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16. Abstract  Spectra Research has developed a non-intrusive lane monitoring sensor which can be used to measure and classify vehicular traffic over multiple lane roadways. This sensor employs a dual beam laser radar (LADAR) that accurately measures location and passage of vehicle tires to determine axle count, velocity, volume, and classification over multiple lanes. The non-intrusive nature permits portable or permanent set-up on the road shoulder without creating costly traffic disruptions, construction, maintenance, or hazardous situations to highway personnel.					
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# Non-Intrusive Traffic Monitoring System (NTMS)

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Spectra Research, Inc. (S\*R) of Dayton, Ohio has developed a family of low-cost, non-intrusive, lane monitoring systems to measure and classify vehicular traffic over multiple lane roadways (*patent pending*). These systems employ a dual-beam laser radar that accurately measures location and passage of vehicle tires to determine axle count, velocity, volume, and classification over multiple lanes. The non-intrusive nature permits portable or permanent set-up on the road shoulder without creating costly traffic disruptions, construction, maintenance, or hazardous situations to highway personnel. Several models that facilitate data storage, remote monitoring, and GPS tagging are scheduled for initial delivery in 2000.

## • FEATURES

- Non-intrusive
- Rapid setup
- Autonomous operation
- Accurate measurements
- Portable
- Rugged

## • BACKGROUND

Spectra Research, Inc. has performed extensive research and development in this area under multiple contracts with the U.S. Air Force. The Ohio Department of Transportation (ODOT) has also sponsored further investigation to determine if errors are introduced due to occlusion of vehicle tires in the outer lanes.

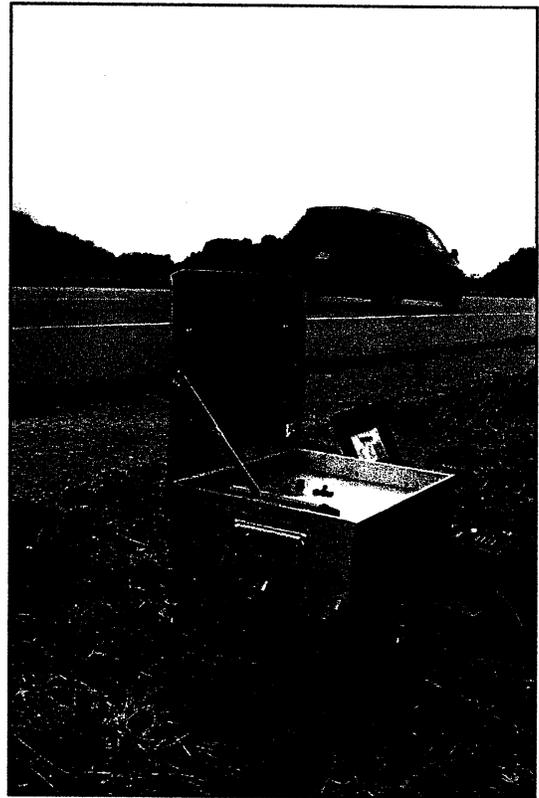
S\*R has also been awarded design contracts with the Ohio Department of Transportation and the Federal Highway Administration to further develop this technology. Safety to technicians and motorists is the primary consideration for these efforts. These programs result in a fully functional NTMS that can be easily integrated into the Intelligent Transportation System (ITS) network.

## • PAYOFF

The remote traffic monitoring system is installed safely on the side of the road without disturbing traffic. This system can also collect data and monitor traffic at remote locations, as well as provide for growth to meet advanced requirements for both the Federal Highway Administration and state DOTs.

## • EXISTING SYSTEMS

Current traffic monitoring systems consist of inductive loops, piezo switches and road tube sensors to monitor traffic flow. These systems are installed to collect and record traffic count, classify vehicle type, and gather speed data. Installations are both permanent and portable. When major road repairs are made at a permanent installation site, the monitoring sensors must also be replaced at additional costs. There is an expressed need for a non-intrusive traffic monitoring system that is safe to install. The key requirements include the capability to (1) classify by lane the vehicle type, (2) monitor 1-4 lanes of traffic simultaneously, and (3) accurately measure vehicle velocity. Additional requirements include packaging each system as a self-contained portable unit that can be set-up in less than 30 minutes, operate autonomously, and exhibit the capability to communicate electronically from remote sites.



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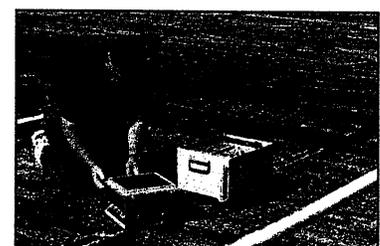
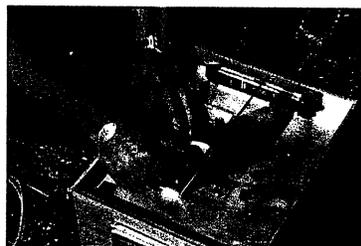
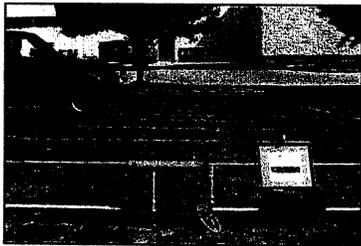
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- **NTMS PERFORMANCE**

Current designs utilize dual-beam laser tripwires, resident processing algorithms, a self-contained power supply with solar augmentation, a user programmable control interface, and an interface port for use with existing recorder units. The NTMS units meet the following performance specifications:

Parameter	Requirement
Sensor Location	Off-road, non-intrusive to traffic (10-15')
Setup Time	< 30 minutes
Interface	Commercial recorders, I/O interface port
Vehicle Classification	14 classes, Scheme F, recorder specific
Lane Coverage	Multiple 1 to 4
Power	Solar augmented battery
Mobility	Portable, self-contained
Operation	24 hours autonomous w/augmentation
Safety	No hazard to technicians, eye-safe

*The S\*R Non-Intrusive Traffic Monitoring System (NTMS) represents a major achievement in traffic engineering through portability, high accuracy, easy setup, and reduced hazards to motorists and highway traffic engineering personnel.*



- **SPECTRA RESEARCH EXPERTISE**

S\*R expertise in the field of optics and electromagnetics originated in 1991 with the development of a laser identification systems. This technology was transitioned into application for traffic monitoring in 1994 through a Phase I Small Business Technology Transfer (STTR) contract with the U.S. Air Force. A successful demonstration of a breadboard traffic monitoring device was successfully conducted in October 1995. Subsequent product design enhancements were demonstrated to the Federal Highway Administration (FHWA) in September 1998.

- **PARTNERING OPPORTUNITIES**

Spectra Research, Inc. is actively seeking partnerships with companies, government agencies, universities, and individuals with interest in producing the S\*R NTMS technology. For further information, please visit our website at [www.spectra-research.com](http://www.spectra-research.com) or contact:

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