

IV. Reset:

Changing the position of DIP switch 10 (Presence / Pulse Mode) or DIP switch 3 (Fail-Safe / Fail-Secure) will reset the detector. The detector can also be reset by momentarily pulling Pin 5 (Reset Pin) to ground. After changing the Frequency selection switches (DIP switches 1 & 2), the detector must be reset.

NOTE: A reset will clear the detector loop fault memory.

V. Failed Loop Diagnostics:

The FAIL LED provides an indication of whether or not the loop is currently within tolerance. If out of tolerance, the FAIL LED indicates a current loop failure by emitting a 20 millisecond flash every second. If and when the loop returns to an in tolerance state, the FAIL LED will flash once every five (5) seconds to indicate that an intermittent loop fault has occurred and has been corrected. This flash rate will continue until another loop failure occurs, the detector is reset, or the detector loses power.

VI. Relay or Solid State Fail-Safe Operation:

One of two modes of Fail-Safe operation can be selected depending on the state of Pin 10. If Output A is driving a Solid-State device, Pin 10 should be grounded; if Output A is driving a Relay device, Pin 10 should have no connection.

Pin 10 State	CALL	No CALL	Power Failure	Loop Failure
No Connection (Relay Operation)	OFF	ON	OFF	OFF
Grounded (Solid-State Operation)	ON	OFF	OFF	ON

NOTES: The state of Pin 10 has no affect on Output B, Fail Output, or Fail-Secure operation.

When used in conjunction with a Model HM1 Motherboard, the HM1 Motherboard correctly sets the state of Pin 10.

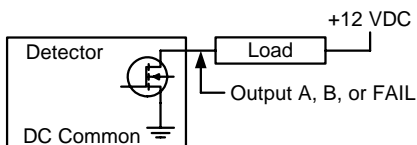
VII. Pin Connections:

One of two modes of Fail-Safe operation can be selected depending on the state of Pin 10. If Output A is driving a Solid-State device, Pin 10 should be grounded; if Output A is driving a Relay device, Pin 10 should have no connection.

Pin	FUNCTION
1	Loop
2	Loop
3	DC Common
4	12 VDC (+)
5	Reset
6	FAIL Output
7	DC Common
8	Output A
9	Output B
10	Relay / Solid State Fail-Safe Operation

NOTES: Pin 6 - FAIL Output is in a conducting state when power is applied and a functioning loop is connected to the detector. If power or the loop fails, the FAIL Output will open indicating the failure.

The three Outputs (Output A, B, and FAIL) are FET devices that sink current to DC Common (i.e. the FET Output switches the load to DC Common). To turn on a device such as a relay, the output must be connected as follows:



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OPERATING INSTRUCTIONS FOR

Model H1 Series

SINGLE CHANNEL LOOP DETECTOR

I. General:

The Model H1 can be configured for Normal Operation or Low Power Mode and is available with a Male or Female connector. The model number designates the configuration as follows:

Model H1-XX-X ← M or F M = Male connector, F = Female connector.
 ↑
 12 or LP 12 = Normal operation, LP = Low Power mode.

Normal / Low Power Operation:

The H1-LP detector can be configured to operate in a low power mode. When configured this way, the detector scans to conserve power, the output response times are slower, and the DETECT LED is automatically disabled three (3) minutes after reset or power up except when the detector is in CALL. When the CALL drops, the DETECT LED is disabled. When the shorting jumper (shunt) on J2 is removed from a low power version (Model H1-LP-M or H1-LP-F), the detector will operate in the normal mode. There is no jumper on J2 on the normal operation versions of the detector (Models H1-12-M and H1-12-F).

NOTE: J2 is located under the protective cover.

II. Indicators and Controls:

i. Detect / Fail LEDs:

The detector has two red LED indicators that are used to provide an indication of the detector's output state and/or loop failure conditions. The tables below list the various indications and their meanings.

LED 1 (DETECT)	
Status	Meaning
OFF	No vehicle present
ON	Vehicle present
Two Hz Flash rate	Delay CALL interval
Four Hz Flash rate	Extend CALL interval

LED 2 (LOOP FAIL)	
Status	Meaning
OFF	Loop OK
One Hz Flash rate	Loop failure
One Flash every Five seconds	Intermittent loop failure

ii. Sensitivity Level Rotary Switch:

The eight-position rotary switch selects one of eight (8) sensitivity levels as shown in the table below. 0 is the lowest, and 7 is the highest, with normal (factory default) being 4. Use the lowest sensitivity setting that will consistently detect the desired type(s) of vehicle(s) that must be detected. Sensitivity, response times, and current consumption for each switch position are also specified in the table below.

Position	0	1	2	3	4*	5	6	7
-Δ/L	2.56%	1.28%	0.64%	0.32%	0.16%*	0.08%	0.04%	0.02%
Normal Operation	60 ± 20 ms							
	27 mA Maximum, 21 mA Typical							
Low Power Mode	180 ± 90 ms							
	8.7 mA Maximum, 3.2 mA Typical							

* Factory default setting.

III. DIP Switch Settings:

Switch	ON	OFF	FACTORY DEFAULT
1	Frequency		OFF
2	(See Table in Frequency Section)		ON
3	Fail-Secure	Fail-Safe	OFF
4	Sensitivity Boost	No Boost	OFF
5	CALL Delay		OFF
6	(See Table in CALL Delay Section)		OFF
7	CALL Extension		OFF
8	(See Table in CALL Extension Section)		OFF
9	Pulse on Exit	Pulse on Entry	OFF
10	Output B Presence	Output B Pulse	OFF

i. Frequency (DIP Switches 1 & 2):

In situations where loop geometry forces loops to be located in close proximity to one another, it may be necessary to select different frequencies for each loop to avoid loop interference, commonly known as crosstalk. DIP switches 1 and 2 can be used to configure the detector to operate at one of four frequencies corresponding to *Low*, *Medium / Low* / *Medium / High*, and *High* as shown in the table below.

Switch	FREQUENCY			
	Low	Medium / Low *	Medium / High	High
1	ON	OFF *	ON	OFF
2	ON	ON *	OFF	OFF

* Factory default setting.

ii. Fail-Safe / Fail Secure (DIP Switch 3):

When DIP switch 3 is in the *OFF* position, the detector will operate in Fail-Safe mode during a loop fault or power failure. If a loop fault or power failure occurs while Fail-Safe is activated, Output A activates. When DIP switch 3 is in the *ON* position, the detector will operate in Fail-Secure mode during a loop fault or power failure. If a loop fault or power failure occurs while Fail-Secure mode is activated, Output A DOES NOT activate. Additionally, one of two modes of Fail-Safe operation can be selected depending on the state of Pin 10.

Switch 3 Setting	Output	PIN 10 GROUNDED			PIN 10 NO CONNECTION		
		CALL	Power Failure	Loop Failure	CALL	Power Failure	Loop Failure
OFF *	A	On	Off	On	Off	Off	Off
	B	On	Off	Off	On	Off	Off
ON	A	On	Off	Off	On	Off	Off
	B	On	Off	Off	On	Off	Off

* Factory default setting.

NOTE: When used in conjunction with a Model HM1 Motherboard, the HM1 Motherboard correctly sets the state of Pin 10.

iii. Sensitivity Boost (DIP Switch 4):

DIP switch 4 can be turned to *ON* to increase sensitivity only during the detect period without changing the sensitivity during the no detect period. When a vehicle enters the loop, the detector automatically boosts the loop sensitivity. As soon as no vehicle is detected, the detector immediately returns to the original sensitivity level. This feature is particularly useful in preventing dropouts during the passage of high bed vehicles. The factory default setting is *OFF* (no Sensitivity Boost).

iv. CALL Delay (DIP Switches 5 & 6):

One of four CALL Delay times can be selected to delay the signals on outputs A and B. A CALL Delay interval of zero, two, five, or ten seconds can be selected by setting DIP switches 5 and 6 as shown in the table below.

Switch	CALL DELAY INTERVAL			
	0 Seconds *	2 Seconds	5 Seconds	10 Seconds
5	OFF *	ON	OFF	ON
6	OFF *	OFF	ON	ON

* Factory default setting.

Delay timing specifies how long a vehicle must be continually detected before the detector outputs are turned on. If the vehicle leaves during this interval, the delay interval will be aborted and the next vehicle entering the loop area will begin a full two, five, or ten second delay time. The detector will indicate that the delay interval is currently timing by flashing the DETECT LED at a two Hz rate with a 50% duty cycle.

v. CALL Extension (DIP Switches 7 & 8):

One of four CALL Extension times can be selected to extend the signals on outputs A and B. A CALL Extension interval of zero, two, five, or ten seconds can be selected by setting DIP switches 7 and 8 as shown in the table below.

Switch	CALL EXTENSION INTERVAL			
	0 Seconds *	2 Seconds	5 Seconds	10 Seconds
7	OFF *	ON	OFF	ON
8	OFF *	OFF	ON	ON

* Factory default setting.

Extension timing specifies how long the CALL output is extended after a vehicle exits the loop area. When the specified amount of time passes, and the loop is still vacant, the CALL output will be turned off. If during this interval another vehicle enters the loop, the extension interval will be reset and the vehicle currently occupying the loop will begin a full two, five, or ten second extension time once it exits the loop area. The detector will indicate that the extension interval is currently timing by flashing the DETECT LED at a four Hz rate with a 50% duty cycle.

NOTE: The Extension times listed in the table above only apply to output B if it is set to Presence mode. Extension time will not affect output B if it is set to Pulse mode. (See the Entry Pulse / Exit Pulse section below.)

vi. Entry Pulse / Exit Pulse (DIP Switch 9):

When Output B is set to operate in Pulse Mode (DIP switch 10 is *OFF*), it can be programmed to output a 250 millisecond pulse only upon vehicle entry into the loop or only upon vehicle exit from the loop. When DIP switch 9 is *OFF*, the detector will output an *Entry Pulse* each time a vehicle enters the loop detection area. When DIP switch 9 is *ON*, the detector will output an *Exit Pulse* each time a vehicle leaves the loop detection area. The factory default setting of DIP switch 9 is *OFF* (Entry Pulse). (DIP switch 9 has no effect on Output A, the Presence output.)

NOTE: When there is a Delay timing interval programmed, and Output B is set to output an *Entry Pulse*, Output B will only output the pulse after the delay timing interval has expired. When there is an Extension timing interval programmed, and Output B is set to output an *Exit Pulse*, Output B will output the pulse at the start of the extension timing interval. If a second vehicle comes into the detection zone and then leaves the detection zone, Output A will not change its CALL state, but Output B will output a second pulse for the second vehicle.

vii. Presence / Pulse Mode (DIP Switch 10):

Output B has two modes of operation, Presence or Pulse. When in Pulse mode (DIP switch 10 set to *OFF*), a 250 millisecond pulse can be set for entry pulse or exit pulse via DIP switch 9. When in Presence mode (DIP switch 10 set to *ON*), the presence hold time is the same as Output A. The factory default setting of DIP switch 10 is *OFF* (Pulse Mode).