

Vehicle Detection (loops) – Deviant Vehicle (Vehicles traveling excessively fast or slow, vehicle traveling in the wrong direction of Travel)

General Description



Excel Technology Group has developed a range of loop based vehicle detectors which provide traffic lane monitoring of specific or user configured vehicle behaviour. The Vehicle Detector can be configured to identify vehicles travelling excessively fast, vehicles travelling too slow and vehicles travelling in the wrong direction. These circuit modules and associated functions are available integrated into a single chassis or as standalone modules.

The devices include additional functions to reduce erroneous reporting. Reporting of a vehicle travelling the wrong direction is filtered by setting additional thresholds related to average speed, loop occupancy and headway i.e., low average speed low headway and high occupancy would indicate queued traffic and therefore it is unlikely that a vehicle will be travelling the wrong way. Vehicle speed detection while triggered from a user threshold is compared to average speed and a 'rolling' speed log.



LEDs are used on all models to indicate power status, operational status, tuning function, loop actuation, loop failure and serial data channel activity. The 2 channel detector has a selector switch for selecting hi-low sensitivity while 8 and 16 channel cards have a range of sensitivity from 3-99. All cards have a manual retune push button while the 8 and 16 channel cards have an additional software reset command function.

Applications

- Contra-flow or Reversible traffic lane monitoring for vehicle travelling wrongway
- Freeway Ramp monitoring vehicle travelling wrong way
- Hazardous road conditions – hazardous sign display and driver advisory signs
- Activating driver advisory signs "Travelling too fast for road conditions" etc
- Simple Traffic survey counting of driver behaviour
- Automated barrier and gate control



Output States

Contact closure is a 'dry' contact closure i.e., no voltage solid state switch of 60V 500millamps capability.

Serial Data 'simple actuation' message:

The serial port configuration is 19200,N,8,1.

The OUTPUT provides a message of the threshold condition upon actuation of a specific channel. The output message state will change accordingly with actuation on channel 1 indicated by #10# and actuation on channel 2 indicated by #01#.

Deviant Vehicle detectors are available in the following configurations

These devices are available as standalone vehicle detection modules with integrated power supply or in an OEM card only configuration.

- 2 Channel Card W 150mms x D 150mms Weight 0.25kgs
- 2 Channel Module size W 225mms x D 165mms x H 45mms Weight 3kgs
- 8 Channel card size W 270mms x D 250mms Weight 0.4kgs
- 8 Channel module size W 300mms x D 280mms x 100mms Weight 4kgs
- 16 Channel card format W 320mms x D 250mms Weight 0.5kgs



General Detector Specification

- Self tuning in the range of 50 to 800 microHenries within 1 second of power up.
- The detector resonates between 40kHz and 150kHz.
- Operate with loops of the specified inductance range and Q of ≥ 3 at typical resonant frequency.
- The circuitry detects a vehicle in less than 50 milliseconds of a departing vehicle (recovery time).
- Standard 2ms scan period with linear interpolation yield of typically 1ms resolution.
- High Speed Scanning for Incident Detection - 250MICRO seconds scan period per channel – providing an accuracy resolution of less than 1kilometre / hour.
- For a sensitivity setting of $(\text{change in L})/L \geq 0.04\%$ the threshold is +/- 5%.
- For a sensitivity setting of $(\text{change in L})/L \leq 0.04\%$ the threshold is +/- 10%.
- Detection trigger actuation (Minimum) Change in inductance of 0.02% for a period of 10 milliseconds
- Detection trigger actuation (Maximum) Change in inductance of 10% for a period of 50ms
- Automatic drift compensation; Temperature change 15dC/hr between -10 and +50@90humidity
- Crosstalk immunity is maximised on 16 channel scanning however recognised loop positioning and feeder allocation improves performance on multiple 8 channel cards
- Failure Mode; open circuit / short circuit loop and low resistance output when power is removed
- Hold time is user configurable (typically 10 minutes) and open/short circuit loop detection occurs within 0.5 of a second
- Vehicle detection – serial output or contact closure: The vehicle passage data is transmitted serially within 5 ms of the trailing edge of the vehicle detection.
- Two levels of lightening protection loop Interface and Circuit Card Transorb.

General Electrical Specification

Serial Ports

The standard serial ports are RS232C electrical signal level compatible. An RS422 Galvanic Isolated and / or Ethernet (TCP/IP) interface is available as an option.

Trigger Configuration

The deviant vehicle detector is configured by the user with trigger parameters through a menu option on the detector card. The user responds to simple questions related to the trigger condition and when the detector is returned to normal mode the the trigger condition is active.

Digital I/O (Contact closure) and Loop Interface

OUTPUT Devices: PVAZ172 MOSFET Photovoltaic Relay 60volt 500 milliamp S/capability
INPUT Devices: PC844 Opto-isolator 5000V rms Isolation, Input 20milliamps @ 1.2volts
LOOP Interface: Transorb and Line isolation transformers 1:1 Typical 100 millihenries

Connector Specification

DB Series Current rating 1 Amp, Contact Resistance 20Mohmsmax@DC100mA.
DIN41612 Current rating 2Amp, Contact Resistance 30Mohmmx @ DC100mA.
Mate-enlock Current rating 3amp per pin, Contact Resistance 30Mohmmx @DC100mA.
PCB Modular Terminal 'Phoenix style' 10Amp Rated Voltage 300VAC
IDC Style Connectors Withstanding Voltage 500v RMS for 1 minute, 0.5amp Current rating

Environmental, Power Supply and Physical Specification

Circuitry implemented on all cards is rated to 65°C operation with a relative humidity of 90%. Circuit cards are conformal coated and will operate within ISO and Australian Standard Guidelines for Traffic Control Devices. The CONFORMAL coating material used to protect the circuit cards is labelled SCC3 CC from Electrolube and is sprayed onto the circuit cards in accordance with the manufacturers recommendations and required OH&S practices. The conformal coating material has a dielectric strength of 90KV/mm and an operational temperature range of -70°C to +200°C and is self extinguishing when exposed to a flame. All standalone modules have provision for 240VAC, 110VAC or 12VDC Battery Solar operation.
2 Ch. - Current consumption 180milliamps @12VDC 8 Ch. Current consumption 290milliamps @ 12VDC
16 Ch.- Current consumption 460milliamps @12VDC Typical P.S. consumption 50-100milliamps @12VDC
* Some degree of variation in current consumption will occur due to operational state and P.S. operation

MTBF

Statistical MTBF individual component extrapolation (MIL-STD-217-E)
* Using chi-squared test, we can state with 90% confidence: > 180,000hrs
Field History – based on installations and period: 1.3 site failures per year