

Extending your communications range using duplex  
VHF/UHF mobile radios.

## **CROSS BAND REPEATERS**

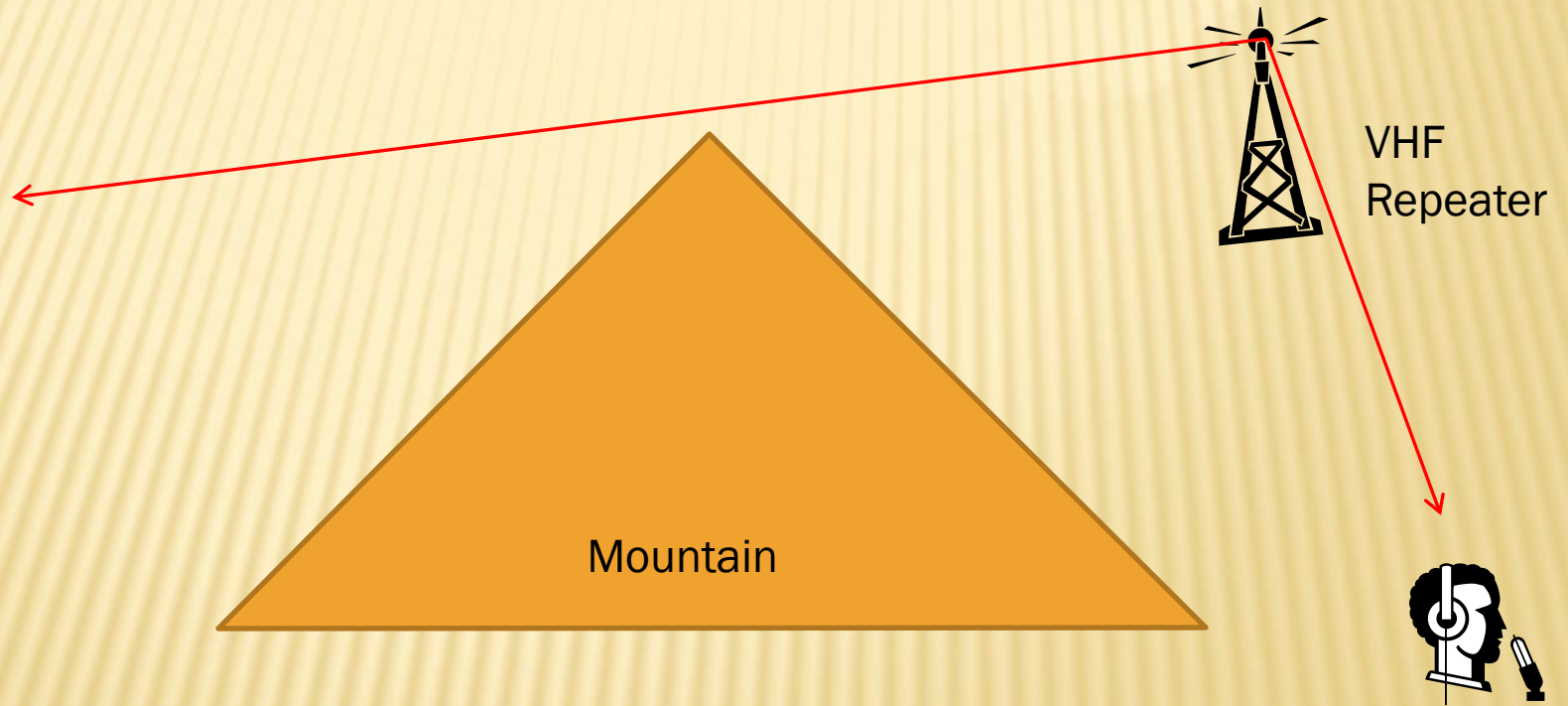
# CROSS BAND REPEAT FUNCTIONALITY

- Transceiver receives a signal on one band and simultaneously transmits it on another band.
- Featured on “top tier” dual band radios such as Kenwood TM-D700, TM-D710G, TM-V71A, Icom IC-2730A, Yeaesu FT-8800, FT-8900, Alinco DR-638T, also on older models from these manufacturers.

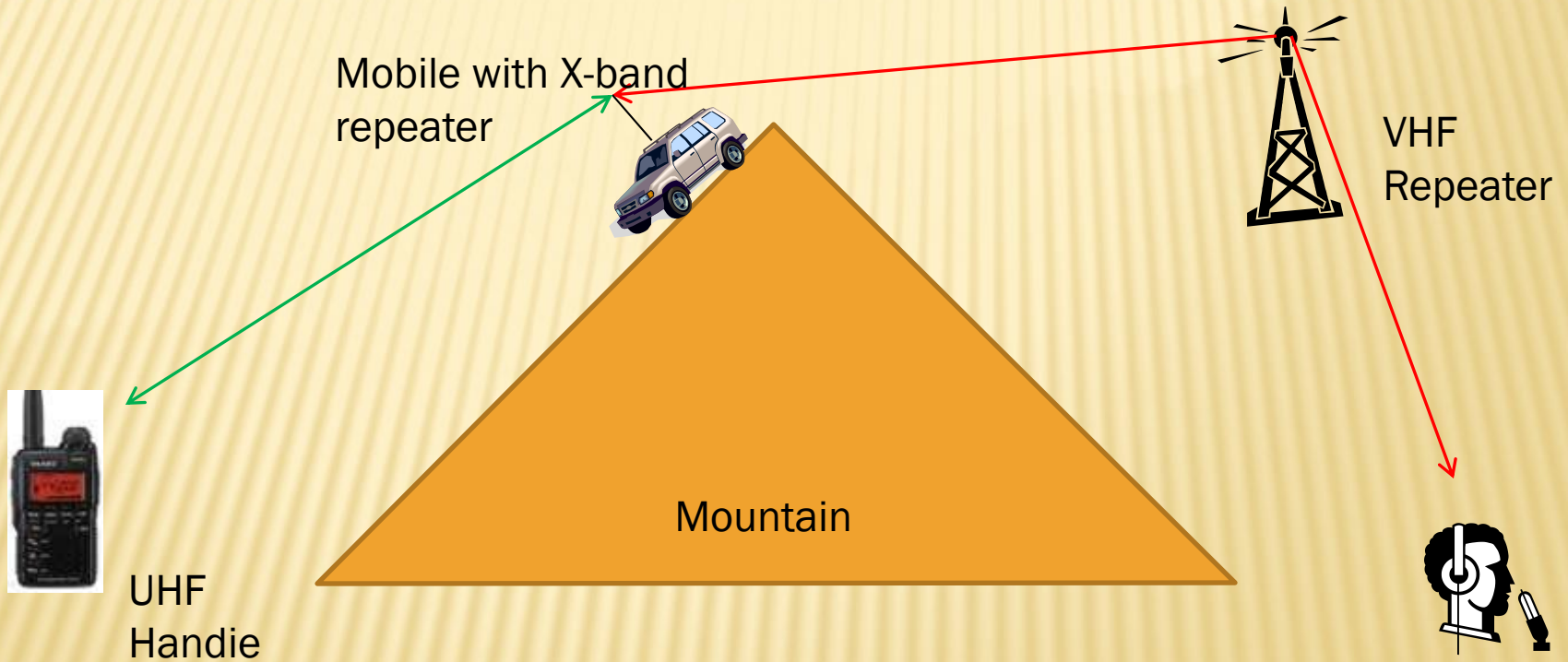
# WHY USE X-BAND REPEAT?

- Use as a **Temporary** repeater to extend communications range, especially for handheld radios.
  - + Mobile has more power, better antenna than HT.
  - + Utilize a portable mast and gain omni or beam antenna for greater reach.
- Inexpensive (if you already own a capable radio).
- Cross Band separation negates receiver de-sense issues that occur with same band frequency pairs.

# PORTABLE OUT OF REPEATER RANGE



# ACTIVATE CROSS-BAND MOBILE UNIT



# IS IT LEGAL?

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- Ummmm..... Perhaps not!
- Part 97 of FCC regulations require:
  - + Remote control operations above 222 Mhz.
  - + Auto Shutdown in 3 minutes (automatic control).
  - + Identification every 10 minutes.
- Most radios do not have auto ID capability.  
“Half duplex” mode negates this requirement.

# IMPLEMENTING X-BAND REPEAT

- Method will be unique to the make and model of radio.
  1. Select the VHF repeater frequency on the “main” band.
  2. Select a Simplex UHF frequency for local use on the “sub” band.  
**Use CTCSS receive tone!**
  3. Activate cross band per radio instructions.
  4. Set your HT to the UHF simplex frequency using the CTCSS tone.

# CROSS BAND REPEATER MODES

1. Simplex Cross Band
2. Duplex Cross Band
3. Full Duplex Cross Band to a Repeater
4. Half Duplex Cross Band to a Repeater

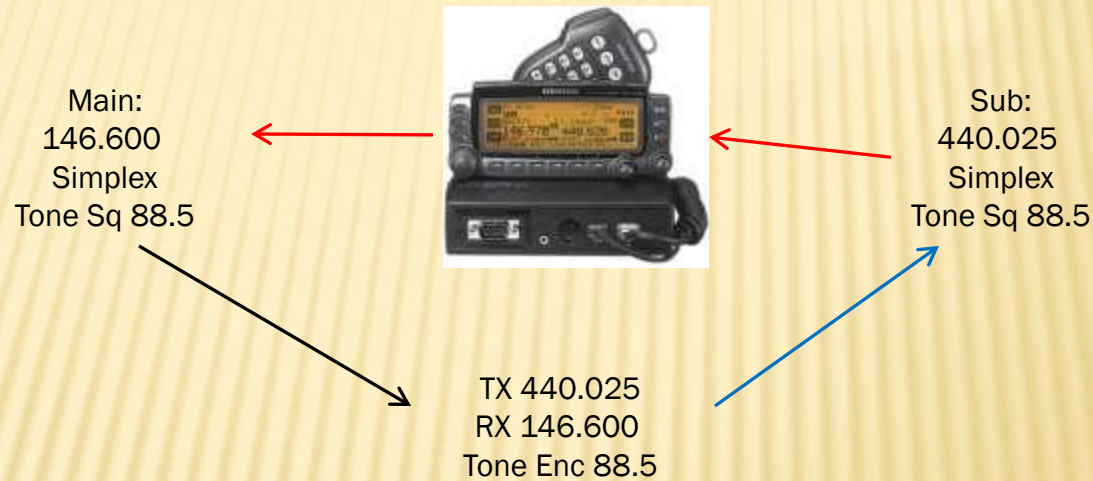
# Simplex Cross Band

- Link one single band VHF Portable to one UHF single Band portable.
- Cross-bander uses VHF Simplex and UHF simplex.
- Limited to two portable .units



# Duplex Cross Band

- Link several DUAL BAND portables.
- Setup cross-bander with VHF and UHF simplex frequencies as in previous example.
- All portable units transmit on UHF and receive the VHF simplex frequencies.



VHF/UHF Dualband portables



# Duplex Cross Band To Repeater

- Set desired repeater frequency on main band using required TX/RX offset and CTCSS tones.
- Set UHF simplex frequency on sub band and activate Cross Band mode.
- Use portable units on UHF simplex frequency.



UHF Monoband portables



# Half Duplex Cross Band To Repeater

- Set the repeater INPUT frequency as simplex on the main band using CTCSS if required.
- Set the UHF simplex frequency with CTCSS on the sub band and activate Cross Band mode.
- Portable units must be dual band. They will receive direct from the repeater on VHF but will transmit on UHF to the Cross Bander.
- Lower duty cycle, ID requirement met.



# PICK YOUR SIMPLEX FREQUENCIES



# UHF MOST TIMES WILL REPEATER SHIFT



# CHANGE REPEATER SHIFT



# REPEATER SHIFT SET TO OFF OR SIMPLEX



# VHF & UHF ARE NOW SET TO SIMPLEX



# STONE FREQUENCY



# SELECT DESIRED TONE FREQUENCY



# tone mode



# SELECT ENCODER, DECODER MODE



# CROSS BAND IS READY ???



# WHY TONE SQUELCH IS IMPORTANT



# USE ON BOTH SIDES IF POSSIBLE



# OPEN SQUELCH - NO TRANSMIT - NO PROBLEM



# KEY UP - GIVE IT 2 SECONDS - TRANSMIT



# PICK UHF SIMPLEX FREQUENCY



# CHANGE REPEATER SHIFT



# REPEATER SHIFT - OFF OR SIMPLEX



# SET TONE FREQUENCY



# SET TONE TO (CONTINUOUS TONE CODED SQUELCH SYSTEM)



# SAVE TO MEMORY



# ODD SPLIT PROGRAMMED - NOT ALL RADIOS CAN



# CROSS BAND INTO A REPEATER - SHORT REPEATER TAIL



# CROSS BAND INTO A REPEATER - LONG REPEATER TAIL



# CONSIDERATIONS

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- All but half duplex method put heavy loads on the Cross Band unit.
- Set power levels accordingly – Perhaps high power is needed to reach the repeater on the main band, but the sub band can use lower setting.
- Always use CTCSS squelch on UHF side to prevent unwanted transmissions.
- Legality is questionable. Use this capability sparingly and in special circumstances.

# RECOMMENDATIONS

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Cross band repeater or duplex radios should:

- A. **Never be used to link to an established repeater system** or to link two established repeaters together without the express approval of the repeater owners.
- B. Be used for **temporary, short duration activities only** and never installed as a long-term communication facility.
- C. **Utilize the minimum power necessary** as per CFR47, Part 97 to accomplish the desired communications. A transmitter placed in the vicinity of the operator should use a non-radiation load or be configured for minimum power output on a unity gain antenna.
- D. **Utilize CTCSS decode and encode circuitry** to minimize uninvited access and unnecessary frequency congestion. Care should be exercised to use a unique CTCSS tone.
- E. **Be identified every 10 minutes** in accordance with CFR47, Part 97.
- F. **Be disabled by its operator within 15 minutes** of notification of interference or other problems as defined in CFR47, Part 97.
- G. **Should be continually monitored** by the operator to minimize interference.

# PLAN AHEAD

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1. Check resources to verify clear simplex frequencies.
2. Program your Cross Band rig and portable memories with simplex frequencies and tones.
3. Learn the procedure to activate and deactivate Cross Band mode.

# MAKE YOUR PLAN

## 652 420-450 MHz VIRGINIA-WASHINGTON

Location	Output	Input	Notes	Call	Sponsor
Reagan Airport	444.7500	+	● 203.5e	K4DCA	E-Star
Tysons Corner	447.0250	-	● 100.0 (CA)ez	NV4FM	NVFMA
Woodbridge	444.9000	+	● 127.3 (CA)e	W4IY	WWI
<b>WINCHESTER</b>					
Bluemont	443.6500	+	● 77.0el	K8GP	DVMS
Bluemont	449.9250	-	● 146.2	WA4TSC	WA4TSC
Maurertown	442.4750	+	● 77.0lWX	N3UHD	N3UHD
Winchester	442.0000	+	● 146.2	W3IF	W3IF
Winchester	448.7750	-	● 146.2	W4RKC	SVARC
Winchester	449.1750	-	● 141.3	WA4RS	Winchester

## WASHINGTON

### FREQUENCY USAGE - EAST WASH LINK

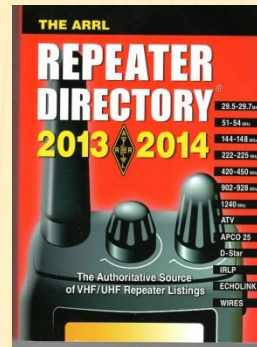
Spokane	430.0750	439.0750	AK2O
Spokane	430.1750	439.1750	AK2O
Spokane	439.0750	430.0750	AK2O
Spokane	441.2500		AK2O
Spokane	446.2250	-	AK2O
Spokane	446.2500	446.2500	AK2O
Wenatchee	430.0250		AK2O
Wenatchee	430.1000		KB7TYR
Wenatchee	430.3500		KB7TYR
Wenatchee	439.0250	430.0250	AK2O
Wenatchee	439.1000		KB7TYR
Wenatchee	439.1750	430.1750	AK2O
Wenatchee	439.3500		KB7TYR
Wenatchee	440.8750		WA7PUD
Wenatchee	441.2250	+	AK2O
Yakima	442.6250	+	● WA7SAR

### FREQUENCY USAGE - IACC AREAS

Snp	443.0000	+	t
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### W WA - FREQUENCY USAGE

Crossband	440.0250	440.0250
Data - Nat'l	441.0000	441.0000
Simplex		
Data - Rptr	440.7000	440.7750
Output		
Data - Simplex	440.8000	440.9000
Data Rptr Input	445.7000	445.7750
Nat'l Calling	446.0000	446.0000
Freq'y		
Rptr Inputs	445.0000	445.6750
Rptr Inputs	446.0500	449.8750
Rptr Outputs	440.0500	440.6750
Rptr Outputs	440.9250	444.9750
Simplex - Voice	445.8000	445.9000



Mode	Frequency	Offset	Tone Frequency	Tone Type
<b>FT-8800 CROSS BAND</b>				
simplex	440.025	none	88.5	ENC.DEC
simplex	147.48	none	88.5	ENC.DEC
simplex	147.9	none	100	CTCSS
simplex	146.28	none	123	CTCSS
simplex	147.74	none	127.3	CTCSS
repeater	147.3	positive	100	CTCSS
repeater	146.88	negative	123	CTCSS
repeater	147.14	positive	127.3	CTCSS
<b>HANDHELD</b>				
simplex	147.48	none	88.5	CTCSS
simplex	440.025	none	88.5	CTCSS

# KNOW YOUR EQUIPMENT!

**YAESU**

**50/144/430 MHz  
TRIPLE-BAND HEAVY DUTY  
SUBMERSIBLE TRANSCEIVER**

**VX-7R**

**Operating Manual**



**VERTEX STANDARD CO., LTD.**  
4-8-8 Nakameguro, Meguro-Ku, Tokyo 153-8644, Japan

**VERTEX STANDARD  
US Headquarters**  
10900 Walker Street, Cypress, CA 90630, U.S.A.

**YAESU EUROPE B.V.**  
P.O. Box 75525, 1118 ZN Schiphol, The Netherlands

**YAESU UK LTD.**  
Unit 12, Sun Valley Business Park, Winnall Close  
Winchester, Hampshire, SO23 0LB, U.K.

**VERTEX STANDARD HK LTD.**  
Unit 5, 20/F., Seaview Centre, 139-141 Hoi Bun Road,  
Kwun Tong, Kowloon, Hong Kong

**VERTEX STANDARD (AUSTRALIA) PTY., LTD.**  
Normanby Business Park, Unit 14/45 Normanby Road  
Notting Hill 3168, Victoria, Australia

**YAESU**

**DUAL BAND FM TRANSCEIVER**

**FT-8800R**

**OPERATING MANUAL**



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# THANK YOU

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Aaron Noack  
AD7DD