

MODEL 2018



18 CHANNEL CONFLICT MONITOR



- Operates in Type 210 or Type 2010 mode
- Accepts 16 and 18 channel program cards
- Enhanced monitoring functions:
 - Multiple Indication Monitoring
 - Red Fail Per Channel Monitoring
 - Short Yellow Monitoring
 - Flashing Don't Walk Monitoring
 - Co-Channel Monitoring
- Event logging capability:
 - AC Line Log
 - Prior Faults Log
 - Signal Sequence Log
 - Configuration Event Log
 - Monitor Reset Log
- Monitor firmware upgradable via front panel Comm Port
- Selectable LED head threshold monitoring
- Complete intersection display using Red, Yellow, and Green LEDs
- Diagnostic Mode displays Line Voltage, Configuration Information, and the 20 most recent faults on the front panel LED display
- 24VDC enhanced monitors for Hi voltage and excessive ripple

Overview:

Reno A & E's Model 2018 Conflict Monitor is the first 170 / 2070 compatible monitor to include features that simplify monitoring of complex intersections. The Model 2018 sets new standards in reliability and functionality by providing enhanced monitoring functions, event logging capability, database management, and advanced diagnostic features. Reno A&E's Model 2018 meets the requirements set forth in Chapter 3, Section 6, of the Caltrans Transportation Electrical Equipment Specifications (TEES) dated 08/16/02.



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MODEL 2018 SERIES ENHANCED FEATURES

The following is a list of features included in Reno A & E's Model 2018 Malfunction Management Unit which enhance the safety and operation of the unit. These features extend the operational capabilities of the Model 2018 beyond the requirements set forth in Chapter 3, Section 6, of the Caltrans Transportation Electrical Equipment Specifications (TEES) dated 08/16/02.

Multiple Indication Monitoring: This monitoring function monitors for simultaneously active inputs of Green (Walk), Yellow, or Red (Don't Walk) on the same channel. A set of switches on the PC board labeled DUAL ENABLE SWITCHES is provided to allow Multiple Indication monitoring to be enabled on a per channel basis.

GY-Dual Indication Monitoring: This monitoring function detects simultaneously active inputs of Green and Yellow field signal inputs on the same channel. When the Green and Yellow inputs of a channel are sensed as active for more than 500 milliseconds the MONITOR transfers the Output relay contacts to the fault condition and illuminates the MULT IND indicator. GY-Dual Indication Monitoring is enabled by the use of the printed circuit board Option switch 6.

GY-Dual Indication Monitoring may be enabled concurrently with Multiple Indication Monitoring. When the GY-Dual Indication Monitoring option is enabled, all channels which have the printed circuit board DUAL ENABLE switches set to OFF will be individually monitored for simultaneously active Green and Yellow inputs. All channels that have the printed circuit board DUAL ENABLE switches set to ON will function as described above in Multiple Indication Monitoring.

Multiple Indication and Short Yellow Monitoring are Always ON: This feature is used when it is necessary to ensure that the Multiple Indication and Short Yellow monitoring are always active. These functions are normally disabled when the Red Enable input is not active. Installing Option jumper 4 enables this feature. When installed, the monitor will always perform Multiple Indication and Short Yellow monitoring.

Red Fail Monitoring: The monitor is capable of monitoring for the absence of voltage on all of the inputs to a channel. When an absence of all signal voltage to a channel is detected for 1500 milliseconds or more, the monitor transfers the Output relay contacts to the fault condition and illuminates the RED FAIL indicator on the front panel. The time interval between the beginning of the absence of signal voltage on a channel and the transfer of the Output relay contacts to the fault condition does not exceed 1500 milliseconds. Red monitoring is enabled on a per channel basis using the RED ENABLE switches on the main printed circuit board. Red monitoring is disabled when the Red Enable input is not active.

Red Enable must be ON or Red Fail: This feature is used when it is necessary to ensure that the Red Interface cable is plugged in under normal operating conditions. Installing Option jumper 3 enables this feature. When installed, the monitor will generate a Red Fail fault whenever the Red Enable input is not active. Special Function 1 & 2 inputs can be used to disable Red Fail monitoring, if needed.

Co-Channel Monitoring: This feature is used when the monitor has a channel that may have all outputs off while another channel's output is on for the movement of traffic. Overlaps and Protected / Permitted applications are common examples. Under normal operation, the Red Enable input would have to be deactivated during the time that channel would have no output, to keep a Red Fail fault from occurring. The Co-Channel monitoring feature allows the user to select other channels that will be tested along with the parent channel such that a Red Fail fault will only occur if the parent channel has no outputs on and the Green and optionally the Yellow of the child channels have no output on.

Co-Channel Monitoring is configured for each channel, individually, through the use of the RaeComM software. When a channel is programmed as a child of another channel, it is a one way relationship. Therefore, if channel 9 is assigned as a child of channel 2 there is no implied reverse relationship of channel 2 being a child of channel 9. If this operation is desired, it must be explicitly programmed as such.

Co-Channel Childs Include Yellow: Setting the Co-Chan Childs Incl Yel user option in RaeComM will cause the Yellow display to be included from the child channels when testing for Red Fail faults. If Co-Chan Childs Incl Yel is not selected, then only the Green will be used from the child channels.

Flashing Don't Walk Monitoring: This feature is used when it is necessary to ensure that flashing Don't Walk displays do not conflict with other Greens or Yellows at the intersection. In order to use this feature the RaeComM software must be used to set the channels that this feature is enabled for. The factory default for this feature is no channels enabled. Flashing Don't Walk Monitoring monitors the channel Red input for a flashing condition. A flashing condition is defined as remaining in a state for at least 200 milliseconds but no longer than 600 milliseconds. If the input stays in a state longer than 600 milliseconds, it is no longer considered as flashing. When Flashing Don't Walk Monitoring is enabled for a channel, a flashing Red input is checked for conflicts the same as the Green and Yellow inputs for that channel. The difference being that a Flashing Don't Walk conflict must exist for 1500 milliseconds to be detected as a fault. This time allows the monitor sufficient time to detect transitions from the flashing state to the solid ON state and not falsely trip.

When a fault is detected due to this feature, it is displayed as a CONFLICT and the channel with a flashing Red input that was involved in the detected fault will be flashing its Red LED. Without this feature enabled, a RED input cannot be part of a conflict fault.

Yellow Monitoring: The monitor verifies that the Yellow Change interval signal is at least 2.7 ± 0.1 seconds and that a Green is followed by a Yellow. When the minimum Yellow Change interval is not satisfied, the monitor transfers the Output relay contacts to the fault condition, illuminates the YELLOW indicator on the front panel. This test can be disabled on a per channel basis using the Yellow Disable jumpers on the program card. Yellow monitoring is disabled when the Red Enable input is not active except when the Multi Indication / Short Yellow option jumper is installed on the printed circuit board.

210 or 2010 Mode: The monitor can operate in the 210 mode or the 2010 mode. The mode is selected with Option switch 7. When Option switch 7 is OFF, the 210 mode of operation is selected. When ON, the 2010 mode of operation is selected.

210 Mode: Watchdog Timer Fault occurs if this input does not change states within 1500 milliseconds of the last state change. Stop Timing output is released at the same time as the Fault Relay is returned to the no fault state. A state change of the Red Enable input is recognized when it is in a state for at least 100 milliseconds.

2010 Mode: Watchdog Timer Fault occurs if this input does not change states within 1000 milliseconds of the last state change. Stop Timing output is released 250 milliseconds before the Fault Relay is returned to the no fault state. A state change of the Red Enable input is recognized when it is in a state for at least 400 milliseconds.

Incandescent or LED Thresholds: The monitor can use the standard incandescent field display thresholds or enhanced LED field display thresholds. The active threshold is selected with Option switch 8. When Option switch 8 is OFF, the standard incandescent field display thresholds are selected. When ON, the enhanced LED field display thresholds are selected.

Incandescent Thresholds: The monitor senses greens and yellows as ON when their voltage is above 25 Vrms and OFF when below 15 Vrms. Reds are ON when their voltage is above 70 Vrms and OFF when below 50 Vrms. Red Enable and Special Function Inputs are ON when their voltage is above 70 Vrms and OFF when below 50 Vrms.

LED Thresholds: The monitor, when checking for Conflicts, Multiple Indications, and Short Yellows, senses greens, yellows, and reds as ON when their voltage is above 25 Vrms and OFF when below 15 Vrms. For the Red Fail check greens, yellows, and reds as ON when their voltage is above 70 Vrms and OFF when below 50 Vrms. Red Enable and Special Function Inputs are ON when their voltage is above 70 Vrms and OFF when below 15 Vrms.

Program Card Absent Monitoring: If the Program Card is not present or not seated properly in the connectors, the monitor will enter the fault mode, transfer the Output relay contacts to the Fault position, and illuminate the PC AJAR indicator on the front panel. The monitor remains in this fault condition until the program card is properly inserted and the unit is reset by the activation of the front panel reset switch or the activation of the Reset input. A monitor Power Failure will reset the monitor when it has been triggered by the detection of a Program Card fault prior to the monitor Power Failure.

Support for 16 Channel and 18 Channel Program Cards: The monitor is capable of accepting both 16 channel and 18 channel Program Cards.

16 Channel Program Cards are not Allowed: Option jumper 1 should be installed to force the monitor to not accept 16 channel Program Cards. When this feature is enabled and a 16 channel Program Card is inserted, the monitor will display a PC AJAR fault with all three field indications flashing for channel 16.

18 Channel Program Cards are not Allowed: Option jumper 2 should be installed to force the monitor to not accept 18 channel Program Cards. When this feature is enabled and an 18 channel Program Card is inserted, the monitor will display a PC AJAR fault with all three field indications for channel 18 flashing.

+24 Volt DC Enhanced Monitoring: The monitor is capable of monitoring the +24VDC input for over voltage and excessive ripple. The enhanced monitoring feature is selected with Option switch 3. When Option switch 3 is OFF, the standard +24VDC monitoring is selected. When ON, the enhanced monitoring is selected. When Enhanced +24VDC Monitoring is enabled, the VDC FAILED indicator will flash at a five Hz rate when the +24VDC input is above 28 VDC. The indicator will flash at a one Hz rate when the ripple on the +24VDC input exceeds 1 Vrms.

Watchdog Timer Monitoring: This monitoring function detects a Watchdog Timer output from a Controller Unit or other external cabinet device. If the monitor does not detect a change in state on the Watchdog Timer input within the required time, the monitor will transfer the Output relay contacts to the Fault position, illuminate the WDT ERROR LED on the front panel, and latch the state of all inputs. This monitoring function is enabled by use of a printed circuit board mounted toggle switch labeled WATCHDOG. The Watchdog Timer input is connected to Rear Edge Connector - Pin 22.

Special Function Inputs: The monitor provides two Special Function inputs, Special Function 1 (Red Interface Connector - Pin 8) and Special Function 2 (Red Interface Connector - Pin 6). There are two Option Switches (Special Function 1 Invert & Special Function 2 Invert) which allow the user to invert the ON and OFF states for each of the Special Function inputs. The presence of an active signal on these inputs disables the monitor's ability to detect the absence of voltage on all field signal inputs of a channel (Red Fail monitoring). The Special Function inputs are sensed as ON when the input voltage exceeds a preset level and are sensed as OFF when it is less than a second preset level. Two different sets of preset levels are used based on the setting of the Incandescent / LED Thresholds option.

Event Logging: Six different Event Logs provide detailed, date and time stamped documentation of selected events recorded by the monitor.

Time Change Log: Records the 50 most recent time changes. Data recorded: Original Date / Time Stamp, New Date / Time Stamp, and Up Time Accumulator Date / Time Stamp.

Monitor Reset Log: Records the 20 most recent resets. Data recorded: Date / Time Stamp, Faults at Time of Reset, and Source of Reset (Front Panel, External, or Power Loss).

Configuration Event Log: Records the ten most recent configuration changes. Data recorded: Date / Time Stamp, Program Card Jumpers, Printed Circuit Board DIP Switch Settings, Type of Program Card, Factory Options set through RaeComM, and User Options set through RaeComM.

Prior Faults Log: Records the 20 most recent faults. Data recorded: Date / Time Stamp; Cabinet Temperature; Faults Reported; Status of all Greens, Yellows, and Reds; Status of all DC Inputs; Status of Red Enable; Entire Front Panel Fault Display; AC Line Voltage; and Red Enable Voltage.

AC Line Log: Records the 50 most recent changes in AC line status. Data recorded: Date / Time Stamp, Event Type (Power Up / Reset, Low Voltage, Low Voltage Recovery, Shutdown, Low Voltage Alarm, Low Voltage Alarm Recovery, High Voltage Alarm, and High Voltage Alarm Recovery), and AC Line Voltage.

Signal Sequence Log: The Signal Sequence Log can be configured to record events occurring prior to a fault in one of two different modes.

Event Mode: The Signal Sequence Log records the 60 most recent events preceding the failure. An event is defined as an instance when any AC or DC signal changes state. The monitor checks all inputs for changes in state every 33 milliseconds for the purpose of accumulating data for this log. Data recorded: Time Prior to Fault; Status of all Greens, Yellows, and Reds; RMS Voltages of all Greens, Yellows, and Reds; Status of all DC inputs; Status of Red Enable; AC Line Voltage; Red Enable Voltage; and DC Input Voltages.

Time Mode: The Signal Sequence Log records the 2 seconds preceding the failure. The monitor records all inputs every 33 milliseconds for the purpose of accumulating data for this log. Data recorded: Time Prior to Fault; Status of all Greens, Yellows, and Reds; RMS Voltages of all Greens, Yellows, and Reds; Status of all DC inputs; Status of Red Enable; AC Line Voltage; Red Enable Voltage; and DC Input Voltages.

Display Test: All of the LEDs on the front panel can be illuminated by pressing the front panel reset switch or activating the Reset input. When the reset switch is pressed or the Reset input activated, all of the LEDs will illuminate for 300 milliseconds. This feature provides a means of ensuring that all displays are functioning correctly.