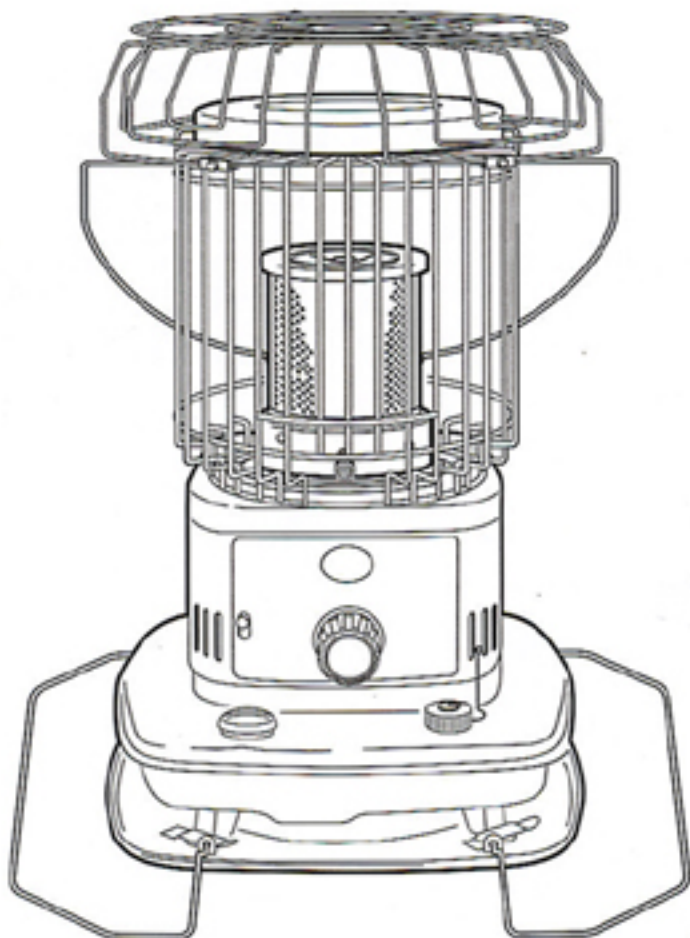


SENGOKU

KEROSENE HEATER OWNER'S

MANUAL



MODEL OR-77
OR-78



SENGOKU L.A., LTD.

TORRANCE, CA90503

877-GET-HEAT

877-438-4328

www.SengokuLA.com

CAUTIONS

1. WARNING:

FAILURE TO INSTALL, MAINTAIN, AND/OR OPERATE THIS KEROSENE HEATER ACCORDING TO MANUFACTURER'S INSTRUCTIONS MAY RESULT IN CONDITIONS WHICH CAN PRODUCE BODILY INJURY AND/OR PROPERTY DAMAGE.

NOTE: The **WARNING** and **IMPORTANT** instructions appearing in this manual are not meant to cover all possible conditions and situations that may occur. It must be understood that common sense, caution, and carefulness are factors which cannot be built into this heater. These factors must be supplied by the person(s) installing, maintaining, or operating the kerosene heater.

Always contact your dealer, distributor, service agent, or the manufacturer on any problems or conditions you do not understand.

2. WARNING: RISK OF EXPLOSION

- * **NEVER** use any fuel other than clear or red dyed No. 1-K kerosene. **NEVER** use fuel such as gasoline, benzene, paint thinners or other oil compounds in this heater.
- * **NEVER** refill heater fuel tank when heater is operating or still hot.
- * **NEVER** use heater in areas where flammable vapors or gases may be present.
- * **NEVER** fill heater fuel tank in living space; fill tank outdoors.
- * **NEVER** store nor transport kerosene in other than a metal or plastic container that is (1) acceptable for kerosene, (2) non-red in color, and (3) clearly marked "Kerosene." **NEVER** store kerosene in the living space; kerosene should be stored in a well ventilated place outside the living area.
- * The unit is **EXTREMELY HOT** while in operation. Due to high surface temperatures, keep children, clothing, furniture, and other combustible objects at least 36" away from top and front area.
- * **RISK OF INDOOR AIR POLLUTION**
USE HEATER ONLY IN WELL VENTILATED AREAS. People with breathing problems should consult a physician before using the heater. In a house of typical construction, that is, one that is not of unusually tight construction due to heavy

insulation and tight seals against air infiltration, an adequate supply of air for combustion and ventilation is provided through infiltration; however, if the heater is used in a small room where less than 200 cubic feet (5.7 m³) of air space is provided for each 1,000 BTU per hour of heater rating (considering the maximum burner adjustment), the door(s) to adjacent room(s) should be kept open or the window to the outside should be opened at least 1 inch (25.4 mm) to guard against potential buildup of indoor air pollution. **DO NOT** use the heater in a bathroom or any other small room with the door closed.

- * **NEVER** use heater to heat or boil water nor use as a cooking appliance.

3. WARNING: RISK OF FIRE

NEVER use gasoline in this heater.

- 4. **NEVER** leave heater operating if you intend to leave for any period of time. Always make sure to turn heater off and inspect to insure that it is completely extinguished prior to going to bed.

- 5. **NEVER** leave heater unattended. **NEVER** use as a source of heat for drying objects.

- 6. **NEVER** place objects on the top plate.

- 7. If poor quality kerosene is used, so much carbon will be accumulated on the upper part of the wick that it may not move down, a strong odor will be generated and shorter wick life will result; therefore, careful attention should be paid to the kerosene quality. When lowering the wick, make certain fire is out. (For details, see Extinguishing on page 7.)

- 8. Adjustment of room temperature, when the room becomes too hot, should be carried out by ventilation such as opening a window, but never by means of the wick adjuster knob. If heat is reduced excessively by means of the wick adjuster knob, it will cause imperfect combustion, thereby resulting in accumulation of carbon, and odor will be generated.

9. CAUTION: RISK OF BURNS

NEVER operate the heater without the guard or grille completely attached.

SAVE THESE INSTRUCTIONS

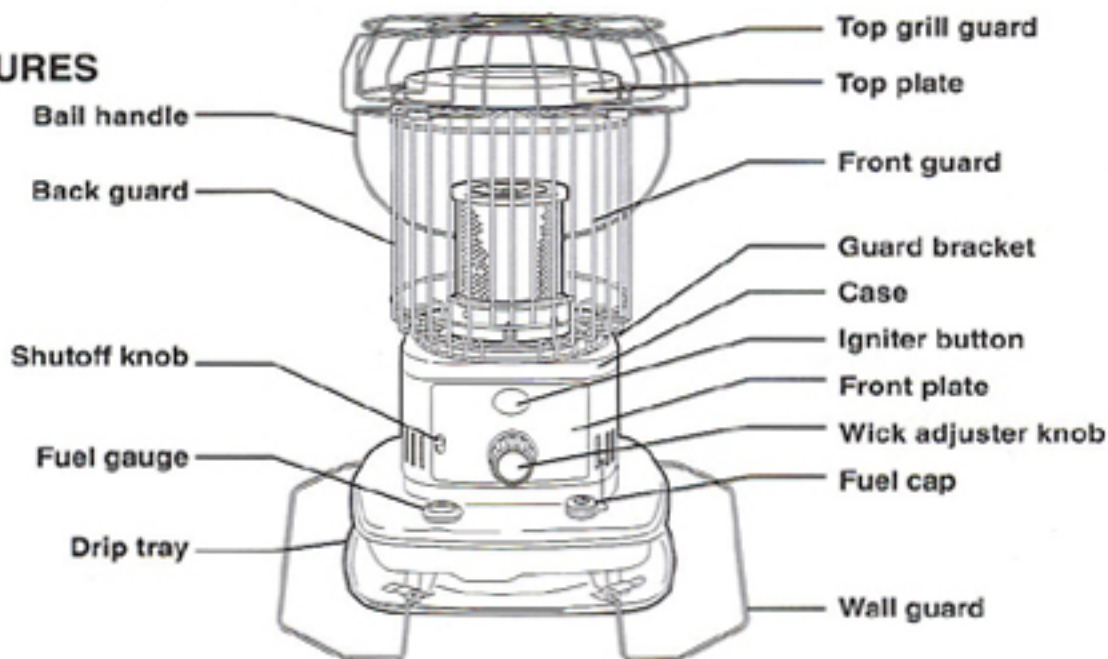
TABLE OF CONTENTS

| | Page | | Page |
|--------------------------|------|---------------------------------|------|
| Cautions | 1 | Carbon Removal/Dry Burning | 8 |
| Introduction | 2 | Wick Replacement | 9 |
| Features | 2 | Igniter Replacement | 10 |
| Specifications | 2 | Glass Cylinder Replacement | 10 |
| Unpacking and Assembly | 3 | Long Term Storage | 10 |
| Fueling | 4 | Wick Raising Mechanism | 11 |
| Ignition | 5 | Quick Cures For Common Troubles | 12 |
| Flame Adjustment | 6 | Exploded Parts Drawing | 13 |
| Extinguishing the Heater | 7 | Parts List | 14 |
| Wick Maintenance | 8 | Kerosene | 15 |

I. INTRODUCTION

Please read this Instruction Manual carefully. It will show you how to assemble, maintain, and operate the heater safely and efficiently to obtain full benefit from its many built-in features.

FEATURES



(Make sure these wall guards are in the down position.)

SPECIFICATIONS

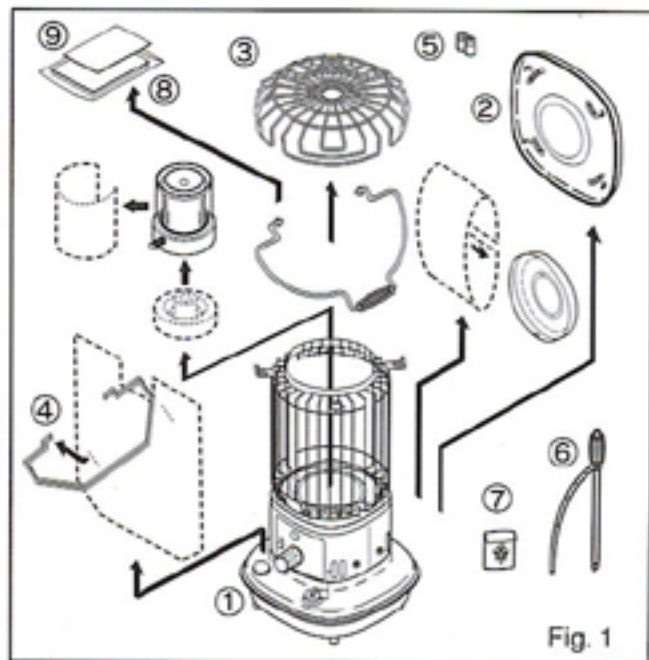
| Model No. | OR-77 · OR-78 | | |
|----------------------------|--------------------------|------------------|----------------------|
| Type of Heater | Omni Directional Radiant | Weight (empty) | 17 lbs. |
| Heat Output | Max. 10,000 BTU/hr. | Dimensions | Height 22 5/8 inches |
| Fuel Tank | Integral | | Width 21 1/4 inches |
| Tank Capacity | 1.2 U.S. Gallons | | Depth 21 1/4 inches |
| Continuous Combustion Time | 12-14 hr. | Max. Wick Height | 25/64 IN. (10 mm) |
| Max. Fuel Consumption | 0.077 U.S. gallon/hr. | Wick No. | OS-0077 |
| Ignition Method | Battery—D Cell x 2 | U.L. Listed | Yes |

II. UNPACKING AND ASSEMBLY

1. Remove the heater and all packing materials from the box.

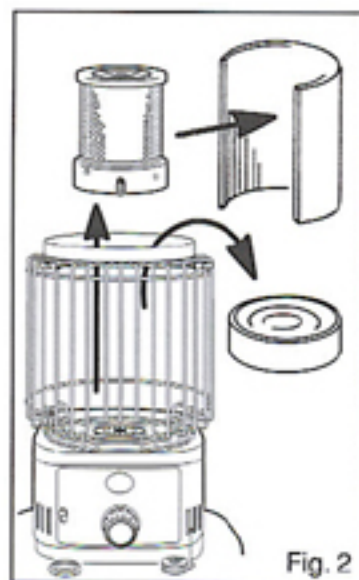
Take time to locate each of these items:

- Heater (1)
- Drip Tray (2)
- Top Grill Guard (3)
- Wall Guard (4)
- 2 "D" Cell Batteries (5)
- Siphon Pump (6)
- Bag of Screws for Assembly (7)
- Owner's Manual (8)
- Safety Tips Manual (9)



2. Lift off the burner and remove packing materials from burner.
(Fig. 2)

3. Set the burner. Locate the wire adjusting handle on the burner so that it can be reached from the front of the heater.
After locating each of these items, replace the styrofoam and all other packing materials in the box.
Save the box for summer storage.



4. Place all the wall guards (2) on the drip tray.

(1) Two wall guards are supplied with your heater. Their purpose is to provide adequate spacing of the heater from the wall so that scorching or discoloration will be prevented. Do not operate the heater without the wall guards in place.(Fig. 3)

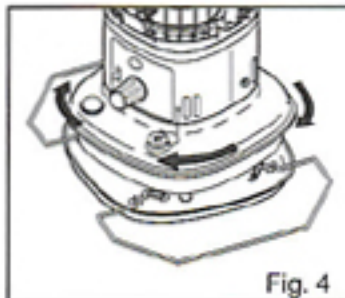
(2) Remove the wall guards from the box.

(3) Position the wall guards on the floor along side the drip tray. Insert each of the tips of both wall guards in the brackets welded to the drip tray.

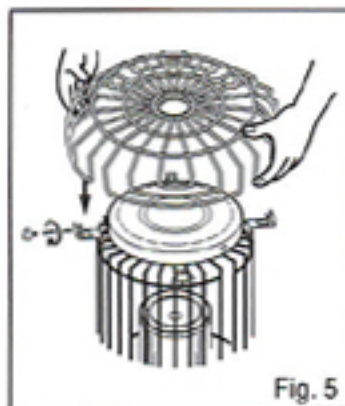
(4) This installation can be performed after the heater has been attached to the drip tray. Note the wall guards can be easily removed for storage or for transportation of the heater.



5. Place the heater on the drip tray and lock in position by turning clockwise. (Fig. 4)

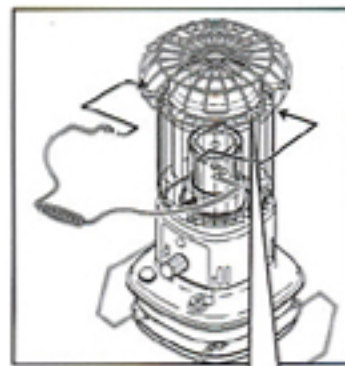


6. Place the top plate on the heater so the holes are aligned to mount the bail handle. (Fig. 5)



7. Place the top grille guard. Use the 4 thumb screws to secure the top grille guard. (Fig. 5)

8. Mount the bail handle by holding it on the top of the heater, pulling it apart (it will spring back when installed), rotating the handle until it is flat to the ground, then allow it to snap through the holes in the body on the right and left side. The bail handle is designed to secure the top plate in place as well as provide an easy means to carry the heater. (Fig. 6)



Install the 2 "D" batteries in the battery case on the back of the heater following the + and - signs.

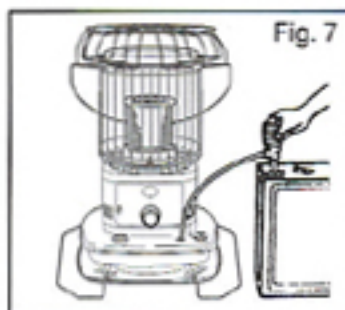
NOTE: A battery cover is NOT provided.

Reach in thru the grill and rotate the burner from side to side using the burner knob. Raise the wick to the full "up" position. Use the knob to lift the burner so that you can test the **manual shutoff** to make certain that the wick drops out of sight.



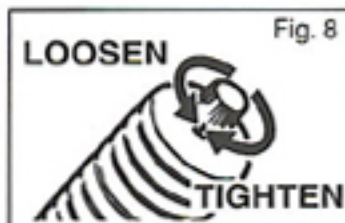
III. FUELING

Take the heater, kerosene, and siphon pump outdoors for fueling. Tighten the air-tight cap located on the top of the siphon; insert the straight tube into the kerosene container, place the flexible hose through the opening of the fuel tank. Squeeze the bulb rapidly, which will lift fuel from the kerosene container into the heater tank. (Fig. 7,8)



Watch the fuel gauge on the base of the heater to determine the amount of kerosene transferred from container to heater. When you approach the full mark, loosen the airtight cap on the siphon, which will stop the flow of kerosene.

Allow the siphon to drain before removing it from the tank and the container. Replace the tank cap and the kerosene container cap securely. Thoroughly wipe up any spilled kerosene.



VERY IMPORTANT: Allow a minimum of 60 minutes (use a timer) for kerosene to completely saturate the wick and eliminate any air pockets which might otherwise occur before lighting the heater for the first time.

IV. IGNITION

The first time the heater is lit, it should be done outdoors to allow residues of oils and waxes used in manufacturing the heater and the wick to burn off. This will eliminate any odors from this initial light up from collecting inside the home.

The heater has been designed to be lit by using the automatic ignition system. This system consists of 2 "D" cell batteries, connecting wires, a manual arm which holds the igniter itself and which, when pushed, raises the burner and brings the igniter in contact with the wick after the wick has been raised to its maximum height.

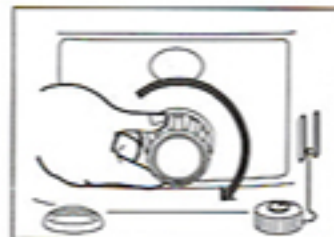


Fig. 9

- (1) Fully turn the wick adjuster knob clockwise to raise the wick to the maximum height. When the wick is completely up the arrow mark of the control dial will point to the "HIGH POSITION".(Fig. 9)
- (2) Ignition by igniter
Push the igniter button.
The burner tilts for ignition.

Ignition by a match

- A broken igniter wire or dead batteries should be replaced with new ones. If a match is used, open the guard and light as illustrated. (Fig.10)
- Never leave a burnt match on the wick adjuster or horizontal reflector. Incomplete burning or fire may occur.
After igniting the wick rotate the burner knob to left and right a few times to ensure that the burner rests properly on the wick adjuster. (Fig.11)
- Reigniting the wick soon after extinguishing the kerosene heater (the burner is still hot at this time) will cause the burner to generate heavy odor. To avoid it, wait for about 10 minutes before reigniting.

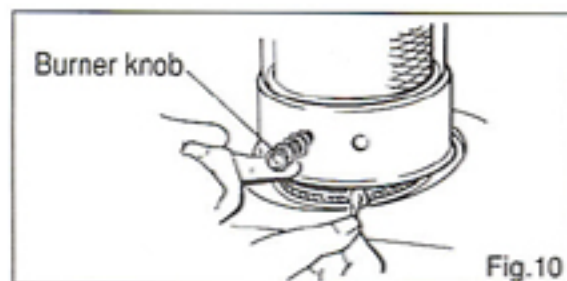


Fig.10

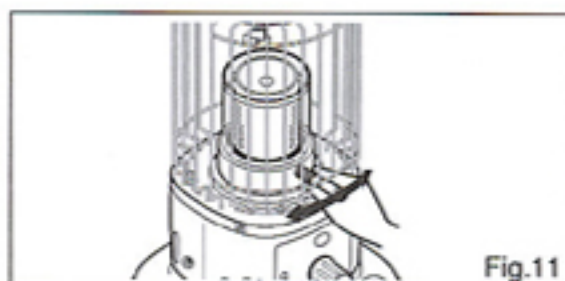
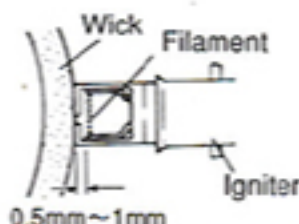


Fig.11

NOTE

- During initial use, a slight odor may be noticed. This is caused by evaporation of anticorrosion oil and therefore not abnormal. This odor disappears after new burner has been used 3 to 4 hours.
- Pushing the igniter button with excessive force may cause the igniter to be caught by the wick. Ignition may not occur. Release the igniter button slightly, and ignition becomes easier. Pushing the igniter knob too little will result in failure of ignition because the igniter is too far away from the wick.
- As illustrated, the optimum distance between the wick and igniter is 1/64-1/32 in. (0.5 to 1 mm). If ignition is difficult, correct deformation of filament.
- Reigniting after the operation of tip-over extinguishing device should be made after 10 minutes. Reigniting immediately after extinguishing will cause non-ignition, white smoke or strong odor.



V. FLAME ADJUSTMENT

IF THE FLAME SHOWS YELLOW FLICKERS, TURN THE WICK ADJUSTER KNOB DOWN SLIGHTLY SO ONLY BLUE FLAME APPEARS.

FOR FINE ADJUSTMENT OF THE FLAME, GRASP THE BURNER KNOB AND MOVE IT FROM SIDE TO SIDE AND FRONT TO BACK UNTIL THE BLUE FLAMES ARE AS EVEN AS POSSIBLE. ALWAYS ALLOW A FEW SECONDS REACTION TIME AFTER ADJUSTING TO ALLOW THE FLAME TO STABILIZE.

THE FLAME MAY NEED TO BE ADJUSTED DURING THE BURNING PERIOD, AS THE HEATER BODY WARMS UP CAUSING THE KEROSENE TO VAPORIZE FASTER.

REASON: THE BURNING RATE CHANGES AS UNIT AND ROOM TEMPERATURES CHANGE.

- REGULATING THE WICK ADJUSTER KNOB TOO LOW OR TOO HIGH WILL PRODUCE CARBON ON THE WICK AND WICK ADJUSTER WHICH WILL RESULT IN IMPROPER COMBUSTION OR IN STIFFENING OF THE WICK. THEREFORE YOU MUST MAKE ADJUSTMENT TO OBTAIN NORMAL FLAME. (See Fig. 12)

During normal operation, you will, on occasion, hear the bubbling sound of the fuel from the cartridge tank filling the fuel reservoir area. This sound is a normal characteristic of kerosene heaters that use cartridge tanks.

NOTE

- Do not turn the wick adjuster knob lower than range of the FLAME ADJUSTMENT. If the heater is used at lower than wick stop intentionally, it may cause the generation of odor or CO, flaring up, etc.

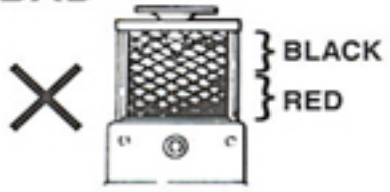

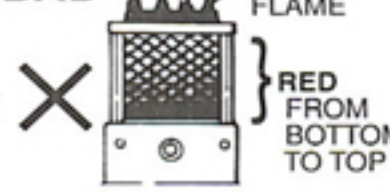
| | | |
|---|---|---|
| <p>BAD</p>  <ul style="list-style-type: none">● Flame too low● Improper combustion results● Produces odor fumes● Reduces heat efficiency <p>CURE: Raise the wick as high as it will go until burner metal inside the glass glows red from top to bottom.</p> | <p>GOOD</p> <p>BLUE FLAME</p>  <ul style="list-style-type: none">● Normal flame● Perfect combustion <p>PERFECT COMBUSTION AND MAXIMUM HEAT OUTPUT. Do not try to reduce heat or save kerosene by lowering the wick.</p> | <p>BAD</p>  <ul style="list-style-type: none">● Flame too high● Improper combustion● Produces odor● Reduces heat efficiency <p>CURE: Lower the wick slightly until the yellow flicker in the flame disappears and only blue flame remains.</p> |
|---|---|---|

Fig. 12

VI. EXTINGUISHING THE HEATER

To extinguish, push down the shutoff lever. If the wick is not lowered by the shutoff lever, keep pressing the shutoff lever down and turn the wick adjuster knob counterclockwise (OFF direction) to the limit. In about 2 to 3 minutes, lift up the burner knob to confirm extinguishment. (Fig. 13)

NOTE

- When a large amount of carbon adheres to the wick, the wick may not lower completely by pushing down the shutoff lever, which could result in the flame not extinguishing. In this case, keep pressing the shutoff lever down and turn the wick adjuster knob counterclockwise (OFF direction) to the limit and carry out the inspection and maintenance described on Page 8.
- The tip-over extinguishing device may function if heater is given a shock by hitting or shaking.
- Never disassemble or adjust the tip-over extinguishing device. Otherwise the tip-over extinguishing device may not operate correctly in case of emergency.

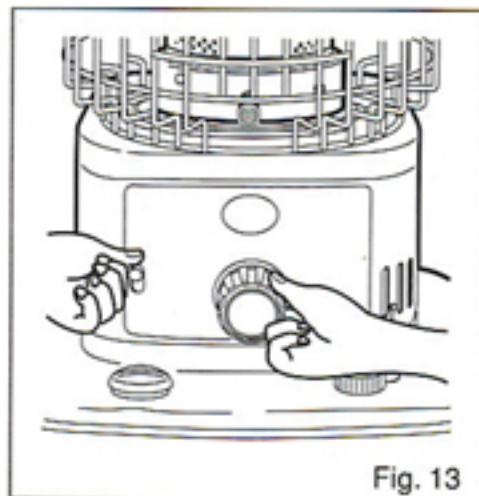


Fig. 13

NOTE: Once the heater has been extinguished, wait 10 minutes before re-lighting. The 10-minute cooling off period allows the heater to return to normal condition and prevents the creation of a strong odor which will occur if an attempt is made to immediately relight an extinguished heater.

WARNING: After a period of use, tar and carbon may build up on the wick, interfering with its smooth lowering into the body of the heater. This could result in the flames not extinguishing completely. It is the owner's responsibility to inspect and maintain the wick to prevent such a hazard from occurring.

The top of a fiberglass wick accumulates carbon in the process of burning kerosene. This must be removed to maintain peak efficiency in burning. It is most important that you feel for carbon hardness after the second or third tankful of fuel. A wick in good condition will feel soft while one that is carbonized will feel like a bristle brush or, in late stages, the top could be coated with hard black carbon.

Check for resistance when turning the wick adjuster knob; check if flame height is correct; check if it is difficult to ignite by the igniter. Any of these troubles result from carbon on the upper part of the wick. To get rid of carbon, perform the "Carbon Removal" in the following procedure.

VIII. CARBON REMOVAL/DRY BURNING

Carry out the "Carbon Removal" outdoors if windless, on a porch or the like, or in a room with its window(s) open because a strong odor is produced.

- (a) With the fuel tank having only a small amount of kerosene, keep the wick burning without refilling with kerosene even when the tank becomes empty. When the flame starts to burn out, raise wick fully and leave it there till it burns out. Wait approximately 30 minutes, then relight the wick with a match if necessary, and allow it to burn out again. When it cools, remove any remaining ash with an old toothbrush.

- (b) The upper part of the wick will be rid of carbon with this operation and be softened; however, if any parts are still stiff, pinch them by means of small pliers to fracture the carbon into pieces, supply a small amount kerosene to tank and once more perform the "Carbon Removal." After the carbon has been removed, refill tank and wait 60 minutes before igniting wick.

Carry out the "Carbon Removal" within 5 to 7 days after the first use of the kerosene heater. This will reduce carbon accumulation to the wick. Thereafter perform the "Carbon Removal" every 5 or 6 tank fulls of kerosene.

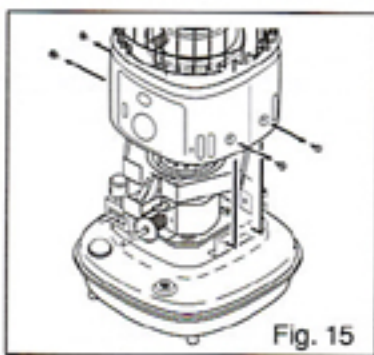
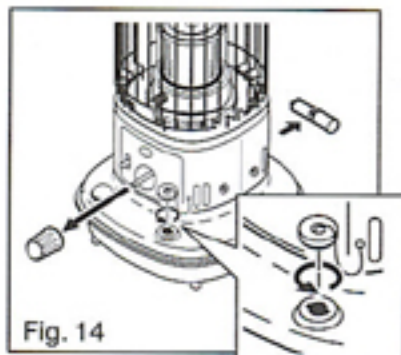
If any water gets into the tank or when the kerosene heater season comes to an end, completely remove all kerosene from the fuel tank. **VERY IMPORTANT!**

NOTE: "CARBON REMOVAL" SHOULD BE DONE WEEKLY DURING THE HEATING SEASON UNLESS NEEDED MORE FREQUENTLY. CHECK TO BE SURE.

IX. WICK REPLACEMENT

Wick replacement should be performed on a completely cool heater after the tank is empty and the remainder of the kerosene in the heater has been burned off.

- (1) Remove the batteries from the heater. Remove the wick adjusting knob by pulling straight out. Remove the tank cap.
- (2) Unscrew 4 screws from the each side of the case and carefully lift off the case.
- (3) Unscrew the screw which holds the wind cover and take off the wind cover.



- (4) Remove the automatic ignition assembly by unscrewing 2 screws.

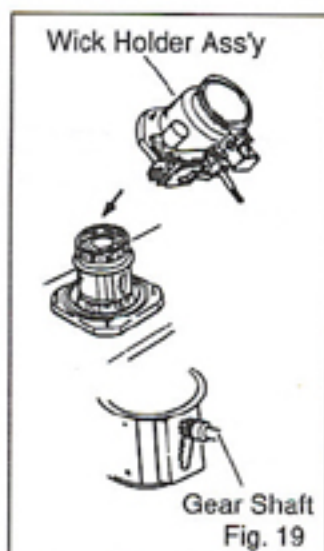
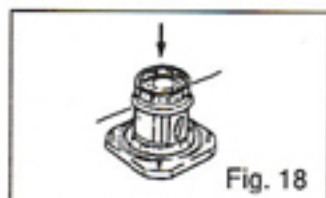
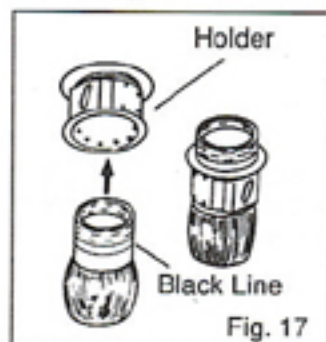
- (5) Unscrew 4 wing nuts and lift off the wick adjuster assembly.

- (6) Remove the wick from the holder by folding it inward. Loosen it from the sharp metal teeth on the inner surface of the holder, then slide it out. **Caution: the teeth are very sharp.**

- (7) Replacement wick has black line. Fold the new wick and slide it into the holder up to the line. The black line on the outside of the wick should match the top edge of the holder. Then carefully press the wick against the teeth inside the holder to obtain a firm grip.

- (8) Slide the wick and holder back on the draft tube. Rotate them 90 degrees left and right and up and down until the wick slides freely. Check to see that the gasket is still in place on the fuel tank.

- (9) Replace the wick adjusting knob on its shaft.



- (10) Check to see that the spring of the wick adjuster assembly is free of torque (has no tension).

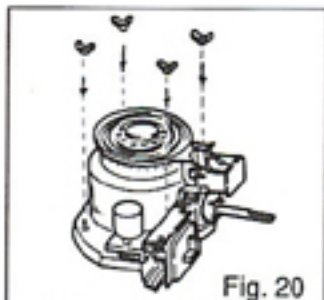
- (11) Use the knob to rotate the wick control shaft clockwise by 3/4 turn. This rotates the ratchet clockwise by 3/4 turn. Hold the latch to prevent the safety shut off device from being activated.

- (12) Insert the pinion on the inside of the wick control shaft into top portion of the rack of the wick holder. This step should be done easily if the wick holder is raised near the top of the draft tube.

- (13) Slide the wick adjuster assembly down the draft tube. Position the adjuster shaft to the front of the heater. Make sure 3/4 turn tension on the spring is kept. Turn the knob clockwise and counter-clockwise a few times to make sure the wick travels up and down smoothly.

- (14) Snug but do not tighten 4 wing nuts on the mounting studs, then raise the wick to the full "up" position, and evenly tighten wing nuts in several steps.

- (15) Check height of wick (10 ± 1 mm). Check for correct clearance between wick holder and draft tube (all around). This can be done easily using a 5/32 or 3/16 dia. drill bit.



- (17) Check the function of safety shut off mechanism by pushing down the manual shutoff lever or upsetting the pendulum.
- (18) Reinstall the automatic ignition assembly and replace the wind cover.
- (19) Remove the wick adjusting knob once again, if it was reinstalled at step (9), then replace the cabinet and tighten 4 screws on the case.
- (20) Reinstall the chimney and replace the wick adjusting knob.

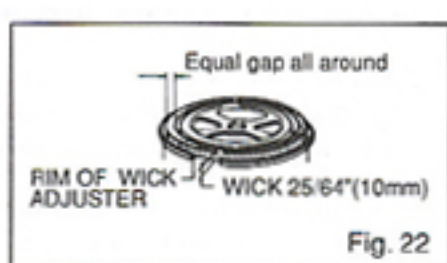


Fig. 22

Install the batteries in the battery case. Fill the tank with clean, pure 1-K kerosene. Wait at least 60 minutes for kerosene to fully saturate the new wick.

IMPORTANT! If this is not done air bubbles may form in the wick reducing its ability to draw up kerosene. Remember to "dry burn" the new wick after each 5 or 6 tankfuls of kerosene are consumed.

X. IGNITER REPLACEMENT

Be sure igniter is 2.5V DC, 1A only.

- (1) Remove batteries from case.
- (2) Open the guard and remove the burner.
- (3) Push the igniter button. To remove the igniter push in and turn counterclockwise. Install new igniter and reassemble burner, and close the guard. Then install batteries.

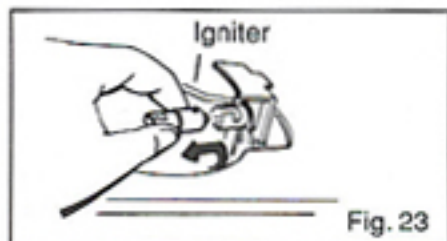


Fig. 23

XI. GLASS CYLINDER REPLACEMENT

Remove speed nuts holding cross pins. Then pull out cross pins. Replace glass cylinder.

In reassembling, make sure that inner and outer cylinders are set in their proper places.

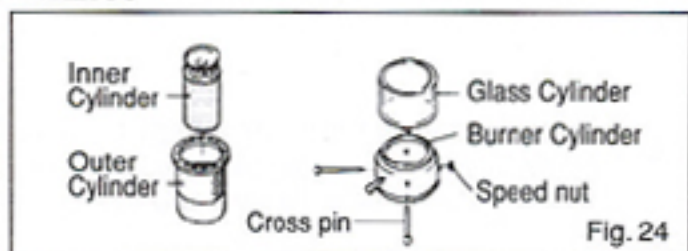


Fig. 24

XII. LONG TERM STORAGE

Store the kerosene heater carefully using the following procedure so it will operate safely next season.

- (1) Agitate and rinse inner part of the tank with a little of the remaining kerosene, then pour out entirely. Water never mixes with kerosene, and it causes rust inside the tank. Remove all kerosene.
- (2) With the kerosene out of the fuel tank, ignite and keep the wick burning. Keep the wick fully turned up until it burns out (about an hour).
- (3) Detach the body, burner and batteries. Remove the wick adjuster from the fuel reservoir, dry the inside of the fuel tank thoroughly. Remove the carbon accumulated on the wick adjuster and/or the soot adhering to the burner with a brush or screw driver.
- (4) After cleaning, reassemble the heater. Remember to reassemble the wick adjuster so as to keep the gap between the wick adjuster and draft tube equal all the way around. Refer to page 9 "Wick Replacement."
- (5) The batteries should be taken out from the battery case because they may leak and corrode the kerosene heater.
- (6) Store the kerosene heater with the tipover extinguishing device deactivated and the wick lowered down.
- (7) Put the kerosene heater in the original box with original packing and keep it in a well-ventilated place. Also keep the Owner's Manual with heater.

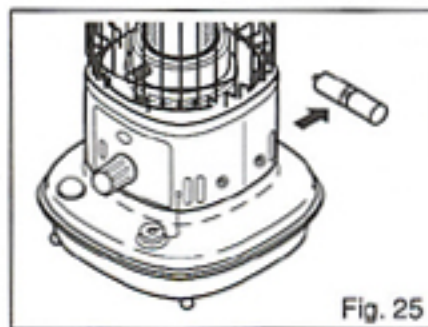


Fig. 25

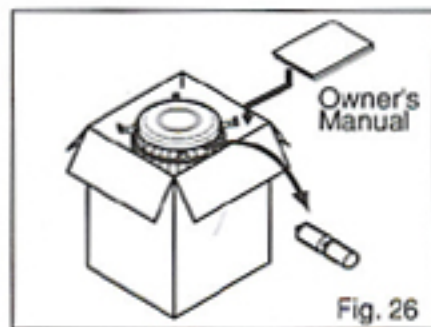
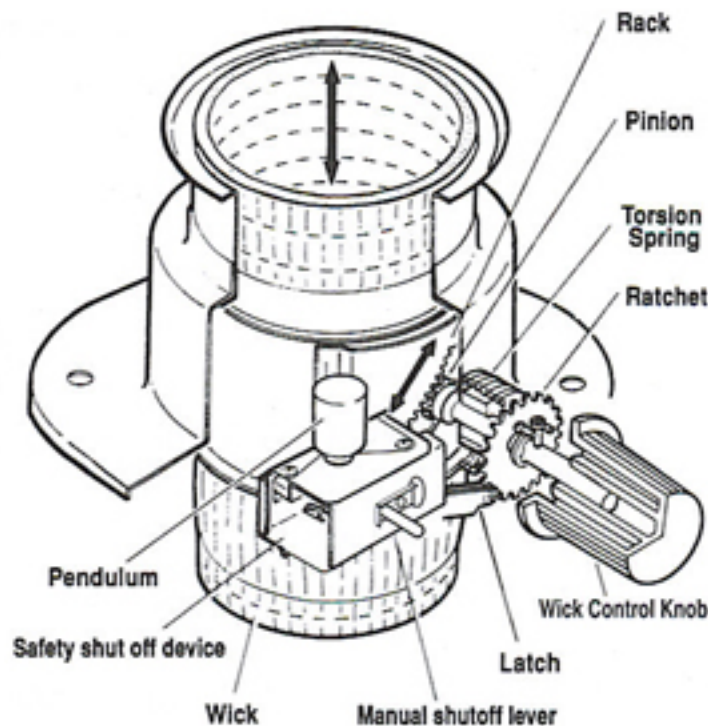


Fig. 26

XIII. WICK-RAISING MECHANISM

Rotating the wick control knob clockwise turns the pinion at the other end of the wick control shaft and causes the rack mounted along the outer circumference of the wick frame to turn. This results in the wick being lifted to the top of the wick holder assembly. As the wick rises, the torsion spring mounted on the wick control shaft is put under tension and compressed. The wick can be contacted by the igniter when in the full "up" position. It is held there against the tension of the torsion spring by the latch that engages the ratchet mounted on the wick control shaft. Pushing the manual shutoff lever down releases the latch, allowing the torsion spring to rapidly lower the wick. The descent of the wick can be slowed by lightly grasping the wick control knob. Lowering the wick slowly in this manner reduces the likelihood of a kerosene odor.



FUNCTION OF THE AUTOMATIC SAFETY SHUTOFF DEVICE

The safety shutoff device is built into the wick raising and lowering mechanism. It is a primary safety system in a kerosene heater. Its purpose is to prevent the spread of flame should a heater be accidentally tipped over while in use.

It functions in the following manner. When the pendulum starts to swing because of a shock, it causes the latch to be retracted from the wick control shaft ratchet. This permits the torsion spring to quickly retract the wick to the fully lowered position. The resulting quick drop puts out the flame.

IMPORTANT: For the automatic safety shutoff mechanism to function as intended, the wick must be free of gummy tar deposits. This can be accomplished by regularly "dry burning" the wick as described on page 8 under "Wick Maintenance" and "Carbon Removal / Dry Burning."

CAUTION

The operation of the automatic safety shutoff mechanism should be checked periodically, i.e., once a week during the heating season. This can be done by using the wick control knob to raise the wick to the fully upright position. **DO NOT LIGHT THE WICK FOR THIS TEST.** Grasp the upper corners of the protective grille and give the heater a firm shake. If the safety shutoff is working correctly, you will hear a loud snap as the latch disengages from the ratchet and the torsion spring quickly drops the wick. Now attempt to rotate the wick control knob counterclockwise. A correctly functioning automatic tipover device will lower the wick completely. If you are able to lower the wick further, this indicates it is time to "dry burn" for carbon and tar removal again.

NOTE: Every time the wick is removed and replaced, the safety shutoff must be tested to insure it is operating properly.

QUICK CURES FOR COMMON TROUBLES

Heater Won't Light

1. Water in kerosene
2. Empty tank
3. Igniter fails to glow brightly
4. Igniter coil contacts side of wick

Action to be Taken

Remove wick assembly and dry out wick on absorbent paper. Drain tank. Reinstall wick assembly. Fill with clean, pure kerosene (1-K Low Sulphur).
Fill with clean, pure kerosene (1-K Low Sulphur).
Check and replace batteries if necessary. Replace igniter coil, disconnected or broken wire.
Use the wick adjusting knob to lower wick until the igniter contacts top of wick

Flame Flickers or Dies

1. Water in kerosene
2. Wick covered with carbon or tar

Remove wick assembly and dry out wick on absorbent paper. Drain tank. Reinstall wick assembly. Fill with clean, pure kerosene (1-K Low Sulphur).
Burn wick clean. (In more serious cases, trim with scissors.)

Flame Smokes or Causes Odor

1. Flame too high
2. Air drafts hitting heater
3. Burner unit not level
4. Wick contaminated with carbon or tar
5. Impure kerosene

Use adjusting knob to lower wick.
Move out of direct drafts.
Use wire handle to rotate burner until it seats on ring encircling wick.
Burn wick clean. (In more serious cases, trim with scissors.)
Remove wick assembly and dry out wick on absorbent paper. Drain tank. Reinstall wick assembly. Fill with clean, pure kerosene (1-K Low Sulphur).

Excessive Wick Burning Down

1. Dangerous volatile fuel such as alcohol, gasoline, paint thinner, etc. mixed in kerosene.

Drain tank.
Replace wick.
Fill with clean, pure kerosene (1-K Low Sulphur).

Wick Adjuster Sticks

1. Water in kerosene
2. Carbon or tar build up on wick

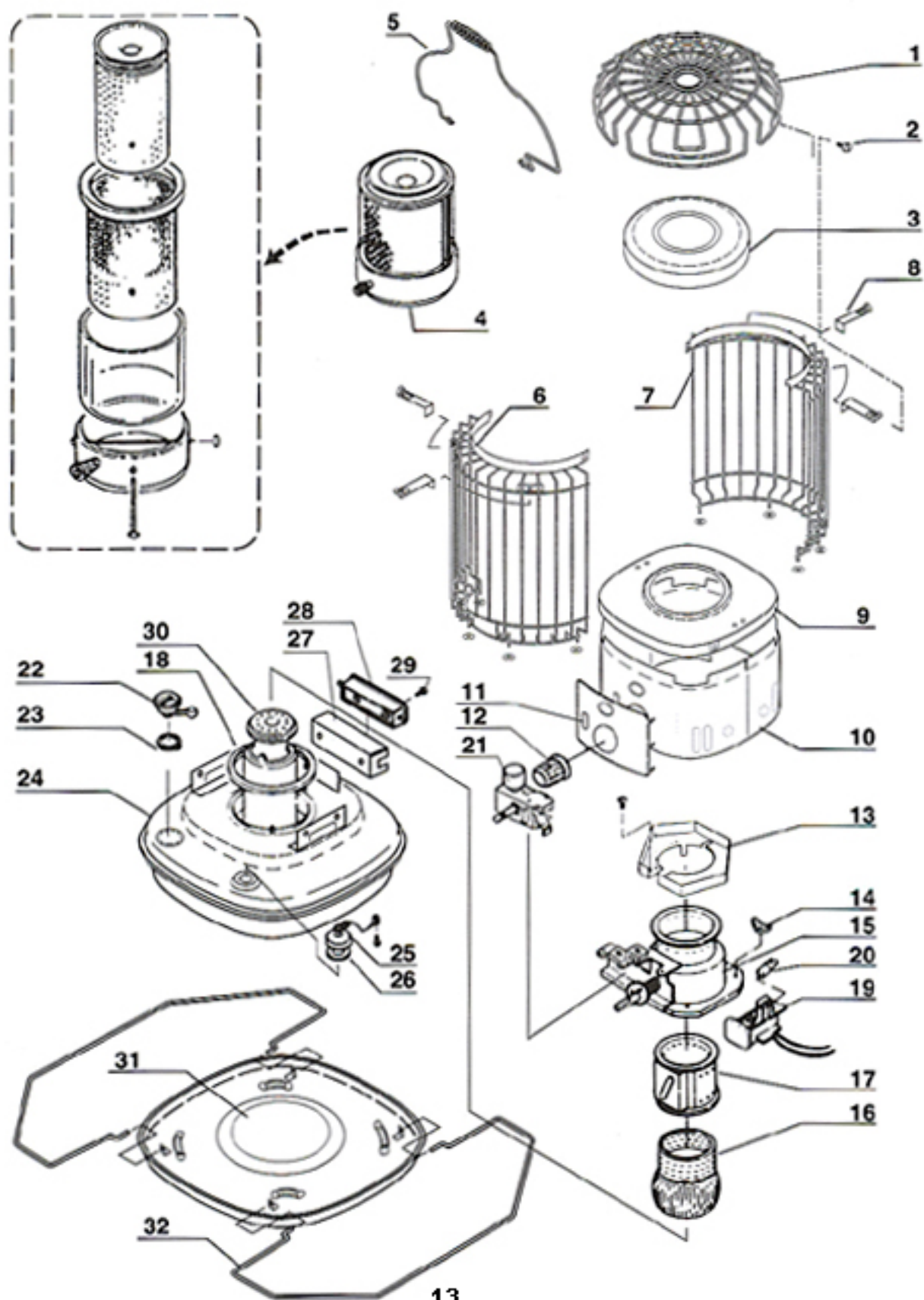
Remove wick assembly and dry out wick on absorbent paper. Drain tank. Reinstall wick assembly. Fill with clean, pure kerosene (1-K Low Sulphur).
Burn wick clean. (See page 8)

If the whole heater is enveloped in flames . . .

If possible smother flames with a fire extinguisher or sand. Otherwise, smother with blankets, then immediately throw water on the blankets. Do not throw water directly on the heater.

EXPLODED PARTS DRAWING

NOTE: SPECIFY MODEL NUMBER AND SERIAL NUMBER WHEN ORDERING PARTS.



PARTS LIST

| PICTURE REFERENCE NUMBER | DESCRIPTION | OR-77 PART NUMBER | OR-78 PART NUMBER |
|--------------------------------|-----------------------------|----------------------|----------------------|
| 1 | TOP GRILL GUARD | OR-701A | OR-701A |
| 2 | (4)GRILL MOUNTING SCREWS | OR-702A | OR-702A |
| 3 | TOP PLATE | OR-703A | OR-703A |
| 4 | CHIMNEY ASS'Y | OS-CT19 | OS-CT19 |
| 5 | BAIL HANDLE | OR-704B | OR-704B |
| 6 | FRONT GRILL GUARD | OR-708A | OR-708A |
| 7 | BACK GRILL GUARD | OR-709A | OR-709A |
| 8 | TOP GRILL-MOUNTING BRACKET | OR-711A | OR-711A |
| 9 | CASE COVER | OR-712A | OR-712A |
| 10 | CASE ASS'Y | OR-713 | OR-713G |
| 11 | PANEL | OR-714 | OR-714G |
| 12 | KNOB | OS-CV14 | OS-CV14G |
| 13 | WIND COVER | OS-CT21 | OS-CT21 |
| 14 | WING NUT | (M4x4) | (M4x4) |
| 15 | WICK HOLDER ASS'Y | OR-715 | OR-715 |
| 16 | WICK | OS-0077 | OS-0077 |
| 17 | WICK HOLDER | OS-CT26 | OS-CT26 |
| 18 | WICK HOLDER GASKET | OS-CT14 | OS-CT14 |
| 19 | AUTOMATIC IGNITION ASS'Y | OS-CT23 | OS-CT23 |
| 20 | IGNITION COIL | OS-CT29 | OS-CT29 |
| 21 | AUTOMATIC SAFETY SHUTOFF | OR-716 | OR-716 |
| 22 | KEROSENE LEVEL GAUGE | OS-CV19A | OS-CV19A |
| 23 | RUBBER PACKING-(A) | OS-CV20 | OS-CV20 |
| 24 | KEROSENE TANK ASS'Y | OR-717 | OR-717G |
| 25 | FUEL CAP ASS'Y | OS-CV27 | OS-CV27 |
| 26 | RUBBER PACKING-(B) | OS-CV28 | OS-CV28 |
| 27 | BATTERY CASE INSULATOR | OR-718 | OR-718 |
| 28 | BATTERY CASE ASS'Y | OS-CT15 | OS-CT15 |
| 29 | TAPPING SCREW, BATTERY CASE | (M3x2) | (M3x2) |
| 30 | DRAFT TUBE TOP | OS-CT28 | OS-CT28 |
| 31 | DRIP TRAY ASS'Y | OR-719A | OR-719AG |
| 32 | WALL GUARD | OR-720A | OR-720A |

KEROSENE

Locating and using proper kerosene is the single most important thing you, the owner, can do to insure your satisfaction in the use of the heater. The correct grade of kerosene will be labeled 1-K, which means it has been carefully refined to eliminate virtually all but the merest trace of sulphur. Sulphur causes the "rotten egg" smell. Kerosene containing sulphur will cause your heater to give off a disagreeable odor and make using it unpleasant.

All heaters will give off a slight odor on start up and turn down. This is normal, unavoidable, and to be expected. Some people are much more sensitive to this odor than others. Once your heater has reached its proper operating temperature (7-10 minutes) and is operating normally, there is no odor.

Kerosene may be purchased either crystal clear or dyed red. Kerosene deteriorates rapidly in storage, so fresh kerosene should be used at all times. Kerosene is easily contaminated by water which condenses in the fuel seller's tank. You can test kerosene for water by tilting your container and drawing four cups from the lowest part of the container into a clear glass jar. Let it sit for a few hours and then examine the bottom of the jar for little pin-heads (or BB's) which are actually water droplets. Water droplets will infiltrate your wick, but cannot pass through it. Instead, they block the flow of kerosene causing your heater to not burn properly.

If you buy kerosene in bulk, be certain to store it in a blue container. **NEVER** store kerosene in a red container which is the universal symbol for gasoline. **NEVER** attempt to use any other fuel such as gasoline, alcohol, white gas, or camping stove fuel in your kerosene heater. These fuels are very volatile and can cause uncontrolled flames.

Kerosene deteriorates with age and will not burn properly in the heater. It should be stored away from direct sunlight or other sources of heat. **NEVER** store kerosene in your living quarters.

A kerosene heater cannot function properly if the kerosene is contaminated with even a small amount of water. Water is frequently present in kerosene which is purchased from bulk storage. This water is due to condensation and comes out of the air which replaces kerosene when a large tank is emptied. For this reason, it is better to buy bulk kerosene from a dealer who dispenses it from a 55-gallon drum.

First Choice: Prepackaged 1-K Kerosene
Second Choice: 55-Gallon Drum
Third Choice: Bulk Kerosene from a Large Tank (either stored in the ground or elevated above ground)

For people who are sensitive to normal kerosene odors, or experience "fumes" during the operation of their heater, we recommend Clear Lite™ Synthetic Fuel manufactured by Exxon Chemical Co. It is completely odorless and is safer to store than kerosene.

When purchasing kerosene in bulk, you must rely on the reputation of your dealer. Even the best dealer can occasionally receive a "bad batch" from his fuel distributor.

Poor quality kerosene, kerosene contaminated with water or traces of other fuel oils, or kerosene with more than a very small trace of sulphur can cause: odor and smoke, low flame, difficulty in lighting or extinguishing the heater, excessive tar deposits on the wick, reduced wick life. If you experience any of the above, the first thing to do is check your kerosene. If there is any doubt as to its quality, dispose of it properly and retest your heater using a gallon of prepackaged kerosene.

Kerosene stored below 40°F will not vaporize easily and will not produce the expected amount of heat until it has warmed up in the tank of the heater in which it is being used. The best idea is to store the heater itself, or a tank full of kerosene, indoors if you intend to use your heater under severe winter conditions in a shed, garage, or ice-fishing house.

Kerosene in the USA is sometimes dyed red due to tax laws and the red dyed kerosene should be translucent (able to be seen through) and not cloudy.