Monitoring police traffic-radar problems

The accuracy of police traffic radar has been the focus of numerous court battles in the last few years. One concern is the question of which target a radar displays when more than one vehicle is present within the radar's antenna beam. Recently, researchers at the Georgia Institute of Technology showed that all techniques for processing the returned radar signals studied thus far "will cause questionable data to be displayed under certain target conditions."

Gene F. Greneker, senior research associate in the radar applications division, concluded in a report given last week at the 1982 Carnahan Conference on Security Technology in Lexington, Ky., "The greater the traffic volume and/or the closer the traffic spacing, the higher the probability of radar processing errors."

Greneker told SCIENCE NEWS, "The most serious problem is the untrained operator." Anyone using speed-timing radar must be trained to recognize the conditions under which the particular kind of radar used will give accurate results and when the capabilities of the radar are exceeded.

The researchers analyzed a variety of traffic situations by videotaping roadway scenes, recording sounds produced by reflected radar signals and displaying the unfiltered radar data. They compared the display — which showed traces for all the vehicles present — to the single speed displayed by the speed-timing radar. Depending on the radar unit, the largest target was not always the target tracked, they found. In the example shown (diagram), no speed was displayed when return signals fluctuated rapidly or when several signals were almost equal in strength. This particular radar unit also had a tracking filter, which allowed it to follow the highest-speed signal even when the target signal was small, rather than the largest signal.

For several years, the National Highway Traffic Safety Administration (NHTSA) has been involved in developing performance standards for police speed-measuring devices and training programs for police officers. Early in 1980, a hearing in Dade County, Fla., highlighted several radar problems, including a radar unit that in two tests appeared to show a house moving at 28 miles per hour and a tree at more than 80 miles per hour. Marshall J. Treado of the National Bureau of Standards' Law Enforcement Standards Laboratory investigated the problems. He showed that in one case the sensitive radar unit probably reacted to the fan motor in the car carrying the radar. In the other, it reacted to a CB radio transmission from the car. In neither case was a moving vehicle present. When an appropriate target was present, the radar registered speed correctly.

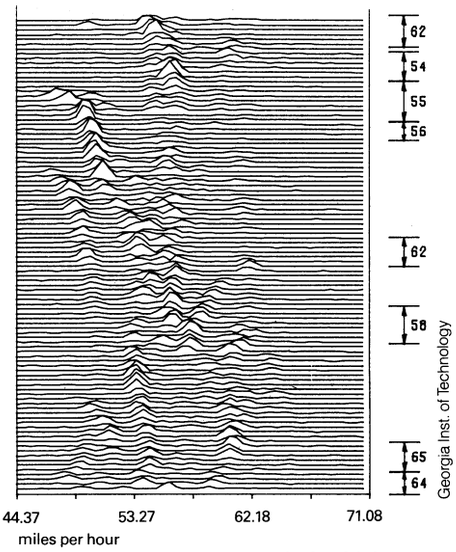
The investigation revealed a variety of other shortcomings and conditions under which then-available traffic radars would not function properly. In January 1981, the NHTSA proposed rules for radar units. In November, the Reagan administration chose to institute a voluntary program instead of mandatory rules. However, under the voluntary program, the National Bureau of Standards is still planning to test radars and publish a "qualified products list." Instead of government imposing the rules, defense attorneys will make sure people buy approved radars, says Treado.

Greneker suggests that manufacturers should provide systems with better signal-processing techniques: "The more information you give the officers, the more accuracy you're going to get," he says. Treado says manufacturers have already eliminated the automatic lock—which automatically displayed the highest speed and prevented the officer from obtaining a tracking history — and added sound so that an officer can distinguish receding and incoming targets more easily.

Greneker says state and local law-enforcement agencies should look for quality in their equipment rather than accepting the lowest bid. He also warns that if signal processing is improved, law enforcement officials may need to get used to systems that display no speed instead of a possibly incorrect speed when the signals are ambiguous.

The 1980 National Bureau of Standards study concluded, "Police radar which measures vehicle speeds is a reliable tool for police use when carefully installed and properly operated by skilled and knowledgeable operators." The demise of police traffic radar predicted after the Dade County hearing has not occurred.

—I. Peterson



This plot displays the speed of vehicles at various times (increasing upward on the vertical axis). The amplitude of a trace at a given time and speed represents the signal strength reflected from a particular target. The radar unit displayed the speed values listed on the right.

Scientists identify chemical sleep agent

After more than a decade of research, scientists have isolated and determined the makeup of a bodily substance thought to play a role in sleep, according to findings reported in a recent JOURNAL OF BIOLOGICAL CHEMISTRY. The chemical compound, a peptide that the scientists are calling "factor S," is apparently a product or residue of bacteria that inhabit the gut; the brain may employ this substance as a neuromodulator to mediate the effects of naturally occurring neurotransmitters on the brain's sleep center.

The search for a natural sleeping agent has been going on for years. In the late 1960s, physiologist John R. Pappenheimer of Harvard Medical School first discovered that extracts from the spinal fluid of sleep-deprived goats could produce slow-wave (or non-dreaming) sleep in laboratory animals, and a few years ago it was found that something in human urine also had sleep-inducing effects. Now Pappenheimer and his colleagues have managed to isolate a specific peptide that prolongs slow-wave sleep in animals. With the chemical constituents of this human sleeping agent now known, it might be possible to synthesize the compound; French scientists have already succeeded in synthesizing a similar drug.

Other sleep-inducing peptides have been identified, according to the researchers, but they produce only a very brief sleep effect. Factor S, in contrast, prolongs and intensifies slow-wave sleep for several hours; it is a deep but normal kind of sleep, similar to the sleep that follows extreme sleep deprivation.

Interestingly, factor S does not resemble any chemical known to be manufactured by mammals, but it is very similar to a peptide found in bacteria. Although the researchers do not rule out the possibility that the substance is synthesized naturally by humans, they also suggest that the components of bacteria that live in the human gut may be absorbed by the body —as vitamins are—and used as a sleeping agent. It has been fairly well established that another chemical, tryptophan, which is absorbed from high-protein foods, can be effective in fighting insomnia. But what remains unclear is how these substances interact with the brain's own chemistry in ruling sleep. If Pappenheimer's findings hold up, sleep researchers say, the substance will be of most immediate value as a research tool for investigating the neurochemical pathways of sleep. The prospects for developing an anti-insomnia drug are remote, most agree. *—W. Herbert*