Connecting the ComLink CS-540 to a "Link-Radio"

By: Ron Kochanowicz
Bridge Embedded Systems, Inc.
Email: Ron@BridgeEmbeddedSystems.com

INTRODUCTION

Many people in the LMR industry have the desire to create or buy a cross band repeater. Also, there is a need for interoperability between various systems. The CS-540 FM Repeater can easily be setup to connect an external transceiver commonly called a "link-radio." A link-radio can help achieve cross-banding and address interoperability concerns. The requirement of the link-radio is that it have an accessory port with the following I/O: Ptt-In, Audio In, COS out, and Received Audio Out. This application note describes how to connect the ComLink CS-540 to a link-radio that meets the above requirements. In addition, many of the CS-540's features are highlighted to show how the system can be tailored to your specific application.

CONNECTIVITY

The CS-540 comes with a DB25 female accessory connector on the rear of the unit. This connector supports all the I/O required for a clean one-cable connection from the link-radio to the CS-540. Figure 1 diagrams the connections:

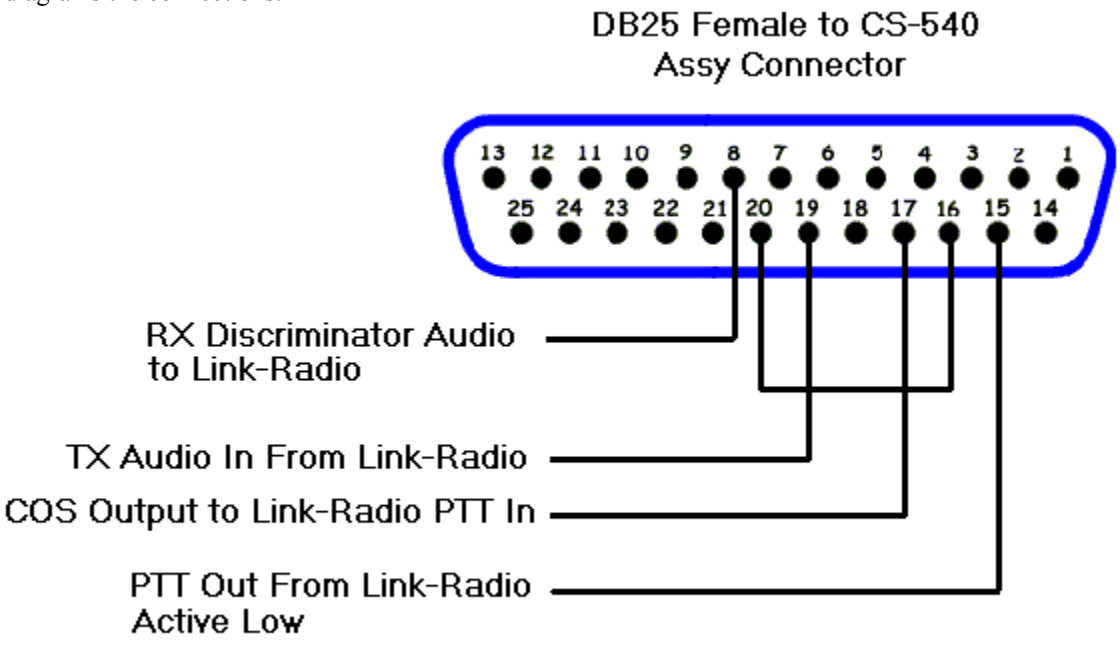

Figure 1: Connectivity Diagram

To achieve these connections a custom built cable is required. This cable can be purchased from BridgeCom Systems, or you can easily build it yourself. To build the cable, 4-conductor shielded cable, one male 25-pin DSUB connector, and one connector specific to your link-radio is required. It is recommended the cable be made as short as possible. All of the connections are simple and straight through. The shield is to be connected to ground. You may also power the link-radio from the CS-540 as it supports a high-current 13.8V DC output.

REPEATER SETUP AND OPERATION

Using the PGM-540 Programmer, set up the channel for how the CS-540 is to operate. Next, setup the customizable COS output. The COS output is to be used to PTT the link-radio. The COS must be enabled before it can be used, otherwise it functions as a general purpose output.

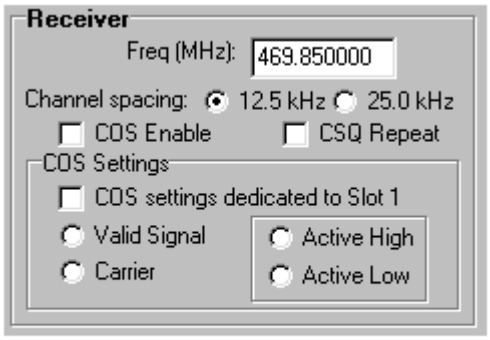

Figure 2: COS Settings

The COS can be dedicated to toggle for the user profiled in Slot 1 or can toggle for all user slots. To dedicate the settings to slot 1, check the appropriate box. Next, decide whether the COS is to toggle based on valid signaling or carrier. If you dedicate the COS to Slot 1, valid signaling is automatically selected. Then, set the polarity of the output pin for the requirement of the link-radio, active high or active low.

Once the personality of the repeater is set up, dump the personality into the repeater. If this is a new channel, don't forget to restore the factory defaults for that channel. Restoring the factory defaults will provide a starting point for all the transmitter alignment data. Once the defaults have been restored, the repeater's transmitter can be fine-tuned to achieve optimum performance. See CS-540 owner's manual for information about alignment.

USING THE CS-540 WITH THE LINK-RADIO

The CS-540 repeater will operate as normal, repeating all valid calls it receives. Yet, when a call comes in, the COS output will PTT the link-radio at the same time the repeater is transmitting. This way, the system can transmit the same received audio on two different frequencies. If you have dedicated the COS to the user code/tone of slot 1, then the link-radio will only be engaged when slot 1 signaling is received.

The system is set up to give the current user of the system priority. Therefore, if the repeater receives a call and the link-radio has control of the transmitter, the repeater's received call will be ignored. Likewise, if the repeater is in the midst of repeating a call and the link-radio attempts to transmit, the attempt will be ignored until the repeater is free. There is a way, however, to give the link-radio priority. Referencing Figure 1: pins 16 and 20 are tied together. The input on Pin 15 is used to screen the PTT request from the link-radio so as not to interrupt the repeater if it is busy. To give the link-radio priority, remove the connection of pin 16 and 20 and tie the PTT request from the link-radio to pin 20 instead of pin 15. This will now give the link-radio priority. For the link-radio to 'bump' a current user off the system, a double-key is required. A double-key in this case is a short quick key, followed by the key press intended for voice.

If you have any questions please email me at:

Ron@BridgeEmbeddedSystems.com