

Interfacing the FM Repeater of a Mixed Mode Motorola Quantar to AllStar, IRLP or Similar by Adrian Stimpson, VE7NZ

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The Motorola Quantar is a rock solid repeater used by many radio amateurs on 440 and 900 MHz. This article explains how to connect the repeater to a radio interface that supports PTT, COS, Audio In, and Audio Out. This could be a repeater controller, link radio, phone patch (do they still have those?), AllStar interface, IRLP interface, or any other wide area VoIP system.

Following the steps in this article and using the associated code plug (repeater configuration file), you will be able to use the Quantar in mixed mode (analog FM and digital P25) whereby FM traffic is sent to the radio interface and digital traffic is not.

By also using a CTCSS tone on the output of the repeater local listeners, after setting CTCSS decode on in their radio, will not hear the digital “noise” that is heard when a P25 transmission is being repeated. Everyone can co-exist in peace and harmony.

From a routing perspective, this gives your users the option to easily use P25 for a local QSO and FM when they want to be heard on a wide area network (WAN) such as AllStar.

If you want to route P25 traffic as well, there are articles on how to do this elegantly but it is not trivial (understatement). *This* article is for the less adventurous.

Parts and/or Requirements:

- The repeater must be equipped with a wireline card. It can be 4 or 8 wire. You do not need a v.24 daughter board. I believe there is terminology for “extended wireline interface” and regular. You do not need an extended interface for this to work.
- Code plug for the repeater, which you can find at this link <https://bit.ly/2YueP2g> or in the files section of wherever this is posted. If you still can't find it, email me. The solution has been tested with firmware version R020. Results with earlier versions may work, but have not been tested.
- Radio programming software to program the repeater. Contact the author at the email above if you need it.
- Serial cable for programming the repeater. Note there are USB-DB9 serial adapters that work for this purpose.
- 50 pin SCSI Telco connector (DigiKey part number 111-050-103L001)
- DB-25 male connector (DigiKey part number 171-025-103L001)
- For the WAN connection I use either the RA-35 or RA-42 from Masters Communications (<http://www.masterscommunications.com/>). You will need a DB-9 connector to connect to this board (DigiKey part number A-DS 09 LL/Z).
- Common jumper wire for the pin to pin shorts below.
- Wire for audio in/out, PTT, COS. I recommend shielded wire such as RG-174U coax, at least for the audio connections, to avoid interference from the repeater or other transmitters in your station.

Steps:

1. Make up the interface cable. The DB-9 connections below are for the RA35 / RA42 radio interface. If you aren't using that, just apply the PTT/COS/Audio In/Audio Out to your interface of choice.

On the 50-pin telco connector:

- connect pins 26 and 27 to 32 (ground) to change the balanced audio to unbalanced.
- connect pins 7 and 43
- connect pins 8 and 22
- connect pin 18 (FM signal COS) to the DB9 pin 3

On the DB25 pin connector:

- connect pin 1 (audio into the repeater) to the DB9 pin 2 (audio from the radio interface - note that on the RA35/42 card this is the "left" audio output when configuring AllStar).
- connect pin 2 (PTT) to the DB9 pin 5 (PTT)
- connect pin 7 (repeater receiver audio) to DB9 pin 6 (audio into the radio interface)
- connect pin 17 to DB9 pin 8 (ground)

Keep all cables as short as reasonably possible to avoid them picking up RF from anywhere.

I recommend grounding the audio in/out shields of the RG-174 to ground on the DB25 connector (pin 8). Do not ground the shield at the DB9 end (Google "ground loops" for more info!)

2. Plug the 50-pin telco connector into the back of the Quantar
3. Plug the DB25 connector into the 25-pin MRTI connection on the back of the Quantar (there are two, you want the one closest to the 50-pin connector).
4. Plug the DB9 into the RA-35/42 interface or whatever radio interface you are using.
5. Load the code plug and restart the Quantar. You will of course need to enter your frequency, call sign, and CTCSS tone (e.g. on the "access code table" 2A = 114.8 Hz), P25 NAC (e.g. 255 in the example file). Note that the code plug turns off all IDs. You may not want this. I ID via the AllStar software since I can easily change that and other settings remotely via SSH. You may want to make other changes to the code plug, just don't change the Wildcard Tables (unless you need to change active hi/lo states for your interface) or "PTT Priority" under the Channel Information menu.

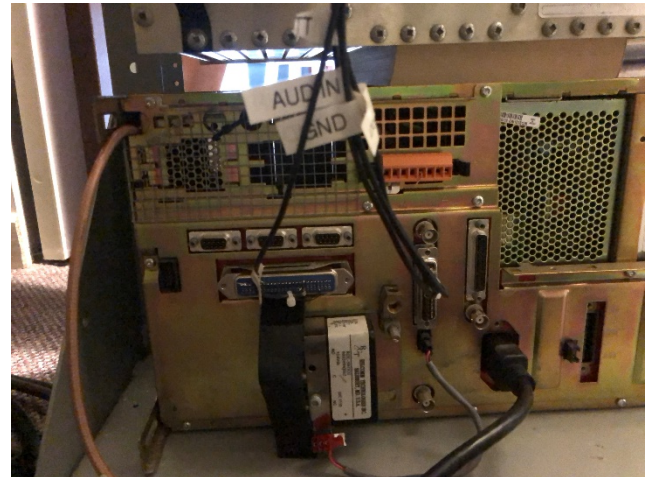
Completely sort of unrelated:

If you are using AllStar and setting up your Quantar as a Narrowband (2.5 kHz deviation) repeater, please please do the following for best results:

1. Make sure your users know to set their radios to "narrow" – a menu item in most radios these days. If not, they will sound too loud, compressed, and their DTMF tones may not be recognized.
2. Use the feature in AllStar to generate a test tone and set the deviation of your transmitter to 1.5 kHz (half the normal deviation of an FM repeater that uses 5 kHz deviation). Do this with CTCSS turned off (modify the code plug temporarily).
3. Set the level to the WAN using the tune feature in the CLI of AllStar. The 3kHz/5kHz readings are not technically correct I believe but the 5kHz marker represents "100% modulation" so set levels so that voice peaks reach 5 kHz but not more. Another way, if you have good ears, is to connect to node 40894 which plays back received audio 10 seconds later and have someone count to

five. The locally repeated audio, assuming you have already set the tx deviation, should sound the same volume as the original transmission. If not, turn the audio to the WAN up/down accordingly.

4. Enjoy using your repeater. Talk about the weather as if no one else has access to the internet or weather network and have fun!



For more info or questions please contact the me at my callsign at arrl.net. Or call me on VE7NZ-220 (AllStar node 450521).

73,
Adrian
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