

## Incident Summary #II-805147-2019 (#10766) (FINAL)

SUPPORTING INFORMATION	Incident Date	January 29, 2019
	Location	Abbotsford
	Regulated industry sector	Electrical - Low voltage electrical system (30V to 750V)
	Impact	Qty injuries
		Injury description
		Injury rating
	Damage	Damage description
		Damage rating
	Incident rating	Minor
INVESTIGATION CONCLUSIONS	Incident overview	A wall mount thermostat located in the secondary suite of a single family dwelling caught on fire when it was installed onto a 240 volt electrical circuit for a 1500 watt baseboard heater. The fire was put out by the homeowner and the fire department was notified to make sure the fire was completely out. See photo 1.
	Site, system and components	<p>A homeowner changed an existing 240 volt rated wall mount thermostat, to a new electronic programmable thermostat. The thermostat was used to control one 240 volt 1500 watt baseboard heater in his home.</p> <p>A 240 volt wall mount thermostat used to control an electric baseboard heating circuit is essentially a switch which is activated when the temperature in the room drops below the set temperature. A 1500 watt baseboard heater will draw a current of 6.25 amps, at 240 volts through the thermostat when it is energized.</p> <p>The existing wall mount thermostat was rated for 240 volts with a maximum current rating of 22 amps. It was the correct thermostat for the application with the heating circuit amperage being well within the maximum allowed according to the manufacturers specifications.</p> <p>The new electronic programmable thermostat has a maximum voltage rating of 30 volts, and a maximum current rating of 1.5 amps. It is designed to send an extra low voltage signal to a furnace to tell it to either heat or cool depending on the application. The programmable thermostat is designed to be operated at or below the provided manufacture's specifications. Operating the thermostat above the rated voltage and current levels can have detrimental effects and cause product failure, and in some cases a fire.</p>
	Failure scenario(s)	<p>The home owner purchased a programmable thermostat to replace an existing line voltage thermostat for an electric baseboard heater. The thermostat was installed, and within 20 minutes of being energized the thermostat failed and caught on fire.</p> <p>When the extra low voltage rated programmable thermostat was connected to the 240 volt line voltage conductors, and energized, the voltage and current ratings of the thermostat were drastically exceeded. Approximately 6.25 amps of current</p>

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	<p>was flowing through the extra low voltage thermostat, which more than likely caused the circuit board to fail and produce a high amount of heat causing a fire.</p>
Facts and evidence	<p>Interview with fire fighter:</p> <ul style="list-style-type: none"> <li>-Indicated that when they arrived the fire had been put out by the home owner.</li> <li>-Indicated that the point of origin was at the thermostat location.</li> </ul> <p>Interview with the home owner:</p> <ul style="list-style-type: none"> <li>-Indicated that he had installed the wall mount programmable thermostat to replace the existing thermostat. See photo 3.</li> <li>-Indicated that the thermostat was purchased from an electrical wholesaler, and that he was told it was the correct thermostat for his application.</li> <li>-Indicated that he was not an electrician and not experienced in electrical work.</li> <li>-Indicated that within twenty minutes of turning the circuit breaker back on after installing the thermostat, the smoke detector alarm went off, and he ran downstairs to see flames shooting out of the thermostat.</li> </ul> <p>Facts, and evidence:</p> <ul style="list-style-type: none"> <li>-Manufacturers specifications show that the thermostat is rated for maximum 30 volts, and 1.5 amps.</li> <li>-The thermostat was connected to a 240 volt 15 amp breaker and controlling a 1500 watt 240 volt baseboard heater. See photos 6-7.</li> <li>-The manufacturers specifications state that the thermostat is intended to be used on a class II extra low voltage system (20-30 volts max), and that it is not to be used on a line voltage system (120-240 volts).</li> <li>-Manufacturer's instructions have warning notices to not exceed ratings, or it could cause a fire hazard. See photo 5.</li> <li>-Manufacturer's instructions state to have the job inspected by a qualified individual if you are unsure of your wiring.</li> <li>-Homeowner was not a qualified individual.</li> </ul>
Causes and contributing factors	<p>The cause of the incident was very likely misapplication for the installation of the replacement thermostat and failure to follow the manufacture's installation instructions and warnings.</p> <p>A contributing factor was that the thermostat was changed by an unqualified individual, who was unaware of the risks involved when installing the incorrect low voltage thermostat for the line voltage application.</p>



Photo 1 (above). Submitted by the fire department..

Fire damage above and below the thermostat location. Red arrow indicates thermostat location.

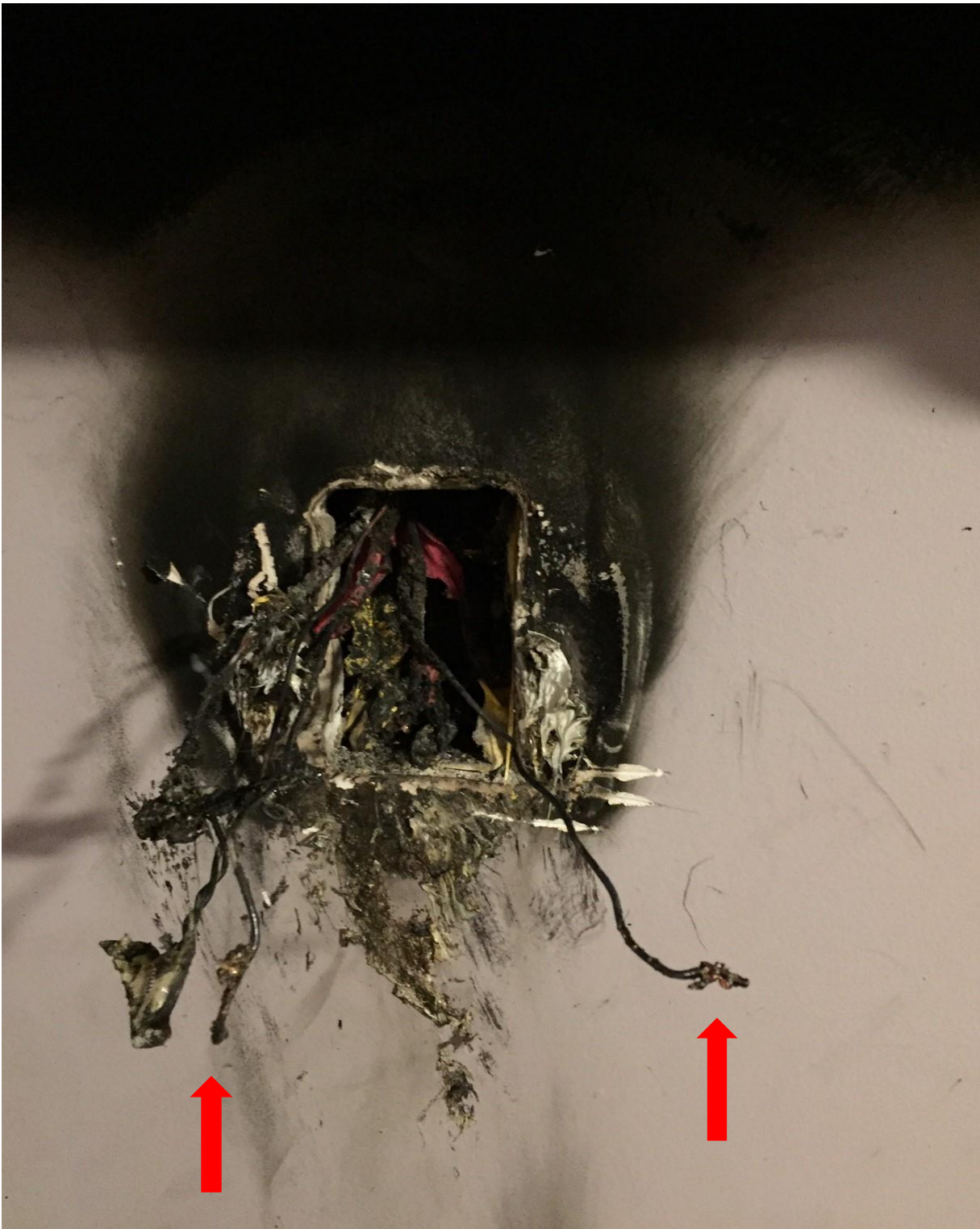


Photo 2 (above). Submitted by the fire department.

Fire damage to the electrical wiring and outlet box that the thermostat was connected to. The red arrows show the 240 volt line voltage conductors from the base board heater branch circuit that the replacement 30 volt low voltage thermostat was connected to.



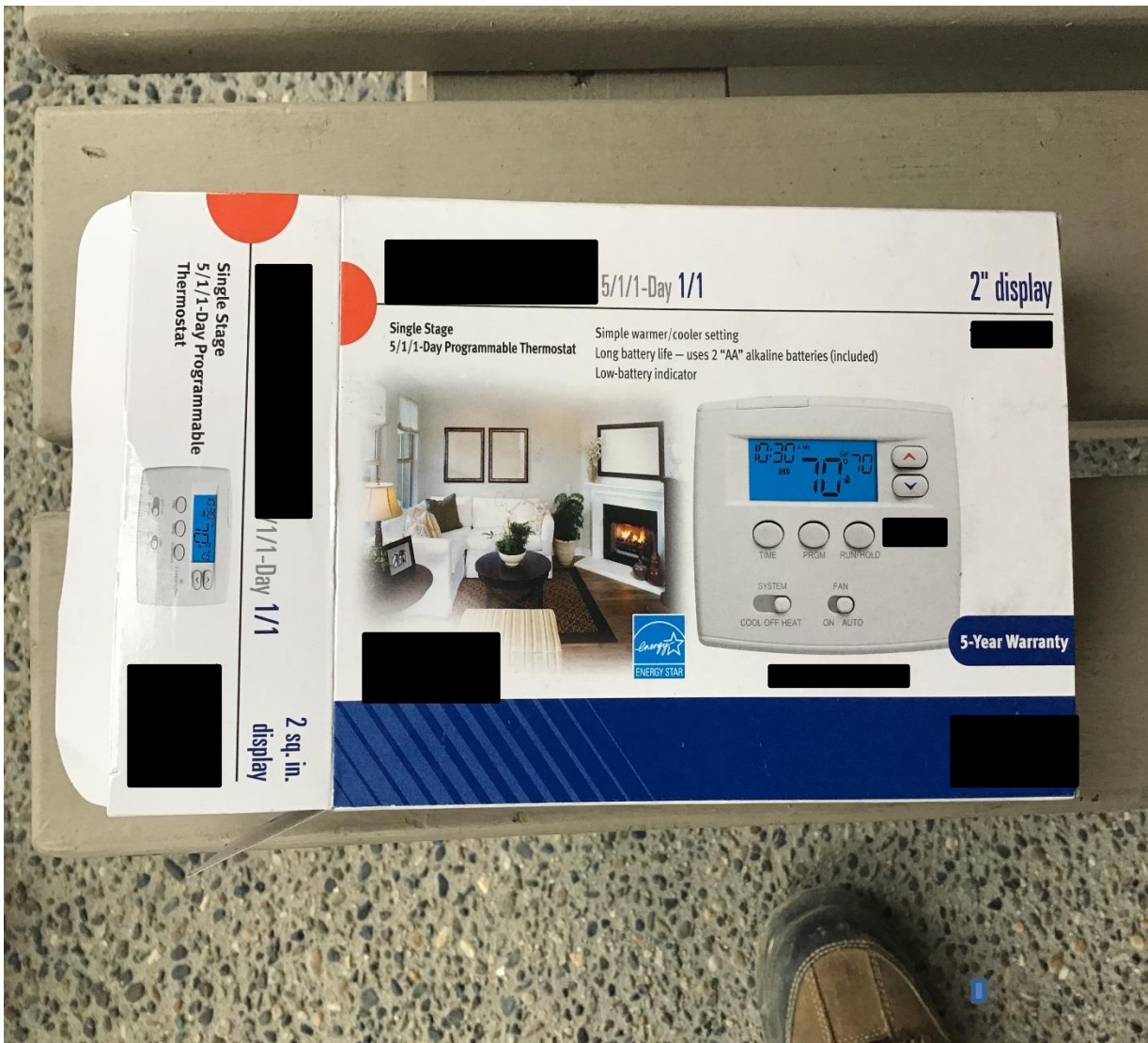


Photo 3 (above).

Programmable thermostat packaging.



Photo 4 (above).

Destroyed thermostat. The photo shows the fire damaged printed circuit board that was inside the replacement low voltage thermostat.



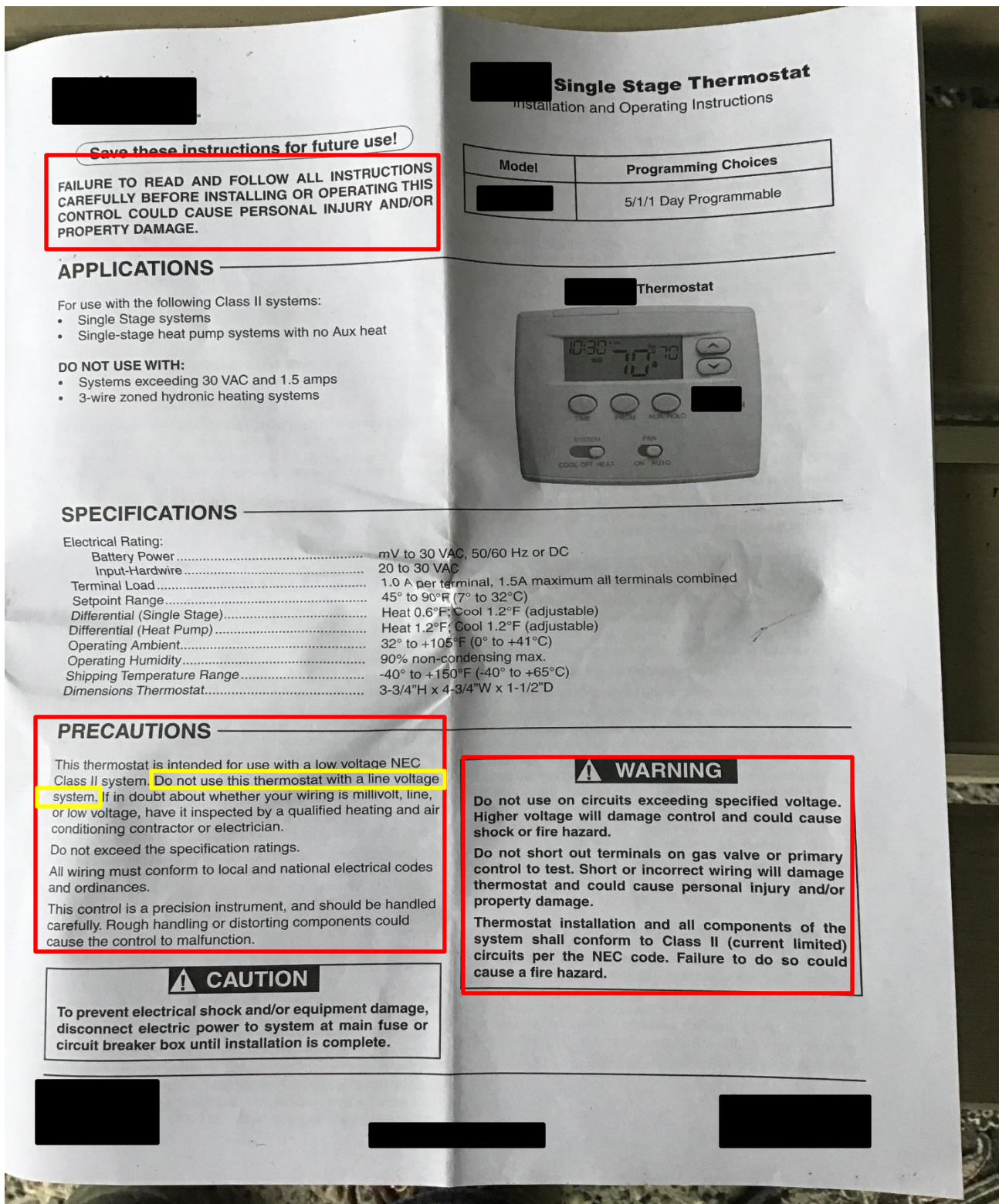


Photo 5 (above).

Manufacturers specifications with installation warnings. The outlines show where the installation instructions warn about installing the thermostat on voltages exceeding the rated voltage.



Photo 6 (Above)

Example of a 1500 watt 240 volt baseboard heater “Similar” to the baseboard heater installed in this situation, which is not compatible with a 20-30 volt low voltage type thermostat.

Red arrow indicates the manufacturers label showing the electrical characteristics of the heater. See photo 7 for a close up of the label.



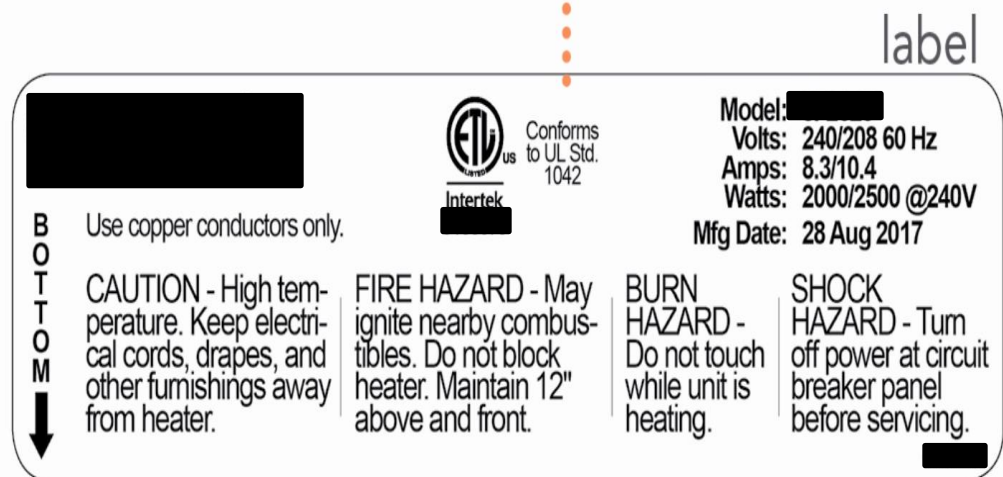
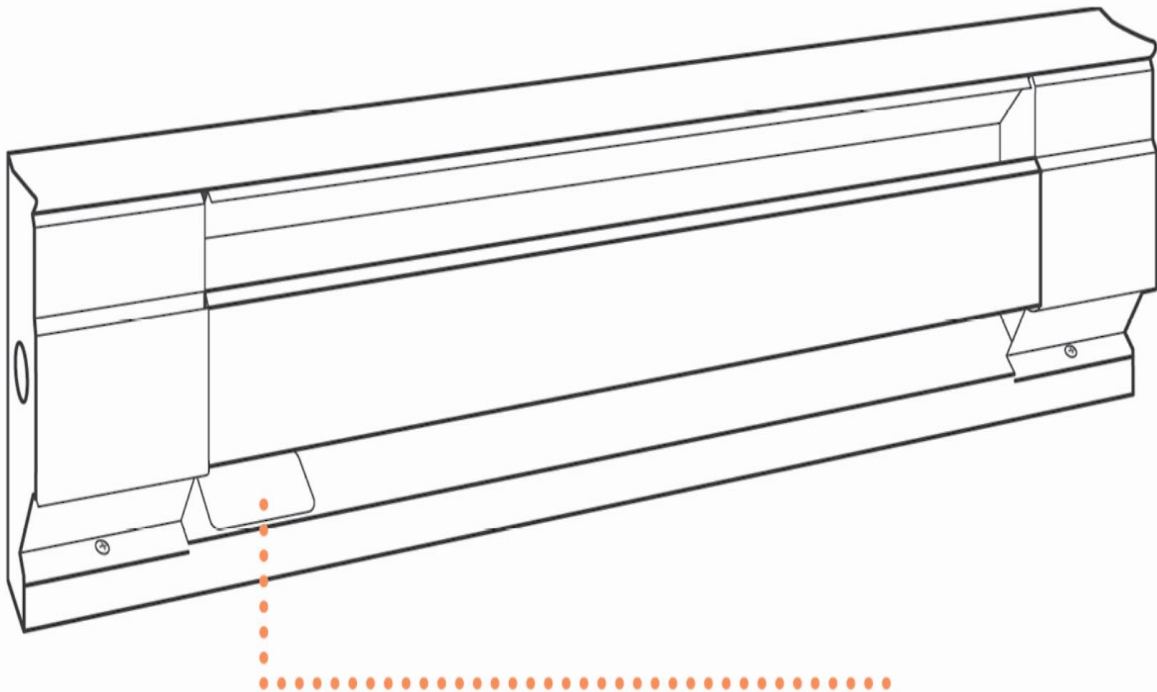


Photo 7 (Above)

Example drawing of a 240 volt baseboard heater "Similar" to the baseboard heater installed in this situation. The blow up of the manufacturers label shows the electrical characteristics of the heater including volts, amps, and watts.