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Overview of the ATRT-1700 Automated Traffic Recorder Tester
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INTRODUCTION

The ATRT-1700 Automated Traffic Recorder Tester (**1700**) is designed to provide a sequence of test inputs to an Automated Traffic Recorder (ATR). The **1700** simulates an actual set of field inputs that the ATR might be subject to in an actual field installation. The tester provides an accurate record of the census of vehicles that were simulated to the inputs of the ATR, and this record is compared to the report created by the ATR to determine the accuracy of the ATR under test. The term "ATR" is used to describe a piece of equipment which may also be known as a Traffic Counter, Counter/Classifier, Traffic Data Recorders, or Traffic Monitoring Device. For brevity, the term ATR will be used throughout this document.

The ATR is used extensively to gather highway usage data for allocation of highway maintenance resources. Like a census-taker, the ATR reports count and classification data for vehicular traffic passing the installation location. The aggregated data base of these usage factors over the years allows various types of analysis, such as a statewide snapshot of highway usage at any point in time, or longitudinal usage profiles over a selected span of years for any specified region or roadway. The results, in turn, are used in allocating resources for maintenance to highways throughout the state.

The **1700** generates "signatures" of vehicles by creating a pattern of outputs which appear to the ATR under test just as a vehicle would in a field installation. The signatures are designed to simulate various vehicles passing over a set of roadway sensors as defined by the operator during the test setup. The **1700** software includes a set of vehicle signature files (signatures) that correspond to the 13 vehicle types established in FHWA Scheme F. In addition, the user may design their own vehicle signatures with up to 20 axles and any practical axle spacing. The user may select any combination from the set of standard and custom signatures during test setup.

The signatures are modified by the spacing and layout of the sensor array specified by the user during test setup. Fourteen sensor layouts are available for one, two, or three sensors per lane. Up to 8 separate lanes can be simulated simultaeously, depending on the sensor array specified. The **1700** has 4 Road Tube, 8 Piezo, 8 Inductive Loop, and 8 Contact Closure outputs.

The signatures are further modified by the simulated speed of the vehicle. During setup the user can specify up to 16 speed bins that the signatures will recorded in. The tester will output the signatures at speeds that fit into these pre-defined ranges so that the ATR report will match the **1700** report.

The **1700** is driven by a Personal Computer (PC) using the Microsoft Windows 95 Operating System. The PC serves as the operator interface, data storage system, and runs the control program. The setup of the **1700** is greatly simplified by the use of a logical sequence of option selection menus and screens, which eliminates the need to memorize software commands. The operator defines the test setup (speed bins, lanes, intervals, etc.), specifies the spacing and layout of the sensor array to be used by the tester, and fills in the test report header using the PC keyboard. The computer creates the signature timing and directs the output to the sensor simulators (in the tester) per the setup.

The operator must then configure the ATR in harmony with the tester setup to properly categorize the signatures sent by the **1700** to the ATR. The specified **1700** sensor outputs are then connected to the ATR inputs, and the testing is started from the PC keyboard.

The test session stops after the time established by the operator during setup has elapsed. This could be as little as 4 minutes up to as much as 4 days, or practically any amount of time in between, based on the purpose of the testing and the needs of the user. When the test is complete, the record of the volume, speeds, and classifications of signatures sent to the ATR are automatically stored on a disk file in the PC driving the **1700**.

The operator then retrieves the record of vehicles counted by the ATR (using the same PC if desired) and stores this file also. The two files may now be compared to determine the accuracy of the ATR which was tested, manually or automatically. Automatic file comparison is available via optional AutoComparison software modules. Manual comparison is performed by the operator.

Highway usage statistics are vitally important for reclaiming Federal tax monies for maintenance and improvement projects. ATR's are the primary instrument used to collect the basic data for these purposes. It is evident that the costs to an agency of inaccurate traffic data could be significant. This is especially true because when an ATR fails, it is most often recording fewer vehicles than are present, which could result in a lesser justification than is actually appropriate. An effective method of verifying the accuracy of these traffic recorders is now available with the **1700**, developed by ATSI.

ROADWAY SENSOR SIMULATORS

The loop simulator inductance is similar to a field installation of 3 turns of wire in a 6' x 6' rectangular loop with AWG 14 wire. The inductance is for the loop turns alone is 74 micro Henries. An additional 30 to 150 micro Henries comes from a typical lead-in cable. For the typical ATR, the standard loop detectors can tune into the loop in the range of 50 to 350 micro

Henries. Based upon the above described loop used in ATR installations and the typical loop detector's inductance range, a simulated loop with a base inductance 125 micro- Henries was selected for use in the **1700**.

The road tube simulator was designed and built to generate controlled air pressure transients to simulate the pressure wave produced by the vehicle passing over a road tube. A rubber hose is used to deliver the air pressure transient to the air switch input of the ATR.

In addition to the road tube, and inductive loop, two other axle sensor inputs are commonly used: piezo-electric and tape switch sensors. Tester outputs to simulate these sensor types were designed and implemented. The tape switch and piezo simulations consist of step changes in resistance and/or voltage levels matched in time duration and magnitude to the roadway sensor outputs observed in the field trials.

SPECIFICATIONS

Enclosure:	Suitcase-type, rugged ABS, 7in. X 14in. X 21in.
Power Requirement:	120 VAC
Weight:	16 lbs. (Without PC)
Outputs:	4 Road Tube 8 Piezo 8 Inductive Loop 8 Contact Closure
Computer Requirement:	Pentium 100/16 MB RAM/Win95/10 MB Free Disk Space Minimum 1 free DB9 serial port
Cable connectors:	Phoenix Contact 2 spare mating connectors supplied for end user Custom cables to be quoted upon request
Warranty:	12 months from date of shipment to customer