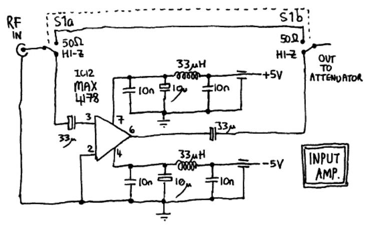
The simple man's Spectrum Analyser
Input Attenuator

{gallery}saattenuator/1{/gallery}

The input module consists of an input amplifier and step attenuator. A piece of coaxial cable passes through [illegible] [10MHz Crystal Calibrator](#) The purpose of the input [illegible]

A Maxim MAX4178 unity gain 300MHz buffer amplifier is used as the [illegible] [145MHz IF Filter module](#) A double-pole double-throw (DPDT) switch [illegible] {gallery}saattenuator/2{/gallery} [illegible]



The input attenuator allows accurate measurements of the relative strengths of spectrum peaks. When strong input signals cause too many responses in the analyser and obscure observations, the input attenuator can also be used to eliminate the weaker frequency components. It consists of 6 T-network sections designed for 50-ohm input and output impedances and attenuations of 1, 2, 4, 8, 16 and 32dB. Each attenuation section may be bypassed by a DPDT switch, such that in combination any attenuation from 0 to 63dB in 1dB increments may be selected by switching in appropriate sections. For example, 26dB attenuation is obtained by selecting 16, 8 and 2 dB switches.

The circuit diagram of the input module is shown below.

{gallery}saattenuator/circuit{/gallery}

The theoretical resistor values required to get the desired attenuation with 50-ohm input/output impedances are not obtainable. To solve this problem, practical-value resistors are paralleled to get the required theoretical values. The necessary parallel resistances were calculated using a spreadsheet. They are indicated on the diagram as a single resistor with multiple value labels. For example in the 4dB section the vertical resistor is made from a 120-ohm, 1K and 4.7K resistor in parallel. The calculated values are such that very precise dB attenuations are obtained.

The DPDT switches have 2 fixing nuts. They are bolted into the screened box (constructed from PCB stock as usual) using one of the nuts, and the whole assemply fixed into the front panel with the other nut. The BNC RF-input socket bolts through the front panel, a washer taking up the nut-thickness between the front panel and the input module box. (In fact, the washer is no more than another piece of inch-square PCB stock with a hole drilled to take the BNC socket thread). In this way, coaxial integrity of the signal path in the analyser is preserved right the way from the input socket to the output.