



RT-2

2-Tone Decoder

Manual Revision: 2008-08-04

Covers Software Revisions:

RT-2: 1.2 and higher

Covers Hardware Revisions:

UED-1: 283B

SPECIFICATIONS

Operating Voltage	+5.5-15 VDC
Operating Current	3 mA
Operating Temperature	-30 - +60 C
PTT Output Current	200 mA
Horn Output Current	200 mA
Disable Output	200 mA
Input Level	25-500 mV RMS
Input Impedance	100 K Ω
Audio Output Level	1V RMS
Audio Output Impedance	10K Ω /22 K Ω

GENERAL INFORMATION

The RT-2 is a 2-Tone decoder module that is capable of decoding up to 3 different 2-Tone sequences. The RT-2 offers a momentary or latched output and supports individual and long tone group calls from 275 to 3500 Hz.

KL-3 PROGRAMMING

Midian's RT-2 is programmed using the KL-3 or a 12-button row/column keypad. For keypad programming see the Keypad Programming section below. 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.

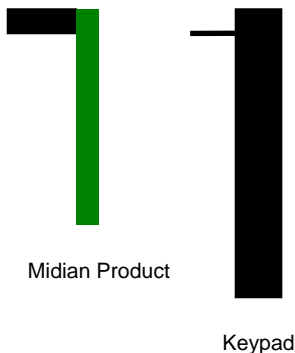
After entering the parameters, save the file by going to File - Save As. Enter the file name in the File Name block and click Save. Saving the file will allow for quick and easy reprogramming of units.

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 RT-2 is non-readable.

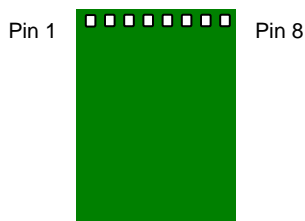
Ground the PTT Input (Gray Wire); turn on power, and within 5 seconds click "Program Unit" in the menu bar to send the file to the product.

KEYPAD PROGRAMMING

If the RT-2 will be programmed with a 12-button row/column type keypad such as Midian's Keypad Option C, the RT-2 and the keypad should be oriented as shown below.



There are 7 pins on the keypad and 8 pin holes on the Midian product. Pins 1-7 are used on the Midian product. Pin 8 is only used if using a Row/Column Ground type keypad. The following diagram shows the pin numbers:



With the red, black and blue wires of the RT-2 connected, the keypad programming process may be done.

To enter programming mode on the RT-2 enter **27182818284** on the keypad.

To enter programming mode on the RT-2 with MOD-1280 enter **271828182846** on the keypad.

The unit will beep 3 times to confirm entry into programming mode.

If during entry of a register's parameters a mistake is made, before *n is pressed, entering the # key will clear the register, so the register may be programmed properly. The programming register page at back of this manual can assist with the keypad programming of the RT-2.

To program a register (registers 1-5), enter the desired information plus *n, where n equals the register number. For example, 0349005105*1 would mean that 349.0 is the A tone and 510.5 is the B tone in the first decode address followed by the standard ring code of 1. If the register is successfully programmed the unit will beep 2 times. If during entry of the register's parameters a mistake is made, before *nn is pressed, entering the # key will clear the register, so the register may be programmed properly.

To program a register (registers 6-9), enter the desired information plus *n, where n equals the register number. If all entries in a register are not completed, trailing zeros will be automatically entered. Extra digits will be ignored. If the register is successfully programmed the unit will beep 2 times.

REGISTERS: Registers 1, 2, & 3

These fields set the tone sequence the RT-2 will decode. These fields are 11 digits in length. The first 5 are for frequency A, 0250.0 – 3500.0 Hz. The second 5 are for frequency B, 0250.0 – 3500.0 Hz. If both the A tone and the B tone are set for the same frequency, an additional 3 seconds will be added to the tone decode time programmed in register 8. This allows for group call decoding of a single long tone used in some systems.

The final digit is for the ring code. Select from the following options:

0 – This will activate the momentary output, but produce no ringing tones.

1 – This will activate the momentary output and produce a telephone like ring.

2 – This will activate the momentary output and produce a pulsing ring tone.

4 – This will latch the horn output on until either the power is cycled or another sequence is decoded with a ring code of 5.

5 – This will unlatch the horn output.

9 – This will provide a latching output through Q7 that can only be reset by receiving the same sequence with this ring code.

Note: Midian recommends not using registers 4-7. Simply enter #*n for each register.

Register 4 – This field sets the ANI that is sent when the PTT is taken to ground. This field is 12 digits in length. This field can be set for 0-9, *, #, and A-D.

Register 5 - This field sets the Disconnect ANI that is sent when the PTT is released. This field is 12 digits in length. This field can be set for 0-9, *, #, and A-D.

Register 6A – Set this register for .00 - .99 seconds. This field sets the length of the DTMF tone time.

Register 6B – Set this register for .00 - .99 seconds. This field sets the length of the gap time between digits.

Register 6C – Set this register for .0 - .9 seconds. This field sets the length of time the RT-2 waits to send out the ANI from when the PTT was pressed.

Register 6D – Set this register to 0-9 seconds. This field sets the length of time after the RT-2 sends the ANI that it unkeys for the dial tone delay period, then keys and dials the number.

Register 6E – Set this register to 0 for off, 1 for Call Routing Digit Mode 1, and 2 for Call Routing Digit Mode 2. Mode 1 will replace the last digit of the connect ANI, if there is exactly one digit in the keyboard buffer. For example, if R4 contains 12349 (CRD is 9) and an 8* is keyed, the transmitted ANI will be 12348.

Mode 2 will replace the CRD with the first digit in the keyboard buffer. For example, if R4 contains 12349 (CRD is 9) and 83456* is keyed in, the transmitted ANI will be 12348 and the dialed number will be 3456.

Register 7A – Set this register for 0-9 minutes. This field sets the Time Out Timer, the time the RT-2 will remain keyed before automatically unkeying.

Register 7B – Set this register for 00-99 seconds. This sets how long the RT-2 will wait for PTT to be pressed before automatically keying the transmitter, so as to prevent some terminals from resetting due to a lack of carrier.

Register 7C – Set this register for .0-.9 seconds. This sets the length of time the transmitter will key-up for.

Register 7D – Set this register for 00-38. This sets the CTCSS code that the RT-2 will encode.

Register 7E – Set this register for 0-9. This sets the output level of the CTCSS being encoded.

Register 8A – Set this register for .01-.99 seconds. This sets the decode time for the first tone in a decode sequence. This time will also be applied to the second tone. The decode tone times should be set to approximately 1/5 of the shortest encode time. Example: Motorola Quick Call 2 would be .20 for a 1 sec 3 sec timing (20=200 ms).

Register 8B – Set this register for 00-99 seconds. This sets the length of time the unit rings when it decodes.

Register 8C – Set this register for 0-7. This sets the mode, tone or ANI, the RT-2 will transpond in.

Register 8D – Set this register for 0-9 seconds. This field sets the time the momentary output will go to ground, before going high again.

Register 8E – Set this field to 0 for ground or 1 for V+. This must match the squelch polarity of the radio, when the radio is active. Squelch is controlled by the monitor input only.

Note: Midian recommends setting all fields in register 9 to 0 except 9E should be a 1 if COR is not connected.

Register 9A – Set this field to 00-99 seconds. This sets the length of time from when the connect ANI is sent to when the RT-2 will send the Disconnect ANI if not activity is detected.

Register 9B – Set this field to 0-9 seconds. This field sets the length of time the unit will monitor the channel for the time entered and will beep 3 times to indicate the channel is no longer busy.

Register 9C – Set this register to 0 for off and 1 for on. If this field is on, the unit will automatically transmit the connect ANI when the channel becomes available. Otherwise, the first user to press the PTT acquires the channel.

Register 9D – Set this register to 0 for off and 1 for on. This field sets the Busy Lockout feature, which prohibits the unit from keying up on a busy channel and gives the user a busy signal.

Register 9E – Set this field to 0 for ground or 1 for V+. This must match the COR polarity of the radio, when the radio is active.

If all entries in a register are not completed, trailing zeros will be automatically entered. Extra digits will be ignored. If the register is successfully programmed the unit will beep 2 times.

If a register is not being used enter #*n. The “#” key acts as a clear command.

To exit programming mode type the following sequence:

***0**

Upon exiting the programming mode the unit will give a long beep and resume normal operation.

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. **Note:** If the COR Input is not connected, program the unit for a COR polarity of V+.

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 – Not available on this product.

P1-10 – Gray/White – Horn Output - This provides a 0-9 second ground during ringing through Q8.

Disable – This feature is the Deadbeat Disable function. When activated Q7 latches low until commanded to unlatch. To access this feature, JU8 must be removed and JU7 installed.

P1-1 – Green – TX Tone Out – Connect to the modulator circuit. Use high impedance point in the radio. If generating CTCSS, use the CTCSS point in the modulator. Only needed if using the transpond tone.

P1-8 – Green/White – Mic Mute – Not typically used on this product.

P1-5 – Blue – Alert Tone/Speaker Audio – Connect to high side of the speaker. This provides Time-Out Timer, Penalty, and Go Ahead tones. 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.

P1-11 – Gray – PTT In – Not typically used on this product.

P1-9 – White – PTT Out – Connect to the PTT Switch of the radio. The PTT transistor, Q6, is rated at 100 mA continuous. This is only needed if using the transpond tone.

P1-12 – Orange/White – Monitor/Program In – For Program In, this lead is connected to the Green lead from the KL-3 programmer. The monitor is not used on this product.

P1-13 – Violet – Auxiliary/Emergency Input – Not typically used on this product.

HARDWARE ALIGNMENT

RX Audio Input: On the RT-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. Additionally, monitor TP2 (U2 Pin 8) for a clean symmetrical square wave. If more level is needed remove R63 by cutting JU1.

TX Audio Output: In a wide band system, set the modulation pot R22 to 3.3 KHz (66% of 5 KHz) of deviation per EIA specifications. In a narrow band system, set the modulation pot R22 to 1.65 KHz (66% of 2.5 KHz) of deviation per EIA specifications. Set CTCSS deviation to 750 Hz – 1 kHz. In Low-Z mic circuits, it may be necessary to short R23 and/or increase C20.

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-6, R-69, & R-5

RADIO PROGRAMMING

The RT-2 is a generic module that wires into most radios. Any radio specific programming, if available, would be found on any Application Notes available for those radios. You may visit our website or call us for application notes.

OPERATION

Decode: Upon decode the unit will ring, via the Alert Tone/Speaker Audio line, according to the ring code programmed. The unit will also 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. Latch Horn On: This will give an open collector output to ground until reset either by receiving a Latch Horn Off sequence or cycling power.
3. Latch Horn Off: This will release the Latch Horn On command.
4. Deadbeat Disable: If used remove JU8 and install JU7. This provides an open collector to ground until the same sequence is decoded again. Cycling power will not reset this output.

Resetting of Outputs: The momentary output will automatically reset after 0-9 seconds depending on how the unit is programmed. When using the Latch Horn On ring code, sending a Latch Horn Off sequence or cycling power will reset the output.

Transpond: If programmed under the Transpond Mode field, the unit will key the PTT Output generate a tone or tone sequence via the TX Tone Out wire. Transpond only works on Decode Register 1.

COR Input: This input controls busy channel lockout. The COR polarity must be programmed for the active carrier polarity of the radio. If programmed for V+ then the RT-2 sees 5 V as busy and ground as clear. If programmed for Ground the RT-2 sees ground as busy and 5 V as clear. **Note:** If the COR is in the active state the unit will not decode. If COR is active and the unit tries to encode with busy lockout enabled, the unit will be prevented from keying up.

TECHNICAL NOTES

Decode Timings: We recommend using the following timings:

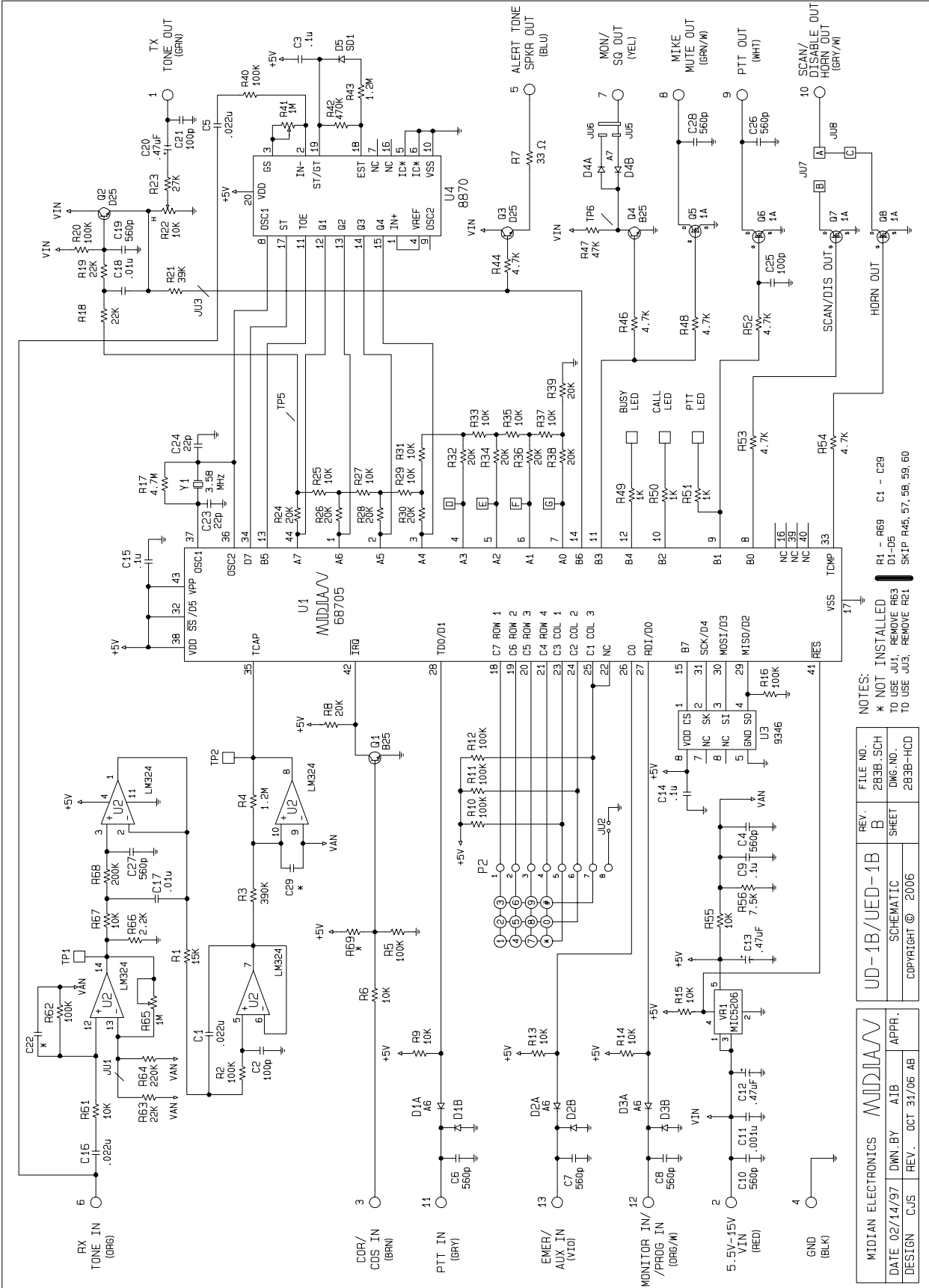
2-tone: 200 msec for 1 second/3 second timing

MIDIAN CONTACT INFORMATION

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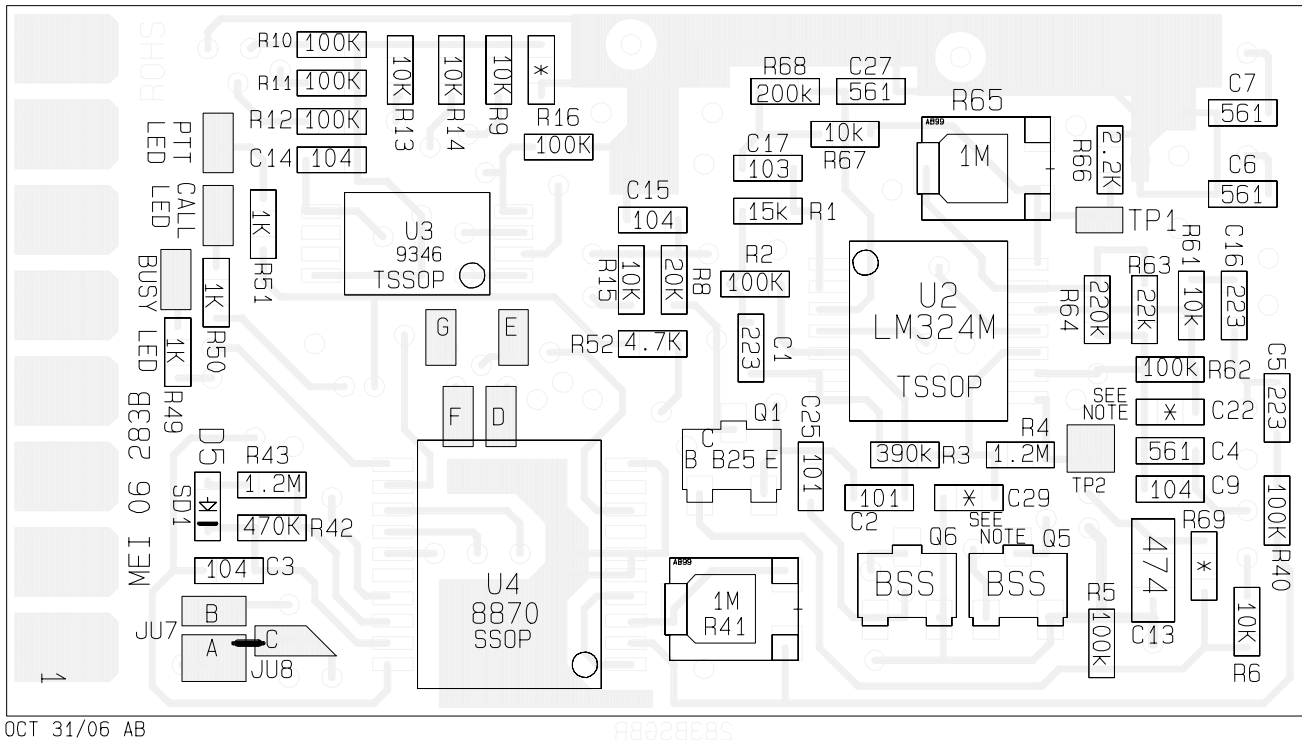
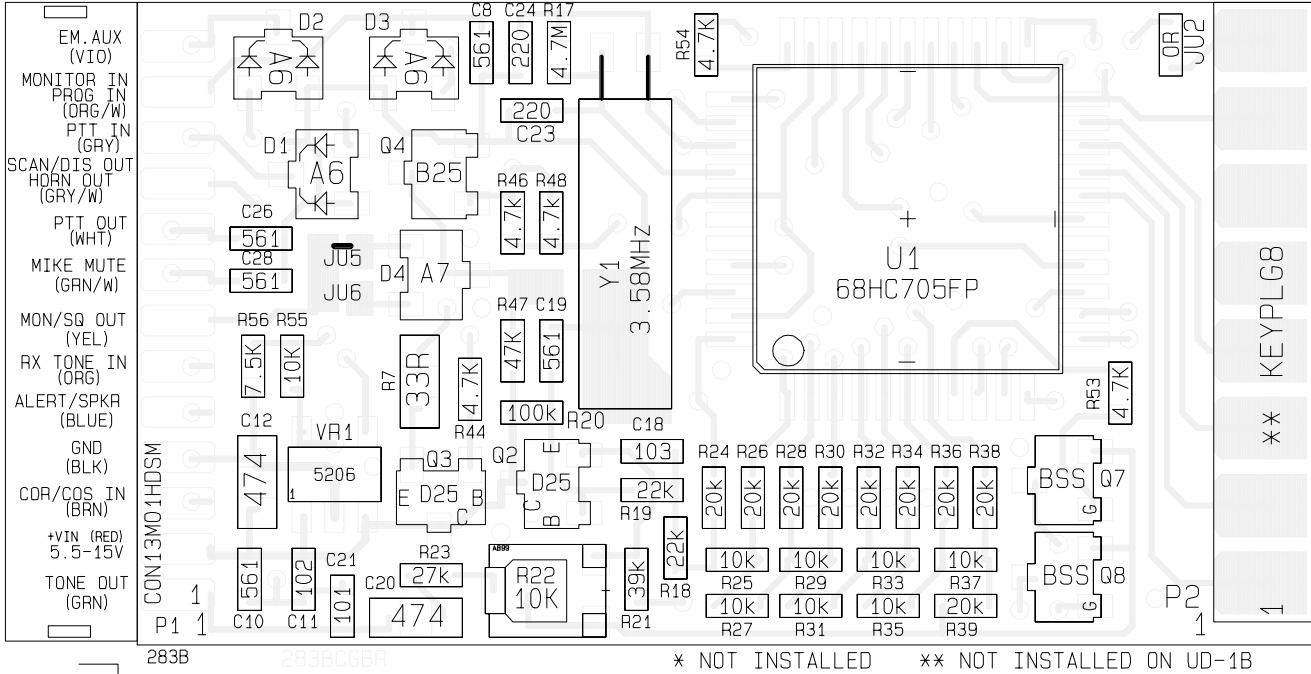


NOTES:
 * NOT INSTALLED TO USE JU1, REMOVE R63 TO USE JU3, REMOVE R21

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SCHEMATIC	283B-HCD
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MIDIAN ELECTRONICS	MMD1A
DATE 02/14/97	DNW.BY AIB
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R1 - R69 C1 - C39
 D1-D5
 SK1P R46,57,58,59,60



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