



CB Scene

HANDLING RADIO-FREQUENCY INTERFERENCE

What can you do when a neighbor complains that your CB transceiver is interfering with his TV reception? In all probability you can get yourself off the hook because the odds are that the problem is not your fault. But if you want to stay on good terms with your neighbor, you will most likely have to show him that you are not the cause of the difficulty. For this reason, the FCC suggests that you take all steps possible to determine that your rig is not the cause of radio-frequency interference (RFI) as a result of a deviation from the technical requirements. Besides, a complaint to the FCC might result in your receiving a violation notice, forcing you to have technical tests conducted on your transceiver by a qualified technician.

Is It Really RFI? The first step when someone complains to you is to find out whether or not the problem is indeed caused by RFI. If the neighbor's TV receiver booms out, "What's your 20, Good Buddy?" CB transmissions are obviously involved. But many other symptoms are mistaken for CB-caused interference.

Randomly spaced lines of black and white spots crossing the picture tube of a TV receiver or sizzling or buzzing sounds in the receiver's sound are certainly RFI; but they are caused by electric motors, vehicle ignition systems, and similar electrical devices. They are *not* caused by CB or other radio equipment. Herringbone patterns in the TV picture are most likely caused by nearby FM stations (especially on TV channel 6), according to the FCC. But they can also be caused by CB or amateur-radio transmissions. If the pattern changes with the TV program's sound, however, it is more likely a problem in the TV.

RFI can also appear on a TV receiver's picture tube as a pattern of interference that shifts as the operator talks. Sometimes, the interfering signal will be audible through the TV receiver's speaker, but this is more likely to occur in high-fidelity systems.

If interference appears on TV channels 2, 5, 6, or 9 (especially 2 and 5), CB interference is the likely cause (but it may not be from your transmitter). If the interference appears on all TV channels, or on only one of the unmentioned channels, then CB transmitters can generally be ruled out as the offender.

Keep in mind that the 6-Meter ham band can cause TV channel-2 interference and that channel-6 interference would likely be limited to 40-channel CB rigs with transmissions on one of the 17 new channels.

Is It Your Rig's Fault? When you receive a complaint, the first step is to find out whether or not your CB rig is involved. A quick and easy way to accomplish this is to have your neighbor switch to TV channels on which he normally gets interference while you make brief transmissions on each of the channels you normally use. Keep in constant touch by telephone as you do this.

If the interference comes and goes as you key on and off your rig's microphone, your CB rig is definitely involved.

Your CB rig may be involved in causing your neighbor's TV receiver or hi-fi system to pick up interference, but it still may not be your fault. As long as your transmitter is operating properly, with no more than full legal output power and no excess harmonics, the legal responsibility for clearing up any RFI problems it causes rests with your neighbors who are suffering from them. This does not mean that you, as a good neighbor, cannot help solve their difficulties. Be sure you have their full cooperation, though.

You have the responsibility to ensure that your operation meets all legal requirements. All transmitters radiate harmonics, of course. Unfortunately, the strong second and third harmonics of transmissions on the 27-MHz band fall close to TV channel 2 (54 to 60 MHz) and channels 5 and 6 (76 to 88 MHz), while the seventh harmonic falls right in the middle of channel 9 (186 to 192 MHz). FCC regulations stipulate that to-

day's 40-channel CB transmitters must attenuate these harmonics by at least 60 dB. (Transceivers built before January 1, 1977 must still attenuate the harmonics by at least 50 dB.) Operating a transceiver that radiates harmonics above these levels is illegal.

Sometimes, the cause of excessive harmonic radiation may be as simple as the accidental loosening of the screws that hold the CB chassis to its metal case. Here, a simple tightening of the hardware may be all that is required to effect a cure. If this does not work, try grounding the transmitter to a cold-water pipe or other good earth ground.

The next step is to try a 52-ohm low-pass filter between the transmitter and antenna. The filter will pass CB signals and effectively attenuate the higher harmonic frequencies that cause RFI. Such a filter can also serve as a diagnostic tool when used with a power or SWR meter. To do this, install the meter between the transmitter and a dummy load and measure the output power (or with an SWR bridge, adjust it to the calibration line). Then install the filter between the transmitter and meter and repeat the measurement without retuning the transmitter. If the meter reading decreases, harmonics may be present.

Harmonics may also escape through the power line. If this is the case, a line filter of two capacitors (0.001 microfarads each) will pass the r-f to ground and may prevent this radiation.

Overmodulation can cause RFI, too, since the resultant clipping of the r-f waveform produces a wealth of harmonic and spurious emissions that are commonly referred to as "splatter." This splatter also causes interference on adjacent CB channels. Therefore, the FCC requires that a modulation limiter be built into CB transmitters that are capable of delivering more than 2.5 watts of r-f output, which includes virtually all base and mobile rigs and many hand-held transceivers. It is more likely that overmodulation occurs with 23-channel rigs than with the new 40-channel rigs because manufacturers' CB models are now more closely inspected.

If you have any reason to suspect that your transceiver is overmodulating or radiating excessive harmonics, and if the elementary checks and solutions described above do not solve the problem, have your transceiver checked out by a person who holds a first- or second-class radiotelephone license.

Correcting the Fault. Demon-

strating that your CB rig is doing nothing wrong will only partially mollify your neighbors. Helping them cure their problems can make your neighbors positively grateful.

RFI is most likely to enter a TV receiver through its antenna terminals. So, the first step is to look over the TV antenna, lead-in cable, and lightning arrestors (if any). Look for corroded connections and deterioration of the cable. Repair or replace any doubtful connections or cable.

If the RFI persists, check for a signal booster on the antenna mast or on the rear of the TV receiver and determine if the receiver is being fed from a distribution amplifier somewhere in the antenna system. (The amplifiers and high-gain antennas used to boost weak signals in fringe reception areas will also boost the received strength of any local CB harmonics.) If there is such an amplifier, removing it from the system may eliminate the RFI problem. If it does, reconnect the amplifier and ground it to a good earth ground. You may have to house it in a metal case, which can then be grounded. Alternatively, you can install a high-pass filter at the amplifier input.

In systems that use boosters, it is usually advisable to install a second high-pass filter near the TV receiver's antenna input terminals, unless the amplifier is right at the receiver. In systems that do not employ boosters, connect the filter to the receiver's antenna input terminals. Make certain that the filter has the correct impedance: 300 ohms for twin-lead, 75 ohms for coaxial cable.

If the filter's instructions state that the filter must be grounded, use a cold-water pipe or other good earth ground. Proceed with caution, however. If the TV receiver does not have an isolating power transformer, this ground connection must be made through a ceramic disc capacitor rated at 1600 volts or more. The capacitor will bypass the r-f to ground without affecting the ac line voltage on the chassis of the TV receiver.

If interference occurs on only channel 2, it may help to install a tuned filter (such as a 1- μ H choke in series with a 2-20- μ F ceramic trimmer capacitor) across the antenna terminals of the receiver. This filter should be tuned for minimum interference.

The quarter-wave tuned stub is another type of filter that can be installed across the TV receiver's antenna input terminals. Connect the antenna's downlead and the stub to the antenna terminals. (With 75-ohm coax, this will require the use of a T connector.)

For 300-ohm systems, cut the stub to 48" (1.22 m), while for coaxial cable, it should be cut to 37" (0.94 m). Then, while the interference is occurring, trim $\frac{1}{8}$ " to $\frac{1}{4}$ " (3.2 to 5.4 mm) at a time until the interference is eliminated.

If after you exhaust the various remedies enumerated here, the problem is not eliminated or radically reduced, the TV receiver may require internal modifications. These might include installation of an additional stub at the tuner or the addition of filters and/or shunts to certain circuits within the receiver. Since detailed knowledge of the particular TV receiver is required in each case, these modifications should be left to a qualified TV service technician.

Getting More Help The FCC has indicated it has hopes of increasing the harmonic attenuation requirement of CB transceivers from its present 60 dB to 100 dB. But this alone will not solve the interference problems. There has been little TV receiver improvement in combatting interfering signals in the past 20 years, noted Commissioner Robert E. Lee. With 53,292 reported cases of interference to TV receivers, mostly from

CB transmissions, it seems that part of the problem rests with poorly designed TV receivers. Accordingly, the Commission is looking toward manufacturers of TV and audio equipment to upgrade their products' interference rejection capabilities. Meanwhile, if you need additional help for handling RFI problems, the FCC has prepared "How To Identify & Resolve Radio-TV Interference Problems," a handbook that is a good source of information. It is available for \$1.50 (make your check or money order payable to the Superintendent of Documents) from the Consumer Information Center, Dept. 051F, Pueblo, CO 81009. Also, two Interference Handbooks—"TV Interference" and "Audio Rectification"—are available from the Consumer Electronics Group/Electronic Industries Association, 2001 Eye St., N.W., Washington, DC 20006.

In some areas of the country, there are now Local Television Interference Committees dedicated to resolving CB interference problems. You can obtain the address of the nearest Committee by writing to the International CB Radio Operators Association, Box 10-2, Roanoke, VA 24005. ◇

CB Radio Is Dead?

CB radio is alive, well, and stronger than ever. More than 800,000 new CBers were licensed in the past three months. In fact, more exciting things are happening in CB today than happened 18 months ago when all the glamor publicity was being given to the market.

You can keep up to date on all that's happening in CB with S9, the oldest and largest monthly magazine devoted to CB in the country. But S9 is more than just a CB magazine. It covers all facets of Personal Communications, including ham radio, short wave listening, and vhf monitoring.

S9 tells you what's happening today and what will happen in the future. And why. It's the fun magazine for people interested in communicating.

We've got a special introductory offer for readers of Popular Electronics. You'll save almost 50% over the regular newsstand rates. Subscribe today. Find out for yourself just how great CB radio can really be.

DON'T YOU BELIEVE IT!

14 Vanderventer Avenue
Port Washington, New York 11050

CB RADIO/S9

Enter my subscription to CB RADIO S/9 at the reduced rate of \$9.95 for 12 issues.
Check enclosed Charge my credit card

Name _____

Address _____

City, State, Zip _____

Signature _____

Credit Card Number:

BankAmericard
 Visa
 Mastercard