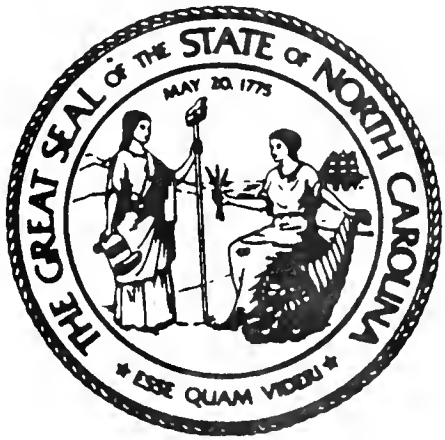
LEGISLATIVE RESEARCH COMMISSION

REPORT TO THE 1979 GENERAL ASSEMBLY OF NORTH CAROLINA SECOND SESSION, 1980



POLICE TRAFFIC RADAR

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LEGISLATIVE RESEARCH COMMISSION

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June 5, 1980

TO THE MEMBERS OF THE 1979 GENERAL ASSEMBLY (SECOND SESSION, 1980):

The Legislative Research Commission herewith reports to the 1979 General Assembly (Second Session, 1980) on the matter of the use of radar and other electronic devices for the detection of motor vehicle speed. The report is made pursuant to Resolution 71 of the 1979 General Assembly.

This report was prepared by the Legislative Research Commission's Radar Study Committee and is transmitted by the Legislative Research Commission for your consideration.

Respectfully submitted,

Carl J. Stewart, Jr. — W. Craig Lawing

Cochairmen
Legislative Research Commission

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INTRODUCTION

The Legislative Research Commission, created by Article 6B of General Statutes Chapter 120, is authorized pursuant to the direction of the General Assembly "to make or cause to be made such studies of and investigations into governmental agencies and institutions and matters of public policy as will aid the General Assembly in performing its duties in the most efficient and effective manner" and "to report to the General Assembly the results of the studies made," which reports "may be accompanied by the recommendations of the Commission and bills suggested to effectuate the recommendations." G.S. 120-30.17. The Commission is chaired by the Speaker of the House and the President Pro Tempore of the Senate, and consists of five Representatives and five Senators, who are appointed respectively by the Cochairmen. G.S. 120-30.10(a).

At the direction of the 1979 General Assembly, the Legislative Research Commission has undertaken studies of twenty-five matters, which were arranged into ten groups according to related subject matter. See Appendix A for a list of the Commission members. Pursuant to G.S. 120-30.10(b) and (c), the Commission Cochairmen appointed study committees consisting of legislators and public members to conduct the studies. Each member of the Legislative Research Commission was delegated the responsibility of overseeing one group of studies and causing the findings and recommendations of the various committees to be reported to the Commission. In addition, one Senator and one Representative from each study committee were designated Cochairmen. See Appendix B for a list of the Study Committee members.

The 1979 General Assembly authorized the Legislative Research Commission to study the use of police traffic radar and other electronic speed-measuring devices. Resolution 71 (Senate Joint Resolution 876) authorized the Commission to include in its study:

"(1) an evaluation of the reliability of available types of equipment, including techniques for calibrating the radar transmitter accuracy on a current basis;

(2) essential training and supervision of operating personnel, including special requirements, if any, of background training;

(3) legal ramifications, including nature of essential proof as to the calibration for accuracy of the equipment, qualifications of operator, and demands upon the time of various personnel arising from required appearances in court."

See Appendix C.

This study was initiated because of (1) the importance of the role of police traffic radar in traffic safety enforcement and (2) recent judicial decisions questioning the reliability and accuracy of radar as employed in those cases. See Appendix D for reprints of State v. Hanson and State of Florida v. Aquilera. These decisions did not reject the validity of the underlying scientific principles of Doppler radar. Instead, they underscored the fact that under certain conditions traffic radar has its limitations and stressed the need for adequate training of radar operators in order to guarantee that these limitations can be recognized by the

operators and that erroneous radar readings can therefore be ignored.

COMMITTEE PROCEEDINGS

The Radar Study Committee held its two meetings on March 28 and May 16, 1980, in the State Legislative Building. Although the study was authorized in 1979 and Committee members were appointed subsequent to the adjournment of the First Session of the 1979 General Assembly, the meetings were postponed while awaiting the results of a federal study on performance standards and a model training program for police speed measuring devides. This study, which was conducted by the National Bureau of Standards (NBS) for the National Highway Traffic Safety Administration (NHTSA), was originally scheduled for completion in late 1979. An extension of time was granted, and the performance standards for radar devices should be completed soon.

An interim report was issued by NHTSA and NBS in February, 1980, which revealed the results of preliminary tests of six different radar devices for accuracy and reliability. With this information and with the convening of the 1980 Session nearing, the Committee Cochairmen called the first meeting. (Both Committee meetings were well attended, as may be discerned by reference to Appendix E.)

At both meetings the Committee was presented information about the technical aspects of radar devices, radar calibration and testing requirements, training of radar operators, radar purchasing practices of governments, criticisms of quality and accuracy of some radar equipment, legal aspects of radar evidence in North Carolina and other states, and the efforts of NBS and NHTSA to arrive at federal minimum standards for radar performance and operator training.

There appears in Appendix F a list of persons who made presentations to the Committee at the March 28 and May 16 meetings. Details of both meetings are contained in the Committee's minutes, which are on file in the Legislative Library.

DOPPLER RADAR PRINCIPLES AND OPERATION

In an article in the North Carolina Law Review, entitled, "The Scientific Reliability of Radar Speedometers," Dr. John M. Kopper, one of the country's leading experts on speed radar, gave perhaps the best description in layman's terms of the principle of radar:

> "The word RADAR is made up from the capitalized letters in the set of words, RAdio Detection And Ranging. Thus, a radar method is one that may be used to detect the presence of a target and determine the distance of that target from the radar set. Radar methods can also be used to obtain information on the bearing of a target, its altitude, and speed. In all the methods electromagnetic energy in the form of radio waves is radiated from the antenna of the transmitter of the radar set so as to 'illuminate' the target; when the target is thus illuminated, it reflects a certain portion of the energy back to the receiver of the radar set. Searching the sky for a target by means of a radar set is like scanning the sky at night with a searchlight. If a part of the light set out by the searchlight comes back to your eyes, we say that something in the sky is reflecting the light, and we deduce from this fact that in the sky there is a cloud or airplane acting as a reflector. All this is a roundabout way of saying that we see a target. In a

similar way a radar set is said to 'see' a target."
33 N.C.L. Rev. 343, 344 (1954).

The radar system employed by law enforcement agencies uses the Doppler effect to read out the speeds of vehicles within the beam range of the system. The Doppler effect is a basic physical principle that states that energy striking a moving object increases or decreases in frequency in direct relation to the speed of the object. The most common example of this effect is the change in the sound of a locomotive horn as the train approaches and passes someone listening to the horn. As the train nears the listener, the pitch of the horn becomes higher; once the train passes the listener, the pitch drops dramatically. The change in pitch is a result of the Doppler effect.

In a speed radar system the Doppler effect is used to measure a change in frequency between a transmitter (radar unit) and receiver (moving vehicle). The system transmits and receives radiomicrowaves in a constant beam (unlike the intermittent pulse waves in military radar). The vehicle being monitored receives the radiomicrowaves and sends them back to the system. This system of transmission and reception satisfies the conditions necessary for the Doppler effect to occur. The radar unit interprets the changing frequency of the radiomicrowaves received from the approaching vehicle and computes the speed of the vehicle based on that frequency change.

In stationary radar systems, this computation is relatively simple because only the target vehicle is in motion. In moving radar systems, the speed of the patrol car must be taken into account. These systems, which are relatively new to the state of the art, actually send out a second beam of radiomicrowaves that reflects

off stationary roadside objects to the system. Using this data, the system then compensates for the speed of the patrol car when converting the radiomicrowave frequency received from the oncoming target vehicle.

THE CRITICS RESPOND: ILLUSTRATIONS OF POTENTIAL ERRORS

Critics of radar are not necessarily at odds with the reliabili or accuracy of radar's underlying scientific principles; rather, they are critical of (1) inadequate training of radar operators, which can result in misidentification of targets, and (2) the design of certain radar systems, which can allow external influences (human and environmental factors) to produce erroneous readings. The illustrations which appear in Appendix H are indicative of some of the potential errors pointed out by critics who are looking to improve radar systems, operation, and training.

FINDINGS

I. With the exception of those promulgated by the State Highway Patrol for its officers, North Carolina has no statewide minimum standards for radar performance, operation, or training of operators and instructors. The State Department of Crime Control and Public Safety and the Highway Patrol should be commended for their efforts in establishing guidelines in the areas of radar operation, training, and traffic safety enforcement measures. Trooper Training Bulletin Number 10, which appears in Appendix G, contains these guidelines.

II. North Carolina has no statutes addressing the legal evidentiary status of readings from radar and other speed-timing devices in cases involving speeding violations. The North Carolina

courts have admitted into evidence readings obtained by law enforcement officers operating radar and other speed-timing devices and have generally treated those readings in the same manner as other scientific evidence that is offered to prove a fact in issue. The courts have based the admissibility of all scientific test results upon authentication of the underlying scientific principle by either expert testimony, judicial notice, or statutory law. Once a preliminary determination has been made accepting the principle, the results of the scientific test are admissible subsequent to satisfactory showings of the qualifications of the test operator and the accuracy of the test instruments. Some examples of scientific evidence are blood alcohol (breathalyzer) tests in prosecutions for driving under the influence and blood tests in paternity actions.

III. The official N.C. State Highway Patrol procedure for detecting speed violators is for the officer to form an opinion through his own visual observation, independent of the radar reading, as to the speed of a vehicle, and then support that opinion with the speed reading from the radar unit. See Section 11 of the Training Bulletin in Appendix G. This is evidently contrary to popular belief, which is that the officer relies first on the radar reading and then his visual observation to detect speeding violations. The procedure in the courts of this State for the introduction of evidence of speeding is to (1) hear the testimony of the officer concerning his visual observation of the vehicle alleged to have been speeding and (2) admit into evidence the results of the speed-timing device in order to corroborate the officer's visual observation.

IV. The National Highway Traffic Safety Administration (NHTSA) is sponsoring two programs to upgrade both the reliability and credibility of police traffic radar equipment and the quality of operator training. In 1977 NHTSA entered into an interagency agreement with the National Bureau of Standards (NBS) to develop performance standards for speed-timing devices, which should be established by June 1980. At that time, NBS will coordinate the testing of existing devices against the standards and subsequently publish a qualified products list in the Federal Register. This list is designed to enable law enforcement agencies to make better-informed radar purchasing decisions and will identify specific radar units that can be purchased by those agencies with federal highway safety funds under Section 402 of Title 23 of the U.S. Code.

In September 1978, NHTSA awarded a contract for the development of a model training program for operators of speed-timing devices.

In its interim report of February 1980, NHTSA strongly urged each state to:

A. Adopt the forthcoming NBS/NHTSA radar speed measuring device performance standards and require police agencies to purchase devices meeting those standards;

B. Develop policy guidelines to ensure that radar speed measuring devices receive proper care and upkeep and establish clear procedures for programmed maintenance, testing, and calibration;

C. Ensure that adequate maintenance and calibration record systems (suitable for introduction as evidence in court) are developed and maintained by each agency using radar speed measuring devices;

D. Adopt the NHTSA radar operator training program or its equivalent as the statewide minimum training standard;

E. Develop a comprehensive State-level radar operator certification program and provide for periodic recertification (every 1-3 years);

F. Develop police radar workshops and seminars for traffic adjudication personnel; and

G. Establish State-level policy/procedural guidelines to ensure proper use of police traffic radar in meeting traffic safety and energy conservation goals and objectives.

The NHTSA report asserts that radar is a reliable tool when properly installed and operated by skilled and knowledgeable personnel. NHTSA believes that the adoption by the states of the measures listed above should enable law enforcement agencies to respond more effectively to challenges to radar such as those raised in Wisconsin and Florida.

RECOMMENDATIONS

I. The General Assembly should enact legislation to enable the North Carolina Criminal Justice Education and Training Standards Commission to (A) establish minimum standards and levels of training for certification and recertification of operators of and instructors for training programs in speed-timing instruments and (B) certify and recertify those persons for each type of speed-timing instrument.

II. The General Assembly should enact legislation to enable the Commission and the Secretary of Crime Control and Public Safety to jointly (A) approve the use of specific types of speed-timing instruments and (B) establish procedures for the operation and standards for calibration and testing for accuracy of each approved instrument.

Comment to Recommendations I and II: The Criminal Justice Education and Training Standards Commission (which is created in General Statutes Chapter 17C) is charged with the power and duty to (1) establish standards for the education and training of State and local criminal justice officers, which by definition includes law enforcement officers who would operate speed-timing devices, and (2) certify criminal justice officers in accordance with the Commission's standards. The requisites of the membership of the Commission as set out in G.S. 17C-3(a) indicate that the Commission would be well qualified and best suited to establish the standards for operator training, certification, and recertification; operation, calibration and testing, and approval of specific speed-timing devices. See Appendix I for a listing of the membership.

III. The General Assembly should enact legislation that addresses the admissibility of speed-timing evidence in judicial proceedings and that requires periodic testing of all electronic speed-timing instruments. The results of an electronic speed-timing instrument should not be admissible unless (A) the operator is certified by the Commission, (B) the operator used the instrument according to the procedures established by the Commission, (C) the instrument used was approved for use by the Commission and the Secretary, and (D) the instrument had been calibrated and tested for accuracy according to Commission standards.

Although the Federal Communications Commission requires annual frequency checks of radar units, the law should require testing for accuracy (which is not the same as calibration) at least once every six months by a qualified technician. This would in effect codify the present practice of the State Highway Patrol.

IV. The effective date of the legislation that would implement Recommendations I through III should be no sooner than July 1, 1981, assuming such legislation is enacted during the 1980 Session. This would provide for a beneficial evaluation of the legislation during the interim period and would allow the 1981 General Assembly time to make necessary corrections to the legislation.

V. The Legislative Research Commission should be authorized to continue its study of radar and other speed-timing devices and to report to the 1981 General Assembly. Because the federal agencies involved in establishing guidelines for radar and other speed-timing instruments will not be arriving at those guidelines until near or after the adjournment sine die of the 1979 General Assembly, the Research Commission believes that its Radar Study Committee should remain in existence to permit it to (A) consider the forthcoming federal guidelines, other related developments, and input and responses from persons that would be affected by Recommendations I through III in this report and (B) provide the 1981 General Assembly with information.

See Appendix J for these recommendations in bill form.

STATE OF NORTH CAROLINA

LEGISLATIVE RESEARCH COMMISSION

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1979-1981

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STATE OF NORTH CAROLINA

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RADAR STUDY COMMITTEE

1979-80

LRC Member Responsible for Study:

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Tabor City

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Senator James H. Edwards
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Committee Members:

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Mr. Charles McCuiston
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Resolutions—1979

S. R. 876 **RESOLUTION 71**

A JOINT RESOLUTION AUTHORIZING THE LEGISLATIVE RESEARCH COMMISSION TO STUDY THE USE OF ELECTRONIC DEVICES FOR THE DETECTION OF SPEED OF MOTOR VEHICLES.

Whereas, the use of radar and other types of electronic equipment for metering the speed of motor vehicles has become commonplace, and law enforcement officers rely heavily upon such devices in the detection and prosecution of alleged speeders; and

Whereas, recent court decisions and rulings have raised serious questions as to the appropriateness of the devices for speed metering purposes and the value as evidence of the information obtained through use of the devices; and

Whereas, it is important to law enforcement officials, to persons using the highways, and to the courts that reliable answers be provided to the questions raised as to the use of these devices;

Now, therefore, be it resolved by the Senate, the House of Representatives concurring:

Section 1. The Legislative Research Commission is authorized to conduct a study of the use of radar and other electronic devices for metering the speed of motor vehicles. The study may include:

(1) an evaluation of the reliability of available types of equipment, including techniques for calibrating the radar transmitter accuracy on a current basis;

(2) essential training and supervision of operating personnel, including special requirements, if any, of background training;

(3) legal ramifications, including nature of essential proof as to the calibration for accuracy of the equipment, qualifications of operator, and demands upon the time of various personnel arising from required appearances in court.

Sec. 2. The Legislative Research Commission may make its report, with recommendations and with a draft of recommended implementing legislation, if any to the 1980 General Assembly.

Sec. 3. This resolution is effective upon ratification.

In the General Assembly read three times and ratified, this the 8th day of June, 1979.

3. **Automobiles and Other Motor Vehicles §744*—prima facie presumption—accuracy of radar—requisites.**
In Wisconsin, prima facie presumption of accuracy sufficient to support speeding conviction will be accorded to moving radar upon testimony by competent, operating police officer that: (1) officer operating device has adequate training and experience in its operation; (2) radar device was in proper working condition at time of arrest; (3) device was used in area where road conditions are such that there is minimum possibility of distortion; (4) input speed of patrol car must be verified; and (5) speed meter is expertly tested within reasonable proximity following arrest and that such testing is done by means which do not rely on radar device's own internal calibrations.

4. **Automobiles and Other Motor Vehicles §752*—speeding—judicial notice as to accuracy of radar—burden of proof—failure requiring reversal.**
Where state failed in showing that judicial notice should have been taken as to reliability and accuracy of moving radar device and failed to carry its burden of proof in prosecution of speeding citation based upon speed reading from such device, conviction would be reversed.

APPEAL from a judgment of the circuit court for Dane county: RICHARD BARDWELL, Circuit Judge. *Reversed and remanded.*

This is an appeal by Lawrence I. Hanson from an order affirming a judgment of conviction entered in the Dane County Court finding Hanson guilty of speeding in violation of sec. 346.57(4), Stats. The judgment of conviction entered by the HON. ARCHIE SIMONSON, County Judge, was made pursuant to an order of the Dane County Circuit Court reversing the County Court's original finding of not guilty. The HON. WILLIAM SACHTJEN reversed the original County Court finding of not guilty on an appeal brought by the state to the Circuit Court of Dane County. The state's appeal to the Circuit Court challenged Judge Simonson's ruling that judicial notice could not be taken of the accuracy and

* See Callaghan's Wisconsin Digest, same topic and section number.

STATE, Respondent, v. HANSON, Appellant.†

Supreme Court

No. 76-061. Argued September 6, 1978.—Decided October 3, 1978.
(Also reported in 270 N.W.2d 212.)

1. **Trial §22*—reopening case—nonautomatic—court's motion—complete record in interests of equity and justice.**
Although litigant has no automatic right to reopen case in order to produce additional testimony, court may on its own motion reopen for further testimony in order to make more complete record in interests of equity and justice.

2. **Evidence §1*—prima facie presumption—judicial notice—propriety.**
Prima facie presumption is very different legal creature than fact for which judicial notice can be taken.

that a verdict contrary to the evidence is a distinct matter from a verdict whose answers are inconsistent to one another.

† Motion for reconsideration denied, without costs, on November 28, 1978.

* See Callaghan's Wisconsin Digest, same topic and section number.

reliability of the speed radar device used in Hanson's arrest.

On January 4, 1975 at 1:18 p.m., the defendant, Lawrence I. Hanson, was ticketed for speeding on U. S. Highways 18–151 in the Town of Verona. He was cited for a violation of sec. 346.57(4), Stats., for allegedly traveling at a speed of 68 m. p. h. in a 55 m. p. h. zone. Hanson's speed on the highway was measured by a speed radar device.

Hanson contested the accuracy of the radar at trial on July 21, 1975 before the HON. ARCHIE SIMONSON, County Judge. At that time, the state called but one witness, Trooper Charles W. Holl. Holl was the patrolman operating the radar device that measured Hanson's speed. He testified the radar unit used was a "moving radar." The moving radar unit used is known by its manufacturer's trade name as the MR–7.

Trooper Holl also testified to the fact that he had received one hour of classroom instruction on the use of the moving radar device, and that he had practical experience with it since October, 1974 when the State Patrol bought this type of radar instrument. Holl also testified that in the morning prior to Hanson's citation he had tested the radar to insure its working order. Holl also testified that before and after issuing Hanson the citation he had tested the radar to insure that it was working properly. Holl stated that he couldn't remember if he had used the radar's "verify button" following the 68 m. p. h. reading on Hanson. Holl testified that his squad car was traveling 50–55 m. p. h. when he took the reading on Hanson.

At the close of Trooper Holl's testimony the state asked Judge Simonson to take judicial notice as to the accuracy and reliability of the "moving radar" device. Following this request, the state rested. The defense objected to judicial notice being taken in that there had been no competent proof offered to establish its reliability and accuracy.

On July 29, 1975, Judge Simonson determined that judicial notice could not be taken as to the MR–7's reliability and accuracy. Judge Simonson scheduled the matter for continued hearings where expert testimony could be introduced due to the technical nature of the device.

At the continued hearing defense counsel objected to the reopening of the case and moved in opposition to any further proceedings. The motion was denied. The expert testimony elicited at the continued hearings will be dealt with in the body of this decision. On October 8, 1975, Judge Simonson rendered a written decision finding the defendant not guilty of speeding, specifically finding that the state had not proven the moving radar was sufficiently accurate and reliable so as to base a conviction upon its measurement of the defendant's speed. Appeal was taken to the Dane County Circuit Court by the state.

Judge Sachtjen reversed Judge Simonson stating there was no significant difference between stationary and moving radar, and that Wisconsin has accepted by judicial notice the accuracy and reliability of stationary radar. Judge Sachtjen further noted the policy consideration that, in requiring the state to produce expert testimony in every speed radar case, law enforcement of speeding prosecutions would be adversely affected.

On remand, Judge Simonson found himself obligated to follow the Circuit Court decision and found the defendant guilty of speeding. On appeal by the defendant, the HON. RICHARD BARDWELL, Circuit Judge, in an oral opinion and written order, affirmed the determination of guilt ostensibly to avoid conflicting Circuit Court decisions.

For the appellant there were briefs by *Peter M. Gennrich* and *Jenswold, Studt, Hanson, Clark & Kaufman* of Madison and oral argument by *Mr. Gennrich.*

For the respondent the cause was argued by *Albert Harriman*, assistant attorney general, with whom on the brief was *Bronson C. La Follette*, attorney general.

COFFEY, J. Two issues are presented for review:

1. Whether the trial court erred when, on its own motions, it permitted the state after resting to reopen its case in order to supply the court with expert testimony as to the reliability and accuracy of the MR-7?

2. Whether the Circuit Court erred in reversing the County Court's determination that judicial notice could not be taken as to the reliability and accuracy of the MR-7?

[1]

The issue as to whether the trial judge can reopen a party's case for further testimony after the party has rested is important in determining the scope of the record from which this court makes its review. If the trial court improvidently reopened the case for further testimony, this court would be obliged to determine this case without the benefit of the expert testimony given at the continued hearings. We do not find the trial court in error in this respect. It has been consistently held that a litigant has no automatic right to reopen a case in order to produce additional testimony, but this limitation is not applicable to the trial court. The court may on its own motion reopen for further testimony in order to make a more complete record in the interests of equity and justice. *Diener v. Heritage Mut. Ins. Co.*, 37 Wis.2d 411, 422, 151 N.W.2d 721 (1967); *In re Estate of Javornik*, 35 Wis.2d 741, 746, 151 N.W.2d 721 (1967). This rule promotes efficient judicial administration in avoiding another trial due to an incomplete record.

As to the second issue, the expert testimony received at trial indicated that both the stationary radar and moving radar devices rely on the same scientific principle know as the Doppler effect. Webster's Third New International Dictionary defines the Doppler effect as a scientific principle in the following manner:

"A change in the frequency with which waves [as sound, light, or radio waves] from a given source reach an observer, the frequency decreasing with the speed at which source and observer move away from each other and increasing with the speed at which they move toward each other so that the pitch of a sound is apparently raised or lowered as the source and the observer move toward or away from each other. . ."

In a speeding conviction based upon a stationary radar instrument, a legal explanation of the Doppler effect and its application in speed radar was presented in *East Cleveland v. Ferrell*, 168 Ohio St. 298, 154 N.E.2d 630 (1958) at 631:

"The radar speed detecting devices commonly used in traffic control operate on what is known as the Doppler Effect and utilize a continuous beam of microwaves sent out at a fixed frequency. The operation depends upon the physical law that when such waves are intercepted by a moving object the frequency changes in such a ratio to the speed of the intercepted object that, by measuring the change of frequency, the speed may be determined."[1]

Many states have held that judicial notice can be taken as to the reliability and accuracy of stationary radar due to the scientific acceptance of the soundness of the Doppler effect.[2] 47 A.L.R.3d 822, "Proof, by Radar

[1] For a substantially similar explanation see: *People v. Magri*, 3 N.Y.2d 562, 565, 170 N.Y.S.2d 335, 337, 147 N.E.2d 728 (1958).

[2] Ark.—*Everight v. Little Rock*, 230 Ark. 695, 326 S.W.2d 796 (1959); Cal.—*People v. MacLaird*, 264 Cal. App.2d 972, 71 Cal. Rptr. 191 (1968); Conn.—*State v. Tomanelli*, 153 Conn. 365, 216 A.2d 625 (1966); Ill.—*People v. Abdallah*, 82 Ill. App.2d 312, 226 N.E.2d 408 (1967); Ky.—*Honeycutt v. Commonwealth*, 408 S.W.2d 421 (1966); Minn.—*State v. Gerdes*, 291 Minn. 353, 191 N.W. 2d 428 (1971); Mo.—*State v. Graham*, 322 S.W.2d 188 (1959, Mo. App.); N.J.—*State v. Dantonio*, 18 N.J. 570, 115 A.2d 35, 49 A.L.R. 2d 460 (1955); N.Y.—*People v. Magri*, 3 N.Y.2d 562, 170 N.Y.S. 2d 335, 147 N.E.2d 728 (1958); Ohio—*East Cleveland v. Ferrell*,

or Other Mechanical or Electronic Devices, of Violations of Speed Regulations."

The moving radar is a relatively recent innovation and at the time of the arrest in this case, moving radar had only been in use in Wisconsin for three months. Moving radar is claimed to have advantages over the traditional stationary radar which is mounted to a parked police car. The moving radar, on the other hand, can be used in tracking the speed of a car traveling in the opposite direction from a moving squad car. While both radar units employ the Doppler effect, the difference from stationary radar is that two frequency beams are emitted instead of just one. The moving radar's second beam is used to determine the patrol car's speed. The moving radar contains computer components which determine the speed of an oncoming car by subtracting the speed of the moving patrol car from the closing rate of the oncoming car to the patrol car.

To this court's knowledge, the State of Ohio is the only jurisdiction in the nation which has permitted the taking of judicial notice as to the reliability and accuracy of a moving radar unit. *State v. Shelt,* 46 Ohio App.2d 115, 346 N.E.2d 345 (1976). A New York court in *People v. Cunha,* 93 Misc.2d 467, 402 N.Y.S.2d 925 (1978) did not directly address the issue before this court, but held a speeding conviction using an untested moving radar device can uphold a conviction for speeding when the speed of the alleged violator can be supported by the testimony of qualified observers. A law enforcement officer was found to be a qualified observer. *Supra* at 926.

This case is indeed novel in raising a challenge as to whether judicial notice can be taken as to the reliability and accuracy of a moving radar device. Its novelty is heightened by the fact that Wisconsin has never directly ruled upon whether judicial notice can be accorded the accuracy and reliability of any speed radar device. The Circuit Court opinions found there was no reason to distinguish the moving radar from a stationary machine. These decisions relied on *State v. Trailer Service, Inc.,* 61 Wis.2d 400, 212 N.W.2d 683 (1973) in finding that judicial notice had been taken as to the reliability of stationary radar and the same treatment should be given to moving radar devices. The reliance on *State v. Trailer Service, Inc., supra,* is misplaced for it was stated at 408:

"A scientific or medical method not recognized as acceptable in the scientific or medical discipline as accurate does not enjoy the presumption of accuracy, *i.e.,* lie-detector tests. *See* cases cited at Anno. (1952), *Physiological or Psychological Truth and Deception Tests,* 23 A.L.R.2d 1306, 1308, sec. 2; *State v. Bohner* (1933), 210 Wis. 651, 246 N.W. 314; *LeFevre v. State* (1943), 242 Wis. 416, 8 N.W.2d 288; *State v. Perlin* (1955), 268 Wis. 529, 68 N.W.2d 32. But tests by recognized methods need not be proved for reliability in every case of violation. Examples, speedometer, breathalyzer, radar. *See* cases cited at Anno. (1973), *Speeding—Proof—Radar,* 47 A.L.R.3d 822, 831, sec. 3; *see also:* Anno. (1967), *Intoxication—Tests—Statutes,* 16 A.L.R.3d 748; 46 A.L.R.2d 1176; 127 A.L.R. 1513; 7 Am. Jur.2d, *Automobiles and Highway Traffic,* p. 878, sec. 334. These methods of measurement carry a prima facie presumption of accuracy. Whether the test was properly conducted or the instruments used were in good working order is a matter of defense. The administration of law would be seriously frustrated if the validity of basic and everyday accepted tests had to be a matter of evidence in every case in the first instance."

[2]

The clear wording of the court's opinion in the *Trailer Service* case is that there is a "prima facie presumption" as to the accuracy of radar. A prima facie presumption

168 Ohio St. 298, 7 Ohio Ops.2d 6, 154 N.E.2d 630 (1958); Tenn.—*Hardaway v. State,* 202 Tenn. 94, 302 S.W.2d 351 (1957) (dictum); Tex.—*Wilson v. State,* 168 Tex. Crim. 439, 328 S.W.2d 311 (1959) (apparently recognizing rule).

is a very different legal creature than a fact for which judicial notice can be taken.

Sec. 902.01(2), Stats., indicates the type of facts upon which judicial notice may be taken:

"KINDS OF FACTS. A judicially noticed fact must be one not subject to reasonable dispute in that it is either (a) generally known within the territorial jurisdiction of the trial court or (b) capable of accurate and ready determination by resort to sources whose accuracy cannot reasonably be questioned."

As stated in the Federal Advisory Committee Notes published with the Wisconsin Code of Evidence in 56 Marq. L. Rev. 155 at 170, as to judicially noticed facts, "[A] high degree of indisputability is the essential prerequisite." Additionally, in *Fringer v. Venema*, 26 Wis.2d 366, 132 N.W.2d 565 (1965), it was established that expert testimony could be given in aiding a court in taking judicial notice. At 372 it was stated:

" 'Courts will take judicial notice of "scientific" facts which have been well established by authoritative scientists and are generally accepted as irrefutable by living scientists.' "

Based upon the standards of *Fringer v. Venema, supra*, the court finds in this case that neither authoritative scientists nor irrefutable scientific fact was presented.

The state called as an expert witness William Goodsen, an engineering manager for Custom Data Communications, Inc. Goodsen's employer manufactures the "moving radar" used by the State Patrol. Goodsen is a trained engineer who has done post-graduate study. It was Goodsen's testimony that the MR–7 is virtually always accurate all but one percent of the time. To his knowledge the only road condition affecting the accuracy of the MR–7 was the traffic condition where a large truck would pass the squad car; the reading for the squad would be affected, but usually in the motorist's favor.

The defense called Jerry Schroeder, an electronics engineer with West Bend Autotronics, a competitor of Custom Data. Schroeder has a two-year degree in engineering and has nine years practical experience in the field. He testified as to the results of tests he had run with a State Patrol MR–7.

He found the MR–7 to be inaccurate 15 to 20 percent of the time. The inaccuracy usually resulted on two-lane highways where traffic is congested or where the roadside is heavily covered with trees or signs. Schroeder stated that the MR–7's inaccuracy usually resulted from an incorrect patrol car speed being registered. The error in the patrol car speed was found to be as much as 20 m.p.h. slow, and this in turn caused a higher speed being calculated for the oncoming car. The tests were conducted under conditions where a calibrated speedometer was not used, and speed was determined by time-distance calculations from stop watch readings.

Apart from the Circuit Court's conclusion that *State v. Trailer Service, Inc., supra*, had accorded judicial notice to stationary radar devices, when the testimony of these experts is put against the testing standards of authoritative irrefutability, judicial notice should not have been taken. Sec. 902.01(2), Stats.; *Fringer v. Venema, supra*. Frequently, persons appearing as experts who are business competitors to one another in a limited market area lack the independent judgment required of an authoritative expert. Further, we find no challenge in the record to the expertise of Jerry Schroeder, and, although his tests were conducted under adequate scientific conditions, these test conditions were hardly in conformity to optimum scientific procedures. The existence of credible, conflicting expert testimony refutes the idea that the accuracy of the MR–7 was indisputable. Despite Schroeder's failure to conduct his testing of the MR–7 under optimum scientific conditions, we do not

find his testimony incredible as a matter of law.[3] Therefore, due to the conflicting expert testimony, judicial notice should not have been taken as to the MR–7's reliability and accuracy.

Given that the law in Wisconsin at the time of trial was that a prima facie presumption could be accorded the accuracy of speed radar, the existence of credible, conflicting expert testimony becomes an issue of fact. The County Court sitting without a jury as the trier of fact found the defense testimony persuasive and ruled for the defendant. We find in this case based upon the record that the reviewing Circuit Court should not have reversed the trial court on an issue of fact dealing with the credibility of the witnesses when there is credible

[3] Dr. John M. Kopper, one of the nation's leading experts on speed radar, gives a layman's explanation to the workings of a speed radar in his treatise "The Scientific Reliability of Radar Speedmeters," 33 N. C. L. Rev. 343, 16 Md. L. Rev. 1. At 344, Dr. Kopper stated:

"Searching the sky for a target by means of a radar set is like scanning the sky at night with a searchlight. If part of the light set out by the searchlight comes back to your eyes, we say that something in the sky is reflecting light, and we deduce from this fact that in the sky there is a cloud or airplane acting as a reflector. All of this is a roundabout way of saying that we see a target. In a similar way a radar set is said to 'see' a target."

Schroeder's testimony that the accuracy of a radar unit is adversely affected by the greater number of targets along a roadside is entirely logical. The greater number of targets the greater the chance the speed of the patrol car will be determined by more than one target. The time-distance differential between more than one tracked target will render the reading on the squad car speed inaccurate.

Minnesota, in giving judicial notice to the underlying principles of the stationary radar but refusing to give judicial notice as to its accuracy, noted that in proving a case necessary to support a speeding conviction there must be proof that the radar was used in an area with the minimum possibility of distortion. *State v. Gerdes*, 291 Minn. 353, 191 N.W.2d 428, 432 (1971).

evidence which under any reasonable view fairly admits of an inference which supports the verdict. *Jacobs v. Stack*, 63 Wis.2d 672, 676, 218 N.W.2d 364 (1974). Since we have found the defense testimony not to be incredible as a matter of law, the trial court's finding of not guilty should have been affirmed. If one accepts the defense testimony as credible that the inaccuracy of the MR–7 results from an incorrect calculation of the patrol car speed, it is persuasive to finding the defendant not guilty in that Trooper Holl failed to establish the use of the "verify button" on this particular occasion. The "verify button" permits the patrolman by utilizing the radar's memory function to ascertain the exact reading on the squad's speed as entered into the radar's speed equation. The reading on the squad's speed then can be manually checked against the squad car's calibrated speedometer. In light of the expert testimony as to the potential inaccuracy of the calculation of the patrol car's speed, we find the use of the "verify button" and other testing techniques important safeguards in ascertaining an accurate radar reading.

Consequently we hold, that as to the MR–7 used on the date in question, the state not only failed in showing that judicial notice should be taken as to its reliability and accuracy, but that it failed to carry its burden of proof in the prosecution of a speeding citation based upon a speed reading from an MR–7 radar device.

The court takes this opportunity to establish guidelines for the prosecution of speeding citations issued on the basis of a moving speed radar device. The courts of this state may take judicial notice of the reliability of the underlying principles of speed radar detection that employs the Doppler effect as a means of determining the speed of moving objects. To this end, expert testimony is not needed to determine the initial admissibility of speed radar readings. The radar reading may be in-

troduced by the operating law enforcement official, if he is qualified in its use and operation.

The accuracy of any speed radar device is another matter. The accuracy of the most indisputable scientific theory is subject to its application in particular conditions. The application of any virtually undisputed scientific fact to the immediate surrounding conditions must be explained in ascertaining its accuracy.

[3]

Consequently, in Wisconsin a prima facie presumption of accuracy sufficient to support a speeding conviction will be accorded to moving radar upon testimony by a competent, operating police officer that:.

1. The officer operating the device has adequate training and experience in its operation.

2. That the radar device was in proper working condition at the time of the arrest. This will be established by proof that suggested methods of testing the proper functioning of the device were followed.

3. That the device was used in an area where road conditions are such that there is a minimum possibility of distortion.

4. That the input speed of the patrol car must be verified, this being especially important where there is a reasonable dispute that road conditions may have distorted the accuracy of the reading (*i.e.*, presence of large trucks, congested traffic and the roadside being heavily covered with trees and signs).

5. That the speed meter should be expertly tested within a reasonable proximity following the arrest and that such testing be done by means which do not rely on the radar device's own internal calibrations.

We do not foresee these conditions to proving a prima facie speeding case will place an onerous burden upon the law enforcement of speeding violators. We believe these conditions are necessary to maintaining and improving

the public confidence in the law enforcement and judicial systems. For the average law abiding American citizen, minor traffic offenses constitute the only contact such a person will have with the law enforcement and judicial systems. Public confidence rests upon the fairness of such proceedings. Until a radar device is invented that is accurate under any conditions, fairness dictates that contested prosecutions are conducted according to meaningful standards which insure the instrument's accuracy.

[4]

By the Court.—Judgment reversed and case remanded for proceedings not inconsistent with this opinion.

IN THE COUNTY COURT
IN AND FOR DADE COUNTY FLORIDA

THE STATE OF FLORIDA,

Plaintiff,

vs

ANA AQUILERA, (AND CONSOLIDATED CASES)

Defendant.

CASE NOS: 711-101S, 309-104S, 711-307S
496-904R, 644-372P, 332-088Y
725-391S, 622-863S, 829-297X
132-781Y, 956-402Y, 353-145T
634-395S, 123-764S, 233-748S
360-809S, 892-382S, 340-269S
239-297Y, 433-4[illegible]5Y, 257-431S
696-977S, 357-500S, 640-416S
115-325S, 250-708S, 429-646Y
647-109X, 163-947Y, 430-798Y
628-352T, 656-725X, 868-898R
160-543Y, 924-944S, 339-214S
649-601X, 713-798S, 381-575T
721-546S, 628-238T, 327-752S
027-343Y, 922-484S, 214-466P
715-592S, 724-088S, 159-266Y
630-823S, 922-147X, 164-103Y
924-561S, 274-986S, 337-364Y
888-320S, 296-236T, 894-270S
742-143S, 427-996Y, 740-304S
897-418S, 240-683S, 894-357S
240-974Y, 730-504S, 296-143T
889-204S, 285-304T, 737-836S
910-199S, 302-805Y, 420-204T
631-951T, 242-194S, 356-938S
361-942S, 238-100Y, 790-215R
743-461S, 239-062Y

ORDER GRANTING MOTIONS TO SUPPRESS AND/OR EXCLUDE

THIS CAUSE came on to be heard on the Defendants' Motions to Suppress and/or Exclude the results of radar speed measuring devices with both the Defendants and the State presenting expert testimony and introducing exhibits to support their respective positions.

At the outset, Messrs Michael Lederberg and Paul Tunis for the Public Defender's office and Mr. Ken Drucker for the State Attorney's office are to be commended for affording the Court an opportunity to truly be informed of the issues in this complex case of first impression, without the necessity of hurdling technical obstacles since all parties have agreed to waive most legal niceties in the search for reasonable answers to the questions involved. Although there have been a few challenges to radar readings in other courts, I say case of first impression because, as far as has been determined, this is the first time that any court has been presented so much testimony and so many exhibits from so many highly qualified experts summoned from all parts of the country. This is undoubtedly due to the fact that no single defendant can afford the tremendous cost in money and time to produce such a defense to a speeding charge.

The Court has heard over two thousand pages of testimony and arguments, and has also examined thirty-three exhibits presented by highly trained and experienced specialists in the fields of mathematics, electrical engineering, and the design, construction and testing of radar devices. Of course, the various and many times diverse opinions of these renowned experts must be tempered by their respective interests in the results of this hearing.

At this point, let us understand that this hearing has dealt only with radar used by police as speed measuring devices in its present mode. There has been no argument with the Doppler system itself, but only as to its use by the current units. Although not having any real bearing on the questions before the court except, perhaps, to emphasize the arguments herein, there has been an apparent belief throughout this hearing that these devices can and should be improved to the extent that they are accurate and identification of the target vehicles can be readily made, under any conditions. Undoubtedly, the manufacturers with their scientific and financial resources can accomplish this in the very near future. The prime inhibition against such success is their quoted awareness that the Purchasing Agents at all levels of the government seem to place economy ahead of quality. If this is true, then it is a disservice to the motoring public, and can place the courts in an untenable position. As the court said in Wisconson v. Hanson case #76-061, 1978, "For the average law abiding American citizen, minor traffic offenses constitute the only contact such a person will have with the law enforcement and judicial systems. Public confidence rests upon the fairness of such proceedings...fairness dictates that contested prosecutions are conducted according to meaningful standards, which insure the instrument's accuracy. Although the Court there referred to certain guidelines, I feel it is equally applicable to the use of inadequate specifications for the evidentiary speed measuring unit.

With respect to the desire for economy, we should refer to the testimony of Mr. Sargent, a manufacture's official, who disclosed that in large quantity purchases, they were able to reduce the single purchase price of $2,500 per unit to $375 per unit. Without questioning what may seem to be a strange profit structure, it would behoove us to establish a

central purchasing office on the state level for radar units so that advantage can be taken of such substantial reductions. The total number of units required could be determined by the requisition from the various lower governmental entities who would then pay for their share at the discount price. Thus the savings would, at least in part, offset the increased cost of the improved product. In line with this procedure, I would then urge such agency to retain the services of independant, highly skilled radar engineers to establish sufficiently high standards of specifications so that accuracy of speed readings and exact identification of the target vehicle will be assured under any conditions.

I recognize that many millions of dollars in revenue are involved in "speeding" fines but let it be understood once and for all, the function of the traffic court is to convict the guilty, acquit the innocent, and improve traffic safety but not to be merely an arm of any revenue collection office. At the same time, if the errors alleged by the opponents of radar do exist, then one must wonder - What percentage of these millions of dollars has been collected from erroneously convicted defendants? - How many of these defendants have suffered the additional penalties of extremely higher insurance rates, and the unnecessary compiling of points with the consequent loss of drivers' licenses and perhaps jobs?

While not pertaining to the reliability of radar, it is incumbent upon the Court to refer to the part of the testimony which raises the spectre of radiation within the police vehicles. It is conceded that the amounts involved are within government safety limits, however, we must take notice that such limits have been wrong in other areas and unfortunately the affects are sometimes not observed until the next generation. My concern is further enhanced by the statement of the expert witness, Dr. Nichols, that there is an ongoing investigation of the problem.

Without repeating any of the voluminous testimony, suffice it to say that it contained in-depth studies of practically all of the errors alleged to be inherent in varying degree in the vast majority of radar units in present usage. Described therein were the Cosine error; Batching error; Panning and Scanning errors; Shadowing error; errors due to outside interferences such as billboards, overpasses, passing

C.B. radios and many other similar causes; errors due to inside interferences such as heater and airconditioning fans, and police radios etc.; errors due to improper mounting of the radar unit; errors due to heat build up; errors due to power surge by shutting off and turning on the radar at the last minute to avoid radar detecting devices; errors due to the auto lock system; errors due to reliance on the auto alarm system; errors due to mirror switch aiming; and errors in the identification of target vehicles due to modern day traffic patterns and the mixture of sizes of vehicles and varied materials in their construction. Admittedly more of these errors pertain to radar in the moving mode than in the stationary mode. Certainly, some of these problems are minimal in degree but their potential has been attested to not only in scientific theory but many have been perceived in actual tests by the witnesses. The State's witnesses have denied these problems but in doing so have expressed a reliance on adequately trained officers recognizing same and not issuing tickets. However, the defense witness, Dr. Nichols, whose expertise and objectivity have been conceded by Mr. Drucker, has prescribed an intensive course of training in both classroom and in the field with written examinations for proof of qualification, conducted by an independent, highly skilled radar operator and not by a manufacturer's agent or his students. Such a program has not apparently been pursued. Even with this type of curriculum, Dr. Nichols seems to imply that there would only be a lessening of the problems.

All of this resolves itself into one main issue, to wit: the reliability of radar speed measuring devices as used today.

Based upon all of the testimony, exhibits, and argument of counsel, I find that the reliability of the radar speed measuring devices as used in their present modes and particularly in these cases, has not been established beyond and to the exclusion of every reasonable doubt and it is therefore,

ORDERED AND ADJUDGED that the Motions to Suppress and/or Exclude herein be and they are hereby granted.

DONE AND ORDERED in Miami, Florida, this 7th day of May, 1979.

JUDGE ALFRED (FRED) NESBITT
COUNTY COURT JUDGE

APPENDIX E

PERSONS WHO ATTENDED ONE OR BOTH COMMITTEE MEETINGS

Floyd Bass	Governor's Highway Safety Program
Alan D. Briggs	N.C. Academy of Trial Lawyers
L.S. Butler	Greensboro Polic Department (PD)
David D. Cashwell	Criminal Justice Standards and Traini
Jimmie L. Cavanaugh	Winston Salem PD
John Cherry	Charlotte PD
L.E. Coltrane, Jr.	City of Greensboro
Jane R. Garvey	N.C. Police Attorneys Assn.
Wayne Gilley	Winston-Salem PD
Fred H. Hart	Kinston PD
E.W. Hostetler	Decatur Electronics
Kenneth J. Johnson	Raleigh PD
Ann McElroy	Governor's Highway Safety Program
Tom McGraw	Kustom Electronics
William H. Michie	Governor's Highway Safety Program
Billy Lee Needham	Purchase & Contract (DOA)
Larry C. O'Quinn	Kinston PD
William R. Pittman	N.C. Dept. of Crime Control & Public Safety
Roscoe Pouncy	Winston-Salem PD
Oliver D. Redd	Winston-Salem PD
Donald W. Reinfurt	N.C. Highway Safety Research Center
Carlie Smith	Governor's Highway Safety Program
Robert Stevenson	N.C. Dept. of Community Colleges

APPENDIX F

PERSONS WHO MADE PRESENTATIONS TO THE COMMITTEE

Joseph Arrowood
N.C. Dept. of Crime Control and Public Safety (CCPS)

David R. Blackwell
Office of the Attorney General

Bryce K. Brown
Decatur Electronics, Inc.

Charles English
CCPS

William Goodson
Kustom Electronics

Sandra Hartley
Kustom Electronics

W. L. Henderson
Greensboro Police Dept.

James Jackson
Kustom Electronics

Van McSwain
High Point Police Dept.

Neal H. Sanders
Electrolert, Inc.

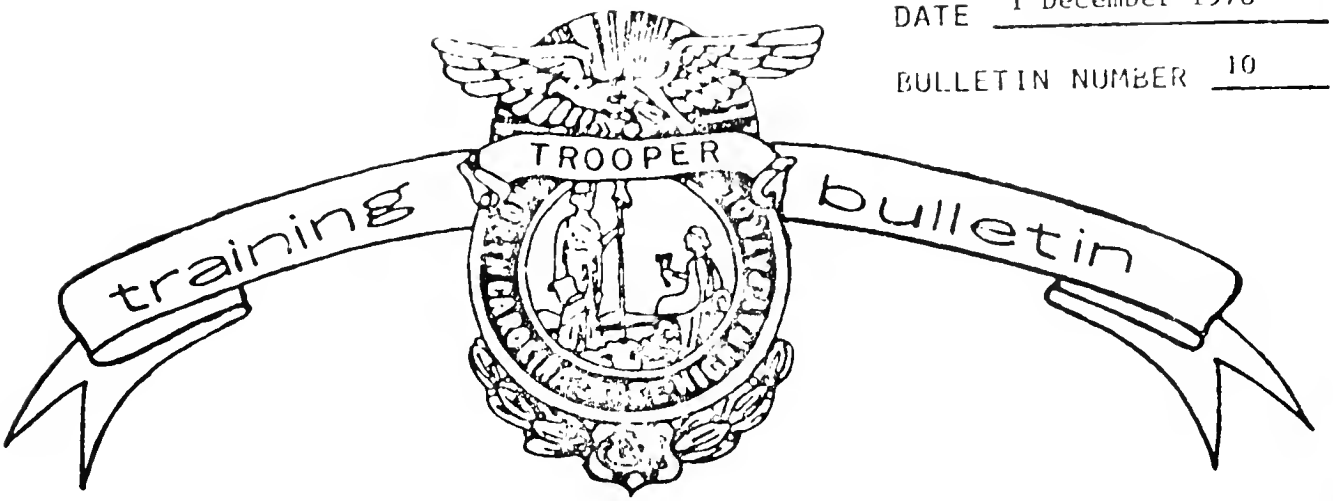
Ed Sergent
M.P.H. Industries, Inc.

Ralph Strother
N.C. Dept. of Community Colleges

John D. Yacos, III
Kustom Electronics

Revised:
DATE 1 December 1978

BULLETIN NUMBER 10



COLONEL JOHN T. JENKINS, COMMANDING

SPEED-TIMING DEVICES

1. FUNCTION

Members shall be governed by the following procedures concerning captioned subject. For the purpose of this Training Bulletin, the terms speed-timing and speed-checking will be used interchangeably and have the same meaning.

2. SELECTIVE USE OF SPEED-TIMING DEVICES

a. District First Sergeants are held accountable for the selective use of speed-timing devices - commensurate with rural traffic collision experience which identifies and matches the need for speed enforcement efforts. (Unusual or special circumstances may warrant the use of speed-timing devices elsewhere; however, deviations from the above assignment and operational policy must meet the approval of the affected First Sergeant's immediate supervisor.)

b. Speed enforcement action, via the use of speed-timing devices in Patrol vehicles, will be taken when and where violations are discovered - irrespective of the traffic collision experience.

3. PATROL VEHICLE CROSSING HIGHWAY MEDIANS IN PURSUIT OF SPEEDERS

a. Crossing the grassed medians of dual lane highways causes damages to the grassed areas, highway shoulders, drainage ditches, front end alignment, and wear to Patrol vehicles.

b. A member of the State Highway Patrol may cross the median of a divided highway when he has reasonable grounds to believe that a felony is being or has been committed, has personal knowledge that a vehicle is being operated at a speed or in a manner which is likely to endanger persons or property or the patrol member has reasonable grounds to believe that his presence is immediately required at a location which would necessitate his crossing a median of a divided highway for this purpose.

4. RADAR UNIT FREQUENCY CHECKS (STATIONARY AND MOVING)

a. The Federal Communications Commission requires that a frequency check of each radar unit shall be made once yearly.

b. The frequency of each radar unit shall be checked at least once every six months. At any time they fail to operate properly, they shall be returned for repair and/or maintenance. A qualified technician shall make a bench test with a frequency test to determine if the unit is operating accurately and is in compliance with the rules, regulations and standards set forth by the Federal Communications Commission, the manufacturer, and the North Carolina State Highway Patrol. At the time of the test, both the technician and the Trooper shall sign a "Radar Operations Certificate" which contains the make, model, PIN, call letters, Amplifier Serial Number, Antenna Serial Number, location of the test and date. The technician shall file his copy of the certification at the radio station, on which technical data required for future reference may be recorded. The Trooper delivers one copy to the District First Sergeant and keeps one copy with the unit so other Troopers who use the unit thereafter will have knowledge of location, date and by whom the equipment was last tested.

5. RADAR PRINCIPLE OF OPERATION AND RELATED FACTS

a. The radar timer is a low-powered radio transmitter and receiver. It sends out radio waves which travel at a speed of 186,000 miles per second, which is the speed of light. In striking the metal of an approaching, departing, or moving vehicle, these waves are reflected back to the radar timer receiver and converted into miles-per-hour reading on the miles-per-hour indicator.

b. Tests have shown that the running engine of a radar-equipped Patrol car will not affect the accuracy of the radar unit.

6. OPERATION DURING INCLEMENT WEATHER (STATIONARY AND MOVING RADAR)

a. This highly sensative equipment will be damaged if exposed to water and resultant rust, et cetera; therefore, this equipment will not be exposed to adverse weather and possible deterioration.

b. Radars will not be operated during inclement weather with the antenna unit outside the Patrol vehicle. (CAUTION: Some antenna units are not designed for external use.)

7. RADAR PRE-OPERATION PROCEDURES (STATIONARY)

a. Place the vehicle as near to the highway as practicable and aim the radar antenna toward the traffic lane, 400 feet away.

b. Calibrating the radar is a prerequisite to enforcement operation.

(1) With the unit in an "on" position, allow a warm-up period according to the manufacturer's specification.

(2) If the unit is equipped with a meter, release the meter locking mechanism, check to insure that the pointer is pointing to "0". If not, have the necessary mechanical adjustment made by Patrol radio technical personnel.

(3) Adjust the range control to the normal operating position.

(4) Calibrate with a tuning fork with the unit switched to operate position.

(a) Strike the fork on a rubber mallet or a hard non-metallic surface, such as a shoe heel or night stick to cause vibration.

(b) Hold the fork steady in front of and at a right angle to the antenna. The indicator should then read the speed stamped on the tuning fork.

(c) If the meter reading is not the same as that stamped on the tuning fork, locate the meter calibration adjustment, if so equipped, and adjust for proper reading.

(d) On units not equippedwith an adjustment screw (such as digital readout units), if the reading does not correspond to the fork being used, remove the unit from service and take it to Patrol radio technical personnel for service.

8. OPERATIONAL PROCEDURE (STATIONARY RADAR)

a. On units equipped with a meter, be sure that the radar speed indicator needle is set at "0" prior to entry of any vehicle into the radar field. On digital readout units, assure that the speed indicator is clear.

b. Form an opinion as to the speed of the target vehicle, keeping it under observation as it enters, passes, and leaves the radar field. Make positive identification of the vehicle.

c. Be sure that the speed indicator reading is not altered by another vehicle or object in the screening area.

d. In manual operation, when the radar speed indicator reaches its maximum speed, press the "hold" or "lock" switch. With the function switch in the automatic position, the lock-down will be accomplished automatically. If a clear-cut, substantial violation has occurred, take enforcement action. Release the locking mechanism and resume speed-timing operation.

9. PRINCIPLE OF OPERATION (MOVING RADAR)

a. A moving traffic radar unit is designed to be used by an officer to corroborate his opinion as to the speed of oncoming traffic while his Patrol vehicle is in motion.

b. The moving radar primarily differs from stationary-type radar in that it contains velocity tracking circuitry which "searches out" and locks to the speed of the Patrol vehicle. After the tracking circuitry has "locked on", it generates a number representing Patrol vehicle speed which is to be subtracted from the closing rate between the oncoming vehicle and Patrol vehicle in order to display the true speed of the target vehicle.

c. The operating range of the velocity tracking circuitry varies depending upon the make and model of the unit being used. A unit will not function as a moving radar if the speed of the Patrol vehicle is outside of the limits of its designed range.

Each time the speed of the Patrol vehicle drops below or attains a speed above the designed range, the velocity tracking circuitry ceases to operate; therefore speed computations cannot be made.

d. The velocity tracking circuitry must search and relock after each time the Patrol vehicle comes to a halt or momentarily falls below or exceeds the designed range. When the Patrol vehicle again assumes a speed within the designed limits, it is important to verify that the unit is again properly "locked on" to the correct speed. Verification procedures vary depending upon the make and model, but all units are designed with features for comparing tracking speed with that shown on the Patrol vehicles calibrated speedometer.

e. After verification, the unit is ready for operation in the MOVING mode.

10. RADAR PRE-OPERATION PROCEDURES (MOVING)

a. Mounting of Antenna: on the outside of the left rear window, far enough back to give free access to the driver's door; on the inside, mounting may vary depending upon the make and model, but caution should be exercised to insure the operator's vision is <u>not</u> obstructed. It shall be alligned not more than 5 degrees to the left of an imaginary line parallel to the vehicle, when the vehicle is moving straight ahead and in a level position.

b. Attach the power and antenna cables to their appropriate receptacles on the rear panel of the indicator unit.

c. With the function switch in the "off" position, insert the power cord plug into the cigarette lighter receptacle.

SPEED-TIMING DEVICES
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d. Place the indicator unit in a secure position so that it will be visible and in convenient reach of the operator.

e. Check the internal calibration according to the manufacturers instructions for the make and model being used. If unable to confirm proper calibration, remove the unit from service.

f. Check to assure that all segments of readout indicators are operating properly according to the manufacturers instructions. If all segments are not working properly, remove the unit from service.

g. With the STATIONARY mode of operation selected, check the calibration with the two tuning forks in the following manner: (CAUTION: IN ANY OF THE FOLLOWING STEPS USING THE TUNING FORKS, DO NOT STRIKE THEM AGAINST EACH OTHER OR ANY METAL OBJECTS AS PERMANENT DAMAGE MAY RESULT.)

(1) Lightly strike the lower speed tuning fork against a non-metallic object such as the plastic handle of a screwdriver or a leather shoe sole and hold it in front of the antenna. The unit should display a reading the same as that stamped on the tuning fork.

(2) Repeat the procedure above using the higher speed tuning fork and confirm a reading the same as stamped on the tuning fork.

(3) If the proper readouts are not displayed, the unit should be removed from service.

h. With the MOVING mode of operation selected, check the calibration with the two tuning forks in the following manner:

(1) Lightly strike the low speed tuning fork as indicated previously and hold it in front of the antennas until tracking speed is establishe

(2) While maintaining the low speed tuning fork in position, lightly strike the higher speed tuning fork as indicated previously and position it beside the lower speed fork. A reading should appear which is equal to the difference of the speeds stamped on the two forks.

(3) If the proper readout is not displayed, the unit should be removed from service.

i. Upon satisfactory completion of these steps, the unit is now ready for operation according to the manufacturer's specifications.

SPEED-TIMING DEVICES

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11. OPERATIONAL PROCEDURE (MOVING RADAR)

a. The practice of setting the radar warning device to alert a member to speed in excess of a selected tolerance is not within itself sufficient to justify taking enforcement action, i.e., arrest or issuance of affidavit and warrant.

b. A member will observe the movement of traffic within his vision and especially those vehicles entering the range of radar. The member should form an opinion, independent of the radar reading, as to the speed and identification of the target vehicle.

c. The reading obtained should correspond to the opinion formed by the officer in some reasonable measure. If there is a wide variance, caution must be exercised. Enforcement action shall not be taken by the officer until probable cause of the violation has been established independent of the radar.

d. On any occasion where a radar reading is not substantiated by an officer's opinion which coincides with the readout, in some reasonable measure, no enforcement action shall be taken.

e. In the stationary mode, a moving radar will function as any other stationary radar.

f. When using a moving radar in the moving mode, it will not be used to clock the speed of oncoming vehicles on dual lane highways with a median in excess of 75 feet.

g. When operating as a moving radar, the following operating procedures will be adhered to:

(1) Engage the verify mode switch. Note: This step is not applicable for units with dual readouts.

(2) While attaining a normal cruising speed at or slightly below the posted speed limit, compare the radar reading of tracking speed with the Patrol vehicle's certified calibrated speedometer reading to assure they are tracking together.

(3) If applicable, switch to the MOVING mode to assure that the unit is responding to oncoming traffic. When using units not equipped with dual readouts, return the unit to the VERIFY mode. The Patrol vehicle should then maintain a steady pace for best results.

(4) Observe oncoming traffic to form opinions according to the requirements set forth in Paragraphs "a" through "d" of this section.

(5) Upon the approach of an oncoming vehicle, which in the opinion of the officer is speeding, confirm the tracking speed of the Patrol vehicle as being correct. Switch to the MOVING mode (unit without dual readouts) and take a reading. If the reading corroborates the officer's opinion, press the lock button to hold the reading. (With the function switch in the AUTO position, the lock-down will be accomplished automatically.)

(6) Following enforcement action in compliance with the arrest policy of the Patrol, release the reading. Check the internal calibration according to the manufacturers prescribed procedures. A correct readout will verify that the unit has maintained proper calibration.

(7) Resume normal Patrol activities as per Paragraphs 1-6 above.

(8) At the end of each period of operation, the calibration shall be checked with the tuning forks as outlined in the calibration procedure, item 10, paragraphs g and h.

12. ADDITIONAL FACTUAL INFORMATION

a. Audio Feature

Although the readout is designed to accurately determine the speed of all vehicles monitored, the operator should also use the audio control. When the audio control is turned up, the operator will hear tones from the target vehicle as the vehicle approaches. The tone pitch will correspond to the speed being read out, i.e., the higher the pitch, the greater the speed. The presence of these audible tones confirms the proper operation of the system. This is especially useful in the case of multiple targets where the operator might question whether the unit is operating properly.

The unit may refuse to display when two targets of equal strength are detected; however, if the operator is listening to the audio from the unit, it will be apparent to him that the unit is receiving more than one target at that time.

b. Inasmuch as terrain, such as hills and curves, can affect the range of the moving radar, it is imperative that the operator identify the target vehicle as being the vehicle in the radar beam.

13. ELECTRONIC DIGITAL SPEED COMPUTER (VASCAR-T.D.S.) - PRINCIPLE OF OPERATION

Formular: $\text{Speed (Velocity)} = \frac{\text{Distance (in miles)}}{\text{Time (in hours)}}$ - MPH

Incorporated into the machine is a simple means of quickly measuring the distance between any two points along the highway and a means to time a vehicle as it traverses that distance. Electronic speed-timing devices

enable the operator to quickly and accurately measure an infinite number of distances along the highway, without the necessity of the operator having to predetermine these distances or even to know what they are. This fact gives the operator an opportunity to utilize electronic speed-timing devices in a great variety of ways. The means of measuring the time lapse used by another vehicle to traverse the measured distance is geometrically coupled with this distance measurement in such a way that electronic speed-timing devices automatically indicate the resultant speed of these two inputs. Electronic speed-timing devices accomplish these measurements in such a simple way, it enables the trained, certified operator while on routine patrol to make speed clocks on vehicles regardless of their relative position to the Patrol car. The device may be used with equal facility whether the Patrol car is cruising or parked, and with it, the operator can clock vehicles in front of him or behind him, going in the opposite direction, or the same direction, or crossing his path.

14. ELECTRONIC DIGITAL SPEED COMPUTER - DESCRIPTION

a. These devices are electro-digital computers.

b. Two switches are involved in the operation of these devices. One switch enables the operator to measure distance and the other to measure time.

c. The "distance" switch activates part of the computer to store distance. The computer is coupled with the odometer cable of the Patrol car through a dual connection (such as used to mount taxi meters) to the transmission. On some units, premeasured distances may be entered into the computer manually. The Trooper, by turning this switch "on" when his Patrol car is at one location point along the highway, such as a tree, and turning the switch "off" at a second location point, such as a bridge, feeds into the device the distance in miles between the tree and the bridge. Distance may be stored (retained) in the computer so that other vehicles may be timed through the same distance.

d. The "time" switch activates part of the computer to store time in the device. The member, by turning this switch "on" when a target vehicle gets to one of the above mentioned location points and turning the switch "off" when the target vehicle is at the other location point, feeds into the device the time it takes the target vehicle to get from the tree to the bridge.

e. After the "time" and "distance" inputs are fed into the device, the computed speed of the target vehicle is indicated on the readout.

f. The location points used by the operator may be shadows cast by the stationary objects along the highway, such as bridges, trees, telephone poles or signs, or shadows cast by the target vehicle as it passes over distinctive objects along the highway, such as intersecting roads, tin cans, cracks in the highway, color changes in the surface or painted lines on the pavement. At night the rear most edge of the target vehicle's light beam as it flicks off a

roadside object, such as a sign or mailbox, can be effectively used.

g. The following example illustrates one of the ways which these devices may be used: A member in a cruising Patrol car observes ahead of him a suspected speed violator. He watches the violator's vehicle until it gets to the shadow of a tree. At this instant, the member turns on the "time" switch. Now the member waits until he gets to the shadow and then turns on the distance switch. The member observes the violator's vehicle until it gets to a bridge. At this instance, he turns off the "time" switch. He has thus measured the time it took the violator to get from the tree shadow to the bridge. When the Patrol vehicle reaches the bridge, the "distance switch" is turned off. The speed of the violator is indicated on the readout. Note that it is unnecessary for the Trooper to be traveling at the same speed as the violator. After the speed of the vehicle being clocked has been noted, and if a clear-cut substantial violation has occurred, the vehicle should be stopped. Under no circumstances, however, shall an Affidavit and Warrant be issued unless the clocking distance is at least 1/10 of one mile.

15. ELECTRONIC DIGITAL SPEED COMPUTER - TIME DEVICES (VASCAR-TDS) - OPERATIONAL PROCEDURES

a. The versatility of electronic digital speed-timing devices enables traffic law enforcement officers to increase their enforcement potential against the speed violator while remaining on routine, moving, collision, preventative patrol. In order to obtain the greatest potential of these devices, this operational procedure is adopted and will be followed:

(1) An accuracy check of these timing devices shall be made at least once daily during a tour of duty. Calibration will be checked according to the manufacturer's specifications. Premeasured distance for accuracy checks shall be measured with a steel tape.

(2) Stop watches used in the calibration of electronic speed-timing devices shall be calibrated at least once every six months by a Patrol technician against the National Bureau of Standards' Broadcasting Station, Station WWV.

(3) Under ordinary circumstances, no more than 15 minutes of each hour of patrol time should be utilized by using electronic digital speed-timing devices in the stationary position. This method comparable to the use of radar units, detracts from the fullest effect of moving patrol, which is preventive in nature (especially when a marked Patrol car is involved), and it also detracts from our primary objective which is the prevention of traffic violations. The stationary method should be used in selected areas <u>in combination with</u> routine moving patrol.

(4) Unlike most violations of North Carolina General Statutes traffic violations frequently involve inadvertent or careless acts

as opposed to intentional acts. The basic policy of a sound traffic enforcement program therefore, is not to generate large numbers of traffic arrests, but to prevent traffic violations and resulting traffic collisions. Electronic digital speed-timing devices will be used to further this policy by the adaption of their extreme flexibility to moving traffic patrol.

(5) In order to insure full use of electronic speed-timing devices without loss of the effect of presence of patrol, members shall designate on the Affidavit and Warrant as to whether the Patrol car was moving (M) or stationary (S) at the time of clock. This designation shall be inserted as a suffix following the speed of travel in the "speed" section. Example: "C 65 M" represents the violator's vehicle being clocked by an electronic digital speed-timing device at 65 miles per hour while the Patrol vehicle was moving.

(6) Electronic digital speed-timing devices will be turned on at all times during the operation of the Patrol vehicle while on routine traffic patrol. Failure to use the electronic digital speed-timing device will be considered cause for constructive consultation and other action if warranted.

16. LIMITATIONS AND RESPONSIBILITY

a. Uniform members of the Patrol shall not operate an electronic speed checking device resulting in enforcement action unless such operator has been trained and certified in the operation thereof.

b. Uniform members testifying in court shall offer evidence pertaining to the operational procedures of speed checking devices only and not the technical aspect.

c. Members shall deny all requests from motorists to check the accuracy of motorist's speedometers with Patrol speed-timing devices or by any other means.

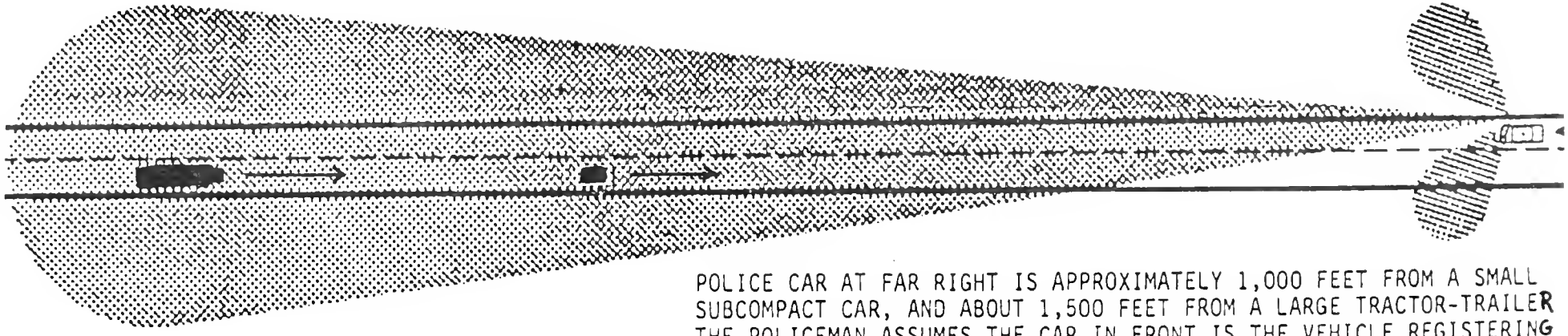
d. Patrol vehicles in the operation of speed checking devices in a stationary position should be situated in such a manner as to afford the member clear unobstructed vision of vehicles as they approach, pass through, and leave the observation area.

e. District First Sergeants shall be held accountable for supervision in carrying out this procedure and each member will be held accountable for the operation of speed-checking devices in accordance with these prescribed procedures.

APPENDIX I

WELCOME TO LIZARD LICK 25MPH
CLOCKING DISTANCE FACTOR
PATROL CAR USING RADAR IN STATIONARY MODE IS POSITIONED APPROXIMATELY 1,000 FEET FROM SPEED LIMIT CHANGE SIGN . . .
. . . AND OBTAINS APPARENTLY HIGHER SPEED READING FROM ONCOMING CARS . . .
. . . BUT RADAR IS TARGET VEHICLES OUTSIDE OF SPEED ZONE.

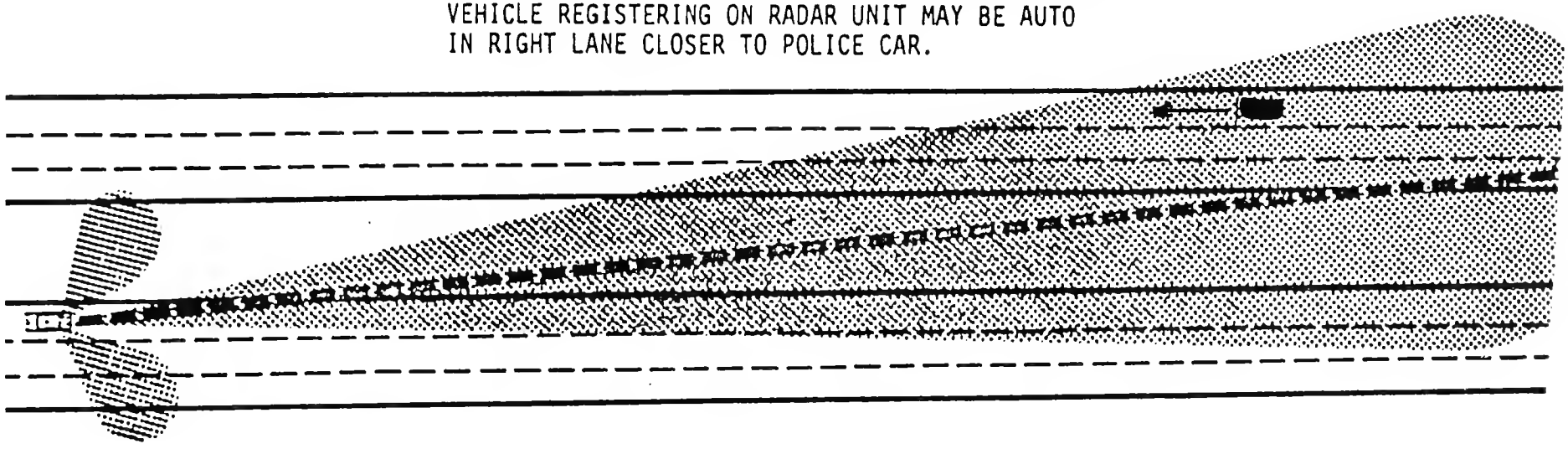
TARGET MISIDENTIFICATION



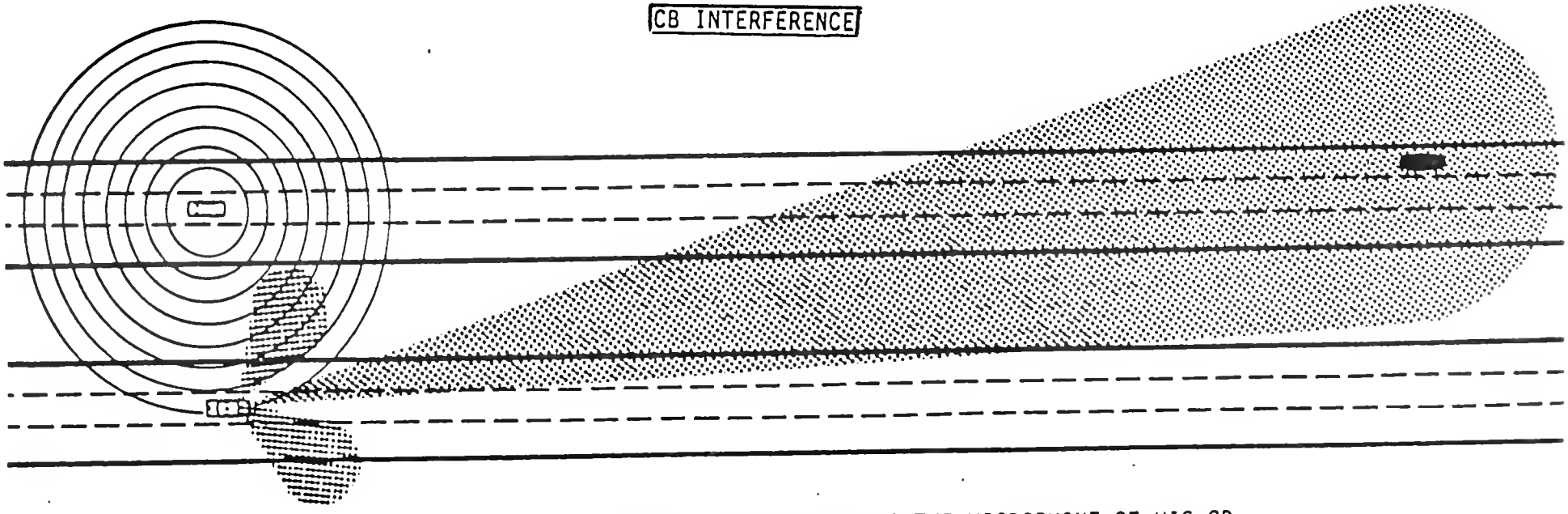
POLICE CAR AT FAR RIGHT IS APPROXIMATELY 1,000 FEET FROM A SMALL SUBCOMPACT CAR, AND ABOUT 1,500 FEET FROM A LARGE TRACTOR-TRAILER. THE POLICEMAN ASSUMES THE CAR IN FRONT IS THE VEHICLE REGISTERING 65 MPH ON HIS RADAR UNIT, AS IT IS THE ONE CLOSEST. THE TRUCK, HOWEVER, BECAUSE OF ITS LARGER SIZE, CREATES A STRONGER SIGNAL REFLECTION SURFACE AREA, AND OVERSHADOWS THE SMALLER CAR.

TARGET MISIDENTIFICATION

POLICEMAN (FAR RIGHT) MAY BE 'MENTALLY' TRAINING RADAR ON LEFT LANE OF A HIGHWAY, WHILE OFFENDING VEHICLE REGISTERING ON RADAR UNIT MAY BE AUTO IN RIGHT LANE CLOSER TO POLICE CAR.

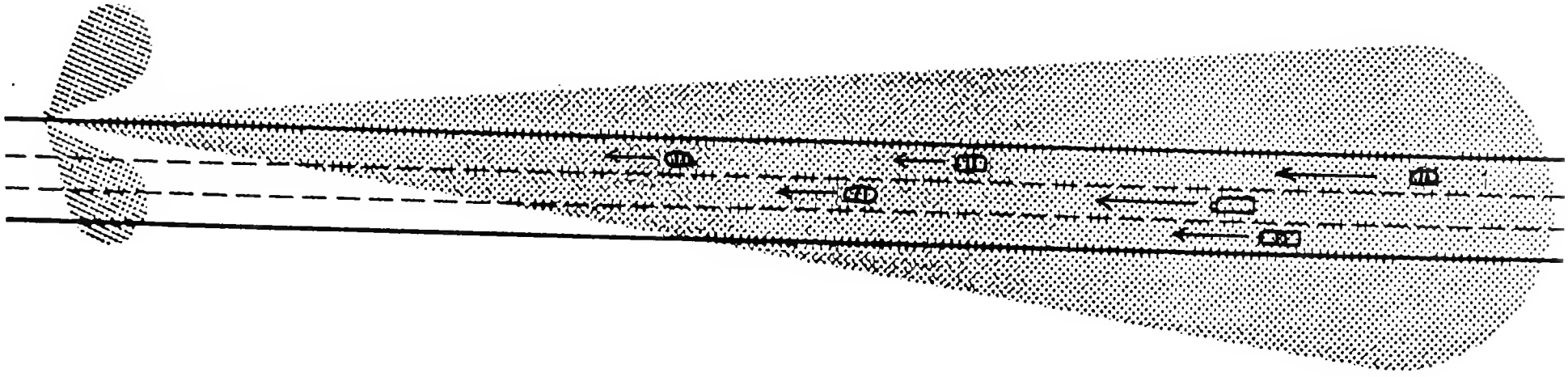


CB INTERFERENCE



THE ACT OF A MOTORIST WHISTLING INTO THE MICROPHONE OF HIS CB RADIO WHILE TRAVELLING IN THE VICINITY OF THE PATROL CAR CAN RESULT IN A READOUT IN EXCESS OF 80 MPH ON THE RADAR UNIT. THE OFFICER MAY BELIEVE THE APPROACHING VEHICLE, CLEARLY IN THE RANGE OF THE RADAR, IS TRAVELLING AT THIS EXCESSIVE SPEED.

UNIDENTIFIABLE TARGET



IN A TRAFFIC PATTERN SUCH AS THE ONE SHOWN, IT WOULD BE DIFFICULT TO IDENTIFY AN OFFENDER FROM AMONG THE TARGET VEHICLES PRESENT.

§ 17C-3. North Carolina Criminal Justice Education and Training Standards Commission established; members; terms; vacancies. — (a) There is hereby established the North Carolina Criminal Justice Education and Training Standards Commission, hereinafter called "the Commission," in the Department of Justice. The Commission shall be composed of 26 members as follows:

(1) Sheriffs. — Three sheriffs or other individuals serving in sheriffs' departments selected by the North Carolina Sheriffs' Association and one deputy sheriff selected by the North Carolina Law-Enforcement Officers' Association.

(2) Police Officers. — One police official selected by the North Carolina Association of Police Executives, one police chief selected by the North Carolina Association of Chiefs of Police, one police chief appointed by the Governor, and one police officer selected by the North Carolina Law-Enforcement Officers' Association.

(3) Departments. — The Attorney General of the State of North Carolina; the Secretary of the Department of Crime Control and Public Safety; the Secretary of the Department of Human Resources; and the Secretary of the Department of Correction.

(4) At-Large Groups. — One individual representing and appointed by each of the following organizations: one mayor selected by the League of Municipalities; one county commissioner selected by the North Carolina Association of County Commissioners; one law enforcement training officer selected by the North Carolina Law-Enforcement Training Officers' Association; one criminal justice educator selected by the North Carolina Association of Criminal Justice Educators; one sworn law enforcement officer selected by the North Carolina State Law-Enforcement Officers' Association; and one district attorney selected by the North Carolina Association of District Attorneys.

(5) Citizens and Others. — One trial court judge selected by the Chief Justice of the North Carolina Supreme Court; one senator selected by the Lieutenant Governor; one member of the House of Representatives selected by the Speaker of the House; the President of The University of North Carolina; the Director of the Institute of Government; the Director of Law-Enforcement Training of the Department of Community Colleges; and two citizens, one of whom shall be selected by the Governor and one of whom shall be selected by the Attorney General.

SESSION 19 80

INTRODUCED BY:

Referred to:

A BILL TO BE ENTITLED

AN ACT TO PROVIDE FOR THE ESTABLISHMENT OF MANDATORY MINIMUM STANDARDS FOR OPERATORS AND INSTRUCTORS AND PROCEDURES FOR USE OF RADIO MICROWAVE AND OTHER SPEED-MEASURING INSTRUMENTS.

The General Assembly of North Carolina enacts:

Section 1. G.S. 17C-6(a) is amended by adding the following new subdivisions:

"(11) Establish minimum standards and levels of training for certification and periodic recertification of operators of and instructors for training programs in radio microwave and other electronic speed-measuring instruments.

(12) Certify and recertify, pursuant to the standards that it has established, operators and instructors for training programs for each approved type of radio microwave and other electronic speed-measuring instruments.

(13) In conjunction with the Secretary of Crime Control and Public Safety, approve use of specific models and types of radio microwave and other speed-measuring instruments and establish the procedures for operation of each approved instrument and standards for calibration and testing for accuracy of each approved instrument."

Sec. 2. G.S. 17C-6 is amended by adding the following new subsection:

"(d) The standards established by the Commission pursuant

to G.S. 17C-6(a)(11) and G.S. 17C-6(a)(12) and by the Commission and the Secretary of Crime Control and Public Safety pursuant to G.S. 17C-6(a)(13) shall not be less stringent than standards established by the U.S. Department of Transportation, National Highway Traffic Safety Administration, National Bureau of Standards, or the Federal Communications Commission.

Sec. 3. Chapter 8 of the General Statutes is amended by adding a new section to read:

"§8-50.2. Results of speed-measuring instruments; admissibility.--(a) The results of the use of radio microwave or other speed-measuring instruments shall be admissible as evidence of the speed of an object in any criminal or civil procedure for the purpose of corroborating the opinion of a person as to the speed of an object based upon the visual observation of the object by such person.

(b) Notwithstanding the provisions of subsection (a) of this section, the results of a radio microwave or other electronic speed-measuring instrument are not admissible in any proceeding unless it is found that:

(1) The operator of the instrument held, at the time the results of the speed-measuring instrument were obtained, a certificate from the North Carolina Criminal Justice Education and Training Standards Commission (hereinafter referred to as the Commission) authorizing him to operate the speed-measuring instrument from which the results were obtained.

(2) The operator of the instrument operated the speed-measuring instrument in accordance with the procedures

established by the Commission for the operation of such instrument.

(3) The instrument employed was approved for use by the Commission and the Secretary of Crime Control and Public Safety pursuant to G.S. 17C-6.

(4) The speed-measuring instrument had been calibrated and tested for accuracy in accordance with the standards established by the Commission for that particular instrument.

(c) All radio microwave and other electronic speed-measuring instruments shall be tested for accuracy within a period of six months prior to the alleged violation by a technician possessing at least a Second Class Radiotelephone License from the Federal Communications Commission. A written certificate by such technician showing that the test was made within the required period and that the instrument was accurate, shall be competent and prima facie evidence of those facts in any proceeding referred to in subsection (a) of this section.

(d) In every proceeding where the results of a radio microwave or other speed-measuring instrument is sought to be admitted, judicial notice shall be taken of the rules approving the use of the models and types of radio microwave and other speed-measuring instruments and the procedures for operation and calibration or measuring accuracy of such instruments, when such rules are filed with the Attorney General in accordance with General Statutes Chapter 150A."

Sec. 4. This act shall become effective on July 1, 1981.

SESSION 19 80

INTRODUCED BY:

Referred to:

A JOINT RESOLUTION AUTHORIZING THE LEGISLATIVE RESEARCH COMMISSION TO CONTINUE ITS STUDY OF THE USE OF RADAR AND OTHER ELECTRONIC DEVICES FOR THE DETECTION OF MOTOR VEHICLE SPEED.

Whereas, Resolution 71 of the 1979 General Assembly authorized the Legislative Research Commission to conduct a study of the use of radar and other electronic devices for metering motor vehicle speed and to report to the 1980 Session; and

Whereas, the National Highway Traffic Safety Administration and the National Bureau of Standards will be promulgating radar performance, maintenance, calibration, and operator training and certification program guidelines near or after the adjournment sine die of the 1979 General Assembly; and

Whereas, although the Legislative Research Commission has arrived at recommendations for consideration by the 1979 General Assembly in its 1980 Session, it would be in the public interest if the study could be extended to report to the 1981 General Assembly to allow the Radar Study Committee to consider the federal guidelines and other developments after the 1980 Session;

Now, therefore, be it resolved by the Senate, the House of Representatives concurring:

Section 1. The Legislative Research Commission is authorized to continue the study that was authorized by Resolution 71 of the 1979 General Assembly.

Sec. 2. The Legislative Research Commission may

make its report, with recommendations in textual and bill form, to the 1981 General Assembly.

Sec. 3. This resolution is effective upon ratification.