CHAPTER 4
ADDITIONAL CONSIDERATIONS

CASE PREPARATION AND PRESENTATION

We have, to this point, discussed several elements essential to the successful prosecution of a speeding offense. When preparing a case presentation, it may be helpful for you to keep in mind that:

A. The officer must establish the time, place, and location of the RADAR device; the location of the offending vehicle when the violation took place; that the defendant was driving the vehicle; and that State law regarding the posting of speed limits and RADAR signs had been complied with.

B. The officer must state his qualifications and training.

C. The officer must establish that the RADAR device was operating normally.

D. The officer must establish that the RADAR device was tested for accuracy, both before and after its use, using a certified tuning fork or other accepted method.

E. The officer must accurately identify the vehicle.

F. The officer must have seen that the vehicle appeared to be speeding and estimated how fast.

G. The officer must have gotten a RADAR reading that agreed with the visual estimate of the target vehicle's speed.

H. If a Doppler audio feature is present on the RADAR device, the officer is strongly encouraged to establish that the audio Doppler pitch emitted correlated with both the visual estimate and the RADAR reading.

I. If moving RADAR is used, the officer must testify that the patrol vehicle's speed was verified at the time the speed measurement was obtained.

These elements should be incorporated into a clear and concise account of the incident. A sample of in court testimony that includes all these elements is shown on the following page.

When testifying, an officer should say only what she or he is sure is true. Under no circumstances should an officer be drawn into a technical discussion of the Doppler Principle or a RADAR unit's internal workings. Remember, the Honeycutt case established that an officer need only be familiar with the operating procedures of a RADAR unit, not be an expert on RADAR.

INSTRUMENT LICENSING

A RADAR unit is composed of a radio transmitter and a receiver; as such it must be licensed by the FCC. A RADAR instrument for vehicle speed measurement is classified by the FCC as a "pushbutton" device, and therefore only a "station license" is required. This means that the police agency owning the RADAR unit(s) is issued the license and the actual RADAR operators do not need to be licensed individually.

All RADAR equipment that is the property of DPS is licensed under a blanket authorization under call sign KC4107. Any non-DPS owned RADAR sets used by DPS personnel should be licensed by the owner of the equipment. (See General Manual 08.40.00.)

GENERAL OPERATIONAL CONSIDERATIONS

Most of the RADAR devices currently on the market require similar preparatory procedures: The device components are assembled and installed, and the required tests for accuracy are performed. Manufacturer's instructions will detail the exact procedures for the specific RADAR(s) you will use (there are differences among the various

manufacturers' units in the exact procedures involved). However, certain procedures are common for all RADAR devices; this section will deal with those procedures.

Instrument Component Assembly

RADAR units fall into two categories: one-piece and multi-piece. A one-piece unit has the RADAR antenna and the counting unit housed in a single component. Multi-piece units have separate components for antenna(s) and counting unit.

Obviously, a one-piece unit requires no component assembly. The unit is merely plugged into a power source (typically the cigarette lighter) to be ready for use. However, always be sure that the unit's power is turned off before plugging in the unit. Leaving the switch on during plug-in can result in a blown fuse or damage to the unit.

Multi-piece units require some component assembly. First, the antenna(s) must be attached to the counting unit. This in turn is connected to the power source. The RADAR device may then be turned on. As with one-piece units, failure to follow this sequence can result in a blown fuse or possible instrument damage. A good method to recall this procedure is to think of it as the "A-B-C" of RADAR assembly:

A - antenna
B - box (counting unit)
C - current

It then becomes Antenna to Box to Current.

RADAR Installation Considerations

Police traffic RADAR comes in a variety of shapes and sizes. The RADAR unit's structure (one-piece, multi-piece) and the manufacturer's recommendations will in large part determine how and where it will be installed in the patrol car. The safety of the patrol car driver and passengers should be the paramount consideration: A poorly secured RADAR unit can become a dangerous missile in the event of any sudden change of patrol car speed or direction. Since a multi-piece RADAR unit creates the most problems in installation, some time must be spent discussing proper mounting of the counting unit and antenna.

Mounting the Box Counting Unit

The size and shape of the counting unit component is likely to dictate where in the patrol car it may be mounted. Usually it is mounted on the dash or console. In any case the safety of the mount, the visibility of the RADAR speed display(s), and whether or not the counting unit is obstructing the operator's vision are all factors to consider in mounting.

Antenna Mounting

The antenna may be provided with mounting brackets allowing inside dash mounting, outside window mounting, or sometimes both. The operator should be aware of the advantages and disadvantages of each type of antenna mounting. Again, the size and shape of the antenna will affect its mounting.

The primary advantage of mounting the antenna outside is that it is away from the potential areas of interference that may be generated inside the patrol car. Its primary disadvantage is that the antenna may be exposed to inclement weather, which can cause increased maintenance problems. Few, if any, current antennas can be classified as weatherproof, although many are reasonably weather resistant. It is strongly recommended that the antenna not be left outside in wet weather. Deviations in temperature do not affect the antenna significantly. The possibility of the antenna being either accidentally or deliberately damaged when mounted outside must also be considered. The antenna should be placed inside if the patrol vehicle will be unattended for any significant length of time.

The primary advantage of inside mounting is that you need not worry about inclement weather. The chances of vandalism and accident damage are also minimized. The disadvantage of mounting the antenna inside is that there is more potential for interference within the patrol car. Dash-mounting the RADAR as close to the windshield

as possible and maintaining the proper straight-ahead antenna alignment will significantly reduce the potential for interference.

The type of RADAR unit (hand-held or multi-piece), the mounting brackets available, the manufacturer's recommendations, and your agency's policies, will generally govern how you mount the antenna. There are three basic guidelines:

- Avoid mounting the antenna so that it unnecessarily exposes the operator or passengers to microwave radiation (i.e., avoid mounting the antenna so that it is pointing at the operator or passenger).

- Do not mount the antenna so that the counting unit is in the RADAR beam (i.e., avoid the panning effect).

- Avoid directing the RADAR beam at nearby large metallic surfaces (e.g., the car door). Over time, strongly reflected signals from close surfaces may damage the RADAR's antenna.

Antenna Direction

With stationary RADAR, the antenna(s) can be directed toward vehicles either approaching or going away from the RADAR. When the antenna is directed toward approaching traffic, the idea is to complete the speed measurement before the target vehicle reaches you. When the antenna is directed toward receding traffic, the suspected speeding vehicle is allowed to pass the RADAR's position and the idea is to make a speed measurement before it gets out of range.

Either antenna direction has its merits and there will be times and places where either one will be advantageous. It is important to understand that the stationary RADAR instrument will work equally well either way. Whether a target is approaching or receding has no effect on its speed relative to the RADAR. With moving RADAR, on the other hand, the front directed antenna is needed most often.

INSTRUMENT TESTS FOR CALIBRATION

Over the years, a number of procedures have evolved to test the accuracy and calibration of police traffic RADAR. Some of these methods are now mandated by case law.

Internal Circuit Test

Testing typically begins with an internal circuit test. These circuit tests vary from device to device and therefore will be discussed in subsequent sections. In essence, the internal circuit test checks the circuits inside the counting unit by means of either crystal(s) or internal electronic tuning fork(s). It should be noted that the internal circuit test checks only the counting unit, not the antenna. On most RADAR instruments, the internal circuit test is performed by pressing a button and checking the speed display to verify that a particular number appears (the number differs from one make and model of RADAR to another). In all cases, the internal test is passed only if the proper number appears exactly. If any other number appears, do not use the instrument.

Light Segment Test

Many police traffic RADARs have a feature that allows the operator to make sure all the individual light segments on the RADAR speed display(s) are working. A burned-out light segment could cause the operator to make a mistaken speed reading. If a burned-out segment is discovered, the RADAR unit should be taken out of service and repaired.

External Tuning Fork Test

Next comes a test of the RADAR's calibration. The tuning forks used in this test should not be confused with those used for tuning musical instruments. The RADAR tuning fork is specially calibrated for use with a RADAR device. The external tuning fork is specially calibrated for use with a RADAR device. The external tuning fork test checks the ability of both antenna and counting unit to process and display a simulated target speed properly.

Below is a diagram of a typical tuning fork. To use the fork, grasp its handle and strike one of the tines against a hard surface. It is better to strike the fork against a surface that is reasonably firm but not as hard as the fork itself, such as the heel of your shoe or a padded steering wheel. Striking the fork against a very hard surface, such as concrete or metal, might chip or break the fork. Tests by the National Bureau of Standards have shown that even a badly chipped fork will probably continue to vibrate properly and give valid results; but there is no reason to needlessly abuse any piece of equipment.

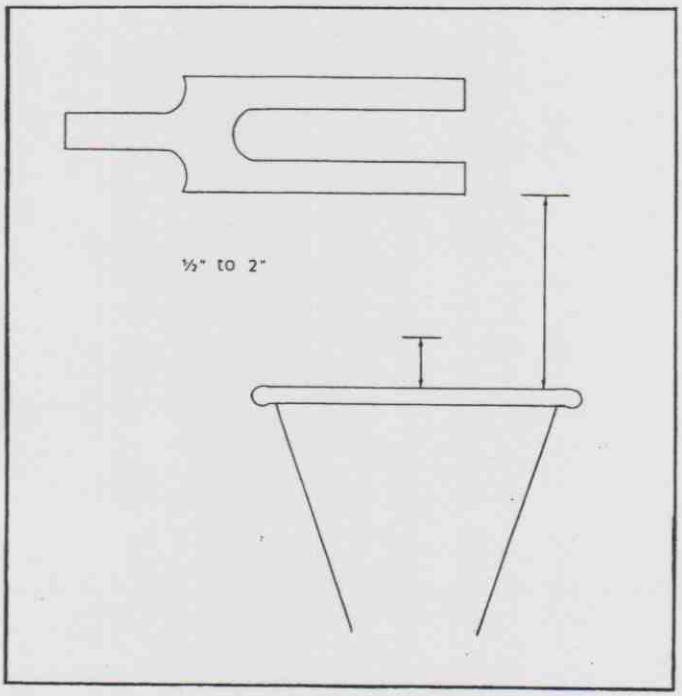

ILLUSTRATION #20

It is also generally better to avoid striking the fork when the fork is extremely hot or cold. Extreme variations in temperature might cause a reading to be displayed other than the one desired. However, you can assume that if you can hold the tuning fork comfortably in your bare hand, its temperature will not affect the reading it displays. (The allegation that a tuning fork being wet can affect the speed it displays on a RADAR device is without scientific basis.)

In preparing to make a tuning fork test, point the RADAR antenna upwards. If the antenna is pointed horizontally (i.e., towards any traffic) there may be interference with the test.

The actual distance the tuning fork is held from the antenna face is not critical, but 1 to 2 inches is generally accepted as optimum. The recommended procedure is to hold the fork so that the two tines line up one behind the other and only the tine faces the antenna. It is not incorrect to hold the fork in some other way and it will not invalidate the test if you do. However, experience shows that the recommended method seems to facilitate the RADAR's ability to measure the fork's vibration.

If you perform the tuning fork test properly, a speed measurement will appear on the RADAR instrument's display window. The speed measurement cannot differ from the fork's certified value by more than 1 mph. For example, if you use a 65-mph fork to test the instrument's calibration, the test will be passed as long as the display does not read lower than 64 or higher than 66. If the speed measurement should differ from the certified value by more than 1 mph, the test should be repeated. If the deviation persists, do not use the RADAR instrument.

Case law over the years has affirmed that using tuning forks is a vital and reliable way to check a RADAR unit's accuracy. Only one tuning fork is needed to check a stationary RADAR unit.

For moving RADAR, two forks are necessary because of the RADAR's additional circuitry. One tuning fork simulates a low speed, 30 to 50 mph. The second tuning fork is a high-speed fork, simulating a speed of 60 and 90 mph.

Moving RADAR is checked by first striking the low-speed tuning fork and holding it in front of the antenna. This

simulates a patrol car speed in the patrol speed display window. A second, high-speed fork is then struck and also held before the antenna. This second fork, presented in conjunction with the first fork, will simulate a target closing speed. The speed displayed in the target display window should show the difference between the high- and low-speed forks, in other words a simulated moving target speed. This process checks the RADAR unit's ability to properly subtract the patrol car speed from the closing speed (remember, TS = CS – PS).

NOTE: Units with dual antennas require that both be checked at the beginning and end of the shift.

RADAR tuning forks must not be mixed between X-band and K-band RADARs. An X-band fork used to test a K-band RADAR (and vice-versa) will not yield accurate results.

Patrol Speed Verification Test

The RADAR tests for accuracy discussed so far (internal circuit test) apply to all traffic RADAR units, moving and stationary. The final test, verification of the RADAR patrol speed readout against the patrol car calibrated speedometer, is required only for moving RADAR units.

This check is to establish that the moving RADAR unit is properly displaying the actual patrol car speed. The operator accelerates to a steady speed and compares the RADAR's patrol speed readout with the patrol car's calibrated speedometer. The speeds must correspond closely; if there is any significant deviation, the RADAR unit should be used, (±3 miles per hour).

While not mandated by case law, this test can also be applied to stationary RADAR devices. Running a stationary RADAR in a moving patrol vehicle (without approaching traffic) should result in a RADAR speed reading consistent with that of the calibrated speedometer.

It should be stressed that the RADAR unit's failure to respond properly to any one of these tests calls for its immediate removal from service.

Subsequent Tests for Accuracy

It can only be assumed that the RADAR was working properly when a speed measurement was made if it can be proved that the RADAR was working properly both before and after the measurement was made. An important procedural question is: How soon before and after a speed measurement must the RADAR's accuracy be tested?

Department policy requires that external calibration be performed at least twice; at the beginning and end of the duty shift in which the RADAR is operated. They may be made more frequently. Additionally, internal calibration is required after each speed arrest, on location.

GENERAL RADAR OPERATING PROCEDURES

Site Selection Considerations

You should keep several considerations in mind when selecting an appropriate place for RADAR operations. Some of these are general considerations; other apply specifically to moving RADAR or to stationary RADAR.

First, there should be a demonstrated need for speed enforcement at any location chosen for RADAR (or any other speed measurement operation). Locations should not be chosen just because they are convenient. A need for RADAR speed enforcement might be shown in locations where:

- There have been a lot of motor vehicle accidents involving speed.
- Many speed violations have previously occurred.
- Citizens have made a lot of complaints about speed violations.
- Special speed regulations or other characteristics (e.g., school zones, construction sites, etc.) require selective or special speed enforcement.

- Planning and allocating enforcement resources call for conducting a speed survey.

These are not the only reasons for choosing a particular location. This list is just to illustrate that there must be some good reason for selecting a RADAR site.

Safety is a major consideration in RADAR site selection. RADAR's whole purpose is to improve traffic safety, so it is clearly undesirable to conduct RADAR operations where the patrol car's presence will worsen the safety situation. For stationary operations, this implies that the chosen site must be far enough off the road that it does not impede the flow of traffic. The site should also give you enough of an unobstructed view that you can enter the traffic stream safely to conduct pursuits. With moving RADAR, you should be very safety-conscious when initiating pursuit, especially since it may involve a U-turn against oncoming traffic. With both stationary and moving RADAR, you must also consider the safety aspects of actually stopping a speed violator. The shoulders of the road or other potential stopping places must be broad enough to ensure that the traffic flow is not obstructed by either the violator's vehicle or the patrol car. Of course, you should observe all basic safety procedures when approaching and investigating an apprehended speed violator, as with any citizen contact.

Traffic and roadway conditions should also influence the selection of RADAR sites. The flow of traffic should not be so heavy that problems with target identification become insurmountable. When operating either stationary or moving RADAR, the operator must be alert to potential distortion sources. In all cases, you should be able to see target vehicles clearly.

It is important that when there are two patrol cars at a RADAR site they must remain in visual contact with each other. This is intended to ensure that both the spotter car (the car with the RADAR unit) and the chase car keep the target vehicle in sight, and thereby that enforcement action is taken against the appropriate vehicle.

RADAR OPERATIONS POLICY

The following instructions and guidelines are applicable to the operations of RADAR as a speed measuring device by any Department employee and in Department vehicles, regardless of whether the RADAR set itself is Department owned or supplied by another entity.

1. The RADAR will be operated from a Department motor vehicle.

2. RADAR will not be operated from a vehicle that is in motion unless the capability for checking the speed of a different vehicle while the RADAR equipped vehicle is in motion is built into the device. This capability (known as "moving mode RADAR) must be a specific internal function of the device that is in addition to the usual functions as utilized in the operation of RADAR not in motion. NOTE: Specific internal function means that the RADAR device has the capability for checking the speed of another vehicle while the RADAR device itself is in a vehicle that is in motion and to electrically and automatically compensate for its own speed and to display on the "Readout" component of the RADAR the correct speed of the patrol vehicle and the vehicle being checked.

3. When operated in a stopped or parked position, the Department automobile from which the RADAR device is operated will be legally parked on the highway.

4. OPERATIONAL ACCURACY. Officers using RADAR in speed law enforcement will make every effort to see that all evidence is accurate beyond a reasonable doubt.

A. RADAR equipment will be checked for calibration externally by using the tuning forks at the beginning and end of each shift in the moving and stationary modes. The light segment test and internal circuit test will also be performed at the beginning and end of each shift. These tests and checks will be duly entered in the RADAR Shift Log. (See RADAR Shift Log Instructions.)

B. RADAR equipment will be checked after each speeding arrest on location by the internal calibration circuitry of the readout unit. The time will be noted on the arrest ticket in the "RADAR Cal." box.

C. Normal RADAR operations require the set to be operated in the manual position both in stationary and moving modes.

5. RADAR operations with stopping officers at a different location will be conducted in such manner that the person operating the RADAR device will maintain visual contact with each vehicle to be stopped until it is identified by the stopping officer. When a single unit operation is used, the identification of the vehicle must be certain.

6. Department members shall only utilize equipment certified by the manufacturer to meet or exceed all applicable standards set by the Federal Communications Commission, the National Highway Traffic Safety Administration, and the National Bureau of Standards.

7. RADAR will be operated within strict compliance of the procedures contained in the RADAR Operations Manual.

RECERTIFICATION PROGRAMS

INSTRUCTORS AND OPERATORS

The following instructions and guidelines are applicable to the certification and recertification of RADAR Units, Speedometers, Tuning forks, Instructors, and Operators.

1. All Highway Patrol lieutenants will be certified as instructors to conduct the classroom portion of the RADAR certification program and field proficiency testing of service Sergeants.

   (a) Five-hour RADAR theory presentation with written examination for certification.

   (b) Minimum two-hour theory presentation for recertification of RADAR operators.

   (c) Recertify sergeants during even-numbered years to perform field operational phase of program.

2. Service sergeants (or trooper designated by the instructor) will conduct the operational phase of the training and proficiency training. Results will be certified to the instructor. Record on "Practical Examination and Demonstration" form - Annex #2

3. Probationary troopers who have been assigned to the field less than 60 days are not eligible for certification, but may operate RADAR under the oversight of a certified operator.

4. Transferees and reinstatees who are not certified must satisfactorily complete the required classroom training and operational tests prior to certification; however, prior to certification they may operate RADAR under the oversight of a certified operator.

5. When RADAR re-certification is completed, the appropriate Service/Division lieutenants will submit a roster to the Training Academy for their respective District/Service personnel. The roster should list the individual's name, ID Number, Social Security Number, and a statement that the personnel listed have been re-certified for RADAR operations.

6. Troopers whose certificates have expired must complete the recertification process prior to operation of RADAR without the oversight of a certified operator.

7. Troopers who operate RADAR must complete the Doppler RADAR recertification prior to August 31, of even-numbered years.

8. Troopers who wish to utilize same lane RADAR devices must first be field certified in accordance with Annex #2.

RADARS

Prior to placing any new RADAR into service, operators shall determine that such instrument is certified by the manufacturer to meet or exceed all applicable standards set by the National Highway Traffic Safety Administration. In addition, operators must ascertain that the RADAR is operating on the proper Federal Communications Commission assigned frequency.

Verification of the unit's operating frequency will be sufficient if the manufacturer provides with each RADAR purchased, a document certifying the unit as operating within design standards and on the frequency specified. The original manufacturer's certificates for the unit must remain with the unit.

TUNING FORKS

Each tuning fork will be tested at least once biennially by a TLE supervisor. Random tuning fork testing is encouraged in addition to the annual test. Also encouraged is the testing of tuning forks about to be involved in court testimony. A "Certification of Accuracy - Tuning Forks" certificate may be completed and offered as testimony to the reliability of the tuning forks. (Annex #4.) Each test, whether biannual, random, or for court purposes will be recorded on the "Tuning Fork Certification" page of the "RADAR Log."

The tuning fork tests will be performed using a department supplied MPH "Tuning Fork Calibrator." (See instructions contained in Annex #5.) Other devices may be used for calibrating tuning forks as long as they have departmental approval. Highway Patrol Lieutenants and other designated supervisors will be instructed in the tuning fork testing procedure.

USER CERTIFICATION

There are currently four types of user certificates:

1. RADAR Instructor Certificate, THP-38a.
2. Basic RADAR Operator Certificate, THP-38b.
3. RADAR Operator Recertification Certificate, THP-38c.
4. Laser Operator Certificate, THP-38d.

Instructions For Certificate Completion

Classroom instructors sign the applicable certificates upon completion of the classroom phase of the training and transmit them to the appropriate field instructor who will endorse them after field testing. The original is given to the student after successful completion of both phases of training.

Duplicate certificates may be completed to replace lost originals. Instructor names should be typed in the appropriate spaces and the certificate validated by the Captain or Lieutenant.

RADAR LOG BOOK

The Texas Department of Public Safety RADAR LOG, TLE-61 (6/88) is the history of an individual RADAR set containing a chronological record of its operation; a verification of required calibration checks; a journal of maintenance and repair; and a tuning fork certification log.

From this log book, a trooper may accurately testify as to his compliance with calibration policy, offer documentation of the RADAR set's maintenance and certify the accuracy of the tuning forks.

Instructions for RADAR Shift Log

1. Enter the D.P.S. vehicle unit number on the top line of each log page. A line entry should be made each time the RADAR set is installed in another vehicle.

2. At the beginning and end of each shift, the following calibration checks should be made and recorded in the log; internal circuit test, light test, and external tuning fork calibration test. A check mark in the "Cal." must be done in both stationary and moving modes in all moving mode RADAR sets. Both antennas must be externally checked in dual antenna sets in both modes.

3. Complete the RADAR shift log as follows:

   A. At the beginning of shift enter date, start time, and check "Cal." box.

   B. At end of shift, enter end time, check "Cal." box and sign with last name and I.D. number.

4. Use as many lines below a shift entry as needed to explain any unusual experience or problem with the RADAR unit.

5. A new log entry must be made for each shift or portion thereof, also when:

   A. The operator passes the RADAR to another operator.

   B. The RADAR unit is installed in another vehicle.

   C. The RADAR unit's removal and reinstallation after repair or maintenance.

6. Upon completion of each RADAR Shift Log page, the duplicate (canary) copy is to be submitted to the sergeant and accompanied with a copy of any repair or work orders for maintenance done during the time period embraced by the shift log page. The sergeant will maintain a file for each RADAR set in his area.

The original (white) page is to be left in the book. When all pages have been used, the book will be submitted to the sergeant who will retain it in his area files. The canary copies may then be disposed of but all work orders must be retained with the log book.

Instructions for Maintenance and Repair Log

When a RADAR set is tested and/or repaired (other than the daily operator calibration checks), an entry will be made in the **Maintenance and Repair Log** section of the log book as per the following:

1. Date taken out of service. Enter the date the set is removed for repairs or has ceased to be used.

2. BY. Enter the name and I.D. number of the operator removing the set.

3. PROBLEM. Describe the nature of the problem or reason for removal from service.

4. REPAIR BY. Enter the name of repairing facility.

5. NATURE OF REPAIR. Describe the repairs made, i.e. parts installed, frequency tuned, etc.

6. DATE PLACED BACK IN SERVICE. Enter the date the set is reinstalled and placed into service.

7. BY. Enter the name and I.D. number of the operator reinstalling the set.

8. Make calibration tests and check appropriate boxes.

9. COMMENTS. Enter any comment you perceive as necessary to the recorded history of the set.

Only an original (green) page of the **Maintenance and Repair Log** will be completed. It will remain in the log book.

Instructions for Tuning Fork Certification Log

Tuning forks should be retained with the same RADAR set as is practical. They will be periodically tested by a supervisor who has the proper testing equipment. Each time the tuning forks are tested, a proper entry will be made on the **Tuning Fork Certification Log**.

Only an original (gold) page will be filled out and will remain in the log book.

Log Book Front

The front cover of the Log Book will be filled out by supplying the obvious information called for.