How I Set Up My FT-8800R
for Crossband Repeating

by Jack Swinden, W5JCK
12 February 2009

Purpose

As we all know the *Yaesu FT-8800R Operating Manual* has less than one page of information on setting up the radio for crossband repeating (p. 56), and those instructions only show how to initialize the crossband repeater function. Completely missing is how to set up the radio frequencies and memory channels. Dean R. Hoover, KB7QDI has provided a really helpful document on choosing the best frequency combinations and tone setups. However, I still needed to experiment quite a bit to get my FT-8800R to work correctly. The purpose of this short document is to illustrate what I did to get crossband repeating to work on my radio.

General Information

Below I list the two repeaters with which I want to communicate using my VX-3R HT via my FT-8800R set to crossband repeat:
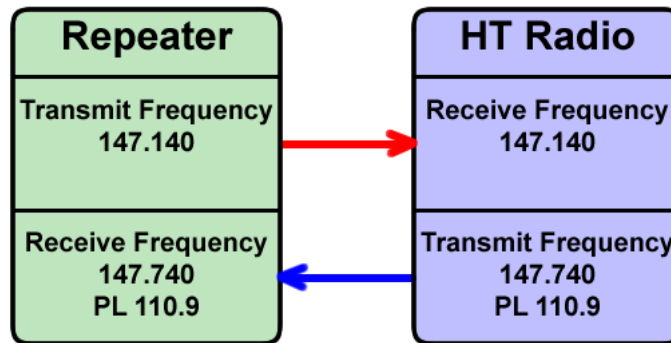
Repeaters

	RX Freq	Rpt Shift	Rpt Offset	TX Freq	Enc Method	Tone
VHF Rpt	147.740	Plus	0.60	147.140	Enc	110.9
UHF Rpt	449.200	Plus	5.00	444.200	Enc	100.0

These are the actual repeaters and under normal circumstances I would set up my radios to work these repeaters as follows:

My Radio(s)

	RX Freq	Rpt Shift	Rpt Offset	TX Freq	Enc Method	Tone
VHF Rpt	147.140	Plus	0.60	147.740	Enc	110.9
UHF Rpt	444.200	Plus	5.00	449.200	Enc	100.0

It is fairly easy to set up a radio to operate with a repeater. I set up my radio(s) to transmit on the repeater's receive frequency and receive on the repeater's transmit frequency, and I make sure I have the correct Repeater Shift, Repeater Offset, Encoding Method, and Tone Codes entered. **Figure 1** illustrates this setup.

Figure 1, Operating a Repeater with an HT

Setting up my FT-8800R in crossband mode to work these local repeaters using my VX-3R HT is more complex. However, it is rather straightforward once you understand how the FT-8800R works in crossband mode.

FT-8800R Crossband Repeater Basics

For the purpose of this document I will assume the Left side of the FT-8800R is the VHF side and the Right side is the UHF side. Whether these can be reversed for crossband repeating I don't know as I have not attempted to do so.

Figure 1 illustrates the typical repeater and HT *two-way relationship*. The repeater is set up to operate with multiple HT, mobile, and base station radios. However, when we set up an FT-8800R as a crossband repeater in order to use a low power HT to operate another repeater, we need to keep it as private as possible to avoid other operators from accidentally activating the local repeater via our FT-8800R crossband repeater. I highly recommend reading Dean R. Hoover's, KB7QDI article "Effective Method of Crossbanding without Breaking too many Rules."

Using the FT-8800R as a crossband repeater to allow a low power HT to operate a local repeater inserts a third radio into the repeater operation. The FT-8800R acts as a bridge between the HT and the local repeater to allow them to connect with one another more efficiently. **Figure 2** and **Figure 3** illustrate this new *three-way relationship*.

Important Concepts to Understand and Remember
- Crossband repeating means transmitting on one band and receiving on another band. When the FT-8800R is in crossband mode, what it receives on the UHF side of the radio it retransmits on the VHF side, and what it receives on the VHF side of the radio it retransmits on the UHF side. So set up two memory channels, one for each side of the radio, as appropriate (see examples below).

- The HT must be set up to hear the local repeater, but transmit to the FT-8800R.
- The FT-8800R receives a signal from the HT then retransmits that signal to the local repeater.
- The local repeater receives the retransmitted signal from the FT-8800R then retransmits that signal on its programmed transmit frequency.
- Those monitoring the local repeater hear the signal transmitted from the HT because it was relayed (repeated) to the local repeater by the FT-8800R. When the HT is not transmitting, it receives the signals from other stations operating on the local repeater.
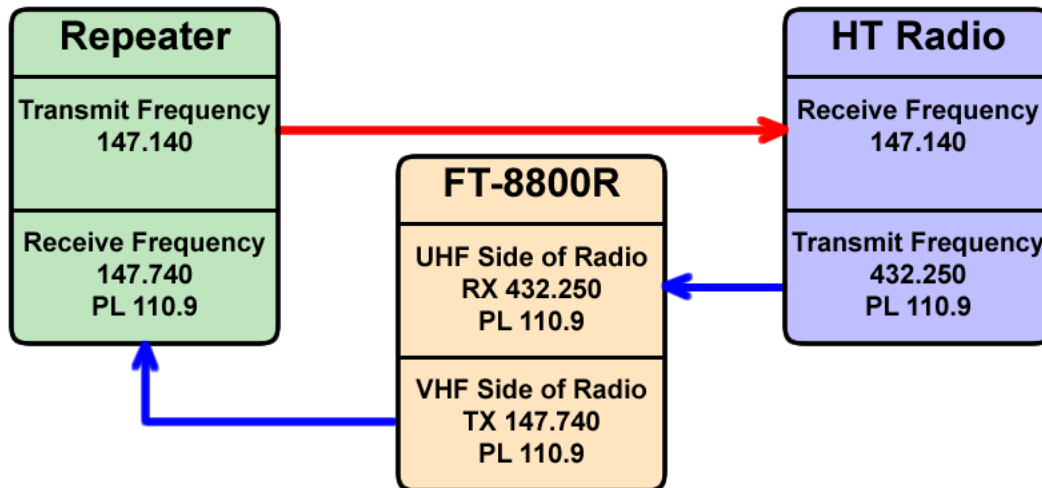
Setting Up the FT-8800R as a Crossband Repeater to work a VHF Repeater

To operate a local VHF repeater via the FT-8800R in crossband mode requires proper memory channel setups on both the FT-8800R and the HT. The following example is how I set up my VX-3R and FT-8800R to operate on a local VHF repeater.

Local VHF Repeater

The local VHF repeater uses a standard VHF shift with the following parameters:

	RX Freq	Rpt Shift	Rpt Offset	TX Freq	Enc Method	Tone
VHF Rpt	147.740	Plus	0.60	147.140	Enc	110.9

Figure 2, Operating a VHF Repeater with an HT via a FT-8800R in Crossband Mode

HT Set Up

I set up the HT with a memory channel to work the local repeater via the FT-8800R in crossband mode using the following parameters:

Memory Ch	RX Freq	Rpt Shift	Rpt Offset	TX Freq	Enc Method	Tone
501 on HT	**147.140**	Split	—	**432.250**	Enc/Dec	110.9

I chose 432.250 as the transmit frequency because it is in the mixed-mode and weak-signal portion of the 70CM band, and I used Encode and Decode. Together these parameters lessen the possibility of unintentional interference from another station.

FT 8800R Set Up

I set up two memory channels on the FT-8800R (one for each side of the radio) with the following parameters:

Memory Ch	RX Freq	Rpt Shift	Rpt Offset	TX Freq	Enc Method	Tone
501 Left	**145.740**	Split	2.00	**147.740**	Enc/Dec	110.9
501 Right	**432.250**	Simplex	—	**432.250**	Enc/Dec	110.9

For the Left side I chose 145.740 (2 MHz non-standard split) as the receive frequency, and I used Encode and Decode. Together these parameters lessen the possibility of unintentional interference from another station.

For the Right side I used 432.250 Simplex to match the HT transmit frequency. I used Encode and Decode to lessen the possibility of unintentional interference from another station.
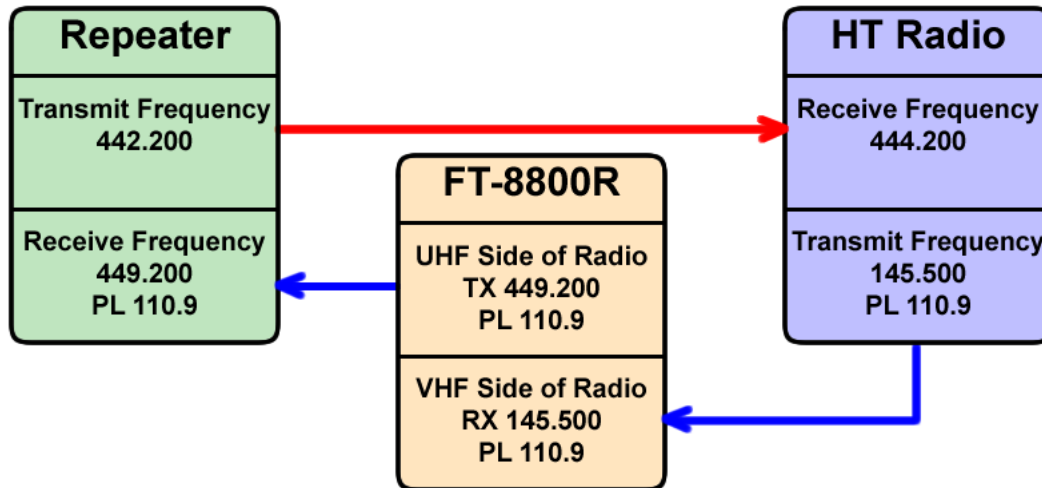
Setting Up the FT-8800R as a Crossband Repeater to work a UHF Repeater

To operate a local UHF repeater via the FT-8800R in crossband mode requires proper memory channel setups on both the FT-8800R and the HT. The following example is how I set up my VX-3R and FT-8800R to operate on a local UHF repeater.

Local UHF Repeater

The local UHF repeater uses a standard UHF shift with the following parameters:

	RX Freq	Rpt Shift	Rpt Offset	TX Freq	Enc Method	Tone
UHF Rpt	**449.200**	Plus	5.00	**444.200**	Enc	110.9

Figure 3, Operating a UHF Repeater with an HT via a FT-8800R in Crossband Mode

HT Set Up

I set up the HT with a memory channel to work the local repeater via the FT-8800R in crossband mode using the following parameters:

Memory Ch	RX Freq	Rpt Shift	Rpt Offset	TX Freq	Enc Method	Tone
502 on HT	**444.200**	Split	—	**145.500**	Enc/Dec	110.9

I chose 145.500 as the transmit frequency because it is in the miscellaneous and experimental modes portion of the 2M band, and I used Encode and Decode. Together these parameters lessen the possibility of unintentional interference from another station.

FT 8800R Set Up

I set up two memory channels on the FT-8800R (one for each side of the radio) with the following parameters:

Memory Ch	RX Freq	Rpt Shift	Rpt Offset	TX Freq	Enc Method	Tone
502 Left	**145.500**	Simplex	—	**145.500**	Enc/Dec	110.9
505 Right	**433.000**	Split	—	**449.200**	Enc/Dec	110.9

For the Left side I chose 145.500 Simplex to match the HT transmit frequency. I used Encode and Decode to lessen the possibility of unintentional interference from another station.

For the Right side I used 433.000 (a non-standard split) as the receive frequency because it is in the mixed-mode and weak-signal portion of the 70CM band, and I used Encode and Decode. Together these parameters lessen the possibility of unintentional interference from another station.

Using the FT-8800R as a Crossband Repeater to work a VHF Repeater

To operate the sample local VHF repeater via the FT-8800R in crossband mode, I do the following:

1. Display memory channel 501 on my HT
2. Display memory channel 501 on the Left side of my FT-8800R
3. Display memory channel 501 on the Right side of my FT-8800R.

   Note: Now you see why I used the same memory channel number for all three channels: it makes setting up for crossband operation much easier and quicker.
4. Activate the crossband repeater mode (see p. 56 of the *Yaesu FT-8800R Operating Manual*).

Using the FT-8800R as a Crossband Repeater to work a UHF Repeater

To operate the sample local UHF repeater via the FT-8800R in crossband mode, I do the following:

1. Display memory channel 502 on my HT
2. Display memory channel 502 on the Left side of my FT-8800R
3. Display memory channel 502 on the Right side of my FT-8800R.

   Note: Now you see why I used the same memory channel number for all three channels: it makes setting up for crossband operation much easier and quicker.
4. Activate the crossband repeater mode (see p. 56 of the *Yaesu FT-8800R Operating Manual*).

Final Comments

I'm now able to work my local repeaters, which are located 9 miles from my home, using my HT set to 100 mW power output. I can easily activate my FT-8800R with my HT from any place in the house, basement, yard, or neighborhood.