



TT-7

12 or 16 Digit DTMF Dialing Encoder

Manual Revision: 2010-04-16

Covers Hardware Revision:
TT-7: C & Higher

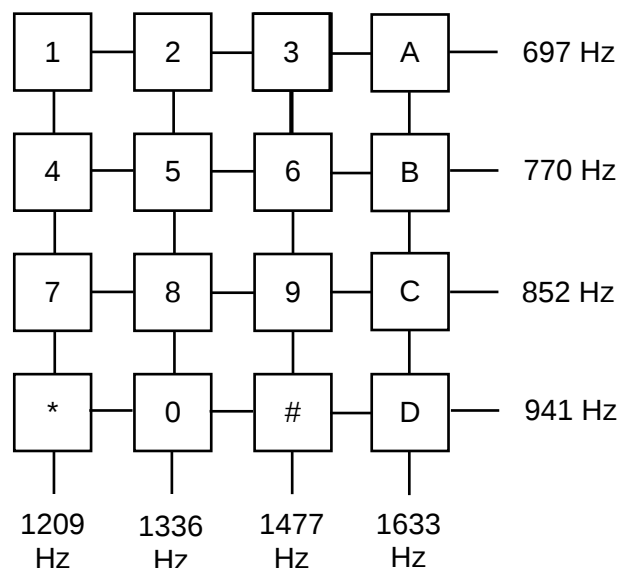
SPECIFICATIONS

Operating Voltage	6.5-24 VDC
Operating Current	3 mA
PTT Output Current	250 mA
Audio Output Level	0-750 mV(rms)
Audio Output Impedance	1 K or 50 K
Twist	0-3 dB
Max Tone Distortion	2%
Interkey Time (Auto PTT)	2 seconds
Adjustment Pots	1 Turn
Operating Temperature	-30° to +60°C
Dimensions	0.7" L x 1.05" W x 0.4" H

GENERAL INFORMATION

The TT-7 is a 12-digit or 16-digit DTMF dial encoder. The TT-7 can be interfaced with a row/column/ground style keypad such as Midian's Keypad Option D (12-button) or Midian's Keypad Option F (16-button). The TT-7 will automatically assert the PTT output when a button is pressed and hold the PTT output for 2 seconds for subsequent digits to follow. The DTMF tones are generated out the HI Z or LO Z outputs for as long as the key is pressed.

The following diagram shows the DTMF tone pairs generated when a particular digit is pressed. For example when the 1 digit is pressed the TT-7 will generate 697 Hz and 1209 Hz simultaneously.



HARDWARE INSTALLATION

Be certain to follow standard anti-static procedures when handling any of Midian's products.

Connector P1

P2-1 – Green – HI Z – Connect to a high impedance audio point in the transmitter modulator.

P2-2 – Red – VIN +6-24 VDC – Connect to switched battery point in the radio.

P2-3 – Brown – LO Z – Connect to a low impedance audio point in the transmitter modulator.

P2-4 – Black – Ground – Connect to the nearest ground plane in the radio.

P2-5 – Blue – Speaker Output– Connect to the high side of the radio's speaker. The speaker completes the ground for the emitter follower Q1. The sidetone level can be increased by reducing R2 and R3. Use caution, if the current gets too high it can burn up resistors R2 or R3 or Q1. CAUTION: When attaching this lead to a 4 or 8 Ohm speaker, add a 100 Ohm resistor in series with this blue lead to limit current. When using 20-40 Ohm speakers, the onboard resistor in series with Q1 should be sufficient.

P2-6 – White – PTT Output – Connect to the PTT switch of the radio. The PTT Output gives an open-collector to ground when activated and is rated at 100 mA continuous.

The remaining 7 wires are not connected.

HARDWARE ALIGNMENT

DTMF Output Level: The DTMF output level can be adjusted for 0-750 mV RMS by adjusting RP1. In a wide band system, set R7 to 3.3 KHz (66% of 5 KHz) of deviation per EIA specifications. In a narrow band system, set the R7 to 1.65 KHz (66% of 2.5 KHz) of deviation per EIA specifications.

OPERATION

DTMF Dialing: Press the desired sequence on the optional 12-digit or 16-digit keypad. When the first digit is pressed the TT-7 will assert the PTT Output and generate the tones out the HI Z or LO Z output. The PTT Output will be held for approximately 2 seconds. The TT-7 will generate the DTMF tones for as long as a button is pressed.

THEORY OF OPERATION

The optional keypad provides a short between a column and a row on IC U1. This programs the internal Divide by N Counter, so that the proper high and low tone groups are generated. The TT-7 is set up to be used with a 12-button keypad. By installing a jumper from Pin 8 of the keyboard connector to Pin 9 of IC U1, the fourth column ABCD tones can be generated if using a 16 button keyboard. If using Midian's Keypad Option D (12-button) and backlighting is desired install a jumper from Pin 8 to ground and connect the red wire on keypad to power.

The synthesized high and low group tones are output on Pin 16 of U1 and are fed through low pass filter R5 C9 to amplifier Q2 and modulation level pot R7. Audio is also fed from Pin 16 to the base of the side tone transistor Q1. Q1 is an emitter follower, whose ground is completed through the radio speaker via the Blue lead. Resistors R2 and R3 can be lowered to increase the level in the speaker. Use caution if the current gets too high, it can burn up the resistor R2, R3 or Q1.

The high tones are pre-emphasized 3dB over the low tones. This is an internal feature of U1. Pre-emphasis helps to compensate for high frequency roll off, which occurs on the phone lines and in some audio circuits. Any high frequency components generated by the digital to analog conversion process in U1 are filtered out by the low pass filter R5 and C9. The value of C9 can also be changed to roll off the twist that is built into U1.

Transmit audio is output on the Green lead and is normally connected to the high impedance port. The low impedance output may be used in applications where direct connection to a low impedance circuit is necessary.

Depressing any key on a keypad causes pin 10 of U1 to go high, which in turn forward biases Q3. The automatic Push-To-Talk circuit consists of D1, C13, C14, R10, and Q3. The time constant of C13, C14 and R10 produces a PTT output for approximately 2 seconds.

The TT-7 input voltage is regulated at +5 volts by VR1. VR1 will work from a low of 6.5 volts to 24 Volts.

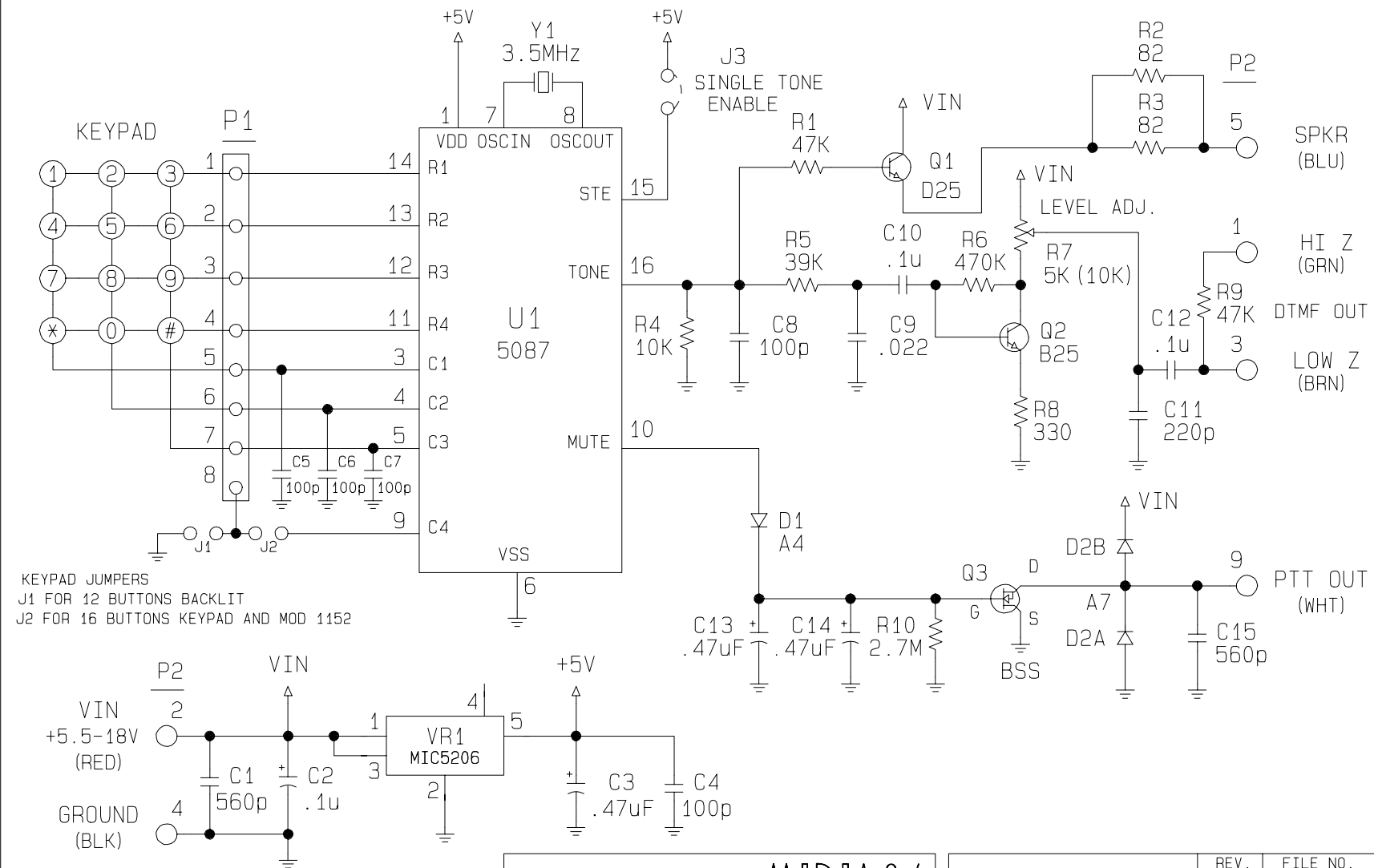
TECHNICAL NOTES

Radio Compatibility: Midian has taken the utmost care to ensure the option board integrates into the radio with minimal impact to the features of the radio. However, some features may not be available in the radio when an option board is used. If a feature is not available, please contact Midian to see if the feature can be added.

MIDIAN CONTACT INFORMATION

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