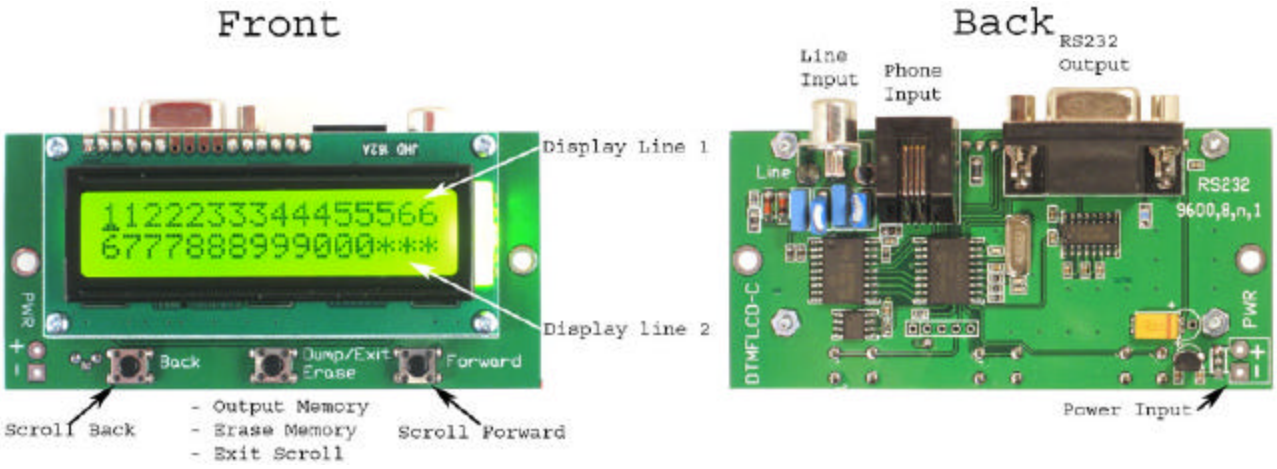
DSchmidt Technologies' Backlit DTMF LCD Decoder with Memory and RS232 Output
(part # DTMFLCD-C-G Green Backlight, DTMFLCD-C-B Blue Backlight)

Overview

This DTMF LCD Decoder will decode touch tone audio signals (0-9, A-D, #, *), display the tone's identity on the 32 character backlit LCD display, store it in non-volatile memory, and output the character via a 9600 baud serial port. When there is a pause between tones of 3 seconds or more, a '-' character is inserted. Memory contents can be viewed with the scroll back / scroll forward buttons. Memory contents can also be downloaded from the serial port or cleared

Features

- 99% assembled and tested. Hook up the audio input and a power source and it's ready
- 2,048 number non-volatile EEprom memory rated for 1M R/W cycles.
- Backlit LCD display (-G Green, -B Blue)
- Remaining free memory displayed at powerup
- New tones received are appended in memory. When memory is full, no further tones are stored.
- RS232 9600,8,n,1 baud output
- Simple three button operation
- Onboard RJ11 phone jack, RCA line input jack and DB9 RS232 output connector
- Small in size, self contained.
- Low current draw (<20 mA)
- Wide power input voltage range (5.5 - 18 VDC), reverse polarity protected



Hookup

The unit comes nearly completely assembled and tested. The only thing you need to do to start using this device is to hookup an audio and power source. For portable operation the most convenient power source is to use a 9V battery. Install a 9V battery connector, snap a fresh 9V to the connector and you will see the cursor in the upper left corner of the display.

There are two audio input sources. The line input should be used if you wish to hook this decoder to a tape player, scanner, radio, etc. The volume setting of your source will need to be adjusted for best response. 1/3 to 1/2 volume level is a good starting point. If the volume is too high, the input can become overloaded, causing missed tones due to ambient background noise being too high.

The RJ11 telephone input can be used if you wish to directly connect this device to a phone line. The input signal is capacitively coupled and isolated so as not to cause any loading of the phone line, or interfere with its operation, even when on the same line as a high speed modem.

WARNING! Do not connect this decoder to a phone line AND to your computer's RS232 port at the same time. The signal from the phone company is floating relative to Earth ground. Your computer has its ground tied to Earth

DSchmidt Technologies 147 Alpine Ave Ventura CA 93004 (805) 628-2407 Voice, (888) 742-7816 Fax

through its three conductor power cord. If the decoder is connected to both your computer and the phone line, interference will be induced on the phone line and the decoder will be unable to decode tones!

If you wish to hook this decoder to your phone line and a computer at the same time, you will need to do so using a 1:1 isolation transformer (also known as a 600:600 phone transformer). This will electrically isolate the two from each other. See schematic for details. A 1:1 audio transformer can be purchased from Radio Shack.

RS232 Connection

The onboard DB9 connector is where you will make your connection between your PC and the decoder. Communication to your PC is performed at 9600 baud, 8 bits, no-parity, 1 stop bit. Run your communication program (such as Hyperterminal) and set it up for the above settings, make sure you have it configured for the right COM port. Connect the female DB9 connector into your available COM port using a serial cable.

As tones are received, they will be displayed on your computer screen. If your terminal program has the ability to log text, you can turn it on to log all tones received. If you are only interested in displaying the memory contents of tones stored in the decoder's EEprom, momentarily press the ***Output Memory*** button.

Scrolling Through Tones Stored in Memory

Using the ***Scroll Back/ Scroll Forward*** buttons, you can scroll through the tones stored in memory. The memory is set up as 128 16 character lines. To begin the scroll, press the ***Scroll Back*** button and the last 32 tones will be displayed. Press it again and the first line on the display will move to the second, and the previous 16 tones will be on the first line. This continues until you reach the beginning space of the EEprom. Pressing the ***Scroll Forward*** button, the second LCD line will move to the first, and the next 16 characters stored will be on the second line. See the memory diagram for a visual representation.

Exiting the Scrollback Display

If you are not pressing a button and a valid tone is received while you are viewing memory contents, the display will clear and the tone will be immediately decoded and displayed.

If you wish to manually exit the scrollback display, depress the ***Exit Scroll*** button momentarily. The display will be cleared and the device will wait for the next tone.

Clearing Stored Tones

If you wish to clear the EEprom of stored tones, press and hold the ***Erase Memory*** button until the display shows "MEM ERASE" and then release. The EEprom will be erased and the display cleared. The unit will then wait for tones.

NOTE: The LCD decoder must be in the tone capture display mode (waiting for tones) before the memory can be erased. If the decoder is in the memory display mode (when you are viewing memory contents) the memory cannot be erased since the middle button is now functioning as a ***Exit Scroll*** button.

Memory Scroll Configuration

```
12345-789012-456
7890123456789012
3456789-12345678
56789-1234567890
123456789012-456
789012345-789012
3456789012345678
901234567890123-
```


DSchmidt Technologies 147 Alpine Ave Ventura CA 93004 (805) 628-2407 Voice, (888) 742-7816 Fax

XXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXX

Sample memory values shown above. Only 10 lines of memory storage are shown (actual = 128).
Box above represents the LCD display's 16 character by 2 line display.

When the ***Scroll Back*** button is first pressed, the display will show the last 32 characters that were decoded. The box above is what is displayed on the LCD.

With each ***Scroll Back*** button push, the display will scroll back one line (box above moves up one line).

With each ***Scroll Forward*** button push, the display will scroll down one line (box above moves down one line).

For Assembled/Tested Products: WARRANTY

DSchmidt Technologies expressly warrants that it will either repair or replace the DTMFLCD-C if it proves to be defective in design, material, or workmanship within ninety (90) days from the buyer's date of purchase.

For warranty repair or replacement, the defective DTMFLCD-C must be returned within ninety (90) days to DSchmidt Technologies either in person, or by insured mail and accompanied by proof of purchase. A repaired or replacement DTMFLCD-C shall be warranted as above for the balance of the original product Warranty Period or thirty (30) days, whichever is longest.

DSchmidt Technologies shall have no obligation with respect to any Product which has been modified or altered. In no event shall DSchmidt Technologies be liable for consequential damages, losses, or expenses arising out of this transaction. The return of the purchase price or the repair or replacement of the product shall be the buyer's sole remedy hereunder.

This limited warranty is DSchmidt Technologies sole warranty. DSchmidt Technologies makes no other warranty of any kind whatsoever, express or implied. All implied warranties of merchantability and/or fitness for a particular purpose are hereby disclaimed by DSchmidt Technologies.

For ALL Products: SOFTWARE RIGHTS

The software programs that controls the DTMFLCD-C manufactured by DSchmidt Technologies is solely owned by DSchmidt Technologies and all rights are reserved. Reproduction, adaptations, or translation of those programs without prior written permission of DSchmidt Technologies is prohibited.