



## **BTD-2**

**Burst Tone Decoder**

### **BTD-2 MOD-1272 Addendum**

**Motorola MDC-1200 ANI Mute Option**

**Manual Revision: 2008-07-21**

**Covers Software Revisions:**  
**BTD-2: 1.0 & Higher**

**Covers Hardware Revisions:**  
**UED-1: 283B**

## SPECIFICATIONS

Operating Voltage	5.5-15 VDC
Operating Current	3 mA
Operating Temperature	-30 - +60 C
Input Level	25-500 mV RMS
Input Impedance	100 K Ohms
Frequency Range	300-3000 Hz
SINAD Ratio	< 9 dB
Burst Tone Band Width	± 1.5%
Momentary Output	200 mA
Dimensions	1.7" L x 0.84" W x 0.23" H

## GENERAL INFORMATION

The BTD-2 will decode a single burst tone and give a momentary and/or latched output. If the BTD-2 MOD-1272 is purchased then the unit will look for the 1800 Hz preamble of a Motorola MDC-1200 ANI packet in order to mute the speaker of the radio, so the packet is not heard.

## PRODUCT PROGRAMMING

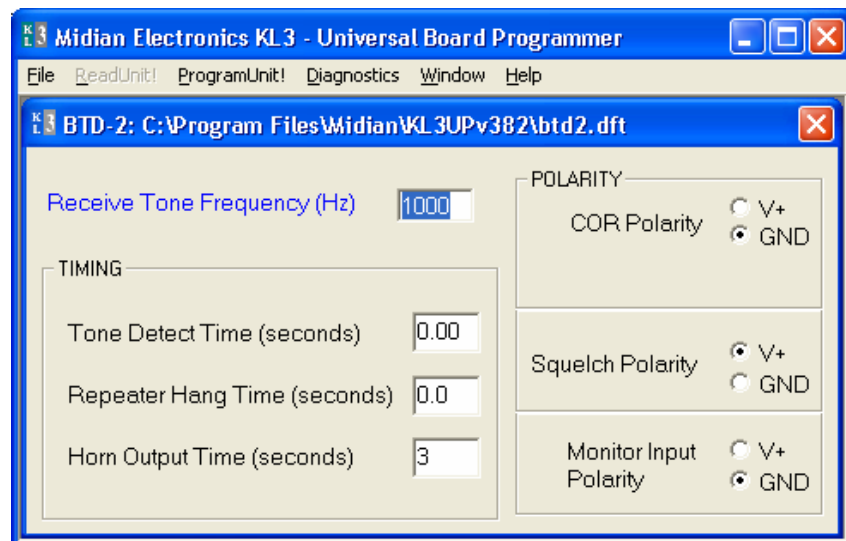
Midian's BTD-2 is programmed using the KL-3 programmer. Please reference the KL-3 manual for setup instructions of the KL-3 software and hardware. From the product selection screen on the KL-3 software, select the appropriate product name from the list and click OK.

Set the parameters of the product to fit the application. If any clarifications on a feature are required, move the mouse cursor over the feature name until the question mark appears and right click, a definition of the feature will be shown.

After entering the parameters, save the file by going to File - Save As. Enter the file name in the File Name block and click Save. Saving the file will allow for quick and easy reprogramming of units.

Connect the Orange/White wire to the Green KL-3 lead and the Black wire to a common ground with the KL-3's Black lead. The Yellow clip lead is not used with these products, as the BTD-2 is non-readable.

Ground the Program Enable (Gray Wire); turn on power, and within 5 seconds click "Program Unit" in the menu bar to send the file to the product.



## Programmable Features:

**Receive Tone Frequency (Hz):** In this register program the desired burst tone frequency in Hz from 300 to 3000.

**Tone Detect Time:** This time is programmable for 0.00 to 0.99 seconds. This is the length of time that the burst tone must be present prior to the BTD-2 decoding the tone. Midian recommends setting this to at least 0.30 to avoid falsing.

**Repeater Hang Time:** This time is programmable for 0.0 to 9.9 seconds. If set to 0.0 the Hang Time is disabled. This sets the amount of time that the BTD-2 must see a loss of COR prior to resetting the Monitor/Squelch Output and the PTT Hang Time Output. The purpose is to keep the repeater active, so that it does not go inactive during a conversation.

**Horn Output Time:** This time is programmable for 0-9 seconds. This sets the amount of time the Horn Output will go low.

**COR Polarity:** This sets the polarity the BTD-2 looks for to see COR as active, GND (Ground) or V+ (+5 V). The BTD-2 looks for an active COR to validate a tone, so as not to false. The unit also resets the latched outputs by seeing COR go inactive.

**Squelch Polarity:** This sets the polarity of the output of the Monitor/Squelch Output, GND (Ground) or V+ (+5 V).

**Monitor Input Polarity:** This sets the polarity the BTD-2 looks for to open the squelch of the radio to look for activity, GND (Ground) or V+ (+5 V). When this input goes active the BTD-2 activates the Monitor/Squelch Output.

## HARDWARE INSTALLATION

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

**P1-4 – Black** – Ground – Connect to the nearest ground point.

**P1-2 – Red** - +5.5 – 15 VDC – Connect to switched B+ in the radio.

**P1-3 – Brown** – COR/COS – Connect to point in the squelch or CTCSS circuit that changes logic level when carrier is received.

**P1-6 – Orange** – RX Tone Input – Connect to an audio point in the receiver, usually the high side of the volume control or discriminator output. When using CTCSS, pick up the audio after the high pass filter.

**P1-7 – Yellow** – Monitor/Squelch Out – Connect to a point in the squelch circuit that normally changes logic level with carrier. The squelch polarity is set in the KL-3 software and by selecting the polarity of D-4 by inserting either JU5 or JU6. R-47 can be changed to provide more or less current as needed. Do not allow the Monitor/Squelch Output to conflict with the COR/COS lead input.

**P1-10 – Gray/White** – Horn Output - This provides a 0-9 second ground during ringing through Q7. JU7 (pads A and B) must be installed and JU8 (pads A and C) must be uninstalled.

**P1-8 – Green/White** – PTT Hang Time Out – Connect to the radio's PTT Input. This will keep the repeater keyed after a loss of COR for the time set in the Hang Time.

**P1-5 – Blue** – Alert Tone/Speaker Audio – Connect to high side of the speaker. This provides a decode indication tone. When using 20-40 Ohm speakers, the onboard resistor in series with Q3 should be sufficient. When attaching this lead to a 4-8 Ohm speaker, add a 100-Ohm resistor in series with the lead to limit current.

**P1-12 – Orange/White** – Monitor/Program In – For Program In, this lead is connected to the Green lead from the KL-3 programmer.

## HARDWARE ALIGNMENT

**RX Audio Input:** On the BTD-2 adjust R65 so that Pin 14 of U2 (TP1) doesn't quite clip when a 1 KHz tone modulated at 3.3 KHz deviation from a signal generator is applied. If more level is needed remove R63 by cutting JU1. Additionally, with an oscilloscope a symmetrical and clean square wave should be seen at Pin 8 of U2 (TP4).

**COR/COS:** If the radio only makes a minute change, it may be necessary to adjust the following values to cause Q1 to change states:

R-5, R-6, & R-69

## OPERATION

The BTD-2 is designed to work in 2 configurations:

1. **Remote Control/Alert:** Upon decoding of the burst tone, the BTD-2 will activate the Horn and Monitor/Squelch Outputs. The horn output will go momentarily low for the 0-9 seconds programmed. The Monitor Squelch output will remain latched until reset.
2. **Repeater Controller:** Upon decoding of the burst tone, the BTD-2 will activate the Monitor/Squelch Output and PTT Hang Time Output. Either of these outputs can be used to key the repeater and will keep it keyed for the amount of time programmed (Repeater Hang Time) after COR/COS input has been lost. If the repeater hang time is programmed to 0.0 the remote control/alert features listed in the above paragraph are activated. Programming to 0.1 or higher activates the repeater controller feature.

**Decode:** Upon decode the unit will give the following outputs depending on the hardware configuration:

1. **Momentary Horn Output:** This will give an open collector output to ground for 0-9 seconds depending on the programmed horn time.
2. **Latched Monitor/Squelch Output:** This output can either go from low to high or from high to low. With JU-5 installed and the squelch polarity programmed for V+ the output will go from high to low. With JU-6 installed and the squelch polarity programmed for Ground the output will go from low to high.

**Resetting of Outputs:** The momentary output will automatically reset after 0-9 seconds depending on programming. The Monitor/Squelch output is reset by cycling power or by the COR going inactive.

**COR Input:** The COR polarity, GND (Ground) or V+ (+5 V) must be programmed for the active carrier polarity of the radio. If used the decoder must see an active COR before decoding. If this feature is not used, do not connect this wire and program the polarity for GND.

## BTD-2 MOD-1272 ADDENDUM

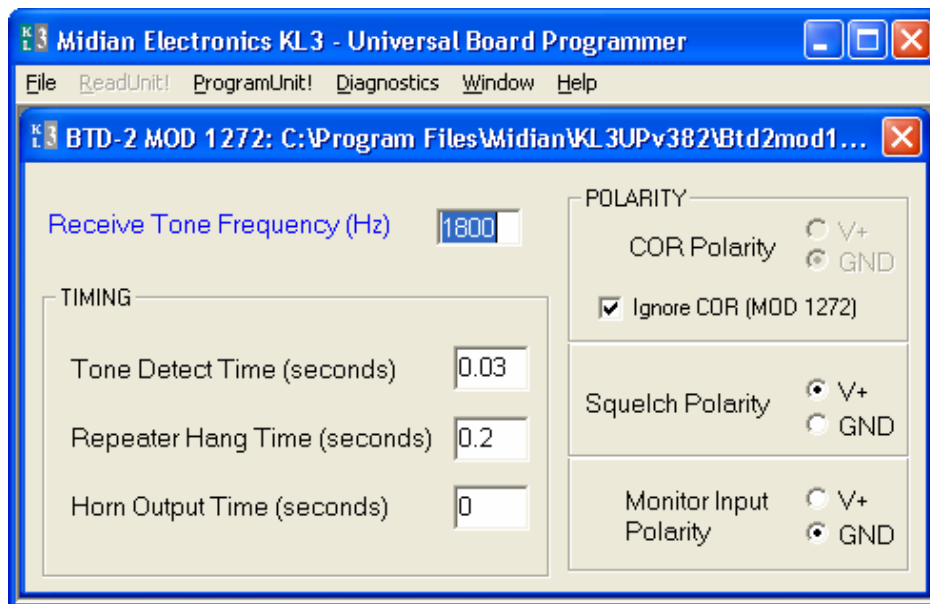
**Overview:** MOD-1272 adapts a BTD-2 to mute ANI signaling packets, in particular Motorola's MDC-1200 packets. It may also work with other signaling protocols that have a known single-tone preamble. In the case of MDC, there is a preamble of 1800 Hz for approximately 27 msec. MOD-1272 changes the BTD-2 so that it is less susceptible to falsing on voice as well as eliminating the need to connect the COR input. Another difference is that the actual decode timing is 1/2 of that programmed. Also, the hardware has been modified to use a crystal for greater decode accuracy. In all other respects, the product is identical to a BTD-2.

**Operation:** Upon detection of a signaling packet, the unit turns on transistor Q5 (PTT hang time out) for approximately 200 msec. This output can be routed to the squelch circuit of a radio, or be used to clamp the audio to ground\* in order to mute the packet. This is the default configuration. The polarity of the squelch output can be also be programmed so that the transistor is off during the mute period (set squelch polarity to V+) if the application requires it.

Only 4 wires of the unit need to be connected: power, ground, RX tone in, and PTT hang time out. The RX level control pot (R65) should be adjusted as described above. The decode sensitivity will not be as described however. Expect packet detection to decrease below -14dB SINAD. Note: If you decide to clip the unneeded wires, be sure not to clip the PROG ENABLE and PROG IN wires.

\* Q5 can sink a maximum of 100 mA. Do not exceed or damage will result.

### Programming Parameters:



The BTD-2 MOD-1272 comes preprogrammed with the above parameters. If different parameters are needed, the KL-3 programming cable will be needed. Be certain to use the BTD-2 MOD-1272 programming file. Note that the actual decode time is 1/2 of that programmed, so that the 0.03 tone detect time above causes the unit to require a minimum of 15 msec of preamble tone in order to detect a signaling packet.

To increase the sensitivity of the unit, the tone detect time can be set to 0.02, but the risk of falsing on voice is increased. Conversely, the tone detect time can be set to 0.04 to reduce the chance of falsing, but fewer packets will be muted.

## TECHNICAL NOTES

**Continuous Decode:** The BTD-2 does not support continuous tone decode. For this feature the BTD-1 should be ordered instead.

## MIDIAN CONTACT INFORMATION

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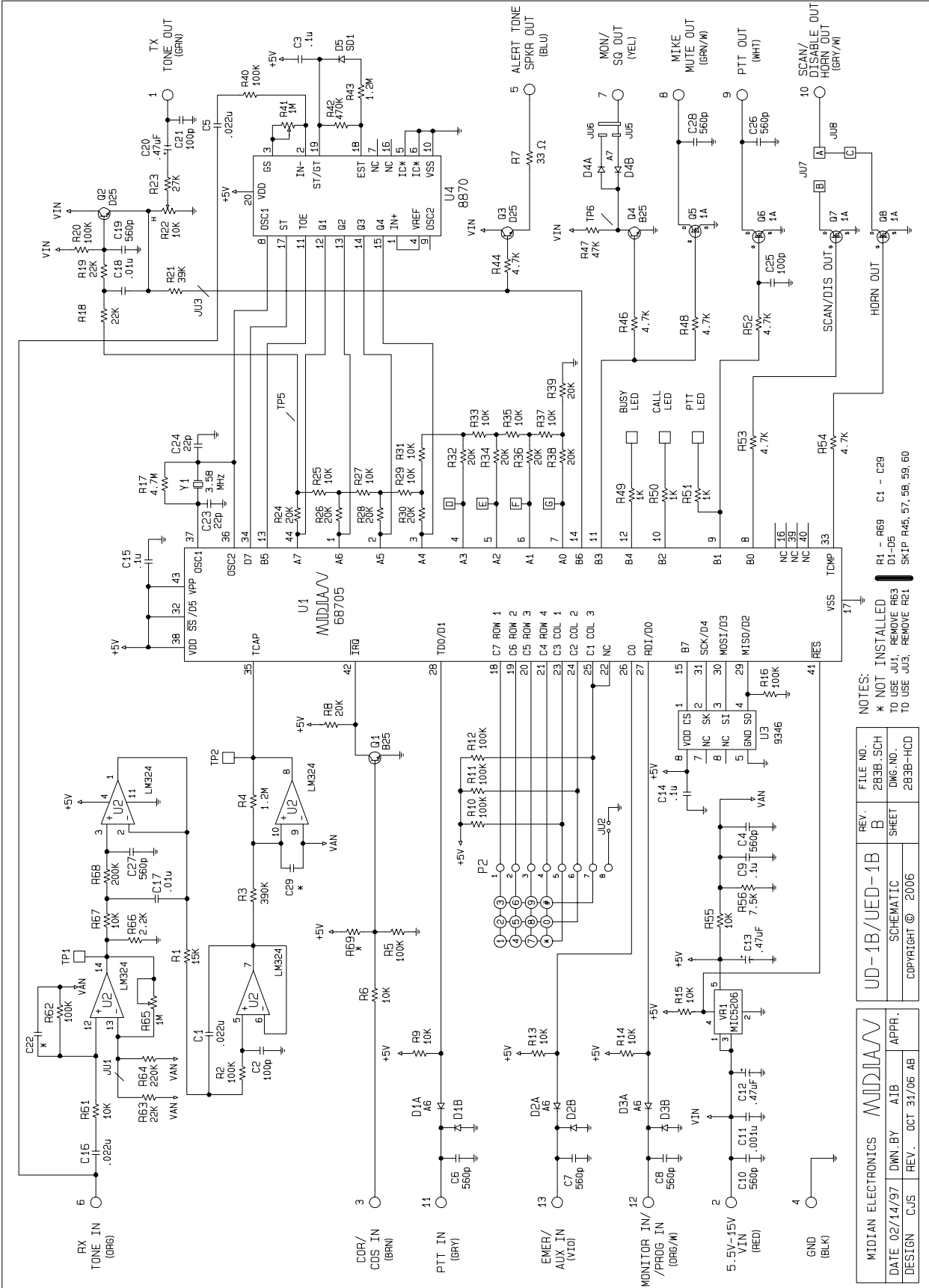
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NOTES:  
 \* NOT INSTALLED TO USE JU1, REMOVE R63 TO USE JU3, REMOVE R21

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 D1-D5  
 SK1P R46,57,58,59,60

