

Construction Notes – KA7EXM PIC Power Meter



These notes are for general guidance only. They are not step by step instructions. If you have suggestions for additional information to add to these notes, let me know and I will update the notes as appropriate.

There is no “correct” way of building the Power Meter kit. It has been my experience that it is easiest to build each board by starting with the smallest parts on each board and work up to the largest. Test each board after it is assembled as suggested in the article, and then interconnect the boards with the cables before you mount them in the case and test the entire unit. Only after you have tested the unit on the bench should you mount it in the case.

Read the QEX article and these notes several times before you begin construction. I will have some photos of the unit as it is being constructed on my web site in the KA7EXM section. Take your time with the SMT components, especially the IC's. It is fairly easy to do, but you need to be sure the IC is lined up with the pads when you solder the first pin to the board. I use a tooth pick, soldering aid, or other small pointed tool to move the SMT parts in place, and then use that same tool to hold them in place while I tack solder the first pin on the pad. On the IC's tack solder the first pin, check the alignment, and then solder the rest of the pins in place. Go back to the first pin when you are done with the entire chip and solder it properly.

RF Board

1. All parts are mounted on the silkscreened side of the board
2. First – Mount all the IC's including the regulators. Pin 1 of each of the three SMT IC's is oriented towards the end of the board that the AD8307 is located on (the BNC end of the board)
3. Then – mount the remaining SMT parts. C212's Positive end is beveled and it goes towards C211 and R212.
4. Finally – Mount the headers if you plan on using connectors. Pin 1 of each connector is indicated by the square pad.
5. Do not mount the BNC connector yet. At final assembly the BNC will be mounted on the front panel and then the PC board will be mounted on the spacers over the BNC connector, and then the BNC center pin will be soldered in place on the board

PIC / Display Board

The following parts are silkscreened on the board but NOT used:

C107, 108, 109, 110, 111

U103

J102, 106, 107

Pad sets marked "A" and "B"

Mount the following parts on the "non-silkscreened" side of the board:

R101, 103, 104, 106, 107, 108, 109, 110, 111, 112

C103, 104

Note that the part designation is on the silkscreened side of the board.

Mount the remaining SMT parts on the silkscreened side of the board

Mount the 40 pin socket for the PIC

Mount the crystal and the 2 LED's. D101 is red, D102 is green. The anode lead of the LED is the longer lead. It goes in the round pad. The cathode (short lead) goes in the square pad.

Mount the header pins for the connectors. J101 is a 2 pin header. J103, 104, and 105 have been supplied as 6 pin headers. J103 and 105 are 8 pin headers on the board, but not all pins are used, so 6 pin headers are used. Be sure that the headers are soldered in the correct 6 pins! All headers use pin 1 - the square pad.

Mount the LCD on the display board using ¼" 4-40 spacers and 1/8" 4-40 screws. The holes are tight and may need to be slightly enlarged. The electrical connection is made by using small pieces of bare wire. The 16 holes (all on one edge of the board) line up – board to board.

Interconnection Cables

Note: The way the boards are mounted in the case result in the connections from one board to the other lining up from board to board. None of the wires cross each other going between the boards.

See Figure 6 in the QEX article for the header size and number of pins used on each header for each cable

Make the cables without the feedthrough caps for testing. P104/204 and P105/205 will be cut in half after testing to install in the final unit.

P104/204 - 6" long

P105/205 - 6" long

P103 - 3" long, connector at one end only.

Connect cables and test boards as per the QEX article before mounting in the case.

Final Assembly

After a successful test, cut the two cables at their mid-point so that the feedthrus can be put in the circuit.

The ground wires on P204 and P205 are connected to a 4-40 solder lug. The remaining wires are each connected (soldered) to the non-threaded end of a feedthru capacitor.

The feedthrus (a nut and lockwasher for each feedthru are supplied) are mounted on the shield plate. The mounting lip on the shield goes down when it is mounted in the case. The feedthrus mount from the bottom up so that the nut and lock washer holding the feedthru in place are on top of the shield. The ground lug is mounted under one of the feedthrus.

Mount the BNC connector on the front panel.

Mount the RF board in the case using 3/8" 4-40 spacers and 1/4" 4-40 screws. Black screws are supplied for mounting to the front panel and regular finish screws are supplied for attaching the PC board to the spacers. Before mounting the board in the case, solder a short length of bare wire thru one of the ground pads for the BNC connector on the PC board. When the board is put in place, feed the wire thru the BNC ground lug to provide a short RF path for Ground between the board and the connector. Solder the ground wire to the lug and the center pin of the BNC connector to the PC board

Mount the shield in place in the case using 4-40 hardware (black 1/4" screws and regular finish nuts). I found it was easier to connect the connectors to the RF PC board before mounting the shield in place.

Solder the cables for P104 and 105 to the feedthrus on the top of the shield. Put a ground lug under one of the mounting nuts for a feedthru for the ground wire in the P204 and P205 cables.

Mount the push buttons and solder the wires for ground and P103.

Mount the display board using 6-32 hardware and spacers. Black screws are supplied for mounting on the front panel.

Mount the battery holder using double sided tape (not supplied).

Connect the plugs to the board and power it up!



