

Expedition SPACE HEATER



Installation and Operating manual



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READ THESE INSTRUCTIONS AND SAVE FOR FUTURE REFERENCE

Overview

Make sure you read and understand this manual before installing and operating your *EXPEDITION*. If you have any questions, or require any explanation, please contact your authorized ITR dealer.

Thank you for purchasing International Thermal Research's (ITR) ***Expedition*** space heater.

The ***Expedition*** Heater is a vaporizing pot burner type space heater with a simple, effective design that produces radiant and convection heat through the efficient combustion of liquid fuel. With regular maintenance and proper operation your heater will function satisfactorily for many years.

The ***Expedition*** heat output ranges from 15,000 to 30,000 BTU's, sufficient to heat areas such as small warehouses, cabins, workshops, etc.

Table 1: General Information

Nominal heat output	Oil Consumption		Chimney draught		Weight	Flue diameter
	min	max	min	Max		
30,000 BTU/Hr	0.19 US Gal/h	0.32 US Gal/h	.040" W.C.	.060" W.C.	40 Lbs	Ø4 inches
8,8 kW	0,72 Liter/h	1,20 Liter/h	10 Pa	15 Pa	18 kg	101,6 mm

1. Safe Operation

Proper installation, operation and maintenance procedures laid out in this manual, as well as local government requirements, must be followed to insure the safe operation of your ***Expedition***. CSA standard B139, Installation Code for Oil Burning Equipment, UL896, or NFPA#31 are standards that apply to this equipment.

Make sure you read, and understand these instructions and save them for future reference. If you have any questions or don't understand anything in this manual, contact your authorized ITR dealer.

2. DOs and DO NOTs

All heaters must be installed according to the installation rules mandated by local, state/provincial, and federal government authorities. These regulations deal with various matters including heater and flue set backs and fuel storage. **DO** determine what regulations apply in your local area. **DO NOT** install the heater or flue unless the installation conforms with the regulations governing your location.

All heaters and stoves, whether they burn solid or liquid fuel, exist for one reason – to produce heat. Therefore, common sense says that all heater parts will be hot when the unit is operating. **DO NOT** touch heater parts if the heater is running. You'll get burned.

Your heater is designed to burn clean #1 and #2 diesel fuel. If you burn any other fuel or burn contaminated diesel, you will void your warranty, cause damage to the fuel control valve (Toby) and may cause a fire or even an explosion. **DO** use only the right fuel. **DO NOT** use any other fuel, under any circumstances.

Fuel delivery from the tank to the heater is important. Any fuel leaks can result in a dangerous fire. **DO** inspect the entire fuel line for leaks before firing the heater. **DO NOT** start the heater until any leaks are properly fixed.

All fuel burning heaters require oxygen to operate and they get that oxygen from the air. **DO** inspect the space below the burner to make sure there are no blockages and, if there is any dust or dirt remove it. **DO** inspect the exhaust flue (stove pipe) to make sure it is not blocked. **DO NOT** start the heater until any blockages have been removed.

Oxygen for combustion comes from the air in the same space as the heater and as that air is used in the combustion process it goes up the exhaust flue. Since you are also in the same space as the heater, if the air in the room is not replaced, all the oxygen needed to keep the heater burning, and you alive, will run out. **DO** make sure that you have a window or door opened a bit to allow fresh air to enter. **DO NOT** operate the heater in an air tight room. To do so will lead to oxygen deprivation and, if the condition continues, will result in death.

If, after the heater has been fired, you smell smoke or exhaust fumes, shut the heater down immediately and examine the stove pipe for leaks or sloppy fittings. **DO NOT** continue to operate the heater until any leaks are repaired. The fumes are poisonous. **DO** vent all exhaust gases outside.

DO NOT ever attempt to relight the heater when it is hot. If the unit is shut down for any reason, **DO** wait until it cools down to room temperature before re-firing.

DO mount the heater securely to a non-combustible floor. If a heater is not solidly secured, and it gets knocked over, it will spill the burning fuel all over the floor. This

will create a serious fire hazard that could burn down the building housing the heater. **DO NOT** start the heater until it is properly secured.

All liquid fuel heaters run best when they are level. **DO** make sure your heater is level before you start it.

All heaters, regardless of the type or make, can malfunction and all manufacturers recommend that heaters are not left running unattended. **DO NOT** leave the heater running unattended. The *Expedition* is mechanically capable of operating unattended, but if there is a malfunction, ITR accepts no responsibility or liability for any damage caused, regardless of the type or extent of the damage. **THIS PARAGRAPH CONTAINS LANGUAGE THAT LIMITS THE MANUFACTURER'S LIABILITY.**

DO install carbon monoxide and smoke detectors in the same room as the heater;

The Canadian Standards Association (CSA) has some additional consumer tips for space heaters which ITR agrees with.

Some of those tips are:

DO NOT hang wet clothing above the heater to dry it. The clothing can catch fire as it dries

DO supervise young children when in the same room as the heater

DO NOT keep gasoline, solvents or other flammable or vapourizing liquids in the same room as the heater.

More tips can be found on http://www.csa.ca/consumers/consumer_tips/.

3. Components

A) Expedition major external components

Heater Shell (1) – The burner shell assembly is the area of the heater where combustion occurs and contains the perforated burner shell.

Top Lid (2) – Contains a sight glass to observe the flame.

Valve Heat Shield (3) – Shield between the oil control valve and burner shell.

Toby Oil Control Valve (4) – Located on the side of the heater and controls the amount of gravity fed fuel supplied to the burner. Turning the control knob will allow more or less fuel to enter the burner. See sections 5 & 6.

Fuel shut off valve (5) – Opens or closes the flow from the fuel tank to the Oil Control Valve.

Fuel Connection (6) – ¼" NPT female threaded fitting

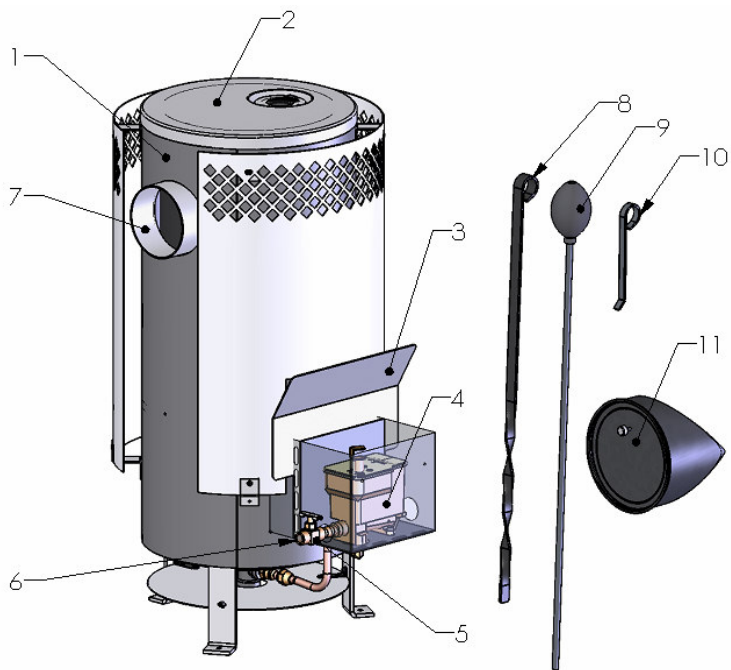
Flue Collar (7) – Attachment for Ø4" Flue stack.

Reamer Tool (8) – To clean the Up-Tube from soot and carbon build up.

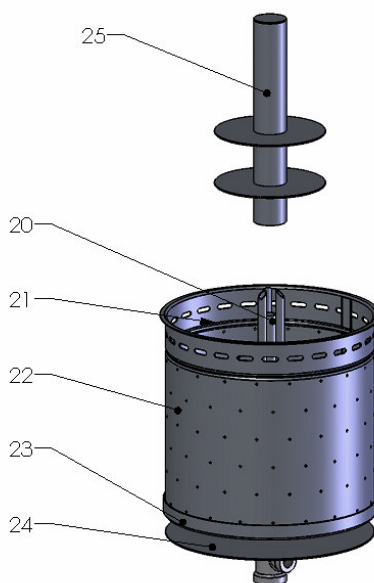
Primer Bulb / fuel dispenser (9) – To put fuel in the bottom of the burner base before lighting the heater.

Removable Handle (10) – Used to open the glass lid on the top. Do not leave the handle on the unit when the heater is running. Handle gets too hot to touch.

Draft Regulator (11) – Works great for solving over-draft situations.



B) Expedition major internal components



Up-Tube (20) – Receives fuel from the oil control valve and permits fuel vapours to flow into the S-Tube (25) during operation.

High Fire Ring (21) – Clean below High Fire Ring periodically, remove any build up of soot or hard carbon deposits and vacuum.

Burner Shell (22) – Area of the heater where combustion occurs. The perforated Burner Shell contains an up-tube (20) welded to the base of the shell and a removable, capped S-Tube (25) which sits over the welded up-tube. The Burner Shell is permanently mounted inside the Heater Shell Assembly (1) and can be accessed by removing the Top Lid (2).

Burner Base (23) – Bottom of Burner Shell (22). Periodic cleaning from soot and carbon build up required.

Burner Heat Shield (24) – Heat shield to keep heat inside the burner Shell and away from the bottom of the **Expedition** Unit.

S-Tube (25) – The large capped tube in the center of the perforated Burner Shell is the S-Tube. The S-Tube is positioned over the welded Up-Tube (20) and is fully removable. During operation, fuel flows through the Up-Tube (20) where its level is gravity maintained with the Toby Control Valve (4). Fuel vaporizes due to combustion heat and is expelled from the up-tube, down through the S-tube and into the perforated burner shell where it ignites.

Note: If any parts appeared damaged, do not operate the heater. Contact your authorized **Expedition** Dealer.

When unpacking the heater, remove any packing material from the side of the burner canister and around the air intake area.

4. Installation

A.) Location and Mounting

The **Expedition** heater may be placed on a flat level surface made of material that can resist heat. Hardwood, plywood, concrete, etc. are acceptable. The **Expedition** should not be mounted directly on a carpeted floor. Use a solid platform or rigid heat resistant material between the carpet and the heater.

Ideally a large open space would best suit the heater. The surfaces of the heater and the flue stack will be generating heat and should be taken into consideration when mounting the heater.

The minimum standard clearance between the heater and any building construction other than the floor is 24 inches (60 cm). The minimum standard clearance between the exhaust vent pipe and any building construction is 18 inches (45 cm).

An unlevelled heater will not operate properly and could be dangerous. Adjust the heater perfectly level in all directions after mounting.

The heater should be securely mounted to the floor. The legs contain a ¼" hole for directly fastening the heater to the floor.

B.) Exhaust Flue Stack

OIL BURNING APPLIANCES SHALL BE CONNECTED TO FLUES HAVING SUFFICIENT DRAFT AT ALL TIMES, TO ASSURE SAFE AND PROPER OPERATION OF THE BURNER.

All heaters must be installed according to the installation rules mandated by local, state/provincial, and federal government authorities. These regulations deal with various matters including heater and flue set backs and fuel storage. **DO** determine what regulations apply in your local area. **DO NOT** install the heater or the exhaust flue stack unless the installation conforms with the regulations governing your location.

The **Expedition** does not come with an exhaust flue stack. Blue stove pipe or All-Fuel "L" type vent capable of continuous use for flue gas temperatures up to 1000°F may be used. Always use flue stacks that are the same diameter as the flue collar on the heater. Appropriate parts for the appropriate flue stack must be purchased at your local heating and ventilation companies. As all installations differ, it is necessary that you follow all local, state/provincial, and federal guidelines in selecting the type, method, and location of the exhaust flue stack for your particular situation.

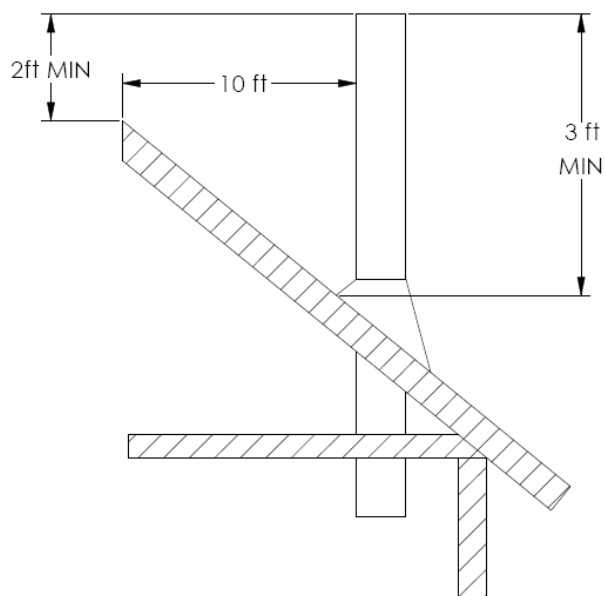
Before the hook up of the **Expedition** to a chimney, check if the chimney is in good condition and that the quality of the flue pipe will allow sufficient draft. A

maximum horizontal length of 6' is allowed. Make sure to have a ¼" slope per foot minimum. Do not use more than two 90° elbows for connecting stove to chimney.

The recommended draft for the **Expedition** is between .040-.060 inches water column. This is measured 18" (45cm) away from the heater and before the draft regulator.

The minimum flue stack height is 12 feet (3,6m)

The chimney flue shall extend at least 2' (0,6m) above the highest roof surface or structure within 10' (3,0m) horizontally of the chimney to prevent down drafts.



Attach the female part of the flue pipe to the heater using 3 self tapping screws, with 120° distance between each of them.

Install the included draft regulator which is necessary in order to maintain stable draft in certain conditions.

Read the installation and adjusting instructions which are packed in the carton of the draft control before installing.

The **Expedition** emits very little carbon and soot into the flue system. However it may be convenient to design your flue system so it can be brushed clean if necessary.

For safe operation, it is highly recommended that the installed exhaust system be inspected by a qualified professional to ensure the suitability of the type and method of the installation.

During operation, the heater produces harmful carbon monoxide (CO) and other gases. To prevent CO poisoning, ensure the exhaust stack sections fit together snugly and that the exhaust gases are properly vented through the roof of the structure.

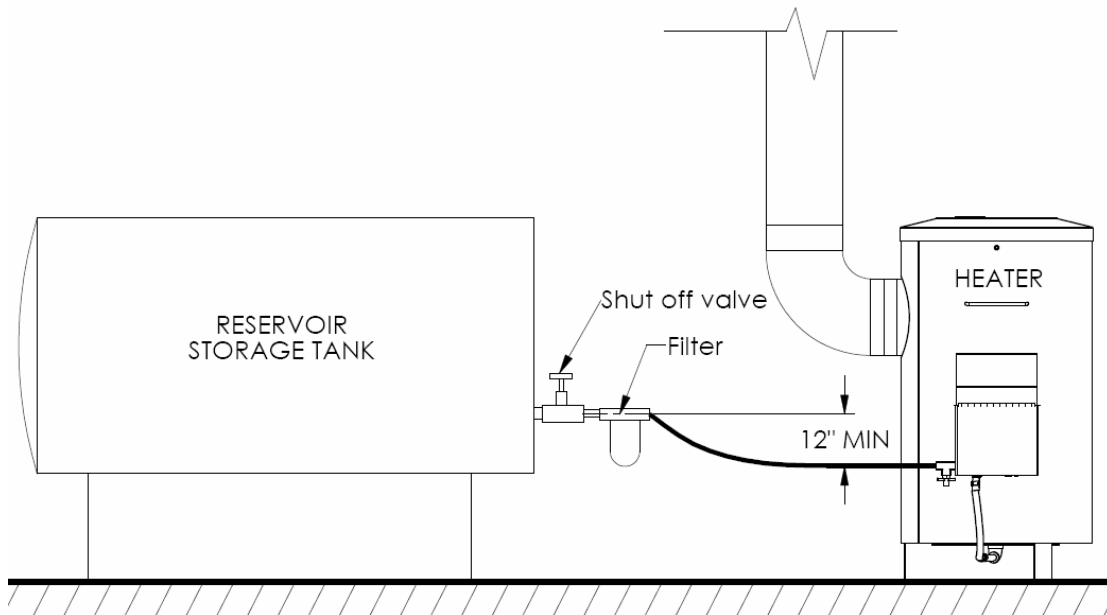
C.) Venting and Air supply

The heater consumes about 4000 ft³ of air per 1 US gallon of oil. This air enters the heater through the air inlets and exits the chimney as combustion gas.

The **Expedition** should be installed in a well ventilated area that allows the entrance of outside fresh air.

Connecting to Oil Tank

The external oil tank is to be installed in accordance with the manufacturer's instructions and the Standard to which the tank has been manufactured.



Make sure that the tank outlet is 12" (305mm) higher than the inlet of the oil control valve. (Gravity fed)

A good quality filter should be placed at the tank to ensure a good clean supply of oil to your heater.

When the tank is installed outdoors, it is preferable to use oil #1, to avoid any viscosity problems.

DO NOT use an oil/fuel tank inside a tent or portable building.

The fuel line can be connected to the oil control valve using a 1/4" NPT male fitting.

INSTALLATION OF THE HEATER, FLUE STACK AND FUEL TANK MUST BE INSTALLED IN ACCORDANCE WITH THE REGULATION OF AUTHORITIES HAVING JURISDICTION, NFPA #31, CSA STANDARD B139. AND UL896.

5. Operation

The **Expedition** heater will require a break in period of 1 – 2 hours. During this period, some smoke and fumes may be generated from the outside burner case; make sure there is enough ventilation for the smoke and fumes to escape the living or operating areas.

A.) Starting the **Expedition** Heater

To start the **Expedition** Heater:

DO NOT USE ANY UNAUTHORIZED FUELS OR MIX DIFFERENT FUELS. ONLY CLEAN UNCONTAMINATED DIESEL #1 OR #2 FUEL IS TO BE USED. USING ANY OTHER FUELS COULD CAUSE A FIRE AND/OR EXPLOSION. DO NOT USE GASOLINE, CRANKCASE OIL, OR ANY OIL CONTAINING GASOLINE.

- Check for any leaks in the fuel system. Locate and repair any leaks and/or clean any spills before igniting the heater.
- Check the exhaust flue stack for any blockage or anything that might obstruct the exhaust gases. The flue stack must be vented outdoors. Do not let any exhaust gas flow into any living or operating areas.
- Check the exhaust fuel stack and the attachment point to the heater for any leaks. Correct any problems before igniting the heater.
- Check the airway around the base of the heater to ensure that the heater receives a clear, unobstructed supply of combustion air. Correct any such problems before igniting the heater.
- Open the fuel shut-off valve from the fuel tank.
- Lift up on Toby Valve Actuating Lever to let fuel run into the float bowl of the valve.
- Open the glass lid on top of the heater.
- Suck some fuel into the primer bulb by squeezing the rubber bulb and then placing the steel tube into the fuel. When the rubber bulb is released it will suck diesel fuel into the dispenser. The primer bulb should then be directed toward the **Expedition** burner base by inserting the steel tube through the top lid opening and squeezing the rubber bulb to expel the fuel.
- When the burner is being lit, it is usually desirable to use a match and a small piece of tissue paper for lighting. Place the Tissue paper in the lid opening. Light the paper and use the auger to drop the tissue down into the base of the burner.
- Securely close the glass lid on top of the heater.
- Place the control knob on the Toby control valve to the first raised "I" mark setting (LOW) next to the "O" mark.

- Wait ten to fifteen minutes for the flames to settle down and turn blue before setting the control knob on the Toby control valve to your desired temperature. The "0" is the OFF setting and a half turn counter clockwise is the highest fuel setting on the burner.
- If the flames die out, wait for the heater to cool down to room temperature before repeating the starting procedures.

DO NOT ATTEMPT TO START OR RE-IGNITE THE BURNER WHEN THE BURNER IS HOT.

Do not leave a heater running unattended. ITR accepts no responsibility for any damages caused by leaving the heater running unattended.

B.) Turning off the *Expedition* Heater

To turn off the *Expedition* Heater:

- Turn the control knob on the TOBY Oil Valve to the OFF position marked "0".
- Turn off the Fuel Shut off Valve from the fuel tank to the heater.
- The flame will die out in about five minutes.

ALWAYS KEEP THE OIL VALVE TURNED OFF WHEN THE HEATER IS NOT OPERATING.

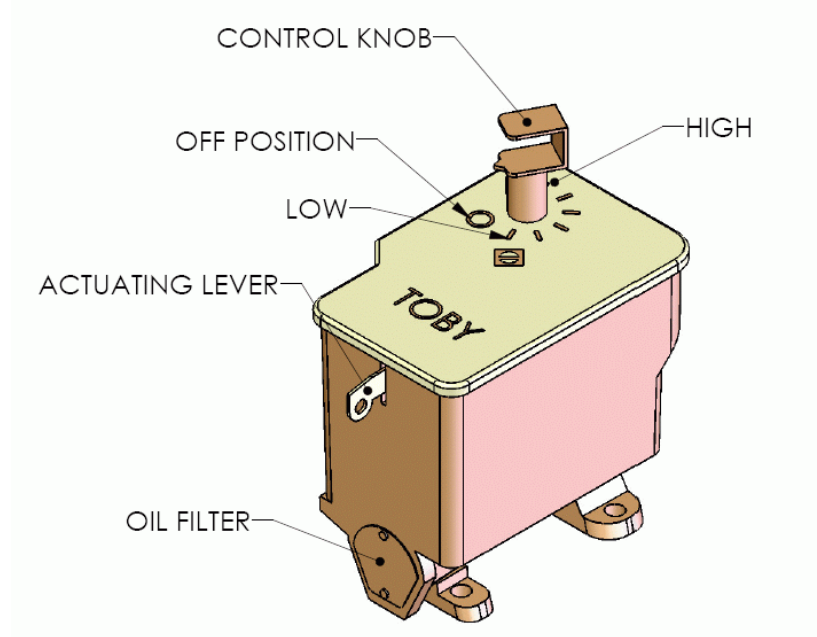
6. Oil Control Valve

A.) TOBY Oil Valve

The TOBY Oil Valve is a continuous flow level control valve designed for controlling fuel flow to the *Expedition* heater.

TOBY Oil Valves are factory preset to work with your heater. Do not tamper with the TOBY Oil Valve. If you have questions or concerns, please contact your authorized *Expedition* Dealer.

The key parts to operating a TOBY Valve for the **Expedition** are the Control knob and the Actuating lever. The control knob controls the fuel flow rate and can be rotated counter clockwise from the off position, which is the "0" marked on the lid to the high fire position, which is the last "I" mark on the lid. The Toby Valve Actuating Lever allows fuel to run into the float bowl of the valve when it is placed in an up position from the originating down position.



The TOBY Oil Valve has two safety features incorporated into the design of the valve.

- High temperature fuel cut off system. If the temperature of the fuel exceeds 100 degrees Celsius or (212 degrees Fahrenheit), fuel will be shut off at the outtake of the valve. Once this occurs, the valve is no longer operable and a new valve is required for the heater to operate.
- Tilt levelling switch. The Toby Oil Valve will shut off at the outtake of the valve when the angle of the valve exceeds the following: lengthwise 5 degrees, width wise 15 degrees.

Toby Valves are ULC Listed and DIN approved. The Toby valve requires no maintenance and has no user serviceable parts.

7. Maintenance

A.) Regular Maintenance

To ensure that your *Expedition* heater operates properly;

- every 750 hours of operation or;
- if the output of the heater appears to be have decreased from the same valve setting or;
- if the exhaust exhibits smoke

Perform the following maintenance:

- In normal operation, carbon and soot will accumulate in the area of the burner base, heater up tube or underneath the high fire ring. These deposits must be periodically removed.
- Working on a cold burner, ensure that the fuel control valve on the heater and the fuel supply to the heater has been turned off. Remove the burner lid and see if there is any soot around or on the perforated burner shell or high fire ring. If so, brush off and vacuum clean.
- Loosen and remove any carbon build up in the center up-tube itself. Remove the bottom heat shield. Locate the clean-out plug at the bottom of the burner shell assembly. Place a small catch pan below the opening of the threaded plug. Use a wrench and remove the threaded plug from the bottom of the assembly. Any quantity of fuel still present in the fuel line will drain into the catch pan. Carefully insert the metal cleaning auger into the up-tube and loosen any hard carbon deposits within the tube by using an up/down twisting motion of the auger. This will loosen any deposits and allow them to fall through the opening of the threaded plug. **Do not use a side to side motion or excessive force or you will distort, bend, or break the welded up-tube.** Continue until the tube is clear of any accumulated deposits. Replace the clean-out plug into the bottom of the burner shell assembly and re-tighten. A pipe sealant or other appropriate sealing compound should be applied to the threads. Check this threaded plug fitting for any leaks when the heater fuel flow is again re-started. Re-tighten if necessary.

Additional regular maintenance items include:

- Check for any leaks in the fuel system, cracked hoses or suspect areas where a leak might occur and correct.
- Check the flue stack for any damage or areas that might allow flue gases to leak into your heating area and correct.
- Check the flue stack for any blockages and/or soot and remove and correct
- Check for fuel strainer blockage and replace if necessary
- The Toby valve requires no maintenance and has no user adjustable parts

B.) Storing the Heater

On storing the heater for an extended period:

- Perform the previous maintenance steps
- Clean the heater with a rag and spray or wipe with a light mist of oil inside the burner area and outside to prevent rusting.
- Drain all fuel lines and any fuel from the heater

ATTENTION: Regular maintenance is required for the *Expedition* heater to perform as designed. Failure to maintain the heater as required will not only void your warranty but can cause the heater to be dangerous to operate.

8. Trouble Shooting

A.) Symptom: Burner does not keep lit, flame shuts off.

Recommendations: On a cold heater

- Check for Fuel Shut off Valve in the ON position.
- Check the Control Actuator lever on the Toby Valve and ensure it is at the on position by lifting it up. (This lever does not stay up however)
- Check the Control Knob on Toby Valve is not set to "0" or OFF position.
- Check for incorrect or poor quality fuel.
- Check for blockages in fuel inlet. (i.e. fuel strainer plugged and/or fuel line to heater obstructed)
- Check for blockages in air inlet or exhaust outlet (flue stack).
- There may be air bubbles in fuel line. Give line a quick shake to dislodge bubbles.
- Check for soot or carbon deposit that may have built up inside the up-tube, under the high fire ring, or on the perforated burner shell.

B.) Symptom: Heater does not provide adequate heat and flame appears weak.

Recommendation: On a cold heater

- Check for incorrect or poor quality fuel.
- Check for adequate fuel supply. Ensure the fuel supply valve is open.
- Check fuel line or fuel strainer for blockage of fuel and correct as necessary.
- Check sections of exhaust stack assembly for leakage or blockage and correct as necessary.
- Check intake opening at bottom of heater for free airflow.
- Heavy winds or other weather conditions can increase the draft of the heater. Ensure you have a draft regulator installed and it is connected properly.
- Check for soot or carbon deposit build up inside up-tube, under high fire ring, or on perforated burner shell.
- Check S-tube for proper seating on up-tube. Wait 30 minutes for heater to cool down to room temperature before checking internal tubes.

C.) Symptom: Heater rumbles and or flame appears high on top.

Recommendations:

- Set the Toby valve to a lower setting.
- Check for incorrect or poor quality fuel.
- Check bottom of heater for free airflow.
- Insufficient exhaust stack height could lower the draft of the heater; ensure you have the recommended draft or consult with your authorized Pioneer dealer for the need of a longer flue stack height.

Note: If Expedition heater is still not functional, contact your authorized Expedition dealer or ITR.

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