

## XV Trouble Shooting

### A. Combustion

- 1) Nozzles - The selection of the nozzle supplied with this boiler is the result of extensive testing to obtain the best flame shape and efficient combustion. Other brands of the same spray angle and pattern may be used but may not perform at the expected level of CO<sub>2</sub> and smoke. Nozzles are delicate and should be protected from dirt and abuse. Nozzles are mass-produced and can vary from sample to sample. For all of those reasons a spare nozzle should be part of a service technician's replacement parts inventory.
- 2) Flame Shape - As seen for the observation port, the flame should appear straight with no sparklers rolling up toward the crown of the chamber. If the flame drags to the right or left, sends sparklers upward or makes wet spots on the chamber walls, the nozzle should be replaced. If the condition persists look for fuel leaks, air leaks, water or dirt in the fuel as described below.
- 3) Fuel Leaks - Any fuel leak between the pump and the nozzle will be detrimental to good combustion results. Look for wet surfaces in the air tube, under the ignitor and around the air inlet. Any such leaks should be repaired as they may cause erratic burning of the fuel and in the extreme case may become a fire hazard.
- 4) Air Leaks - Any such leaks should be repaired as they may cause erratic burning of fuel and in extreme cases may become a fire hazard.
- 5) Gasket Leaks - If CO<sub>2</sub> readings between the limits shown in Table 12.0 with a #1 smoke cannot be obtained in the breeching, or if odors are observed, look for leaks around the burner mounting gasket, observation door and canopy gasket, or in the breeching below the point where the flue gas sample is taken. Air leakage into the boiler or breeching can cause low CO<sub>2</sub> readings (the lower the firing rate, the greater effect an air leak can have on CO<sub>2</sub> readings). Such leaks can also cause flue gas leakage into the building, resulting in odor complaints.
- 6) Dirt - The use of a fuel filter is required. Accidental accumulation of dirt in the fuel system can clog the nozzle or nozzle strainer and produce a poor spray pattern from the nozzle. The smaller the firing rate, the smaller the slots in the nozzle and the more prone to plugging it becomes.
- 7) Water - Water in the fuel in large amounts will stall the fuel pump. Water in the fuel in smaller amounts will cause excessive wear on the pump. More importantly it chills the flame and causes smoke and unburned fuel to pass through the combustion chamber and clog the flueways of the boiler.
- 8) Cold Oil - If the oil temperature near the fuel pump is 40°F or lower, poor combustion or delayed ignition may result. Cold oil is harder for the nozzle to atomize, thus the oil droplets get larger and travel further creating a longer flame. An outside fuel tank that is above grade or has fuel lines in a shallow bury is a good candidate for cold oil. The best solution is to bury the tank and lines deep enough to keep the oil above 40°F. Be sure to follow any state and local codes when burying fuel oil tanks and/or fuel oil lines.
- 9) Start-Up Noise - Delayed ignition is the cause of start-up noises. If it occurs recheck for electrode settings, flame shape, air or water in the fuel lines.
- 10) Shut Down Noise - If the flame runs out of air before it runs out of fuel, an after burn with noise may occur. That may be the result of a faulty cut-off valve in the fuel pump, or it may be air trapped in the nozzle line. It may take several firing cycles for that air to be fully vented through the nozzle. Water in the fuel or poor flame shape can also cause shut down noises.

### TEST PROCEDURE FOR FUEL SIDE PROBLEMS


A good test for isolating fuel side problems is to temporarily connect the burner to a small alternate source of clean, fresh, warm #2 fuel oil located near the burner. If the burner runs successfully when drawing out of the auxiliary pail then the problem is isolated to the fuel or fuel lines being used on the installation.

## **B. Control System**

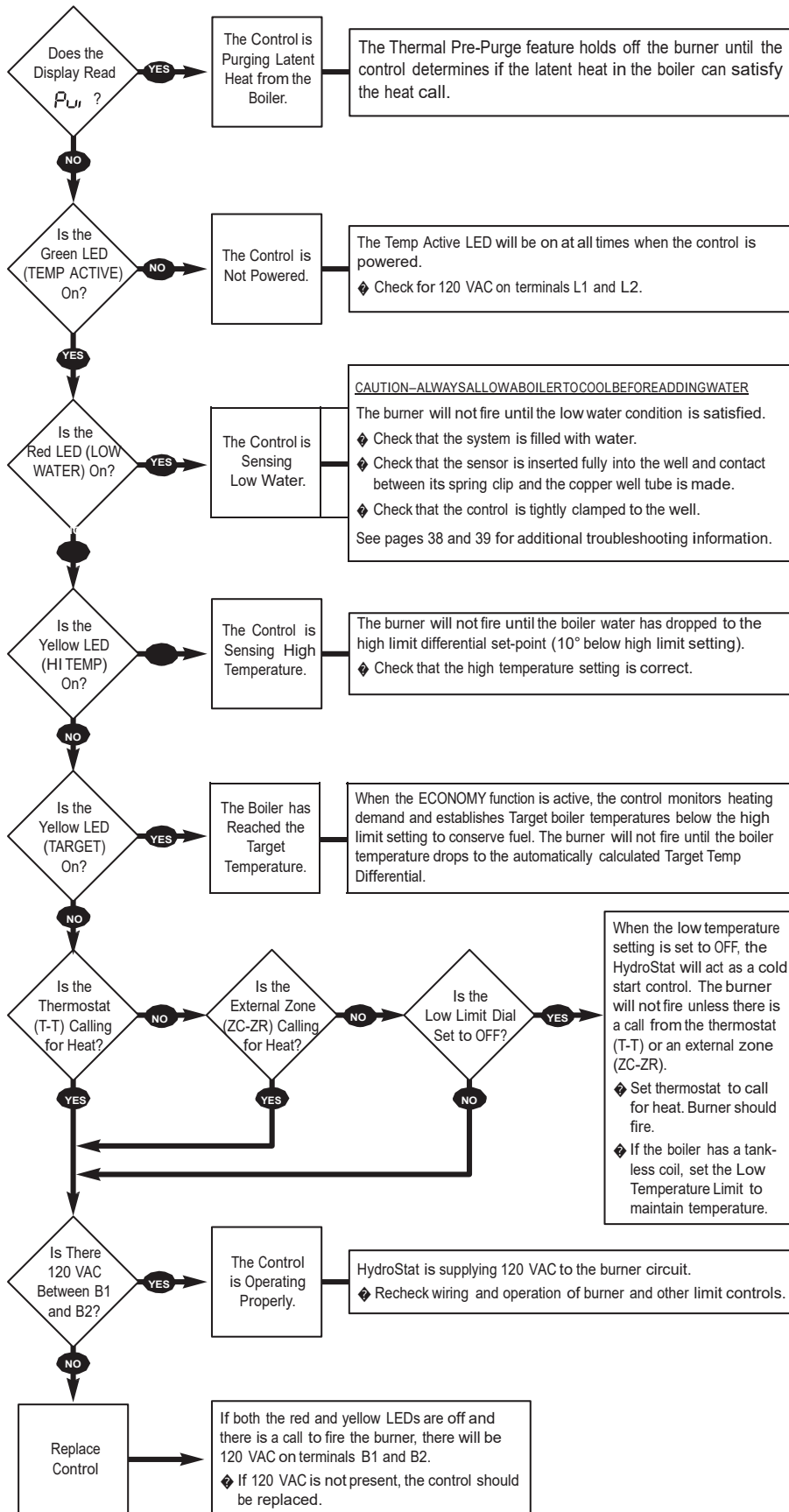
The following pages contain a trouble shooting table and flow charts for use in diagnosing control problems. When using these materials the following should be kept in mind:

- 1) This information is only meant to be used by a professional heating technician as an aid in diagnosing boiler problems.
- 2) Where applicable, follow all precautions outlined in the Section XII (Start-up and Checkout).
- 3) In general, this table and flow charts assume that there are no loose or miswired electrical connections. Before using these tables inspect all electrical connections on the boiler to make sure that they are tight. Also, check the wiring on the boiler against the wiring diagram in Figures 11.0 and 11.1. Ensure that incoming 120 VAC power polarity is correct and that the boiler is properly grounded.
- 4) All controls on the boiler are tested at least once in the manufacturing process and a defective control or component is generally the least likely cause. Before replacing a component, try to rule out all other possible causes.

**TABLE 14.0 - DIAGNOSTIC CONDITIONS**

Condition	Possible Cause
Burner will not fire	See Flow Chart 1, page 46
Burner will not shut down	See Flow Chart 2, page 47
Temperature display exceeds high limit setting	Under normal operation, boiler temperature will continue to rise after the control shuts off the burner. This condition, known as “thermal stacking”, results from hot boiler surfaces continuing to release heat into the boiler water.
No or insufficient domestic hot water	For boilers equipped with a tankless coil, make sure the low limit setting on the control is set properly. <b>NOTE:</b> If the low limit setting is dialed fully counterclockwise, it will shut off the low temperature maintenance feature and will function as a cold start control. If installed with an indirect water heater, check that the Zone/Indirect Switch is set in the Indirect (I) position. Verify that the end switch in the relay box controlling the indirect water heater is connected to the ZC-ZR terminals. This will ensure that the domestic water calls are prioritized.
Low water light (Red LED) is on or blinking	 <p><b>WARNING:</b> A low water condition is a serious and potentially dangerous condition. Do not attempt to add water to a hot boiler. Allow the boiler to fully cool before adding water.</p> <p>When the LOW WATER light is on, this indicates that the control is not detecting water in the boiler. When the LOW WATER light is blinking, this indicates that the control has been programmed to provide low water lock-out protection and is currently locked out (see Manual Reset Low Water Cut-Off). Pressing the TEST/SETTINGS button after the low water condition is resolved will reset the lock-out condition.</p> <ol style="list-style-type: none"> <li>1. If the light is on and the heating system is filled with water, pull the sensor out of the well and inspect it. Make sure that the metal clip is protruding enough to come in contact with the inside of the well tube. Check that the well does not have excessive build-up of heat transfer grease that may interfere with the clip contacting the well.</li> <li>2. Remove well and examine for excessive residue build-up. Clean and re-install.</li> </ol>
Boiler will not maintain low limit temperature	Check for overlapping high temperature setting. If the high limit setting is set below the low limit setting, the control will default to the high limit setting and the corresponding high limit differential setting.
House will not get or stay warm	<ol style="list-style-type: none"> <li>1. Check for air-bound radiators.</li> <li>2. Check thermostat settings including heat anticipator settings (common on non-digital thermostats).</li> <li>3. Check the Economy setting. The Economy feature, much like outdoor reset controls, lowers average boiler temperature and can slow or, in some cases, prevent the house from coming up to temperature. Move to a lower setting (see “Setting the Economy Feature”).</li> </ol>
Circulator contacts C1 and C2 not energized on call for heat	Check to see that boiler water is at or above 125°F. On a call for heat, the control will not permit the circulator to operate if the boiler water temperature is below 125°F (see “Circulator Hold Off”).
All LED lights and temp display are blinking	If the LED lights and the temp display are blinking alternately, this indicates the control has sensed a boiler temperature of 250°F. When this occurs, the control pulses the burner relay and then shuts down and locks-out the burner. The system should be analyzed to determine the cause of the overheating condition. Check that the sensor is inserted all the way into the well so it can accurately sense the temperature of the boiler water. Check the load on the burner contacts: If the load exceeds the 7.4 Amp rating, the contacts may have welded. Correct the overloading condition and replace the control before reenergizing the system. If the load on the contacts is below the rating, check system wiring and operation as well as the control’s high limit setting. If the cause of the overheating is found and the system is deemed safe, the control can be reset by removing power from the control and then repowering while simultaneously pressing the Test/Settings button on the top of the control. If the cause of the overheating condition is not determined, the control should be replaced.

# Troubleshooting Flow Chart 1 – Burner Will Not Fire



## Troubleshooting Flow Chart 2 – Burner Will Not Shut Down

