Add more speakers

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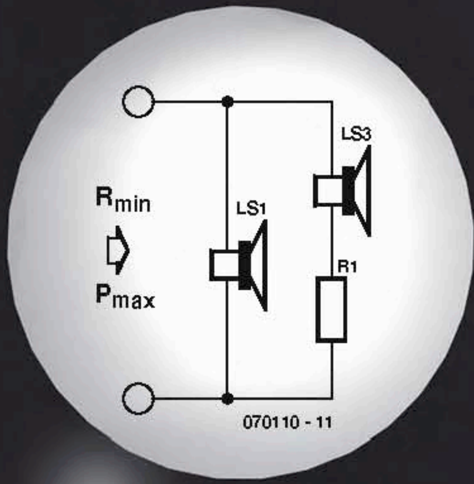
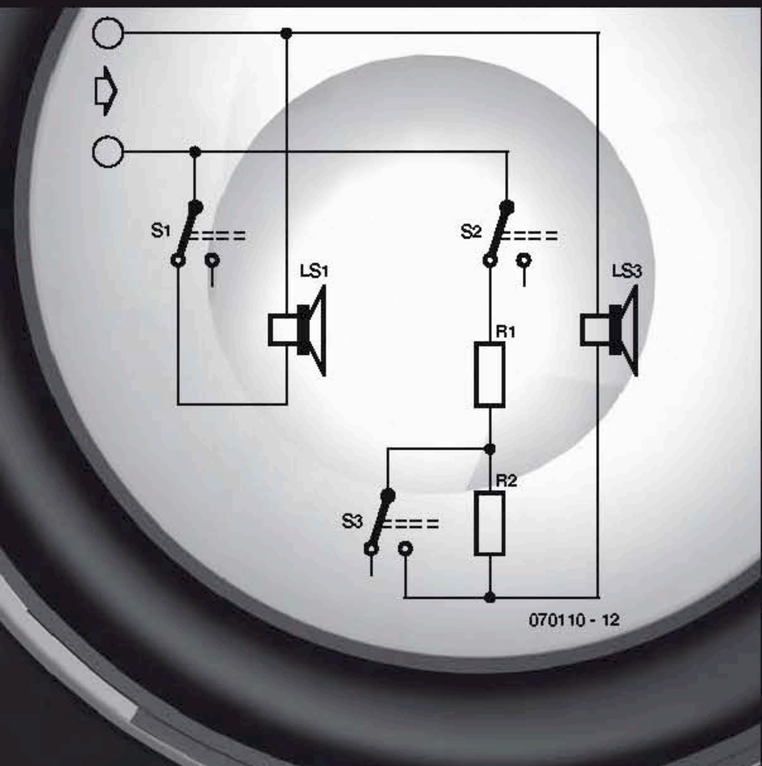
The chances are that you only have one socket on the back of your mini HiFi to connect the speakers. Wiring an extra set of speakers in parallel to the originals may damage the amplifier output stage if the resulting load impedance is too small. Extending the sound of your HiFi into another room (e.g. bedroom or study) may not be entirely unproblematic.



For clarity the modification to only one of the stereo channels is described here, simply repeat the process to make extensions for both the left and right channel speakers.
It may be the case that you have a mini HiFi without any speakers or you want to use the (usually low quality) existing speakers as extension speakers. Firstly check the amplifier rating which should be either in the amplifier handbook or printed on the back of the amplifier. Choose a set of main speakers (LS1) which have an impedance greater than the minimum load that the amplifier can handle. This minimum load may for example be 4 Ω in which case 6 Ω or better still 8 Ω speakers would be a good choice. Amplifiers with a minimum load of 6 Ω would need 8 Ω or better 12 Ω speakers. Most amplifiers will have enough power in reserve to offset the reduction in volume. The loudspeaker sensitivity with respect to the volume setting now seems to have an approximately logarithmic characteristic rather than linear.
For the extension speaker LS3 make sure its impedance is equal to or greater than the main speaker LS1.
From the diagram you can see that the principle is really simple, now that the main speakers have an impedance greater than the minimum value required by the amplifier it allows an extension speaker (with a suitable series resistor R1) to be wired in parallel without loading the amplifier too much. The minimum value of series resistor R1 can be calculated:



$$R1 = (R_{min} \times Z_{LS1} + R_{min} \times Z_{LS3} - Z_{LS1} \times Z_{LS3}) / (Z_{LS1} - R_{min})$$

The value R_{min} is the minimum load that the amplifier can handle (check the amplifier specification).

The power rating (P_{R1}) of resistor R1 can now be calculated:

$$P_{R1} = (P_{max} \times R1) / ((Z_{LS3} + R1)^2 : Z_{LS1} + Z_{LS1} \times R1)$$

Power dissipated in the extension speaker will be:

$$P_{LS3} = (P_{max} \times Z_{LS3}) / ((Z_{LS3} + R1)^2 / Z_{LS1} + Z_{LS1} \times R1)$$

Power dissipated in the main speaker will be:

$$P_{LS1} = P_{max} / (1 + Z_{LS1} / (Z_{LS3} + R1))$$

A typical example giving R_{min} = 4 Ω, P_{max} = 50 W, Z_{LS1} = 8 Ω and Z_{LS3} = 8 Ω can be worked out in your head. R1 is not needed i.e. it has a value of 0 Ω and power is divided equally between LS1 and LS3, each dissipating 25 W. When however Z_{LS1} has a value of 6 Ω, then R1 = 4 Ω, P_{LS1} = 33.3 W, P_{LS3} = 11.1 W and P_{R1} = 5.6 W. Ensure that the power rating of R1 is bigger than this figure.