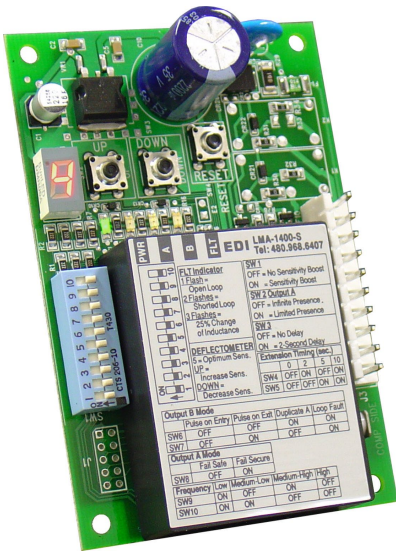


LMA-1400

SERIES



INDUCTIVE LOOP VEHICLE DETECTORS

- UNIVERSAL SINGLE CHANNEL PCB DESIGN
- DUAL PROGRAMMABLE RELAY OR SOLID STATE OUTPUTS

Eberle Design, Inc. (EDI) provides access professionals with reliable, high quality mission critical vehicle detection products that will improve the performance and lifecycle of your access control systems.

EDI's wide range of vehicle detection products help technicians save valuable time and maximize profits by quickly installing, accurately trouble-shooting, and reliably maintaining access control systems with easy to use hi-tech vehicle detectors that provide built-in set-up tools, frequency & sensitivity meters, and non-volatile memory to maintain diagnostic history, all of which are invaluable and always available - Because they're built-in!

ENHANCED FEATURES

Three Connectors Available:

The following model configurations are available:
 Model LMA-1400-M provides a 10-pin male Molex connector
 Model LMA-1400-F provides a 10-pin female Molex connector
 Model LMA-1400-B provides a 10-pin Block Terminal connector

DEFLECTOMETER™:

The 7-segment LED DEFLECTOMETER™ provides visual feedback and assistance for setting the correct sensitivity, reading the frequency of the loop, reporting Loop Faults, and indicating Delay & Extension Timing functions

Sensitivity Meter:

With a typical size vehicle over the roadway loop, the DEFLECTOMETER™ functions as a Sensitivity Meter. The optimum sensitivity setting should provide a reading of "5". You can adjust the DEFLECTOMETER™ reading by using the UP or DOWN sensitivity buttons. Automatic quantitative feedback of the loop system operation ensures that the detector is set to the most optimum sensitivity level to detect ALL vehicles, including motorcycles and high-bed vehicles.

Frequency Meter:

Following power-up or reset, the DEFLECTOMETER™ will indicate a 2 or 3 digit number (quickly flashes) that indicates the loop frequency of the loop & loop network. Keeping your loops separated by at least 5 KHz avoids crosstalk problems and future service calls.

Ten Levels of Sensitivity:

Ten levels of sensitivity (0 to 9) can be easily set using the UP or DOWN push buttons.

Relay or Solid State Output:

Relay outputs are standard. Solid state outputs are can be ordered as an option (add "-S").

Versatile Power Supply Input Range:

LMA-1400 series operates on 12VDC to 24VDC, and 24VAC

Advanced Loop Diagnostics:

The Loop Fault Monitor continually checks the integrity of the loops and will report and store three types of loop faults; Open Loops, Shorted Loops, and 25% sudden changes in inductance.

Loop Fault Memory:

The Loop Fault Memory uses internal Non-Volatile memory to store and display the current and previous loop faults utilizing the "Loop Fault" LED and DEFLECTOMETER™. A power loss or reset will not delete this memory. A MUST FOR TROUBLESHOOTING!

Call Output Memory:

The detector will not drop a Call state if power is lost for a minimum of 4 seconds or less.

"Delayed" & "Extended" Detection:

A 2-second CALL "Delay" time and 2, 5, or 10-second CALL "Extension" time can be provided.

STANDARD FEATURES

- ☑ Automatic Tuning - Lightning & Surge Protection - Four Frequency Levels - Compatible with ALL radio controls & remote openers - Sensitivity Boost - Fail Safe and Fail Secure Configurations - Separate Color-Coded LED indicators - Wide Loop Inductance Range: 20 to 2500 micro Henrys.

EBERLE DESIGN INC.

3510 East Atlanta Avenue Tel (480) 968-6407
 Phoenix, AZ 85040 USA Fax (602) 437-1996
 www.EDITraffic.com



LMA-1400 DEFLECTOMETER™ SERIES INDUCTIVE LOOP VEHICLE DETECTORS

Universal Single Channel PCB Design with Dual Programmable Outputs

SPECIFICATION

Controls: DIP switches and push buttons allow the user to set up operational parameters including frequency & sensitivity.

Reset (Power up): The Detector can be manually reset by pressing the RESET button or interrupting power. Upon power up, the loop frequency is displayed (quickly flashes) on the 7-segment DEFLECTOMETER™. Following power-up, two or three numbers will display (quickly flashing) within two seconds. As an example, you may see a "2" then a "5", indicating 25 kilohertz. The reset button is also used for reviewing previous loop fault conditions stored in the internal memory.

Setting Sensitivity - Sensitivity Push Buttons (UP & DOWN)

The DEFLECTOMETER™ (7-segment LED) aids in setting the DETECTOR 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, 4x4's, 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 DETECTOR 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 be displayed on the DEFLECTOMETER™ display for 5 seconds. The factory default Sensitivity setting is level 4.

Sensitivity Boost (DIP Switch #1): When ON, sensitivity will increase only during the DETECT output period without changing the sensitivity of a vacant loop. When a vehicle enters the loop, the Detector sensitivity is boosted to a higher level than the vacant loop setting. The boosted sensitivity remains throughout the DETECT 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.

Output Presence Modes (DIP Switch #2): Two modes of Presence operation are selectable: Limited Presence or Infinite Presence. When ON (Limited Presence Mode), the presence DETECT output 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 relative to the loop zone. When OFF (Infinite Presence Mode), the presence DETECT output hold time will always be maintained as long as a vehicle is located over the loop zone and power is not removed from the Detector.

2-Second Output Delay (DIP Switch #3): When ON, the DETECT output will be delayed for a period of 2 seconds after a vehicle has entered the detection zone. The DEFLECTOMETER™ will display the letter "d" during the delay period. If the vehicle does not remain in the loop zone for the full 2 seconds the delay will terminate and no DETECT output will be produced.

2, 5, or 10-Second Output Extension (DIP Switch #4 & #5): One of three Extend times, or OFF may be selected for either presence modes. The DETECT output is held for the selected time after the vehicle has left the zone of detection. The DEFLECTOMETER™ will display the letter "E" during the Extend period. This feature does not affect Pulse mode.

Switch 4	Switch 5	Function
OFF	OFF	0 seconds Extend time.
ON	OFF	2 seconds Extend time.
OFF	ON	5 seconds Extend time.
ON	ON	10 seconds Extend time.

Output "B" Relay Modes (DIP Switch #6 & #7): Four modes of operation are selectable from DIP switches 6 & 7: Presence, Pulse on Entry, Pulse on Exit, or Fault.

Switch 6	Switch 7	Function
OFF	OFF	250 millisecond pulse on vehicle entry.
OFF	ON	250 millisecond pulse on vehicle exit.
ON	OFF	Duplicates operation of Output "A".
ON	ON	Output is ON during loop fault condition.

Output "A" Mode (DIP Switch #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.

Loop Frequency (DIP Switch #9 & #10): One of four settings (normally in the range of 13 to 150 kilohertz) may be selected to alleviate interference which may occur when loops connected to different detectors are located adjacent to one another. To help eliminate crosstalk problems, the loop frequency is displayed on the DEFLECTOMETER™ following power-up or Reset. The display will indicate a two or three digit number (quickly flashing) that indicates the loop frequency. As an example you may see a "2" followed by a "5", indicating 25 kilohertz. This feature is a great tool for separating frequencies of adjacent loops to avoid crosstalk. Detectors on adjacent loops should all be separated by at least 5 kilohertz.

Loop Fault Monitoring: The Detector continuously checks the integrity of the loop. The system is able to detect shorted or open circuit loops, or sudden changes in inductance exceeding 25% of the

nominal inductance. If a fault is detected, the OUTPUT and FLT indicators continuously emit a sequence of flashes. Additionally, the 7-Segment DEFLECTOMETER™ displays the letter "F" indicating a current loop fault. Each type of fault is identified by a different flash sequence:

Flash Sequence	Fault
1 flash	Open Circuit Loop.
2 flashes	Shorted Circuit Loop.
3 flashes	25% excessive change in inductance.

If the Open or Shorted fault condition self heals, the DETECT Output indicator and 7-Segment DEFLECTOMETER™ will return to normal operation. The FLT indicator will continue to flash with the sequence signifying the type of 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. The fault condition will be indicated by the flash sequence of the FLT indicator. Pressing the "Reset" button will reset the Detector and clear the flash sequence from the FLT indicator. To review the last loop fault condition, simply press and hold the "Reset" button for 2 seconds. See "Loop Fault Memory" below.

Power Status Indicators (Green LED): Solid ON indicates normal power status during detector operation. The POWER indicator will flash every 2 seconds during low input voltage (Brown out) conditions, indicating insufficient input voltage. In addition to the POWER indicator, the seven (7) segment DEFLECTOMETER™ display will be illuminated during normal detector operation.

Output "A" & "B" Detect Output Status Indicator (Red LED's):

- Vehicle Detection = Steady ON
- 2-Second Delay = Flashes at a 2 Hz rate
- 2, 5, or 10 Seconds of Extension Time = Flashes at a 4 Hz rate (Presence modes only).

Fault Status Indicator (Yellow LED): While a current fault is being detected, the red OUTPUT and the yellow FLT indicator continuously emit a sequence of flashes together. When only the yellow FLT indicator continuously emits a sequence of flashes, a fault has occurred and the Detector had self corrected. Each type of fault is identified by a different flash sequence.

Loop Fault Memory: Previous loop faults are stored in non-volatile (internal) memory. If power is interrupted, for any length of time, the Detector will not lose the last loop condition status, which is valuable information for troubleshooting purposes. When power is restored to the Detector, the yellow FLT indicator will automatically display the last loop fault status condition (open loop, shorted loop, 25% change in inductance or no loop problem occurred). Momentarily pressing the front panel Reset button will reset the loop fault memory and the Detector. To review the last loop fault condition, simply press and hold the reset button for 2 seconds. See "Loop Fault Monitoring".

DETECT Output Memory: A power loss of 4 seconds or less from nominal input voltage will not lose the DETECT state. If power is removed for 4 seconds or less and then restored, the Detector will automatically restore the DETECT state present before the power loss.

Loop Inductance (Tuning) Range: 20 to 2500 micro-Henry with a Q factor greater than 5.

Self Tuning: The Detector will automatically tune to any loop and lead-in combination within the tuning range upon application of power.

Environmental Tracking: The Detector automatically and continuously compensates for component drift and environmental effects throughout the tuning range and across the entire temperature range.

Loop Input (Lightning Protection): The loop input incorporates lightning and transient protection devices and the loop oscillator circuitry is transformer-isolated. The lightning protection will withstand the discharge of a 10 uF capacitor charged to 2,000V across the loop inputs or between either loop input and earth ground. The transformer isolation allows operation with a loop which is grounded at a single point.

Grounded Loop Operation: The Detector will operate when connected to poor quality loops including those that have a short to ground at a single point.

Input / Output Circuitry Isolation: The loop inputs are isolated by means of the internal loop isolation transformer. The outputs are isolated by means of the output relay.

Lead-in Length: The Detector will operate with lead-in (feeder) lengths up to 5,000 feet with appropriate loops and proper lead-in cable.

Output Relay Rating(s): Contacts are rated 5A, 250 VAC, 30 VDC.

Environmental:

- Operating Temperature Range: -34°C to +74°C (-30°F to 165°F)
- Humidity Range: 0 to 95% relative.

Mechanical:

- Dimensions: 4.14" (10.52 cm.) long x 2.71" (6.88 cm.) wide x 0.75" (1.91 cm.) tall
- Weight: 10 oz.

Power Supply: 10 to 32 VDC or 14 to 28 VAC, 85 mA maximum

Connector(s): LMA-1400-M(S) Models: 10 pin Male (M) Molex
LMA-1400-F(S) Models: 10 pin Female (F) Molex
LMA-1400-B(S) Models: 10 pin Terminal Block (B) Type

Pin Assignment (Connections):

Model LMA-1400		
F-PIN	M-PIN	FUNCTION
10	1	Relay A, Common
9	2	Relay A, Normally Closed (fail-safe), SW8-OFF Relay A, Normally Open (fail-secure), SW8-ON
8	3	Relay A, Normally Open (fail-safe), SW8-OFF Relay A, Normally Closed (fail-secure), SW8-ON
7	4	Relay B, Common
6	5	Relay B, Normally Open (Closes for DETECT)
5	6	Reset (when connected to DC Ground)
4	7	12 VDC to 24 VDC / 24 VAC (+)
3	8	DC Ground / 24 VAC (-)
2	9	Loop Input
1	10	Loop Input

Model LMA-1400-S		
F-PIN	M-PIN	FUNCTION
10	1	Output A, Emitter (DC Ground)
9	2	No connection
8	3	Output A, Normally Open (Conducts on DETECT)
7	4	Output B, Emitter (DC Ground)
6	5	Output B, Normally Open (Conducts on DETECT)
5	6	Reset (when connected to DC Ground)
4	7	12 VDC to 24 VDC / 24 VAC (+)
3	8	DC Ground / 24 VAC (-)
2	9	Loop Input
1	10	Loop Input

Default Settings:

- Sensitivity Level 4
- Output "A" Relay Infinite Presence
- Output "B" Relay Pulse on Entry
- Sensitivity Boost OFF
- 2-Second DETECT Delay OFF
- 2, 5, or 10-Second DETECT Extend OFF