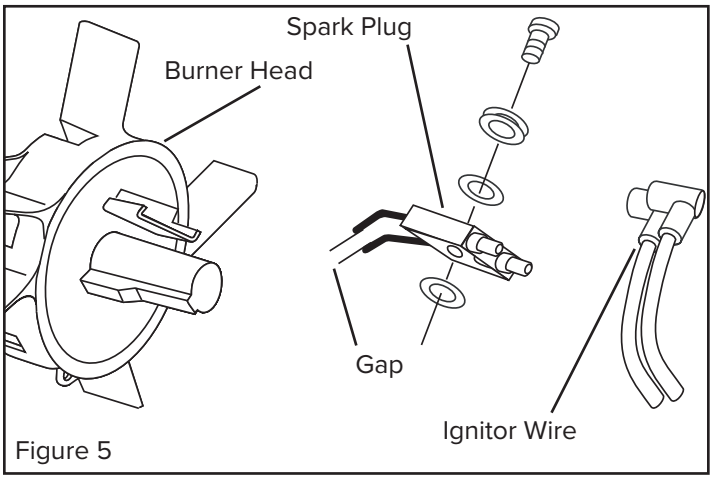


Figure 5

PHOTOCELL:
The photocell should be cleaned using a cotton swab dipped in alcohol or water at least once per heating season, or more depending on conditions. See Figure 6.

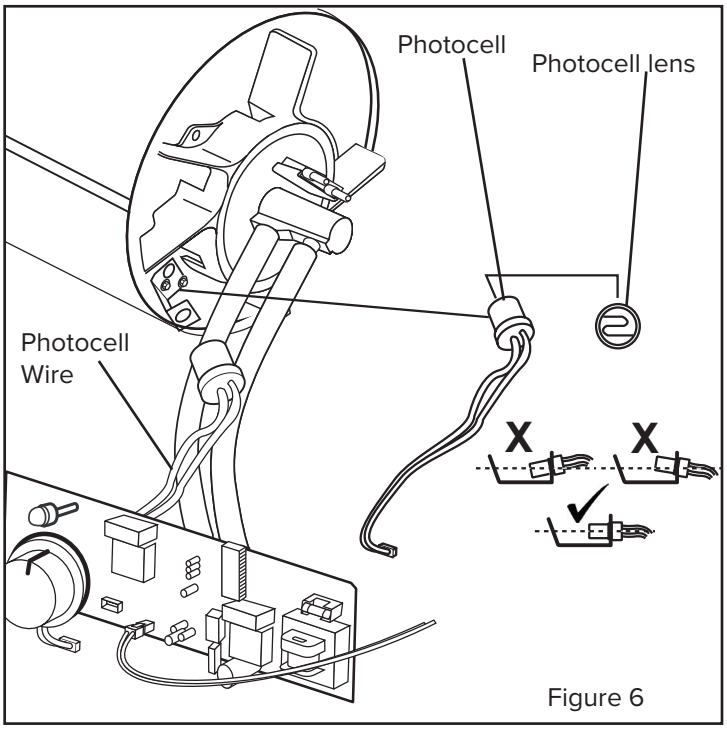


Figure 6

PUMP PRESSURE:
While heater is operating, turn adjusting screw clockwise to increase, counter-clockwise to decrease pressure. Correct pump pressure is as follows:

Model Number	Pump Pressure
45	3.0 PSI (0.21 BAR)
80	3.8 PSI (0.26 BAR)
140	6.6 PSI (0.41 BAR)
190	8.5 PSI (0.59 BAR)
215	9.0 PSI (0.62 BAR)

Tolerance ± 10%

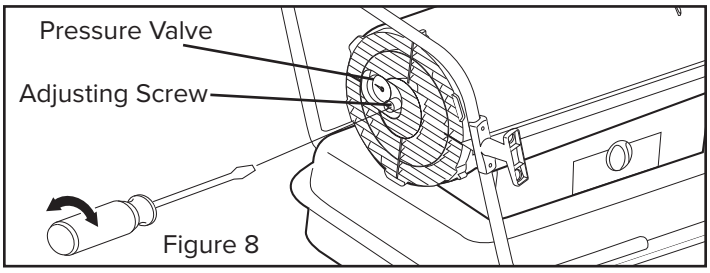


Figure 8

NOZZLES:
Nozzles should be cleaned or replaced at least once per heating season. Contaminated fuel could make this necessary immediately. To clean dirt from nozzle, blow compressed air through nozzle front. It may be necessary to soak the nozzle in K-1 kerosene to loosen any dirt particles.

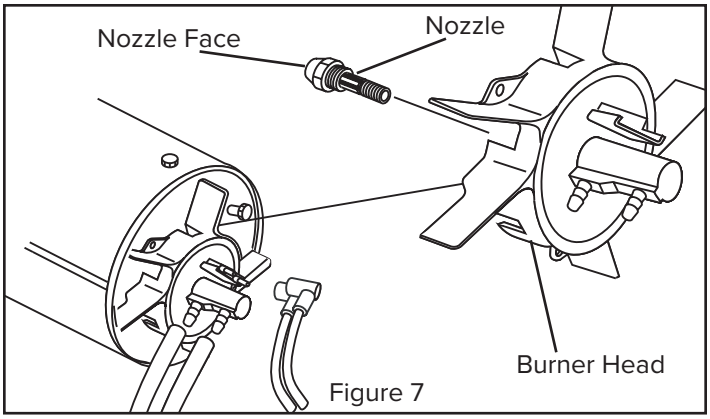
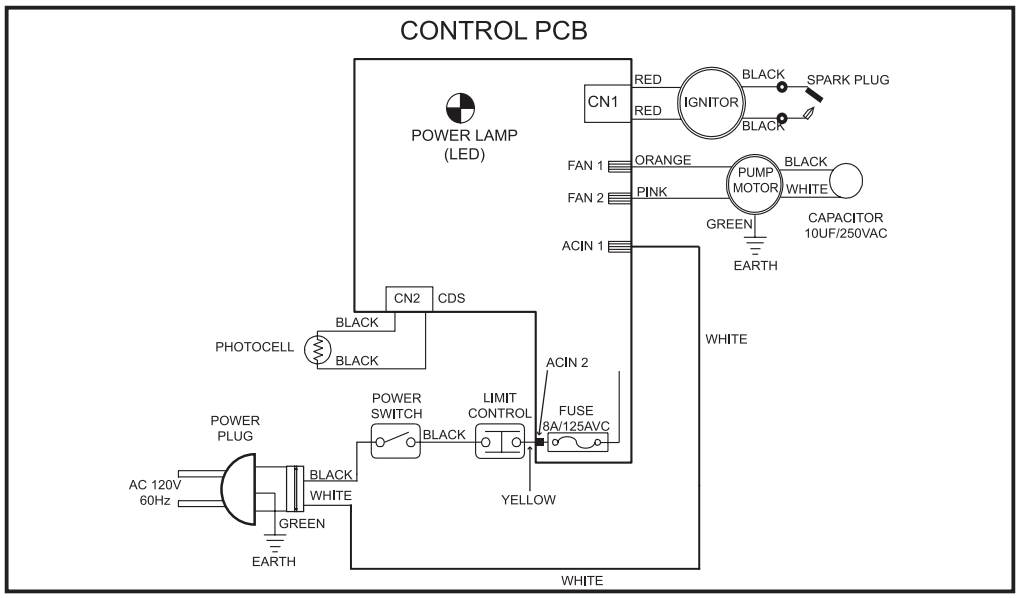


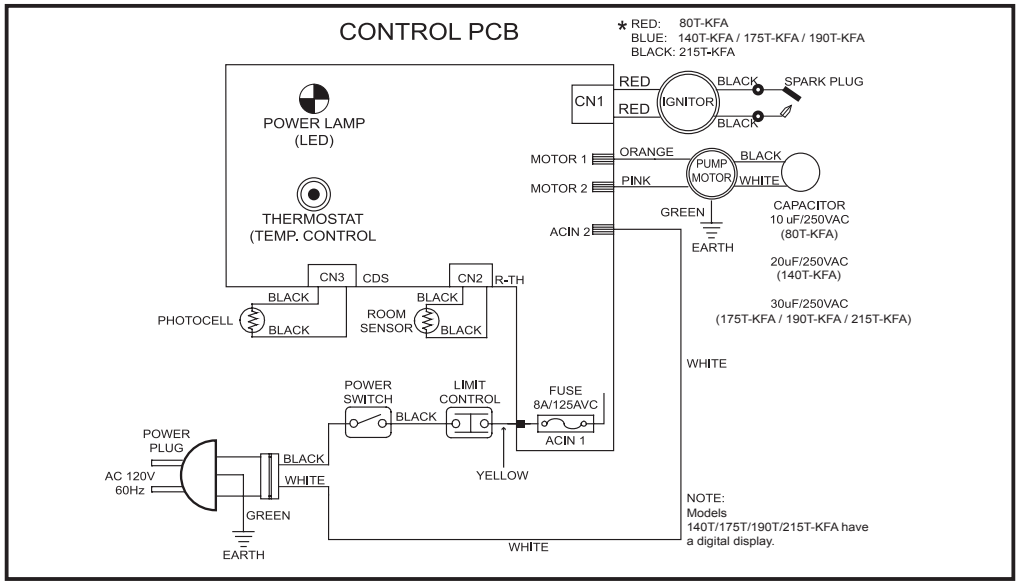
Figure 7

WIRING DIAGRAMS

45



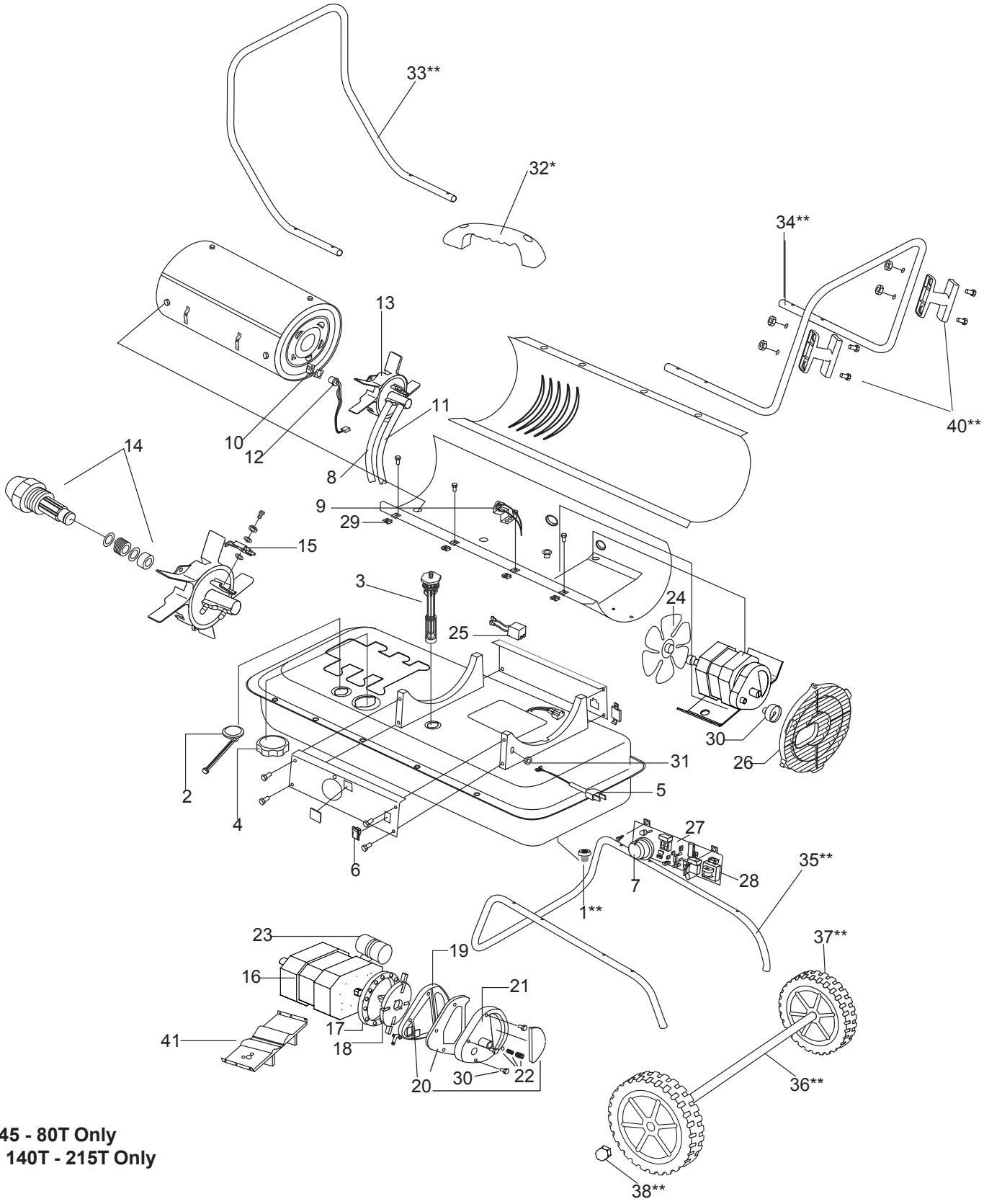
80 - 215



TROUBLESHOOTING GUIDE

Problem	Possible Cause	Solution
Heater Ignites, but main PCB shuts off after a short period of time. Lamp flickers and LED display shows “E1”.	1. Incorrect pump pressure. 2. Dirty input, output or lint filter. 3. Dirty fuel filter. 4. Nozzle is dirty. 5. Photocell lens is dirty. 6. Photocell not installed properly. 7. Photocell is defective. 8. Improper electrical connection between main PCB and photocell. 9. Improper location of thermister sensor (does not apply to 45 model) 10. Improper electrical connection within the temperature limit switch	1. Adjust pump pressure. 2. Clean / replace air or lint filter. 3. Clean / replace fuel filter. 4. Clean / replace Nozzle. 5. Clean / replace photocell. 6. Adjust photocell position 7. Replace photocell 8. Check wiring connections (see wiring diagrams on page 10). 9. Check thermister placement 10. Replace temperature limit switch
Heater will not operate or motor runs for a short time. Lamp flickers and LED display shows “E1”.	1. No kerosene in the fuel tank. 2. Incorrect pump pressure. 3. Corroded spark plug or incorrect plug gap. 4. Dirty fuel filter. 5. Dirty nozzle. 6. Moisture in fuel tank. 7. Improper electrical connection between transformer and circuit board. 8. Ignitor wire not connected to spark plug. 9. Defective ignitor. 10. Improper spacing with rotor	1. Fill tank with fresh kerosene. 2. Adjust pump pressure. 3. Clean / replace spark plug. 4. Clean / replace fuel filter. 5. Clean / replace nozzle. 6. Rinse fuel tank with clean, fresh kerosene. 7. Inspect all electrical connections (see wiring diagrams on page 10). 8. Re-attach ignitor wire to spark plug. 9. Replace ignitor. 10. Adjust rotor
Fan does not operate when heater is plugged in and power switch is in the “ON” position. The lamp is flickering or and LED display shows “E1” or “E2”.	1. Thermostat is set too low (does not apply to 45 model). 2. Broken electrical connection between main PCB and motor.	1. Rotate thermostat to a higher setting 2. Inspect all electrical connections (see wiring diagrams on page 10).
Lamp is flickering and LED display shows “E3”.	1. Thermostat switch has failed.	1. Replace thermostat switch (see Wiring diagrams on page 10).
Poor combustion and / or excess soot production.	1. Dirty input, output or lint filter. 2. Dirty fuel filter. 3. Poor quality of fuel. 4. PSI is too high or too low. 5. Dirty nozzle	1. Clean / replace air or lint filter. 2. Clean / replace fuel filter. 3. Flush fuel tank and refuel heater. 4. Use proper pressure. 5. Clean / replace nozzle
Heater does not turn on and the lamp is not lit.	1. Temperature limit sensor has overheated. 2. No electrical power. 3. Fuse is blown. 4. Improper electrical connection between temperature limit sensor and circuit board.	1. Push power switch to “OFF and allow heater to cool for 10 minutes. Restart heater. 2. Check power cords for proper connection and test the power supply. 3. Check / replace the fuse. 4. Inspect all electrical connections (see wiring diagrams on page 10).

EXPLODED VIEW



*** 45 - 80T Only**
**** 140T - 215T Only**

PARTS LIST

#	Description
1	Drain Bolt
2	Fuel Gauge
3	Fuel Filter
4	Fuel Cap - Large Plastic
5	Power Cord
6	Power Switch
7	Thermostat Control Knob
8	Air Line
9	Thermostat Limit Control
10	Photocell Bracket
11	Fuel Line
12	Photocell
13	Burner Head Assembly
14	Nozzle Kit
15	Spark Plug Kit
16	Motor
17	Pump Body
18	Rotor Kit
19	End Pump Cover
20	Filter Kit
21	End Filter Cover
22	Pump Adjustment Kit
23	Capacitor
24	Fan
25	Ignitor
26	Fan Guard
27	Main PCB Assembly
28	Fuse
29	Clip Nut
30	Air Pressure Gauge
31	Cord Bushing
32	Handle
33	Front Handle
34	Rear Handle
35	Wheel Support Frame
36	Wheel Axle
37	Wheel
38	Wheel Nut
39	Hardware Kit (not pictured)
40	Cord Wrap
41	Motor Supporter