

TED250 CTCSS UNIT

TONE ENCODER/DECODER
MODEL TED-250
SETUP AND INSTALATION

Revision B

September 2007

Description

TED250 encoder/decoder from Hamtronix is a programmable device for encoding and decoding CTCSS tones. Thanks to SMT technology used in some components, TED250 is small enough to be mounted inside any mobile radio and even in some portables.

TED250 is able to encode and decode all 39 standards tones used by the major radio equipment manufacturers. This unit is able to encode and decode 8 extras non-standard tones, not available in most radios for best security in commercial repeaters, since most amateur radio equipment don't carry these extra tones.

LIMITED WARRANTY

Please observe the following precaution to prevent circuit damage:

- Verify the correct polarity of the power source. Incorrect polarity may destroy the board.
- Do not modify the circuits unless instructed by this manual or by Hamtronix documentation.
- Do not place the board in excessively dusty areas, humid areas, wet areas, nor on unstable surfaces that may cause short-circuits.

If abnormal odor or smoke is detected coming from the board, turn off the power immediately. Contact Hamtronix for support and service.

This unit works in two modes as following:

Decoder Mode

In this mode TED250 can decode any CTCSS tone for radio or repeaters receivers.

Encoder Mode

TED250 can encode any CTCSS tone for radio or repeaters transmitter.

Note: TED250 is not able to encode and decode simultaneously. If you need to use the same unit for this two purposes, please, use the PTT signal with an external circuit to switch modes during transmission.

MODE SETUP

Encoder Mode

To operate the unit as encoder, short the solder pads marked as **ENC** in the solder side of the board. The unit comes set as encoder from factory. Adjust the trimpot for desired tone level output at pin 3. In this mode, feed the tone output to modulator input of transmitter. Do not connect to microphone input. The transmitter pre-emphasis circuit filter will prevent CTCSS tone transmissions.

Decoder Mode

To operate the unit as decoder, clear the solder pads marked as **ENC** in the solder side of the board. In this mode, discriminator (DET) signal from receiver should be connected at audio input pin 1. Do not use speaker output audio, since de-emphasis circuit will prevent CTCSS tones to reach the unit. When the correct tone is decoded pin 5 will go low, otherwise, it will stay high (5V).

CTCSS Tone Frequency Selection

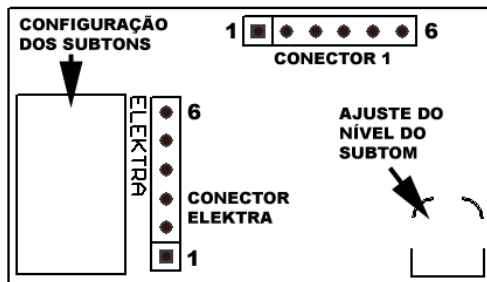
Use the table 1 to select the desired CTCSS tone frequency.

Note: If you don't want the CTCSS tone present in the repeater transmissions, feed the transmitter audio input with filtered discriminator audio available at pin 2.

FIXING THE UNIT

The best way to fix the TED250 is using a thick two sided tape. Fix the unit inside the radio or in the repeater cabinet.

| Pin | Connector 1 | |
|-----|-----------------|-----------------------------|
| 1 | Audio Input | From RX discriminator |
| 2 | Filtered output | To repeater modulator |
| 3 | CTCSS output | To TX modulator |
| 4 | GND | Ground |
| 5 | Decoder Out | Goes low with correct CTCSS |
| 6 | 7V ~ 15V DC | VCC |



Technical Specifications

| | |
|--------------------------|-----------------------------|
| Voltage operation range: | 7V ~ 15V |
| Current in use: | 5mA |
| Frequency range: | 67.0 Hz ~ 254.1 Hz |
| Temperature operation: | -30 ~ +60 |
| Frequency stability: | Better than +/-0.2% |
| Output level: | Adjustable from 0 ~ 0,7 Vpp |
| Distortion: | Less than 1% THD |
| Dimensions: | 43mm x 23mm x 10mm |

TABLE 1 - CTCSS TONE SELECTION

| TONE | HEX | D6 | D5 | D4 | D3 | D2 | D1 |
|-------|-----|----|----|----|----|----|----|
| 67.0 | 3F | | | | | | |
| 69.3 | 39 | | | | ON | ON | |
| 71.9 | 1F | ON | | | | | |
| 74.4 | 3E | | | | | | ON |
| 77.0 | 0F | ON | ON | | | | |
| 79.7 | 3D | | | | | ON | |
| 82.5 | 1E | ON | | | | | ON |
| 85.4 | 3C | | | | | ON | ON |
| 88.5 | 0E | ON | ON | | | | ON |
| 91.5 | 3B | | | | ON | | |
| 94.8 | 1D | ON | | | | ON | |
| 97.4 | 3A | | | | ON | | ON |
| 100.0 | 0D | ON | ON | | | ON | |
| 103.5 | 1C | ON | | | | ON | ON |
| 107.2 | 0C | ON | ON | | | ON | ON |
| 110.9 | 1B | ON | | | ON | | |
| 114.8 | 0B | ON | ON | | ON | | |
| 118.8 | 1A | ON | | | ON | | ON |
| 123.0 | 0A | ON | ON | | ON | | ON |
| 127.3 | 19 | ON | | | ON | ON | |
| 131.8 | 09 | ON | ON | | ON | ON | |
| 136.5 | 18 | ON | | | ON | ON | ON |
| 141.3 | 08 | ON | ON | | ON | ON | ON |
| 146.2 | 17 | ON | | ON | | | |
| 151.4 | 07 | ON | ON | ON | | | |
| 156.7 | 16 | ON | | ON | | | ON |
| 159.8 | 31 | | | ON | ON | ON | |
| 162.2 | 06 | ON | ON | ON | | | ON |
| 167.9 | 15 | ON | | ON | | ON | |
| 173.8 | 05 | ON | ON | ON | | ON | |
| 179.9 | 14 | ON | | ON | | ON | ON |
| 183.5 | 32 | | | ON | ON | | ON |
| 186.2 | 04 | ON | ON | ON | | ON | ON |
| 189.9 | 33 | | | ON | ON | | |
| 192.8 | 13 | ON | | ON | ON | | |
| 196.6 | 34 | | | ON | | ON | ON |
| 199.5 | 35 | | | ON | | ON | |
| 203.5 | 03 | ON | ON | ON | ON | | |
| 206.5 | 36 | | | ON | | | ON |
| 210.7 | 12 | ON | | ON | ON | | ON |
| 218.1 | 02 | ON | ON | ON | ON | | ON |
| 225.7 | 11 | ON | | ON | ON | ON | |
| 229.1 | 37 | | | ON | | | |
| 233.6 | 01 | ON | ON | ON | ON | ON | |
| 241.8 | 10 | ON | | ON | ON | ON | ON |
| 250.3 | 00 | ON | ON | ON | ON | ON | ON |
| 254.1 | 38 | | | | ON | ON | ON |
| 0 | 30 | | ON | | | | |

Grey frequencies are non-standards TIA/EIA tones