

Vehicle Detector Board Setup Instructions

Eberle Design, Inc. Model LMA-1800

Author	Derek Mitzel
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Approver	Ken Neeld

Overview

The LMA-1800 is a single channel vehicle detector used in Delphi’s TIU-2000 timer interface unit as part Delphi’s Insight Track® drive thru timing system. The LMA-1800 is connected to in-ground loops placed in the drive thru lane to detect vehicles at multiple service points including but not limited to Menu, Payment and Pickup windows. This document describes the setup and calibrating procedure for the LMA-1800 to provide the optimal sensitivity for maximizing detection accuracy across a wide range of vehicle types.



LMA-1800 Vehicle Detector



TIU-2000 Timer Interface Unit

Setup and Calibration Procedure

1. Apply power to the TIU2000. Verify that the 7 segment display on the LMA-1800 shows 2 flashing numbers, with a pause between. These 2 numbers are the approximate frequency of the oscillating signal on the loop, in kilohertz. For instance, you may see a “4” and then a “2”, this means the approximate frequency on the loop is 42 kilohertz. After a few seconds, the display will revert to the loop detection level as described below. To recall the loop frequency numbers, press and release the button labeled “RESET” on the front of the LMA-1800 which is the furthest switch to the bottom, and the frequency numbers will appear again.

NOTE: The frequency should be somewhere between 30 kilohertz and 70 kilohertz, if it is not, contact Delphi Display Systems – Customer Care Center for assistance per the contact information at the end of this document.

2. After the frequency display, the LMA-1800 display will then show a number, which represents the detection strength. This may vary if there is a vehicle near the loop. If there is not a vehicle near the loop, the display should show a “0”.
3. To calibrate the sensitivity, have an average height vehicle stop over the loop. This should NOT be a lowered vehicle or a lifted vehicle but should be an “average” height vehicle.
4. Verify that the number on the display is “5”. If this number is other than a “5”, use the “UP” or “DOWN” switches to adjust the displayed number to “5”.

NOTE: Once the LMA-1800 has been calibrated for an average height vehicle, lower vehicles will show a higher number and lifted vehicles will show a lower number, this is normal.

ALSO NOTE: The sensitivity setting of the vehicle detector board can be viewed by pressing either the “UP” or “DOWN” switch once while the loop is not occupied. The setting will be displayed for 5 seconds.

Technical Support

For technical assistance, please contact:

Delphi Display Systems, Inc.

3550 Hyland Avenue

Costa Mesa, CA 92626

In the US : 1-800-456-0060

1. Select menu Option 1 for technical support

2. Select Option 2 for timer support

International : +1-714-825-3400

Email: techsupport@delphidisplay.com

Supplemental Information



LMA-1800 Series

SINGLE CHANNEL VEHICLE DETECTOR

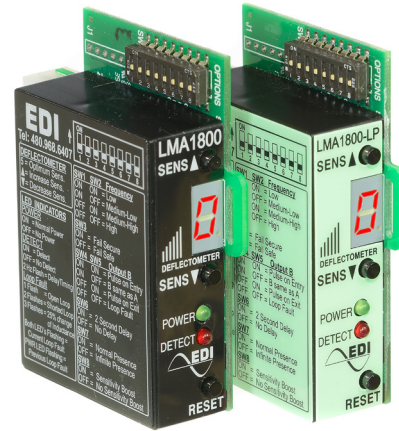
Reliable, high quality vehicle detector that will improve the performance and lifecycle of your access control system.

FEATURES

- Automatic Tuning
- Lightning & Surge Protection
- 4 Frequency Levels
- Compatible with ALL radio controls & remotes
- Sensitivity Boost
- Fail Safe & Fail Secure Configurations
- Separate Color-Coded LED indicators
- Wide Loop Inductance Range

HIGHLIGHTS

- DEFLECTOMETER®
- Sensitivity & Frequency Meters
- 10 Levels of Sensitivity
- Covers ALL Low Voltages
- Advanced Loop Diagnostics
- Loop Fault Memory
- Call Output Memory
- 2 Second Delayed Detection
- Power consumption in No Detect state < 8 miliamps (LMA-1800-LP)



DEFLECTOMETER®: The front panel 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 vehicle over the roadway loop, the DEFLECTOMETER® functions as a Sensitivity Meter. Automatic quantitative feedback of the loop system operation ensures 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 the loop frequency of the loop & loop network. Keeping your loops separated by at least 5 KHz avoids crosstalk problems and future service calls.

Advanced Loop Diagnostics: The Loop Fault Monitor continually checks the integrity of the loops and will report and store 3 types of loop faults; Open Loops, Shorted Loops, and 25% sudden changes in inductance.

Controls: PCB mounted DIP switch (8 position) and front panel push buttons allow the user to set up operational parameters including frequency & sensitivity. All switch settings, excluding the frequency switch settings, dynamically update immediately when changed. The front panel "RESET" push button is provided for resetting the detector and for reviewing previous loop fault conditions stored in the internal memory.

Reset (Power up): The detector can be manually reset by pressing the front panel RESET button or interrupting power. Upon power up, the loop frequency is displayed (quickly flashes) on the 7- segment LED. (i.e. apply power and two or three numbers will display (quickly flashes) within two seconds. As an example, you may see a "2" then a "5", indicating 25 kilohertz. This feature is a great tool for separating frequencies of adjacent loops to avoid crosstalk. Typically you DO NOT want to two detectors/loops to be within 5 kilohertz of each other.

Setting Sensitivity - Front Panel Sensitivity Push Buttons: The DEFLECTOMETER® (front panel 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®: 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 front panel SENS↓ 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 front panel SENS↑ 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.

Manually Adjusting 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 front panel SENS buttons (↑ or ↓) when a vehicle is NOT over the roadway loop. The first time a SENS button (↑ or ↓) is pressed, the current sensitivity level is displayed on the DEFLECTOMETER® for 5 seconds. If either SENS button (↑ or ↓) is pressed again before the 5 second period ends, the sensitivity setting will increase (SENS↑) or decrease (SENS↓). The new sensitivity value will be displayed on the DEFLECTOMETER® display for 5 seconds. The factory default Sensitivity setting is level 4.

Loop Frequency (2 Position DIP Switch - DIP 1 & 2): One Four frequencies, normally in the range of 13 to 150 kHz are DIP switch selectable. To help eliminate crosstalk problems, the loop frequency is displayed on the front panel DEFLECTOMETER. Following power-up or Reset, the display will indicate a two or three digit number (quickly flashing mode) that indicates the loop frequency. As an example, you may see a "2" followed by a "5", indicating 25 kHz. This feature is a great tool for separating frequencies of adjacent loops to avoid crosstalk. Typically you want two detectors (loops) to be separated by at least 5 kHz.

Fail Safe / Fail Secure Operation (8 Position DIP Switch - DIP 3): When operating in the Fail Safe mode Output A will assume the "DETECT" output state during a loop fault condition. When in the Fail Secure mode Output A will not respond to loop failures.

Output Relay "B" Modes (8 Position DIP Switch - DIP 4 & 5): Two : Four modes of operation are selectable from DIP switches 4 & 5; Presence, Pulse on Entry, Pulse on Exit, or Fault.

Switch 4	Switch 5	Function
OFF	OFF	Output is ON during loop fault condition

Switch 4	Switch 5	Function
OFF	ON	250 msec pulse on vehicle exit
ON	OFF	Duplicates operation of Output "A"
ON	ON	250 msec pulse on vehicle entry

2-Second Output Delay (8 Position DIP Switch - DIP 6): This feature may be turned ON, via the 8 position DIP Switch, so outputs A & B will be delayed for a period of 2 seconds after a vehicle has entered the detection zone. Note, 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.

Output Relay "A" Modes (8 Position DIP Switch - DIP 7): Two modes of Presence operation are selectable; Infinite Presence or Normal Presence. When OFF (Infinite Presence Mode), a presence OUTPUT will always be maintained as long as a vehicle is present and power is not removed for more than approximately 3 seconds. When ON (Normal Presence Mode), the 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.

Sensitivity Boost (8 Position DIP Switch - DIP 8): This feature may be turned ON from the 8 Position DIP Switch to increase sensitivity only during the DETECT output period. 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 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 particularly useful in sliding gate situations.

Power / Loop Fault Status Indicator (Green LED): Indicates power status during normal detector operation. In addition to indicating power status, while a "Real-Time" fault is being detected, the RED OUTPUT LED and the GREEN POWER LED continuously emit a sequence of flashes together. When only the GREEN LED continuously emits a sequence of flashes, a fault had occurred and the detector had self corrected. Each type of fault is identified by a different flash sequence. See "Loop Fault Monitoring" and "Loop Fault Memory". Note: The POWER LED also flashes every 2 seconds during "Brown out" conditions, indicating insufficient line power.

Output "A" Status Indicator (Red LED): Vehicle Detection = Steady ON. Loop Fault Conditions (See Loop Fault Monitoring). 2-Second Delay = Flashes at a 2 Hz rate.

Output "B" Status Indicator: There is no status indicator for Output "B".

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 DETECT and POWER LEDs continuously emit a sequence of flashes. Additionally, the 7-Segment DEFLECTOMETER displays the code "F1", "F2", or "F3" indicating a current loop fault. Each type of fault is identified by a different flash sequence:

Flash Sequence	Fault	Display
1 Flash	Open Circuit Loop	F 1

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Flash Sequence	Fault	Display
2 Flashes	Shorted Circuit Loop	F 2
3 Flashes	25% excessive change in inductance	F 3

If the Open or Shorted fault condition self heals, the Output LED's and 7-Segment DEFLECTOMETER will return to normal operation. The POWER LED 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 retune 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 POWER LED. Pressing the "Reset" button will reset the detector and clear the flash sequence from the POWER LED (Note: After pressing reset, the frequency will be displayed on the DEFLECTOMETER). Should you want to review the last loop fault condition, simply press and hold the "Reset" button for 2 seconds. See "Loop Fault Memory".

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 GREEN POWER / FAULT LED will automatically indicate the last loop status condition (open loop, shorted loop, 25% excessive change in inductance or no loop problem occurred). Momentarily pressing the front panel Reset button will reset the loop fault memory and the detector. However, should you want to review the last loop condition, simply press and hold the reset button for 2 seconds. See "Loop Fault Monitoring".

CALL Output Memory: A power loss of 3 seconds or less will not drop the CALL (DETECT) Output. Basically when power is removed for 3 seconds or less, then restored, the detector will automatically remember if a vehicle is present over the roadway loop.

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

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

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.

Internal Circuitry Isolation: All internal electronic circuitry is isolated from the loop by means of the loop isolation transformer.

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 Rating(s): Open Collector Transistor referenced to DC Common. Max current rating 100 mAmps. Max voltage 30 VDC.

Construction: Printed circuit boards are double sided 1oz. copper with plated through holes. Circuit boards are conformally coated for environmental protection.

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

Mechanical: Dimensions = 2.30" (5.84 cm) high x 2.75" (6.98 cm) wide x 0.80" (2.03 cm) thick. Weight: 1.50 oz (42 g).

Power Supply:

- LMA-1800: 10 to 30 VDC or 14 to 26 VAC, 50 mA max
- LMA-1800-LP: 10 to 30 VDC or 14 to 26 VAC, 8 mA max in No Call state, 9 mA max in Call state

Connector: Rear mount 10 pin male female Molex type 09-48-1104. Mates with other male PCB 0.156" pitch headers used by many gate, parking and access control devices.

Pin Assignment (Connections):

Pin	Function
1	Loop Input
2	Loop Input
3	Power (+10 to 30 VDC or 26 VAC)
4	No Connection
5	No Connection
6	Output B
7	Output B Inverted
8	Output A (Presence Output)
9	Power (+10 to 30 VDC or 26 VAC)
10	DC Common

NOTE: Power applied on either pin 3 or 9, or both.

Default Settings:

- Sensitivity = Level 4
- Output "A" Relay = Infinite Presence
- Output "B" Relay = Fail Output
- Sensitivity Boost = OFF
- 2-Second DETECT Delay = OFF
- Configuration = Fail Safe

Model Options:

Model	Power	Application
LMA-1800	50mA max	Normal
LMA-1800-LP	9mA max	Solar/Battery Powered

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