

KØNR UHF Repeater

Construction Notes

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5 Oct 2016

Overview of the Repeater

This is a conventional UHF FM repeater with a few added capabilities:

- 2m transceiver interfaced to the repeater for use as a remote base.
- Telephone autopatch, voice synthesis (controller options)
- Weather Radio alert

Output frequency: 447.725 MHz

Input frequency: 442.725 MHz

Equipment:

Yaesu DR-1X Repeater

Decibel Products 4-can Duplexer

SCOM 7K Repeater Controller

Yaesu FT-7800R Transceiver (dualband but only used on 2 meters)

Bearcat WX100 Weather Radio

SCOM 7K Controller

The 7K controller is an awesome design with lots of programming flexibility. SCOM has replaced the 7K with a newer model but I've been using this one for about two decades. Interfacing to the 7K is easy with the usual inputs and outputs. It is highly configurable and I won't try to describe the programming details here. Send me an email if you want to know more.

DR-1X Interfacing and Configuration

The internal controller in the DR-1X is very simple with a limited feature set. Yaesu also provided an external port (DB-15 connector) for control using an external controller. Unfortunately, they did not implement a robust design so even this interface is limited. Most notably, there is no easy way to run mixed analog FM and C4FM digital when using an external controller. Various people have implemented workarounds to support this but I've decided to just implement analog FM.

Most of the connections between the 7K and the DR-1X are pretty obvious, so I will focus on the unique situations (see Connection Diagram). The DR-1X connects to the TX1/RX1 port on the SCOM 7K. The DR-1X pin 1 must be connected to ground to enable external control.

The DR-1X is programmed from the front panel for FM mode, input/output frequency, power level, etc. The manual says to put the DR-1X into "Remote" mode from the front panel but I did not find that it made a difference. EXT Port 1 and EXT Port 2 (Pins 11 and 12) determine the repeat mode used. FM in and FM out requires a Low on Port 1 and High on Port 2. The inputs apparently float high, so I just grounded Port 1 and left Port 2 open.

I normally run CTCSS on both the receiver and transmitter. The DR-1X allows the internal Tone Decoder to be used with an external controller, so I set the CTCSS tone via the front panel. The DR-1X does NOT let you use the internal tone encoder for transmit. I supplied an external tone to Pin 6 on the DR-1X. To accomplish this, I installed a Communication Specialists TS-32 module inside the SCOM 7K. The tone comes out of the 7K on J2-24.

Note that the handy front panel speaker on the DR-1X is disabled when using an external controller.

Be sure to run the DR-1X at mid power setting (20W) for repeater operation. The full power setting is not warranted at full duty cycle.

FT-7800R Interfacing and Configuration

The FT-7800R is connected to the TX2/RX2 port on the SCOM 7K. I've used the "packet port" on the FT-7800 for repeater interfacing before and it works pretty well. No hacking into the radio as the required signals are present on the back panel. The radio is controlled using its front panel. See connection diagram.

Bearcat WX100 Interfacing and Configuration

The WX100 is a consumer grade weather radio that has a digital output that triggers when a weather alert occurs for the designated area. The WX100 is connected to the control receiver port (RX3) on the SCOM 7K. The digital control line from the WX100 drives the COS input. A few macros in the 7K handle the routing from RX3 to the repeater transmitter to play the weather radio audio for a specified period of time (about a minute or so).

Connection Diagram

SCOM 7K	Pin	Yaesu DR-1X	Pin	Comment
RX1 Audio	J2-1	AF OUT	9	De-emphasized receiver audio
RX1 COR	J2-2	SQL DET	4	Noise squelch (Low = Squelch open)
RX1 CTCSS Decoder	J2-5	CTCSS/DCS	3	CTCSS decode (Low = Decoded)
TX1 PTT	J2-10	PTT	2	PTT (Low = transmit)
TX1 Audio	J2-14	AF IN	7	Transmit audio
CTCSS Output	J2-24	Tone In	6	CTCSS input for transmit
Ground	J2-21	GND	5	Ground
Ground	J2-22	GND	5	
		Remote	1	Connect to ground
		EXT Port 1	11	Set for FM/FM operation – tie to ground
		EXT Port 2	12	Set for FM/FM operation – let float high
Power		VCC	15	Power connector on 7K
Ground		GND	10	Power connector on 7K
		Yaesu FT-7800R	Pin	
RX2 COR	J2-3	PKS (SQL)	6	Receiver squelch
RX2 Audio	J2-8	RX1200	5	Receiver audio
TX2 PTT	J2-11	PTT	3	PTT
TX2 Audio	J2-15	PKD (DATA IN)	1	Transmit audio
Ground	J2-19	GND	2	
		Bearcat WX100	Pin	
RX3 COR	J2-4	Control line		
GND	J2-22	Ground		
RX3 Audio	J2-25	Audio output		

Tone Encoder

Communication Specialists TS-32 Tone Encoder was installed inside the SCOM 7K.

Output of encoder is connected to J2-23 (at R68). Encode tone is brought out via J2-24