CTA and Interference Problems

Occasionally, one of our customers experiences problems of interference when using one of our CTA transmitters in a remote truck or van. Often the assumption is made that the transmitter is emitting harmonics and that these are interfering with the other equipment in the van. We are extremely desirous that any product made by COMREX do what it is designed to do. The purpose of this note is to discuss the problems involved and suggest ways of solving them.

To begin, each and every CTA transmitter is tested very carefully to make sure that it does what the specifications say it should do. We check the output on a TEKTRONIX spectrum analyzer to make certain that harmonics are as low as possible. Our final test specification calls for all harmonics to be at least 50dB below the rated one watt output. This means less than 10 microwatts of harmonics. Usually the harmonics are more than 55 to 60 dB below one watt and they should remain that low permanently, unless attempts are made to "tweak up" the CTA without a spectrum analyzer.

Interference problems typically encountered are either interference with the van TV receiver or hum and/or buzz in audio circuits. The causes of these are different and will be discussed separately below.

Hum and/or buzz in audio circuits are most often caused by the way the CTA is installed in the truck. The one watt of RF energy generated in the CTA transmitter must be conveyed from the output connector through a "leakproof" cable to the antenna. The antenna is not just the rod which sticks up above the truck, it is the rod and the ground plane under it. In this case, the roof of the truck. You should think of the truckroof/antenna rod interface as a place which should be RF "tight" so that no RF can leak back into the truck. If RF gets loose inside the truck and gets into the power cables of other equipment and meets the power rectifiers, it is modulated by 120Hz and re-radiates into the microphone input stages. It is this rectified RF that appears in the van audio circuits and produces the buzz and hum. If you wish to eliminated the hum in the audio, you must eliminate the RF in the truck.

If you have purchased a "CB" type antenna to use with the CTA and are using the co-ax cable that came with it, you will probably have to change the cable to double shielded co-ax. Also if you have purchased one of the short center fed types, you may be experiencing very high VSWR. Better to buy a "professional" antenna.

After changing to better cable, you will want to make sure that the CTA transmitter is truly grounded to the truck body, the equipment racks and to anywhere else you can find. You may have to invest a bit of time in experimenting but it will be worth it. Be most certain that the co-ax is bonded to the roof of the truck where it goes through to the antenna. A poor ground here can negate all of your other efforts.

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Sometimes a customer is puzzled that the CTA transmitter causes interference when another transmitter such as a remote pickup unit does not. This is because the remote pickup transmitter usually operates in the 160MHz or 450MHz frequency ranges and the antenna's co-ax cables are of high quality. It you attempted to use a "hobbyist" type antenna on a 160MHz or 450MHz transmitter, most of the generated power would go to heating up the co-ax dielectric.

Now to interference with TV reception: Before going further we should point out that the front ends of most TV receivers are very broad band and often consist of just a mixer without much filtering. And the most popular TV receiving antenna, it seems, is the round flat "frisbee" type. These units often use a bipolar transistor amplifier to raise the received signal level and to match the co-ax. They are very broad band. Any strong signal injected into the input of one of these units is likely to be rectified by the input amplifier. Everyone knows that rectification produces harmonics. If there are other strong signals at the rectifier junction you will get harmonics and intermodulations. If you feed these into a broadband TV receiver, interference is inevitable.

So, how do you get rid of this type interference? First, we will assume that you took all of the steps prescribed above for problems in audio circuits. It is important that there not be loose RF circulating about within the van. Next it will be necessary for you to remove the rectifier at the antenna. You could just cut it out and connect the antenna elements directly to the co-ax. This will reduce the sensitivity, but you may have enough signal that the loss will not be noticeable. Finally, we manufacture a 26 MHz notch filter which can be inserted in the co-ax run. This may reduce the 26MHz signal at the TV set input enough that the TV set mixer will not produce harmonics itself. This is assuming that you are using a very good TV receiver.

Please remember that the CTA transmitter is not producing harmonics strong enough to interfere. The very strong 26MHz is being multiplied either in your antenna or in your TV receiver.

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