An RF Sampler

I came across a YouTube video where someone built an adjustable RF sampler. It was to go between a HF transmitter and the antenna so that the RF signal can be displayed on an oscilloscope for an example. I built an RF sampler in the past but it was not adjustable. I had all the parts so I decided to build this adjustable one.

Here is the link to the video.

https://www.youtube.com/watch?v=RLwZFlP9wr8

I built mine in a smaller box than he used but the circuit is the same. When it was completed I did a couple of extra checks on it that he did not cover in his video like insertion loss (VSWR) and variable attenuation across HF.

This Hammond box was used for a least two other previous projects before this one and I had a few extra holes to fill.

FREQUENCY	ISOLATION MIN.	ISOLATION MAX.	RETURN LOSS	VSWR
3.5 MHz	44 dB	63 dB	33 dB	1.05 to 1
7.0 MHz	42 dB	57 dB	32 dB	1.05 to 1
14.0 MHz	41.5 dB	51 dB	32 dB	1.05 to 1
21.0 MHz	41 dB	48 dB	25 dB	1.12 to 1
28.0 MHz	41 dB	46 dB	20 dB	1.22 to 1
30.0 MHz	N/A	N/A	19 dB	1.25 to 1

As can be seen in the table above the ISOLATION MIN. spread is not bad across HF (about 3 dB) but when you increase the isolation using the control on the top of the box (ISOLATION MAX.) it is not as good. At 3.5 MHz it is 19 dB MIN. to MAX. and at 28 MHz it is only 5 dB. To be fair his results may be better than mine.

I did not include the isolation for 30 MHz because I forgot to write it down but it will be close to the 28.0 MHz readings.

The VSWR readings were calculated using the return loss measurements.

For the test set up I used a Motorola signal generator R-1020A (Wavetek), a homebrew return loss bridge from the ARRL publication EXPERIMENTAL METHODS IN RF DESIGN and a Ballantine 323 RF voltmeter. The 50 Ω terminations used were commercially made precision ones.

I don't know how much power the sampler will handle. I tried it on 20 meters running 150 Watts and it worked OK. I wouldn't try this one I built at a KW.

The RF Sampler used a toroid transformer for the coupling. I like this approach and I might build another without the variable attenuation. The advantage of being variable may not matter much if you use it on a typical oscilloscope. It may be more important if you use it with a frequency counter for example. I would also like to see if I can improve the VSWR on the higher frequencies.

December 13, 2016

Home Page www.ve6kq.com