QUESTIONS AND ANSWERS ABOUT VEHICLE SPEED DETECTION

RadioShack™
WHAT IS VEHICLE SPEED DETECTION?

Vehicle speed detection is the general name for a variety of ways law enforcement agencies enforce traffic speed laws. Methods include pacing, VASCAR, aircraft surveillance, hoses, ORBIS, traffic radar, and LIDAR (laser).

HOW DOES PACING WORK?

Using the pacing method, the police officer drives behind your vehicle and matches your vehicle's speed with his/her vehicle's speed. The officer can then determine your speed from the speedometer in the police car.

This method is usually effective only at night. During the day, a reasonably alert driver can spot the police car and adjust to the speed limit before the officer can match the driver's speed.
WHAT IS VASCAR?

VASCAR is an acronym for Visual Average Speed Computer and Recorder. VASCAR is little more than a combination stopwatch and measuring device. In its simplest application, the police officer uses the VASCAR to measure a section of road. The officer then starts the VASCAR when a vehicle enters the section and stops the VASCAR when it leaves the section. The VASCAR displays the vehicle’s average speed over the section of road.
HOW DO AIRCRAFT FIND MY SPEED?

Police agencies mark a section of road with stripes that are a known distance apart. Police aircraft then use VASCAR to determine vehicle speed. Typically, a police helicopter hovers over the measured section of road and determines each vehicle's average speed. Then an officer in the helicopter radios to officers waiting out of sight on the road, informing them of each vehicle's speed.

If your local law enforcement agency uses aircraft, you can watch for the aircraft near marked sections of roads.
HOW DO OFFICERS USE HOSES TO DETERMINE VEHICLE SPEED?

An officer places two rubber hoses across the road. The hoses are like those at gas stations that ring a bell, except these hoses connect to a box that measures the time it takes for your vehicle to travel between the hoses. Your vehicle speed is indicated on a receiver in the police vehicle.

Since the hoses are not easy to see, are only a few feet apart, and are used for collecting other traffic information, this can be a very effective method for determining vehicle speed.
WHAT IS AN ORBIS?

ORBIS is a greek word meaning eye. An ORBIS traffic speed detection system uses permanently installed roll-over sensors in the traffic lane to determine vehicle speed, and a camera to take a vehicle’s picture. A vehicle travelling faster than a preset speed triggers ORBIS to take a picture of the vehicle, including the front license area and the driver. The date, time, and vehicle speed are included on the picture.

Since ORBIS units are permanently installed, they are easy to spot and avoid. Also, rulings by courts have held that an officer must see the violation, so ORBIS has been effectively ruled out in most areas.
HOW DOES TRAFFIC RADAR WORK?

RADAR (Radio Detecting And Ranging) devices bounce a radio signal off of a moving object, such as a car. The reflected signal is picked up by a receiver. Traffic radar receivers measure the frequency difference between the original and reflected signals. This frequency difference is converted into a speed, which appears on the receiver's display.

Radar signals, like other types of radio signals, travel in straight lines until they hit an object that either absorbs, reflects, or refracts the signal. Radar receivers cannot see around curves or over hills, so a vehicle must be in the receiver’s line of sight for traffic radar to get a speed measurement.
IS RADAR ALWAYS ACCURATE?

Usually, yes. A well-maintained, properly-tested radar receiver, used by a professional operator, can be accurate to within $\frac{1}{10}$ of a mile per hour.

The radar signal spans all traffic going in both directions. Aimed at an object less than $\frac{1}{4}$ mile away, the beam can be as wide as six or eight lanes of traffic. The radar receiver reports on the strongest signal it picks up. Vehicle size and shape can make a difference (a big truck reflects a stronger signal than a motorcycle or small car). This means that the radar receiver can sometimes pick up a reading from a vehicle other than the one intended by the operator.

ARE RADAR DETECTORS LEGAL?

It is legal to use radar detectors in all vehicles weighing under 10,000 lbs in most of the U.S. However, regulations prohibit radar detectors in several states. If you are not sure, check with your local law enforcement agency.
WHAT ARE THE DIFFERENT RADAR SPEED DETECTION SYSTEMS?

Technical advances have yielded several radar speed detection systems you should be aware of.

Continuous Wave (CW)—This traffic radar system transmits constantly. The detector alerts you up to several miles from the radar source in optimum conditions.

Continuous Wave Low Power—This traffic radar system operates like CW radar, but uses a much lower power level. The detector can alert you up to a mile or more from the radar source in optimum conditions.

Triggered CW, Stationary Mode (also known as Instant-On, Laser Pulse, or Hawk)—This system transmits radar signals in bursts, and requires less than 1 second to determine speed. The detector senses the burst and sounds a special signal up to several miles from the source. However, since the radar gun only transmits signals when the operator triggers it, the alert range depends on how often the operator triggers the gun.

Triggered CW, Moving Mode—This system uses pulses to determine the police vehicle’s speed. Then, when the operator triggers the system, it transmits a signal burst to determine the speed of oncoming traffic. The detector senses both the police vehicle speed pulses and the triggered signal.
WHAT ARE THE DIFFERENT RADAR BANDS?

There are three bands in use for traffic radar: X, K, and Ka.

**X-Band**—This was the first band used for traffic radar. It was introduced during the 1960s and uses a frequency of 10.525 GHz (gigahertz). Many other devices, such as automatic door openers and alarm systems, use this same frequency range. Most false alerts occur because of these non-traffic X-band devices.

**K-Band**—Approved for use in the mid 1970s, K-band traffic radar units are lower powered and more difficult to detect than X-band. K-band traffic radar operates at 24.15 GHz. Also, K-band is shared with other devices.

**Ka-Band**—Put into use in 1987, the original Ka-band traffic radar devices could operate on a limited set of frequencies. In 1990 the FCC approved Wideband Ka, which permitted these devices to operate between 34.2 and 35.2 GHz. Now Super Wideband Ka devices operate on any frequency between 33.4 and 36.0 GHz.
WHAT CONDITIONS AFFECT RADAR ALERTS?

Keep in mind that the following conditions can influence the intensity or duration of a radar alert.

• If the police are using instant-on/pulsed radar, the officer does not trigger the unit to send a signal until he or she has a clear view of your vehicle. To detect this signal, you must rely on reflected signals from radar directed at the traffic traveling ahead of you.

• If the traffic radar source is positioned perpendicular to the road, around a curve, or just over the crest of a hill, the possible reception range is significantly reduced.

• Traffic between your vehicle and the traffic radar source both blocks and reflects transmitted signals. The presence of several large trucks between you and the traffic radar could also significantly reduce reception.

• Rain and humid weather conditions can absorb transmitted signals before they reach your vehicle, again reducing the detection range.

• If the traffic radar equipment is misaligned, it might transmit outside the allocated X-, K-, and Ka-bands.
HOW DOES LIDAR WORK?

The latest addition to the police officer’s speed detection arsenal is LIDAR (Laser Infrared Detection And Ranging). To measure a vehicle’s speed, LIDAR times how long it takes a light pulse to travel from the LIDAR gun to the vehicle and back. From this information, LIDAR can quickly find the distance between the gun and the vehicle. By making several measurements and comparing the distance the vehicle traveled between measurements, LIDAR very accurately determines the vehicle’s speed.

LIDAR uses a laser beam of invisible infrared light. The beam reflects off any flat surface on your vehicle. Since the beam is very narrow, it is impossible for any laser detector to indicate how far away the LIDAR source is.

From the illustration, you see that a vehicle (right lane) can receive little or no signal while a vehicle nearby (left lane) is targeted. By moving the LIDAR gun only slightly, the vehicle in the right lane could be targeted and its speed could be determined in less than a second.
WHAT AFFECTS LASER ALERTS?

- The maximum effective range for LIDAR is about 2,000 feet. In optimum conditions, a laser detector detects LIDAR signals up to a couple of miles away.

- Since water absorbs infrared light (the type of light used by LIDAR), LIDAR range is greatly reduced on humid, foggy, or rainy days.

- Laser detectors cannot pick up LIDAR over hills or around most curves.

- Laser detectors are almost completely immune to false alerts. Treat every laser alert seriously...yours could be the next vehicle targeted.

- If the laser alert sounds, immediately take the appropriate action. Laser is not like radar; you do not get much advance warning.

- If you are driving over the speed limit and are in the lead of a group of vehicles when a laser alert sounds, you have probably been caught. Like instant-on radar, there is no warm-up time. Speed detection takes about .3 seconds...half the time it takes your foot to move to the brake.

ARE LASER DETECTORS LEGAL?

Laser detectors are legal in all states as of April, 1995.
WHAT CAUSES FALSE ALERTS?

Ideally, a detector should only alert in the presence of police radar. However, because other devices share the X- and K-band with police radar, false alerts sometimes occur. Generally, a false signal produces only a short audio and visual alert. Since they are most often weak, it is possible to drive out of the signal's range very quickly and receive only a brief alert.

Although many times you can easily identify the probable source of the false signal (supermarket, bank, commercial building, and so on), you should exercise caution until you can verify the source. The X- and K-band alert pattern caused by a non-police source can look like the first alert caused by actual police radar. For this reason, you should always take the appropriate action whenever your detector sounds an alert.
WHAT IS A RADAR DETECTOR DETECTOR?

In areas where radar detectors are illegal, some officers have a VG-2 radar detector detector. These are very sensitive receivers tuned to a frequency commonly generated by radar detectors.

Some radar detectors do not generate the frequency a VG-2 can detect, however. These radar detectors, marketed with the keywords Ghost or Stealth technology, also cause less interference with other radar detectors and generate much weaker electromagnetic fields.

HOW ABOUT PHOTO RADAR?

Photo radar is a low power radar system that triggers a camera, similar to ORBIS operation. The officer need never pull over your vehicle...the registered owner of the vehicle is mailed the ticket along with a photograph of the violation. Since power is very low, typical detection range is less than 500 feet. Currently, photo radar is used in only a few areas, but it is a technology to keep an eye on.

DRIVE SAFELY!

Radar and laser detectors are meant to keep you alert and aware of traffic conditions. They are not a license to speed. Drive safely and always wear your seatbelt.
WHAT IS SAFETY ALERT™ AND SAFETY WARNING SYSTEM™?

These systems are low-power transmitters used by some emergency services and road crews to alert drivers to hazardous conditions. The Safety Alert system can indicate stationary, moving, or railroad hazards. Radar detectors that are Safety Alert compatible indicate the presence of a Safety Alert signal.

The Safety Warning System is similar to Safety Alert, however it operates at a higher power level and can alert you to many different emergency or hazardous conditions in the area (58 different messages are currently defined, with 6 additional messages reserved for future use).

While neither of these systems are in widespread use yet, there are already several different radar detector models that can detect these systems. These systems have the potential to dramatically increase a driver’s awareness of road hazards, and decrease the potential for traffic accidents.

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