



VENTED WICKLESS KEROSENE HEATER INSTALATION AND OPERATION INSTRUCTIONS

FF LASER CLEAN

MODEL **FF-50**



IMPORTANT

READ AND UNDERSTAND INSTRUCTIONS BEFORE INSTALLING OR USING HEATER.
RETAIN INSTRUCTIONS FOR FUTURE REFERENCE. CHECK STATE AND LOCAL CODES FOR PERMITTED USE. THIS HEATER IS DESIGNED TO BE USED NO MORE THAN 3000 FT. ABOVE SEA LEVEL. DO NOT OPERATE AT ALTITUDES HIGHER THAN 3000 FT. ABOVE SEA LEVEL.

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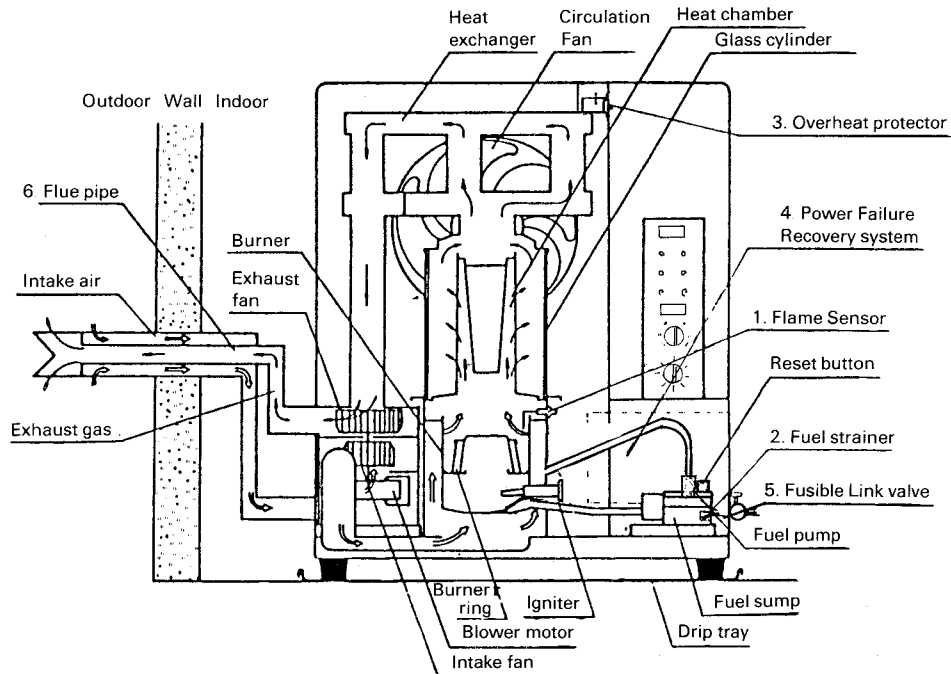
SECTION A: SPECIFICATIONS

Model:	FF-50
Heater Efficiency:	93% ⁽¹⁾
Heat Rating:	High — 22,000 BTU/h Low — 11,000 BTU/h
Fuel Consumption:	High — 0.1633 gal/h Low — 0.0817 gal/h
Fuel System:	External tank ⁽³⁾
Fuel Type:	Water Clear No. 1-K Kerosene Only
Dimensions (W×H×D): (Includes drip tray)	24-3/8" × 26-3/4" × 16"
Weight:	60 lbs. Empty
Vent Pipe Hole:	3-1/8" — 3-3/8" diameter
Maximum Length of Vent Pipe System:	16 ft., 3 bends or less
Electrical Rating:	120 Volts AC, 60Hz Preheat — 265W Burning — 58W
Typical Room Size ⁽²⁾ :	850 square feet (0°F) 1280 square feet (20°F)

- (1) Heat and vaporized water are produced by the combustion process of this kerosene heater. This rating does not take into account heat loss due to condensation of water vapor.
- (2) Room size for which this heater is suitable will vary depending on outside temperature, house insulation, window size, and other factors.
- (3) External tank to be purchased from local suppliers.

SAFETY FEATURES

Your FF-50 is equipped with the following safety features. Please familiarize yourself with these features. When your heater is extinguished due to a safety mechanism, be sure to identify and correct the problem.



1. Flame Sensor

Heater will automatically stop all operations if ignition fails or if flame fails during combustion, in order to prevent fuel overflow. Warning lamp turns on.

2. Fuel Strainer

Special strainer catches any dust or impurities present in the fuel before it is sent to the burner.

3. Overheat Protector

Automatically stops all operations if heater cabinet reaches abnormally high temperatures due to motor malfunction or abnormal combustion, in order to prevent fire. Warning lamp turns on.

4. Power Failure Recovery System

If power fails during heater operation, heater will turn off. When power resumes, heater will automatically reignite to maintain the selected room temperature.

5. Fusible Link Valve

If a household fire should occur, bringing the fuel line or heater to extremely high temperatures, the fusible link valve will stop the fuel supply to the burner. This will prevent the fuel supply from the external tank continuing to flow into the house.

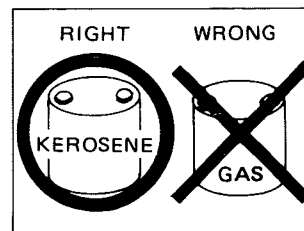
6. Fully Vented System

Flue pipe system provides outside air for combustion and vents all combustion products to the outdoors.

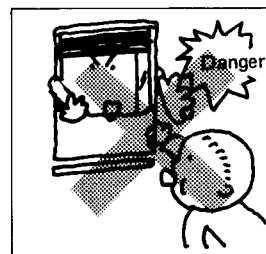
SECTION B: SAFETY TIPS FOR OPERATION

CAUTION: Heater and vent pipe system must be properly installed before operation. Please follow instructions under "Installation", Section E.

1. Never use any fuel other than water-clear kerosene (ASTM No. 1-K Kerosene). **NEVER USE GASOLINE.** Use of gasoline can lead to uncontrollable flames, resulting in destructive fire.



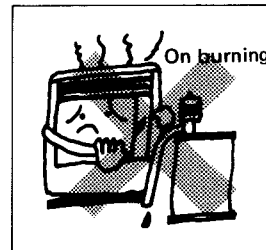
2. Due to high surface temperatures, keep heater away from children, furniture and clothing while in operation (See Page 22).



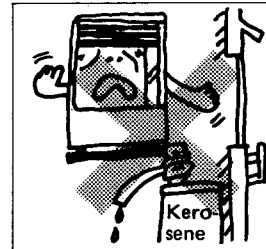
3. To prevent abnormal operation and prolong heater life, be sure to perform routine maintenance (See Pages 12—14).



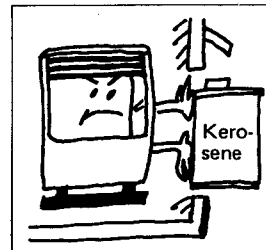
4. Never refill optional removable fuel tank when heater is operating or still hot. To do so may cause a "flash back" of flame, resulting in injury to yourself and your property.



5. Never fill optional removable fuel tank in living space. Fill tank outdoors. Never overfill.
Always replace tank cap securely after refueling.



6. Never store or 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.



SECTION C: FUEL GUIDE

The Toyostove FF-50 is designed for use with water clear No. 1-K kerosene only. Use of low-quality kerosene will cause burner performance to drop, leading to abnormal combustion and reduced heater life.

Purchase only 1-K kerosene in non-red cans reserved exclusively for kerosene and marked accordingly with the word "KEROSENE". Always store your kerosene in a separate area from where you store gasoline for your power equipment to avoid accidental use of gasoline in your heater.

What to Buy . . .

- ALWAYS : Crystal clear, colorless, high-quality KEROSENE, ASTM No.1-K.
- ALWAYS : Kerosene free of contaminants, water or cloudiness.
- NEVER : Gasoline, alcohol, white gas, camp stove fuel or additives.
- NEVER : Yellow or sour-smelling fuel.

How to Use It . . . (when optional removable fuel tank is used)

- ALWAYS : Fill heater away from living quarters when heater is cool; use siphon.
- ALWAYS : Watch fuel gauge to avoid overfilling heater.

How to Store It . . .

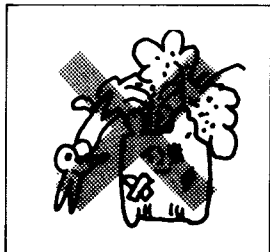
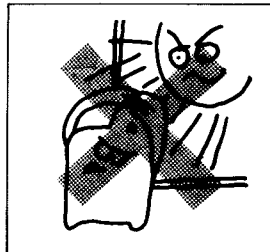
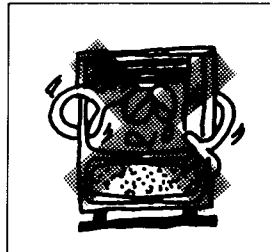
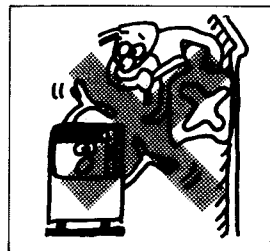
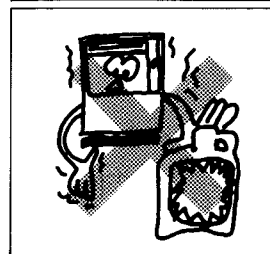
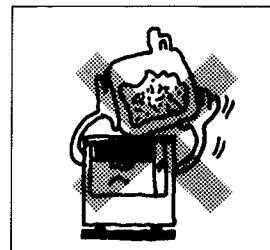
- ALWAYS : Store in a clean container, non-red in color, clearly marked KEROSENE.
- ALWAYS : Store away from direct sunlight, heat sources or extreme temperature changes.
- NEVER : In a glass container, or one that has been used for other fuels.
- NEVER : For longer than six months. Begin each heating season with fresh kerosene; discard at the end of season.
- NEVER : In the living space.

Why It is Important . . .

Pure, clean kerosene is essential for safe and efficient heater operation. Poor quality or contaminated kerosene can cause:

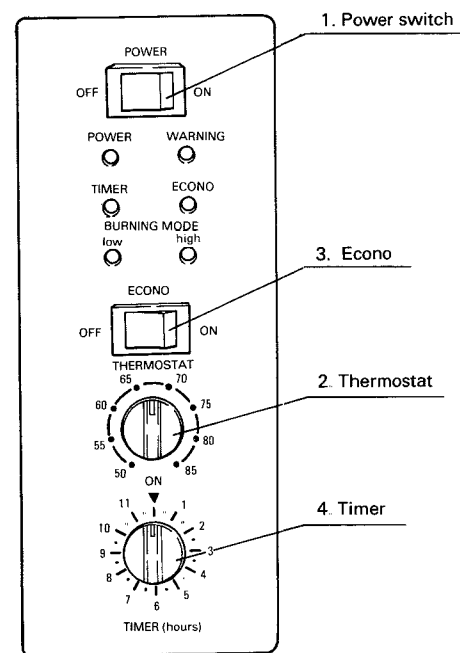
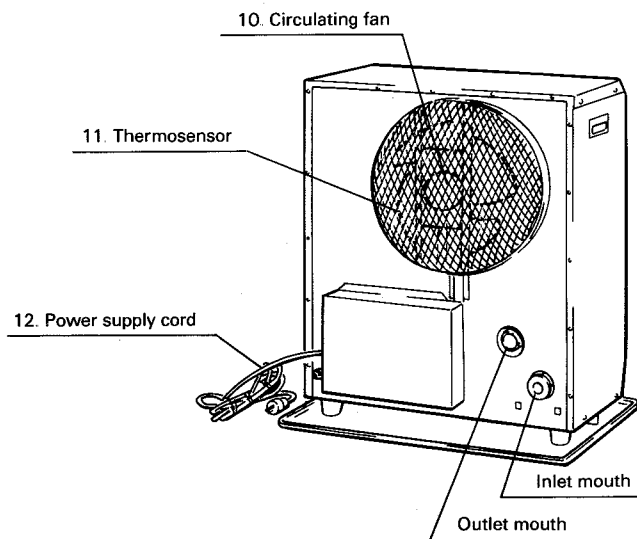
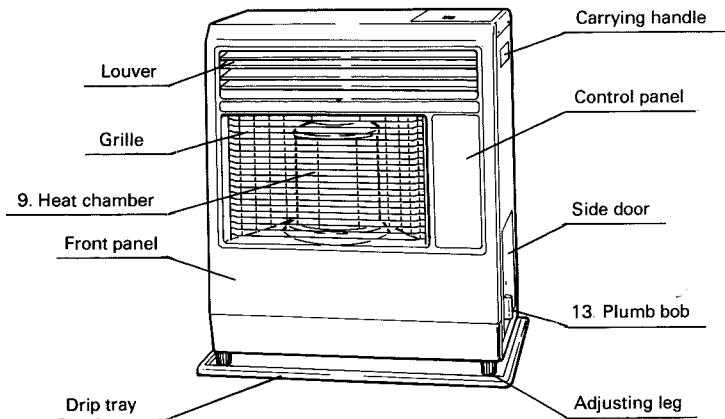
- Excess tar deposits on burner and flue pipe
- Incomplete combustion
- Reduced heater life

Use of a highly volatile flammable fuel such as gasoline can produce uncontrollable flames, creating a severe fire hazard.



SECTION D: OPERATING CONTROLS AND PART NAMES

Before using heater, familiarize yourself with the following operating controls and part names.



Make a note of your heater's serial number,
located on the outside cabinet surface.
Your heater's serial number:

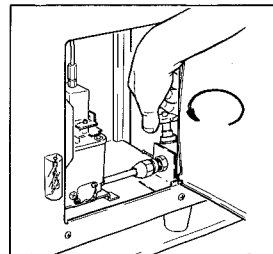
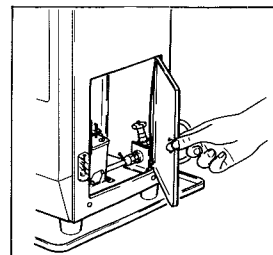
SERIAL NO.

1. Power switch: Main switch turns heater on and off. When switched on, heater begins operation and combustion starts after a 40-second preheat period.
2. Thermostat: Maintains a comfortable room temperature by automatically adjusting heat output in accordance with temperature selected by user.
3. Econo switch/Econo lamp: Increases fuel economy while preventing overheating of room. Regulates temperature by alternating between high combustion, low combustion, off and reignite cycles as necessary.
4. Timer: Turns heater on automatically after the time period selected by user (See Page 9, "Timer Ignition").
5. Warning lamp: Lights when safety devices activate due to heater malfunction. Flame will be extinguished automatically. Heater may be reignited after problem is corrected (See Page 3).
6. Power lamp: Lights when heater is in an operation mode.
7. Timer lamp: Lights when timer is in operation.
8. Burning mode lamps: Show whether heater is operating at high or low output level.
9. Heat chamber: Warms room efficiently by emitting powerful radiant heat during high combustion, and gentle radiant heat during low combustion.
10. Circulating fan: Two-speed motor supplies high-capacity warm air flow during high combustion for heating room up quickly, and low-capacity warm air flow during low combustion for maintaining a comfortable room temperature.
11. Thermosensor: Constantly senses room temperature and supplies information to heater so that desired room temperature can be maintained.
12. Power supply cord: For use in 120V, AC electrical outlets.
13. Plumb bob: Allows user to check if heater is positioned evenly.
14. Reset button: Begins the supply of fuel from fuel tank to heater when heater is used for the first time, or after running out of fuel.

SECTION E: OPERATION

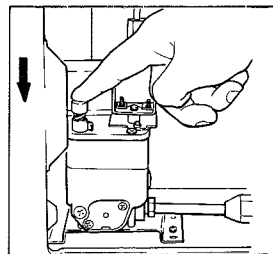
BEFORE IGNITION

1. Open the valve(s) of the separate fuel tank.
2. Open the side door on right side heater cabinet.
3. Turn knob of fusible link valve counterclockwise to open the valve.



4. If using heater for the first time, or after heater has been out of fuel, press the red reset button once for a period of one second in order to send fuel to the fuel regulator.

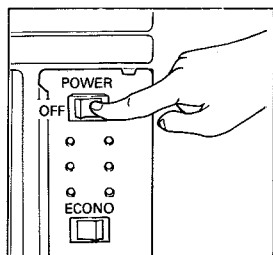
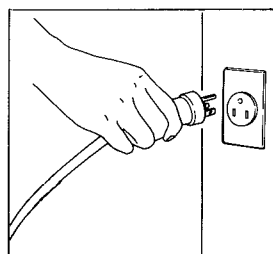
Note: Make sure there is no fuel leakage from the fuel line or joints.



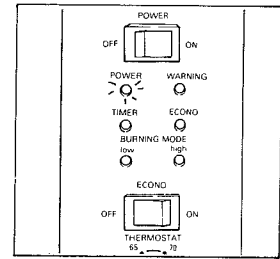
IGNITION

1. Plug heater into a 120V, AC electric outlet.
2. Press power switch to the "ON" position. Power lamp should turn on.

Note: Timer knob should be in the "ON" position for manual ignition.



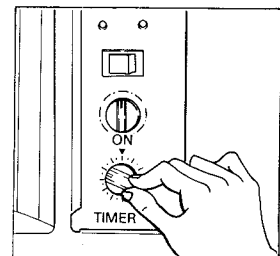
3. Ignition takes place after 40 seconds of preheat time. Heater operates at low combustion for 5 — 6 minutes after startup, regardless of temperature control setting. After this period, output may be adjusted as desired using the temperature control.



TIMER IGNITION

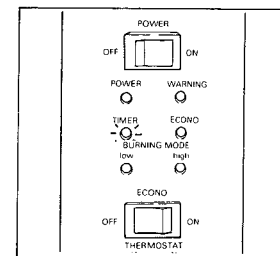
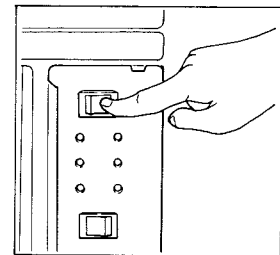
1. Turn timer knob clockwise to set timer. If timer is set at "10", for example, heater will turn on automatically after ten hours have elapsed.

Note: If you wish to set the timer for less than two hours, first turn timer knob clockwise beyond the "2", then back to desired position.



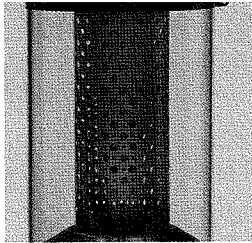
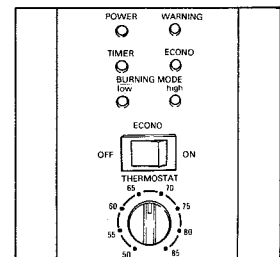
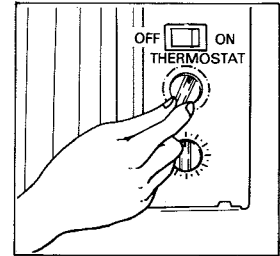
2. Set power switch to the "ON" position. Make sure the timer lamp turns on.

Note: If timer is set while heater is operating, power switch will remain in the "ON" position but heater turns off and will automatically reignite at the selected time.



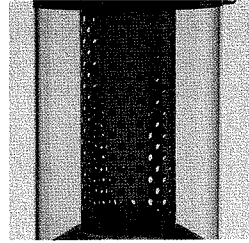
TEMPERATURE REGULATION

1. The temperature control should be set at the position you find most comfortable. Heat output will be regulated automatically in accordance with the room temperature registered by the thermosensor.
2. Heater will burn at high combustion until room temperature reaches the selected temperature level. When room temperature exceeds the selected setting, heater will automatically shift to low combustion to maintain the desired temperature.
3. Burning mode lamps indicate at which output level the heater is operating at any given time. The heater shifts automatically between low and high output levels to maintain the desired temperature.



High

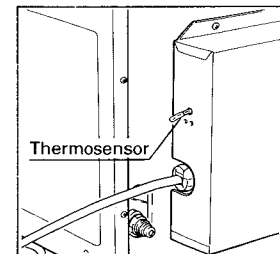
Heat rating: 22, 000 BTU/hr
Fuel consumption: 0.1633 gal/hr



Low

Heat rating: 11,000 BTU/hr
Fuel consumption: 0.0817 gal/hr

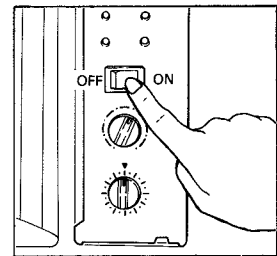
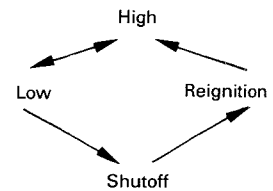
4. A thermosensor is located on the cabinet back for the purpose of measuring room temperature and regulating heat output. Make sure to locate heater so that thermosensor temperature will be representative of actual room temperature. Thermosensor should be away from direct sunlight or warm air flow from the heater, central heating system or other heat source.



"ECONO" TEMPERATURE REGULATION

The FF-50 includes an "ECONO" mode for the most economic heater operation. When the "ECONO" option is selected, heater will not only alternate automatically between high and low combustion, but will also include an "OFF" cycle if room temperature goes 4°F above the desired temperature selected by user. If room temperature drops 4°F below selected temperature, heater will automatically reignite.

For "ECONO" temperature regulation, press the econo switch to the "ON" position. Main power switch must also be turned "ON". Check to make sure the econo lamp turns on. Both the econo lamp and the power lamp will remain lit even during the "OFF" cycle of econo operation.

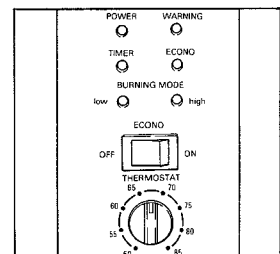
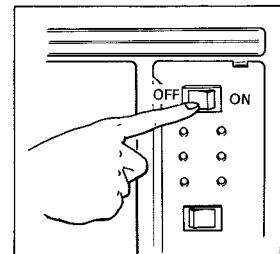


TURNING HEATER OFF

Press power switch to "OFF" position. Circulation fan and combustion fan motors continue to operate for approximately three minutes to cool heater down. Make sure power lamp goes out when fans stop.

Note: After turning heater off, wait approximately 10 minutes before relighting.

Note: Disconnect heater plug from electrical outlet after power lamp has turned off if heater will be out of use for any period. Plug should also be disconnected during electrical storms.

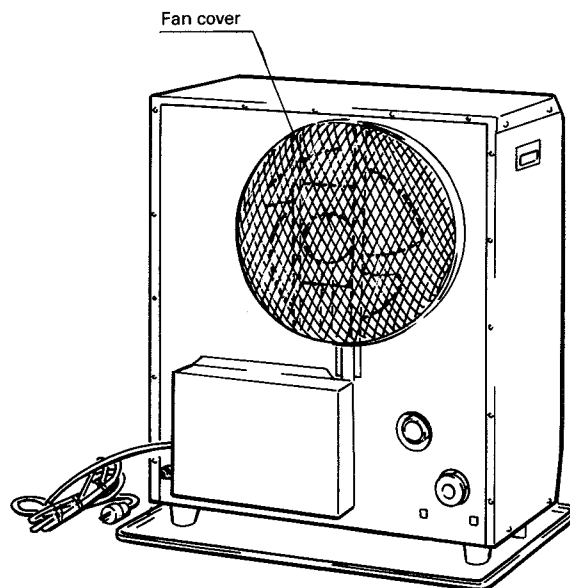
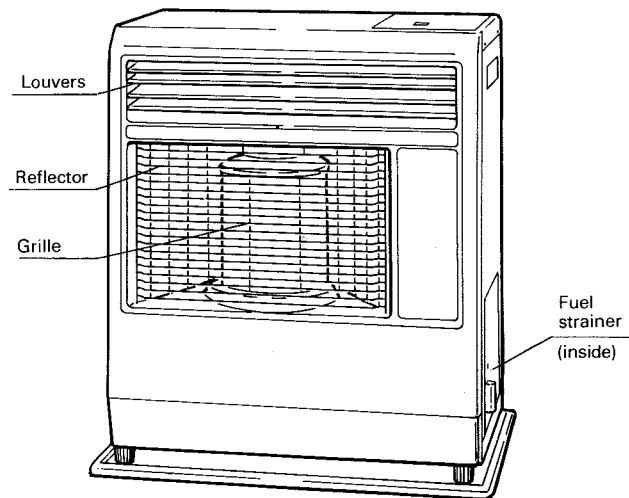


SECTION F: ROUTINE MAINTENANCE

CAUTION: Be sure to unplug heater before performing any checks or cleaning.

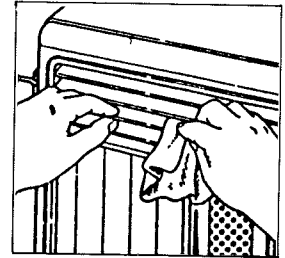
CAUTION: Allow heater to cool completely before cleaning or maintenance.

FOR OPTIMUM HEATER PERFORMANCE, THE PARTS SHOWN BELOW SHOULD BE CLEANED REGULARLY:



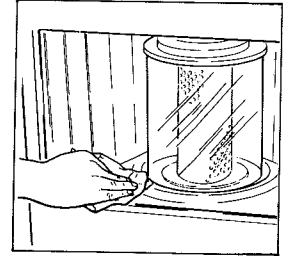
1. Clean Louvers and Grille (ONCE A WEEK)

Dust and stains should be wiped off louvers and grille with a damp cloth.



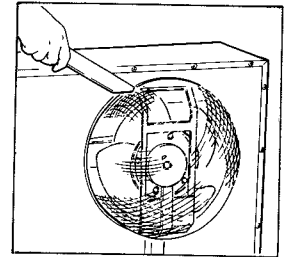
2. Clean Reflector (ONCE A WEEK)

Reflector should always be kept clean for optimum heating efficiency. Wipe away any dust and stains on reflector with a damp cloth.



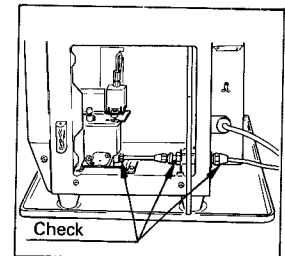
3. Clean Circulation Fan Cover (ONCE A WEEK)

Remove any dust or pet hair from the fan cover on the back of the heater.



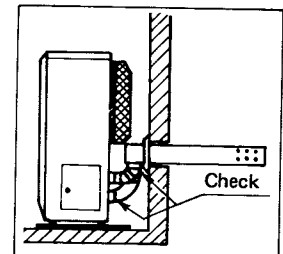
4. Check for Kerosene Leaks (REGULARLY)

Make it a habit to check for any sign of kerosene leakage along the fuel line and at all joints. Kerosene leaks may lead to risk of fire.



5. Check Flue Pipe Area (ONCE A WEEK)

Check the flue pipe joint to make sure connection is firm. Use a vacuum cleaner to remove any dust or pet hair.

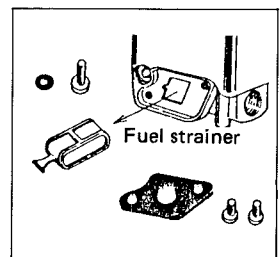
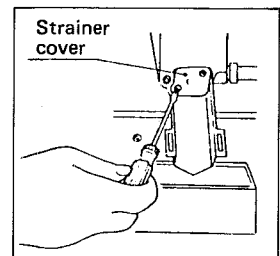
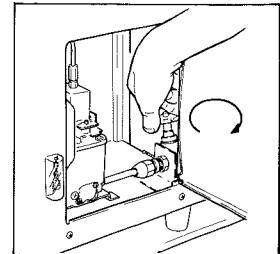


6. Clean Fuel Strainer (ONCE A MONTH)

The strainer of the fuel sump should be cleaned once a month and before storing heater at the end of each season.

- (a) Open the door on the right side of cabinet.
- (b) Turn knob of the fusible link valve counterclockwise to close the fuel line.
- (c) To catch the fuel which will drain out, set the drain plate below the strainer cover, with a small container under it.
- (d) Loosen the two screws from the strainer cover and remove.
- (e) Remove the strainer and wash with kerosene.
- (f) Return the strainer to its original position. Replace strainer cover and screw to secure.
- (g) Wipe away any spilled kerosene.
- (h) Turn the knob of the fusible link valve clockwise to open. Check for kerosene leakage.

Note: Be sure to unscrew the drain screw to remove all remaining kerosene from the fuel sump at the end of each season.



SECTION G: TROUBLESHOOTING

Should problems arise during operation or ignition, use this chart to determine the cause and the proper steps to take. Be sure to unplug heater and allow to cool completely before taking corrective measures.

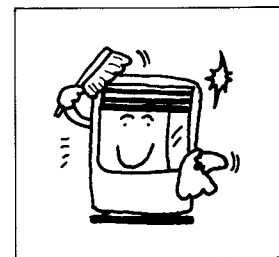
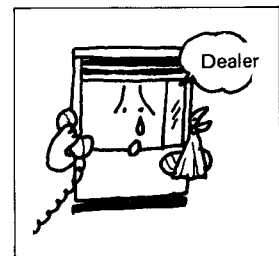
PROBLEM	CAUSE	SOLUTION
POWER LAMP FAILS TO TURN ON	Disconnected power plug Timer knob not in "ON" position Circuit board malfunction	Plug into 120V AC outlet. Turn timer knob to "ON" position. Consult your dealer.
NO IGNITION	Out of fuel Fusible link valve closed Air pocket in fuel line Clogged fuel strainer Igniter, circuit board or fuel pump malfunction	Check fuel gauge on fuel tank; refuel. Open valve by turning counterclockwise. Push reset button on the fuel sump, located inside side door, once. Clean fuel strainer (see page 14). Consult your dealer
EXTINGUISHED AFTER IGNITION	Air pocket in fuel line Out of fuel Incorrect, missing or misset air damper High limit switch activated Flame sensor malfunction	Push reset button on the fuel sump, located inside side door, once. Check fuel gauge on fuel tank; refuel. Check that correct damper is in place; replace as necessary (see page 24). Clean circulation fan cover, remove any obstructions. Consult your dealer.
POOR COMBUSTION/NOISY COMBUSTION	Incorrect, missing or misset air damper Soot buildup on flue pipe line Burner ring not properly seated Altitude too high	Check that correct damper is in place; replace as necessary (see page 24). Clean out any soot. Consult your dealer. Consult your dealer.
ODOR	Leaking flue pipe Kerosene leakage Faulty packing or gasket in combustion area	Tighten all flue pipe connections. Tighten all fuel line joints. Wipe away any kerosene drippage. Consult your dealer

If the corrective measures outlined above do not solve the problem, please consult your TOYOSTOVE dealer.

SECTION H: LONG TERM STORAGE

At the close of each heating season, or when you do not plan to use your heater for an extended period, the following procedures are recommended.

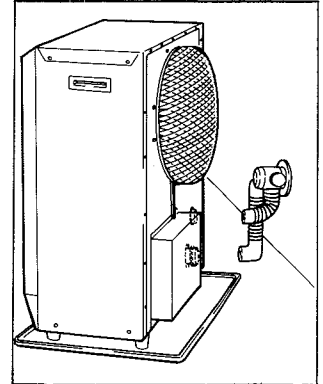
1. As the end of the season approaches, calculate your kerosene purchases so that you can use up all the kerosene you have on hand. When kerosene is stored for over six months, its quality may deteriorate. The use of such kerosene will have an unfavorable effect on heater operation.
2. If your heater needs any service or repair, now is the time to call your dealer and get it done before storage. That way your heater will be ready for immediate use when the next heating season begins.
3. If you plan to store your heater in place,
 - (a) Unplug heater.
 - (b) Close the main tank valve.
 - (c) Close the fusible link valve by turning knob clockwise. Remove all kerosene from the fuel sump and clean the fuel strainer (see page 14).
 - (d) Wipe off any stains or dust on heater with a damp cloth, then wipe once again using a dry cloth.
 - (e) Cover heater completely with a large plastic bag to protect from dust.



4. To store heater in another location,
 - (a) Unplug heater.
 - (b) Close the main tank valve.
 - (c) Close the fusible link valve by turning knob clockwise. Remove all kerosene from the fuel sump and clean the fuel strainer (see page 14).
 - (d) Disconnect fuel line and flue pipe from the heater.

Note: Kerosene remaining in the fuel line may flow out when fuel line is disconnected. Have a container ready to catch drainage.

- (e) Remove any soot accumulated in the flue pipe using a brush and/or vacuum cleaner.
- (f) Wipe off any stains or dust on heater with a damp cloth, then wipe once again using a dry cloth.
- (g) Put the heater and flue pipe in the original shipping box, and store in a dry place. If original shipping box is not available, cover the heater completely with a large plastic bag to protect from dust during storage.
- (h) Plug inner and outer sleeve openings using the two rubber caps provided for this purpose.



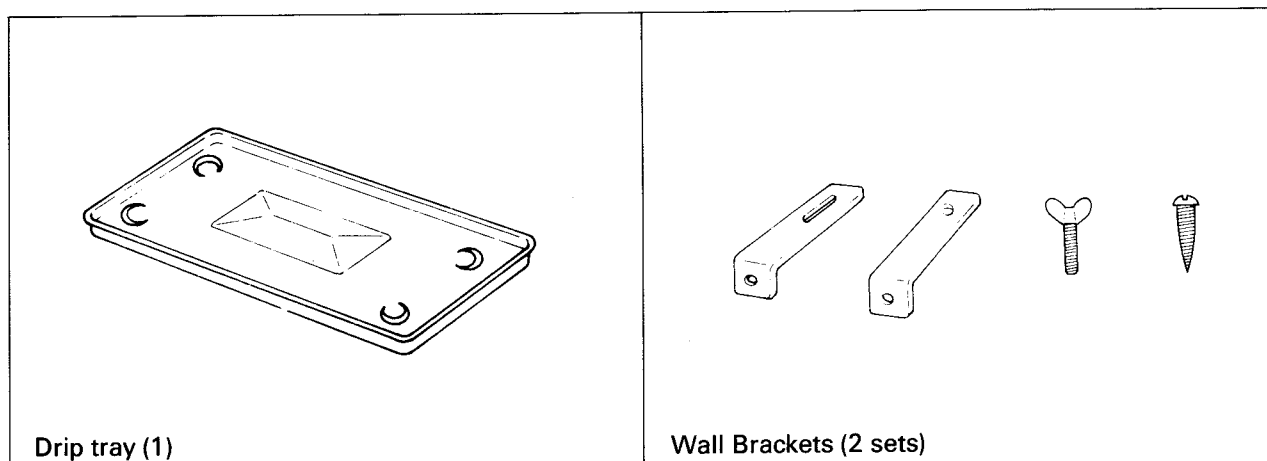
SECTION I: INSTALLATION

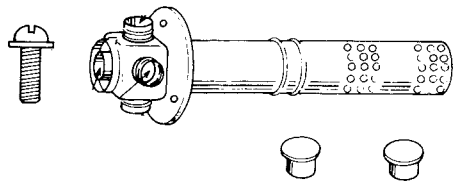
TOOLS NEEDED FOR INSTALLATION

Tool	Use
Phillips Head Screwdriver	Installation of flue pipe, etc.
Electric Drill	Drilling hole in wall for flue pipe
Hole Saw, 3¼" diameter	Making hole in wall for flue pipe
(3⅛" or 3⅜" may also be used)	

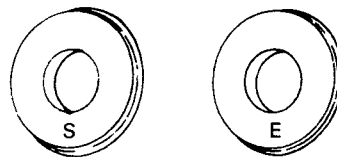
STANDARD INSTALLATION PARTS

The following standard installation parts are enclosed with heater. For alternate installation methods, you may need to purchase additional accessories which are available from your TOYOSTOVE dealer. See "Accessory Parts", page 20.

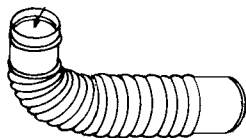




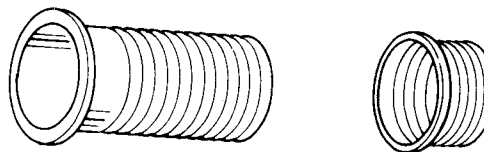
Flue Pipe (1)



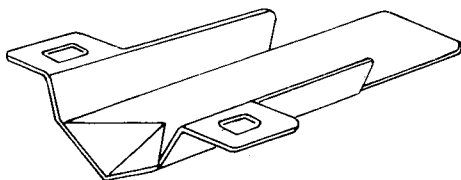
Air Damper (2)



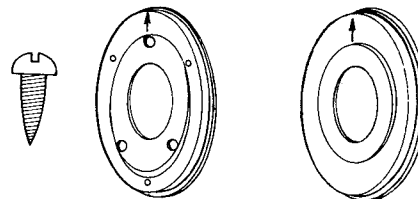
Bent Joint (1)



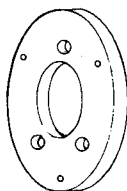
Wall Sleeve and Sleeve Nut (1 ea.)



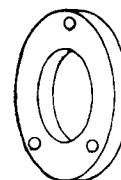
Drain Plate (1)



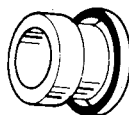
Inner and Outer Sleeve Flange (1 ea.) w/screws



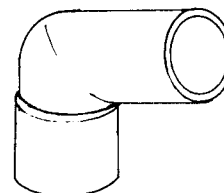
Flange Packing (2)



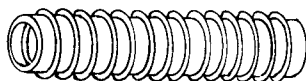
Flue Pipe Packing (1)



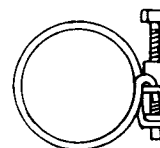
Sleeve Cap (2)



L-Shaped Hose (2)



Inlet Hose (1)



Hose Band (2)

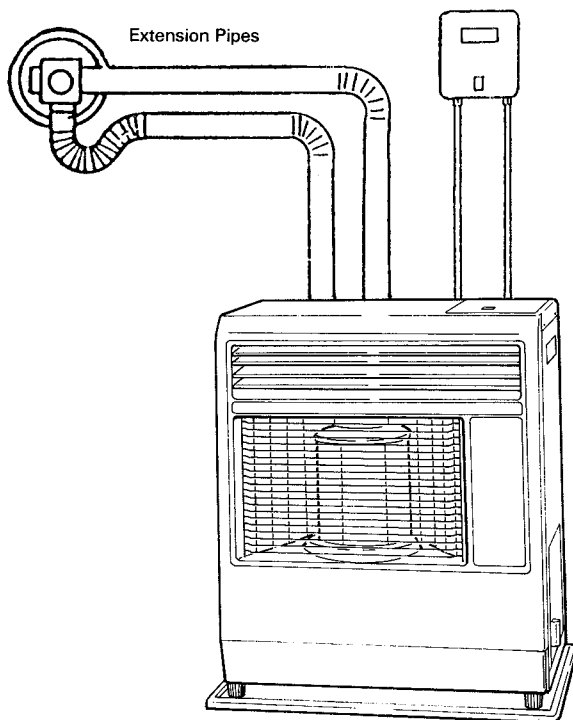
ACCESSORY PARTS

The following accessory parts are available for use in non-standard installation of the FF-50. After giving careful consideration to your desired heater and flue pipe locations and fueling system, consult your TOYOSTOVE dealer to purchase the necessary accessory parts.

Accessory	Part No.	Application
Extension pipes (L)*	22744998	Extends pipe system by 61-3/4 to 78-3/4"
Extension pipes (M)*	22744997	Extends pipe system by 22-1/2 to 39-3/8"
Extension pipes (S)*	22744996	Extends pipe system by 12-5/8 to 19-5/8"
L-Shaped exhaust joint*	22744961	For 90 degree bend in exhaust pipe
L-shaped intake joint*	22744962	For 90 degree bend in intake pipe
Electric kerosene Lifter Model OL-A-1	22744991	Used to lift fuel to heater when fuel tank is located underground or outdoors in a position lower than the heater
External Fuel Supply Installation Kit	10005098	for installation of external tank system

* Total length of extension pipe between heater and flue pipe must be no greater than 16 ft. No more than three bends may be used in extension pipe. When an extension pipe kit is used, type "E" air damper must be used at the intake hole of the heater (see page 24).

Kerosene Lifter Model OL-A-1

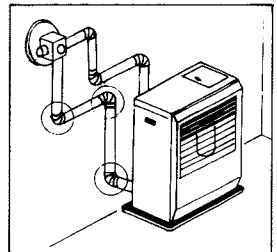
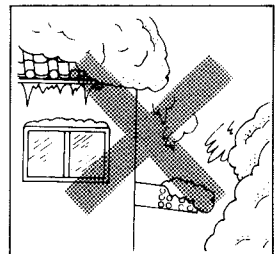
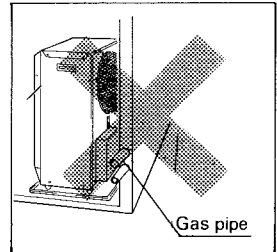
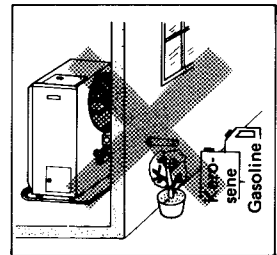
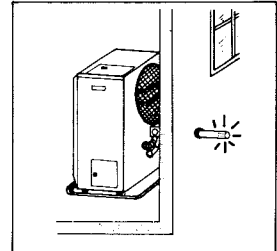


External Fuel Supply Installation Kit

TIPS FOR SAFE INSTALLATION

Follow the safety tips below when planning the installation of your FF-50.

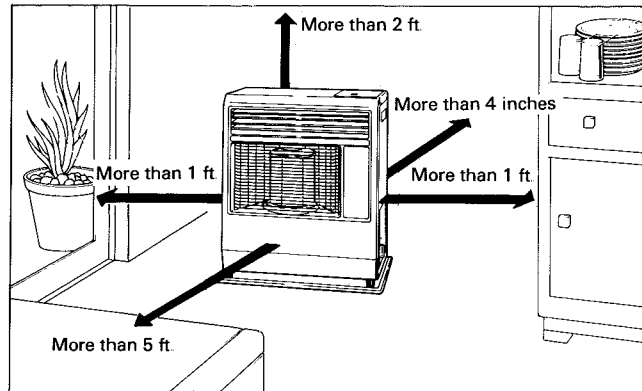
1. Intake and exhaust flue pipe openings must be fully exposed to outside air. Do not vent into garage, basement under the floor, or into any enclosed area.
2. Do not install flue pipe in close proximity to other objects or materials (see page 22).
3. Before making a hole in your wall for the flue pipe, make sure the area is free of electrical wires, gas pipes and other obstacles.
4. Do not install flue pipe where it will be exposed to heavy snow or strong drafts.
5. Total length of extension pipe between heater and flue pipe must be no greater than 16 ft., and no more than 3 bends may be used.



INSTALLATION OF HEATER AND FLUE PIPE

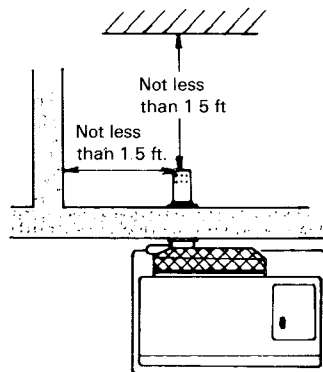
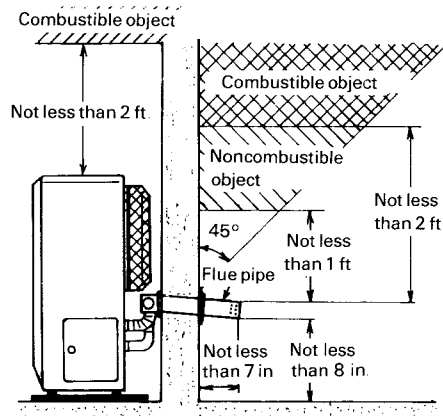
NOTE: check and comply with all state and local codes that may apply to vented heaters in your area before beginning installation.

1. Select heater location. Allow clearances as indicated below between heter and all other materials.



2. Make sure that the outside area to which flue pipe will be extended is clear of objects as shown below.

NOTE: Make sure wall thickness is no greater than 12 inches.

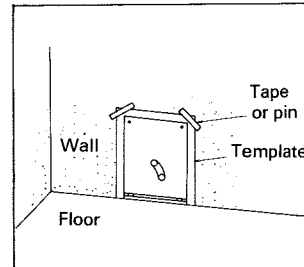


3. For standard installation, use the template included with heater to position hole for flue pipe. Pin or tape template to wall at desired position.

NOTE: These instructions may be used as a reference for non-standard installations utilizing extension pipe kits, etc., but adjustments should be made as appropriate.

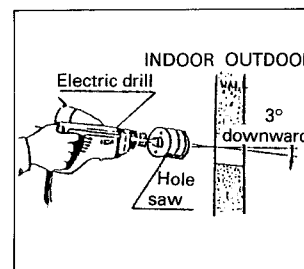
NOTE: Before making hole in wall, make sure there are no electric wires, gas pipes or other obstructions present.

NOTE: Heater should be installed on a strong, level and flat floor surface.



4. Cut the flue pipe hole from inside the room, using a 3-1/4" diameter hole saw and electric drill. To allow for draining of condensed moisture from the pipe to outdoors, and to prevent rain or snow from entering pipe, flue pipe should be installed at a downward slant of approximately 3 degrees. Therefore, outer hole should be approximately 1/2" lower than inner hole.

After hole is complete, remove template from wall.

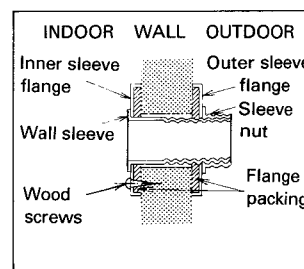


5. Slide inner sleeve flange and flange packing over wall sleeve as indicated. From inside room, insert wall sleeve into flue pipe hole.

From outside, slip outer sleeve flange and flange packing over projecting end of wall sleeve. To secure sleeve flange and packing tightly against outer wall, screw sleeve nut onto wall sleeve. Make sure arrows on inner and outer sleeve flanges are pointing up.

Secure inner sleeve flange by screwing the three screws provided for this purpose into the three larger holes on inner sleeve flange.

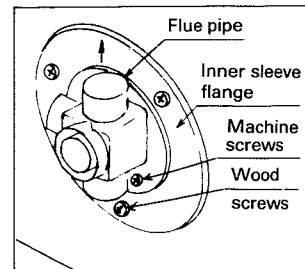
NOTE: Cut off any extra length from outside wall sleeve, leaving 2—3 threads projecting from sleeve nut, if necessary.



6. Insert flue pipe with packing attached into wall sleeve from inside room. Align the 3 holes on flue pipe flange with the 3 smaller holes on sleeve flange, and secure with the 3 machine screws provided for this purpose.

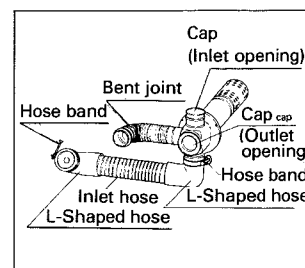
From outside, adjust length of telescoping flue pipe so that the flue pipe projects from sleeve, leaving approximately 1 inch between end of sleeve and first row of holes on flue pipe.

NOTE: Wall sleeve must not cover any of the holes on flue pipe.



7. Attach type "S" air damper to L-shaped hose as shown.

NOTE: If heater is to be installed using extension pipes, type "E" air damper must be used instead of type "S".

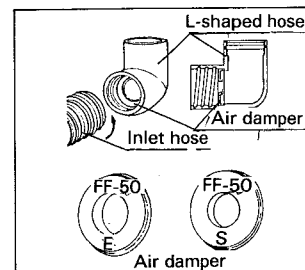


8. As shown, insert bent joint into exhaust outlet from inside room. Attach 1 L-shaped hose to each end of inlet hose. Slide hose band over each L-shaped hose.

Slide end of one L-shaped hose over inlet opening on flue pipe. Secure by tightening hose band over L-shaped hose.

NOTE: Plug unused inlet and outlet openings with caps enclosed for this purpose. Make sure cap fits tightly into opening.

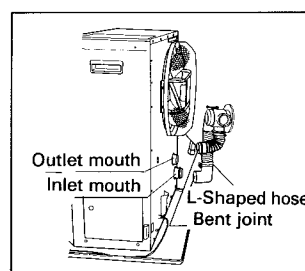
NOTE: Length of inlet hose may be adjusted by cutting.



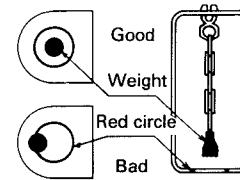
9. To connect heater to flue pipe system, move heater into position and slip bent joint of flue pipe over exhaust pipe opening (upper opening) on rear heater cabinet.

Next, slide L-shaped hose over intake pipe opening (lower opening) on rear heater cabinet. Secure tightly with hose band.

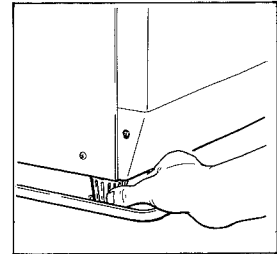
Make sure all connections are tight.



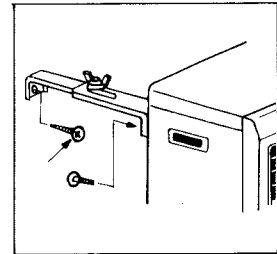
11. Check if heater position is level using plumb bob located at side of heater. when viewed from directly above, plumb bob weight should be within the red circle. If weight is not within the red circle, adjust heater legs as necessary by turning legs in either direction.



Plumb bob as viewed from above



12. After heater and flue pipe installation is complete, secure heater to wall using the wall brackets provided. Check to make sure heater is parallel to wall.



13. Before proceeding, recheck the following:

- Each connection is tight and firm.
- Heater and flue pipe areas are free of all combustible and non-combustible materials as shown on page 22.
- Heater is level and parallel to wall.
- Exhaust and intake holes at end of flue pipe are fully exposed to outdoor air, but do not project too far outside of sleeve.

SECTION J: FUELING

WARNING: Use only water-clear No. 1-K kerosene. NEVER USE GASOLINE. Use of gasoline can lead to uncontrollable flames resulting in destructive fire.

FF-50 FUEL SYSTEM OPTIONS

- **Large Capacity External Tank**

Where bulk delivery of kerosene is available, an outdoor or underground fuel tank may be used. Tank must be purchased separately and installed by a qualified fuel supply technician.

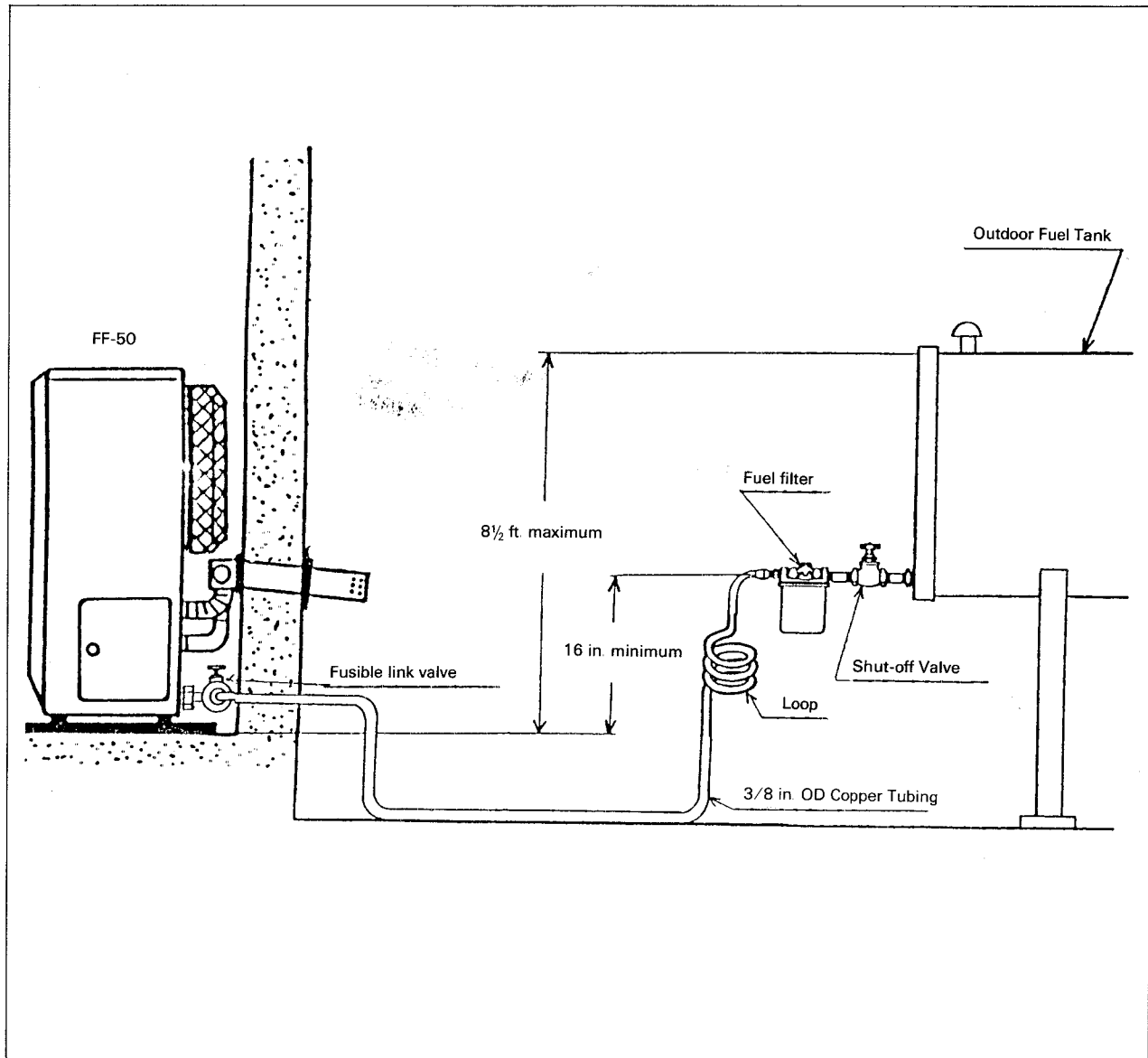
EXTERNAL TANK INSTALLATION

NOTE: External tank installation must comply with National Fire Protection Association Code NFPA 31 or locally applicable codes. Check with local building officials.

The following instructions should be followed for installation of a large capacity, gravity-fed external fuel tank.

- Installation height of tank's fuel outlet should be at least 16 in. above floor surface upon which heater rests.
- To avoid excess fuel pressure to heater, top of fuel tank should be no more than 8½ ft. above floor surface upon which heater rests.
- Fuel tank should be located at least 6 ft. away from all heat sources.

- 3/8" OD copper tubing should be used for fuel line.
- To prevent air locks in fuel line, fuel line should be smooth with no U-shaped or sharp bends.
- Use of a fuel filter in fuel line adjacent to tank is recommended. A shut-off valve should also be connected to the tank.



LIMITED WARRANTY

TOYOTOMI AMERICA INC. ("TOYOTOMI") warrants each product and any parts thereof sold by it to be free from defects in materials or workmanship under normal use and service for TWELVE (12) MONTHS from the date of delivery to the original purchaser at retail subject to the following terms and conditions:

An extended warranty period of 36 months is offered for vented FF heaters. This coverage is limited to the combustion assembly, specifically the burner pot, radiant chamber and heat exchanger. The remainder of heater is subject to 12 months.

WHAT IS COVERED: Product or any parts thereof which are defective in materials or workmanship.

WHAT IS NOT COVERED:

(1) This warranty does not extend to any defect due to the negligence of others; failure to instal, operate or maintain unit in accordance with installation instructions (operating and maintenance instructions are furnished with each new unit); unreasonable use; accidents; alteration, use of unauthorized or non-standardized Toyotomi parts and accessories; electrical malfunctions, i.e., as resulting from large power surges, short circuit, etc.; incorrect installation; use of any fuel other than that specified in owners manuals; or repair by anyone other than a service facility specified by Toyotomi.

(2) Normal wear and tear of parts, including wicks, batteries, igniter coils and siphons, cutting blades, hoses, cables, burner mats and accessories.

WHO IS COVERED: The original purchaser at retail.

WHAT WE WILL DO: TOYOTOMI will either repair or replace, at its option, all defective parts free of charge that are covered by this limited warranty on a carry-in basis, to your nearest authorized dealer or distributor of TOYOTOMI.

WHAT YOU MUST DO FOR WARRANTY SERVICE: You must return the defective Product or part to any authorized dealer or distributor of TOYOTOMI with this LIMITED WARRANTY CARD and a copy of your bill of sale or credit card charge receipt or other document evidencing the date of the Product's delivery. If service is not available locally, please contact our CUSTOMER RELATIONS DEPARTMENT or call:

TOYOTOMI AMERICA INC.
604 Federal Road, Brookfield, CT 06804 (203) 775-1909

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