

FUNCTIONAL DESCRIPTION

The COR module is designed for operation with Hamtronics® FM Transmitters and Receivers (and CWID board when used) to provide repeater operation. The unit may also be used with other makes of transmitters and receivers providing the required interface signals are available. The unit comprises three main circuits. 1.) A carrier operated electronic relay provides operating power to the oscillator and low level stages in the transmitter whenever the receiver squelch is open. When the squelch closes, the COR circuit holds the transmitter on for an extended time (tail) with no audio modulation. If the receiver is held on for more than the legal transmit period (ex. 3 minutes), the COR circuit automatically shuts down the transmitter until the receiver is released. 2.) An audio mixer stage which mixes and buffers audio from the receiver, and the CWID for application to the transmitters. 3.) A speaker amplifier which provides adjustable drive for a local speaker separate from the repeater audio; this avoids having to use "L" pads, etc. and compromising local audio for benefit of repeater. Refer to catalog for complete specifications for COR unit.

CONSTRUCTION GUIDELINES

There is no special construction sequence; but following are some notes regarding various parts.

- Resistor bodies are designated as circles on the assembly diagram for those which are mounted vertically.
- Note the polarity of IC's, transistors, diodes, electrolytic capacitors, and LED's. LED polarity may be distinguished in either of two ways: the short lead is the cathode or the case has a small flat at the base aligned with the cathode.
- Trim pots may be marked in plain values, such as 50K or 500K or may be in significant numbers and multipliers, such as "23" and some meaningless letter for 2K pots.
- LED's may be mounted directly on the PC board as shown or they may be mounted on the front panel of the repeater with extended leads tied to board. LED's can be mounted easily by drilling 3/16 inch diameter holes in the panel and fastening LED's to panel with cement after passing into holes from the rear of the panel.
- Terminal pins for E1-E12 should be cut from the metal carrier strip, then snapped in place from top of board using care not to crush them. Firm pressure with a pair of fine nose pliers grasping one wall of the pin will cause it to snap and lock into hole.

INSTALLATION

The COR board can be mounted with standoffs in the four corners of the board. No special shielding is required. Connections are made to the terminal pins either by soldering hookup wires into hollow top of pin or wrapping around pin and soldering. Following are descriptions of required interface connections. When used with Hamtronics® Exciter, Receiver, and CWID boards, required interface levels are assured. When used with other equipment, some care must be taken to be sure compatible interface connections are arranged. Referring to the Repeater System diagram, it can be seen that the Exciter/PA and the Receiver are mounted in different boxes with feedline capacitors used at control and audio signal entrances.

- COR OUTPUT FROM RECEIVER.** This control signal, taken from the squelch stage in the receiver must be about +5 Vdc behind a 5K to 10K resistor (to limit current into Q1 base on COR) when the squelch is open and near ground when squelch is closed.
- AUDIO FROM RECEIVER.** The high level audio output from the IC in the receiver, which normally feeds the speaker, is connected to E3 on the COR board instead. The COR board provides a dummy load for the audio and applies it to the audio mixer stage for application to the Exciter. The receiver audio is also connected through a (user supplied) 10K LOCAL VOLUME control to E2. A speaker amplifier on the COR board amplifies the signal from the LOCAL VOLUME control to provide an isolated signal for a local speaker on the repeater panel. Note that the receiver audio must be isolated from the receiver B+ by a blocking capacitor in the receiver, and the audio output should be referenced to ground (receiver speaker normally connected to ground return).
- LOCAL SPEAKER** connected to E7 and E8 on COR board should be an 8 ohm speaker. Up to 2W of audio can be obtained from the COR speaker amplifier. Note that the speaker must return to E8 (B+) not ground.
- B+ for COR board should be +13.6 Vdc connected to E6. Ground should be tied to E1. Current drain depends on speaker level and amount

of current supplied to Exciter keyed B+ line, but should normally be less than 150 mA.

- KEYED B+ to Exciter** is +12V (not 13.6 Vdc due to drop in IC) at up to 50 mA. To avoid relays, only low current B+ is switched, not B+ to entire Exciter. With Hamtronics® T51 and T451 Exciters, the output from E9 on the COR is applied to the input (high side) of regulator series resistor R18 which feeds the oscillator and modulator stages in the Exciter. R18 is disconnected from the normal Exciter B+ line at the adjacent ferrite bead. Thus, full +13.6 Vdc is applied to the normal Exciter B+ terminal and keyed +12V is fed to the oscillator voltage regulator circuit. Because the Exciter multiplier and amplifier stages are class C, it is unnecessary to switch the B+ to the entire transmitter.
- REPEATER AUDIO** from E5 is connected to the high level repeater audio input on the Exciter. The nominal level is 0 dBm (0.225 Vrms).
- Connections to CWID are as shown on the Repeater System diagram. ID TRIP is normally high and goes low when the Receiver squelch is open to trip the ID when a transmission first begins. The ID KEY signal is normally low and goes high to key the COR circuit while the CWID runs. The CWID audio output should be tied to E4, the input to the audio mixer on the COR board.

ADJUSTMENTS

- Adjust R4 for desired repeat tail time. Delay is adjustable up to about 5 seconds. The value of R5 may be increased for longer times.
- Adjust R8 for desired "time out" period up to ten minutes. R9 may be removed for longer time out period.
- Set up repeater audio level as follows. Set Exciter controls for normal microphone operation as stated in Exciter instruction manual. Then, adjust volume control on receiver for desired repeat modulation. It is normally not necessary to depend on the Exciter limiter for hard limiting because the filter in any good receiver will limit the maximum deviation level and thereby the maximum audio level applied to the Exciter. Note: If you cannot use this procedure because a different Exciter is being used, set receiver volume control for 2 Vrms (400 mW) at E3, and adjust the deviation level at the Exciter's gain control.
- Adjust LOCAL VOLUME control to set speaker volume.
- CWID modulation level is adjusted with R16. Normally, the ID level is set lower than voice level.

TROUBLESHOOTING

The following dc voltages were measured with an 11 megohm input FETVM on a sample unit with +13.6 Vdc applied. All voltages may vary considerably without necessarily indicating a problem; however, used in conjunction with a systematic troubleshooting plan, these voltages may help in locating a problem.

DEVICE/CONDITION	PIN			
	E	B	C	
Q1 RCVR CLOSED	0	0.1	11	
Q1 RCVR OPEN	0	0.7	.05	
Q2 RCVR CLOSED	0	0.7	.06	
Q2 RCVR OPEN	0	.05	9	
Q3	6.8	7.4	12.6	
	2.4	6.7	8	3
U1 UNKEYED	11	0	13.6	.01
U1 KEYED	.05	0	13.6	.01
U1 TAIL	11	0 to 9	13.6	12
U2 UNKEYED	0.3	0	13.6	0
U2 KEYED	7	0 to 9	13.6	12
U2 TIMED OUT	7	0	13.6	0
	1	2	4	5
U3	13.6	8.4	0.7	0.6
			7	12
			13	14
			6.5	6.5
				13.6

Note: The LED's are also helpful in troubleshooting. Note that DSI "RCVR OPEN" will normally glow dimly when not on at full brilliance; that does not indicate a problem.