
Section 6: Power-up and Test

[] Prepare for the Tests

When first ready to apply power to the newly-assembled Micro908, position the pc board on the bench (without the enclosure) and with the LCD and controls side facing up. This will enable you to more easily see the components and you can spot gross problems (like exploding capacitors, smoking regulators, etc.) as soon as they occur.

Make sure the shunt (small, black 1x2 position jumper socket) is removed from P3.

Install the HC908 Daughtercard. Make certain the Heartbeat LED is oriented toward the bottom of the Micro908 pc board, as shown in Appendix E: Fully-Assembled PC Board

Do not install the DDS Daughtercard yet.

Do not install the DSP Daughtercard yet.

It's a good practice to use a current-limited external power supply when first testing out projects like the Micro908. You can set the maximum current to be about 500ma and be assured that a short circuit will not blast away circuit traces in the process of first applying power. A good alternative is to power the project from a battery on the bench. The similar effect can be gained by the natural limits of a battery to supply lots of current.

[] Apply power and see display on LCD

After plugging in the power supply and moving the Power slide switch to the ON position (up), you will see the approximate power supply voltage displayed in the LCD for about ½ second, then the LCD will display the “main menu” message of “AA908 v2.0” on the first line, and “Select Command” on the second line.. If you don't see this indication on the LCD, proceed to the Troubleshooting section.

[] Press MODE Pushbutton and see Frequency, SWR, R and X display on LCD

Pressing MODE pushbutton (also called the Manual Mode) will the displayed values for frequency, SWR, R and X displayed on the LCD. (You might need to turn the Dial a bit to see the full display appear.) The readings for SWR, R and X will be meaningless at this point since you do not yet have the DDS Daughtercard (i.e., the RF signal source) installed.

[] Turn Dial to Change Frequency

Turning the Dial will result in changing the displayed frequency, starting at the digit that has the underline cursor beneath it. This digit will be the 10 kHz digit.

[] Press and Turn Dial to Change Cursor Position

When you press-and-turn the Dial, the underscore cursor will move to the next-higher (or next-lower) digit in the frequency display, thus allowing you to change frequency at a more (or less) rapid rate. The cursor will stop at the rightmost digit despite further clockwise rotation of the Dial, thereby providing 10 Hz increments as the smallest allowable. Similarly, the cursor will stop at the leftmost position despite further counterclockwise rotation of the Dial, thereby providing 10 MHz as the greatest incrementing value of frequency.

[] Press the BAND Pushbutton to Select Band

You can press the BAND pushbutton at any time to select one of four bands segments to automatically scan when you later press the SCAN pushbutton. The band segments are 1-10 MHz, 10-20 MHz, 20-30 MHz and “Custom Band”. (The Custom Band uses start/end limits that were previously set in the Configuration menus, discussed later.) The different Band segments are sequentially displayed while turning the Dial. A band is selected by pressing the Dial when the desired band is displayed. Once a band is selected, the display will show the Main display (“AA908 v2.0” / “Select Function”).

[] Press the SCAN Pushbutton to Scan the Band

When you press the SCAN pushbutton, you initiate an automatic scan of the selected band. The LED is illuminated and the internal DDS signal generator is automatically set to the Start frequency for that band and the SWR is determined. The frequency is incremented by the Step value (default of 10 kHz and user-settable in Config) and the SWR is determined at this point. This sequence continues throughout the entire band until the End frequency is reached. Throughout the scanning, the software saves the frequency that yielded the lowest SWR and when the scan is complete, control is given to the Mode function that displays that point of lowest SWR. The display will show the frequency, SWR, R and X values for that point and the user is able to manually control the instrument as described in the Mode section above. Since the DDS signal generator is not yet installed, the Scan will likely exit showing a frequency of 1,000.00 MHz and an SWR of '>10'.

This is okay for now. If the LED did not illuminate at the start of the Scan, and turn off at the end of the Scan, make a note to visit the Troubleshooting section later on.

[] **Press the CONFIG Pushbutton to get into the Configuration Menus**

The CONFIG pushbutton may be pressed at any time to access the Configuration menus. Please refer to the Micro908 Technical Reference and Operation Guide for a complete description of the available functions in this mode. But in summary, the user is allowed to specify Start/End frequencies and Step size for a Custom Band, turn the Tones On/Off, Update the Software, turn on DEBUG Mode, access the low-level Debug Monitor (HCmon), Display the battery voltage, Calibrate the instrument, and Exit back to the Main display.

[] **Select TONE ON to hear Audio Indication of SWR**

While in the Configuration menus, turn the Dial until 'Tone ON' is displayed and then press the Dial to select it. Rotate the Dial until 'Exit' is displayed and press the Dial to exit. A message on the second line of the LCD will indicate that the changed settings are being saved (to nonvolatile EEPROM memory) and then the Main display will show once again. Press the MODE pushbutton to see the frequency display in Manual Mode and immediately hear a high-pitched tone coming from the speaker, indicating that a high SWR reading is currently being displayed. If you do not hear a tone, make a note of later checking it out in the Troubleshooting section. When we later install the DDS Daughtercard and an antenna (or dummy antenna), you will note a variable pitch being generated when the Dial is tuned through a resonance. A lower tone indicates a lower SWR being measured. In order to preserve your sanity (and hearing) during the remainder of the tests, go back into Configuration menu to turn the Tone OFF.

[] **Select 'Debug Monitor' from Configuration Menus**

You will test the RS232 serial port on the Micro908 now, so connect a 9-pin, "straight-through" serial cable (not a "null modem cable") between your Micro908 pc board (connector J2) and a PC running a dumb terminal program such as HyperTerm. Configure the terminal program to run with settings of "9600 N81" (9600 baud, No parity, 8 bits, 1 stop bit). In the Micro908 Configuration menu, select 'Debug Monitor' and see a line of data displayed on the PC screen that shows "HCmon>" and intelligible letters and numbers following it. If you do not see this indication on the PC screen, make a note to check it out in the Troubleshooting section.

[] **Turn the Micro908 power switch S1 to OFF**

[] **Install the upgraded DDS Daughtercard**

After making the improvements to the DDS Daughtercard (per the simple instructions provided in Appendix E), install the DDS card into its connector J10.

[] **Turn on the power to the Micro908**

After siding S1 back to ON, check that there is no smoke, sizzle or unexplained flashes of light coming from your DDS Daughtercard. The DDS chip, the MAV amplifier and the R4 bias resistor will indeed get warm to the touch, but not excessively so. If they do, power down immediately and go to the Troubleshooting section.

[] **Attach Dummy Antenna to BNC connector J1**

We're going to measure some antenna characteristics here so you'll need a load. Ideally at this point, you should connect a "dummy antenna" that you might have previously prepared, per Appendix F. Alternatively, you can connect an antenna that is known-resonant at some frequency within the HF bands.

[] **Get into Manual Mode (MODE Pushbutton) and See Measurements Change**

When you get into the Manual mode (by pressing MODE pushbutton), move the frequency up/down until you see a dip occur in the SWR display, indicating that you are approaching the resonant point of the dummy antenna. When you have found the minimum SWR "dip", move the cursor to the next lower position (by press-and-turning the Dial to move the underscore cursor) and continue turning the Dial to get finer resolution of the minimum SWR point. If you do not see this SWR dip condition happening, go to the Troubleshooting section to dig into the problem.

[] **Select the Band that has the Resonance and SCAN**

Make sure you have selected the Band that contains the known-resonant frequency (1-10, 10-20 or 20-30 MHz) and press SCAN. The instrument will scan the band, and at the end it will display the antenna characteristics (SWR, R and X) found at the point of minimum detected SWR.

[] Calibrate the Micro908 reflectometer channels for gain

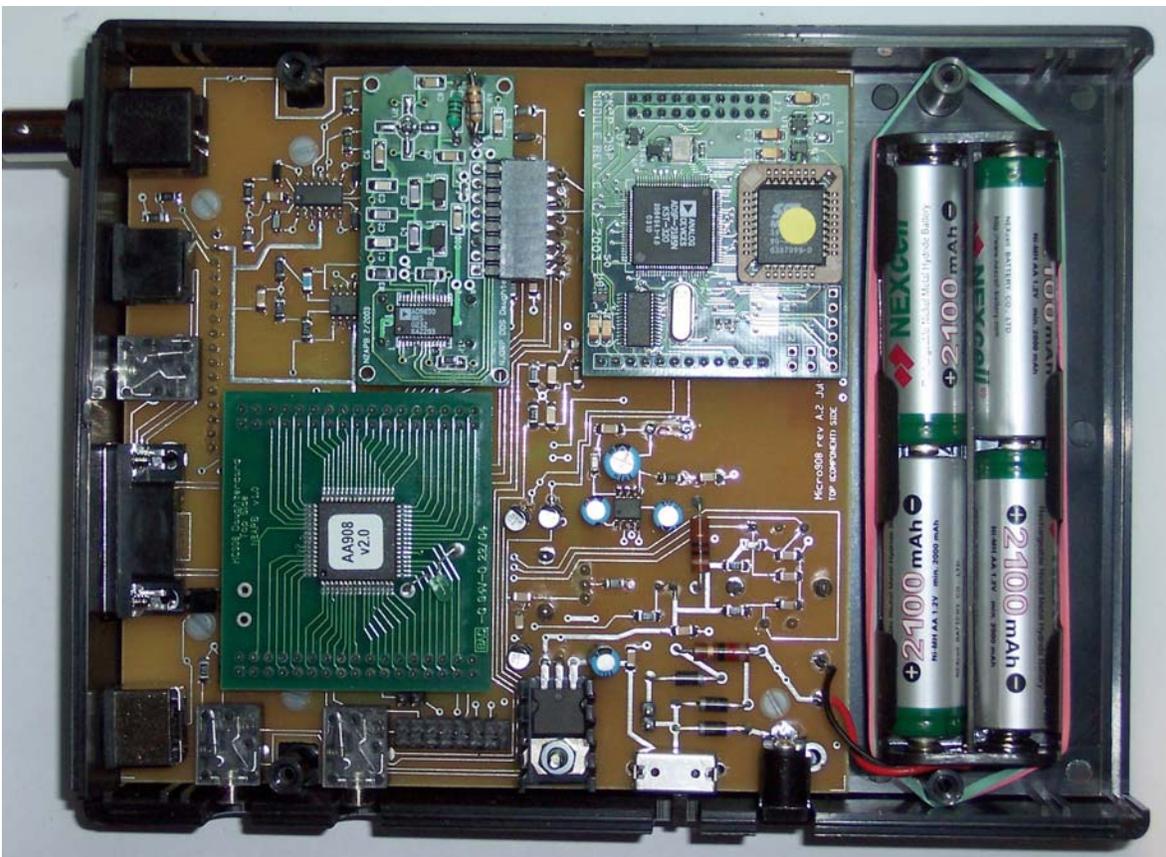
The “calibrate” function is only available starting with version 3.0, so if you don’t yet have this latest software, please download and install it per the instructions given in Appendix G. Once this is done, you can select the Calibrate function from the Config menus and just follow the directions given in the LCD. The calibration steps include:

- 1) Ensuring that no channel exceeds the range of the A/D converter for an open circuit (i.e., no load on J1). You will be instructed to adjust the trim pot on the DDS card such that none of the open circuit voltages displayed on the LCD are approaching FF.
- 2) You will place a 50-ohm load on J1 and press the Dial to continue.
- 3) You will place a 100-ohm load on J1 and press the Dial to continue.
- 4) You will place a 270-ohm load on J1 and press the Dial to continue.

Section 7: Installing the PCB in the Enclosure

Now that the functional tests are complete, you can finish the final assembly of the Micro908 by installing it into the enclosure. (NOTE: The enclosure is an optional item and may not have been purchased. If this is the case, you are done!) Refer to the Mechanical Assembly diagram in Appendix E for a detailed “exploded view” described in this section.

When this section is complete, your Micro908 will look something like the photo below.



Fully-Assembled Micro908 PCB mounted in the Top Shell of the Enclosure