

# LENNOX

## COMPLETE HEAT SYSTEM

**MODEL NUMBER:** HM 30 Heating Module  
 AM 30 Air Module

**BTU SIZES:** 100,000 and 150,000 BTU's

### ACCESSIBILITY CLEARANCE

CompleteHeat System or HM30 Alone Service Clearances:

<u>Clearances</u>	<u>Location</u>	<u>Inches</u>
Recommended	Front/Access Panel Side .....	30
Service access	HM30 .....	30

### CLEARANCE FROM COMBUSTIBLE MATERIAL

CompleteHeat System or HM30 Alone Installation Clearances:

<u>Clearances</u>	<u>Location</u>	<u>Inches</u>
To Combustible materials	Top .....	0
	Exhaust .....	0
	Side, rear and front .....	0
	Floor .....	0

### COLD AIR RETURN AIR DUCTS

Return air can be brought in either side, rear, or at the bottom of the AM30 unit.

For bottom return air, return air duct should be secured to the AM30 unit using rivets or S-locks. For side return air, secure return air duct to filter rack using screws.

### GARAGE

Approved. Must meet requirements in the UMC and the Good Practice Book.

### GENERAL

When the CompleteHeat system is used in conjunction with an air conditioner, it shall be installed in parallel with or on the upstream side of the cooling units to avoid freeze-up of water system.

Room thermostat anticipator setting (if adjustable) should be set according to amps listed on unit wiring diagram.

**HIGH ALTITUDE INSTALLATIONS**

Deration	Installation above 2,000 feet reduce ratings 4% for each 1,000 feet above sea level.
Orifice	Change
Regulator Pressure	0.3" ± 0.1" w.c.
Pressure Switch	See Figure 36. (page 8)

**MOBILE HOME**

Not approved.

**VENTING MATERIAL AND REQUIREMENTS**

Vent Pipe	Refer to tables 6 and 7. (below)
Vent Fittings	Refer to tables 6 and 7. (below)

Table 6

Table 7

**VENT PIPING AND FITTINGS SPECIFICATIONS**

PIPE & FITTING MATERIAL	ASTM SPECIFICATION
Schedule 40 PVC (Pipe)	D1785
Schedule 40 PVC (Cellular Core Pipe)	F891
Schedule 40 PVC (Fittings)	D2466
SDR-21PVC (Pipe)	D2241
SDR-26 PVC (Pipe)	D2241
Schedule 40 ABS (Pipe)	D1527
Schedule 40 ABS (Fittings)	D2468
ABS-DWV (Drain Waste & Vent) (Pipe & Fittings)	D2661
PVC-DWV (Drain Waste & Vent) (Pipe & Fittings)	D2665

**TERMINATION KITS**

Lennox Part No.	Kit LB#	Description-Inches (mm)
60G77	LB-49107CE	2" (50.8) Concentric Termination Kit
15F75	LB-49107CC	2" (50.8) Roof Termination Kit
22G44	LB-49107CD	2" (50.8) Wall Assembly Termination Kit
15F74	LB-49107CB	2" (50.8) Wall Ring Kit
44J41	LB-65678A	3" (76.2) Roof Termination Kit
44J40	LB-65701A	3" (76.2) Wall Assembly Termination Kit
30G78	WTK-G14	2" (50.8) Wall Termination Extended Vent
30G79	WTKX-G14	2" (50.8) Wall Termination Extension Riser

**VENT CLEARANCE FROM COMBUSTIBLE MATERIAL**

Exhaust vent = 0"

## VENTING PROCEDURE

Metal or plastic strapping may be used for vent pipe hangers.

**IMPORTANT:** Minimum pipe length for all input units is 5 feet (1.5m) and 1 elbow of 2" (50.8mm) diameter pipe.

For no reason should the intake and exhaust pipe be different diameter pipes.

Table 8

### VENT PIPE SIZING FOR CompleteHeat SYSTEM MINIMUM DIAMETER OF INTAKE/EXHAUST PIPE

Vent Pipe Equivalent Length (Max. Feet)	Pipe Diameter, Inches
	HM30-100, -150
10	2
20	2
30	2 or 3*
40	2 or 3*
50	2 or 3*
60	3*
70	3
80	3
90	3
100	3
110	3
120	3
130	3

\*Requires the use of 2" (50.8mm) termination kit instead of 3" (76.2mm) kit. **NOTE**—A 90° elbow is the equivalent length of 5 feet (1.5m). A 45° elbow is the equivalent length of 2-1/2 feet (.75m). Minimum length is 5 feet (1.5m) and 1 elbow.

- 1- Use recommended piping materials for both intake and exhaust piping.
- 2- Secure all joints, including drain leg, using approved cement.
- 3- Piping diameters should be determined according to length of pipe run. See table 8. Locate intake piping upwind (prevailing wind) from exhaust piping. To avoid re-circulation of exhaust, pipe must be higher than intake pipe. Exhaust and intake exits must be in same pressure zone. Do not exit one through the roof and one on the side. Also, do not exit the intake on one side and the exhaust on another side of the house or structure.
4. Intake and exhaust pipes maximum separation is 3" on roof termination and 6" on side wall termination.

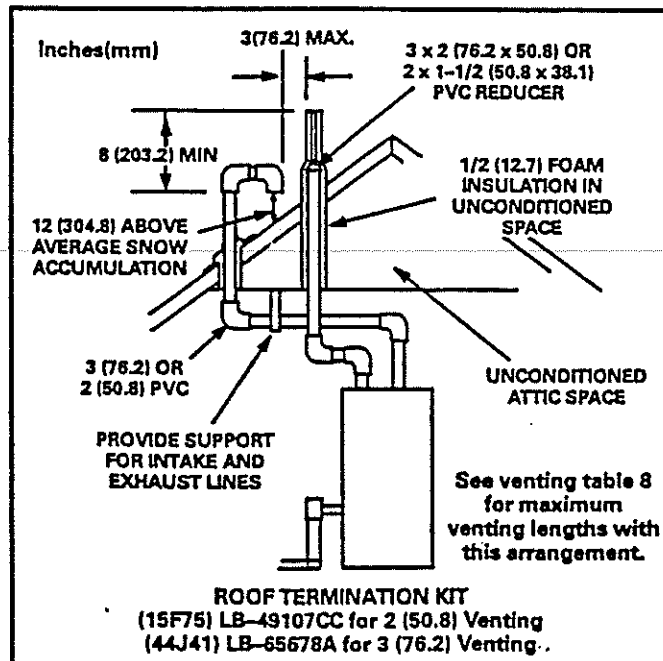


Figure 10

Note - If winter design temperature is below 32°F, exhaust piping must be insulated with 1/2" (12.7mm) foam insulation such as Armaflex or equivalent when run through unheated space.

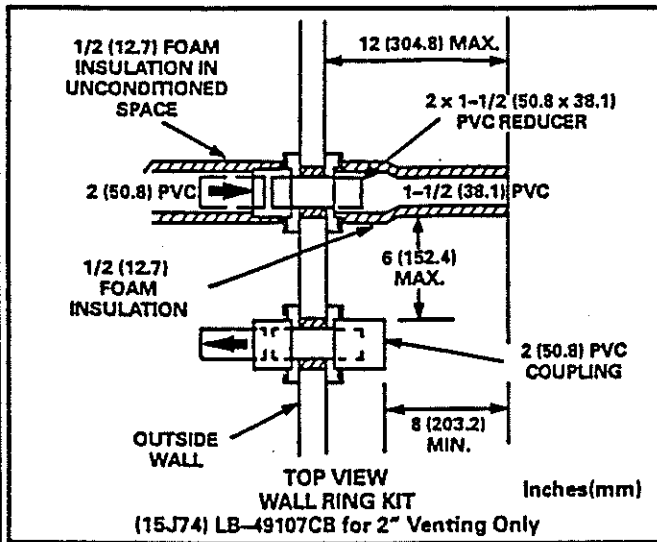


Figure 11

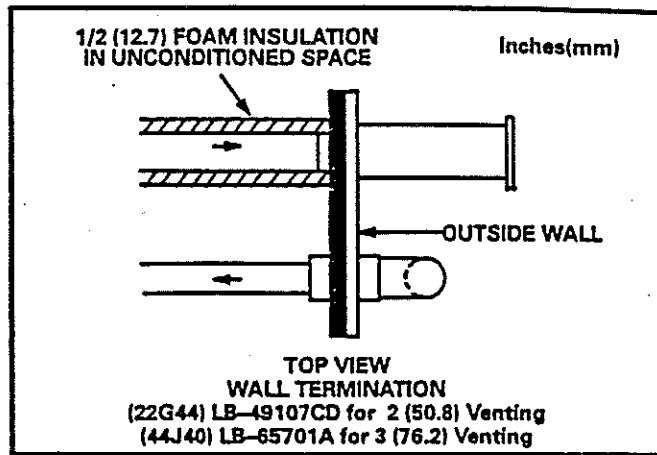


Figure 12

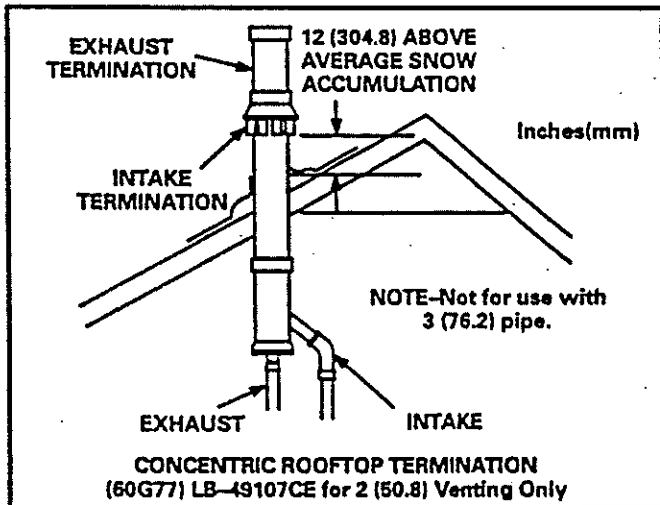


Figure 13

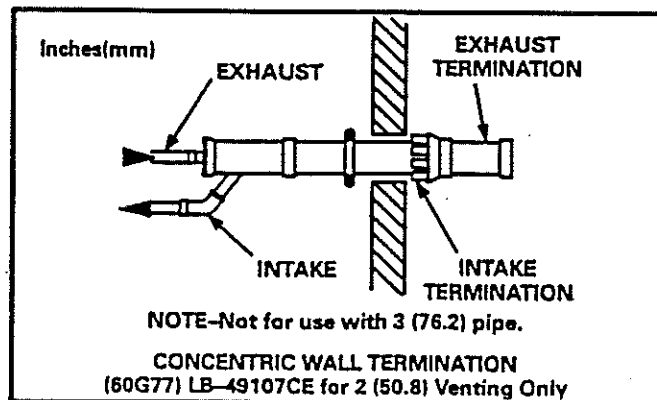
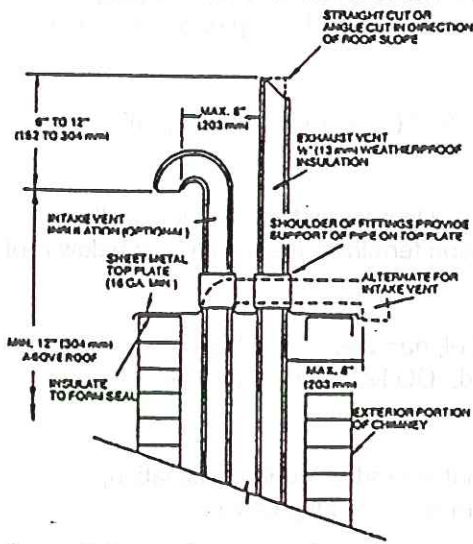


Figure 14

HM30 VENTING IN EXISTING CHIMNEY



NOTE-Do not discharge exhaust gases directly into any chimney or vent stack. If vertical discharge through an existing unused chimney or stack is required, insert piping inside chimney until the pipe open end is above top of chimney and terminate as illustrated. In any exterior portion of chimney, the exhaust vent must be insulated. An alternate method is to fill the chimney with vermiculite or equal to take advantage of its acoustic and thermal properties.

Figure 21

1. Use provided no-hub fitting to connect intake piping in slip connector located at top of unit. Use provided hose clamps to securely seal connection.

HM30 INTAKE & EXHAUST 2" (50.8mm) CONNECTIONS

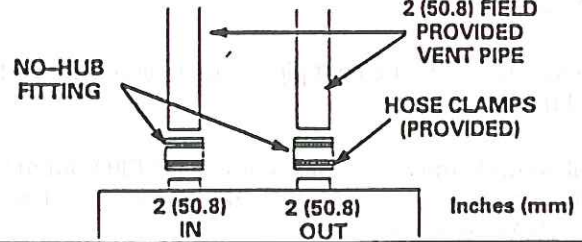


Figure 22

2. Adapter coupling kit is available for 3" venting.

HM30 INTAKE & EXHAUST 3" (76.2mm) CONNECTIONS

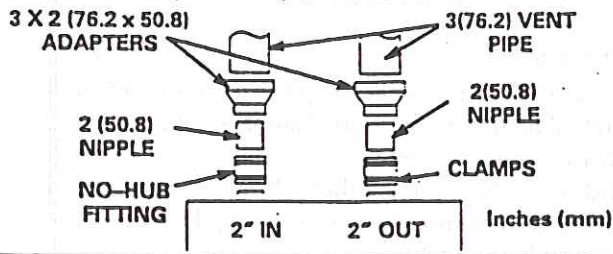


Figure 23

METAL OR PLASTIC STRAPPING

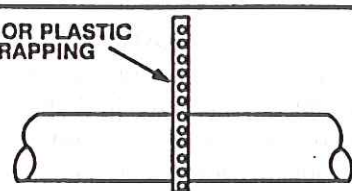


Figure 17

CAUTION: Combustion air intake inlet must be located more than 6 feet from dryer vent or combustion air inlet or outlet of another appliance.

All horizontal runs of exhaust pipe must slope back toward unit. A minimum of 1/4" (6.4mm) drop for each 12" (304.8mm) of horizontal run is mandatory for drainage. Horizontal runs of exhaust piping must be supported every 3-5 feet.

Exhaust piping must be insulated with 1/2" Armaflex or equivalent when run through unheated space.

## MISCELLANEOUS INFORMATION/NOTES

**WARNING:** Do not discharge exhaust into a stack that also serves another gas appliance. If discharging through an unused vertical stack, insert PVC pipe until the end of the pipe is even with the top or outlet end of the metal stack.

**WARNING:** The exhaust vent pipe termination must be located at least 3 feet (9.1mm) from any opening into another building.

Termination ends must be a minimum of 12" (304.8mm) above grade level. Do not point into window wells, stairwells, alcoves, courtyard areas or other recessed areas. Do not position termination ends directly below roof eaves or above walkway.

**Water Damaged Control** - If the controls (water thermostat, ignition control, gas valve, etc.) have been exposed to water, DO NOT operate the system. These controls MUST be replaced. DO NOT attempt to repair water damaged controls.

**WARNING:** Product contains fiberglass wool. Disturbing the insulation in this product during installation, maintenance, or repair will expose you to fiberglass wool. Breathing this may cause lung cancer.

For systems requiring water temperature higher than allowed by codes or 140°F (60°F), an anti-scald water mixing valve MUST be installed between the HM30 hot water outlet and the connection to the portable water system.

DO NOT remove temperature/pressure (T&P) relief valve from HM30 and reinstall elsewhere. Doing so will deny protection from high temperatures and pressures.

When using the HM30 unit to run a radiant floor loop, a minimum flow rate of 3 gpm is required.

For systems running more than 30 feet from the water heating device, an auxiliary pump is required in the return line.

Plumbing pipe - Only copper pipe suitable for potable (drinking) water systems may be used. For Radiant Floor Heating Applications - Connections to the HM30 must be copper pipe.

### CONDENSATE PIPING INSTALLATION

This unit is designed for either right or left side exit of condensate piping. Condensate drain line should be routed within the conditioned space to avoid freezing of condensate and blockage of drain line. An electric heat cable should be used where piping is exposed to unconditioned areas.

### GAS PIPING

The HM30 heat module is shipped standard for top side installation of gas piping. Simply connect gas supply to piping assembly.

Gas piping must not run in through air ducts, clothes chutes, chimneys or gas vents, dumb waiters or elevator shafts.



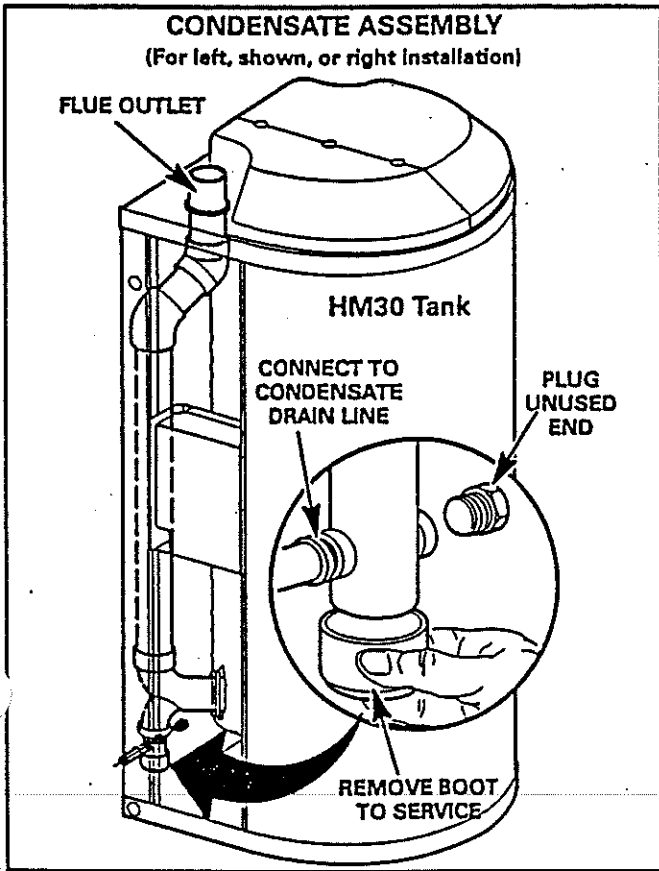


Figure 24

**MANIFOLD PRESSURE MEASUREMENT**

- To check for proper gas valve operation, the HM30 unit will need to be operating at high burner.
1. Connect positive (low) side of test gauge to outlet tap on gas valve. See Figure 37.
  2. Use field provided tee and hose to connect other gas valve vent to the negative (high) side of the test gauge. See Figure 37.

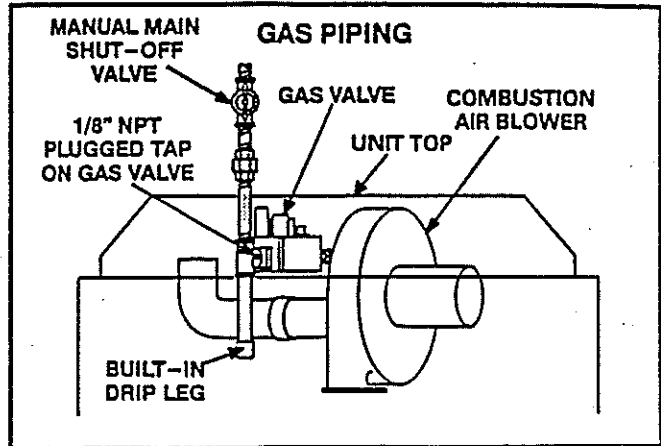


Figure 25

The gas valve used on the HM30 unit is a special low outlet pressure valve. If replacement necessary, replace with the same kind of valve.

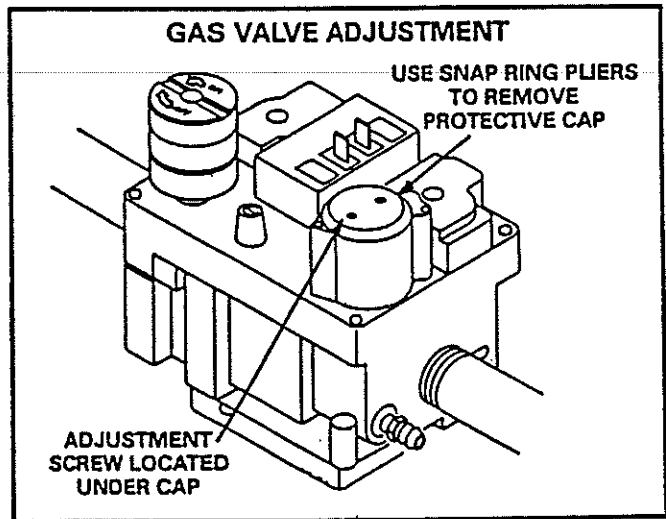


Figure 38

3. While unit is running at high burner (only when there is a demand for heating water), measure the pressure between these two points. Manifold pressure should be around  $0.3" \pm 0.1"$  w.c.
4. When measurement is completed, disconnect hose and reconnect as shown in Figure 36.

#### GAS MANIFOLD PRESSURE ADJUSTMENT

1. The gas valve may be adjusted to the normal operation of  $0.3" \pm 0.1"$  w.c. If unit is running rough, check all other symptoms before adjusting gas valve. A pair of snap ring pliers (.070) tip may be used to remove the protective cap on the gas valve. The adjustment screw is located under the cap.
2. After adjustment is completed, replace protective cap over adjustment screw and recheck manifold pressure and rate and sample flue products.

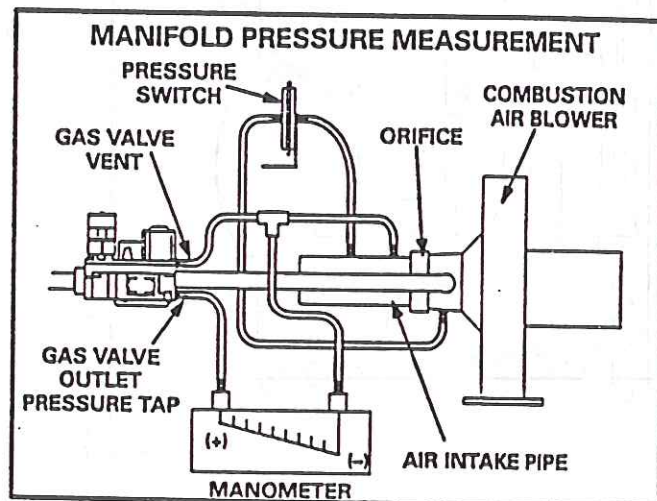
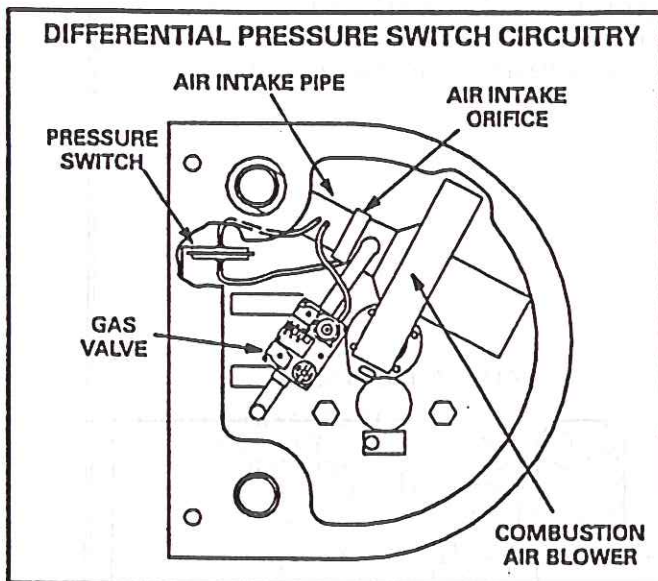


Figure 36

Figure 37

#### "TIMED-ON" and "TIMED-OFF" DELAYS

The "timed-off" delay (time that the blower operates after the heat demand has been satisfied) of 30 seconds is not adjustable.

"Timed-on" delay (time delay between the heat demand signal and the beginning of blower operation) can be adjusted by moving the jumper on the AM30 blower control. "Timed-on" delay will affect comfort and is adjustable to satisfy individual applications. See Figure 39.



**BLOWER SPEEDS** - Blower speed selection is accomplished by changing the taps at the harness connector at the blower motor. See Figure 40

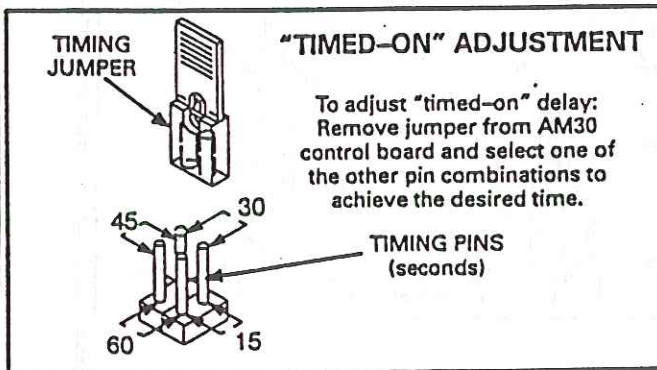


Figure 39

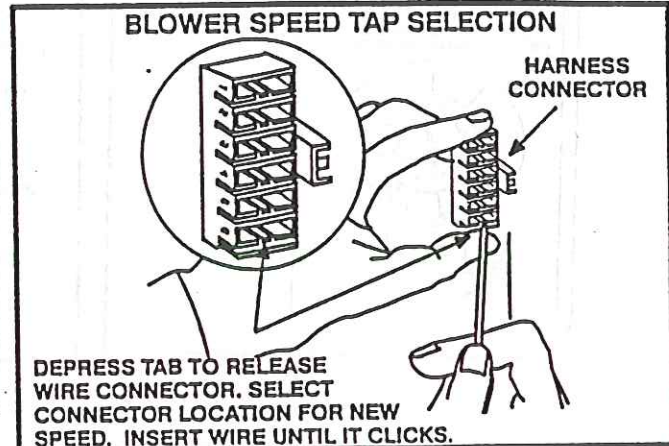


Figure 40

#### HOT WATER THERMOSTAT ADJUSTMENT

The water temperature dial is located at the lower left hand side of the HM30 control box. It is factory set at 120° F (49° C). Water temperature setting may be raised by turning dial clockwise to the desired setting.

Temperatures up to 140° F (60° C) are marked on the control board. Each dash mark represents an increase of 10° F (5.6° C) with the maximum being 170° F (77° C). See Figure 41.

Refer to local codes for highest temperature allowed for potable water supply at the point of use (shower heads, faucets, etc.). Some codes allow a maximum water temperature of 120° F (49° C).

If water temperatures above 140° F (60° C) are required, a jumper located on the heat module control board (see Figure 42) (page 10) must be removed. Adjusting dial to any dash mark above 140° F (60° C) will not raise water temperature unless the P1 jumper is removed.

**An approved anti-scald water mixing valve must be installed in the potable water piping to reduce the risk of scalding if temperature is adjusted above the maximum that code allows. Lennox recommends the use of the anti-scald water mixing valve in ALL applications.**

**LIMIT CONTROL** - Primary limit control will trip at 210°F (99°C). Limit will only reset after water temperature decreases to 120° F (99° C). An automatic secondary reset limit control will prevent operation in the event air is trapped at the top of the tank. The limit will trip at 350° F (177° C) and reset at 310° F (154° C).

**TANK DRAINING PROCEDURE** - It is recommended that 5 to 10 gallons of water from the HM30 tank be drained every six months to remove any sediment. **DO NOT** re-apply power to a dry tank. The burner should never operate with an empty water tank. Irreparable damage to the HM30 unit may occur.

Figure 41

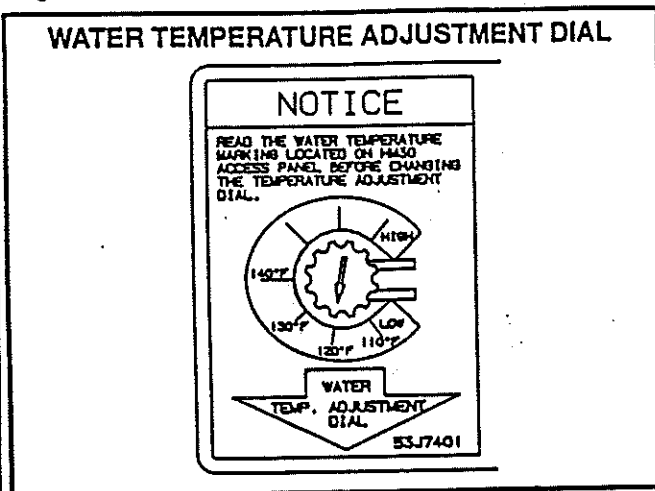
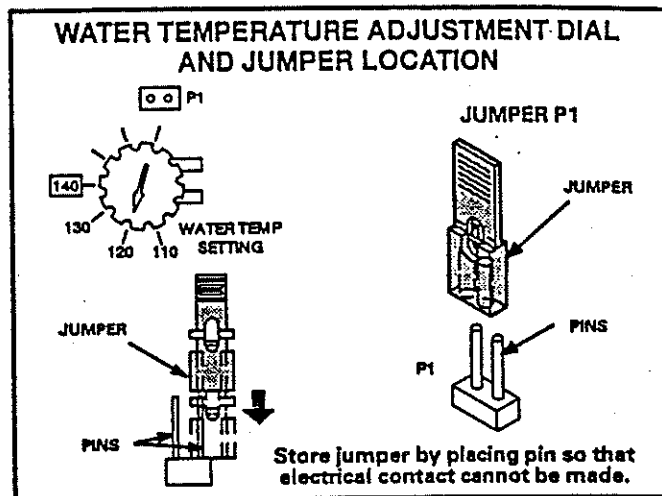


Figure 42



### TEMPERATURE/PRESSURE RELIEF VALVE TESTING

The temperature/pressure (T & P) relief valve is rated at 210° F (99° C) and 150 psi (1034 kPa). This valve is a safety device to protect against abnormally high temperature and pressures. Never remove T & P valve from the HM30 and reinstall in the drain line. If replacement of the valve is needed it must be replaced with the recommended valve and installed in its original location. If a temperature/pressure relief valve discharges periodically, this may be due to thermal expansion in a closed water supply system. Never plug the T & P relief valve. A thermal expansion tank may be needed to allow water to expand.

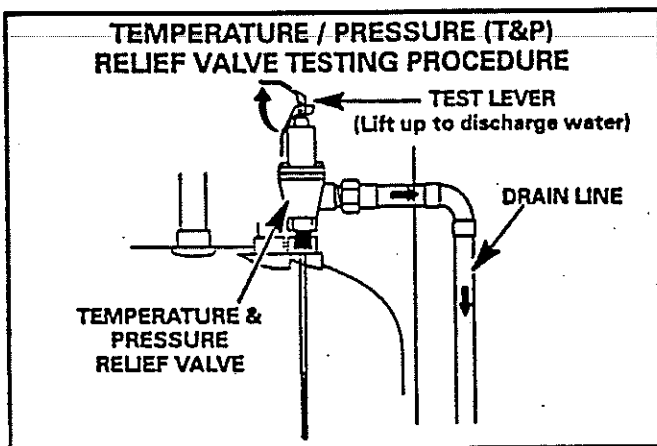


Figure 43

### CLEAN BURNER

The burner is virtually maintenance free. However, if the unit is running rough, an abnormal amount of soot is found in the condensate trap, or a build-up of soot is found under the burner, the burner may need to be disassembled and cleaned. Anytime the burner is disassembled, new gaskets are required (part numbers 57J14 and LB-68574). Never use the same gaskets.

1. Turn off both electrical and gas power supplies to furnace.
2. Remove top access panel from the HM30.
3. Remove combustion air intake.
4. Disconnect gas piping at the union and move piping out of way so the gas valve and combustion air blower can be lifted up and away from the top of the tank.
5. Disconnect wires leading to burner and heat exchange assembly.
6. Locate four nuts which hold the combustion air blower in place. Remove nuts.
7. Lift combustion air blower, along with gas valve, off the four studs to expose the burner. Set the combustion air blower and gas valve to the side.
8. Lift burner, along with spark electrode and flame sensor, out of the burner housing.
9. Gently clean burner using a brass wire brush.
10. With a shop vacuum or rags, clean out soot and scale deposits from burner, spark electrode and flame sensor.
11. Check the gap in the spark electrode and regap if necessary. See Figure 44.

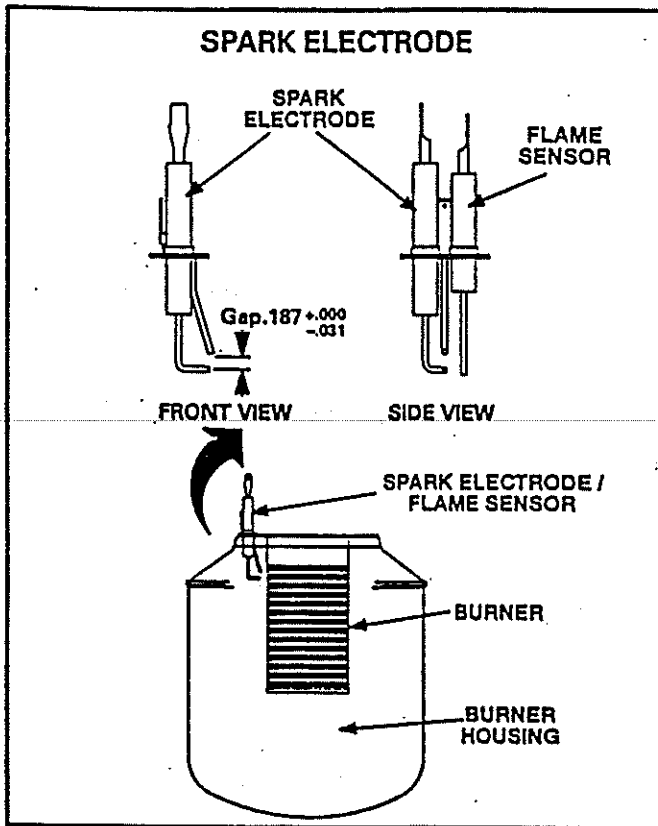


FIGURE 44

12. Replace burner, along with spark electrode and flame sensor, making sure to use new gaskets. Resecure combustion air blower, along with gas valve, using the four nuts.
13. Resecure combustion air intake pipe, gas piping and access panel.
14. Carefully check all piping connectors (factory and field) for gas leaks. Use a leak detecting solution or other preferred means.
15. Turn on gas and electric supply.

## HM30 HEAT MODULE PARTS DESCRIPTION

**TANK ASSEMBLY** - The water tank is made of stainless steel.

**CIRCULATING PUMP** - circulating pump is factory installed in the HM30 tank assembly to prevent hot water stratification and sediment build-up. The pump is energized when burner flame has been proven. The HM30 pump will only operate when there is a demand for hot water; not space heating.

**TEMPERATURE/PRESSURE RELIEF VALVE** - The valve opens at either 210°F (99°F) or 150 psig (1034kPa).

**FLUE/CONDENSATE TRAP ASSEMBLY** - This assembly vents flue products and provides an internal condensate trap.

**HELICAL HEAT EXCHANGER AND BURNER ASSEMBLY**- The heat exchanger and burner assembly are located in the water tank.

**TANK THERMOSTAT/DIRECT SPARK IGNITION CONTROL** - It monitors the tank water temperature (through the use of a thermistor). The board is equipped with two diagnostic LEDs. The control is equipped with the Watchguard circuit which automatically resets the ignition control lockout after one hour of continuous thermostat demand.

**GAS VALVE** - This automatic 100% shut-off gas valve compensates for variations in gas supply pressure. Pressure regulator may only be adjusted by a qualified technician using special tools.

**COMBUSTION AIR BLOWER** - Located on top of the water tank, the two-speed combustion air blower operates when the burner is required to heat water.

**LIMIT CONTROLS** - In cases of excessive tank or heat exchanger temperature, the manually reset primary limit control will trip at 210°F (99°C). In addition automatic secondary reset limit control will prevent operation in the event air is trapped in the top of the tank. The limit will trip at 350°F (177°C).

**PRESSURE SWITCH** - The pressure switch will not allow unit to operate until combustion air blower has established proper air flow.

## AM30 AIR MODULE PARTS DESCRIPTION

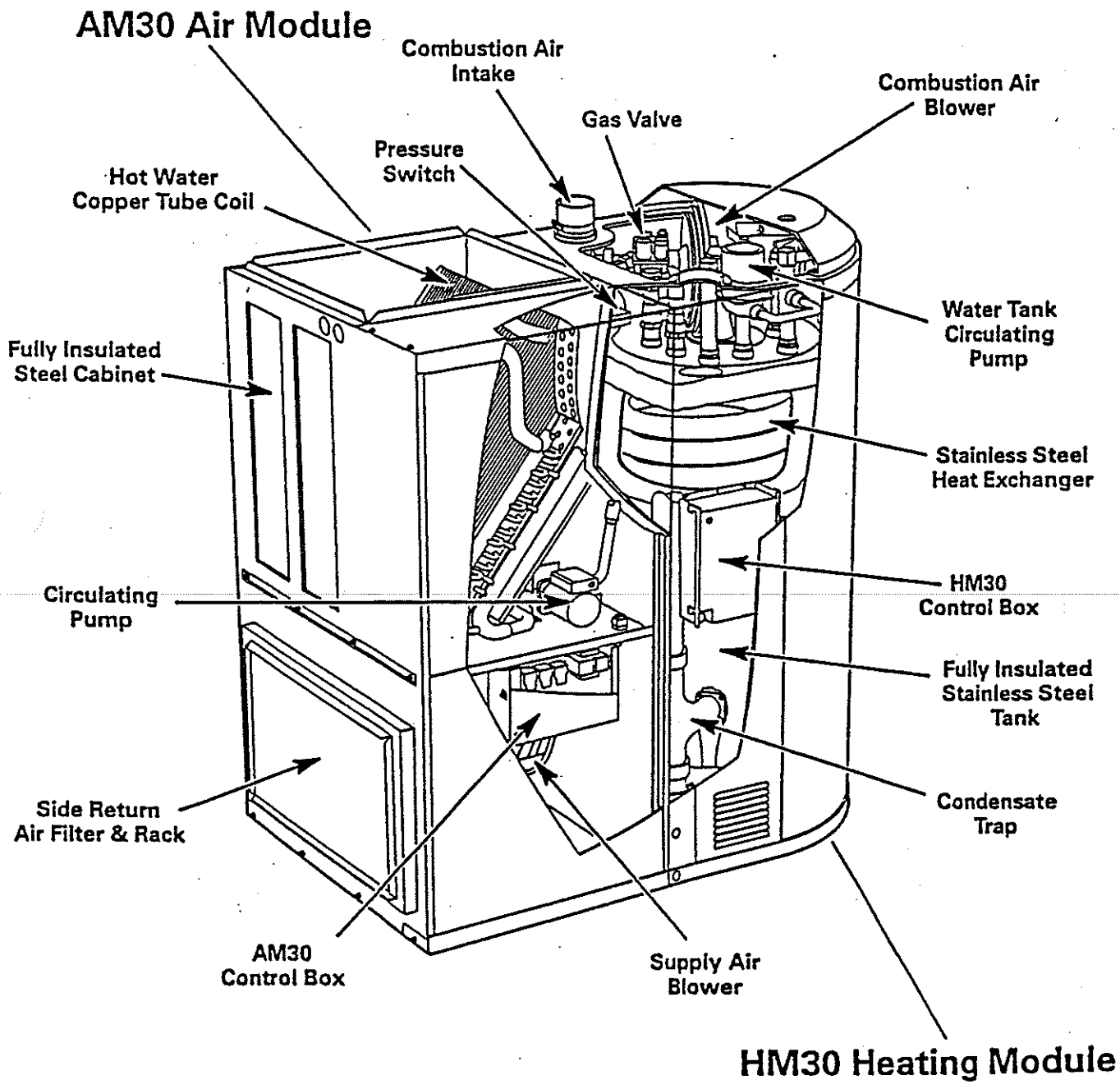
**BLOWER** - The direct drive blower provides multiple speeds which may be changed at the harness connector on the blower motor.

**HOT WATER COIL** - The hot water coil is made of copper tube and aluminum fins which provide excellent heat transfer. Manual air bleed ports are located in the copper tubing to release trapped air in the water circuit.

**BLOWER/CIRCULATING PUMP CONTROL** - Located in the AM30 control box, the control houses the blower "timed-on" delay jumper (adjustable from 15 to 60 seconds) and the "timed-off" delay (factory set, not adjustable). During non-heating periods, the control sends a signal to the pump to circulate water through the hot water coil every six hours for 30 seconds.

**CIRCULATING PUMP** - The circulating pump moves the potable hot water throughout the system.

**CompleteHeat™ SYSTEM (AM30 & HM30) PARTS ARRANGEMENT**





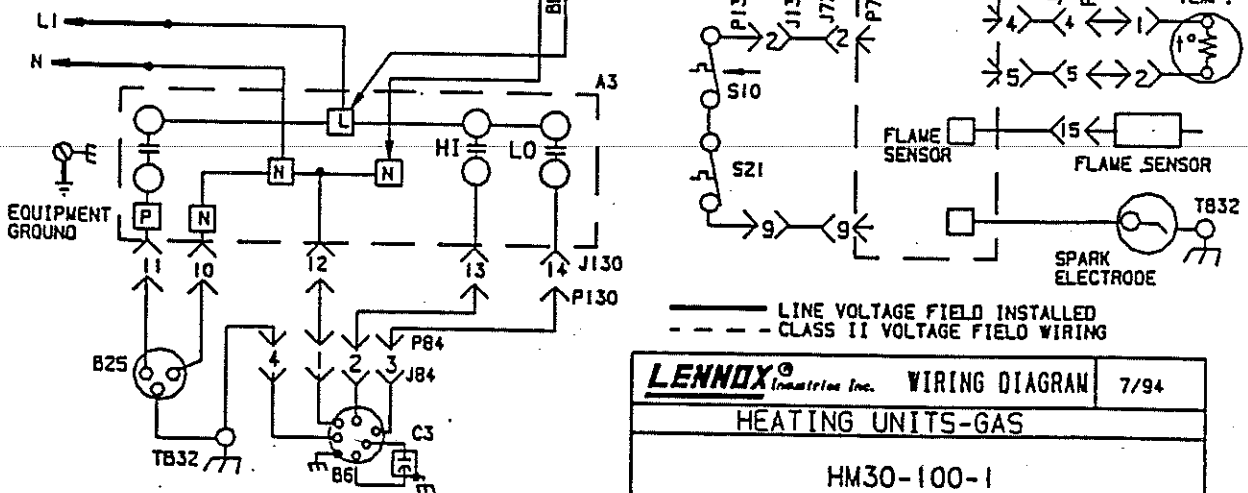
# TYPICAL CompleteHeat™ HM30 UNIT WIRING DIAGRAM

KEY	DESCRIPTION
A3	CONTROL - BURNER
A15	CONTROL - BLOWER DRIVE
B6	MOTOR - COMBUSTION AIR BLOWER
B25	MOTOR - PUMP, INTERNAL
C3	CAPACITOR - COMBUSTION AIR BLO.
GV1	VALVE - GAS
J72	JACK - PRIMARY CONTROL
J84	JACK - COMBUSTION AIR BLOWER
J127	JACK - WATER SENSOR
J130	JACK - GAS BURNER
P72	PLUG - PRIMARY CONTROL
P84	PLUG - COMBUSTION AIR BLOWER
P127	PLUG - WATER SENSOR
P130	PLUG - GAS BURNER
RT12	SENSOR - WATER TEMPERATURE
S10	LIMIT - PRIMARY GAS
S21	LIMIT - SECONDARY GAS
S72	SWITCH - DIFFERENTIAL PRESSURE
T12	TRANSFORMER - GAS CONTROL
TB32	TERMINAL STRIP - GROUND

NOTE -  
FOR USE WITH COPPER  
CONDUCTORS ONLY

OPTIONAL  
TRANSFORMER  
KIT

NOTE - IF ANY OF THE ORIGINAL WIRES IN THIS  
APPLIANCE IS REPLACED, IT MUST BE REPLACED  
WITH WIRES OF LIKE SIZE, RATING AND  
INSULATION THICKNESS.



WARNING -  
ELECTRIC SHOCK HAZARD, CAN CAUSE INJURY  
OR DEATH. UNIT MUST BE GROUNDED IN  
ACCORDANCE WITH NATIONAL AND LOCAL CODES.

--- LINE VOLTAGE FIELD INSTALLED  
- - - CLASS II VOLTAGE FIELD WIRING

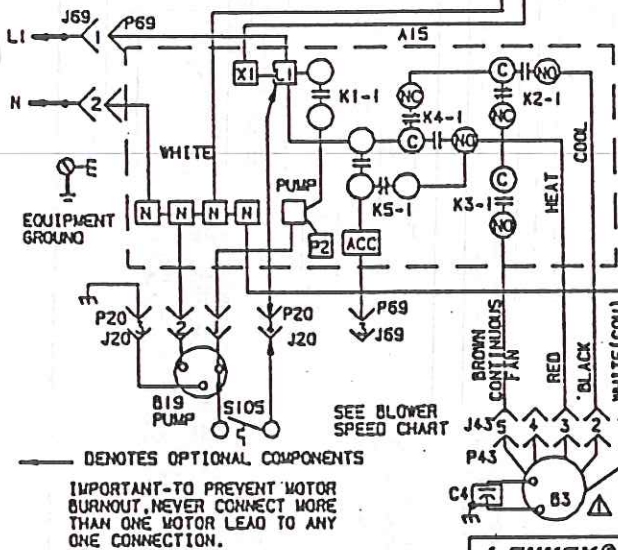
<b>LENOX</b> <small>Instruments Inc.</small> WIRING DIAGRAM 7/94	
HEATING UNITS - GAS	
HM30-100-1 HM30-150-1	
Superseded Form No.	SECTION A New Form No. 531,075W
©1994 Lennox Industries Inc.	LISTED U.S.A.

FIGURE 29

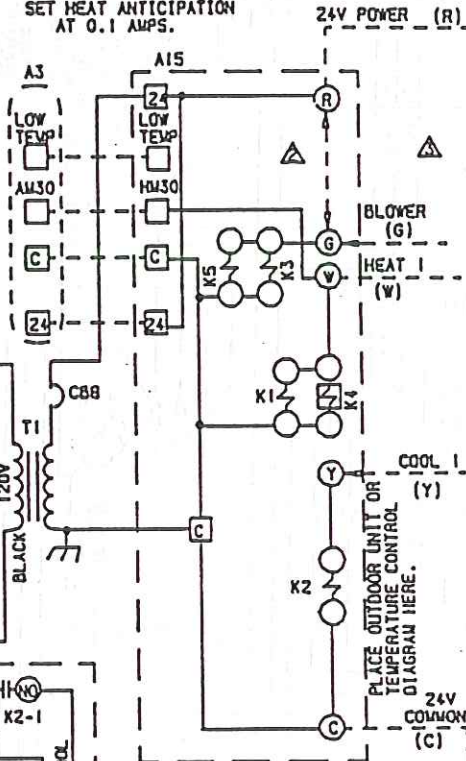
# TYPICAL CompleteHeat™ AM30 UNIT WIRING DIAGRAM

KEY	DESCRIPTION
A3	CONTROL - BURNER
A15	CONTROL - BLOWER DRIVE
B3	MOTOR - BLOWER
B19	MOTOR - WATER PUMP
C4	CAPACITOR - BLOWER MOTOR
C88	CIRCUIT BREAKER
J20	JACK - GAS
J43	JACK - BLOWER MOTOR
J69	JACK - BLOWER DECK
K1, -	RELAY - BOARD, PUMP
K2, -	RELAY - BOARD, BLOWER
K3, 1	RELAY - BOARD, CF
K4, -	RELAY - BOARD, HEAT BLOWER
K5, -	RELAY - BOARD, ACCESSORY
P20	PLUG - GAS
P43	PLUG - BLOWER MOTOR
P69	PLUG - BLOWER DECK
S105	THERMOSTAT - ANTI FREEZE
S106	SWITCH - FAN
T1	TRANSFORMER - CONTROL

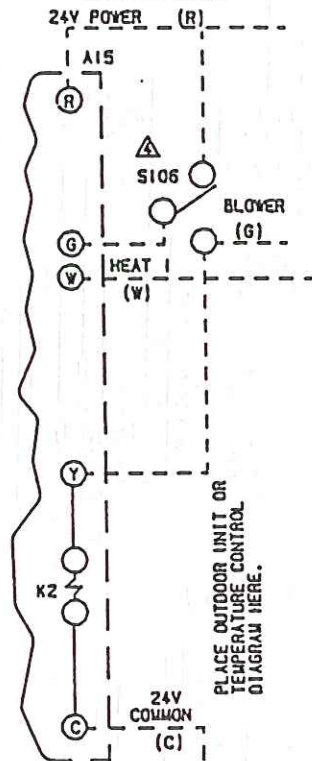
BLOWER SPEED CHART				
BLOWER MOTOR (B3)	FACTORY CONNECTED SPEED TAPS			MOTOR SPEEDS AVAILABLE
	COOL	HEAT	LOW	
1/5 HP	2	3	4	3
1/3, 1/2 HP	2	3	5	4
3/4 HP	2	3	6	5
BLOWER SPEED SELECTION				
HI <span style="float: right;">LO</span>				
SPEED TAPS	2	3	4	5
	2	3	4	5



SET HEAT ANTICIPATION AT 0.1 AMPS.



OPTIONAL WIRING FOR CONTINUOUS LOW SPEED BLOWER OPERATION



TO CHANGE MOTOR SPEED TAP AND FOR BLOWER SPEED SELECTION PROCEDURE, REFER TO INSTALLATION INSTRUCTION

CONTINUOUS FAN OPERATION WITH HEAT ONLY THERMOSTAT  
CONNECT JUMPER TO R AND G AS SHOWN. BLOWER WILL RUN ON CONTINUOUS FAN SPEED DURING NO HEAT DEMAND. BLOWER WILL RUN AT HEAT SPEED DURING HEAT DEMAND.

CONTINUOUS FAN OPERATION WITH HEAT/COOL THERMOSTAT  
WHEN THERMOSTAT FAN SWITCH IS IN "ON" POSITION, BLOWER RUNS CONTINUOUS FAN SPEED DURING PERIODS OF NO HEAT NOR COOLING DEMAND. DO NOT CONNECT JUMPER BETWEEN R & G.

FOR SELECTABLE FAN SPEED WITH HEAT/COOL THERMOSTAT  
CONNECT S106 SWITCH AS SHOWN. BLOWER WILL RUN AT CONTINUOUS FAN SPEED WHEN S106 IS CLOSED (R TO G) DURING PERIODS OF NO HEAT NOR COOLING DEMAND. WHEN THERMOSTAT FAN SWITCH IS IN "ON" POSITION, BLOWER RUNS COOL SPEED.

— DENOTES OPTIONAL COMPONENTS  
IMPORTANT - TO PREVENT MOTOR BURNOUT, NEVER CONNECT MORE THAN ONE MOTOR LEAD TO ANY ONE CONNECTION.

WARNING - ELECTRIC SHOCK HAZARD, CAN CAUSE INJURY OR DEATH. UNIT MUST BE GROUNDED IN ACCORDANCE WITH NATIONAL AND LOCAL CODES

NOTE - IF ANY WIRE IN THIS APPLIANCE IS REPLACED, IT MUST BE REPLACED WITH WIRE OF LIKE SIZE, RATING AND INSULATION THICKNESS.

— LINE VOLTAGE FIELD INSTALLED  
- - - CLASS II VOLTAGE FIELD WIRING

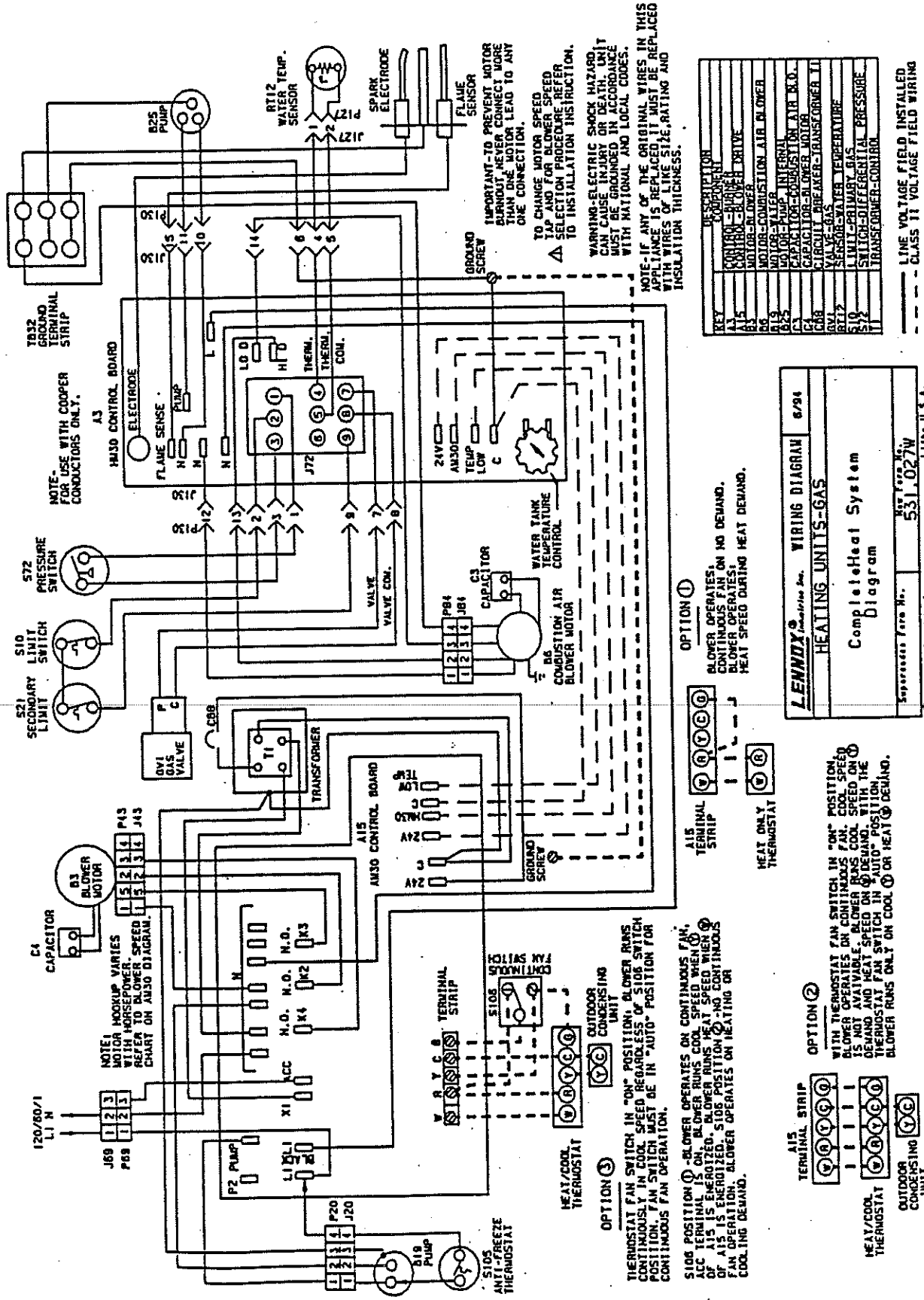
<b>LENNOX</b> Industries Inc.		WIRING DIAGRAM 7/94
HEATING UNITS-GAS		
AM30 SERIES		
Supersedes Form No.	New Form No.	
	531,076W	

NOTE - FOR USE WITH COPPER CONDUCTORS ONLY

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FIGURE 30

# CompleteHeat System Point to Point Diagram



KEY	DESCRIPTION
A1	CONTROL - BLOWER
A2	CONTROL - BLOWER DRIVE
A3	MOTOR - BLOWER
A4	MOTOR - VALVE
A5	MOTOR - VALVE INTERNAL
A6	MOTOR - VALVE EXTERNAL
A7	MOTOR - VALVE EXTERNAL AIR B.O.
A8	MOTOR - VALVE EXTERNAL AIR B.O.
A9	MOTOR - VALVE EXTERNAL AIR B.O.
A10	MOTOR - VALVE EXTERNAL AIR B.O.
A11	MOTOR - VALVE EXTERNAL AIR B.O.
A12	MOTOR - VALVE EXTERNAL AIR B.O.
A13	MOTOR - VALVE EXTERNAL AIR B.O.
A14	MOTOR - VALVE EXTERNAL AIR B.O.
A15	MOTOR - VALVE EXTERNAL AIR B.O.
A16	MOTOR - VALVE EXTERNAL AIR B.O.
A17	MOTOR - VALVE EXTERNAL AIR B.O.
A18	MOTOR - VALVE EXTERNAL AIR B.O.
A19	MOTOR - VALVE EXTERNAL AIR B.O.
A20	MOTOR - VALVE EXTERNAL AIR B.O.
A21	MOTOR - VALVE EXTERNAL AIR B.O.
A22	MOTOR - VALVE EXTERNAL AIR B.O.
A23	MOTOR - VALVE EXTERNAL AIR B.O.
A24	MOTOR - VALVE EXTERNAL AIR B.O.
A25	MOTOR - VALVE EXTERNAL AIR B.O.
A26	MOTOR - VALVE EXTERNAL AIR B.O.
A27	MOTOR - VALVE EXTERNAL AIR B.O.
A28	MOTOR - VALVE EXTERNAL AIR B.O.
A29	MOTOR - VALVE EXTERNAL AIR B.O.
A30	MOTOR - VALVE EXTERNAL AIR B.O.
A31	MOTOR - VALVE EXTERNAL AIR B.O.
A32	MOTOR - VALVE EXTERNAL AIR B.O.
A33	MOTOR - VALVE EXTERNAL AIR B.O.
A34	MOTOR - VALVE EXTERNAL AIR B.O.
A35	MOTOR - VALVE EXTERNAL AIR B.O.
A36	MOTOR - VALVE EXTERNAL AIR B.O.
A37	MOTOR - VALVE EXTERNAL AIR B.O.
A38	MOTOR - VALVE EXTERNAL AIR B.O.
A39	MOTOR - VALVE EXTERNAL AIR B.O.
A40	MOTOR - VALVE EXTERNAL AIR B.O.
A41	MOTOR - VALVE EXTERNAL AIR B.O.
A42	MOTOR - VALVE EXTERNAL AIR B.O.
A43	MOTOR - VALVE EXTERNAL AIR B.O.
A44	MOTOR - VALVE EXTERNAL AIR B.O.
A45	MOTOR - VALVE EXTERNAL AIR B.O.
A46	MOTOR - VALVE EXTERNAL AIR B.O.
A47	MOTOR - VALVE EXTERNAL AIR B.O.
A48	MOTOR - VALVE EXTERNAL AIR B.O.
A49	MOTOR - VALVE EXTERNAL AIR B.O.
A50	MOTOR - VALVE EXTERNAL AIR B.O.

**LENNOX** Industries Inc. WIRING DIAGRAM 6/94

HEATING UNITS-GAS

CompleteHeat System Diagram

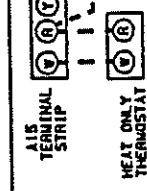
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**OPTION 1**

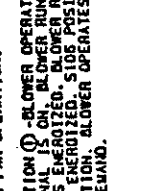
BLOWER OPERATES, CONTINUOUS FAN ON NO DEMAND.

BLOWER OPERATES, HEAT SPEED DURING HEAT DEMAND.



**OPTION 2**

WITH THERMOSTAT FAN SWITCH IN "ON" POSITION, BLOWER OPERATES ON "COOL" POSITION, BLOWER RUNS COOL SPEED WHEN "COOL" IS ENERGIZED. BLOWER RUNS HEAT SPEED WHEN "HEAT" IS ENERGIZED. S108 OPERATES ON HEATING OR FAN OPERATION. BLOWER OPERATES ON HEATING OR COOLING DEMAND.



**OPTION 3**

THERMOSTAT FAN SWITCH IN "ON" POSITION, BLOWER RUNS CONTINUOUSLY IN COOL SPEED REGARDLESS OF FAN SWITCH POSITION. FAN SWITCH MUST BE IN "AUTO" POSITION FOR CONTINUOUS FAN OPERATION.

S108 POSITION 1 - BLOWER OPERATES ON CONTINUOUS FAN, ACC 12V IS ENERGIZED. BLOWER RUNS COOL SPEED WHEN "COOL" IS ENERGIZED. S108 OPERATES ON HEATING OR FAN OPERATION. BLOWER OPERATES ON HEATING OR COOLING DEMAND.



FIGURE 31

# Complete Heat SYSTEM SEQUENCE OF OPERATION

## AM30 Air Module

Unit disconnect closes and provides 120V to the transformer T1 and AM30 control board. Transformer T1 provides 24VAC power to both the AM30 blower / pump control board (A15) and room thermostat.

## HM30 Heat Module

120V is routed to HM30 TDSI control board through two-wire line voltage harness. 24VAC is sent from the AM30 to the HM30 through the interconnecting harness.

### Cooling Demand

Thermostat terminal Y1 energizes AM30 control terminal Y and the condenser.

The indoor blower (B3) is energized at cooling speed by the blower relay (K2).

When cooling demand is satisfied, thermostat terminal Y1 de-energizes the condenser and AM30 control terminal Y. The blower immediately de-energizes or switches to continuous speed (K3).

### Space Heating Demand

Room thermostat terminal W1 sends 24VAC to W located on the AM30 control.

During a call for space heat, the temperature setpoint increases by 5°F (2.75°C) causing burner cycle to start. This insures adequate hot water during space heating demand.

If HM30 water temperature is more than 20°F (11.10°C) below setpoint, the AM30 will wait for the water temperature to rise within 15°F (8.33°C) of setpoint before continuing with pump/blower operation.

### AM30 Pump / Blower Operation

When demand is routed through pump relay (K1) in the blower / pump control board, AM30 water pump (B19) is energized. Water pumped from HM30 to AM30 is hotter than water for domestic use.

The blower (B3) is energized at heating speed by the blower relay (K4) after a "timed-on" delay, adjustable from 15 to 60 seconds.

When heating demand is satisfied, thermostat terminal W1 de-energizes AM30 control terminal W and the circulating pump. After a fixed 30-second "timed-off" delay, the blower either de-energizes or goes to continuous speed (K3). The six-hour circulating timer resets.

### Six-Hour Circulation Timer

The blower / pump control board circulates water through the AM30 coil for 30 seconds every six hours. The six-hour circulation timer resets after each 30-second run or after each heating demand is satisfied. When in cooling mode, the control will wait until a cooling demand is satisfied before energizing the pump.

### HM30 Burner Operation

The TDSI control checks the N.O. pressure switch (S72), N.C. primary limit (S10), N.C. secondary limit (S21), and that no flame is present.

If all conditions are satisfied, the control energizes the combustion air blower (B6) at high speed.

When enough air is provided to close the pressure switch, a ten-second prepurge period begins allowing the combustion chamber to vent itself.

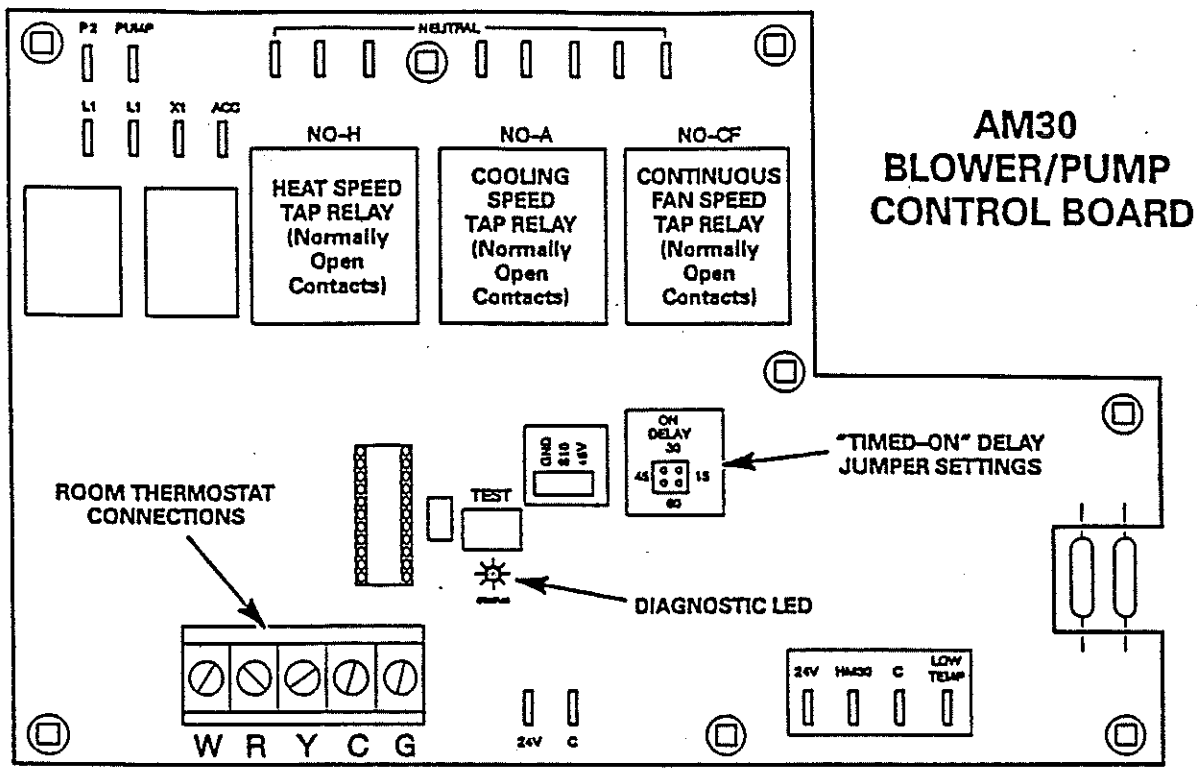
After prepurge, the combustion air blower will shut off for three seconds. With the pressure switch remaining closed, the TDSI control simultaneously opens the gas valve and sends high voltage to the spark electrode to light the burner. After two seconds, the combustion air blower begins to run at high speed. If flame still does not exist six seconds after prepurge, the gas valve closes, spark electrode de-energizes and the combustion blower turns on for a ten-second inner-purge cycle.



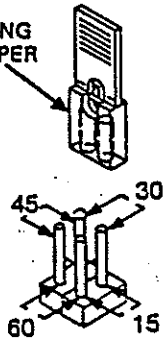



When flame is sensed, the TDSI control energizes the HM30 circulating pump (B25) and initiates a 10-second flame stabilization period. If flame is present after 10 seconds, the controller establishes a 600-millisecond flame failure response time.

After flame stabilization period, the combustion air blower will reduce to low speed; assuming the tank temperature is within eight degrees of setpoint. If tank temperature is not within eight degrees of setpoint the blower will remain on high speed.

When the temperature setpoint + 5°F (2.75°C) is satisfied, the gas valve de-energizes. The combustion air blower will continue to operate (post-purge) at low speed for 30 seconds.

**AM30 BLOWER/PUMP CONTROL BOARD TROUBLESHOOTING CHART**

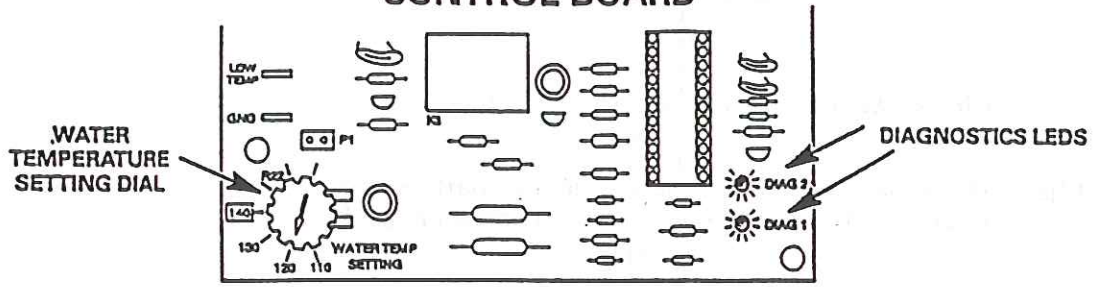


AM30 BOARD DIAGNOSTIC LED	MODE INDICATION	REMEDY
 Flashing	Normal Operation	None. Flashing LED signifies normal operation.
 On	"Timed-On" Delay Jumper Setting Defaulting to 15 Seconds	Control cannot read the ON DELAY jumper setting and has defaulted to 15 seconds. Remove jumper and reposition on pins corresponding with the desired "timed-on" period. If control still cannot read delay, replace AM30 control board. 
 On	Simultaneous Demand from W and Y	Control reads a signal from both W and Y (heating and cooling). Check wiring at thermostat and thermostat connections on the AM30 board.
Continuously  On or  Off	Board Failure	Replace the AM30 control board.



**HM30 TDSI CONTROL BOARD TROUBLESHOOTING CHART**

**HM30 TDSI  
BURNER/IGNITION/TEMPERATURE  
CONTROL BOARD**



TDSI BOARD DIAGNOSTIC PATTERNS	MODE INDICATION	REMEDY
DIAG 2  Flashing Together DIAG 1  Flashing Together	Normal Operation	None. Flashing LED signifies normal operation.
DIAG 2  Flashing DIAG 1  On	Watchguard	The system is in Watchguard mode. Other error conditions may have occurred during the postpurge period before the system went into Watchguard. Reset power to the system and observe diagnostic LEDs for any other error conditions.
DIAG 2  Off DIAG 1  Flashing	Thermistor Fail	This LED pattern will only exist during the postpurge prior to Watchguard. If this condition occurs, check wiring and replace thermistor if necessary.
DIAG 2  On DIAG 1  Flashing	Limit Switch Open	This LED pattern will only exist during the postpurge prior to Watchguard. If this condition occurs, proceed with limit switch open troubleshooting flowchart.
DIAG 2  Flashing DIAG 1  Off	Abnormal Pressure Switch Operation	This LED pattern will exist during the prepurge and postpurge prior to Watchguard. If this condition occurs, proceed with abnormal pressure switch operation troubleshooting flowchart.
DIAG 2  Flashing Alternately DIAG 1  Flashing Alternately	Flame Failure	This LED pattern will only exist during the postpurge prior to Watchguard. If this condition occurs, proceed with flame failure troubleshooting flowchart.
DIAG 2  Continuously On or  Off DIAG 1  Continuously On or  Off	TDSI Board Failure	Replace the TDSI control board.

