



Owner's Manual and Instructions



MODEL	IGNITION	OUTPUT (Btuh)	FUEL
PALS	Direct Spark	250,000	Propane Vapor
		200,000	Natural Gas

Certification by:



Congratulations!

You have purchased the finest 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, toll-free, at (800) 345-7200.

ATTENTION ALL USERS

This heater has been tested and evaluated by C.S.A. International in accordance with Standard ANSI Z83.7• CSA 2.14 and is listed and approved as a direct gas-fired convection construction heater with intended use for primarily the temporary heating of buildings under construction, alteration, or repair. As an alternative use, this heater has also been tested and evaluated by the L.B. White Co., Inc. for the heating of PALS agricultural animal confinement buildings. **This heater is designed for indoor hanging installation only. It shall be installed according to minimum clearances as prescribed in this owner's manual and on the heater's dataplate.** If you are considering using this product for any applications other than those previously stated, then please contact your fuel gas supplier or the L.B. White Co., Inc.



Quality heaters you can count on.

W6636 L.B. White Rd., Onalaska, WI 54650 ■ (800) 345-7200 ■ (608) 783-5691 ■ (608) 783-6115, fax ■ info@lbwhite.com

150-22668-B



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 800-345-7200.



WARNING

- Proper gas supply pressure must be provided to the inlet of the heater.
- Refer to rating plate 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

- 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.



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 life.

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.



Table of Contents

<u>SECTION</u>	<u>PAGE</u>
General Information	3
Heater Specifications	4
Safety Precautions	5
Installation Instructions	
General	7
Hanging Instructions	8
Hose & Regulator Assembly	9
Start-Up Instructions	10
Shut-Down Instructions	10
Cleaning Instructions	11
Maintenance Instructions	11
Service Instructions	
General	11
On/Off Switch	12
Ignition Module	12
Voltage Regulator	13
Fuse Holder and Fuse	13
Igniter and Flame Sensor	13
Burner Orifice	14
Gas Control Valve	14
Gas Pressure Checks	15
Troubleshooting Guide	16
Electrical Connection and Ladder Diagram	19
Heater Component Function	20
Parts Identification	
Schematic	21
Parts List	22
Warranty Policy	23
Replacement Parts and Service	23

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 and serial number available. This information is contained on the dataplate.

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 PALS -Wilmar Poultry at 1-800-328-8842 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

Model

CV250

SPECIFICATIONS

Fuel	Propane Vapor	Natural Gas	
Maximum Input (BTUH)	250,000	200,000	
Ventilation Air Required to Support Combustion (CFM)	1,000		
Inlet Gas Supply Pressure Acceptable at the Inlet of the Heater for Purpose of Input Adjustment (PSIG)	MAX.	7.5	5
	MIN.	7.5	3
Burner Manifold Pressure (PSIG)	7.5	1.5	
Electrical Supply (D.C.)	24 Volts		
Amp Draw	0.5		
Fuel Consumption Per Hour	11.6 lbs.	200 cu. ft.	
Dimensions (Inches) L x W x H	19 1/4 x 15 x 25		
Minimum Safe Distances From Nearest Combustible Materials	TOP	5 ft. 10 in.	
	SIDES	4 ft.	
	BOTTOM	4 ft.	
	GAS SUPPLY	6 ft. (1.83 m)	N/A
Minimum Ambient Temperature in Which Heater May be Used	32° F		
Net Weight (lbs.)	16		
Shipping Weight (lbs.)	19		

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

Propane 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 gas tank or cylinder fuel supply valves, or the main fuel supply valve located at the meter if you use natural gas.
- Propane 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 or natural gas. You must determine if you can smell the odorant in these fuel gases.
- Learn to recognize the odor of propane gas and natural gas. Local propane 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 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 gas odor may differ in intensity at different levels. Since propane 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 gas and natural gas have a distinctive odor. Learn to recognize these odors. (Reference "Fuel Gas Odor" and "Odor Fading" sections above.)
- Even if you are not properly trained in the service and repair of the heater, ALWAYS be consciously aware of the odors of propane gas and natural gas.
- If you have not been properly trained in repair and service of propane 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 gas or natural gas fuel system.
- 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, state and national codes as well as the manufacturer's requirements.
2. We cannot anticipate every use which may be made of our heaters. Check with your local fire safety authority if you have questions about applications.
 3. All installations and applications of L.B. White heaters must meet all relevant local, state and national codes. Included are propane 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.

Also refer to:

- ANSI/NFPA 58, latest edition, Standard for Storage and Handling of Liquefied Petroleum Gas and/or:
 - ANSI Z223.1/NFPA 54, National Fuel Gas Code
 - ANSI/NFPA 70, National Electrical Code.
4. Do not move, handle, or service heater while in operation or connected to a power or fuel supply.
 5. For safety, never operate this heater with any of its safety devices that have been bypassed. Do not operate this heater unless all of these features are fully functioning.
 6. Do not operate the heater with case removed.
 7. Do not locate fuel gas containers or fuel supply hoses anywhere near the discharge outlet of the heater.

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 or animal loss.
9. The hose assembly 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, periodically, and when relocating the heater, its gas supply, or gas supply line.
11. This heater should be inspected for proper operation by a qualified service person before building repopulation, each use, and at least annually.
12. Always turn off the gas supply to the heater when the heater is not in use.
13. This heater is wired for a three-wire 24 Volt D.C. electrical system. There is a positive lead, negative lead, and a ground lead. The heater must be properly connected into a grounded electrical supply using the ground lead in the power cord.
14. If gas flow is interrupted and flame goes out, do not relight the heater until you are sure that all gas that may have accumulated has cleared away. In any event, do not relight the heater 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 that are rated and approved for propane gas and natural gas in a hanging type of installation.
16. When hanging the heater, use only approved gas hose or approved flexible connectors which are rated for use with propane or natural gas.
17. If your heater utilizes propane vapor, the minimum propane gas supply cylinder size should be a 100 pound cylinder. When using a cylinder supply system, it should be arranged to provide vapor withdrawal from operating cylinder.
18. When the heater is to be stored indoors, the connection between the propane gas supply cylinder(s) and the heater must be disconnected and the cylinder(s) removed from the heater and stored in accordance with the Standard for the Storage and Handling of Liquefied Petroleum Gases, ANSI/NFPA 58.
19. Propane gas supply cylinders have left-handed threads. Always use a wrench to make the connection to remove the P.O.L. fitting. Do not use a pliers.

Installation Instructions

GENERAL



WARNING

Fire or explosion hazard.

Can cause property damage, severe injury or death.

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

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. 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. The heater is approved for indoor use only.
4. The heater shall be installed so that it is not directly exposed to water spray, rain, and dripping water.
5. Certified construction heaters include a gas hose and single-stage regulator. The single-stage regulator is to be used only in applications where temporary use of the heater is required. Contact the L.B. White Co. or your fuel gas supplier if you have questions.
6. For permanent heater installations, two-stage gas regulation is required. The heater's second-stage 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.
7. 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.
8. Make certain that a sediment trap is installed near 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.
9. Any heater connected to a piping system must have an accessible, approved manual shut off valve installed within six feet (6 ft.) of the heater it serves.

10. Check all connections for gas leaks using approved gas leak detectors. Gas leak testing is performed as follows:



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.
- 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.
 - Furthermore 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.
 - 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.
11. A qualified service agency must check for proper operating gas pressure upon installation of the heater.
 12. Light according to instructions on heater or within owner's manual.
 13. It is extremely important to use the proper size and type of gas supply line to assure proper functioning of the heater. Contact your fuel gas supplier for proper line sizing and installation.

14. Make sure the heater has the proper gas regulator for the application. 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.
15. This heater is configured for use with propane gas vapor withdrawal only. Do not use the heater in a propane gas liquid withdrawal system or application. If you are in doubt, contact the L.B. White Co., Inc.
16. 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.

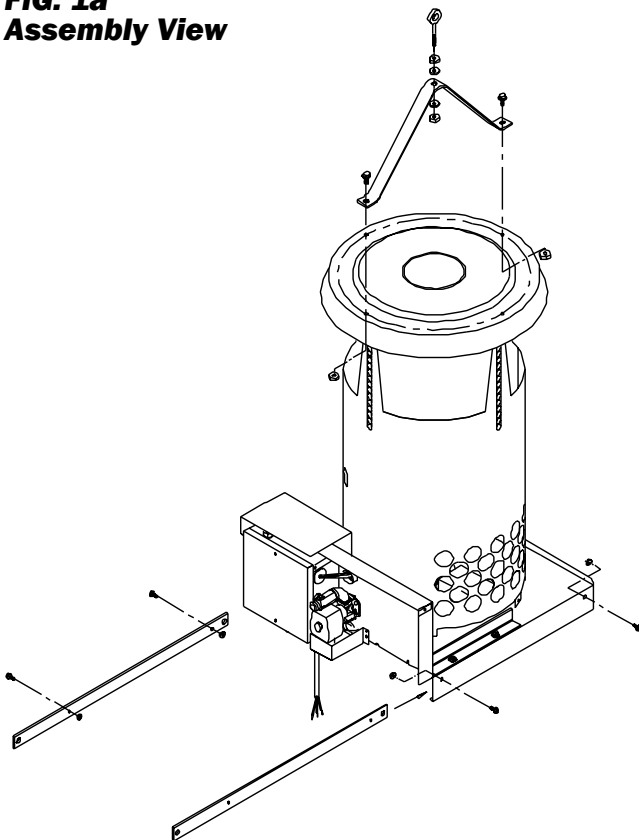
17. Take time to understand how to operate and maintain the heater by using this Owner's Manual. Make sure you know how to shut off the gas supply to the building and also to the individual heater. Contact your fuel gas supplier if you have any questions.
18. Any defects found in performing any of the 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.

HANGING INSTRUCTIONS

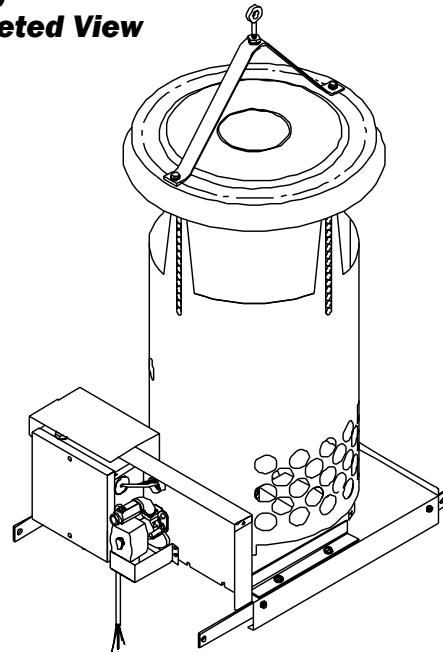
A. Hanging Kit Assembly (See Fig. 1a and 1b)

1. Position mounting supports within base legs of heater so holes in support and base align.
2. Install the 10-24 x 1/2 machine screws through base leg and mounting support. Secure in place with 10-24 nuts.
3. Assemble eye bolt, nut, and washers to center hole of hanging strip. Tighten the nuts securely.
4. Remove two case top screws and nuts directly across from each other.
5. Align hood support holes with screw holes.
6. Reinstall case top nuts and screws so strip is attached to case top. Tighten nuts and screws securely.

**FIG. 1a
Assembly View**



**FIG. 1b
Completed View**

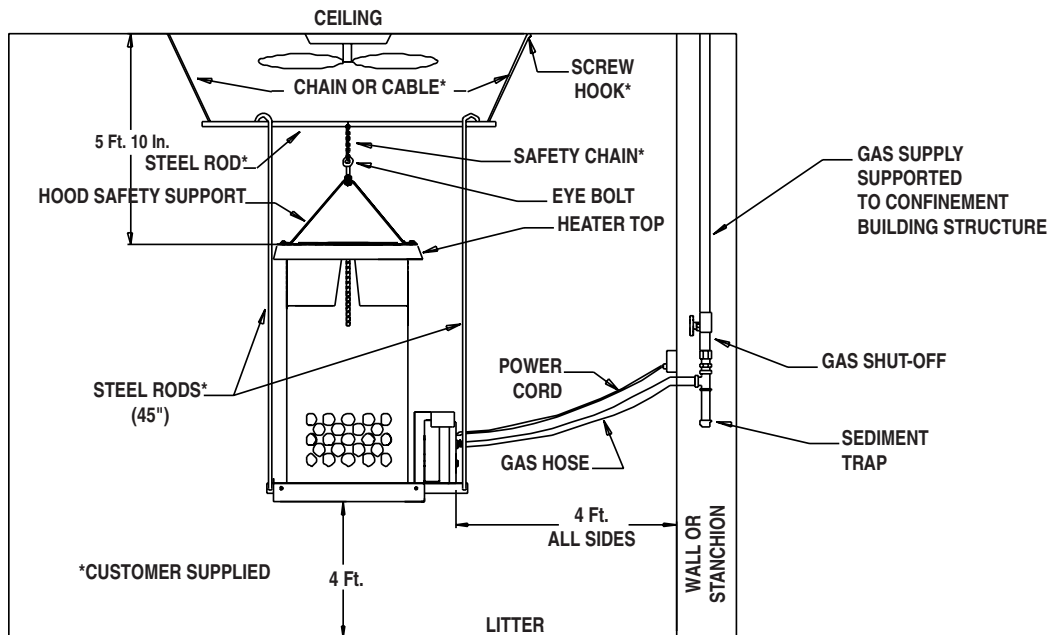


B. Hanging the Heater

1. Observe and obey all minimum safe distances to the nearest combustible materials. Minimum safe distances are given on the heater's data plate and are as follows:
 - Top to Ceiling: 5 Ft. 10 In.
 - Sides: 4 Ft.
 - Bottom: 4 Ft.
2. Ensure the heater is properly positioned before use and is hung level.
3. See Fig. 2 on Page 10 for a typical PALS indoor installation. In any animal confinement building, consideration must be given to making sure the heater is located away from livestock so that livestock cannot knock the heater, tear it loose from its mounting, or damage the heater, its power supply cord, or gas supply line in any way.

(Continued on page 9)

FIG. 2



HOSE AND REGULATOR ASSEMBLY

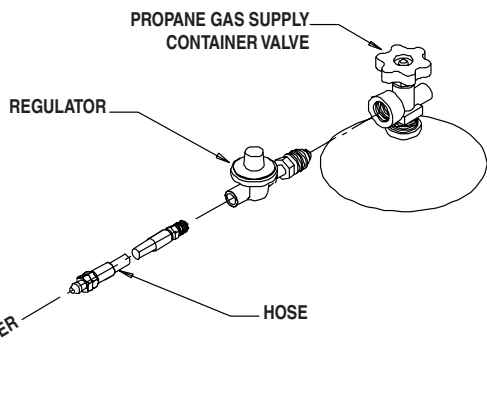
ATTENTION

- Always use approved pipe thread compound suitable for use with propane gas or natural gas.
- Tighten all connections securely and check them all for gas leaks using approved leak detectors.
- The following views show general assembly of the components.
- The regulator must be installed so its vent, regardless of regulator design or vent location, is always pointed downward.

A. Installations using single stage regulators. See Fig. 3.

- This shall only be accomplished on installations where a single heater's gas regulator is intended to be connected to:
 - A single 100 lb. cylinder
 - A manifolded set of 100 lb. cylinders (Up to 3 cylinders maximum)
 - ASME Tank (500 Gallon 1,000 Gallon)
- This type of regulator installation is typically associated with heaters utilized in a construction application.

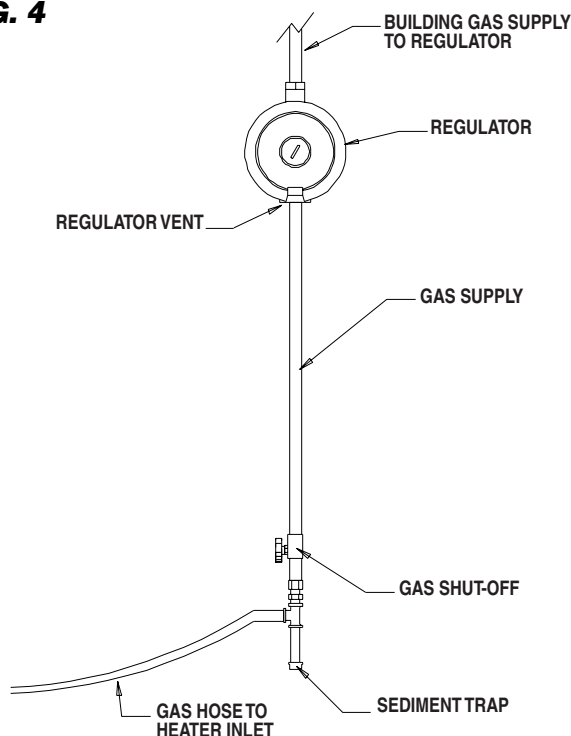
FIG. 3



B. Installations using two stage regulation.

- Connect the hose to a second stage regulator as shown in Fig. 4 when two stage regulation is required. Make sure the regulator's vent is positioned down.
- Two stage regulation is used when a constant gas supply pressure (typically 5-10 PSI) is required for multiple heaters at an installation.
- This type of installation is typically associated with heaters applied within an agriculture confinement building.

FIG. 4

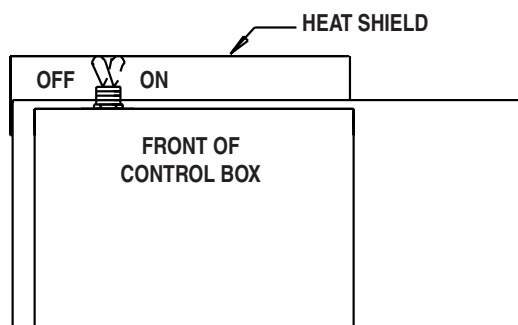


Start-Up Instructions

Follow steps 1 - 5 on initial start-up after heater installation by a qualified gas heater service person. For normal start-up, simply turn building's environmental control thermostat above room temperature. The heater will start.

1. Connect the heater to its approved electrical supply.
2. Open fuel supply valves to the heater.
3. Check for gas leaks with approved leak detectors.
4. Position the On/Off switch on the heater to On. See Fig. 5.
5. When a call for heat is received, the igniter will spark until gas flame sense has been established.

FIG. 5



ATTENTION

- The ignition control has one 6 second trial for ignition.
 - If burner flame is not established, the igniter will stop sparking and the heater will shut down.
 - To recycle the heater for ignition:
 - Position On/Off switch to Off, and then back to On.
- OR
- Turn the buildings temperature control to Off and then On.
 - It is normal for air to be trapped in the gas line on new installation. It may be necessary to recycle the heater more than once before air is purged from the line and ignition takes place.

Shut-Down Instructions

If the heater is to be shut down for cleaning, maintenance or repair, follow steps 1 - 4. Otherwise, the heater will cycle off based upon the building's environment control thermostat.

1. Close all fuel supply valves to heater.
2. Allow heater to burn off any gas remaining in its gas supply line.
3. Position On/Off switch to Off.
4. Disconnect the heater from its electrical supply.

Cleaning Instructions



WARNING

Fire, Burn, and Explosion Hazard

- This heater contains electrical and mechanical components in the gas management and safety 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 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 or a soft brush on its exterior.
 - b. At least once a year, give the heater a thorough cleaning. At this time, remove the case assembly and brush and/or blow off the burner and its related components.
 - c. Observe and obey the Warning within these Cleaning Instructions.



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:

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

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

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.

Service Instructions

GENERAL



WARNING

Burn Hazard

- Heater surfaces are hot for a period of time after the heater has been shut down.
- Allow the heater to cool before performing service, maintenance, or cleaning.
- Failure to follow this warning will result in burns causing injury.



WARNING

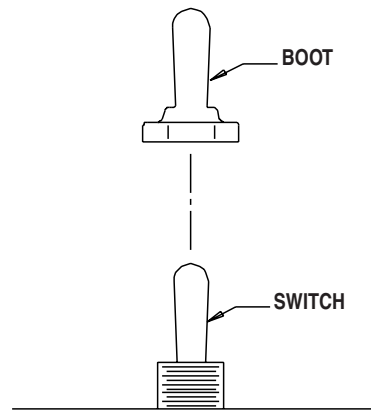
Fire and Explosion Hazard

- Do not disassemble or attempt to repair any component part of the heater, including regulators and gas hoses.
- All components must be replaced if defects are found.
- Failure to follow this warning will result in gas leaks, or improper heater operation
- Gas leaks or improper operation can cause fire or explosions, leading to property damage, injury, or death.

1. Close the fuel supply valve to the heater and disconnect the heater's electrical supply before servicing unless it is necessary to have the valve open and electrical supply connected for your service procedure.
2. Remove control box cover for access to ignition control, voltage regulator, and electrical wiring.
3. For reassembly, reverse the respective service procedure. Ensure gas connections are tightened securely.
3. After servicing, start the heater to ensure proper operation and check for gas leaks.
4. **Clean the heater's burner orifice with compressed air or a soft, dry rag. Do not use files, drills, etc. to clean the orifice holes. Doing so may enlarge the holes, causing combustion or ignition problems. Replace the orifice if it cannot be cleaned properly.**

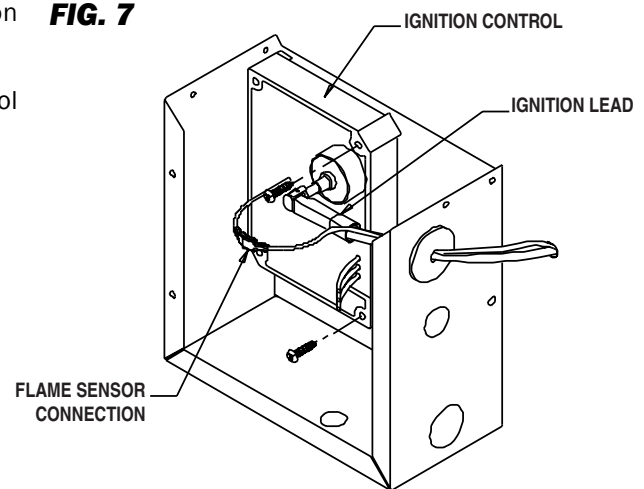
ON/OFF SWITCH

1. Disconnect the electrical leads from the On/Off switch. **FIG. 6**
2. Remove the rubber boot from the On/Off switch. See Fig. 6.
3. Remove the switch from the control box.



IGNITION MODULE

1. Disconnect all electrical leads from the ignition control, including igniton cable and flame sensor.. **FIG. 7**
2. Remove the screws securing the ignition control module to the control box back.



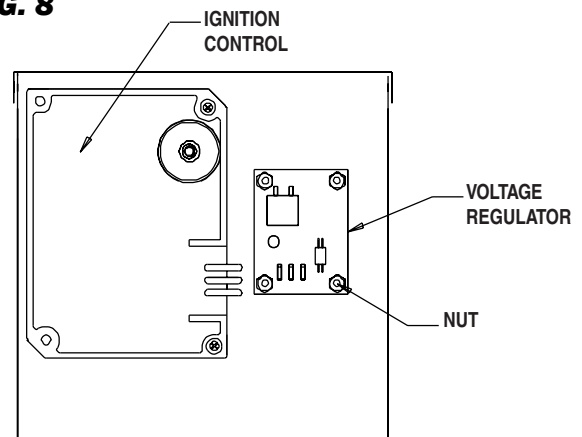
VOLTAGE REGULATOR

ATTENTION

- Handle the voltage regulator at the edges of the board. Do not touch voltage regulator components. Doing so may damage the voltage regulator.

1. Disconnect electrical leads from the voltage regulator.
2. Remove nuts which secure voltage regulator to control box.

FIG. 8



FUSE HOLDER AND FUSE

ATTENTION

- This heater uses a 1.5 amp fuse for over current protection.
- Do not use a fuse with an amperage other than that specified on the fuse as originally supplied.
- An under or over-rated fuse will cause improper operation and may damage ignition related components.

A. Fuse Replacement

1. Remove cap.
2. Push in and turn the fuse retainer. See Fig. 9.

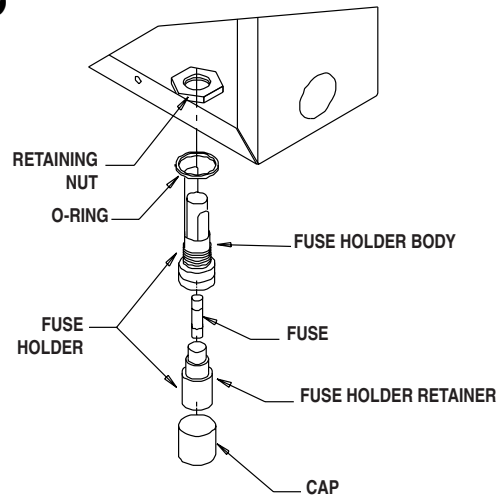
A. Fuse Holder Replacement

1. Remove control box cover.
2. Disconnect electrical leads to fuse holder.

3. Loosen the fuse holder retaining nut. See Fig. 9.

4. Remove fuse holder with O-ring from control box.

FIG. 9



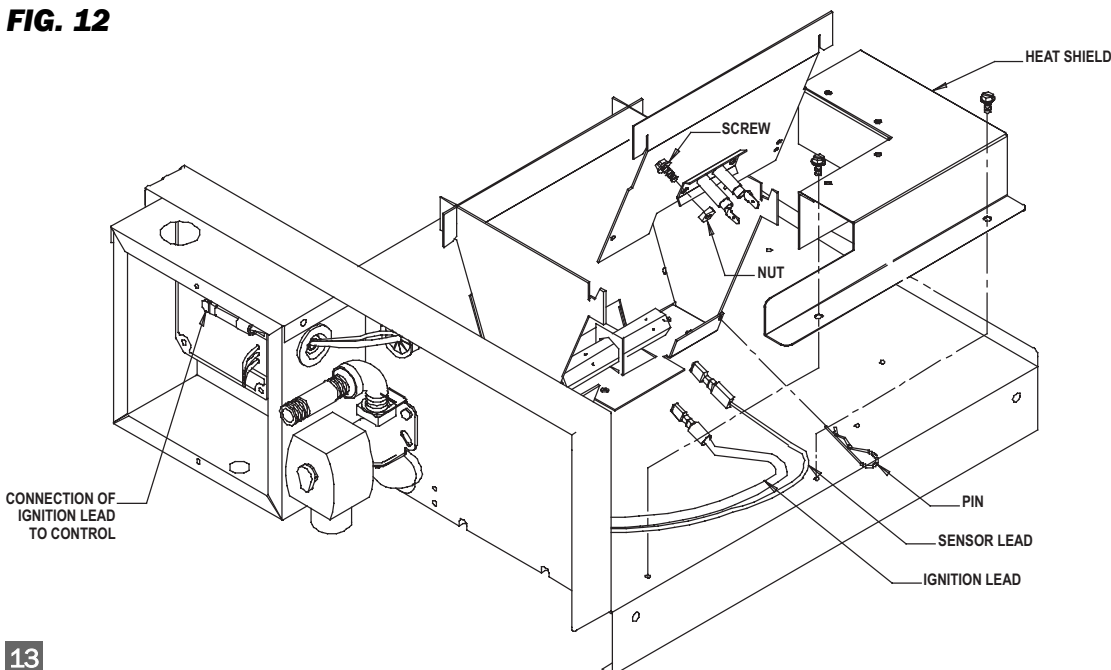
IGNITER AND FLAME SENSOR

1. Open access door on barrel.
2. Remove retaining pin and side panel from main burner assembly. See Fig. 12.
3. Disconnect flame sensor and ignition leads. Remove nuts and screws.
4. Remove heat shield and control box cover if replacing the igniter/sensor wiring. See Fig. 12.

ATTENTION

- The igniter/sensor assembly may require cleaning due to accumulations of dust and dirt over a period of time.
 - If spark appears to be weak, rub the igniter electrode with emery cloth or steel wool to remove buildup.
 - If spark appears strong but the heater cycles off, rub the flame sensor to remove buildup.
- Ensure igniter and sensor gap to inside of burner are:
 - Propane gas - .100
 - Natural gas - .140
- If either the flame sensor or igniter can be moved within the insulator, the assembly requires replacement.

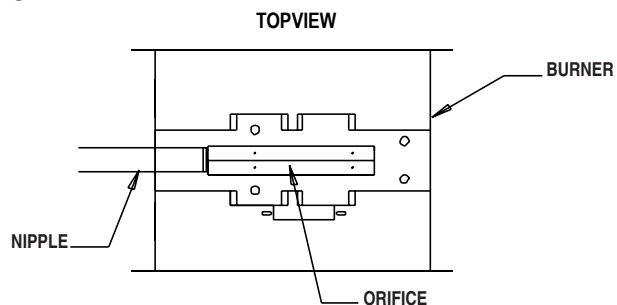
FIG. 12



BURNER ORIFICE

1. Remove gas hose from control valve inlet.
2. Remove control box and solenoid valve covers. See Fig. 10.
3. Remove solenoid valve mounting nut and washer. See Fig. 10.
4. Disconnect solenoid valve leads.
5. Pull solenoid with manifold and burner orifice from heater.
6. Remove burner orifice from manifold.
7. Position the orifice as shown in Fig. 11.

FIG. 11



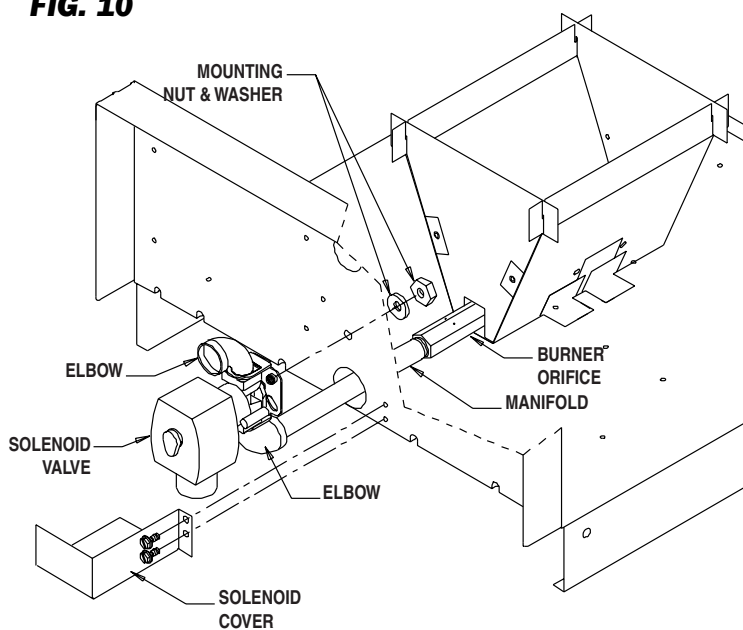
GAS CONTROL VALVE

1. Remove gas hose from heater.
2. Remove control box cover and solenoid valve cover. See Fig. 10.
3. Disconnect solenoid valve leads.
4. Remove solenoid mounting nut. See Fig. 10.
5. Pull solenoid valve with manifold and orifice from heater. See Fig. 10.
6. Remove elbows and mounting bracket.

ATTENTION

- The inlet and outlet flow connections are marked on the replacement gas control's body. Ensure proper installation.

FIG. 10



GAS PRESSURE CHECKS

ATTENTION

- This procedure is to be done once a year prior to the heating season, anytime the heater is moved from one job location to the next, or after servicing the heater.

WARNING

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

MATERIALS REQUIRED

(To be secured through local purchase)

<u>Quantity</u>	<u>Description</u>
1	High Pressure Gas Gauge capable of reading up to 15 PSIG

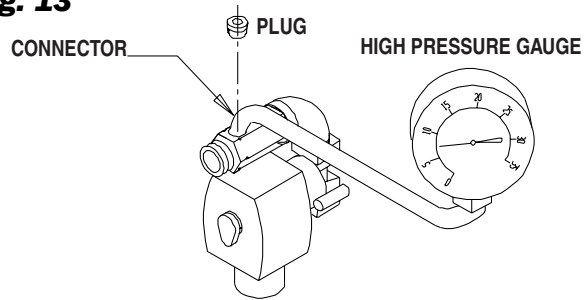
A. PREPARATION

1. Close all fuel supply valves to heater.
2. Disconnect heater from its electrical supply.
3. Allow heater to burn off gas remaining in it's gas supply line..

B. GAUGE INSTALLATION

1. Remove the hex plug as shown in Fig. 14. Attach the pressure gauge to this point.
2. Open fuel supply valves to heater and reconnect heater to its electrical supply.

Fig. 13



C. READING PRESSURES

1. Start the heater. With the heater operating, the pressure gauge should read the pressure specified on the dataplate or in the specification section of this owner's manual.
2. Does the pressure reading agree with that given on the dataplate? If so, no further checking or adjustment is required. Proceed to section D.
3. If the pressures does not agree with that specified on the dataplate, then check the following:
 - Improper regulator for heater.
 - Regulator out of adjustment. (Replace if necessary).
 - Blockage in gas hose.
 - Insufficient size or quantity of propane gas supply containers.

D. COMPLETION

1. Once the proper pressure has been confirmed, close fuel supply valves and disconnect heater from its electrical supply.
2. Allow heater to burn off fuel remaining in gas supply line.
4. Remove gauge and install hex plug.
5. Tighten all connections securely and check for gas leaks.
6. Open fuel supply valves to heater and reconnect to its electrical supply.

Troubleshooting Guide


READ THIS ENTIRE SECTION BEFORE BEGINNING TO TROUBLESHOOT PROBLEMS.

The following troubleshooting flow charts provide procedures for isolating heater problems. The charts are intended for use by a QUALIFIED GAS HEATER SERVICE PERSON. DO NOT SERVICE THE HEATER 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 DC voltage.
- **High Pressure Gauge** - For checking inlet pressures to the heaters.

 **WARNING**
Electrical Shock and Burn Hazard

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

INITIAL PREPARATION

1. Visually inspect equipment for apparent damage.
2. Check all wires and gas hoses for abrasion and wear. Replace any that are suspect.

<u>Heater Problems</u>	<u>Page</u>
1. Igniter does not spark	17
2. Igniter sparks, but heater will not light	18
3. Heater lights, but will not stay lit	18
4. Burner flame extends beyond case assembly	18
5. Burner does not shut off after building temperature is achieved.	18

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.

OPERATION SEQUENCE:

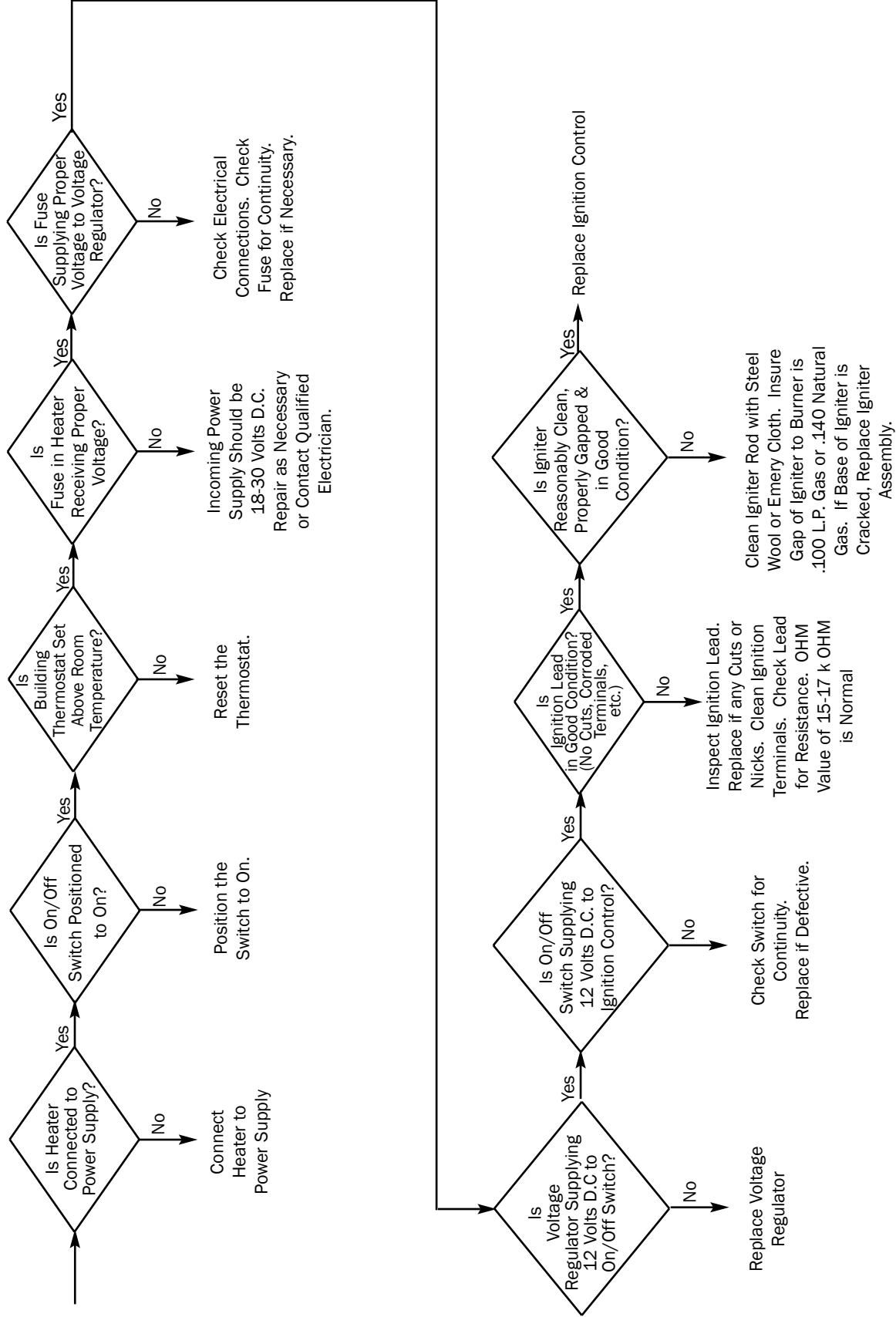
- A call for heat occurs from building thermostat.
- 24 Volts D.C. is sent from building's temperature control to heater's voltage regulator.
- Voltage regulator reduces incoming D.C. Voltage to 12 Volts D.C. and sends it to On/Off Switch.
- Switch sends power to ignition control when positioned to On.
- Ignition control module begins ignition trial sequence
 - Ignition control sends high voltage to igniter electrode
 - Igniter sparks
 - Gas control solenoid opens
- Ignition occurs
 - Igniter continues to spark until flame proving occurs
 - Ignition spark is shut off
 - Gas control solenoid stays open
- Building warms to desired temperature
 - Building thermostat is satisfied
 - Heater shuts down
- Process is repeated on a call for heat

IGNITION FAILURE SEQUENCE:

- Ignition control will make one ignition trial
 - Trial lasts 6 seconds
- If ignition control does not establish flame sense within ignition trial:
 - Ignition spark shuts off
 - Gas valve closes
- Ignition control system lockout occurs
- To manually reset the ignition control:
 - Disconnect the heater from its electrical supply, wait several seconds and then reconnect it.
 - OR
 - Turn heater's On/Off switch to Off, wait several seconds and then turn back to On.

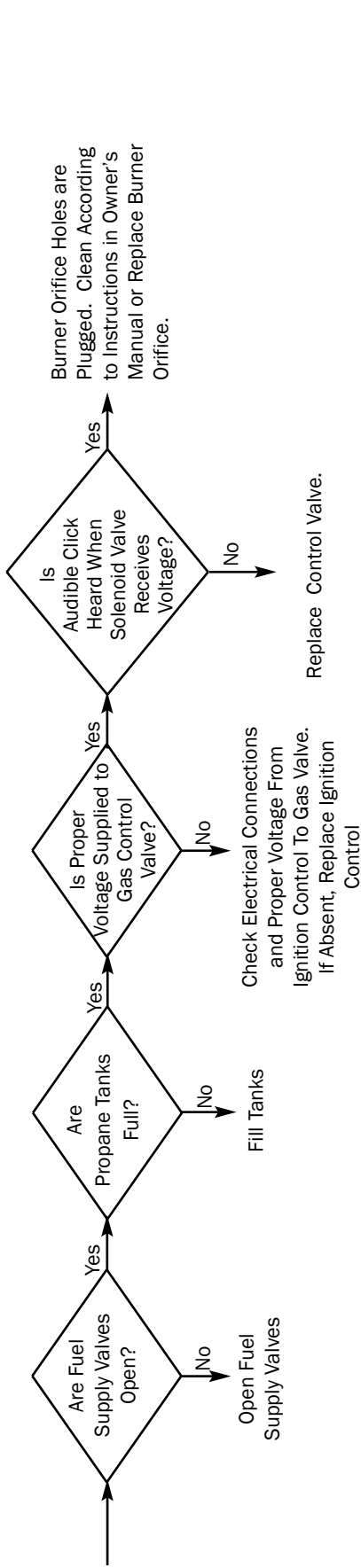
Problem 1

Igniter Does Not Spark



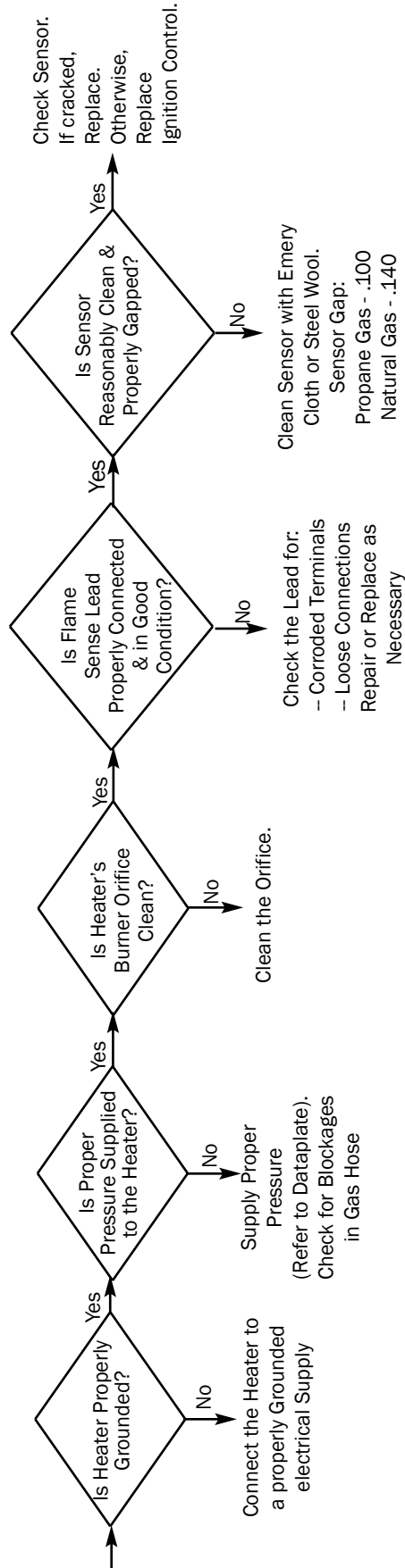
Problem 2

Igniter Sparks, Heater Does Not Light



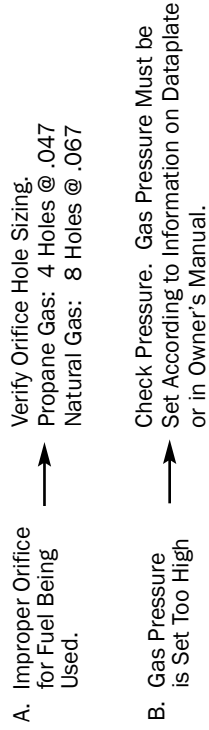
Problem 3

Heater Lights But Will Not Stay Lit (or Repeatedly Cycles Main Burner On/Off)



Problem 4

Burner Flame Extends Beyond Top of Case Assembly



Problem 5

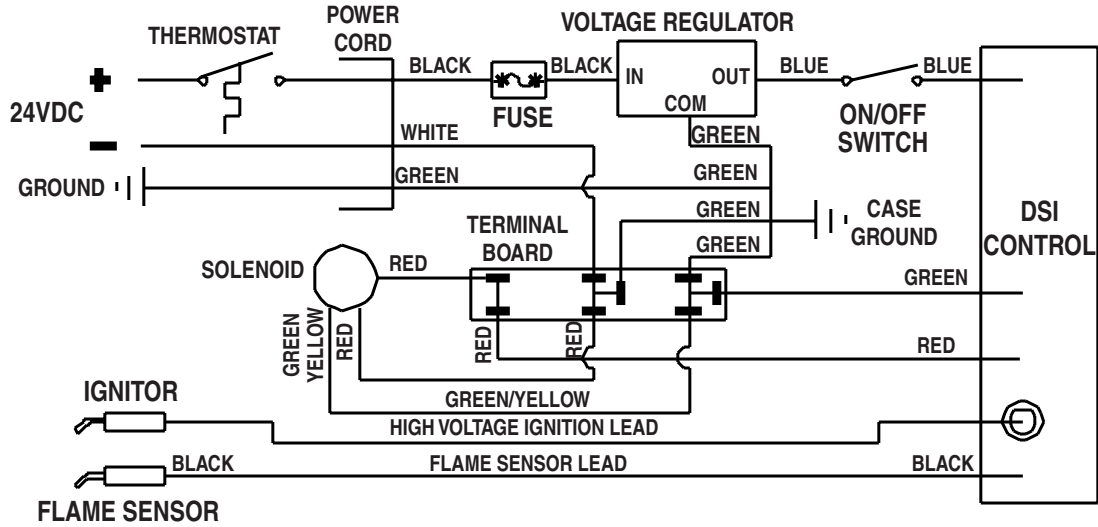
Burner Does Not Shut Off When Building Temperature is Achieved.



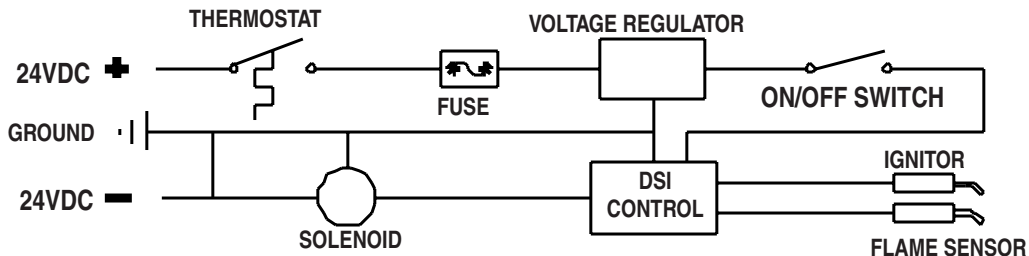
Electrical Connection and Ladder Diagram

CAUTION-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 WIRES AS SUPPLIED WITH THE HEATER MUST BE REPLACED, IT MUST BE REPLACED WITH WIRING MATERIAL HAVING A TEMPERATURE RATING OF AT LEAST 302°F (150°C)

Heater Component Function

Base

Sheet metal case platform used to support and stabilize burner and barrel assemblies.

Burner

Component at which combustion of fuel gases takes place.

Burner Orifice

Brass metering device used to feed gas to burner at a specific rate, with the appropriate pressure.

Case Barrel (w/ Top)

Upright sheet metal case component. Acts as a chimney to distribute heat to surrounding area.

Direct Spark Ignition Control

Electronic circuit board which sends and receives voltages in an automatic ignition systems. An important safety feature is that it will shut down the entire heater, thereby stopping the flow of fuel gas if burner flame goes out.

Fuse

Safety device which is used to protect against an over amperage condition resulting from a direct short or electrical overload condition.

Gas Control Valve

Component that houses an electromagnet which is energized by voltage and therefore opens or closes to supply or close off the flow of gas to the burner.

Gas Hose

Flexible connector used to convey gas from supply line or cylinder to heat.

Gas Regulator

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

Igniter/Flame Sensor Assembly

Assembly consisting of:

- Spark Igniter: Electrical ignition device used on automatic ignition control systems. Ignites gas by a spark.
- Flame Sensor: Also known as a flame rod or flame probe, this device works in conjunction with the ignition module in proving that burner flame has been established.

On/Off Switch

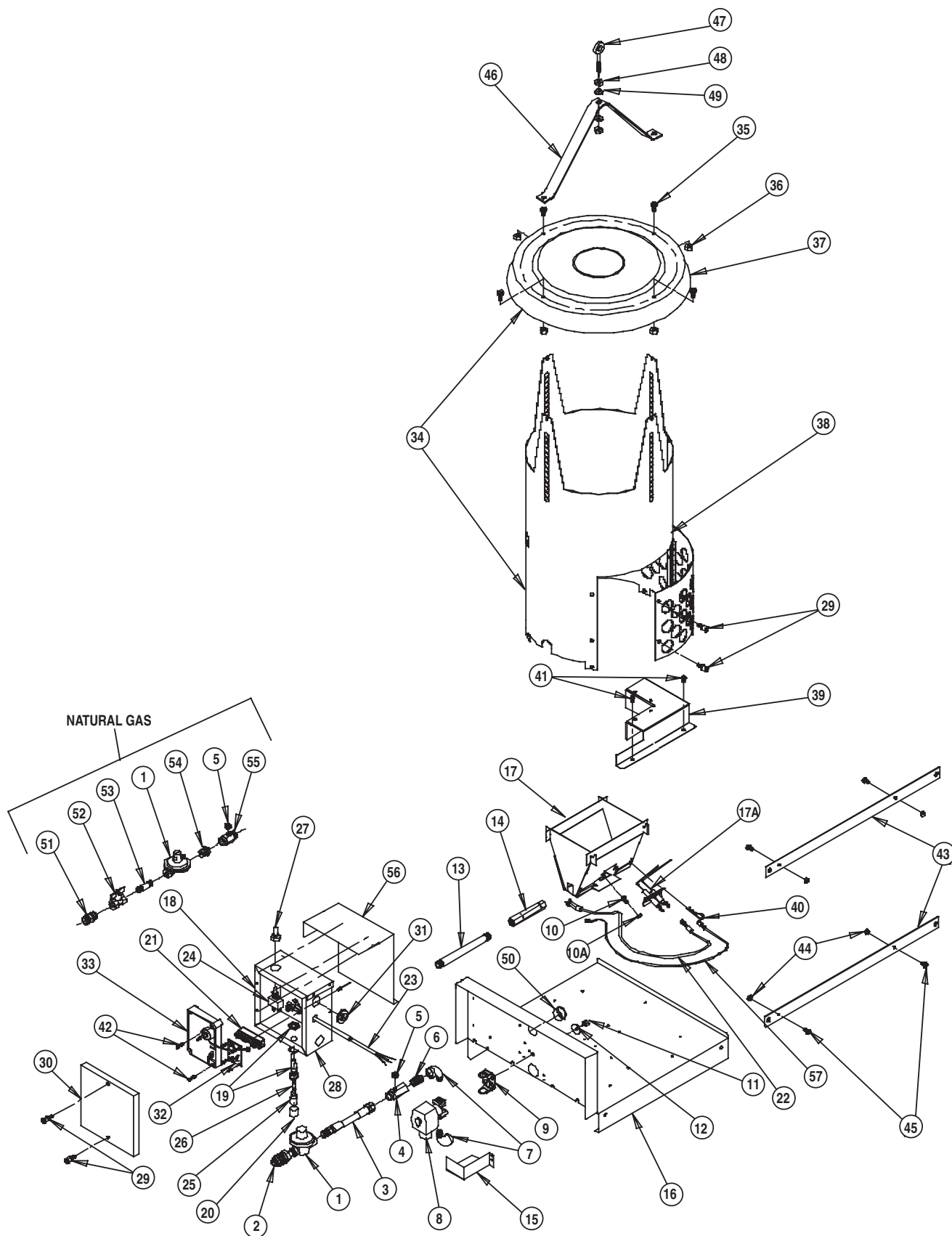
Simple electrical device used to connect or disconnect incoming voltage to the ignition control on the heater.

Voltage Regulator

Component responsible for insuring that 12 Volts D.C. is constantly supplied to ignition control and solenoid valve based upon incoming power supply of 24 Volts D.C.

Parts Identification

PARTS SCHEMATIC



PARTS LIST

<u>Item</u>	<u>Description</u>	<u>Part Number</u>
1	Regulator, Single Stage	Propane Gas 22765 Natural Gas 22639
2	P.O.L. Fitting for Regulator	01248
3	Hose, 1/4 in. x 10 ft.	20706
4	Adapter, Hose, 1/4 NPTF x 9/16-18 w/ Pressure Tap	22348
5	Plug, Pressure Tap 1/8 NPT	09271
6	Nipple	01142
7	EII	01425
8	Valve, Gas Control, w/ Mounting Bracket, 12 VDC	22623
9	Solenoid Bracket w/ Threaded Stud	22784
10	Screw	22761
10a	Nut	22769
11	Nut, 1/4 - 20	22778
12	Washer, 1/4 in.	03054
13	Nipple	Propane Gas 20228 Natural Gas 22645
14	Orifice, Burner	Propane Gas 22644 Natural Gas 22643
15	Cover, Solenoid	Propane Gas 22773 Natural Gas 22638
16	Base	22621
17	Burner w/ Igniter & Sensor	Propane Gas 25013 Natural Gas 25036
17A	Igniter & Sensor	22626
18	Control Box Assembly	22641
19	Fuse Holder	21653
20	Cap, Fuse	21655
21	Terminal Block	22296
22	Ignition Lead	22651
23	Cord, Power	22653
24	Switch, Toggle	22714
25	Holder, Fuse	22762
26	Fuse, 1.5 Amp, 250 V	22763
27	Boot, On/Off Switch	09916
28	Control Box	22629
29	Thumbscrew with Clip	25012
30	Control Box Cover	22632
31	Grommet	21851
32	Voltage Regulator	22759
33	Control Ignition	23676
34	Case Assembly w/ Top	24928
35	Screw, 10 - 24 x 1/2	22761
36	Nut, Hex 10-24	22769
37	Top	22640
38	Case, Barrel	24927
39	Shield, Heat	25028
40	Pin, Burner	24970
41	Screw, 3/8 in.	07288
42	Screw, 1 in.	22754
43	Support Mounting	22660
44	Nut	22761
45	Screw	22769
46	Support, Hood	22655
47	Eyebolt	22775
48	Nut, 1/4 - 20	02512
49	Washer, 1/4 In.	03054
50	Bushing	05768
51	Adapter, Hose 1/2 NPT x 1/2 NPS	02894
52	Valve, Manual Gas Shut Off	05548
53	Nipple	01305
54	Bushing	01519
55	Adapter w/ Pressure Tap	22646
56	Shield, Heat, Control Box	22782
57	Wire, Flame Sensor	23675

Warranty Policy

EQUIPMENT

L.B. White Co., Inc. warrants that the component parts of its heater 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 heater, with a new part or heater, 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 heater 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 heater, and in any event L.B. White's liability in connection with the heater, including for claims based on negligence or strict liability, is limited to the purchase price.

Some states do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to you. Some states 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 state to state.

Replacement Parts and Service

Contact your local L.B. White dealer for replacement parts and service or call L.B. White Co., Inc. at (800) 345-7200 for assistance. Be sure that you have your heater model number and configuration number when calling.