

## DTMF display kit with 2x8 line LCD display.

Our DTMF display can display up to 16 characters (8 per line). The display can be cleared by a button (not supplied) or can auto clear on a timed basis from receipt of the last character.

The input circuit is the same as our DTMF decoder kits, therefore it can be configured for unbalanced, balanced or microphone input. When an Electret microphone is connected it can pick-up tones from a speaker phone a few inches away.

Connecting a momentary on button between the button input pin and 0V pin clears the display on pressing, however holding the button during power-up enables the timed reset mode. In timed reset mode the display is automatically cleared 10 seconds after the last character is received.

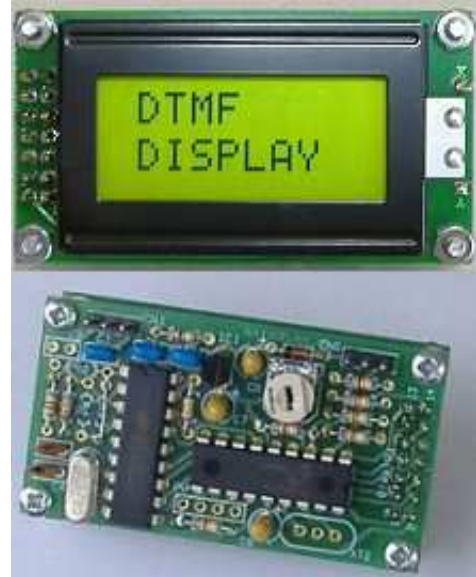
Complete kit of parts including pre-programmed PIC micro, gold plated PCB, LCD display, nuts bolts and spacers.

Runs from 7 to 16V DC at a few mA.

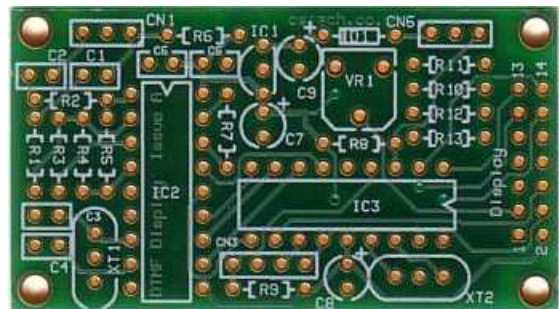
This kit is supplied with a backlit display, the backlight requires 4.05V at up to 60mA (e.g. 13.8V via a 220 ohm ½ watt resistor). The backlight is not connected in any way to the decoder PCB.

**Please make sure you fit the pins for the display connection on the back of the PCB as shown in the pictures.**

## DTMF Display



All parts shown in the assembled photo are included as well as some extras for alternative input configuration.



**A circuit diagram is on the last page of this document.**

A PDF data sheet for the HT9170B maybe viewed at:-

[www.cstech.co.uk/ht9170.pdf](http://www.cstech.co.uk/ht9170.pdf)

## DTMF Display Parts List

IC1	78L05
IC2	HT9170B
IC3	PIC16F627A (programmed)
D1	1N4148
XT1	3.579MHz crystal
XT2	not fitted (uses PIC internal osc.)
R1*	4K7
R2, 4	not fitted
R3*	270K
R5	wire link
R6*	1K
R7	330K
R8, 9, 10, 11, 12, 13	10K
VR1	10K variable
C1, 5, 6	100nF (marked 104)
C2	not fitted
C3, 4	22pf
C7, 8, 9	1uF observe polarity
CN1, 6	3 pins
CN2	7+7 pins (supplied as 3+3 & 4+4)
CN3	not fitted

Also supplied:-

DTMF display PCB Issue A  
Crystal insulator pad  
2 x 10K for alternative input configuration  
3+3 & 4+4 sockets for display  
LCD display  
4 x nuts, bolts and spacers

\*Note:-

Only fit R6 if using an Electret microphone as input.

Only fit R1 & R3 as 4K7 & 270K for use with a microphone otherwise fit R1 & R3 as 10K or calculate a custom input configuration from HT9170 datasheet.

### DTMF Display application notes follow.

There are 3 input configurations for our DTMF decoder, Electret microphone, un-balance and balanced, the 3 options are shown below in the circuit extracts. The HT9170 DTMF decoder chip has a wide input signal range from approx. 27mV to 775mV, but as it contains an op-amp at it's input and the op-amp gain can be altered using different resistor values, many combinations can be achieved.

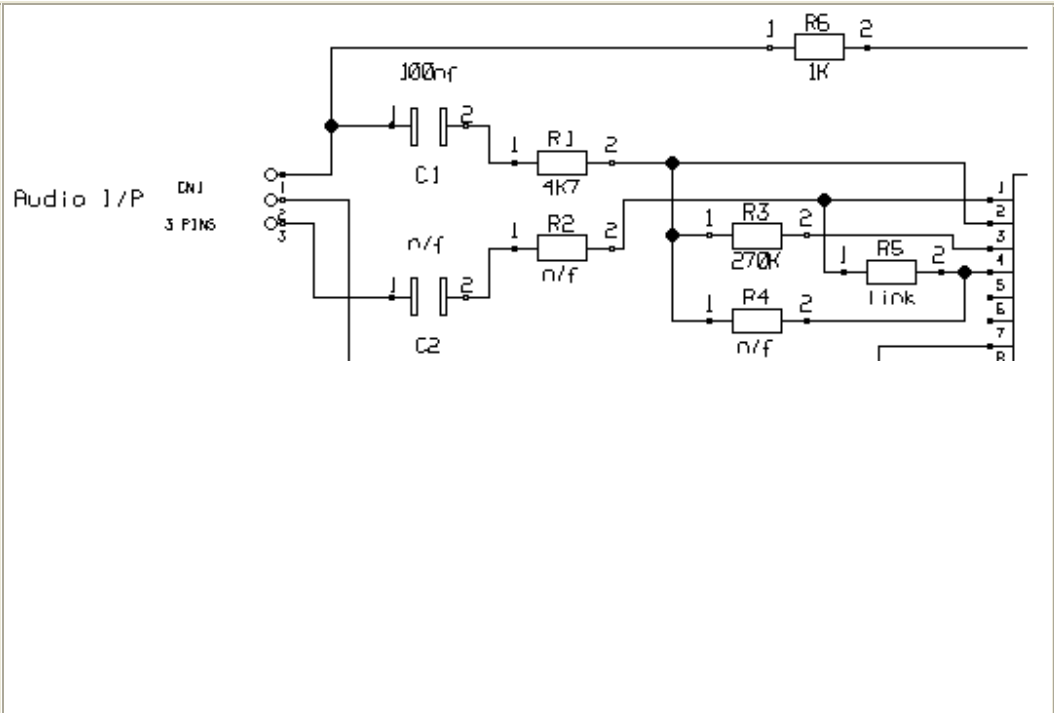
Please see notes below.

The Electret microphone input version provides power to a microphone insert via R6 (1K) and using R1 at 4K7 and R3 at 270K to set the decoder chip's input op-amp gain to x57 the sensitivity allows pick-up from a DTMF tone pad at a couple of inches. A speaker phone, two-way radio speaker or the keypad tones from a mobile can be picked up 6 to 12 inches away.

We do not recommend increasing the input gain any higher.

Connect the microphone between pins 1 and 2 (2 = GND).

Resistors are provided in the kit for this option.

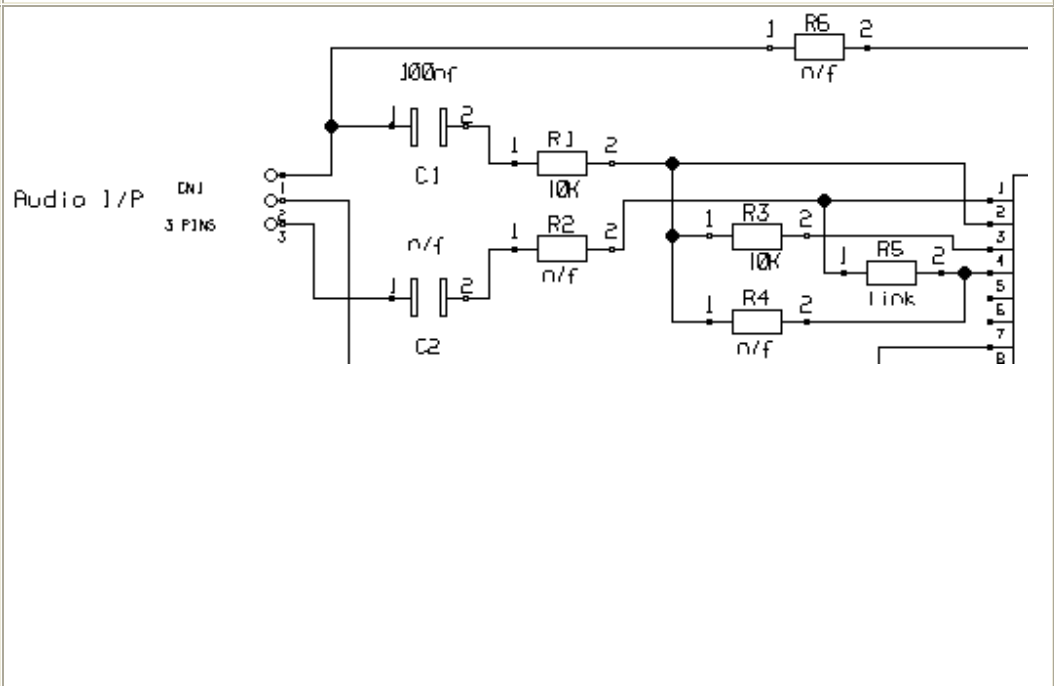


This example offers an unbalanced audio input, using 10K resistors for R1 and R3 sets the decoder chip's input gain at x1 and gives an input impedance around 10K, R6 is omitted and this configuration can be fed directly from say the Packet modem RX audio output of a Ham radio.

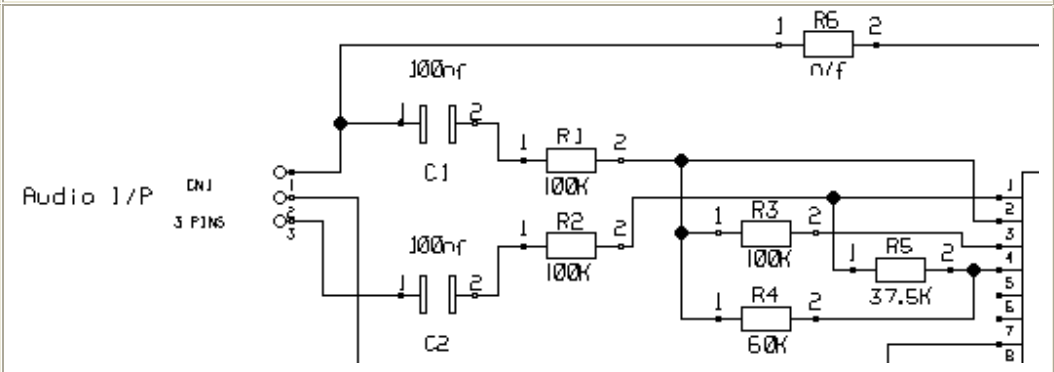
If it is desired to change the input gain then increase R3 for higher gain and decrease R3 for lower gain.

Connect the signal source between pins 1 and 2 (2 = GND).

Resistors are provided in the kit for this option.



The balanced audio input can be connected to say the earphone audio output of a GSM modem, with the values shown the decoder chip's input gain is also x1, however this can be changed as required, see the HT9170 data sheet for the calculations.



Connect the signal source between pins 1 and 3.

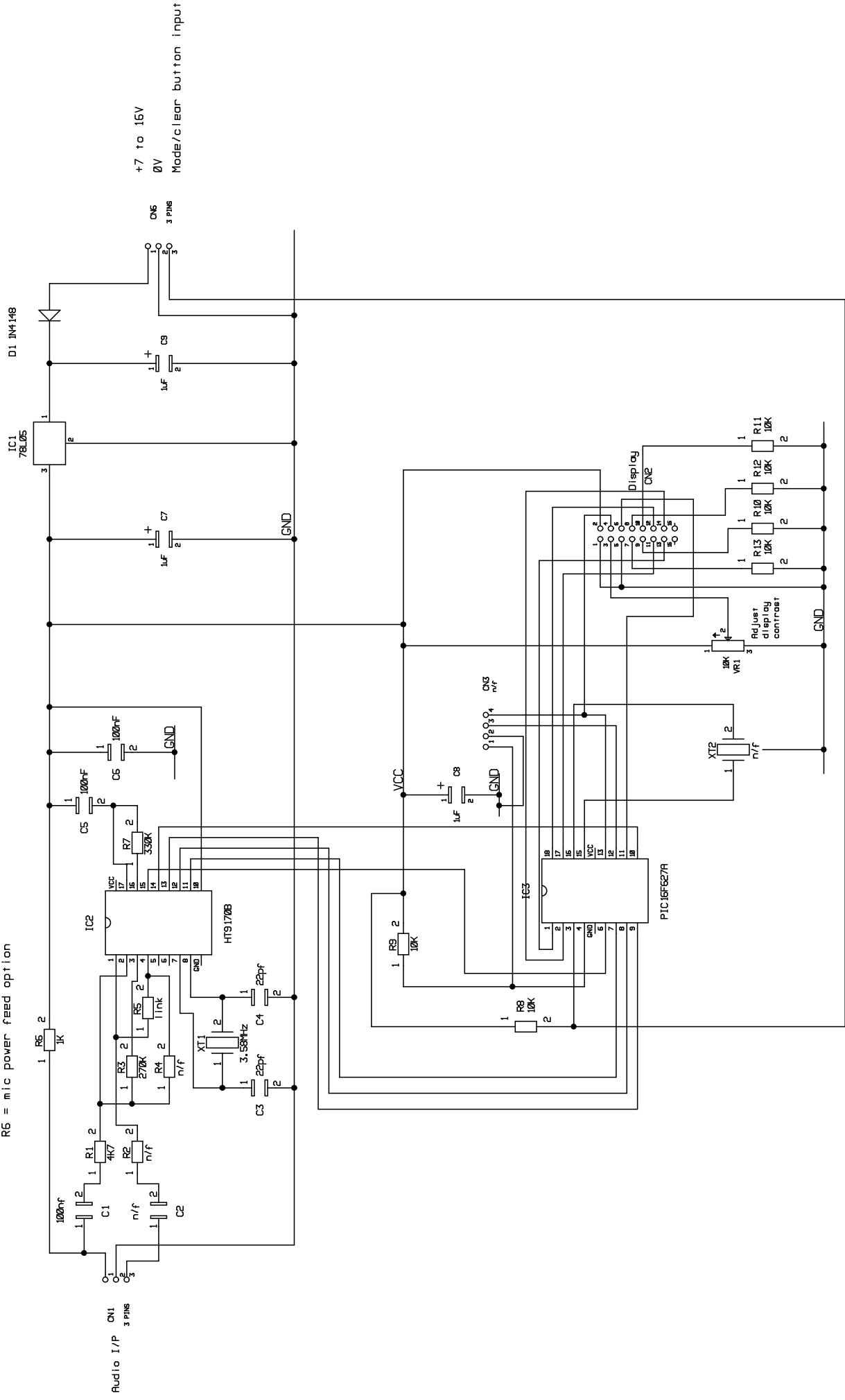
Resistors are NOT supplied in the kit for this option as there are many combinations that could be required.

62K and 36K can be used instead of 60K and 37.5K

A pdf data sheet for the HT9170B maybe viewed at:-

[www.cstech.co.uk/ht9170.pdf](http://www.cstech.co.uk/ht9170.pdf)

R1 & R3 set op-amp input gain  
 C2, R2, R4 & R5 are for balanced input  
 R6 = mic power feed option



DTMF Display Circuit