

Microvolt

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A repeater is a radio station that can receive a signal and re-transmit that signal, often with greater signal power. To many of us, it's an engineering marvel that can help us communicate using a mere handheld radio with others over significant distances, that might otherwise be unavailable to us.

Most newly licensed hams experience their first contacts by using FM repeaters, typically on 2 meters. You don't really need to know *how a repeater works*, to effectively operate a repeater, but you should understand *how to work a repeater*, to be an effective repeater operator. Let's explore what all that means.



Cover story	2
Editorial	3
Letters to the editor	4
Club news	5
For your information	6
Spotlight on KBlahT	7
Tech corner	9*
Strays	13*

*Online version only

Cover – Repeaters



Technically, a repeater can be realized in a number of ways, but for our purposes, we're going to keep it simple. Let's assume our repeater uses FM on 2 meters or 70 cm.

A typical FM repeater is set up with an input frequency, an output frequency, and a tone. Using the drawing below of Jim, Tony, and their 2-meter FM repeater as an example, let's walk through that operation.

The repeater has been programmed such that its output frequency (the one it uses to **transmit its signal**) is set to, say, 146.760 MHz. Why this frequency? Because the repeater owner consulted with the **Frequency Coordinator** to get that frequency assigned to his 2-meter FM repeater per its location and power level.

It's also been programmed such that its input frequency (the one it uses to **receive its signal**) is set to 146.160 MHz. Why this frequency? Because the repeater owner understands that 1) since his repeater is a 2-meter FM repeater, it must use a 0.6 MHz **offset**, the difference between the repeater input and output frequencies and 2) the repeater owner understands that the input frequency must be 0.6 MHz less than the output frequency in Utah, as determined by

Repeater output is	Repeater input is
> 147.000 MHz	+ 0.6 MHz
≤ 147.000 MHz	– 0.6 MHz
any 70 cm MHz	– 5.0 MHz

With their radios both programmed to match these, when Jim presses his PTT, the "146.760" on his radio display automatically changes to "146.160" to let him transmit (output) from his radio to the repeater's input. The repeater then receives the signal on 146.160 MHz, and sends it, or "re-transmits it" out everywhere on 146.760 MHz, its output, allowing Tony to receive it on 146.760 MHz, his input.

In addition to the above, and missing from the diagram, most repeaters require a sub-audible (you can't hear it) **tone** sent to it from your radio, to enable its "re-transmit" feature. Without this tone, the repeater that requires it will simply ignore your signal.

Also missing from this discussion is the idea of **bandwidth**. All Utah amateur FM repeaters use the WIDE bandwidth setting, so be sure to set that instead of NARROW, or your signal might not sound as expected. Most other US FM repeaters also use a WIDE bandwidth, but be sure to check the band plan in other states whose repeaters you plan to use.

Microvolt editorial staff

