

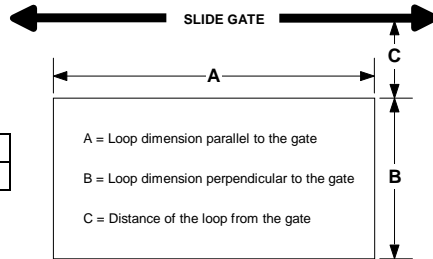
## Loop Installation

The vehicle detection characteristics of the 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

1. The detection height for a loop is 2/3rds the shortest leg (A or B) of the loop. Example: Short leg = 6' then Height = 4'.
2. As leg A is made longer, distance C will need to increase.
3. For reliable detection of small motorcycles, legs A and B should not exceed 6 feet.

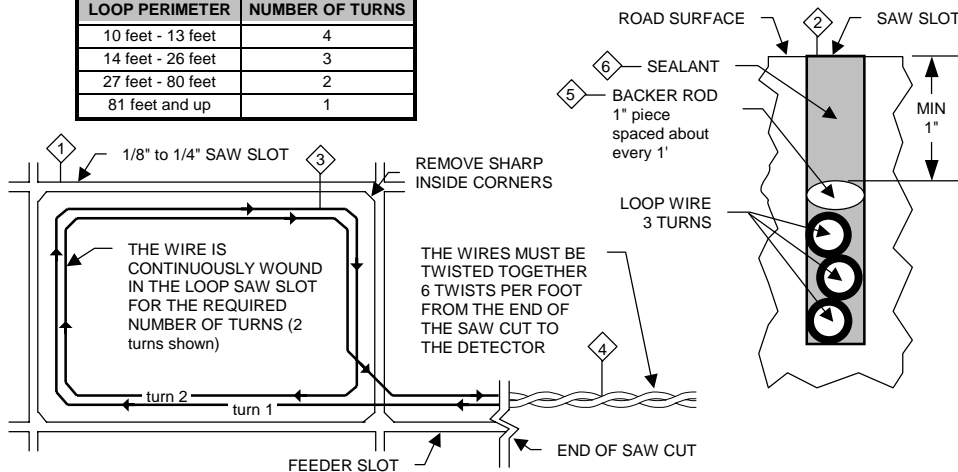
A =	6 ft	9 ft	12 ft	15 ft	18 ft	21 ft
C =	3 ft	4 ft	4.5 ft	5 ft	5.5 ft	6 ft



## Loop Installation - Saw Cut Type

1. Mark the loop layout on the pavement. Remove sharp inside corners that can damage the loop wire insulation.
2. Set the saw to cut to a depth (typically 2" to 2.5") that insures 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.
3. 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.
4. The wire must be twisted together a minimum of 6 twists per foot from the end of the saw slot to the detector.
5. 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.
6. Apply the sealant. The sealant selected should have good adhering properties with similar contraction and expansion characteristics to that of the pavement material.

LOOP PERIMETER	NUMBER OF TURNS
10 feet - 13 feet	4
14 feet - 26 feet	3
27 feet - 80 feet	2
81 feet and up	1



**Recommended Loop Wire:** Reno LW-120 for 1/8" slots  
Reno LW-116-S for 1/4" slots



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**Reno A & E**  
4655 Aircenter Circle  
Reno, NV 89502-5948 USA  
Telephone: (775) 826-2020  
Fax: (775) 826-9191  
Website: www.renoae.com  
E-mail: contact@renoae.com



## OPERATING INSTRUCTIONS FOR

# Model BX Series

## SINGLE CHANNEL LOOP DETECTORS

### I General

*Please verify source voltage before applying power.* The model designations indicate the input power required for each detector as follows:

Model	BX-3	BX-7	BX-8	BX-23	BX-24
Voltage	120VAC	24VAC	240VAC	12VDC	24VDC

Each detector is factory configured for either Fail-Safe or Fail-Secure operation (see unit side label).

	Fail-Safe		Fail-Secure	
Relay	Power Failure	Loop Failure	Power Failure	Loop Failure
A	Call	Call	No Call	No Call
B	No Call	No Call	No Call	No Call

### II Indicators and Controls

Status	PWR Power LED	DET Detect LED	FAIL LED
Off	No power or low power	Output off	Loop OK
On	Normal power to detector	Output on	Open Loop
Flash	N/A	4 Hz - 2 second timing delay	1 Hz - Shorted Loop 3 Hz - Prior Loop Failure

*Note: If the supply voltage drops below 75% of the nominal supply voltage, the power LED will turn off, providing a visual check of low supply voltage. Model BX detectors operate with supply voltage as low as 70% of nominal supply voltage.*

### Sensitivity Level Rotary Switch

The 8-position rotary switch selects one of eight sensitivity levels as shown below. 0 is lowest and 7 is highest, with normal (factory default) being 3. Use the lowest sensitivity setting that detects the desired vehicles.

Position	0	1	2	3	4	5	6	7
$\Delta L/L$	1.28%	0.64%	0.32%	0.16%	0.08%	0.04%	0.02%	0.01%

## Front Panel DIP Switches

Switch	On	Off	Factory Default
1	See Table under Frequency Section		Off
2			Off
3	Normal Presence	Infinite Presence	Off
4	Sensitivity Boost	No Boost	Off
5	2 Second Delay	No Delay	Off
6	Overrides Switches 7 & 8	No Effect	Off
7	Exit Pulse	Entry Pulse	Off
8	Presence Mode	Pulse Mode	Off

## Frequency (DIP switches 1 and 2)

Switch	Low	Medium-Low	Medium-High	High
1	On	Off	On	Off
2	On	On	Off	Off

Loop frequency is controlled by DIP switches 1 and 2 on the front panel. Sometimes where loops are in close proximity, it is necessary to select a different frequency for each loop to avoid loop interference – commonly known as crosstalk. Four frequencies are available as shown in the above table. High is the default frequency.

## Normal Presence/Infinite Presence (DIP switch 3)

Output A is always a presence output. The detector has two presence hold time modes: Limited Presence and True Presence. When set for True Presence (DIP switch 3 OFF), the detector will hold the output Call for as long as the vehicle is present and power is not removed or reset applied. True Presence time applies only for normal size automobiles and trucks and for normal size loops (approximately 12 ft<sup>2</sup> to 120 ft<sup>2</sup>). When set for Limited Presence (DIP switch 3 ON), the detector will typically hold the output Call for about one to three hours when a vehicle is in the detect zone.

## Sensitivity Boost (DIP Switch 4)

DIP switch 4 can be turned ON to increase sensitivity only during the detect period without changing the sensitivity of a vacant loop. When a vehicle enters the loop, the detector then automatically boosts the loop sensitivity but only during the detect condition. As soon as no vehicle is detected, the detector immediately returns to the original sensitivity level. This feature helps prevent dropouts during the passage of high-bed vehicles and is particularly useful in sliding gate situations.

## Output Delay (DIP Switch 5)

A 2 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 output is delayed after a vehicle first enters the loop detection area. If the 2 second Output Delay feature is activated, the output relays will only be turned on after 2 seconds has passed with a vehicle continuously present in the loop detection area. If a vehicle leaves the loop detection area during the 2 second delay interval, detection is aborted and the next vehicle to enter the loop detection area will initiate a new full 2 second delay interval. By flashing the front panel DET LED at 4 Hz with a 50% duty cycle, the detector indicates that a vehicle is being detected but that the output is being delayed.

## Fault Output (DIP switch 6)

When in the ON position relay B will output a “Fault” signal only when a loop fault condition exists. If the loop fault self-corrects, relay B will assume the “No Fault” output state. Selecting ON for this DIP switch overrides settings on DIP switches 7 and 8.

## Entry Pulse/Exit Pulse (DIP switch 7)

In Pulse Mode (with DIP switch 8 set to OFF), the detector can be programmed to output a 250 millisecond pulse only upon vehicle entry over the loop or only upon vehicle exit from the loop. DIP switch 7 has no effect on output A (the presence output).

## Presence/Pulse (DIP Switch 8)

Relay B has 2 modes of operation: Presence and Pulse. When in Pulse mode (DIP switch 8 set to OFF), the 250 ms pulse can be set for entry pulse or exit pulse via DIP switch 7. When in Presence mode (DIP switch 8 set to on), the presence hold time is the same as Output A.

## III Reset

Changing any DIP switch position (except 1 or 2) will reset the detector. After changing the frequency selection switches, the detector will require a reset (a reset will clear the loop fault memory).

## IV Call Memory

When power is removed for 2 seconds or less, the detector automatically “remembers” if a vehicle was present and a Call was in effect. When power is restored, the detector will continue to output a Call until the vehicle leaves the loop (Power loss or dips of 2 seconds or less will not bring a gate arm down onto cars as they wait at the gate).

## V Failed Loop Diagnostics

The FAIL LED indicates whether or not the loop is currently within tolerance. If out of tolerance, the LED indicates whether the loop is shorted (1 Hz flash) or open (steady ON). If and when the loop returns to within tolerance, the FAIL LED will flash 3 flashes once per second to indicate an intermittent loop fault has occurred and corrected. This flash rate will continue until another loop fault occurs, the detector is reset, or the detector loses power.

## VI Pin Connections

Pin	Wire Color	BX-3, BX-7, BX-8, BX-23, BX-24	BX-8-E, BX-8-ES
1	Black	Power (Line)	Power (Line)
2	White	Power (Neutral)	Power (Neutral)
3	Orange	Relay B, Normally Open (N.O.)	Relay B, Normally Open (N.O.)
4	Green	No Connection	Relay B, Common
5	Yellow	Relay A, Common	Relay A, Normally Open (N.O.)
6	Blue	Relay A, Normally Open (N.O.)	Relay A, Common
7	Gray	Loop	Loop
8	Brown	Loop	Loop
9	Red	Relay B, Common	No Connection
10	Black/White	Relay A, Normally Closed (N.C.)	Relay A, Normally Closed (N.C.)
11	Red/White	Relay B, Normally Closed (N.C.)	Relay B, Normally Closed (N.C.)

Notes: Wire colors apply to Reno A&E Model 802-4 wiring harness.

The relay contacts shown above are with power applied, loops connected, and no vehicle present. Relay B (pulse relay) always operates in Fail Secure mode when power fails.

## VII Fuse (Automatic Recovery – BX-7 only)

If 120VAC power is applied to the Model BX-7 (24VAC), the automatic fuse will open. The fuse will automatically reset when power is removed for 3 seconds. Check source voltage before reinstalling.

## VIII Warnings

Separately for each loop, a twisted pair should be created consisting of only two (2) loop wires all the way from the loop to the detector (including through all wiring harnesses) at approximately six (6) full twists per foot. For trouble free operation, it is **highly recommended** that all connections (*including crimped connectors*) be soldered.