Executive Summary Report

Development of a Traffic Counter Bench Tester with 8-Lane Testing Capability

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Problem

ODOT utilizes Automated Traffic Recorder (ATR) devices to collect highway traffic vehicle count and class data. The data is used to support funding proposals and highway maintenance decisions. The Federal Highway Administration (FHWA) requires each state to test their highway traffic data collection equipment (Ref: 23 CFR Parts 500.203 & 500.204). Further, the regulation states that only equipment passing the test procedures may be used for the collection of data for projects funded by FHWA.

ODOT tests their ATRs with an automated bench-top tester, the ATRT-1700 model tester, produced by Athens Technical Specialists, Inc. (ATSI). This automated tester saves time and money, reduces the potential for human error, and eliminates the roadway hazards to the field personnel involved in manual testing of ATRs. However, the ATRT-1700 lacks the capability for testing an ATR equipped to count 8 lanes of traffic in a single session. The ATRT-1700 has 8 piezo and 8 loop outputs, which limits the testing of ATR units to 4 lanes at one time when using the loop-piezo-loop sensor array design. ODOT installations of up to 8 lanes of loop-piezo-loop installations are now common. A new tester built to test the 8-lane ATR in one session will preserve the safety of ODOT field crews, save time, and reduce documentation issues for the Office of Technical Services.
Objectives

The objective of this research project is to design a bench top tester for testing ATRs that are equipped to count/classify 8 lanes of traffic with a loop-piezo-loop sensor arrangement.

The new tester will be designated as model ATRT-1716 and will be similar in operation to the ATRT-1700 model which ODOT has used successfully for many years.

Description

Research was conducted on the previous ATRT-1700 design, in order to identify any of the electronic circuits that would be transferable to the new tester. It was determined that some of the critical parts in the ATRT-1700 were no longer available, and the microcontroller did not have the resources necessary to expand the operation to eight lanes of loop-piezo-loop sensors.

New electronic circuitry was designed using a more modern microcontroller. Also a Universal Serial Bus (USB) communication interface was added to the tester to make it compatible with the communication ports of modern Windows based computers.

Once a completed tester was assembled, firmware development was begun. The firmware code is programmed into the Flash memory of the tester's microcontroller. The firmware controls USB communication with the computer and all of the simulated sensor outputs (loops, piezos, road tubes).

In parallel with the firmware development, software development was begun. A Windows based computer controls the tester with software that sends commands via the USB communication interface. The foundation for this software was the ATSI ATRT-1700 interface software. The software for the new tester is very similar to the ATRT-1700 software with the addition of 8 lane loop-piezo-loop capability and USB connectivity.

Conclusions & Recommendations

The new tester design was completed. The tester enclosure is a standard 19" rack mount type. This will allow it to be mounted in a standard Electronic Industries Alliance (EIA) 19" rack mount test equipment cabinet or in commonly available 19" rack mount ruggedized transport cases.

The tester can connect to any ATR using screw terminals located on the front.

Also supplied with the tester is the computer interface software. The software operates on a Windows based computer and controls all of the tester operations. The software is compatible with Windows XP, Windows Vista, and Windows 7.

Implementation Potential

Upon receipt of the new ATRT-1716 tester, ODOT should incorporate its use into the existing ATR testing program that is now in place. The time and overhead savings will begin to accrue immediately. Since the operation of the new tester will be deliberately kept very similar to the existing tester, it is anticipated that a single brief training session will be required to familiarize the ODOT technicians with the new equipment. If this is not the case, ATSI will readily assist, as described earlier, to answer any questions and demonstrate the system operation as needed.