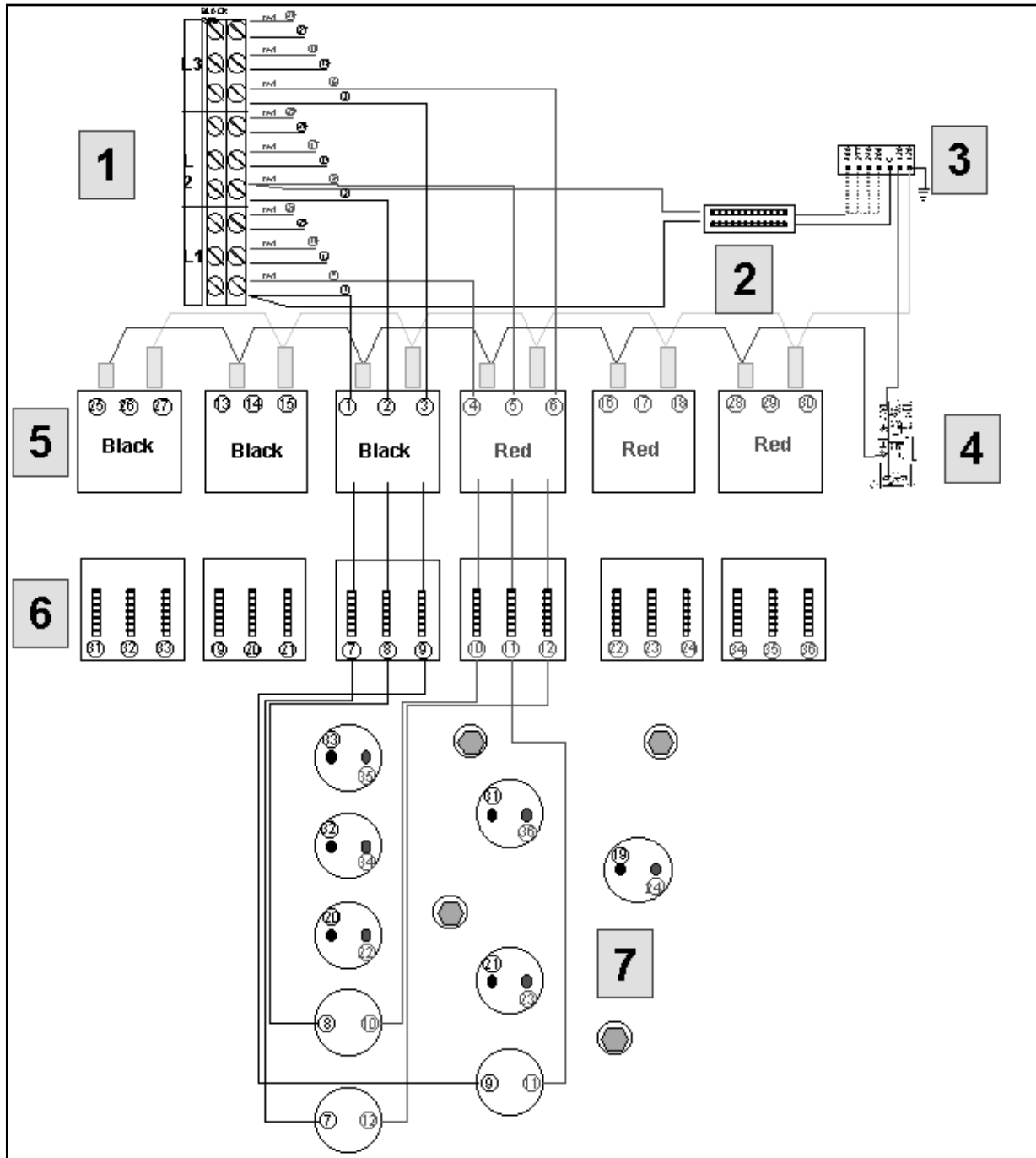




Commercial Electric Sequence of Operations
Prior to Oct 2002

The following pages reflect the Sequence of Operations for the heavy-duty commercial electric water heaters manufactured before October 1, 2002.



<p>Tank is cold and full of water. Line voltage is connected to the field wiring block</p>	<p>NO</p>	<p>Fill tank to prevent dry firing of elements</p> <p>Ensure line voltage connections are present</p>	
<p>YES</p>			
<p>Line voltage is applied to the field wiring block 1</p>	<p>NO</p>	<p>Check L1, L2 and L3 leg for line voltage at the field wiring block</p>	<p>Replace fuse or reset breaker at service panel</p>
<p>YES</p>			
<p>Line voltage is routed through transformer fuse block to the transformer 2</p>	<p>NO</p>	<p>Check transformer fuse block for presence of 3 amp fuse.</p> <p>Check fuse</p>	<p>Replace fuse</p>
<p>YES</p>			
<p>Line voltage also flows to the top of the contactors; but is not passed to the fuse blocks</p>	<p>NO</p>	<p>Note: The contactors and fuse blocks pass line voltage to the heating elements. Contactors are energized with 120V and controlled by the thermostat</p>	<p>Check for line voltage at top of the contactor</p>
<p>YES</p>			
<p>Transformer converts line voltage to 120V (also called control voltage) for use by the thermostat and the contactors 3</p>	<p>NO</p>	<p>Check the position of the red wire on the transformer screw terminal pad. It should be connected to the same terminal as the line voltage. Black wire should be connected to the common (COM) terminal.</p>	
<p>YES</p>			
<p>120V flows along the blue wire from the transformer to the Energy Cut Off (ECO) on the thermostat 4</p>	<p>NO</p>	<p>Check red wire and black wire terminal screw location</p> <p>Check blue wire and white wire location with wiring diagram</p> <p>Check transformer fuse</p> <p>Check transformer</p>	<p>Rewire according to wiring diagram</p> <p>Replace fuse</p> <p>Replace transformer</p>
<p>YES</p>			
<p>ECO passes 120V to the thermostat</p>	<p>NO</p>	<p>Reset ECO by pushing the red reset button</p>	<p>Replace thermostat</p>
<p>YES</p>			
<p>Thermostat demands heat Thermostat closes and relays 120V to the contactors</p>	<p>NO</p>	<p>Check thermostat</p>	<p>Replace thermostat</p>
<p>YES</p>			

Table 3 - Sequence of Operations Flowchart

Contactors receive 120V and actuate (close). (120 V power flow stops here). Line voltage is relayed to the fuse blocks 5	NO	Note: Contactors - when closed - relay line voltage through the contactor to the fuse blocks. Each contactor has a square, black manual 'check' button Check for line voltage at the bottom of the contactor	Check, reset or replace contactors
YES			
Fuse blocks relay line voltage through a fuse and to the heating elements 6	NO	Note: Each element requires two legs of the line voltage. The fuse block protects each leg to the element with its own fuse.	Check and replace fuses
YES			
Heating elements (all of them at the same time) receive line voltage and heat the water 7	NO	Check LED panel for red lights Note: Some models operate on a principle called staging. This involves multiple thermostats. See the section on staging.	Check element if LED is not lit. If element is OK, check power to the element
YES			
Water is heated to the thermostat setting. Call for heat ends	NO	Thermostat is stuck closed. ECO will normally trip due to excessive heating of the water.	Check and replace thermostat
YES			
Thermostat suspends 120V to the contactors.	NO	Thermostat is stuck closed. ECO will normally trip due to excessive heating of the water	Check and replace thermostat
YES			
Contactors open and suspend line voltage to the fuse blocks and heating elements	NO	Contactors may have 'fused' closed. If call for heat has ended, contactors should be open. No power at bottom of the contactor.	Check and replace contactors
YES			
Heater is fully recovered. Water is hot.			

NOTES
