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loudspeaker protection

There are many ways of protecting loudspeakers against the switch-on 'plop': many of these rely on a clamp circuit across the power amplifier input to hold this at 0 V for a few seconds after switch-on. Others, like the one suggested here, depend on a relay to switch off the loudspeaker(s). Terminals A and B of the circuit in figure 2 are connected to one of the sensing circuits in figures 1a...1f, of which the pros and cons will be discussed shortly. Whichever of these circuits is used, A is shorted to B immediately the power is switched on. This cuts off transistor T1 instantly, which causes capacitor C1 to charge. After a few seconds, the voltage across C1 causes zener D2 to break down. Transistor T2 and T3 then conduct; the relay is energized, and the loudspeakers are connected in circuit. When the power is switched off, T1 conducts and this causes C1 to discharge very rapidly. The voltage across C1 quickly drops below the breakdown level of D2; transistors T2 and T3 are cut off, and the relay returns to its quiescent state, which disconnects the loudspeakers.

Input circuit 1a relies on a light-dependent resistor (LDR) fitted close to the mains on indicator lamp. When the lamp lights, the resistance of the LDR drops sharply, so that terminal A is virtually shorted to B.

The input in 1b relies on a reed relay connected to the secondary winding of the mains transformer. As soon as the mains is switched on, the relay contacts close.

The third possibility, shown in 1c, is that the mains on/off switch has a third contact that connects A to B when the mains is switched on.

A further option is illustrated in 1d, where a transistor is connected to the secondary of the mains transformer via a diode and resistor. The transistor conducts when the mains is switched on.

The inputs in 1e and 1f also provide power for the protection circuit. That in 1e has a bridge rectifier connected across the secondary winding of the mains transformer. When the mains is switched on, the BC 547 conducts and shorts A to B.

Finally, the circuit in 1f is connected direct to the mains. Here again, as soon as the mains is switched on, the BC 547 conducts and terminal A is shorted to B.

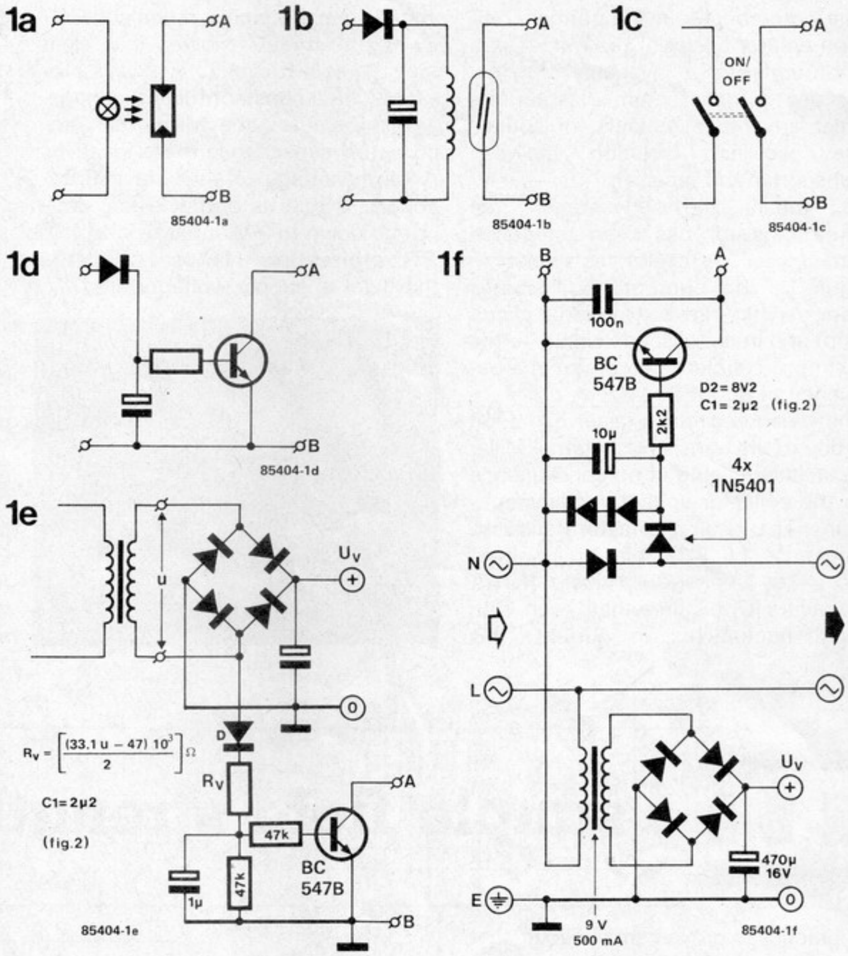
Whichever of the input circuits is used depends on circumstances and/or individual preferences. If one of circuits 1a...1d is used, a separate power supply is required for the protection circuit. As suggested, the output voltage, U_v, of this should be 40...60 V d.c. For lower values of U_v, the rating of D2 must be reduced accordingly.

Resistance R_v depends on the relay used, and is calculated from $R_v = [(U_v - U_r - 2.5)/I_r]\ \Omega$ where U_r and I_r are the operating voltage (in volts) and current (in amperes) of the relay used respectively.

The relay contacts must be able to carry a large current: 10 A is not unusual in many amplifiers.

The rating of R_v is $[U_r I_r]$ W.

If the 'plop' is still heard, increase the value of R3 as required — in reasonably small steps.



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