

OPERATING, MAINTENANCE AND SERVICE INSTRUCTIONS WITH ILLUSTRATED PARTS LIST

MODEL AG-50 PORTABLE HEATER

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 fees 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 any 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.

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



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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. This 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

1. Fuel System. Operation of the heater is easy to understand. It consists of three simple systems. (See Figure 1.) 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 forces it into the combustion chamber in a fine spray.

2. Ignition System. The electric arc of a spark plug that fires constantly 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.

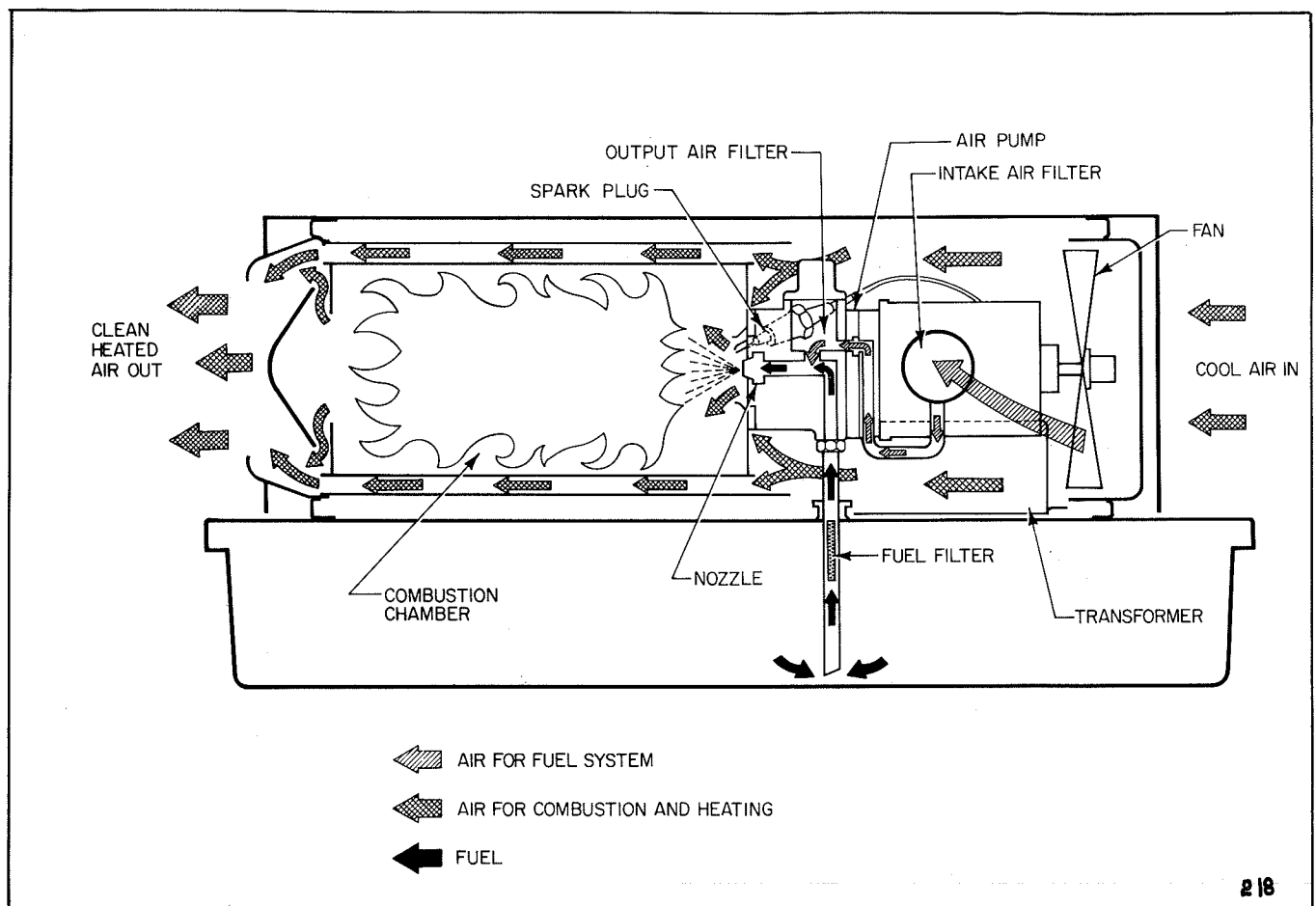


Figure 1. Flow Diagram

C. SPECIFICATIONS

Output rating 50,000 BTU per hour

Air output..... 100 Cubic ft. per minute
approx.

Fuel.....Kerosene or No. 1 fuel oil
only

Voltage As shown on heater instruction
plate

Motor 3450 RPM on heaters built
(Totally enclosed) for 115-volt 60-cycle AC

2850 RPM on heaters built
for 230-volt 50-cycle AC

Fan Five blades, 6-5/8 in. diame-
ter, pitched to give required
CFM at rated motor RPM

Air Pump Four-blade dry type

Amperage..... 4, during normal run

Duct.....None recommended

Weight.....38 lbs., approx.

Fuel tank capacity..... 4.5 U. S. gallons

Fuel Consumption..... approx. 1/3 U. S. gallons per
hour

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 adequate ventilation.

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 electrical power that is the same as specified on the heater instruction plate.

4. Plug the heater into a grounded receptacle, or use the grounding adapter supplied with the heater. Be sure the heater is grounded whenever you work on it.

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

6. Do not use the heater in the presence of volatile fumes 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 before inspecting the motor.

B. EXTENSION CORD SIZES

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

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

C. FUEL

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

When the heater is operated at extremely low temperatures (beyond 10° F below zero), the fuel may congeal. To prevent this, add Frostex or similar anti-icer to the fuel (approximately 2 tablespoonfuls of anti-icer to each 5 gallons of fuel) to keep the fuel from congealing. Be sure the tank is clean before filling.

D. STARTING

To start the heater, plug the cord into an outlet that will give power of the same voltage and frequency as the instruction plate. The heater will start operating immediately.

E. STOPPING

To stop the heater, unplug the heater cord from the outlet.

SECTION III MAINTENANCE

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

A. FUEL TANK MAINTENANCE

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

B. INTAKE AIR FILTER MAINTENANCE

1. Check and clean the intake air filter often. It needs cleaning if you can see a film of dust on the filter element. To check or clean, remove the screw which attaches the filter cover to the heater housing.

2. Pull out the filter element and wash it with a mild detergent and hot or cold water. Dry thoroughly and replace. Install the cover and the screw.

CAUTION: Do not oil the filter element.

C. REMOVING HEATER HOUSING

NOTE: You will need to remove the heater housing in order to perform the rest of the maintenance on the heater.

Remove the housing by taking out the two handle-attaching screws. You can lift off the handle and housing.

NOTE: The heater will not operate properly if the housing is not in place, with the holding clips on the housing engaged over the tank skirt.

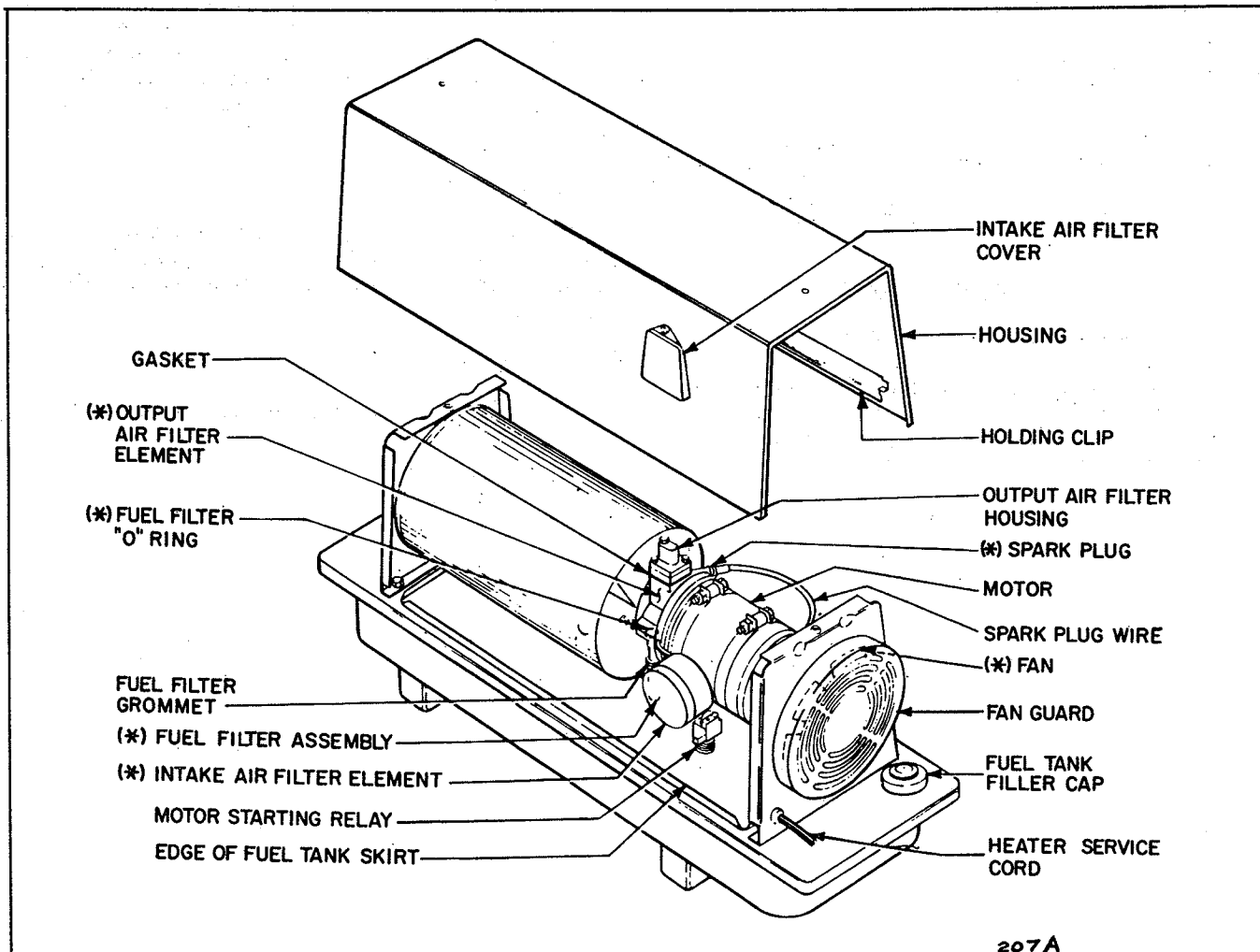


Figure 2. Maintenance Points

(* Indicates parts recommended as replaceable by owner or user of heater.)

D. OUTPUT AIR FILTER MAINTENANCE

1. Check the output air filter after every 150 hours of operation, or at least twice every heating season.

2. To remove, take out the two screws that attach the valve body. Lift off the valve body and gasket, then lift out the output air filter element and the lint filter.

3. Wash the filter element and the lint filter in hot or cold water with a mild detergent. Dry thoroughly. Do not oil either filter. Be sure the gasket is tight when replacing the valve body.

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

E. SPARK PLUG MAINTENANCE

WARNING

Be sure the heater is not plugged in. The spark plug wire carries high voltage when the heater operates.

1. Disconnect the spark plug wire.
2. Remove the spark plug from the burner head and check the gap between the electrodes. The gap must be within the limits given in Figure 3. This is about the thickness of a dime.
3. Adjust the gap by bending the outside electrode.
4. Reinstall the spark plug if no further maintenance is needed for the burner head. If you do not reinstall the spark plug at this time, protect it from damage.

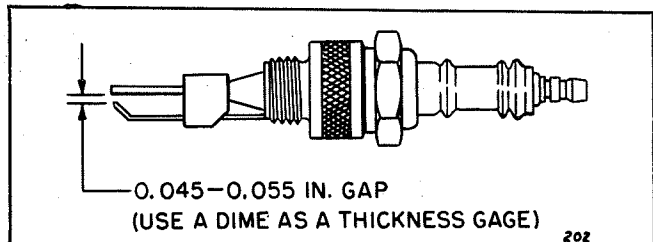


Figure 3. Spark Plug Gap Setting

F. MOTOR LUBRICATION

1. The ball bearing on the pump-end of the motor is lubricated for the life of the motor. Do not lubricate.
2. Oil the sleeve bearing at the fan-end of the motor once every heating season with a few drops of No. 30 or Arctic C oil, or electric motor oil. Do not over-oil.

G. FAN MAINTENANCE

1. Clean the fan blades 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. Remove the fan guard to reach the fan for cleaning.

2. Wipe the blades clean with a cloth moistened with kerosene or solvent. Be careful not to bend the blades. Dry the fan thoroughly.

3. Reinstall the fan guard if the motor, pump and burner head assembly is not going to be removed at this time.

H. DISASSEMBLY

NOTE: It will be necessary to remove the combustion chamber and the burner, pump and motor assembly in order to reach the fuel filter for maintenance.

1. Remove the wire nuts and disconnect the wires.
2. Take off the combustion chamber by loosening the screw that holds it to the burner head. You can reach this screw by inserting a screwdriver into the hole near the rear of the left side of the combustion chamber. As you face the outlet of the heater, rotate the combustion chamber to the left (counterclockwise) to release it from the burner. Pull it out through the end cap.
3. Remove the motor starting relay from its bracket at the left side of the heater. Loosen the air filter and starting relay bracket. Disconnect the air intake tube from the pump. Remove the motor clamps. Loosen the fan guard.
4. Disconnect three motor leads. Lift out the assembly of the motor, pump, and burner head.
5. When you reinstall the combustion chamber, position it so that the drain holes will be at the bottom. Check to be sure the combustion chamber fits tight against the face of the burner head. If not, see Section V, paragraph L-1-g.

I. FUEL FILTER MAINTENANCE

1. Remove the filter from the burner head, using a wrench. (The fuel filter is the open-ended tube which extends from the burner down into the fuel tank.)
2. Rinse the filter several times in clean fuel. Blow it dry through the fitting end.
3. When you reinstall the filter, be sure the "O" ring is in place and undamaged, then tighten the filter firmly into the burner head. The grommet must be in place in the fuel tank before you insert the fuel filter.

J. REASSEMBLY

Be sure all parts are in place and all screws and electrical connections are tight before attempting to use the heater. Take care not to damage the spark plug and to keep the proper gap between its electrodes.

When installing the heater housing, be sure the holding clips at the bottom edges are engaged with the tank skirt.

SECTION IV

TROUBLE SHOOTING

A. GENERAL

If normal maintenance fails to keep a heater in good operating condition, it probably requires service or replacement of some parts. Examine it for clues as to why service is necessary, then test-fire it to gain first-hand knowledge of why service might be needed.

This section tells how to examine and test-fire the heater. It also gives 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 filters. Be sure the heater is clean before test-firing it.

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

C. TEST FIRING

1. Clean the tank and fill it with at least two gallons of clean fuel. A minimum of two gallons of fuel must be in the tank for proper test firing.

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

3. Remove the heater housing and combustion chamber (Section III, paragraphs C and H). Disconnect the spark plug wire. Take out the plug which is in the output air filter housing. Install the pressure gage (listed in Section V, paragraph B) into the hole.

4. Plug the heater cord into an electrical outlet. The pressure gage must read 4 pounds per square inch, plus or minus 1/16 pound. If not, adjust the pressure as described in Section V, paragraph K.

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

5. After making the pressure check and adjustments, reinstall the combustion chamber, the plug and the heater housing. Reconnect the spark plug wire.

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

7. 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 how to correct the problem, or tells you by means of a section and paragraph number, where to find instructions for correcting it. In trouble shooting, remember that the air pump is part of the fuel system, because the air it supplies siphons 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.

TRUBLE SHOOTING CHART

PROBLEM	POSSIBLE CAUSE	REMEDY
1. Motor does not start.	<u>Electrical Troubles</u>	
	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. (II-B) Be sure the voltage at the outlet is same as shown on heater instruction plate.
	b. Defective motor or starting relay.	Check motor and relay. (V-D) Replace a defective motor or starting relay.
	<u>Mechanical Troubles</u>	
	c. Dry bearing on fan-end of motor.	Lubricate motor. If lubrication does not solve problem, check pump. (III-F, V-J)
	d. Pump rotor binding or carbon blades worn out.	Rebuild pump. (V-J)
	e. Fan striking end shield due to damaged end shield or broken motor mount support.	Check for damaged end shield; repair or replace if damaged. Replace fan if damaged. (V-F) Check for broken weld on motor mount. If broken return to dealer for replacing or re-welding.
2. Heater will not ignite, but motor runs.	<u>Fuel System Troubles</u>	
	a. Fuel tank empty, water in fuel, wrong fuel.	Check for water in tank, clean tank and fuel filter if water is found. Fill tank with new, clean kerosene or No. 1 fuel oil.
	b. Fuel filter clogged.	Remove and wash in clean fuel. (III-I)
	c. Nozzle plugged or defective.	Clean by blowing compressed air through nozzle from outlet end of nozzle. Replace nozzle if cleaning does not solve problem. (V-I)
	d. Low air pump pressure.	Check pressure; adjust, rebuild or replace air pump as needed. (V-J & K) Check rubber sleeve around shank of nozzle. Replace if leaking. (V-I) Check seal between burner head and air pump port plate; be sure seal is in place. (V-L) Check gasket at output air filter cover. Be sure it is holding pressure. Be sure air filters are clean. (III-B & D)

TROUBLE SHOOTING CHART

PROBLEM	POSSIBLE CAUSE	REMEDY
2. (Continued) Heater will not ignite, but motor runs.	<u>Ignition Troubles</u>	
	e. Defective spark plug. (Wrong gap, plug wet with fuel or electrodes carboned, or plug damaged.)	Measure gap between electrodes, using thickness of a dime as a gage. Adjust electrode gap. (III-E) Inspect plug for broken porcelain or electrodes. Discard a damaged spark plug.
	f. Spark plug wire disconnected from plug or from terminal of transformer.	<u>Disconnect heater cord!</u> Check at plug and transformer to be sure wire is tight at both ends.
	g. Defective transformer.	Disconnect spark plug wire from transformer, and check transformer for spark; replace if no spark can be obtained. (V-G)
3. Heater burns, but smoke or puffs of smoke can be seen; heater will not burn steady; heater burns with odor.	<u>Improper Fuel-Air Mixture (Not enough fuel)</u>	
	a. Heater running out of fuel; water condensation in fuel tank.	Shut heater off and check fuel tank. If you can see water in the bottom, drain and flush the tank with clean fuel. Refill with new kerosene or No. 1 fuel oil.
	b. Dirty intake and output air filters, causing reduced air flow through nozzle, resulting in low fuel flow.	Remove and clean the air filters. (III-B & D) Be sure air intake passage is not blocked.
	c. Fuel filter loose, dirty, or leaky; or defective fuel filter "O" ring.	Remove and wash fuel filter in clean fuel. (III-I) Test filter for leaks; check condition of "O" ring. Use a new one if defective. (III-I) Replace tightly in burner head.
	d. Dirty nozzle.	Remove and clean burner head. (V-I) Blow compressed air through nozzle from <u>outlet</u> end. <u>Never</u> use a drill, wire, or other tool to open nozzle passage. Replace a defective nozzle. (V-I)
	e. Low pump output pressure. (Low motor speed, worn pump, pump out of adjustment.)	Check pump output pressure; adjust pressure; repair pump if adjustment cannot be made. (V-K) Check to see that no dirt or trash (or dirty fan blades) could cause motor slowdown. Lubricate fan-end bearing of motor. (III-F)

TROUBLE SHOOTING CHART

PROBLEM	POSSIBLE CAUSE	REMEDY
3. (Continued) Heater burns, but smoke or puffs of smoke can be seen, heater will not burn steady; heater burns with odor.	f. (Remote possibility) Rubber sleeve on shank of nozzle is leaking.	Check for bubbles in fuel tank while heater is operating. If bubbles appear, replace rubber sleeve. (V-I)
	g. (Remote possibility) Combustion chamber not tight against burner head, allowing too much air to enter combustion chamber.	Adjust fins for good fit of combustion chamber to burner head. (V-L-1g)
4. Flames come out front of heater.	<u>Improper Fuel-Air--Mixture (Too much fuel, or not enough air for amount of fuel.)</u>	
	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 too high.	Check and adjust pump output pressure. (V-K)
	c. Fan loose or improperly located on shaft.	Check; correct if not right. (V-F)
	d. Housing holding clips not properly engaged over fuel tank skirt.	Check housing fit; correct if not tight.
5. Heater cycles intermittently.	<u>Electrical System Troubles (Motor overload protector tripping out.)</u>	
	a. Low voltage, causing trip-out of motor overload protector.	Check power line voltage. Use correct size extension cord. (II-B) Be sure extension cord and heater cord are in good condition, without intermittent open circuits.
	b. Motor overload protector tripping out due to motor trouble, or binding pump.	Lubricate fan-end bearing. (III-F) Keep motor and fan area clean. Replace defective motor or rebuild defective pump. (V-E & J)

A. GENERAL

Whenever a part needs to be replaced, you can identify it on the exploded view, and order the part by name and part number from the parts list, in Section VI.

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

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

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

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

CAUTION: Fumes are poisonous, use with GOOD ventilation!

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

C. TRANSFORMER

NOTE: To begin the transformer test, first be sure the heater is NOT plugged in.

1. Remove the spark plug wire from the transformer output terminal.

WARNING

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

2. Plug the heater cord into an outlet of the proper voltage and frequency. Place a screwdriver with a GOOD INSULATED HANDLE across the output terminal and bring the tip of the screwdriver near a metal part of the heater. If no spark jumps, and the wiring to the transformer is good, the transformer is defective and must be replaced.

3. Be sure the mounting surfaces of the new transformer are scraped clean, and the mounting

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Figure 4. Wiring Diagram

D. CHECKING THE MOTOR AND RELAY

In case the motor fails to start when the heater is plugged in, check the motor and relay as follows.

1. Spin the fan by hand. Any stiffness indicates that the fan-end bearing is dry or worn, or that the pump is binding. If the motor spins freely, make the following electrical check.

2. Take the black wire from the motor off its terminal on the relay. See the Wiring Diagram, Figure 4. Plug the heater cord into an outlet of the proper voltage.

CAUTION: Avoid touching the bare wires.

3. Touch the black wire from the motor to the terminal of the red motor wire, on 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.

4. If the motor starts, replace the relay.

5. If the motor fails to start, or if it fails to continue running when the black wire is disconnected, it is defective. Replace it, or return it to a factory-approved authorized service organization.

E. MOTOR SERVICE

If the motor requires service, it must be removed from the heater, as described in Section III, paragraph H.

The alignment of the motor with the air pump is critical. If any service is to be done on the motor, be sure not to loosen or remove the pump body, or this alignment will be disturbed.

Apply a few drops of oil to the fan-end bearing of a stiff motor. If this fails to correct the stiffness, rebuild the pump as described in paragraph J of this section. During rebuilding of the pump, check again for stiffness, and if it still exists, rebuild the motor.

NOTE: The motor cannot be repaired by rewinding the stator. If the electrical values of the motor are changed by rewinding, the starting relay will also be affected.

F. FAN

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

When checking or replacing the fan, see that the setscrews are located in the notch in the motor shaft that is nearest the outer end of the shaft, and that the hub is toward the end of the 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.

G. FURTHER DISASSEMBLY

Remove the combustion chamber, and the group of parts consisting of the motor, pump, and burner head, as described in Section III, paragraph H. This will let you reach the rest of the heater parts for service.

H. FUEL FILTER SERVICE

1. Remove the fuel filter from the burner head and clean it, as described in Section III, paragraph I.

2. If there was evidence of the fuel filter leaking, test by placing your thumb over the tube-end of the filter. Apply air pressure to the fitting-end. Immerse in kerosene and watch for bubbles between the tube and the brass fitting. Replace if bubbles appear.

3. When reinstalling the fuel filter, be sure the "O" ring is in place and undamaged. Tighten the filter firmly.

NOTE: If the burner head requires further service, lay the filter aside and protect it from damage until final reassembly.

I. CLEANING BURNER AND NOZZLE

1. Remove the burner head by taking out the two attaching screws. Take out the spark plug to prevent damage. Remove the nozzle.

2. Soak the burner head for one hour in non-flammable cleaning solvent. **DO NOT USE KEROSENE OR FUEL OIL.**

3. Blow the burner head dry through both passages in the burner head.

CAUTION: NEVER try to open the nozzle passage with a drill, wire, or any other tool. 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.

4. Replace with a new nozzle if there is any sign of damage. Blow a new nozzle out thoroughly with air, from outlet to inlet end, before installing it into the burner. (See Figure 5.) Protect the nozzle face from scratches!

CAUTION: Protect the nozzle passage from damage when installing a new nozzle. Always be careful to keep the nozzle **CLEAN** while it is out of the burner.

5. 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.

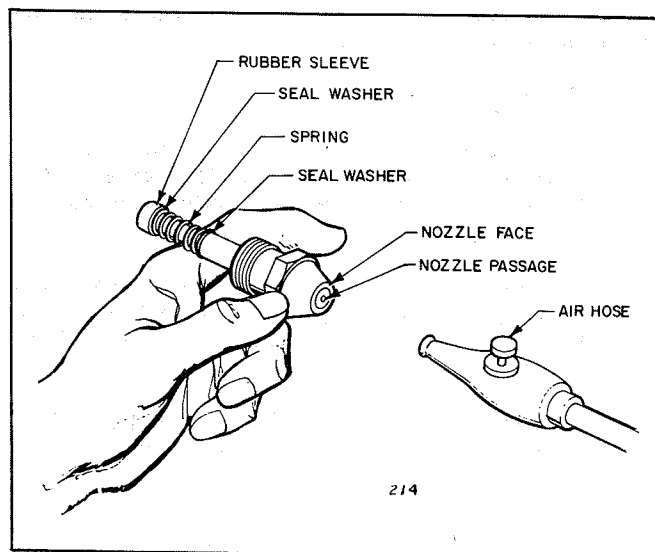


Figure 5. Blowing Out Nozzle

6. Be sure the seal washer, spring, and second seal washer are in place on the nozzle before installing the rubber sleeve.

7. When seating the nozzle firmly against the burner head, do not apply so much pressure with the wrench that the nozzle could be distorted.

J. AIR PUMP REPAIR

NOTE: Because of the close tolerances and critical positioning involved, 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. The motor end plate also serves as one of the end plates of the pump.

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

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

1. 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 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 the 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.

2. Disassembly of Air Pump.

a. Remove the four screws which attach the end cover, and remove the end cover. Then take out the two screws which attach the pump body to the motor, and take off the pump body.

NOTE: Hold a clean, dry cloth under the pump while you take it apart, to catch the carbon blades as they fall out when the pump body is removed.

b. Take the carbon blades out of the rotor. Pull the rotor and spring off the motor shaft.

3. Replacing the Rotor.

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

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

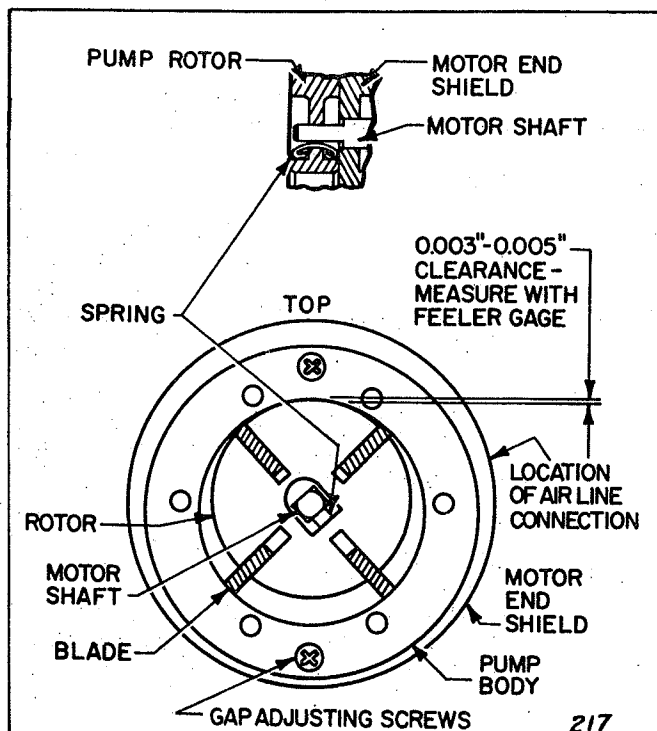


Figure 6. Air Pump Assembly and Rotor Clearance

4. Reassembly of Air Pump.

a. Install the spring in the pump rotor as shown in Figure 6, then assemble the rotor on the motor shaft. Attach the pump body to the motor with the two screws which were removed.

b. Adjust the pump body to provide 0.003-0.005 inch clearance at the point shown in Figure 6. 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 the carbon blades, as described above.

d. Install the end cover, with the air line connection located as shown in Figure 6, using the four screws.

e. Install burner head, air filter, and nozzle assembly. Adjust pump pressure.

K. ADJUSTMENT OF AIR PUMP PRESSURE

1. Install the pressure gage into the output air filter housing. (See Figure 7.)

2. Start the heater. (Fuel need not be in the tank.)

3. Pump pressure must be 4-1/8 pounds per square inch, plus or minus 1/8 pound without fuel in tank or housing in place. If pressure is not within this range, adjust relief valve.

4. To adjust, screw the valve stem in (clockwise) to raise the pressure; out (counterclockwise) to lower it.

L. REASSEMBLY OF HEATER

1. Reinstallation of Burner Head.

a. Be sure the seal is in place in its recess in the rear of the burner head casting. (See Figure 8.)

b. Attach the burner head to the pump and motor assembly with the two screws that were removed.

c. Be sure the "O" ring is in place and install the fuel filter into the burner head. Tighten firmly, to avoid air leakage.

d. Place the assembly of motor, pump and burner head on the bracket on the fuel tank, and attach with the clamps. Be sure the spacers are in place between the halves of the clamps.

e. Install the spark plug. Be careful to protect the electrode gap setting.

f. Connect the air inlet line to the pump body. (The long end of the line goes into the pump body; the short end into the air intake filter.) Tighten the filter and relay bracket.

g. Reinstall the combustion chamber and tighten the attaching screw. If the combustion chamber does not fit tight against the face of the burner head, carefully bend the fins on the back end of the combustion chamber to eliminate all air gaps where the two parts meet. If this is necessary, loosen the motor mounting straps before installing the combustion chamber, then tighten them snugly when the combustion chamber is in place.

2. Completing the Reassembly.

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

b. Check all wiring to be sure it conforms to the Wiring Diagram. Be sure all electrical connections are tight.

c. Remove the gage and replace the plug, and install the heater housing. (Be sure to engage the holding clips at the bottom edges of the housing over the edges of the tank skirt.

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

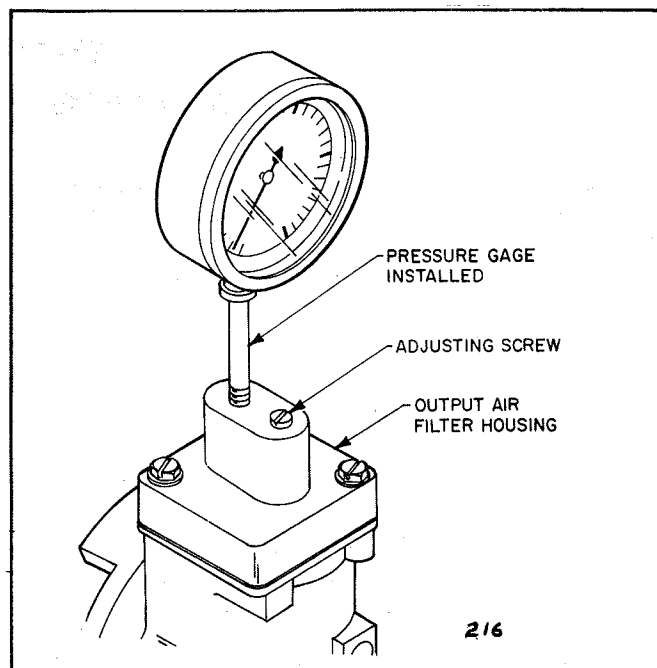


Figure 7. Pressure Gage Installation

M. FINAL CHECK

Test-fire the heater for a few minutes after all service has been completed, to be sure it will operate satisfactorily.

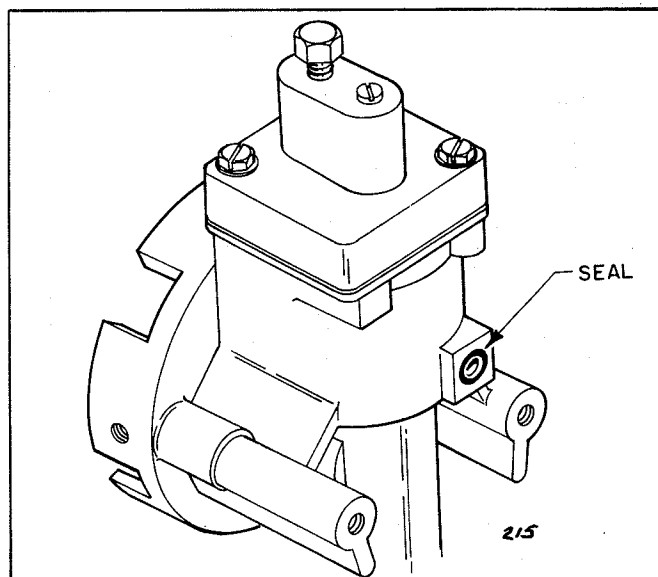


Figure 8. Burner Seal Installation

SECTION VI

ILLUSTRATED PARTS LISTS

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 (*).

Check the model decal for the correct model number of the heater. Include the model and serial 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.

Index No.	Part Number	Part Name	Quan.
A	M11148G5	Motor, Pump and Burner Head Assembly	1
B	M12428G3	Burner Head Assembly	1
1	M11054-1	. Nozzle, Siphon	1
2	M10659-1	. Washer, Nozzle seal	2
3	M10809-1	. Spring, Nozzle seal	1
4	M8882	. Sleeve	1
5	M10837	. Plug, Hex head	1
6	M10992-1	. Screw, Adjusting	1
7	M10993-1	. Spring, pressure relief	1
8	M8940	. Ball, 1/4 dia	1
9	M12461-54	. Screw, Hex hd, 10-24 x 7/8	2
10	M12576	. Body, Valve	1
11	M12577	. Gasket	1
12	*M9942G3	. Filter Element (output)	1
13	M12578	. Filter, Lint	1
14	*M10962-2	. Spark Plug	1
15	M14525	. Electrode Retainer	1
16	M12273	. Body, Burner head	1
17	M10908-38	. Screw, Type S, 12-24 x 3/8	1
18	*M10718-1	. O-Ring	1
19	*M12614G1	. Fuel Filter	1
20	ROP12-8	. Roll Pin, 3/16 x 1/2	4
C	M12429G1	Motor & Pump Assembly	1
21	FHPF3-8C	. Screw, Fil hd, 10-32 x 1	4
22	M12430	. End Cover, Pump	1
23	FHPF3-4C	. Screw, Fil hd, 10-32 x 1/2	2
24	M8645	. Body, Pump	1
25	M11959	. Rotor	1
26	M11966-5	. Spring	1
27	M8643	. Blade	4
28	M11938	. Motor	1
29	M8947	. End Shield, Motor Front (Service only)	1
30	M11265-1	Seal	1
31	FHF3-20C	Screw, Fil hd, 10-32 x 2-1/2	2
32	M12425G1	End Cap	1
33	M12461-64	Screw, Hex hd, 1/4-20 x 5/8	2

Index No.	Part Number	Part Name	Quan.
34	WLI-4	Lockwasher	2
35	M10979G2	Combustion Chamber	1
36	HC4-10C	Screw, Round hd, 1/4-20 x 1-1/4	2
37	M10964-1	Clamp, Motor	4
38	M13620	Spacer	2
39	WLM-4	Lockwasher	2
40	NPC-4C	Nut, Hex, 1/4-20	2
41	*M12431-2	Fan	1
42	SFK-4-2	. Setscrew, socket hd, cup pt. 1/4-28	2
43	M12461-64	Screw, Hex hd, 1/4-20 x 5/8	2
44	WLI-4	Lockwasher	2
45	M12427G1	Guard, Fan	1
46	M10990-3	Bushing	1
47	WP-3C	Washer	2
48	ST3-3B	Screw, Hex hd, Type B 10-12 x 3/8	2
49	M10816G15	Lead, Electrode	1
50	M14291	Transformer	1
51	M11143-1	Bushing, Strain relief	1
52	M13942-4	Connector, Wire	2
53	M10813G15	Cord, Service	1
54	M9050	Adapter	1
55	M11151-1	Cap, Filler neck	1
56	M12426	Seal, Rubber	1
57	M12424-2	Skirt, Tank	1
58	M12416G2	Tank, Fuel	1
59	*M11146-1	Element, Filter, intake	1
60	M12749-25	Screw, Fil hd, 10-24 x 1/2	2
61	M10747-1	Body, Filter	1
62	M10257-2	Gasket, Filter intake	1
63	WLI-2	Lockwasher	2
64	RC2-3C	Screw, Round hd, 8-32 x 3/8	2
65	M9900G37	Wire Assembly	1
66	M12462-2	Relay	1
67	M10908-51	Screw, Hex hd, Type S, 10-24 x 1/2	2
68	M12433	Bracket, Relay & filter	1
69	M13293	Grommet, Rubber	1
70	M12432	Tube, Intake air	1

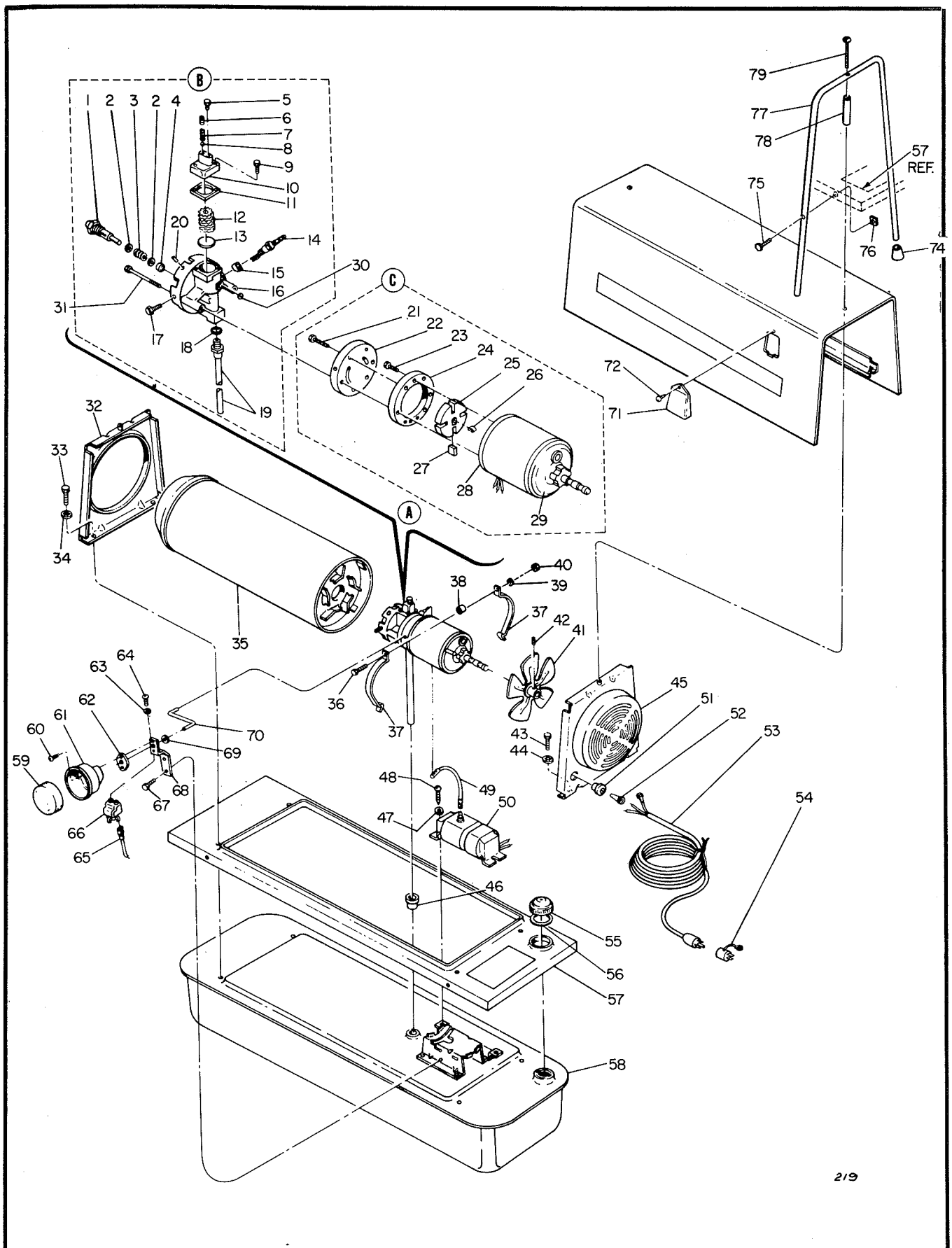


Figure 9. Portable Heater, Exploded View

Index No.	Part Number	Part Name	Quan.
71	M12568	Cover, Filter	1
72	M10908-2	Screw, Hex hd, Type S, 6-32 x 3/8	1
73	M12436G2	Housing, Heater	1
74	M11292-1	Cap, Leg	4
75	M12461-55	Screw, Hex hd, 10-24 x 1	4
76	M11271-4	Nut, Speed	4
77	M12488	Leg	2

Index No.	Part Number	Part Name	Quan.
78	M12655	Support, Leg	2
79	RPC-18C	Screw, Round hd, 1/4-20 x 2-1/4	2
	M11220-1	Decal, Operation Instr.	1
	M14959	Decal, Nameplate	1
	M14960	Decal, Trade Name	1
	M12634	Decal, Wiring Diagram	1
	M13386-6	Touch-up paint, Aerosol Can, (red)	
	M13386-7	Touch-up paint, Aerosol Can, (white)	