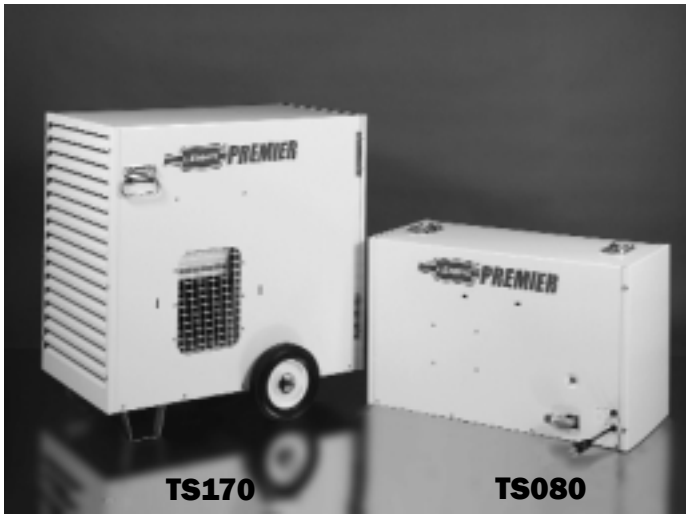
Owner's Manual and Instructions

Circulating Tent Heaters



MODELS	OUTPUT	FUEL
TS080	23.4 KW	Both Models are available in either L.P. Gas Vapor Withdrawal or Natural Gas Configurations.
TS170	49.8 KW	

MADE IN THE U.S.A.

Congratulations!

You have purchased the finest tent heater available.

Your new L.B. White heater incorporates the benefits from the most experienced manufacturer of heating products using state-of-the-art technology.

We, at L.B. White, ***thank you*** for your confidence in our products and welcome any suggestions or comments you may have...call us, at 608-783-5691.

ATTENTION ALL USERS

This heater has been designed and developed specifically for use as a direct-fired circulating heater for tent heating applications. The heater has been evaluated by Advantica Certification Services and found to conform to essential health and safety requirements as required by the Gas Appliance Directive, Low Voltage Directive, and Electromagnetic directive. If you are considering using this product for any application other than its intended use, then please contact your local agent, or contact L. B. White Co., Inc. in the U.S.A. at 608-783-5691.

W6636 L.B. White Rd., Onalaska, WI USA ■ (608) 783-5691 ■ Fax: (608) 783-6115

⚠ GENERAL HAZARD WARNING

- Failure to comply with the precautions and instructions provided with this heater, can result in:
  - Death
  - Serious bodily injury or burns
  - Property damage or loss from fire or explosion
  - Asphyxiation due to lack of adequate air supply or carbon monoxide poisoning
  - Electrical shock
- Read this Owner's Manual before installing or using this product.
- Only properly-trained service people should repair or install this heater.
- Save this Owner's Manual for future use and reference.
- Owner's Manuals and replacement labels are available at no charge. For assistance, contact L.B. White at 608-783-5691.

⚠ WARNING

- Proper gas supply pressure must be provided to the inlet of the heater.
- Refer to the heater's dataplate for proper gas supply pressure.
- Gas pressure in excess of the maximum inlet pressure specified at the heater inlet can cause fires or explosions.
- Fires or explosions can lead to serious injury, death, or building damage.
- Gas pressure below the minimum inlet pressure specified at the heater inlet may cause improper combustion.
- Improper combustion can lead to asphyxiation or carbon monoxide poisoning and therefore serious injury or death to humans.

⚠ WARNING
Fire and Explosion Hazard

- Not for home or recreational vehicle use.
- Installation of this heater in a home or recreational vehicle may result in a fire or explosion.
- Fire or explosions can cause property damage or loss of fire.

FOR YOUR SAFETY

Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other heater.

FOR YOUR SAFETY

If you smell gas:

1. Open windows.
2. Don't touch electrical switches.
3. Extinguish any open flame.
4. Immediately call your gas supplier.

⚠ WARNING
Fire and Explosion Hazard

- Keep solid combustibles a safe distance away from the heater.
- Solid combustibles include wood or paper products.
- Do not use the heater in spaces which contain or may contain volatile or airborne combustibles.
- Volatile or airborne combustibles include gasoline, solvents, paint thinner, dust particles or unknown chemicals.
- Failure to follow these instructions may result in a fire or explosion.
- Fire or explosions can lead to property damage, personal injury or loss of life.

Table of Contents

General Information

This Owner's Manual includes information for all options and accessories commonly used on this heater.

When calling for technical service assistance, or for other specific information, always have model number, configuration number and serial number available. This information is contained on the dataplate. The dataplate is located on the exterior of the burner end door.

This manual will instruct you in the operation and care of your unit. Have your qualified installer review this manual with you so that you fully understand the heater and how it functions.

The gas supply line installation, installation of the heater, and repair and servicing of the heater requires continuing expert training and knowledge of gas heaters and should not be attempted by anyone who is not so qualified. See page 6 for definition of the necessary qualifications.

Contact your local L.B. White distributor or the L.B. White Co., Inc. for assistance, or if you have any questions about the use of the equipment or its application.

The L.B. White Co., Inc. has a policy of continuous product improvement. It reserves the right to change specifications and design without notice.

Heater Specifications

Specifications		Model TS080		Model TS170	
Fuel		**L.P. Gas**	**Natural Gas**	**L.P. Gas**	**Natural Gas**
Maximum Input		23.5 KW		49.8 KW	
Ventilation Air Required to Support Combustion		950 Cubic Meters per Hour		2,050 Cubic Meters per Hour	
Inlet Gas Supply Pressure Acceptable at the Inlet of the Heater for Purpose of Input Adjustment	**MAX.**	50 mbar	25 mbar	50 mbar	25 mbar
	MIN.	30 mbar	20 mbar	30 mbar	20 mbar
Burner Manifold Pressure Relative to Gas Category		25 mbar I_{3P} 20/25 mbar $I_{3B/P}$	10 mbar I_{2H} 10 mbar I_{2E} 14 mbar I_{2L} 10/14 mbar I_{2Er}	25 mbar I_{3P} 20/25 mbar $I_{3B/P}$	9 mbar I_{2H} 9 mbar I_{2E} 13.5 mbar I_{2L} 9/13 mbar I_{2Er}
Fuel Consumption Per Hour	**MAX.**	1.68 Kilograms	2.29 Cubic Meters	3.57 Kilograms	4.86 Cubic Meters
Motor Characteristics		Ball Bearing			
		149 Watts 1300 RPM		248 Watts 1100 RPM	
Electrical Rating		IP14B			
Electrical Supply (Volts/Hz/Phase)		220-240/50/1			
Amp Draw	**STARTING**	5.0		8.0	
	CONTINUOUS OPERATION	1.5		2.5	
Minimum Safe Distances From Nearest Combustible Materials	**TOP**	.3 m			
	SIDES	.3 m			
	BACK	.3 m			
	BLOWER OUTLET	Combustible Materials LP Gas Cylinder		1.83 m 6.10 m	
	GAS SUPPLY	L.P. Gas Supply — 1.83 m Natural Gas Supply — N/A			
Minimum Ambient Temperature in Which Heater May be Operated		-28° C.			
Dimensions L x W x H		75 cm x 34 cm x 51 cm		78 cm x 46 cm x 72 cm	
Air Delivery Temperature at a 1.5 Meter Arc from Blower Outlet of Heater		35° C.		40° C.	

FUEL INFORMATION FOR COUNTRY OF DESTINATION

	Gas Type	Appliance Category	Supply Pressure	Gas Rate TS080	Gas Rate TS170
Great Britain	L.P. Gas	I_{3P}	37 mbar	1.68 kg/hr.	3.55 kg/hr.
	Nat. Gas	I_{2H}	20 mbar	2.34 m^3/hr.	4.74 m^3/hr.
Germany	L.P. Gas	I_{3P}	50 mbar	1.68 kg/hr	3.55 kg/hr.
	Nat. Gas	I_{2E}	20 mbar	2.34 m^3/hr.	4.74 m^3/hr.
Denmark	L.P. Gas	$I_{3B/P}$	30 mbar	(propane) 1.68 kg/hr. (butane) 1.71 kg/hr.	3.55 kg./hr. 3.62 kg/hr.
	Nat. Gas	I_{2H}	20 mbar	2.34 m^3/hr.	4.74 m^3/hr.
France	L.P. Gas	I_{3P}	37/50 mbar	1.68 kg/hr.	3.55 kg/hr.
	Nat. Gas	I_{2E}	20/25 mbar	(G-20) 2.34 m^3/hr. (G-25) 2.6 m^3/hr.	4.74 m^3/hr. 5.51 m^3/hr.
Holland	L.P. Gas	I_{3P}	30/50 mbar	1.68 kg/hr.	3.55 kg/hr.
	Nat. Gas	I_{2L}	25 mbar	2.6 m^3/hr.	5.51 m^3/hr.

Safety Precautions

⚠ WARNING

Asphyxiation Hazard

- This heater is intended for heating of tents with temporary human occupancy. Do not use this heater for heating human living quarters.
- Do not use in unventilated areas.
- The flow of combustion and ventilation air must not be obstructed.
- Proper ventilation air must be provided to support the combustion air requirements of the heater being used.
- Refer to the specification section of the heater's Owner's Manual, heater dataplate, or contact the L.B. White Company to determine combustion air ventilation requirements of the heater.
- Lack of proper ventilation air will lead to improper combustion.
- Improper combustion can lead to carbon monoxide poisoning in humans leading to serious injury or death. Symptoms of carbon monoxide poisoning can include headaches, dizziness and difficulty in breathing.

FUEL GAS ODOR

LP gas and natural gas have man-made odorants added specifically for detection of fuel gas leaks.
If a gas leak occurs, you should be able to smell the fuel gas.
THAT'S YOUR SIGNAL TO GO INTO IMMEDIATE ACTION!

- Do not take any action that could ignite the fuel gas. Do not operate any electrical switches. Do not pull any power supply or extension cords. Do not light matches or any other source of flame. Do not use your telephone.
- Get everyone out of the building and away from the area immediately.
- Close all propane (LP) gas tank or cylinder fuel supply valves, or the main fuel supply valve located at the meter if you use natural gas.
- Propane (LP) gas is heavier than air and may settle in low areas. When you have reason to suspect a propane leak, keep out of all low areas.
- Natural gas is lighter than air and can collect around rafters or ceilings.
- Use your neighbor's phone and call your fuel gas supplier and your fire department. Do not re-enter the building or area.
- Stay out of the building and away from the area until declared safe by the firefighters and your fuel gas supplier.
- **FINALLY,** let the fuel gas service person and the firefighters check for escaped gas. Have them air out the building and area before you return. Properly trained service people must repair the leak, check for further leakages, and then relight the appliance for you.

ODOR FADING -- NO ODOR DETECTED

- **Some people cannot smell well. Some people cannot smell the odor of the man-made chemical added to propane (LP) or natural gas. You must determine if you can smell the odorant in these fuel gases.**
- Learn to recognize the odor of propane (LP) gas and natural gas. Local propane (LP) gas dealers and your local natural gas supplier (utility) will be more than happy to give you a "scratch and sniff" pamphlet. Use it to become familiar with the fuel gas odor.
- Smoking can decrease your ability to smell. Being around an odor for a period of time can affect your sensitivity to that particular odor.
- **The odorant in propane (LP) gas and natural gas is colorless and the intensity of its odor can fade under some circumstances.**
- If there is an underground leak, the movement of gas through the soil can filter the odorant.
- Propane (LP) gas odor may differ in intensity at different levels. Since propane (LP) gas is heavier than air, there may be more odor at lower levels.
- **Always be sensitive to the slightest gas odor.** If you continue to detect any gas odor, no matter how small, treat it as a serious leak. Immediately go into action as discussed previously.

ATTENTION -- CRITICAL POINTS TO REMEMBER!

- Propane (LP) gas and natural gas have a distinctive odor. Learn to recognize these odors. (Reference "Fuel Gas Odor" and "Odor Fading" sections above.
- If you have not been properly trained in repair and service of propane (LP) gas and natural gas fueled heaters, then do not attempt to light heater, perform service or repairs, or make any adjustments to the heater on propane (LP) gas or natural gas fuel system.
- Even if you are not properly trained in the service and repair of the heater, ALWAYS be consciously aware of the odors of propane (LP) gas and natural gas.
- A periodic "sniff test" around the heater or at the heater's joints; i.e. hose, connections, etc., is a good safety practice under any conditions. If you smell even a small amount of gas, CONTACT YOUR FUEL GAS SUPPLIER IMMEDIATELY. DO NOT WAIT!

1. Do not attempt to install, repair, or service this heater or the gas supply line unless you have continuing expert training and knowledge of gas heaters.

   Qualifications for service and installation of this equipment are as follows:

   a. To be a qualified gas heater service person, you must have sufficient training and experience to handle all aspects of gas-fired heater installation, service and repair. This includes the task of installation, troubleshooting, replacement of defective parts and testing of the heater. You must be able to place the heater into a continuing safe and normal operating condition. You must completely familiarize yourself with each model heater by reading and complying with the safety instructions, labels, Owner's Manual, etc., that is provided with each heater.

   b. To be a qualified gas installation person, you must have sufficient training and experience to handle all aspects of installing, repairing and altering gas lines, including selecting and installing the proper equipment, and selecting proper pipe and tank size to be used. This must be done in accordance with all local, regional and national codes as well as the manufacturer's requirements.

2. All installations and applications of L.B. White heaters must meet all relevant local, regional and national codes. Included are L.P. gas, natural gas, electrical, and safety codes. Your local fuel gas supplier, a local licensed electrician, the local fire department or similar government agencies, or your insurance agent can help you determine code requirements.

3. Do not move, handle, or service heater while in operation or connected to a power or fuel supply.

4. Do not wash the interior or exterior of the heater. Use only compressed air, a soft brush or dry cloth to clean the interior or exterior of the heater and it's components.

5. For safety, this heater is equipped with manual reset high-limit switches and an air flow switch. Never operate this heater with any safety device that has been bypassed. Do not operate this heater unless all of these features are fully functioning.

6. Do not operate the heater with its door open or panel removed.

7. The heater must be located at least 1.83 m from any LP-Gas container.

8. Do not block air intakes or discharge outlets of the heater. Doing so may cause improper combustion or damage to heater components leading to property damage.

9. The hose assembly shall be visually inspected prior to each use of the heater. If it is evident there is excessive abrasion or wear, or if the hose is cut, it must be replaced prior to the heater being put into operation. The hose assembly shall be protected from traffic, building materials, and contact with hot surfaces during use. The hose assembly shall be that specified by the manufacturer. See parts list.

10. Check for gas leaks and proper function upon heater installation or when relocating.

11. This heater should be inspected for proper operation by a qualified service person upon installation and at least annually.

12. Always turn off the gas supply to the heater if the heater is not going to be used.

13. This heater is wired for a three-wire electrical system. There is a hot lead, neutral lead, and a ground lead. The heater may or may not incorporate a plug in the power cord on the heater and the plug may or may not incorporate a pin for the ground wire. In any case, the heater must be properly connected into a grounded electrical supply using the ground lead in the power cord. Failure to use a properly grounded electrical supply can result in electrical shock, personal injury, or death.

14. The ignition control module will make only one trial for ignition. If ignition is not achieved after the one trial, the control system will "lock out" the gas control valve. If gas is smelled after system lock out has occurred, immediately close all fuel supply valves. Do not relight until you are sure that all gas that may have accumulated has cleared away. In any event, do not relight for at least 5 minutes.

15. Installations not using the gas hose supplied with this appliance must connect dimensionally using BS1387 Medium Duty Galvanized Steel Tube. (Aluminum piping or tubing shall not be used.) Copper tubing when used for conveying natural gas, shall be internally tinned or equivalently treated to resist sulphur.

16. The minimum gas cylinder size shall be a 47 KG cylinder.

17. The hot air discharge of the heater and its ductwork shall not be directed toward any L.P. gas cylinder within 6.10 m of the air discharge.

18. During storage, the connection between the L.P. gas supply cylinder and the heater must be disconnected. The cylinder(s) must be moved from the heater and stored in accordance with local codes.

Installation Instructions

GENERAL

WARNING
Fire and Explosion Hazard
Can cause proper damage, severe injury or death.

- Disconnect power supply before wiring to prevent electrical shock or equipment damage.
- To avoid dangerous accumulation of fuel gas, turn off gas supply at the appliance service valve before starting installation, and perform gas leak test after completion of installation.

WARNING
Fire and Explosion Hazard

- Do not use open flame (matches, torches, candles, etc.) in checking for gas leaks.
- Use only approved leak detectors.
- Failure to follow this warning can lead to fires or explosions.
- Fires or explosions can lead to property damage, personal injury or loss of life.

1. Read all safety precautions and follow L. B. White recommendations when installing this heater. If during the installation or relocating of heater, you suspect that a part is damaged or defective, call a qualified service agency for repair or replacement.

2. Insure that all accessories that ship within the heater have been removed from inside of heater and installed. This pertains to gas hose, regulators, etc.

3. Make sure the heater is properly positioned before use. Observe and obey all minimum safe distances of the heater to the nearest combustible materials. Minimum safe distances are given on the heater dataplate and on page 4 of this manual.

4. The heater is designed for either indoor or outdoor use. For outdoor application, the heater is approved for use with a .3 meter diameter by 4 meter long flexible duct and air diffuser as supplied by the L.B. White Co. The heater shall not be used with any other ducting or ductwork.

5. Heaters used in the vicinity of combustible tarpaulins, canvas, plastic wind barriers, or similar coverings and materials shall be located at least 3 m from the coverings. The coverings shall be securely fastened to prevent ignition or upsetting of the heater due to wind action on the covering or other materials.

6. The heater shall be located so that rain, ice, or snow drainage from the structure does not affect heater operation. If the heater is installed outside, it must be installed above any pooled or standing water. If the heater is located on the ground, a surrounding trench is recommended to drain any rain, ice or snow away from the heater.

7. The heater must be installed on a flat, horizontal surface.

8. Locate the heater so as to protect it from tipover or accidental movement.

9. The heater must be installed so as not to interfere with or obstruct normal exits, emergency exits, doors and walkways.

10. Railing, fencing or suitable substitute materials should be used as needed to isolate the heater from people using and visiting the temporary structure.

11. Do not use the heater equipment area for storage of any other materials.

12. The ground and surrounding terrain must be cleared of any combustible vegetation and other combustible materials.

13. Protect any electrical wiring and gas hoses with a shield device of suitable nature to protect both from equipment and people traffic.

14. This heater is supplied with a gas pressure regulator. Make sure that gas regulator is appropriate for the fuel source; LP-Gas or natural gas. The regulator must be properly connected to the LP-Gas cylinder or natural gas supply to assure that gas pressure at the inlet to the gas valve is regulated within the range specified on the dataplate. The heater's gas regulator (with pressure relief valve) should be installed outside of the tent. Any regulators within the tent must be properly vented to the outside. Local, regional and national codes always apply to regulator installation. Contact your gas supplier or local L. B. White agent if there are any questions.

15. Check all connections for gas leaks using approved gas leak detectors. Gas leak testing is performed as follows: Check all pipe connections, hose connections, fittings and adapters upstream of the gas control with approved gas leak detectors. In the event a gas leak is detected, check the components involved for cleanliness and proper application of pipe compound before further tightening. Further tighten the gas connections as necessary to stop the leak. After all connections are checked and any leaks are stopped, turn on the main burner. Stand clear while the main burner ignites to prevent injury caused from hidden leaks that could cause flashback. With the

main burner in operation, check all connections, hose connections, fittings and joints as well as the gas control valve inlet and outlet connections with approved gas leak detectors. If a leak is detected, check the components involved for cleanliness in the threaded areas and proper application of pipe compound before further tightening. Further tighten the gas connection as necessary to stop the leak. If necessary, replace the parts or components involved if the leak cannot be stopped. Ensure all gas leaks have been identified and repaired before proceeding.

16. A qualified service agency must check for proper operating gas pressure upon installation of the heater.

17. Light according to instructions on heater or within owner's manual.

18. This heater can be configured for use with either L.P. gas vapor withdrawal or natural gas. Consult the dataplate, located on the exterior of the burner end door for the gas type of the specific heater. Do not use the heater in an L.P. gas liquid withdrawal system or application. If you are in doubt, contact your local agent or the L.B. White Co., Inc.

19. Take time to understand how to operate and maintain the heater by using this Owner's Manual. Make sure you know how to shut off the gas supply to the heater. Contact your fuel gas supplier if you have any questions.

20. Any defects found in performing any of the service or maintenance procedures must be eliminated and defective parts replaced immediately. The heater must be retested by a properly qualified service person before placing the heater back into use.

HEATER SIZING GUIDELINES

1. Multiply tent length x width x height = Cubic Meters **(A)**.
2. Multiply **(A)** x .133 x 35 = **(B)**.
3. Subtract outdoor temperature from desired indoor temperature = **(C)**.
4. **(B)** x **(C)** ÷ 2 = Heat Requirements in Watts **(D)**.
5. **(D)** ÷ 1,000 = Heat Requirements in KW.

EXAMPLE:

1. Tent Length (15 meters) x width (15 meters) x height (4 meters) = 900 cubic meters **(A)**.
2. 900 **(A)** x .133 x 35 = 4190 **(B)**.
3. 20° C. (Desired Temperature) - 0° C. (Outdoor Temperature) = 20° C. **(C)**.
4. 4190 **(B)** x 20 **(C)** ÷ 2 = 41,900 Watts **(D)**.
5. **(D)** 41,900 ÷ 1,000 = 41.9 KW.

Use one TS170 or two TS080 heaters.

CYLINDER SELECTION

Once you have determined the total heat requirement, you can now calculate how many 47 KG cylinder(s) are needed at the job. For all heating applications when extended heater use is required, a minimum size of a 47 KG cylinder is the smallest cylinder to be used.

The amount of vaporized L.P. gas available from the cylinders will vary depending upon:

- The amount of liquid propane in the cylinder(s).
- The surrounding air temperature of the cylinder(s).

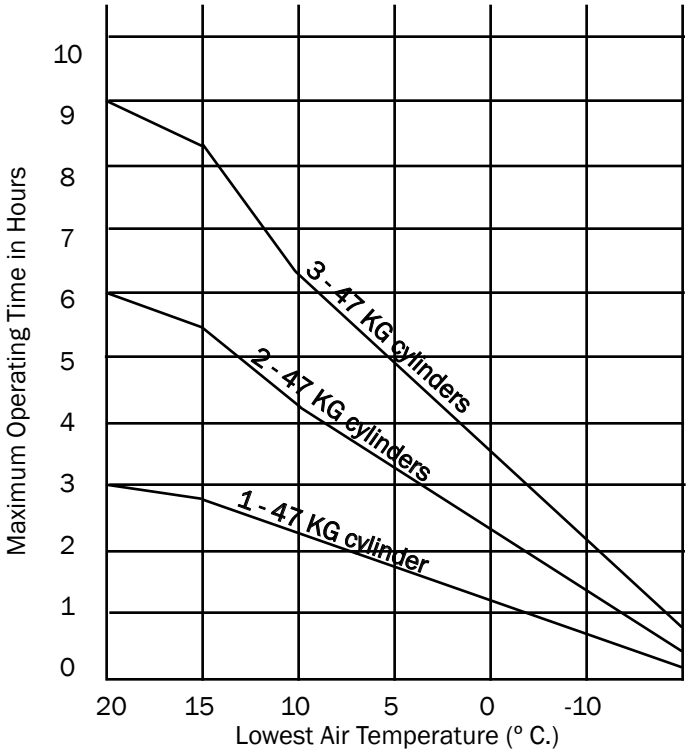
Since less gas is vaporized at lower temperatures, two or more 47 KG cylinders may be needed in colder weather. Your local propane gas dealer will help you select the proper supply system.

The following table shows the minimum number of 47 KG cylinders needed to run the heater.

Number of Cylinders Required at Various Temperatures

Model	20° C.	15° C.	10° C.	5° C.	0° C.	-10° C.
TS080	1	1	1	1	2	2
TS170	2	2	2	2	3	3

The diagram at right shows "a supply time versus temperature" comparison. It is based upon initial use of full, 47 KG cylinders and a heat load of 29.3 KW at continuous draw. Notice that one 47 KG cylinder may be used for about 3 hours maximum operating time when at 16° C. But, as temperature drops, so does the amount of time that the cylinder is capable of supplying the vapor necessary to feed the heater. Looking at 0° C. scale, you can see that a 47 KG cylinder is only capable of supplying the full heat load for one hour.



REMINDER

- The minimum cylinder size shall be 47 KG.
- The minimum number of 47 KG cylinders used shall be:

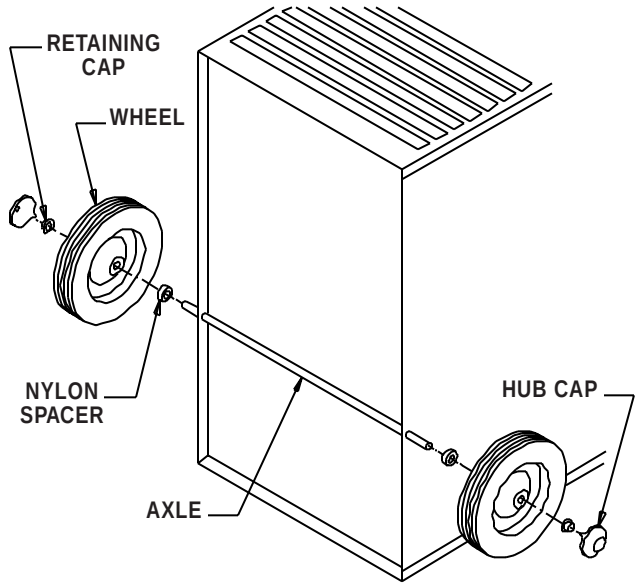
  TS080 - 1
  TS170 - 2

- The maximum number of cylinders used within the area to be heated shall be three 47 KG.
- Have your LP-gas supplier resize your installation from cylinders to a larger capacity tank if requirements are above three 47 KG cylinders capacity.
- The sizing, delivery, set up, and refilling of all L.P. gas supply containers must only be done by a qualified, properly trained, L.P. gas installation person.

WHEEL ASSEMBLY MODEL TS170

1. Tap one retaining cap onto one end of the axle with a hammer.
2. Slide the wheel onto the axle, making sure the slots on the wheel are toward retaining cap.
3. Slide the nylon spacer onto axle.
4. Slide the axle through holes in the base assembly until the nylon spacer butts up against the case.
5. Slide the remaining spacer and wheel onto the axle. Make sure slots on wheel face are directed towards end of shaft.
6. Tap the remaining retaining cap onto the end of the shaft until it is securely attached.
7. Snap hub caps into wheel slots.

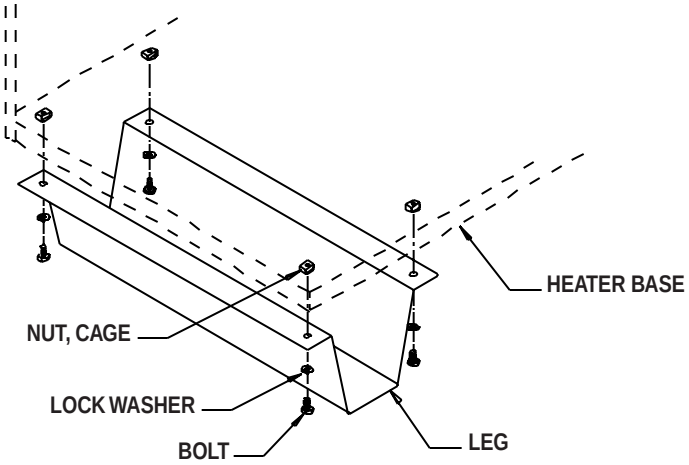
FIG. 1.



LEG ASSEMBLY MODEL TS170

1. Placing cardboard or other material under the hinged burner access panel to prevent scratching, tip the heater back so the louvered air inlet panel is facing up.
2. Mount the support leg to the underside of the base using four 12.7 mm bolts and lock washers provided.

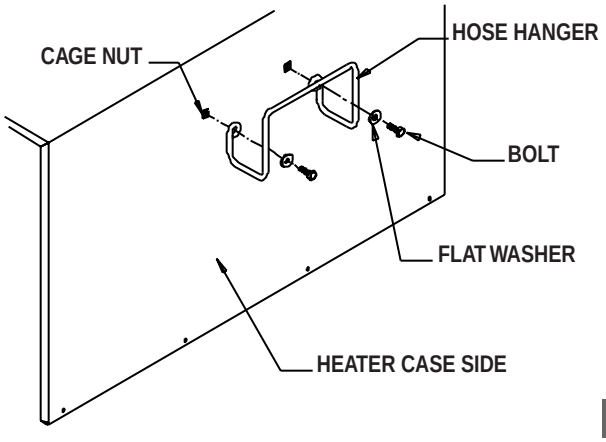
FIG. 2



HOSE HANGER

Mount the hose hanger to the back of the heater as shown. Use the 19 mm bolts and 6 mm washers provided. Tighten both bolts securely.

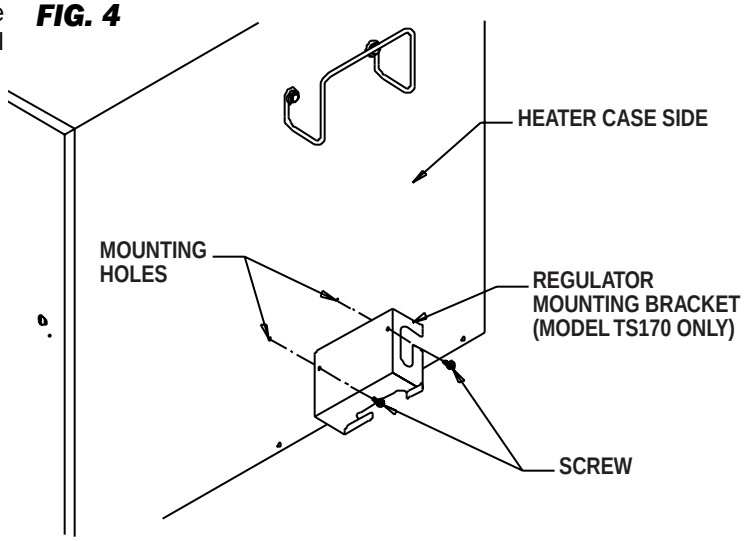
FIG. 3



REGULATOR STORAGE BRACKET ASSEMBLY MODEL TS170

Mount the storage bracket to the back of the case at the two 3 mm holes using two 6.3 mm hex head sheet metal screws provided. Tighten both screws securely.

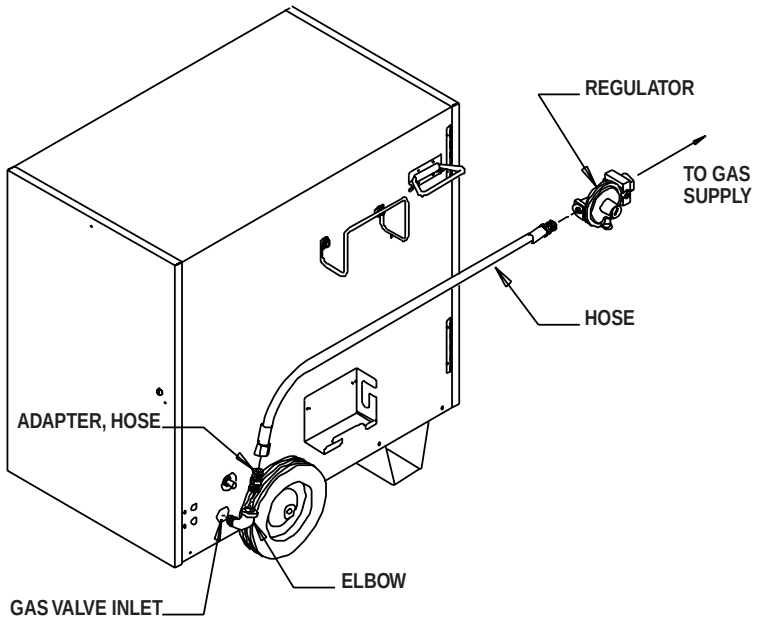
FIG. 4



HOSE AND REGULATOR ASSEMBLY (Optional Accessory)

1. Use approved pipe thread compound suitable for use with L.P. gas or natural gas on the threaded connections.
2. Assemble the components together as shown. Tighten securely.
3. The hose and regulator should be stored on the heater when the heater is not being used.

FIG. 5



1. Mount the duct to the heater by inserting the tabs on the duct adapter into the vertical slots on each side of the blower outlet.

2. Push down on the duct adapter to secure the adapter in place to the heater.

3. Extend the duct out to its full 3.6 meter length.

4. The tent material may then be draped around the duct outlet, or an optional air diffuser (part number 21177) may be attached for air distribution purposes.

FIG. 6

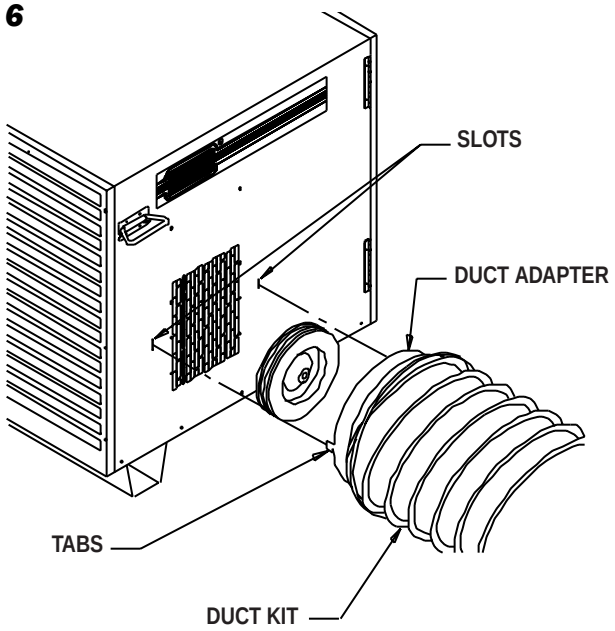
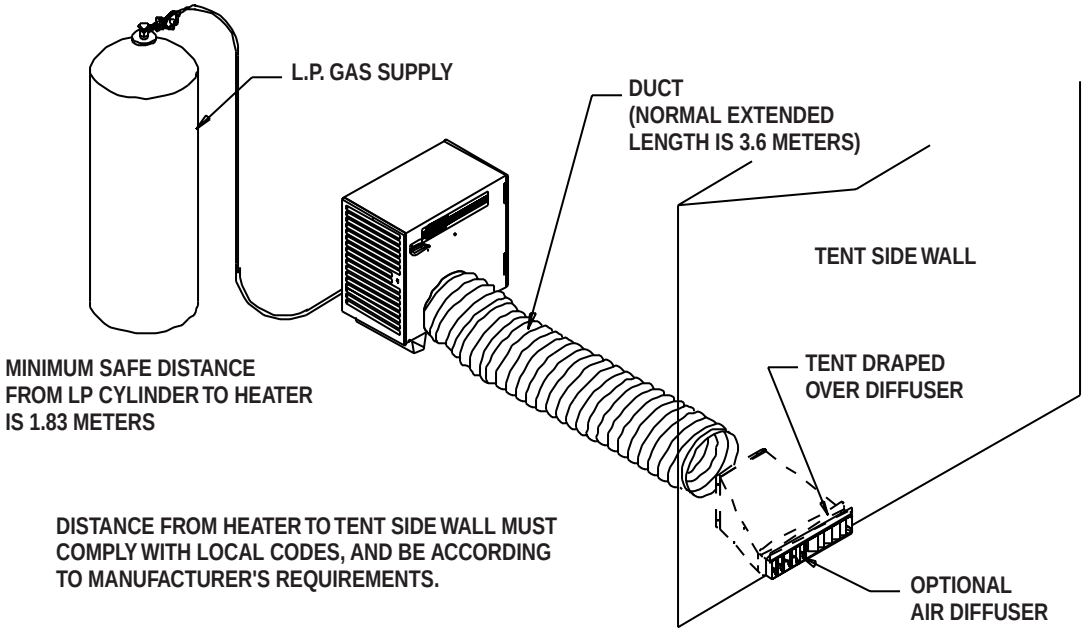


FIG. 7



Start-Up Instructions

Follow steps 1 - 8 on initial start-up after heater installation by a qualified gas heater service person. For normal start-up, simply turn thermostat above room temperature. The heater will start.

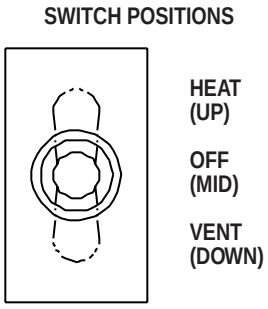
1. Open all manual fuel supply valves and check for gas leaks using approved leak detectors.

2. Connect the electrical cord to an approved electrical outlet.

3. Set the thermostat to desired room temperature.

4. The heater has a selector switch located on the back of the heater. The selector switch allows you to either heat or ventilate (no heat). The selector switch positions are as follows:

FIG. 8



When the selector switch is set to “Heat”, the heater will cycle on and off based upon setpoint of the thermostat. To use the heater for ventilating, position the selector switch to “Vent”. With the switch in this position, the thermostat will not cycle the heater. The burner will not ignite, but the fan motor will operate continually.

5. This heater includes a direct spark ignition (DSI) control module for purposes of controlling the timing of the ignition process of the heater as well as monitoring of the safety functions. The DSI module is located at the burner end of the heater. On the DSI is a red light emitting diode (LED). This LED indicates the status of the heater. A consistent flashing from the LED is an indicator that the heater is functioning correctly. Any other light pattern, steady on or flashing, given by the LED is indicative that there is a problem in the operation of the heater. Refer to the troubleshooting decal within the access panel at the burner end of the heater for assistance in troubleshooting or refer to the troubleshooting guide within this Owner’s Manual. Only qualified and properly trained personnel shall service or repair the heater.

6. On a call for heat, the motor will start up and run for five (5) seconds prior to ignition trial. This “pre-purge” is a safety feature and a normal operational characteristic. After five (5) seconds the igniter will spark until burner flame is detected by the control module.

   NOTE: It is normal for air to be trapped in the gas hose on new installations. You may have to attempt more than one trial for ignition before the air is finally purged from the line and ignition takes place.

7. If ignition is not achieved during the ignition trial, the ignition control module will lock-out and a two-flash pattern will be indicated by the LED.

8. Do not exceed the input rating stamped on the dataplate of the heater. Do not exceed the burner manifold pressure stated on the dataplate. Do not use an orifice size different than specified for the specific input rating of this heater, fuel type configuration and altitude.

Shut-Down Instructions

1. For normal shutdown (when further use is anticipated), position the power supply switch to 'Off' and the thermostat to off or no heat.

2. To properly shut down the heater when disconnecting the gas supply for service, maintenance, or relocation:

   a. Position the power supply switch to 'Off' and disconnect the heater's electrical supply.

   b. Close the gas supply valve(s) at gas source.

   c. Disconnect heater's gas pressure regulator from gas source. A minimal amount of gas trapped in the gas hose will escape. This is normal and will not cause an unsafe condition.

Cleaning Instructions

⚠ WARNING
Fire, Burn, and Explosion Hazard

- This heater contains electrical and mechanical components in the gas management, safety and airflow systems.
- Such components may become inoperative or fail due to dust, dirt, wear, and aging.
- Periodic cleaning and inspection as well as proper maintenance are essential to avoid serious injury or property damage.

1. Before cleaning, shut off all gas supply valves and disconnect the electrical supply.
2. The heater should have dirt or dust removed periodically:
   a. After each use, give the heater a general cleaning using compressed air, a soft brush or dry rag on its interior and exterior.
   b. At least once a year, give the heater a thorough cleaning. At this time, remove the fan and motor assembly and brush or blow off the fan wheel, giving attention to the individual fan blades and also dust off the motor case to prevent the motor from overheating and shutting the heater down. Make sure the burner air inlet venturi ports and the "throat" of the casting are free of dust accumulation and the area between the heat chamber top and inside case is also free of dust. Additionally, the igniter should be removed, cleaned, and its gap checked according to the service instructions within this Owner's Manual.
   c. When cleaning, observe and obey the Warning within these Cleaning Instructions. This same Warning is also supplied on the heater.

⚠ WARNING

This heater must not be washed. Use of a pressure washer, water or liquid cleaning solution on this heater can cause severe personal injury or property damage due to water and/or cleaning solution:

- In electrical components, connections and wires causing electrical shock or component failure.
- On gas control valves causing corrosion which can result in gas leaks and fire or explosion from the leak.

This heater must be cleaning in accordance with the manufacturer's instructions without being subjected to liquid spray or wetting.

Maintenance Instructions

1. **The appliance area shall be kept clear and free from combustible materials, gasoline, and other flammable vapors and liquids.**
2. Regulators can wear out and function improperly. Have your gas supplier check the date codes on all regulators installed and check delivery pressures to the appliance to make sure that the regulator is reliable.
3. Regulators must be periodically inspected to make sure the regulator vents are not blocked. Debris, insects, insect nests, snow, or ice on a regulator can block vents and cause excess pressure at the appliance.

Service Instructions

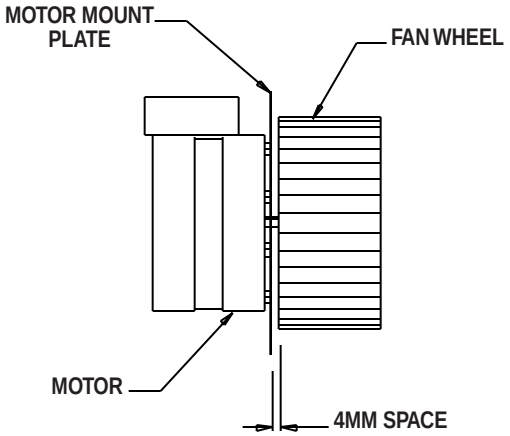
MOTOR AND FAN WHEEL ASSEMBLY

1. Shut off the gas supply to the heater.
2. Disconnect the heater from its electrical supply.
3. Open the louvered access panel on the motor end of the heater.
4. Disconnect the motor leads.
5. Remove the screws securing the motor mounting plate to the fan housing.
6. Pull the fan and motor assembly from the housing.
7. Loosen the square head set screw(s) on the fan wheel with a wrench.
8. Pull the fan wheel from the motor shaft. Use a wheel puller if necessary.
9. Remove the four (4) nuts securing the motor to the mounting plate.
10. To replace the motor and fan, reverse the above procedures.

NOTES: a. Fan wheel to motor mount plate spacing must be adjusted to a clearance of 4 mm before tightening the fan wheel to the motor shaft.

b. Make sure that set screw(s) of the fan are on the "flats" of motor shaft when tightening.

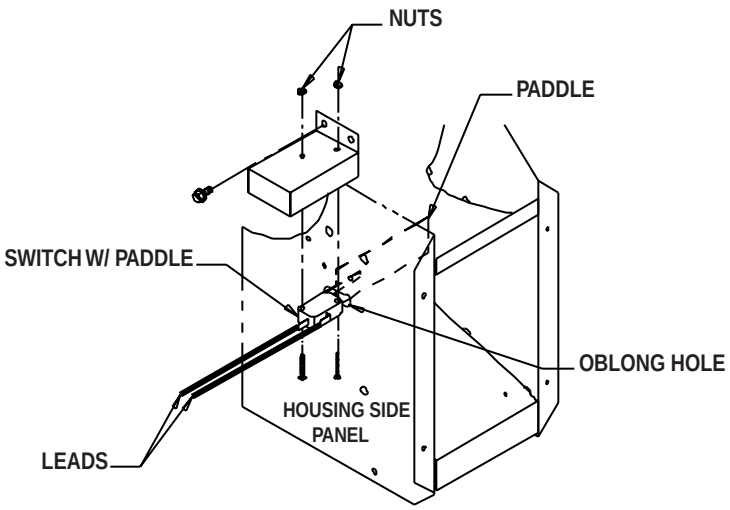
FIG. 9



AIR PROVING SWITCH WITH PADDLE

1. Shut off the gas supply to the heater.
2. Disconnect the heater from its electrical supply.
3. Open the louvered access panel on the motor end of the heater.
4. Remove the two (2) sheet metal screws holding the switch with bracket to blower housing. Remove the air proving switch assembly by turning the switch 90°so the paddle on the switch arm can be pulled through the oblong hole on side of fan housing.
5. Disconnect the leads from the air proving switch.
6. To replace the switch, reverse the above procedure. The replacement switch will be pre-assembled to its mounting bracket.

FIG. 10



IMPORTANT

Make sure you do not bend the switch arm when installing the replacement switch. Bending the switch arm may create ignition problems later.

⚠ WARNING
Fire and Explosion Hazard

- Do not disassemble the gas control valve.
- Do not attempt to replace any components on the gas control valve.
- The gas control valve must be replaced if any physical damage occurs to the control valve assembly.
- Failure to follow this warning will result in fire or explosions, leading to injury or death to humans and livestock, and building damage.

1. Brush off any accumulation of dust that may be found.

2. Check manifold gas pressure with a low pressure gas gauge:

   a. Shut off the gas supply to the heater.

   b. Disconnect the heater from its electrical supply.

   c. Turn the pressure tap at the outlet of the valve counterclockwise a minimum of one full turn.

   d. Connect a low pressure gas gauge to the pressure tap.

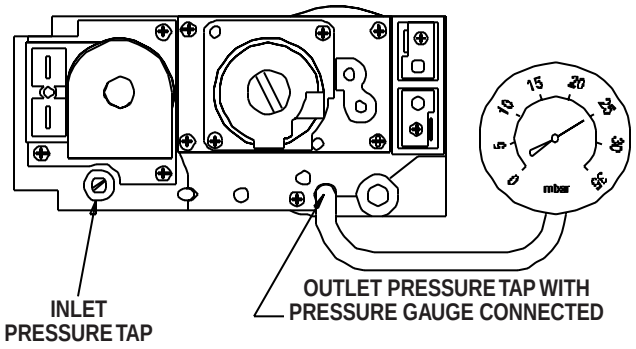
   e. Open the fuel supply and reconnect the heater to electrical supply.

   f. Start the heater.

   g. When heater lights, the gas gauge will read 25 mbar for LP vapor or 10 mbar for natural gas pressure. This pressure is the flowing gas pressure necessary for the heater to deliver its maximum output. If the gauge does not indicate proper manifold pressure, check the inlet pressure to the gas control valve. Maximum and minimum acceptable inlet pressures to the gas control valve are shown in the heater specifications table and also on the heater's dataplate. The inlet pressure may need adjustment as necessary to achieve proper outlet pressure. Inlet pressure is checked in the same manner as outlet pressure.

   h. After pressures have been checked, shut off the gas supply and electrical supply to the heater, remove the gauge, and tighten the pressure tap securely. Open the gas supply and reconnect the heater to is electrical supply.

FIG. 11



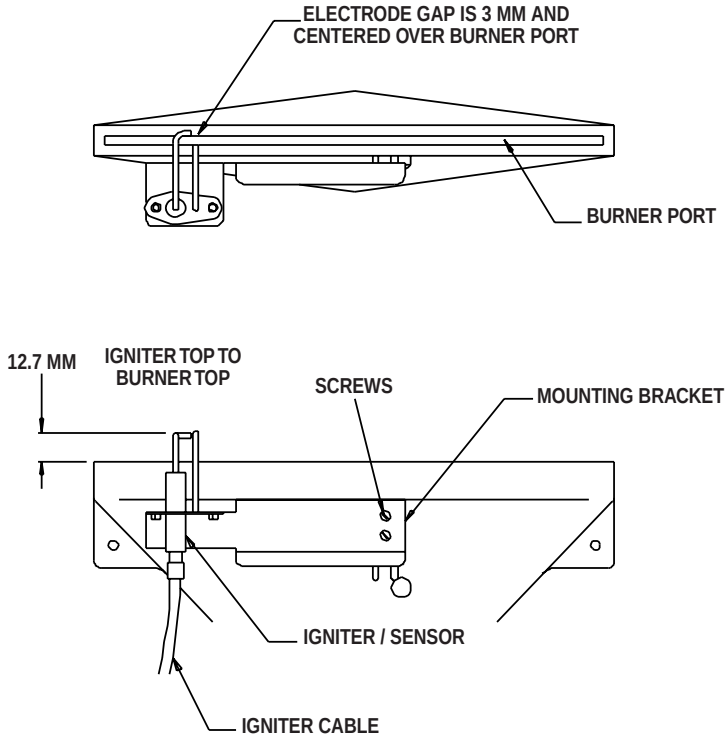
IGNITER

1. Shut off the gas supply to the heater.
2. Disconnect the heater from its electrical supply.
3. Open the burner end access panel.
4. The igniter and sensor assembly is located at the top of the burner casting mounted on a bracket.
5. Disconnect the high voltage lead from the igniter by pulling downward on the lead connector at the igniter.
6. Loosen the screws that secure the igniter bracket to the burner and remove this assembly from the heater.
7. Remove the screws that secure the igniter to the mounting bracket.
8. To assemble, reverse the procedure.

IMPORTANT

- The igniter can accumulate dust or dirt over a period of extended use thereby affecting its ability to spark. If the spark appears to be weak, rub the igniter electrode and ground rod with steel wool or emery cloth to remove any build up.
- Make sure the gap between the igniter electrode and the ground rod is set at 3 mm. Check the igniter's ceramic base for cracks. If any cracks are found, replace the igniter.

FIG. 12



TESTING THE MANUAL RESET HIGH LIMIT SWITCHES

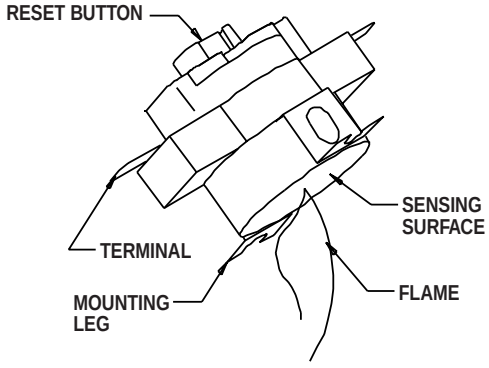
⚠ WARNING
Fire Hazard

- Do not operate the appliance with the high limit switches bypassed.
- Operating the heater with bypassed high limit switches may lead to overheating, possibly resulting in a fire, with subsequent damage to the heater, building damage, or loss of livestock.

This heater has two high limit switches. One is located on the heat chamber face, while the other is located on the fan housing at the opposite end of the heater. The high limit switches should be tested a minimum of once per year when the heater is given a thorough cleaning.

1. Disconnect the heater from its electrical supply.
2. The high limit switches have different temperature ratings. To eliminate confusion, remove and test only one high limit switch at a time.
3. Holding the switch by one of its mounting legs or terminals, apply a small flame only to the sensing portion on the back of the switch. **Be careful not to melt the plastic housing of the switch when conducting this test.**
4. Within a minute, you should hear a "pop" coming from the switch, which indicates the contacts of the switch have opened. Check for lack of electrical continuity across the switch terminals to verify contacts have opened.
5. Allow the switch to cool down for about a minute before firmly pressing the reset button on the switch.
6. Check for electrical continuity across the switch terminals to make sure the contacts have closed.
7. Reinstall the switch back into the heater. Reconnect the heater to its electrical supply. Start the heater and check for proper operation.

FIG. 13



READ THIS ENTIRE SECTION BEFORE BEGINNING TO TROUBLESHOOT PROBLEMS.

⚠ WARNING
Electrical Shock and Burn Hazard

- Troubleshooting this system may require operating the unit with line voltage present and gas on. Use extreme caution when working on the heater.
- Failure to follow this warning may result in property damage, personal injury or death.

The following troubleshooting flow charts provide systematic procedures for isolating equipment problems. The charts are intended for use by a QUALIFIED GAS HEATER SERVICE PERSON. **DO NOT SERVICE THESE HEATERS UNLESS YOU HAVE BEEN PROPERLY TRAINED.**

TEST EQUIPMENT REQUIRED

The following pieces of test equipment will be required to troubleshoot this system with minimal time and effort.

- **Digital Multimeter** - for measuring AC and DC voltage and resistance.
- **Low Pressure Gauge** - for checking inlet and outlet pressures of the gas control valve against dataplate rating.

INITIAL PREPARATION

- Visually inspect equipment for apparent damage.
- Check all hoses for abrasion and wear. Replace any that are suspect.
- Make sure heater is properly installed and meets minimum clearances to nearest combustible materials. (Refer to dataplate on the heater.)
- Check all wiring for loose connections and worn insulation.

Refer to the system operation sequence in this section (page 20) to gain an understanding as to how the heater operates during a call for heat.

Understanding the sequence of operation of the ignition module and related components is essential as it will relate directly to problem solving provided by the flow charts.

The ignition control module is self-diagnostic. The red light on the module will flash a 2, 3 or 5 flash pattern repetitively depending upon the problem which is diagnosed. To effectively use the flow charts, you must first identify what the problem is by the light pattern of the red diagnostic light. If the light is flashing, the pattern will be followed by a pause and then a repeat of the pattern until the problem is corrected. Refer to the table on page 20 for further direction to troubleshooting any problems.

The red diagnostic light will only be on when the selector switch is positioned to “Heat” and the thermostat is set above room temperature. The light will not be on when the selector switch is positioned to “Vent”.

Ignition Control Lock-Out

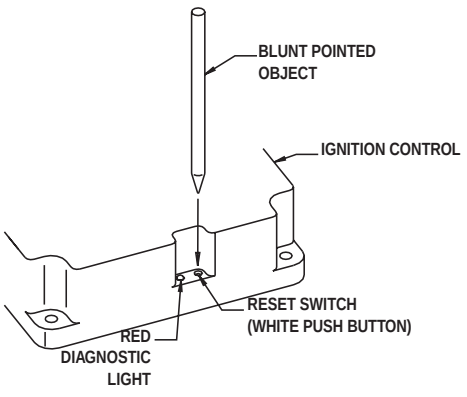
- For safety, the ignition control in this heater continually monitors air proving components (fan motor and air proving switch) and burner flame.
- The ignition control will lock out the control system if it does not recognize burner flame presence or if air proving components fail. Either condition causes control valve closure to occur.
- Other problems may create a lock-out condition (see Troubleshooting flow charts), however, most common reasons for system lock-out are:
  - -- Improperly shutting the heater down by closing off the heater’s fuel supply while heater is still in operation.(Refer to page 14 for proper shut down procedures.)
  - -- Not having a sufficient L.P. Gas supply, thereby allowing the heater to run out of fuel. (Refer to page 10 for proper sizing of L.P. Gas supply.)
- System lock-out is identified by:
  - -- Fan motor not operating
  - -- Heater no longer burning gas
  - -- Red diagnostic light on ignition control flashing 2, 3 or 5 times repetitively, depending on problem.
- The red diagnostic light is located adjacent to the white reset switch button on the ignition control. The ignition control is at the gas inlet end of the heater and is readily seen when the heater’s access door is opened. The red light and reset switch are easily located.
- Ignition control will require resetting when troubleshooting and repairing the heater. See reset instructions below.

Resetting Ignition Control

1. Insure heater is connected to an approved electrical supply and a sufficient gas supply is being used.
2. Open fuel supply valves to heater.
3. Insure selector switch and thermostat are calling for heat.
4. Using a small pointed object, push down the white reset switch button on the ignition control and hold for 4-5 seconds until the fan motor starts. At this point release the button. The heater will light. See illustration below.

IMPORTANT

- Use only **light** pressure to reset the switch.
- Excessive pressure may damage the reset.



Components should be replaced only after each step has been completed and replacement is suggested in the flow chart. Refer to the "Servicing" sections as necessary to obtain information on disassembly and replacement procedures of the component once the problem is identified by the flow chart.

DIRECT IGNITION OPERATION SEQUENCE:

- Line Voltage is Sent to Selector Switch
- Selector Switch Sends Line Voltage to the Thermostat
- A Call for Heat Occurs from the Thermostat
- Thermostat Sends Line Voltage to the Transformer and to the Motor Relay Contacts
- Transformer Sends 24 Volts to the Circuit Breaker
- Circuit Breaker Sends 24 Volts to the Ignition Control Module
- Red L.E.D. on Control Module is Illuminated
- Ignition Control Module Performs Self Safety Check
  - Internal Components are Tested
  - Air Proving Circuit is Checked
- Ignition Control Module Begins Ignition Trial Sequence
- Ignition Control Module Sends 24 Volts to the Motor Relay Coil and to Air Proving Switch
  - Fan Motor Starts
  - Air Proving Switch Closes and 24 Volts is Returned to the Ignition Control Module
- Ignition Control Module Sends High Voltage to the Igniter Electrode
  - Igniter Sparks
- Ignition Control Module Sends 24 Volts to the Gas Control Valve through the High Limit Switches
  - Gas Control Valve Opens
- Ignition Occurs
  - Igniter Continues to Spark until Flame Proving Occurs
  - Ignition Spark is Shut Off
  - Gas Valve Stays Open
- Room Warms to Desired Temperature
  - Thermostat is Satisfied
  - Heater Shuts Down
- Process Starts Again on a Call for Heat

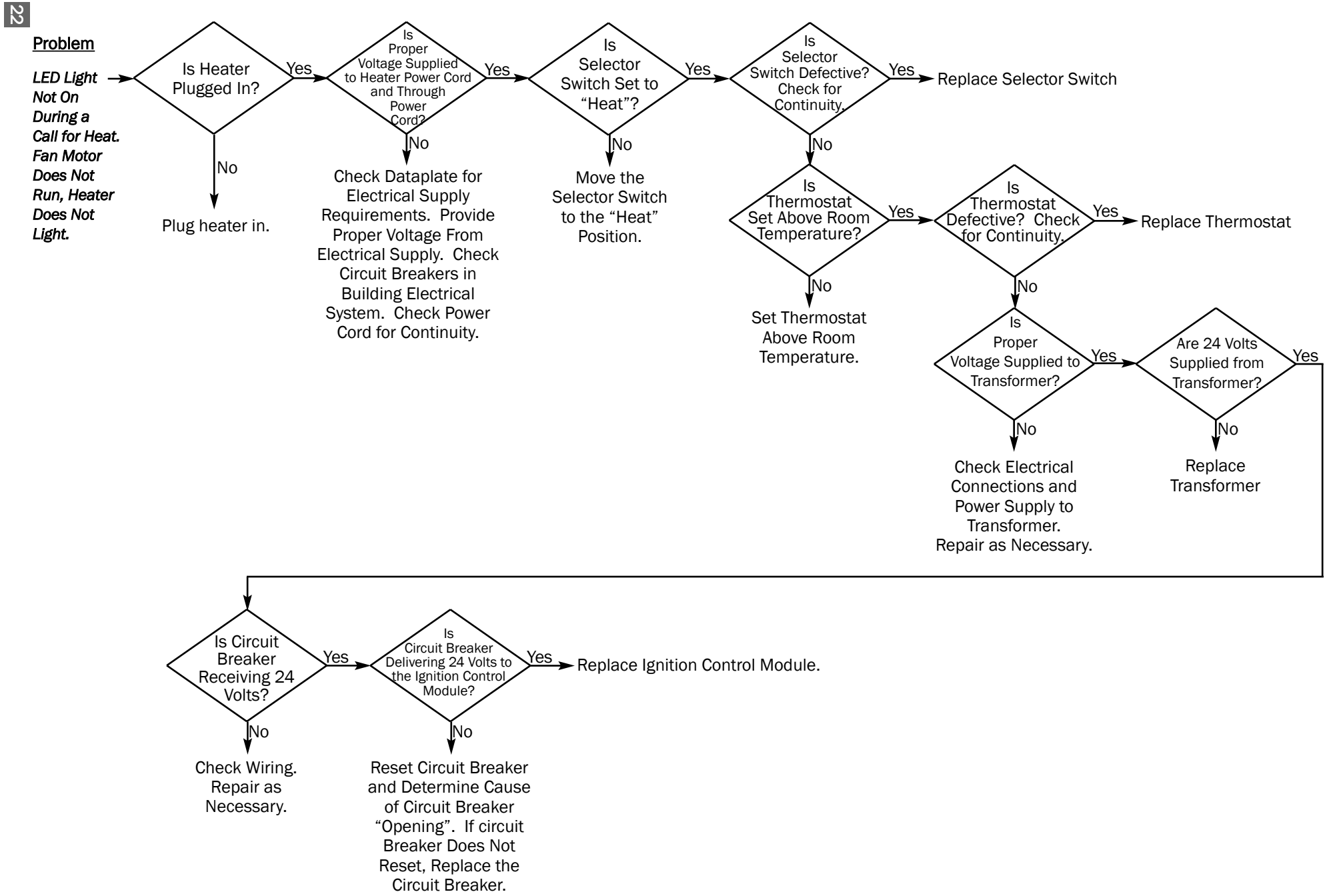
HEATING MODE

LED Flashing → Normal Operation

LED is Not On, But Heater is Operating Properly During a Call for Heat. → Defective LED in Control Module. → Replace Ignition Control Module.

LED is Steady On. No Flash Pattern. → Ignition Control Lock-Out Due to: → Reset Ignition Control Module:

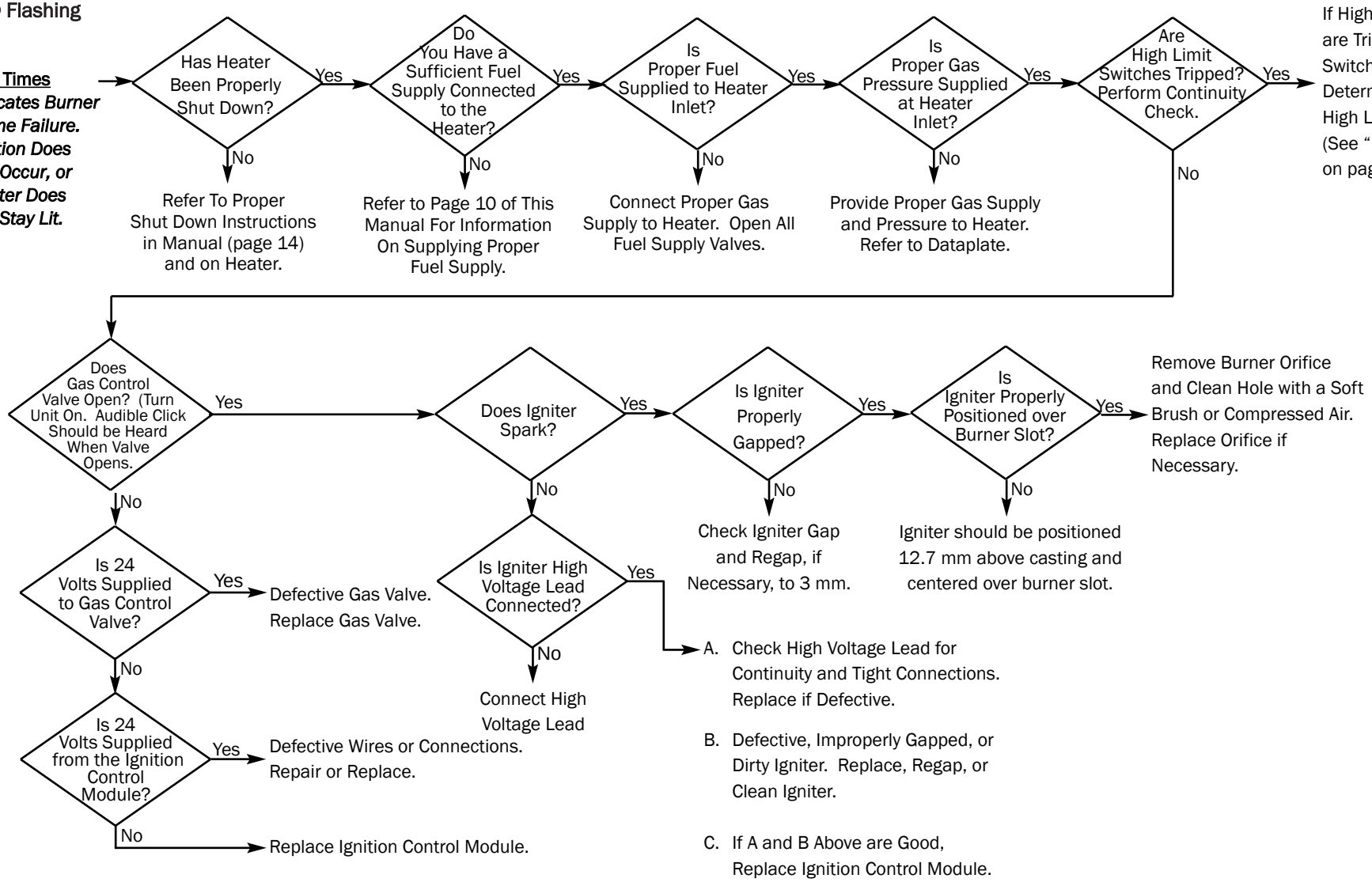
(A) Ignition Control Module Failure.	(A) If Control Module Does Not Reset, Replace Ignition Control Module.
(B) Poor Electrical Quality: Frequency Line Noise, Line Spikes.	(B) Have Qualified Electrician Check the Power Supply.

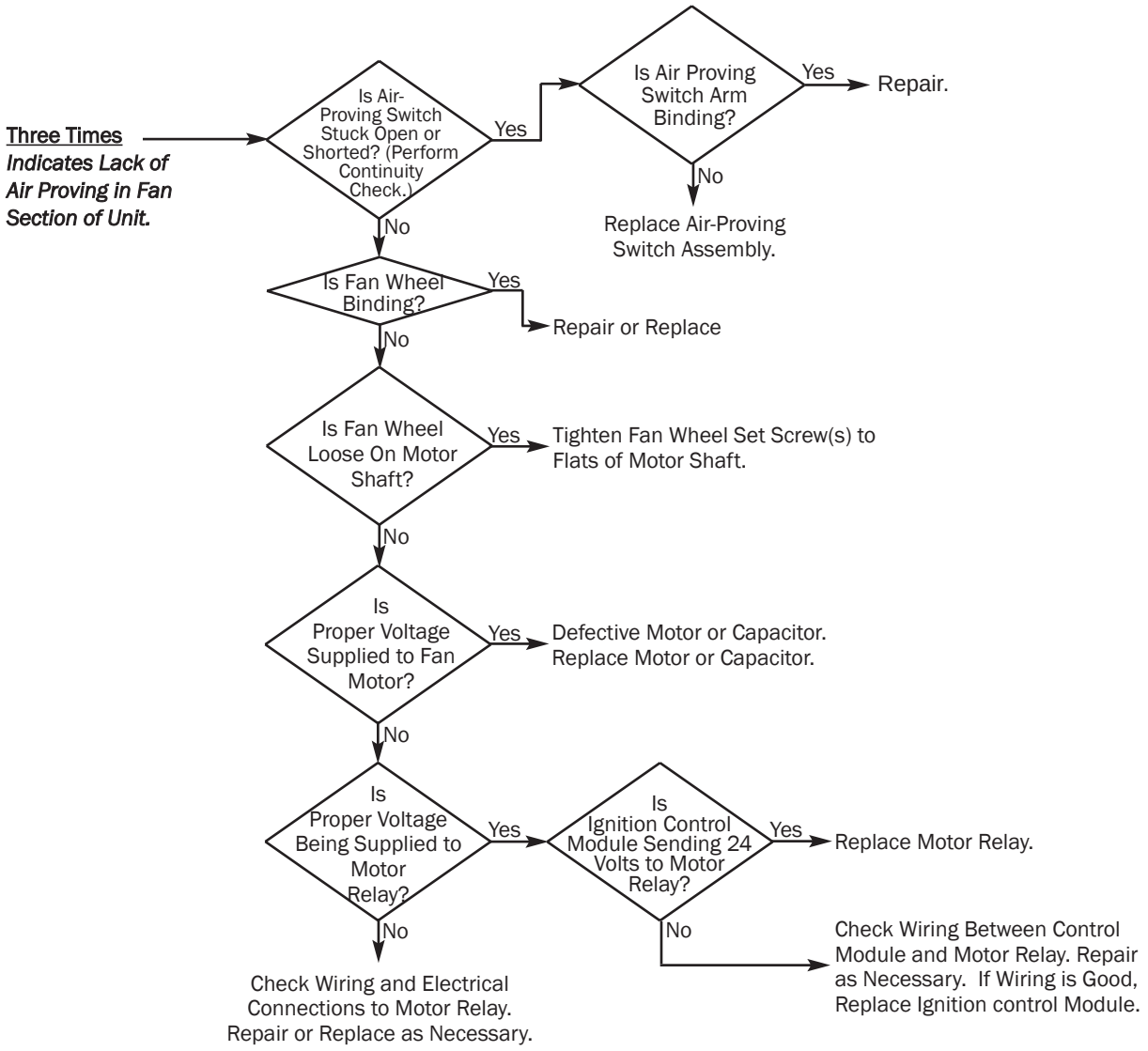

Problem
LED Light Not On During a Call for Heat. Fan Motor Does Not Run, Heater Does Not Light.
Is Heater Plugged In?
Yes
No
Plug heater in.
Is Proper Voltage Supplied to Heater Power Cord and Through Power Cord?
Yes
No
Check Dataplate for Electrical Supply Requirements. Provide Proper Voltage From Electrical Supply. Check Circuit Breakers in Building Electrical System. Check Power Cord for Continuity.
Is Selector Switch Set to "Heat"?
Yes
No
Move the Selector Switch to the "Heat" Position.
Is Selector Switch Defective? Check for Continuity.
Yes
Replace Selector Switch
No
Is Thermostat Set Above Room Temperature?
Yes
No
Set Thermostat Above Room Temperature.
Is Thermostat Defective? Check for Continuity.
Yes
Replace Thermostat
No
Is Proper Voltage Supplied to Transformer?
Yes
No
Check Electrical Connections and Power Supply to Transformer. Repair as Necessary.
Are 24 Volts Supplied from Transformer?
Yes
No
Replace Transformer
Is Circuit Breaker Receiving 24 Volts?
Yes
No
Check Wiring. Repair as Necessary.
Is Circuit Breaker Delivering 24 Volts to the Ignition Control Module?
Yes
No
Reset Circuit Breaker and Determine Cause of Circuit Breaker "Opening". If circuit Breaker Does Not Reset, Replace the Circuit Breaker.
Replace Ignition Control Module.

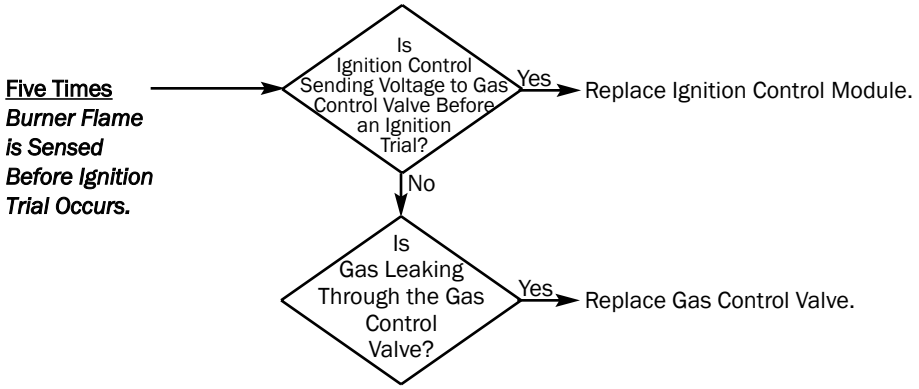
Problem

LED Flashing

Two Times ***Indicates Burner Flame Failure. Ignition Does Not Occur, or Heater Does Not Stay Lit.***




Three Times
Indicates Lack of Air Proving in Fan Section of Unit.
Is Air-Proving Switch Stuck Open or Shorted? (Perform Continuity Check.)
Yes
Is Air Proving Switch Arm Binding?
Yes
Repair.
No
Replace Air-Proving Switch Assembly.
No
Is Fan Wheel Binding?
Yes
Repair or Replace
No
Is Fan Wheel Loose On Motor Shaft?
Yes
Tighten Fan Wheel Set Screw(s) to Flats of Motor Shaft.
No
Is Proper Voltage Supplied to Fan Motor?
Yes
Defective Motor or Capacitor. Replace Motor or Capacitor.
No
Is Proper Voltage Being Supplied to Motor Relay?
Yes
Is Ignition Control Module Sending 24 Volts to Motor Relay?
Yes
Replace Motor Relay.
No
Check Wiring Between Control Module and Motor Relay. Repair as Necessary. If Wiring is Good, Replace Ignition control Module.
No
Check Wiring and Electrical Connections to Motor Relay. Repair or Replace as Necessary.



IMPORTANT NOTES:

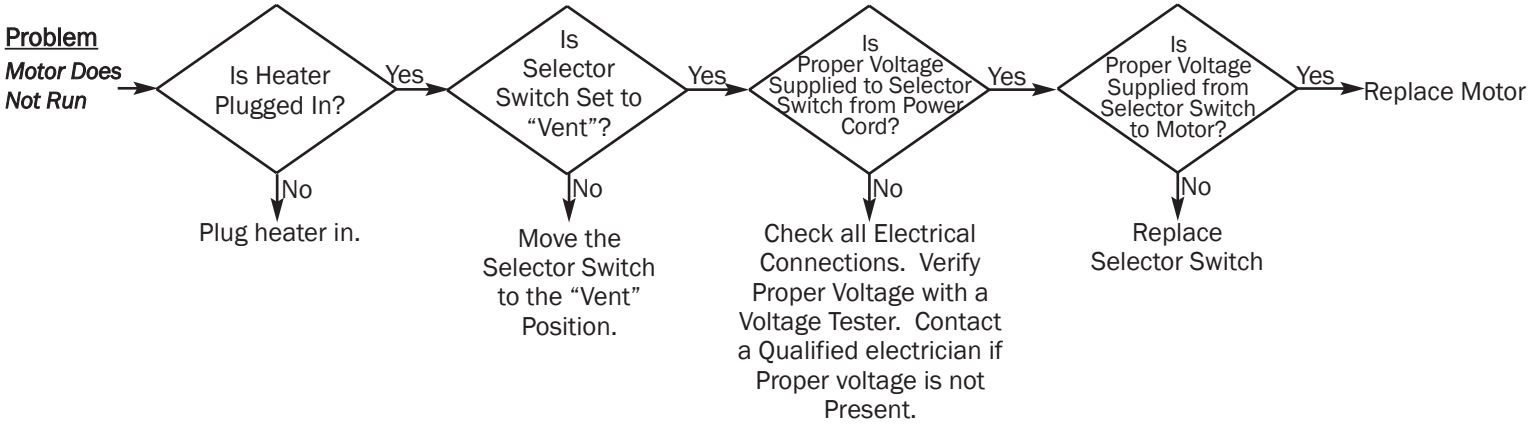
(1) With any electrical problem, all wiring should be checked for good connections and proper voltage.

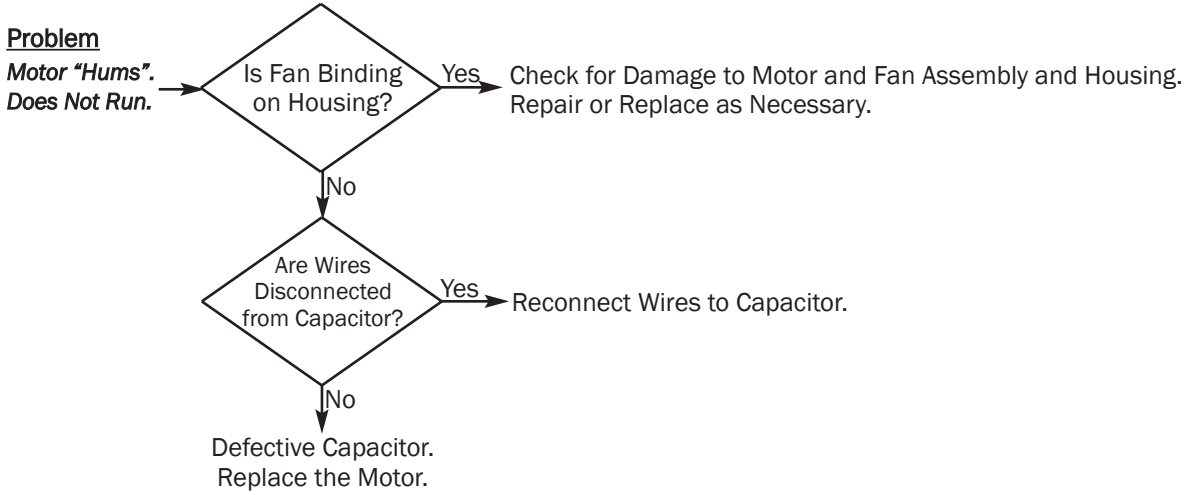
(2) To determine if part is defective, place a jumper wire across the two terminals that the wires are connected to. DO NOT leave the jumper wire on and operate if part is defective. Replace component IMMEDIATELY or do not operate unit.

(3) The ignition control module sends and receives voltages throughout the entire operation sequence. The ignition control module terminals should also be checked for delivering proper voltages in addition to the individual components as indicated by the respective flash pattern to make sure the board itself is working properly.

(4) The high limit switch will “open” for a number of reasons. Common problems associated with this are high gas pressure, low voltage, loose or dirty fans, restrictions/blockages at air inlets or outlets, or excessive dust and dirt accumulations in the heater.

VENTILATION MODE



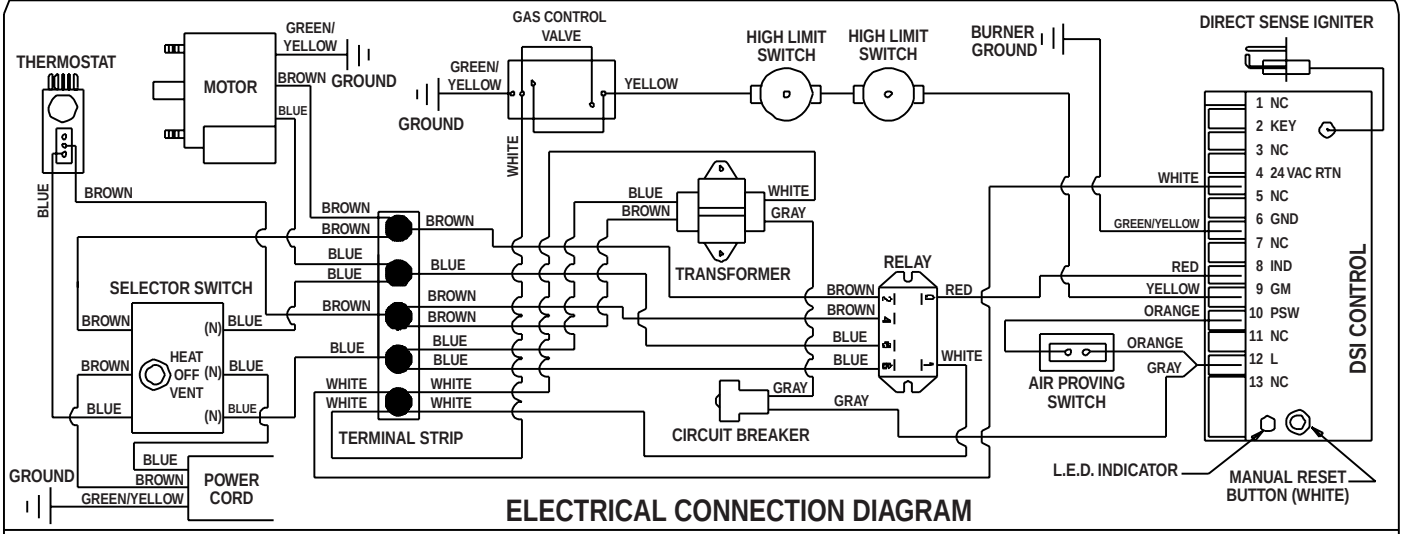


Electrical Connection and Ladder Diagram

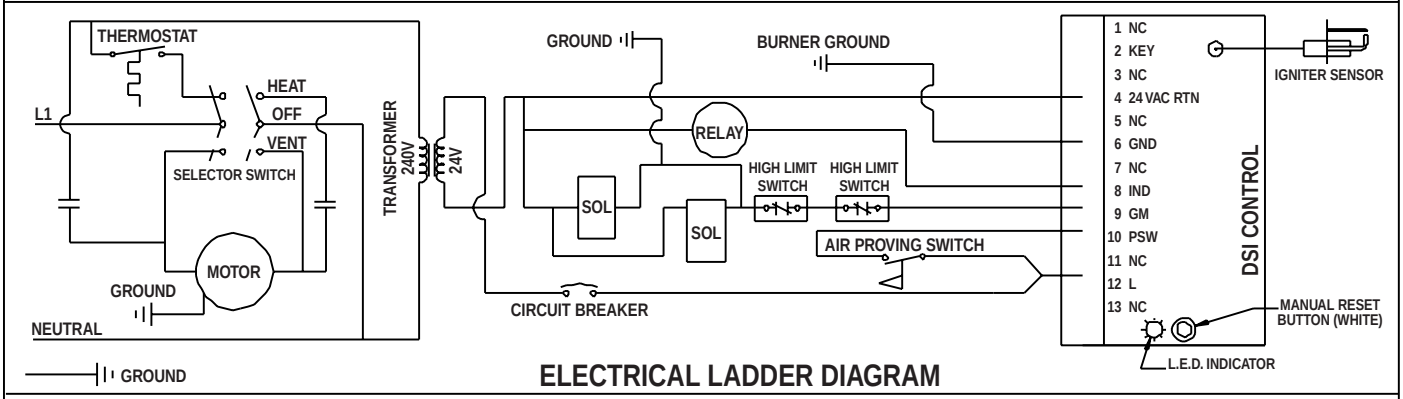
CAUTION

Always refer to the heater's electrical connection diagram when servicing to avoid wiring errors and heater malfunction. Check for proper operation after servicing.

WARNING: THIS HEATER MAY START AT ANY TIME



ELECTRICAL CONNECTION DIAGRAM



ELECTRICAL LADDER DIAGRAM

IF ANY OF THE ORIGINAL WIRE AS SUPPLIED WITH THE APPLIANCE MUST BE REPLACED, IT MUST BE REPLACED WITH WIRING MATERIAL HAVING A TEMPERATURE RATING OF AT LEAST 302º F. (150º C.)

Heater Component Function

Air Proving Switch with Paddle
Safety device used to insure that the proper air flow is being achieved before the gas valve is opened.

Burner
Cast iron component used to mix air and gas and provide an area at which the fuel may ignite.

Burner Orifice
Brass metering device used to supply gas to burner at a specific rate.

Circuit Breaker
Safety device which is used to protect against an over amperage condition which results from a direct electrical short or an overload condition, within the 24 volt circuit.

Direct Spark Ignition Control Module
Electronic printed circuit board which sends and receives voltages to various controls in an automatic ignition system. An important safety feature of the control board is that it will shut down the entire heater, thereby stopping the flow of fuel gas if burner flame goes out.

Fan Housing
Chamber used for delivering air for efficient air movement.

Fan Wheel
Component used in conjunction with the motor and fan housing to pull the hot air from heater and blow it into room for heating (also known as a “squirrel cage”).

Gas Control Valve
Houses electrical solenoids which are energized by voltage and therefore opens allowing fuel gas to pass through to burner for ignition. The gas control valve will close, shutting off the flow of fuel gas in the event burner flame goes out.

Gas Hose
Flexible connector used to deliver gas from supply line in building to heater.

Heat Chamber
Metal “fire box” within the appliance that provides an area where burner flame mixes with combustion air thereby providing heat.

High Limit Switch
Safety device wired into the control system which is used to break an electrical circuit to the gas control valve in event of overheat situation.

Igniter
Ignition device used on automatic direct spark ignition control systems. Ignites gas by spark.

Motor
Electric device used to drive a fan to pull preheated air through the heater and to circulate heat within a certain area. Converts electrical energy into mechanical energy.

Motor Relay
Electrical device which supplies high voltage to the motor upon receipt of low voltage from the ignition control module.

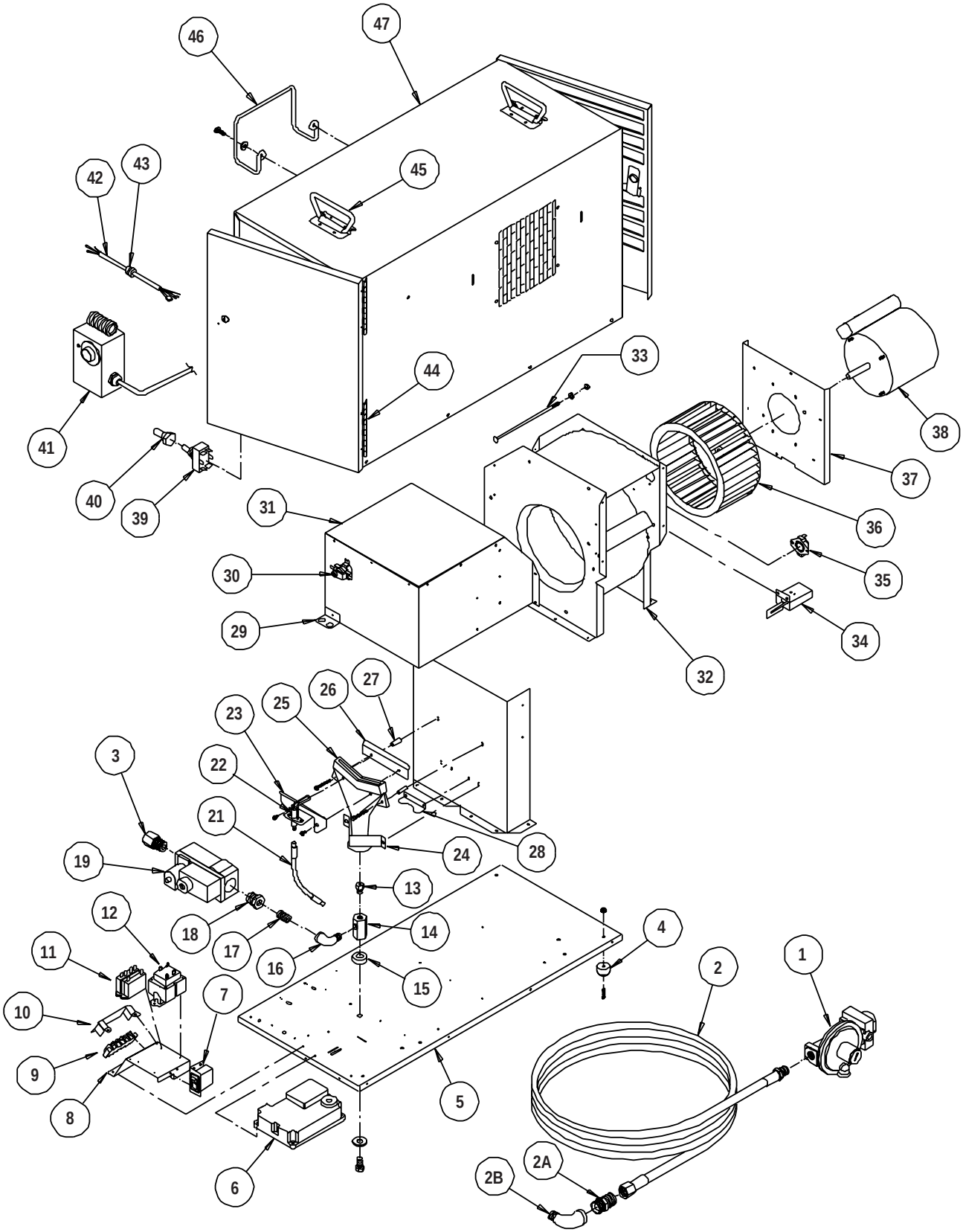
Regulator
The heart of any gas supply installation. Used to deliver a working gas pressure to the appliance under varying conditions in tank pressure.

Selector Switch
Electrical device which is used to allow the end user to use the heater in either a heating or ventilation application.

Thermostat
Electrical device used as an automatic “on/off” switch which will respond to changes in temperature in a certain area. Can be wired so contacts in the thermostat open or close on temperature increase or decrease.

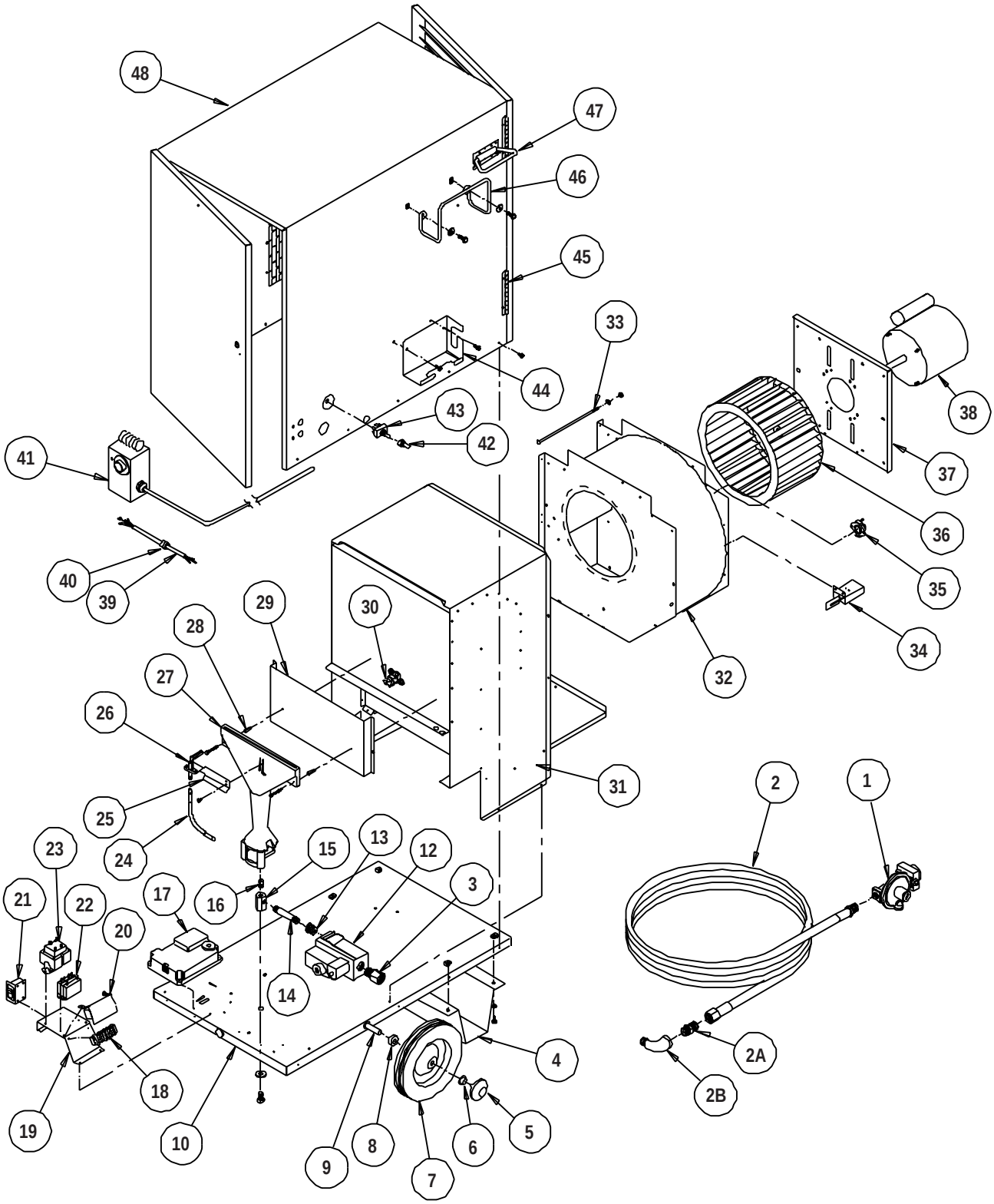
Transformer
Electrical control used to accept line power supply primary voltage and reduce it to lower secondary voltage to operate certain control systems.

PARTS SCHEMATIC
TS080



PARTS LIST
TS080

Item	Description	Part Number
1	Regulator (L.P. Gas)	23041
	Regulator (Natural Gas)	23043
2	Hose Kit, 3m x 12.7mm ID, w/ Hose Adapter and Elbow	23040
2A	Adapter	80858
2B	Elbow	23039
3	Adapter, 1/2 NPT x 1/2 BSPT	80860
4	Bumper, Recessed, Heater Base	08932
5	Base	08909
6	Ignition Control Module	23314
7	Circuit Breaker, 2.0 Amps, 24 Volts	21080
8	Bracket, Mount, Electrical Components	21149
9	Terminal Block, 5 Position	08253
10	Bracket, Cover, Terminal Block	21150
11	Relay, Motor	09819
12	Transformer, 240/24 Volt	20659
13	Orifice (L.P. Gas)	09753
	Orifice (Natural Gas)	09754
14	Holder, Orifice	09759
15	Spacer, Nylon	07905
16	Ell, Street, 1/4 NPT, Brass	09621
17	Nipple	01142
18	Bushing, Reducing, 1/2 NPT x 1/4 NPT	22697
19	Valve, Gas Control (L.P. Gas)	21472
	Valve, Gas Control (Natural Gas)	21473
21	Wire, Ignition Cable	09348
22	Igniter/Sensor	06479
23	Bracket, Igniter/Sensor, Mount	08906
24	Bracket, Support, Burner Casting	08933
25	Casting, Burner	08921
26	Bracket, Burner, Flame Arrestor	08942
27	Spacer	02687
28	Bracket, Casting Locator	07443
29	Bracket, Limit Switch Wires	09767
30	Switch, High Limit (Heat Chamber)	03933
31	Heat Chamber Assembly	08952
32	Fan Housing Assembly w/Airflow Switch and High Limit Switch	21299
33	Bolt, Fan Housing	06632
34	Airflow Switch Assembly	21186
35	Switch, High Limit (Blower Housing)	09821
36	Fan, Wheel	08177
37	Bracket, Motor Mount	08146
38	Motor, 149 Watts, 230/50/1	21276
39	Switch, Selector, Toggle	09915
40	Boot, Selector Switch	09916
41	Thermostat, Nema 4X	21247
42	Power Cord	20612
43	Strain Relief	20036
44	Hinge, Case	05868
45	Handle, Case, Fold Down	08534
46	Hanger, Hose	08936
47	Case Assembly, w/Handles, Hinges and Labels	21209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PARTS LIST
TS170

Item	Description	Part Number
1	Regulator (L.P. Gas)	23042
	Regulator (Natural Gas)	23043
2	Hose, 3m x 12.7mm ID, w/ Hose Adapter and Elbow	23040
2A	Adapter	80858
2B	Elbow	23039
3	Adapter, 1/2 NPT x 1/2 BSPT	80860
4	Bracket, Leg, “U” Channel	20750
5	Hub Cap	07187
6	Cap, Retaining	01095
7	Wheel	09160
8	Spacer, Nylon	07905
9	Axle, Assembly, w/Pal Nut	09148
10	Base	09150
12	Valve, Gas Control (L.P. Gas)	21472
	Valve, Gas Control (Natural Gas)	21473
13	Bushing, Reducing, 1/2 NPT x 1/4 NPT	21254
14	Nipple	03114
15	Holder, Orifice	09759
16	Orifice (L.P. Gas)	09786
	Orifice (Natural Gas)	09787
17	Ignition control Module	23314
18	Terminal Block	08253
19	Bracket, Mount, Electrical Components	21149
20	Bracket, Cover, Terminal Block	21150
21	Circuit Breaker, 2.0 Amps, 24 Volts	21080
22	Relay, Motor	09819
23	Transformer, 240/24 Volt	20659
24	Wire, Ignition Cable	09348
25	Bracket, Igniter/Sensor Mount	09783
26	Igniter/Sensor	06479
27	Casting, Burner	03453
28	Spacer, Burner	02687
29	Bracket, Burner Mount	20029
30	Switch, High Limit (Heat Chamber)	03933
31	Heat Chamber Assembly	09133
32	Fan Housing Assembly w/Airflow Switch and High Limit Switch	21297
33	Bolt, Fan Housing	09239
34	Air Flow Switch Assembly	09925
35	Switch, High Limit (Blower Housing)	09784
36	Fan Wheel	09050
37	Bracket, Motor Mount	08647
38	Motor, 248 Watts, 230/50/1	21073
39	Power Cord	20612
40	Strain Relief	20036
41	Thermostat, Nema 4X	21247
42	Boot, Selector Switch	09916
43	Switch, Selector, toggle	09915
44	Bracket, Regulator Mount	09919
45	Hinge, Case	05868
46	Hanger, Hose	08936
47	Handle, Case, Fold down	08534
48	Case Assembly, w/Handles, Hinges and Labels	21134

LABEL IDENTIFICATION

Description	Location	Part Number TS080 L.P. Gas	TS080 Natural Gas	TS170 L.P. Gas	TS170 Natural Gas
Label, Wiring Diagram	Interior Door, Burner End	21122			
Label, Troubleshooting Label	Interior Door, Burner End	21123			
Nameplate	Exterior Door, Burner End	21200	21199	21143	21144
Logo, Premier 80	Cabinet Side	21243			
Logo, Premier 170	Cabinet Side			150-20285-B	
Label, Danger, High Voltage	Exterior Door, Burner End	20384			
Label, Danger, High Voltage	Interior, Electrical Enclosure Cover	20384			
Label, Isolate	Exterior Door, Burner End	20385			
Label, Warning, Hot Surfaces	Cabinet (3 places)	20453			
Label, Warning, General Hazard	Exterior Door, Burner End	20979			
Label, Warning, Electrical, Grounding	Cabinet, Next to Power Cord	21007			
Label, Warning, Fire Hazard	Exterior Door, Motor End	21068			
Label, Attention, High Limit Switch	Exterior door, Motor End	21185			
Label, Start-Up/Shut Down Instructions	Exterior Door, Burner End	21304			
Label, Selector Switch (Heat/Off/Vent)	Cabinet, Next to Selector Switch	F#4769			
Label, Earth, Ground	Interior Base	21238			
Label, “N” (Neutral)	Interior, Selector Switch	21241			

WIRE SELECTION TABLE

Description	Color	Length	Part Number TS080	TS170
Wire, Motor Relay to Terminal Block	White	12.7 cm	09041	
Wire, Igniter Cable	Black	30.5 cm	09348	
Wire, Gas Control Valve to Terminal Block	White	33 cm	--	09921
Wire, Gas Control Valve to Terminal Block	White	17 cm	09962	--
Wire, Motor Ground to Case Ground	Green/Yellow	111.8 cm	20515	--
Wire, High Limit Switch to Gas Control Valve	Yellow	56 cm	20570	
Wire, Motor to Terminal Block	Brown	86.4 cm	20613	
Wire, Gas Control Valve	White	20.3 cm	20619	20615
Wire, Gas Control Valve to Ground	Green/Yellow	20.3 cm	20616	
Wire, Gas Control Valve	Yellow	20.3 cm	20617	
Wire, High Limit Switch to High Limit Switch	Yellow	152 cm	20618	
Wire, Heat/Vent Switch to Terminal Block	Brown	35.6 cm	20621	
Wire, Heat/Vent Switch to Terminal Block	Blue	35.6 cm	20622	
Wire, Motor Relay and Transformer to Terminal Block	Brown	15 cm	20623	
Wire, Motor Relay and Transformer to Terminal Block	Blue	15 cm	20624	
Wire, Motor to Terminal Block	Blue	86.4 cm	20969	
Wire, Motor Ground to Case Ground	Green/Yellow	129.5 cm	--	21124
Wire, Harness, Ignition Control Module	--	--	21139	
Wire, Transformer to Terminal Block	White	20 cm	21245	
Wire, Circuit Breaker to Transformer	Gray	15 cm	21246	

FASTENER SELECTION TABLE

Description	Application	Part Number
Screw, 9.5 mm (Machine)	Igniter Bracket to Burner	01213
Washer, Flat	Burner Mounting to Base	01589
Screw	Burner Mounting to Heat Chamber	02688
Bolt, 19 mm	Burner to Base	02692
Screw, 9.5 mm	All Other Applications	07288
Cage Nut	Hose Hanger	07708

Warranty Policy

EQUIPMENT

L.B. White Co., Inc. warrants that the component parts of its equipment are free from defects in material and workmanship, when properly installed, operated, and maintained in accordance with the Installation and Maintenance Instructions, safety guides and labels contained with each unit. If, **within 12 months from the date of purchase by the end user**, any component is found to be defective, L.B. White Co., Inc. will at its option, repair or replace the defective part or equipment, with a new part or equipment, F.O.B., Onalaska, Wisconsin.

A warranty card on file at L.B. White will automatically qualify a unit and its component parts for warranty consideration. If a warranty card is not on file, a copy of the bill of sale will be required to establish warranty qualification. If neither is available, the warranty period will be 12 months from date of shipment from L B. White.

PARTS

L.B. White Co., Inc. warrants that replacement parts purchased from the company and used on the appropriate L. B. White equipment are free from defects both in material and workmanship for **12 months from the date of purchase by the end user**. Warranty is automatic if a component is found defective within 12 months of the date code marked on the part. If the defect occurs more than 12 months later than the date code but within 12 months from the date of purchase by the end user, a copy of a bill of sale will be required to establish warranty qualification.

The warranty set forth above is the exclusive warranty provided by L.B. White, and all other warranties, including any implied warranties or merchantability or fitness for a particular purpose, are expressly disclaimed. In the event any implied warranty is not hereby effectively disclaimed due to operation of law, such implied warranty is limited in duration to the duration of the applicable warranty stated above. The remedies set forth above are the sole and exclusive remedies available hereunder. L.B. White will not be liable for any incidental or consequential damages directly or indirectly related to the sale, handling or use of the equipment, and in any event L.B. White's liability in connection with the equipment, including for claims based on negligence or strict liability, is limited to the purchase price.

Some regions do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to you. Some regions do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you. This warranty gives you specific legal rights, and you may also have other rights which vary from region to region.

Replacement Parts and Service

Contact your local L.B. White dealer for replacement parts and service or call the L.B. White Company, Inc. at 1-608-783-5691 for assistance. Be sure that you have your heater model number and configuration number when calling.

L.B. White Co., Inc.
W6636 L.B. White Rd.
Onalaska, WI USA 54650

Agricultural, Construction and Tent Heaters

(800) 345-7200 ■ (608) 783-5691 ■ Fax: (608) 783-6115 ■ mail@lbwhite.com

EC Declaration of Conformity

Manufacturer: L.B. White Co. Inc.
W6636 L.B. White Rd. Tel. 608-783-5691
Onalaska, Wisconsin 54650 Fax 608-783-6115
U.S.A.

Declaration of Conformity:

We declare that the equipment designated below meets the requirements of the EC Gas Appliance Directive, Annex I and Annex II, and Low Voltage Directive, Annex 1 on the basis of type evaluation of design and manufacture.

Designated Equipment: Model TS170 and TS080 Tent Heaters. Direct fired, gaseous fueled heaters, with optional ducting and air diffusers, for providing heat for temporary tent style facilities.

Directive this equipment complies with:

90/396/EEC Gas Appliance Directive
73/23/EEC Low Voltage Directive
89/336/EEC Electro Magnetic Compatibility

Basis of Conformity:

Gas Appliance Directive by Type Examination: Product Identification No. 87AT62, Certificate No. BG/EC-87/98/62. Applied Standard: prEN1596--May 1997

Manufacturing Surveillance: BG plc Notified Body 0087, Certificate ECS-00153a

Low Voltage Directive by Examination: BG plc Notified Body 0087 Certificate BG/TC/98/39. Applied Standard: EN60335-1:1994

Electro Magnetic Compatibility by Examination: BG plc Notified body 0087 Certificate BG/TC/98/2. Applied Standards: EN50081-1:1992 and EN50165:1997, Clause 19.101.

Manufacturer: Date of Issue: 4 June 1998

John L. Tomlinson
Director of Engineering