

2004E\_01

Figure 8 Pinouts for D-Range 2

## T800-32-0010 Paging Board

The T800-32-0010 PCB can be fitted to Tait T800 Series II transmitters to enable them to function as low-speed paging transmitters. This paging board is for transmitters that will be connected to an external frequency standard. It is a DFSK Modulator, suitable for POCSAG or similar paging data formats. Reference frequency stability is determined by the stability of the external standard. The PCB is not designed for use with 66 to 88MHz equipment.

Newer T800 transmitters have a Micromatch connector in the audio processor compartment. This simplifies installation.

This fitting instruction describes how to fit the PCB into existing T800 transmitters. You need to be proficient in the soldering of SMD components. It may be preferable to obtain a T800 transmitter already fitted with this board from your Tait dealer or national sales office.

### Parts Required

The T800-32-0010 kit should contain the following items:

- 1 x T800-32-0010 DFSK modulator board
- 1 x terminated coaxial cable
- 1 x T800-03-1000 auxiliary D-range kit
- 4 x M3 x 8 Taptite Pan Torx screws
- 1 x coaxial socket
- 1 x 47 ohm resistor SMD 0805
- 1 x terminated 8-way ribbon cable
- 1 x terminated 4-way ribbon cable

### Installation



**Caution:** The radio must be powered off for this modification. After modification, do not remove the coaxial lead from the socket unless the radio is powered off.

1. Remove the TCXO module from the synthesiser compartment of the T800 transmitter.
2. Fit the miniature coaxial socket (=SK710) and 47 Ohm SMD resistor (=R705) to the PCB pads provided beneath the TCXO, as shown in Figure 1.

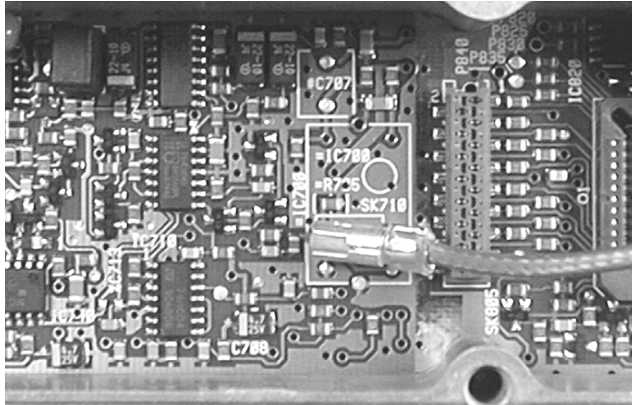


Figure 1 Location Of Socket And SMD Resistor

**Note:** Keep the angle of the coaxial socket steep to ensure that there is space for the Micromatch cable as well as for the coaxial cable.

3. Remove the two screws and cover plate from the second D-range mounting hole at the rear of the T800 chassis. (If the transmitter already has a second D-range, this must be removed so that the D-range with a second Micromatch socket can be fitted.)
4. Remove R291, R289, and R296 from the audio processor (shown in Figure 2).

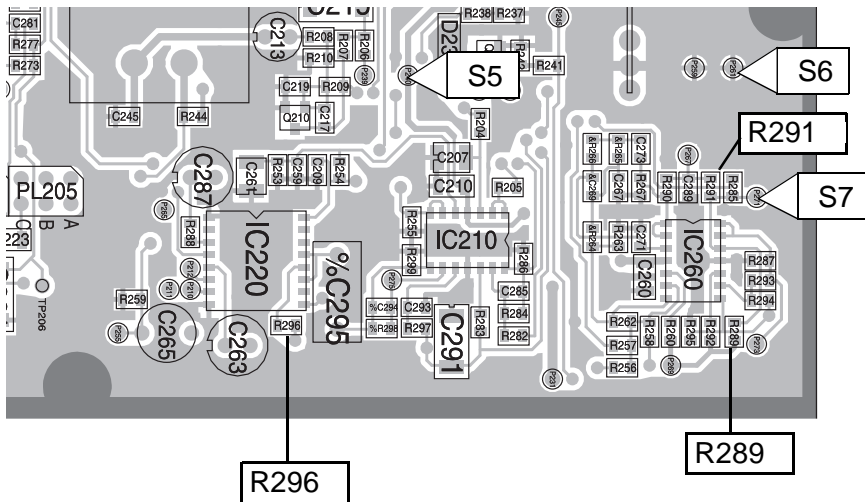


Figure 2 T800 Transmitter Audio Processor (older version without Micromatch connector) - Top Side

4. Using an AC-coupled oscilloscope set to 50 mV/div, observe the signal at TP2. Adjust RV2 until the triangle wave amplitude has been minimised.
5. Apply 600 Hz to the DATA line. Use a modulation analyser to observe the frequency deviation on the output of the transmitter. Adjust RV1 to get 4.5 kHz deviation on the modulation analyser.
6. Observe the transmitter's VCO control line using an AC-coupled oscilloscope set to at least 20 mV/div and 0.5ms/div. Vary the input frequency down to low frequencies (for example 100 Hz) and check that the control line still has a good square wave.

**Note:** You may have to re-adjust RV2 and RV1 alternately to achieve a square wave on the VCO control line and a 4.5 kHz deviation. Figure 7 shows a typical 100 Hz VCO control line waveform with RV1 and RV2 set correctly.

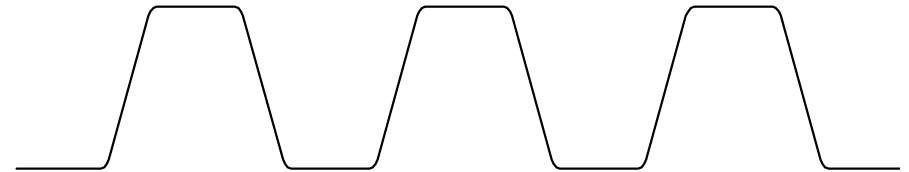


Figure 7 100 Hz VCO Control Line Waveform

**Note:** If the lower cut off frequency of an AC coupled oscilloscope is too high, excessive distortion may be introduced which will result in 'sag' on the square wave displayed. Determine if this is a problem by directly monitoring the original square wave source and observe any sag.

If there is sag, switch the oscilloscope to DC and use a 10 $\mu$ F capacitor in series with the scope probe (observing the correct polarity) to directly monitor the VCO control line. Note that the trace settling time will be approximately one minute.

Figure 6 shows the location of these resistors on the PCB.

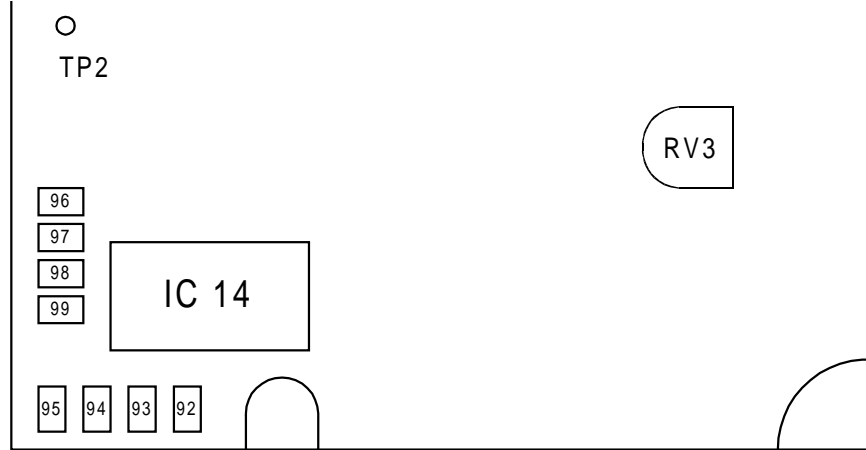


Figure 6 Location of Zero Ohm Resistors

For a different frequency, calculate the resistor pattern as follows:

1. Divide the external oscillator frequency by 100 kHz.
2. Convert the result into binary.
3. Where there is a 0 in the binary number, place a zero ohm resistor in the equivalent position. Where there is a 1, leave an open link.

MSB							LSB
N7	N6	N5	N4	N3	N2	N1	N0
R92	R93	R94	R95	R96	R97	R98	R99

### Modulation Adjustment

Before the paging transmitter can be used, its modulation must be set up correctly.

1. Apply +5 V DC to the  $\overline{\text{DATA}}$  input (see Figure 8 for D-range 2 pin assignments) and observe the transmitter output using a frequency counter. The output should read the carrier frequency.
2. Remove the +5 V DC from the  $\overline{\text{DATA}}$  input and apply a ground (0 V) to the DATA input. Observe the transmitter output with a frequency counter. Adjust RV3 to get an output of  $F_{\text{carrier}} + 4.5 \text{ kHz}$ .
3. Remove the 0 V from the DATA line and apply a 100 Hz 5 Vp-p square wave.

5. Remove R718 and R719 from the synthesiser compartment (shown in Figure 3).

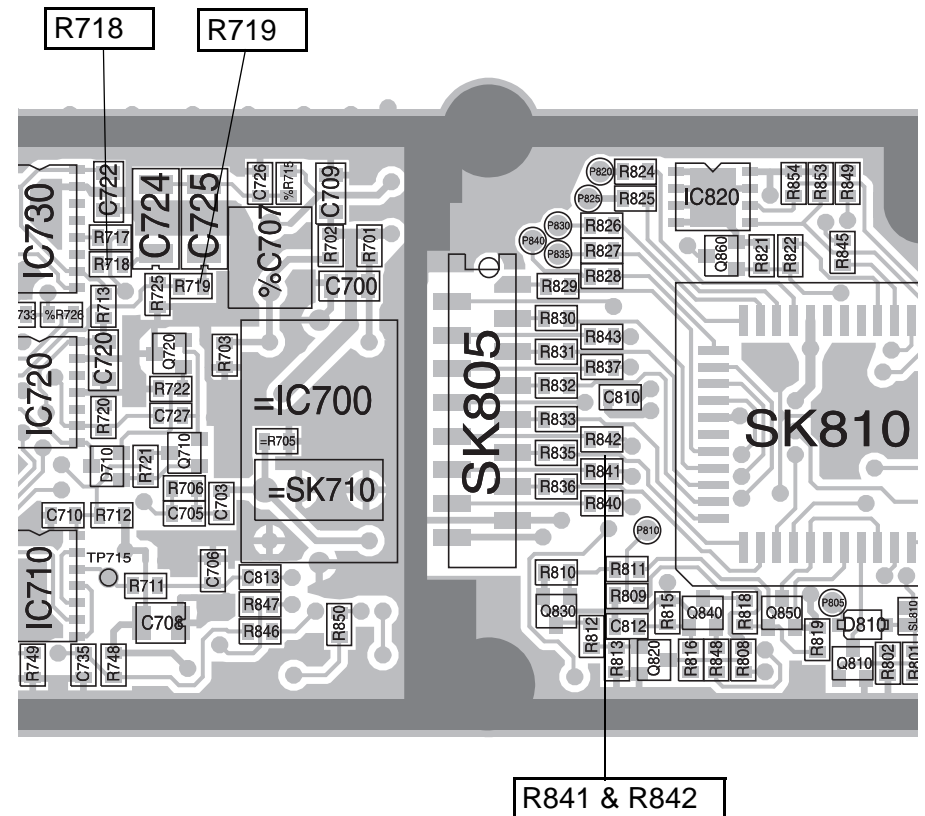


Figure 3 T800 Transmitter Microncontroller and Synthesiser Compartments

6. Remove R841 and R842 (SMD) from the microcontroller compartment (shown in Figure 3) to disconnect the appropriate lines from the microcontroller.
7. Lay the T800-32-0010 PCB above the exciter compartment with the component side up and positioned so that the Micromatch sockets are on the side closer to the front panel of the radio.
8. Connect the 8-way ribbon cable to the SK200 Micromatch socket in the audio compartment and connect the other end to the Micromatch socket SK3 on the PCB.

If there is no Micromatch socket in the audio compartment (older Series II transmitters), connect wires from the PCB to the audio compartment as follows.

Wire	Length (mm)	Connection
red	140	S5 I/O Pad, P240 (+9V) just below D230
grey	140	S7 I/O Pad, P271 (BUFF_IN)
black	140	S6 I/O Pad, P261 (GND)

For more information, refer to Figure 2 and the Test Points and Options Connections drawing in the relevant service manual)

- Connect the 4-way ribbon cable to the Micromatch socket SK4 and feed it through the loom channel cast into the chassis, to the auxiliary D-range compartment, as shown in Figure 4.
- Connect the coaxial cable provided between SK1 on the T800-32-0010 PCB and =SK710 on the T800 transmitter PCB, as shown in Figure 4.

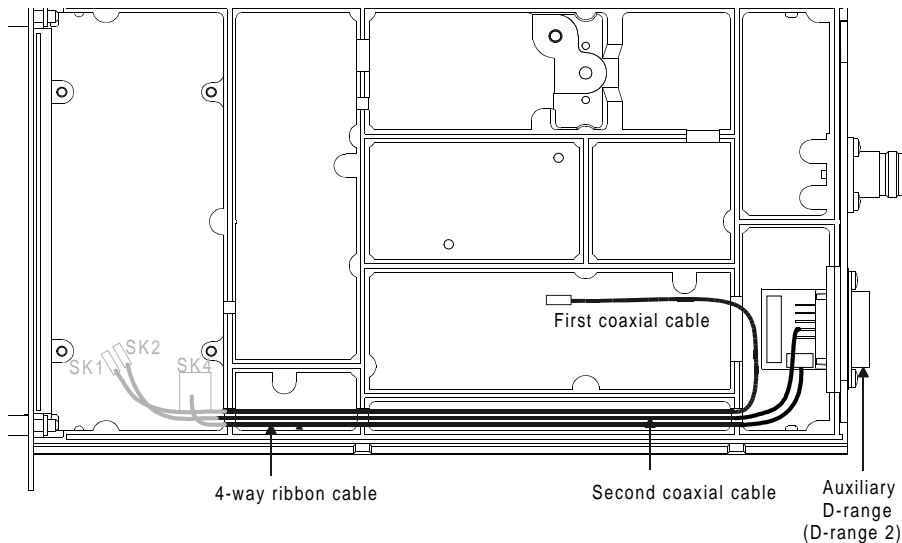


Figure 4 Cable Routing

- Screw D-range 2 in place.
- Thread the second coaxial cable from D-range 2 through the loom channel to the paging board and connect it to SK2.
- If the transmitter will be operating in VHF (frequencies <360 MHz), solder short LINK2 and LINK 3 (see Figure 5).

(The T800-32-0010 PCB links are set for UHF operation.)

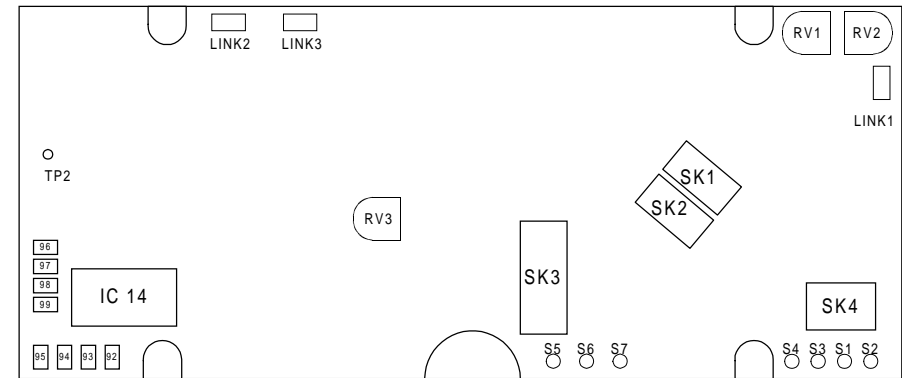


Figure 5 T800-32-0010 Link Location - Top Side

- Turn the T800-32-0010 PCB over, so that the ribbon cables and components face down, and position it above the audio processor compartment.
- Connect the other end of the 4-way ribbon cable to the Micromatch socket on the auxiliary D-range.
- Screw the PCB in place using the 4 M3 x 8 screws provided.

#### Configuring for the External Oscillator Frequency

The PCB is configured for a 10 MHz external reference, using a pattern of zero ohm resistors. For a 5 MHz or 12.8 MHz external oscillator frequency, you need the following pattern:

Reference Frequency	Resistors
5 MHz	R92, R93, R96, R97, R99
12.8 MHz	R93, R94, R95, R96, R97, R98, R99