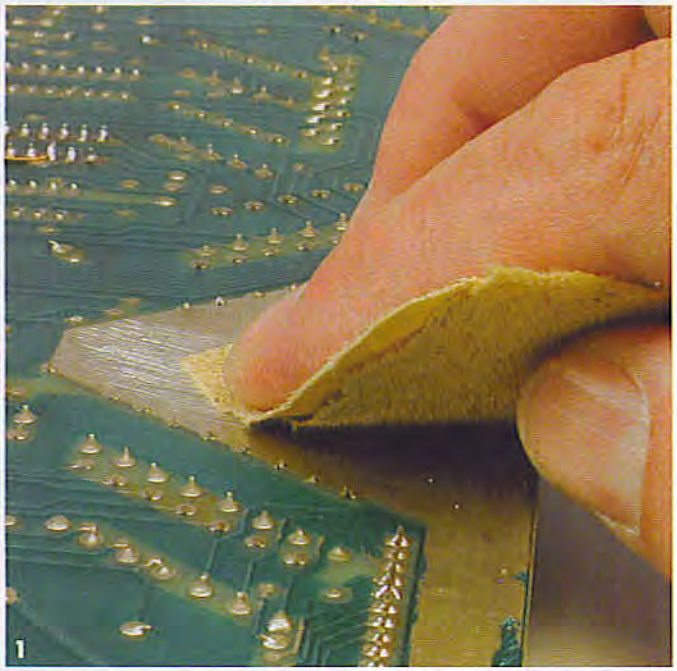

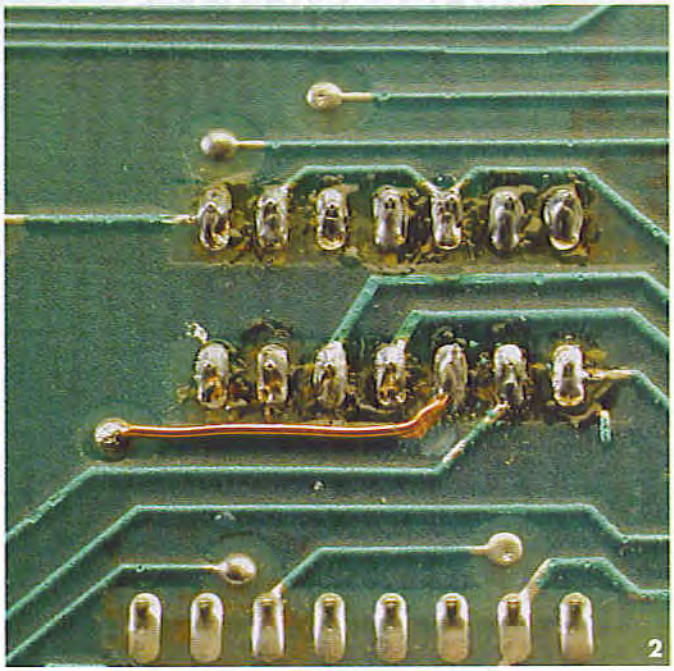

Repairing the damage caused by leaking batteries

Most of you will have suffered from this at one time or another: a torch or other battery-powered equipment has been neglected too long and the batteries started leaking. After all, these cells contain a cocktail of corrosive chemicals that will eventually find their way through the battery housing and end up in all those places where they're not wanted.
NiCad cells that are overcharged can vent the electrolyte in gas form. The metal parts in particular will be damaged by this, with disastrous consequences.
It becomes even worse when the batteries, whether in a holder or not, are mounted on a PCB. This can be the case with (older) microprocessor boards, which have, for example, a real-time clock that has to keep running, or a volatile memory that stores settings that have to be maintained when the power is turned off or lost. A leaking battery on a PCB leads to corrosion, which has both visible and invisible consequences.
When repairing this it is pointless just to polish those areas that are visibly affected; any repair has to stand the tests of time. The electrolyte can penetrate into certain materials and continue with its destructive process underneath the surface. Just cleaning the surface is therefore not enough; the only remedy is the complete removal of every bit of electrolyte.
On a PCB the corrosion can be seen in various ways. Firstly as a simple mark where the battery is mounted. Next, it can be seen as a green or white deposit on the pins, components and solder joints.

We start with the removal of all components that are on the affected part of the PCB. Use a good quality solder sucker and/or desoldering braid and keep in mind that in many cases, such as for resistors, capacitors, IC sockets and standard logic ICs, the PCB is more important than the component that has to be removed. In those cases, you can cut the connections and remove them one by one.
One problem that occurs when desoldering is that solder affected by corrosion often won't flow properly. In that case you should add some fresh solder and try it again. If you are still unsuccessful, you should sand the joint until the corrosion has gone, and try again with the solder sucker. In extreme cases you may have to use a PCB drill to restore the connections.

When all components have been removed from the corroded part of the PCB, it should be sanded with fine wet-and-dry sandpaper. Any solder resist should be removed as well; you just keep sanding until all tracks become shiny again.

To finish the job properly any remaining electrolyte has to be neutralised by rinsing the PCB in a 1:1 mixture of water and vinegar. It is often thought that all batteries contain acids, but Nicads and alkaline cells have KOH as electrolyte, which is an alkaline. Hence we need to use an acidic solution to neutralise it. After this it should be rinsed with water, dried and then cleaned with alcohol (white spirit is much cheaper, but less pure). The PCB should then be sprayed with a solder lacquer, which protects the tracks from oxidation and lets the solder flow cleanly when the PCB is repopulated.
The PCB now has to be inspected carefully, and any broken tracks have to be repaired using enamelled copper wire, cut to length. The components can then be soldered back onto the PCB.
It's quite a time-consuming job, but if it is done properly the PCB should give many years more service, unless the batteries start leaking again...

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