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MODEL AX1LDR and AXULDR

SINGLE CHANNEL LOOP DETECTORS

OPERATING INSTRUCTIONS

I General

The model designations indicate the input power required for each detector as follows.

Model AX1LDR requires 120 VAC input power.

Model AXULDR requires 10 to 30 VAC or 10 to 30 VDC input power.

Please verify source voltage before applying power. Application of 120 VAC power to a Model AXULDR will damage the detector.

Both detectors are factory configured for Fail-Secure operation during power outages and Fail-Safe operation during loop failure conditions.

	Power Failure	Loop Failure
Relay Normally Open (N.O.) Contact State	Open (No Detection)	Closed (Detection)
Relay Normally Closed (N.C.) Contact State	Closed (No Detection)	Open (Detection)

II Indicators and Controls

i Power / Detect / Fail LEDs

The detector has one green and two red LED indicators that are used to provide an indication of the detector's power status, output state, and/or loop failure conditions. The table below lists the various indications and their meanings.

Status	POWER LED	DETECT LED	LOOP 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 - Two second timing delay activated	1 Hz - Shorted Loop 3 Hz - Prior Loop Failure

Note: If the supply voltage drops below 75% of the nominal level, the **POWER** LED will turn off, providing a visual indication of low supply voltage. Model AX1LDR and AXULDR detectors will operate with supply voltage as low as 70% of nominal supply voltage.

ii Front Panel DIP Switches

Switch	ON	OFF	Factory Default
1	Frequency		OFF
2	*(See Table under Frequency Section)*		OFF
3	Pulse Mode	Presence Mode	OFF
4	Sensitivity Boost	No Boost	OFF
5	Sensitivity		ON
6	*(See Table under Sensitivity Section)*		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 on the next page.

NOTE: After changing any frequency switch setting(s), the detector must be reset by momentarily changing one of the other switch positions or pressing the front panel* RESET *pushbutton.

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 / Pulse (DIP Switch 3)

The output relay has two modes of operation, Presence and Pulse. When set to operate in Presence mode (DIP switch 3 ***OFF***), an internal DIP switch can be used to select one of two presence hold times; Limited Presence or True Presence™. When set to operate in Pulse mode (DIP switch 3 ***ON***), the internal DIP switch can be used to configure the pulse output to occur when the vehicle enters the loop detection zone (Pulse-on Entry) or when the vehicle leaves the loop detection zone (Pulse-on-Exit). (See the **Presence Hold Time or Output Relay Pulse Mode** section below for details.) The factory default setting is ***OFF*** (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).

Sensitivity (DIP Switches 5 and 6)

DIP switches 5 and 6 select one of the four (4) sensitivity levels as shown in the table below. 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.

Switch	Sensitivity Level (-ΔL/L)			
	0.32% (0)	0.16% (1) *	0.08% (2)	0.02% (3)
5	OFF	ON *	OFF	ON
6	OFF	OFF *	ON	ON

* Factory default setting.

iii PC Board Mounted DIP Switches

Switch	ON	OFF	Factory Default
1	Exit Pulse or Limited Presence	Entry Pulse or True Presence™	OFF
2	Two Second Delay	No Delay	OFF

Presence Hold Time or Output Relay Pulse Mode (DIP Switch 1)

When front panel mounted DIP switch 3 is set to **PRES**, one of two presence hold times can be selected by means of DIP switch 1 on the two-position, PC board mounted DIP switch (labeled **SW2**). Limited Presence and True Presence™ modes both provide a Call output when a vehicle is present in the loop detection zone. When DIP switch 1 is ***ON***, Limited Presence is selected, and the detector will typically hold the Call output for one to three hours. When DIP switch 1 is ***OFF***, True Presence™ mode is selected, and the detector will hold the Call output as long as the vehicle is present in the loop detection zone and power is not removed. True Presence™ time applies only for normal size automobiles and trucks and for normal size loops (approximately 12 ft^2 to 120 ft^2).

When front panel mounted DIP switch 3 is set to **PULSE**, one of two pulse output modes can be selected by means of DIP switch 1 on the two-position, PC board mounted DIP switch (labeled **SW2**). The Pulse-on-Entry setting (DIP switch 1 ***OFF***) causes the output relay to provide a 250 millisecond pulse when a vehicle enters the loop detection zone. The Pulse-on-Exit setting (DIP switch 1 ***ON***) causes the output relay to provide a 250 millisecond pulse when a vehicle exits the loop detection zone.

The factory default setting is ***OFF*** (Pulse-on-Entry / True Presence™).

Output Delay (DIP Switch 2)

A two second delay of the output can be activated by setting DIP switch 2 on the two-position, PC board mounted DIP switch (labeled **SW2**) to the ***ON*** position. Output delay is the time the detector output is delayed after a vehicle first enters the loop detection zone. If the two second Output Delay feature is activated, the output relay 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 output is being delayed, by flashing the front panel **DET** LED at a four Hz rate with a 50% duty cycle.

The factory default setting is ***OFF*** (no Output Delay).

III Reset

Pushing the front panel **RESET** pushbutton or changing any DIP switch position (except 1 or 2) will reset the detector. After changing the frequency selection switches, the detector must be reset.

IV Call Memory

When power is removed for two 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 detection zone (loss of power or power dips of two 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 the loop is out of tolerance, the **FAIL** LED indicates whether the loop is shorted (one Hz flash rate) or open (steady ON). If and when the loop returns to within tolerance, the **FAIL** LED will flash at a three flashes per second rate 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.

VI Pin Connections (Wiring Harness Model 802-4)

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

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

VII Warnings

Separately, for each loop, a twisted pair should be created consisting of only two (2) loop wires running the entire distance from the loop to the detector (including runs through all wiring harnesses) at 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

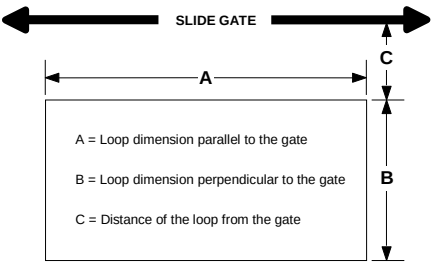
The vehicle detection characteristics of an inductive loop detector are greatly influenced by the loop size and proximity to moving metal objects such as gates. Vehicles such as small motorcycles and high bed trucks can be reliably detected if the proper size loop is selected. If the loop is placed too 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

1. 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 x 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

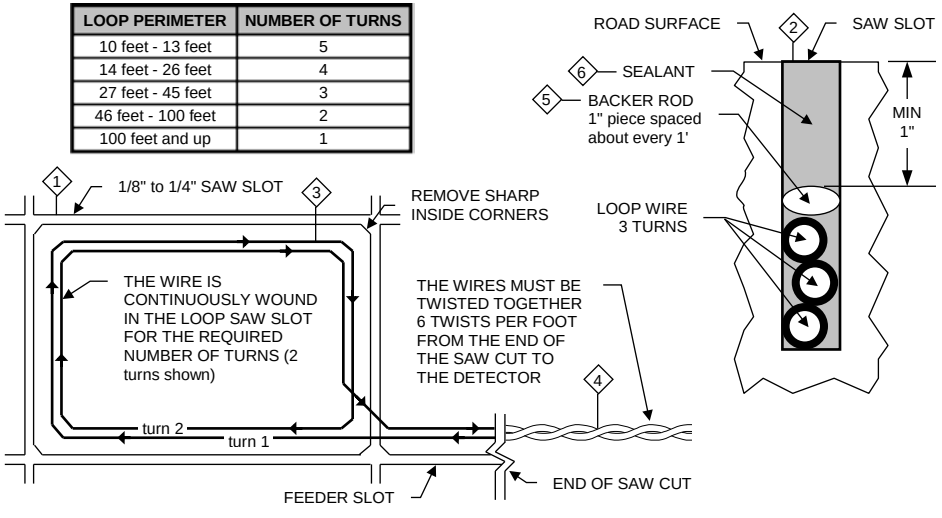
2. As the length of leg A is increased, distance C must also increase.
3. For reliable detection of small motorcycles, legs A and B should not exceed 6 feet.



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 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.
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 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 LW-120 for 1/8" slots
Reno LW-116-S for 1/4" slots