The HiFiCollective 23-Way Seiden Ladder Attenuator

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The HiFiCollective 23-way Seiden Ladder stepped attenuator is based around a 4-pole switch that selects individual pairs of resistors. With reference to Figure 1, each step is made up of two resistors, Rx and Ry, that forms the attenuation at that step.

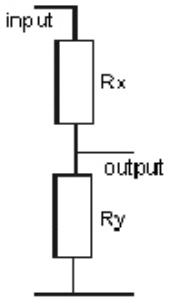

Figure 1. Circuit of each step

The advantage of having both resistors selectable is that the resistor values are chosen to provide a constant input impedance. In other words, Rx+Ry is constant for a given attenuator. This accurately mimics the effect of a potentiometer, but without any of the problems associated with the use of a wiper on a resistive track.

The value of attenuation for each step has been chosen to provide a fine range at low volumes, getting increasingly coarser as maximum volume is approached (the effect of a 1dB change at loud volumes is much greater as it is a logarithmic scale). Commercial stepped attenuators tend to have a 60dB range (corresponding to the Step 2 attenuation), but I have found in the past that with higher output source equipment, especially some CD players, this is not quite enough. I therefore chose a starting value of 71dB attenuation – see Figure 2.

Step	Attenuation (dB)
1	∞
2	71
3	65
4	59
5	53
6	48
7	43
8	39
9	35
10	32
11	29
12	26
13	23
14	20
15	17
16	14
17	12
18	10
19	8
20	6
21	4
22	2
23	0

At Step 1, maximum attenuation is provided by having Rx equal to the chosen value of the attenuator (for example, 10K) and Ry equal to zero. Similarly, at full volume, Rx is zero and Ry is the chosen attenuator value.

Resistor packs are available in a wide variety of types and are supplied to enable 10K, 25K, 50K, 100K or 250K attenuators to be constructed. Other values can be supplied by special order. The switch is a 23-way unit made by Seiden.

The Seiden Switch and Resistors

The switch itself is beautifully made and of the shorting type. The contacts are silver on gold and are enclosed in a transparent cover to keep dust out.

The switch has an extremely smooth and gentle action as you turn the volume throughout the range. In fact, I could turn the shaft with my fingers without having to fit a knob first!

The resistors in the attenuator used for this review were the Takman "REY" range of metal film resistors (although other resistors can be supplied if required). These resistors are designed specifically for audio equipment and features thin film material made mainly of Ni-Cr-Al materials, brass end-caps and non-oxygen copper wire. High-precision is achieved by using laser trimming and high stability and high sound quality are achieved with special coating materials.

Testing the Attenuator

The attenuator was tested with a variety of recordings covering a range of musical genres. Amongst other recordings, I chose 'Tchaikovsky Symphony No. 4' by Lorin Maazel and the Cleveland Orchestra (Telarc Digital 10047) for testing with a full orchestra. For some baroque, I used 'Vivaldi Concerti Volume 2' by Concerto Amsterdam (Telefunken Das Alte Werk 6.42355) and for something a bit more upbeat, the classic 'Bridge Over Troubled Water' by Simon and Garfunkel (CBS 63699 Half-speed Mastered Audiophile Pressing) was played.

First up was Tchaikovsky symphony and the trumpets in this recording came across were extremely clear and open, yet strident as they should be. The bass drums were punchy and well extended.

I also was able to confirm that the volume was smooth across the range with no evidence of clicks or abrupt changes in volume between the steps.

Moving on to the Vivaldi, this baroque recording had a real openness and transparency. Instrument positioning was also excellent, both from a side to side and front to back perspective.

In my experience, the CBS recording of Simon and Garfunkel can easily sound muddled and confused with poor quality components in the signal path. This recording is particularly prone to this, as the sound engineers in the late '60s - early '70s had a tendency to mess around with the mix and add artificial echo and the such-like. However, this attenuator presented a smooth and clear sound with an excellent top-end presentation.

Conclusion

This is another superb HiFiCollective attenuator and offers the option of a full stereo ladder attenuator for those who require a constant input impedance from their amplifier. Making use of high quality components ensures silky smooth operation, no clicks between the steps across the range and a choice of top-quality resistors for audiophile performance that offers outstanding definition that simply cannot be matched by conventional potentiometers.

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