

The meeting was called to order at 1:34 p.m. in Room 323 in the Legislative Building.

Senator Blakemore in the Chair.

PRESENT: Senator Richard E. Blakemore, Chairman
Senator Wilbur Faiss, Vice-Chairman
Senator Keith Ashworth
Senator William Hernstadt
Senator Lawrence Jacobsen
Senator Clifford McCorkle
Senator Joe Neal

OTHERS

PRESENT: Daryl Capurro, Nevada Motor Transport Association
Robert Guinn, Nevada Motor Transport Association
Gene Phelps, Nevada Highway Department
John Hill, Mopeds Are, Reno
J.R. Winningham, Mopeds Are, Carson City
Larry Ketzenberger, Las Vegas Metropolitan Police Dept.
John Madole, Associated General Contractors

S.B. 247 PROVIDES FOR RESTRICTED DRIVER'S LICENSE FOR OPERATION OF MOPEDS BY CERTAIN MINORS.

Mr. John Hill, Mopeds Are, Reno and Mr. J.R. Winningham, Mopeds Are, Carson City, spoke in favor of S.B. 247. Mr. Hill stated that parents are coming in his store and buying mopeds for their underage children. He said that when they sell a moped they stamp on the buyer's receipt that the laws were explained to the buyers.

Senator Hernstadt asked if a license of any kind was necessary to use a moped. Mr. Hill replied that at least a Class 3 license was necessary which is a vehicle operator's license for a car. The purpose of this bill is to have operators of mopeds to at least have a fundamental knowledge of the road laws without restricting them to a special license. Mr. Hill stated that moped operators are not required to wear a helmet, the vehicle gets about 120 miles per gallon and that their range of speed is between 25 and 30 miles per hour.

Mr. Winningham said that if 14 and 15 year olds were required to have a license they would have to go to the Department of Motor Vehicles and get a handbook, learn something about traffic laws and take a test. He felt this process would give the children a sense of responsibility once they had received their license. Mr. Winningham added that he felt if 14 and 15 year olds were licensed it would add more continuity to enforcing the age for driving laws.

Mr. John Borda, Office of Traffic Safety, spoke in opposition to S.B. 247. He was afraid that if 14 year olds were licensed then

eventually 10 and 11 year olds would be riding mopeds. Mr. Hill stated that he thought if 14 year olds were licensed it would give the police more leverage if they found younger children riding mopeds. He said at the present time police are just looking the other way. He said parents are requesting that younger children be licensed so they can buy mopeds for them and they would be regulated too. Mr. Borda said he also had had parents talk to him about not licensing younger children because they cannot control their children. He said he has a great fear of younger people riding mopeds in congested areas. Mr. Borda stated that if this bill were passed it would have to have revisions with a great deal of guidance.

Mr. Larry Ketzenberger, Las Vegas Metropolitan Police Department, spoke against S.B. 247. He read some comments made by his Commander who said the violations and problems with bicycle riders would be compounded by issuing licenses for motor-driven bicycles.

Chairman Blakemore closed the hearing on S.B. 247.

S.B. 260 AUTHORIZES ISSUANCE OF BONDS TO COMPLETE HIGHWAY CONSTRUCTION PROJECTS.

Mr. Gene Phelps, Nevada Highway Department, spoke in favor of S.B. 260. He said they had made an error in the bill request, it being their intent to limit the bonding obligation for a term not to exceed 5 years. He said the purpose of this bill is in trying to find short term authority for the Highway Board of Directors to be able to borrow funds against future federal funds to permit advancing projects when it is appropriate to do so. This bill would allow them to complete a project and pay back the bond with federal aid over a 5-year period, which is the maximum time the federal government will permit advance construction. He said the taxpayer would benefit from this bill as well as the federal government in avoiding the increased cost due to inflation and the interest cost would be less than the inflationary cost. The public would also benefit by having the use of the facility earlier and would have had a return on an investment that was already there.

Mr. John Madole, Associated General Contractors, spoke in favor of S.B. 260. Senator Hernstadt asked how much highway costs are going up each year. Mr. Madole replied he thought it is about 15 or 20 percent but he was not certain.

Mr. Daryl Capurro, Nevada Motor Transport Association, clarified the point that whether or not federal aid highway apportionment is used it would still be collected from highway users in the state in the form of fuel tax.

Chairman Blakemore closed the hearing on A.B. 44.

A.B. 44 INCREASES PENALTY FOR BYPASSING MUFFLER ON MOTORCYCLE.

Senator Neal stated that this was already in the Statutes and this bill was to simply delete NRS 486.321 which is a duplication of NRS 484.611.

Mr. Larry Ketzenberger, Las Vegas Metropolitan Police Department, said this bill was originally introduced to increase the penalty for bypassing mufflers on motorcycles as a gross misdemeanor. Since this was felt to be too stiff a penalty, it was suggested that NRS 486.321 be repealed and the provision already in NRS remain as is.

Chairman Blakemore closed the hearing on A.B. 44.

COMMITTEE ACTION:

A.B. 44 Senator Hernstadt moved that A.B. 44 "Do Pass" as amended.

Seconded by Senator Neal

Motion carried unanimously.

Senator Hernstadt presented the amendments for S.J.R. 11 before the Committee as was discussed in the minutes of March 1, 1979. These amendments incorporate the Oklahoma resolution as well as other changes that had been discussed previously.

S.J.R. 11 Senator Ashworth moved that S.J.R. 11 be amended and "Do Pass."

Seconded by Senator Faiss.

Motion carried.

Senator Neal absent.

The Committee discussed amendments for S.B. 30 and more articles were submitted for the minutes (see Exhibits A and B).

S.B. 30 Senator McCorkle moved that S.B. 30 be amended and "Do Pass."

Seconded by Senator Ashworth.

Motion carried.

Senators Blakemore and Jacobsen voted no.

S.B. 247 Senator Jacobsen moved that S.B. 247 have no further consideration.

Seconded by Senator Faiss.

Motion carried.

Date: March 6, 1979

Page: Four


S.B. 260 Senator Hernstadt moved that S.B. 260 be amended and
"Do Pass."

Seconded by Senator Ashworth.


Motion carried.

There being no further business, the meeting was adjourned at
3:37 p.m.

Respectfully submitted,


Jane A. King, Secretary

APPROVED:


Richard E. Blakemore, Chairman

"ON AND OFF THE BEAM"

Spero Canton
Reporter

Ever since the Governor instructed the Florida Highway Patrol to crack down on speeders exceeding the 55 mile-per-hour speed limit, motorists have been paying more attention to how fast they're travelling. In some cases it's turned into a cold war on the highways...drivers armed with fuzzbusters and CB radios combatting policemen using radar guns.

Hundreds of thousands of motorists are convicted of speeding every year with the radar guns as the only evidence against them. In most cases the speeding ticket is only \$25.00, but the cost doesn't stop there. This blemish in a driving record is recorded by insurance companies for three years...resulting in higher premiums.

Canton

In your experience do you think that the criminal justice system kind of takes the radar gun for its word?

Ray Sandstrom
Attorney

It certainly does. Mr. driver himself does that..When he falls prey to one of them, he generally walks in with an air of defeat...that he's been caught...and ends it right there with a plea. Very seldom do I find anyone from the public defending against what the radarman said.

Canton

The question now rises how infallible are these radar guns..can they detect if a car is travelling at 56 or 57 miles-per-hour. One of the inventors of the radar unit is Dale Smith. He claims that in many cases they are inaccurate and that thousands of persons receive undeserved speeding tickets every year.

Dale Smith
inventor

Well, based upon what we're seeing, it looks like at least 30% of the radar tickets that are written are bogus for one of three reasons: Either equipment error, operator mis-use, and in some cases, just straight abuse...the little Woosey-Selma type thing.

Anton

Tomorrow we will look at some of the ideosyncrasies of the MW-715...
the moving radar system used by the Florida Highway Patrol.

Canton
Reporter

Nine out of ten motorists who receive speeding tickets because a radar unit claims there has been a violation will probably end up paying the fine...the radar gun inventor Dale Smith claims it's not that accurate. Many radar tickets come as a result of the readings of the MV-715... the moving radar system employed by the Florida Highway Patrol. The machine's purpose is to permit a trooper to be more mobile...he can keep surveillance of a stretch of road while watching out for speeders...a feat which appears impossible to do with the machine. At 300 feet the radar beam covers four lanes of traffic

Dale Smith
Inventor

Here's a typical example where you have a very clear identification problem as to target. There is no way that you can operate a radar here, but yet I'll guarantee you that they write tickets.

Canton

The MV-715 contains a computer which figures out how fast an oncoming car is going by subtracting the speed of the patrol car...which appears on the right side of the machine. We pointed the radar gun at a house while the vehicle we were in was at a full stop. The computer showed us how vulnerable it is to outside interference...it told us we were traveling 28 miles-per-hour.

Smith

You know what's happening there is actually reading the speed of the fan motors or the ignition noise of the car...and it assumes that that's the patrol car speed.

Canton

Smith claims that in some cases this could result in an undeserved speeding ticket. The MV-715 has another idiosyncrasy which caused highway patrols in at least two states to return every unit they had.

Smith

Now this particular unit has an idiosyncrasy, if you will, which does not permit it to read the speed of a car travelling at the same speed as a patrol car. In other words if the patrol car is travelling 55, a 55 mile-an-hour car coming the other way is not picked up by it, but

th rather a car behind it is picked up which may be travelling say, 60. However, the law states that the car in front is the guilty party, whereas, the guy's really innocent. And for that reason several states have either sent the units back, or just strictly removed them from the road.

Canton Tomorrow we'll see the MV-715 in action on Interstate 95 while it's being used by the Florida Highway Patrol.

Canton

A main fallacy of any radar unit is that in heavy traffic, while in the moving or stationary mode it locks on the largest object...which makes tractor-trailer drivers more likely to receive a ticket. Such was the case when we rode with trooper Wayne Miller...a veteran of the Florida Highway Patrol for five years.

The machine he uses...the MV-715..locked on a tractor-trailer which it claimed was travelling 68 miles-per-hour. Then the chase ensued.

Natural sound of siren.

After we pulled the driver over he claimed that it was impossible for him to exceed the 55 mile-per-hour speed limit because of a governor his employer put in his truck.

Truck Driver

Something's wrong with your radar equipment. You get in this tractor, or somebody else get in it, and say my life depended on getting this thing over 65, it's impossible, loaded or empty. We're governed down. The most I can pull out of it is between 53 and 54. But I'm going to fight like hell before I pay 'em this 20 some dollars ticket and have it against my license.

Canton

Miller said he was positive of the speed because he visually saw the truck going faster than other traffic. The radar machine just confirmed his suspicions. He did say though, that the unit has a tendency to pick up the largest object.

Wayne Miller
FHP Trooper

With regards to the tractor-trailers...the radar does generally pick up the largest object...also generally the fastest object. When a tractor-trailer is within range it will many times remain on the tractor-trailer at the slower speed regardless of whether or not a faster vehicle is passing it at the time.

Canton

Tomorrow we will take a look at the K-55...which is probably the most widely-used radar unit in the state.

Canton

Troopers working for the Florida Highway Patrol are probably the best trained officers using speed radar machines. Each trooper is required to take fifteen hours of classes before he is permitted to patrol the highways with a radar unit. The reason for the training is so he can be aware of the radar unit's limitations. Many troopers say the radar unit is impractical to use in heavy traffic. Sergeant Dozier Lee of the Florida Highway Patrol thinks a unit can be misused if the operator isn't careful.

Dozier Lee
FHP Sgt.

Well, when using the radar unit you've also got to use a lot of common sense. If you're running the radar and you read a high reading, say 150 miles-an-hour, it's very obvious that nobody is coming down the highway at that speed. And if a man has been a police officer, and judging traffic, if he's using radar he is going to be able to see the vehicle that's speeding, visually, as well as know the speed on the radar.

Canton

The Highway Patrol said it wouldn't comment on the specific radar errors we've shown in this series...and felt questions would be best answered by radar engineers...who say they will respond next week. The law contends that a defendant is innocent if there's a reasonable doubt of guilt. The doubt concerning radar has reached the federal government's National Bureau of Standards whose scientists have asked radar pioneer Dale Smith to assist with their tests. He thinks radar machines will change.

Dale Smith
Inventor

I think one of the things you're going to try to do is to restrict the beam width so that you don't have the problem of looking at 300 foot wide beam. So that the officer has some idea of just exactly which target he's looking at. The other thing is there will probably be a tracking requirement so that he has some kind of a history on what's happening. In other words, it isn't just suddenly a number that pops up and he's got to go out and guess what target did it. He'll have the ability to watch it

with
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and see what it's doing.

I think that there'll be some relatively major changes actually in the circuitry and it may very well obsolete every radar that's now on the road.

Canton

To those who question his motivation in discrediting the moving radar device which he helped develop...Smith says simply that its flaws and misuse which have now become evident are hurting the public. Smith, in fact, stands to lose money if radar is taken off the road because he also invented the anti-radar device called the fuzzbuster.

What we've shown you this past week are fallacies in devices that were thought to be near perfect.

It is not an encouragement to speed or violate the law. These reports were also not meant to negatively reflect on the police officers who use the devices...but the fact remains that radar machines are usually the only evidence that convict an accused speeder and some radar experts as well as some government officials think they possibly should be open to more scrutiny than they presently receive.

Police radar can be an effective tool for controlling speed, but neither the equipment nor the officers using the equipment are infallible. Since radar's introduction in the mid-'50s, it has generally been accepted by the courts as an accurate, reliable method of obtaining speed readings. That little black box has been an almost unimpeachable witness against speeders. But radar isn't perfect; various types of malfunctions can be the result of electronic failure, mechanical interference, electronic interference or deliberate abuse.

Electronic failures occur when one of the components of the radar unit ceases functioning. This rarely affects the speed at which you are clocked, as most failures of this nature result in a decrease of the unit's range rather than any error in the speed that is displayed by the unit.

Often the officer has no idea that the unit is defective until he has no readings at all.

Another common electronic failure occurs when the unit loses one or more segments in the numeric display. With a burnt-out segment, a 6 might be read as a 5, or a 7 as a 1. Burnt-out segments usually result in a lower number, so this type of failure will be to the speeding motorist's advantage. The only number that might read higher is the 8, which could possibly be read as a 9. Of course this rarely provides a defense, as judges frown on 80-mph violations almost as much as they do on 90-mph violations.

Mechanical interference is usually the result of some material presence in the environment. Natural phenomena such as rain, fog and blowing dust tend to shorten the range of radar and may cause false readings.

Wind-blown tree limbs, doors and revolving signs are also potential sources of false signals which may appear on the radar unit, with no car in sight.

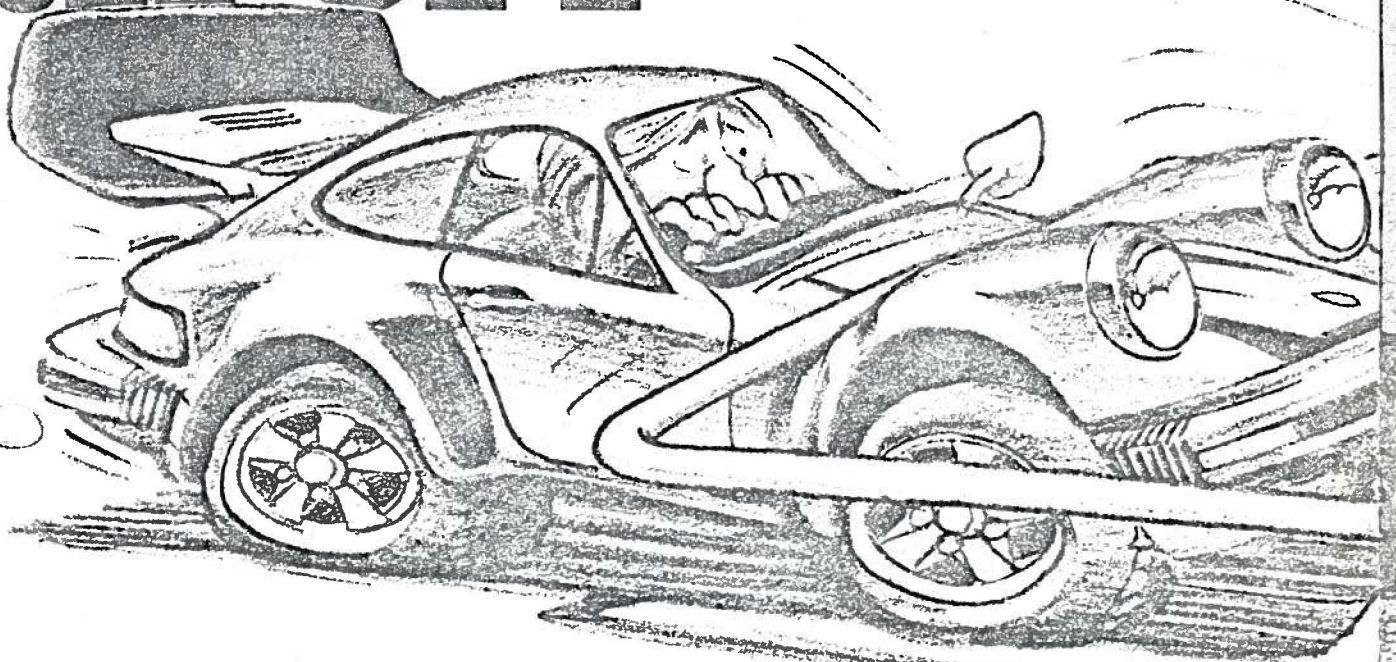
Moving radar is particularly susceptible to various types of mechanical error, such as "shadowing," "batching" and the "715 error." Shadowing occurs when the patrol car passes or is passed by a truck or other large vehicle. The part of the radar signal that is used to compute the ground speed of the patrol car loses contact with the ground, locking onto the passing vehicle instead. Instead of showing the true ground speed of perhaps 55 mph, it registers the difference in speed between the truck and the patrol car, perhaps 10 mph.

Now the patrol car clocks an oncoming vehicle which is actually traveling at 50 mph. The closing speed

POLICE RADAR ISN'T NEARLY AS ACCURATE OR INFALLIBLE AS ITS MANUFACTURERS AND THE POLICE WOULD HAVE US BELIEVE

THE RADAR RIPOFF

By Rod Dornsife & Mark Miller



DAVE DEAL ILLUSTRATION COURTESY THE TICKET BOOK

between the two cars is 105 mph, so the unit subtracts 10 mph and reads 95 mph on the "violin."

"Batching" results from the radar unit's inability to respond instantly to changes in the ground speed. If the patrol car accelerates suddenly, the radar may immediately read the increase in closing speed between the patrol car and the target vehicle without picking up the increase in ground speed. The result can easily amount to an error of 5-10 mph that the officer is entirely unaware of.

The "715 error" (named after the model number of the unit) is peculiar to one widely used model of moving radar. The unit often fails to read the speed of an oncoming car which is traveling close to the same speed as the patrol car. Thus a patrol car cruising at 55 mph might read through the nearest target which is also traveling at 55 mph and read a second target behind the first which is traveling at 70 mph. Once again, the officer would have no indication that his equipment was in error.

Electronic interference is probably the most common cause of false readings and spurious "phantom" speeds. It's not at all uncommon for a speed to appear suddenly on the radar unit, with no vehicle present in

the beam. Radar manufacturers used to mention this in their instruction manuals, but they have largely eliminated the warning since members of the public started subpoenaing the manuals into court in their defense.

Electrical storms, power transformers and transmission lines, CB radios, commercial air-conditioning units, neon lights and automobile inverters are just a few of the sources of electronic interference in the environment that can affect radar. Even the radar itself may generate electronic interference. Modern moving radar units allow the antenna to be swiveled in any direction, so the officer can park on an overpass and "shoot" cars in either direction. However, when the antenna is aimed at or swept past the counting unit, a false reading often occurs. This type of malfunction, like most of the others, is rarely understood by the officers who operate the radar units.

The most difficult types of radar error to deal with are those involving abuse of the equipment, either through deliberate misuse or unintentionally through improper installation and ignorance on the part of the officer. *The Ticket Book* catalogs at least 15 different forms of abuse and alludes to the potential for many others. Here are some of the forms of abuse which are commonly encountered:

AUTOMATIC CALIBRATION: Most radar units are equipped with a "calibration" switch which actually doesn't calibrate the unit, but serves as a verification that the unit is operable. By a mere flip of this switch, the verification speed is displayed on the unit. Although 64 is the most common verification speed, 30, 32, 45, 50, 60, 65, 67 and 72 have all been used by various manufacturers. Few drivers could tell that the speed displayed was not a valid reading without careful scrutiny of the unit.

THE BAD CONNECTION: On the older types of radar unit, with a dial face and a needle to show speed, a sharp blow to the unit or a light tapping on the case will cause the needle to swing an additional 10-20 mph while clocking. The operator can simply lock in the speed as the needle passes the desired mark.

THE CATCH-UP SPEED: This is one of the most common abuses of radar, and one which is virtually impossible to prove. A stationary radar unit in operation while the patrol car is in motion will read the ground speed, effectively clocking the speed of the patrol car. An officer accelerating after your car may hit a

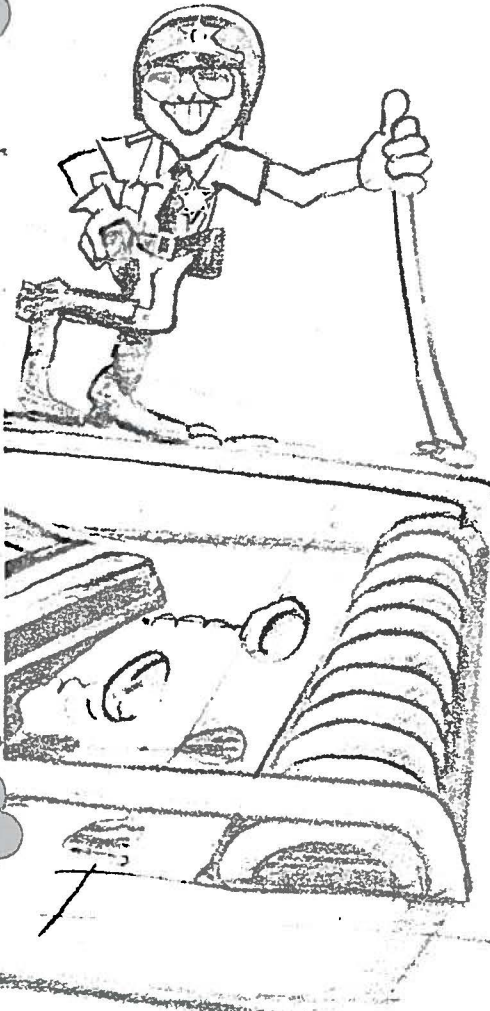
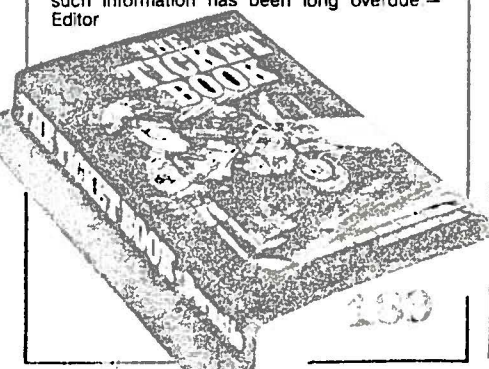
speed of 90 mph in order to close the distance between your vehicles. The officer can then lock in his own speed at whatever point he wishes, showing the speed to the violator as if it were a valid reading.

THE FINAL APPROACH: Radar is capable of clocking almost any moving object, including trains and aircraft. Airports are good places for an unscrupulous officer to lock in a high-speed reading, while the officer working near a rail line might never realize that he was clocking an oncoming Super Chief instead of your Chevy.

THE HURRY-UP HUSTLE: Many moving radar units begin losing the ground reading above 65-70 mph and will show erratic readings above that speed. If the patrol car is intentionally driven at those speeds, the officer could lock onto one of these inaccurate readings. Fortunately, many new radar units automatically shut down when the patrol speed exceeds 65 mph.

KITING: Many officers have found that the presence of the radar unit on their window makes their job a lot easier; motorists are much less likely to challenge a citation if they think radar is involved. The officer may not have been using radar at all and may simply have created a speed, or increased the actual radar reading on your ticket. This trap can be avoided by always asking to see your reading on the radar unit. Make

Rod Dornsite and Mark Miller co-authored *The Ticket Book*, with Dornsite supplying most of the background and inside information. He served for five years with a major metropolitan police department as a routine patrol officer, traffic officer, field training officer, radar operator and on various other assignments, so he is well acquainted with the inside story about how such things as radar are misused. He is also familiar with our traffic court and legal procedures. Consequently, *The Ticket Book* is filled with answers to all the questions about fighting traffic tickets, and the accuracy and potential misuse of police radar, that you've always been afraid to ask. *The Ticket Book* is a must for anyone who drives.
Dornsite and Miller have extracted a small portion of the wealth of information in their book for this exclusive article for HOT ROD. After you read it, we're sure you'll agree that such information has been long overdue - Editor



PHOTOGRAPHY: BOB McCLURG, DAVE WALLACE

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sure that the speed shown on the unit is the same as the one he writes on the citation.

LEFTOVERS: All radar units use some method of preserving the violator's speed on the display, either by use of a manual lock activated by the officer or an automatic lock that engages above a preset speed. Some units can even store the reading, displaying the speed when the officer hits a "recall" button. The speed the officer shows you could very easily have been that of a previous violator, still locked into the unit.

PANNING: Radar always reads the strongest target. If the antenna of a stationary unit or a hand-held radar

gun is panned by the officer to follow a vehicle as it passes, the radar reads the strongest target: the entire world sweeping by. With a little practice, an officer can sweep up any speed he wants.

SHIFTING ZONES: This type of error occurs when the officer is enforcing the speed limit in a reduced speed zone, such as a school zone or a business district. His patrol car may be well into the reduced speed area, but with the radar's long range, he may still be clocking vehicles in the higher speed area.

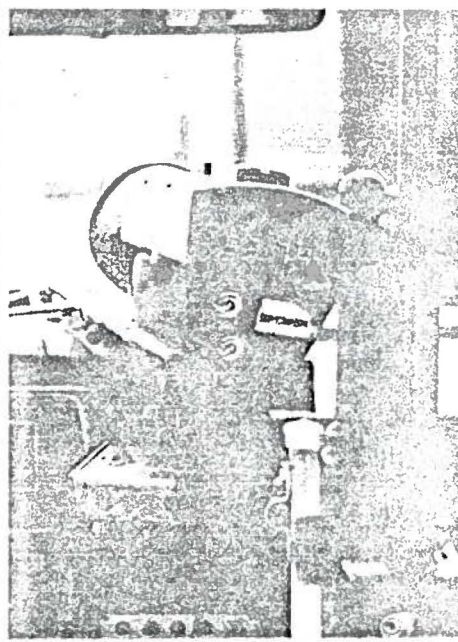
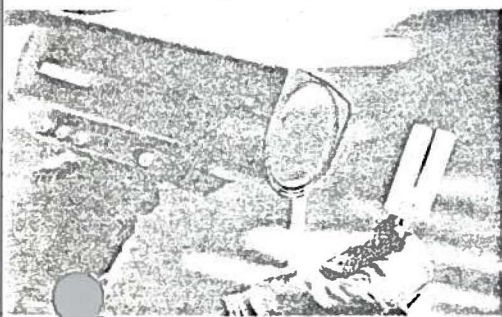
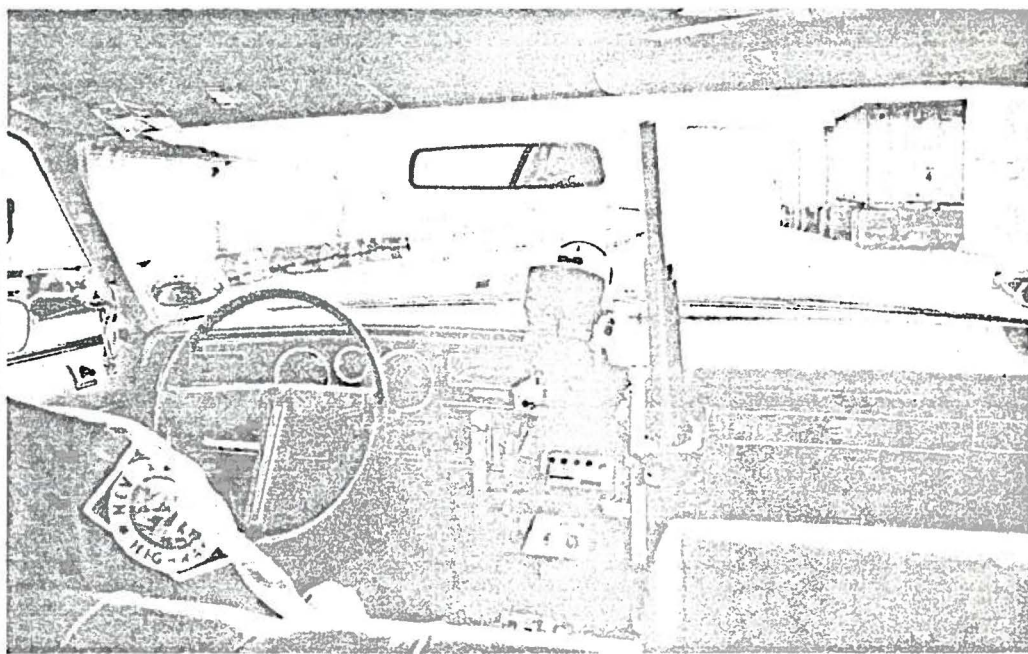
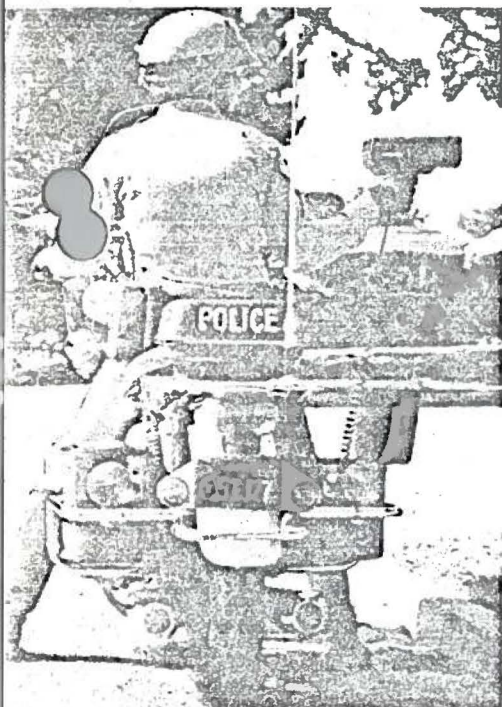
SPEEDING FANS: Radar will clock any movement. When the antenna is mounted inside the car, either on the dashboard or the sun visor, radar will sometimes clock the heater, air conditioner fan or torque converter. By adjusting from "Fresh Air" to "High Blower," the officer can adjust the speed on his radar unit as well.

THE SWITCH: A modern radar unit may also be equipped with a built-in stopwatch. Unfortunately, the stopwatch functions read out on the same display as the speed for the radar. All of the input is controlled by the officer, so it's easy for him to allow the unit to count up to any number of seconds and represent those readouts as a speed.

THE TUNE-UP: The accepted (and court-mandated) method of calibrating a radar unit is by use of a tuning fork. When properly struck, the fork will vibrate at a specific frequency to artificially produce a known speed. Unfortunately, these forks are available in 5-mile-per-hour increments from 25 to 100 mph, with the 65-mph fork one of the most common. The officer with his own stock of forks could "tune up" just about any speed.

THE WHISTLER: Although the police generally deny it, CB radio

RADAR RIPOFF



Hand-held radar guns are becoming quite popular with police. Erroneous readings can be generated by "panning" such units. The only approved method of calibrating any radar unit is with a registered tuning fork, but forks are available in 5-mph increments and they can also be used to generate false readings.

Newest mobile units that permit clocking of oncoming vehicles while the patrol car is in motion can be confused by other traffic, producing erroneously high indications. Sights atop radar guns mislead the officer into thinking he is clocking only the vehicle directly in the sights; but radar beam spread is 12 to 16 degrees, and he might be clocking the car ahead or behind the one in the sights. Typical beam width is about 225 feet at a 1000-foot range.

and police radar just don't get along together at all. Keying the mike near a radar unit can produce speeds in the mid-50s, voice transmissions rise into the 60s and 70s, while a high-pitched whistle can bring up a reading of over 100 mph. If you're cruising through the countryside and hear someone whistling Dixie on the CB, keep an eye out for radar cars and watch your speed.

THE WIPE: The older radar units which incorporated a dial face and a needle to show the speed usually used a plastic lens to cover the needle. When a hand is wiped across the lens, the static electricity generated can add 10 mph to any reading.

WHODUNIT?: Stationary radar will clock vehicles whether they are

RADAR RIPOFF

approaching the radar unit or traveling in the opposite direction. A vehicle traveling away from the radar unit may have a high enough speed to be interesting to the officer, yet already be too far gone to catch. The officer may just stop the next car to come by that looks fast, using the reading that is already locked into the unit.

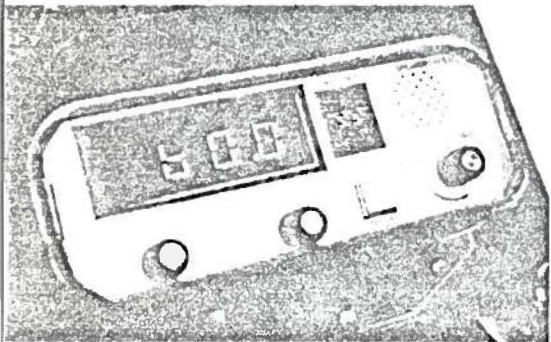
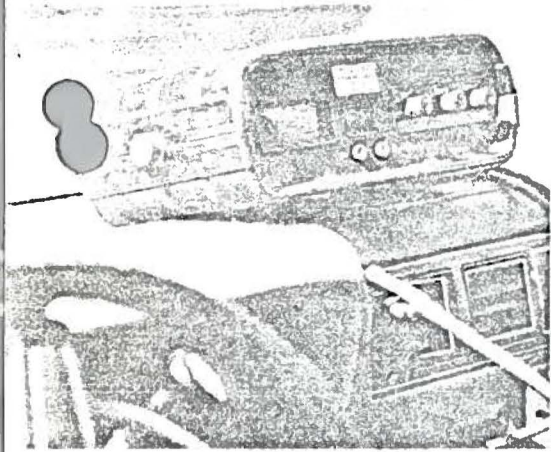
Even without interference or intentional abuse, radar is tough to operate. Correct usage is achieved only through a lot of training, experience and good judgment on the part of the officer. Target differentiation is one of the hardest things to achieve. Radar antennas are often equipped with a set of sights similar to the open sights of a handgun, but the actual spread of the beam is much wider, as much as 20 degrees. The officer may be aiming dead center at a Porsche, but the target the radar is actually tracking is a large truck at the periphery of the beam.

Radar tracks the strongest target, which may not always be the nearest target. Picture the dilemma of an officer aiming his radar unit down the

highway and picking up a speed reading. Fifty feet away is a moped, a quarter-mile down the highway is a sports car, a half-mile down the highway is a Greyhound bus, and a mile down the highway is a freight train. Each is a progressively larger target that will give a stronger signal, but there is no way for the officer to determine which target the radar unit is actually clocking.

The Ticket Book is highly recommended for anyone who has been "burned" by police radar. The book takes you step by step through the entire citation process, helping you evaluate your citation and the chances of beating it in court, showing you how to prepare your case and how to lay out your entire plan for fighting and winning your radar citation. Armed with this book, you can go into court probably knowing far more about radar and the law than the police officer you face. **HR**

(*The Ticket Book* is available at \$6.95 through bookstores, automotive parts stores or directly from The Ticket Book, Inc., P.O. Box 1087, La Jolla, CA 92038.)



TOP—Radar units last indefinitely. Older units such as this are still in use by many smaller police agencies. **ABOVE**—Many new radar units feature an internal "calibrate" mode. This does not calibrate the unit, but only verifies the operation of the internal electronics. When the unit is in the calibrate mode, a verification speed is displayed. Careful examination of the radar unit may reveal that an unscrupulous officer actually dialed up a calibration number rather than clocking you in violation of the speed limit. When stopped for an alleged speeding violation, always ask to see the alleged indication on the unit.

"Well, the theory sounds good"

Police radar (the cops like to call it "Traffic Safety Radar") works on a relatively simple principle. The word is actually an acronym for "Radio Detection And Ranging" and is still referred to as "radiodetection" equipment by the Federal Communications Commission, the federal agency responsible for policing the police radar. All police radar units operate on the Doppler principle, a theory that proved that any radio frequency striking a moving object will undergo an increase or decrease in the reflected frequency. Because this shift is directly proportional to the speed of the object, the change in frequency can be interpreted by the radar unit as speed.

Police radar units transmit a radio beam on one of two FCC authorized frequencies: either X-band, at a frequency of 10.525 gigahertz, or K-band at 24.150 gigahertz. This radio wave is transmitted in a continuous beam down the roadway, spreading about 12 to 16 degrees, roughly the same as a cheap flashlight. When this radio wave strikes a moving object, such as a car, it bounces back to the radar unit, where the shift in the frequency is interpreted and displayed for the trooper in easily read miles per hour. A control on the radar allows the operator to preset the speed at which he's going to apprehend people; any speed over that will be locked into the display automatically (he can also lock in any other speed manually).

Moving radar uses the same principle, but sends out two radio signals while the patrol car is in motion. The two signals are reflected back to the radar unit, one from the ground and the other from an oncoming vehicle. The moving radar unit then computes the two speeds and displays both the speed of the patrol car and the speed of the oncoming vehicle. **HR**

One man's opinion: Dr. Henry Kolm

One of the most qualified critics of radar is Doctor Henry Kolm, a physicist and radar expert at the Massachusetts Institute of Technology, who began criticizing police radar some serious study after he was caught by radar (his testimony soon had the case against him dropped). He claims that only 10 percent of the readings that show up on the radar unit are valid.

"This is justice carried out with completely erratic equipment," he says. "In principle, Doppler radar can be accurate, but the problem is in the operation of the thing. These companies manufacture an instrument that is erratic. The policeman throws out his bad readings. Sure, if you take enough readings, eventually one will be good and they nail a guy. If a scientist conducted an experiment that way, he'd lose his PhD."

He goes on to point out the basic fallacy of police radar. "What this radar does is measure the speed of light—186,000 miles per second (the speed of the radio wave)—versus the speed of a car—50 miles per hour." He points out that this is a difference in magnitude of one hundred million to one, far beyond the ability of such a small, inexpensive unit as police radar.

"That is near the accuracy of an atomic clock," says Dr. Kolm. He goes on to say that aircraft do use Doppler radar to calculate ground speed, but it's considered so inaccurate that it is used only as a backup. Far more sophisticated and expensive than police radar, these aircraft Dopplers take at least 6 seconds to obtain a valid reading; police radar reads out in less than a second. **HR**