Interfacing an S-COM 7330 to a Yaesu DR-2X

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[Added CTCSS Encoder tone wiring to wiring tables.]

Overview

The Yaesu DR-2X is the second generation of the Yaesu System Fusion repeater. The S-COM 7330 and Yaesu DR-2X can be configured to work together in two basic ways.

7330 as a Wired Link. This configuration lets the DR-2X internal controller control the audio path, repeater timing and the identifier. The 7330 is programmed as a wired link between the 7330 radio port connected to the DR-2X and devices on its other two ports.

7330 as a Repeater Controller. This configuration puts the 7330 in control of the audio path and repeater timing. In this configuration, the DR-2X is mostly just a box with a receiver and a transmitter, though the DR-2X controller does still control the identifier. This configuration is limited to transmitting analog FM and an external CTCSS decoder is required. The 7330 has other devices connected to its other two ports.

These configurations require minimal 7330 and DR-2X programming and a basic interface cable. No hardware adapter module is required other than the CTCSS decoder in the second configuration.

There are fancier ways to configure the 7330 to work with the DR-2X. Like Justin Reed NV8Q did for the DR-1X interface, macros can be written for custom applications like full DR-2X Automatic Mode Selection (AMS) with the 7330. I'm sure one of the owners will feel inspired to work through this.

7330 as a Wired Link

Summary:

On the DR-2X CONTROL I/O connector, wire pin 2 (PTT) to pin 1 (EXT I/O). In this configuration, the DR-2X controller is repeating the audio, controlling repeater timing and sending the identifier message. The 7330 handles linking of the DR-2X to devices on its other ports.

All four DR-2X modes (see table below) are available as selected by pins 11 and 12. All modes of the repeater interface properly with the 7330. These modes let an FM user or a Fusion user, depending on the mode, communicate with any device connected to the other ports of the 7330, maybe another repeater, Allstar, IRLP, Echolink or anything else you choose to interface to it.

The port on the 7330 is configured as a half-duplex wired link interface. PTT from the 7330 cannot be asserted while the internal controller is transmitting in order for audio to be heard when the internal controller stops transmitting. The commands below use the CTCSS Logic Input of the 7330 to provide the 7330 PTT control required to make this interface operate properly.

The DR-2X internal controller monitors both the PTT signal from its internal receiver and the external PTT signal from the CONTROL I/O connector. When the internal receiver is active, audio from the internal receiver is fed to the transmitter. When the external PTT is active, audio from the AF IN pin of the CONTROL I/O connector is fed to the transmitter. The selection of audio source depends on the first signal to arrive. The audio is never mixed; that is, the second signal to arrive does not interrupt the first.

DR-2X Modes:

DR-2X Port Pins		DR-2X Receiver	DR-2X Internal	DR-2X Control I/O
Port 2	Port 1	Mode	PTT	PTT
L	L	Auto (AMS)	Auto (AMS)	Fix FM
L	H	Auto (AMS)	Fix FM	Fix FM
H	L	Digital	Fix Digital	Fix Digital
H	H	Auto (AMS)	Fix Digital	Fix Digital

7330 Commands:

```
; The following commands configure 7330 Port 1 to operate properly
;   with the wiring shown below and the modes shown above.

; disable the TX1 IDer, handled by DR-2X
MPW 09 2106 0 * ; TX1

; Disable the TX1 transmitter tail for best operation
MPW 09 0100 0 * ; TX1, Set Courtesy Delay to zero
MPW 09 0101 0 * ; TX1, Set Dropout Delay to zero
MPW 31 0112 *   ; TX1, Delete the Dropout Message
MPW 09 0102 0 * ; TX1, Set PTT Minimum Unkey Delay to zero

; Disable the RX1-TX1 repeat path
MPW 63 0141 0 *

; Set other Paths from RX1 as required.
;   Always use Access Mode CTCSS or COR-AND-CTCSS
MPW 57 12 3 *   ; RX1-TX2 Access Mode
MPW 57 13 3     ; RX1-TX3 Access Mode

; Set other Paths to TX1 as required, any Access Mode.
MPW 57 21 1     ; RX2-TX1 Access Mode
MPW 57 31 1     ; RX3-TX1 Access Mode

; Set Courtesy Messages to TX1 as required
MPW 31 0101 <message> * ; RX2-TX1 Courtesy Message
MPW 31 0102 <message> * ; RX3-TX1 Courtesy Message

; These Event Macros operate port 1 half-duplex
MPW 20 A001 MPW 63 0112 0 * ; disable TX1 PTT
MPW 26 0117 A001 *          ; execute on RX1 CTCSS Active
MPW 20 A000 MPW 63 0112 1 * ; enable TX1 PTT
MPW 26 0118 A000 *          ; execute on RX1 CTCSS Inactive
```

Wiring

Straight wiring. Also connect DR-2X Control I/O Pin 1 to Pin 2.

DR-2X Control I/O Connector		S-COM 7330	
#	Name	Connector and Pin Number	Name
1	EXT I/O	Radio Port: Pin 4	PTT
2	EXT PTT	Radio Port: Pin 4	PTT
3	CTCSS Detect	Radio Port: Pin 3	CTCSS Logic In
4	SQL DET	Radio Port: Pin 2	COR Logic In
5	GND	Radio Port: Pin 7	Ground
6	TONE IN	Radio Port: Pin 8	CTCSS Encoder Tone
7	AF IN	Radio Port: Pin 5	TX Audio
8	DISC OUT		
9	AF OUT	Radio Port: Pin 1	RX Audio
10	GND	Power Conn: Ground	Ground the 7330
11	EXT PORT 1	I/O: Pin 2	Logic Output 2
12	EXT PORT 2	I/O: Pin 3	Logic Output 3
13	EXT PORT 3		
14	EXT PORT4		
15	VCC OUT	Power Conn: +12V	Power the 7330

Note: set 7330 Jumper J37/J38/J39 for CTCSS. See page B-12.

7330 as a Repeater Controller

Summary:

On the DR-2X CONTROL I/O connector, ground pin 1 (EXT I/O). In this configuration, the DR-2X controller is mostly disabled. The 7330 repeats the audio from the DR-2X receiver, either FM or Fusion, to the DR-2X transmitter, always as FM.

An external CTCSS decoder is required to properly repeat analog FM transmissions.

DR-2X Modes:

DR-2X Port Pins		DR-2X Receiver	DR-2X Internal	DR-2X Control I/O
Port 2	Port 1	Mode	PTT	PTT
L	L	Auto (AMS)	No Repeat	Fix FM
L	H	Auto (AMS)	No Repeat	Fix FM
H	L	Digital	No Repeat	No Repeat
H	H	Auto (AMS)	No Repeat	No Repeat

7330 Commands:

```
; The following commands configure 7330 Port 1 to work properly
;   with the wiring below and the modes shown above.

; disable the TX1 IDer, handled by DR-2X
MPW 09 2106 0 *      ; TX1 Interval

; Set Paths from RX1 as required.
;   External CTCSS Decoder required.
MPW 57 11 3 *   ; RX1-TX1 Access Mode Repeat Path
MPW 57 12 3 *   ; RX1-TX2 Access Mode
MPW 57 13 3     ; RX1-TX3 Access Mode

; Set other Paths to TX1 as required, any Access Mode.
MPW 57 21 1     ; RX2-TX1 Access Mode
MPW 57 31 1     ; RX3-TX1 Access Mode

; Set Courtesy Messages to TX1 as required
MPW 31 0100 <message> * ; RX1-TX1 Courtesy Message
MPW 31 0101 <message> * ; RX2-TX1 Courtesy Message
MPW 31 0102 <message> * ; RX3-TX1 Courtesy Message
```

Wiring

Changes here are DR-2X DISC OUT to CTCSS Decoder discriminator in. Also, CTCSS Logic Out to 7330 Radio Port Logic In; no CTCSS connection to DR-2X.

DR-2X Control I/O Connector		S-COM 7330		CTCSS Decoder
#	Name	Connector and Pin Number	Name	Name
1	EXT I/O	Radio Port: Pin 7	Ground	
2	EXT PTT	Radio Port: Pin 4	PTT	
3	CTCSS N/C	Radio Port: Pin 3	CTCSS Logic In	CTCSS Logic out to 7330
4	SQL DET	Radio Port: Pin 2	COR Logic In	
5	GND	Radio Port: Pin 7	Ground	
6	TONE IN	Radio Port: Pin 8	CTCSS Encoder Tone	
7	AF IN	Radio Port: Pin 5	TX Audio	
8	DISC OUT			Discriminator In from DR-2X
9	AF OUT	Radio Port: Pin 1	RX Audio	
10	GND	Power Conn: Ground	Ground the 7330	Ground the CTCSS Decoder
11	EXT PORT 1	I/O: Pin 2	Logic Output 2	
12	EXT PORT 2	I/O: Pin 3	Logic Output 3	
13	EXT PORT 3			
14	EXT PORT4			
15	VCC OUT	Power Conn: +12V	Power the 7330	Power the CTCSS Decoder

Notes: set 7330 Jumper J37/J38/J39 for CTCSS. See page B-12.   NC == No Connection