

## User Responsibilities for RTK GPS equipment

The Federal Communications Commission (FCC) is aware of and very concerned about the effect of RTK GPS radio transmissions on other users on shared channels. The FCC has repeatedly requested that everyone in the GPS industry work to increase user awareness of the issues of using shared channels for data broadcast.

The very nature of the RTK GPS radio broadcast places an extreme load on the channel on which it is broadcast. Data is broadcast every second for as long as the RTK base receiver is operating, and the broadcast is actually on from 25 to 80 percent of every second. There is not much airtime left over for other users.

Recent events regarding radio licensing for RTK GPS should serve as a wake-up call to all involved – we must start doing a much better job of using shared channels if we want to continue surveying with RTK GPS. The FCC even suspended processing license applications for several months, but has now resumed this activity.

Some important points for every organization using RTK GPS and UHF-band data radios:

1. Each employee involved with operating RTK GPS equipment must understand that the radio channels used are shared frequencies, and data broadcasts must yield to voice broadcasts. It is the duty of the RTK GPS operator to make certain that the RTK GPS broadcast does not interfere with voice users. Furthermore, FCC regulations obligate all licensees to cooperate in the shared use of channels.
2. Each RTK GPS crew must have and carry a scanner that is programmed to the frequencies on which their base and repeater radios are capable of broadcasting. This scanner must be in proper operating condition with good batteries and must be with the crew whenever RTK GPS surveying is to be done with data broadcast over shared channels. A speaker built into the base radio is not satisfactory because it is difficult or impossible to use before the base radio is set up for operation. Also, it cannot be used to check for interference when the operator is away from the base radio. The Radio Shack PRO-79 scanner has worked very well for many RTK GPS users and Inland GPS recommends this model for its portability, sensitivity, and durability. It can be obtained from Radio Shack stores nationwide.

A scanner can be a valuable troubleshooting tool. In addition to detecting interference, it can also help identify problems such as mismatched communication parameters, defective radio modems, and other radio-system malfunctions. Inland GPS expects RTK GPS users requesting telephone assistance with radio-modem problems to have an operating scanner on hand before calling.

3. The frequency on which it is planned to broadcast must be scanned before the base radio is started (recommend scanning while driving to job site) and during the course of the day to make certain the RTK GPS broadcast is not interfering with voice users.
4. Radio modems used to broadcast RTK GPS data must have carrier detect or “automatic listen before transmit” capabilities operating to prevent broadcasting over voice users. This is similar to the well-known FCC requirement that you monitor the channel and make certain it is clear before beginning a voice transmission, except the data radio must do this automatically. It is illegal to operate data radio modems with carrier detect disabled.

On the Trimble Trimmark 3 radio modem this feature is referred to as Channel Sharing. The default factory procedure seems to be to set Channel Sharing to “Off.” It is a clear and flagrant violation of FCC regulations to operate the Trimble Trimmark 3 radio modem with Channel Sharing set to “Off.” The recommended setting is “Avoid Weak Signals.” The only time it is acceptable to use “Avoid Strong Signals” is when the source of interference is positively known to be not associated with any broadcast that could in any way be used for a safety issue (including summoning help for an accident situation).

5. Radio modems used to broadcast RTK GPS data must provide automatic identification. Having the radio broadcast the FCC-license callsign in Morse code before broadcasting and every 15 minutes thereafter is how this requirement is met. This requirement has been in the FCC regulations for some time but was not enforced in the past. Users should welcome this – if there is an interference problem it is much better if channel users can resolve the problem locally instead of calling in the FCC enforcement staff. Please note that the user is responsible for making certain the equipment provides the required automatic identification. It is no excuse that the equipment did not do this as received from the dealer or manufacturer.

If you do not have an FCC-assigned callsign, set the radio modem to broadcast the letters WT followed by your seven-digit telephone number. This is the callsign to be used when operating a radio under a temporary authorization and it allows others to reach the operator if there is an interference problem.

We strongly encourage RTK GPS users to inspect the public record and determine which other users are licensed for and likely to be using specific radio channels in the RTK GPS user's area of operation. Pay special attention to licensees (most likely not RTK GPS users) actually located in the area of interest.

One way to obtain this information is to search the FCC database, which is accessed through the FCC Web site. The FCC home page is found at <http://www.fcc.gov>. From there you would go to the Wireless Telecommunications Bureau, then to License Search. To get directly to the License Search page, point your Web browser to <http://wireless2.fcc.gov/UlsApp/UlsSearch/searchLicense.jsp> and enter appropriate search parameters.

Remember when searching by location that in many instances the address on the license is the organization's headquarters and that the equipment may actually be located and used at branch offices around the country.

It may be easier to take advantage of the work already done by some scanner hobbyists who have compiled and posted lists of licensees for various frequencies at various cities.

Warning – be aware that these listings may be misleading because they only show the licensee's city – not the area in which the licensee is authorized to broadcast. Many FCC licenses, including those for RTK GPS operation, provide for statewide or nationwide operation.

An organization named City Frequencies has compiled a list of licensees in various states, you can access this information at <http://www.cityfreq.com>. Click on the name of the state in which you are interested and see what you find.

Lightning Leo's Wyoming Frequency Guide is a Wyoming-only project and is organized by counties. It is found at <http://www.scanwyoming.vcn.com>. It appears this one was last updated in April 2003, so keep that in mind if you use it.

Other similar sources may be available on the Web. If you find something good please send us the link, address to Glenn Borkenhagen <Glenn@inlandgps.com>.