Agway

PORTABLE HEATERS

MODELS

AG-75

Spec. Nos.
2811G12
2811G12-1

AG-120

Spec. Nos.
2827G4
2827G4-1

OPERATING, MAINTENANCE and SERVICE INSTRUCTIONS with PARTS LIST

atoMaster BURNER SYSTEM

AGWAY INC., TERRACE HILL, ITHACA, N.Y. 14851

Form No. 2064 (9/66)

Litho in U. S. A.

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SECTION I
INTRODUCTION

A. GENERAL

1. Purpose of Heater. Use this heater wherever you need temporary portable heat. It must be used with adequate ventilation and proper electrical power.

2. Purpose of Manual. The Service Manual gives complete instructions for operating, maintaining, trouble shooting, and servicing the heater. A complete parts list is included at the end of the manual.

B. PRINCIPLES OF OPERATION

Operation of the heater is simple. It involves three basic systems. (See figure 1.)

1. Fuel System. An air pump on one end of the motor shaft forces air through the nozzle. The moving air lifts fuel from the tank by a siphon action and carries it into the combustion chamber in a fine spray.

2. Ignition System. An electric arc that fires constantly between a pair of electrodes while the heater is in operation ignites the mixture of fuel and air.

3. Air System. A fan on the other end of the motor shaft supplies additional air to the heater. Part of this air enters the burner through ports around its outer edge, and helps complete the combustion of the burning fuel-air mixture.

The rest of the air from the fan passes over and around the combustion chamber. At the front of the heater it mixes with the hot air coming from inside the combustion chamber. The air then flows out of the heater as a jet of clean, heated air.

C. MODEL DIFFERENCES

The two sizes of heaters covered by this Operating and Service Manual are basically the same in construction and principle. However, the 120,000 BTU heaters have a built-in thermostat, and the motor starting circuit is slightly different.

The thermostat on the 120,000 BTU heaters is mounted in the transformer housing on the left side of the heater. It can be set for any temperature from 30° to 90°F, and cycles the heater on and off to maintain the surrounding air at the desired setting. At its OFF position, it shuts the heater off. At its ON position, it causes the heater to operate continuously.

A separate thermostat is available as an accessory for the 75,000 BTU heaters.

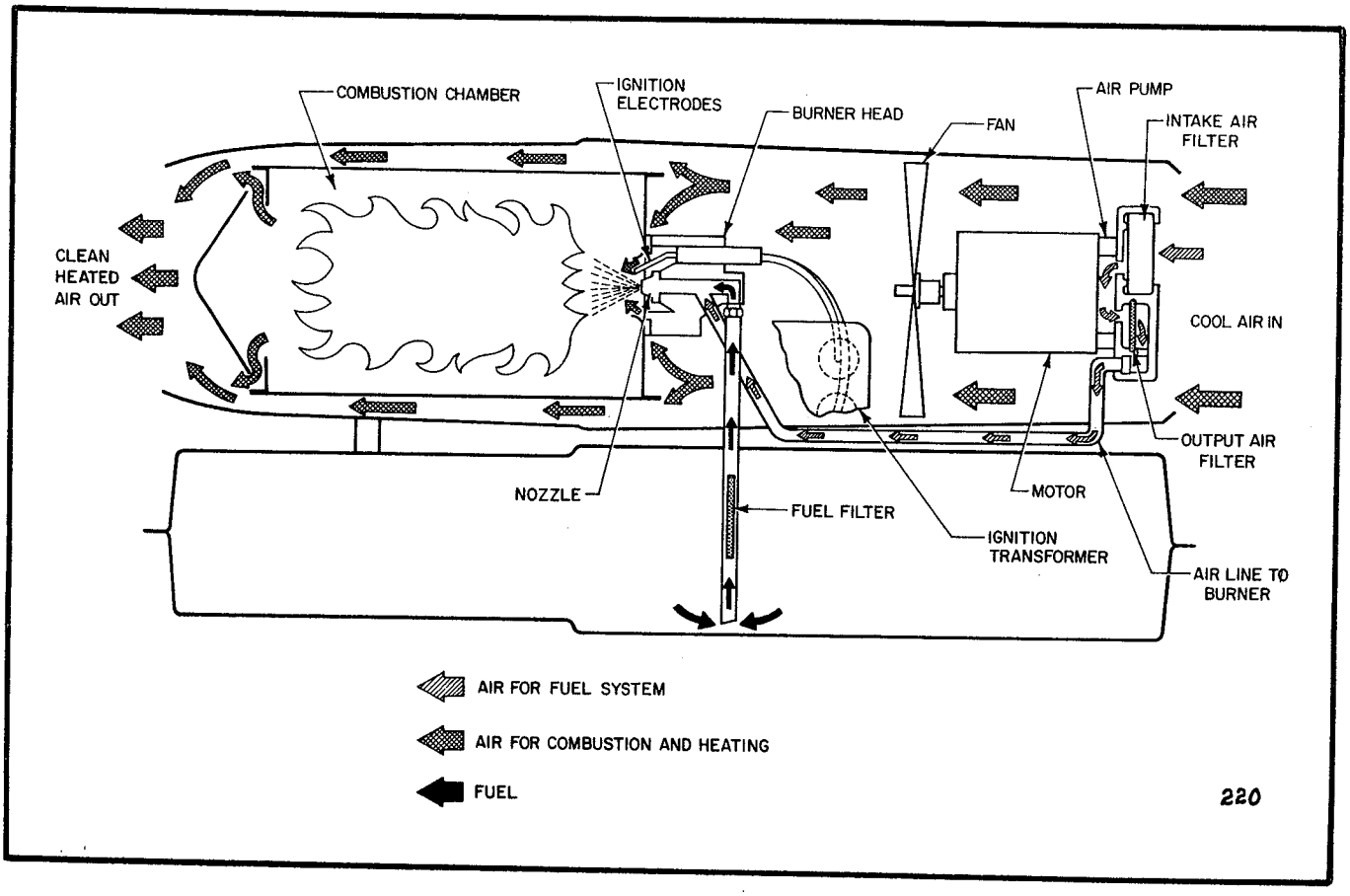


Figure 1. Schematic Diagram Showing Principles of Heater Operation

D. SPECIFICATIONS

Characteristic	75,000 BTU Heaters	120,000 BTU Heaters
Output rating (BTU per hour)	75,000	120,000
Air output, approx. (Cu. ft. per minute)	345	450
Amperage (During normal run)	4	5.5
Weight, approx. (Pounds)	68	90
Fuel	Kerosene or No. 1 fuel oil only.	

Characteristic	75,000 BTU Heaters	120,000 BTU Heaters
Fuel tank capacity (U.S. gallons)	9.0	13.5
Fuel consumption, approx. (Gallons per hour)	0.55	0.85
Voltage and cycles	As shown on heater instruction plate.	
Motor RPM (115-volt, 60-cycle heaters)	3,450	3,450
(230-volt, 50-cycle heaters)	2,850	2,850
Duct	No duct recommended.	

SECTION II

OPERATION

A. OPERATING CAUTIONS

1. Use the heater in a well-ventilated area only. A partly-opened door or window near the heater will give enough ventilation. We do not recommend the use of this heater as the primary source of heat in sleeping quarters.

2. Use ONLY kerosene or No. 1 fuel oil. DO NOT USE GASOLINE, AS IT IS VOLATILE AND DANGEROUS. Do not use No. 2 or No. 3 fuel oil, as they contain tars which will contaminate the heater.

3. Use the heater only on the specified electrical power. This is given on the heater instruction plate.

4. Plug the heater into a grounded receptacle, or use a grounding adapter. Be sure the heater is grounded whenever it is in operation and whenever you are working on it.

5. Keep the heater at least 4 feet from any combustible material.

6. Do not use the heater in the presence of flammable vapors like those from paint or gasoline.

7. Do not add fuel while the heater is operating.

WARNING

The motor has an automatic thermal overload protector. It may stop due to low voltage or overload, then RESTART automatically. Be sure to disconnect the heater service cord before removing the upper shell or inspecting the motor.

B. EXTENSION CORD WIRE SIZES

Be sure to use an extension cord of the proper size to assure adequate voltage at the heater.

Length of cord (feet)	100	200	300	400	500
Wire size (AWG)	14	12	10	8	6

C. FUEL

Be sure the tank is clean. Fill it with clean kerosene or No. 1 fuel oil ONLY. Do not use any other fuel.

When the heater is operated at very low temperatures (beyond 10°F below zero), the fuel may congeal. To prevent this, add Frostex or similar anti-icer to the fuel, about 2 tablespoonfuls of anti-icer to each 5 gallons of fuel.

D. STARTING

75,000 BTU Heaters. Plug the heater cord into an outlet that will give the proper voltage and frequency. The heater will start operating immediately. (If a thermostat kit is used, operation is similar to the 120,000 BTU heaters.)

120,000 BTU Heaters. Plug the heater cord into an outlet that will give power of the proper voltage and frequency. Set the thermostat to the desired temperature, for automatic control, or to ON for continuous operation.

E. STOPPING

75,000 BTU Heaters. To stop the heater unplug the heater cord from the outlet.

120,000 BTU Heaters. Set the thermostat to the OFF position. Unplug the heater cord from the power outlet.

Neither size heater requires a cooling-off period at shutdown.

SECTION III

MAINTENANCE

Maintenance consists of the simple operations the owner or user of the heater can perform to keep the heater running and in good condition. If ordinary maintenance fails to return the heater to good operating condition, refer to Section IV in this manual for checking and trouble shooting. See Figure 2 for maintenance points.

A. FUEL TANK MAINTENANCE

Drain the fuel tank after every 150 hours of operation, or whenever necessary, and flush it out with clean fuel. Refill with new clean fuel.

B. AIR FILTERS

1. Check and clean the intake air filter often. The filter needs cleaning if you can see a film of dust on it. It will need cleaning more often if the heater is operated in dusty air.

2. To clean the intake air filter, simply pull it out of the housing. Wash it with a mild detergent and hot or cold water. Dry it thoroughly, and replace it in the housing.

CAUTION: Do not oil the filter element.

3. Replace the output air filter once each heating season.

4. To reach the output air filter, remove the four screws which attach the filter housing end cover. Lift the output air filter out.

NOTE: Cleaning the output air filter may cause a change in the air pump output pressure. If the heater burns improperly after cleaning, have the air pump pressure checked. See Section V, paragraph L.

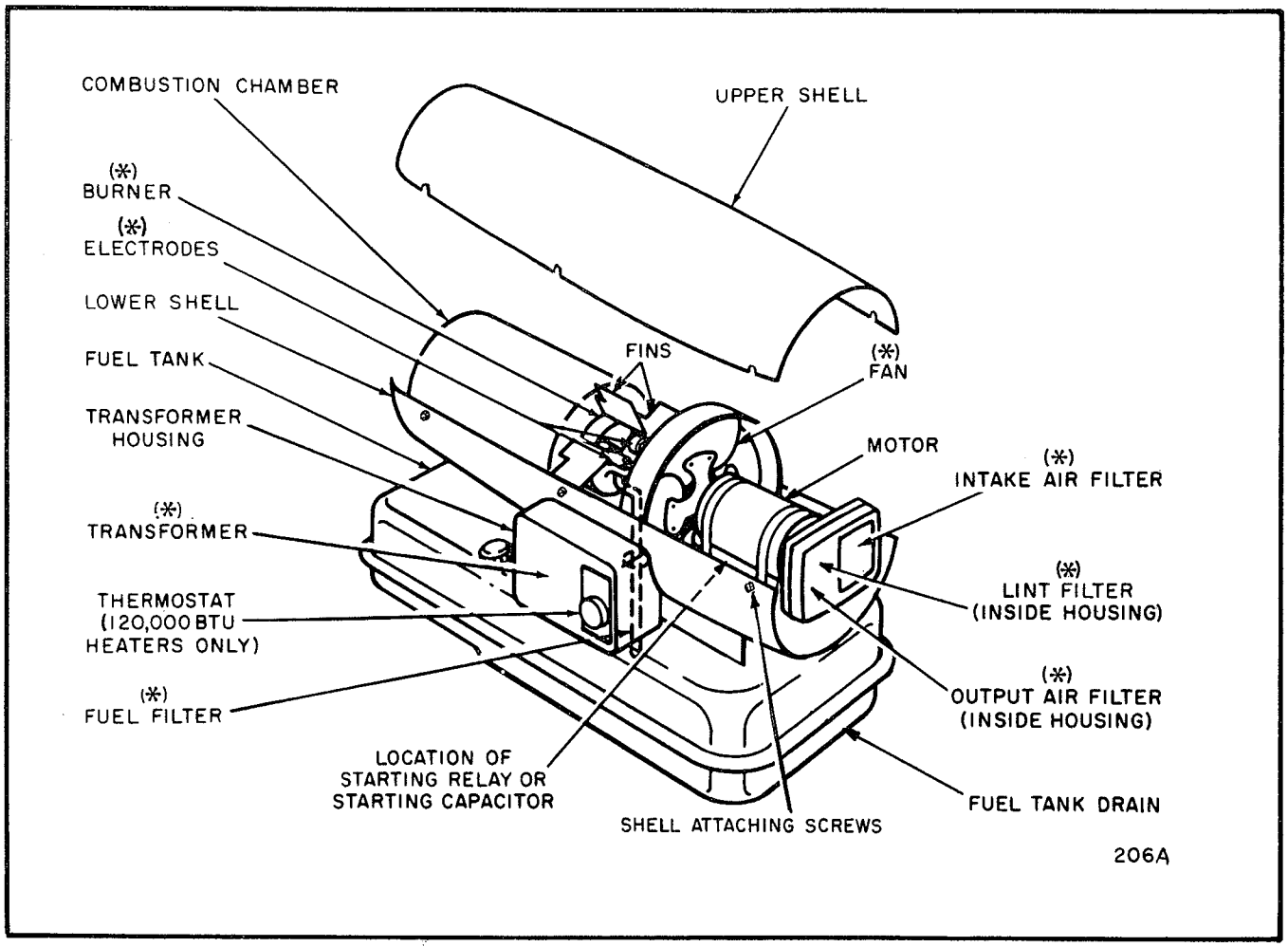


Figure 2. Heater Maintenance Points
Symbol (*) indicates parts recommended as replaceable by owner or user of heater.
(Heater shown without wheels and handles, and with upper shell removed, for clarity.)

5. When changing the output air filter, clean the lint filter. Pick it out of the housing, wash with mild detergent and hot or cold water. Dry thoroughly. Do not oil.

6. Replace the lint filter, the output air filter, the filter housing end cover, and the screws and washers.

C. REMOVING UPPER SHELL

NOTE: You will need to remove the upper shell in order to perform the rest of the maintenance operations. The heater will not operate properly if the upper shell is not in place.

Remove the upper shell by loosening the six screws (3 on each side) that hold the upper shell to the lower shell. Lift the upper shell off.

WARNING

With the upper shell removed and the serivce cord plugged in, the heater can be dangerous. Be careful to keep away from the transformer leads and the fan when the upper shell is off.

To replace the upper shell, slip the six slots located along its lower edge over the six screws in the lower shell, and tighten the screws.

D. CLEANING THE FAN

Clean the fan blades after every 500 hours of operation, or whenever you see that they are getting dirty. A build-up of dirt will reduce the air supply and cause faulty operation.

To clean, wipe the blades with a cloth moistened with kerosene or solvent. Be careful not to bend the blades. Dry the fan thoroughly.

E. CLEANING THE FUEL FILTER

The fuel filter is the tube which leads up from the fuel tank to the burner. Clean it twice each season, or if the Trouble Shooting Chart indicates.

1. To remove the fuel filter, loosen the hex nut that attaches it to the burner, and slide the nut back on the tube. Then turn the tube to one side, and pull it up out of the tank.

2. Rinse the fuel filter several times in clean fuel. Blow it dry through the fitting end.

3. Blow the filter dry through the fitting end.

4. When reinstalling the filter, moisten it with fuel so it will slip into the grommet in the fuel tank top. Position the filter carefully, so the hex nut will line up properly with the threads of the elbow installed in the burner. Then tighten the nut securely.

NOTE: If the burner head is to be removed for maintenance, do not reinstall the fuel filter until ready to reinstall the burner.

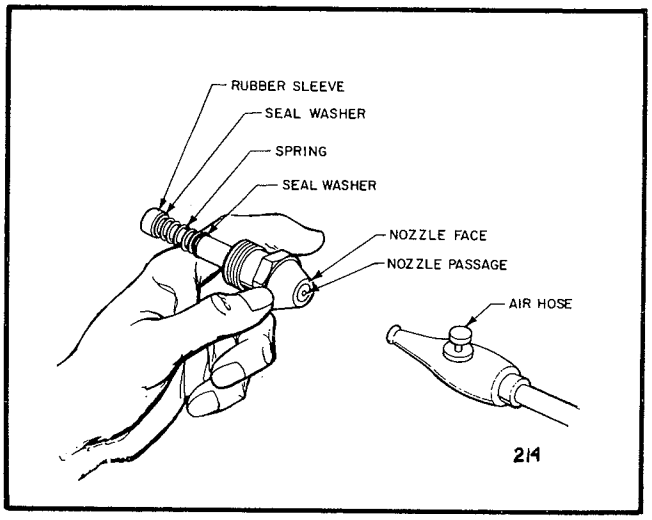


Figure 3. Blowing out nozzle with compressed air.

F. MOTOR LUBRICATION

The ball bearing on the pump-end of the motor is lubricated for the life of the motor. Do not lubricate it.

Oil the sleeve bearing on the fan-end of the motor once each heating season with a few drops of No. 30 oil, Arctic C oil, or electric motor oil. Do not over-oil.

G. BURNER REMOVAL, CLEANING, AND REPLACEMENT

NOTE: If the electrodes need to be replaced or adjusted, it is necessary to remove the burner head.

1. Be sure the heater cord is unplugged, and remove the lead wires from the electrodes. Remove fuel filter from burner head.

2. Loosen the screw that fastens the burner to one of the fins on the rear of the combustion chamber. Twist the burner clockwise to disengage it from the grooves in the fins, then draw it straight back and lift it out.

3. Remove nozzle, carefully, using a socket wrench.

CAUTION: Do not attempt to open the nozzle passage with a steel drill, a wire, or any other tool, as you will damage it beyond repair. Protect the nozzle face from damage while the burner is out of the heater. This is important!

4. Soak the complete burner head for one hour in non-flammable liquid cleaning agent. (DO NOT use kerosene or fuel oil.) Blow dry through fittings in rear of head. Blow the nozzle dry through the face (OUTLET) end ONLY.

5. Re-check electrode settings after cleaning the burner. See paragraph H of this Section.

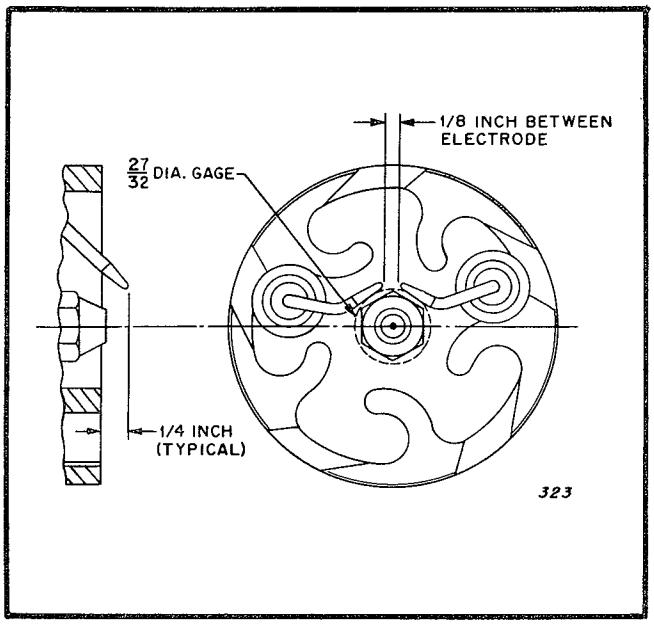


Figure 4. Electrode Setting Diagram

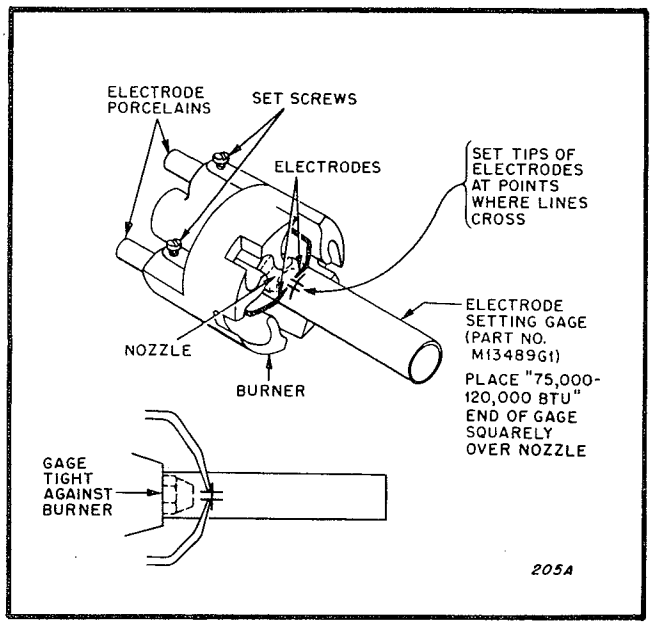


Figure 5. Use of Electrode Setting Gage

6. When reinstalling the burner, be sure it is started straight. The fins on the combustion chamber could be bent if the burner were forced into position at an angle. When the burner is in position, turn it clockwise to lock it, then tighten the screw.

7. Insert the electrode leads until they snap into place, to prevent loosening as the heater is moved.

CAUTION: Do not attempt to repair the nozzle as a part of routine maintenance. If the nozzle needs to be repaired, see Section V of this manual.

H. ELECTRODE REPLACEMENT AND SETTING

Replace both electrodes if the old ones are cracked or excessively dirty.

NOTE: Remove the electrodes through the nozzle-side of the burner. The tips could be damaged if the electrodes were removed or inserted through the rear of the burner.

1. To remove, loosen the clamping screws.

2. When reinstalling the electrodes, place the metal bands directly under the screws, with the slot in the band positioned opposite (180° from) the screw. This will prevent damage to the porcelain when the screws are tightened. If the porcelain is cracked, the electrode will short-out through the burner.

3. Refer to Figure 4 for electrode settings. Figure 5 shows how to use the Electrode Setting Gage, Part No. M13489G1, which is available from your dealer. Use the 75,000 - 120,000 BTU end of the gage when setting the electrodes on these heaters.

4. When the electrode tips are positioned correctly, tighten the screws enough to prevent the electrodes from shifting, then reinstall the burner head.

I. REASSEMBLY AFTER MAINTENANCE

Put the heater back together in the reverse order of disassembly. Be sure all parts are in place and all screws and electrical connections are tight, before attempting to use the heater.

SECTION IV
TROUBLE SHOOTING

A. GENERAL

If normal maintenance fails to keep a heater in good operating condition, it probably requires repair or replacement of some parts. Examine it and test-fire it to gain first-hand knowledge of why the service might be needed.

This section tells how to examine and test-fire the heater. It also contains a Trouble Shooting Chart for help in diagnosing heater troubles and finding the remedies.

B. EXAMINATION

1. Check the fuel tank for sludge and water. If you find it, expect to find a dirty nozzle and/or fuel filter.

2. Spin the fan to be sure it turns freely. If it is stiff, look for a worn or dry bearing on the fan-end of the motor, or for a binding pump rotor.

3. Check the heater for dirt and foreign materials around the pump, fan, and air filters. Be sure the heater is reasonably clean before test-firing it.

4. Check the heater cord for obvious breaks or other unsafe conditions. If the cord is doubtful, repair it or install a new one before test-firing.

C. TEST-FIRING

1. Clean the fuel tank and fill it with at least 3 gallons of fuel. A minimum of 3/4 gallon of fuel must be in the tank for proper test-firing.

2. Clean the air intake filter. (See Section III, paragraph B.)

3. Check and adjust the air pressure, as described in Section V, paragraph L, except that fuel must be used for test-firing.

NOTE: It is not possible to test-fire a heater properly if this adjustment cannot be made.

4. Allow the heater to run for 15 minutes. Observe its operation during the test-run.

5. After making the pressure check, adjustment, and test-firing, remove the gage and reinstall the plug.

6. If any troubles show up during the test-firing, refer to the Trouble Shooting Chart to find out how to correct them.

D. TROUBLE SHOOTING

The following chart lists the problems you might find in a heater. For each problem, there is a list of "Possible Causes". The "Remedy" column tells you how to correct the problem, or tells you by means of a section and paragraph number where to find detailed instructions for correcting it.

In trouble shooting, remember that the air pump is part of the fuel system, because the air it supplies lifts the fuel from the tank and pushes it through the nozzle.

NOTE: Be sure to follow all cautions and warnings. They will help you prevent damage to the heater or injury to yourself.

TROUBLE SHOOTING CHART

PROBLEM	POSSIBLE CAUSE	REMEDY	FOR FURTHER DETAILS SEE:
1. Motor does not start; thermostat (if used) is set to call for heat.	Electrical Troubles		
	a. No power or low voltage at heater.	Be sure power is reaching heater; check condition of heater cord. Repair or replace as needed. Use extension cord with wires heavy enough to carry the electrical load of the heater. Be sure voltage at outlet is same as shown on heater instruction plate.	Sec. II, Para. B.

TROUBLE SHOOTING CHART (Continued)

PROBLEM	POSSIBLE CAUSE	REMEDY	FOR FURTHER DETAILS SEE:
1. (Continued) Motor does not start, thermostat (if used) is set to call for heat.	b. Damaged motor, motor starting relay, motor starting capacitor, or motor starting switch; binding fan-end bearing; binding pump.	Check motor (and starting relay, if used).	Sec. V, Para. F.
		Replace a defective motor or motor starting relay.	Sec. V, Para. F.
		Install a starting capacitor that is known to be good.	
		Lubricate motor (Fan-end only).	Sec. III, Para. F.
		Rebuild motor.	Motor Mfr's. Instructions
		Rebuild or replace a binding pump.	Sec. V, Para. K.
	c. Thermostat (if used) damaged.	Replace.	
	Mechanical Troubles		
	d. Dry bearing on fan-end of motor.	Lubricate motor. If lubrication does not solve problem, check pump.	Sec. III, Para. F.
	e. Pump rotor binding or carbon blades worn out.	Rebuild pump.	Sec. V, Para. K.
	f. Fan obstructed by mechanical damage or dirt.	Check for bent fan guard or outer shell.	Sec. V, Para. H.
		Check for damaged fan; replace if defective.	
		Check for damaged motor mount.	
2. Heater will not ignite, but motor runs.	Fuel System Troubles		
	a. Fuel tank empty, water in fuel, wrong fuel.	Check for water in tank: clean tank and fuel filter if water is found. (Water in the tank will form globules in the bottom, which you can see.)	
		Fill tank with new, clean kerosene or No. 1 fuel oil.	
	b. Fuel filter clogged.	Remove and wash in clean fuel. Blow dry and replace.	Sec. III, Para. E.
	c. Nozzle plugged or defective.	Clean by blowing compressed air through nozzle from outlet end of nozzle.	Sec. III, Para. G.
		Replace nozzle if cleaning does not solve the problem.	Sec. V, Para. J.
	d. Low air pump pressure.	Check pressure; adjust, rebuild, or replace air pump as needed.	Sec. V, Paras. K & L.
		Check rubber sleeve around shank of nozzle; replace if leaking.	Sec. V, Para. J.

TROUBLE SHOOTING CHART (Continued)

PROBLEM	POSSIBLE CAUSE	REMEDY	FOR FURTHER DETAILS SEE:
2. (Continued) Heater will not ignite, but motor runs.	d. Low air pump pressure. (Continued)	Check to be sure all air line connections from pump to burner are secure. Check to be sure air filter end cover is securely fastened, without air leaks. Be sure air filters are clean.	Sec. III, Para. B.
	e. Air leak at fuel filter.	Check fuel filter for air leaks and for tightness of fitting where filter is connected to burner head.	
	Ignition Troubles e. Electrode gap too wide, electrode bent or broken, electrode porcelain cracked.	Measure gap, check electrodes and porcelains for damage. Readjust or replace as needed.	Sec. III, Para. H.
	f. Electrodes wet with fuel or carboned.	Wipe dry and check adjustment; replace if carboned.	Sec. III, Para. H.
	g. Electrode wire disconnected from electrode or transformer.	Disconnect heater cord! Check electrode wires at electrodes and transformer output terminals.	
	h. Defective transformer.	Disconnect electrode wire from transformer and check transformer for spark. Replace transformer if no spark can be obtained when service cord is plugged in.	Sec. V, Para. E.
3. Heater burns, but puffs of smoke can be seen; heater will not burn steady; heater burns with odor, heater smokes continuously.	Improper Fuel-Air Mixture (Not enough fuel) a. Heater running out of fuel; water condensation in fuel tank; wrong fuel.	Shut heater off; check fuel tank. If you can see globules of water in the bottom, drain and flush the tank and filter with clean fuel. Refill with new, clean kerosene or No. 1 fuel oil.	
	b. Dirty air filters causing reduced air flow through nozzle, resulting in low fuel flow.	Remove and clean the air filters. Be sure air intake is not blocked.	Sec. III, Para. B.
	c. Fuel filter loose, leaky, or dirty.	Remove and wash fuel filter in clean fuel. Check condition of connection between fuel filter and burner head. Replace with new filter and fitting if connection can't be tightened without leaks.	Sec. III, Para. E. Sec. V, Para. I.

TROUBLE SHOOTING CHART (Continued)

PROBLEM	POSSIBLE CAUSE	REMEDY	FOR FURTHER DETAILS SEE:
3. (Continued) Heater burns, but puffs of smoke can be seen; heater will not burn steady; heater burns with odor, heater smokes continuously.	d. Dirty nozzle.	Remove and clean the burner head. Blow compressed air through nozzle from outlet end. Never use a drill, wire, or other tool to open a nozzle passage. Replace a defective nozzle.	Sec. III, Para. G. Sec. V, Para. J.
	e. Low pump output pressure. (Low motor speed, worn pump, pump out of adjustment.)	Check and adjust pump output pressure; repair or replace pump if adjustment cannot be made. Check to be sure that no dirt or trash (or dirty fan blades) could be causing motor slowdown. Lubricate fan-end bearing of motor.	Sec. V, Paras. K & L. Sec. III, Para. F.
	f. Loose air output line connections between filter housing and burner.	Be sure connections are tight.	
	g. (Remote possibility) Rubber sleeve on shank of nozzle is leaking.	If heater puffs intermittently. replace the rubber sleeve. (Handle parts carefully to prevent damage; assemble them carefully to preserve airtightness.)	Sec. V, Para. J.
	h. (Remote possibility) Combustion chamber not tight against burner head, allowing too much air to enter combustion chamber.	Adjust fins for good fit of head to combustion chamber. There must be no air gap tween face of burner head and back of combustion chamber.	
4. Flames come out front of heater.	Improper Fuel-Air Mixture (Too much fuel, or not enough air for amount of fuel being supplied.)		
	a. Dirty fan, or air passageway through heater blocked by dirt or trash.	Clean the fan. Be sure the air passageway through the heater is clean. Keep the heater clean.	
	b. Pump output pressure is too high, causing too much fuel to be supplied.	Check and adjust pump output pressure.	Sec. V, Para. L.
	c. Fan loose or improperly located on shaft.	Check fan; correct if not right.	Sec. V, Para. H.
	d. Bent or damaged fan.	Replace. Do not attempt repair of fan.	
	e. Burner pins not tight in slots; bent fins on combustion chamber.	Be sure burner is installed properly without bending fins.	Sec. III, Para. G.

TROUBLE SHOOTING CHART (Continued)

PROBLEM	POSSIBLE CAUSE	REMEDY	FOR FURTHER DETAILS SEE:
5. Heater cycles intermittently.	Electrical System Troubles a. Thermostat (if used) set too low.	Set thermostat to a higher temperature for more even operation.	
	b. Defective thermostat (if used).	Replace a defective thermostat.	Sec. V, Para. C.
	c. Low voltage causing trip-out of motor overload protector.	Check power line voltage. Use extension cord with proper size wire.	Sec. II, Para. B.
	d. Defective electrical supply or defective connections.	Be sure extension cord and heater service cord are in good condition, without intermittent open circuits. Check mechanical and electrical soundness of all wiring connections in the heater and service cord.	
	e. Motor overload protector tripping out due to motor trouble or binding pump.	Lubricate fan-end bearing. Keep motor and fan area clean. Replace defective motor or rebuild defective pump. CAUTION: Keep fingers away from fan when heater service cord is plugged in.	Sec. III, Para. F. Sec. V, Paras. F, G, & K.

SECTION V

SERVICE AND REPAIR INSTRUCTIONS

A. GENERAL

This section covers replacement of parts, repair and rebuilding of heater components, and the making of adjustments. Check to be sure the maintenance of the heater has been done, before going into the more extensive service operations. The heaters can be completely rebuilt and checked in less than one hour.

Whenever a part needs to be replaced, you can identify it on the exploded view in the Parts List portion of this book, Section VI. Order any needed part by name and part number.

B. SPECIAL TOOLS, EQUIPMENT, AND SUPPLIES

The following tools, equipment and supplies should be available for complete servicing of the heater.

1. Air Gage, Part No. M9148, or any gage with a 15 pound pressure range and 1/4 pound divisions, able to indicate 4-1/4 pounds accurately, plus fittings for installation into a 1/8 inch standard pipe-threaded hole.

2. Oil Burner Nozzle Wrench, or any deep 5/8 inch socket wrench.

3. Clean fuel, either kerosene or No. 1 fuel oil.

4. Non-flammable liquid cleaning solvent, such as carbon tetrachloride.

CAUTION: Fumes are poisonous; use with GOOD ventilation!

5. Compressed air is advisable, but not absolutely necessary.

C. THERMOSTAT (OR THERMOSTAT ACCESSORY)

If you suspect that thermostat failure is preventing the heater from starting, and the thermostat is set to call for heat, check it as follows:

1. Turn the knob from OFF to ON, slowly, through the full range of the thermostat, two or three times. (The thermostat has positive OFF and ON positions.) If the heater does not start, proceed as follows.

2A. (120,000 BTU Heaters) Unplug the heater service cord from the outlet, and take out the four screws that hold the thermostat to the transformer housing. Connect a jumper wire across the two terminals of the thermostat. (Leave the heater's wiring connected to the thermostat terminals.)

2B. (75,000 BTU Heaters) Unplug the heater service cord from the Thermostat Accessory outlet, to take the thermostat out of the circuit.

3. Plug the heater service cord into an outlet. If the heater motor starts, the thermostat is defective and must be replaced. If the motor does not start, the thermostat is probably not the cause.

D. REMOVAL OF UPPER SHELL

It will be necessary to remove the upper shell in order to perform the rest of the service operations on the heater. See Section III, paragraph C.

WARNING

With the upper shell removed and the service cord plugged in, the heater can be dangerous. Be careful to keep away from the transformer leads and the fan when the upper shell is off.

E. TRANSFORMER

Check the transformer as follows:

WARNING

Be EXTREMELY careful when checking the transformer. A transformer in good condition produces VERY high voltage at the output terminals.

1. Place a screwdriver with a GOOD INSULATED HANDLE in contact with one of the output terminals. Bring the tip of the screwdriver near the other terminal. A transformer in good condition will make a spark about 3/16 inch long jump from the tip to the terminal. If no spark jumps, check the wiring to the transformer. If the transformer is receiving power but produces no spark, it is defective and must be replaced.

2. To replace the transformer, take the nuts off the two mounting studs which come through the transformer mounting bracket, inside the heater shell, and take the transformer and its housing out of the heater.

3. Remove the housing by straightening the mounting tabs.

4. Replace the housing, then install transformer and housing into the heater shell. Make wiring connections according to the Wiring Diagram, Figure 6.

5. Be sure the electrode leads are snapped tightly onto the transformer output terminals, to prevent their coming loose when the heater is moved.

F. CHECKING THE MOTOR, STARTING RELAY, AND STARTING CAPACITOR

In case the motor fails to start when the cord is plugged in or the thermostat is set to call for heat, check the motor and its starting circuit components as described in the following paragraphs.

Because of the differences in motors and starting circuits, the electrical checks for the motors in the two sizes of heaters are given separately.

WARNING

The motors contain an automatic thermal overload protector. This may stop the motor, due to overload or low voltage, then RESTART it automatically. Be sure to disconnect the heater before inspecting the motor.

1. Mechanical check, both sizes of heaters. Spin the motor by turning the fan blades by hand. If the motor turns freely, make the electrical check as described in paragraph 2A and 2B. Any stiffness of the motor indicates mechanical troubles. See "Motor Service", paragraph G of this Section.

2A. 75,000 BTU Heaters. These heaters have 1/8 horsepower motors and separate starting relays. (See the Wiring Diagram, Figure 6.)

NOTE: The relay is "position-sensitive" and must be tested in the same position as when installed in the heater (with the contacts at the top).

a. Take the relay out of the heater by taking out the screw which holds its bracket to the left side of the lower shell, near the motor.

CAUTION: Avoid touching the bare wires or the exposed wire terminals.

b. Take the black motor wire off its terminal on the starting relay. Touch this wire to the terminal of the red motor wire, at the relay. The motor should start. As soon as the motor reaches operating speed, remove the black wire from contact. The motor should continue to run.

c. If the motor starts, install a new relay, and reconnect the wiring according to the Wiring Diagram, Figure 6.

d. If the motor fails to start, or if it fails to continue running when the black wire is taken away, it is defective. Repair or replace it. See paragraph G of this Section.

2B. 120,000 BTU Heaters. These heaters have 1/4 horsepower motors, with internal starting switches and external starting capacitors. (See the Wiring Diagram, Figure 6.)

a. Failure of the motor to start could result from a failure of the starting capacitor, or from an internal fault in the motor, such as failure of the starting switch or failure of the thermal overload protector.

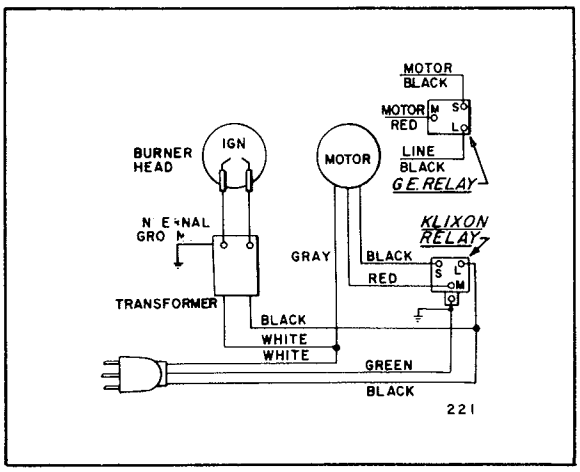
b. To check the capacitor, replace it with a new one and try the motor. If the motor starts, the old capacitor was bad. Leave the new capacitor in the circuit.

c. If the motor fails to start with a new capacitor in the circuit, remove the motor, install a new or rebuilt motor, and send the defective motor to the nearest Robbins and Myers service station for rebuilding, or order a replacement motor from the factory.

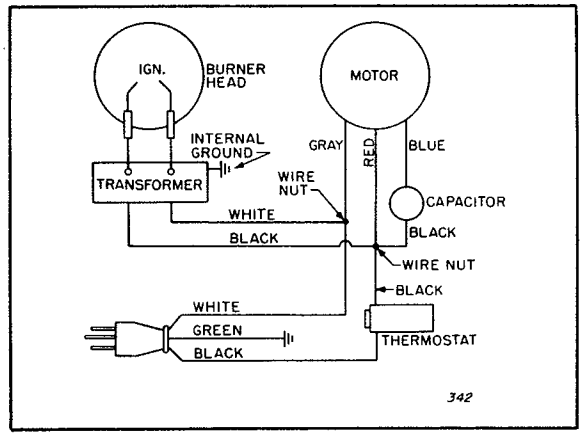
NOTE: When sending the motor away for repairs, remove the fan, the air filter housing, and the pump end cover. Take out the rotor and carbon blades. (See paragraph K for pump service instructions.)

G. MOTOR SERVICE

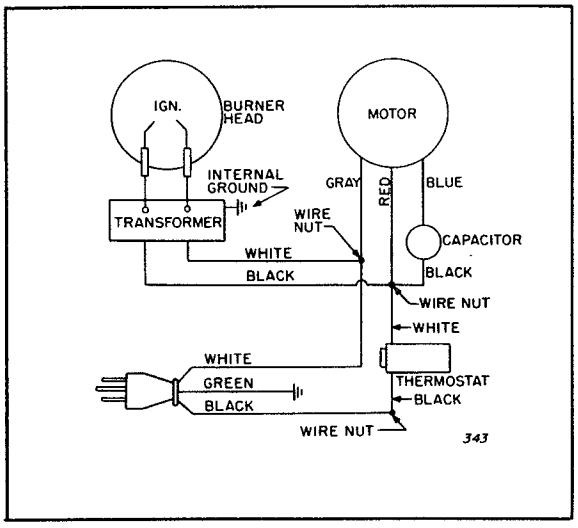
1. Apply a few drops of oil to the fan-end bearing of a stiff motor. If this fails to correct the starting difficulty, rebuild the pump, as described in paragraph K of this Section.



Model AG-75



Model AG-120
(Spec. No. 2827G4)



Model AG-120
(Spec. No 2827G4-1)

Figure 6 Wiring Diagrams

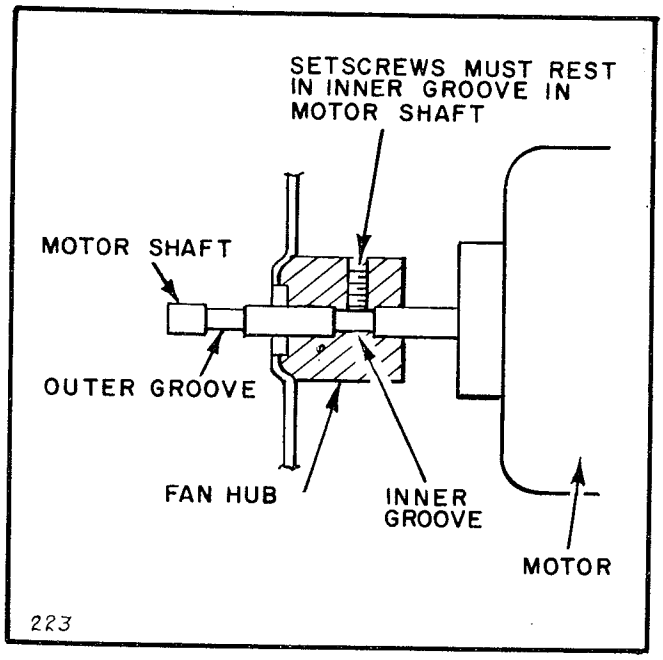


Figure 7. Location of Fan on Motor Shaft.

2. During rebuilding of the pump, check the motor again for stiffness, and if it still exists, rebuild the motor of a 75,000 BTU heater according to the manufacturer's instructions; or send the motor of a 120,000 BTU heater to the nearest Robbins and Myers service station for rebuilding.

3. Whenever a motor has been rebuilt, be sure to check the pump rotor clearance as described in paragraph K-4 of this Section, before reassembling the motor into the heater.

4. When you install the motor, insert the spacers between the ends of the motor clamps.

H. FAN SERVICE

Replace a damaged or bent fan. Do not attempt repair except as a temporary emergency measure. Loosen two setscrews to remove the fan from the motor shaft.

Be sure the replacement fan has the same blade pitch as the fan that was removed. This is important in order to retain the air flow and combustion characteristics of the heater.

Check for proper fan location of the motor shaft. Make sure the fan is in the same position and location as before it was removed. See Figure 7.

I. FUEL FILTER SERVICE

1. Remove the fuel filter from the heater and clean it, as described in Section III, paragraph E.

2. When reinstalling the fuel filter, check the grommet where it enters the fuel tank. Be sure the grommet is in good condition -- not cut or cracked. Replace a damaged grommet.

3. Reinstall the fuel filter according to Section III, paragraph E. Replace with a new filter if the connecting parts are damaged to prevent a tight connection.

J. BURNER HEAD SERVICE

1. Remove the burner head and take out the electrodes. Clean the entire burner head, as described in Section III, paragraph G.

2. If there is any sign of damage to the nozzle, or if it is impossible to clean out the nozzle by blowing compressed air into it through the outlet-end, replace with a new nozzle. Always blow a nozzle out thoroughly with air, from the outlet-end, before installing it into the burner.

CAUTION: NEVER try to open a nozzle passage with a drill. Any change in the size or shape of the passage will damage the nozzle beyond repair. Do not disassemble the nozzle, as flow characteristics are changed by disassembly. Protect the passage from damage whenever you work on the burner or nozzle.

3. Always install a new rubber sleeve whenever you install a nozzle into the burner. The sleeve is the part that helps maintain the needed pressure difference between the air and fuel chambers of the burner head. If bubbles have appeared in the fuel tank during operation, the rubber sleeve is probably leaking and should be replaced.

4. Be sure the seal washer, spring, and second seal washer are in place on the nozzle before you install the rubber sleeve.

5. When seating the nozzle firmly against the burner head, do not apply too much pressure with the wrench, or the nozzle could be distorted.

6. Adjust the electrodes as explained in Section III, paragraph H.

K. AIR PUMP REPAIR

NOTE: Because of the close tolerances and critical positioning of the parts, we recommend that only skilled mechanics attempt any repair of the air pump.

The heater's air pump consists of a rotor with four carbon blades, rotating inside a pump body. The rotor is driven directly by the motor, and is supported by the ball-bearing end of the motor. One of the pump end plates is the motor's back end plate. The other pump end plate is part of the housing for the air intake and outlet filters.

Handle all pump parts with care and keep them clean. The parts are made with close tolerances. Dirt and oil on pump parts will hinder the performance of the pump.

If pump repair is required, you may order a complete pump package, or individual parts, as shown in the Parts List, Section VI.

1. Disassembly.

CAUTION: Do not take the pump apart any further than you need to in order to reach the parts which must be replaced.

a. Remove the end cover and take out the intake and outlet air filters and the lint filter. Disconnect the air line from the elbow on the remaining portion of the air filter housing.

b. Hold a clean, dry cloth under the pump, and remove the six screws that hold the end cover to the pump body. Catch the carbon blades in the cloth, if they fall out as the pump body is removed.

c. Take all four carbon blades out of the rotor. Pull the rotor and the spring off the motor shaft.

2. Replacing Carbon Blades.

a. Worn or sticking carbon blades cause loss of air pressure. If the blades are worn, or are sticking in the rotor slots, replace them. (It is not necessary to remove the rotor or the pump body to replace the carbon blades.)

b. Wash the rotor, end cover, and pump body in non-flammable cleaning solvent and blow them dry before you install new blades.

c. Install the carbon blades into the slots, with the notched ends of the blades inside the slots and the rounded ends toward the outside.

3. Replacing the Rotor.

Use a new rotor only if deep grooves or uneven wear appear on the surfaces. Check the spring for wear, and replace it if worn or loose.

To remove the rotor, first remove the pump body. When installing the rotor, take care to keep it perpendicular to the motor shaft.

4. Reassembly of Air Pump.

a. Install the spring in the pump rotor as shown in Figure 8, then assemble the rotor on the motor shaft. Attach the pump body to the motor with the two top and bottom recessed screws which were removed to take it off.

b. Adjust the pump body to provide 0.003 to 0.005 inch clearance at the point shown in Figure 8. Measure the clearance with a feeler gage. Spin the motor by hand to be sure the rotor does not rub on the pump body. The proper clearance must be maintained. Be sure the screws are tight after adjusting the clearance.

c. Insert carbon blades as described above.

d. Install the end cover, using the six screws which were removed. Reconnect the air line to the elbow in the end cover.

L. ADJUSTMENT OF PUMP PRESSURE

1. Remove the plug from the air filter housing, and install the pressure gage (listed in paragraph B of this Section) into the hole. See Figure 9.

2. Start the heater. (You do not need to have fuel in the tank for this pressure check and adjustment.)

3. Pump pressure for 75,000 BTU heaters must be 4 pounds per square inch, plus or minus 1/16 pound. For 120,000 BTU heaters, it must be 5 pounds per square inch, plus or minus 1/16 pound. If the pressure is not within this range, adjust the pressure relief valve.

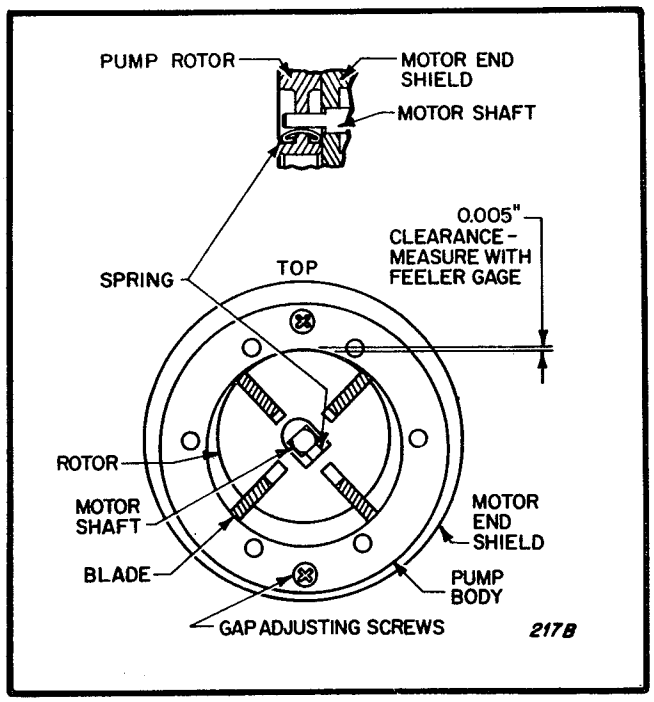


Figure 8. Checking Clearance of Air Pump Rotor

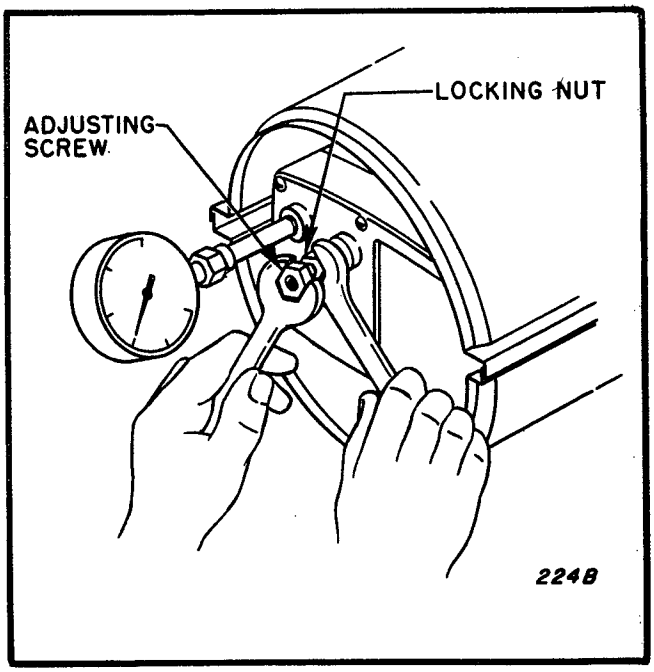


Figure 9. Checking and adjustment of Air Pump Pressure

4. To adjust, back off the locking nut 1/4 turn. Screw the valve stem in to raise the pressure; out to lower it. Tighten the locking nut securely and recheck the pressure.

5. Remove the gage and replace the plug.

M. REASSEMBLY OF HEATER

1. Put the heater back together in the reverse order of disassembly.

2. Check all wiring to be sure it agrees with the wiring diagram. Be sure all electrical connections are tight.

3. Tighten the connections at both ends of the copper air line, and tighten the connection where the fuel filter is assembled to the burner head.

4. Make sure the electrode leads are snapped onto the electrodes and the transformer output terminals.

5. Be sure all parts are in place and the screws are tight before attempting to use the heater.

N. FINAL CHECK

Put at least two gallons of fuel in the fuel tank and test-fire the heater for a few minutes, after all service has been completed, to be sure it will operate satisfactorily.

SECTION VI

ILLUSTRATED PARTS LIST

This section contains a list of all replaceable parts used in the heater covered by this manual. The only parts that are recommended for replacement by the heater's owner or user are indicated by the symbol (*). Parts indicated by the symbol (**) are standard hardware items, and may be obtained locally, if needed.

Check the nameplate decal for the correct model number and Spec. No. of the heater. INCLUDE THE MODEL AND SPEC. NUMBER WHEN ORDERING PARTS Order parts by part name and part number only. Do not use the index numbers from the illustration when ordering parts.

MODEL AG-75

Index No.	Part Number	Part Name	Quan. per Spec. No. 2811G12	Quan. per Spec. No. 2811G12-1
1	M13134G1	Shell, Upper	1	-
1	M13134G3	Shell, Upper	-	1
(A)	*M11937G1	Motor Package Assy	1	1
2	M11938	Motor	1	1
(B)	*M13614G1	Pump and Filter Parts Package	1	1
3	M11966-5	. Spring	1	1
4	M8643	. Blade	4	4
5	M11959	. Rotor	1	1
6	M8645	. Pump Body	1	1
7	**FHPF3-4C	. Screw, Fil hd, 10-32 x 1-1/8 in.	2	2
8	M12233	. End Cover, Pump	1	1
9	WLI-3C	. Washer	6	6
10	*M11637	. Filter, Lint	1	1
11	**M12461-32	. Screw, Hex hd, 10-32 x 1-1/8 in	6	6
12	*M12244G1	. Filter Assy	1	1
13	*M12179	. Intake Filter	1	1
14	M12234	End Cover	1	1
15	M10837	. Pipe Plug	1	1
(C)	M8943G2	. Pressure Relief Valve Assy	1	1
16	M10362	. . Connector	1	1
17	M8940	. . Ball, 1/4 dia.	1	1
18	M8941	. . Spring, Compression	1	1
19	**M8993	. . Hex, Nut, 3/8-24	1	1
20	M11941	. . Bushing, Pressure adjustment	1	1
21	69248	. Male Elbow	1	1
22	**WLI-3C	. Lockwasher, Internal #10	4	4
23	**M12461-31	. Screw, Hex hd, 10-32 x 1 in.	4	4
24	M11920G1	Combustion Chamber	1	-
24	M11920G2	Combustion Chamber	-	1
(D)	*M11929G1	Burner Assy	1	1
25	M11931	. Elbow, Male, 45°	1	1
26	M5976	. Connector, Male	1	1
27	**HF3-3C	. Screw, Hex hd, 10-32 x 3/8 in.	3	3
28	*M8989	. Electrode, LH	1	1
29	*M8990	. Electrode, RH	1	1
30	M8882	. Sleeve	1	1
31	M8667	. Nozzle	1	1
32	M10659-1	. Washer, Nozzle Seal	2	2
33	M10809-1	. Spring, Nozzle Seal	1	1
34	WP-3C	. Washer, Flat	1	1
35	M8716G2	. Burner Head	1	1
35A	M15995	Plug Button	-	1
36	M13846G1	Fuel Filter Assy	1	1
36A	1000577	Grommet (Air line and Fuel Filter)	-	2
37	No Number	Setscrew, Socket hd, cup pt, 1/4-28	2	2
38	M14529	Fan, 16° Pitch	1	1
39	M12331	Housing, Fan	1	-
39A	M15807	Strap, Retainer	-	1
40	**NPC-4C	Nut, Hex, 1/4-20	2	2
41	**WLM 4	Washer, Lock, 1/4	2	2
42	M13620	Spacer	2	2
43	M10964-1	Clamp, Motor	4	4
44	M12330	Bracket, Shell Support	1	1
.A	M15809	Plug	-	1
45	M11271-6	Nut, Tinnerman	1	1
45A	* ST2-2AC	Screw, Rd hd, No. 8 x 1/4	1	1
46	M11942	Bracket, Motor Support	1	1
47	**RC-2-3C	Screw, Rd hd, 8-32 x 3/8 in	2	2
48	**WLI-2C	Washer Lock #8	2	2
49	M11952	Bracket, Relay Mounting	1	1
50	M12462-2	Relay	1	1
51	M9946G4	Wire Assy	1	1
52	**M13942-4	Connector	1	1
53	**M10908-51	Screw, 10 24 x 1/2	4	-
53	**M11084-27	Screw, 10-12 x 1/2, Type A	-	4
54	M12328	Shell. Lower	1	-
54	M15805	Shell, Lower	-	1
55	**M11084-27	Screw, 10-12 x 1/2, Type A	7	7
56	**HC4 1½C	Screw, 1/4-20 x 1-1/4	2	2
57	**M10908-51	Screw, 10-24 x 1/2 in	2	-
57	**M11084-27	Screw, 10-12 x 1/2, Type A	-	2

(*) - Parts recommended for normal service replacement.
(**) - Standard hardware, obtainable lo..lly

PARTS LIST CONTINUED

MODEL AG-75

Index No.	Part Number	Part Name	Quan. per Spec. No. 2811G12	2811G12-1
58	**M10908-53	Screw, 10-24 x 3/4	4	-
58	**M11084-29	Screw, 10 12 x 3/4, Type A		4
59	M11954	Bushing, Strain Relief	2	2
60	**M13942-4	Connector	1	1
61	M10813G1	Service Cord Assy	1	1
62	M10990-3	Bushing	1	1
63	M12321G1	Fuel Tank Assy	1	1
65	M13990	Plug	1	1
66	**M10908-51	Screw, 10-24 x 1/2	8	-
66	**M11084-27	Screw, 10-12 x 1/2, Type A	-	8
67	M3353	Cap, Fuel Tank	1	1
68	M10816G11	Lead Assembly, Electrode	2	2
69	M12332G1	Mounting Bracket	1	-
70	**M10908-51	Screw, 10-24 x 1/2 in.	4	-
71	M13042	Spacer	2	-
72	*M15425	Transformer	-	1
73	M12509G1	Transformer Assy	1	-
73A	M12570	. Cover, Transformer	1	-
73B	M12511	. End, Transformer cover	1	-
73C	*M3259-4	. Transformer	1	-
74	**WP-4C	Washer, 1/4 in.	2	2
75	**NTC-4C	Nut, Hex, 1/4-20, Torque-Lock	2	2
76	M11271-6	Nut, Tinnerman	6	6
77	**M10908-51	Screw, 10-24 x 1/2	2	-
77	**M11084-27	Screw, 10-12 x 1/2, Type A	-	2
77A	*M11943	Air Line	1	1
78	M12337	Handle, Rear	1	-
78	M15131	Handle, Rear	-	1
79	**M12345-34	Screw, 10 24 x 1-3/4, Oval hd	8	8
80	M12342	Frame, Wheel Support	1	1
81	**NTC-3C	Nut 10-24	8	10
82	M11957	Axle	1	1
83	M12663	Wheel	2	2
84	**WP-8C	Washer	2	2
85	**C4-7	Cotter Pin	2	2
86	M12336	Sleeve, Alignment	2	2
87	M12335	Handle, Front	1	-
87	M15808	Handle, Front	-	1
88	M14262	Hub Cap	2	2
89	M12367	Plate, Clamp	2	2
90	**M12345-31	Screw, 10-24 x 1-3/4, Oval hd	2	2
	M12646	Decal, Wiring	1	1
	M14960	Decal, Trade Name	1	2
	M14962	Decal, Nameplate	1	-
	M14962-2	Decal, Nameplate	-	1
	M12649	Decal, Operating Instructions	1	-
	M15938	Decal, Operating Instructions	-	1
	M12647	Decal, Air Filter	1	1
	M13125	Decal, Cover Removal	1	-
	M16262	Decal, Caution	-	1
	M13386-6	Aerosol Can, Touch Up Paint (Red)		
	M13386-8	Aerosol Can, Touch Up Paint (Black)		
	M13386-7	Aerosol Can, Touch Up Paint (White)		

(*) - Parts recommended for normal service replacement.
(**) - Standard hardware, obtainable locally.

MODEL AG-75

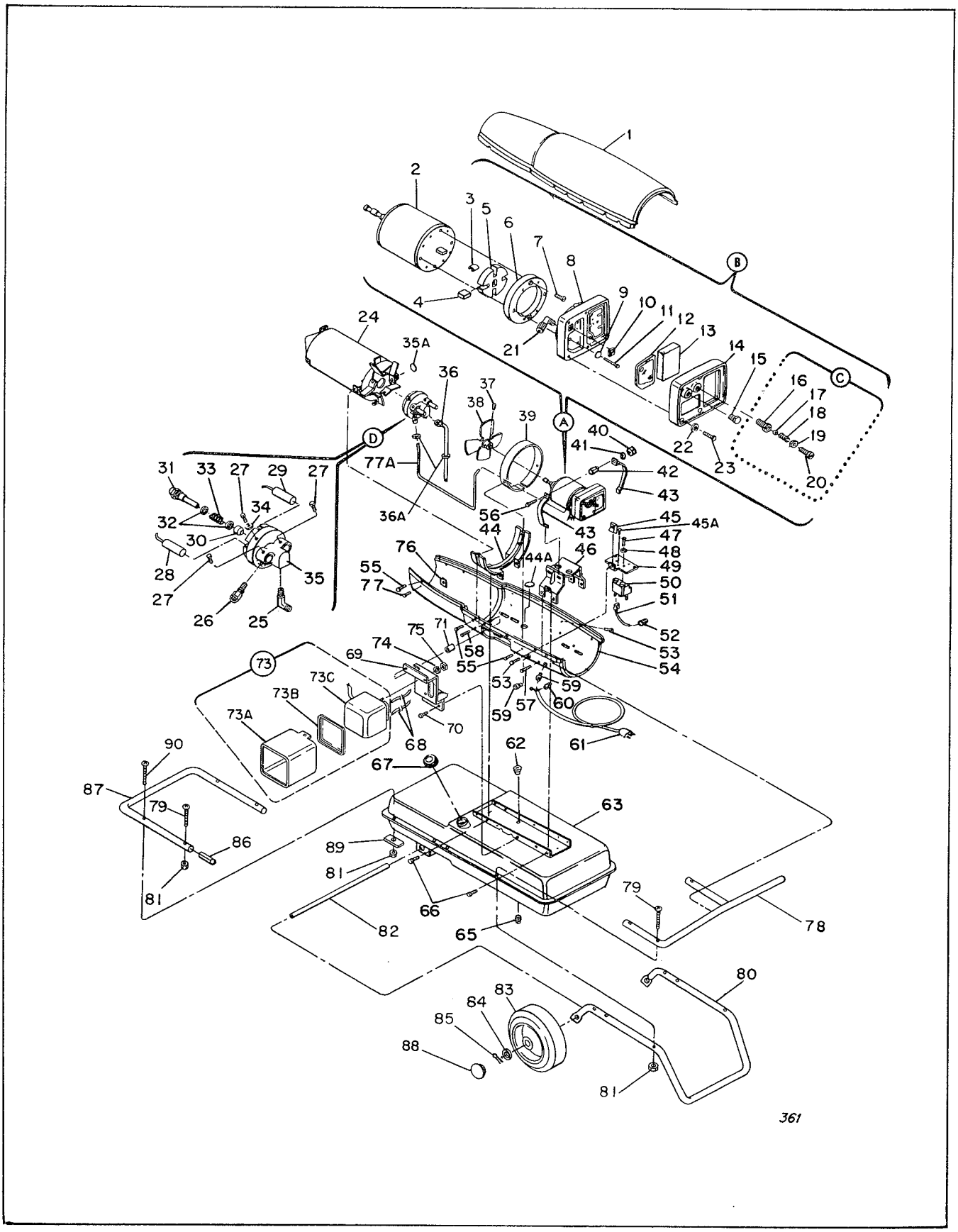


Figure 10. Model AG-75 Portable Heater, Exploded View

MODEL AG-120

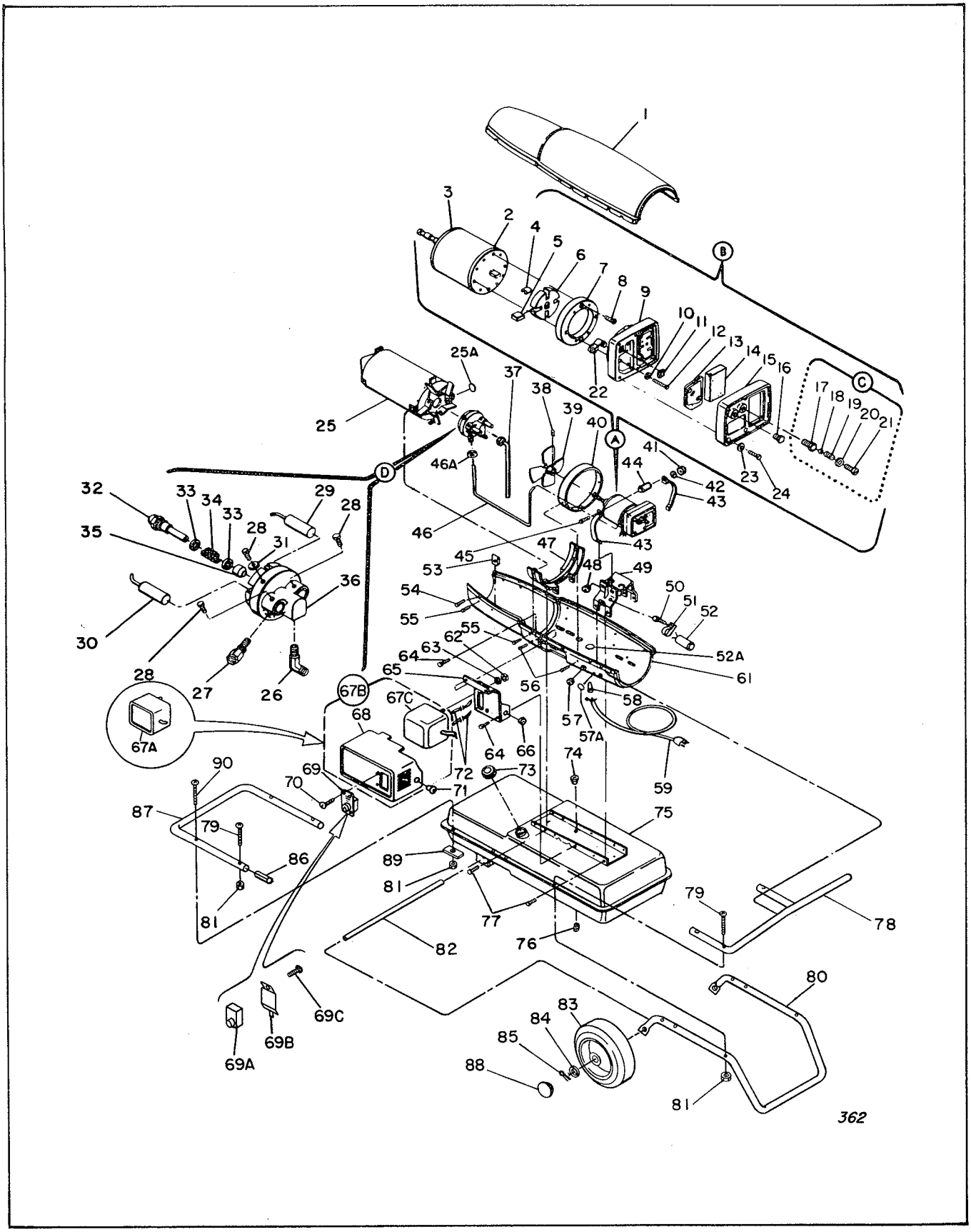


Figure 11. Model AG-120 Portable Heater, Exploded View

MODEL AG-120

Index No.	Part Number	Part Name	Quan per Spec No. 2827G4	2827G4-1
1	M13520G1	Shell, Upper	1	-
1	M13520G3	Shell, Upper		1
(A)	*M12864G1	Motor Package Assy	1	1
2	M12811	Motor	1	1
3	M8947	End Shield, front	1	1
(B)	M15442G1	Pump and Filter Parts Package	1	1
4	M11966-5	. Spring	1	1
5	M8643-3	. Blade	4	4
6	M11969	Rotor	1	1
7	M8645 3	. Pump Body	1	1
8	**FHPF3 7C	. Screw, Fil hd 10 32 x 1/2 in.	2	2
9	M12233	. End Cover Pump	1	1
10	**WLI-3	. Washer	6	6
11	*M11637	. Filter, Lint	1	1
12	**M12461-34	. Screw, Hex hd, 10-32 x 1-1/2 in.	6	6
13	*M12244G1	. Filter Assy	1	1
14	*M12179	. Intake Filter	1	1
15	M12234	. End Cover	1	1
16	M10837	. Pipe Plug	1	1
(C)	M8943G2	. Pressure Relief Valve Assy	1	1
17	M10362	. . Connector	1	1
18	M8940	. . Ball, 1/4 dia	1	1
19	M8941	. Spring, Compression	1	1
20	**M8993	. . Hex Nut, 3/8 24	1	1
21	M11941	. . Bushing, Pressure adjustment	1	1
22	M12865	. Male Elbow	1	1
23	**WLI-3	. Lockwasher, Internal #10	4	4
24	**M12461-31	. Screw, Hex hd, 10-32 x 1 in.	4	4
25	M12934G1	Combustion Chamber	1	1
25A	M15995	Plug Button	-	1
(D)	*M12947G3	Burner Assy	1	1
26	M14256	. Elbow	1	1
27	M12949	. Connector	1	1
28	**HF3-3C	. Screw, 10-32 x 3/8 in.	3	3
29	M12952	. Electrode RH	1	1
30	M12951	. Electrode LH	1	1
31	WP-3C	. Washer Flat	1	1
32	M14293	. Nozzle, Siph n	1	1
33	M10659-1	. Washer Nozzle Seal	2	2
34	M10809-1	. Spring, Nozzle Seal	1	1
35	M8882	. Sleeve	1	1
36	M12948G1	. Burner Head	1	1
37	M14259G1	Fuel Filter	1	1
38	No Number	Setscrew, Soc hd, cup pt, 1/4-28	2	2
39	*M13038	Fan, 90° pitch	1	1
40	M12830	Fan Housing	1	1
41	**NPC-4C	Nut, 1/4-20, Hex	2	2
42	**WLM-4	Lockwasher, 1/4 in.	2	2
43	M10964-1	Clamp, Motor	4	4
44	M13620	Spacer	2	2
45	**HC4-10C	Screw, 1/4-20 x 1 1/4	2	2
46	M14245	Air Line	1	-
46	M15970	Air Line	-	1
46A	1000577	Grommet	-	1
47	M12828	Bracket, Shell Support	1	1
48	1000577	Grommet	1	2
49	M12829	Bracket, Motor Support	1	1
50	**M10908-51	Screw, 10-24 x 1/2, Type S	1	1
51	M12651	Clamp, Tinnerman	1	1
52	M12650-1	Capacitor	1	1
52A	M15809	Plug	-	1
53	M11271-6	Nut, Tinnerman	6	6
54	**M11084-27	Screw, 10-12 x 1/2 in., Type A	6	6
55	**M11084-27	Screw, 10-12 x 1/2 in., Type A		8
55	**M10908-51	Screw, 10-24 x 1/2	8	-
56	**M10908-53	Screw, 10-24 x 3/4	4	-
56	**M11084-29	Screw, 10-12 x 3/4 in., Type A	-	4
57	M5890	Grommet	1	-
58	**M13942-4	Connector	2	2
58	**M13942-2	Connector, Wire	-	1
	M9900G51	Wire Assembly	-	1
	M9900G10	Wire Assembly	1	-
	M9900G30	Wire Assembly	1	-
59	M10813G20	Extension Cord Assy	1	-
59	M10813G24	Extension Cord Assy	-	1
61	M12826	Shell, Lower	1	-
61	M15810	Shell, Lower	-	1
62	**NTC-4C	Nut, Hex 1/4-20, Torque Lock	2	2
63	**WPC-4C	Washer, 1/4 in.	2	2
64	**M10908 51	Screw, No. 10-24 x 1/2	4	-
65	M12841G1	Mounting Bracket	1	
66	M6087	Grommet	1	-
67A	M15425	Transformer	-	1
67B	M12834G1	Transformer Assy	1	-
67C	M3259-4	. Transformer	1	-
68	M14985G1	. Cover, Transformer	1	-
69	M12611	Thermostat	1	-
69A	M16121G1	Thermostat Assy	-	1
69B	M15814	Bracket, Thermostat	-	1
69C	**ST1-2B	Screw, Self-tapping No. 6 x 1/4, Rd. hd.	-	4
70	**FHF3-3C	Screw, Fil hd, 10-24 x 3/8 in.	4	-
71	M11143-1	Bushing, Strain Relief	1	-
71	M11954	Bushing, Strain Relief	-	3
72	M10816G20	Lead, Electrode	-	2
72	M10816G12	Lead, Electrode	2	-
73	M3353	Cap, Fuel Tank	1	1
74	M14260	Bushing, Rubber	1	1

(*) - Parts recommended for normal service replacement.
(**) - Standard hardware, obtainable locally.

PARTS LIST CONTINUED

MODEL AG-120

Index No.	Part Number	Part Name	Quan. per Spec. No. 2827G4	Quan. per Spec. No. 2827G4-1
75	M12820G4	Fuel Tank	1	1
76	M13990	Plug	1	1
77	**M10908-51	Screw, 10-24 x 1/2	8	-
77	**M11084-27	Screw, 10-12 x 1/2 in., Type A	-	8
78	M12832	Handle, Rear	1	-
78	M15813	Handle, Rear	-	1
79	**M12345-34	Screw, Mach, oval hd, 10-24 x 2 in.	8	8
80	M12831	Frame, Support, wheel	1	1
81	**NTC-3C	Nut, 10-24	8	10
82	M12867	Axle	1	1
83	M12663	Wheel	2	2
84	**WP-8C	Washer	2	2
85	**C4-7	Cotter Pin	2	2
86	M12336	Sleeve, Alignment	2	2
87	M12833	Handle, Front	1	-
87	M15812	Handle, Front	-	1
88	M14262	Hub Cap	2	2
89	M12367	Plate, Clamp	2	2
90	**M12345-31	Screw, No. 10-24 x 1-1/4, Oval hd	2	2
	M12649	Decal, Operating Instructions	1	-
	M15938	Decal, Operating Instructions	-	1
	M12647	Decal, Air Filter	1	1
	M16262	Decal, Caution	-	1
	M14960	Decal, Trade name	2	2
	M14964	Decal, Nameplate	1	-
	M14964-2	Decal, Nameplate	-	1
	M14678	Decal, Wiring Diagram	1	-
	M16614	Decal, Wiring Diagram	-	1
	M13125	Decal, Cover Removal	1	-
	M13386-8	Aerosol Can-Touch Up Paint (Black)		
	M13386-7	Aerosol Can-Touch Up Paint (White		
	M13386-6	Aerosol Can-Touch Up Paint (Red)		

(*) - Parts recommended for normal service replacement.
(**) - Standard hardware, obtainable locally.

Warranty

The Company warrants its equipment to be free from defects in material or workmanship, under normal and proper use in accordance with instructions of the Company for a period of ninety days from date of delivery to the buyer, but the liability on such warranty shall be limited to the repair or replacement by the Company (f.o.b. factory) of any of its equipment which may be returned by the buyer to the factory, transportation charges and handling fee prepaid within said ninety day period and which is found by the Company to have been thus defective in material or workmanship. The foregoing is the full extent of the responsibility of the Company. Except as expressly stated above, we make no warranty of merchantability and no warranty of fitness for any particular purpose nor do we make any warranty, express or implied, of any nature whatsoever with respect to our equipment or the use thereof, and in no event shall the Company be liable for delay caused by defects, for consequential damages, or for any charges or expenses of an nature incurred without its written consent. This warranty will not apply to any product which has been repaired or altered outside of our factory, in any respect which, in our judgment, affects its condition or operation.