

# ICOM IC-7000 HM-151 DTMF Pad Install

## Courtesy Barry Mahaffey – VE5BMW

### April 22, 2010

1. The usual “if you mess this up don’t blame me thing”
2. Of course you know that the components you are working with are prone to destruction by static electricity
3. This document is laid out with text first and then pictures. Simply follow along and enjoy after you are done.

#### DTMF Pad Install

1. Order your TTE-7 from here – I paid \$79.95USD plus shipping and tax – (under \$100 CDA). I confirmed that you can call my contact to order your TTE-7 as follows:

Michael Soulliard, General Manager & VP of Sales & Marketing  
**Midian Electronics, Inc.**  
2302 E 22nd St. Tucson,  
AZ 85713 – USA  
Ph.520-884-7981  
[michael@midians.com](mailto:michael@midians.com)  
[www.midians.com](http://www.midians.com)

2. <http://www.midians.com/html/specspage.asp?pname=TTE-7+KEYPAD&ptitle=DTMF+%28Touch+Tone%26amp%3Breg%3B%29+Encoder+Keypad&pcat=Encoders%2FDecoders&pline=Tone+Signaling>
3. Remove the HM-151 from the mic cord
4. Remove the two screws from the back of the mic and store in a safe place
5. If your HM-151 has been modified by Bob Nagy (AB5N) with the weights added in you will need to save the back of the mic with container where the weights are located (if you wish to reuse them – this mod re-uses the weight)
6. Once you have the TTE-7 (DTMF Pad) in hand you need to remove the connector with the 13 wires and remove the circuit board from the bezel holding it in place – DO NOT use the circuit board as a point of leverage! The easiest way is to turn the bezel bottom side up and place the clear plastic rods holding it in place against the sharp edge of a desk and smack it with your hand – the rods will bend in toward the circuit board and you can pull them out easily – they are not used again
7. After removing the connector, take a small screw driver and press down on the tabs holding the unused wires in place, remove them
8. You will only need:
  - a. Red – B+ 6.5 – 24 VDC goes to pin 1 – see picture
  - b. Black – Ground - to the ground trace on the front of the original HM-151 mic – see picture
  - c. Brown – Low Z - the HM-151 is 600 Ohms
  - d. White – connect to mic PTT line – see picture
  - e. If you find a way to get a line to the radio speaker you will also need the blue wire. This mod does not use the blue speaker wire.

- f. You should now only have 4 wires on the connector – note you can cut the unused wires off if you prefer
9. Take the DTMF pad and place it on the back of the HM-151 such that the top of the board is 1/8" BELOW the bottom of the mic hanger when looking inside the mic – this gives you room to attach the DTMF pad from inside the HM-151
10. Measure the outline of the DTMF pad all the way around on the back of the HM-151
11. Drill a small hole to allow a saw of you're choosing to come through the hole and cut out the back of the mic where the DTMF pad will fit. I used a scroll saw
12. Cut to the inside of your line
13. Once the piece has been cut out you need to take a file and file the opening to make a snug square fit for the DTMF pad. The pad should be held in place by virtue of a snug fit. This will ensure the pad stays in place while you use hot glue from inside the HM-151 to make the pad install firm
14. Once you are happy with fit – you want to be sure the top of the DTMF pad is a bit below the bottom end of the mic hanger looking from the outside of the mic. By doing this you will note that the DTMF pad is protected from wear by this protruding piece of the mic hanger bottom piece and the fact the HM-151 is a bit rounded so the bottom of the mic is a bit above the DTMF pad at the bottom as well – this will happen automatically if you follow these directions.
15. Pick your method of attaching the DTMF pad to the HM-151. I used hot glue as this allowed me to heat up the glue after the install if I needed to move something around. I did have to reheat the glue using a soldering iron so I could add the container holding the metal shot weight that AB5N had added when he did the mic mod for sound
16. Now that the DTMF pad is securely attached. Turn the mic over and fill in the space around the pad (on the front of the DTMF pad using black silicone)
17. Your pad is now securely attached and you are done this part

### Wiring the TTE-7 to the HM-151

1. Remove the 3 screws holding the original HM-151 circuit board in place – save and re-use them
2. Remove the circuit board from the mic
3. Turn the circuit board over and you will see 8 small solder pads where the RJ45 connector attaches to the circuit board
4. The pin numbering of the pad is as follows:
  - a. With the solder pads face up and nearest to you note there are 2 lines of solder pads – line 1 will be the row closest to you at the bottom of the circuit board. The line above that is row 2
  - b. The left bottom most pin on row 1 is pin 1 – the **red – B+** wire goes here
  - c. The 2<sup>nd</sup> pin on the top row (row 2) is pin 4 solder the white PTT wire here
  - d. The next pin over on row 2 is pin 6 – the **brown LOW Z** (mic element) wire goes here
  - e. The gold trace that you see at the bottom of the connector is ground. Carefully solder the **Black Ground** wire here – see pictures for all of these connections
5. Tuck all 4 wires under the RJ45 connector and use a bit of hot glue, silicone or?? To hold the wires out of the way and under the RJ45

### Adding the weight back in

1. Cut out the rectangular container holding the weights from the back of the piece you removed from the mic back
2. You will need to remove some of the weights from this piece since it is now too tall to fit back in the HM-151
3. What you must do is to cut the rectangular piece down in height so that it does not protrude above the microphone support posts on the back piece of the MH-151. There are several protrusions that stick up from the back of the MH-151. The piece you cut down must be lower than these pieces. Once this piece is cut down you need to **ensure** that there is a small cut out for the crystal on the TTE-7 to fit under it. I cut this piece out with a saw. Once you are sure the piece fits – see pictures for where I placed it – you now **must** provide a layer of insulation so that the metal weights you place back into this rectangular piece do NOT contact any of the circuit boards in the HM-151! I used hot glue as the insulation layer and when it was set-up I added the weights and used hot glue on top to hold the weights in place. I had 16 weights that would not fit in the rectangular holder and they were hot glued into the top of the mic out of harm's way. This makes the mic a bit top heavy but I like it. You may choose any method to install the weight back in that suits you.

Put everything back together in the opposite manner that you disassembled it.

Enjoy DTMF tones

#### NOTES:

The only adjustment is the small pot at the bottom of the DTMF pad. It adjusts the tones.

If need be adjust the tone levels for 30% modulation on AM and 3.3kc on FM wideband. The TTE-7 is not programmable.

I did not have to adjust anything!



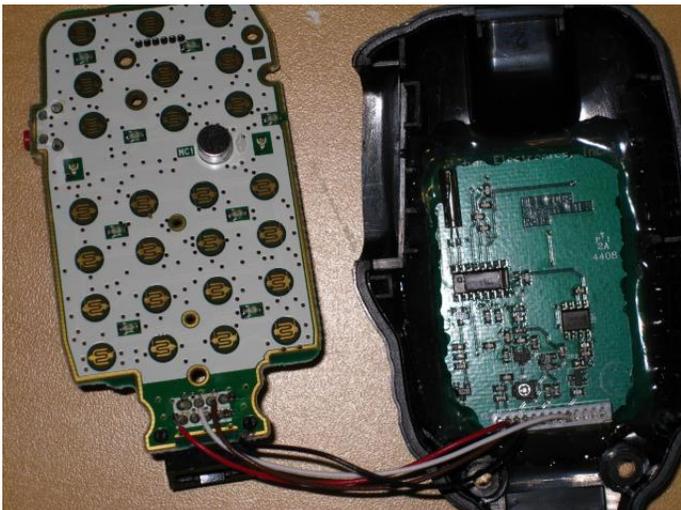
DTMF pad installed. Black silicone fills opening around pad



Front of HM-151



Solder pads and DTMF pad



Wiring hook-up. Row 1 of solder pads is where the red wire is. That is pin1. Pin 2 is the first pin on row 2 – white and brown wires go there on pins 4 and 6 The black wire is soldered to the gold trace right below the solder pads.



Wires under RJ45. A dab of hot glue holds them between the RJ45 and the screw post on the mic



Weights added back in. Some placed on top of mic  
ALL insulated from any circuit board!