

## TED-01 USER PROGRAMMABLE CTCSS/DCS/ AUDIBLE DECODER / ENCODER INSTRUCTION MANUAL

### OVERVIEW

The TED-01 is a miniature microprocessor controlled multipurpose signaling decoder and encoder. Multiple subaudible and audible tones as well as sequences can be decoder and encoded. CTCSS, DCS as well as two tone and multitone formats can be decoded and encoded. Firmware and user defined configurations are field programmable using a terminal emulator and logic level converter. Firmware programs and configuration files are standard text files that can be downloaded off the web.

### SPECIFICATIONS

Frequency Range (Subaudible)	60.0 to 254.1Hz
(Audible)	208 to 3000 Hz encode / 624.4 to 3000Hz decode
Frequency Stability	±0.1% nominal
Input Sensitivity	15mVrms to 1Vrms
Input Impedance	>480kΩ
CTCSS Detection Time (Composite Signal)	220ms maximum
CTCSS Dropout Time (Composite Signal)	220ms maximum
Audible Tone Detection Time	20ms maximum
Audible Tone Dropout Time	25ms maximum
High Pass Filter	Eliminates CTCSS tones in the received and transmit audio
Output Controls	3 open source FETs (100 mA sink max ), up to 8 logic outputs depending on firmware.
Input Controls	3 buffered FET inputs, up to 8 logic inputs depending on firmware.
Level Controls	Potentiometers for Audible and Subaudible outputs as well as software level control.
Operating Voltage	+5.5 to +28 volts
Operating Current	12 mA nominal
Operating Temperature	-20 to +70 °C
Size	16.6 x 32.0 x 7.0mm (0.65" x 1.28" x 0.28")
Interfacing	2 - 11 pin miniature headers (2 mating connectors with 30cm (12") color coded flying leads provided)
Mounting	Double Sided Tape (Supplied)

# INTERFACING

Interfacing to the TED-01 is performed with a color coded flying lead wire harness. To mount the TED-01, remove the protective covering from the supplied double sided tape and apply to bottom side of printed circuit board (side with out potentiometers). Next remove the remaining protective covering from the double sided tape and attach to the desired location. Mounting surface must be dry and free of dirt, dust and grease. To reduce the potential for interference to the board, it is suggested the board is mounted away from areas of high R.F. levels. Also, it is recommended to keep the interface leads as short as possible to reduce R.F. pickup.

Wire harness (P1) potentiometer or crystal side.

Color	PIN #	Normal Function	Description
RED	1	Positive Power Supply	Connect to a positive +5.5 to +28V supply.
BLACK	5	Negative Power Supply	Connect to supply ground.
GRAY	3	PTT In	Buffered input normally used for PTT sense.
BROWN	4	Monitor	Buffered input normally used to monitor active channel for activity.
ORANGE/ WHITE	2	Decode Output	FET output, normally used to open squelch circuits after a valid decode.
WHITE	10	PTT Out	FET output, normally used to key a transmitter.
GREEN	11	Discriminator Input, in simplex mode	Connect to receiver discriminator or to the high side of the volume control not controlled by the squelch circuit.
PURPLE	9	Transmit Audio Input or Discriminator Input	Connect in series with transmit audio path in Simplex mode. Connect to discriminator in when used in duplex mode.
BLUE	7	Receive Audio Output	This input is filtered of CTCSS tones and optionally muted depending on firmware.
ORANGE	8	Transmit Audio Output	Contains transmit audio with audible tones. Adjust level with R4.
YELLOW	6	Sub Audio Output	Contains sub audible tones. Connect to subaudible injection point of exciter, after microphone filter. Adjust level with R5.

Table 1

Wire harness (P2) U5 (microcontroller) side

Color	PIN #	Normal Function	Description
BLACK	5	Negative Power Supply	Connect to supply ground.
ORANGE/ WHITE	2	Auxiliary Output	FET output, general output that can be used to activate alarm, etc.
GREEN	11	Auxiliary Input	Buffered input, use depends on firmware and user configuration.
ORANGE	8	Channel 1 Input/ Output	Logic level input, used to select operating channel or mode.
BLUE	7	Channel 2 Input/ Output	Logic level input, used to select operating channel or mode
YELLOW	6	Channel 4 Input/ Output	Logic level input, used to select operating channel or mode
BROWN	4	Channel 8 Input/ Output	Logic level input, used to select operating channel or mode
GRAY	3	Channel 16 Input/ Output	Logic level input, used to select operating channel or mode
RED	1	Channel 32 Input/ Output	Logic level input, used to select operating channel or mode
PURPLE	9	Serial Data Out	Serial data output, (logic level). Used to program device.
WHITE	10	Serial Data In	Serial data input, (logic level). Used to program device.

Table 2

# SCHEMATIC

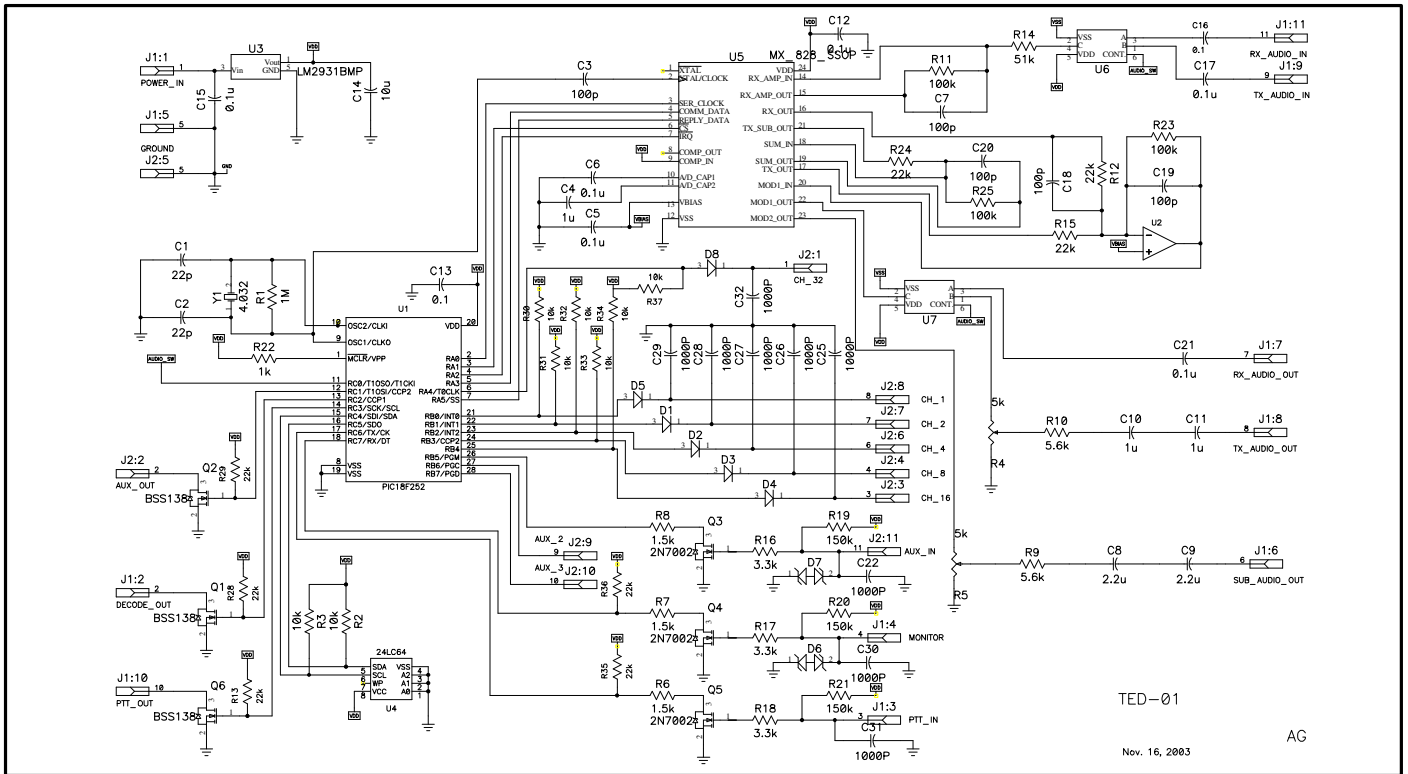


Figure 1

## PCB-TOP SIDE (crystal side)

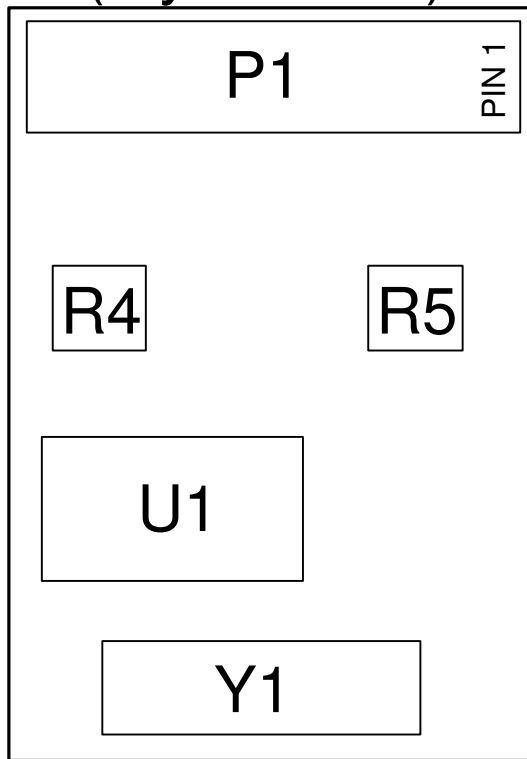


Figure 2

## PCB-BOTTOM SIDE

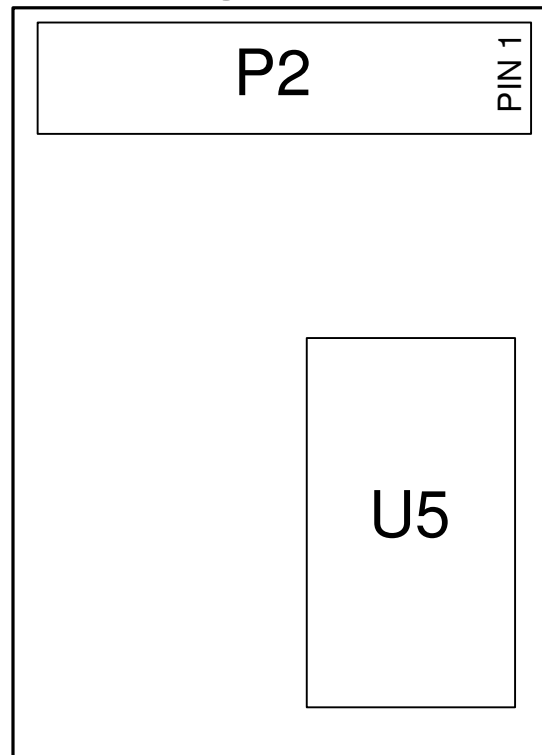


Figure 3

# **PROGRAMMING**

If not factory programmed, the user must load the desired firmware and also the user configuration file. An RS-232 to logic level converter is required as well as a computer with an available RS232 port and a terminal emulator program that allows text file transfers.

## TERMINAL EMULATOR CONFIGURATION:

Data Rate: 19200 bps

Data Bits: 8

Parity: None

Stop Bits: 1

Flow Control: XON/XOFF

Line Delay: 20ms

## INSTRUCTIONS FOR PROGRAMMING:

1. Connect TED-01 to computer with RS232 to logic level converter.
2. Serial Data In (P2-10) connects to RS232 computer data send.
3. Serial Data Out (P2-9) connects to RS232 computer data receive.
4. Configure Terminal Emulator as described above.
5. Apply power to TED-01 while holding the = key on the terminal emulator. If using the PRG-01, switch power from OFF to DUPLEX quickly while holding the = key on the terminal emulator.
6. Screen will display: WAIT then after a couple of seconds, LOAD.
7. Select Transfer, Send Text File in terminal emulator program. Exact commands may be different depending on terminal emulator.
8. Select firmware or configuration file to transfer.
9. Data address will increment on screen.
10. A successful load will display number of bytes remaining.
11. If an error message is encountered confirm terminal emulator configuration and try procedure again.
12. If a second program file or configuration file is to be loaded, power must be turned off and on again while holding the = key on the terminal emulator. See step 5 above.

## NOTE:

Although we do not have the resources to support customer developed firmware, additional information is available on loading customer developed firmware if required or desired. Please email for further information.