



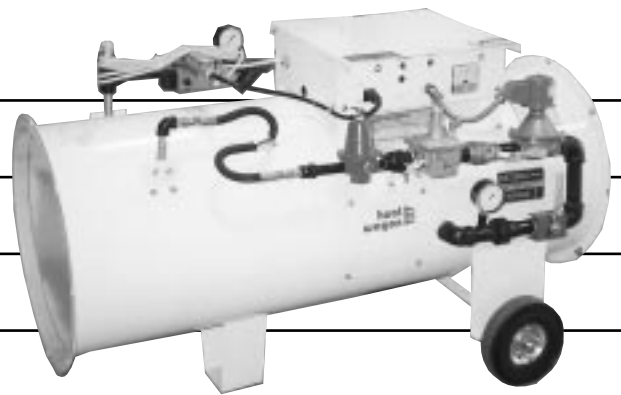
342 N. Co. Rd. 400 East
Valparaiso, IN 46383
219-464-8818 • Fax 219-462-7985
www.heatwagon.com

Installation and Maintenance Manual

Please retain this manual for future reference.

1800(L)

*Construction
Heater*



For your safety: Do not use this heater in a space where gasoline or other liquids having flammable vapors are stored.

IMPORTANT INFORMATION! READ FIRST

The heater is designed for use as a construction heater under ANSI Z83.7a-1993. The primary purpose of construction heaters is to provide temporary heating of buildings under construction, alteration, or repair and to provide 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.

NFPA-58 1989 STANDARD FOR THE STORAGE AND HANDLING OF LIQUEFIED PETROLEUM GASES

Use of the heater must be in accordance with this Standard and in compliance with all governing state and local codes. Storage and handling of propane gas and propane cylinders must be in accordance with NFPA 58 and all local governing codes.

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 VAPORS ARE STORED OR USED.

CONSTRUCTION HEATER 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 your local Heat Wagon dealer or the manufacturer.

W A R N I N G

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.

Not for home or recreational vehicle use!

If you have read this entire manual and you still have questions, please call us at 888-heatwagon

Installation and Maintenance Manual Model 1800(L) Construction Heater

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WARRANTY

All new Heat Wagon and Sure Flame heaters and fans are guaranteed against defective materials and workmanship for one (1) year from invoice date.

Warranty repairs may be made only by an authorized, trained and certified Heat Wagon dealer. Warranty repairs by other entities will not be considered. Warranty claims must include model number and serial number.

LIMITATIONS

Warrant claims for service parts (wear parts) such as spark plugs, igniters, flame rods will not be allowed. Diagnostic parts such as voltage meters and pressure gauges are not warrantable.

Evidence of improper fuel usage, fuel pressures outside of manufacturer's specification, poor fuel quality, and improper electric power, misapplication or evidence of abuse may be cause for rejection of warranty claims.

Travel time, mileage and shipping charges will not be allowed. Minor adjustments of heaters are dealers' responsibility. Defective parts must be tagged and held for possible return to the factory for 60 days from date of repair. The factory will provide a return goods authorization, (RGA) for defective parts to be returned.

No warranty will be allowed for parts not purchased from Heat Wagon.



342 N. Co. Rd. 400 East • Valparaiso, IN 46383
219-464-8818 • 888-432-8924 • Fax 800-255-7985
www.heatwagon.com

DESIGN RELATED SAFETY FEATURES

- 1) **FLAME FAILURE**
The electronic ignition control shuts off the gas supply in .8 seconds if flame is lost to prevent raw gas from leaving the heater.
- 2) **OVERHEATING**
The totally enclosed motor is protected by thermal overload. A manual reset high temperature limit switch is mounted in the heated air stream.
- 3) **LOW SUPPLY VOLTAGE**
A panel mounted voltmeter indicates supply voltage before heater start up and also during heater operation.
- 4) **BLOCKED AIR SUPPLY**
An airflow switch detects the differential pressure in the combustion chamber and shuts off the gas flow when airflow is insufficient.
- 5) **LOCKING GAS SELECTOR LEVER**
To avoid over firing of the heater and damage to property, make sure the lever is locked in position when using propane.
- 6) **LOW SHELL TEMPERATURE**
The Model 1800(SL) is designed with a burner heat shield to keep the outside shell cool for added safety in the work place.
- 7) **DURABLE CONSTRUCTION**
The Model 1800(SL) uses a heavy gauge steel housing and a stainless steel burner for long life and consistent performance.

NOTE: In order to maintain the highly efficient combustion of the heater, the combustion chamber must remain as manufactured. Any change or distortion could alter the fuel/air mixture and create excessive products of combustion.

SPECIFICATIONS

Model No. 1800 & 1800SL

Designed to ANSI Z83.7-1990 Standard Construction Heater

Gases:	Natural or Propane
Capacity:	750,000 Btu/h maximum
Orifice Size:	36DMS (X18)
Blower:	4,200 CFM
Electrical Rating:	115V 60Hz 15 amps, single phase
Minimum Temperature Rating:	Minus 20 degrees F

Gas Supply:	Inlet Pressure		Manifold Pressure
	Max PSI	Min PSI	W.C.
Propane	50 lbs.	5 PSI	7.0"
Natural Gas	50 lbs.	5 PSI	7.0"

(Minimum inlet pressure as low as 9.5" W.C. can be achieved by removing 2nd stage 40SV06 regulator)

Inlet Connection:

Model 1800SL	1/4" FNPT
Model 1800	3/4" FNPT

Weight (approximate): 200 lbs.

Maximum Duct Length Straight: 50 Ft. @ 18" Diameter

INSTALLATION

The Heat Wagon Model 1800(SL) is a direct fired gas heater intended to be used primarily for the temporary heating of building under construction, alteration, or repair. Since all the products of combustion are released into the area being heated, it is imperative that adequate ventilation is provided. The flow of supply air and combustion gases must not be obstructed in any way.

1. The heater is designed for indoor or outdoor installation in a horizontal position. Allow the following clearances from any combustible material or fuel containers.

Front Outlet:	10 feet	Sides:	2 feet
Intake:	1.5 feet	Top:	4 feet

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

2. The heater should be inspected before each use, and at least annually by a qualified service person.
3. The hose assembly must be inspected prior to each use of the heater. If it is evident that there is excessive abrasion or wear, or the hose is cut, it must be replaced prior to the heater being put into operation. The replacement hose assembly shall be that specified by the manufacturer. See parts list.
4. 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 50 psig) will damage the controls and void the warranty.
5. Connect the hose assembly to the heater gas inlet elbow. The 1800 elbow has 3/4" Female NPT thread, 1800SL elbow has a 1/4" Female NPT thread. The hose assembly is supplied with a swivel connector to avoid kinking or twisting the hose. Use a minimum inside diameter of 1/2" on LP or 3/4" on natural gas installations. Ensure that the hose assembly is protected from traffic, building materials, and contact with hot surfaces.
6. After installation, check hose assembly for gas leaks by applying a soap and water solution to each connection.
7. Connect the heater to an adequate 115 volt electrical supply as specified on the rating plate. For protection against shock hazard the supply cord should be plugged directly into a properly grounded three-prong receptacle.

EXTENSION CORDS:

Properly Wired and Grounded

Use #14 wire up to 100'

Use #12 wire up to 200'

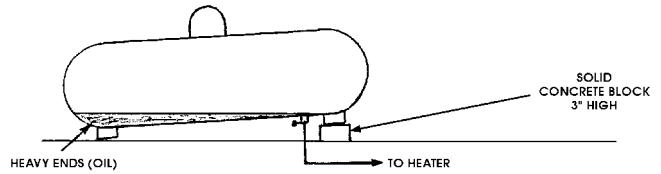
Use #10 wire up to 300'

8. Replacement parts are available from any Heat Wagon distributor or by calling 1-888-432-8924 for parts information.

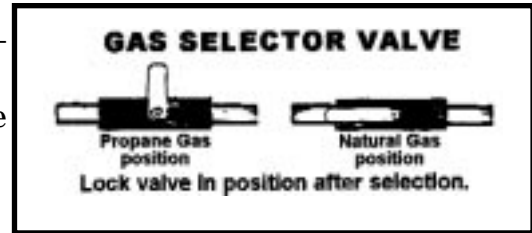
MODEL 1800 & 1800SL

PROPER SET UP:

Model 1800SL is a liquid withdrawal unit. This unit will use 8.25 gal of LP per hour. Use at least (1) 200 gal. withdrawal tank. This will insure 20 hours of continuous operation. Since the 1800(L) is a Liquid Propane unit, it must be set up outside of the building. Use 3/8" or 1/2" LPG approved hose or copper tube.



Model 1800S is a Vapor Propane or Natural Gas unit. When using Propane (liquid or vapor) turn the fuel selector valve (located on the lower manifold) to the **Propane** position. When using **Natural Gas** turn the selector valve to the **Natural Gas** position. This unit can be set up indoors or out.



VAPOR PROPANE QUICK
REFERENCE HOSE
CHART

Hose Length in Feet	BTU 1 Million	
	1/2PSI	10PSI
10	3/4	3/4
25	1-1/4	3/4
35	1-1/4	3/4
50	1-1/4	3/4
75	1-1/4	3/4
100	-	3/4
125	-	3/4
150	-	3/4
175	-	3/4
200	-	3/4
225	-	3/4

NATURAL GAS QUICK
REFERENCE HOSE
CHART

Hose Length in Feet	BTU 1 Million			
	<1PSI	1PSI	2PSI	5PSI
10	1-1/2	1	3/4	3/4
25	1-1/2	1-1/4	3/4	3/4
35	1-1/2	1-1/4	3/4	3/4
50	1-1/2	1-1/4	3/4	3/4
75	2	1-1/4	3/4	3/4
100	2	1-1/4	3/4	3/4
125	2	1-1/4	1-1/4	3/4
150	2	1-1/4	1-1/4	3/4
175	2	1-1/4	1-1/4	3/4
200	2	1-1/4	1-1/4	3/4
225	2	1-1/2	1-1/4	3/4

VAPORIZATION RATES IN BTUH @ 0 DEG. F							
TANK SIZE	NUMBER OF TANKS MANIFOLDED	PERCENTAGE OF TANK FILLED					
		10%	20%	30%	40%	50%	60%
250	1	12,690	169,200	197,400	225,600	253,800	282,000
	2	279,180	372,240	434,280	496,320	558,360	620,400
	3	486,027	648,036	756,042	864,048	972,054	1,080,060
500	1	198,135	264,180	308,212	352,240	396,270	440,300
	2	435,897	581,196	687,066	774,928	871,794	968,660
	3	758,857	1,011,809	1,180,451	1,349,079	1,517,714	1,686,349
1000	1	354,240	472,320	551,040	629,760	708,480	787,200
	2	779,328	1,039,104	1,212,288	1,385,472	1,558,656	1,731,840
	3	1,356,739	1,808,985	2,110,483	2,411,980	2,713,478	3,014,976

NOTE: USE FOLLOWING MULTIPLIERS FOR OTHER AIR TEMPERATURES

- For -10° F multiply x 0.50
- For + 10°F multiply x 1.5
- For +20°F multiply x 2.0
- For +40°F multiply x 3.0
- For +50°F multiply x 3.5
- For +60°F multiply x 4.0



INSTALLATION USING A PROPANE SUPPLY TANK(S)

- 1) When installing the heater for use with propane gas, set the gas selector to "Propane" and lock in position.
- 2) The propane supply system must be set up for vapor withdrawal from the operating tank(s). Liquid Propane can cause the heater to overfire and will damage valve train components.
- 3) The heater must be located at least 6 ft from any LP-Gas container, and not directed toward any LP-Gas container within 20 ft.
- 4)

<u>Minimum Tank Size</u>	<u>Outdoor Temperature</u>
500 Gal.	Above +25°F
1000 Gal.	+25°F to + 10° F
2 x 1000 Gal.	Below +10°F
- 5) The installation must conform with local codes, or in the absence of local codes, with the Standard for Storage and Handling of Liquefied Petroleum Gasses ANSI/NFPA 58.
- 6) Turn off the propane supply valve at the tank(s) when the heater is not in use.
- 7) When the heater is to be stored indoors the propane tank(s) must be disconnected from the heater and the tank(s) stored in accordance with Chapter 5 of the above National Standard.

COMMON INSTALLATION AND OPERATIONAL PROBLEMS

- 1) **LOW VOLTAGE AT THE HEATER**
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, or low voltage at the power source. Low voltage results in the motor overheating, burnt relay contacts, or a relay that will not make contact. Check voltmeter on heater before start-up.
- 2) **SUPPLY LINE TOO SMALL**
See reference hose chart on page 6.
- 3) **INSUFFICIENT VAPORIZATION AT SUPPLY**
Normally caused by undersized supply tank.
- 4) **IMPROPER GAS SUPPLY PRESSURE**
Usually a result of propane supply pressure being too high because of improper or lack of regulation or too low of natural gas pressure at meter.
- 5) **DIRTY GAS SUPPLY**
Dirty gas can cause strainers to plug or form a build-up in the burner orifice.
- 6) **LACK OF PREVENTIVE MAINTENANCE**
Heaters must be cleaned as required, especially when used in a dirty environment.
- 7) **IMPROPER SUPPLY OF FRESH AIR**
It is strongly recommended that the intake air of the heater be taken from outside the enclosed area. This provides a slight pressurization and prevents any problems associated with recirculation of products of combustion.

ON-SITE SAFETY PROBLEMS

1) SHORTING OUT OF DEFECTIVE COMPONENTS

This is a very 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 can cause a safety hazard.

3) SUPPLYING LIQUID PROPANE TO HEATER NOT EQUIPPED WITH A BUILT IN VAPORIZER

This problem has occurred upon initial start-up. To minimize the damage, shut off the gas supply and let the heater run until all of the liquid in the lines had been consumed.

OPERATING INSTRUCTIONS

- 1) Set the **gas selector valve** for fuel being used. Check for proper gas pressure.
- 2) Open **manual shut-off valve** on heater.
- 3) Connect power supply (115 volt). Check voltmeter to confirm full voltage.
- 4) Slowly open shut-off valve at gas meter or propane tank. Check for leaks.
- 5) Set **fan** and **burner switches** to “on” position.
- 6) Set **thermostat** for desired room temperature.
- 7) To stop, turn **thermostat** down or turn **fan switch** “off”.
(Burner will turn off; after 5 seconds fan will turn off.)
- 8) Close **manual shut-off valve** on heater.

NOTE: If the heater will be shut down over night, close valve at fuel supply first and burn all gas out of line.

The appliance area should be kept clear and free from combustible materials, gasoline, and other flammable vapors 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 American National Standard A-10.10-1987, Safety Requirements for Temporary and Portable Space Heating Devices and Equipment Used in the construction industry.

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

MODEL 1800 & 1800 SL
SEQUENCE OF COMPONENT OPERATION

- 1) **POWER SUPPLY**
Plug the heater into a 120 Volt grounded receptacle. Power is now at the 20 amp fuse and the 3 amp circuit breaker.
- 2) **20 AMP FUSE & 3 AMP BREAKER**
If the circuit breaker and fuse are good there will be power at the thermostat and at the motor relay (normally open).
- 3) **THERMOSTAT**
When the thermostat calls for heat there will be power at the fan switch.
- 4) **FAN SWITCH**
With the fan switch ON it sends power to the burner switch and the control relay.
- 5) **BURNER SWITCH**
This sends power to the airflow switch.
- 6) **CONTROL RELAY**
After receiving power from the fan switch it closes, sending power to the fan delay timer.
- 7) **FAN DELAY TIMER**
Receives power from the control relay and closes. Energizes the motor relays holding coil.
- 8) **MOTOR RELAY**
With its coil energized it closes its contacts, sending power to the fan motor.
- 9) **FAN MOTOR**
Turns the fan blade causing the air flow switch to close.
- 10) **AIR FLOW SWITCH**
Received its power from the burner switch and sends the power to the indicator light and the flame safeguard control.
- 11) **FLAME SAFEGUARD CONTROL**
This sends power to transformer and the igniter and sends power out to the high temperature limit switch.
- 12) **HI TEMPERATURE LIMIT SWITCH**
This switch has normally closed contacts, it sends power to the gas solenoid valve.
- 13) **GAS SOLENOID VALVE**
With its coil energized, the valve opens, gas passes through to the burner and ignites.
- 14) **FLAME SAFEGUARD CONTROL**
This is now sensing flame through the flame rod and the spark stops. The heater is operating.
- 15) **THERMOSTAT**
When it is satisfied, the contacts open taking power away from the ignition control, the gas valve closes, and the fan delay timer is activated.
- 16) **FAN DELAY TIMER**
This will operate the fan motor for approximately 10 seconds and turns the fan off.

PREVENTIVE MAINTENANCE

Heat Wagon Construction Heaters are built to withstand the rigors 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.

- 1) **CHECK POWER CORD**
 - A. Insulation not frayed or cracked.
 - B. Ground peg is there on male end.
 - C. Polarity is correct (Black wire on fuse, white wire on motor relay).

- 2) **CHECK ALL WIRING FOR TIGHT AND CORRECT CONNECTIONS**

- 3) **CHECK MOTOR RELAY**
 - A. If it buzzes, clean contacts or replace.
 - B. Check for voltage drop through L1 or T1 contacts if its more than 2 volts replace.

- 4) **CHECK AIR FLOW SWITCH**
 - A. Blow out the inlet tube and negative pressure fitting.
 - B. Adjust the switch, light on control panel stays on if the heater is bumped and shuts off if fan inlet is blocked off.

- 5) **CLEAN THE BURNER**
 - A. Clean out port holes (Gas outlet).
 - B. Clean air mixture holes.

- 6) **CHECK IGNITER/SENSOR**
 - A. Move sensor probe; if rubbery, replace.
 - B. If stiff; clean and re-gap at 1/8"

- 7) **CHECK FOR GAS LEAKS**
 - A. Operate the heater, (with leak detector or soapy water) check all pipe connections for leaks.

- 8) **TIGHTEN ALL BOLTS**
 - A. Motor mounts
 - B. Fan blade
 - C. Burner mount
 - D. Pipe train mounts

TROUBLE SHOOTING

DIRECTIONS: Find the specific symptom. Refer to the Sequence of Component Operation Guide. Check the components listed with a voltmeter for proper operation as described. Replace any components not operating correctly.

Fan will not start when fan switch & thermostat are ON.

- Check sequences 1 through 4 (Page 4)

Fan runs, no spark for ignition.

- Check sequences 5, 10 and 11 (Page 4-5)
- Check continuity of igniter leads. Replace if shorted or broken.
- Check igniter for carbon buildup, gap spacing (1/8”), secure mounting.
- Replace igniter if porcelain is cracked or if electrodes are rubbery

Have spark but no flame.

- Check sequences 11,12 and 14 (Page 5)
- Check for gas pressure on the manifold gauge, if gas is present clean the port holes in the burner

Flame occurs but burner locks out after a few seconds.

- Check sequence 1 (Page 4)
- Check for proper polarity of incoming voltage
 - A) Place one lead of voltmeter on ground and the other lead on the 20 amp fuse
 - B) Place one lead of voltmeter on ground and the other lead on the neutral or white wire from power cord. Reading should be “0” volts.
- Check the igniter sensor electrodes, if the porcelain is cracked or the electrodes are rubbery replace them
- If the 1st 4 steps check, replace the ignition control

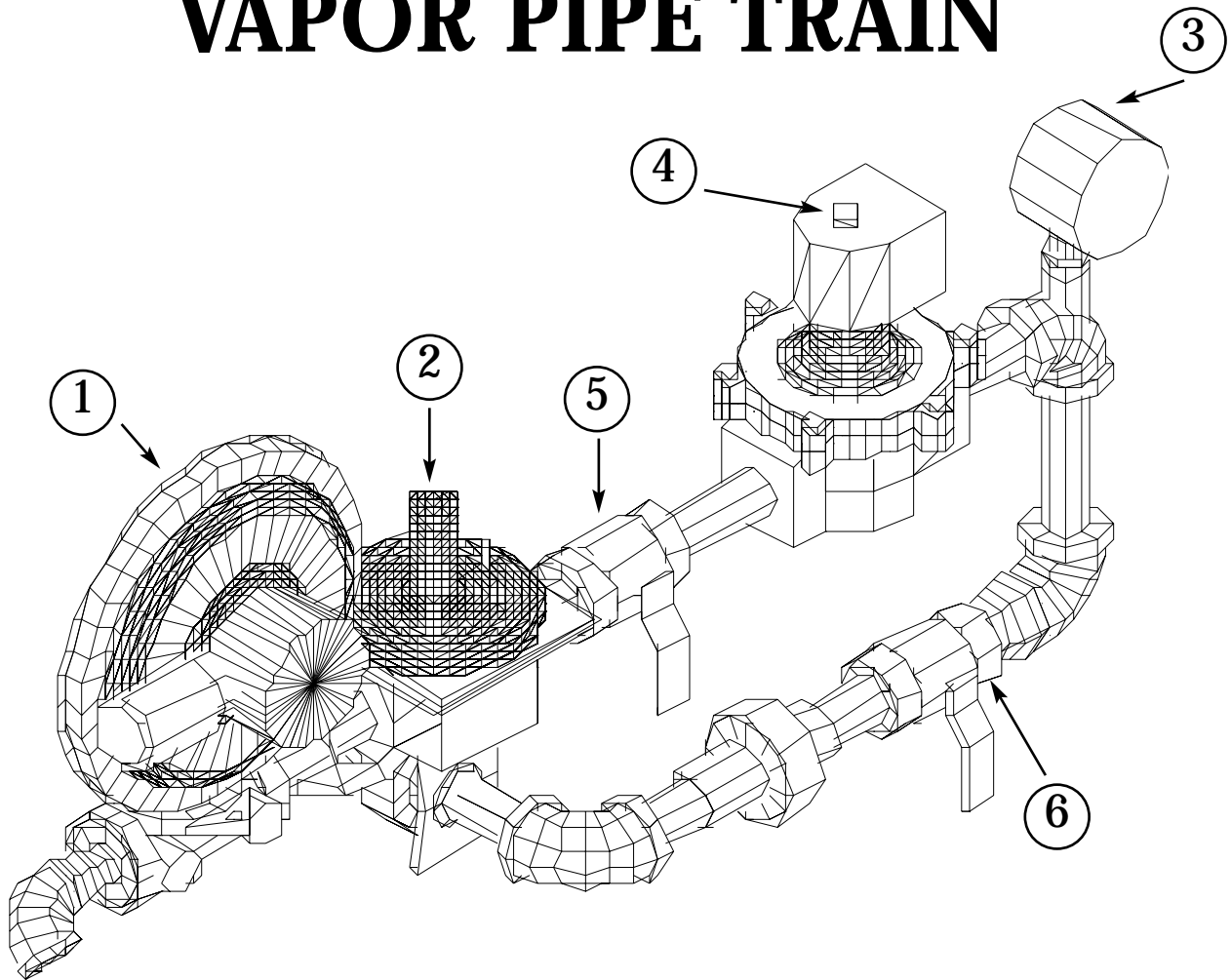
Flame occurs but small.

- Check proper pressure at manifold gauge. If yes:
 - A) Clean port holes in burner
 - B) Check proper position of gas selector valve (For Natural Gas)
- Not enough pressure
 - A) Check fuel supply
 - B) Check liquid strainer for restriction (1800L)
 - C) Check for restriction at Hi pressure regulator
 - D) Check for restriction at solenoid valve

Fan does not shut off when thermostat turns off burner.

- Check for proper wiring on fan delay timer
- Fan should run for 5 to 7 seconds after burner shuts off. Replace fan delay timer if fan runs over 10 seconds.

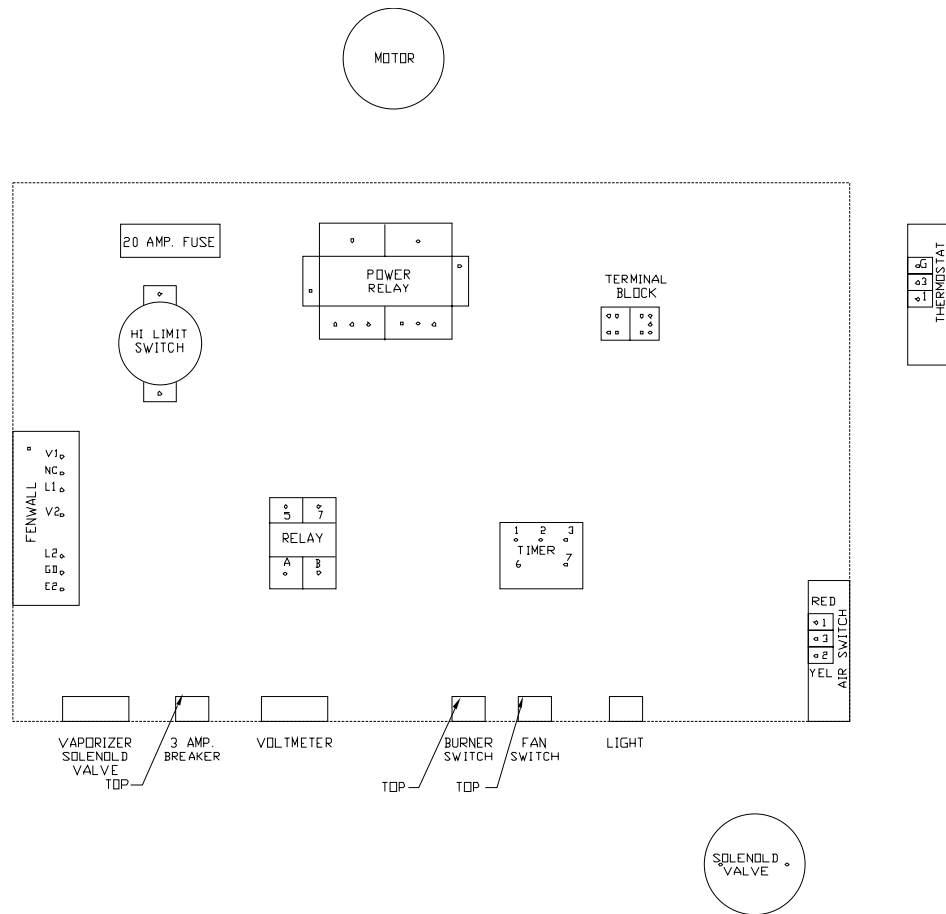
1800 VAPOR PIPE TRAIN



Item#	Part #	Description
*1	HWP 40SV06	1ST STAGE REGULATOR 3/4" x 1"
2	HWP HV1162	1" LOW PRESSURE REGULATOR
3	HWP HV1169	15" W.C. LOW PRESSURE GAUGE
4	HWP HV1032	115V. GAS SOLENOID VALVE 1" DIAMETER
5	HWP HV1035	1" BALL VALVE
6	HWP HV1160	1" LOCKING GAS SELECTOR VALVE
	HWP HV1032C	COIL COVER FOR HV1032

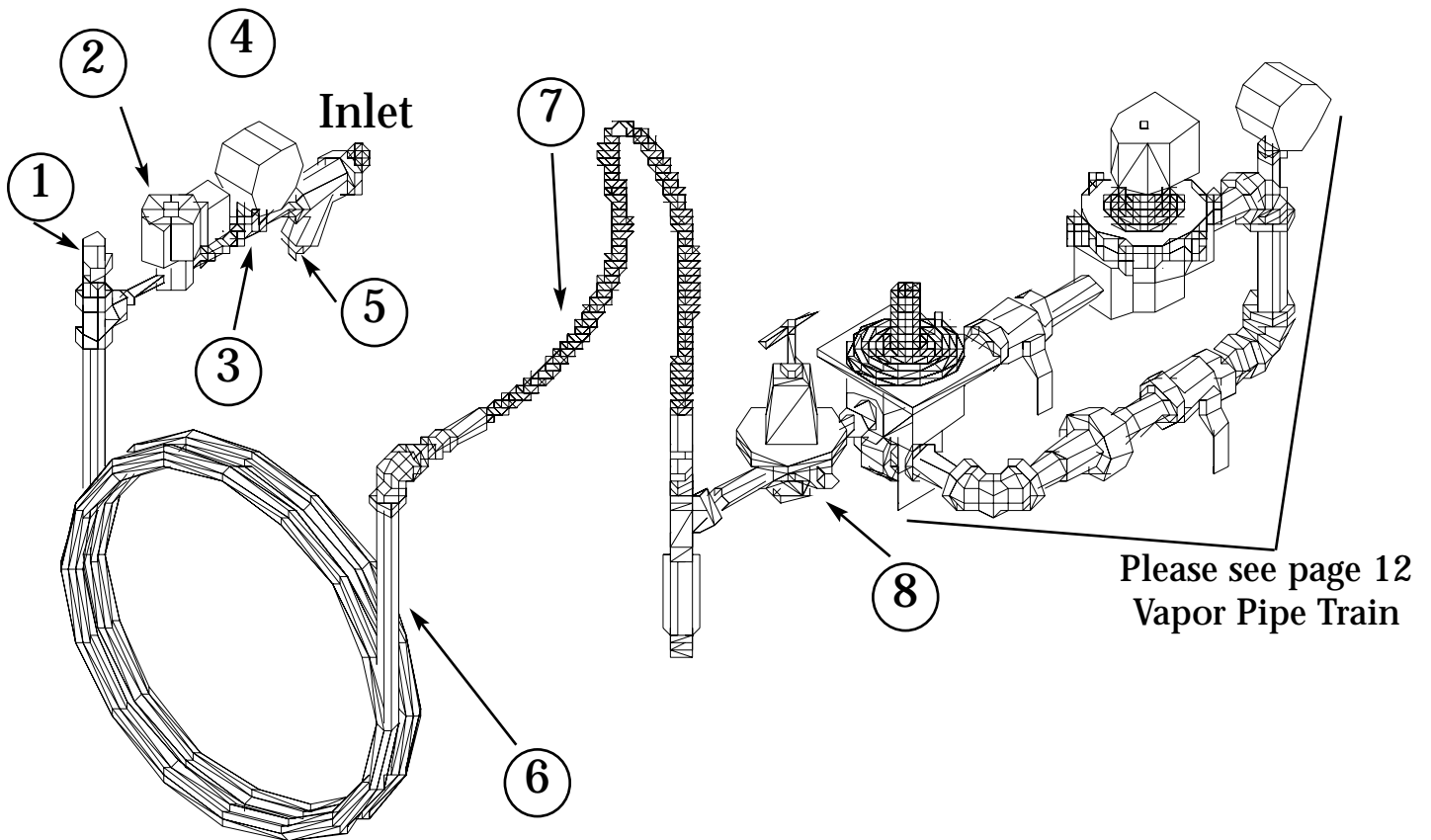
*If you have an 1800L (Liquid Propane Heater) use part #HR1053 1st stage regulator

CONTROLS BREAKDOWN



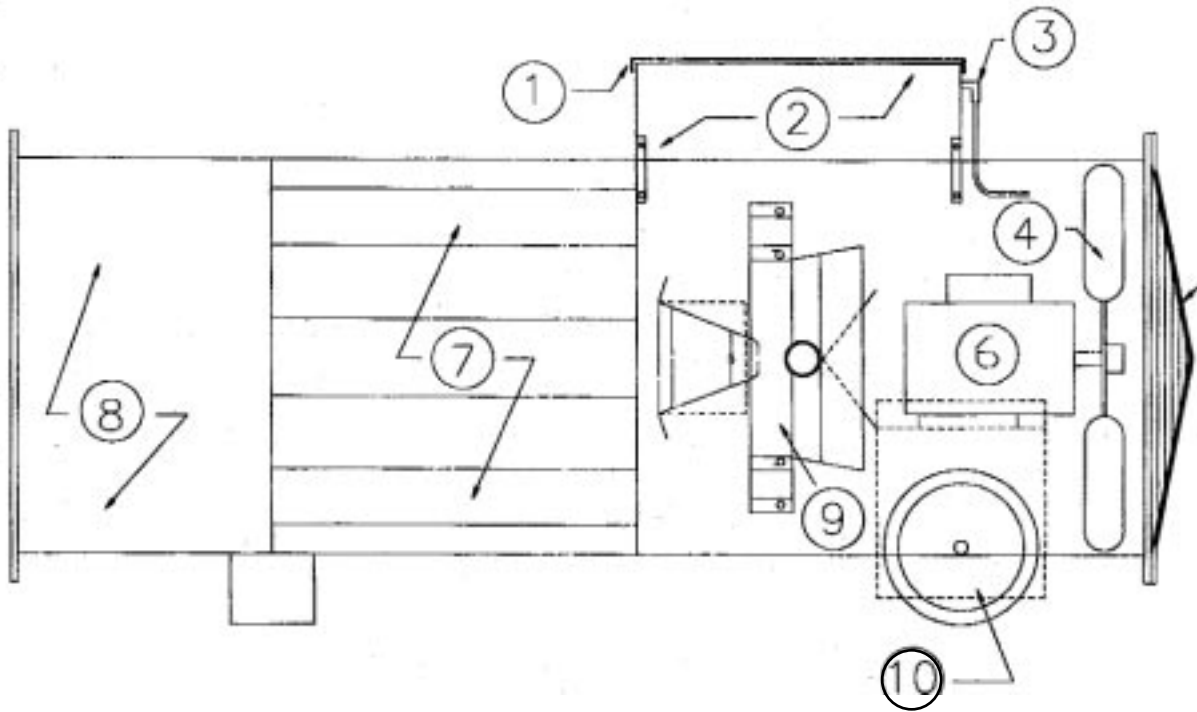
Item#	Part #	Description
1	SFP 5989	SUPPLY VOLTAGE METER (0-150)
2	SFP 2505	INDICATOR LIGHT
3	HWP HC1011	FAN ON/OFF SWITCH
4	HWP HC1011	BURNER ON/OFF SWITCH
5	SFP 2453	REMOTE THERMOSTAT
6	HWP HC1016	VAPORIZER RECEPTACLE
7	HWP HC1019B	3 AMP. CIRCUIT BREAKER
8	HWP HC1004B	ELECTRODE ASSEMBLY
9	HWP HC1010	AIRFLOW SWITCH
10	SFP 4512	CONTROL RELAY
11	HWP HC1003A	FAN DELAY TIMER
12	SFP 2446	HIGH-LIMIT CONTROL
13	HWP HC1001C	IGNITOR CONTROL BOARD W/TIME DELAY
14	SFP 2436	MOTOR RELAY
15	HWP HC1115	20 AMP. FUSE (SC-20)
16	HWP HC1122	FUSE BLOCK
17	HWP HC1020	POWER CORD

1800 LIQUID PIPE TRAIN

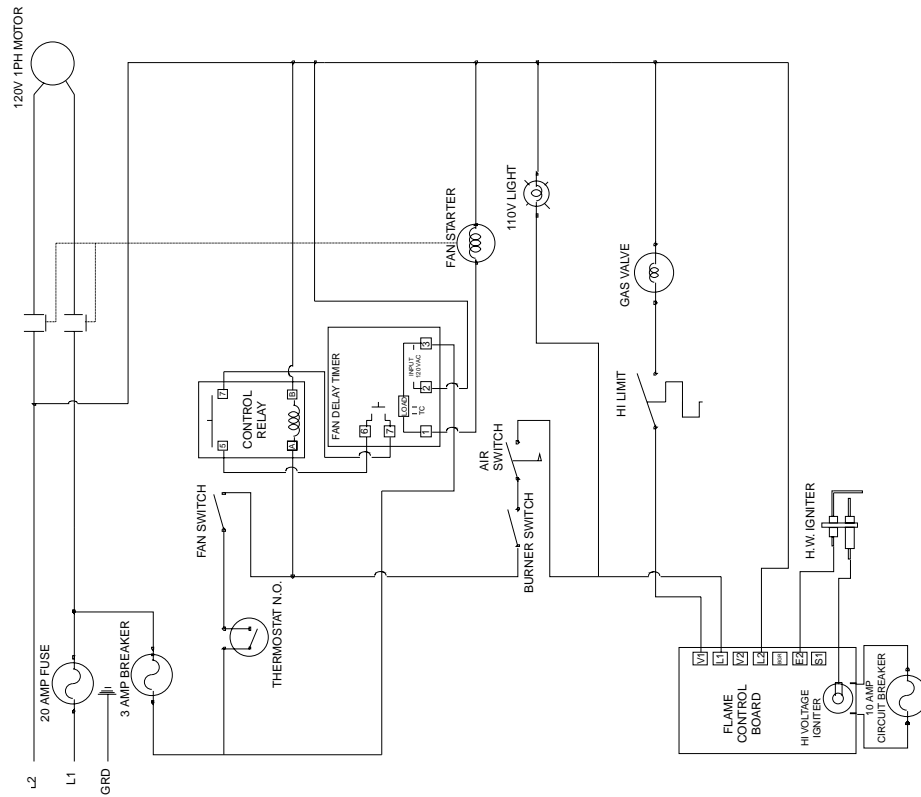


Item#	Part #	Description
1	HWP HV1039	SAFETY RELIEF VALVE
2	HWP HV1137	LIQUID PROPANE SOLENOID VALVE
3	HWP HV1123	MANUAL SHUT-OFF VALVE
4	HWP HV1054	LIQUID PRESSURE GAUGE
5	HWP HV1129	LIQUID STRAINER
6	HWP HV1140	COIL
7	HWP HV1042B	HOSE
8	HWP HR1053	HIGH PRESSURE REGULATOR

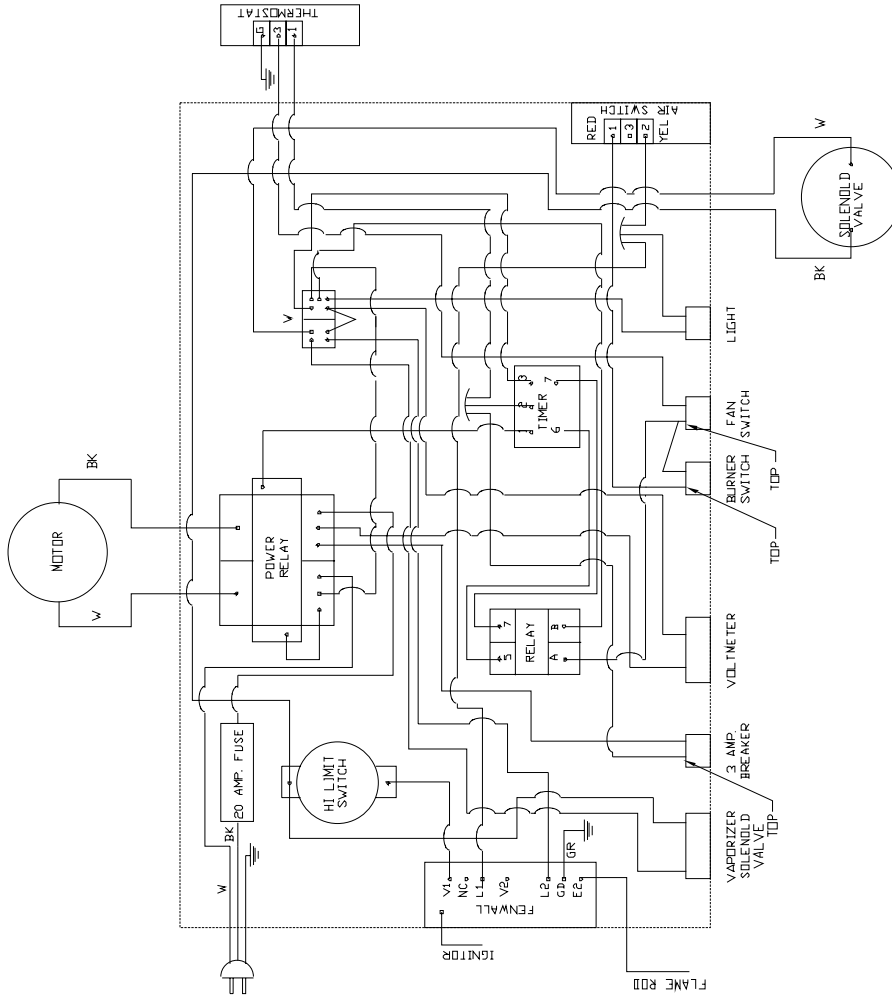
Model 1800(SL) Series



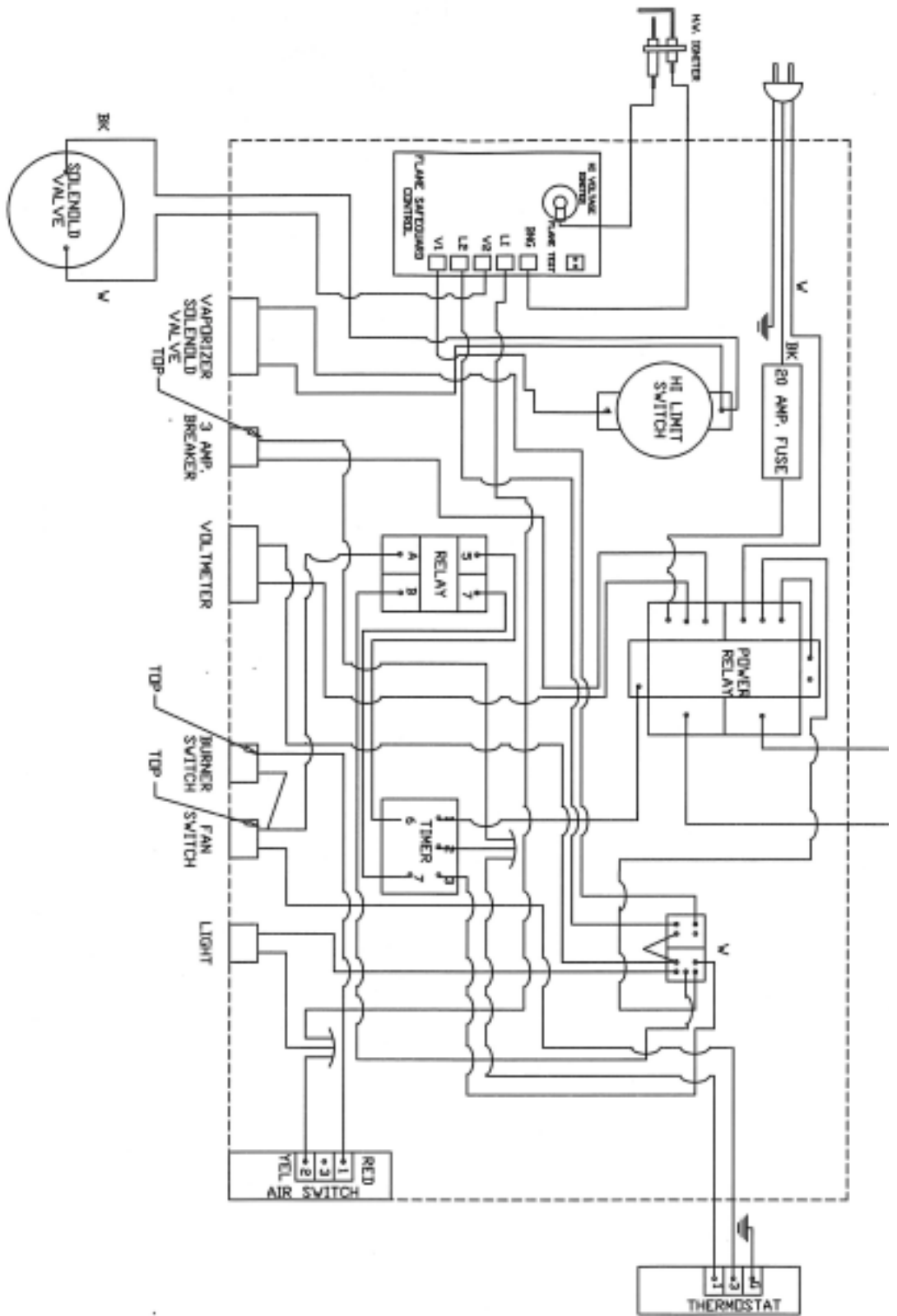
Item#	Part #	Description
1	HWP HC1069B	LID/CONTROL BOX
2	HWP HC1069A	CONTROL BOX W/LID
3	N/S	COPPER TUBE/AIR SWITCH
4	HWP HP1161	FAN BLADE
5	HWP HG1167	FAN GUARD
6	HWP HM1166	MOTOR 1 HP
7	HWP HB1177	HEAT SHIELD
8	HWP HB1800	BODY
9	HWP HB1171	BURNER
10	HWP HW1164	WHEEL 8"x 1.75" x 1/2" HUB
	HWP HW1164B	AXLE FOR 1800



SURE FLAME MODEL 1800
 FROM 1989 TO 1998
 180089CU1989 CUR.

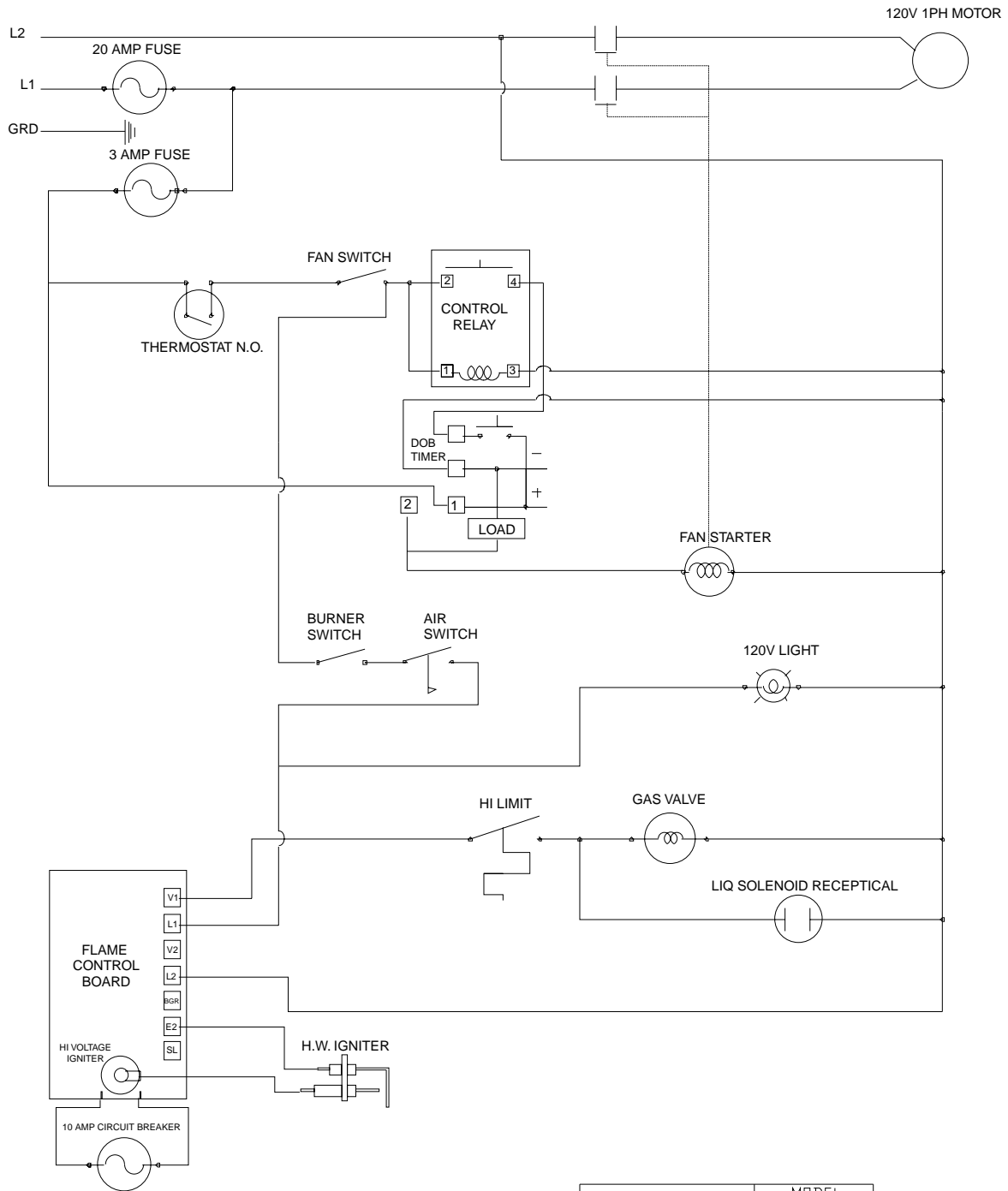


NOTE:
 ALL 16 GA. STR. IEW 600V RED,
 UNLESS OTHERWISE SPECIFIED



NOTE:
 ALL 16 GA. STR. IEW 600V RED,
 UNLESS OTHERWISE SPECIFIED

HEAT WAGON	MODEL 1800
DATE OF 2007 DRAWING	FROM TO
1800wd2-2007	05 CURR.



SURE FLAME	MODEL 1800
DATE OF DRAWING 1998	FROM TO
1800P89	PRIOR 1989

