

Assembly Guide for the CircuitShell GPC1 Board

Refer also to the GPC1 Parts List, GPC1 Schematic, GPC1 Component Locator and the GPC1 photos. Assembly is straightforward, but some helpful notes and suggestions follow:

Important: Note that parts in parentheses on the Component Locator drawing, such as the power indicator LED, light sensor, switches, LCD connectors, and AAA battery clips are to be mounted on the back of the board! All other components mount on the front of the board, which is labeled CircuitShell GPC1.

For a flux-free finished board, instead of rosin core solder consider using organic core type 331 in the .032 size or smaller. As soon as possible after completion wash and brush soldered areas with solution of hot water and a cleaner (such as Shout), then rinse with hot water. Thoroughly blow dry with hot air, as some parts are not approved for water wash and any water left in recesses may cause corrosion.

A square pad is used to denote the lower potential pin of electrolytic capacitors, the cathode of diodes, and Pin 1 of ICs and connectors. Parts in TO-92 package mount with the center pin recessed back from the end pins and the legend side of the package. Pad layout makes it possible to substitute surface mount parts for the TO-92 parts. Square boxes on the schematic denote pin numbers of the microcontroller. Octagonal boxes denote pin numbers of user buss connector J5.

Battery charging components F2 and Q10 are purposely located together for thermal bonding. It is recommended that a length of heat shrink tubing be slipped over the parts to draw them close together so that F2 can sense heat from Q10 and protect it from over-current conditions that may result from charging a defective or deeply discharged battery. The shrink tubing will shrink during the first charge cycle.

Select either a Lithium battery with holder or a super-cap, as B1 for the Real Time Clock (RTC) backup. If a super-cap is used, install D6 and R7 for charging if the RTC does not have a built-in charger.

Select a RTC in either a DIP8 or SO8 package. It must be I2C compatible with backup power on Pin 3.

Select either a 2x16 or 4x20 LCD display. Install R13 for additional backlight current only if the 4x20 display is used. Mount the LCD socket strip(s) on the backside of the board. It is recommended that the socket strips be no higher than 0.175 inch to insure that the installed LCD will be less than 0.65 inch high to fit under the CircuitShell cover. Clearance is especially critical in the case of the 4x20 LCD with backlight. Standoffs of 0.186 inch will let the LCD board barely clear the top of the sockets. For mating pins, save the relatively stiff wires trimmed from the 1N4148 diodes. With the LCD mounted on standoffs, insert the wires through the holes in the LCD board into the sockets, and solder them at the top of the LCD board, taking care that excessive solder does not flow down the wire into the socket.

The LCD is interfaced as a memory device but it can also be used as a port device if resistor network RN1 is installed to provide pull-ups to Port 0. The timing specs for the LCD suggest that it will operate as a memory device only up to 9MHz crystals, but preliminary testing indicates that it works at 12MHz.

Installing all of the parts will result in a flexible general-purpose microcontroller, but a study of the schematic may reveal that some parts are unnecessary for a particular application. For instance, there is no need to install battery holders or charging components if no batteries are used.