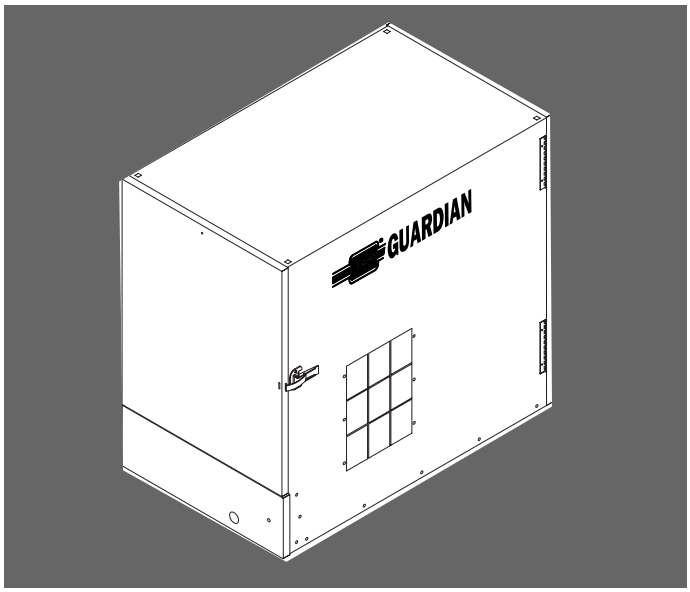
Owner's Manual and Instructions

Agricultural Animal Confinement Building Heaters



MODELS	OUTPUT	FUEL
AW230	**67.4 KW**	Available in either L.P. Vapor Withdrawal or Natural Gas Configurations.

Certification by:

The Australian Gas Association
ACN 004 206 044

Congratulations!

You have purchased the finest agricultural building 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 1-608-783-5691.

ATTENTION ALL USERS

This heater is approved by Australian Gas Association as a direct gas-fired circulating heater for the heating of agricultural animal confinement buildings. The heater is approved for either indoor or outdoor mounting. If you are considering using this product for any application other than it's intended use, contact your local agent or the L. B. White Co., Inc. in the U.S.A. at 608-783-5691. This heater has been evaluated in accordance with AG404 as well as relevant sections of AG106 and AG103. In addition, an electrical evaluation in accordance with AS3100-1990 was conducted.

Local Agent: Sonoma Enterprises
Sonoma Lodge
129 Racecourse Rd
Ashburton, New Zealand

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, building damage or loss of livestock.
- 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 and livestock.

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

FOR YOUR SAFETY

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

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, feathers, straw, and dust.
- 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 all options and accessories commonly used on this heater. However, depending on the configuration purchased, some options and accessories may not be included.

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 interior of either the burner end or motor 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 AW230	
		L.P. Gas	**Natural Gas**
Maximum Input		67.4 KW (242.42 MJ/h)	
Ventilation Air Required to Support Combustion		1,630 Cubic Meters per Hour	
Inlet Gas Supply Pressure Acceptable at the Inlet of the Heater for Purpose of Input Adjustment	**MAX.**	3.36 KPa	
	MIN.	2.75 KPa	1.13 KPa
Burner Manifold Pressure		2.50 KPa	0.75 KPa
Fuel Consumption Per Hour	**MAX.**	4.83 Kilograms per Hour	6.57 Cubic Meters per Hour
Motor Characteristics		Ball Bearing, 187 Watts 950 RPM	
Electrical Supply (Volts/Hz/Phase)		240/50/1	
Amp Draw (Starting Amps Includes Igniter)	**STARTING**	6.5	
	CONTINUOUS OPERATION	1.2	
Dimensions L x W x H		78 CM x 46 CM x 72 CM	
Minimum Safe Distances From Nearest Combustible Materials	**TOP**	.3 Meters	
	SIDES	.3 Meters	
	BACK	.3 Meters	
	BLOWER OUTLET	1.83 Meters	
	GAS SUPPLY	Reference AS1596 and AG601	

Safety Precautions

⚠ WARNING

Asphyxiation Hazard

- 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.
- Symptoms of improper combustion affecting livestock can be disease, lower feed conversion, or death.

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. Odors present in animal confinement buildings can mask fuel gas 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!

Safety Precautions

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, state 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, state and national codes. Included are AG601 Gas Installation Code, 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. This heater may be installed in areas subject to washdown. This heater may only be washed on the external case assembly—see Cleaning Instructions. Do not wash the interior of the heater. Use only compressed air, soft brush or dry cloth to clean the interior of the heater and it's components. After external washdown, do not operate this heater until it is completely dry. In any event, do not operate the heater for at least one hour after external washdown.

5. For safety, this heater is equipped with a manual reset high-limit switch 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. Do not locate fuel gas containers or fuel supply hoses anywhere near the blower outlet of the heater.

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

9. The hose assembly (if provided) shall be visually inspected on an annual basis. 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 animals, 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, before building repopulation or when relocating.

11. This heater should be inspected for proper operation by a qualified service person before building repopulation and at least annually.

12. Always turn off the gas supply to the heater if the appliance is not going to be used in the heating of livestock.

13. This heater is wired for a three-wire electrical system. There is a hot lead, neutral lead and ground lead. The heater may or may not incorporate a plug in the power cord to 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. Hot surface ignition heaters will make up to three trials for ignition. If ignition is not achieved after the third 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. In a hanging type installation, rigid pipe or copper tubing coupled directly to the heater may cause gas leaks during movement, and therefore must not be used. Use only gas hose assemblies complying with AS1869 that are rated and approved for LP-gas and natural gas in a hanging type of installation.

16. Installations not using the gas hose supplied with this heater must connect dimensionally using the Australian AG601 Gas Installation Code or local codes as required. (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.

GENERAL

⚠ WARNING

Fire or Explosion Hazard.

Can cause property 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.
- Do not force the gas control knob. Use only your hand to turn the gas control knob. Never use any tools. If the knob will not operate by hand, the control should be replaced by a qualified service technician. Force or attempted repair may result in fire or explosion.

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

3. For heaters intended for outdoor installation, the heater is to be installed at least 46 cm above the ground or to a height that would prevent snow blockage of heater's air inlet.

4. The heater may be used either indoors or outdoors. When the heater is mounted outdoors, use only the ductwork supplied in the outdoor mounting kit.

5. The heater's approved gas regulator (with pressure relief valve) should be installed outside of building. Any regulators inside the buildings must be properly vented to the outside. Local, state and national codes always apply to regulator installation. Natural gas regulators with vent limiting device may be mounted indoors without venting to outdoors.

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

7. Make certain that a sediment trap is installed at the gas valve inlet to prevent foreign materials (pipe compound, pipe chips and scale) from entering the gas valve. Debris blown into the gas valve may cause that valve to malfunction resulting in a serious gas leak that could result in a possible fire or explosion causing loss of products, building or even life. A properly installed sediment trap will keep foreign materials from entering the gas valve and protect the safe functioning of that important safety component.

8. Any heater or appliance connected to a piping system must have an accessible, approved manual shut off valve installed within 1.83 meters of the heater it serves.

9. 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 thread 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.

⚠ 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.

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

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

12. It is extremely important to use the proper size and type of gas supply line to assure proper functioning of the heater. Refer to standard AG601. Contact your fuel gas supplier for proper line sizing and installation.

13. Make sure the heater is fitted with an approved regulator. A regulator must be connected to the gas supply so that gas pressure at the inlet to the gas valve is regulated within the range specified on the dataplate at all times. Contact your gas supplier, or the L. B. White Co., Inc. if you have any questions.

14. This heater can be configured for use with either L.P. vapor withdrawal or natural gas. Consult the dataplate, located on interior of the burner end or motor end door, for the gas configuration 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 the L. B. White Co., Inc.

15. Eventually, like all electrical/mechanical devices, the thermostat can fail. Thermostat failure may result in either an underheating or overheating condition which may damage critical products and/or cause animal injury or death. Critical products and/or animals should be protected by a separate back-up control system that limits high and low temperatures and also activates appropriate alarms.

16. 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 building and also to the individual heater. Contact your fuel gas supplier if you have any questions.

17. 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 properly qualified service personnel before placing the heater back into use.

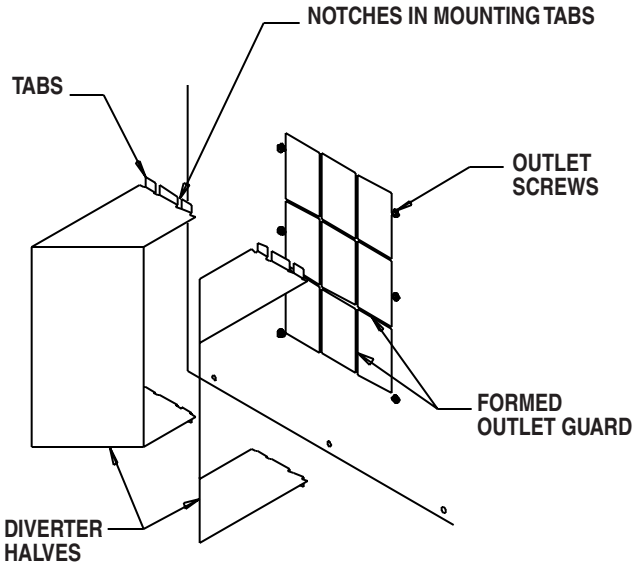
AIR DIVERTER INSTALLATION INSTRUCTIONS

(Optional accessory on some models.)
(Appearance of the outlet on heater may vary from model to model.)

1. Optional air diverters can be installed in the heater outlet to provide direction to the heated air as it exits the heater. Installation options include installing the diverters in such a way as to broadly distribute the air in two 45 degree paths or to focus the air flow in one 45 degree direction.

2. The air diverter's tabs on each half will "pop" into the blower outlet between the inside of the case assembly and the blower housing outlet. If the notched tabs do not "pop" into the blower outlet, loosen (do not remove) the blower outlet screws. Doing this provides a gap into which you can insert the tabs. Retighten the screws after installation.

FIG. 1 (Typical installation allowing two directions of air movement.)

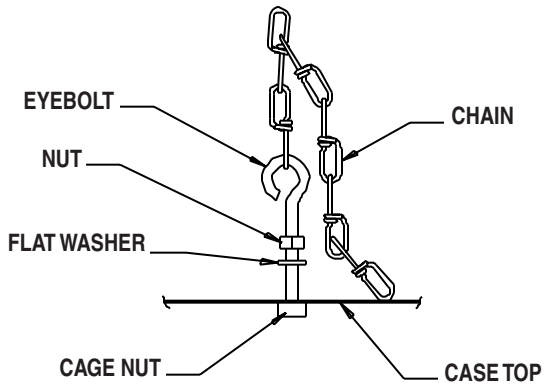


Alternate Air Diverter Installations

HANGING INSTRUCTIONS

1. Assemble according to the illustration below and tighten all eyebolts securely.

FIG. 2

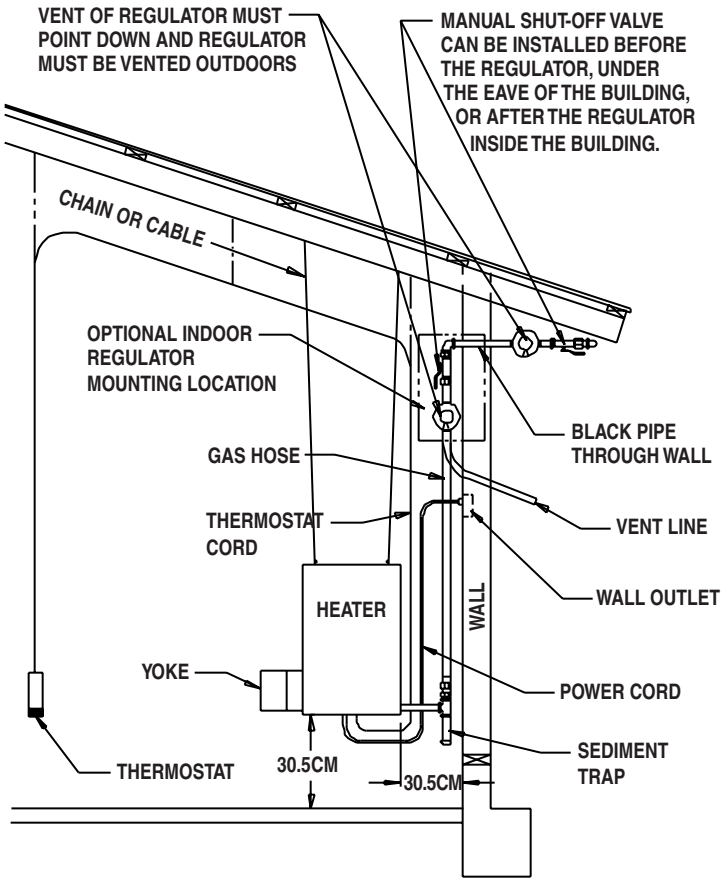


2. Be sure heater is securely fastened and is hanging level. (Check crosswise and lengthwise.)

4. See Fig. 3 for **typical** indoor installation. In any animal confinement building, consideration must be given to making sure the heater is located away from the livestock so that livestock cannot knock the heater, tear it loose from its mounting, or damage the heater or its gas supply line in any way. Make sure you observe and obey minimum clearance distances to combustible materials as stated in the specification section of this owner's manual and on the heater dataplate.

FIG. 3

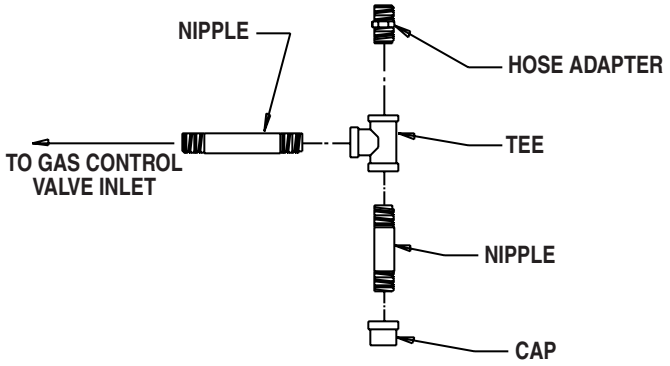
NOTE: REGULATORS SHOULD ALWAYS BE MOUNTED OUTDOORS. IF CIRCUMSTANCES FORCE INSTALLING THE REGULATOR INDOORS, THE REGULATOR'S VENT MUST BE VENTED OUTDOORS USING VENT LINE NO SMALLER THAN VENT OPENING.



SEDIMENT TRAP ASSEMBLY

Assemble the tee, nipples and cap together and tighten securely. The sediment trap assembly must always be mounted in a vertical position. Make sure pipe thread compound that is resistant to both L.P. and natural gas is used in making all connections. **Check all connections for gas leaks using approved gas leak detectors.**

FIG. 4



THERMOSTAT INSTALLATION

⚠ WARNING
Electrical Shock Hazard

- Disconnect the electrical supply before connecting the thermostat to the heater.
- Failure to follow this warning can result in electrical shock, leading to personal injury or death.

1. **To Connect the Series Tap Plug Thermostat Kit:**

   a. Connect the power cord of the heater to the female side of the plug on the end of the thermostat cord.

   b. Plug the male side of the series tap plug on the thermostat cord into a three-wire (grounded) electrical outlet within the building.

2. **To Connect the Direct Wired Thermostat Kit to the Control Box on the Heater:**

   a. The installation and wiring of a thermostat must be done by an electrician or someone properly qualified.

   b. The thermostat may use 18 gauge, 2 wire cord to handle the low voltage being supplied to the thermostat from the transformer.

   c. Follow all instructions provided with the thermostat kit.

   d. The heater must be tested for proper operation after the thermostat has been connected.

MANUAL SHUT-OFF VALVE, HOSE AND REGULATOR ASSEMBLY

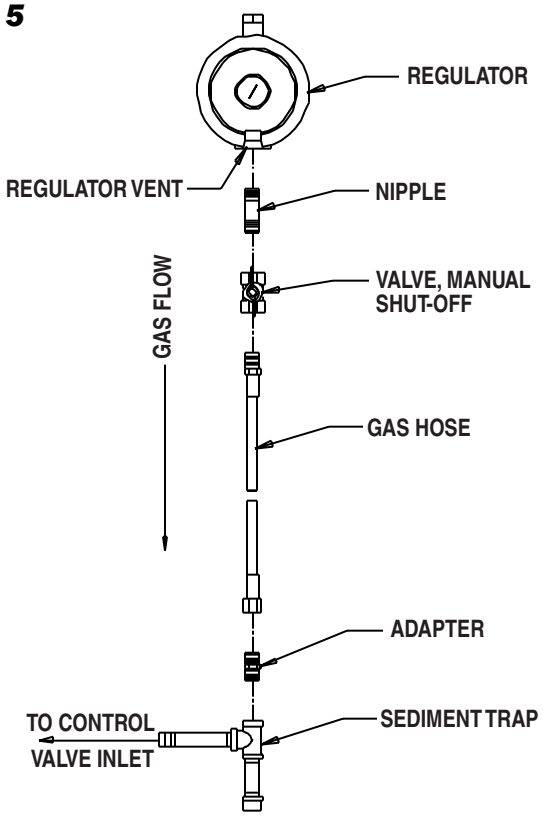
1. Always use approved pipe thread compound suitable for use with L.P. or natural gas on the threaded connections.

2. Assemble the components together according to the figure. This view is to show general assembly of the components only. The regulator must always be mounted so its vent, regardless of location on the regulator, is always pointed downward.

3. Tighten all connections securely.

4. **Check all connections for gas leaks using approved gas leak detectors.**

FIG. 5



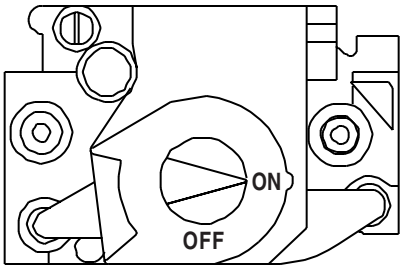
Start-Up Instructions

Follow steps 1 - 9 on initial start-up after heater installation by a qualified service person. For normal start-up, simply set the thermostat to a setting above room temperature.

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

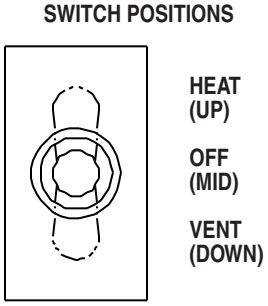
2. The gas control valve has a manual shut-off feature incorporated into the valve assembly. Remove the metal cover from the control valve enclosure and make sure the indicator on the control valve is positioned to "On". Replace the metal cover.

FIG. 6



3. The heater also has a selector switch located on the control box at the motor end of the heater. The selector switch allows you to heat or ventilate (no heat). The switch positions are:

FIG. 7



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.

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

5. Set the thermostat to desired room temperature.

6. This heater includes a hot surface ignition (HSI) control module for purposes of controlling the timing of the ignition process as well as monitoring safety functions. The HSI module is contained with the control box. On the HSI module is a red light emitting diode (LED). This LED indicates the status of the heater. The LED is visible external of the control enclosure through the plastic eye. A constant light from the LED is an indicator that the heater is functioning correctly. Any flash pattern by the LED is indicative that there is a problem in operation. Refer to the troubleshooting decal on the access panel at the fan motor end of the heater for assistance in troubleshooting. Only qualified and properly trained personnel shall service or repair the heater.

7. On a call for heat, the motor will start up and run for five (5) seconds and then stop. This "pre-purge" is a safety feature and a normal operational characteristic prior to ignition taking place. After the motor has stopped, the igniter will heat up (approximately 30 seconds). After igniter warm up time has been achieved, the motor will start again and shortly thereafter ignition will occur.

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

8. The HSI control will make up to three trials for ignition. Each trial for ignition will take approximately 20 seconds. The first two trials for ignition will occur within 40 seconds if ignition is not achieved. A 15 minute "wait period" will then begin after the second trial for ignition has taken place. After the 15 minute time span has elapsed, the third and final trial for ignition will take place. If ignition is not achieved at this final trial, the system will "lock out", and a "three flash" pattern will be indicated by the LED.

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

Shut-Down Instructions

If the heater is to be shut down for cleaning, maintenance or repair, follow steps 1 - 6. Otherwise, simply turn thermostat to "off" or "no heat" for standard shut down.

1. Close all manual fuel supply valves.

2. With the heater lit, allow heater to burn off excess fuel in gas supply hose.

3. Move the selector switch to the "off" position.

4. Turn the indicator on the gas control to "off".

5. Turn thermostat to "off" or "no heat" position.

6. Disconnect the heater from the electrical supply.

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, aging, or the corrosive atmosphere of an animal confinement building.
- 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 flock or between building re-population, give the heater a general cleaning using compressed air or a soft brush on its interior and exterior. At this time, dust off the motor case to prevent the motor from over-heating and shutting the heater down.
   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. 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 flame sensor should be removed and cleaned according to the service instructions within this Owner's Manual.
   c. When washing with water, observe and obey the Warning within these Cleaning Instructions. This same Warning is also supplied on the heater.

WARNING

This heater may be washed only on the external case assembly provided:

A. The heater is disconnected from the electrical supply.

B. All access panels are securely closed.

C. Water spray nozzle shall not discharge within 1.83 m of the heater.

D. The water pressure does not exceed 310 KPa for 10 seconds on each side of heater.

E. The heater is not reconnected to electrical supply for a minimum of 1 hour or until the heater is thoroughly dry.

Improper cleaning of the heater can cause severe personal injury or property damage due to water and/or cleaning solution:

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

Clean internal components of the heater with a soft, dry brush or cloth, or compressed air.

Maintenance Instructions

1. Have your gas supplier check all gas piping annually for leaks or restrictions in gas lines. Also, at this time have your gas supplier clean out the sediment trap of any debris that may have accumulated.
2. **The appliance area shall be kept clear and free from combustible materials, gasoline, and other flammable vapors and liquids.**
3. 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.
4. 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.

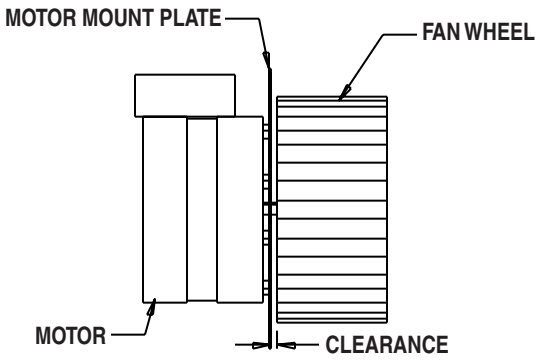
MOTOR AND FAN WHEEL ASSEMBLY

1. Shut off the gas supply to the heater.
2. Disconnect the heater from its electrical supply.
3. Open the case fan access panel on the control box 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 3.2 mm clearance 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.

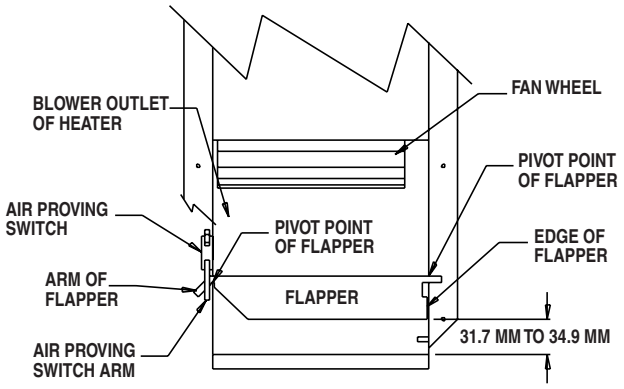
FIG. 8



SAIL SWITCH AND SAIL (FLAPPER)

1. Shut off the gas supply to the heater.
2. Disconnect the heater from its electrical supply.
3. Make sure there is not any dust, dirt, etc. that will cause "binding" on the pivot points of the sail as it rides within the blower housing. If debris is found, use a soft brush or compressed air to clean the area as necessary.
4. The "arm" of the sail should engage the arm of the sail switch when the trailing edge of the sail body is lifted and is approximately 31.7 mm to 34.9 mm off the blower housing bottom. At this distance you will hear a "click" which are the contacts closing within the switch mechanism.
5. If the switch contacts do not close within this distance, then manually push in the arm in the switch to make sure the switch is not defective. If a "click" is heard, the switch is good and the sail arm then needs to be adjusted to engage the switch arm.
6. Using a needle nose pliers, gently bend up the arm of the sail **(NOT THE SWITCH ARM)** in increments until the sail arm engages the switch arm, closing the contacts of the switch when the sail body trailing edge is 31.7 mm to 34.9 mm from the housing bottom.

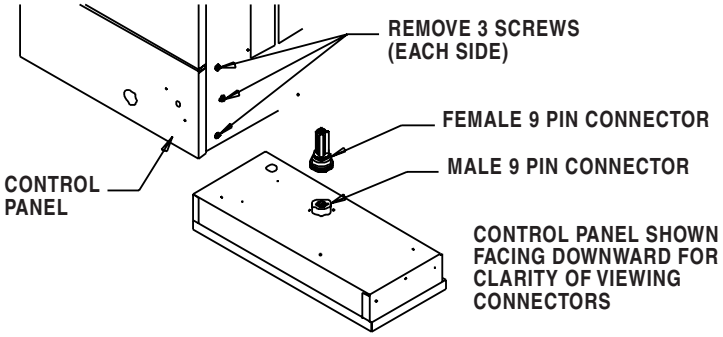
FIG. 9



TO REMOVE CONTROL BOX FROM HEATER

1. Shut off the gas supply to the heater.
2. Disconnect the heater from its electrical supply.
3. Open the motor access panel.
4. Turning counterclockwise, disconnect the 9 pin female/male pin connector socket located on the back of the panel.
5. Remove three (3) screws on each side of the control panel and remove the control box from the heater.
6. To assemble, reverse above procedure.

FIG. 10



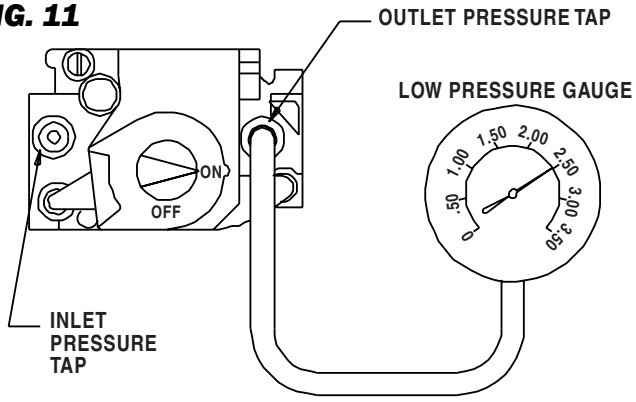
GAS CONTROL VALVE

⚠ 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 placed 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. Remove the metal cover from the control valve enclosure.
   d. Turn the screw in the pressure tap at the outlet of the valve counterclockwise a minimum of one full turn.
   e. Connect a low pressure gas gauge to the pressure tap.
   f. Open fuel supply and reconnect heater to electric supply.
   g. When heater lights, the gas gauge will read 2.50 KPa - LP or 1.13 KPa - Natural gas pressure. This pressure is the flowing gas pressure necessary for the heater to deliver maximum output. If the gauge does not indicate proper manifold pressure, check inlet pressure to the gas control valve. Maximum and minimum acceptable inlet pressures to gas control valve are shown in the heater specifications table (See page 4.) and on the heater's dataplate The inlet pressure may need adjustment as necessary to achieve proper manifold 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 gas supply and reconnect the heater to its electrical supply.
3. Reinstall the metal cover.

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. Disconnect the plastic male and female plugs located at the end of the igniter leads. See Fig. 12
5. Remove the screw securing the igniter shield and the igniter to the mounting bracket and remove the igniter and shield.
6. Connect the male plug on the replacement igniter to the female connector plug on the red wires which lead back to 9 pin connector housing.
7. Position the igniter so the lip on back side of igniter is resting on the edge of the mounting bracket and so the mounting hole in the igniter aligns with the mounting hole in the bracket.
8. Slide the igniter shield over the igniter so hole in shield aligns with hole in igniter and bracket.
9. Install igniter retaining screw and tighten snugly. DO NOT OVERTIGHTEN. Overtightening can cause cracks in base of igniter, possibly leading to future igniter failure.

IMPORTANT

- Do not handle the igniter by the igniter element. Doing so may cause premature igniter failure. Handle the igniter by its ceramic base, or by its leads.
- Center the igniter shield over the igniter element, making sure the shield does not touch the igniter element, otherwise igniter damage will occur when the igniter is energized..
- Do not overtighten the igniter mounting screw. Overtightening will crack the base of the igniter, leading to premature failure.

FLAME SENSOR

Complete this procedure at least once during the heating season.

1. To help maintain proper flame sense, the sensor should be removed from its mounting bracket and its metal rod cleaned using steel wool or emery cloth. Rub briskly to remove build up of dust, dirt and aluminum oxide. Be careful not to fracture the ceramic base of the sensor. See Fig. 12 for sensor location.
2. Check the flame sensor's ceramic base for any cracks. If cracks are found, replace the sensor.

IMPORTANT

- For proper flame sense operation, the flame sensor tip must be properly positioned within the burner flame. Normally 12.7 mm to 19 mm is sufficient. See Fig. 13.

FIG. 12

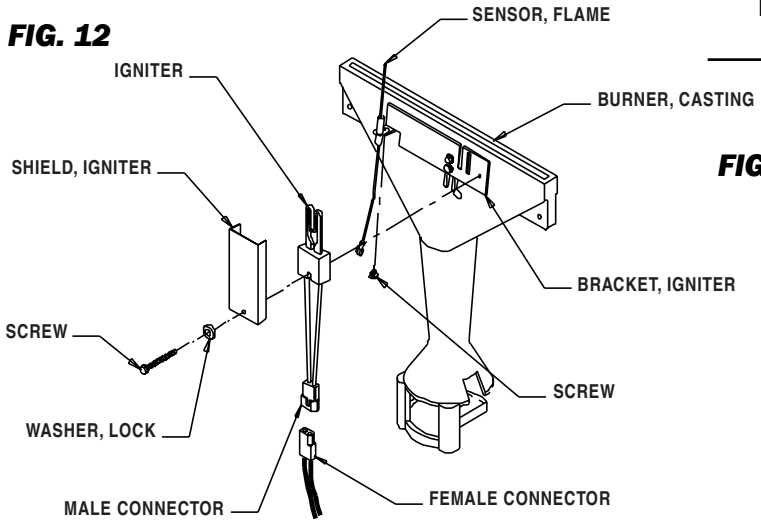
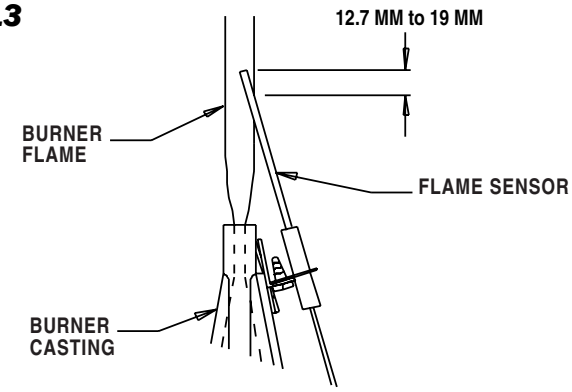


FIG. 13



TESTING THE MANUAL RESET HIGH LIMIT SWITCH

⚠ WARNING

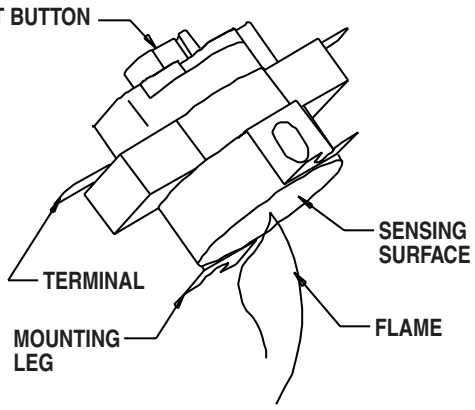
Fire Hazard

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

The high limit switch 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. Remove the high limit switch from the heat chamber.
3. Holding the switch by one of its mounting legs or electrical terminals, apply a small flame only to the sensing surface 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.
5. Allow the switch cool down for about a minute before firmly pressing the red 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. 14



Troubleshooting Guide

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 troubleshooting flow charts on the following pages 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.
- **Microamp Diagnostic Kit** - (L. B. White Part No. 500-08507) When used with a standard digital multimeter, this kit allows testing of the flame sensor on direct ignition systems.
- **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 heater.)
- Check all wiring for loose connections and worn insulation.

Refer to the system operation sequence in this section to gain an understanding as to how the equipment operates during a call for heat. Understanding the operation sequence 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 specific pattern depending upon the problem which is diagnosed. To effectively use the flow charts, you must first identify what the problem is by the flashing pattern of the L.E.D. (light emitting diode) diagnostic light. If the light is flashing, the flash pattern will be followed by a pause and then a repeat of the flash pattern until the problem is corrected. Refer to the tables below to identify what page to refer to when troubleshooting any problems.

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

Components should be replaced only after each step has been completed and replacement is suggested in the flow chart.

DIRECT IGNITION OPERATION SEQUENCE:

(Heating Mode)

- Line Voltage is Sent from Selector Switch to Transformer
- 24 V.A.C. is sent from Transformer to the Thermostat
- A call for Heat Occurs
- 24 V.A.C. is sent from Thermostat to Ignition Control Module
- Red Light on Ignition Module Begins to Glow
- Ignition Control Module Performs an Internal Safe Start Check
  - Internal Components are Tested
  - Voltage is sent to Flame Sensor from Control Module to Start Flame Proving Process
  - Air Flow Circuit is Checked
- Ignition Control Module Begins Safety Lockout Timing
- Ignition Control Module Starts Fan Motor for Prepurge
  - Air Flow Switch is Checked for Proper Operation
  - Module Stops the Fan Motor
- Ignition Control Module Powers the Igniter
- Ignition Control Module Restarts the Fan Motor (after igniter warm-up)
  - Air Flow Switch Closes
  - Gas Control Valve Opens
- Ignition Occurs
  - Igniter stays “Powered-up” for 6 seconds after Ignition
  - Flame Proving occurs (in 6 seconds)
  - Igniter Shuts Off
  - Gas Valve Stays Open
- Room Warms to Desired Temperature
  - Thermostat is Satisfied
  - Heater Shuts Down
- Process Starts Again on Call for Heat

IGNITION FAILURE SEQUENCE:

- First Trial for Ignition Takes Approximately 30 Seconds
- Two More Trials for Ignition will Occur
  - Second Trial Follows Immediately if First Trial Fails
  - Module Starts a 15 Minute “Wait” Period to Allow Ignition Interruption to Pass
  - Third and Final Trial Occurs After 15 Minute Wait Period
- If Ignition Control Module Does Not Prove Flame After Third Trial, the Module Goes into Safety Lockout (3 Flash Pattern)
  - Igniter Shuts Down
  - Fan Motor Stops
  - Gas Valve Closes
- To Manually Reset the Ignition System
  - Unplug the Heater and Plug it back in

-- OR --

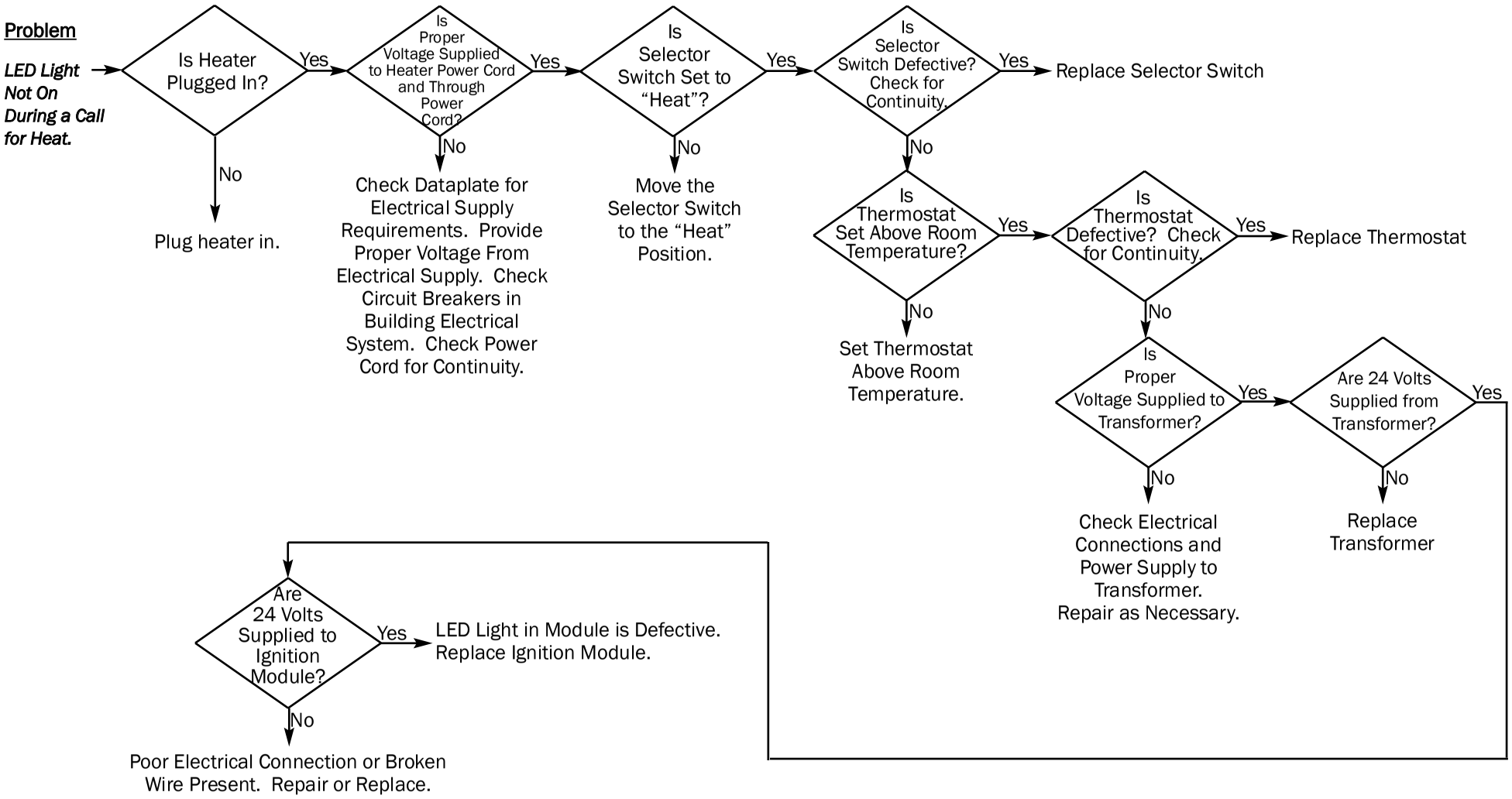
Turn Thermostat to “Off” or “No Heat” and Then Back to Above Room Temperature

-- OR --

Move the Heat/Vent Selector Switch to “Off” and Then Back to “Heat”

HEATING MODE PROBLEMS

LED Constant On → Normal Operation



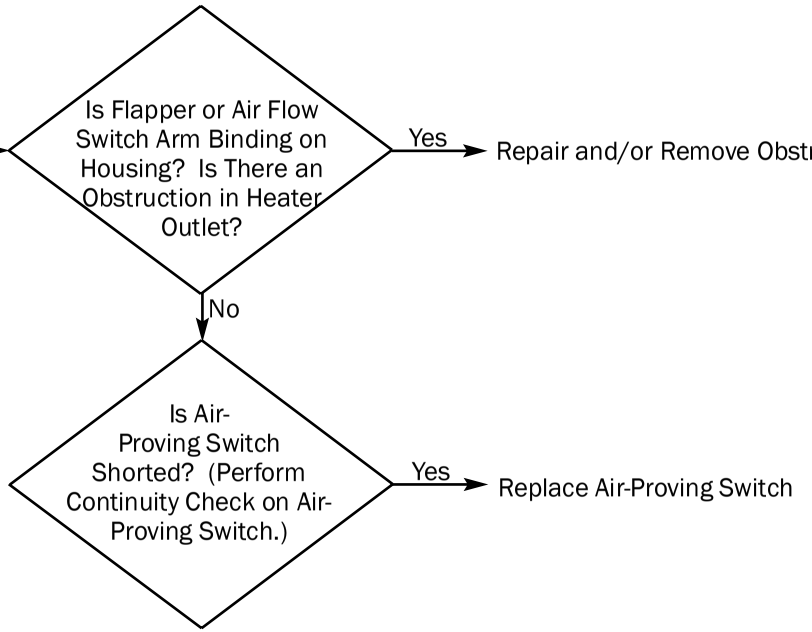
Problem

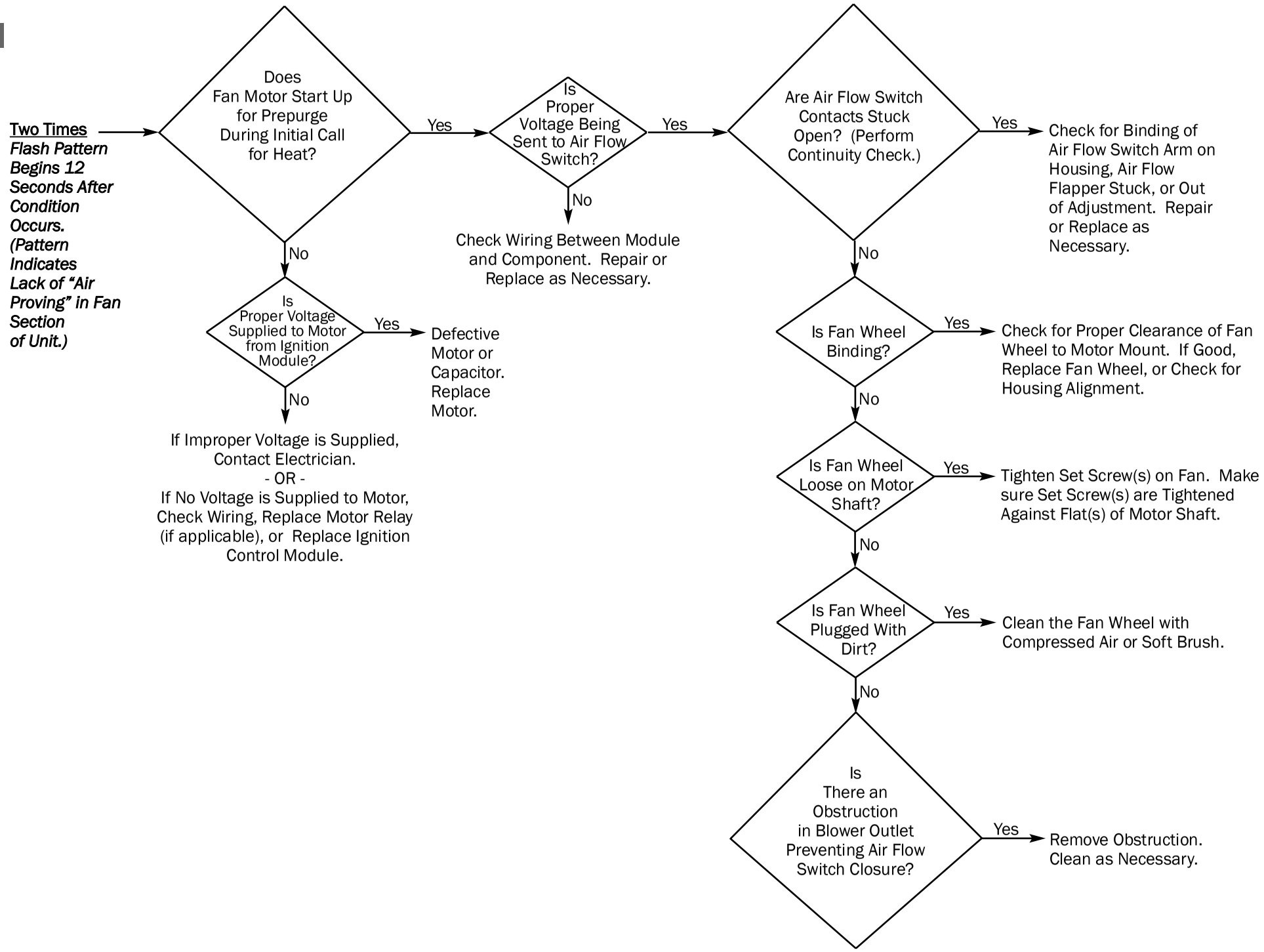
LED Flashing

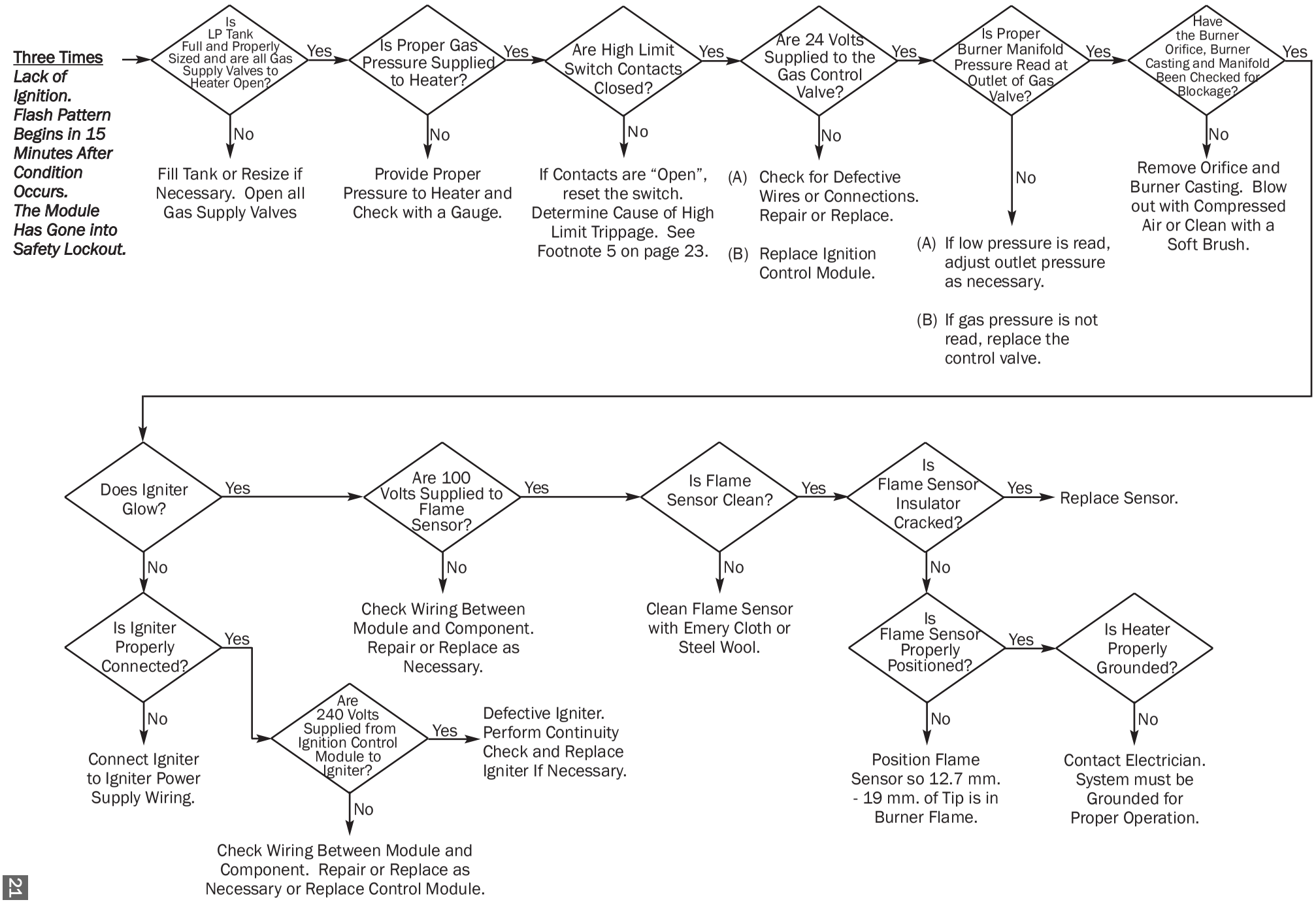
Rapid Flash → Reverse Polarity. Have Electrician Check Neutral and Hot Wire Connections that Outlet Heater is Connected to.

Long Flash → *Two Seconds On, Two Seconds Off Repetitively for 15 Minutes.* Heater has Attempted Two Ignition Trials. Heater is in a 15 Minute Wait Period Before Attempting its Third (Final) Trial for Ignition. If Ignition is not Achieved After the Third Trial, the Heater will Lock Out and the Ignition Control Module will Present the "Three Time" Flash Pattern. Either Recycle the Heater or Wait for Heater to Attempt Third Ignition Trial.

One Time → *Flash Pattern Begins Immediately, Fan Does Not Run. Heater Does Not Light.*




Two Times
Flash Pattern Begins 12 Seconds After Condition Occurs. (Pattern Indicates Lack of "Air Proving" in Fan Section of Unit.)
Does Fan Motor Start Up for Prepurge During Initial Call for Heat?
Yes
No
Is Proper Voltage Being Sent to Air Flow Switch?
Yes
No
Check Wiring Between Module and Component. Repair or Replace as Necessary.
Are Air Flow Switch Contacts Stuck Open? (Perform Continuity Check.)
Yes
Check for Binding of Air Flow Switch Arm on Housing, Air Flow Flapper Stuck, or Out of Adjustment. Repair or Replace as Necessary.
No
Is Proper Voltage Supplied to Motor from Ignition Module?
Yes
Defective Motor or Capacitor. Replace Motor.
No
If Improper Voltage is Supplied, Contact Electrician.
- OR -
If No Voltage is Supplied to Motor, Check Wiring, Replace Motor Relay (if applicable), or Replace Ignition Control Module.
Is Fan Wheel Binding?
Yes
Check for Proper Clearance of Fan Wheel to Motor Mount. If Good, Replace Fan Wheel, or Check for Housing Alignment.
No
Is Fan Wheel Loose on Motor Shaft?
Yes
Tighten Set Screw(s) on Fan. Make sure Set Screw(s) are Tightened Against Flat(s) of Motor Shaft.
No
Is Fan Wheel Plugged With Dirt?
Yes
Clean the Fan Wheel with Compressed Air or Soft Brush.
No
Is There an Obstruction in Blower Outlet Preventing Air Flow Switch Closure?
Yes
Remove Obstruction. Clean as Necessary.


Three Times
Lack of Ignition.
Flash Pattern Begins in 15 Minutes After Condition Occurs.
The Module Has Gone into Safety Lockout.
Is LP Tank Full and Properly Sized and are all Gas Supply Valves to Heater Open?
Yes
No
Fill Tank or Resize if Necessary. Open all Gas Supply Valves
Is Proper Gas Pressure Supplied to Heater?
Yes
No
Provide Proper Pressure to Heater and Check with a Gauge.
Are High Limit Switch Contacts Closed?
Yes
No
If Contacts are "Open", reset the switch. Determine Cause of High Limit Trippage. See Footnote 5 on page 23.
Are 24 Volts Supplied to the Gas Control Valve?
Yes
No
(A) Check for Defective Wires or Connections. Repair or Replace.
(B) Replace Ignition Control Module.
Is Proper Burner Manifold Pressure Read at Outlet of Gas Valve?
Yes
No
(A) If low pressure is read, adjust outlet pressure as necessary.
(B) If gas pressure is not read, replace the control valve.
Have the Burner Orifice, Burner Casting and Manifold Been Checked for Blockage?
Yes
No
Remove Orifice and Burner Casting. Blow out with Compressed Air or Clean with a Soft Brush.
Does Igniter Glow?
Yes
No
Are 100 Volts Supplied to Flame Sensor?
Yes
No
Check Wiring Between Module and Component. Repair or Replace as Necessary.
Is Flame Sensor Clean?
Yes
No
Clean Flame Sensor with Emery Cloth or Steel Wool.
Is Flame Sensor Insulator Cracked?
Yes
Replace Sensor.
No
Is Igniter Properly Connected?
Yes
No
Connect Igniter to Igniter Power Supply Wiring.
Are 240 Volts Supplied from Ignition Control Module to Igniter?
Yes
Defective Igniter. Perform Continuity Check and Replace Igniter If Necessary.
No
Check Wiring Between Module and Component. Repair or Replace as Necessary or Replace Control Module.
Is Flame Sensor Properly Positioned?
Yes
No
Position Flame Sensor so 12.7 mm. - 19 mm. of Tip is in Burner Flame.
Is Heater Properly Grounded?
No
Contact Electrician. System must be Grounded for Proper Operation.

Four Times →	If HSI board does not reset, then replace the board. (Internal board fault.) Have qualified electrician check power source for power quality problems. (Frequency, line noise, or line spikes.)
Five Times *Rapid On/Off Cycling of the Burner.* →	See Flame Sensor Related Problems in "Three Time" Flash Pattern.
Six Times →	Low Microamp Output For Flame Sensing. Check Microamp Output for Proper Flame Proving of Flame Sensor.

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

(2) IMPORTANT: Remember, the ignition control board sends and receives voltages throughout the entire operation sequence. The HSI board 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.

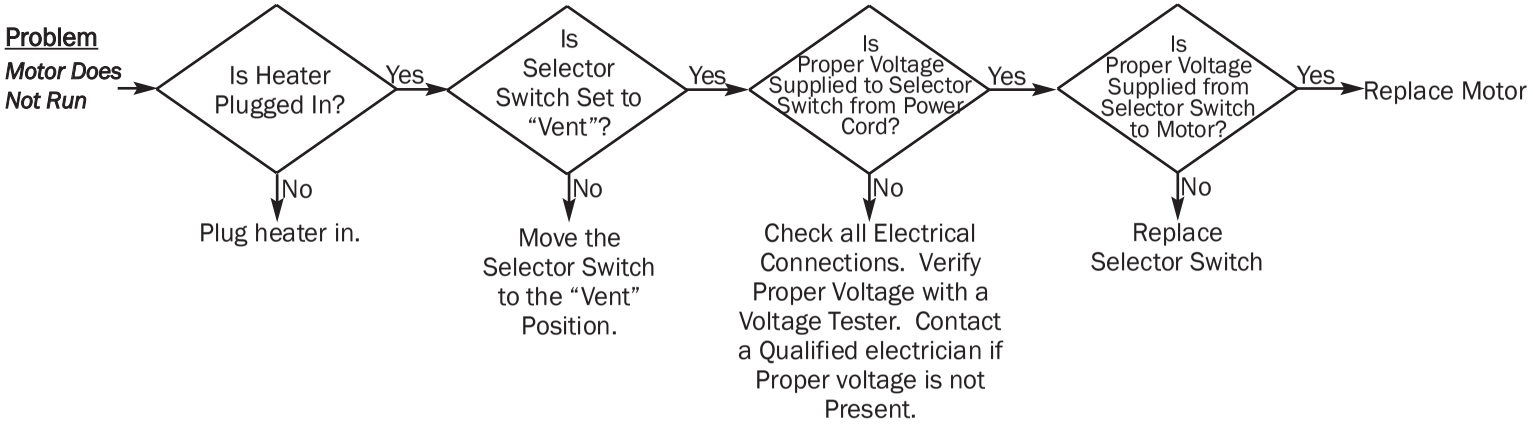
(3) To determine if part is defective, place a jumper wire across the two terminals that the wires are connected to. Use the jumper wire only to determine if part is defective. Replace the part IMMEDIATELY or do not operate unit until properly serviced. NEVER operate a heater with a jumper wire used to bypass a safety device as a temporary fix. (NOTE: The sail switch cannot be jumpered prior to ignition taking place as the control system must "prove" the switch contacts close and open during the prepurge cycle.)

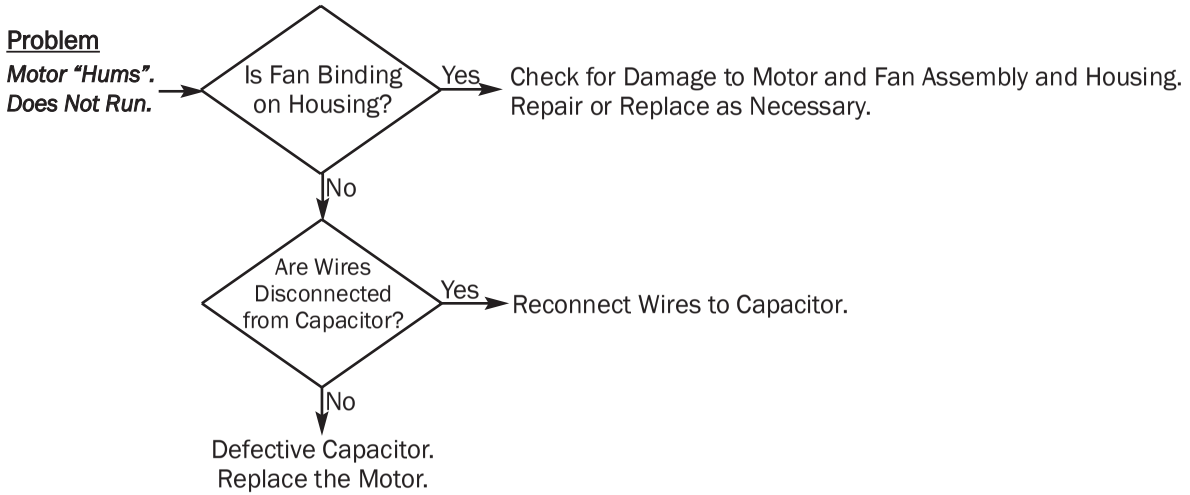
(4) In order to verify the diagnosis of the flashing LED or to reset the unit and retry ignition, disconnect the unit from power and then reconnect to power or if your heater uses a thermostat, turn down thermostat below room temperature and then turn thermostat above room temperature. When testing is completed, reset thermostat to desired temperature.

(5) The high-limit switch will open or "trip" for a variety of reasons, such as high gas pressure, low voltage, excessive dust and dirt build-up within the heater, dirty fan assembly, fan is not tightened onto motor shaft, and obstructions in air inlets or discharge outlet of heater.

(6) With a six time flash pattern, the heater will continue to operate as normal. This flash pattern means, however, that flame sense is low and that flame failure or improper operation can occur at any time.

VENTILATION MODE PROBLEMS



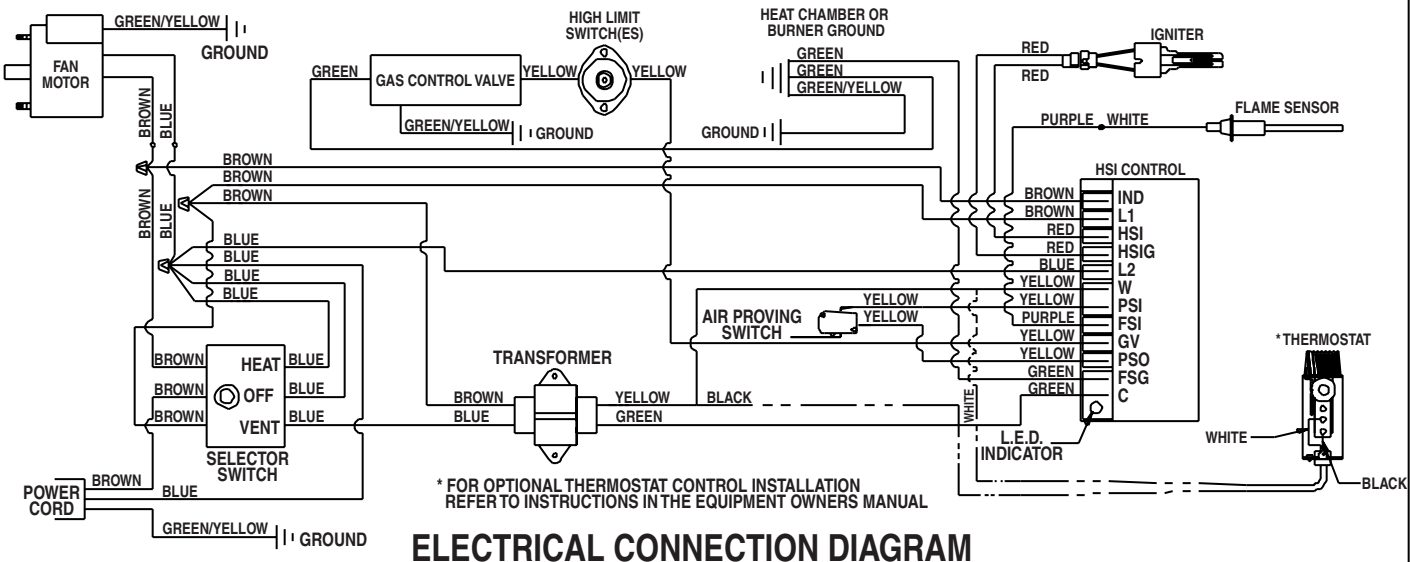


Electrical Connection and Ladder Diagram

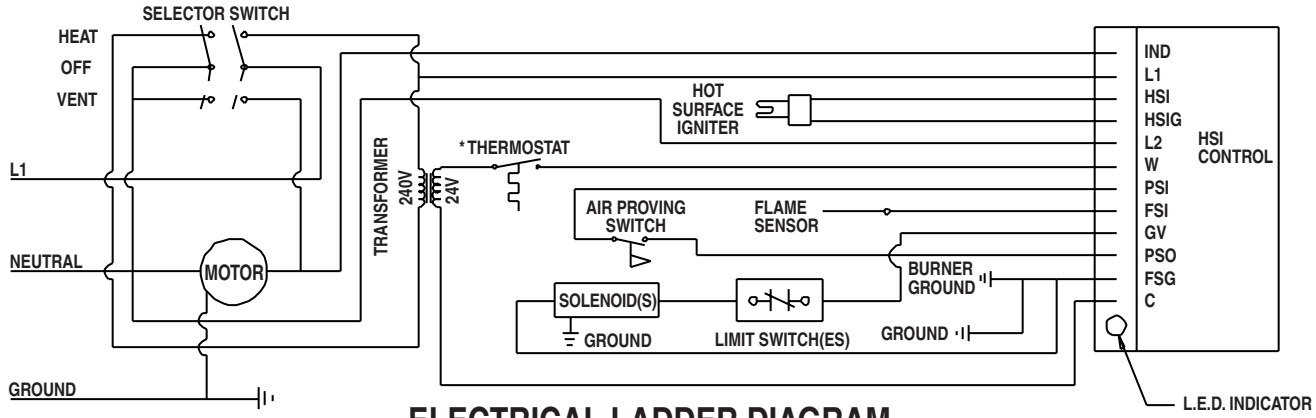
CAUTION

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 HAVING A TEMPERATURE RATING OF AT LEAST 150° C.

Heater Component Function

Air Proving Switch
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 channel gas and provide an area at which the fuel may ignite.

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

Fan Housing
Chamber used for compressing 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 open allowing 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 convey 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.

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

Igniter
Ignition device used on automatic ignition control systems. Ignites gas by surface temperature rather than by spark or flame.

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

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

Sail (Flapper)
A formed piece of stainless steel located in the blower outlet of the heater that pivots up with an increase in air pressure, thereby engaging air flow switch.

Selector Switch
Electrical device which allows the grower to use the heater for either heating or ventilation.

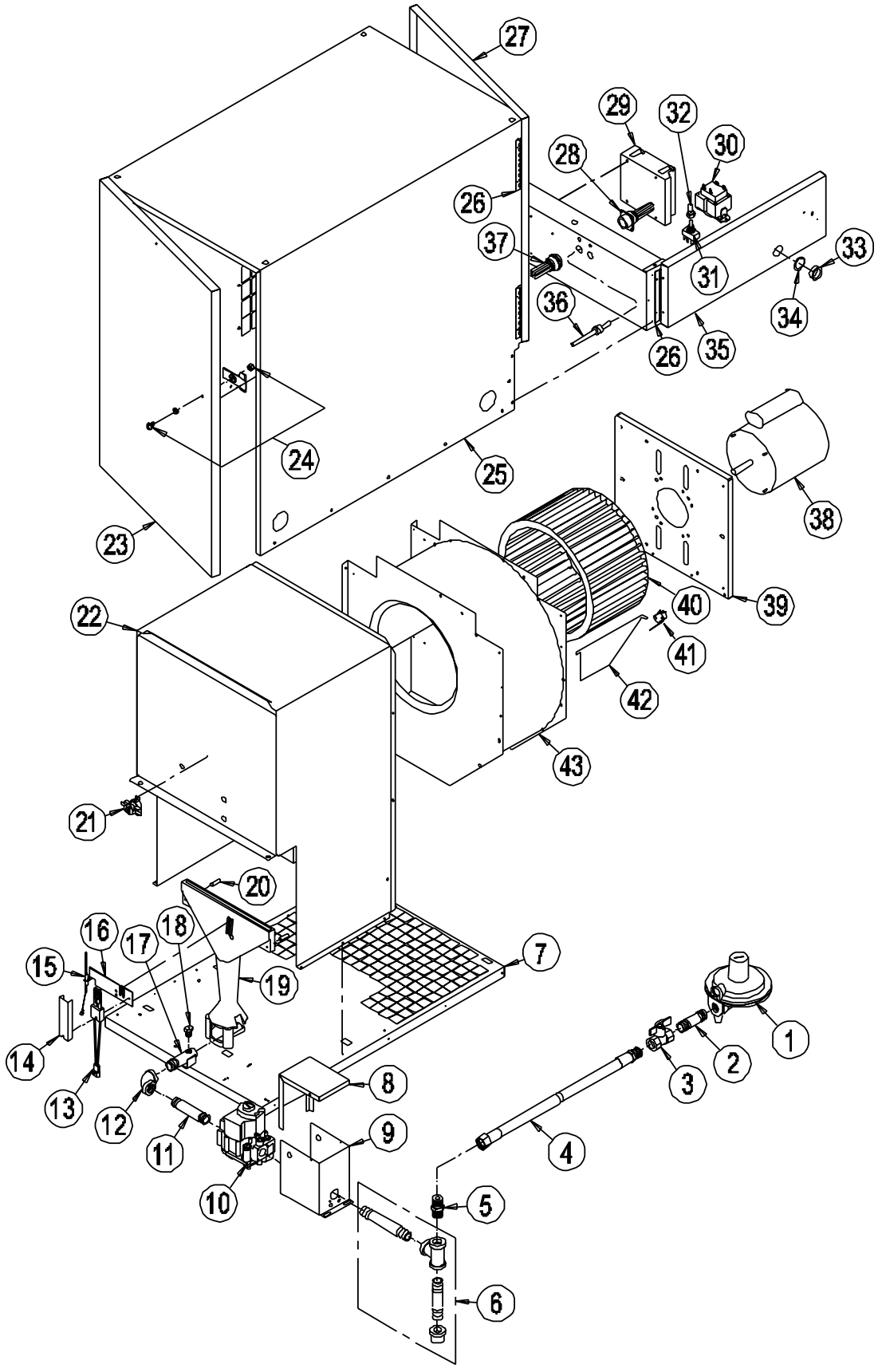
Sensor
Device used in conjunction with the ignition control board to insure that the burner flame exists during a call for heat.

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 take higher incoming voltage and reduce it to lower outgoing voltage to operate certain control systems.

Parts Identification

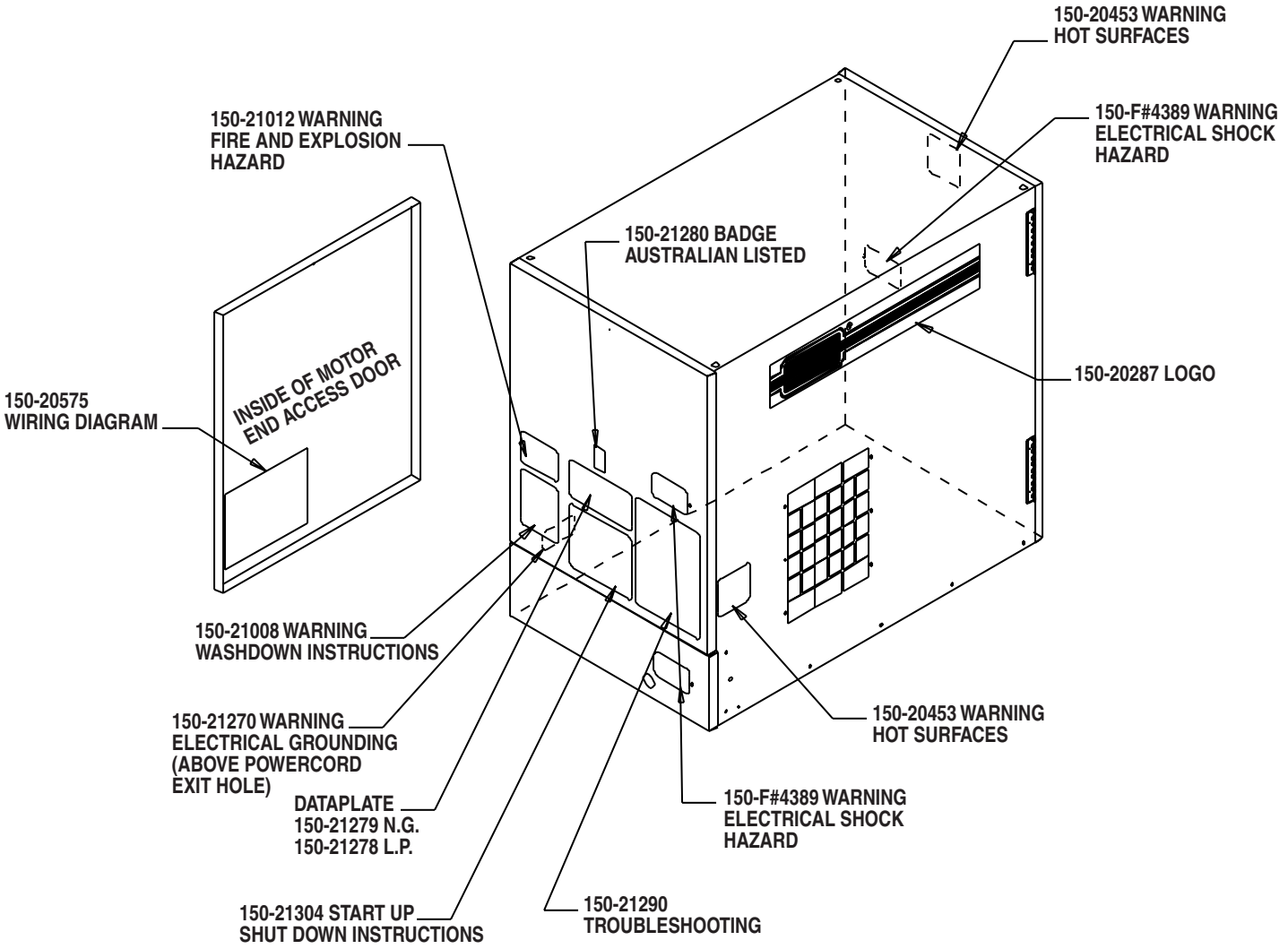
PARTS SCHEMATIC



Item	Description	Part No.
1	Regulator (L.P. Gas)	400-20126*
	Regulator (Natural Gas)	500-07087*
2	Nipple, 12.7 mm x 89 mm	130-07148*
3	Valve, Manual Shut-Off	130-05548*
4	Hose, 12.7 mm ID x 3 Meter	550-20714*
5	Adapter, Hose	310-02894*
6	Kit, Sediment Trap	500-00815
7	Base	225-20724
8	Cover, Gas Control	225-09287
9	Bracket, Gas Control Valve	225-09506
10	Valve, Gas Control (L.P. Gas)	500-22207
	Valve, Gas Control (Natural Gas)	500-22208
11	Nipple	130-07148
12	Elbow	130-01426
13	Igniter	550-20748
14	Shield, Igniter	240-20577
15	Sensor, Flame	120-20139
16	Bracket, Igniter	260-20722
17	Manifold	420-09291
18	Orifice, Burner (L.P. Gas)	310-20049
	Orifice, Burner (Natural Gas)	310-21113
19	Burner	320-03453
20	Spacer	130-02687
21	Switch, High Limit	120-05566
22	Chamber, Heat	400-20024
23	Door, Right	225-20757
24	Latch, Assembly (for case assembly and control box)	550-20959
25	Case, Assembly with Doors and Latches	400-21286
26	Hinge	130-05868
27	Door, Left	225-20756
28	Harness, 9 wire, 9 male pin	120-20574
29	Control, Ignition	120-20579
30	Transformer, 240/24 v.	120-20659
31	Switch Selector	120-09915
32	Boot, Selector Switch	130-09916
33	Plug, Window	130-08255
34	O-Ring, 28.6 mm O.D.	130-08347
35	Cover, Control Box	400-21289
36	Cord, Power, 3 m	120-20572
37	Harness, 9 wire, 9 female pin	120-20573
38	Motor, 187 Watt, Ball Bearing	120-20668
39	Mount, Motor	225-08647
40	Wheel, Fan	130-09050
41	Switch, Air Flow with Screws and Nuts	500-02680
42	Sail, Air Flow	240-21035
43	Housing, Fan, with Sail, Air Flow Switch and Motor Mount	500-20250

* Optional Accessory

Label Identification



WIRE SELECTION TABLE

Description	Color	Length	Part Number
Wire, Burner to Gas Control Valve	Green	46 cm	120-20138
Wire, Motor to Ground	Green/Yellow	36 cm	120-21194
Wire, Terminal “L1” and “IND” on Ignition Control to Wire Nuts	Brown	33 cm	120-20569
Wire, High Limit Switch to Gas Control Valve	Yellow	56 cm	120-20570
Wire, Terminal “L2” on Ignition Control to Wire Nut	Blue	29 cm	120-20571
Wire, Terminal “W” on Ignition Control to Transformer	Yellow	14 cm	120-20660
Wire, Terminal “C” on Ignition Control to Transformer	Green	16.5 cm	120-20661
Wire, Toggle Switch and Transformer to Wire Nut	Brown	19 cm	120-20662
Wire, Toggle Switch to Wire Nut	Blue	15 cm	120-20663
Wire, Toggle Switch to Transformer	Blue	14 cm	120-20664
Wire, Burner to Ground	Green/Yellow	168 cm	120-21192
Wire, Gas Control to Ground	Green/Yellow	168 cm	120-21193

FASTENER SELECTION TABLE

Description	Application	Part Number
Bolt, 3/8	Burner Mounting	130-02692
Nut, Cage	Case Top (for hanging)	130-07708
Nut, Hex	Toggle Switch Nut	130-20683
Nut, Hex, Locking	Transformer Mounting	F130-83172
Screw	Igniter Bracket to Burner	130-01213
Screw	Transformer Mounting	130-05552
Screw	Ignition Control	130-02330
Screw	Burner	130-02688
Screw	Flame Sensor Mounting	130-03027
Screw	High Limit Switch	130-06658
Screw	Igniter Mounting	130-07240
Screw	Used in all other applications	130-07288
Washer, Flat	Burner Mounting	130-01589
Washer, Lock	Igniter Mounting	130-02726

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.