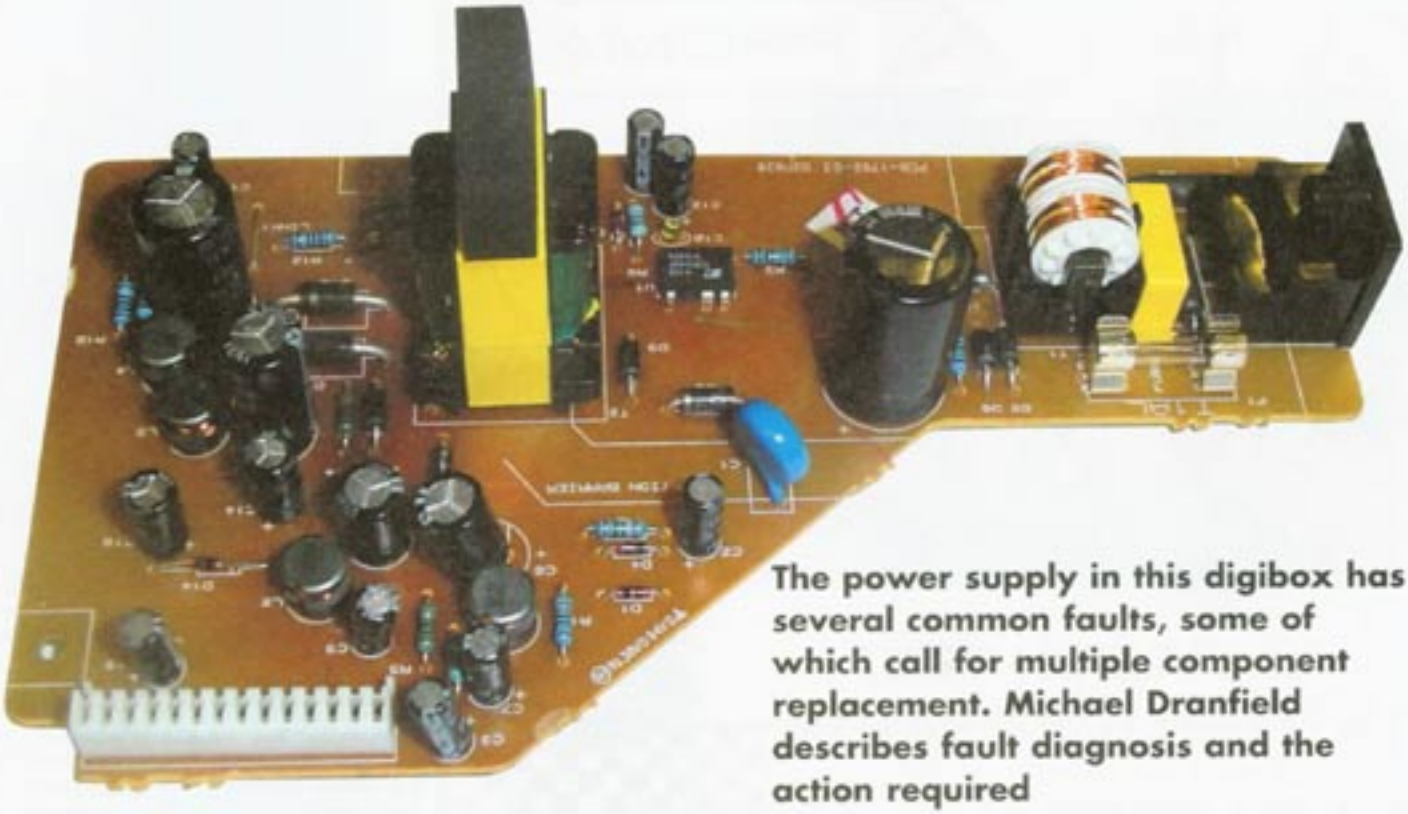

The heading photo shows the Amstrad DRX400's power supply.

The power supply in this digibox has several common faults, some of which call for multiple component replacement. Michael Dranfield describes fault diagnosis and the action required

DRX400 PSU problems

The Amstrad DRX400 digibox is becoming a regular visitor to the workshop now that it's out of warranty. Apart from failure of the Connexant CX24108-20ES front-end ZIF tuner chip, which causes signal problems, most faults occur in the power supply. As with earlier Grundig digiboxes, most failures here are caused by the use of poor-quality electrolytic capacitors.

Power supply circuit

Fig. 1 shows the circuit diagram of the power supply which, in comparison with earlier models, is remarkably simple. It's easy to work on, and fault-diagnosis is simple. There are only a handful of components on the primary side of the power supply, the main one being the TOP243P chopper/control chip U1. Regulation feedback is applied to pin 4 of this IC from the PC123 optocoupler IS01, which is driven by the TL431ACZ adjustable shunt regulator chip U2. The latter monitors the 5V and 3·3V supplies at its reference pin, via 1% resistors.

The only slightly unusual arrangement on the secondary side is the way in which the 30V supply is obtained, by a voltage-doubler circuit (D1, D4, C2, C3) that 'sits' on the unsmoothed 20V supply.

Fault diagnosis

After removing the lid, which is very difficult, a visual inspection of the power supply will usually reveal the cause of the problem.

If the power supply is dead with the mains input fuse F1 (1AT) intact, the cause is usually failure of one or both of the 1MΩ start-up resistors R3 and R13. They should both be replaced, using the 0·75W, 350V metal-film type.

If the mains input fuse is blackened and the top has blown off the chopper chip U1, the cause is the mains bridge rectifier's reservoir capacitor C5 (33μF, 400V). You will find that it's open-circuit. In addition, the 1N4007 mains bridge rectifier diodes D2, D3, D6 and D7, IS01 and the 1N4148 rectifier diode D11 will all have been damaged and will have to be replaced, even if a cold check suggests that they are OK – they can fail at switch on.

Finally there's the most serious fault. This is given away by the presence of a loose object inside the box. You will find that capacitor C6 (330μF, 25V), the reservoir capacitor for the 20V supply, has exploded. The basic cause of this is failure of C13 (2,200μF, 6·3V) or C15 (3,300μF, 6·3V). The value of either of these two capacitors can fall dramatically. As they are the reservoir capacitors for the 5V and 3·3V supplies respectively, U2 and IS01 think that one of these supplies has fallen and attempt to increase it, with the result that all the supply voltages on the secondary side rise. In this event, because of internal heating nearly all the capacitors on the secondary side of the circuit will have fallen in value. For any chance of long-term reliability, the whole lot must be replaced. Despite this rise of voltages on the secondary side of the circuit, I have yet to find any damage on the main board.

After carrying out a repair I always give the PCB a good clean with Electrolube FLU Fluxclene, which is available from SEME, and dry it with a hairdryer to give a perfect finish.

Repair kits

As a result of the experiences described above, SatCure has produced two reliability kits, one to upgrade the primary side of the power supply and the other for the secondary side. The part numbers are RELKIT42 and SATKIT42. To order, or for further details, go to the website at www.satcure.co.uk ■

Author: Michael Dranfield

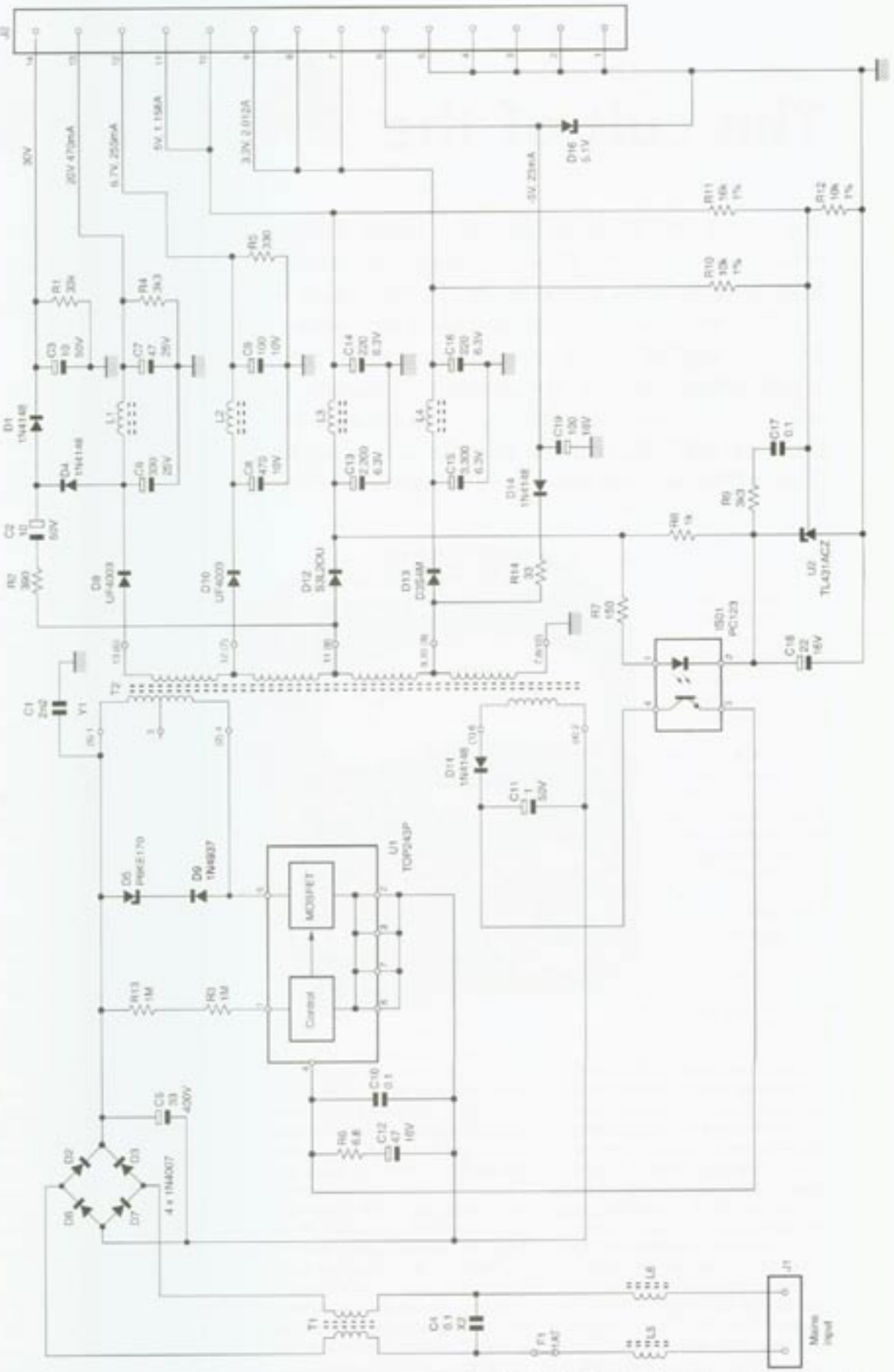

Fig. 1: Circuit diagram of the power supply in the Amstrad digibox Model DRX400. The numbers shown in brackets at the connections to chopper transformer T2 are for an alternative type used in some of these digiboxes.