

Lantern Alignment Monitor (Australian Patent # 678406)



The Lantern Alignment Monitor or LAM 'learns' the position and facing direction of an installed traffic signal lantern (Azimuth). This data is stored in an embedded non-volatile memory in the LAM microprocessor. Thereafter, if the lantern's azimuth deviates more than 22 degrees from the calibrated or learnt position, the lantern may be switched to safety flash yellow or extinguished completely according to road authority requirements.

Lanterns are swung from their installed position due to high winds, physical force from a vehicle passing too close, or premeditated vandalism. The resultant effect of viewing a green light not intended for them has caused motorists to be involved in serious automobile accidents at intersections installed for driver safety. Although traffic controllers monitor last lamp out failure, a situation where a lantern has been swung to the opposing traffic signal phase will incur varying degrees of risk dependent on the direction, other lamp activity and possible lamp failure in the relevant traffic phase or opposing phase. A motorist facing an intersection approach where a clear red lamp is displayed and a clear green lamp is displayed finds this ambiguous and will generally move through the intersection. Sometimes the motorist does not even see the red signal and proceeds on the basis of the visible green. Numerous court cases have resulted from driver perception and interpretation of ambiguous traffic signal states. The Lantern Alignment Monitor decreases this risk and protects the driving public through reducing potential ambiguous signal interpretations.



The Lantern Alignment Monitor is one of a number of initiatives undertaken by Excel Technology Group in their quest to establish acceptance of an intelligent traffic signal lantern. These initiatives include utilising long life low energy consumption LED technology, Lantern Alignment Monitoring and data network control of lanterns including cableless internalised lantern aspect switching. Excel Technology Group has developed and provided this technology for specific traffic applications since the mid 1990s.

Features

- The traffic signal lantern 'learns' its azimuth when the installer secures the lantern in its correct position relative to approaching traffic and presses the learn button, thereafter correct alignment
- The traffic signal lantern may re-learn its azimuth at any time
- The traffic signal lantern may be preset to execute safety flash yellow or extinguish all aspects when a change of position is detected
- The traffic signal lantern upon extinguishing all aspects in the lantern incorrectly aligned, effectively presents a 'lamp failure' to the lamp monitoring function in the traffic controller. The traffic controller will decide if the intersection can operate safely by evaluating the operational state of other lanterns in the specific traffic signal phase
- Simple and easy to retro-fit into existing traffic signal lanterns

Pictorial Traffic Signal Lantern reproductions by courtesy of ATS and TTI.





General Specification

Physical

- Weight: < 0.28 Kg
- Encapsulated module 85 mm x 55 mm x 30mm
- Operational temperature: 65°C 90% humidity
- Circuit card size: 60 mm x 40 mm x 25 mm (height)
- Circuit cards are conformal coated and will operate within Australian Standard Guidelines for Traffic Control Devices as per TSC/3 and TSC/4
- The conformal coating material has a dielectric strength of 90 KV/mm and an operational temperature range of -70°C to 200°C and is self extinguishing when exposed to a flame

Power Supply

- Current consumption: > 100 milliamps
- Operational voltage: The circuit card utilises the 240 volt AC switched lamp active from each aspect
- The circuit 'floats' on the 240 volt AC signal

Connector Specification

- Easy to connect through PCB Modular Terminal 'Phoenix style' connectors, 10 amp rated voltage 300 volt AC

Digital I/O and general electronics

- Output devices
- PVAZ172 MOSFET Photovoltaic Relay 60 volt 500 milliamp capability
- Inputs are optically typically isolated by PC844 Opto-isolator 5000 volt RMS isolation devices, input 20 milliamps at 1.2volts
- The operation of the circuit is provided by IC1 – Microprocessor PIC 16C84
- Lamp Isolation Relay: Contacts 6A/250 volt AC (max contact voltage 400 volt)

Simple to Install

- Connect a feeder cable to each signal aspect within the lantern (power source)
- The Neutral connection of each aspect must be wired together and 'broken' by the LAM order for the LAM to switch off all aspects simultaneously
- An optional SAFETY FLASH yellow module is available

Fault Operation

- If the LAM is uncalibrated or has not deviated from learnt position then the power to the lamps is uninterrupted
- The LAM stores the 'learnt' azimuth in an internal microprocessor controlled eeprom. Thereafter if the lantern's azimuth deviates more than +/- 22 degrees from the learnt position, then the power to the lamps will be removed within 45 seconds
- If the LAM has determined that there is a fault, then the lantern should be rectified
- Upon completion of this work the LAM can be reset by one of the following actions
 - Recalibrate the LAM or
 - Power off the LAM for 30 seconds and power up again (Note the LAM will remember the calibration in the EEPROM and will again cut power if the lantern has not been fixed)