**Optional hardware to add when assembling the Main board.**

There are a set of options that can be selected and added to the Main board either during the initial build, or later as needed to provide enhanced hardware functionalities. In it’s simplest form, the Main board is 100% compatible with previous versions of the T41 hardware. However, with a few low-cost components, the hardware configuration can support an add-on “scanned” switch matrix and encoder “front panel” module, an accessory connector for built in advanced diagnostics and testing, and a start-up/ shut-down module that can run user specific code in the Teensy during radio start-up and shut-down.

Please read the following paragraphs… select the options you want to customize your T41 in advance of warming up your soldering iron.

**OPTION:** A base built Main board supports the V010/V011 switch matrix and four encoders. If you will use this configuration, populate the “front panel” and “encoder” locations with 2x5 pin male IDC connectors for the encoders, and connect the analog switch matrix board to pins 1 (GND), 9 (SW), and 10 (3.3V)of the front panel connector as was done on the V011 main board. However, if you decide to add the scanned front panel module, leave the “encoder” 2x5 pin male IDC box connector off the board. The front panel module will plug into the 2x5 pin male IDC box connector labeled “front panel”. No other hardware changes are necessary.

**OPTION:** To prepare the main board for advanced diagnostics and testing, populate the Acc connector with a 2x4 IDC male box connector, or a 2x4 row of male IDC pins.

**OPTION:** The on-off switch module is a clever way to electronically turn the T41 radio on and off with a FET. Like the V010/V011 power supply board, the basic design provides reverse polarity protection. It also incorporates a small ATTINY85 processor programmed to communicate with the Teensy such that when the off button is pressed, it tells the Teensy to execute a “shutdown” routine with user code (examples: save selected parameters, last band and mode, volume, etc., custom shut down screen, stay active with screen saver, etc.). When the Teensy has completed the shut down routine, it communicates back to the ATTINY85 to complete the shut down and turn the radio off.

If you want to build the on-off module hardware in the red box on the V012.6 schematic, populate the main board with the thirteen parts shown in red on the BOM. A pre-programmed ATTINY85 was shipped with your V012 board sets. If you don’t want to use this module, please populate the two parts shown in the blue box on the schematic and blue on the BOM to provide reverse polarity protection.

**OPTION:** The display voltage is now selectable between 3.3V or 5V by the placement of the jumper on J2. Make sure the voltage is selected properly before connecting the display or you may damage it.

**OPTION:** Note that on the V012 main board, three I2C busses are brought out for use by add on modules. Buss “0” is available on pins 1 and 3 of the “rf control” connector, buss “1” is available on pins 5 and 7 of the “front panel” connector, and buss “2” is available on pins 5 and 7 of the “bands” connector. While some functions of the T41 are controlled with these I2C busses, there are plenty of unused addresses left for experimentation.

Two pins on the “bands” connector, pins 6 and 8 have been brought out for reading FOR and REF power when connected to an inexpensive line section. If the front panel module option is used, all pins on the “encoders” connector can be repurposed for external modules and experimentation.