

- 8. **MULT IND:** Shall illuminate when the Monitor detects simultaneous outputs on more than one of the field outputs that comprise a monitored channel (green/yellow/red). The failed channels shall be displayed on the corresponding channel indicators.
- 9. **YELLOW:** Shall illuminate when the Monitor detects the absence of a minimum period of active yellow field output during a green to red sequence. The failed channel shall be displayed on the corresponding channel indicator.
- 10. 1, 2, 3, ..., 48: Channel indicators shall illuminate FAILED state in conformance with Section 962.06, F-2.

J. **Monitor Board Edge Connector.** Monitor board edge connectors shall conform to CalTrans specifications.

K. **Monitoring of Conflicting Voltages.** Inputs to any channel that exceed the specified conflict threshold (see Section 962.09) shall be sensed as "ON" and shall illuminate their respective channel indicators. The number of active channels shall in no way affect the conflict threshold.

The following voltage levels and times shall apply: A conflict has occurred and will cause a FAILED state only when voltages appear at the field output terminals,  
> 20 ± 5.0 V rms for a duration > 350 ± 150 ms.

L. **Conflict Program Card.** Conflict program cards shall comply with CalTrans specifications.

**962.07 Fault Relay Operation.**

A. **Line Drop out.** The Monitor will determine that a LINE DROP OUT has occurred when:  
The AC Line Voltage is < 98 ± 2 V ac for > 400 ± 100 ms.

Within this time frame the Monitor shall suspend all fault monitoring functions, close the output relay contacts, enable Stop Time output, and the AC POWER indicator on the front panel will flash at a rate of 2 Hz ±20 % to indicate LINE DROP OUT status. The Monitor remains in the FAULT RELAY mode until a LINE RECOVERY has occurred.

B. **Line Recovery.** The Monitor will determine that a LINE RECOVERY has occurred when:  
The AC Line Voltage is > 103 ± 2 V ac for > 400 ± 100 ms.

C. **Fault Relay Recovery.** When LINE RECOVERY is established, FAULT RELAY RECOVERY shall be initiated. For an interval of 6.0 ± 0.5 seconds, the following will take place:  
The Output Relay contacts remain closed, and the Stop Time output remains active.  
All fault monitoring functions remain suspended.  
The AC POWER indicator light flashes at a rate of 2 Hz ±20%.

At the end of this time interval the Monitor begins counting Watchdog transitions from the controller and prepares to resume normal fault monitoring.

D. **Resumption of Normal Monitoring.** The resumption of normal Fault Monitoring shall occur

when either:

The Monitor has counted 5 transitions between the True and False state from the controller Watchdog; or 10 ± 0.5 seconds has elapsed from the time of LINE RECOVERY.

If the controller Watchdog output does not become active, the Monitor shall go into a Latched Fault condition.

**962.08 Red Monitoring Connector.**

A. **Connector.** A connector, 3M-3428-5302, with two 3518 polarizing keys, or equivalent, shall be mounted on the Monitor front panel. The pin assignments of the P20 connector and terminal assembly are defined in this specification.

It shall be possible to plug and unplug the Red Monitoring Connector P20 without placing the cabinet into Flash operation.

**P20 Connector Pin Assignments**

PIN	FUNCTION	PIN	FUNCTION
1	CHANNEL 15 RED	2	CHANNEL 16 RED
3	CHANNEL 14 RED	4	UNDEFINED
5	CHANNEL 13 RED	6	SPECIAL FUNCTION 2
7	CHANNEL 12 RED	8	SPECIAL FUNCTION 1
9	CHANNEL 10 RED	10	CHANNEL 11 RED
11	CHANNEL 9 RED	12	CHANNEL 8 RED
13	CHANNEL 7 RED	14	CHANNEL 6 RED
15	CHANNEL 5 RED	16	CHANNEL 4 RED
17	CHANNEL 3 RED	18	CHANNEL 2 RED
19	CHANNEL 1 RED	20	RED ENABLE

Keying shall be between pins 3/5, and 17/19. The odd numbered pins are on one side, and the even pins are on the other. The P20 connector and the CMU connector shall be keyed physically alike (to prevent the Red Monitoring cable from being inserted into the P20 180 degrees out of alignment).

B. **Red Enable Input.** Pin 20 of the Red Monitoring Connector shall provide the Red Enable input to the Monitor. When the Red Monitoring Connector is disconnected, or Red Enable is not present, the Monitor shall check for conflicting combinations of Greens and Yellows, Watchdog Timer, 24VDC, Conflict Program Card Ajar, and Monitor Fail. When enabled, the extended Monitor functions shall become active including: Red Fail, Multiple Output, and Yellow Fail.