

California Department of Transportation



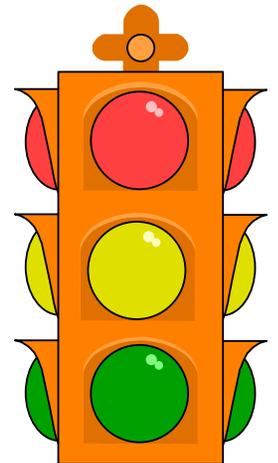
SENSOR SHARING PROJECT

Presented at NATMEC 2002 by

Robert Triplett

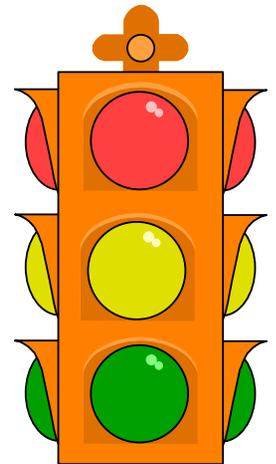
and

Joseph Avis



We will present the following:

- How the Traffic Volume program shares existing ramp meter and signalized intersection loop detectors to collect traffic counts
- The three types of isolation currently in use at Caltrans-
 - Blocking Diodes
 - Model 242 Isolation Assembly
 - Detector Isolation Assembly



Typical Ramp Meter and Intersection Control



Typical Traffic Controller Cabinet

- California uses 170 Model Controller
- Signal Cabinets are 332 and 334 Models





Why Share Sensors?

- Economic- eliminates the building of a data collection site, the infrastructure of loops, cabinet and power already exist
- Safety- many conventional highways are unsafe for hose placements
- At the time our Traffic Management Centers were not archiving data for planning purposes.
- More count sites to provide data beyond the needs of the Traffic Volumes Program.



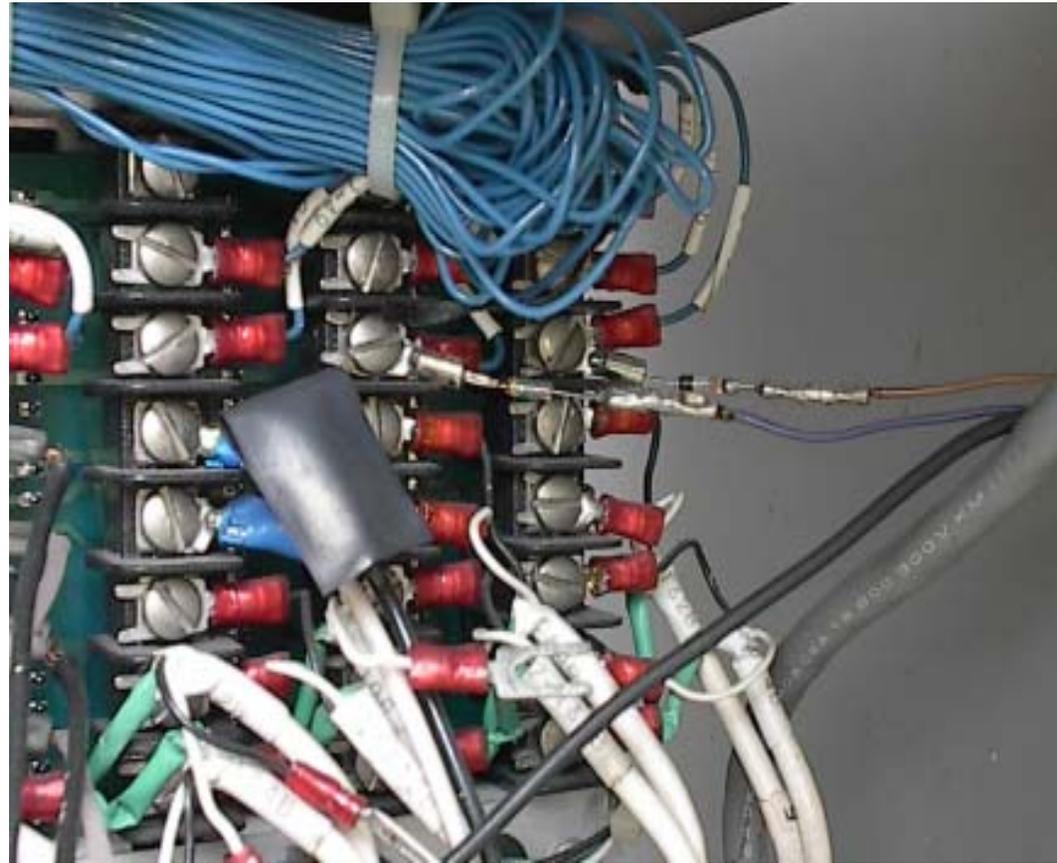
Requirements

- The ATR will need a contact closure card.
- Output capability from the detector amplifier
- Buy in from the owners of the detection infrastructure

Blocking Diodes



- This variation uses a simple blocking diode to provide isolation between the ATR equipment and the traffic controller.
- Protects the controller. from ATR feedback.



Model 242 Isolation Assembly



- Model 242 is installed in a unused slot in the input file.
- Model 242 isolates the ATR equipment from the controller.
- Model 242 contains optical diodes.



Signal Cabinet with Model 242



← **ATR**

← **Traffic Controller**

← **Model 242 Isolator**

Model 242 Front and Back





Disadvantages of Diodes and 242

- Blocking diodes
 - labor intensive to install
 - potential for breaking is high
 - Signal maintenance technicians expressed concern on the reliability of this isolation
- 242 Isolator
 - limited to 2 lanes per unit
 - limited number of slots available in our controller cabinets. On most freeway applications only 2 to 3 slots are available.



- Caltrans management directed the Traffic Operations Electrical Engineering and Traffic Data staff to develop a device that can provide safe and total isolation between an ATR and signal controller for multiple lane applications.



Requirements

- To expand this sensor sharing program
 - Caltrans Electrical Engineers developed a standard device “**Detector Isolation Assembly**” that will be accepted statewide.



Isolation Objectives

- The DIA will be transparent to the controller unit and detector sensing unit.
- The DIA will be designed so that it will not be possible for the ATR equipment to affect the signal to the controller unit.

The DIA



- The DIA has 30 independent channels.
- Each channel is optically isolated from each output channel for full protection.
- The DIA operates by “sensing” the electronic switch closure produced by the detector amplifier and passes the signal through the isolation circuitry to the ATR.

DIA Front





The DIA has two connectors:

One for input- connects the output of the detector to the DIA input

One for output- connects the DIA output to the ATR



Ramp Meter with DIA



ATR

DIA

**Traffic
Controller**

**Detector
File**

Ramp Meter with DIA

Rear View



ATR

DIA

Traffic Controller

Ramp Meter with DIA Rear View

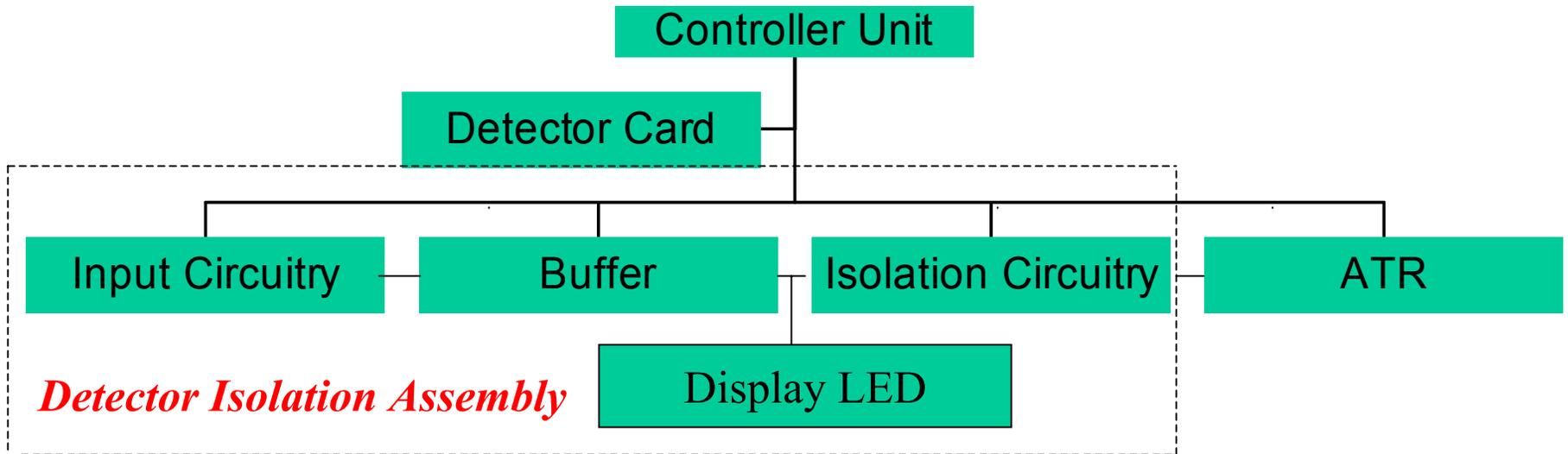


- DIA Harness connected to rear of Detector File





Block Diagram of DIA



Conclusion

- The DIA is Caltrans preferred Isolation
 - Easier to install and maintain
 - Multi Lane capability
 - Acceptance by Signal Maintenance

Where do we go now

- New and rebuilt intersections to include departure loops
- Data Archiving from traffic controllers through the Caltrans Freeway Performance Monitoring System (PEMS). A joint Caltrans and University of California project.

Visit with us at the Poster Session

Wednesday, May 15

9:30am-10:30am