MODEL 2018E

18 CHANNEL CONFLICT MONITOR

ETHERNET PORT AND USB PORT FOR REMOTE AND LOCAL COMMUNICATION WITH RAECOMM SOFTWARE

- **Meets and/or exceeds all Caltrans requirements (TEES 08/16/2002)**
- **Supports Flashing Yellow Arrow Left Turn (FYA)**
- **Event logging provides a detailed, time-stamped record of all data:**
  - **Time changes**
  - **Resets**
  - **Configuration changes**
  - **Prior faults**
  - **AC line voltages**
  - **Signal sequence data**
- **Advanced diagnostic features isolate problems**
- **64 front panel LEDs provide a real-time status of all channels**
- **Enhanced LED signal monitoring**
- **Operates in Type 210 or Type 2010 mode**
- **Canadian Flashing Green Monitoring version available**

Overview:
Reno A&E's Model 2018E Conflict Monitor is the first 170/2070 compatible monitor to provide both Ethernet and USB ports to allow simultaneous local and remote communication, using RaeComM software. The Model 2018E provides enhanced monitoring functions, event logging capability, database management, and advanced diagnostic features. Reno A&E's Model 2018E meets the requirements in Chapter 3, Section 6, of the Caltrans Transportation Electrical Equipment Specifications (TEES) dated 08/16/02.

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ISO 9001 REGISTERED
Since 2000

Model 2018E Enhanced Features

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

Hardware Features: The 2018E unit incorporates a 16-bit microprocessor, a digital signal processor (DSP), and two microcontrollers. The main microprocessor can be upgraded via the front panel USB or Ethernet port. The DSP and the microcontrollers are flash based and can be programmed in circuit.

One of the microcontrollers is dedicated to monitoring diagnostic signals from the DSP and the main microprocessor. This microcontroller holds the main processor in the reset state until the AC Line voltage and all supply voltages have been verified as being within operational ranges.

The monitor has an internal buzzer that indicates when the main processor is not running. This will only occur very briefly during power up, 1.5 seconds after loss of AC power, and during major diagnostic failures.

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.

LED Thresholds: The monitor can use the standard lit field display thresholds or enhanced LED field display thresholds. The monitor normally uses 15 VAC as off and 25 VAC as on for Green, Yellow, and Walk displays and uses 50 VAC as off and 70 VAC as on for Red displays. With the LED thresholds active, the monitor uses the same voltage thresholds for all displays but will use different voltage thresholds based on the test being performed. For Conflict and Multiple Indication the monitor uses 15 VAC as off and 25 VAC as on. For Red Fail, Short Yellow, and Short Clearance the monitor uses 50 VAC as off and 70 VAC as on.

Multiple Indication Monitoring: This monitoring feature detects simultaneously active inputs of Green (Walk), Yellow, or Red (Don't Walk) on the same channel. A set of switches on the printed circuit board labeled DUAL ENABLE SWITCHES is provided to allow Multiple Indication monitoring to be enabled on a per channel basis. Multiple Indication monitoring is disabled when the Red Enable input is not active.

GY-Dual Indication Monitoring: This monitoring function detects simultaneously active inputs of Green and Yellow field signal inputs on the same channel. GY-Dual Indication Monitoring is enabled by the use of 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. GY-Dual Indication monitoring is disabled when the Red Enable input is not active.

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.

Flashing Yellow Arrow Left Turn Monitoring: The monitor supports four sections Flashing Yellow Arrow (FYA) left turn displays. Faults monitored for include: Dual Indication, Red Fail, Flashing Yellow Arrow must flash, and a solid Yellow Arrow terminating a Green Arrow must conflict with the opposing through Green and Yellow. Reno A&E monitors provide the most flexible and advanced Flashing Yellow Arrow Left Turn monitoring capabilities available in the industry.

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 FAIL 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.

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.

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.

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.