

VA3TO VoIP MULTIMODE INTERFACE
Assembly Instructions v2.1(2)

Follow the checklist below to assemble the board. The location of each part is clearly marked on the pc board. A parts placement overlay can be zoomed into using the Acrobat viewer.

Be sure to use a good hot iron to solder the components to the board. Let the iron heat up the pcb pad and the component lead then apply solder, allowing it to flow around the pad and form a nice fillet to the lead. Do not apply too little or too much solder.

Step 1.

Install the following **Jacks, Plugs and Sockets**:

Be sure to install the IC sockets with the pin-1 notch as shown on the silkscreen.

<u>Qty</u>	<u>Part/Value</u>	<u>Location</u>	<u>(check)</u>
1	2.1mm power jack	J1	()
8	3.5mm phone jack	J2 – J9	()
1	DB-9 female	P1	()
2	18 pin DIP IC socket	U1,U2	()
1	16 pin DIP IC socket	U3	()
2	6 pin DIP IC socket	U4,U5	()

Step 2.

Install the following **Relay**:

K1 is double-footprinted to accept an NEC EA2-12 or Omron G5V (or equivalent) relay. When using the NEC relay, be sure to install it correctly with pin 1 (dot) of the relay oriented to correspond with the dot on the silkscreen. Note also that diode D4 is not required when using the NEC relay.

<u>Qty</u>	<u>Part/Value</u>	<u>Location</u>	<u>(check)</u>
1	NEC-EA2-12 <i>or</i> Omron G5V	K1	()

Step 3.

Install the following **Resistors**:

<u>Qty</u>	<u>Part/Value</u>	<u>Location</u>	<u>(check)</u>
3	4.7k ¼ watt (yellow-violet-red)	R1,R7,R20	()
3	100k ¼ watt (brown-black-yellow)	R3,R4,R5	()
6	1k ¼ watt (brown-black-red)	R6,R8,R10,R12,R14,R15	()
2	2.2k ¼ watt (red-red-red)	R13,R19	()
1	510k ¼ watt (brown-red-yellow)	R16	()
2	270 ¼ watt (red-violet-brown)	R18,R21	()
2	50k trimpot	R9,R17	()

Step 4.

Install the following **Capacitors**:

Observe the polarity of the Electrolytic capacitors. The longer lead is positive and the body often has a marking indicating either the negative (-) or positive (+) lead.
(Note: C8 & C9 not used with v2.1 firmware.)

<u>Qty</u>	<u>Part/Value</u>	<u>Location</u>	<u>(check)</u>
7	0.1uf (100n) (alt .01uf) Ceramic	C3,C13,C14,C15 C16,C17,C24	()
2	0.1uf (100n) Polyester	C2,C20	()
3	33pf Ceramic	C10,C11,C23	()
1	.001uf (1n or 1000pf) Polyester	C21	()
1	33uf (25v or higher) Electrolytic	C12	()
4	1uf (16v or higher) Electrolytic	C4,C5,C6,C7	()

Step 5.

Install the following **Crystal**:
(Y1 not used with v2.1 firmware.)

<u>Qty</u>	<u>Part/Value</u>	<u>Location</u>	<u>(check)</u>
1	3.579 MHz	Y2	()

Step 6.

Install the following **Diodes**:

Install the diodes in the correct polarity with the band (Cathode) matching that shown on the silkscreen. * Note that D4 is not required when using the NEC relay.

Bend the LED leads as shown in Figure 1 so that they are installed at a right angle to the board. Be sure the long (positive) lead is inserted into the hole with the square pad and the flat on the body is to the right as shown on the silkscreen.

<u>Qty</u>	<u>Part/Value</u>	<u>Location</u>	<u>(check)</u>
4	1N4148 (alt 1N914)	D1,D3,D5,D6	()
2	1N4005 (alt 4001 to 4007)	D2, *D4	()
5	LED (install colours as desired)	LED1,2,3,4,5	()

Step 7.

Install the following **Transistors + Regulator**:

Metal can (TO-18) transistors drop into place as per the silkscreen marking. When using black plastic TO-92 parts, bend the centre lead (Base) forward and install with the flat surface facing the line on the silkscreen.

Bend the leads of U6 down 90 degrees to the body where the lead becomes narrower. Secure U6 to the board using a 4-40 screw and nut before soldering it into place.

<u>Qty</u>	<u>Part/Value</u>	<u>Location</u>	<u>(check)</u>
3	2N2222A	Q1,Q2,Q3	()
1	7805	U6	()

Step 8.

Preliminary Check.

Before installing the Integrated Circuits, perform the following checks:

1. Visually inspect the board. Pay particular attention to the correct orientation of polarized parts and look over the soldering job for any poor looking joints. Repair as necessary.
2. Once you are content with the assembly, plug the power connector from a 12 to 15 vdc source into J1 (centre positive). Only the Power LED should illuminate.

Using a voltmeter, check for 12 to 15 vdc at pin 1 of U6 (relative to ground). If this voltage is not observed, check that J1 and D1 are installed and soldered correctly and measure the power source to verify that voltage really is present.

3. Check for 5vdc (+/- 0.25v) at:
- | | | |
|-----------------|------|-----|
| U1 pin 14 | ok ? | () |
| U2 pins 10 + 18 | ok ? | () |
| U3 pin 16 | ok ? | () |

If any one of these pins does not have 5 volts present, look carefully for cold solder joints or shorts.

4. If the voltages check out okay, unplug the power connector and install the five I.C.s in the correct orientation with the notch corresponding to the socket and silkscreen.

U1 = PIC16F628 (alt 16F648)
U2 = HT9170B
U3 = MAX232 (alt HIN232)
U4 & U5 = 4N33 (alt 4N25/ 4N28)

I.C.s often come with the leads spread out slightly for automatic insertion purposes. Carefully bend the leads slightly against a flat surface so that they are at 90 degrees to the component body. Do this on both sides of each part then install them into their corresponding sockets. Inspect the installed IC's to ensure that all leads are inserted properly into the socket with no pins bent out or curled underneath the part.

5. Once all I.C.s have been properly installed, plug the power connector back into J1. This time, the Power LED should illuminate and the PTT & DATA LEDs should illuminate for 1 second, then extinguish.

Step 9.

Installing the board into the Chassis.

Install the standoffs in all four corners of the pc board as shown in Figure 2 then install the completed board into the lower chassis half. Start by inserting the LEDs on the front of the board into the corresponding holes on the front of the case. Once the LEDs are protruding out the front of the case continue to position the board so that it is flush with the sides of the lower chassis. Ensure that the board is seated properly then mount it using the four black 4-40 screws (Figure 3). Complete the assembly by installing the cover onto the chassis bottom using four black 4-40 screws.

FIGURES

