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MODEL 222S SERIES

(Firmware Version GT 2.1)

TWO CHANNEL DIP SWITCH PROGRAMMABLE LOOP DETECTORS

OPERATING INSTRUCTIONS

I General

The Model 222S is a scanning, two channel, card rack mounted loop detector. Once the detector is plugged into an appropriately wired card rack with 10.8 to 30 VDC present, the detector 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 Model 222S is available with solid state or relay outputs.

The operation of each channel is independent and is programmed using two front panel mounted eight-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 222S incorporates a front panel mounted three-position Call / Test toggle switch for each channel that can be used to simulate a continuous or momentary Call output. The Model 222S also has a Test Mode that verifies proper operation of the LED indicators, DIP switches, and loop oscillator circuitry.

II Indicators and Controls

i Front Panel Mounted Programming DIP Switches

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

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Front Panel Eight-position DIP Switch Module
 (Factory Default Settings Shown)

Channel Disable (DISABLE) (DIP Switch 1)

When the **DISABLE** DIP switch is turned **ON**, the channel's output is continuously in the No Call state regardless of the presence or absence of vehicles over the loop. The loop oscillator is not activated when the channel is in the disabled state. The factory default setting of this switch is **OFF**.

NOTE: Changing the Channel Disable DIP switch setting will reset the detector channel. Care should be taken to ensure that the detector is not reset while the detection zone is occupied.

Frequency (FREQ) (DIP Switches 2 and 3)

Each channel of the Model 222S detector has four (4) frequency selections that allow altering the resonant frequency of the loop circuit. DIP switches 2 and 3 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 **ON**. If the switch is **OFF**, 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 following table 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 six DIP switches (DIP switches 1, 4, 5, 6, 7, or 8).

Frequency	DIP Switch 3	DIP Switch 2	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.

Fail Safe / Fail Secure Mode (FAIL SAFE) (DIP Switch 4)

DIP switch 4 is used to select the Call state of each channel's output when a loop failure condition exists on the loop network to the channel.

When DIP switch 4 is turned **ON**, the channel's output maintains a Call state during a loop failure condition. This is the factory default setting and the most common setting for intersection control.

When DIP switch 4 is turned **OFF**, the channel's output maintains a No Call state during a loop failure condition. This setting is typically used in incident detection systems for freeway management.

NOTE: Changing the Fail-Safe / Fail-Secure Mode DIP switch setting will reset the detector channel. Care should be taken to ensure that the detector is not reset while the detection zone is occupied.

Presence / Pulse Mode (PRES PULS) (DIP Switch 5)

DIP switch 5 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 DIP switch setting will reset the detector channel. Care should be taken to ensure that the detector is not reset while the detection zone is occupied.

Sensitivity (SENSE LEVEL) (DIP Switches 6, 7, and 8)

There are eight (8) selectable sensitivity levels for each channel. The eight sensitivity levels are selected via DIP switches 6, 7, and 8 on each of the two front panel mounted eight-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 **ON**. If the switch is **OFF**, 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 one of the eight 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 6: $-\Delta L/L = 0.02\%$ for detection. The table below lists the DIP switch settings and associated sensitivity selections.

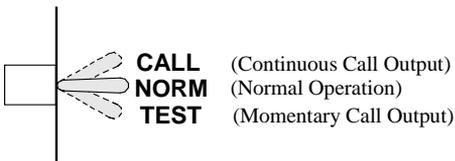
NOTE: Changing the Sensitivity Level setting will reset the detector. Care should be taken to ensure that the detector is not reset while the detection zone is occupied.

Sense Level	$-\Delta L/L$	DIP Switch 6	DIP Switch 7	DIP Switch 8	Effective Value
0	1.28%	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 Call / Test Toggle Switches:

Each channel has a three-position toggle switch (labeled 1 or 2) that can be used to simulate the presence of a vehicle over the loop(s). Moving the switch to the **CALL** position induces a continuous Call output. Holding the switch in the **TEST** position induces a momentary Call output that lasts as long as the switch is held in the **TEST** position. This feature is particularly helpful when troubleshooting and isolating problems related to detector outputs and/or controller inputs. The default position of these toggle switches is in the **NORM** position.



Front Panel Three-position Toggle Switch

iii 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. To deactivate this feature, press and hold the pushbutton for one second. 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.

iv PC Board Mounted Programming DIP Switches

The two-position DIP switch module labeled **S3** located on the printed circuit board affects both channels. To turn one of these DIP switches **ON**, push the switch up.

Test Mode (TEST) (DIP Switch 1):

When DIP switch 1 is turned **ON**, Test Mode is activated. For more information on Test Mode, refer to the Model 222S Operation Manual. The factory default setting of this switch is **OFF** (Test Mode OFF).

NOTE: The Test Mode DIP switch must be OFF for normal detector operation.

100 Millisecond Minimum Output Mode (DIP Switch 2):

Two modes of operation are available for the Call outputs of the detector when operating in Presence Mode. Normal Mode or 100 Millisecond Minimum Output Mode is selected by means of DIP switch 2. When this switch is in the **OFF** position, the Call outputs stay on only as long as the detection zone is occupied. When this switch is in the **ON** position, every Call output will have a minimum duration of 100 milliseconds. This feature forces all detection events less than 100 milliseconds long to be 100 milliseconds long. The factory default setting of this feature is **OFF** (100 Millisecond Minimum Output Off).

v Detect / Fail Indicators

The Model 222S 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. When operating in Fail-Safe mode, this indication also generates a Call output. When operating in Fail-Secure mode, no Call output is generated. A one Hz (red) flash rate indicates that a current shorted loop failure condition or an inductance change condition of greater than -25% exists. When operating in Fail-Safe mode, this indication also generates a Call output. When operating in Fail-Secure mode, no Call output is generated. 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 table below lists the various Detect / Fail indications and associated meanings.

NOTE: If either 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) resets the channel. When the detector is installed and operating, the most convenient 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. The detector also can be reset by connecting a logic ground signal to Pin C of the edge card connector or by the reappliation of power after a power loss.