



MODEL K 350 A

Spec. No. 5043G01

HIGH PRESSURE HEATER

OPERATING, MAINTENANCE and SERVICE INSTRUCTIONS with PARTS LIST



KOEHRING
ATOMASTER DIVISION
BOWLING GREEN, KENTUCKY 42101



WARNING — Safety Requirements

IMPORTANT: Read and Understand Instruction Manual before Starting or Servicing!

IMPROPER USE OF THIS HEATER CAN RESULT IN SERIOUS BODILY INJURY DUE TO HAZARDS OF FIRE OR EXPLOSION, CARBON MONOXIDE POISONING, BURN, AND ELECTRICAL SHOCK.

- Use **ONLY** Kerosene or Number 1 Fuel Oil. **NEVER BURN GASOLINE, NAPHTHA, PAINT THINNERS, ALCOHOL OR OTHER VOLATILE FUELS!**
- Use **ONLY** in areas **FREE OF FLAMMABLE VAPOR OR HIGH DUST CONTENT**. **NEVER USE HEATER WHERE GASOLINE, PAINT THINNER OR OTHER HIGHLY FLAMMABLE VAPORS ARE PRESENT.**
- Make sure hot air outlet is **AT LEAST 8 FEET** from **COMBUSTIBLE MATERIALS**.
- Fill fuel tank or move heater **ONLY** when heater is **UNPLUGGED**.
- **NEVER USE HEATER IN ROOMS USED FOR SLEEPING.**
- **USE ONLY IN WELL VENTILATED ROOMS.** Provide ventilation of **AT LEAST 3 SQUARE FEET** FOR EACH 100,000 BTU OF RATING. (For example, a 30,000 BTU Heater would require a two foot wide window raised six inches.)
- When used with **THERMOSTAT**, **HEATER MAY START ANYTIME!**
- **KEEP CHILDREN AWAY FROM HEATER AT ALL TIMES—NEVER LEAVE A HEATER PLUGGED IN WITHOUT AN ADULT PRESENT IF CHILDREN ARE LIKELY TO BE PRESENT.**
- Use **ONLY** with electrical voltage and frequency specified on model plate.
- Use **ONLY** a **PROPERLY GROUNDED THREE-WIRE EXTENSION CORD.**
- **DO NOT MOVE, HANDLE OR SERVICE WHILE HOT OR BURNING.**
- Use **ONLY** in accordance with local ordinances and codes.
- **NEVER ADD DUCT WORK TO FRONT OF HEATER.**

Safety requirements and model plate data comply with American National Standards Institute Safety requirements.

ANSI A10-1970

TUNE UP

To keep your heater in top operating condition, perform the following services at the start of each heater season then at the interval specified below:

Clean and/or replace fuel filter	Clean at least twice a season. More often if heater performance indicates the need. Replace if necessary.
Clean fan	Clean fan after every 500 hours of operation. Clean more frequently if heater is operating in dusty areas or if there is a build-up of dirt on the blades.
Replace burner nozzle	Replace nozzle at least once during the heater season or more often if heater performance indicates the need.
Clean and adjust spark plug	After every 300 hours of operation, clean and adjust spark plug electrodes. Adjust gap or replace the plug if electrodes have been burned, eroded, or carboned.
Clean photo cell	Clean the photo cell face with a soft cloth at least once during the heater season. If cell face tends to soot up, check with your nearest service station to determine the cause.

INTRODUCTION

Congratulations . . . you have just purchased one of the finest oil-fired heaters on the market today. Your portable heater has been designed and engineered to provide you with years of warm comfort. We encourage you to read this manual carefully before using.

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THE HEATER IS DESIGNED FOR USE WHERE LARGE AMOUNTS OF HEAT ARE NEEDED. IT MUST BE USED WHERE ADEQUATE VENTILATION AND PROPER ELECTRICAL POWER ARE AVAILABLE.

THIS MANUAL CONTAINS OPERATING, MAINTENANCE AND TROUBLE SHOOTING INSTRUCTIONS FOR THE HEATER. A COMPLETE LIST IS INCLUDED AT THE END OF THE MANUAL.

OPERATION

ELECTRICAL

Do not use a power source other than that specified on the nameplate. It is important to use extension cords of the right size if the heater is to be operated at a distance from the electrical source.

The following table shows the minimum recommended wire sizes for various lengths of extension cords. This wire size is calculated to assure adequate voltage reaches the heater. Use of a smaller wire size than those recommended will result in slow starting and may result in malfunction of electrical components.

Length of Cord (Feet)	200	100	50
Minimum Wire Size (AWG)	8	10	12

FUEL

CAUTION: NEVER USE VOLATILE FUELS SUCH AS GASOLINE, NAPHTHA OR ALCOHOL.

NEVER FILL FUEL TANK WHILE HEATER IS PLUGGED IN.

This heater is designed to operate on Kerosene or number 1 fuel oil. These fuels can be obtained at your local fuel oil supplier or service station. Be sure the fuel is clean. Wipe up any spills or overflows.

Cold temperature may cause fuel to thicken. This may require a non toxic anti-icer.

VENTILATION

CAUTION: USE ONLY IN WELL VENTILATED AREAS. PROVIDE AT LEAST THREE (3) SQUARE FEET OF FRESH AIR FOR EACH 100,000 BTU RATING. IT IS PREFERRED TO HAVE CROSS VENTILATION OF THE AREA IF POSSIBLE. THIS HEATER REQUIRES 10.5 SQ. FT. OF VENTILATION.

DO NOT USE WHERE FLAMMABLE VAPOR IS PRESENT OR WITHIN EIGHT (8) FEET OF COMBUSTIBLE MATERIAL.

NEVER USE HEATER IN SLEEPING AREAS.

NEVER LEAVE HEATER RUNNING UNATTENDED WHEN CHILDREN ARE IN THE AREA.

PRINCIPLES OF OPERATION

Operation of the heater involves three to four simple systems:

1. **Fuel System.** A gear-type fuel pump attached to one end of the motor shaft delivers fuel at 100 PSI from the fuel tank through a filter and a solenoid valve to the nozzle, which forces it into the combustion chamber in a fine spray.

2. **Air System.** A fan attached to the other end of the motor pushes air through the heater. Part of the air enters the combustion chamber and mixes with the atomized fuel to form a combustible mixture.

The rest of the air 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. This results in a jet of clean, heated air flowing out of the front of the heater.

3. **Ignition System.** A transformer provides high voltage to a spark plug which extends through the burner head into the combustion chamber. A constantly firing spark from the spark plug ignites the mixture of fuel and air.

NOTE

The installation of this unit shall be in accordance with the regulations of the authorities having jurisdiction.

4. **Control System.** The control system is actuated by a light sensing, instantly reacting cell used in conjunction with the safety control to initiate a safety shutdown in the event of ignition or flame failure. In addition, the control system provides a period of blower operation after normal shutoff to purge and cool the combustion chamber.

5. A thermostat, mounted on the heater, will operate it in response to the temperature setting provided that the setting is higher than the surrounding air temperature.

SPECIFICATIONS

BTU Rating	350,000 per hour
Air Delivery	1600 CFM
Voltage	115,60 HZ, 1 phase
Amperes Starting	28.0
Running	7.1
Fuel	Kerosene or No. 1 Fuel Oil
Fuel Tank Capacity	30 U.S. Gallons
Nozzle	2.50 GPH 70° hollow cone
Motor	1/3 HP @ 1725 RPM
Weight Empty	180 lbs.
Full Tank	390 lbs.
Pump Pressure	100 PSI

OPERATING CAUTIONS

1. Use heater only with adequate ventilation. If used in a closed room, a partly-opened door or window near the heater will provide enough ventilation. Do not use this heater as a source of heat in sleeping quarters.

2. Use only kerosene or No. 1 fuel oil; do not use No. 2 or heavier fuel oil as they contain tars which will contaminate the heater. **DO NOT USE GASOLINE: IT IS VOLATILE AND DANGEROUS.**

3. Use the heater only on the electrical power specified on the 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 or near it.

5. Keep the heater at least 8 feet from any combustible materials.

6. **DO NOT** use the heater in the presence of flammable vapors such as paint, gasoline, or solvents.

7. Never add fuel while the heater is operating.

8. Keep the air inlet and discharge areas free of loose materials and any obstructions that would hinder the free flow of air into and out of the heater.

NOTE

The motor contains a manual reset overload protector. If this should stop the motor due to low voltage or overload, the motor can be re-started by pressing the red button. Be sure to disconnect the power cord before opening the heater or checking the motor, because the heater may start at any time.

PREPARING FOR OPERATION

1. Remove the heater from its shipping and take off any protective packing material which may be applied to it.

2. Check the heater for possible shipping damage. If any is found, **IMMEDIATELY** notify the agent of the carrier which delivered the heater to you, and make out a claim for the damage.

3. Fill the fuel tank with the proper fuel.

NOTE

If the heater is used at below zero temperatures, the fuel may congeal. To prevent this, add two tablespoons of Frostex or similar anti-icer to each 5 gallons of fuel. Be sure tank and fuel is water-free before filling.

OPERATING INSTRUCTIONS

1. Starting.

a. Plug heater into adequate electrical outlet receptacle.

b. Set the thermostat dial to the desired temperature.

Operation from this point on is automatic.

2. Stopping.

a. Stop the heater by turning the thermostat dial to the **NO HEAT** position.

b. You can also stop the heater temporarily by setting the thermostat to a temperature lower than the surrounding air.

c. The heater flame will go out immediately, but the thermal switch will keep motor operating long enough so that air flow from the fan will cool the combustion chamber.

d. Do not shut the heater off by unplugging it, as this deprives it of the purge cycle.

NOTE

The heater should never be unplugged while in operation because this could cause damage to heater. The heater should not be restarted until the combustion chamber has cooled.

E. OPERATING SEQUENCE

The following is a description of the normal automatic operating sequence of the heater (See the Wiring Diagram, Figure 1).

1. The heater is turned on by the thermostat automatically in response to a temperature setting of the dial, provided the setting is higher than the surrounding air temperature.

2. When operation is called for, the transformer and the motor, fan and fuel pump start operating immediately.

3. After fan reaches running speed, the solenoid valve will open. This allows fuel to flow to the nozzle. The heater will then ignite.

4. After about 2 minutes, the purge circuit is energized.

5. When the thermostat setting equals the surrounding air temperature or is turned to the NO HEAT position, the solenoid valve shuts off the flow of fuel to the nozzle, and the fire goes out immediately. The fan continues to run, purging the heater.

6. When the combustion chamber cools, the thermal switch changes back to its starting position, shutting off the motor.

7. If, for some reason, the fire goes out before the thermostat is satisfied, or if the heater fails to ignite when operation is called for, the safety control will shut off the heater within 15 seconds. If this should occur, unplug the heater, and determine the cause of the shutdown. Correct the cause then press the reset button on the safety control and restart the heater.

F. CLEANING

Test fire the heater to make sure it will function properly. If it does not, check all wiring connections according to the wiring diagram, Figure 1.

G. FUEL PUMP MAINTENANCE AND SERVICE

1. The pump operates at 100 psi. To check pressure, remove the hex head pipe plug from the part marked gage on the fuel pump and install a pressure gage. (Pressure Gage, Part No. M4574 is available from our service dealers).

2. If the pressure gage does not read 100 psi, plus or minus 5 psi, when the motor is running and pumping fuel, adjust the pump.

3. Remove the access plug on the side of the pump body marked pressure adjustment. To increase the fuel pressure, turn the slotted screw inside the port clockwise. To decrease the fuel pressure, turn the screw inside the port counterclockwise. After completion of the adjustment install the plug into the adjusting port, then remove the gage, install the plug into the fuel pump.

4. If the fuel pressure cannot be adjusted, replace the pump.

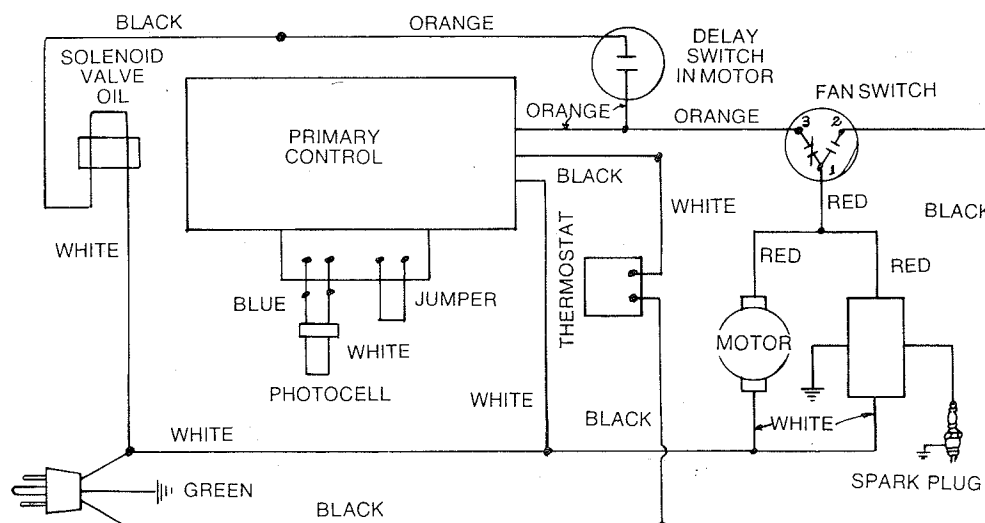


Figure 1. Wiring Diagram

SECTION III

MAINTENANCE AND SERVICE

Maintenance consists of the operations the owner or user of the heater can perform to keep the heater operating properly. If routine maintenance fails to return a heater to top-operating condition, refer to the Trouble Shooting Table. Keep the heater clean to reduce the need for extensive maintenance or repair.

A. FUEL SYSTEM MAINTENANCE

1. Use the cleanest fuel available. Dirt and water in the fuel will clog the filter, and may cause the heater to burn with an odor. If there is excessive water in the fuel, the flame may go out. Every 250 hours (or oftener) drain the tank and rinse it with clean, "dry" fuel (having no water in it.) Then refill with clean fuel.

2. Every 250 hours of operation, unscrew the filter can to remove the filter element. Rinse the bowl in clean kerosene and wipe dry with a clean cloth to remove all accumulated dirt. Use a new filter element and a new gasket before replacing filter bowl.

3. Check the fuel line connections occasionally to be sure they are tight.

4. If the solenoid valve should begin to stick open or closed, replace it.

B. AIR SYSTEM MAINTENANCE

1. If the heater is used in dusty or dirty air, the fan blades may in time build up enough dirt to reduce the over-all efficiency of the heater. Inspect them occasionally, and wipe off any loose dirt. Use a rag moistened with kerosene or non-flammable cleaning solvent to get stubborn dirt off the blades.

2. Keep the deflector plate and the air passages around the burner head free from dirt and trash.

C. BURNER MAINTENANCE AND SERVICE

WARNING

Be sure the heater is disconnected from the power line before opening up and working in the burner area.

1. For access to the nozzle (Figure 7) remove the upper shell. Disconnect the fuel line, spark plug lead. Remove the screws attaching the burner head assembly to remove it from the combustion chamber.

2. Do not attempt to clean the nozzle. If the nozzle is badly carboned or dirty, replace it.

When replacing the nozzle, the tightness torque should be 75 to 100 inch pounds.

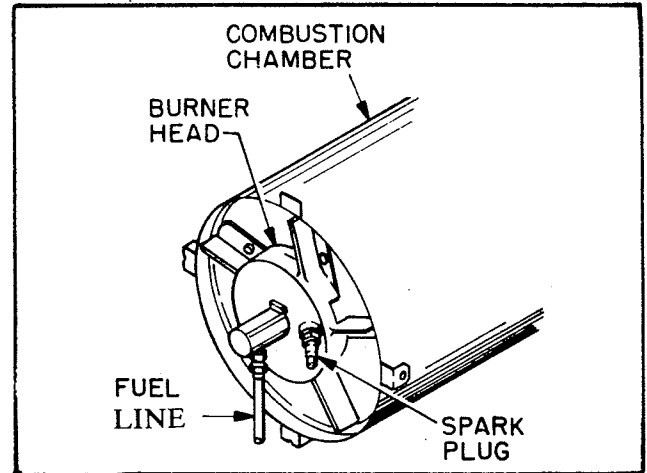


Figure 2. Burner Head, Spark Plug

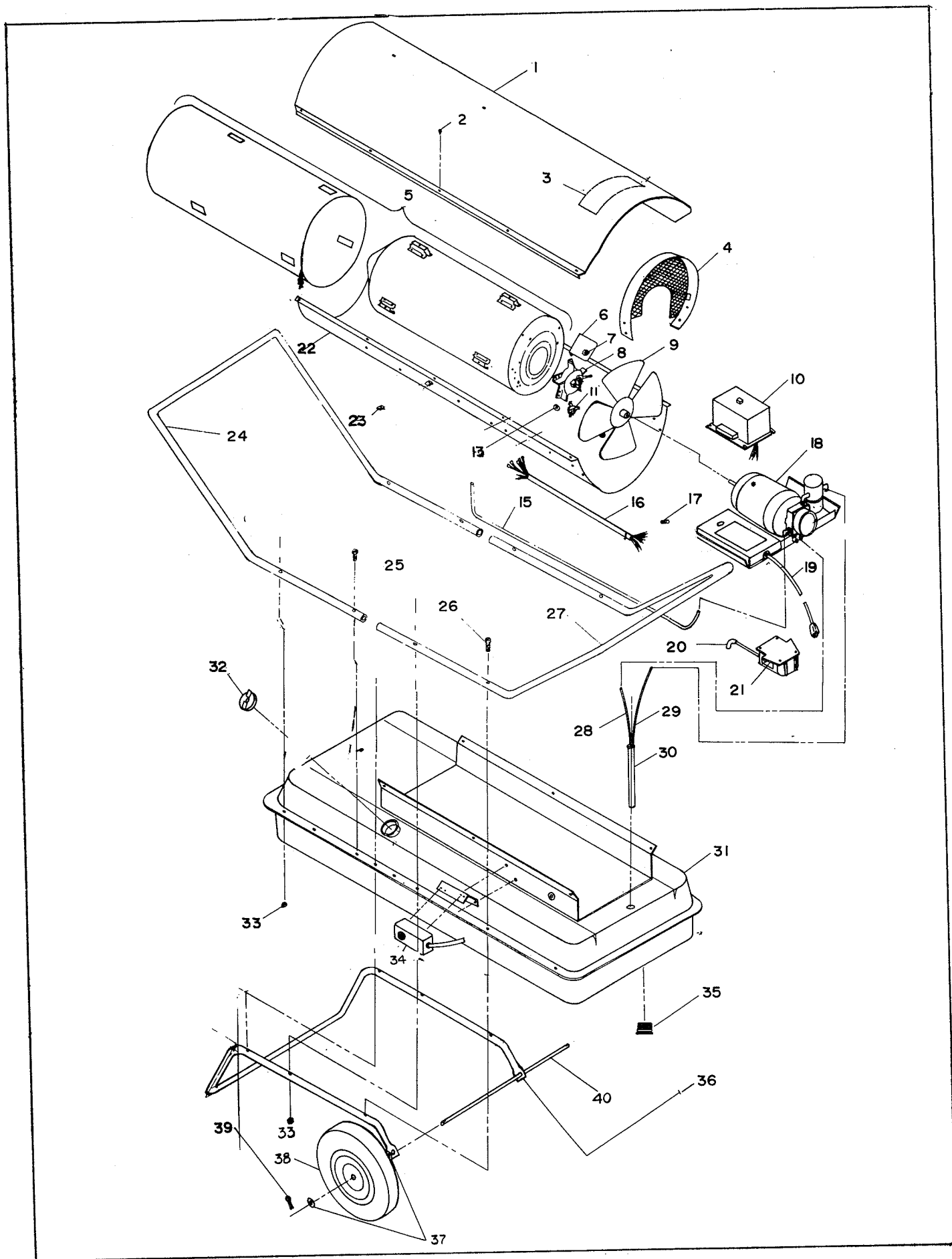


Figure 4 Heater Assembly EXPLODED VIEW

SECTION V PARTS LIST

This list contains all replaceable parts used in the heater covered by this manual, with key numbers for easy reference between the list and the exploded view.

When ordering parts, check the model decal for the correct model number, specification number, and serial number of the

heater. Include the MODEL, SPECIFICATION, and SERIAL numbers when ordering parts. ORDER PARTS BY PART NAME AND PART NUMBER ONLY. DO NOT use the key numbers from the illustration when ordering parts.

Key No.	Part Number	Part Name	Qty.	Key No.	Part Number	Part Name	Qty.
1	M50060AZ	Upper Shell	1	21	M50570-C1	Transformer and bracket	1
2	M11084-26	Screw No. 10-12 x 3/8	10	22	M50061AZ	Lower Shell	1
3	M50089	Wiring Diagram Decal	1	23	M11271-6	Nut, Tinnerman	10
4	M50097-01AA	Guard, Fan	1	24	M50062-03	Handle, Front	1
5	M50542-01	Combustion Chamber and Heat Deflector	1	25	HC4-12C	Screw ¼-20 x 1½	4
6	M50086	Air Deflector	5	26	HC4-18C	Screw ¼-20 x 2¼	6
7	M50104-02	Bushing Short	3	27	M50062	Rear handle (Frame support)	1
8	M50084-07	Assem. Burner Head	1		M50115-04	Assem. Fuel Line	1
9	M50121	Fan	1	28	M50118-02	. Fuel Line (Return)	1
10	M22082	Control Safety	1	29	M50118-03	. Fuel Line (Input)	1
11	M31301-02	Fan Switch	1	30	M50262-01	. Screw and Bushing Assembly	1
13	M50104-02	Bushing Short	1	31	M50071-01AA	Fuel Tank Assembly	1
15	M50295	Fuel Line	1	32	M23284	Fuel Cap	1
16	M50391-01	Wire Harness Assembly	1	33	NTC-4C	Nut ¼-20	10
17	M13942-7	Wire Connector	3	34	M25297-14	Thermostat Assembly	1
18	M50079-04	Motor & Pump Assembly (Ref. figure) Not Available as a unit		35	M27417	Drain Plug	1
19	M10813-33	Extension Cord Assembly	1	36	M50063	Frame, Wheel Support	1
20	M50050	Boot ignition	1	37	WP-10C	Washer, Flat 5/8	4
				38	M50389	Wheel	2
				39	C5-10C	Pin, Cotter, 5/32 x 1 ¼	2
				40	M18774A	Axle	1

PARTS AVAILABLE—NOT SHOWN

- | | | |
|----|------------|--|
| 1. | M50624-63 | Decal-Model Data |
| 2. | M50623 | Decal-Operation Instruction |
| 3. | M20532-1 | Decal-Pump Pressure |
| 4. | M22743 | Decal-Warning |
| 5. | M50089 | Decal-Wiring Diagram
(Same as Key No. 3) |
| 6. | M50124-04 | Decal-Tradenam |
| 7. | M29870-101 | Manual Instruction |
| 8. | M50278 | Sleeve (Located on the
Motor Shaft, Between
the Fan and the Motor) |
| 9. | M50296 | Spacer, Wheel |

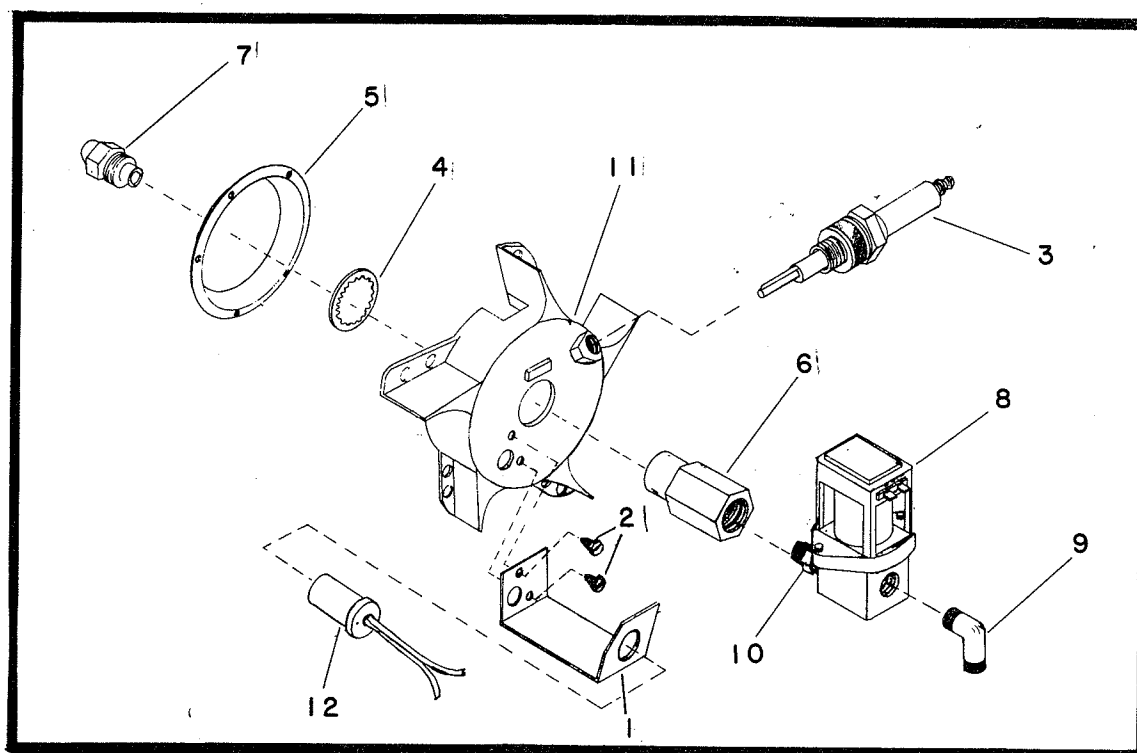


Figure 5 Burner Head Assembly

Index No.	Part Number	Description	Qty.
	M50084-07	Burner Head Assembly	1
1	M50340-02	Bracket, Photo Cell	1
2	M10908-2	Screw, Hex Hd., No. 6-32x3/8 (Attaches Bracket to Comb. Chamber)	2
3	M10962-2	Spark Plug	1
4	M16741-18	Ring, Retaining	1
5	M50396	Orifice, Burner Head	1
	M11523-1	Screw - No. 6-20 x 1/4 (Attaches Orifice to Burner Head)	5
	M50080-01	Assembly Adapter Nozzle	1
6	M50081	. Adaptor	1
7	M50112	. Nozzle 2.50 GPH	1
8	M50077	. Solenoid Valve	1
9	M50297	. Elbow Compression	1
10	69246	. Nipple, Straight	1
11	M16534-02	Body, Burner Head	1
12	M16656-4	Photo Cell Assembly	1

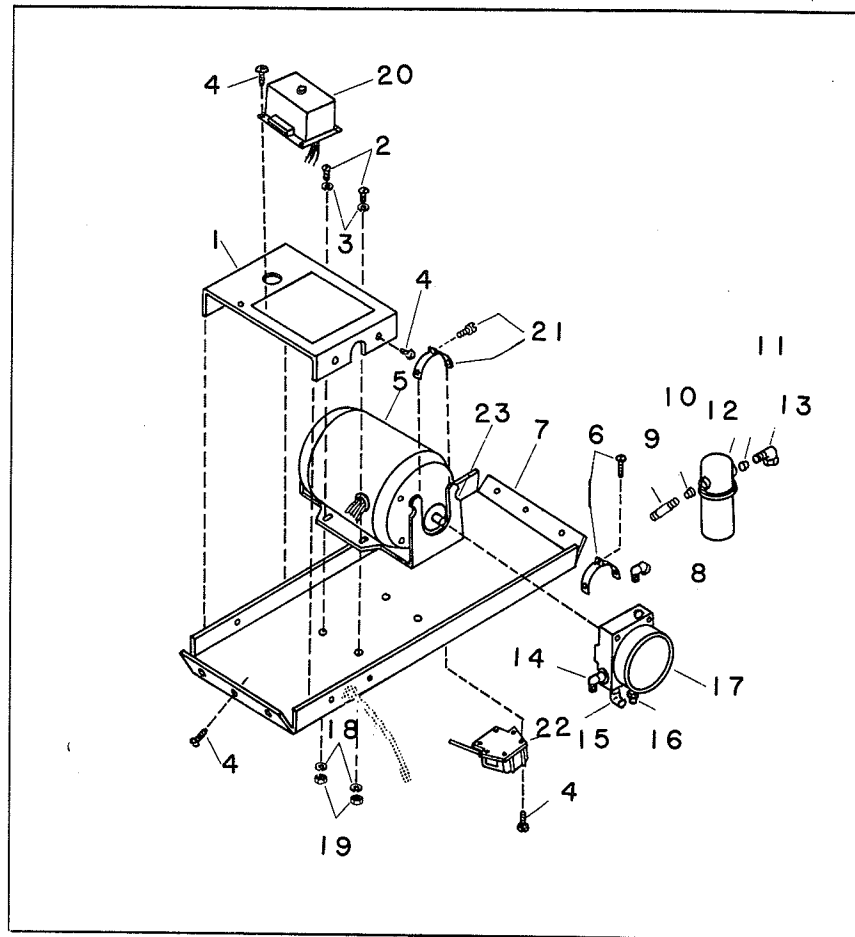


Figure 6 Motor and Pump Assembly

Index No.	Part Number	Description	Qty.	Index No.	Part Number	Description	Qty.
1	M50082AA	Cover, Wiring	1	13	M50114-02	Elbow, Male 90° 1/4 to 1/4	1
2	HF5-5C	Screw, 5/16-24	4	14	M50297	Elbow, Compression	1
3	WLE-5	Washer, Lock 5/16	4	15	57413	Elbow Street	1
4	M11084-26	Screw No. 10-12 x 3/8	5	16	M50113-02	Fitting, Straight 1/4 to 1/4	1
5	M50064-01	Motor	1	17	M50065	Pump, Fuel	1
6	M50116	Clamp Flanged (Holds Pump to Motor)		18	WLM-5	Washer, Lock 5/16	4
7	M50083AA	Support, Motor	1	19	NPF-5C	Nut, Hex 5/16-24	4
8	57413	Elbow Street	1	20	M22082	Control, Safety	1
9	M50393	Nipple, long	1	21	M50942-01	Clamp, Motor (Includes one (1) No. 10-32 x 1" screw and one (1) No. 10 nut.	
10	M20137	Bushing, Pipe	1	22	M50570-01	Transformer (5000 volt)	1
11	M20137	Bushing, Pipe	1	23	M50987-01	Motor Base	1
12	M50398	Filter Assembly	1				
	M50399	Element Filter	1				



KEEP THIS WARRANTY

Model _____

Serial No. _____

Date Purchased _____

Fill in above information for your own record

ALWAYS SPECIFY MODEL AND SERIAL NUMBERS WHEN COMMUNICATING WITH THE FACTORY.

WE RESERVE THE RIGHT TO AMEND THESE SPECIFICATIONS AT ANY TIME WITHOUT NOTICE. THE ONLY WARRANTY APPLICABLE IS OUR STANDARD WRITTEN WARRANTY. WE MAKE NO OTHER WARRANTY, EXPRESSED OR IMPLIED.

CERTIFICATE OF GENERAL EQUIPMENT - LIMITED SIX MONTHS WARRANTY (U.S.A.)

Koehring Company warrants new Products sold by it to be free from defects in material or workmanship for a period of six months after date of delivery to the first user and subject to the following conditions:

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

Any transportation charges, costs of installation, duty, taxes or any other charges whatsoever must be borne by the user. Koehring Company's obligation under this limited Warranty shall not include any liability for direct, indirect, incidental, or consequential damage or delay. (Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above may not apply to you.) If requested by Koehring Company, Products or parts for which a warranty claim is made are to be returned transportation prepaid by user to the factory. Any improper use, including operation after discovery of defective or worn parts, operation beyond rated capacity, substitution of parts not approved by Koehring Company, or any alteration or repair by others in such manner as in Koehring Company's judgment affects the Product materially and adversely, shall void this Warranty.

"NO EMPLOYEE OR REPRESENTATIVE IS AUTHORIZED TO CHANGE THIS WARRANTY IN ANY WAY OR GRANT ANY OTHER WARRANTY UNLESS SUCH CHANGE IS MADE IN WRITING AND SIGNED BY AN OFFICER OF KOEHRING COMPANY AT ITS HOME OFFICE."

This Warranty gives you specific legal rights and you may also have other rights which vary from state to state. For information write Koehring Atomaster Division, P. O. Box 719, Bowling Green, Ky. 42101, Attention: Customer Service Manager.



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