SC/MP power supply

Although this power supply is primarily intended for use with the SC/MP system, its general-purpose design renders it suitable for other microcomputer systems as well.

As has already been mentioned earlier in the series, the NMOS version of the SC/MP in particular places fairly high demands upon the stability of the supply (V_{CC} = 5 V ± 5%). Although a 5 V stabiliser IC would normally prove adequate for this purpose, it could happen that a 'worst case' IC together with the voltage loss in the supply lines and board tracks would result in the voltage on the chip dropping below minimum. For this reason it is desirable to have a stabilised supply which can be adjusted so that the IC voltage can be set exactly. A complete SC/MP system consisting of RAM I/O, CPU and memory extension cards, HEX I/O and 4-k RAM draws a current of approximately 2.5 A from the 5 V supply. The power supply must therefore have no trouble delivering this current, whilst keeping something in reserve for possible expansion of the system. In addition to the +5 V a negative voltage of −12 V must also be provided for the PROMs.

Circuit

A power supply which meets all the above requirements is shown in figure 1. A 723 (IC1) is used to stabilise the +5 V supply. By means of the preset potentiometer P1 the output voltage can be varied between 5 V and 5.5 V. T1 and T2 are external current booster transistors, the output current being limited to approx. 3 A. If, for the purpose of system expansion, more current is required, then the value of the current sense resistor R5 can be lowered to 0.1 Ω/4 W. The maximum current will

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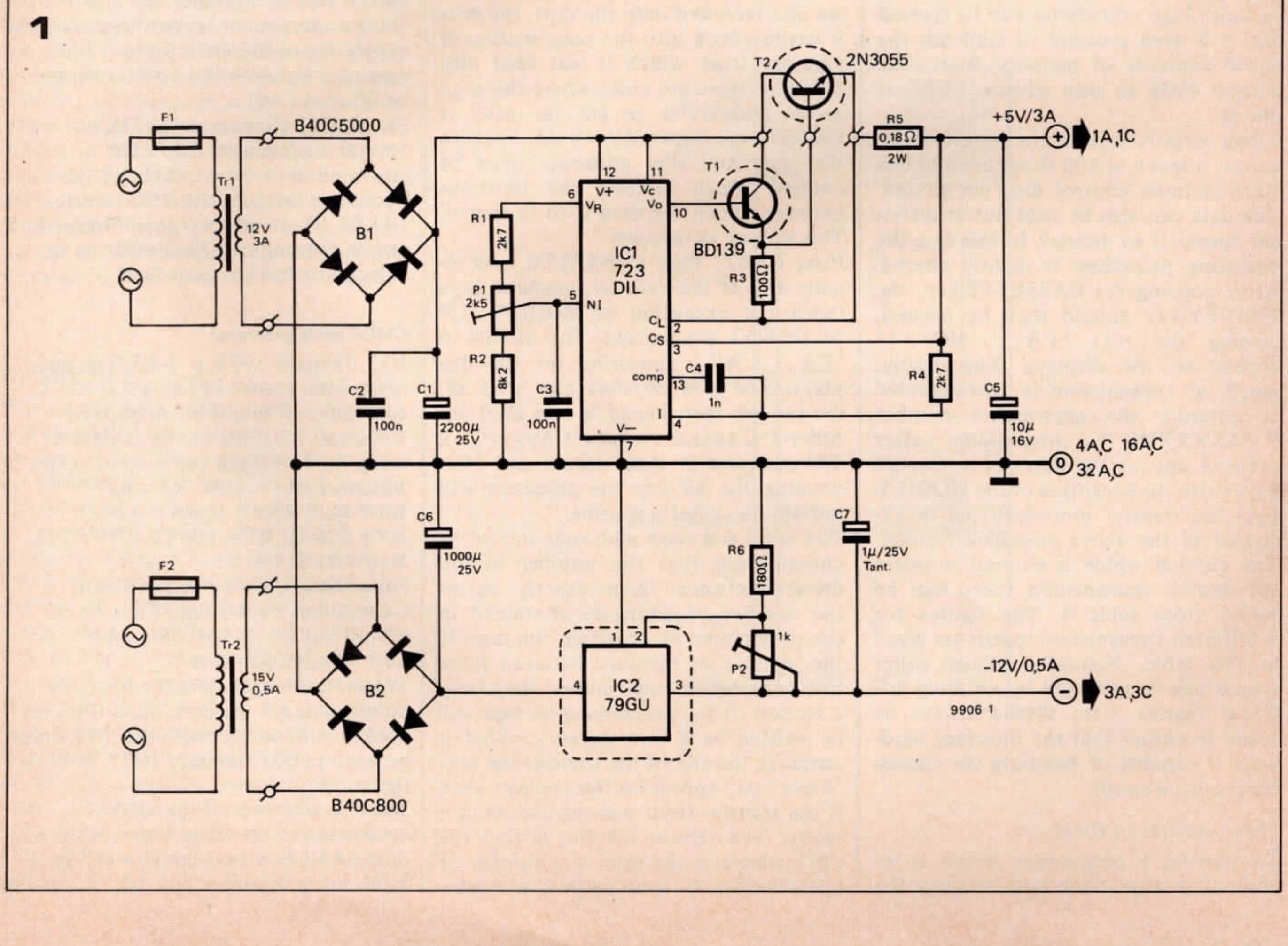

Parts list to figures 1, 2 and 3

Resistors:
R1,R4 = 2k7
R2 = 8k2
R3 = 100 Ω
R5 = 0,18 Ω/2 W
(see text)
R6 = 180 Ω
P1 = 2k5
P2 = 1 k

Capacitors:
C1 = 2200 μ/25 V
(see text)
C2,C3 = 100 n
C4 = 1 n
C5 = 10 μ/16 V
C6 = 1000 μ/25 V
C7 = 1 μ/25 V tantalum

Semiconductors:
IC1 = 723
IC2 = 79G
T1 = BD 137, BD 139
T2 = 2N3055
B1 = B40 C5000 40 V
5 A bridge rectifier
(see text)
B2 = B40 C800 40 V
800 mA bridge rectifier

Miscellaneous:
Tr1 = Transformer 12 V,
3 . . . 4 A secondary
(see text) parts list contd.
Tr2 = Transformer 15 V,
0.5 A secondary
(see text)
F1,F2 = 300 mA slo blo
fuse

Figure 1. The circuit diagram of the complete power supply.

Figure 2. Track pattern of the printed circuit board for the power supply (EPS 9906).

Figure 3. Component layout for the printed circuit board of figure 2.

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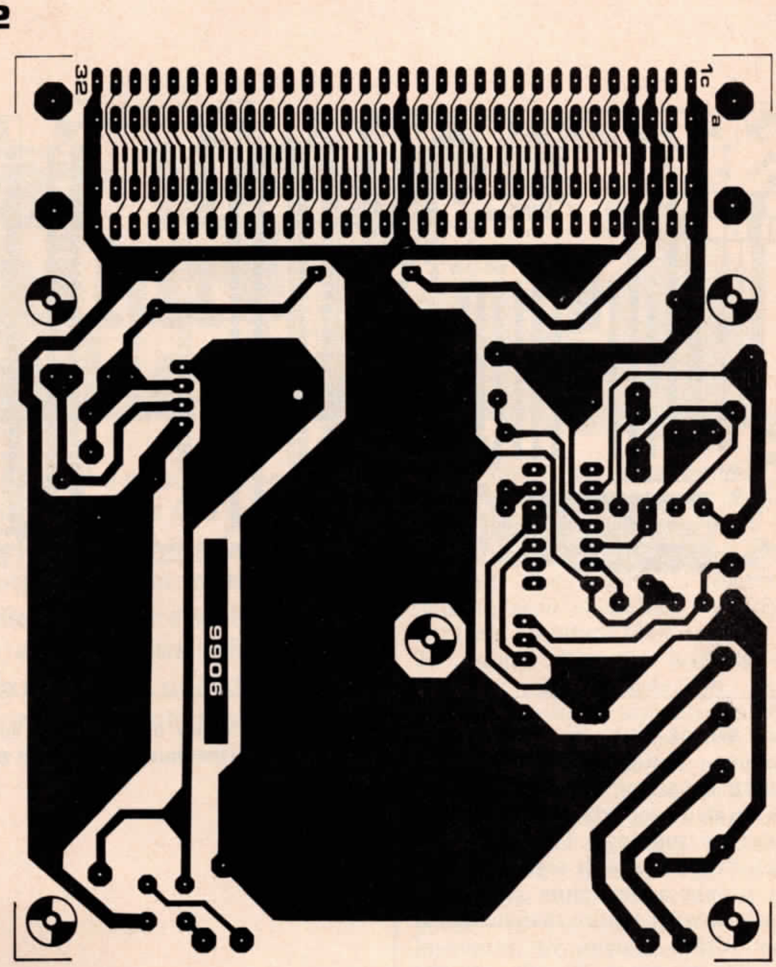

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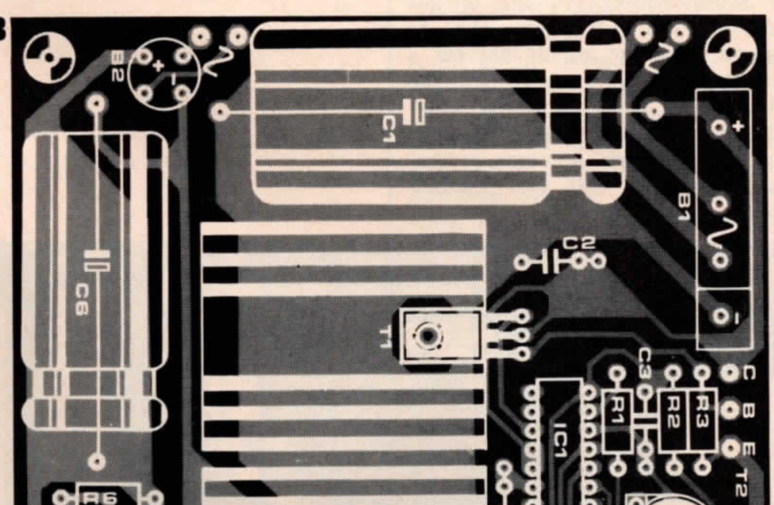
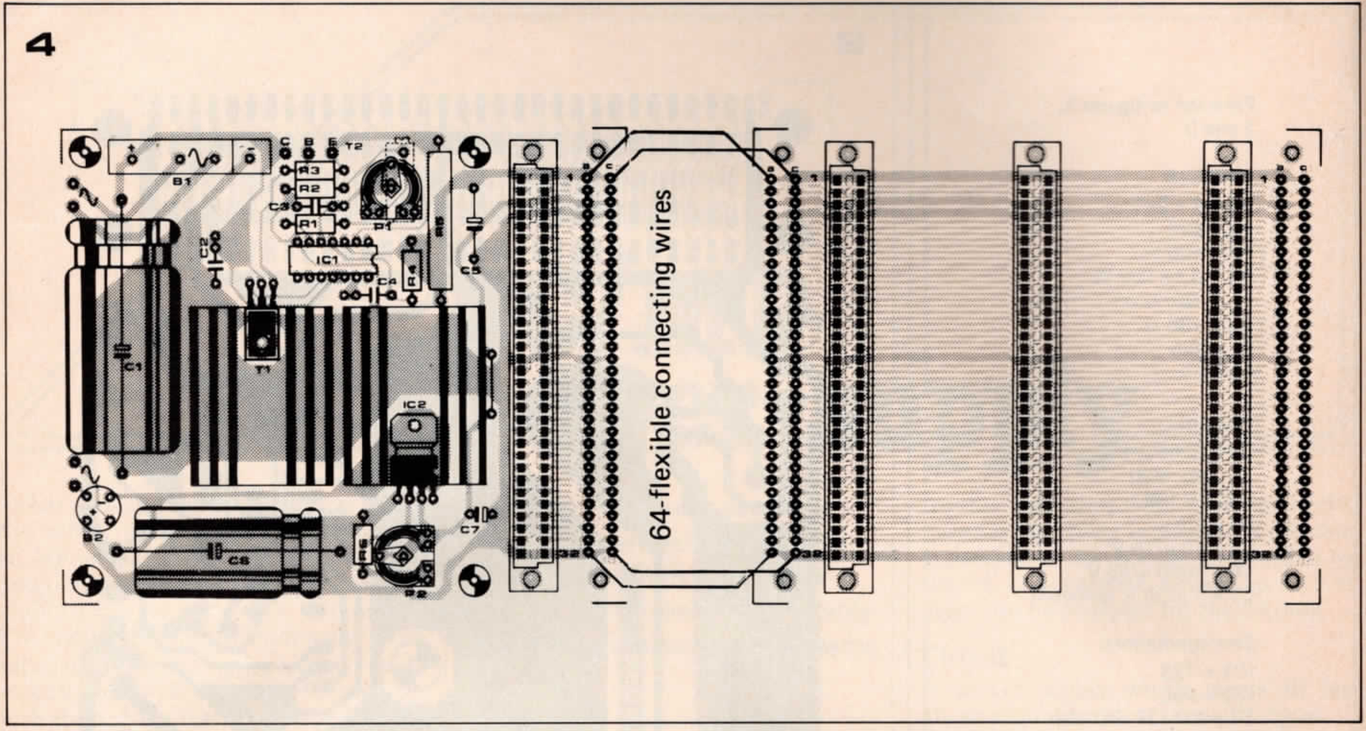
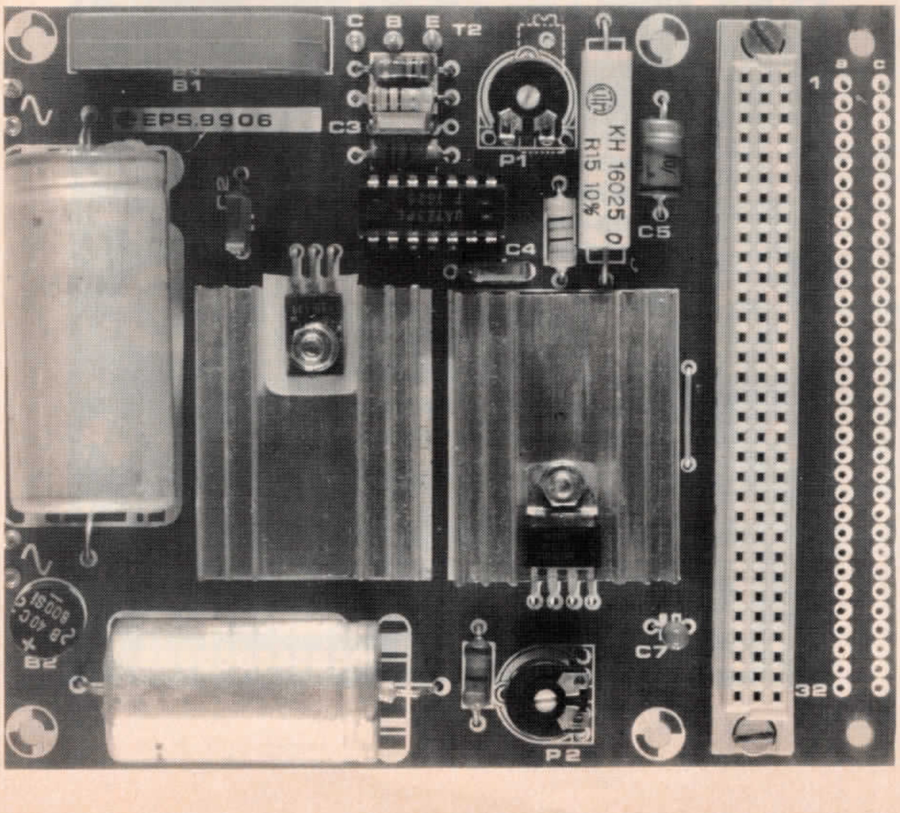




then be approx. 6 A. In that case the transformer, bridge rectifier and smoothing capacitor must, of course, also be uprated proportionally.
The negative supply (−12 V) is stabilised by a 79G IC variable regulator. This IC can supply a maximum current of 0.5 A, which will be more than sufficient for the SC/MP system. By means of preset potentiometer P2, the output voltage can be set to exactly −12 V. As is apparent from the circuit diagram, a separate transformer is used for the negative supply. It is of course quite possible to use a single transformer for both supply voltages; however in that case a transformer with two separate windings is required.

Figure 4. This figure illustrates the connections between the bus- and power supply boards.



Printed circuit board and construction

The entire power supply, with the exception of the transformer(s) and transistor T2, is mounted on a single printed circuit board (see figures 2 and 3). T2 should be mounted on a heat sink with a max. thermal resistance of 1.5 °C/W, for I = 3 A. For currents greater than this the thermal resistance should be correspondingly decreased. T1 and IC2 can be fitted with a heat sink on the board.
The dimensions of the board for the power supply are the same as those of the previously published bus board (EPS 9857, Elektor 33). In addition to the 64 termination points (see figure 2) to connect the supply board to the bus board, the former also contains a second series of connection holes which are designed to accomodate the female half of a connector. This means that the supply board can be used to hold e.g. an extra 4-k RAM card. Figure 4 shows how the supply- and bus boards are connected. The connecting wire between the two boards should be fairly flexible, although for the supply lines, it is advisable to make the wire as thick as possible.
The arrangement shown in figure 4 will accomodate four plug-in Eurocards, e.g. the CPU card, memory extension card and 2 RAM cards. The HEX I/O (and, if still in use, the RAM I/O) card is connected to the bus board using ribbon cable. Such a system will draw a total current of approx. 3.5 A, thus Tr 1 must be capable of supplying a current of 4 A and resistor R5 should then have a value of 0.15 Ω/4 W.