

New Car RFI? Buyer Beware

That shiny new car may not be quite the mobile platform you were hoping for.

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If you plan to install Amateur Radio equipment in a new or used vehicle, first check the frequencies you plan to operate for RFI. Most of us are aware of having difficulties with low band equipment in vehicles, but I recently experienced interference to 2 meters.

It was time to purchase a new car for my wife. She had previously owned two models of a popular family sedan in the past. Both of these cars had her trusty dual band (2 meters and 70 cm) mobile radio installed and it had operated successfully in each.

After a bit of test driving we decided another of the same model was to join our family. We purchased a V-6 version. It had plenty of engine power and was fun to drive, but I digress.

A New Transceiver for the New Car

With the new car it was time to purchase a 21st century radio. A beautiful new dual band transceiver was selected to replace the old veteran. The radio body was carefully installed under the passenger seat, the control head mounted in the center console, and the coax cable routed to the rear deck of the car for connection to the antenna. The complete hidden wire installation took a couple of hours.

Finally, it was time to check radio performance. All was going well until the engine was started. I checked our local repeater on 146.76 MHz and found a very objectionable heterodyne. Other frequencies were fine. How could this be?

Upon further investigation the heterodyne was present at times without the key in the ignition. Just opening the car door resulted in RFI for a few seconds.

Figure 1 shows the offending signal at 146.7627 MHz 30 dB above the noise. The signal was picked up by a 2 meter flexible antenna connected to the spectrum analyzer and lying on the dash where the measurement was taken.

I should mention that the 146.76 repeater in Central Ohio is a high profile repeater that is used for NWS weather spotting as well as other public safety nets. This heterodyne was unacceptable for our car.



Figure 1 — The offending signal at 146.7627 MHz 30 dB above the noise.

I used my 2 meter handheld radio to check for interference. I just opened the squelch control and manually scanned the band. On other vehicles I found different RFI frequencies. I have heard of hams requesting to place their low band radios on the seat, plugging into the power outlet, connecting a short wire antenna, and tuning to their favorite bands before purchasing a vehicle.

My first thought was the manufacturer had used an inexpensive TV color burst crystal somewhere in the car. Many hams who operate on a 146.76 MHz repeater have heard the harmonic problems that a 3.58 MHz crystal can cause. Many early CPUs, in all types of electronics, incorporated it ($41 \times 3.579545 = 146.76134$). This was not my source of interference, however.

I Take Action

After speaking to factory tech reps and much online research, interesting things were discovered. Three CPUs in the car operate at different clock speeds and are multiplexed onto a data bus. Two of the CPUs are attached directly to the back of the fuse panels located in the panels by our feet. This makes it impossible to place toroids or other filters on them. The third is located beside the battery under the hood. A product of this multiplexed bus is generating the RFI signal. The good old days of simple cars are gone.

I contacted my local dealer promptly explaining the problem. I was fortunate to

find the assistant sales manager formerly was a radar technician and understood my problem. The dealer assisted in checking other vehicles in their inventory, as now they were interested in the problem. The dealer contacted the manufacturer explaining the issue and including my spectrum analyzer photos. After a short time I was told by the manufacturer, "nothing is wrong with your car." This is not what I wanted to hear.

The Solution to My Problem

How did I solve the problem? I got rid of the car. I must give credit to my local dealership. They allowed me to trade for a

different vehicle without taking a loss. I guess this is why we have bought three cars from them in the past. Interestingly, the replacement car generates a signal on 146.785 MHz. Since this is not a local repeater frequency, it is not an issue for us.

Avoiding the Problem

The moral of this story is that, even if you have had good luck with RFI from cars in the past you can't assume that new models will behave the same way. While car shopping, take along a radio that covers the bands of interest and listen carefully while trying each accessory. [On my wife's car, the air conditioning compressor emits strong 2 meter RFI every time it starts up. — Ed.]

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John's Amateur Radio interests include maintaining the Central Ohio Radio Club repeaters and operating on the HF bands. He is an ARRL VE and an OO. Other interests include maintaining his commercial-instrument pilot rating. You can reach him at 3477 Arica Rd, Galena, OH 43021, or at w8rxx@arrl.net.

