

A SWITCHED ATTENUATOR

How many times has a signal been too strong for the experiment you wish to carry out? It could be from an oscillator on the bench or from signals from an antenna overpowering a mixer. This attenuator will solve those problems and is presented from *Practical Projects*, courtesy of the RSGB.

ATTENUATORS

When designing the attenuators, we must take into account the possibility of poor shielding. There is hardly any point in designing a 20-dB attenuator when the leakage around the circuit is approaching this value. It is also important to decide on the accuracy required. If it is intended to do very accurate measurements, the construction has to be impeccable, but for comparisons between signals such preci-

sion is not essential.

The most useful attenuator is a switched unit covering 0 to 60 dB (or more) in 1-dB steps. This is not as difficult as it first seems because, by summing different attenuators, we can obtain the value we need. It takes only seven switches to cover 65 dB. The seven values of attenuation are 1, 2, 4, 8 and 10 dB, and two at 20 dB; these can be switched in or out at will. As an example, for 47 dB, switch on the two 20-dB pads plus the 4, 2 and 1-dB pads.

Construction

The resistor values shown in **Fig 19.69** determine the attenuator's accuracy at around 5%. This is done for practical reasons, to make use of available $\frac{1}{4}$ W, 1% resistor values. For example, if we wanted to make the attenuation value of the 4-dB

section exactly 4 dB, the resistor values would have to be 220.97 and 23.85 Ω . The values used are 220 and 24 Ω , giving an attenuation value of 4.02 dB. The switches must have low capacitance between the contacts, and simple slide switches are the best selection. J1 and J2 must be coaxial jacks (builder's choice).

The attenuator is housed in a box made from epoxy PCB material. The top and sides are cut to size and soldered into a box. It is easier to cut the switch holes prior to making the box. After the box has been constructed, screens made from thin brass shim should be cut and soldered between the switch holes to shield each section. Next, the switches are fitted and the unit wired up. When this is done, the unit is checked and a back cover, securely earthed to the box, is fitted.

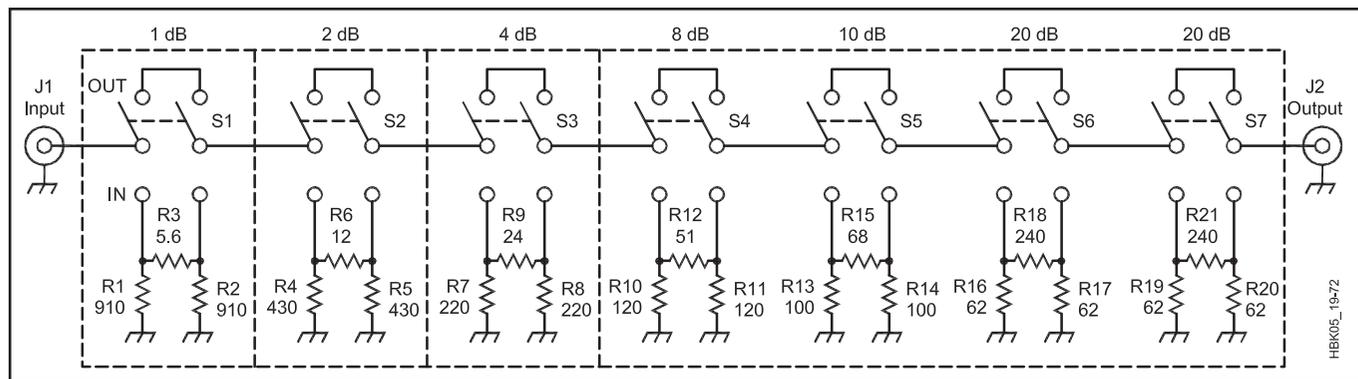


Fig 19.69 — The attenuator consists of seven pi network sections, so-called because each pad (eg, R1, R3 and R2) resembles the Greek letter pi (π). Input and output impedances are 50 Ω .