RENO A & E

MODEL 224 SERIES

Firmware Version 2.00

FOUR CHANNEL, DIP SWITCH PROGRAMMABLE LOOP DETECTORS

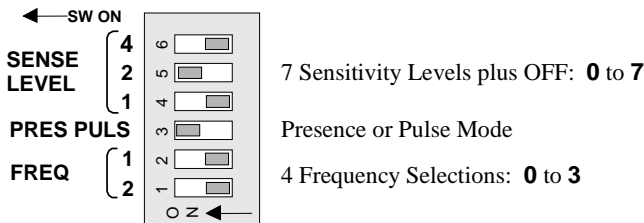### OPERATING INSTRUCTIONS

I   General

The Model 224 is a scanning, four channel, card rack mounted loop detector. Once the detector is plugged into an appropriately wired card rack, it will begin to operate. The detector automatically tunes itself and is operational within two seconds after application of power or after being reset. Full sensitivity and hold time require approximately 30 seconds of operation. The detector is fully self-compensating for environmental changes and loop drift over the full temperature range and the entire loop inductance range.

The operation of each channel is independent and is programmed using one of four, front panel mounted, six-position DIP switch modules. Each channel has a single, dual color (green / red) Detect / Fail LED indicator. The LED provides an indication of the channel's output state and loop failure conditions. Output State conditions are indicated when the Detect / Fail LED is illuminated in a green state. Loop Failure conditions are indicated when the Detect / Fail LED is illuminated in a red state. The Model 224 also has a Test Mode that verifies proper operation of the outputs, LED indicators, DIP switches, and loop oscillator circuitry.

II   Indicators and Controls

i   Front Panel Mounted Programming DIP Switches

The four, six-position DIP switch modules located on the front panel that are labeled **1**, **2**, **3**, and **4** affect each channel independently. To turn one of these DIP switches *ON*, push the switch to the left.

SENSE LEVEL 4 2 1   7 Sensitivity Levels plus OFF: **0** to **7**

PRES PULS   Presence or Pulse Mode

FREQ 1 2   4 Frequency Selections: **0** to **3**

Front Panel Six-Position DIP Switch Module
(Factory Default Settings Shown)

Frequency (FREQ) (DIP SWITCHES 1 and 2)

Each channel of the Model 224 detector has four (4) frequency selections that allow altering the resonant frequency of the loop circuit. DIP switches 1 and 2 are used to select the frequency for a given channel. The value (**1** or **2**) to the left of the DIP switch is assigned to the switch when the switch is in the *ON* position. If the switch is in the *OFF* position, the switch has a value of zero (0). By adding the switch *ON* and *OFF* values, the two switches will combine for values from 0 to 3 that indicate one of the four frequency selections. The table below lists the DIP switch settings and associated frequency selections.

NOTE: After changing either frequency DIP switch setting, it is necessary to reset the detector channel by momentarily changing the position of one of the other four DIP switches (DIP switches 3, 4, 5, or 6).

Frequency	DIP Switch 2	DIP Switch 1	Effective Value
HI *	*OFF* *	*OFF* *	$0 + 0 = 0$ *
MED HI	*ON*	*OFF*	$1 + 0 = 1$
MED LO	*OFF*	*ON*	$0 + 2 = 2$
LO	*ON*	*ON*	$1 + 2 = 3$

   * Factory default setting.

Presence / Pulse Mode (PRES PULS) (DIP Switch 3)

DIP switch 3 controls the output mode of each channel.

PRESENCE (**PRES**): When the switch is in the *ON* position, Presence Mode is selected. Presence Mode provides a Call hold time of at least four minutes (regardless of vehicle size) and typically one to three hours for an automobile or truck. This is the factory default setting and the most common setting.

PULSE (**PULS**): When the switch is in the *OFF* position, Pulse Mode is selected. Pulse Mode will generate a single 125 millisecond pulse output for each vehicle entering the loop detection zone. Any vehicle remaining in the loop detection zone longer than two seconds will be tuned out providing full sensitivity for the vacant portion of the loop detection zone. Full sensitivity for the entire loop detection zone is recovered within one second following the departure of any vehicle that has occupied the loop detection zone longer than two seconds.

NOTE: Changing the Presence / Pulse Mode setting will reset the detector channel. Care should be taken to ensure that the detector channel is not reset while the detection zone is occupied.

Sensitivity (SENSE LEVEL) (DIP Switches 4, 5, and 6)

There are seven (7) selectable sensitivity levels plus OFF for each channel. The seven sensitivity levels and OFF setting are selected via DIP switches 4, 5, and 6 on each of the four front panel mounted six-position DIP switch modules. The value (**1**, **2**, or **4**) to the left of the DIP switch is assigned to the switch when the switch is in the *ON* position. If the switch is in the *OFF* position, the switch has a value of zero (0). By adding the switch *ON* and *OFF* values, the three switches will combine for values from 0 to 7 that indicate OFF or one of the seven sensitivity level selections. Choose the lowest sensitivity level that will consistently detect the smallest vehicle that must be detected. Do not use a sensitivity level higher than necessary. The factory default setting is Sensitivity Level 2, $-\Delta L/L = 0.32\%$ for detection. The following table lists the DIP switch settings and associated sensitivity level selections.

NOTE: Changing the Sensitivity Level setting will reset the detector channel. Care should be taken to ensure that the detector channel is not reset while the detection zone is occupied.

Sense Level	-ΔL/L	DIP Switch 4	DIP Switch 5	DIP Switch 6	Effective Value
0 (OFF)	N/A	*OFF*	*OFF*	*OFF*	0 + 0 + 0 = 0
1	0.64%	*ON*	*OFF*	*OFF*	1 + 0 +0 = 1
2 *	0.32% *	*OFF* *	*ON* *	*OFF* *	0 + 2 +0 = 2 *
3	0.16%	*ON*	*ON*	*OFF*	1 + 2 +0 = 3
4	0.08%	*OFF*	*OFF*	*ON*	0 + 0 +4 = 4
5	0.04%	*ON*	*OFF*	*ON*	1 + 0 +4 = 5
6	0.02%	*OFF*	*ON*	*ON*	0 + 2 +4 = 6
7	0.01%	*ON*	*ON*	*ON*	1 + 2 +4 = 7

* Factory default setting.

ii Front Panel Mounted Pushbutton - Audible Detect Signal (Buzzer)

A front panel mounted pushbutton labeled **BUZZER** is used to enable an audible detect signal that is emitted any time a given channel's detection zone is occupied. Only one channel can have this feature active at any given time. To activate this feature, press the pushbutton. The first time the pushbutton is pressed, a short (50 millisecond) audible signal confirms the activation of the feature for Channel 1. The second time the pushbutton is pressed, two short (50 millisecond) audible signals confirm the activation of the feature for Channel 2. The third time the pushbutton is pressed, three short (50 millisecond) audible signals confirm the activation of the feature for Channel 3. The fourth time the pushbutton is pressed, four short (50 millisecond) audible signals confirm the activation of the feature for Channel 4. To deactivate this feature, press the pushbutton once more. A long (250 millisecond) audible signal confirms the deactivation of the feature. This feature will automatically turn off 15 minutes after activation.

NOTE: When operating in Pulse mode, the audible detect signal will cease if a vehicle occupies the detection zone for more than two seconds.

iii PC Board Mounted Jumper - Test Mode

Placing a two pin shorting jumper into the PC board mounted two pin female header labeled **TEST** activates Test Mode. For more information on Test Mode, refer to the Model 224 Operation Manual.

NOTE: For normal detector operation, the Test Mode jumper must not be installed.

iv Detect / Fail Indicators

The Model 224 detector has a single two color (green / red) light emitting diode (LED) per channel to indicate a Call output and/or the status of any current or prior loop failure conditions. A green indication signifies a Call output (detect state). A red indication signifies a loop failure condition. A continuous ON (green) state indicates a Call output. A continuous ON (red) state indicates that a current open loop failure condition or an inductance change condition of greater than +25% exists. This condition also generates a Call output. A one Hz (red) flash rate indicates that a current shorted loop failure condition or an inductance change condition of greater than -25% exists. This condition also generates a Call output. A flash rate of three 50 millisecond (red) flashes per second indicates a prior loop failure condition. A flash rate of three 50 millisecond (red) flashes per second followed by a single 750 millisecond (green) flash indicates a prior loop failure condition and a current Call output (detect state). The following table below lists the various Detect / Fail indications and associated meanings.

NOTE: If a channel has the audible detect feature activated, that channel's Detect / Fail LED will be illuminated in an orange state for any Call output condition.

Detect / Fail LED	Meaning
OFF	No Detect (No Call Output)
Solid ON (Green)	Detect (Call Output)
Solid ON (Orange)	Audible Detect Signal Activated Detect (Call Output)
Solid ON (Red)	Open Loop Failure or Inductance change condition of greater than +25% exists
One Hz flash rate (Red) (50% Duty Cycle)	Shorted Loop Failure or Inductance change condition of greater than -25% exists
Three 50 ms (Red) flashes per second	Loop Failure condition occurred but no longer exists
Three 50 ms (Red) flashes per second followed by a single 750 ms (Green) flash	Loop Failure condition occurred but no longer exists and Detect (Call Output)
Three 50 ms (Red) flashes per second followed by a single 750 ms (Orange) flash	Loop Failure condition occurred but no longer exists Audible Detect Signal Activated and Detect (Call Output)

III   Reset

Changing the position of any of an individual channel's front panel mounted DIP switches (except the Frequency switches) will reset the channel. When the detector is installed and operating, the best method for resetting a channel is to momentarily change the position of the Presence / Pulse DIP switch and then return it to its original position.

Pressing and holding the front panel pushbutton labeled **BUZZER** until the buzzer sounds and all four channel Detect / Fail LEDs are illuminated (red) initiates a detector reset. When the pushbutton is released, the buzzer will continue to sound and the four channel Detect / Fail LEDs will remain illuminated for an additional second. When the buzzer and Detect / Fail LEDs turn off, the detector will be reset.

The detector can also be reset by connecting a logic ground signal to Contact C of the edge card connector or the return of power after a power loss.