

Presented to: Waukesha County ARES/RACES on 8/3/2010 by Warren Schall

Amateur Radio Cross Banding

- 1) For this discussion: VHF = 144mhz = 2 meters
UHF = 440mhz = 70 centimeters
- 2) VHF receivers get desensitized by nearby VHF transmitters. Same for UHF.
- 3) VHF receivers work very well in the presence of nearby UHF transmitters, and vice-versa, even inside the same radio. Just make sure the UHF RX frequency is not equal to 3 times the VHF TX frequency.
Example: 147.00 x 3 = 441.00. Those frequencies would be ugly.
- 4) Amateur radio operators are fortunate to have VHF and UHF allocations. that makes crossbanding possible. The FCC rules make it legal. In some countries, it's not legal.
- 5) Manual crossbanding might mean: you listening on a VHF simplex and talking on a UHF simplex; and a friend of yours doing the opposite. This allows you to interrupt each other.
- 6) Repeaters are now familiar devices. They use automatic control, legal here.
- 7) Equipment manufacturers have made dual band equipment that does automatic (control) crossbanding. That makes crossbanding practical.
- 8) Crossbanding automatic can be 1-way or 2-way. Kenwood does either. Yaesu and Icom do 2-way only.
- 9) 1-way allows HT range extending. Your HT transmits on UHF. Your mobile picks that up and retransmits it on the repeater input on VHF. You listen on the repeater output directly on your HT. Yaesu HT's can store a VHF receive and a UHF transmit in a single memory with a non-standard 300 Mhz offset. Not all dual band HT's can do that. See Example 1.
- 10) 2-way allows 2 operators to range extend their HT's on simplex via a pair of mobile radios. The mobiles sit idle with both UHF and VHF receivers listening. When an HT on VHF is keyed, that mobile retransmits it on UHF to the other mobile which retransmits it on VHF to the other HT. The first HT unkeys and both mobiles go back to listening. Now the second HT can key and reverse the path back to the first HT. I have only done this once. See Example 3 (3 diagrams: 3A, 3B, 3C):
- 11) Right now all of my crossbanding is 1-way HT range extending. Kenwood big radios and Yaesu HT's work for me to do that. I recommend the following currently available pieces of equipment:

Kenwood TMV71A \$369	I have one of these.	Cost effective.
Kenwood TMD710A \$549	I have one of these.	
Kenwood TS2000 \$1450	I have one of these.	
Yaesu FT60R \$200		Cost effective.
Yaesu VX3 \$170	I have several of these.	
Yaesu VX6R \$250	I have two of these.	Limited sales life.
Yaesu VX7R \$290		Limited sales life.
Yaesu VX8GR \$420		
- 12) The Yaesu FT8800R is price attractive at \$389. To use it for 1-way crossbanding requires a work-around. Program your VHF side for a nonstandard offset with PL decode to receive out of the amateur band. This plan is used by some people. Be careful. It's easy to make a mistake.

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- 13) The Kenwood TMV71A is price competetive at \$369. 1-way crossbanding is built in and fewer programming mistakes are made.
- 14) You may be tempted to use 2-way crossbanding on a repeater. This presents a lot of problems, which I prefer not to go into. Some people do it because they can't hear the repeater directly on their HT's. If this is a continuing need, consider the plan shown in Example 2.
- 15) Identification considerations: When you say your callsign thru your HT, you are also saying it thru your crossband transmitter, thus identifying it. Other users should be told they are being crossbanded, so they can know what transmitter they are identifying,
- 16) PL considerations: Encode the repeater PL in your HT signal, and also encode on the crossband output signal. Crossband mobiles do not pass your PL signal thru the crossbander.
- 17) Every different radio has different ways to program memories and to put it into a crossband mode. If you have your book or an on-line manual can be found, I will help you get started.

- 18) Temporary UHF crossband frequencies coordinated per WAR.

446.425	446.435	446.445	446.455	446.465	446.475
446.4275	446.4375	446.4475	446.4575	446.4675	
446.430	446.440	446.450	446.460	446.470	
446.4325	446.4425	446.4525	446.4625	446.4725	

- 19) I did club meeting programs on crossbanding in May of 1996 (MRC) and August of 2000 (MRAC). I do HT range extending crossbanding every day (from possibly two different locations). I do it regularly on 146.91-, 147.165+, 145.13-, and 145.39. And I am stating that it is MAGNIFICANT, or it can be gosh-awful.

Here are my two rules to keep it the former and prevent the latter:

- A) I always monitor the repeater output into which I am crossbanding. If my crossbander causes a problem, I can detect that and fix it quickly.
- B) I always shut off my crossbanding equipment when I leave my house or workplace.

The MRC Board of Directors insists on NO UNATTENDED CROSSBANDING!!!

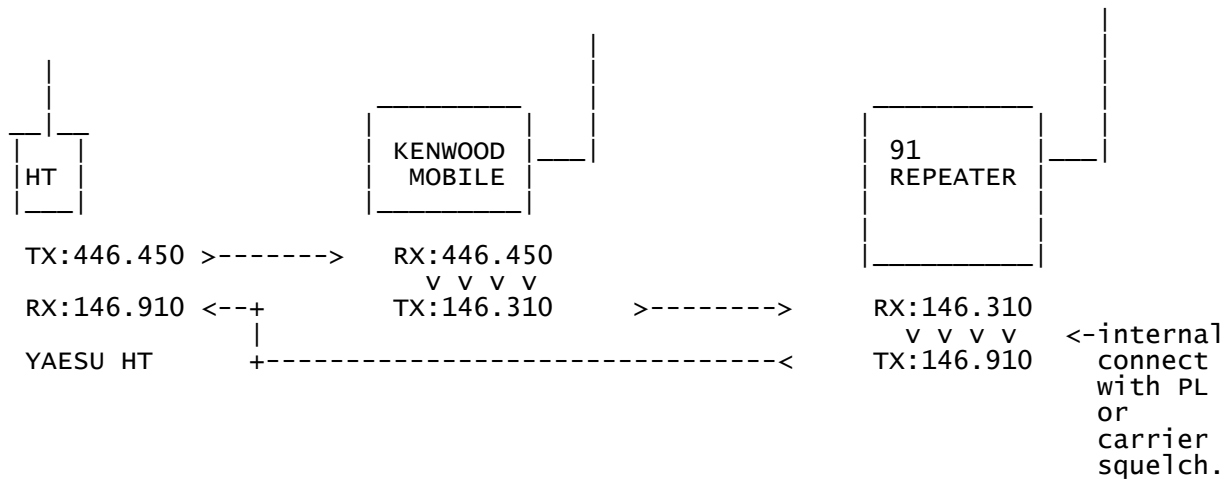
73,Thanks,warren K9IZV

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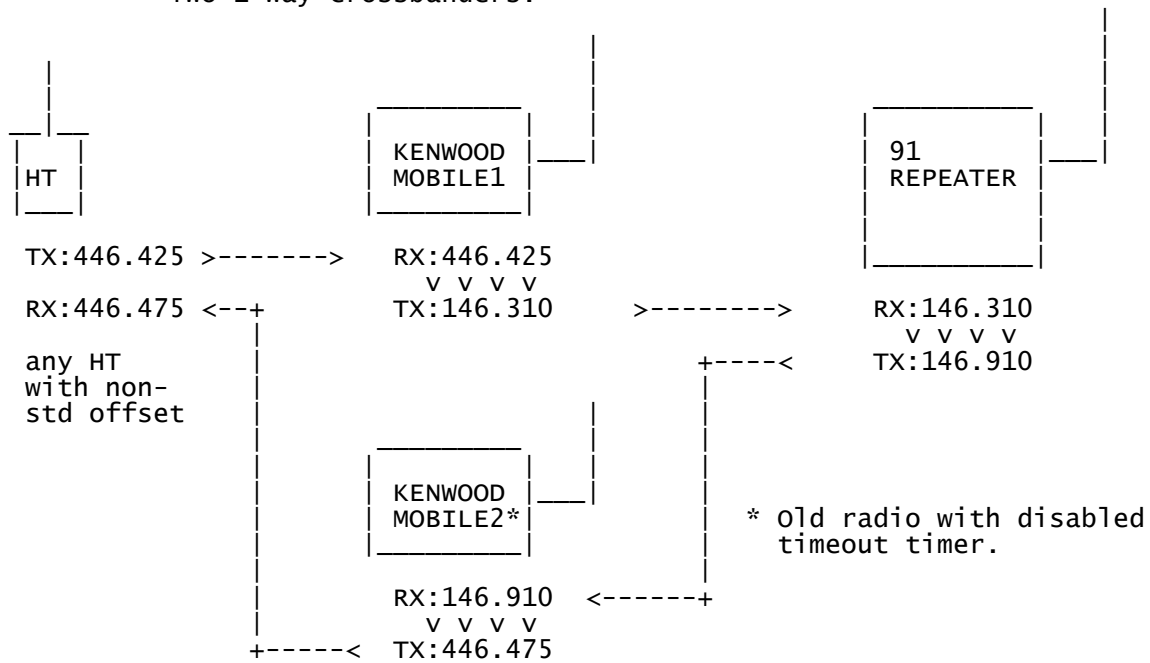
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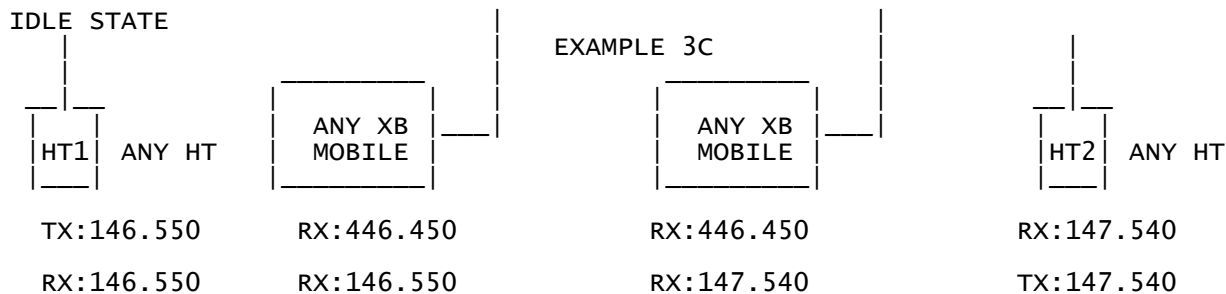
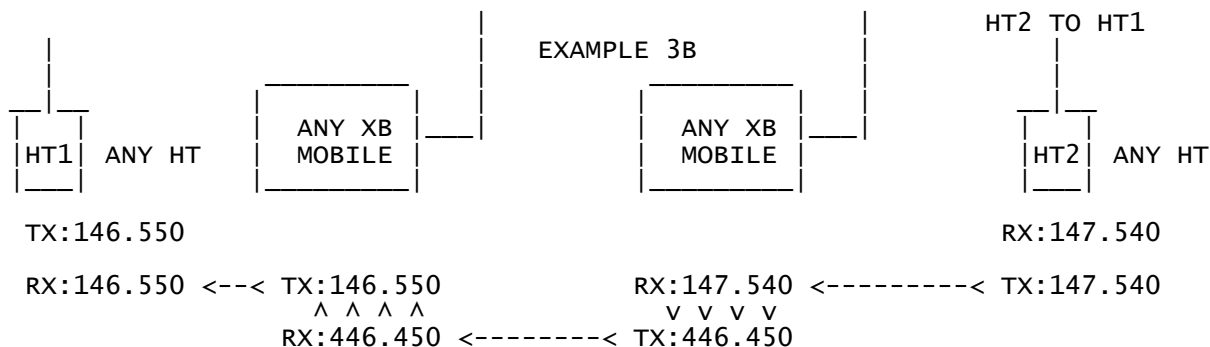
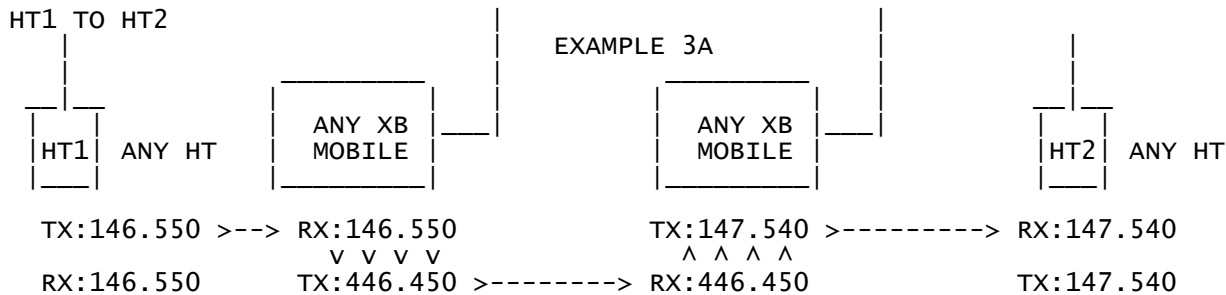
Example 1: HT range extender (K9IZV all day, every day). One 1-way crossbander.



Example 2: Link a repeater to a distant location (Trek-100)
Two 1-way crossbanders.



Example 3: Double HT simplex range extender (K9IZV only once). Two 2-way XB.



Example 4: Make a temporary 2M repeater. (K9IZV did this once with N9KXA-SK and N0XXL at a Milwaukee Ares meeting). Two 1-way crossbanders.

