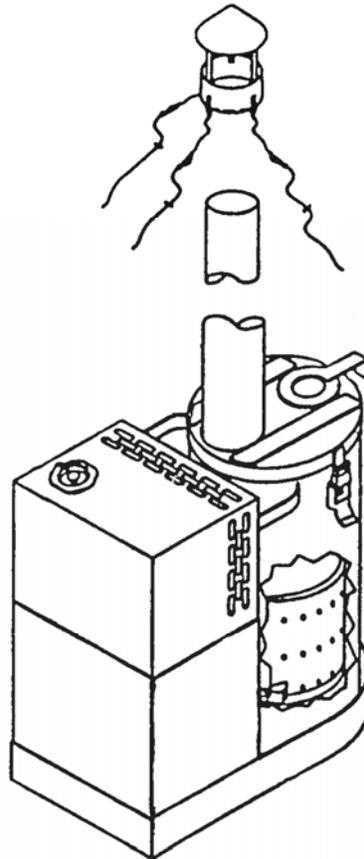


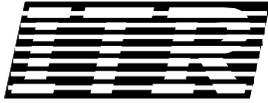
# Space Heater Small (SHS)



*Designed and Manufactured by*

**INTERNATIONAL THERMAL RESEARCH LTD.**  
*Richmond, British Columbia, Canada*

**Patent No. 5527180**



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## SPACE HEATER SMALL (SHS)

### DESIGNED FOR USE WITH DFA, DF1, DF2, JP8, JetA1, AND KEROSENE

**Operation (Using the internal fuel tank)** (All numbered references are to the SHS Theory of Operation diagram.)

General:

Liquid fuel flows from the **fuel tank**(1) to the **regulating float valve**(10). Fuel flows from the valve into the **burner up-tube** (4) inside the **burner shell assembly**(5). The heat output of the burner is controlled by adjusting the height of the **regulating float valve**(10) using the **thumb dial** (9), which decreases or increases the amount of fuel sent to the **burner up-tube**(4).

The **overflow hose** (12) is attached to the barb fitting located on the left side of the **regulating float valve**(10). The other end of the **overflow hose**(12) should discharge to a safe, outside location below the level of the heater. Place a petroleum absorbent mat under the open end of the **overflow hose**(12).

To light the burner, the **air vent**(6) located on the **fuel tank filler cap**(7) should be opened with two or three turns. The **shutoff valve**(3) is set to the ON position. With access through the **lid**(11) opening, use the **primer bulb**(21) to draw one full squeeze of fuel from the **fuel tank**(1) and squirt it evenly into the bottom of the **burner shell assembly**(5). Double the amount if the temperature is 0 degrees F or less. A burning piece of fuel dampened tissue is dropped to the bottom of the **burner shell assembly**(5). Use the **primer bulb**(21) to chase the lit tissue to the very base of the **burner shell assembly**(5). Close the **lid**(11) and in five to ten minutes, enough heat is produced by the burning priming fuel to vaporize the fuel within the **burner up-tube**(4). Fuel vapors are generated and are discharged into the **burner down-tube**(13), where it enters the **burner shell assembly**(5), mixes with air and is combusted. By the time all the priming fuel is consumed, the combustion process has been established and will continue as long as there is fuel in the **fuel tank**(1) and the **shutoff valve**(3) is on the ON position.

Air is drawn through the bottom of the heater into the **burner shell assembly**(5). The **lid assembly**(14) is secured to the heater **body assembly**(15) by **latches**(16). This prevents air leakage while the heater is in use, which would impair operating efficiency.

The flame is monitored through the **sight glass**(17) on the **lid**(11). Combustion gases pass from the **burner shell assembly**(5) through the **body assembly**(15), through the **stack adapter assembly**(18), up through the **telescopic stack assembly**(19), and outside the shelter through the **stack rain cap assembly** (20).

**Telescopic Stack Assembly**(19). Consists of 6 pipe sections of decreasing diameter each stamped 1 to 6, no. 1 being the largest. When assembled, the sections form a cone shaped stack with the largest diameter section at the base and the smallest diameter at the top. Each section is beaded on its smaller end in order to fit into the next higher section. The **Assembly**(19) seats in the **Stack Adaptor Assembly**(18) allowing combustion gases to discharge outside the tent during operation. When disassembled, the sections fit inside each other for storage. Even numbers on one side, odd numbers on the other side.

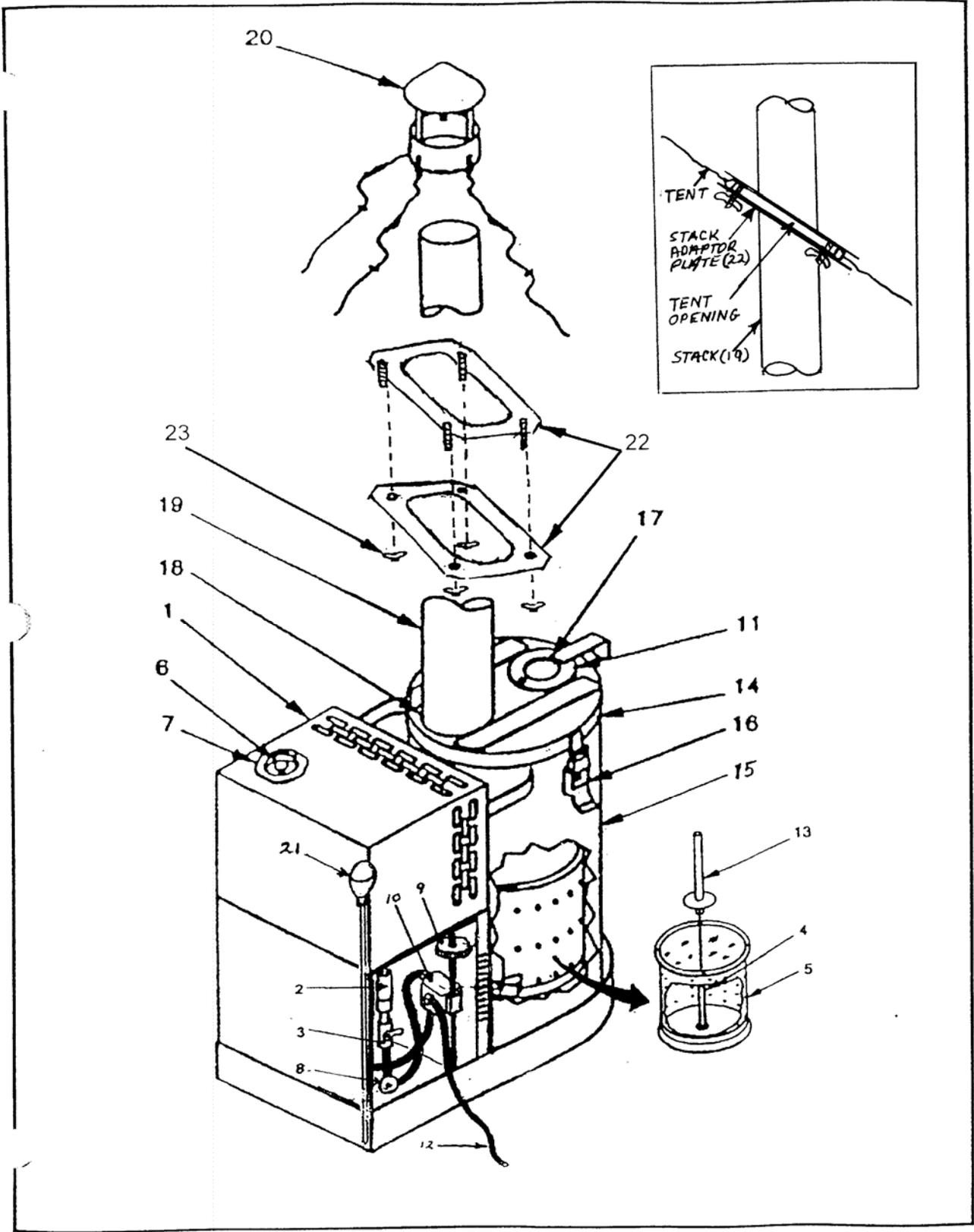
**NOTE:** If the stack opening in the tent is too large to keep the weather out, the SHS heater comes with a **stack adapter plate**(22). To use the adapter plate, place the top plate (with the 4 studs) on the outside of the tent surface over the tent opening with the studs protruding through the opening. Line up the second plate (with the 4 holes) on the inside of the tent surface to match the protruding studs and loosely secure with the provided **wingnuts**(23). Ensure the tent material is evenly distributed between the two plates and then tighten the **wingnuts**(23).

To shut down the burner, turn the **shut off valve**(3) to the OFF position. Wait for the heater to completely cool before disassembling or performing maintenance. Make sure the **fuel tank**(1) is completely drained for storage or transport.

**EXTERNAL FUEL TANK ADAPTER (OPTIONAL):** Refer to next page for hookup instructions

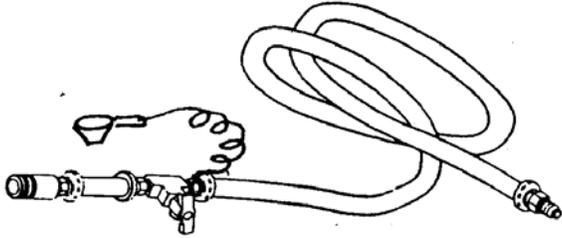
**MAINTENANCE:** Check the **fuel filter**(8) periodically and clean or replace if necessary.

**BREAK IN PERIOD:** The heater should be set up and operated for a break-in period of 1 to 2 hours in a well ventilated areas so that any fumes generated by newly painted parts can flash off.

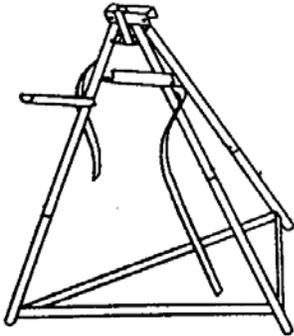


## OPTIONAL ACCESSORIES FOR EXTERNAL FUEL HOOKUP

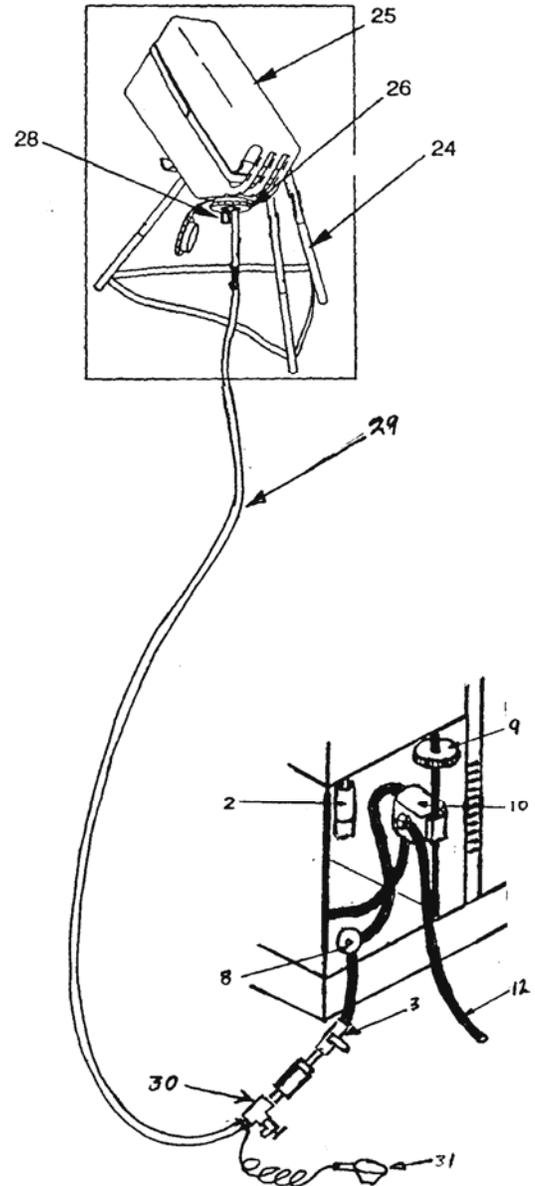
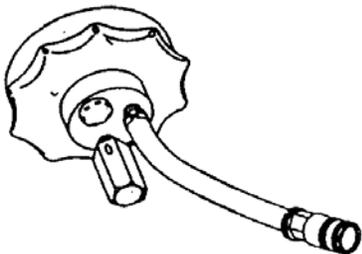
**Fuel Supply Hose(29).** Connects between the fuel can gravity Feed adaptor and the fuel flow control valve. Supplies fuel to the SHS. A "T" connector with **pettock(30)**, permits fuel to be drained off into the **measuring cup(31)** for priming. Half a cup to 0 degrees F and slightly more for colder



**Fuel Can Stand(24).** The **Fuel Can Stand(24)** supports a standard plastic **fuel can(25)** in an inverted position in order to gravity feed fuel to the heater. The stand disassembles



**Adapter, Gravity Feed(26).** This adapter installs in a standard issue plastic fuel can and permits fuel to flow by gravity from the **fuel can(25)** to the SHS through the **fuel supply hose(29)**. The **automatic vent(28)** permits air to vent into the can for proper fuel flow to the heater.



To connect heater to an external fuel source. Unplug **fuel valve(3)** from **fuel tank disconnect(2)** and plug it into **fuel supply hose(29)**.

**HEATER OPERATOR INSTRUCTION AND WARNING LABELS**

**OPERATING INSTRUCTIONS - SHS HEATER**

1. See heater manual for detailed instructions.
2. Never attempt to light the burner while it is HOT. Wait until the heater has completely cooled.
3. Use only authorized fuels in the heater: Diesel, DFA, D1, D2, and JP8, Jet A1 and Kerosene.
4. Always open the air vent on the top of the fuel tank even if an auxiliary fuel source is used.
5. Adjust the fuel regulating valve to the #5 setting.
6. Turn the fuel shutoff valve to "ON" and wait for 2 minutes.
7. Open the lid of the heater. Using the primer bulb, draw one full squeeze of fuel from your source and squirt it evenly onto the bottom of the burner.(Double the amount if the temperature is 0° or less.)
8. Light a small piece of fuel soaked tissue paper and drop it through the lid opening to the bottom of the burner. Use the primer bulb to ensure the paper falls to the bottom of the burner.
9. Close the lid and wait for 5 -10 minutes. Then adjust the height of the regulating float valve to obtain the desired heat output.
10. If the burner is smoking, lower the setting for the fuel regulating valve
11. To shut down the burner, turn the shutoff valve to "OFF". Wait for the heater to completely cool before disassembling or performing maintenance.

*Designed & Manufactured by  
International Thermal Research Ltd.*

*Serial No.*

**SHUTOFF ON**  
**VALVE**



**OFF**

**REGULATING**  
**FLOAT VALVE**

**HIGH** ⇔ **LO**

**SHS HEATER**

**WARNING!!!**

**EXPLOSION HAZARD**

**ALWAYS KEEP THE AIR  
VENT OPEN ON THE  
FILLER CAP DURING ALL  
HEATING OPERATIONS**

**WARNING !!!**

**EXPLOSION HAZARD**

**WHEN USING AN  
AUXILIARY FUEL SOURCE,  
ALWAYS DRAIN THE FUEL  
FROM THE INTERNAL  
FUEL TANK AND OPEN  
THE AIR VENT**

**WARNING!!!**

**WARNING!!!**

**EXPLOSION HAZARD**

**FUEL TANK MUST BE  
DRAINED PRIOR TO  
STORAGE OR  
TRANSPORT**

**WARNING!!!**

**EXPLOSION HAZARD**

**TURN HEATER OFF AND  
ALLOW TO COOL PRIOR  
TO RE-FUELING**

## **SHS HEATER**



### **WARNING!**

#### **Fire or Explosion hazard**

Do not use unauthorized fuels! Use of unauthorized fuel may result in fire/explosion!

Tent exhaust opening closure flap must be rolled and tied securely. Tent may catch fire if hot stack assembly contacts the flap.

Poorly fitted stack sections may allow hot stack to fall on tent and start a fire, or deadly carbon monoxide to leak into tent. Ensure sections seat together fully.

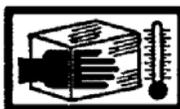
Heat or sparks from stack assembly could ignite external fuel supply. Set up external fuel supply on a clear site seven feet (approx. 2.5 meters) from tent and away from flame sources.

For safe operation, be sure to allow at least two (61cm) feet of space between the heater and the tent wall. Never relight an extinguished flame while the heater is hot. Be sure to allow the heater to cool completely before attempting to relight. Do not attempt to replenish the fuel supply while the heater is in operation. Be certain that there is no open flame in the vicinity of the liquid fuel.



#### **Explosion Potential - Do Not Use Unauthorized Fuels**

Gasoline, JP-4, Used Motor Oil, Solvents, or other unauthorized fuels should NOT be used with the SHS under any circumstances. Only approved liquid and solid fuels may be used. Using unauthorized fuels in the SHS will create a fire danger and potential for explosion.



### **WARNING!**

#### **Freeze Hazard**

Severe injury may occur to personnel handling metal parts without protective gloves when temperatures are below freezing. Skin may freeze upon contact and tear from the flesh.

Do not allow fuel to come in contact with bare skin. Even though fuel does not freeze, it is extremely cold and will burn exposed skin on contact. Wear protective gloves whenever handling or working with liquid fuel.



**WARNING!**

**Carbon Monoxide**

During operation, the SHS produces harmful carbon monoxide (CO) and other gases. Carbon monoxide is a colorless, odorless, and tasteless gas. Mild cases of carbon monoxide poisoning can cause symptoms such as nausea, dizziness, or headaches. Severe cases of carbon monoxide poisoning can result in brain damage, heart damage or death. Remember that although CO has no telltale odor, it may mix with other odors which mask its presence; therefore, CO can be present within a mix of seemingly harmless odors.

To prevent CO poisoning, ensure that the SHS exhaust stack sections fit together snugly and that the exhaust gases are properly vented through the roof of the shelter.

The best way to prevent CO poisoning is to keep the SHS in good working order. Ensure that all possible sources of CO leakage have been repaired and that the operating space is well ventilated.



**WARNING!**

**Hot Surfaces**

Do not attempt to handle or perform services on a SHS that has recently been in operation. Let the space heater cool down before performing these procedures to avoid the possibility of serious burns.



**WARNING!**

**Cut Hazard**

Some metal components of the SHS may have sharp edges. Be careful when handling and assembling the SHS to avoid cuts.