

Installation Instructions

Base Unit No. 1 or Base Unit No. 2 with Options Available

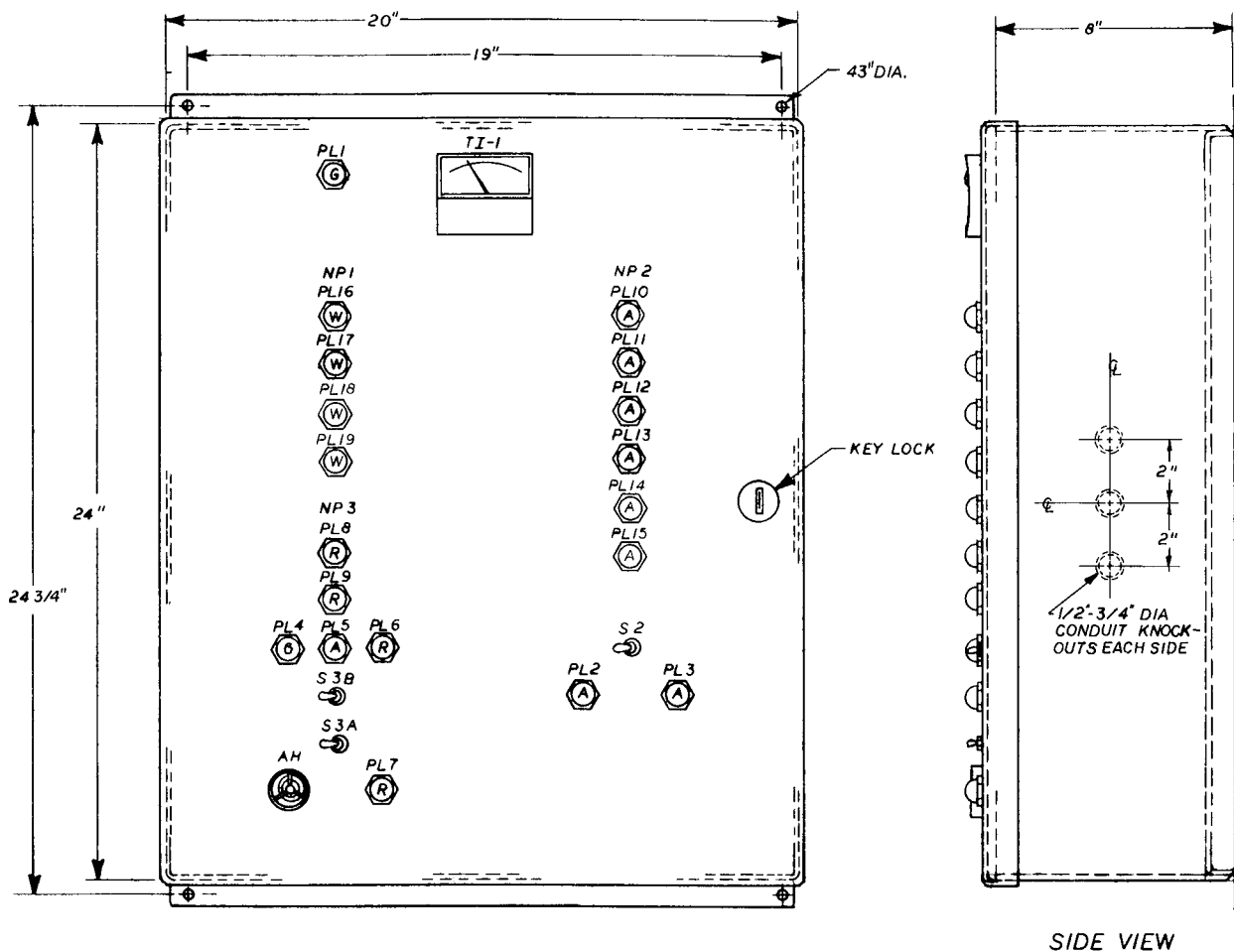


**Fig. 1 — Accessory Loop Control Panel
with Dimensions**

GENERAL

The Carrier Loop Control Panel (Fig. 1) is designed for use with Model 50HQ, VQ, QE, KQ Water Source Heat Pumps. Its purpose is to monitor and control conditions within a building's water source heat pump water loop while automatically initiating the following functions:

1. Energizes up to 4 stages of cooling tower control when water temperature exceeds the adjustable set point. Panels are available with up to 6 stages of heat rejection capability.
2. Energizes up to 2 stages of supplementary heat when the loop water temperature drops below the adjustable set point. Panels are available with up to 4 stages of supplementary heat control capability.
3. Automatic pump sequencer circuit starts the standby pump in the event of loss of water flow.

4. Pilot lights for normal system status. Pre-alarm and alarm functions are supplemented with an audible alarm and silencer switch.
5. A master lock-out relay circuit activated in the event of extreme abnormal temperature conditions. Central shutdown circuit provides a signal for de-energizing all water source heat pumps through a central control system.
6. After the cause of any abnormal condition has been corrected, the controller's manual reset provides a central start-up signal to a central WSHP control system.

NOTE: Panel enclosure gives temperature in Fahrenheit and Centigrade scales.

SAFETY CONSIDERATIONS

Installing and servicing this equipment can be hazardous due to electrical components. Untrained personnel should not install or service this equipment to avoid the risk of personal injury. Observe all precaution tags and labels attached to this unit and other safety statements that apply.

INSTALLATION

Step 1 — Inspect the Shipment — The Accessory Loop Control Panel and other related accessories are factory tested and inspected prior to shipment. It is packed to arrive in good condition. However, mishandling in transit or at the job site can occur. Report any visible or concealed damage to the shipping company immediately.

Step 2 — Select Panel Location — Panel should be mounted indoors, in a dry, vibration-free location. Avoid areas where excessive moisture, corrosive fumes or vapors are present, and where ambient temperature range is between 45 F and 125 F. Avoid locating where electrical interference or high radio frequency occur.

Step 3 — Mount Panel — Mount panel to a wall using field-supplied screws or bolts, installing them through the 1/2-in. mounting holes provided at each corner of panel. See Fig. 1. Be sure to allow ample space to enable opening keylocked access door.

⚠ CAUTION

Avoid any contact with printed circuit board during installation. *Do not* drill any holes in control panel cabinet. Use accessible knockouts. Metal chips and debris can short electronic components and void warranty.

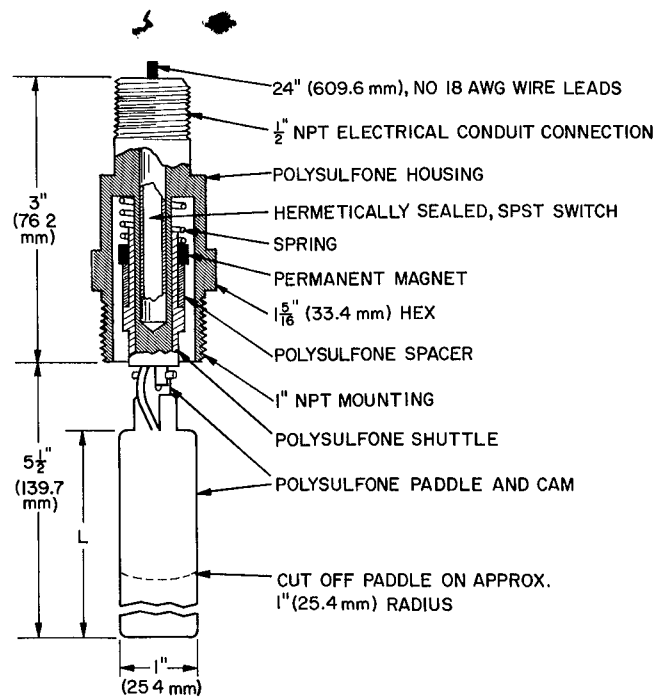
Step 4 — Make Power Supply Connections

- Panel requires an uninterrupted 115-v single phase, 60-Hz power supply. All field wiring must comply with all local and national fire, safety and electrical codes.
- It is recommended that power supply be separate from power source supplying the water source heat pumps. The panel is internally fused and a power switch (On-Off) is located inside enclosure on the circuit board.
- Supply the power wires to the panel and through the appropriate knockouts. Connect wires to terminal L1 and L2.
- Do not turn on power to panel until all connections are made and voltage supply is verified.

Step 5 — Connect Ground Lead — Connect dedicated ground wire to G terminal on terminal board.

Step 6 — Install Flow Switch — Install flow switch on discharge side of circulating pump(s) in a common supply main so that total system flow rather than individual pump flow is detected. See Fig. 2.

- Flow switch must be placed in a vertical position and must match the actual water flow direction by matching water flow with direction indicators on flow switch.
- Seal one-in. NPT fitting of flow switch with teflon tape and insert in a standard pipe tee or reducing fitting, with at least 3 pipe diameters straight run on each side.
- Cut paddle to desired length required and wire switch to terminals 6 and 8. (Shield Cable.)



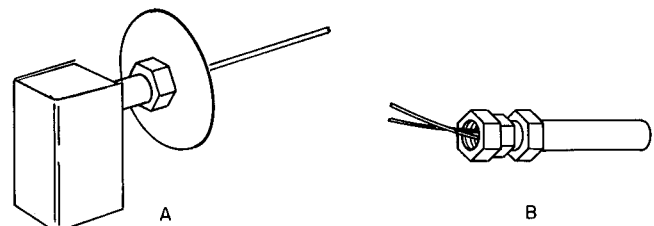
Maximum Operating Pressure — 150 psig
Maximum Pressure Drop — 3 psig

Fig. 2 — Flow Switch Data

- Make electrical connections to 1/2-in. NPT fitting of switch. Switch is supplied with 24-in. 18 AWG wire leads.
- Voltage through flow switch is 115 vac.

Step 7 — Install Water Loop Sensor — Install water loop sensor in water supply main ahead of water source heat pump. See Fig. 3 and 4.

- Insert sensor fully into an immersion well (field supplied) 3/8-in. OD x 6-1/4 in. insertion length, or Barber Colman AT-215 type.
- Seal immersion well threads with teflon tape and install into pipe tee or reducing fitting.
- Wire sensor to terminals 72, 73 and SH in panel, using appropriate knockouts (Fig. 5, 12).
- Sensor may be located in any position in relation to main supply line. Use shield cable to protect from any interference. Connect shield drain wire at panel end only. Do not install probe wiring in conduit with ac wiring.



SENSOR	ELEMENT LENGTH (in.)	WIRING ENCLOSURE (in.)	CONNECTION
Water Loop	8	3/8 H 2 1/4 W 2 1/4 D	1/2-in conduit top and bottom
Outdoor Air	5	None	1/2-in. conduit 3-ft leads

Fig. 3 — Loop Sensor (A), Outdoor Air Sensor (B)

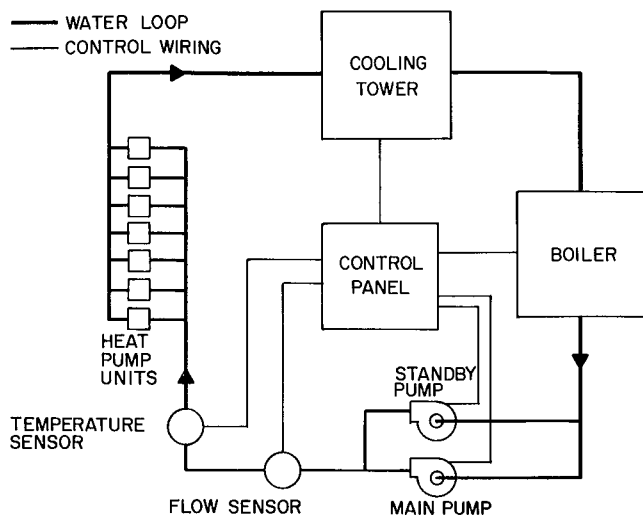


Fig. 4 — System Installation Schematic

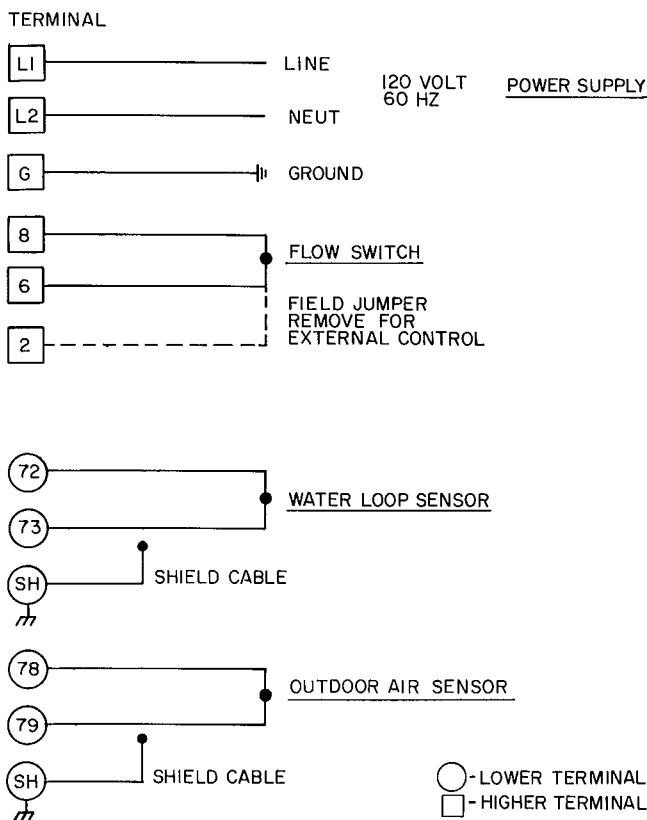


**Fig. 5 — Field Wiring
(also see Fig. 11 and 12)**

Step 8 — Connect Outdoor Air Sensor (Optional) — Locate outdoor sensor in a shaded area next to the building so a mixture of outdoor and building wall temperatures are sensed. See Fig. 3.

- Determine this location by measuring the temperature with a thermometer next to the building, then gradually moving it outward until temperature stabilizes at true outdoor air temperature.
- Make electrical connections through a stub 1/2-in. conduit run. Wire sensor to terminals 78, 79 and SH

(Shield Cable). See Fig. 5. Sensor is supplied with 2-1/2 ft 18 AWG wire leads.

- Use shield cable to protect against any interference.

Controlling Pumps (Fig. 6, 11)

- To control #1 pump starter contactor using loop panel supplied 115, 1 amp signal: *Do not* remove jumper and connect to terminals 15 and 3 for signal.
- To control #1 pump through the loop panel normally open set of contacts: *Remove* jumper and wire to terminals 15 and 16.
- To control #2 starter contactor using loop panel supplied 115, 1 amp signal: *Do not* remove jumper and wire to terminals 26 and 3 for signal.
- To control #2 pump through the loop panel normally open set of contacts: *Remove* jumper and wire to terminals 26 and 27.

NOTE: Contact ratings are 5 amp at 120 volts.

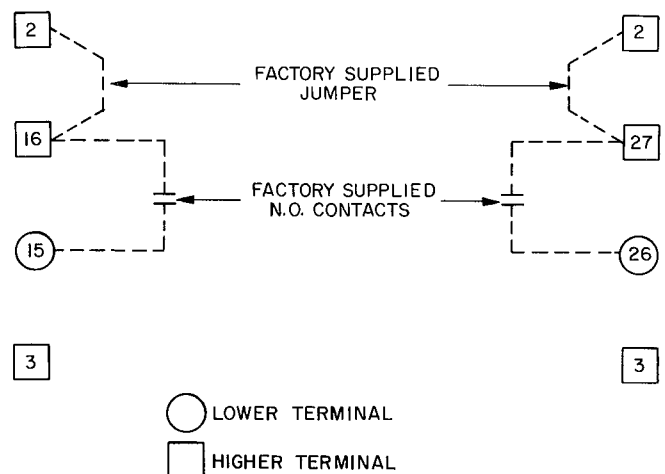


**Fig. 6 — Circulating Pumps
(also See Fig. 11)**

Field Calibration Procedures

PRELIMINARY ADJUSTMENTS

- CP1, 6-Stage Controller (See Fig. 7): Verify dip switch and jumper configuration conform to loop control composite assembly drawing enclosed with accessory loop control panel. White jumper wire should be on Pin H. Minimum position potentiometer should be at fully counterclockwise position. Mixed Air Start Point (MASP) potentiometer should be at fully clockwise position.
- CP4, 6-Stage Relay (on 10-Stage Models only): Verify dip switch and jumper configuration conform to loop control composite assembly drawing enclosed with accessory loop control panel.
- CP2 and CP3, 2-Stage Alarm Relay: Verify the alarm dead band jumpers are installed at pin marked 1/2.
- Loop Water Temperature Transmitter (TT1): Verify a jumper is connected between 50 F terminal and terminal immediately above 50 F.
- Signal Adaptor Module (SA1): The mark on dial of signal adaptor module should be set at 1 (See Fig. 8).
- Pump Delay Timers (TR1, TR2): These 2 timer relays mounted on printed circuit board are factory set for 15 seconds.

LOOP WATER TEMPERATURE TRANSMITTER (TT1) CALIBRATION — Attach the 1000 ohm 1/4-watt 1% resistor taped to TT1, or equivalent, to terminals 72 and 73 of printed circuit board (PCB). Use a small-slotted or Phillip's screwdriver to adjust potentiometer through front hole on TT1. Adjust potentiometer until temperature indicator TT1 (50 F to 100 F) is set for 70 F.

OUTDOOR AIR TEMPERATURE TRANSMITTER (TT2) (certain models only) — Attach the 1000 ohm 1/4-watt 1% resistor taped to TT1, or equivalent, to terminals 78 and 79 of PCB. Adjust the metal potentiometer on TT2, to read 70 F on outdoor air temperature indicator (TI2; -40 F to 160 F indicator.)

CPI, 6-STAGE CONTROLLER CALIBRATION

1. Alarm output level adjustment: With the loop water temperature indicator, TT1, at 70 F, adjust mixed air (M.A.) low limit potentiometer to read 7.5 vdc between terminals OP3 and common of CPI. Use a digital voltmeter.

2. Heating Stages Adjustments: If loop control panel is provided with option C (control test simulations) move switch S8 to test position and adjust potentiometer P2, or use Carrier test simulator 50HQ900-351, to vary the loop water temperature indication. Attach simulator to terminals 72 and 73 of PCB. Attach digital voltmeter, set to D.C. volts, positive lead on terminal 101 of CPI, and negative lead to terminal marked common. Vary the loop water temperature indicator (TT1) to read 63 F. The heating throttling range (TRA) potentiometer, should be set with 10 at about the 9:00 (270 F) location.

Adjust heating set point potentiometer (SPA) until D.C. voltage at terminal 101 is 6.55 vdc. Vary loop water temperature to indicate 61 F. The voltage at terminal 101 should read 7.05 vdc. Adjust TRA for 7.05 reading. Readjust SPA potentiometer and TRA as necessary, for 63 F = 6.55 vdc, 61 F = 7.05 vdc. On 10-stage control panels with 4 stages of heating, adjust for 50 F = 7.55 vdc, 57 F = 9.05 vdc. This sets 2 F increments between stages of heating.

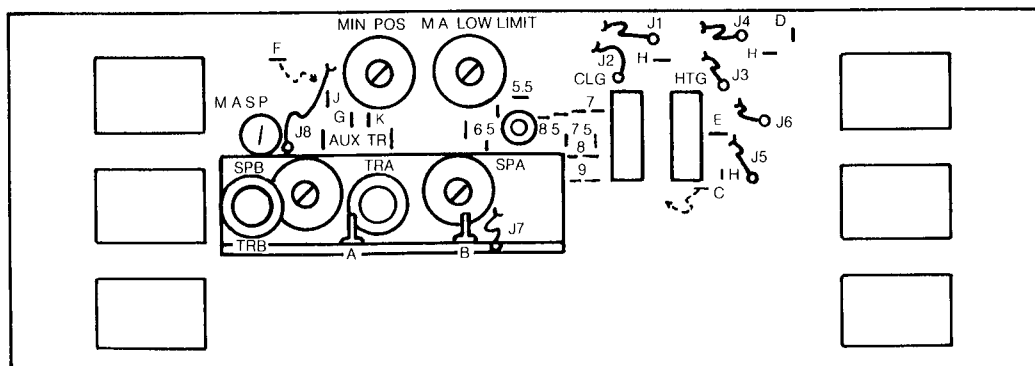
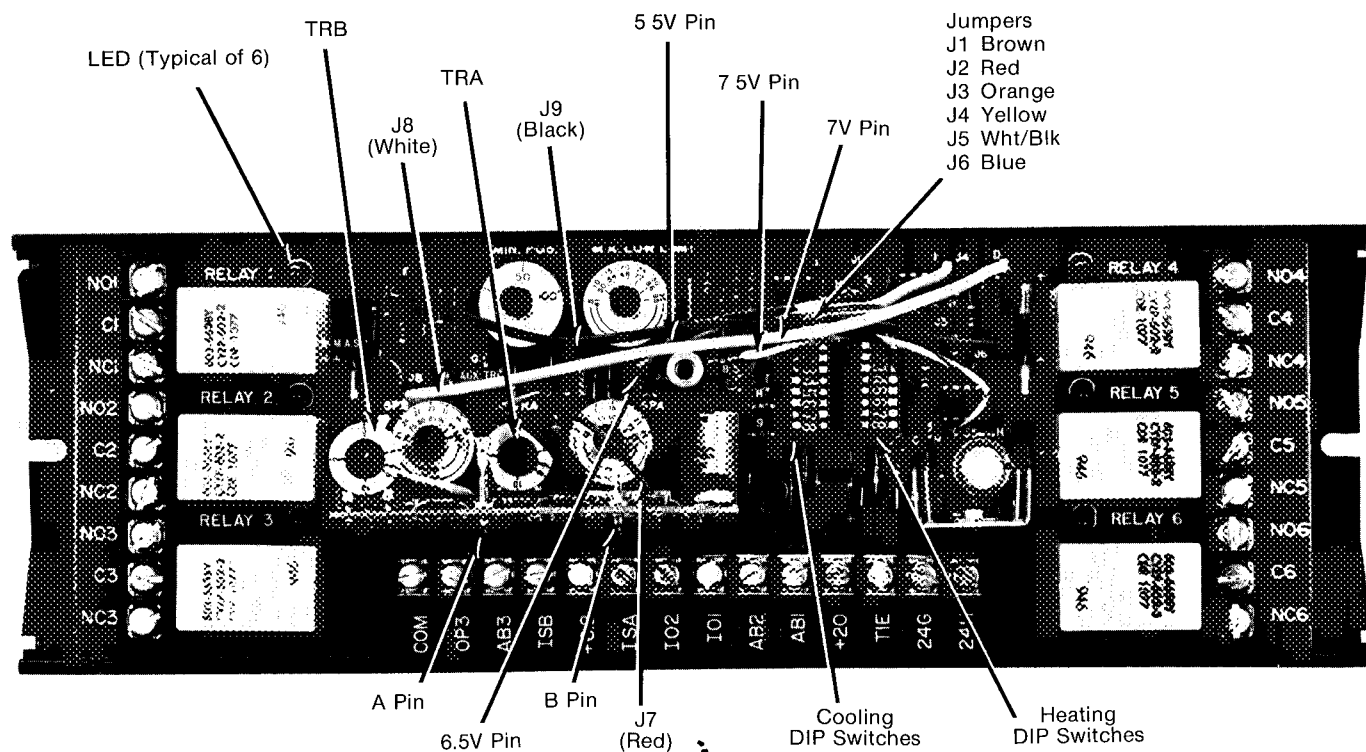


Fig. 7 — 6-Stage Controller

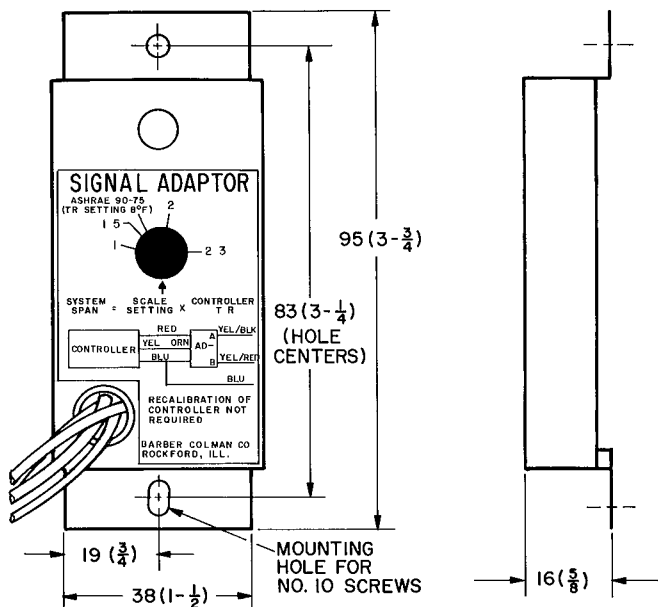


Fig. 8 — Signal Adaptor Module

3. Cooling Stages Adjustments: If loop control panel is provided with option C (control test simulations) move switch S8 to test position and adjust potentiometer P2, or use Carrier test simulator 50HQ900-351, to vary the loop water temperature indication. Attach simulator to terminals 72 and 73 of PCB. Attach a digital voltmeter, set for D.C. volts, positive lead on terminal 102 of CP1 and the negative lead on common terminal. The cooling throttling range (TRB) potentiometer should be set with the 10 at about the 9:00 position. Vary the loop water temperature to indicate 83 F.

Adjust cooling set point potentiometer (SPB) on CP1 to indicate 6.55 vdc at terminal 102. Vary loop water

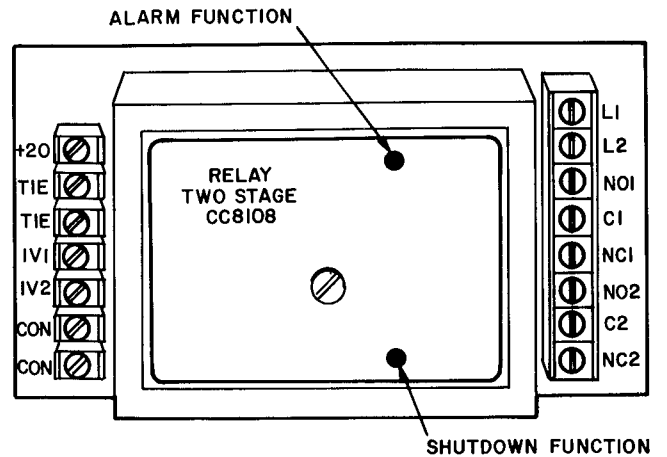


Fig. 9 — Alarm and Shutdown Functions

temperature to indicate 85 F. Adjust TRB, if necessary, for reading of 7.05 vdc at terminal 102. Readjust SPB potentiometer and TRB, as necessary, for 83 F = 6.55 vdc, 85 F = 7.05 vdc, 87 F = 7.55 vdc, 89 F = 8.05 vdc. On 10-stage loop control panels, adjust for 91 F = 8.55 vdc, 93 F = 9.05 vdc.

ALARM AND SHUTDOWN SET POINTS — After verifying or adjusting output (OP3) voltage as described under *CPI 6-Stage Controller Calibration* use the following loop control panel instructions to adjust individual alarm set points.

The Accessory Loop Control panel is factory set for both high- and low-temperature alarm and shutdown. If any adjustments are required. . .

1. Unlock front panel to gain access. See Fig. 10.

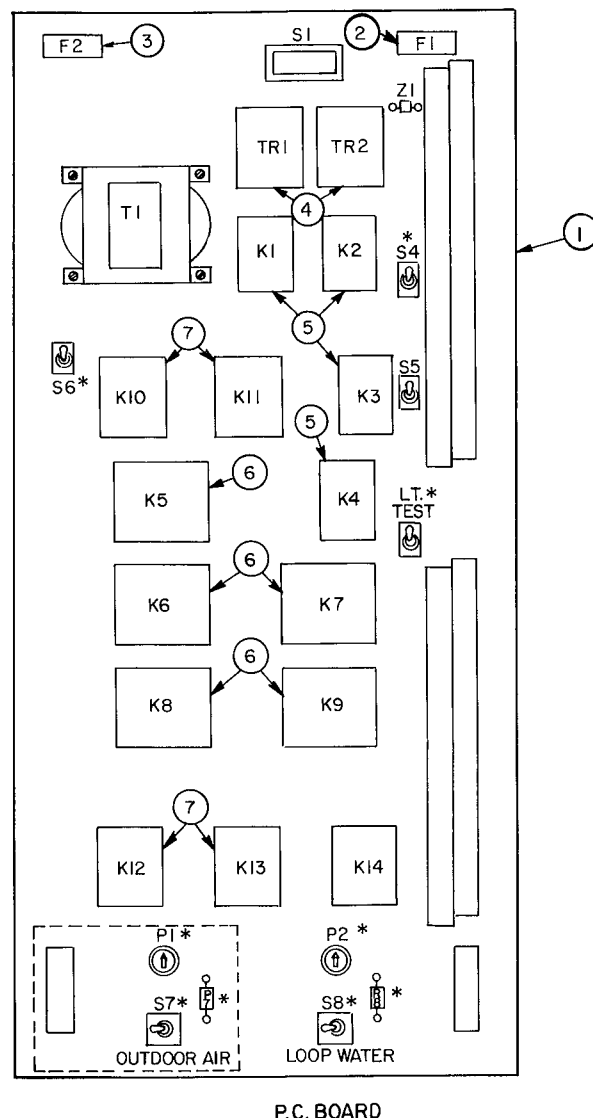
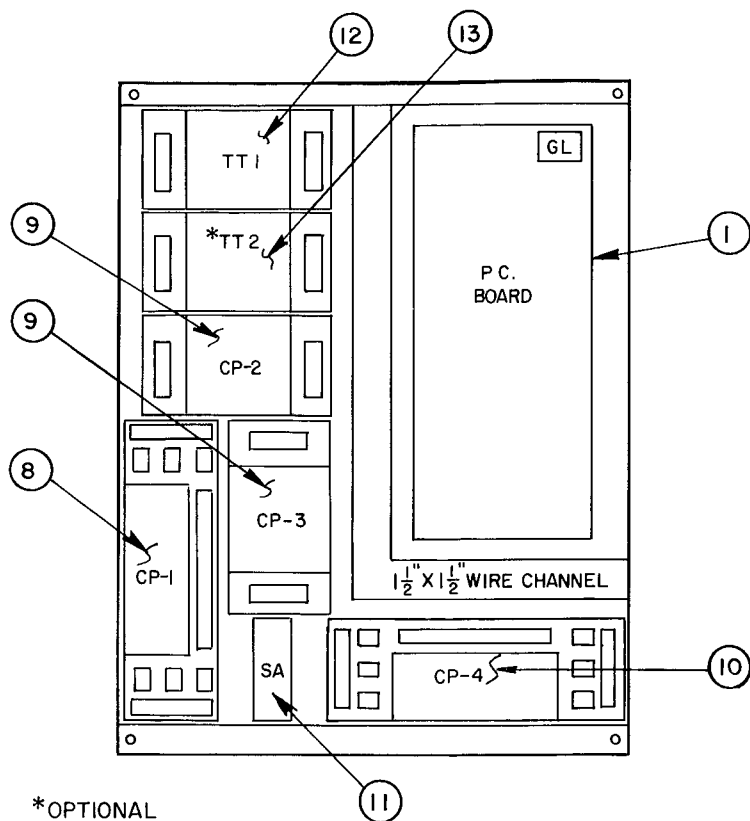


Fig. 10 — Loop Control Panel Interior (10 Stage)

Low Temperature

2. Locate control device CP3 in panel enclosure.
3. Remove front cover of CP3 with small slot-type screw driver.
4. There are 2 Phillips-head slot adjusters located one on top of the other. The top adjusting slot is for the alarm function and the bottom is for the shutdown function. See Fig. 9.

To decrease the temperature set points, turn adjusting screws *clockwise*. To increase temperature set points, turn adjusting screws *counterclockwise*.

IMPORTANT: The alarm set point must be higher than the shutdown set point but below the last stage of heating.

Desired set points can also be achieved through use of Carrier test simulator 50HQ900-351.

5. Replace CP3 cover and lock front panel.

High Temperature

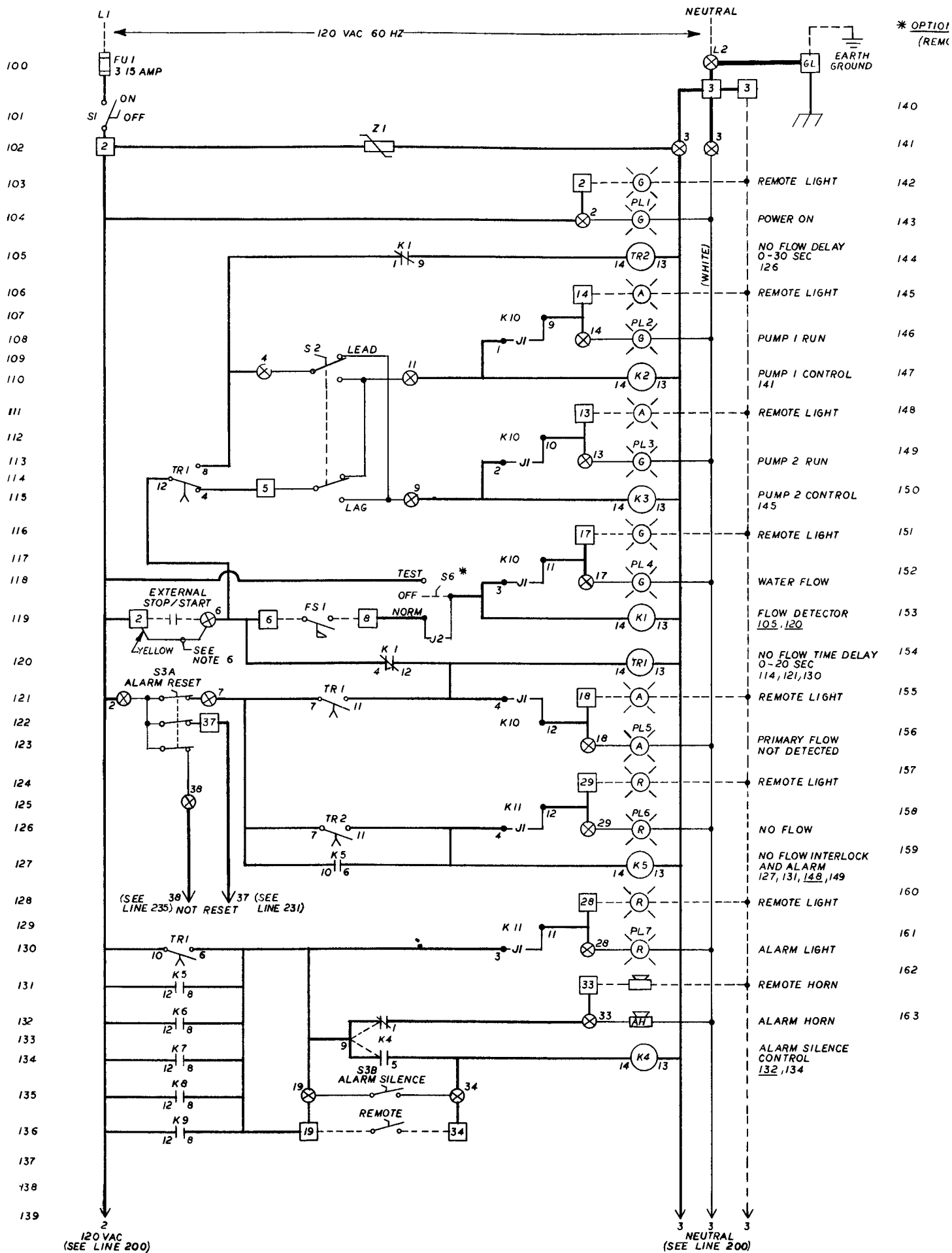
1. Locate control device CP2 in panel enclosure.
2. Remove front cover of CP2 with small slot-type screw driver.
3. There are 2 Phillips-head slot adjusters located one on top of the other. The top adjusting slot is for the alarm function and the bottom is for the shutdown function. See Fig. 9.

To decrease temperature set points, turn adjusting screws *counterclockwise*. To increase the temperature set points, turn adjusting screws *clockwise*.

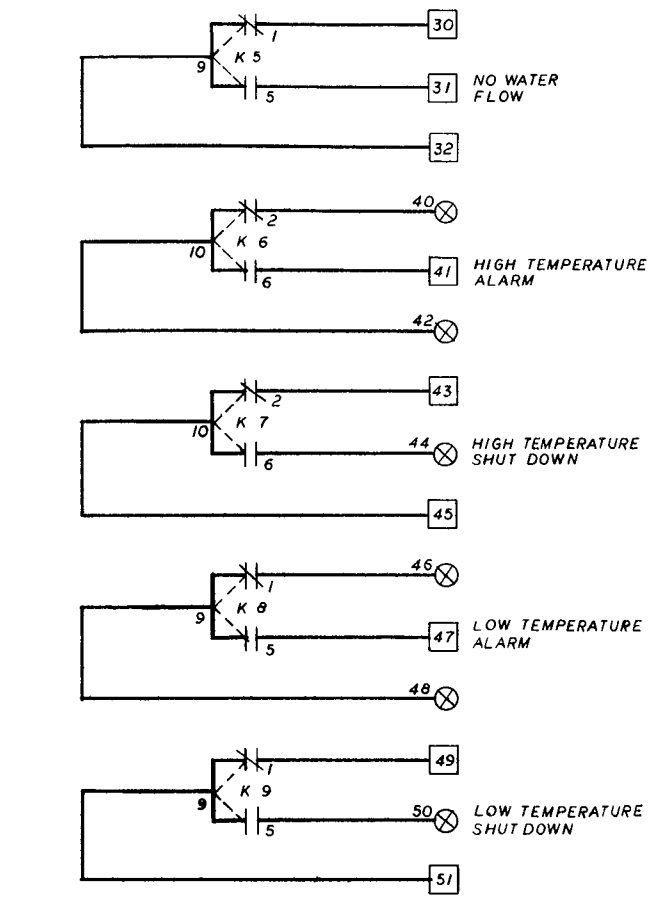
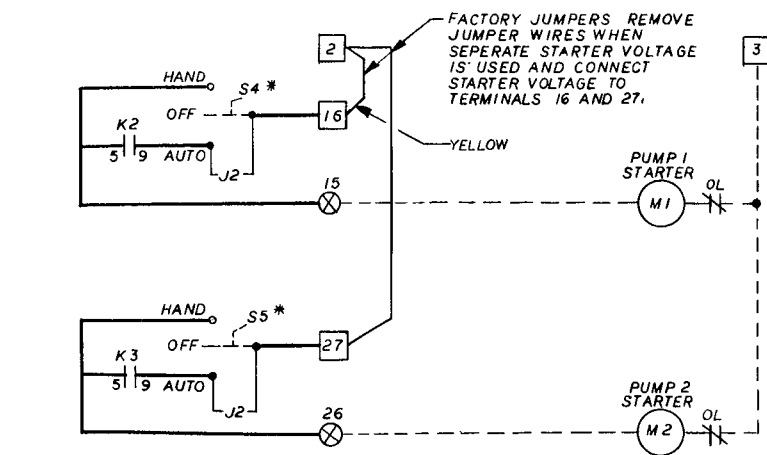
IMPORTANT: The alarm set point must be lower than the shutdown set point but higher than the last stage of cooling.

Desired set points can also be achieved through use of Carrier test simulator 50HQ900-351.

4. Replace CP2 cover and lock front panel.



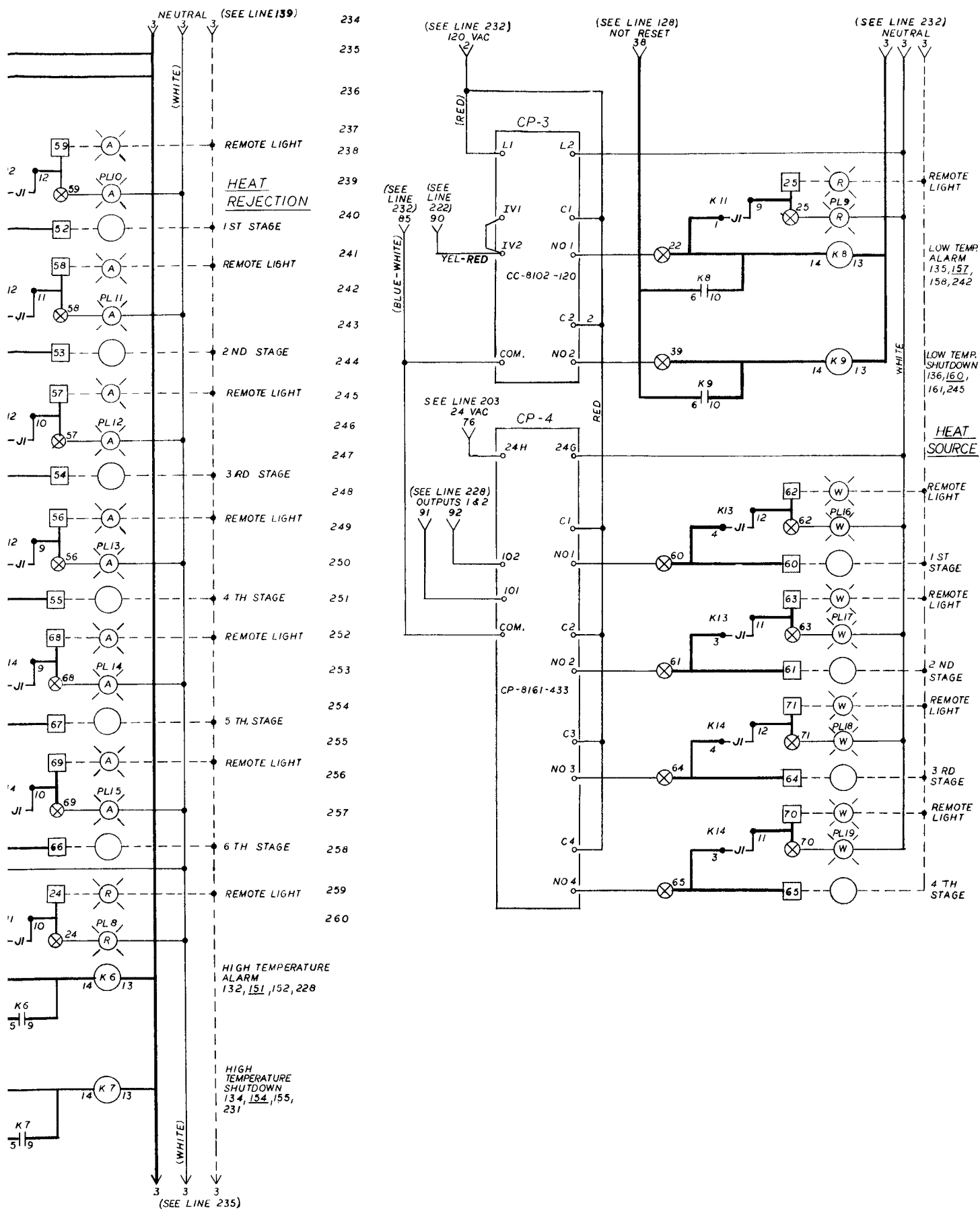
OPTIONAL HAND-OFF-AUTO SWITCH WIRING
(REMOVE JUMPER & ADD SWITCH WHEN REQUIRED)



LEGEND (Fig. 11 and 12)

- (A) — Amber Light
- Cp — Controller
- CR — Control Relay
- FS — Flow Switch
- Fu — Fuse
- (G) — Green Light
- Grd — Ground
- K — Relay
- M — Motor Starter
- MOV — Metal Oxide Varistor
- OL — Overload Relay
- Pb — Pushbutton
- PL — Pilot Light
- R — Resistor
- (R) — Red Light
- S — Switch
- T — Transformer
- TB — Terminal Block
- TI — Temperature Indicator
- TR — Timer Relay
- TS — Temperature Sensor
- TT — Temperature Transmitter
- (W) — White Light
- Z — Varistor

- NOTES:
- 1 Heavy lines — denote printed circuit board trace
 - 2 Light lines — denote control panel wiring
 - 3 Dashed lines — denote field wiring
 - 4 ⊗ Denotes low terminal on PC board
 - 5 □ Denotes high terminal on PC board.
 - 6 Remove jumper wire for external control



Water Temperature Controls and Alarms (no options)

Manufacturer reserves the right to discontinue, or change at any time, specifications or designs without notice and without incurring obligations.

Book 1 4
Tab 5a 5a

PC 111

Catalog No 535-089

Printed in U S A

Form 50HQ-2SI

Pg 8

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Replaces: New