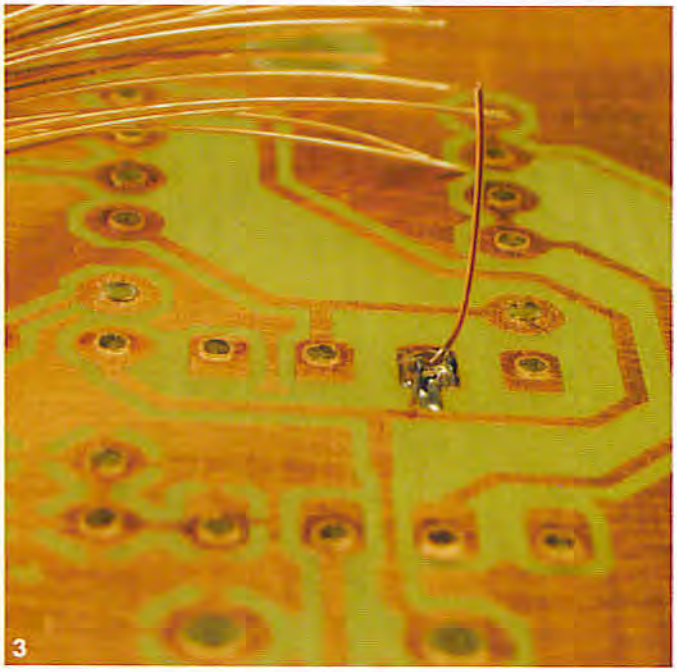
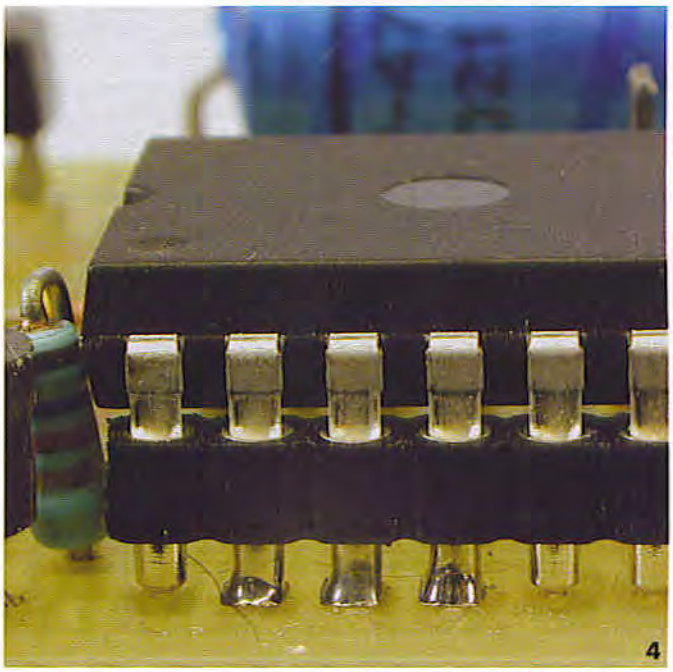


3



4

Through-hole 'plating' double-sided PCBs

Making a double-sided PCB is far from easy. It is quite a task to make sure that the artwork films with the tracks and pads are perfectly aligned on both sides. And it becomes even more difficult when both sides have to be connected at various points.

The professional PCB manufacturer uses through-hole plating: the board is drilled and a thin layer of copper is deposited in the holes that require a connection between the top and bottom side. An electrochemical process is then used to make the actual connection. This however requires specialist equipment, which won't be available in many electronics labs. Fortunately there are other methods, although they are somewhat laborious. These methods are also useful when repairing damaged double-sided boards.

The simplest solution is to solder the pins or leads of the components on both sides of the board. This is easily accomplished with conventional components (resistors, diodes, transistors, etc.), but with radial capacitors and ICs (in sockets) this is more difficult.

The second method uses Litz wire, which is often on hand in the electronics workshop. This wire consists of many thin copper strands, which are highly suitable for making connections between two sides of the board and still leave enough room in the holes for the component leads (**Figure 3**). The thin strands are soldered on the component side of the board, taking care that the solder joint doesn't rise above the board too much, and that the hole doesn't become blocked by the solder. When all connections have been made, the components can be placed on the board and soldered on the solder-side. We recommend that you use two strands per connection, thereby reducing the risk that a connection is damaged when the component pin is stuck through the board.

For DIL-IC sockets there is a much simpler method: there are contact strips that have the same type of contacts as turned-pin IC sockets. These have the advantage that they are raised slightly further above the board, providing enough room to solder the pins on both sides of the board (**Figure 4**). These strips are preferable to ordinary turned-pin sockets because the pins on the component side of the board are easier to get to with a soldering iron from both sides.

(040025-2)

Alternatives for battery-backed RAM

Many microprocessor boards include a static RAM that stores a variety of system settings. It is often desirable to keep these settings when the power supply is turned off or interrupted. For this reason a backup battery is mounted on these boards, which provides standby power to the SRAM.

At first sight, this seems a simple solution, but it is far from ideal. Batteries take up a fair amount of space on the PCB. They also need to be checked regularly for any possible leakage and that they supply the correct voltage. On modern processor boards a flash memory or EEPROM is often used, neither of which require a backup battery. Older boards can be given a new lease of life by replacing the SRAM and batteries with a modern alternative such as FRAM.

Ramtron International Corporation has introduced two ICs, the FM1608 and FM1808, which are ideal for removing the need for backup batteries in older systems, and which are of course very useful in new designs too. These are a special type of non-volatile memory, Ferroelectric RAM, which is being developed further by the manufacturer. A detailed description of the technology can be found on their website at www.ramtron.com/aboutfram. The manufacturer guarantees at least 10 billion read/write cycles and a 10-year data retention for these ICs. The best characteristic of these memories is that they are pin compatible with standard 8 K x 8 (FM1608) and 32 K x 8 (FM1808) SRAMs and EEPROMs, and can therefore be used in existing designs without having to make any drastic modifications.

There is just one aspect of the design that has to be taken into account when a 'normal' SRAM