Caltrans Laser Detector

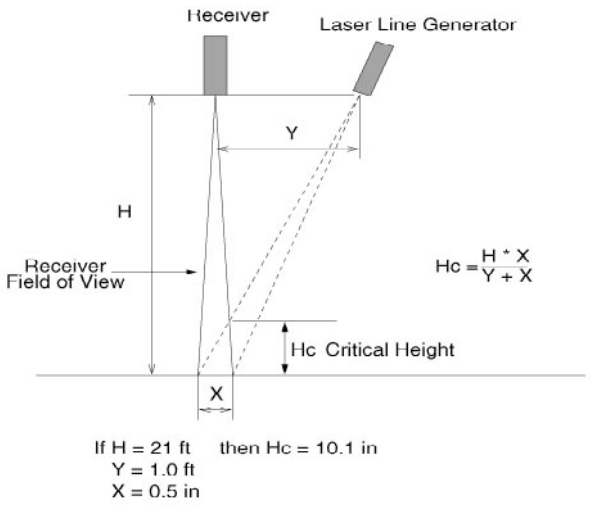
Results

Caltrans and UC Davis have developed, patented, and are now commercializing a new type of traffic detector. It is deployed out-of-pavement, avoiding the safety and maintenance issues of in-pavement sensors; and is also much more accurate than any other traffic detector. This sensor not only generates the speed, volume, and occupancy data conventionally used within Caltrans, but is so accurate that it can also re-identify individual vehicles, generating Travel Time, Incident Detection, and Origin/Destination information for the next generation of ITS applications. An innovative mounting system has also been developed so that the detector can be easily deployed and/or maintained by a single field worker from the ground safely without using a bucket lift truck or closing off a lane.

What is it?

This Traffic Detector is based on a patented new principle

This sensor is quite different from the loop detectors, magnetometers, and Radar units which current generate most of the traffic information Caltrans uses. It is also quite different from existing "Lidar" based laser detectors, which measure the time of flight of light to determine if a vehicle is there or not.



This sensor just shines a laser beam on the road, and when there is no reflection, then it knows a vehicle is present. Each IR laser pulse lasts only a few nanoseconds and is considerably less bright than sunlight, so is invisible to all but the most sensitive instrumentation. Two lasers about a foot apart generate the speed, acceleration, and top-down length profile of every vehicle. The laser beam stretches across the full roadway width, so each vehicle profile "signature" is consistent independent of the vehicle's position in the lane, and is (almost) unique. It is this nonintrusive "re-identification" capability that makes the detector so valuable for ITS applications, and the reason why it is being brought to market by the commercial sector. The figure to the left shows the basic principle as it appeared in the original patent application, that is now identified as US Patent # 6,404,506 owned exclusively by the State of California.

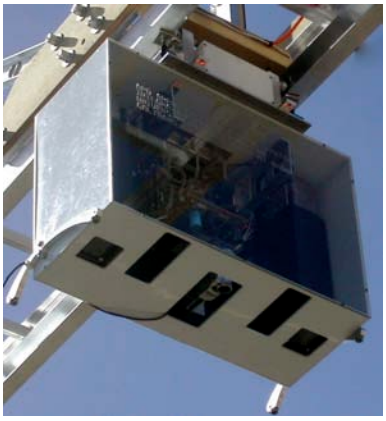
Contact Joe Palen at 916 654 8420 or japalen@dcn.org for more information

Innovative Mounting System makes both Installation and Maintenance quick and easy

DETECTOR BEING RAISED BY WINCH

The installation or maintenance of overhead detectors currently requires a full crew with a bucket lift truck and a crash attenuator vehicle. A lane closure also may be necessary as individual tools or fasteners can fall on traffic.

The new Mounting System developed in conjunction with UC Davis allows this or any other detector to be mounted or dismounted above freeways from ground level safely by single person at the side of the road with no special tools. This system uses an innovative winch and trolly mechanism to get the detector up and over to the required spot. It just requires 2 "C" channels to be attached to the over-crossing or overhead sign truss, and the entire mounting system just clamps on to these "C" channels.

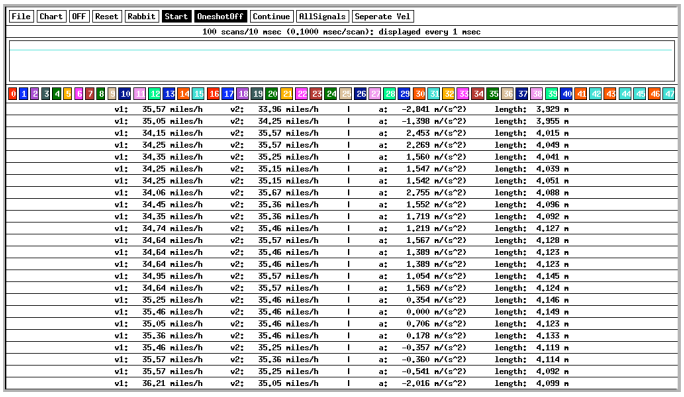


DETECTOR BEING MOVED BY TROLLY ON OVERHEAD TRUSS

Why Develop a New Traffic Detector?

According to Caltrans' Performance Monitoring System, PeMS, a very high percentage of the existing deployed loop and Radar detectors are not generating usable data. Both the Divisions of Maintenance and Operations have recurrently called for the development of out-of-pavement sensors.

Although Radar detectors are relatively easy to instal at the side of the road, they can be difficult to calibrate, and have proven to not be very accurate. Acoustic and video image processing systems (VIPS) have been evaluated but also lack 24/7 accuracy.



PRECISE VEHICLE LENGTH PROFILE IS GENERATED, ALLOWING DOWNSTREAM RE-IDENTIFICATION

Caltrans customers want to know not just the travel time along the freeway right now, but also want to know what it will be by the time they get there. A new bread of look-ahead predictive traffic models have been developed to provide this, but these models cannot make accurate predictions without accurate information on how each vehicle's Origin/Destination pairs interact. This detector not only provides precise speed, volume, and occupancy data; but can generate Travel Time, Incident Detection, and Origin/Destination data from the entire fleet anonymously (without collecting personal information from license plates, cell phones, or ETC tags).

Research Results

As the result of this research, negotiations are currently underway to license this unit for manufacture. Rather than paying a contractor to build this for us, we are being paid for the rights to build it. We are filing new US and international patents which will add "color" determination, should allow the unit to run off solar power without any hardwired infrastructure, detect pollution, and make other enhancements.

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