Introduction

The T800-02 CTCSS unit is designed to operate with the T800 Series I range of receivers and transmitters. It will encode and decode CTCSS tone frequencies within the range 67 to 250.3Hz and is compatible with any other CTCSS unit which conforms to EIA RS220. The T800-02 is internally mounted above the audio processor section onto screw lugs provided on the chassis. Provision has been made for two units to be fitted for dual tone CTCSS if required, however there are limitations to this configuration (refer to TN-566). The T800-02 has silent squelch tail circuitry fitted to improve communication quality.

Parts Required

The T800-02 CTCSS kit should contain the following items:

1 x T800-02 CTCSS PCB
1 x wiring loom complete with socket
2 x M3x8 pan Torx screws
2 x cable ties
1 x spring clip

Fitting

1. Mount the T800-02 PCB in the T800 receiver or transmitter as shown in Figure 1.

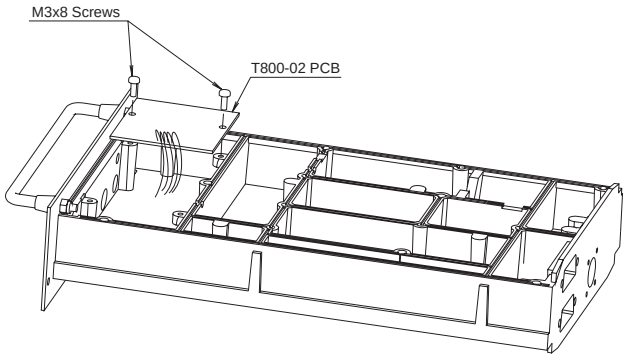

Figure 1 T800-02 Mounting Details

2. Connect the T800-02 to the audio and power supply points in the audio processor as shown in Figure 2 (receivers) or Figure 3 and Figure 4 (transmitters).

Note: For older model receivers without “MUTE I/PA”, replace R160 with a zero ohm resistor and connect S3 to “MUTE I/P” (refer to Technical News No. 51).

For T825 receivers, connect S3 to “MUTE I/P2”.

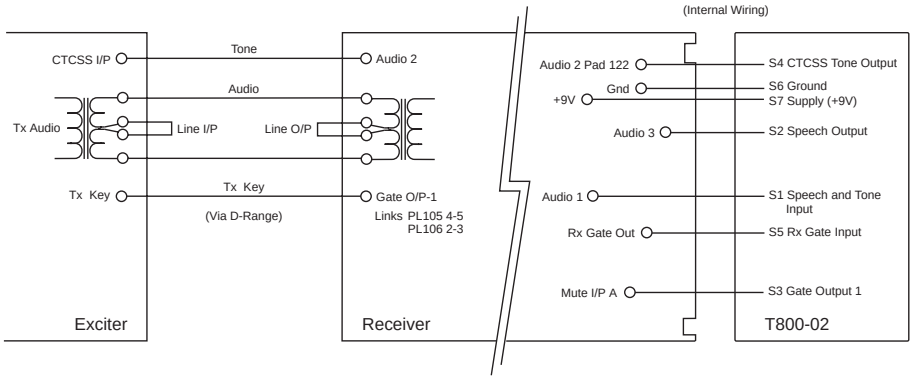

Figure 2 Receiver CTCSS Wiring Details

Note: If fitting a T800-02 PCB to a T800 module already fitted with a T800-07 multichannel PCB, remove C19 from the T800 PCB.

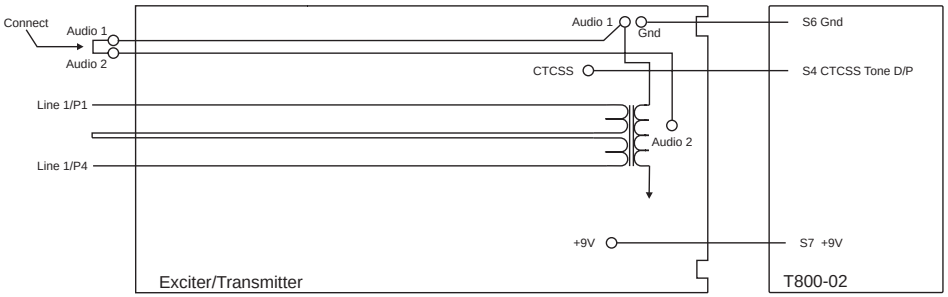

Figure 3 Transmitter CTCSS Wiring Details

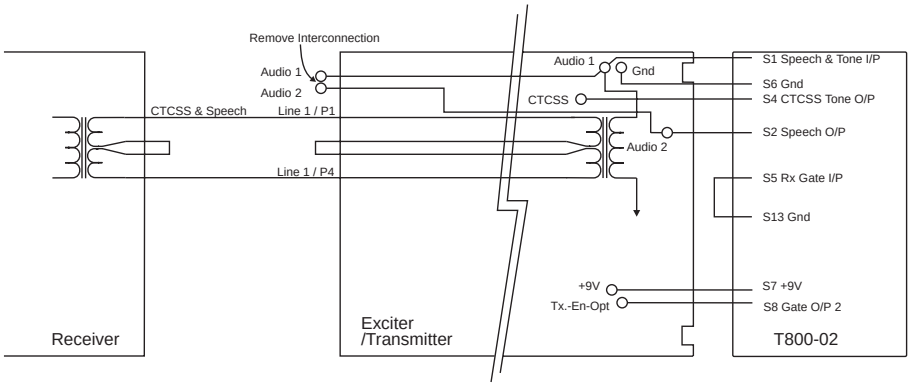

Figure 4 Talk Through Repeater Wiring

Servicing

Refer to TN-566.

Programming

Refer to Table 1 and Figure 5.

The DIP switch codes for standard EIA tones are set out in Table 1 on the following page. Program the DIP switch (SW1) on the T800-02 PCB as shown in Figure 5.

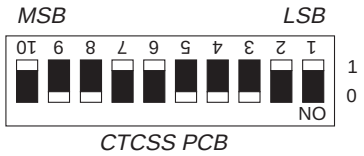

Figure 5 DIP Switch Programming

Non-standard Tones

1. Calculate "n": $n = \frac{40960}{\text{tone frequency required}}$

2. Round off to the nearest whole number.

3. Convert to binary code and program the DIP switch (LSB to "1" switch and MSB to "10" switch) as shown in Figure 5.

   Example: tone frequency = 67.0Hz $\frac{40960}{67}$ = 611.343

   therefore n = 611

   convert n to binary code:

n	n ÷ 2 =	Remainder (Switch Position)	Switch Number	Significance
611	305	1	1	LSB
305	152	1	2	
152	76	0	3	
76	38	0	4	
38	19	0	5	
19	9	1	6	
9	4	1	7	
4	2	0	8	
2	1	0	9	
1	0	1	10	MSB

EIA Frequency (RS220)	Actual Frequency	Error %	n	Switch Code[a] MSB 10 9 8 7 6 5 4 3 2 1 LSB
67.0	67.04	+0.06	611	1 0 0 1 1 0 0 0 1 1
71.9	71.86	-0.06	570	1 0 0 0 1 1 1 0 1 0
77.0	76.99	-0.01	532	1 0 0 0 0 1 0 1 0 0
82.5	82.58	+0.10	496	0 1 1 1 1 1 0 0 0 0
88.5	88.47	-0.04	463	0 1 1 1 0 0 1 1 1 1
94.8	94.81	+0.02	432	0 1 1 0 1 1 0 0 0 0
100.0	99.90	-0.10	410	0 1 1 0 0 1 1 0 1 0
103.5	103.43	-0.06	396	0 1 1 0 0 0 1 1 0 0
107.2	107.23	+0.02	382	0 1 0 1 1 1 1 1 1 0
110.9	111.00	+0.10	369	0 1 0 1 1 1 0 0 0 1
114.8	114.73	-0.06	357	0 1 0 1 1 0 0 1 0 1
118.8	118.72	-0.06	345	0 1 0 1 0 1 1 0 0 1
123.0	123.00	0.0	333	0 1 0 1 0 0 1 1 0 1
127.3	127.20	-0.08	322	0 1 0 1 0 0 0 0 1 0
131.8	131.70	-0.07	311	0 1 0 0 1 1 0 1 1 1
136.5	136.53	+0.02	300	0 1 0 0 1 0 1 1 0 0
141.3	141.24	-0.04	290	0 1 0 0 1 0 0 0 1 0
146.2	146.29	+0.06	280	0 1 0 0 0 1 1 0 0 0
151.4	151.14	-0.17	271	0 1 0 0 0 0 1 1 1 1
156.7	156.93	+0.15	261	0 1 0 0 0 0 0 1 0 1
162.2	161.90	-0.19	253	0 0 1 1 1 1 1 1 0 1
167.9	167.87	-0.02	244	0 0 1 1 1 1 0 1 0 0
173.8	173.56	-0.14	236	0 0 1 1 1 0 1 1 0 0
179.9	179.65	-0.14	228	0 0 1 1 1 0 0 1 0 0
186.2	186.18	0.0	220	0 0 1 1 0 1 1 1 0 0
192.8	193.21	+0.20	212	0 0 1 1 0 1 0 1 0 0
203.5	203.78	+0.14	201	0 0 1 1 0 0 1 0 0 1
210.7	211.13	+0.20	194	0 0 1 1 0 0 0 0 1 0
218.1	217.87	-0.10	188	0 0 1 0 1 1 1 1 0 0
225.7	226.30	+0.27	181	0 0 1 0 1 1 0 1 0 1
233.6	234.06	+0.20	175	0 0 1 0 1 0 1 1 1 1
241.8	242.37	+0.23	169	0 0 1 0 1 0 1 0 0 1
250.3	249.76	-0.22	164	0 0 1 0 1 0 0 1 0 0

a. "0" = on, "1" = off.

Table 1

Remote Programming Of Encode/Decode Tones

If remote tone programming is required, a 10-wire loom and socket is provided in the kit for wiring to an additional D-range connector at the rear of the T800 receiver or transmitter. Fit the socket to PL-1 on the T800-02 PCB, feed the wires through the channel provided in the chassis and solder the wires to the D-range connector. Secure the wires with the cable ties and spring clip if required. When using the remote cable, program the DIP switch (SW1) on the T800-02 to all "1"s (off).

Adjustments

Refer to Figure 2.

Note: For narrow band sets use half the stated deviation levels.

1. Set the receiver RF mute pot (RV100) to the required threshold (e.g. 20dB sinad).

2. Set the receiver line level pot (RV102) for -10dBm using a steady received RF signal at approximately -70dBm.

3. Program the required CTCSS tone.

4. Adjust RV1 on the T800-02 PCB to provide ±600Hz (nominal) tone deviation of transmitter modulation.

5. **Transmitter Deviation**

   This must be reset so that the maximum deviation for both audio and CTCSS does not exceed ±4.7kHz.

   Adjust the transmitter line sensitivity pot (RV100) fully clockwise.

   Adjust the transmitter deviation pot (RV106) to set the maximum total deviation of the CTCSS tone and 1kHz AF to ±4.7kHz.

   Sweep the audio frequency from 100Hz to 4kHz and ensure that the maximum deviation does not exceed 4.7kHz.

   Readjust RV106 if necessary.

   Readjust the line sensitivity for ±3kHz deviation.

6. **Transmitter Tail Timer**

   The transmitter tail timer must be set up if reverse phase burst is required.

   Adjust RV202 to obtain the required tail setting (approximately 80ms) as follows:

   - Observe the "Tx Reg" line of the transmitter with an oscilloscope and trigger on the rising edge of the "Tx Key" (scope: 2V/div, 20ms/div, normal trigger).
   - Adjust RV202 fully clockwise and then adjust anticlockwise while keying the transmitter on/off until the required tail is obtained.
   - Alternatively, change R245 from 1k5 to 22k and adjust RV202 fully clockwise.