

At first blush, it would appear that installing HF and/or VHF radios into a vehicle (of any ilk) will present insurmountable obstacles, with respect to RFI. The real truth is, you will experience more problems with the vehicle interfering with you, than you will interfering with it. However, you have to follow a few basic rules. Let's look at both sides of the issue.

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Modern vehicles contain all manner of electronic circuitry, with the majority being digital. Due to their inherent design, these devices emit spurious signals throughout the amateur HF spectrum and beyond. Ignition systems, although not strictly digital, are by far the most prevalent with respect to RFI. They are not the only offenders, however.

More and more vehicles are being equipped with integrated control systems. These systems use a common buss (or busses) to carry digital signals between the various control systems. A good example are vehicle stability systems. While they have their own "black box", they receive and transmit data to and from the antilock brake system. These data busses tend to produce birdies rather than hash like ignition systems do.

There is another aspect of vehicle RFI which needs to be mentioned, and that is the level of emitted RFI. Hybrid vehicles are certainly the worse offenders. Some hybrids are so RFI pervasive, you can hear them from blocks away. Imagine trying to operate from one!

Other than shunning hybrids, buying one specific vehicle and/or model isn't a sure-fire cure for RFI. Fact is, otherwise two, identical vehicles can emit far different levels of RFI. A common suggestion is to take a small, pocket AM radio to the dealer with you as a means of checking for RFI. That doesn't work well as what you hear on the AM broadcast band, may be far different than what you hear on the HF bands. It should be noted, that transportation vehicles are exempt from Part 15 R&R (albeit the FCC recommends the standard be followed), so that recourse isn't open to us.

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Contrary to popular belief, it is almost impossible to damage any on-board digital devices, albeit you might cause them to hiccup under certain conditions (more on this below). This document ([ES-XW7T-1A278-AC](#)) from Ford Motor Company, contains the engineering specifications for digital devices made for their OEM consumption. They're not much different from those of other automobile manufacturers. A quick once over of the requirements will illustrate why automotive, on-board devices are nearly RFI bulletproof.

One might ask then, why so much anecdotal information to the contrary exists on the web, with respect to damaging on-board electronics? There is a simple reason, and it is this; Far too many amateurs do not take the time to correctly and properly, install and wire their gear. And when they aren't installed correctly, RFI issues abound.

Almost without exception, vehicle manufacturers offer radio installation guidelines, and here's Ford Motor Company's; [http://www.fordemc.com/docs/download/Mobile\\_Radio\\_Guide.pdf](http://www.fordemc.com/docs/download/Mobile_Radio_Guide.pdf). Unfortunately, they aren't always followed. As a result, it is not uncommon to experience a ground loop, which is one of the toughest problems to solve, as they mimic RFI when they're not.

As alluded to above, RF induced into the vehicle's wiring, ground loops, and common mode currents can and do effect the various sensors the control CPUs use. If the installation in question follows the manufacturers guide lines, the occurrences of such maladies are greatly reduced, but still may occur. Fortunately, we have devices and methodologies to quell them.

Ferrite cores are wonderful devices, especially the split bead types which can be snapped over existing cabling. Doing so turns them into RF chokes, and if applied correctly, the RFI is suppressed.

Although not addressed by the installation guides, there are other procedures which will help reduce the level of RFI, both in and out. One of those is bonding. Bonding (RF grounding) the exhaust system to the frame of the vehicle is a typical example, as are doors, hoods, and trunk lids. Doing so often reduces ignition RFI to a respectable level.

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By following the manufacturer's recommended installation and wiring guide lines, avoiding temporary mounting means (especially antennas), proper use ferrites and bonding, and you can safely install amateur radio gear in any motor vehicle without fear or reprisal.