



SURE FLAME[®]

SL11B

&

S1500

CONSTRUCTION HEATERS

October 14, 2003

**SERVICE AND MAINTENANCE MANUAL No. 934-6644
PLEASE RETAIN FOR FUTURE REFERENCE**

SURE FLAME[®] PRODUCTS

A DIVISION OF HAUL-ALL EQUIPMENT LTD.
LETHBRIDGE, ALBERTA

SL11B & S1500 CONSTRUCTION HEATERS



GENERAL HAZARD WARNING

Failure to comply with the precautions and instructions provided with this heater, can result in death, serious bodily injury and property loss or damage from hazards of fire, explosion, burn, asphyxiation, carbon monoxide poisoning, and/or electrical shock.

Only persons who can understand and follow the instructions should use or service this heater.

If you need assistance or heater information such as an instruction manual, labels, etc. Contact the manufacturer.



WARNING

Fire, burn, inhalation, and explosion hazard. Keep solid combustibles, such as building materials, paper or cardboard, a safe distance away from the heater as recommended by the instructions. Never use the heater in spaces which do or may contain volatile or airborne combustibles, or products such as gasoline, solvents, paint thinner, dust particles or unknown chemicals.



WARNING

Not for home or recreational vehicle use

READ THIS WARNING FIRST!

The heater is designed and approved for use as a construction heater under CAN 2.14-2000. The primary purpose of construction heaters is to provide temporary heating of buildings under construction, alteration, or repair and to provide temporary emergency heat. Properly used the heater provides safe economical heating. Products of combustion are vented into the area being heated.

The heater is not designed as an Unvented Gas Fired Room Heater under ANSI-Z21.11.2 and should not be used in the home.

ANSI A119.2(NFPA 501C)-1987 Recreational Vehicle Standard prohibits the installation or storage of LP-Gas containers even temporarily inside any recreational vehicle. The standard also prohibits the use of Unvented Heaters in such vehicles.

Gas inspection authorities in Canada require that the installation and maintenance of heaters and accessories be accomplished by qualified gas fitters.

Installation must comply with CAN/CGA-B149.2 Installation Code for Propane Burning Equipment.

Installation must comply with CAN/CGA-B149.1 Installation Code for Natural Gas Burning Equipment.

We cannot anticipate every use which may be made for our heaters. CHECK WITH YOUR LOCAL FIRE SAFETY AUTHORITY IF YOU HAVE QUESTIONS ABOUT LOCAL REGULATIONS.

Other standards govern the use of fuel gases and heat producing products in specific applications. Your local authority can advise you about these.

FOR YOUR SAFETY

**DO NOT USE THIS HEATER IN A SPACE WHERE
GASOLINE OR OTHER LIQUIDS HAVING
FLAMMABLE VAPOURS ARE STORED OR USED.**

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SPECIFICATIONS

SL11B & S1500 Construction Heaters

Certified to CSA 2.14-2000 Gas Fired Unvented Construction Heater

| | | |
|--------------------|-------|--|
| Gases: | | Natural or Propane |
| Capacity: | SL11B | 1,000,000 Btu/h |
| | S1500 | 1,500,000 Btu/h Maximum 850,000 Btu/h Minimum |
| Orifice Size: | | 43 DMS x 46) |
| Blower: | | 7,000 cfm |
| Electrical Rating: | | 115 volts, 60 Hz, 15 amps, single phase |

Gas Supply: SL11B

| | Inlet Pressure | | Manifold Pressure |
|---------|----------------|----------|-------------------|
| | Max.W.C. | Min.W.C. | Max.W.C. |
| Propane | 14 inch | 8 inch | 1.8 inch |
| Natural | 14 inch | 8 inch | 4.8 inch |

(Minimum inlet pressure is for purpose of input adjustment)

Gas Supply: S1500

| | Inlet Pressure | | Manifold Pressure | |
|---------|----------------|----------|-------------------|-----------|
| | Max.W.C. | Min.W.C. | Max.W.C. | Min.W.C. |
| Propane | 14 inch | 8 inch | 2.7 inch | 0.75 inch |
| Natural | 14 inch | 8 inch | 7.2 inch | 2.0 inch |

INSTALLATION

The Sure Flame Models SL11B & S1500 are direct fired gas heaters intended to be used primarily for the temporary heating of buildings under construction, alteration, or repair. Since all the products of combustion are released into the area being heated, it is imperative that adequate ventilation be provided. The flow of supply air and combustion gases must not be obstructed in any way. Do not use the heater with ductwork as this will restrict the flow of supply air.

- 1 Install the heater in a horizontal position at least 6 feet from any LP-gas container, and allow the following clearance from any combustible materials:

| | | | |
|---------------|----------------|--------|----------------|
| Front Outlet: | 20 feet (6 M) | Sides: | 2 feet (0.6 M) |
| Intake: | 2 feet (0.6 M) | Top: | 4 feet (1.2 M) |

Front Outlet must not be directed at any LP-gas container within 20 feet (6M).

Also make sure that no flammable vapours are present in the space where the heater is being used.

- 2 When connecting the heater to a natural gas or propane supply line ensure that the pressure at the heater inlet is within the specified range. Excessive pressure (over 1/2" psig) will damage the controls and void the warranty.
- 3 Visually inspect the hose assembly and ensure that it is protected from traffic, building materials, and contact with hot surfaces. If it is evident that there is excessive abrasion or wear, or the hose is cut, it must be replaced.
- 4 After installation, check the hose assembly for gas leaks by applying a water and soap solution to each connection.
- 5 Connect the heater to an adequate 115 volt electrical supply as specified on the rating plate. For protection against shock hazard the supply cord must be plugged directly into a properly grounded three-prong receptacle.
- 6 In all applications install the heater in such manner that it is not directly exposed to water spray, rain and/or dripping water.

INSTALLATION USING A PROPANE SUPPLY TANK

- 1 When installing the heater for use with propane gas, set the gas selector valve to “Propane” and lock in position.
- 2 The supply container must be equipped with a UL listed Gas Pressure Regulator. This is essential to reduce the gas pressure to a safe transmittable pressure. This pressure must further be reduced so the gas pressure does not exceed the maximum input pressure of the heater. This can be accomplished by placing a suitably sized second stage gas regulator on the valve train at the heater. This regulator should also be a UL listed LP Gas Pressure Regulator.
- 3 Arrange the propane supply system to provide for vapour withdrawal from the operating container. Supplying liquid propane to the heater is dangerous and will damage the components.
- 4 Ensure that for the surrounding temperature the size and capacity of the propane supply container is adequate to provide the rated Btu/h input to the heater.
- 5 Turn off the propane supply valve at the container when the heater is not in use.
- 6 The installation must conform with local codes, or in the absence of local codes, with CAN/CGA-B149.2 Propane Installation Code.
- 7 When the heater is to be stored indoors the propane container must be disconnected from the heater and the container moved away and stored in accordance with the above National Standard.

INSTALLATION FOR NATURAL GAS APPLICATIONS

- 1 When installing the heater for use with natural gas, set the gas selector valve to the “Natural” position.
- 2 A regulator must be installed on the heater to ensure that the pressure to the heater does not exceed 1/2 psi inlet pressure.
- 3 The installation of this heater to a natural gas supply must conform with all applicable local codes or, in the absence of local codes, with the CAN/CGA-B149.1 Natural Gas Installation Code.

OPERATING INSTRUCTIONS

- 1 Set GAS SELECTOR VALVE to gas being used. The conversion shall be done by the owner or lessor of the equipment.

NOTE: When using Propane Gas the Selector Valve **must** be locked in position.

- 2 Ensure the FIRING VALVE (valve nearest the burner) is in the "ON" position.
- 3 Connect power - 115 volt supply.
- 4 Open gas supply.
- 5 Push START Button and hold. White light will come on immediately. After 5 second purge, red light will come on. When red light comes on, release START button. If red light fails to remain on repeat sequence.
- 6 Set thermostat to desired temperature. (S1500 only)
- 7 To stop, turn gas off, then push STOP button.

The appliance area should be kept clear and free from combustible materials, gasoline, and other flammable vapours and liquids.

Ensure that the flow of supply air and combustion gases is not obstructed.

The installation and operation of the heater shall comply with the code requirements specified by the authorities having jurisdiction.

General criteria for the use of construction heaters may be found in the applicable sections of the National Standard of Canada Propane Installation Code CAN/CGA-B149.2.

**THE INSTALLATION AND MAINTENANCE OF THE
HEATER MUST BE ACCOMPLISHED
BY A QUALIFIED SERVICE PERSON.**

SEQUENCE OF OPERATION

- 1 Push start button and hold.
- 2 Motor relay, and control relay #1 close simultaneously.
- 3 Fan starts.
- 4 Fan reaches full speed, air switch closes, and white light comes on.
- 5 Control relay closes.
- 6 Gas valves energized, and spark is initiated.
- 7 Flame rod senses a proven flame, and red light comes on.
- 8 Release start button.

The following instruction (#9) is for Model S1500 only.

- 9 Set thermostat to desired temperature, heater will cycle from low to high flame thermostatically.

COMMON INSTALLATION AND OPERATIONAL PROBLEMS

1 LOW VOLTAGE

This is one of the most common problems and is usually the result of the supply cord having too small a wire gauge for its length. Low voltage results in the motor overheating, burnt relay contacts, or a relay that will not maintain contact.

2 SUPPLY LINE TOO SMALL

3 INSUFFICIENT VAPORIZATION AT SUPPLY

Normally caused by too small size of supply tank.

4 IMPROPER GAS SUPPLY PRESSURE

Usually a result of supply pressure being too high because of improper or lack of regulation.

5 DIRTY GAS SUPPLY

Dirty gas can cause strainers to plug or form a build-up in the burner orifice.

6 LACK OF PREVENTATIVE MAINTENANCE

Heaters must be cleaned as required, especially when used in a dirty environment.

7 IMPROPER SUPPLY OF FRESH AIR

Recommended: Intake air for the heater be taken from outside the enclosed area. This provides a slight pressurization and prevents any problems associated with recirculation.

SAFETY FEATURES

Servicing of Sure Flame Construction Heaters normally involves one of several built-in safety features. The Models SL11B & S1500 incorporate devices to detect the following:

- | | | |
|---|--------------------|---|
| 1 | LOSS OF FLAME | Gas supply is shut off if flame is lost to prevent raw gas from leaving the heater. |
| 2 | OVERHEATING | (a) Thermal overload protection in the motor. (b) High temperature limit switch in the combustion chamber. |
| 3 | LOSS OF POWER | Total shutdown with manual reset required. Any one of the safety devices will create a loss of power situation. |
| 4 | BLOCKED AIR SUPPLY | A switch detects the differential pressure in the combustion chamber and shuts down when insufficient. |

DESIGN RELATED ADDITIONAL SAFETY FEATURES

1 LOCKING POSITION FOR LPG ON GAS SELECTOR LEVER

Units used with LPG while the gas selector valve is positioned for Natural Gas will throw significantly more heat than the rated Btu/h. This is definitely a safety hazard.

2 LOW SKIN TEMPERATURE

Sure Flame Heaters are designed to have a low skin temperature. This provides added safety in the workplace.

3 DURABLE CONSTRUCTION

The Models SL11B & S1500 use a stainless steel burner for long life and consistent performance.

In order to maintain the highly efficient combustion of the Sure Flame Heater, the combustion chamber must remain as manufactured. Any change or distortion could alter the fuel/air mixture and create unwanted gases.

ON-SITE SAFETY PROBLEMS

1 SHORTING OUT OF DEFECTIVE COMPONENTS

This is a common problem which saves short term expense at the risk of a large future cost. Any heaters found in this condition should be removed immediately.

2 IMPROPER ENCLOSURES

When heaters are installed partially to the outside for fresh air intake, strict adherence must be made to the minimum clearance to combustibles given on the instruction plate. Wood framing around a heater is a request for trouble.

3 SUPPLYING LIQUID PROPANE TO HEATER

This problem has occurred from time to time. To minimize the damage, and possible personal injury, shut off the gas supply and let the heater run until all of the liquid in the lines has been vaporized.

PREVENTIVE MAINTENANCE

Sure Flame Construction Heaters are built to withstand the rigours of operating on construction sites, for mining applications, and a multitude of other locations where heaters are used. To maintain the reliable performance required it is necessary to do a certain amount of regular maintenance.

A VISUAL CHECKS

The following items should be checked for excessive wear or damage:

- 1) Wheels
- 2) Cords and Connectors
- 3) Wiring and Conduit
- 4) Heater Shell (including heat shield) and Control Box
- 5) Valve Train

It is recommended that units purchased as spares be rotated periodically, so that each unit will be placed in operation at least once every 90 days.

B BURNER

Flame Rod and Insulator - Clean with soap and water or solvent on a routine basis. Any build up on burner should also be removed at this time.

Ground Wire - Ensure that the ground wire is secured to the burner. This is necessary for the flame detection system to operate.

Spark Plug - Clean with solvent and check spark gap.

C CONTROL BOX

The inside of the control box should be cleaned using a dry cloth or by blowing compressed air. Do not use any liquid or aerosol spray cleaners. Also check that all electrical connections are snug and tight.

D MOTOR

The electric motor on the SL11B & S1500 Heaters is fitted with sealed bearings and no oiling is required. Keep the motor clean by blowing or wiping off dust or dirt in order to prevent it from over heating.

E FAN

Check for dust or dirt build up on fan blades. Check the tightness of the set screw and run the heater to check for fan vibration.

SL11B/S1500 TROUBLESHOOTING

For units incorporating Fenwall series 05-14 Ignition modules

An AC voltmeter is required to make these checks. Voltage is 115VAC on the control circuit and the motor. Use extreme caution when checking voltage.

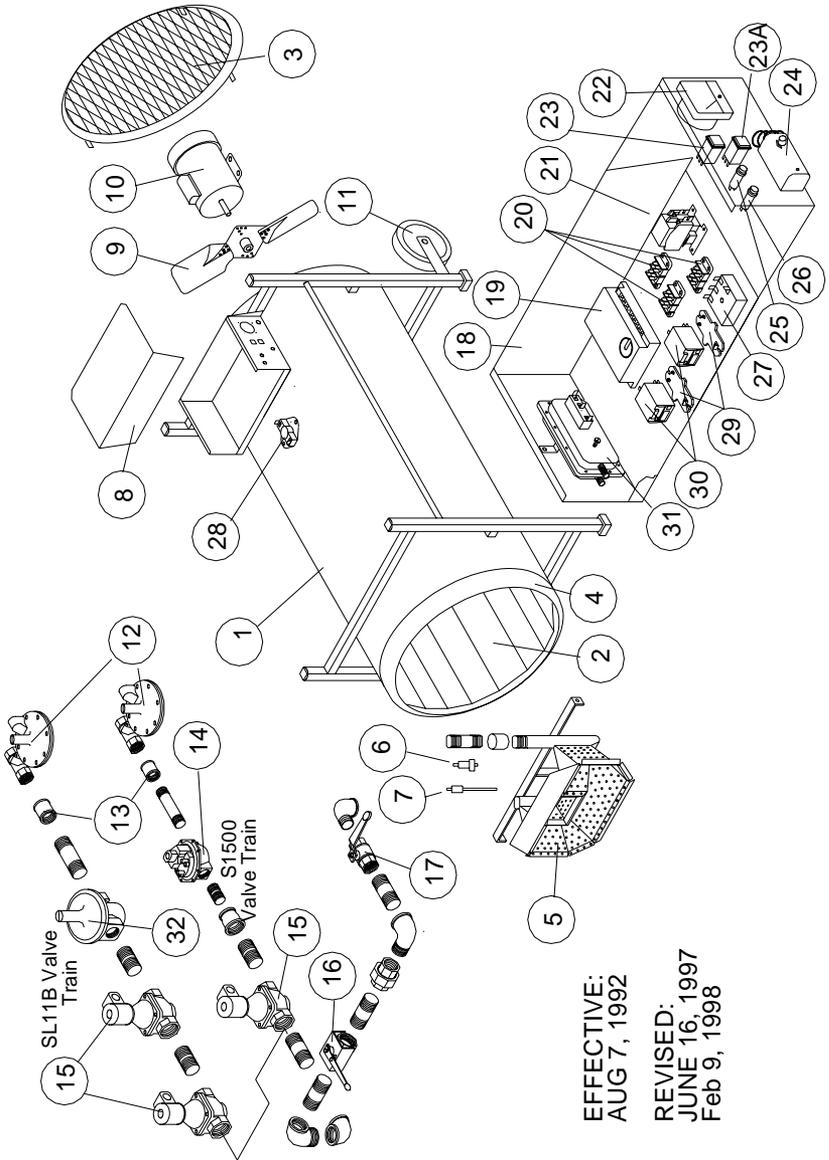
- 1 Push start button and hold for 2 to 3 seconds.
- 2 Motor relay and control relay #1 close simultaneously:
 - 1) If motor relay does not close check:
 - a) If there is power between the coil terminals of the motor starting relay then the relay is faulty.
 - b) If there is no power between these two terminals then proceed to check the delay timer.
 - c) If there is power between terminals 1 & 2, and 2 & 3, but no power between 2 & 6, then the timer is defective.
 - d) If there is no power between terminals 2 & 3 of the timer then check the start switch.
 - e) If there is power at the red wire on the start switch and no power at the middle terminal of the start switch, then the start switch is faulty.
 - 2) If control relay # 1 does not close then check:
 - a) If there is power present at terminals A & B of the control relay then the control relay is defective.
 - b) If there is no power between these terminals then check the stop switch.
 - c) If there is power on the common (middle) terminal of the stop switch but no power on the NC terminal then the stop switch is defective.
- 3 Fan Starts, if not check:
 - a) If there is power between the black and white wires inside the motor junction box (located on side of motor) then the motor may need manual resetting. Pushing the red button on the side of the junction box. If this does not correct the problem then the motor is faulty.
 - b) If there is no power at these two wire ends then check the motor relay contacts, they may need cleaning or replacing, if burnt.
- 4 Fan reaches full speed, airswitch closes, and white light comes on, if not check:
 - a) If there is power on only one of the airswitch terminals while motor is running, then the airswitch is staying open. First check if either the upstream or down stream airtubes are plugged.
 - b) If both are free then check alignment (tubes must be positioned parallel to the direction of airflow).

- c) If above procedures do not correct problem, then the adjusting screw located on the side of the airswitch can be rotated counter clockwise, just enough so that the fan stays running.
- 5 Control relay #2 closes, if not check:
- a) If there is power between terminals A & B of relay #2, if power is present then relay is faulty.
 - b) If there is power between terminals L1 & L2 of the Fenwall module, but no power 2 seconds after startup between terminals V1 & V2 of the Fenwall, then the Fenwall module is defective.
- 6 Gas valves are energized, and spark is initiated:
- 1) If gas valves do not open then check each gas valve individually:
 - a) If there is power between the wires leading to the gas valve, then the gas valve is faulty.
 - b) If there is no power at terminal V1 of the Fenwall module 2 seconds after startup, but there is power at terminal L1 of the Fenwall then the Fenwall module is faulty.
 - c) If there is no power at terminal L1 of the Fenwall module then check the following components using the previously mentioned tests for the limit switch, the airswitch and control relay #2.
 - 2) If there is no spark then check:
 - a) Check the spark plug, gap should be at least 1/8".
 - b) Check if ignition wire is burnt or if it grounding out to the heater.
 - c) If there is power at terminal L1, and no power at terminal V1 of the Fenwall then the Fenwall module is faulty.
- 7 Flame rod senses, and maintains flame, if not check:
- a) If flame rod wire is connected to flame rod and not grounding out to the heater.
 - b) if flame rod wire is inserted into to the correct location on the Fenwall module.
 - c) The flame rod must always be screwed into the burner securely. The probe part should not be touching the burner in any way thus grounding out.
 - d) If the flame is too short and flame rod is not a bright orange colour, then check if there is adequate manifold gas pressure.
 - e) If above checks are all good then the Fenwall module is defective.

The following instruction (#8) pertains to model S1500 only.

- 8 Set thermostat to desired temperature, heater will cycle from low to high flame, if not:
- a) If there is no power at the thermostat then the start switch is faulty.
 - b) If there is no power at the high flame side of the 2 stage regulator then the thermostat is faulty.
 - c) If there is power at the high flame side of the 2 stage regulator then the valve is faulty.

SL11B/S1500 HEATER PARTS



EFFECTIVE:
AUG 7, 1992

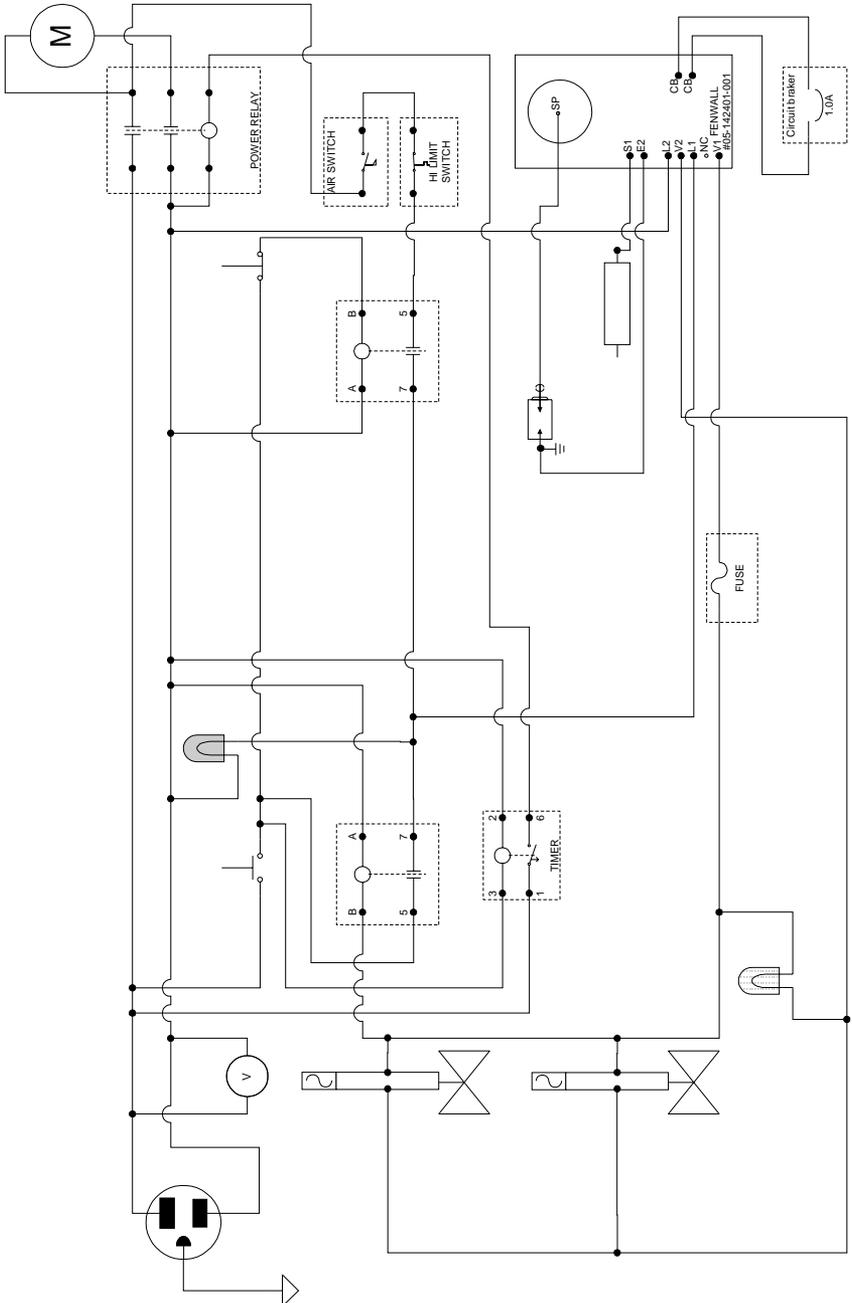
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JUNE 16, 1997
Feb 9, 1998

SL11B/S1500 HEATER PARTS

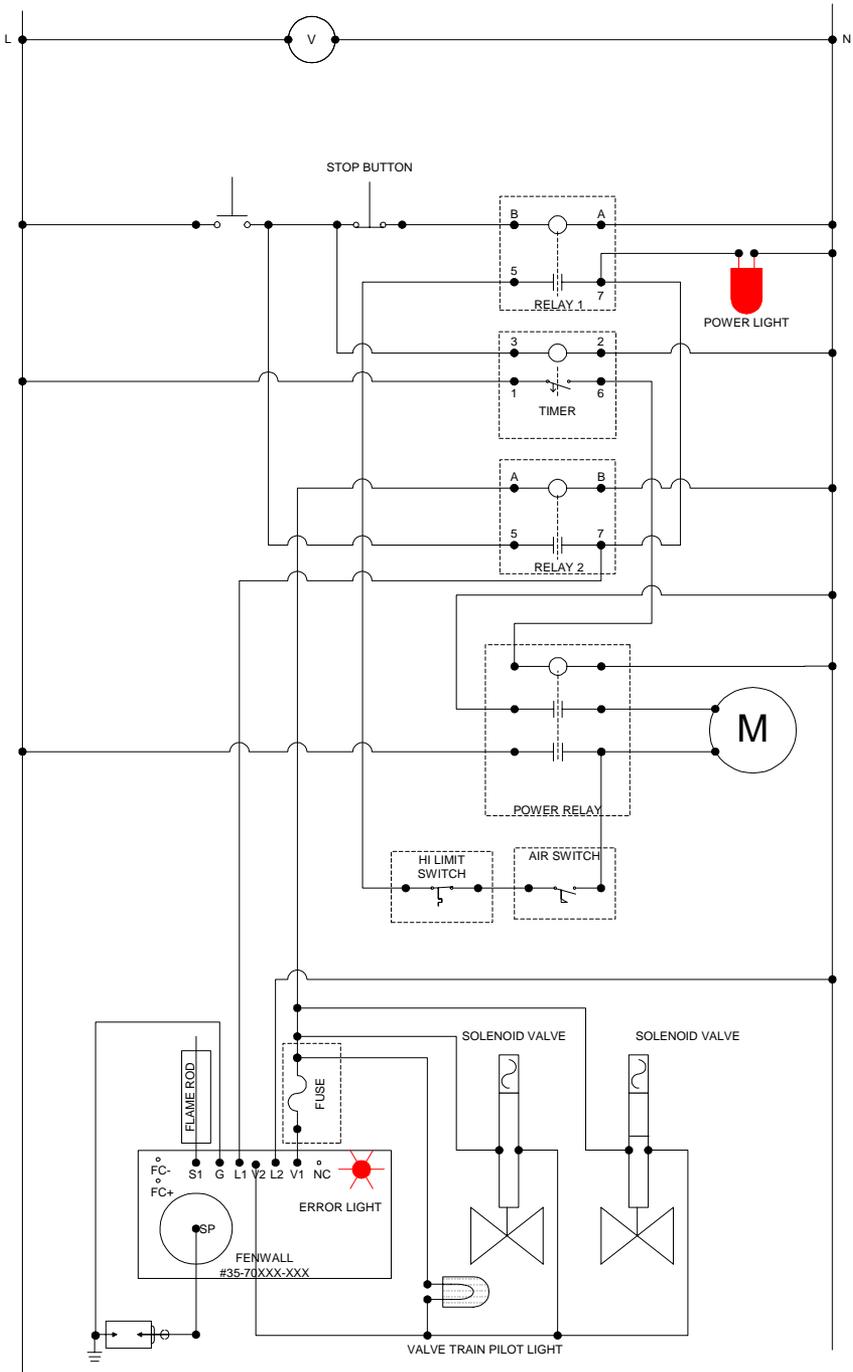
Sept 13, 2002

| Ref. Part No | Description |
|--------------|---|
| 1 S1505-55 | Heater Body includes: 2, 4, 5 |
| S1505-56 | Heater Body includes: 2, 4 |
| 2 SL11B-90 | Heat Shield |
| 3 SL11B-53 | Screen |
| 4 SL11B-13 | Nose Cone |
| 5 BV85-50 | 1,500,000 BTU Burner |
| 6 2143 | Spark Plug |
| 7 SL11B-86 | Flame Rod |
| 8 SL11B-35 | Control Box Cover |
| 9 2423 | 24" Fan Blade |
| 10 5953 | 1 HP Electric Motor |
| 11 6119 | 8" Semi Pneumatic Wheel |
| 12 2528 | Regulator (optional) |
| 13 SL11B-82 | 1.5" Strainer (SL11B only) |
| S1500-83 | 1.25" Strainer (S1500 only) |
| 14 4490 | 1.25" 2-Stage Regulating Valve (S1500 only) |
| 15 2537 | 1.5" Solenoid Valve |
| 16 S1505-81 | Changeover Valve 17/32 Orifice |
| 17 2539 | 1.5" Manual Shut-Off Valve |
| 18 SL11B-58 | Control Box |
| 19 8864 | Fenwal Ignition Control |
| 20 5768 | Terminal Blocks |
| 21 2436 | Motor Starting Relay |
| 22 5989 | Voltmeter |
| 23 3337/9 | ON Switch (Green) |
| 23a 3337/8 | OFF Switch (Red) |
| 24 2453 | Thermostat (S1500 only) |
| 25 2505 | White Light |
| 26 2506 | Red Light |
| 27 5988 | 10-Second Delay On Break Timer |
| 28 2446 | HI Limit Thermoswitch |
| 29 6440 | Relay Clip |
| 30 4512 | Control Relay with clip |
| 31 5355 | Air Switch (0.5" W.C.) |
| 32 2526 | 1-1/2" Appliance Regulator (SL11B only) |

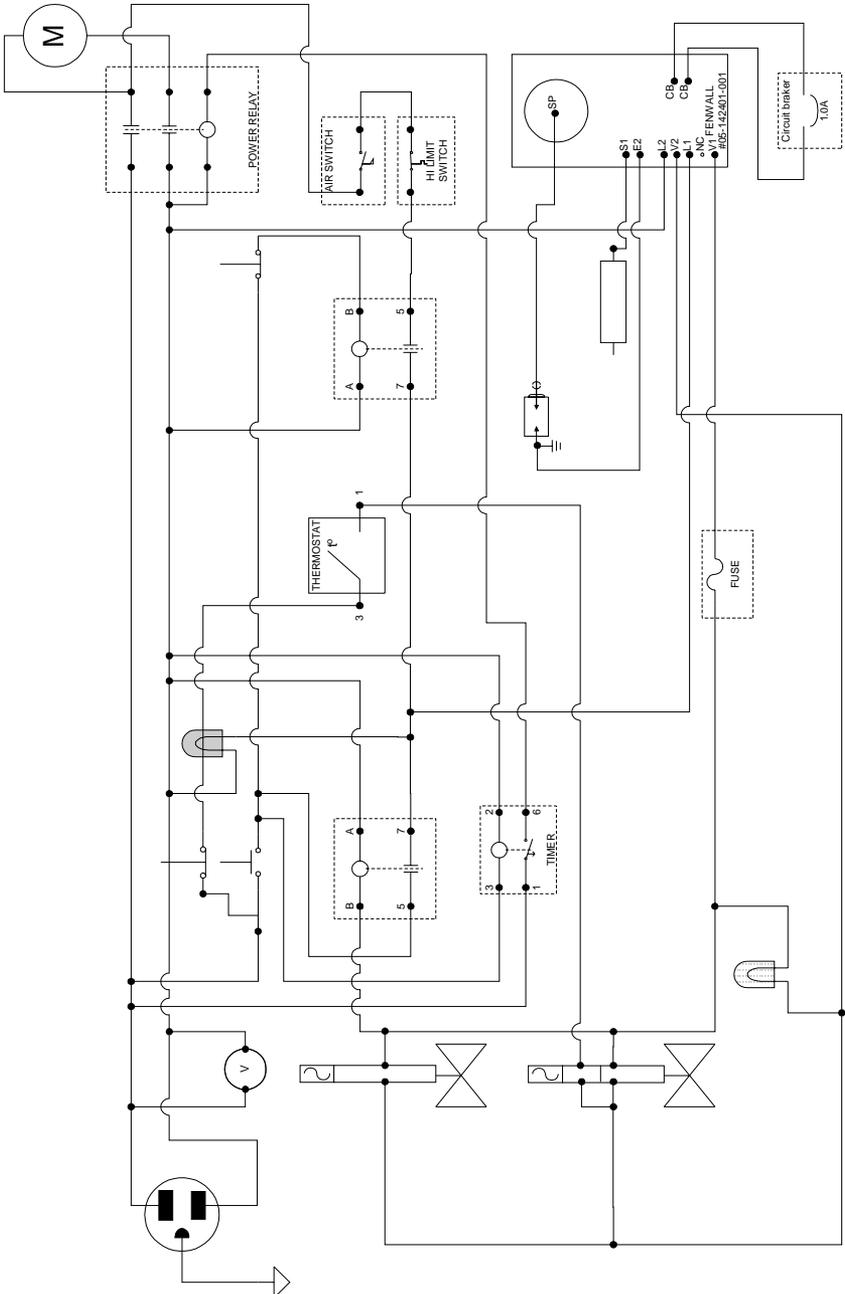
SL11B CONNECTION WIRING DIAGRAM



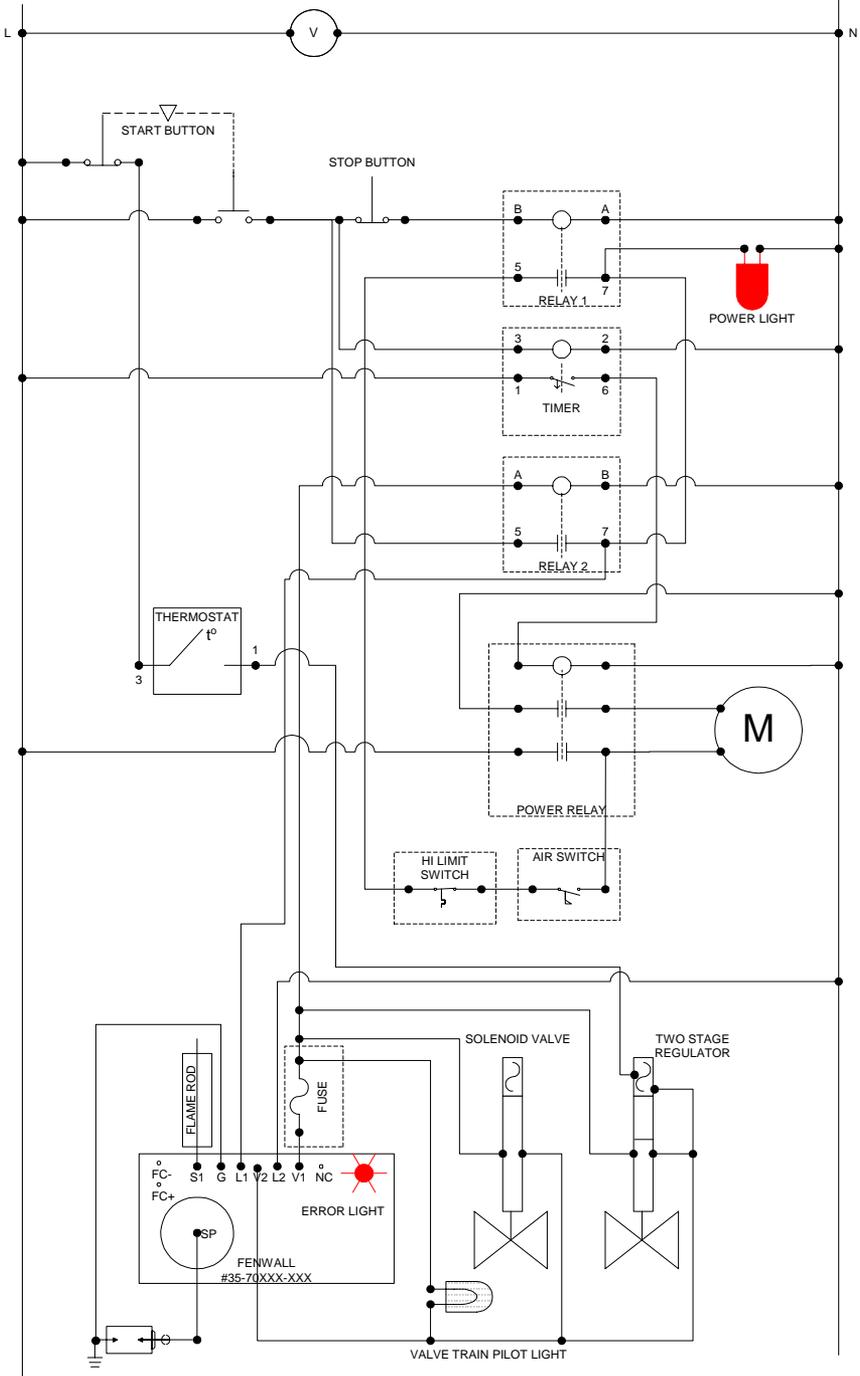
SL11B LADDER WIRING DIAGRAM



S1500 CONNECTION WIRING DIAGRAM



S1500 LADDER WIRING DIAGRAM



LPG - PROPANE FUEL VAPORIZATION RATE

The following chart shows the amount of BTU's that various sizes of tanks will produce on the average at specific temperatures and regular atmospheric conditions.

| Tank Size Gallons (Pounds) | Maximum intermittent withdrawal rate (BTU/hr) without tank frosting* if lowest outdoor temperature (average for 24 hours) reaches. | | | | | | | |
|----------------------------------|---|---------|---------|---------|---------|---------|---------|---------|
| | +40 F. | +30 F. | +20 F. | +10 F. | 0 F. | -10 F. | -20 F. | -30 F. |
| 150 (600) | 214,900 | 187,900 | 161,800 | 148,000 | 134,700 | 132,400 | 108,800 | 107,100 |
| 250 (1000) | 288,100 | 251,800 | 216,800 | 198,400 | 180,600 | 177,400 | 145,800 | 143,500 |
| 500 (2000) | 478,800 | 418,600 | 360,400 | 329,700 | 300,100 | 294,800 | 242,300 | 238,600 |
| 1000 (4000) | 852,800 | 745,600 | 641,900 | 587,200 | 534,500 | 525,400 | 431,600 | 425,000 |

* Frosting on the outside of the tank acts as an insulator, reducing the vaporization rate.

MAXIMUM BTU CONTENT (PROPANE)

The following table shows the maximum BTU's that a cylinder contains.

| CYLINDER SIZE | BTU CONTENT |
|-----------------|-------------|
| 100 pound | 2,159,100 |
| 250 gallon USA | 22,922,500 |
| 500 gallon USA | 45,845,000 |
| 1000 gallon USA | 91,690,000 |

CAUTION: In extremely cold weather it is impossible to completely empty a propane cylinder.

PRESSURE & FLOW EQUIVALENTS

| | | |
|--------------------------|---------------------|-------------------|
| 1 Std. Atmosphere = | 14.73 lb./sq. in. = | 1.014 bar |
| 1" Water Column (W.C.) = | 0.58 oz./sq. in. = | 2.49 millibar |
| 11" Water Column = | 0.4 lb./sq. in. = | 27.39 millibar |
| 1 lb./sq. in. (psig) = | 27.71" W.C. = | 0.0689 bar |
| 1" Mercury = | 0.49 psig = | 33.86 millibar |
| 1 Std. Cubic Ft./Hr. = | 2,500 BTU/Hr. = | 0.02832 cu. m/hr. |
| 1 BTU/Hr. = | 0.2931 Watts | |

