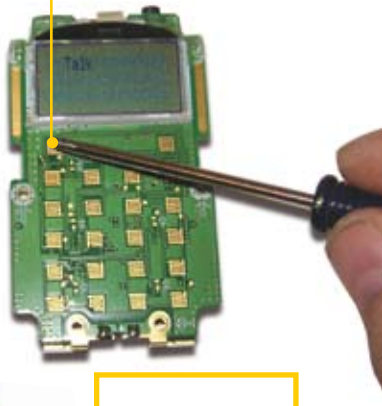
PRY FURTHER AT EDN.COM

Go to www.edn.com/070607pry for additional images of the Polycom CT12.

Breaking up: diagnosing a dropped phone

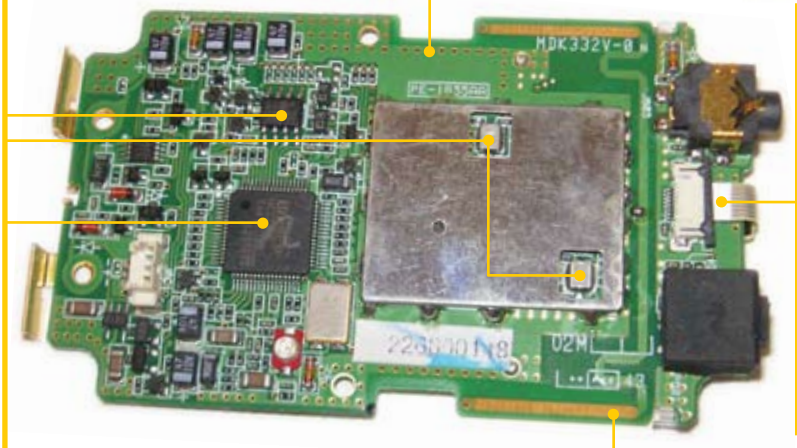
About to hang up from a conference call, I accidentally dropped Plantronics' (www.plantronics.com) Polycom CT12 portable phone. It just happened to hit the floor right on its headphone plug, breaking its solder joints. I guess the fall did more damage, because, shortly thereafter, I noticed that its audio was intermittent, so I dismantled the phone, revealing a clean, modern design. The PCB (printed-circuit board) takes up the entire phone, which works without the case—albeit with audio interference. You can more easily design, test, and repair the phone when it is without its case. The designers of the phone also addressed cost in the design phase, during which 80% of cost requirements occur. To fix the audio problem, all I had to do was touch a soldering iron to the five solder pads on the surface-mounted headphone connector. I wondered whether the solder joints would have broken if Plantronics had used a though-hole headphone jack as opposed to a surface-mounted one. The Plantronics phone, including headset, costs $70.

The phone's PCB is a complete product; to make it work, you need only to hook up the battery and touch the keypad. Some pulsating audio interference disappears when the board is in the case—a shielding component that is not essential to the function of the product. The plastic or a conductive coating inside the case most likely contains a conductive fiber to reduce RFI (radio-frequency interference).



Via stitching creates multiple low-impedance ground planes in the PCB, which has a gold-immersion finish, not just for ROHS (reduction-of-hazardous-substances) compliance, but also to prevent oxidation on the pushbutton contacts. The manufacturer soldered the charging terminals to the board, but mounting screws running through holes in the brass terminals take up the mechanical strain on the PCB's terminals.

A large metal can shields the RF components and dominates the PCB. The case has two cutouts to allow the use of components that are taller than the metal case. A 64-pin Uniden (www.uniden.com) UC2746C quad gull-wing baseband chip lies outside the metal can. A low-profile crystal oscillator sits next to the baseband chip to minimize clock-trace length. The double-layer, 31-mil-thick PCB also includes a 32-kbit Microchip (www.microchip.com) 24LC32A serial I²C EEPROM. Another eight-pin IC, most likely a regulator or battery charger, resides near the battery connector.



The connector for the LCD screen sits near the dipole antenna. The short ribbon cable has eight circuits. The length ensures a minimum of stray radiation from the cable.

Emerging from under the metal can, a dipole RF antenna has size and spacing that comply with the 2.4-GHz operating frequency of the DSSS (direct-sequence-spread-spectrum) phone. Plantronics removed the solder mask from the radiating areas of the antenna. A via at the extremity of each arm of the dipole connects to an identical trace on the other side of the board. Each of those traces then returns to the ground plane.