The KW5GP Universal Shield

Huntsville Rebelthon Version

The KW5GP Universal Shield adds Bandswitching capability along with easy interfacing to various displays and the chipKIT's I^2C bus. The display and I^2C power is selectable between 3.3V and 5V to accommodate a larger selection of devices. The Huntsville Rebelthon version is a slimmed-down version of the KW5GP Universal Shield used in my "Limited Edition" Rebel that incorporates the Rebelthon features along with a front panel-mounted 128x64 OLED, GPS, 8 pin I/O port expander and the EMIC 2 Text-To-Speech Synthesizer.

- Bandswitching is done using dual-coil latching relays so no relay power is needed during normal operation once the band has been selected at Power-On. The Rebel Power switch is replaced with a DPDT Center-Off switch to support Bandswitching.
- The Rebelthon Version uses the Nokia 5110 Graphic LCD Display
- Uses a standard Arduino Prototyping Shield modified for use with the chipKIT Uno32
- The sketch includes support for Bandswitching and the Nokia Display

Huntsville Rebelthon Universal Shield Parts List

Huntsville Rebelthon Universal Shield Assembly

- R1, R2 – 10KΩ 1/8W Resistor
- R3, R4 - 220Ω 1/8W Resistor
- D1, D2 – 1N4001 or equivalent Diode
- K1, K2 – NEC EA2-5TNFG 5v Dual Coil Latching Relay
- T1, T2 – 2N2222A NPN Transistor
- J1 – 3 Pin DuPont-style 2.54mm Right Angle Header
- J2 - 5 Pin DuPont-style 2.54mm Right Angle Header
- J3 - 8 Pin DuPont-style 2.54mm Right Angle Header
- J4 - 12 Pin DuPont-style 2.54mm Right Angle Header
- JP1 – JP4 – 3 Pin DuPont-style 2.54 Header Sockets and cable assembly
- 2 pin DuPont-style 2.54mm Shorting Jumper Block

Nokia 5110 LCD Display Assembly

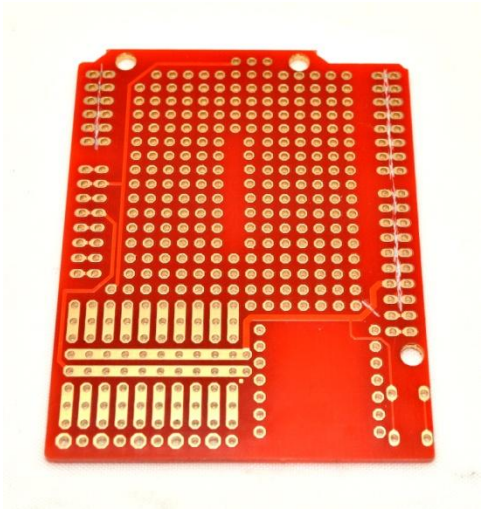
- 8 Pin DuPont-style 2.54mm Header Socket Nokia Display Cable
- 470Ω 1/8W Resistor

S1 – DPDT – Center-Off Switch with 2 Pin DuPont-style 2.54 Header Socket and cable assembly

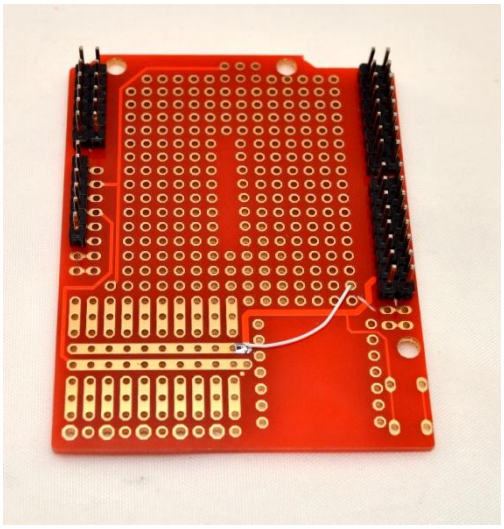
DuPont-style 2.54 Header Pins (qty 2)

Huntsville Rebelthon Universal Shield Construction

1. Modify a standard Arduino Prototyping Shield to use with the Rebel chipKIT Uno32
    a. Cut the links between the pads on J5, J6 and J7 on the Arduino Prototyping Shield
    b. Cut the trace between the Prototyping Shield Ground Bus and Pins 40 and G on J5



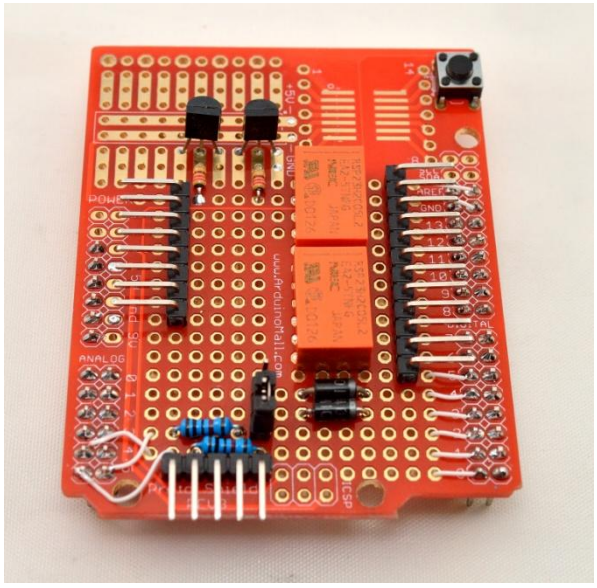
    c. Install DuPont-style 2.54mm Header Pins in J2, J5, J6 and J7 on the Prototyping Shield
    d. Connect the Prototyping Shield Ground Bus to pin G



e. This completes the Arduino Prototyping Shield Modifications for the chipKit Uno32

2. Install the Universal Shield components on the Prototyping Shield per the schematic diagram and photo.

   a. The Shorting Jumper Block is used to select between 3.3V and 5V on the I^2C and LCD Interface connectors



3. Construct an 8 conductor patch cable with 8-Pin DuPont-Style 2.54mm Header Sockets to connect the Nokia 5110 Display to the Universal Shield. Note: Only 7 pins are required to

connect the Nokia Display. Ribbon cable works best for fitting through the Rebel rear access panel.

   a. Solder a 470Ω 1/8W Resistor between the Light and GND pins on the Nokia Display for the Backlight LEDs

      i. Optionally, you can use the unused wire on the patch cable and solder the resistor to the Prototyping Shield

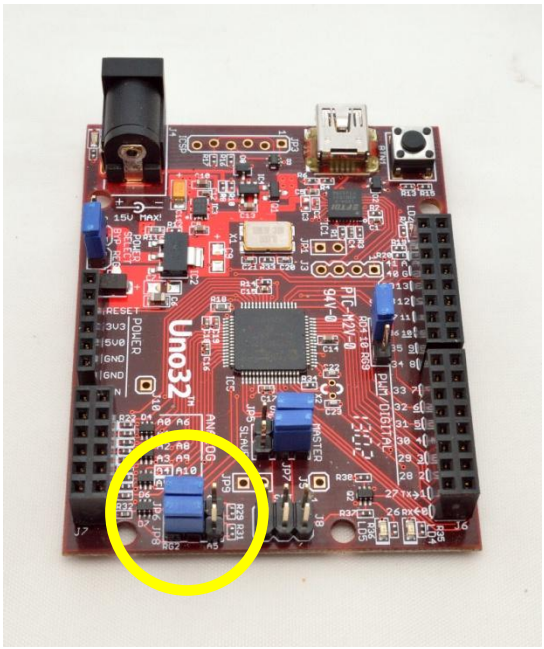
4. Construct four 3-conductor patch cables with 3 pin DuPont-style Header sockets on each end to attach the Bandswitching Relay outputs on J4 to the Jumper positions on the Rebel Main Board.
5. Construct the new Power and Bandswitching Assembly (S1) as shown in the schematic. Use 2 DuPont-style Header Socket pins to connect to the power side of the switch. These will be used to attach the new power switch to header pins that will be soldered on the Rebel Main Board.

   a. Construct a 2-conductor cable with a 2-pin DuPont-style Header Socket to attach between the new power switch and the 20/40m Band Select Jumper on the Rebel Main Board.

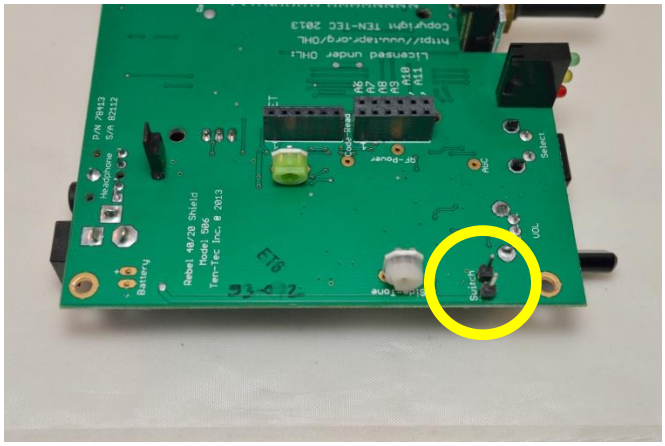
6. This completes the preparation of the Universal Shield Modification.

Huntsville Rebelthon Rebel Modification Instructions

1. Remove the 4 screws on the side of the Rebel Top Cover
2. Remove the Rebel Top Cover
3. Remove the Front Panel Knobs and pull the LED from its mounting hole in the Ten-Tec Logo
    a. The Allen Wrench needed to remove the knobs is .05” or 1.27mm (both have worked for me)
4. Remove the nut holding the Power Switch and pull the power switch from the mounting hole
5. Remove the 4 screws on the **outer edge** of the Rebel circuit board assembly.
    a. **Do not remove** the screws next to the frequency dial encoder
    b. **Do not remove** the screw directly behind the LED
6. Remove the Rebel circuit board assembly
    a. Verify that Jumpers JP6 and JP8 on the chipKIT Uno32 are in the RG2 and RG3 positions as shown
    b. If not, remove the chipKIT and move the jumpers to the proper position



7. Desolder the 2 power switch wires from the Rebel circuit board assembly
8. Solder the DuPont-style Header pins in the Power Switch holes on the Rebel circuit board assembly as shown



9. Reinstall the Rebel circuit board assembly
    a. Place the LED back in its mounting hole in the Ten-Tec Logo

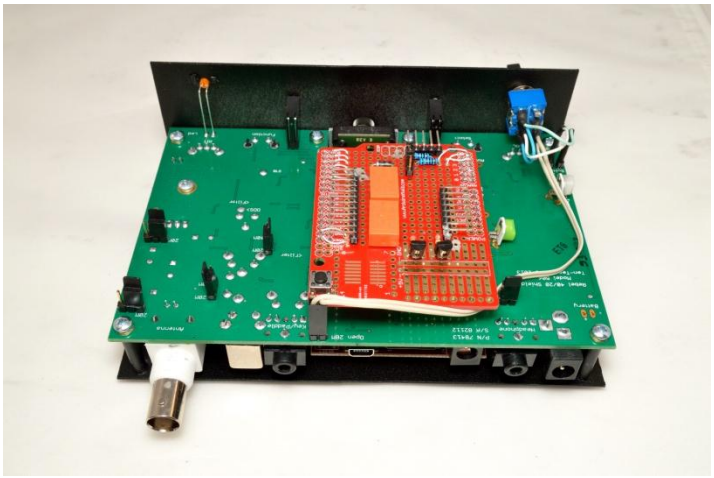
10. Install the modified Power Switch Assembly as shown

    a. Connect the 2 power wires to the jumper pins installed in Step 8

    b. Replace the 20/40m Band Select Jumper on the Rebel circuit board assembly with the 2 pin header socket

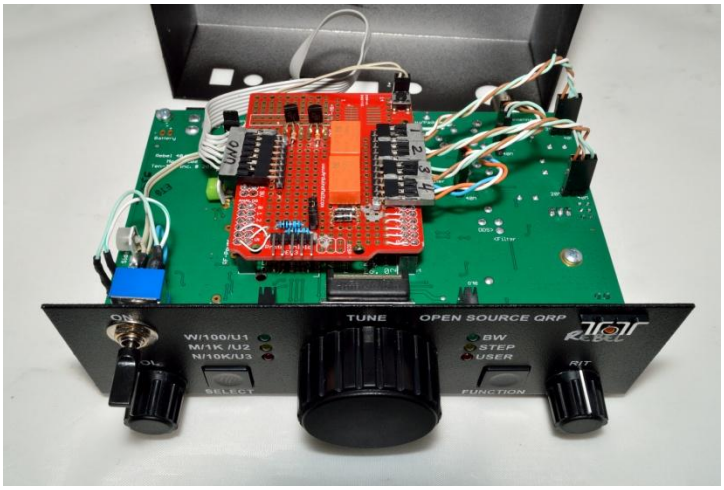
11. Reattach the Rebel Front Panel Knobs

12. Install the Rebelthon Universal Shield on the chipKIT header pins on top of the Rebel circuit board assembly as shown



13. Remove the Bandswitching jumpers on the Rebel circuit board assembly

    a. Install the Bandswitching jumper cables as shown. The silver stripe side on the Rebel circuit board connector goes to the 20m side of the header pins on the Rebel circuit board assembly. The silver stripe on the Universal Shield connector goes closest to the silver mark (Pin 1) on the 12 pin header.



14. Remove the chipKIT access plate from the Rebel Top Cover
    a. Route the Nokia Display Patch Cable through the chipKIT access hole
15. Connect the USB cable from a PC to the chipKIT Uno32 USB port.
    a. **Do not** connect the 12v Power Cable to the Rebel at this time
    b. Turn the Rebel Power Switch to the Off (center) position
    c. Upload the Rebelthon Universal Shield Software
        i. You will need to copy the LCD5110_Basic library into the MPIDE Libraries folder before compiling
    d. After the upload is complete, the Nokia Display should display 20m band information
16. Turn the Power Switch to the 40m position (up) and press the Reset button on the Universal Shield
    a. You should hear the Bandswitching Relays switch bands
    b. The Nokia display should now display 40m band information
17. Switch the Power Switch to the 20m position (down) and press the Reset button on the Universal Shield
    a. You should hear the Bandswitching Relays switch bands
    b. The Nokia display should now display 20m band information

18. Switch the Power Switch to the Off (center) position and unplug the USB cable from the chipKIT Uno32
19. Attach the Rebel Top Cover, carefully routing the Nokia Display Cable between the Rebel circuit board assembly and the chipKIT access port on the Rebel Top Cover
20. (Optional) Mount the Nokia Display in a plastic business card holder

21. Attach the Antenna, Headphones, Key and Power Cable to the Rebel
22. Turn the Rebel Power Switch On for the desired band (up for 40m, down for 20m)
23. Call CQ
    a. Repeat as necessary