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MODEL BX-LP SERIES

CHANNEL LOOP DETECTOR

SINGLE

OPERATING INSTRUCTIONS

I General

The Model BX-LP is a low power loop detector for solar or low power installations. To minimize power consumption the detector's **DET** (Detect) LED will only light during the three minutes immediately following initial power-up or detector reset. After the three minutes the **DET** (Detect) LED is will not light, but the detector continues to function normally.

Please verify source voltage before applying power. The model designation indicates the input power required and output configuration for the detector as follows:

Model BX-LP-xx

- Blank = 12 VDC with Relay Outputs
- 24** = 24 VDC with Relay Outputs
- SS** = 12 VDC / 24 VDC with Solid State Outputs

The input voltage range, and current consumption figures for the various versions of the detector are listed in the table below.

	Relay Outputs		Solid State Outputs
Model	BX-LP	BX-LP-24	BX-LP-SS
Input Voltage	10 to 14 VDC	20 to 28 VDC	10 to 28 VDC
Current Consumption*	3.3 to 7.0 mA in No Detect State 35 to 40 mA in Detect State (Output A Presence / Output B Pulse) 60 to 65 mA in Detect State (Output A Presence / Output B Presence)		3.3 to 7.0 mA**

NOTES: * Current consumption is a function of the sensitivity. See the table in the "Front Panel Rotary Switch (Sensitivity)" section for actual current draw at each of the sensitivity settings.
 ** Add 6.0 mA for each lit (DET and/or Fail) LED.

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 **DET** (Detect) LED is only activated during the three minutes immediately following initial power-up or detector reset. The table below lists the various indications and their meanings.

Status	DET (Detect) LED	FAIL (Loop Fail) LED
Off	Output(s) Off	Loop OK
On	Output(s) On	N/A
Flash	4 Flashes per Second (50% duty cycle) Two second timing delay activated	1 Hz (50% duty cycle) Loop Failure One flash every five seconds Prior Loop Failure

NOTE: The **DET** (Detect) LED will only turn on or flash during the three minutes immediately following initial power-up or reset of the detector. After the three minutes immediately following initial power-up or detector reset, the Detect LED is deactivated, but the detector continues to function normally. The **FAIL** (Loop Fail) LED provides the indications shown above at all times.

ii Front Panel Rotary Switch (Sensitivity)

The eight-position rotary switch selects one of eight (8) sensitivity levels as shown in the table below. 0 is lowest and 7 is highest, with normal (factory default) being 3. Use the lowest sensitivity setting that will consistently detect the smallest vehicle that must be detected. Do not use a sensitivity level higher than necessary.

Position	0	1	2	3 *	4	5	6	7
-ΔI/L	1.28%	0.64%	0.32%	0.16% *	0.08%	0.04%	0.02%	0.01%
Current Draw	3.3 mA	3.5 mA	3.8 mA	4.6 mA *	5.0 mA	5.1 mA	5.2mA	7.0 mA

* Factory default setting.

iii Front Panel DIP Switches

Switch	ON	OFF	Factory Default
1	Frequency		OFF
2	<i>(See table in Frequency section)</i>		OFF
3	Limited Presence	True Presence™	OFF
4	Sensitivity Boost	No Boost	OFF
5	Two Second Delay	No Delay	OFF
6	Fail-Safe Output A	Fail-Secure Output A	OFF
7	Exit Pulse Output B	Entry Pulse Output B	OFF
8	Presence Mode Output B	Pulse Mode Output B	OFF

Frequency (DIP Switches 1 and 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.

NOTE: After changing any frequency DIP switch setting(s), the detector must be reset by momentarily changing one of the other DIP switch positions.

Switch	Frequency			
	Low (0)	Medium / Low (1) *	Medium / High (2)	High (3)
1	ON	OFF *	ON	OFF
2	ON	ON *	OFF	OFF

* Factory default setting.

Presence Hold Time (DIP Switch 3)

Output A always functions as a presence output. DIP switch 3 can be used to select one of two presence hold times; Limited Presence or True Presence™. Both modes provide a detect output when a vehicle is present in the loop detection zone. True Presence™ is selected when DIP switch 3 is **OFF**. If DIP switch 3 is **ON**, Limited Presence is selected. Limited Presence will typically hold the detect output for one to three hours. True Presence™ will hold the detect output as long as the vehicle is present in the loop detection zone provided that power is not interrupted, and the detector is not reset. TruePresence™ time applies only for normal size automobiles and trucks and for normal size loops (approximately 12 ft² to 120 ft²). The factory default setting is **OFF** (True Presence™ Mode).

Sensitivity Boost (DIP Switch 4)

DIP switch 4 can be turned **ON** to increase sensitivity during the detect period without changing the sensitivity during the no detect period. The boost feature has the effect of temporarily increasing the sensitivity setting by up to two levels. When a vehicle enters the loop detection zone, the detector automatically boosts the sensitivity level. 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).

Output Delay (DIP Switch 5)

A two second delay of Outputs A and B can be activated by setting DIP switch 5 to the **ON** position. Output delay is the time the detector outputs are delayed after a vehicle first enters the loop detection zone. If the two second Output Delay feature is activated, the outputs will only be turned on after two seconds have passed with a vehicle continuously present in the loop detection zone. If the vehicle leaves the loop detection zone during the two second delay interval, detection is aborted and the next vehicle to enter the loop detection zone will initiate a new full two second delay interval. The detector provides an indication that a vehicle is being detected but that the outputs are being delayed, by flashing the front panel **DET** (Detect) LED at a four Hz rate with a 50% duty cycle. The factory default setting is **OFF** (no Output Delay).

Fail-Safe / Fail-Secure (DIP Switch 6)

When DIP switch 6 is in the **ON** position, the detector will operate in Fail-Safe mode when a loop fault condition exists. If a loop fault condition occurs while Fail-Safe mode is selected, Output A will activate (Relay A Normally Open contacts closed, Relay A Normally Closed contacts open or Solid State Output A sourced to ground). When DIP switch 6 is in the **OFF** position, the detector will operate in Fail-Secure mode when a loop fault condition exists. If a loop fault condition occurs while Fail-Secure mode is selected, Output A will not activate (Relay A Normally Open contacts open, Relay A Normally Closed contacts closed or Solid State Output A not sourced to

ground). Output B always operates in the Fail-Secure mode, it will not activate during a loop fault condition (Relay B Normally Open contacts open, Relay A Normally Closed contacts closed or Solid State Output A not sourced to ground) regardless of the setting of this switch. The factory default setting is **OFF** (Output A Fail-Secure).

Output	Loop Failure - Output A Fail-Safe	Loop Failure - Output A Fail-Secure *
A	Output ON	Output OFF *
B	Output OFF	Output OFF *

* Factory default setting.

Output B Output Mode (DIP Switches 7 and 8)

Output B has three (3) modes of operation: Pulse-on-Entry, Pulse-on-Exit, and Presence. DIP switches 7 and 8 are used to configure the Presence and/or Pulse output modes of Output B.

When set to operate in Pulse mode (DIP switch 8 set to **OFF**), Output B can be set to provide a 250 millisecond pulse when a vehicle enters or exits the loop detection zone. DIP switch 7 is used to select Pulse-on-Entry or Pulse-on-Exit. When DIP switch 7 is **OFF**, Pulse-on-Entry is selected. When DIP switch 7 is **ON**, Pulse-on-Exit is selected.

When set to operate in Presence mode (DIP switch 8 set to **ON**), Output B presence hold time is the same as Output A.

The table below shows the various combinations of switch settings and Output B modes of operation.

Switch	Pulse-on-Entry *	Pulse-on-Exit	Presence	Presence
7	OFF *	ON	OFF	ON
8	OFF *	OFF	ON	ON

* Factory default setting.

III Reset

Changing any DIP switch position (except 1 or 2) or the Sensitivity level setting will reset the detector. After changing the frequency selection switches, the detector must be reset.

IV Failed Loop Diagnostics

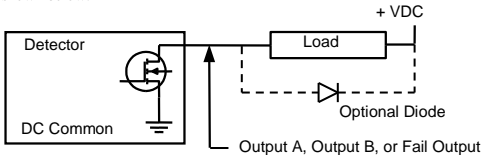
The **FAIL** LED indicates whether or not the loop is currently within tolerance. If the loop is out of tolerance, the **FAIL** LED will flash at a rate of one flash per second. If and when the loop returns to within tolerance, the **FAIL** LED will flash at a rate of one flash every five seconds to indicate that an intermittent loop fault has occurred and has been corrected. This flash rate will continue until another loop fault occurs, the detector is reset, or power to the detector is interrupted.

V Pin Connections (Reno A & E Wiring Harness Model 802-4)

Pin	Wire Color	Function	
		Relay Outputs	Solid State Outputs
1	Black	DC+	DC+
2	White	DC Common	DC Common
3	Orange	Relay B, Normally Open (N.O.)	Output B Collector (Drain)
4	Green	No Connection	No Connection
5	Yellow	Relay A, Common	DC Common
6	Blue	Relay A, Normally Open (N.O.)	Output A Collector (Drain)
7	Gray	Loop	Loop
8	Brown	Loop	Loop
9	Red	Relay B, Common	DC Common
10	Violet or Black / White	Relay A, Normally Closed (N.C.)	No Connection
11	White / Green or Red / White	Relay B, Normally Closed (N.C.)	No Connection

NOTES: All pin connections listed above are with power applied, loop(s) connected, and no vehicle detected.

On the Solid State version (BX-LP-SS), the two Outputs (Output A and Output B) are FET devices that sink current to DC Common (i.e. the FET Output switches the load to DC Common). To operate properly, the output must be connected as shown below:



If the output is being used to turn on an inductive device such as a relay, a snubber diode should be wired in parallel with the relay coil.

VI Warnings

For trouble free operation, use the Reno A&E model PLH (for pave over), or model PLB (for saw cut installation). And follow good loop installation practices. The lead-in cable for each loop (including runs through all wiring harnesses) must be twisted together a minimum of six (6) complete twists per foot. For trouble free operation, it is **highly recommended that all connections (including crimped connectors)** be soldered.

VIII Loop Installation

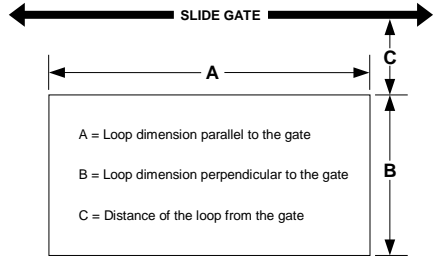
The vehicle detection characteristics of an inductive loop detector are greatly influenced by the loop size and proximity to moving metal objects such as gates. Vehicles such as small motorcycles and high bed trucks can be reliably detected if the proper size loop is selected. If the loop is placed too close to a moving metal gate, the detector may detect the gate. The diagram below is intended as a reference for the dimensions that will influence the detection characteristics.

General Rules

- The detection height of a loop is 2/3 the shortest leg (A or B) of the loop. Example: Short leg = 6 feet, Detection Height = $2/3 \times 6$ feet = 4 feet.

A =	6 ft	9 ft	12 ft	15 ft	18 ft	21 ft
C =	3 ft	4 ft	4.5 ft	5 ft	5.5 ft	6 ft

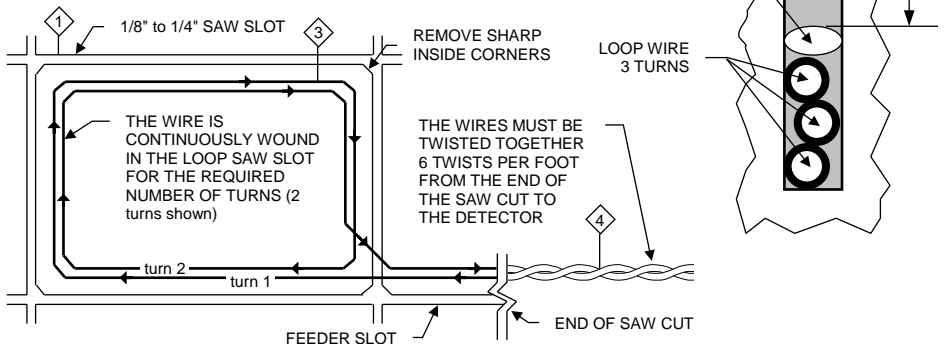
- As the length of leg A is increased, distance C must also increase.
- For reliable detection of small motorcycles, legs A and B should not exceed 6 feet.



Loop Installation - Saw Cut Type

- Mark the loop layout on the pavement. Remove sharp inside corners that can damage the loop wire insulation.
- Set the saw to cut to a depth (typically 2" to 2.5") that ensures a minimum of 1" from the top of the wire to pavement surface. The saw cut width should be larger than the wire diameter to avoid damage to the wire insulation when placed in the saw slot. Cut the loop and feeder slots. Remove all debris from the saw slot with compressed air. Check that the bottom of the slot is smooth.
- It is highly recommended that a continuous length of wire be used to form the loop and feeder to the detector. Loop wire is typically 14, 16, 18, or 20 AWG with cross-linked polyethylene insulation. Use a wood stick or roller to insert the wire to the bottom of the saw slot (do not use sharp objects). Wrap the wire in the loop saw slot until the desired number of turns is reached. Each turn of wire must lay flat on top of the previous turn.
- The wire must be twisted together a minimum of 6 twists per foot from the end of the saw slot to the detector.
- The wire must be held firmly in the slot with 1" pieces of backer rod every 1 to 2 feet. This prevents the wire from floating when the loop sealant is applied.
- Apply the sealant. The sealant selected should have good adhering properties with contraction and expansion characteristics similar to those of the pavement material.

LOOP PERIMETER	NUMBER OF TURNS
10 feet - 13 feet	5
14 feet - 26 feet	4
27 feet - 45 feet	3
46 feet - 100 feet	2
100 feet and up	1



Recommended Loop Wire:

Reno A&E LW-120 for 1/8" slots
Reno A&E LW-116-S for 1/4" slots