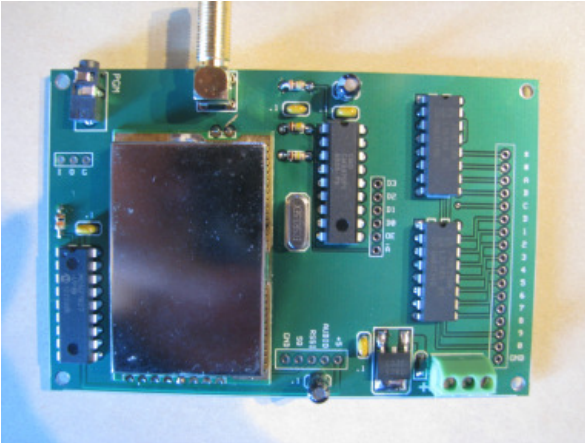


## Micro-DTMF v1.0



The Micro-Trak DTMF Receiver/Decoder is an integrated programmable VHF receiver, designed primarily for remote control applications. The receiver may be set to any 2 meter amateur radio frequency (in 5 KHZ channel steps) via a terminal program and a standard, Kenwood style (2.5mm, three conductor, plug) programming cable. (Available from Byonics) The decoder will decode all standard DTMF touch-tones, from your VHF transmitter, and set

the corresponding output high momentarily during detection of the tone. Note that these are 5 Volt, logic-level outputs, and to drive devices requiring more than a few milliamperes, a buffer may be required (Optoisolator, drive transistor, etc) Do not apply power to any of the of the decoder output pins; this may cause them to be destroyed, requiring replacement of the 74HC238N decoder output integrated circuits. The Micro-DTMF draws about 30 mA in operation.

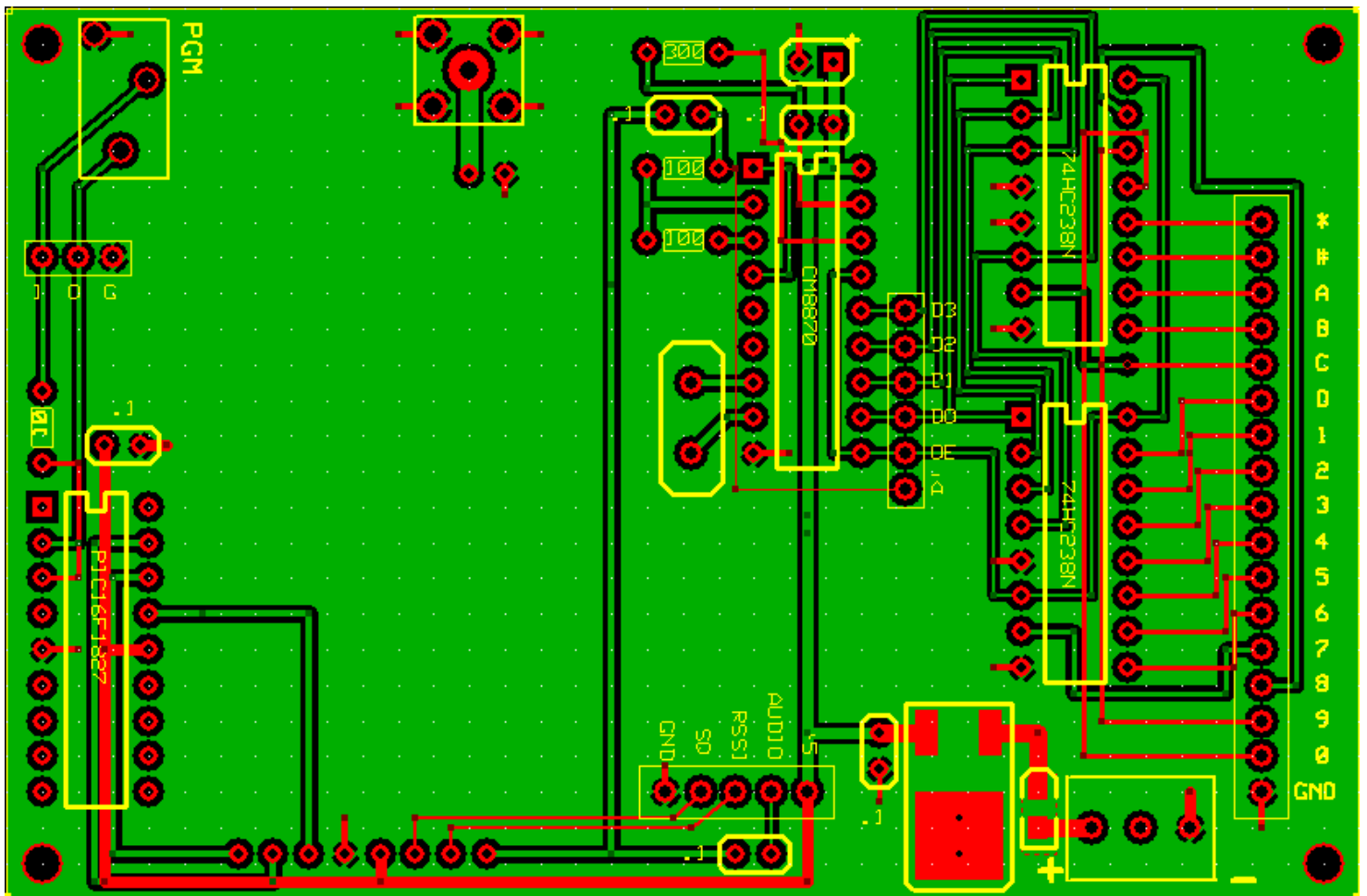
### Operation

If you specified an operating frequency at the time of the order, the receiver will be programmed to your designated frequency. Connect the MT-DTMF to a clean source of DC power, not to exceed 15 Volts, and not less than 7 Volts. There is a three terminal screw terminal connector on the lower right hand section of the PC board for power. Note that the polarity is marked on the board. Connect a VHF antenna to the SMA connector. The Micro-DTMF is now ready to receive and decode DTMF tones. Please note that in testing, you may overdrive the receiver by operating a high power transmitter too close to the DTMF receiver, causing excessive audio distortion, so set your transmitter some distance away when testing and/or reduce your transmission power for close range testing.

### Setting a new frequency

Connect the Micro-DTMF to your personal computer using the Kenwood-style programming cable to plug into the jack on the upper left hand corner of the unit. Connect your programming cable to a serial port or USB-to-serial port adapter, and open your terminal program (We suggest downloading a free copy of Terraterm from the Web: It's free and simple!) Set your terminal program to 4800, N, 8, and 1. Apply power the the Micro-DTMF. If you are connected properly, you will see the Micro-DTMF report its software name and version number, and the currently programmed frequency displayed in KHZ. (No decimal point, i.e., 144.390 MHZ would display as "144390 KHZ") At the prompt, type in your new desired frequency, i.e 1445000 would set the unit to 144.500 MHZ. The unit will respond with "Current frequency is 144500 Khz". If you are unable to connect to the unit, check your terminal program settings and ensure that you are set to the correct port.

# Printed Circuit Board



## **Outputs and external connections**

You may note that the Micro-DTMF has several locations for header pin connections in addition to the decoded DTMF outputs. These are intended for advanced users who may have special requirements.

### **PGM Header**

This is a three pin connector point allowing direct access to the frequency programming connections. The pins include Serial in, Serial out, and Ground. These pins are for setting and reading the frequency of the receiver by direction connection.

### **Receiver Header**

The receiver header allows direction connection to a number of potentially useful receiver features. These include Ground, Squelch (carrier detect) RSSI (received signal strength) Audio output, and the 5 Volt regulated power output from the Micro-DTMF decoder

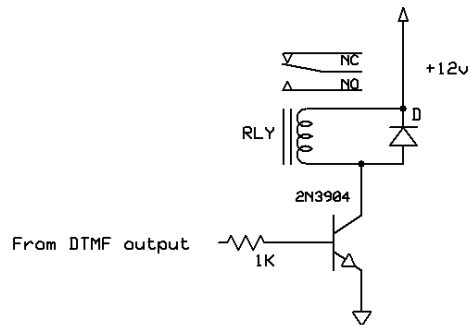
### **DTMF Header**

The DTMF header allows direct access to the raw (BCD) data from the CM8870 DTMF decoder integrated circuit. Additionally, a direct tap to the audio input to the decoder is made available so that can prevent audio from being fed to the DTMF decoder by bringing this pin to ground. This will not deactivate the receiver, and the audio sampling pin the receiver header will still be available.

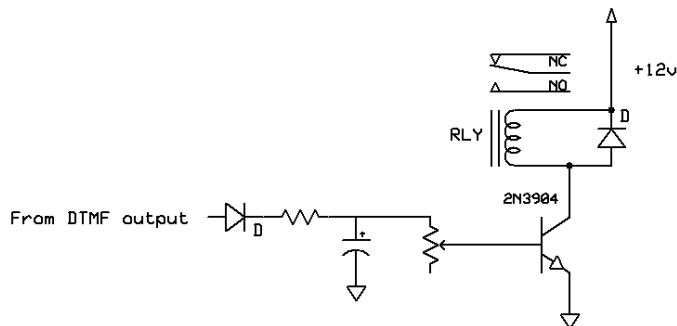
## Output Switching

Shown below is a typical example of switching a higher current or voltage signal from a logic level output. In this example, a decoded output is used to switch an NPN transistor and a relay to allow high power switching.

### Relay Driver



### Relay Driver with Timer



In this example, an R/C timer is added to the circuit. This will keep the relay activated for a time period determined by the value of the electrolytic capacitor and the potentiometer. This can be used to allow (for instance) one DTMF tone to temporarily activate the relay, which can then be utilized to pass any other output, allowing a simple "password" protection, since the second "command" tone may only be passed before the relay timer is active.