



## **PR-1**

### **Paging Tone Regenerator**

**Manual Revision: 2008-01-14**

**Covers Software Revisions:**

**PR-1: 1.1 and higher**

**Covers Hardware Revisions:**

**PR-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 $\Omega$              |
| Audio Output Level     | 1V RMS                      |
| Audio Output Impedance | 10K $\Omega$ /22 K $\Omega$ |

## GENERAL INFORMATION

Midian's PR-1 is a paging tone regenerator that will decode a tone sequence and then regenerate either the same or another tone sequence. This is used to regenerate paging sequences into dead spots. Please note that this module does not regenerate voice.

**Predictive Mode:** In Predictive Mode the PR-1 will decode up to 3 different tone sequences in a single tone format and then regenerate either the same tone sequence(s) or a single set of different tones.

**Non-Predictive Mode:** In Non-Predictive Mode the PR-1 will decode and regenerate unlimited paging sequences within a single tone format such as DTMF, CCIR, Motorola Quick Call 2 General , etc.

## PRODUCT PROGRAMMING

Midian's PR-1 is programmed using the KL-3. 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 this product, as the PR-1 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.

## 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 ground.

**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-5 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 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 a high impedance point in the radio. If generating CTCSS, use the CTCSS point in the modulator.

**P1-8 – Green/White** – Mic Mute – If desired, connect to mic element bias point or to some other point in the audio amp to crowbar mic audio to ground during ANI to prevent voice interference.

**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 – Requires a logic low from the radio's PTT switch. If TOT is not needed, the PTT In & Out wires can be tied together and connected directly across the radio's PTT switch. For non-common PTT, open the PTT path and connect the gray wire to the switch.

**P1-9 – White** – PTT Out – Connect to the other side of the open PTT path as referred to in the above step. The module now has control of the PTT for Time Out Timer (TOT) and penalty timer. The PTT transistor, Q6, is rated at 100 mA continuous.

**P1-12 – Orange/White** – Monitor/Program In – For Program In, this lead is connected to the Green lead from the KL-3 programmer. For Monitor taking this input high or low (depending on programming) will reset the monitor/squelch output.

**P1-13 – Violet** – Auxiliary/Emergency Input – When taken to Ground, this input can send Emergency or encode in a secondary dialing format. This depends on the Auxiliary Input setting in the KL-3 under the Control tab. This lead can also be used to disable the transpond.

## HARDWARE ALIGNMENT

**RX Audio Input:** On the PR-1 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.

When decoding DTMF, adjust R41 so that Pin 3 of U4 has a voltage not exceeding 1.5 VPP.

**TX Audio Output:** In a wide band system, set the modulation pot R-23 to 3.3 KHz (66% of 5 KHz) of deviation per EIA specifications. In a narrow band system, set the modulation pot R23 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 PR-1 series products are generic modules that wire 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

**Note:** Regeneration of the tones occurs after the PR-1 sees a loss of COR. If 2-Tone Long Tone Group Call or Plectron tones need to be decoded or regenerated, the Plectron Option should be ordered with the PR-1.

**Predictive Decode Method 1:** Upon decode of one of the 3 tone sequences programmed into the decode registers, the unit will regenerate the same sequence(s). On the Transpond tab set the tone format and timing the unit should regenerate and leave the Transpond Regenerator field blank. For predictive mode this should be the same format as programmed on the Decode page. This will cause the unit to regenerate the same tones that were decoded.

Example: Decode Register 1 is programmed for cap code 112 and Decoder Register 2 is programmed for cap code 129 with a Decode Format of Motorola General. The Transpond Format would be programmed as Motorola General with a Tone Time 1 of 1000 and Tone Time 2 of 3000 and the Transpond Regenerator field is left blank. When cap code 112 or 129 is decoded, then cap code 112 or 129 will be regenerated. However if a non-programmed cap code such as 115 is decoded it will not be regenerated.

**Predictive Decode Method 2:** Upon decode of one of the 3 tone sequences programmed into the decode registers, the unit will regenerate a different programmed tone sequence in either the same or a different tone format. On the Transpond tab set the desired tone format and timing the unit should regenerate and enter the desired tone sequence into the Transpond Regenerator field.

Example: Decode Register 1 is programmed for cap code 112 and Decoder Register 2 is programmed for cap code 129 with a Decode Format of Motorola General. If upon decode of either of these cap codes the user wants a DTMF code of 1234 to be regenerated then 1234 would be programmed into the Transpond Regenerator field with the Transpond Format as DTMF and Tone Time 1 to 0060 and Tone Time 2 to 0040 (60/40 is the DTMF standard, but custom timing can be entered). When cap code 112 or 129 is decoded, then 1234 in DTMF will be generated. However, if a non-programmed cap code such as 115 is decoded nothing will be regenerated.

**Non-Predictive Decode Method 1:** By leaving the 3 decode registers blank, the PR-1 will decode any tone sequence within the programmed Decode Format and then regenerate those same tones if the Transpond format is set to the same format as the Decode Format.

Example: Decode Registers 1, 2 and 3 are left blank with a Decode Format of Motorola General. The Transpond Format would be programmed as Motorola General with a Tone Time 1 of 1000 and Tone Time 2 of 3000 and the Transpond Regenerator field is left blank. When any cap code within the Motorola General code plan is decoded, then that cap code will be regenerated.

**Non-Predictive Decode Method 2:** By leaving the 3 decode registers blank, the PR-1 will decode any tone sequence within the programmed Decode Format and then regenerate a different programmed tone sequence in either the same or a different tone format. On the Transpond tab set the desired tone format and timing the unit should regenerate and enter the desired tone sequence into the Transpond Regenerator field.

Example: Decode Registers 1, 2 and 3 are left blank with a Decode Format of Motorola General. If upon decode of any Motorola General cap code, the user wanted the PR-1 to regenerate a DTMF sequence of 1234, then 1234 would be programmed into the Transpond Regenerator field with the Transpond Format as DTMF and Tone Time 1 to 0060 and Tone Time 2 to 0040 (60/40 is the DTMF standard, but custom timing can be entered). When any cap code within the Motorola General code plan is decoded, then 1234 in DTMF will be generated.

**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. **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.
3. **Latched Mic Mute:** This will give an open collector to ground. It will be necessary to install a 10 K Ohm resistor to the open collector. Set the Monitor Polarity to Ground and the Input as "Controls Squelch". The Squelch Control should be "Unmute when called" or "Stay muted until called". The Monitor or Inactivity field can be programmed to any setting.
4. **Latched Disable Output:** If used, the Horn Output is not available. It will be necessary to reconfigure the hardware jumpers from the Horn to the Disable line. To use this output it is necessary to program the ring code as "Unit deadbeat disable". Upon receiving the decode sequence the output will latch and stay latched until it receives the sequence again.

**Resetting of Outputs:** The momentary output will automatically reset after 0-9 seconds depending on how the unit is programmed. The Mic Mute and Monitor/Squelch outputs can be reset by cycling power, sending another sequence with the ring code of "Turn off call lamp/mute", resetting on a loss of carrier, by grounding the monitor input, or after 25 seconds of inactivity. These reset options depend upon the programming of the unit.

**Transpond:** This sets the format, timing and ID of the regeneration of the tones. If the ID field is left blank the unit will regenerate the tone sequence that was decoded provided the format matches.

**COR Input:** This input controls two functions, busy lockout and reset of a loss of carrier. The COR polarity must be programmed for the active carrier polarity of the radio. **Note:** If the COR is in the active state the unit will not decode.

1. **Busy Lockout:** If COR is active and the unit tries to encode with busy lockout enabled, the unit will be prevented from keying up.
2. **Reset on Loss of Carrier:** The unit can reset the latched outputs after a loss of carrier of 0-9 seconds depending on programming.

**ANI Encode:** This feature is typically not used on this product. When the PTT Input is grounded, the unit will assert the PTT Output and send the programmed ANI tones out the TX Tone Output.

**ENI Encode:** This feature is typically not used on this product. When the Emergency Input is grounded, the unit will assert the PTT Output and send the programmed Emergency ANI tones out the TX Tone Output.

**Keypad Dialing:** This feature is typically not used on this product. To send a page or make a selective call via the keypad enter the desired sequence followed by the \* key. The \* key acts as the send key. If a mistake is made during entry, press the # key to clear the entry. When the \* key is pressed the unit will assert the PTT Output and send the sequence out the TX Tone Output.

**Memory Dialing:** This feature is typically not used on this product. The technical notes section explains how to enter the memory dials into memory. To send a sequence from memory enter the \* key followed by a 0-9 that corresponds to the sequence in memory you wish to send. When the memory dial is entered the unit will assert the PTT Output and send the sequence out the TX Tone Output.

## TECHNICAL NOTES

**Decode Timings:** We recommend using the following timings:

5-tone: 5 msec for 30-45 msec tones  
5-tone: 10 msec for 50-100 msec tones  
Pulse (1500 & 2805 Hz): 10 msec  
2-tone: 200 msec for 1 sec/3 sec encode timing  
DTMF: 1 sec

**Note:** 5-Tone should not be encoded at a rate faster than 30 msec per tone, as the reliability decreases.

**Memory Dial:** The UED-1B supports a 10 number memory dial and last number redial. Last number redial is accomplished by entering \*\*. To enter the programming mode for memory dial enter the following sequence:

**000000**

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

To enter a memory dial enter the sequence followed by \*n, where n equals the memory location (0-9). For example 1234\*1 would enter a sequence of 1234 in the first memory dial register. For special characters such as A, B, C and D press the PTT while pushing the "2" key for A, the "5" key for B, the "8" key for C, and the "0" key for D. The European group tone "G" can also be used by holding the PTT and pressing the "\*" key. To exit memory dial programming, enter the following sequence:

**000000**

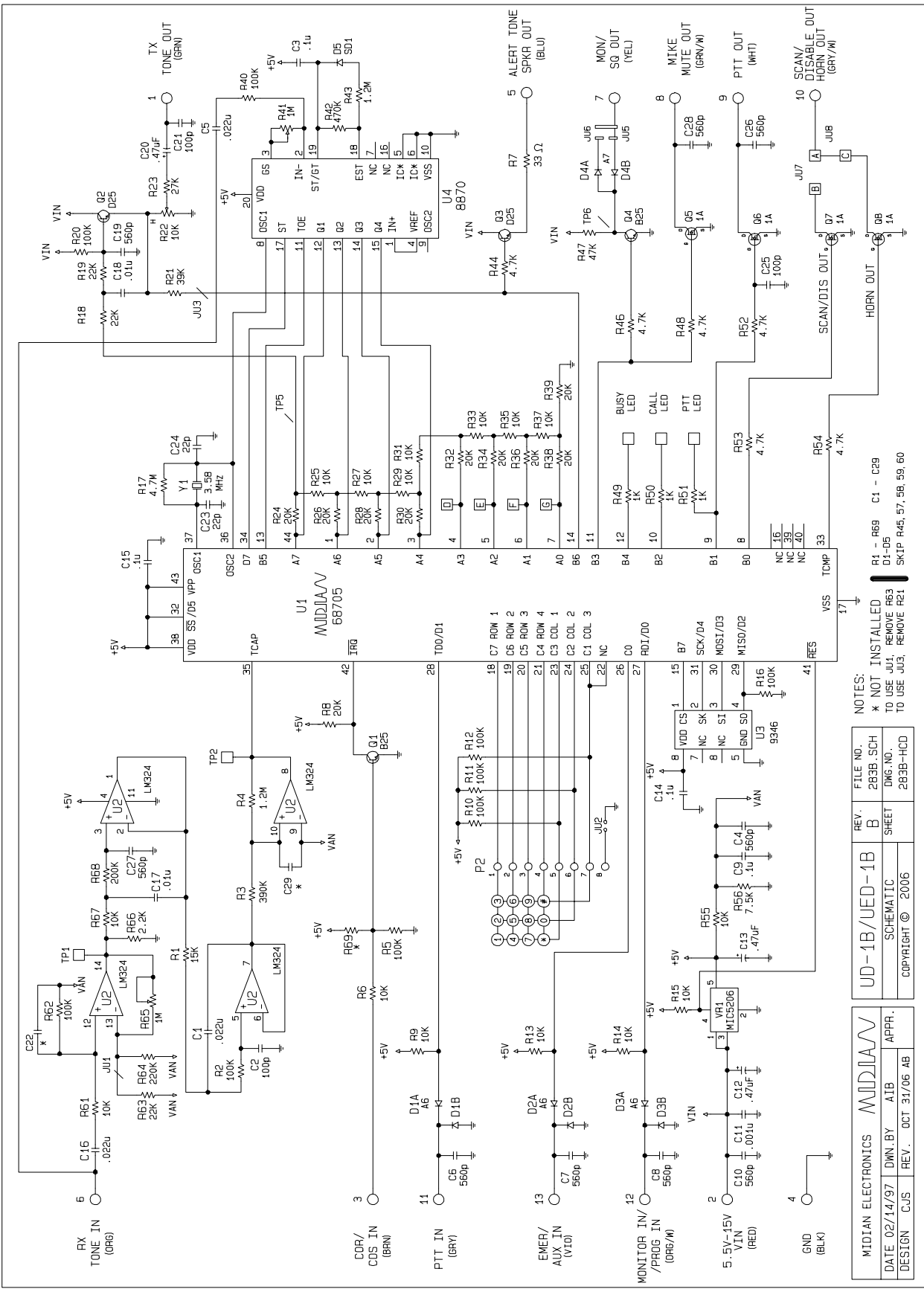
The unit will respond with a long beep and resume normal operation.

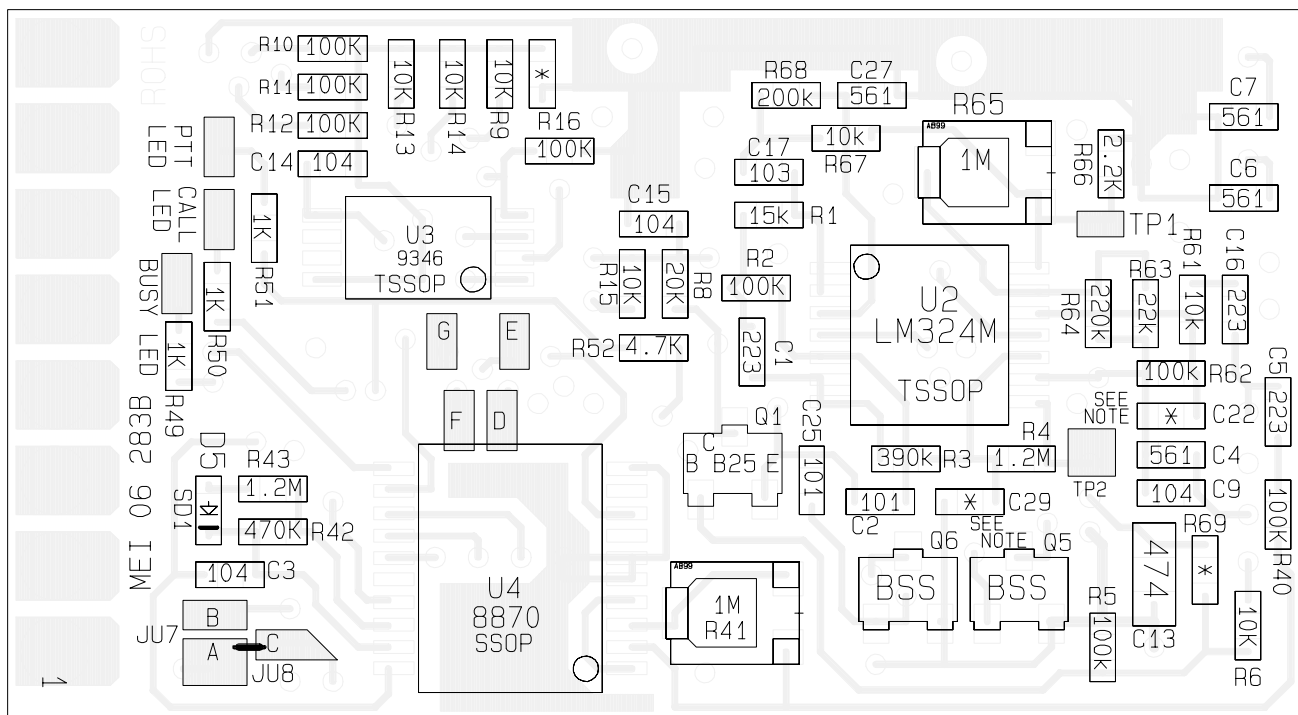
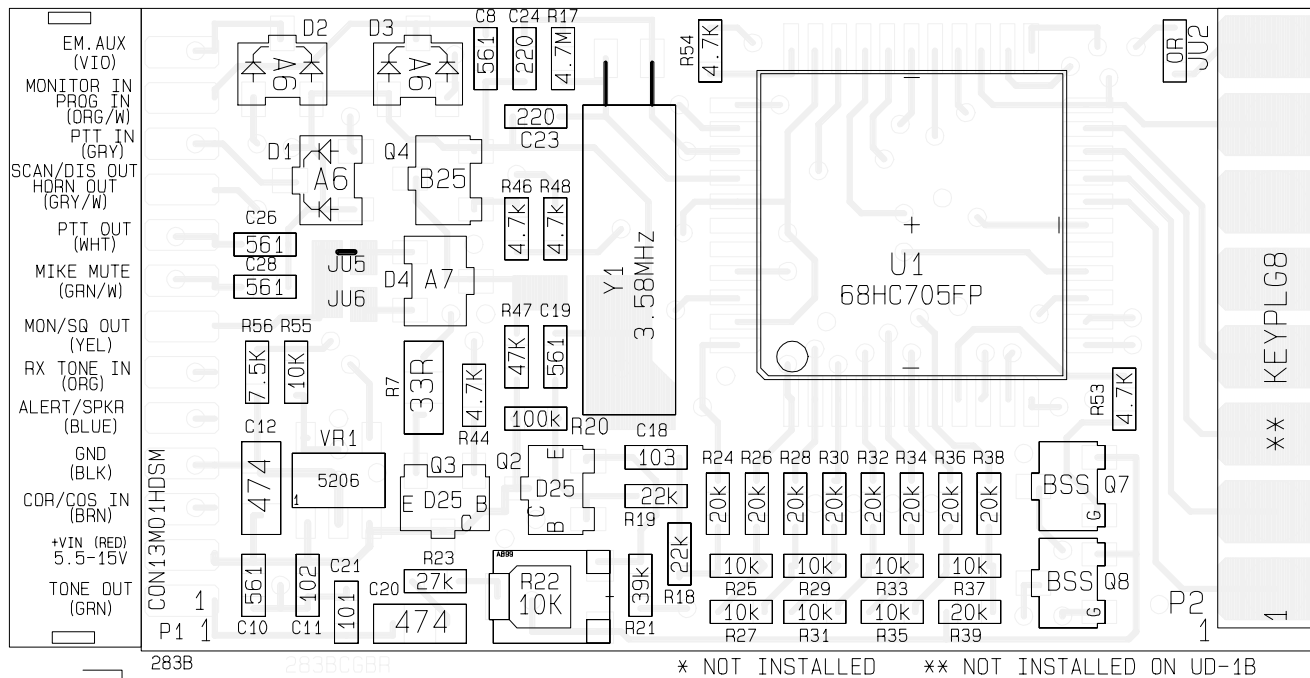
To dial from memory, simply enter \*n, where n equals the memory location (0-9).

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