



Model

BTD-1

BURST TONE DECODER

INSTRUCTION MANUAL

Features

- *Wide dynamic range*
- *No input levels to adjust*
- *Latched output to drive call light*
- *Microphone hang-up reset for latched output*
- *Tunes from 1200-2600 Hz (Option A) or 700-3000 Hz (Option B)*

SPECIFICATIONS

Operating Voltage	6-24 VDC
Operating Current	3 mA

INPUTS

Input Level	10 mV-2.0V(rms)
Input Impedance	100k
Frequency Range	700-3000 Hz
Band Width	.5%

OUTPUTS

Ringing Output	2400 Hz
Momentary-Horn	200 mA
Latched-Call Light	200 mA
Transpond Output	200 mA

TIMING

Detect/Release Time	20 ms-1.5 sec
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MECHANICAL

Standard Dimension Large Pot	1" x 1.85" x 0.3"
Standard Dimension Small Pot	1" x 1.85" x 0.25"
Dimension with Small Pot & Flying Leads	1" x 1.85" x 0.15"
Adjustment Pots	15 Turn & 1 Turn
Operating Temperature	-30 to +60°C

WARRANTY

Midian Electronics, Inc., warrants this product to be free from defects in material and workmanship for two years from date of shipment. If such malfunction occurs, it will be repaired or replaced (at our option) without charge for materials or labor if returned to the factory. This warranty does not apply to any parts damaged due to improper use--including accident, neglect, unreasonable use, and improper installation--or to unauthorized alterations or modifications of the equipment. It does not extend to damage incurred by natural causes such as lightning, fire, floods, or other such catastrophes, nor to damage caused by environmental extremes, such as power surges and/or transients. It does not extend to microprocessors, if it is determined that the failure of a micro is due to static damage, application of improper voltages to the unit, or other problems not related to circuit design. In such case or in the case of a desire to update the micro to a different version of software, such request must be specified in writing, and there will be a charge agreed upon by both parties.

This product is warranted to meet published specifications and to operate as specified only when properly installed in radio equipment which complies with U.S. FCC specifications and the applicable radio manufacturer's specifications. Midian Electronics is not responsible for any operational problems caused by system design, outside interference, or improper installation.

Equipment for repair can be returned to the factory without prior written authorization. A brief letter describing the nature of the defect should be included with the merchandise. Repair by other than Midian Electronics, Inc., will void this warranty. In-warranty merchandise must be shipped, freight prepaid, to Midian Electronics. Midian Electronics will return, freight prepaid via UPS ground, the repaired or replaced equipment to purchaser, within the United States. Out-of-warranty repairs will be billed at the rate of \$60 per hour, plus replacement parts.

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INSTALLATION INSTRUCTIONS

Installation Note

Midian products utilize CMOS integrated circuits, which are susceptible to damage from high static charges. Be sure to follow standard antistatic procedures when handling, including using grounded workstations and soldering irons and wearing grounding bracelets. Please be careful when selecting wire colors. It is sometimes difficult to distinguish between the grey, black, and brown wire colors under fluorescent lighting. We suggest using Color-Bright/Color-Corrected or incandescent lighting. If in doubt, compare wire positions on board layout for correct color code.

Wire	Function	Instructions
Pin 4* Black	Ground	Connect to nearest ground point.
Pin 2 * Red *	5.5 - 15 VDC	Connect to switched B+ in radio.
Pin 6 * Orange	Audio Input	Connect to an unsquelched audio point in the receiver. Usually the discriminator or volume control high.
Pin 12* Orange/White *	Monitor 1 Input	Connect to a point in the radio that goes high when PTT is pressed. The squelch outputs will not be reset when the PTT is released.
Pin 11 * Grey *	Monitor 2 Input	Remove JU2. Connect grey/white lead to a point in the radio that is normally low and goes high or to a float when PTT is pressed. A return to a low when PTT is released will reset the squelch outputs.
Pin 7 * Yellow *	Positive Or Negative Squelch Input	With JU5 installed, connect to a point in the receiver squelch circuit that is high when a carrier is present and low when the carrier is missing. With JU6 installed, connect to a point in the receiver that is low when a carrier is present and high when the carrier is missing. Repeater knock down will occur when the carrier is removed.
Pin 10 * Grey/White *	Horn Output	Provides a low (200mA) output for approximately 4 seconds after decode.
Pin 1 * Green *	Transpond Output	Provides a low output (200mA) approximately 2 seconds after the horn output.
Pin 5 *Blue*	Alert Tone (Lo Z) Output	Provides a tone output (2400Hz) for approximately 2 seconds upon decoding.
Pin 13 * Violet *	Alert Tone (Hi Z) Output	Provides a tone output (2400Hz) for approximately 2 seconds upon decoding.
Pin 9 * White *	Call Light Output	Provides a latched low output (200mA).
Pin 8 * Green/White *	Squelch Output	Connect to the radio squelch circuit to mute the radio until decode occurs. Provides high output until decode, then a float is present with JU3 installed. With JU4 installed a low output is provided via D9 from U2C Pin 14.
Pin 3 * Brown *	Repeater Out	Provides a low output when decode occurs. Goes to float when radio carrier is removed. See Pin 7 (Yellow lead) positive and negative squelch inputs, shown above.

Note: The input audio level is adjusted by changing the value of R4. See gain chart on schematic.

CIRCUIT DESCRIPTION

The single tone is input on the orange lead and passes through C1 to the input of U1A, which amplifies the input tone. R4 may be adjusted to change the sensitivity of the unit. The tone then passes through R5 to the active filter circuit of U1B, U1C, and U1D. The output on Pin 7 of U1C is passed through R22 to detector U2A. The output of U2A passes through D4 and R30 to the input of comparator U2B. The comparator's window is set by adjusting R25 (bandwidth) to produce the proper trigger voltage on U2B, Pin 6.

R34, when adjusted, provides a variable delay from the moment of decode to the time the various outputs are activated. The output of U2B, Pin 7 goes high when the proper burst tone is detected, and D3A is then back biased. C13 then charges, triggering U3A. The output of U3A goes low, producing a pulse through C14, turning off U3B for four seconds, and producing a high on its output.

The high output on U3B turns on Q1 for four seconds, causing a low output on the grey/white Pin 10 horn output wire. When U3A triggers, a 2400 Hz alert tone is produced on the blue lead, Pin 5, and violet lead, Pin 13, and after 2 seconds, a low transpond output is produced on the green lead, Pin 1, for approximately 2 seconds.

The high output of U3B is also passed to the input of latch U2C. U2C turns on, producing a high output that turns on Q3, which creates a low call light output on the white lead, Pin 9, and back biases D8, producing a float output on the normally high green/white lead, Pin 8, positive squelch output via JU3.

A high input on the orange/white monitor 1 input lead, Pin 12, latches U2C. The monitor 2 input on the grey lead, Pin 11, is normally grounded, through JU2. If JU2 (ground) is removed, a transition from a low to a high or float on the monitor 2 input lead produces monitoring. When the input returns to low, the white call light lead, Pin 9, the brown repeater out lead, Pin 3, and the green/white radio squelch lead, Pin 8, are reset.

The negative and positive squelch inputs are used if the BTD-1 is to be used in a radio repeater. The transition from a low on the yellow lead, Pin 7, via JU6 for the negative squelch input or a high on the yellow lead via JU5 for the positive squelch polarity, or a float, will turn off Q4, and the brown repeater output lead, Pin 3, will float. The white call light lead, Pin 9, and the green/white squelch output lead, Pin 8, will also reset.

TUNING INSTRUCTIONS

The frequency of the BTD-1 is set using either one of two methods:

Method 1

Install JU1 and, while monitoring Pin 7 of U1C with a frequency counter, adjust R15 to the desired frequency. Remove JU1.

Method 2

Inject an audio signal, at the proper amplitude, on the desired burst tone frequency into the orange lead. While observing Pin 7 of U1C with a scope, adjust R15 for a peak in amplitude.

The Bandwidth is set by injecting the signal into the orange lead, as above, except set the frequency .25% away from the desired burst tone frequency. While monitoring Pin 7 of U2B, adjust R25 until Pin 7 goes high.

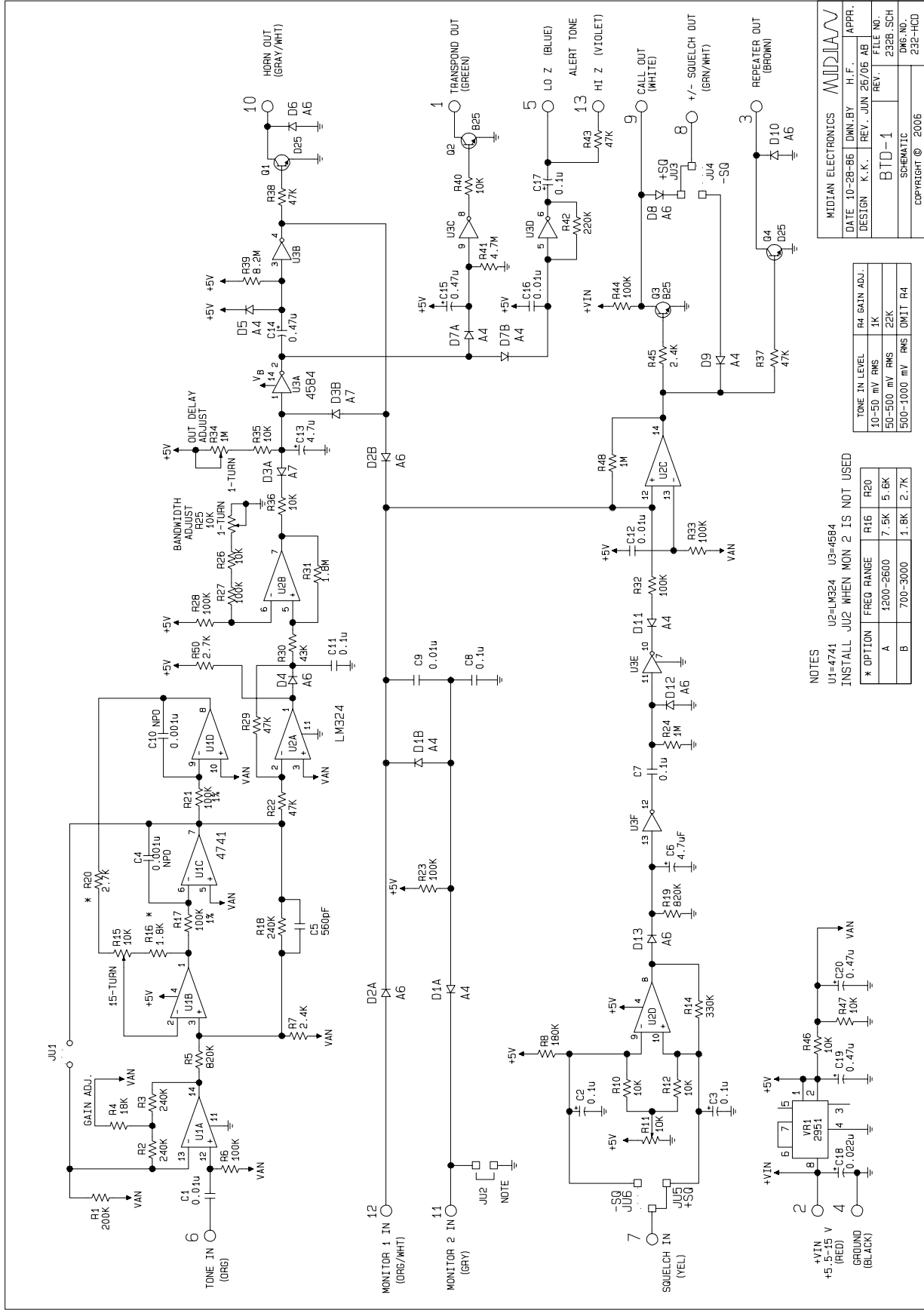
R34 adjusts the tone decode time before actuation of any of the BTD-1 outputs. (This delay is used to prevent falsing due to short duration audio signals entering the decoder.)

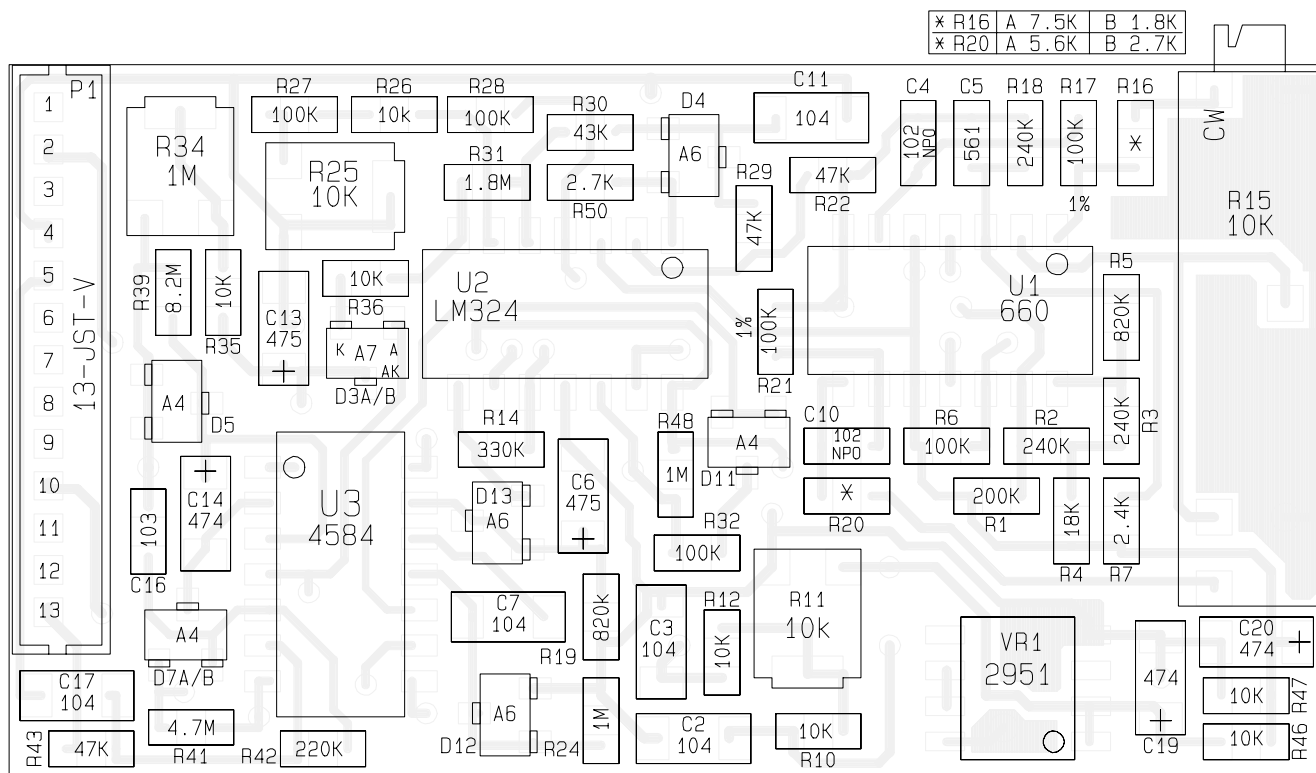
R11 adjusts the amount of negative or positive squelch input voltage that is required to disable the repeater output lead when the carrier is no longer present. Most newer radios use TTL 5 volt logic levels but a lot of older radios may only change a few tenths of a volt. Set R11 for your particular circumstance.

U3F with R19 and C6 acts as a hang timer after the loss of carrier signal on Pin 7 yellow squelch lead. When this timer times out it causes U3 to generate a reset pulse on U2C turning off the repeater output.

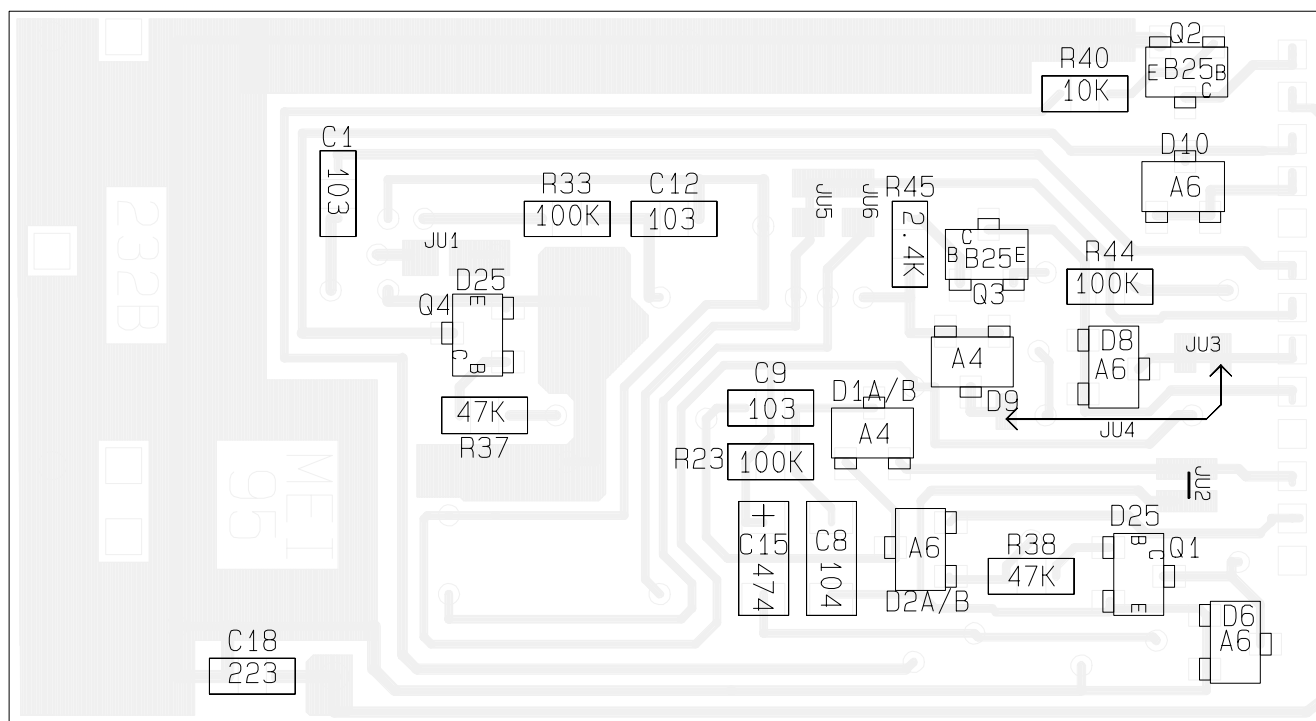
Continuous Tone Option

The BTD-1 has the trace IC2 pin 14 to R37 cut with a jumper from IC2 pin 7 to R37 installed. As long as the BTD-1 receives a continuous 2900 Hz tone the unit will turn on the Repeater Out transistor causing its output to go low (brown wire).





232B.PCB COMP SIDE **=NOT INSTALLED



SOLDER SIDE 232B.PCB

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