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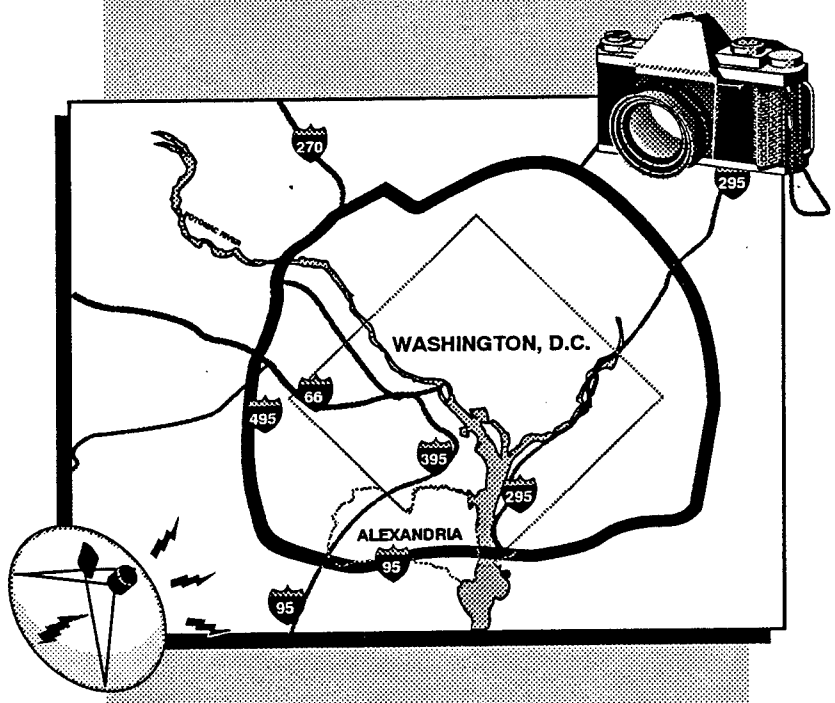
EXECUTIVE SUMMARY

A STUDY OF THE FEASIBILITY OF USING PHOTO-RADAR FOR TRAFFIC SPEED ENFORCEMENT IN VIRGINIA



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Abstract

Because of increasing difficulties in enforcing posted speed limits on the Capital Beltway around Washington, D.C., local officials proposed that experiments be conducted with photo-radar to determine if that method of automated speed enforcement (widely used in Europe for about 30 years and very recently employed in the western United States) could help reduce average speed and speed variance.

A project task force led by the Virginia Department of State Police, with assistance from the Maryland Department of State Police and the Virginia and Maryland Departments of Transportation, and with technical assistance from the Virginia Transportation Research Council, conducted site visits to cities in Europe and the United States where photo-radar is being used. The task force also invited six manufacturers of photo-radar equipment to staff and demonstrate their equipment. Five of the manufacturers conducted a 2-week series of tests on sections of interstate highways with varying volumes of traffic and different traffic characteristics. The tests, which were conducted from June through September 1990, were designed to provide the evaluators with data on the accuracy, reliability, and efficiency of each unit (in terms of the number of speeding cases that could potentially be generated by the use of photo-radar on the Beltway) and help the study team determine if photo-radar could be successfully deployed on the Capital Beltway as an enforcement tool. In addition, the project included an analysis of legal and constitutional issues associated with photo-radar use as well as an evaluation of public sentiment concerning photo-radar use on the Capital Beltway. The evaluators concluded that photo-radar use was feasible on high-speed, high-volume roads such as the Capital Beltway and, therefore, recommended efforts to pass state enabling statutes and test further the efficacy of photo-radar in actual traffic enforcement conditions.

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(The opinions, findings, and conclusions expressed in this report are those of the authors and not necessarily those of the sponsoring agencies.)

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Virginia Transportation Research Council
(A Cooperative Organization Sponsored Jointly by the Virginia Department of Transportation and the University of Virginia)

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The authors extend their most sincere thanks to Ms. Linda Evans whose editorial revisions transformed our rather turgid prose into the more readable document that appears here. Our purpose was to produce a brief and lucid report on our photo-radar work that might be read by busy policy makers, and, if that happens, it will be because of Linda's talent at providing clear and straightforward narrative. We hereby express our genuine admiration and sincere appreciation for her efforts.

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INTRODUCTION

Speeding on high-speed, high-volume highways continues to be a serious problem in the United States. The expansion of roadways to up to eight lanes in response to increasing traffic has reduced and sometimes eliminated the shoulder area traditionally used for roadside ticketing of speeders. The size and capacity of these roadways add to the problem. This is especially true for the Capital Beltway (I-495) around Washington, D.C., where more than 60% of the drivers exceed the speed limit.

Because of increased speeds and the resulting increase in incidents on the Capital Beltway, the Departments of State Police and Transportation in Maryland and Virginia, in cooperation with the Federal Highway Administration and the National Highway Traffic Safety Administration, instituted a feasibility study of the use of photo-radar for speed enforcement. This study was conducted by the Virginia Transportation Research Council (VTRC) for the Virginia Department of State Police and culminated in a report entitled "Automated Speed Enforcement Pilot Project for the Capital Beltway: Feasibility of Photo-Radar," from which this summary is drawn. (Those desiring a more detailed discussion of the issues presented in this document should refer to that report, available from the VTRC.)

This summary considers the following seven questions:

1. What is photo-radar?
2. How was the feasibility study conducted?
3. Will the use of photo-radar be upheld by the courts?

4. Has photo-radar been used successfully in other places?

5. Can photo-radar be used successfully on the Capital Beltway?

6. Will the public support the use of photo-radar?

7. What can be concluded and recommended about the use of photo-radar in Virginia?

WHAT IS PHOTO-RADAR?

Photo-radar equipment combines a camera and electronic controls with a radar unit that detects speeding vehicles. The various configurations in which photo-radar may be operated are shown in Figure 1. It can be operated in a stationary mode mounted on a tripod, in a cabinet, on a pole on the side of the roadway, on an overhead structure, or in the back of a motor vehicle. Some types of photo-radar can be operated in a mobile mode—installed in the dashboard area of a vehicle to take pictures of speeding vehicles as they approach or pass. Once the unit's radar detects a speeding vehicle, the unit's camera photographs the vehicle. If deployed to photograph oncoming traffic (see Figure 2), the camera photographs the driver's face and front license plate. If deployed to photograph receding traffic, the camera photographs the rear license plate. At least one manufacturer's unit can photograph in both the oncoming and receding modes through use of an additional camera, which is activated by the flash unit of the primary camera.

The radar used in photo-radar equipment operates on the same principle as the radar used by police in everyday speed enforcement. This principle, called the Doppler effect, is the apparent change in the frequency of a soundwave resulting from the change in the distance between the "listener" and a moving object. The radar unit sends out soundwaves of a given frequency that bounce off the moving vehicle and are received by the radar unit. By measuring the change in frequency over a given time period, the distance traveled is measured and the speed of the vehicle is calculated.

After the license number of the speeding vehicle is determined from the photograph, a citation is sent to the registered owner of the vehicle. If the owner was not the driver, the owner may avoid liability for the ticket by identifying the driver.

Traffic Monitoring Technologies (TMT), located near Houston, Texas, is the only manufacturer of photo-radar equipment in the United States. TMT equipment is currently being used in Pasadena, California, and Paradise Valley, Arizona. The other five principal manufacturers are located in Western Europe and Scandinavia, where photo-radar equipment has been in use for more than 30 years, and in Australia.

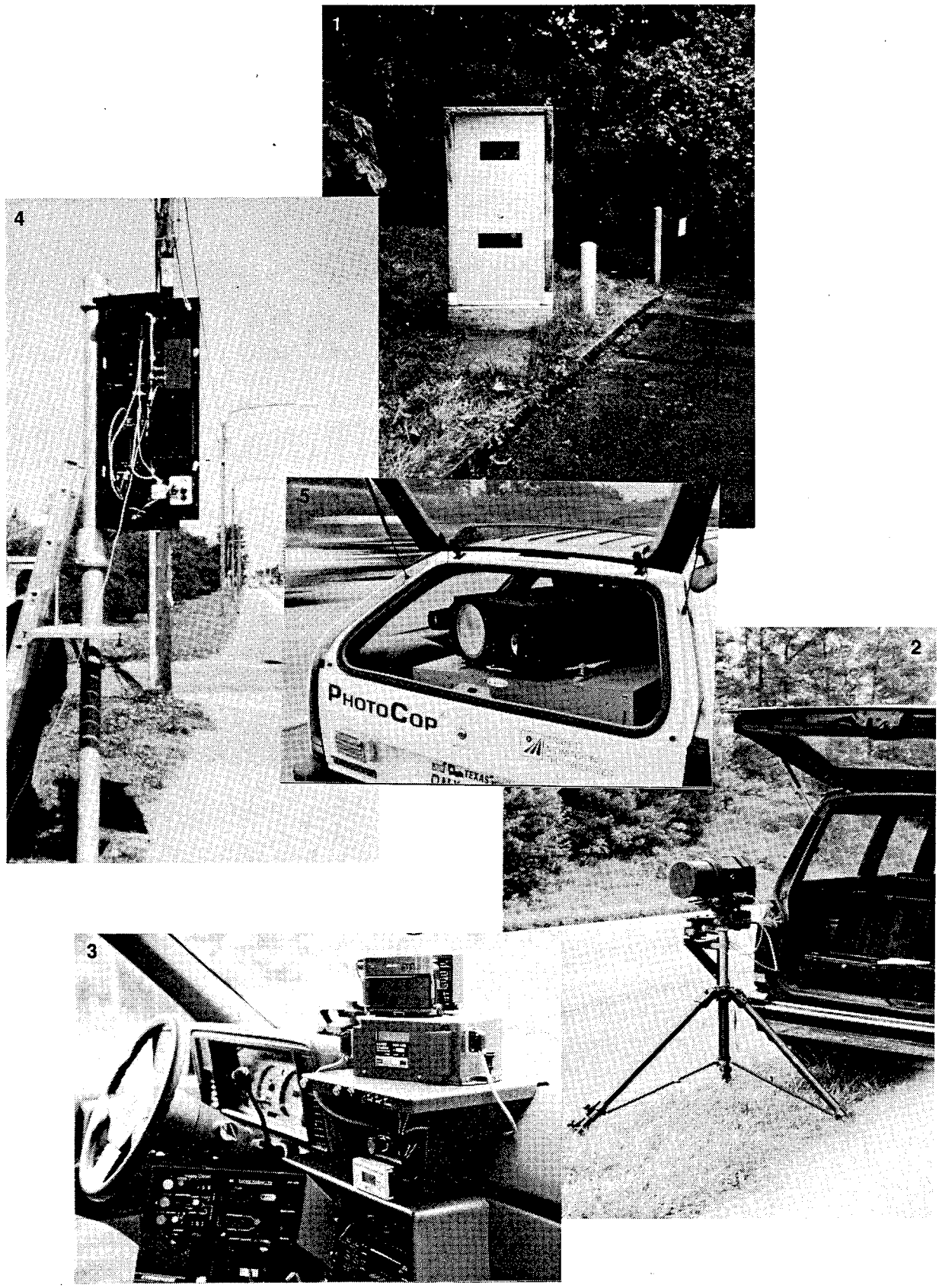

Figure 1. MODES OF PHOTO-RADAR OPERATION.

Figure 2. TYPICAL PHOTOGRAPH PRODUCED BY A PHOTO-RADAR UNIT. (The license plate number was deleted to ensure the privacy of the vehicle's owner.)

HOW WAS THE FEASIBILITY STUDY CONDUCTED?

The researchers sought to evaluate the feasibility of using photo-radar on the Capital Beltway through four steps:

1. Outline the history and acceptance of past forms of speed enforcement technology and address the legal issues presented by photo-radar use.
2. Make site visits to the two cities in the United States where photo-radar technology has been used in speed enforcement and to the four principal European manufacturers of photo-radar equipment.
3. Test photo-radar equipment on selected highways in Virginia and Maryland.
4. Conduct an opinion survey to measure public sentiment concerning the potential use of photo-radar on the Capital Beltway.

WILL THE USE OF PHOTO-RADAR BE UPHELD BY THE COURTS?

In order to answer this question, legal issues possibly relevant to the use of photo-radar were examined. In addition, past forms of speed technology and their acceptance by the courts were examined to gain information to predict how the courts might react to this most recent form of speed enforcement technology.

Past Forms of Speed Technology

With the proliferation of automobiles at the turn of the century, law enforcement officials soon discovered that the chief advantage of automobiles—speed—also represented a significant threat if abused. By the late 1940s, law enforcement officials had introduced police radar to enforce traffic speed limits. Overcoming challenges to its constitutionality, police radar soon gained acceptance by Virginia courts, eliminating the need for expert testimony to establish that a properly functioning radar unit is both reliable and accurate.[1]

Photo-radar is not the first device to employ photography in speed enforcement. In 1910, the Supreme Judicial Court of Massachusetts approved the use of a device called the photo speed recorder.[2] The device photographed speeding vehicles at measured intervals. The vehicle's speed could then be calculated based on the size of the vehicle in the photograph as it moved further away from the camera.[3]

In 1954, however, the unattended use of a similar device, referred to as the photo-traffic camera or Foto-Patrol, was prohibited by the state court of New York.[4] Foto-Patrol consisted of a camera mounted on the side of road that was activated by

an electronic impulse when passed by a speeding vehicle. The device photographed only the rear license plate of the vehicle, preventing identification of its driver. A New York court rejected a presumption that the registered owner of the vehicle was its operator, stating that unless an officer staffed the unit, Foto-Patrol use was prohibited.[5]

In the late 1960s, a device known as the Orbis III system resolved the problem of driver identification.[6] The Orbis III system utilized two rubber tubes, which triggered a computer that measured the speed of the vehicle. The device then photographed the vehicle if it was speeding. Orbis III permitted driver identification because it photographed the vehicle's front license plate and its driver.[7] Although Orbis III was abandoned for administrative reasons, a study by the U.S. Department of Transportation asserted that the device would probably have withstood constitutional challenges to its use.[8]

Legal Issues

Constitutional Challenges

If there is one constant in speed enforcement, it is that drivers will contest speeding tickets. Because constitutional challenges are easily fashioned to assert nearly any position, attacks against photo-radar will inevitably take the form of claims challenging its constitutionality. Current jurisprudence supports the constitutionality of photo-radar despite the challenges that might be leveled against it. There are six areas in which constitutional challenges are likely to be raised:

1. zone of privacy
2. unreasonable search and seizure
3. freedom of association
4. equal protection
5. due process
6. common law right of privacy.

Zone of Privacy

The constitution has been interpreted as limiting the states' regulatory powers over a number of activities that fall within an individual's "zone of privacy."[9] A driver ticketed by photo-radar might claim that the photographs produced by photo-radar violate his or her zone of privacy.[10] *However, it is highly unlikely that courts would sustain a challenge based on such grounds.* The zone of privacy applies only to rights that are considered fundamental,[11] including "marriage, procreation, contraception, family relationships, and child rearing and education."[12]

Operation of an automobile clearly does not fall in this category of rights. To the contrary, the U.S. Supreme Court considers a person's expectation of privacy in an automobile to be quite limited and subject to significant regulatory power.[13]

Unreasonable Search and Seizure

It is also possible that a ticketed driver might claim that the photographs produced by a photo-radar unit constituted an unreasonable search under the Fourth Amendment.[14] Under the Fourth Amendment, a person has a right to freedom from unreasonable search and seizure in circumstances where the person has a reasonable expectation of privacy.[15] This right is violated if a search or seizure is made without probable cause and a search warrant.[16] A person, however, has a lower expectation of privacy in an automobile.[17] Moreover, Fourth Amendment protection does not apply to whatever a person knowingly exposes to the public.[18] *Because a person's likeness is exposed to the public while driving, photo-radar in capturing this likeness violates no reasonable expectation of privacy and its use is a valid method of law enforcement not requiring a search warrant under the Fourth Amendment.*[19]

Freedom of Association

Photo-radar use could also be challenged as a violation of an individual's right of freedom of association. This claim would be based on the notion that photo-radar use might prevent people from traveling with anyone with whom they do not wish to be photographed, thus violating the freedom of association.[20] There are two types of associational rights: (1) freedom of expressive association, and (2) freedom of intimate association.[21] It is highly unlikely that photo-radar use will be considered to violate either. The freedom of expressive association protects the right of individuals to organize into groups to exercise First Amendment rights.[22] A successful claim under this freedom must involve a government regulation that targets the activities of a particular group organized specifically to exercise its First Amendment rights.[23] The group targeted by photo-radar is composed of speeding drivers, who do not represent an organized group—much less a group organized for First Amendment purposes. *Hence, a claim based on the freedom of expressive association would fail.*

Nor does photo-radar use compromise the right of intimate association. The U.S. Supreme Court has used the freedom of intimate association provisions to strike down regulations that directly interfere with marital and familial relationships.[24] *Photo-radar does not prevent individuals from engaging in intimate relationships with family members or any other persons and thus does not implicate the right of intimate association.*

Equal Protection

Since photo-radar devices require 1 second to reset themselves after photographing a speeding vehicle, some violators will pass through the field of a photo-radar unit undetected. Therefore, theoretically not all those violating the speed limit are given the same treatment by the device and an equal protection claim may

arise due to "unequal" police enforcement.[25] *However, it is highly probable that such a claim would fail,* since all law enforcement efforts allow some offenders to avoid arrest. An equal protection claim would succeed only if the criteria for enforcement are based on a suspect classification, such as race.[26] Failure to prosecute all violators does not by itself support an equal protection claim.[27]

Due Process

Because the photographs from a photo-radar unit must pass through a development process and the citation is issued by certified mail, there is a delay between the time of the violation and the issuance of the citation. A ticketed driver could assert that photo-radar use constitutes a denial of due process of law because the element of delay hampers the ability to gather witnesses and evidence—and thus to prepare a proper defense. *This claim would probably fail,* since the government is not using the delay for tactical advantage[28] and the delay is insufficient to prevent access to witnesses or evidence. Indeed, photo-radar may improve access to evidence for a speeding violation since it creates a photographic record of the scene of the violation.

Currently, the cities of Paradise Valley, Arizona, and Pasadena, California, attempt to weaken further any due process claims by issuing citations within a specified time period following the offense and by deploying signs providing considerable warning of approaching photo-radar units.

Common Law Right of Privacy

If federal constitutional attacks against photo-radar fail, then ticketed drivers might pursue a claim involving the invasion of privacy under the state common law.[29] *This claim is likely to fail for three reasons.* First, courts have repeatedly held that taking photographs of criminally charged persons by law enforcement officials does not by itself constitute an invasion of privacy.[30] Second, certain state courts have followed the U.S. Supreme Court's Fourth Amendment doctrine in right of privacy cases, holding that what a person knowingly exposes to the public cannot be protected in an evidentiary hearing under an invasion of privacy claim.[31] Third, the U.S. Court of Appeals for the Fourth Circuit has stated that a statutory right of privacy exists in Virginia, but not one based on the common law.[32] The privacy statute cited by the circuit court prohibits the use for commercial purposes of a person's name, portrait, or picture without his or her consent.[33] Obviously, photo-radar does not fall under this protection, and to date the Virginia Supreme Court has not addressed the issue of whether any state common law right to privacy exists outside the statute.

Evidentiary Issues

There are three evidentiary issues that are likely to be of relevance in the photo-radar issue: (1) the pictorial testimony theory, (2) the silent witness theory, and (3) chain-of-custody concerns.

Pictorial Testimony Theory

Photographic evidence is admissible under the pictorial testimony theory if a witness testifies that it is an accurate representation of the scene actually observed by the witness.[34] *Thus, photographs produced by photo-radar would be admissible under this theory if a police officer or other person staffed the unit and then testified in court as to the accuracy of the scene depicted in the photograph.*

Silent Witness Theory

A new evidentiary theory might permit admission of photo-radar photographs from an unstaffed unit. Under the silent witness theory, photographic evidence is admissible if other technical evidence relating to the smooth functioning of the camera "is sufficient to provide an adequate foundation assuring the accuracy of the process producing it."[35] This theory has been used to admit into evidence photographs produced by Regiscope cameras, which are used to photograph check-cashing transactions.[36] Since the processes used by Regiscope cameras and photo-radar are analogous, *it is possible that photo-radar photographs produced by an unstaffed unit would be admissible under the silent witness theory.*

Chain-of-Custody Concerns

The procedures for handling and developing film produced by photo-radar devices must provide reasonable certainty that physical tampering or alteration does not occur. Since film and photographs can be altered with ease, the photographs offered under the silent witness theory must be authenticated. Authentication is accomplished by establishing the "chain of custody," usually through testimony of each successive custodian of the film or photograph, proving that the photograph is genuine.

The general chain of custody rule in Virginia requires evidence that establishes with reasonable certainty that the physical evidence was not altered, substituted, or contaminated.[37] The specific operational procedures that are used by the Virginia State Police for handling and processing photographic evidence include the following: First, the police officer who took the picture delivers the film to the police photo laboratory and requests a specific number and size of the prints required. The laboratory then logs the film, develops it, makes prints, and returns copies in a sealed package to the officer in charge by U.S. mail. Negatives are retained at the laboratory, and through this process the film/photographs are stored in limited access areas to prevent tampering.

Virginia courts have written little on the operational procedures required with regard to handling film and photographs. One decision discussing such procedures dealt with a store owner who sent away for a print from a negative held in storage, which depicted a forged check transaction, and then had an employee deliver the print to the police. The court found that this process provided an adequate foundation to assure the accuracy of the picture.[38] The practice of mailing evidence in a sealed package, in the absence of tampering, has also been held not to upset the chain of custody in Virginia.[39]

Other state courts have written more specifically on what is required to prove the chain of custody where photographs are concerned. One state has required that in cases involving automatic cameras, evidence must be shown of how the camera was loaded and activated, when the photographs were taken, and how the film was removed and processed.[40] Other state courts have approved less stringent chain of custody procedures, requiring only satisfactory evidence of the integrity of the film/photographs, such as the testimony of an expert who determined that no alteration occurred.[41]

Requirement for Legal Service

Virginia law requires a driver detained by a police officer for any violation punishable as a misdemeanor to give a written promise to appear for a hearing.[42] This requirement is normally fulfilled at the time of issuance of the traffic citation, a method unavailable with the photo-radar system. However, it is possible that Virginia courts could narrowly construe this requirement to apply only when a driver is *detained*, an event that does not occur with the photo-radar method of mailing the citation. Whether courts would adopt this narrow construction rather than a broad personal service requirement for traffic citations is impossible to determine. *Adoption of legislation providing for service of traffic citations by mail could solve this potential problem.*

HAS PHOTO-RADAR BEEN USED SUCCESSFULLY IN OTHER PLACES?

Overview

From February 26 to March 5, 1990, site visits were made to Pasadena, California, and Paradise Valley, Arizona, where photo-radar devices leased from TMT is currently used in speed enforcement. Between May 20 and June 2, 1990, the facilities of four European manufacturers of photo-radar were visited: Gatsometer (The Netherlands), Multanova (Switzerland), Traffipax (Germany), and Trafikanalysis (Sweden). The manufacturer in Australia—AWA Defence Industries—was not visited due to budgetary constraints.

The objectives of the site visits were as follows:

1. Review and discuss the equipment on-site with its users and manufacturers.

2. Observe the equipment in use at locations where the manufacturer felt it had been used successfully.

3. Evaluate the equipment in comparison with the manufacturer's claims, and evaluate its potential for effectiveness on a congested urban highway such as the Capital Beltway.

Pasadena, California

Confronted with speed-related problems arising from heavy commuter traffic through residential neighborhoods, Pasadena, a city of 130,000, commenced the testing of photo-radar in 1987 in speed zones of up to 50 mph. Photo-radar is currently used on highways with three or fewer lanes. Approximately 45% of drivers ticketed by photo-radar pay the fine without attending court, nearly 32% of drivers choose traffic school, and about 7% of the cases are dismissed.

However, 16% of those cited ignore the ticket. Moreover, those who ignore the ticket suffer no consequences because the administrative cost of issuing a summons for a photo-radar violation in Pasadena is simply too high. Police fear this may eventually undermine the program. TMT leases the photo-radar equipment to Pasadena for a fee of $20 per conviction. However, the Pasadena program does not pay for itself due to a low fine schedule and the option of attending traffic school as an alternative to paying the fine.

Paradise Valley, Arizona

Paradise Valley, a town of 14,000, plays host to a high volume of speeding commuter traffic. Photo-radar has garnered community, judicial, and media support. Estimates suggest that citation rates for photo-radar are 19 times greater than for mobile patrols. Citations are mailed within 2 weeks of the offense, and if the offender challenges the citation, a photograph is produced for trial. At trial, if the driver photographed is not the owner, the owner is requested to identify the driver under oath. If the owner identifies the driver, a citation is issued to the driver within 30 days of the offense, satisfying due process requirements. If the owner refuses to identify the driver, the owner can be held in contempt. However, to protect the public image of the photo-radar project in Paradise Valley, this option is rarely used.

Paradise Valley, unlike Pasadena, discounts the threat presented by ignored citations. The authorities may immediately issue a summons to those who disregard citations. Moreover, Paradise Valley authorities suspend the vehicle owner's license indefinitely if the summons is ignored. Speeds on most roads have decreased, and local officials feel that photo-radar has freed more police time for enforcement of alcohol-related violations. Further, police officers assert that once they gained experience concerning the locations and times at which photo-radar was most effectively used, the percentage of usable photographs increased. TMT services the program in Paradise Valley at a fee of $20 per conviction. Fines generated from photo-radar convictions exceed the costs of the program itself, providing a source of revenue for the Paradise Valley community.

Western Europe and Scandinavia

Photo-radar has been used in Western Europe for about 30 years and in Scandinavia for about 5 years. Although one brand of photo-radar equipment has been used on a high-speed, high-volume roadway (i.e., the Autobahn in Elzberg, Germany), photo-radar is used in basically the same manner as in the United States—on relatively low-volume, low-speed surface streets. Most manufacturers cite "success stories" in which photo-radar use resulted in reduced speeds or reduced accidents.

Capabilities of Equipment

All of the equipment can operate in a stationary mode. All of the units can operate at night using a strobe. Three of the six units can monitor traffic while being operated in a moving vehicle. Five of the six units can monitor both oncoming and receding traffic at the same time, although this feature is rarely used. Finally, and most important for states like Virginia that have a separate speed limit for trucks, four of the six photo-radar units can enforce one speed limit for passenger vehicles and another for large trucks.

A series of add-ons and attachments are available for use with photo-radar. All manufacturers offer a computer interface and software that will analyze the speed data collected on site. Video is also available for on-site use. One of the more interesting peripherals available is a photographic processing unit that converts images from negatives into a picture on a television monitor. These TV pictures can then be viewed to determine if they are clear enough to be used in court. They can be manipulated by changing the contrast or by zooming in on the driver or license plate. Also, the passenger or any other image in the picture can be blacked out or excluded from the photograph, and the resulting image can be printed instantaneously.

CAN PHOTO-RADAR BE USED SUCCESSFULLY ON THE CAPITAL BELTWAY?

Field Demonstrations

Since photo-radar use had proven feasible in several American and European cities, the study proceeded to the issue of whether photo-radar use would be technically and operationally feasible in the high-speed, high-volume environment of the Capital Beltway. Major aspects of this feasibility were the accuracy of the equipment and clarity of the photographs produced. Without documented evidence as to its accuracy, photo-radar use would not pass muster with the courts, and without a sufficient number of clear, readable photographs, too few citations would be

produced to make the program worthwhile. Another major aspect of feasibility was whether the specific units could perform adequately in varying conditions. Thus, field demonstrations of each of five manufacturers of photo-radar equipment were conducted during the summer of 1990 on Interstates 64, 81, 95, 295, and 495 in Virginia and Interstate 95 in Maryland. The equipment of each of the five manufacturers was tested for a 2-week period.

Information Gained in Demonstrations

The demonstrations yielded information in six major areas:

1. accuracy of recorded speeds
2. accuracy of equipment in multivehicle traffic
3. number of usable photographs
4. effect of misalignment on accuracy
5. ease of detection by radar detectors
6. effect of photo-radar use on speed characteristics.

Accuracy of Recorded Speeds

Unless a speed enforcement device is accurate, both the courts and the motoring public will reject it. To test the accuracy of the photo-radar equipment, test vehicles were driven through the path of the photo-radar units. The speed reading generated by each photo-radar unit was then compared to the speed measurement produced by the "loop detectors" embedded in the pavement. (These loop sensors are permanently installed around the state to collect speed and volume data.) The accuracy of a particular photo-radar unit was expressed as the percentage of times the unit measured a vehicle's speed within +2 mph or –3 mph of the speed reading generated by the loop detector. This criterion was derived as follows:

1. The accuracy of the police radar currently in use in the United States is +1 mph to –2 mph.
2. The accuracy of the loop detector is ±1 mph.
3. By combining these two sources of error, the standard against which the photo-radar units was measured (i.e., + 2 mph and –3 mph) was developed.

The accuracy of the photo-radar units varied, with one unit's recorded speeds falling within the required range 96% of the time and another's falling within the range only 84% of the time. Moreover, certain units resolved speed reading errors in favor of the driver, as do ordinary police radar units used in the United States. This fosters confidence in the speed reading since it reflects an underestimation of

the driver's actual speed. Clearly, in considering which type of photo-radar equipment to use, the units that most closely resemble police radar in terms of accuracy and direction of the error are the most desirable since police radar use is so widely accepted in the United States.

Accuracy of Equipment in Multivehicle Traffic

Test vehicles were driven in pairs through the photo-radar beam to determine the effect that simultaneously driving two or more vehicles through the radar beam had on the accuracy of speed readings. The data revealed that neither the lane in which the vehicle was driven nor the pairing of vehicles affected the accuracy of the speeds recorded. Under field conditions, the photo-radar unit could isolate the speeding vehicle and record its speed without a loss of accuracy.

Number of Usable Photographs

Photographs produced by a photo-radar unit must be of sufficient clarity for two reasons: (1) a registered owner of a vehicle cannot be cited if the license plate of the vehicle is illegible, and (2) a court probably will not admit a blurred photograph as the sole evidence of a speeding violation. The numbers provided in this summary represent *the percentage of speeding vehicles passing each unit that the unit could detect and then clearly photograph.* This number of clear (i.e., usable) photographs varies with traffic volume, vehicle speed, threshold speed setting, and site selection.

When the photo-radar equipment was deployed to photograph oncoming traffic on interstate highways, the most efficient unit adequately detected and photographed 2.4% of those vehicles exceeding the speed limit and the least efficient unit adequately detected and photographed 1.7%. In terms of expected number of citations produced per hour, the least efficient unit would produce 9 citations per hour and the most efficient unit would produce 65 citations per hour, both in the oncoming mode. It is important to remember that when photo-radar is used on local roads or residential streets, where both speeds and volumes are lower than on interstate highways, the percentage of vehicles detected and the number of citations produced are much higher than on the Beltway.

Although the percentages of speeding vehicles adequately photographed appear quite low, it is notable that the citation rate for the least efficient equipment still exceeds the number of citations that could be written by a police officer in 1 hour. The most efficient units produce far more citations per hour than an officer could write. Also, most of the photo-radar units were not designed for use on three- and four-lane roads. Thus, speeders on the lanes furthest from the unit would be more likely to be visually blocked by other vehicles and less likely to be photographed adequately. To photograph vehicles in the third or fourth lanes, manufacturers recommend putting a unit in the median. Moreover, these figures do not measure the deterrent effect of photo-radar on speeding drivers. Therefore, photo-radar still might prove highly effective at speed enforcement even if it fails to detect and photograph the majority of speeding drivers.

Effect of Misalignment on Accuracy

It is possible that photo-radar equipment will be operated under conditions that do not meet the exacting requirements of experimental conditions. To account for this, the researchers deliberately misaligned the photo-radar equipment up to a maximum of 8 degrees. With the exception of the AWA unit, the misalignment resulted in a maximum error of +3 mph. For the AWA equipment, a misalignment of 8 degrees caused a maximum error of +9 mph. All misaligned units overestimated the speed of the vehicle.

Ease of Detection by Radar Detectors

It is reasonable to surmise that some drivers will attempt to evade photo-radar speed enforcement through the use of a radar detector. With that in mind, the researchers tested the distance at which each manufacturer's equipment was detectable. A test vehicle with the radar detector installed was driven slowly toward the equipment until it activated the radar detector. The location of detection was marked, and the distance from the equipment measured.

Both the AWA and the Trafikanalys equipment were detected by the radar detector at 2,250 feet, and both the Gatsometer and Traffipax equipment were detected at 1,056 feet. The radar detector did not detect the TMT equipment since the radar detector used could not pick up the Ka band.

Effect of Photo-Radar Use on Speed Characteristics

To measure whether photo-radar use will lead to reduced speeds requires full enforcement of photo-radar citations and increased motorist awareness of photo-radar use, both of which were outside the scope of the study. With this in mind, photo-radar use during the test runs produced a statistically insignificant reduction in the mean speed, which varied according to both the site and the equipment used. Further reductions can probably be expected if drivers are made aware of photo-radar use and are actually ticketed due to detection by a photo-radar unit.

WILL THE PUBLIC SUPPORT THE USE OF PHOTO-RADAR?

Even after a speed enforcement technology gains judicial acceptance, it must withstand the attacks of perhaps its most difficult critic: the motoring public. Although public opinion polls in Pasadena and Paradise Valley indicated that motorists favor photo-radar use in residential areas on local roadways, it should be noted that virtually all of the ticketed drivers are nonlocal. The application of photo-radar to an interstate highway poses a unique set of concerns. In order to determine public sentiment on the issue of photo-radar implementation on the Capital Beltway, a cross section of Maryland, Virginia, and Washington, D.C., residents was sampled.

Approximately 60% of those sampled either approved or strongly approved of photo-radar use as a speed enforcement tool, and approximately 35% of respondents disapproved or strongly disapproved. Roughly 5% of respondents had no opinion. Although less than 2% of respondents named photo-radar as a speed enforcement tool without it being suggested, once mentioned, 78% claimed to have heard of photo-radar technology.

Within the sample, nondrivers and non-Beltway drivers felt more positively concerning photo-radar than did drivers or Beltway drivers. Moreover, women were more inclined to favor photo-radar use than men, and Washington, D.C., residents viewed it more favorably than Virginia or Maryland residents.

Generally, the findings support two assertions. First, despite certain gender-specific and geographic-specific variations in the results, those least affected by potential photo-radar use on the Beltway were the most positive concerning its use. Confirming intuition, Beltway drivers were more likely to oppose photo-radar use than the other drivers sampled. Second, the overall attitude of those sampled toward photo-radar as a speed enforcement device was positive. Even among Beltway drivers, the segment most skeptical of photo-radar use, there was a 53% approval rating.

WHAT CAN BE CONCLUDED AND RECOMMENDED ABOUT THE USE OF PHOTO-RADAR IN VIRGINIA?

Conclusions

It is feasible to use photo-radar technology to detect and cite speed violators on high speed, high-volume roads. This advancement in speed enforcement technology will undoubtedly encounter significant resistance by at least some segments of the motoring public. Moreover, the limits of the study itself should be noted: the study did not determine whether photo-radar use is cost-effective given the staff requirements and administrative costs of its operation. However, if photo-radar meets the requirements of the National Institute of Standards and Technology for accuracy and withstands initial legal challenges, then it should gain acceptance as an effective tool in speed enforcement. Effective photo-radar legislation could safeguard individual rights, meet constitutional requirements, and enhance the enforcement of speed laws. (These conclusions are expressed in detail and supporting documentation is presented in the full report.)

Recommendations

1. As part of its continuing commitment to improve safety on the highways, it is recommended that Virginia take steps to test and evaluate further the effectiveness of photo-radar in reducing speeds in traffic situations where traditional techniques of speed enforcement are impractical or unsafe.

2. To accomplish this, it is suggested that the Commonwealth implement a program of actual speed enforcement on Virginia's highways through photo-radar technology, combined with an informational campaign on photo-radar to apprise motorists of its use.

3. Since Virginia law requires that the General Assembly pass enabling legislation in order to implement photo-radar use, two pieces of model legislation have been prepared (see Appendix). The first piece of model legislation would permit speed enforcement against large-truck traffic on interstate highways where a 10 mph differential speed limit exists. The second piece would enable speed enforcement of all traffic on The Chesapeake Bay Bridge-Tunnel. Each piece provides a mechanism for citation and enforcement of speeding violations while according violators the guarantee of due process of the law.

NOTES

1. *Dooley v. Commonwealth*, 198 Va. 32, 35, 92 S.E.2d 348, 350 (1956).
2. *Commonwealth v. Buxton*, 91 N.E. 128 (Mass. 1910).
3. *E.C. Fisher,* Legal Aspects of Speed Measurement Devices *4 (1967).*
4. *People v. Hildebrandt*, 126 N.E.2d 377 (N.Y. 1954).
5. *Id.* at 379. *See also* Fisher, *supra* note 3, at 8; 7A Am. Jur. 2d *Automobile Highway Traffic*, sec. 373, 374 (1980).
6. Traffic Monitoring Technologies, *Legal Information Package: Photocop Photo-Radar* (1990).
7. S.C. Smith, *Giving Big Brother the Birdie*, 103 Car and Driver (August 1989).
8. *Glater,* Legal Issues Raised by Orbis, A Motor Vehicle Speed Detection Device Taking Photos of Speeders *1 (1973).*
9. *See, e.g., Roe v. Wade*, 410 U.S. 113, 152-53 (1973); *Paul v. Davis*, 424 U.S. 693, 713 (1976).
10. Glater, *supra* note 8, at 7.
11. *Roe*, 410 U.S. at 152; *Paul*, 424 U.S. at 713.
12. *Roe*, 410 U.S. at 152-153; *Paul*, 424 U.S. at 713.
13. *New York v. Class*, 475 U.S. 106, 113 (1986).
14. Glater, *supra* note 8, at 12.
15. *Katz v. United States*, 389 U.S. 347, 353 (1967); *United States v. Knotts*, 460 U.S. 276, 280-81 (1983).
16. *Katz*, 389 U.S. at 357.
17. *Knotts*, 460 U.S. at 281 (citing *Cardwell v. Lewis*, 417 U.S. 583, 590 (1974)).
18. *Katz*, 389 U.S. at 351.
19. *See Knotts*, 460 U.S. at 281 (A person "travelling in an automobile on public thoroughfares has no reasonable expectation of privacy in his movement from one place to another" since this information is knowingly exposed to the public).
20. Glater, *supra* note 8, at 14.
21. *McKenna,* Freedom of Association or Gender Discrimination? New York State Club Association v. City of New York, *38 Am. U. L. Rev. 1061, 1064-1065 (1989); Note,* State Power and Discrimination by Private Clubs: First Amendment Protection for Nonexpressive Associations, *104 Harv. L. Rev. 1835, 1842 (1991).*

22. *Roberts v. United States Jaycees*, 468 U.S. 609, 622 (1984).

23. *See NAACP v. Alabama*, 357 U.S. 449 (1958) (Action by the Alabama Attorney General to obtain the membership lists of the National Association for the Advancement of Colored People (NAACP) held violative of the freedom of expressive association); *NAACP v. Button*, 371 U.S. 415 (1963) (A Virginia statute that prevented solicitation of legal business by an attorney violated the freedom of expressive association when applied to the NAACP); *Kusper v. Pontikes*, 414 U.S. 51 (1973) (Illinois law that prevented a person who voted in a primary election of a particular party from voting in a primary election of another party for 23 months afterward violated the freedom of expressive association).

24. *See Moore v. City of East Cleveland*, 431 U.S. 494 (1977) (invalidating a city ordinance that prohibited family members who were not members of the nuclear family from inhabiting the same residence on the basis of freedom of intimate association); *compare Village of Belle Terre v. Boraas*, 416 U.S. 1 (1974) (affirming the validity of a zoning ordinance preventing unrelated adults from living in the same residence from a freedom of intimate association challenge). Note that in *Roberts*, the Supreme Court indicated that the right of intimate association could extend to regulations interfering with intimate relationships outside the family context, *Roberts*, 468 U.S. at 620. Successful freedom of intimate association claims have thus far involved only impediments to familial relationships.

25. Glater, *supra* note 8, at 22-28.

26. *Id.* at 25 (citing *Oyler v. Boles*, 368 U.S. 448, 456 (1962)).

27. *See Sims v. Cunningham*, 203 Va. 347, 354-355, 124 S.E.2d 221, 225-226 (1962).

28. *United States v. Delario*, 912 F.2d 766 (5th Cir. 1990).

29. Letter from Crawford C. Martin, Att'y Gen. of Tex., to Hon. A. Ross Rommel (Sept. 14, 1970) (opinion on legality of Orbis III use); Letter from Frank J. Kelly, Att'y Gen. of Mich., to Noel C. Bufe (Sept. 8, 1971) (opinion on legality of Orbis III use); Glater, *supra* note 8, at 18.

30. 62 Am. Jur. 2d *Privacy* §205 (1990); *Walker v. Lamb*, 254 A.2d 265, 266 (Del. Ch. 1969), *aff'd*, 259 A.2d 663 (Del. 1969); *Downs v. Swann*, 73, A. 653, 655-6 (Md. 1909).

31. *Jeffers v. City of Seattle*, 597 P.2d 899, 907 (Wash. App. 1979).

32. *Brown v. American Broadcasting Co.*, 704 F.2d 1296, 1302-1303 (4th Cir. 1983).

33. *Id.* at 1302.

34. C. McCormick, *McCormick on Evidence* §214 (1984).

35. *Ferguson v. Commonwealth*, 212 Va. 745, 747, 187 S.E.2d 189, 191 (1972), cert. denied, 409 U.S. 861 (1972), reh'g denied, 409 U.S. 1050 (1972).

36. *Id.*

37. *Reedy v. Commonwealth of Virginia,* 9 Va. App. 386, 387, 388 S.E. 2d 650, 650–651 (1990) (citing *Washington v. Commonwealth of Virginia*, 228 Va. 535, 550, 323 S.E. 2d 577, 587 (1984)).

38. *Ferguson v. Commonwealth*, 212 Va. 745, 745, 187 S.E. 2d 189, 190 (1972).

39. *Robertson v. Commonwealth of Virginia*, 12 Va. App. 854, 856–857, 406 S.E. 2d 417, 418–419 (1991).

40. *Groves v. State of Indiana*, 456 N.E. 2d 720, 721 (1983).

41. *Molina v. State*, 553 So. 2d 701, 711 (1988).

42. Va. Code Ann. § 46.2–936 (1989).

Appendix
MODEL PHOTO-RADAR LEGISLATION

PROPOSED VIRGINIA STATUTE TO AUTHORIZE THE USE OF PHOTO-RADAR FOR TRUCK SPEED LIMIT ENFORCEMENT ON INTERSTATE HIGHWAYS

A BILL to amend the Code of Virginia by adding sections numbered 46.2-822.1, 46.2-936.1, and 46.2-945.1 and amending and reenacting sections numbered 46.2-938 and 46.2-940 relating to checking on speed using photo-radar technology.

Referred to the Committee on Transportation

Be it enacted by the General Assembly of Virginia:

1. That the Code of Virginia is amended by adding sections numbered 46.2-822.1, 46.2-936.1, and 46.2-945.1 and amending and reenacting sections numbered 46.2-938 and 46.2-940 as follows:

46.2-882.1 Use of photo-radar for truck speed enforcement.

A. The Virginia State Police are authorized to use "photo-radar" technology on all highways within the Commonwealth for the purpose of detecting speeding violations if the vehicle is a truck, tractor truck, combination of vehicles designed to transport property, house trailer, or motor vehicle being used to tow vehicles designed for self-propulsion as enumerated in § 46.2-870. This authorization will expire July 1, 1997, unless re-enacted prior to that date.

B. As used in this section, "photo-radar" means a device that uses radio-microwaves to measure and indicate the speed of a moving object and photographs the moving object for which speed is being measured. Photographs by that device may be of the vehicle's registration plate and of the driver of the vehicle and must be of sufficient quality to identify the driver of the vehicle. Such photographs shall be accepted as prima facie evidence of the speed of such vehicle in any court or legal proceeding under this section where the speed of the vehicle is at issue provided that the police officer who activated the equipment shall testify as to the placement of the camera and the accuracy of the scene depicted.

In any court or legal proceeding in which any question arises about the calibration or accuracy of any photo-radar device as defined in this section used to check the speed of a vehicle enumerated in this section, a certificate, executed and signed by the officer or officers calibrating or testing such device for its accuracy, and stating the time of such test, type of test, and results of testing when such certificate is accompanied by a certificate, or a true copy thereof, showing the calibration or accuracy of the speedometer of any vehicle employed in calibrating was made, shall be admissible when attested by one such officer who executed and signed it as evidence of the facts therein stated and the results of such testing. No calibration or testing of such devices shall be valid for longer than six months.

C. A person is in violation of Title 46.2 Subtitle III, Article 8, if the person is the registered owner or the lessee of a truck, tractor truck, combination of vehicles designed to transport property, house trailer, or motor vehicle being used to tow vehicles designed for self-propulsion driven in excess of the posted speed limit. In the case of leased or rented vehicles, the companies holding title to such vehicles shall inform the police, under authority of § 46.2-108, as to the identity of the lessee.

D. It shall be an affirmative defense to a violation of Title 46.2, Subtitle III, Article 8, by the registered owner or lessee of the photographed vehicle that the registered owner or lessee of the photographed vehicle identifies another person who drove the vehicle at the time of the violation or that the vehicle was stolen at the time of the violation.

E. In the event that the registered owner or lessee of the photographed vehicle identifies the person who drove the vehicle at the time of the violation, the person so identified will be charged with violation of Title 46.2, Subtitle III, Article 8, for driving the vehicle in excess of the posted speed limit.

F. Signs to indicate the use of photo-radar devices for measuring speed shall be clearly posted along the Beltway at locations selected by the Commonwealth Transportation Commissioner at his discretion. The operation and effect of this section shall be the same as that of § 46.2-883.

G. The penalties for violations under this section shall be as prescribed under the Uniform Fee Schedule, set out in Rule 3B:2, but no points shall be assessed against the operator's license for violations based on photo-radar evidence.

46.2-936.1 Issuance of traffic citations based on photographic evidence obtained by means of photo-radar device.

A. If a Virginia State Police officer, based on photographic evidence obtained by means of a photo-radar device, as described in § 46.2-882.1, has probable cause to believe that the driver of a vehicle specified in § 46.2-882.1 has violated Title 46.2, Subtitle III, Article 8, by driving in excess of the posted speed limit, the State Police or any other state agency or contractor designated by the Commonwealth shall promptly send a citation by certified mail to the registered owner or lessee of the vehicle charging the registered owner or lessee with the violation and shall keep a copy of the citation bearing the police officer's certification under penalty of perjury that the facts stated in the citation are true. In the event that the registered owner or lessee of the vehicle identifies the driver of the photographed vehicle as a person other than the registered owner or lessee of the vehicle, then the State Police shall promptly send a citation by certified mail to the identified driver of the vehicle charging the identified driver with the violation and shall keep a copy of the citation bearing the police officer's certification under penalty of perjury that the facts stated in the citation are true.

B. A traffic citation issued under this section shall contain the violation charged, including the time, date, and location of the violation; the fine for the violation charged; the license number of the vehicle photographed; the name and address

of the registered owner of the vehicle photographed; a notice to appear in court to the person charged with the violation if that person wishes to contest the violation; the time when and place where the person charged with the violation is to appear in court, provided such time is at least 10 days after the alleged violation; and a statement acknowledging receipt of the citation to be signed by the person charged with the violation. On the side of the citation to be signed by the person charged with the violation, a clear and conspicuous statement shall appear that the signing of the citation by the person charged with the violation does not constitute an admission of guilt and that the failure to sign may subject the person to arrest. This statement shall further contain any other information that the Commonwealth deems necessary.

A person charged with violation of this section who does not elect to contest the charge must sign the citation and return it along with any fines that the Commonwealth assesses for violation of § 46.2-882.1. If a person wishes to contest a charge for violation of § 46.2-882.1, that person must sign the citation and appear in court at the time and place designated in the citation.

Any person acknowledging receipt of the citation through certified mail who fails to sign the citation shall be taken before a magistrate or other issuing officer having jurisdiction who shall proceed according to the provisions of § 46.2-940.

Any person acknowledging receipt of the citation through certified mail who does not return the citation along with any fines assessed or appear before the court at the time and place designated by the citation shall be treated in accordance with the provisions of § 46.2-938.

46.2-938. Issuance of warrant upon failure to comply with summons; penalties; suspension of licenses for failure to appear.

Upon the failure of any person to comply with the terms of a summons, *notice, or citation* as provided in § 46.2-936 *and 46.2-936.1*, such person shall be guilty of a Class 1 misdemeanor and the court may order a warrant for his arrest. The warrant shall be returnable to the court having jurisdiction of the offense and shall be accompanied by a report by the arresting officer which shall clearly identify the person arrested, specifying the section of the Code of Virginia or ordinance violated, the location of the offense, a description of the motor vehicle and its registration or license number.

If the warrant is returned to the court with the notation "not found" or the person named in the warrant does not appear on the return date thereof, the court shall forward a certificate of the fact of non-service or nonappearance, with a copy of the report specified in the foregoing provisions of this section, to the Commissioner of the Department of Motor Vehicles, who shall forthwith suspend the driver's license of such person. The order of suspension shall specify the reason for the suspension. Such suspension shall continue until such time as the court has notified the Commissioner that the defendant has appeared before the court under the terms of the summons or notice and the warrant.

46.2-940. When arresting officer shall take person before issuing authority.

If any person is: (i) believed by the arresting officer to have committed a felony; (ii) believed by the arresting officer to be likely to disregard a summons issued under § 46.2-936; (iii) refuses to give a written promise to appear under the provisions of § 46.2-936 or § 46.2-945; or (iv) *fails to sign a citation under the provisions of § 46.2-936.1*; the arresting officer shall promptly take him before a magistrate or other issuing authority having jurisdiction to determine whether probable cause exists that such person is likely to disregard a summons. The magistrate or other authority may issue either a summons or warrant as he shall determine proper.

46.2-945.1 Issuance of citations based on photographic evidence obtained by means of photo-radar device to non-resident violators.

A. If a Virginia State Police officer, based on photographic evidence obtained by means of a photo-radar device, as described in § 46.2-882.1, has probable cause to believe that the driver of a vehicle specified in § 46.2-882.1 has violated Title 46.2, Subtitle III, Article 8, by driving in excess of the posted speed limit, the State Police or any other state agency or contractor designated by the Commonwealth shall promptly send a citation by certified mail to the registered owner, lessee, or driver of the vehicle. Such citation will contain all the information set out in § 46.2-936.1.

B. Upon the failure of any nonresident motorist to comply with the terms of a citation under this section, the State Police officer, or other appropriate official, shall report this fact to the Department of Motor Vehicles. Such report shall clearly identify the motorist, describe the violation specifying this statute, indicate the location of the offense, give a description of the vehicle involved, and show the registration or license number of the vehicle. Such report shall be signed by the police officer or an appropriate official.

C. Based on the report described in paragraph B of this section, the Department of Motor Vehicles shall take the action authorized by § 46.2-946.

PROPOSED VIRGINIA STATUTE TO AUTHORIZE THE USE OF PHOTO-RADAR ON THE CHESAPEAKE BAY-BRIDGE TUNNEL

A BILL to amend the Code of Virginia by adding sections numbered 46.2-822.1, 46.2-936.1, and 46.2-945.1 and amending and reenacting sections numbered 46.2-938 and 46.2-940 relating to checking on speed using photo-radar technology.

Referred to the Committee on Transportation

Be it enacted by the General Assembly of Virginia:

1. That the Code of Virginia is amended by adding sections numbered 46.2-822.1, 46.2-936.1, and 46.2-945.1 and amending and reenacting sections numbered 46.2-938 and 46.2-940 as follows:

46.2-882.1 Use of photo-radar on The Chesapeake Bay Bridge Tunnel.

A. The Virginia State Police are authorized to use "photo-radar" technology on The Chesapeake Bay Bridge-Tunnel for the purpose of detecting speeding violators. This authorization will expire July 1, 1997, unless re-enacted prior to that date.

B. As used in this section, "photo-radar" means a device that uses radio-microwaves to measure and indicate the speed of a moving object and photographs the moving object for which speed is being measured. Photographs by that device may be of the vehicle's registration plate and of the driver of the vehicle and must be of sufficient quality to identify the driver of the vehicle. Such photographs shall be accepted as prima facie evidence of the speed of such motor vehicle in any court or legal proceeding under this section where the speed of the motor vehicle is at issue provided that the police officer who activated the equipment shall testify as to the placement of the camera and the accuracy of the scene depicted.

In any court or legal proceeding in which any question arises about the calibration or accuracy of any photo-radar device as defined in this section used to check the speed of any motor vehicle, a certificate, executed and signed by the officer or officers calibrating or testing such device for its accuracy, and stating the time of such test, type of test, and results of testing when such certificate is accompanied by a certificate, or a true copy thereof, showing the calibration or accuracy of the speedometer of any vehicle employed in calibrating was made, shall be admissible when attested by one such officer who executed and signed it as evidence of the facts therein stated and the results of such testing. No calibration or testing of such devices shall be valid for longer than six months.

C. *A person is in violation of Title 46.2, Subtitle III, Article 8, if the person is the registered owner or the lessee of the vehicle driven in excess of the posted speed limit. In the case of leased or rented vehicles, the companies holding title to such vehicles shall inform the police, under authority of § 46.2-108, as to the identity of the lessee.*

D. *It shall be an affirmative defense to a violation of Title 46.2, Subtitle III, Article 8, by the registered owner or lessee of the photographed vehicle that the registered owner or lessee of the photographed vehicle identifies another person who drove the vehicle at the time of the violation or that the vehicle was stolen at the time of the violation.*

E. *In the event that the registered owner or lessee of the photographed vehicle identifies the person who drove the vehicle at the time of the violation, the person so identified will be charged with violation of Title 46.2, Subtitle III, Article 8, for driving the vehicle in excess of the posted speed limit.*

F. *Signs to indicate the use of photo-radar devices for measuring speed shall be clearly posted along the Beltway at locations selected by the Commonwealth*

Transportation Commissioner at his discretion. The operation and effect of this section shall be the same as that of § 46.2-883.

G. *The penalties for violations under this section shall be as prescribed under the Uniform Fee Schedule, set out in Rule 3B:2, but no points shall be assessed against the operator's license for violations based on photo-radar evidence.*

46.2-936.1 Issuance of traffic citations based on photographic evidence obtained by means of photo-radar device.

A. If a Virginia State Police officer, based on photographic evidence obtained by means of a photo-radar device, as described in § 46.2-882.1, has probable cause to believe that the driver of a vehicle has violated Title 46.2, Subtitle III, Article 8, by driving in excess of the posted speed limit, the State Police or any other state agency or contractor designated by the Commonwealth shall promptly send a citation by certified mail to the registered owner or lessee of the vehicle charging the registered owner or lessee with the violation and shall keep a copy of the citation bearing the police officer's certification under penalty of perjury that the facts stated in the citation are true. In the event that the registered owner or lessee of the vehicle identifies the driver of the photographed vehicle as a person other than the registered owner or lessee of the vehicle, then the State Police shall promptly send a citation by certified mail to the identified driver of the vehicle charging the identified driver with the violation and shall keep a copy of the citation bearing the police officer's certification under penalty of perjury that the facts stated in the citation are true.

B. *A traffic citation issued under this section shall contain the violation charged, including the time, date, and location of the violation; the fine for the violation charged; the license number of the vehicle photographed; the name and address of the registered owner of the vehicle photographed; a notice to appear in court to the person charged with the violation if that person wishes to contest the violation; the time when and place where the person charged with the violation is to appear in court, provided such time is at least 10 days after the alleged violation; and a statement acknowledging receipt of the citation to be signed by the person charged with the violation. On the side of the citation to be signed by the person charged with the violation, a clear and conspicuous statement shall appear that the signing of the citation by the person charged with the violation does not constitute an admission of guilt and that the failure to sign may subject the person to arrest. This statement shall further contain any other information that the Commonwealth deems necessary.*

A person charged with violation of this section who does not elect to contest the charge, must sign the citation and return it along with any fines that the Commonwealth assesses for violation of § 46.2-882.1. If a person wishes to contest a charge for violation of § 46.2-882.1, that person must sign the citation and appear in court at the time and place designated in the citation.

Any person acknowledging receipt of the citation through certified mail who fails to sign the citation shall be taken before a magistrate or other issuing officer having jurisdiction who shall proceed according to the provisions of § 46.2-940.

Any person acknowledging receipt of the citation through certified mail who does not return the citation along with any fines assessed or appear before the court at the time and place designated by the citation shall be treated in accordance with the provisions of § 46.2-938.

46.2-938. Issuance of warrant upon failure to comply with summons; penalties; suspension of licenses for failure to appear.

Upon the failure of any person to comply with the terms of a summons, *notice, or citation* as provided in § 46.2-936 *and 46.2-936.1*, such person shall be guilty of a Class 1 misdemeanor and the court may order a warrant for his arrest. The warrant shall be returnable to the court having jurisdiction of the offense and shall be accompanied by a report by the arresting officer which shall clearly identify the person arrested, specifying the section of the Code of Virginia or ordinance violated, the location of the offense, a description of the motor vehicle, and its registration or license number.

If the warrant is returned to the court with the notation "not found" or the person named in the warrant does not appear on the return date thereof, the court shall forward a certificate of the fact of non-service or nonappearance, with a copy of the report specified in the foregoing provisions of this section, to the Commissioner of the Department of Motor Vehicles, who shall forthwith suspend the driver's license of such person. The order of suspension shall specify the reason for the suspension. Such suspension shall continue until such time as the court has notified the Commissioner that the defendant has appeared before the court under the terms of the summons or notice and the warrant.

46.2-940. When arresting officer shall take person before issuing authority.

If any person is: (i) believed by the arresting officer to have committed a felony; (ii) believed by the arresting officer to be likely to disregard a summons issued under § 46.2-936; (iii) refuses to give a written promise to appear under the provisions of § 46.2-936 or § 46.2-945; or (iv) *fails to sign a citation under the provisions of § 46.2-936.1*; the arresting officer shall promptly take him before a magistrate or other issuing authority having jurisdiction to determine whether probable cause exists that such person is likely to disregard a summons. The magistrate or other authority may issue either a summons or warrant as he shall determine proper.

46.2-945.1 Issuance of citations based on photographic evidence obtained by means of photo-radar device, to non-resident violators.

A. *If a Virginia State Police officer, based on photographic evidence obtained by means of a photo-radar device, as described in § 46.2-882.1, has probable cause to believe that the driver of a vehicle has violated Title 46.2, Subtitle III, Article 8, by driving in excess of the posted speed limit, the State Police or any other state agency or contractor designated by the Commonwealth shall promptly send a citation by certified mail to the registered owner, lessee, or driver of the vehicle. Such citation will contain all the information set out in § 46.2-936.1.*

B. *Upon the failure of any nonresident motorist to comply with the terms of a citation under this section, the State Police officer, or other appropriate official, shall report this fact to the Department of Motor Vehicles. Such report shall clearly identify the motorist, describe the violation specifying this statute, indicate the location of the offense, give description of the vehicle involved, and show the registration or license number of the vehicle. Such report shall be signed by the police officer or an appropriate official.*

C. *Based on the report described in paragraph B of this section, the Department of Motor Vehicles shall take the action authorized by § 46.2-946.*