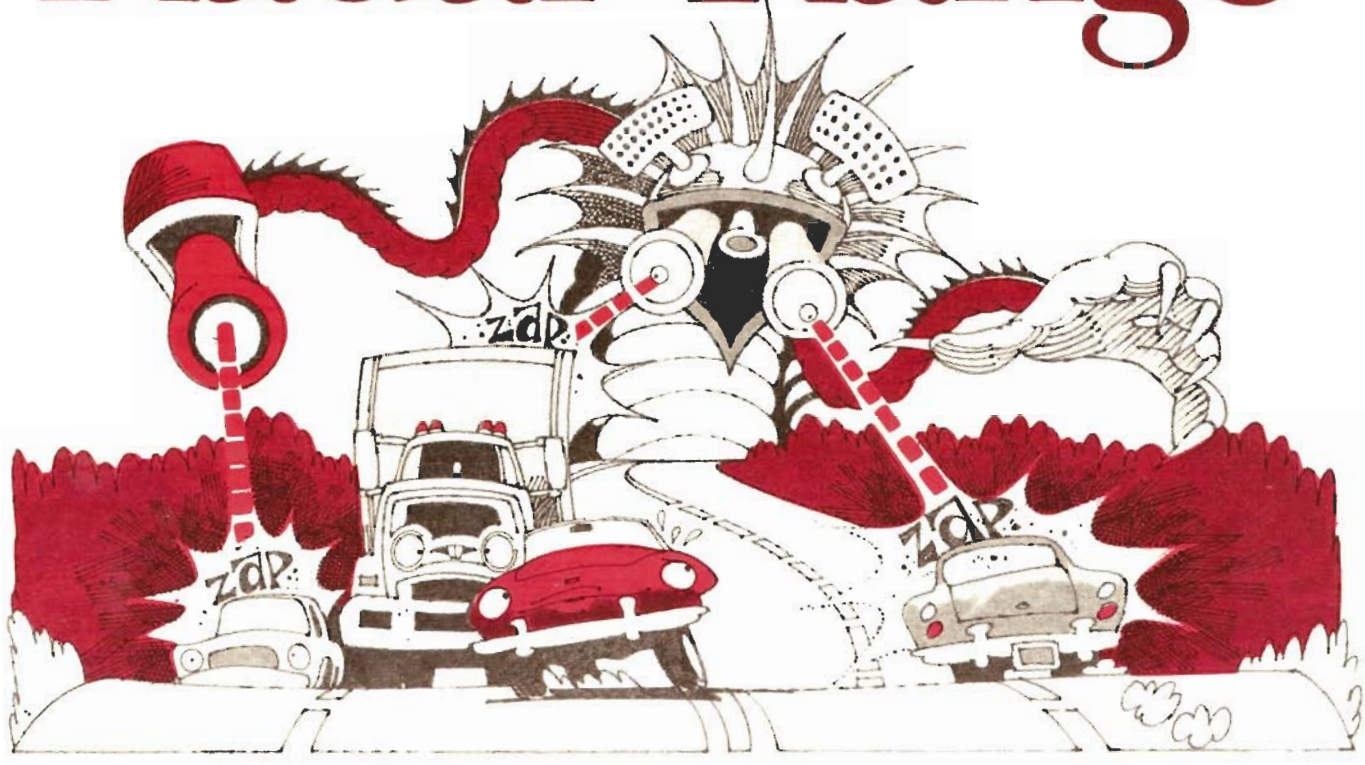
Radar Range



Wherein we debunk a persistent myth about police radar.

BY PATRICK BEDARD

• Never mind what the judges say. And while you're never minding them, never mind what the highway patrolmen, state lawmakers, federal bureaucrats, and witless dupe attorneys for radar manufacturers say either. All cars are *not* created equal under radar.

Radar has long been regarded by the courts as an infallible witness. The cornerstone of this infallibility is its supposed impartiality. It sees all cars equally, we are told. It is a scientific device, and everybody knows that science doesn't lie.

This notion of equality is absolutely essential to the use of radar as a device for nabbing speeders because it gives cops a way of deciding which of the oncoming cars is actually doing the speeding. A casual knowledge of science would suggest that it must be the front one, so, in most states, that's the way the laws read. If you're in front and an extralegal number appears in the radar display, you're the culprit.

This turns out to be one of the proverbial cases in which a little bit of knowledge is truly dangerous. I discovered that several years ago when I set up my own experimental speed trap with a Kustom Signals MR-7 on a section of four-lane divided highway. There was always one car or more in range, either coming or going, and there was always a speed reading showing on the meter. But because the meter reading was changing every few seconds, and in a way that I could rarely correlate with the passing of specific cars, I began to wonder how cops could reliably separate the speeders from the solid citizens.

You see, radar doesn't point a finger at any particular one. It just shows *a number*. And no matter how many vehicles are within sight, it still just shows one number. But whose number is it? We know what the law says. But science is not so simple.

Radar works by sending out a relatively narrow beam of microwaves at a known frequency. These microwaves travel in straight lines and bounce off objects in their path. Some of the microwaves bounce back to the radar itself, which has a receiving system to process these returned signals. That is the way it determines speed. Objects moving toward the receiver increase the frequency of the reflected microwaves; objects moving away lower the frequency. And, of course, stationary objects cause no frequency shift at all.

ILLUSTRATION BY LARRY TOPLE

PHOTOGRAPHY BY AARON RILEY

Now, when the cops set up a radar trap, they spray the whole countryside with microwaves for several miles down the road, and probably a quarter-mile wide. The microwaves hit fenceposts, guardrails, birds, swaying trees, cows, and who knows how many cars and trucks. What they get back is one number. Whose number is it?

Well, never mind what the law says. Let's look at the way a radar unit actually works. The receiver has been designed to process only one—the strongest—of the reflected signals. All of the rest fall on deaf ears.

What makes strong reflections? Distances are important. The shorter the span, the stronger the bounce. Size counts too: the bigger the better. But microwaves tend to be rather fussy about what they'll bounce off of. They go right through glass, for example, and most kinds of plastics as well. But metal makes a solid signal—provided it's not shaped wrong. The military has found that by designing airplanes a certain way—with a special sort of pointy nose—it can give them a very low radar profile. Trucks, of course, are shaped just the opposite, and they bounce signals back with vigor.

But normal traffic is made up of all sorts of shapes, most of them neither blunt nor pointy, and a wide variety of sizes. It seems very doubtful to us that the closest vehicle will always make the strongest signal.

Other possibilities suggest themselves. There may be certain cars that have such naturally low radar profiles that their drivers are effectively exempt from this form of electronic surveillance. Isn't that a delicious prospect, driving right through a radar net without raising so much as a blip?

To find the answers to all these questions, we set up our own *C/D* Radarorama on an unopened freeway just west of Detroit. There just happened to be a straight and level section of roadway, about as long as the eye could see in the Michigan summer haze. So we pointed a Kustom Signals KR-11 downrange (this is a K-band unit, the most expensive and most sophisticated police radar on the market and therefore presumably the most reliable in its readings), and then drove a variety of vehicles toward it, measuring the distance at which each first produced a speed reading.

Just as we suspected, there is a tremendous variation in the way different cars show up on radar. And significantly, there is no way to look at a car and accurately predict its radar range, as you will see in the accompanying section describing the individual cars. But we did reach a few significant conclusions nonetheless. If you want to slip unnoticed through the radar screen, a Corvette would appear to be your best bet. In the test, a bright red Corvette, so red that your eyes would latch on to it at a half-mile, would not show up on radar until it was within an average distance of 520 feet from the transmitter. The next-best car, a Honda Civic, could be picked up more than twice as far away.

And if you wish to avoid radar, by all means don't take a truck. Corrigan Moving Systems of Ann Arbor supplied a Ford 9000 tractor with a 40-foot trailer. That little unit came on screen at 7670 feet, almost a mile and a half, too far away for the naked eye to be sure that anything was even moving.

Finally, don't believe it when the judge and the cops and the radar manufacturers tell you that radar always gets the front car. We rigged up a little experiment in which the truck and a Firebird Trans Am approached the transmitter side by side at 35 mph. At a distance of about one-half mile, the Firebird accelerated to 45 mph. Not only was it ahead of the truck from that point on, but it was also widening the gap by 10 mph. The radar never saw the car; instead, it held the truck's reading until both had passed the transmitter because the truck dominated the radar with a much larger reflection. Which means that the car will likely be blamed for whatever the truck is doing. And if the truck happens to be speeding, the car is likely to get a ticket. This sort of ticket would be difficult to beat in court because, first, you probably wouldn't know that a truck was behind you as a radar reading was being taken and, second, even if you did, you'd have a tough time proving it before a judge.

This brings us right back to where we started. Never mind what radar's proponents say, it doesn't treat all cars equally. And that is exactly why we should be wary of it.

Radar Rangefinder

Chevrolet Corvette

Frontal Area: 19.7 square feet
Radar Range: 520 feet

We expected the Corvette to be good but not great. It has a pointy nose and a small frontal area, but the advantage of its fiberglass body should be pretty much offset by the steel structure inside. Microwaves are like X-rays in that they pass through plastic and read the metal inside. The Corvette has plenty of metal, even in the roof.

Still, it turned out to be darned near invisible to radar. But it is so conspicuous to the naked eye, and a sports car besides, that we don't think you can drive a Corvette and get by with much.

Honda Civic

Frontal Area: 18.2 square feet
Radar Range: 1090 feet

The Civic was our attempt at finding a conventional steel car with the smallest possible frontal area. If all things are equal, the theory goes, then small cars should be less conspicuous to radar than big ones.

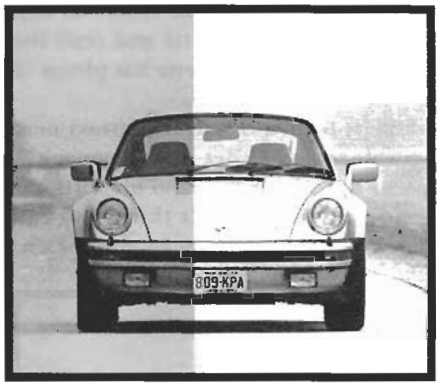
The Civic proves this theory to our satisfaction. With this car and a good radar detector, you should almost always be able to find radar before it finds you.

Continued

VW Rabbit

Frontal Area: 20.2 square feet
Radar Range: 1120 feet

The Rabbit occupies the same theoretical position in this test as the Honda Civic, and its results fall nicely in the predictable range. It has a bit more frontal area than the Civic and a bit more range. Yawn. Actually, we wouldn't have even bothered with this car except that it belongs to associate editor Don Coulter and we think he doesn't give it enough exercise.

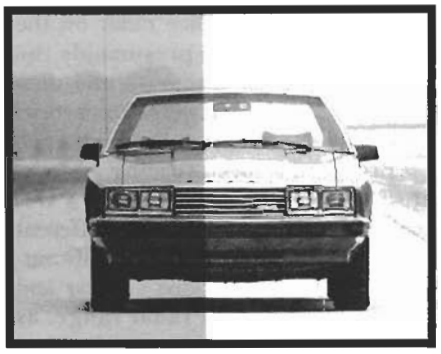


Porsche Turbo

Frontal Area: 20.6 square feet
Radar Range: 1180 feet

Previous radar testing on a Porsche 911 suggested that this shape was more difficult to find than that of the average car. We attributed this to the sloping hood, which is said to reflect microwaves unfavorably.

However, the results of this test suggest that the Turbo's radar range is about what you would expect for a steel car of this frontal area. Actually, we think it could be better than the test results indicate. This car has metallic paint, which seems to lengthen a car's radar range considerably, although we don't have conclusive evidence of this effect. We suspect that a Porsche with nonmetallic paint would have scored a shorter radar range.



Mercury Capri

Frontal Area: 21.3 square feet
Radar Range: 1230 feet

We had no preconceived notions about this car. Its frontal area is typical of the new generation of American family and sporting cars, which makes it significant, and its nose is almost entirely composed of a plastic grille, which might somehow influence microwaves. But in fact, the Capri showed up about right where you'd think it would, considering its rather large frontal area alone.

The one hopeful sign here is that this new-style sporty car fared a whole lot better than the old-style sporty car, represented in this test by the Firebird Trans Am.

Mercedes-Benz 450SEL

Frontal Area: 23.6 square feet
Radar Range: 1570 feet

Now we're getting into the biggies. This car actually came through very well, considering its rather large frontal area and the fact that it was covered with silver metallic paint.

If we were searching for theories to explain its relative findability on radar—and we are—we'd propose that the rounded contours of this car's nose tend to dissipate microwaves rather than reflect them back toward the transmitter. Then again, it could be that the Germans know something we don't.

Lotus Europa

Frontal Area: 16.4 square feet
Radar Range: 1590 feet

We went to a heap of trouble to find this car because we were dead solid certain it was going to be the hot tip, the car that would drive right under the cops' noses before it would ever show up on radar. It has everything: small frontal area, pointy nose, plastic body with a minimum of steel in the structure. And, boy, were we wrong. The radar could smell it coming three times farther away than the Corvette.

All we can say to Ken Kelly of Sports Car Service of Ann Arbor, who lent us his car, is "Too bad, Ken."

Buick Skyhawk

Frontal Area: 20.9 square feet
Radar Range: 1750 feet

We had high hopes for this car too. It has a narrow body with rounded contours and a sloping hood. Moreover, the entire nose, from the bottom of the chin spoiler to the hood cutline, is made of plastic. All of that should count for something.

Unfortunately, the test car was finished in a very sparkly silver metallic paint. And radar could see it coming a long way off. It's our hunch that a nonmetallic Skyhawk would do much better. But it's not a hunch you should bet your only driver's license on.

Continued

Buick LeSabre

Frontal Area: 25.4 square feet
Radar Range: 1800 feet

This hulk was pressed into service as a representative of the class of Big American Cars, such as they are in this era of downsizing. This particular test sample was big, brown, and blunt, and radar could spot it way down the road.

Some people would say that justice is well served by this car's vulnerability.

Firebird Trans Am

Frontal Area: 23.9 square feet
Radar Range: 1820 feet

The frontal area of this car is surprisingly large, fractionally greater than that of the Mercedes 450SEL. Yet it has a sloping nose composed largely of plastic and, in this case, white, nonmetallic paint. As a result, we did not expect the radar range to be so long.

As much as anything, this car shows how illogical radar really is.

Pontiac Phoenix

Frontal Area: 21.9 square feet
Radar Range: 1900 feet

More evidence that you can't outguess the whims of radar. This is really quite a compact car with very little more frontal area than the Capri, although the grille has much more brightwork. Paint in this case didn't help much either, it being the popular silver metallic. But nonetheless, a 1900-foot radar range is an outrage. If word of this gets out, Phoenix sales could take a real beating.

Dodge Power Wagon

Frontal Area: 34.7 square feet
Radar Range: 2110 feet

As a class, the so-called recreational vehicles are much bigger than passenger cars and presumably far more susceptible to radar. This four-wheel-driver has somewhat more frontal area than a pickup because of its height, which exposes the front axle. But even so, a van would be larger still.

Considering that its frontal area is more than twice that of the Lotus, the Power Wagon came off rather well, we think. Once again groping for an explanation, we single out the rounded contours of its hood and front fenders. And you know how reliable our theories have been so far.

Jeep CJ-7

Frontal Area: 29.3 square feet
Radar Range: 2510 feet

This is David E. Davis, Jr.'s, personal possum-pursuit vehicle, outfitted with all the bells and whistles necessary for bearding them in their natural habitat. Davis loves it and so does the radar, sniffing it out nigh onto half a mile down the road.

The Jeep did produce an unusual radar response, however, in that range measurements varied considerably from one run to the next (results shown for all cars are an average of three runs). We are not surprised that the average is quite long, though, because the flat bumper, grille, and windshield frame should be ideal for reflecting microwaves back to the antenna.

Ford 9000 with 40-foot trailer

Frontal Area: 95.1 square feet
Radar Range: 7670 feet

This rig is flat on the front and three times larger in frontal area than the Jeep, and the radar spotted it three times farther away. This was not a marginal reading, either. The KR-11 picked it up solidly and with greater consistency than the typical passenger car at a fraction of the range.

During this part of the test, Larry Griffin was watching from the back seat of the radar car. The first time the United Van Lines eighteen-wheeler popped on display at 35 mph, he jerked forward, squinted into the distance, and in the voice of a hard driver suddenly seeing how vulnerable he is, said, "Where the ——— is the truck?" Neither of us could see anything moving.

But the radar could. ●