

A Basic Overview of FM and Repeater Operation: Facts and Fallacies

By Tony Whobrey, KC4JTV

Not too many years after Edwin H. Armstrong initially tested FM modulation for broadcast use on June 9, 1934; FM radios were used for military communications during World War 2. Due to the success of this use, nearly all commercial land-mobile users soon implemented FM. The ease of operation and relative freedom from interference of the new FM radio, as compared to the AM equipment previously available, was considered a near miracle. Soon most public safety and service vehicles were equipped with FM radios operating in the 25-42MHz (now 30-50MHz) range, known as "low band". Two-way radios were considered cutting edge technology, and many taxicabs, tow trucks and public utility vehicles sported 6-foot whips and the now nostalgic words "radio dispatched" on a door or fender.

When low band became crowded, a new allocation of 150 to 174 MHz, just above the 2-meter amateur band, was unveiled with the understandable name of "high band". Subsequently, a UHF band was also established, then covering 450 to 470 MHz. Mobile to mobile simplex range on both high band and UHF left much to be desired, and the eventual solution was the "mobile relay" station; a.k.a. repeater. The now ubiquitous repeater was an instant hit, with both commercial and amateur radio users.

The combination of FM and repeater operation is arguably one of the best happenings in amateur radio's recent past. With the availability of surplus "high band" equipment in the late 60's, more 2-meter amateur repeaters began to appear. Some 35 years later, nearly every community with a population of more than a few thousand is within range of at least one amateur repeater, with some larger communities having several. For this reason, the first radio used by many new licensees is often an FM transceiver on the 2-meter band. You can make your operation via a repeater far more enjoyable, with attention to a few often-overlooked essentials of repeater operation;

The repeater doesn't recognize that you are on a handheld radio. - If you use a portable radio, you may soon discover that you can hear the repeater much better than it can hear you. Unfortunately, this is a normal condition. Most modern portables have excellent receivers that will hear a repeater's powerful transmitter at distances that their own small transmitter can never equal. A good rule of thumb for portable operation; If you hear any noise at all on a repeater's signal, it probably can't hear you well, if at all.

In FM operation, louder isn't always better. If you are asked to repeat a transmission, resist the urge to speak loudly. This can be a hard habit to break, as it would seem to defy logic. In fact, an FM signal will lose apparent strength as the deviation increases, since its power will spread out over a larger bandwidth. Speaking in a thunderous voice will actually decrease your signal's effectiveness in most cases.

Limit background noise when possible. With rare exception, contemporary ham radio equipment will have more than enough microphone gain. Newer transceivers tend to have very sensitive microphones, which can pick up your CD player, air conditioner blower or the conversation of anyone nearby as readily as your own voice. This can make your signal somewhat less intelligible than it should be, and thus can mark you as a less experienced operator. If you consistently get reports of "wind noise" in mobile operation, you have far too much mike gain; a small piece of foam placed in front of the microphone element will often eliminate such problems.

Every repeater has its own personality. A repeater will reflect the philosophy of its keeper, to some extent. You will, of course, have to determine the input frequency of the repeater you wish to access; only a few are non-standard. Some require that a specific sub-audible tone (CTCSS tone) be transmitted to access the repeater, while others don't require one. Some repeaters will deny access to

anyone using a tone, while working fine for those who don't use a sub-audible tone. All repeaters in amateur service are required to limit any single transmission's continuous access to a maximum of 3 minutes. The method of recovery from such a timeout varies, some require that the repeater transmitter be allowed to un-key, while others reset when the receiver squelch closes. If you have questions about a particular machine, don't be afraid to ask the trustee or one of the more experienced users.

Source: Kentucky Amateur Radio Web Site – www.kyham.net