

Appendix 2

PI 4100 OPERATION QUICK REFERENCE

The 4100 has on-screen help for most operations. In the menu use up & down arrow keys to go to an item. To select a digit to change use left & right arrow keys. To change the digit value use up & down arrow keys.

Turn the 4100 on: Press POWER/BKLT until text appears.

Turn the backlight on/off: Short press of POWER/BKLT.

Turn the 4100 off: Press POWER/BKLT until text disappears, in approximately 2 sec.

Set frequency and get GPS-derived distance, azimuth, bearing, and time: Press MENU, press SELECT to get Tx select, choose frequency, press MENU two times.

Enter station data needed to get GPS-derived data: Press MENU, choose Tx add, follow on-screen help to enter the antenna latitude and longitude and the declination/variation. For declination go to: www.ngdc.noaa.gov/geomagmodels/Declination.jsp.

Set frequency: (no GPS-derived data) Press FREQ SET. Change frequency digits using on-screen help.

Preset a frequency: 1) Select the frequency in MENU - Tx select; 2) press FREQ PRESET; hold down an Fn key until a beep is heard.

Set frequency using presets: Press FREQ PRESET; give a short press of the Fn key for the frequency.

Listen to audio: Press AUDIO. To change the level through four steps press AUDIO for each change. To turn audio off press AUDIO for at least 2 sec. To use headphones and mute the speaker, plug phones into the rear jack.

Point the 4100 loop antenna using GPS-derived data: Note the on-screen BRG (bearing) reading and rotate the 4100 with the loop vertical until the compass reading equals the BRG reading.

Start a self-calibration: Set the frequency; hold down LPF until CAL in a box appears on the screen.

Reduce field strength reading variations: Short press of LPF, LPF1 on display changes to LPF2; for less variation and slower response press LPF again, display shows LPF3. To return to normal response press LPF again, display shows LPF1.

Hold a field strength reading on the display: Press HOLD. To exit hold press HOLD or SAVE.

Save a field strength reading: Press SAVE, enter SAVE screen data as desired per on-screen help, press SAVE again.

Enter SAVE screen data for later use: Press SAVE, enter data, press MENU.

Delete a measurement record: Press DELETE, go to the desired record, press SELECT to delete it.

Change the units in which field strength is displayed: Press MENU, go to Fld Str 1 or Fld Str 2, follow on-screen help.

View a spectrum showing dB below the carrier (dBc): Set the center frequency on the field strength screen and press MODE once.

View a spectrum showing dBc with peak hold: Do as for dBc above but press MODE two times. The 4100 needs a stable mount for this.

View a spectrum showing absolute field strength: Press MODE three times.

Change the spectrum span (sweep width): Press MENU, go to Spectrum kHz: 128 45, follow on-screen help.

Go to the field strength screen from a spectrum screen: Repeat presses of MODE until the field strength screen appears.

Measure a harmonic in dB below the carrier (dBc): Set the desired carrier frequency, position the 4100 for a field strength reading between 300mV/m and 3 V/m (110 - 130 dBuV/m), press MENU, go to Harmonic: 1 2 3 4 5, follow on-screen help to choose a harmonic and return to the field strength screen.

Measure RF voltage: Press MENU, go to Input: LoopAnt RF in. Press the right arrow key to change to RF in and press MENU. Connect the source to the rear RF In connector (Input R = 2500 Ohms, Vmax = 40 Vrms). To return to field strength reading press MENU, go to Input, press the left arrow key to change to LoopAnt, press MENU.

Display local time correctly: Press MENU, go to UTC Offset, enter the difference between UTC and local time (for US EST, enter -05h00m).

Use the loop antenna to drive a spectrum analyzer: Connect the RF Out connector to the spectrum analyzer input. The level for a 1 V/m (120 dBuV/m) field is 28 mVrms (89 dBuV) in $50 \Omega \pm 0.5 \text{ dB}$, 200 kHz - 5 MHz. To obtain field strength from the analyzer display multiply by 35.5 or add 31 dB.

Check/Change the GPS datum: Press MENU, go to GPS Datum, follow on-screen help.

Set the time of non-use for automatic turnoff: Press MENU, go to Auto off:, follow on-screen help.

Check the need for battery charging: Read the battery voltage on the display at the upper right. Less than 7.0V indicates less than one hour of operation remaining. The 4100 turns itself off at 6.0V.

Charge the battery: Connect the charging supply output cord to the 4100's charging connector (rear, upper right, middle connector) and connect the line input power cord to the line. Or, connect the vehicle charging cord to the 4100 and to the vehicle lighter socket. A full charge takes three hours, a partial charge is OK, the 4100 can be on or off. Voltage required is 11-15V, negative ground, 1.3 A, 2.1 mm connector.

Replace the battery: Pull the battery door open (bottom of front panel) starting with the upper left corner. Pull the battery pack out, disconnect it (press on the tab at the battery side of the connector), connect the replacement pack, insert it with its cable to the right, and push the connector under the battery. Close the door, pressing its side edges and then its top edge until it snaps in all around.

Download measurement data to a computer: Install and open the 4100 Data Downloader program supplied. Connect a USB A to B cable with the B plug to the 4100 (rear, upper right, lower connector). The 4100 can be off; if it is on, it will go off when the cable is connected. Click the Download button specify a .csv file name and destination, and click **Save**. All data records in the 4100 are then downloaded. Open the .csv file in a spreadsheet program where selected items can go to a data sheet template. Downloader program buttons indicate other tasks it can do.

Get a dc output voltage proportional to field strength in dBuV/m: Connect to the RF In BNC connector. The open-circuit (no load) output level is 1.0 V at 100 dBuV/m.