Bellbrook Amateur Radio Club Repeaters

BARC Membership Meeting

May 19, 2022

John Westerkamp, W8LRJ

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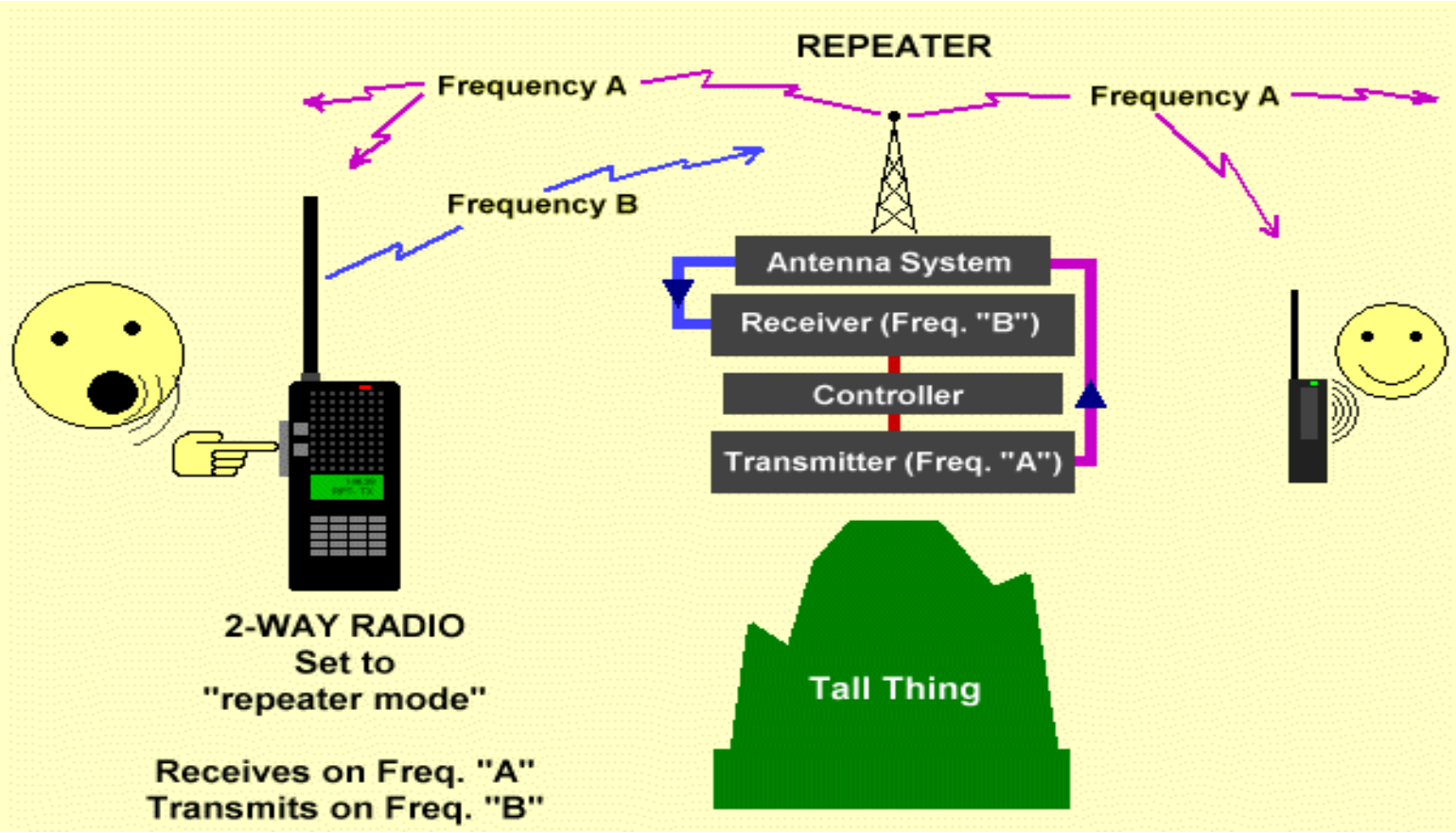
- Treasurer and Communications Coordinator
- BARC Member since 2018
- Ph.D. in Electrical Engineering from Purdue University
- 17 years on Electrical Engineering Faculty at University of Dayton
- Lori, Rachel, Jacob (LRJ)

- Working for the past several months with Eric Vinande, KG6NFJ, Tim Procuniar, N8NQH, Jim Dean, W8UD, and Russ Roysden, N8NPT, and Dan Kinney (KAS site owner) to update the repeater site.

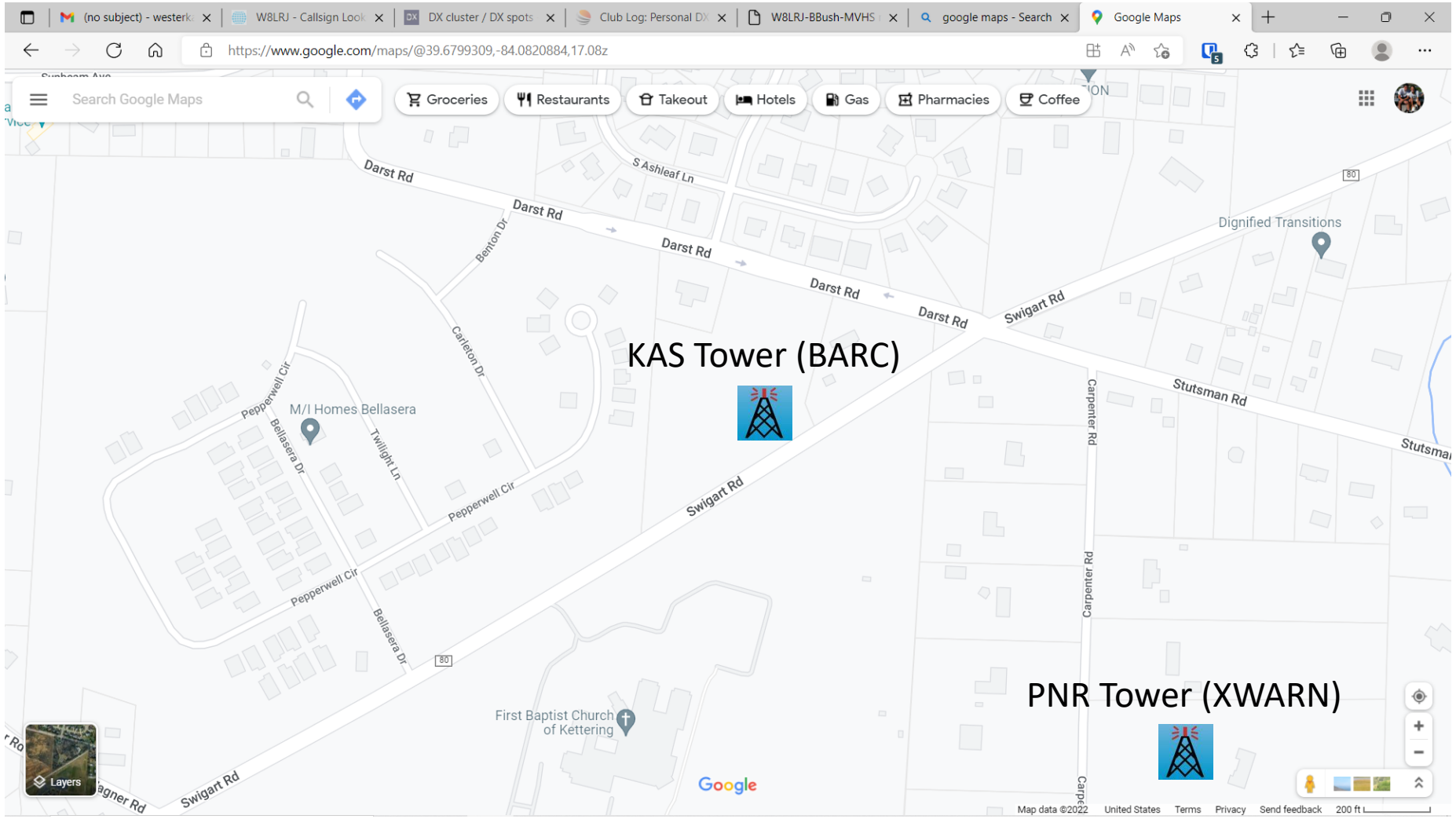
How Do Repeaters Work?



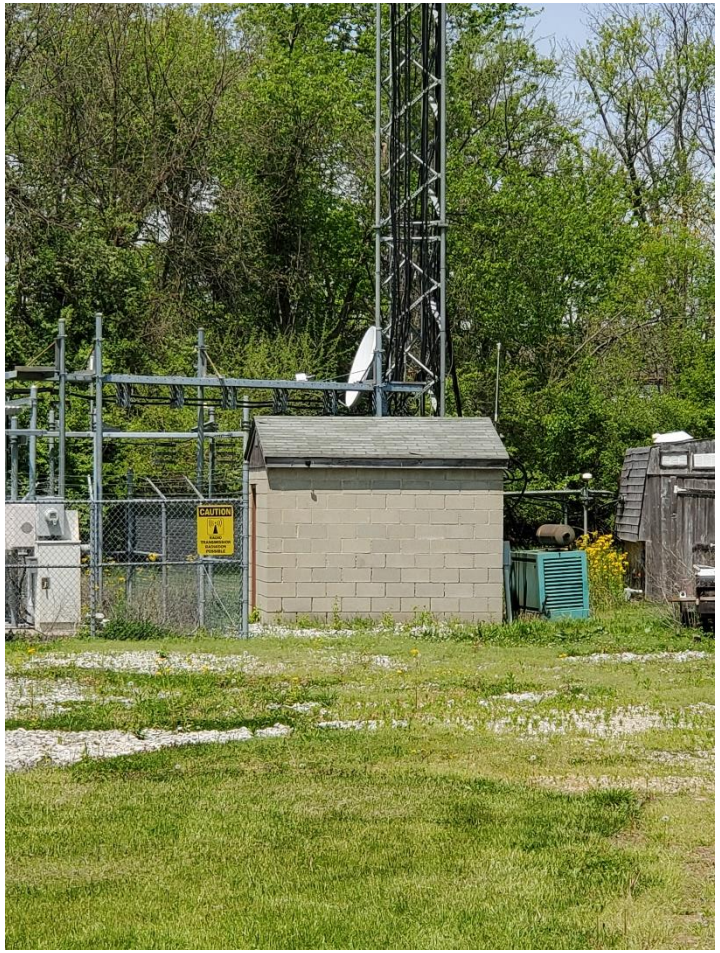
- Usually high on a tower
- Higher power than HT
- Defined by transmit Frequency A
- BARC is 147.045 MHz
- VHF 2m offset is 0.6 MHz
- VHF 1.25m offset is 1.6 MHz
- UHF 70cm offset is 5 MHz
- Below 147.0 MHz negative offset
- 147.0 MHz and above positive
- May require sub-audible tone to activate the repeater (or the HT)

- Example: BARC repeater
  Frequency A is 147.045 MHz
  Frequency B is 147.645 MHz
  Tone encode 118.8 Hz
  Tone decode none

Where is the Repeater?



KAS Tower Site



Overview

BARC 147.045 Repeater
(+ offset, no tone)
BridgeCom BCR-50 VHF

Analog repeater and analog Internet modes

BARC 443.675 Repeater
(+ offset, no tone)
Yaesu System Fusion DR-1X

Analog or digital repeater and digital Internet mode

Repeater Settings

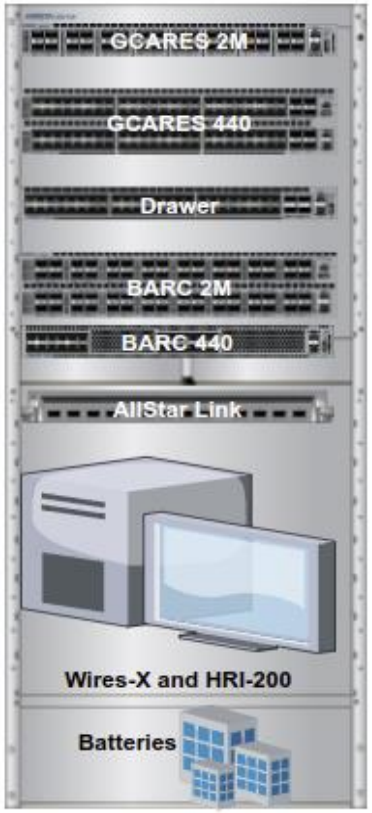
Repeater	Callsign	Tx (MHz)	Rx (MHz)	Tone Decode (Hz)	Tone Encode (Hz)	Power (watts)
BARC 2M	W8DGN/R	147.0450	147.6450	None	118.8	30
BARC 440	W8DGN/R	443.6750	448.6750	None	118.8	20

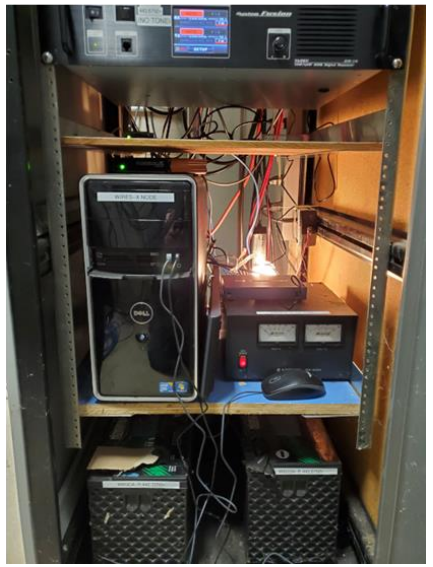
- Your radio does not require a tone to transmit through either repeater.
- If you set a transmit tone, the repeater will ignore it.
- If you do not set a receive tone, your radio will ignore any tone from the repeater.
- If you set a receive tone, your radio will only open its squelch for a transmission on the correct frequency with the tone you set.
- Setting a receive tone on the BARC 440 repeater channel in your radio is useful to avoid hearing the digital noise from the System Fusion transmissions (which do not send a tone).

Cabinet Layout

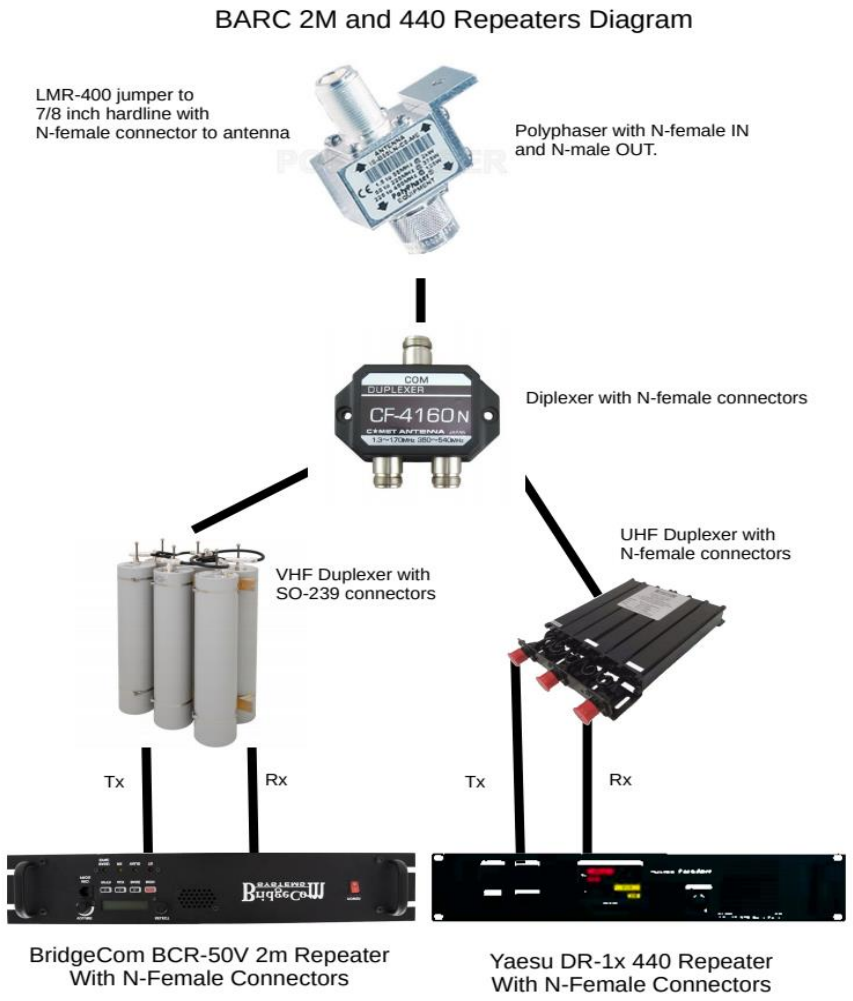
BARC and GCARES Network Rack Layout

Location: KAS Tower Site





Repeater Configuration



- Polyphaser lightning arrestor (equipment protection)
- Diplexer to separate or combine bands (combine different repeater outputs)
- Duplexer separates the Tx and Rx repeater signals (from the same repeater)

Duplexer vs. Diplexer

- A duplexer is a narrowband cavity resonator (bandpass filter) meant to separate two signals that are *close in frequency*, e.g., the transmit and receive frequencies of a repeater (typically 90 dB of isolation). Allows for *duplex* operation.
- A diplexer is a device meant to separate or combine two *bands of frequencies that are farther apart*, e.g., the 2m repeater and the 440 repeater.
- A duplexer is a necessity for a repeater system to avoid *desensing*.
- A diplexer is optional but allows two repeaters in different bands to share a single feedline and dual band antenna.

Radio Output to Feedline Coax Run

VHF Duplexer

UHF Duplexer

BARC GCARES

Diplexers and Polyphasers

Feedline and Antenna

7/8 inch Hardline

Comet GP-6 Dual Band

Coax Attenuation Specs

- LMR 400
  1.5 dB per 100 feet @ 150 MHz
  2.7 dB per 100 feet @ 450 MHz

- 7/8 inch Hardline
  0.449 dB per 100 feet @ 150 MHz
  0.808 dB per 100 feet @ 450 MHz