

SOLVING TVI

TVI (television interference) resulting from citizens band radio transmitters is an annoying and not uncommon problem. A knowledge of the different causes of television interference and their cures will help the CB operator solve his own individual problem.

The person experiencing the interference is most likely to place the blame on the operator of the transmitter. He may or may not be correct. Unfortunately a number of transmitters on the market are capable of radiating spurious energy along with the desired signal. Even those that are properly designed may cause TVI if one or more of the following conditions are present: weak transmitting tubes; improperly tuned transmitter circuits; misadjusted linear amplifier; poor coaxial cable connections; improper or complete lack of an adequate ground; transceiver out of its case or case screws missing.

Alternatively, it may be that the citizens band station is free of spurious radiation yet a television interference problem exists. This condition may exist because of the lack of ability of many television receivers to properly reject out of band signals.

The first step in solving a television interference problem is to make sure that the offending transmitter is not guilty of any of the previously mentioned causes of television interference.

The next step is to look at the way in which the transmitter can cause interference and how to eliminate it. The class D citizens band radio service is located in a narrow region about 27 MHz. Spurious transmitter energy is most likely to take the form of harmonic radiation. A harmonic is an integer multiple (2x, 3x, etc.) of the fundamental frequency; 27 MHz in this case. As a result, the first harmonic of a citizens band transmitter occurs near 54 MHz and the second harmonic near 81 MHz. Unfortunately these frequencies are occupied by television channels 2 and 5 respectively.

The intensity of the interference at the television receiver will depend upon:

1. The intensity of the harmonic radiation. In general, the higher the harmonic number, the weaker the intensity.
2. Distance between the CB transmitting antenna and the television receiving antenna.
3. The heading of the citizens band antenna if it is directional.
4. The strength of the television channel being received. The strength of the harmonic radiation can be greatly attenuated by placing a filter between the transceiver's antenna terminal and the antenna.

The filter should be of such a design that it passes unattenuated the desired 27 MHz signal yet greatly attenuates any harmonics that may be present at the transmitter output. The most

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common form of this filter is called a low pass filter, called so because it passes the fundamental or low frequency signal but impedes harmonics or high frequency energy. A number of these filters are available commercially varying in their power handling capability and the degree of attenuation they offer to harmonic energy. Many of the filters are designed for amateur radio use and as a result are of little or no use in attenuating 1st harmonic citizens band energy which falls on channel 2 television. Avanti makes a low pass filter designed specifically for citizens band use, and as a result exhibits a nominal 80db. (Comparable to reducing the harmonic intensity one hundred million times) at channel 2 and slightly lower on other television channels. (In order to take maximum advantage of a filter it is important that the length of coaxial cable connecting the filter to the transceiver be as short as possible; preferably four inches or less. If convenient, a double male coaxial barrel is the best solution. Any SWR meter, switch boxes, matching networks, etc. should go after the filter. The transceiver should also be connected to a good ground rod buried three or four feet deep. When these steps have been taken, the transmitter should be clean of spurious radiation.

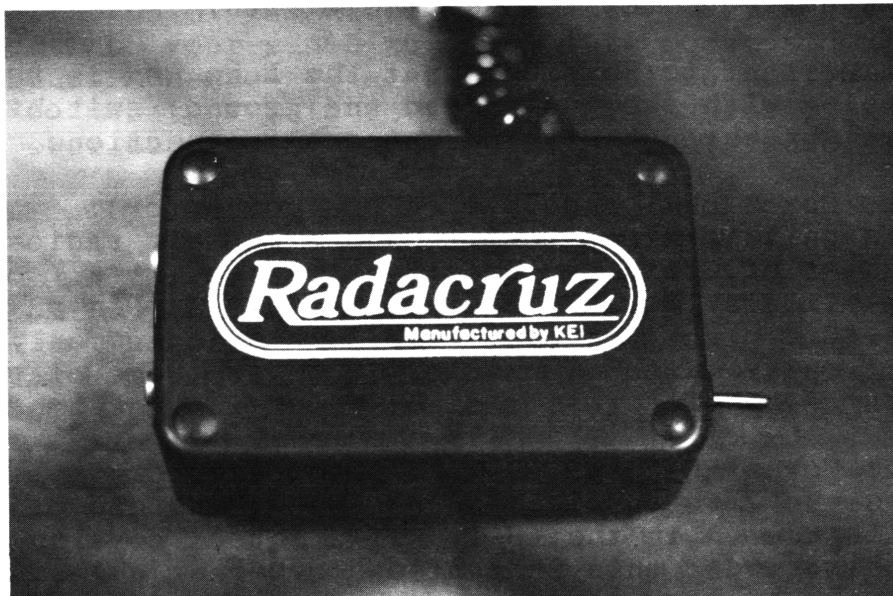
Any remaining interference is most likely a result of front end overloading of the television receiver by the 27 MHz signal. In instances where high power is being used and/or the citizens band antenna is near the television antenna the resulting 27 MHz citizens band signal enters the television receiver and harmonics of the 27 MHz signal are generated within the television itself. In addition, through a process called mixing, other non-harmonically related interference signals may be generated within the television receiver resulting in interference on channels other than channels 2 and 5. Because the harmonics are being generated within the television receiver, the low pass filter on the transmitter cannot stop this radiation. In order to eliminate this interference the intensity of the 27 MHz signal entering the TV receiver must be reduced to such a level that harmonics are not generated and undesirable mixing does not take place. To accomplish this a filter that attenuates 27 MHz energy is attached between the television antenna and receiver. Filters to accomplish this attenuation are commercially available and are of two basic types; the notch filter, and the high pass filter. The notch filter, although quite effective, can be very critical in adjustment and if misadjusted can actually cause the interference to appear worse. High pass filters are more commonly available and can be very effective. The high pass filter will pass, unattenuated, all television channels while attenuating energy below a certain frequency called the cutoff frequency. Whether a notch filter or high pass filter is employed, two points bear mentioning. First, the low pass filter must be left in the trans-

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mitter coaxial line while the notch or high pass filter is being tried on the television receiver as the interference is often a combination of transmitter harmonic generation and television receiver deficiency. Secondly, to be most effective the television filter should be installed as close to the television receiver as is possible. Avanti's high pass filter comes supplied with a four inch length of twin lead and appropriate connectors. In instances of extreme television interference, some interference may still be apparent even after the installation of filters at the transmitter and television receiver. One way in which the residual interference may leak through is by means of the A.C. power lines. To cure this problem a line filter must be installed at the interfering transmitter and/or at the television receiver. Excess cord should be wound around the filter box.

Transistorized TV receivers are many more times susceptible to signal overload (with the resulting internal generation of harmonics) than are their vacuum tube counterparts. Loose, broken, or cracked twin lead will most likely aggravate an interference problem. A television antenna fed with 75 ohm coaxial cable and the appropriate matching transformers is less susceptible to interference than is a system fed with 300 ohm twin lead.

The steps listed above, followed in the proper sequence will result in interference free operation in the majority of instances.



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