SINGLE-CHIP 50 W AF AMPLIFIER

The chip on which the amplifier is based, a Type LM3876, is a member of the Overture family from National Semiconductor, All members of this family are pin-compatible and mutually interchangeable. They are typified by an internal protection (called SPIKE). In practice, the difference between them is the power output. The series was described on the basis of the LM3886 in an earlier issue*.

The PCB has been designed so that it can accommodate the LM3876 (50 W) as well as the LM3886 (150 W). Because of this, pin 5 of the IC on the board is connected to the positive supply line. This connection is not needed for the LM3876, since its pin 5 is not (internally) connected (NC).

The IC is located at the side of the board to facilitate fitting it to a heat sink as shown in the photograph.

An important aspect for optimum performance is the decoupling of the unregulated supply lines by C_7–C_{10}. All earth connections go to a single terminal on the board.

Air-cored inductor L_1 consists of 13 turns of 1 mm dia. enamelled copper wire with an inner diameter of 10 mm. The completed inductor is pushed over R_7 and its terminals soldered to those of the resistor.

All electrolytic capacitors must be mounted upright.

The amplifier can be muted with a single-pole switch connected to the MUTE input (pin 8). This function is enabled when the switch is open. If muting is not required, solder a wire bridge across the mute terminals on the board.

Boucherot network R_6-C_6 is not normally required in this application, but provision has been made for it for use in other applications.

According to the manufacturers, both chips are optimized for a load of 8 Ω. The output power is lower when a 4 Ω load is used or when the supply voltage is reduced. When a 4 Ω load is used, the SPIKE protection becomes active when the supply voltage is about 27 V, resulting a in a reduction of the power output to 10 W. This means that it is not advisable to use loudspeaker with an impedance < 8 Ω.
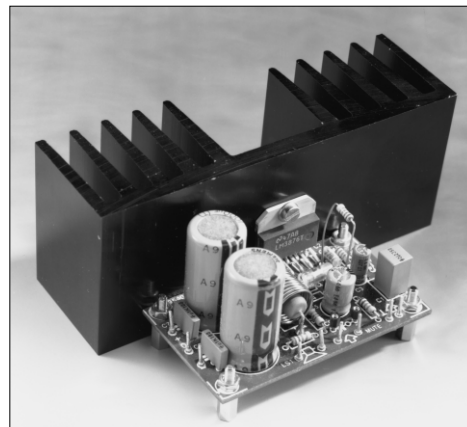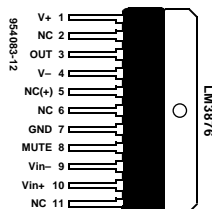
Parts list

R$_1$, R$_3$ = 1 kΩ
R$_3$, R$_4$, R$_5$ = 18 kΩ
R$_6$ = see text
R$_7$ = 10 Ω, 5 W
R$_8$, R$_9$ = 22 kΩ

Capacitors:
C$_1$ = 2.2 µF, polypropylene, pitch 5 mm
C$_2$ = 220 pF, 160 V, polyester
C$_3$ = 22 µF, 40 V, radial
C$_4$ = 47 pF, 160 V, polyester
C$_5$ = 100 µF, 40 V, radial
C$_6$ = see text
C$_7$, C$_8$ = 100 nF

C$_9$, C$_{10}$ = 1000 µF, 40 V, radial

Inductors:

L$_1$ = 0.7 µH – see text

Integrated circuits:
IC$_1$ = LM3876T

Miscellaneous:
Heat sink for IC$_1$ < 1.5 K W^{-1},
   e.g. SK71/50 (Dau 01243 553 031)
Single-pole switch – see text
PCB not available ready made
            Design by T. Giesberts
                     [954083]
*May 1995.

Main parameters

Input sensitivity	1 V r.m.s.
Output power	43 W into 8 Ω (THD+N = 0.1%)
Damping factor (8 Ω)	350 at 1 kHz; 220 at 20 kHz
Slew rate	11 V µs^{-1}
Power bandwidth	8.5 Hz – 117 kHz
Signal-to-noise ratio	> 95 dB (linear 22 Hz – 22 kHz) > 98 dBA