

Just recently I had a very expensive integrated circuit in a voltage regulator in an alternator which ceased to work correctly after someone, presumably accidentally, made a wrong connection. With nothing to lose, I used a thin-bladed knife to loosen the glue along three sides and to prise off the lid. Inside was an elegant array including what looked like a power transistor, a power diode, an integrated circuit chip, a capacitor, and what looked like several power resistors. Each of five main terminals had a flying lead of what looked like 10-amp fuse wire to a small pad in an insulated surface: all except one, that is. In the gel coating near the last pad there were a lot of black specks, which I assumed were the burnt-out remains of the fifth flying lead. Fortunately the circuit semiconductors and resistors showed no signs of overheating. I assume that this was due to the greater heat capacity produced by the components being closely bonded to the heat-sink. Once again I was able to tin the terminal pad and the terminal with a hot soldering iron and a piece of fuse wire to link the two. I then smoothed out the gel to protect against moisture. Evo-stik on the lid completed the repair and the unit is now back in its alternator and fitted in the vehicle.

Obviously not all transistors and i.c.s are worth attention when they fail. Of those which are worth attention some will be damaged beyond repair. But if the method can successfully repair a £15 i.c. or a £3 power transistor, and save the delivery time of weeks or months for some components, it is worth spending 10 minutes to have a look inside and another fifteen minutes to repair and put back together an expensive semiconductor device.

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## REPAIRING SEMICONDUCTORS

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When an expensive power transistor ceased functioning for no obvious reason I decided I had nothing to lose by opening it up. I therefore sliced off the top surface of the T03 can to investigate. The hacksaw blade had just touched one of the connecting leads inside but it was clear that the cause of the failure was a flying lead from the transistor chip having become detached.

In the absence of an ultrasonic welding kit I investigated whether I could reconnect the loose lead and found to my surprise that the transistor terminal pad was quite easily solderable. I resoldered the loose lead, glued in the sawn-off lid with epoxy resin, and the transistor has been in service ever since.