

Final Assembly Manual

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I. IMPORTANT NOTES BEFORE BEGINNING

A. Failure to take ESD precautions could permanently damage the components. ESD damage is permanent and invisible to the naked eye. (Zapped parts are terribly difficult to find once they are assembled into your MIDItools Computer.)



Although it is best to always wear your ESD ground strap while assembling your kit, all assembly steps that require ESD protection are marked with this symbol in the margin.

B. All ribbon cable connectors are *polarized*. This means that they must be installed only in the orientation shown on the layout diagram.



All assembly steps that pertain to polarized, or directional, connectors are marked with this symbol in the margin. Incorrect orientation can damage components.

C. This manual refers to the TOP, BOTTOM, LEFT or RIGHT sides of circuit boards or enclosures. These directions correspond to the item being held as shown in the layout diagrams.

II. SET UP YOUR WORK AREA

A. Your work surface should be well lit and well ventilated.

B. Gather your tools: ESD grounding strap; soldering iron; solder (noncorrosive electronics solder); wire cutters; screwdrivers (phillips and pan head); pliers; etc.

C. Prepare ESD grounding protection. A typical ESD ground strap is adequate. Put the strap around your wrist and clip the other end to the head of a slightly-loosened screw of a working, grounded AC outlet plate. The strap will should have an internal 10M ohm (or equivalent) resistor in series to ground. This will safely dissipate any static charge that might otherwise damage your components during assembly and test.

D. Lay out the completed circuit board, enclosure, and component subassemblies.

III. INSTALL THE SUBASSEMBLIES IN YOUR ENCLOSURE

A. Handheld Enclosure (Item **00040** or equivalent)

1. Stick the 4 rubber feet (**00056**) to the underside of the enclosure bottom (**00051**).

2. Install the data potentiometer. Remove the knob and panel nut. Insert the shaft through the hole in the enclosure top (**00052**). The anti-rotation tab should fit into the smaller hole in the enclosure top. Place the nut over the shaft and secure the pot to the panel. Be careful not to scrape the paint! Turn the pot fully counter-clockwise.

Slide the knob on the shaft and position the pointer to approximately 8 o' clock (imagine holding the computer, with the MIDI connectors pointing away from you). Tighten the set screw.



3. Solder the black wire of the data pot to the CPU Board Assembly circuit board where you see the label **"WIRE HOLE FOR GND ON CCW SIDE OF DATA POT"**. Solder the red wire to the CPU Board Assembly circuit board where you see the label **"WIRE HOLE FOR CW SIDE OF DATA POT"**. Solder the yellow wire to the CPU Board Assembly circuit board where you see the label **"WIRE HOLE FOR CENTER PIN ON DATA POT"**.



4. Install the LCD module. Take the 4 tiny LCD mounting screws (**00104**) and stick them through the LCD mounting holes on the Handheld Human Interface circuit board from the solder side. The screw should stick up on the same side as the LEDs. Place 4 hex nuts (**00108**) over the screws as spacers. Thread the LCD module over the screws so that the ribbon cable sticks out over the top of the circuit board. Place the 4 lock washers (**00110**) over the screws, followed by 4 more hex nuts (**00108**). Gently tighten the nut *just to the point that the LCD will not jiggle around*. Remove the plastic sheet attached to the LCD.

DO NOT OVER TIGHTEN -- you could damage the LCD module circuitry.

5. Stick the 4 1.5" screws (**00064**) through the holes in the enclosure top (**00052**). When you are finished, the screw heads should be visible to the outside world. Set the enclosure face down on your work surface so that the data pot is on the side closest to you. The screws should be pointing up at you.

Slide 4 0.5" spacers (**00115**) over the screws. Route the data pot wires (with CPU circuit board attached) out the bottom for a moment.



Take the Human Interface circuit board (with LCD module attached) and slide it over the screws. The LCD, switches, and LEDs should all line up into their respective cutouts in the enclosure top. The circuit board should slide over the screws and butt up with the spacers. If they do not, or you see that the circuit board is flexing or bowing, inspect the placement and alignment of the LEDs, switches and LCD. Correct any misalignment.

Carefully bend the LCD ribbon cable down over the solder side of circuit board. Both ribbon cables should now be pointing at you, out the bottom of the enclosure.

Next, slide 4 0.25" spacers (**00113**) over the screws. Place the CPU circuit board -- solder side down -- over the screws so the MIDI connectors are at the top (facing away from you). The board should slide over the screws and butt up with the spacers. If they do not, or you can see that the circuit board is flexing or bowing, inspect the alignment.

Note: The LCD cable should now be trapped between the solder sides of both the CPU and Human Interface circuit boards. Also, the data pot wires should be coming from the pot, out the bottom side of the Human Interface circuit board (closest to you), and up over both circuit boards. There should be no wires in front of the MIDI jacks, power jack, on/off switch, or LCD contrast trimpot.

Secure the entire circuit board sandwich by threading 4 kep nuts (**01137**) over the screws and tightening.



6. Take the LCD ribbon cable connector and insert it into the socket on the CPU circuit board marked "**LCD CONNECTOR**". Make sure that all 16 pins are properly inserted in the socket. The red wire (pin 1) should be at the bottom of the socket, aligned with the notch on the socket.



Take the Human Interface Assembly ribbon cable connector and insert it into the socket on the CPU circuit board marked "**STANDARD I/O CONNECTOR**". Make sure that all 16 pins are properly inserted in the socket. The red wire (pin 1) should be at the bottom of the socket, aligned with the notch on the socket.

Your MIDIttools Computer should now look similar to the picture given on page 107 of *Digital Projects for Musicians*.

B. Rackmount Enclosure (Item **00041** or equivalent)

1. Install the data potentiometer. Remove the knob and panel nut. Insert the shaft through the hole in the enclosure front panel (**00048**). The anti-rotation tab should fit into the smaller hole in the front panel. Place the nut over the shaft and tighten the pot to the panel. Be careful not to scrape the paint! Turn the pot fully counter-clockwise. If you imagine your MIDIttools Computer mounted in a rack, the data pot should be located on the far left of the front panel. Slide the knob on the shaft and position the pointer to approximately 8 o' clock. Tighten the set screw in the knob.



2. Install the LCD module. Take the 4 tiny LCD mounting screws (**00129**) and stick them through the LCD mounting holes on the enclosure front (**00048**) from the outside. The screw should stick out the same side as the data pot body and wires. Thread the four standoffs (**00114**) and the LCD module over the screws so that the ribbon cable sticks out over the top of the front panel. Place the 4 lock washers (**00110**) over the screws, followed by the 4 hex nuts (**00108**). Tighten the nuts so that the black LCD frame is flush to the panel cutout. Remove the protective plastic sheet attached to the LCD glass.

3. Attach the front panel (**00048**) to the enclosure bottom (**00049**) using 4 0.5" screws (**00106**). Note that this mechanical connection does not require nuts or washers, as the enclosure bottom has captive nuts already installed.

4. Stick the 4 0.75" screws (**00107**) through the holes in the front panel (**00048**). The screw heads should be visible to the outside world, flush to the panel surface. Slide the 4 0.375" spacers (**00114**) over the screws.



Take the Human Interface circuit board and slide it over the screws. The switches and LEDs should all line up into their respective cutouts in the front panel. The circuit board should slide over the screws and butt up with the spacers. If they do not, or you can see that the circuit board is flexing or bowing, inspect the placement and alignment of the LEDs and switches. Correct any misalignment. The ribbon cable stick out the top.

Secure the circuit board by threading 4 kep nuts (**01137**) over the screws and tightening.



5. Solder the black wire of the data pot to the CPU Board Assembly circuit board where you see the label **“WIRE HOLE FOR GND ON CCW SIDE OF DATA POT”**. Solder the red wire to the CPU Board Assembly circuit board where you see the label **“WIRE HOLE FOR CW SIDE OF DATA POT”**. Solder the yellow wire to the CPU Board Assembly circuit board where you see the label **“WIRE HOLE FOR CENTER PIN ON DATA POT”**.

6. Stick 4 0.5” screws (**00106**) through the holes in the enclosure bottom (**00049**). The screw heads should be on the underside of the enclosure. Set the enclosure down on your work surface so that the screws point up.



Slide 4 0.25” spacers (**00113**) over the screws. Place the CPU circuit board -- solder side down -- over the screws so the MIDI connectors are at the back (facing away from you). The board should slide over the screws and butt up with the spacers. If they do not, or you can see that the circuit board is flexing or bowing, inspect the alignment of the MIDI connectors, pushbutton switch, power jack and LCD contrast trimpot.

Secure the circuit board by threading 4 kep nuts (**01137**) over the screws and tightening.

7. [optional -- only if you are installing an expansion circuit board subassembly]

Stick 4 0.5” screws (**00106**) through the remaining holes in the enclosure bottom (**00049**). The screw heads should be on the underside of the enclosure. Set the enclosure down on your work surface so that the screws point up.

Slide 4 0.25” spacers (**00113**) over the screws. Place the expansion circuit board -- solder side down -- over the screws so the PAVO logo is right side up. The board should slide over the screws and butt up with the spacers. If they do not, or you can see that the circuit board is flexing or bowing, inspect the alignment.

Secure the circuit board sandwich by threading 4 kep nuts (**01137**) over the screws and tightening.

If your expansion board kit came with a rear panel cover (e.g., the MIDI Patch Bay or Relay Driver), attach it to the back panel from the outside of the enclosure using the 2 0.25” screws (**00105**). The cutouts in the cover should be aligned with the expansion board connectors. If you are using the Custom Instrument expansion board, your switch cables can enter the enclosure through the open cutout at the back of the enclosure.



8. Take the LCD ribbon cable connector and insert it into the socket on the CPU circuit board marked **“LCD CONNECTOR”**. Make sure that all 16 pins are properly inserted in the socket. The red wire (pin 1) should be at the bottom of the socket, aligned with the notch on the socket.



Take the Human Interface Assembly ribbon cable connector and insert it into the socket on the CPU circuit board marked **“STANDARD I/O CONNECTOR”**. Make

sure that all 16 pins are properly inserted in the socket. The red wire (pin 1) should be at the bottom of the socket, aligned with the notch on the socket.

[optional -- only if you are installing an expansion circuit board subassembly]



Take the Expansion Board Assembly ribbon cable connector and insert it into the socket on the CPU circuit board marked "**EXPANSION CONNECTOR**". Make sure that all 16 pins are properly inserted in the socket. The red wire (pin 1) should be at the bottom of the socket, aligned with the notch on the socket.

Your MIDIttools Computer should now look similar to the picture given on page 107 of *Digital Projects for Musicians*.

IV. INSTALL YOUR PROM

Move the lever on the ZIF socket to the open position. Insert your PROMpack's 6805 microcontroller in the socket so the notch (or pin 1) of the chip is nearest the lever arm. Verify that all 40 pins are properly inserted in the ZIF socket. Move the lever arm to lock the chip in place. **DO NOT SOLDER!**

V. FINISHING THE ENCLOSURE

A. Handheld Enclosure (Item **00040** or equivalent)

1. Place the enclosure bottom (**00051**) over the circuitry. The on/off switch should be pushed in when you do this. Be patient -- the MIDI jacks, power jack, on/off switch, and LCD contrast trimpot must all be properly aligned with the cutouts in the enclosure bottom. When you are satisfied with the alignment of the back panel components, secure the enclosure bottom to the top using the 4 sheet metal screws (**00065**).

B. Rackmount Enclosure (Item **00041** or equivalent)

1. Place the cover (**00050**) over the enclosure and secure using the 8 sheet metal screws (**00065**).
2. Your MIDIttools Computer can now be mounted in an equipment rack using the 4 rack screws (**00112**) with nylon washers (**00063**).

VI. INSTALL THE POWER SUPPLY

Make certain that the on/off switch is in the out (OFF) position. Plug the power supply (**00078**) connector in to the power jack on the back panel of your computer. Plug the other end in to an AC outlet.

VII. TURN IT ON

STOP! BEFORE YOU GO ANY FURTHER, PLEASE REREAD STEP #9 ON PAGES 112-114 OF DIGITAL PROJECTS FOR MUSICIANS. IT CONTAINS IMPORTANT INFORMATION THAT SHOULD BE READ BEFORE TURNING YOUR COMPUTER ON FOR THE FIRST TIME!

When you are ready, turn your MIDIttools Computer on. You should see a greenish light on the LCD. Adjust the LCD contrast trimpot until you see the MIDIttools welcome screen on the LCD.

VIII. TEST AND TROUBLESHOOT

If you do not see the backlighting or the welcome screen, your computer is not working. Please reread the “WHERE DO I TURN TO FOR HELP” section of the READ THIS FIRST notice included with your kit.

IX. USE YOUR MIDIttools COMPUTER

The user manual for your PROMpack can be found in Chapter 7 of *Digital Projects for Musicians*. You can make your own labels for the connectors, LEDs and switches or you can use PAVO's (if applicable).