

# LMA-1400 Series "DEFLECTOMETER" Series Operating Instructions

## Single Channel / Dual Output Inductive Loop Vehicle Detector

### 1. Connect to proper source voltage

Verify the source voltage before applying power.

MODELS	12 VDC to 24 VDC or 24 VAC	Relay Outputs	Solid State Outputs	Fail Secure
LMA-1400				
LMA-1400-S				

LMA-1400	Fail Secure Operation	
OUTPUT RELAY	POWER FAILURE	LOOP FAILURE
A	DETECT	DETECT
B	DETECT	See "Output B Mode" Table

LMA-1400-S	Fail Secure Operation	
OUTPUT RELAY	POWER FAILURE	LOOP FAILURE
A	No Output	DETECT
B	No Output	See "Output B Mode" Table

### 2. DEFLECTOMETER™ Indications

STATUS	DEFLECTOMETER
0	No Call
1, 2, 3, 4, 5, 6, 7, 8, 9	Sensitivity Meter (4, 5 & 6 = Optimum Sensitivity Setting for Loop & Lead-in Network)
d	2-Second Delay Timing
E	2, 5 or 10 Second Extension Timing
F	Current "Real Time" Loop Failure

### 3. LED Indications

STATUS	INDICATORS			
	POWER	OUTPUT	LOOP FAULT	DEFLECTOMETER
Normal, No Call	ON	OFF	OFF	0
Normal, Call	ON	ON	OFF	1 thru 9
Output Delay Mode	ON	2 Hz Flash	OFF	d
Output Extension Mode	ON	4 Hz Flash	OFF	E
Current Fault: Open Loop	ON	Single Flash	Single Flash	F
Current Fault: Shorted Loop	ON	Double Flash	Double Flash	F
Current Fault: 25% Inductance Change	ON	Triple Flash	Triple Flash	F
Previous Fault: Open Loop	ON	Normal	Single Flash	Normal
Previous Fault: Shorted Loop	ON	Normal	Double Flash	Normal
Previous Fault: 25% Inductance Change	ON	Normal	Triple Flash	Normal
Low Supply Voltage	Short Flash every 2 seconds	OFF	OFF	OFF

### 4. Setting Sensitivity - Sensitivity Push Buttons (UP & DOWN)

The DEFLECTOMETER™ (7-segment LED) aids in setting the LMA-1400 quickly and easily to the most optimum sensitivity level to ensure the trouble-free detection of all vehicles, including motorcycles and high bed vehicles. For typical vehicles (mid-size vehicle / small pick up) utilizing properly installed roadway loops, a value of 5 displayed on the DEFLECTOMETER™ during the DETECT output period indicates an optimum sensitivity setting. For high profile vehicles (commercial trucks, 4x4s, etc...), a DEFLECTOMETER™ reading of 4 will be optimum. For low profile vehicles (sports cars, etc...), a DEFLECTOMETER™ reading of 6 will be optimum.

#### Adjusting sensitivity using the DEFLECTOMETER™ (recommended):

The DEFLECTOMETER™ should read zero (0) with no vehicle over the roadway loop. When the typical vehicle is completely in the detection zone (OUTPUT indicator On), the sensitivity should be adjusted up or down until the DEFLECTOMETER™ displays the desired optimum value of 5 (or 4 or 6 as described above).

If a typical vehicle located over the roadway loop causes the number "7" to be displayed on the DEFLECTOMETER™, the sensitivity should be decreased two levels. This can be done by pressing the **DOWN** button two times.

If a typical vehicle located over the roadway loop causes the number "2" to be displayed on the DEFLECTOMETER™, the sensitivity should be increased three levels. This can be done by pressing the **UP** button three times.

**NOTE: THE DEFLECTOMETER™ DYNAMICALLY UPDATES AFTER EACH SENSITIVITY LEVEL CHANGE, ALLOWING YOU TO CHANGE SENSITIVITY SETTINGS WHILE A VEHICLE REMAINS IN THE LOOP DETECTION ZONE.**

#### Adjusting sensitivity without using the DEFLECTOMETER™ (manually setting sensitivity):

The LMA-1400 offers 10 levels of sensitivity (0 to 9). Level 9 is the highest sensitivity. Sensitivity can be manually set to any desired level by pressing the **UP** or **DOWN** buttons when a vehicle is NOT over the roadway loop. The first time an **UP** or **DOWN** button is pressed, the current sensitivity level is displayed on the DEFLECTOMETER™ for 5 seconds. If either **UP** or **DOWN** button is pressed again before the 5 second period ends, the sensitivity setting will increase (**UP**) or decrease (**DOWN**). The new sensitivity value will then be displayed on the DEFLECTOMETER™ display for 5 seconds. The factory default Sensitivity setting is level 4.

### 5. DIP Switches

#### Loop Frequency – Ten Position DIP Switch

SWITCH	LOW	MEDIUM – LOW	MEDIUM – HIGH	HIGH	FACTORY DEFAULT
9	ON	OFF	ON	OFF	OFF
10	ON	ON	OFF	OFF	OFF

**Loop Frequency** is controlled by Switch 9 and 10 of the 10-Position DIP switch. On occasion, loops are placed in close proximity and it is necessary to select a different frequency level for each loop to avoid interference (crosstalk). Four frequencies are selectable, HIGH being the factory default.

**Measuring Loop Frequency:** With no vehicle in the detection zone, press RESET and review the two or three digits (in Kilohertz) that quickly flash before the DEFLECTOMETER™ changes back to zero. The most significant digit of the frequency is flashed first in the sequence. This unique feature allows you to read and reliably separate the frequency of each detector loop. The LMA-1400 frequency should be adjusted such that there is a minimum of 5 Kilohertz of separation between all adjacent loops. Loop frequency is also displayed at power-up.

### 6. Additional Features & Benefits

**Reset:** The LMA-1400 can be manually cleared and retuned by pressing the RESET button or by interrupting power. The current loop frequency is displayed immediately after pressing RESET (flashing digits). See "Measuring Loop Frequency" in section 5.

**Output "CALL" Memory:** A power loss of 4 seconds or less will not drop the vehicle CALL Output.

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**Loop Fault Diagnostics:** The LOOP FAULT indicator and 7-Segment DEFLECTOMETER™ indicate if the LMA-1400 is within the specified loop inductance range. The LMA-1400 is able to detect Open Loops, Shorted Loops, or sudden changes in loop inductance exceeding 25% of the nominal inductance. If a Loop Fault is detected, the OUTPUT and LOOP FAULT indicators continuously emit a sequence of flashes (See the "LED Indications" table in section 3). Additionally, the 7-Segment DEFLECTOMETER™ displays the letter "F" indicating a current loop fault condition.

If a fault condition self-heals, the OUTPUT indicators and the 7-Segment DEFLECTOMETER™ will return to normal operation. The LOOP FAULT indicator will continue to flash with the sequence signifying the type of loop fault that was last detected. In the case of the excessive inductance change fault, the unit will return to the new inductance after a period of two seconds and continue operation. Pressing the RESET button will clear the flash sequence from the LOOP FAULT indicator.

**Loop Fault Memory:** Previous loop faults are stored in non-volatile internal memory. If power is interrupted for any length of time, the LMA-1400 will not lose the last loop condition status. After power is restored to the LMA-1400, the yellow LOOP FAULT indicator will automatically indicate the last loop status condition (Open Loop, Shorted Loop, 25% Change In Inductance, or No Loop Problem). See the "LED Indications" table in section 3. Momentarily pressing the RESET button will clear the LOOP FAULT indicator and return the LMA-1400. Should you want to review the last loop condition after the LMA-1400 has been reset, simply PRESS and HOLD the RESET button and after 2 seconds the LOOP FAULT indicator will indicate the last loop fault condition.

**Operating Temperature:** -30°F to 165°F (-34°C to +74°C).

### 7. LMA-1400 Parameter Options – Ten Position DIP Switch

SWITCH	ON	OFF	FACTORY DEFAULT
1	Sensitivity Boost	No Sensitivity Boost	OFF
2	Limited Presence	Infinite Presence	OFF
3	2-Second Delay Timing	No 2-Second Delay Timing	OFF
4	See "Extension Timing" Table Below (Switches 4 & 5)		OFF
5			OFF
6	See "Output B Mode" Table Below (Switches 6 & 7)		OFF
7			OFF
8	Output A No Detect in Fault Mode (fail secure)	Output A Detect in Fault Mode (fail safe)	OFF

#### Extension Timing (Switches 4 & 5)

SWITCH	0 Seconds	2 Seconds	5 Seconds	10 Seconds
4	OFF	ON	OFF	ON
5	OFF	OFF	ON	ON

#### Output B Mode (Switches 6 & 7)

SWITCH	Pulse On Entry	Pulse On Exit	Duplicate Output A	ON During Loop Fault
6	OFF	OFF	ON	ON
7	OFF	ON	OFF	ON

**Sensitivity Boost (DIP 1):** When ON, sensitivity will increase only during the CALL Output period without changing the sensitivity of a vacant loop. When a vehicle enters the loop, the LMA-1400 sensitivity is boosted to a higher level than the vacant loop setting. The boosted sensitivity remains throughout the CALL Output period. When the vehicle leaves the loop, the sensitivity returns to the vacant loop setting. This feature helps prevent dropouts during the passage of high bed vehicles and is exceptionally useful in sliding gate situations.

**Presence Output Modes (DIP 2):** When ON (Limited Presence Mode), the presence CALL Output A hold time is between 5 minutes minimum and 3 hours maximum. Hold time depends on loop geometry; number of wire turns in the loop, vehicle size, and position of the vehicle in the loop zone. When OFF (Infinite Presence Mode), the presence CALL Output A hold time will always be maintained as long as a vehicle is located over the loop zone and power is not removed from the LMA-1400.

**Two Second Output Delay (DIP 3):** When ON, the CALL Outputs A & B will be delayed for a period of 2 seconds after a vehicle has entered the loop zone. If the vehicle does not remain in the loop zone for the full 2 seconds the delay timer will terminate and no CALL Output A or B will be produced.

**Output Extension (DIPS 4 & 5):** Utilizing the settings shown in the "Extension Timing" DIP switch table above, or the label located on the side of the LMA-1400, the Output A can be selected to hold a CALL output for either 2, 5 or 10 seconds after the vehicle has left the loop zone. This feature does not affect Output Pulse modes or Output B.

**Output B Mode (DIPS 6 & 7):** Utilizing the settings shown in the "Output B Mode" DIP switch table above, or the label located on the side of the LMA-1400, four output modes of operation are selectable for Output B. Output A always operates in Presence mode.

In the **Pulse on Entry Mode**, the Output B provides a 250-millisecond pulse when a vehicle enters the loop zone.

In the **Pulse on Exit Mode**, the Output B provides a 250-millisecond pulse when a vehicle exits the loop zone.

In the **Duplicate Output A Mode**, the Output B operates in presence mode and follows the operation of Output A.

In the **ON During Loop Fault Mode**, the Output B is On during a current loop fault condition.

**Output A Mode (DIP 8):** When ON (Fail Secure Mode), the Call Output A is No Detect during a current loop fault condition (continuity exists between Common & Normally Closed on both relays "A" & "B"). NOTE: On the solid state models (-S), Outputs A & B are non-conducting during a loop fault condition.

When OFF (Fail Safe Mode), the Call Output A is DETECT during a current loop fault condition (continuity exists between Common & Normally Open). NOTE: On the solid state models (-S), Output A is conducting during a loop fault condition.

NOTE: On the solid state models (-S), Output A is always No Detect (Fail Secure) for a loss of power.

### 8. Connector Pin Assignments: The connectors utilize a 10 pin Molex. The male connector is P/N 26-48-3105. The female connector is P/N 09-52-3101-P

F-PIN	M-PIN	Model LMA-1400	Model LMA-1400-S
		<b>FUNCTION</b>	<b>FUNCTION</b>
10	1	Relay A, Common	Output A, Emitter (DC Ground)
9	2	Relay A, Normally Closed (fail-safe), SW8=OFF Relay A, Normally Open (fail-secure), SW8=ON	No connection
8	3	Relay A, Normally Open (fail-safe), SW8=OFF Relay A, Normally Closed (fail-secure), SW8=ON	Output A, Normally Open (Conducts on DETECT)
7	4	Relay B, Common	Output B, Emitter (DC Ground)
6	5	Relay B, Normally Open (Closes for DETECT)	Output B, Normally Open (Conducts on DETECT)
5	6	Reset (when connected to DC Ground)	Reset (when connected to DC Ground)
4	7	12 VDC to 24 VDC / 24 VAC (+)	12 VDC to 24 VDC / 24 VAC (+)
3	8	DC Ground / 24 VAC (-)	DC Ground / 24 VAC (-)
2	9	Loop Input	Loop Input
1	10	Loop Input	Loop Input

