Earthquake Sound SWAT 2.4 Wireless Transceiver

Written by John E. Johnson, Jr.
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Introduction

I think that most of us who made the transition from two-channel audio to home theaters with a projector and surround sound never realized the mass of cables we would end up with along the floor, along the ceiling, or wherever else we could stuff them. For me, this has been going on for about 15 years now, and although I have replaced cables with other cables, I never replaced cables with no cables, until now.

Our cordless phones have moved up the frequency chain from 900 MHz to (recently) more than 5 GHz. With that increased RF range comes less noisy interference.

I don't know about you, but I am really primed for a wireless world - aka wireless home network - throughout my house. I have just installed 802.11n Ethernet for our computers, which lets me choose 2.4 GHz or 5 GHz.

In the home theater world, wireless has been slow to catch on. For some reason, we seem stuck to our endless bundles of cables.

Well, if you want to be an early adopter, here is your chance.

Earthquake Sound has just introduced its SWAT 2.4 Stereo Wireless Transceiver, at MSRP $349, which includes a transmitter, receiver, 5 volt DC wall warts, and short cables (until receiver manufacturers build the wireless transmitters into their products, I guess we will still need at least that last foot of cable).

Specifications

- Design: Stereo Transmitter and Receiver, Operating on 2.4 GHz Band
- Frequency Range (20 Channels): 2.4 Ghz - 2.528 Ghz
- Transmitter Power: 20 dBm
- MFR: 20 Hz - 20 kHz
- THD+N: 0.3% at 1 kHz
- Inputs and Outputs: 1/8" Stereo Phone Jacks

- Dimensions: 1" H x 2.7" W x 3.2"D
- Weight: 0.5 Pound/each Transmitter and Receiver
- MSRP: $349 USA (Extra Receivers $199/each)
- Earthquake Sound

Design

The SWAT 2.4 consists of two small units that are labeled Transmitter and Receiver on the bottom. One end has the input or output jack (a standard 1/8" stereo phone jack, like the one on your iPod that connects to your ear buds), a channel button for changing the frequency on which the unit operates, and a USB jack that you can use to power the units if you choose not to use the included 5 volts DC wall warts. The USB connections are only for power, they do not carry an audio signal. There is also a mute button and the status light. On the other end is the on/off power switch, the jack for the wall wart, and the antenna.

Out of the box, the transmitter and receiver are paired, meaning that they are set at the factory to be on the same frequency. However, depending on what other wireless components you have in your house, or maybe even your neighbor's house, you might need to change the channel of operation.

Also, occasionally, the transmitter and receiver will simply stop communicating because they lost their pairing. You can easily pair them again or change to a different channel. This is done by pressing and holding the CH button the transmitter and receiver until the status lights start to blink. You then release the buttons, the transmitter light will blink a few more times and then stop blinking and stay illuminated. The status light on the receiver will turn off. This indicates successful pairing of the transmitter and receiver. The transceiver operates on your choice of 20 channels in the 2.4 GHz band.

Here is a short video (*.mp4) demonstrating the procedure.

In Use

I decided to really put this product through the wringer by setting up three transceivers in my home theater lab, each operating on a different frequency. Transceiver 1 would drive my front left and right subwoofers, Transceiver 2 would drive the LFE subwoofer, and Transceiver 3 would drive the rear channels.

Pairing the three units was very easy. I just pressed the CH button three times for transceiver 2 and six times for transceiver 3 (transceiver 1 was already paired at the factory setting). They all then operated independently. I simply connected the subwoofer and LFE pre-outs on my SSP to to transmitters 1 and 2, and the rear channel pre-outs to transmitter 3. I placed receivers 1 and 2 near the subs, and ran the output cables from the receivers to the RCA input jacks on the left and right subwoofers, and the output of receiver 3 to the inputs of (two) subs that I use for the LFE. Receiver 3 was placed behind my couch and connected to the inputs of two Bryston PowerPro 120 monoblock power amplifiers which had speaker cables that ran up the corners to my rear speakers. I chose the Bryston's due to excellent build quality, their ability to drive low impedance loads (planar speakers are notorious for this), and also because of their low profile (they fit easily under the couch). They also run cool when idle.

So, basically, I eliminated several sets of long cables that ran from the SSP to four subwoofers, and also eliminated speaker cables from the power amplifier on my equipment rack to the rear speakers (these cables normally ran along the molding at the top of the side walls).

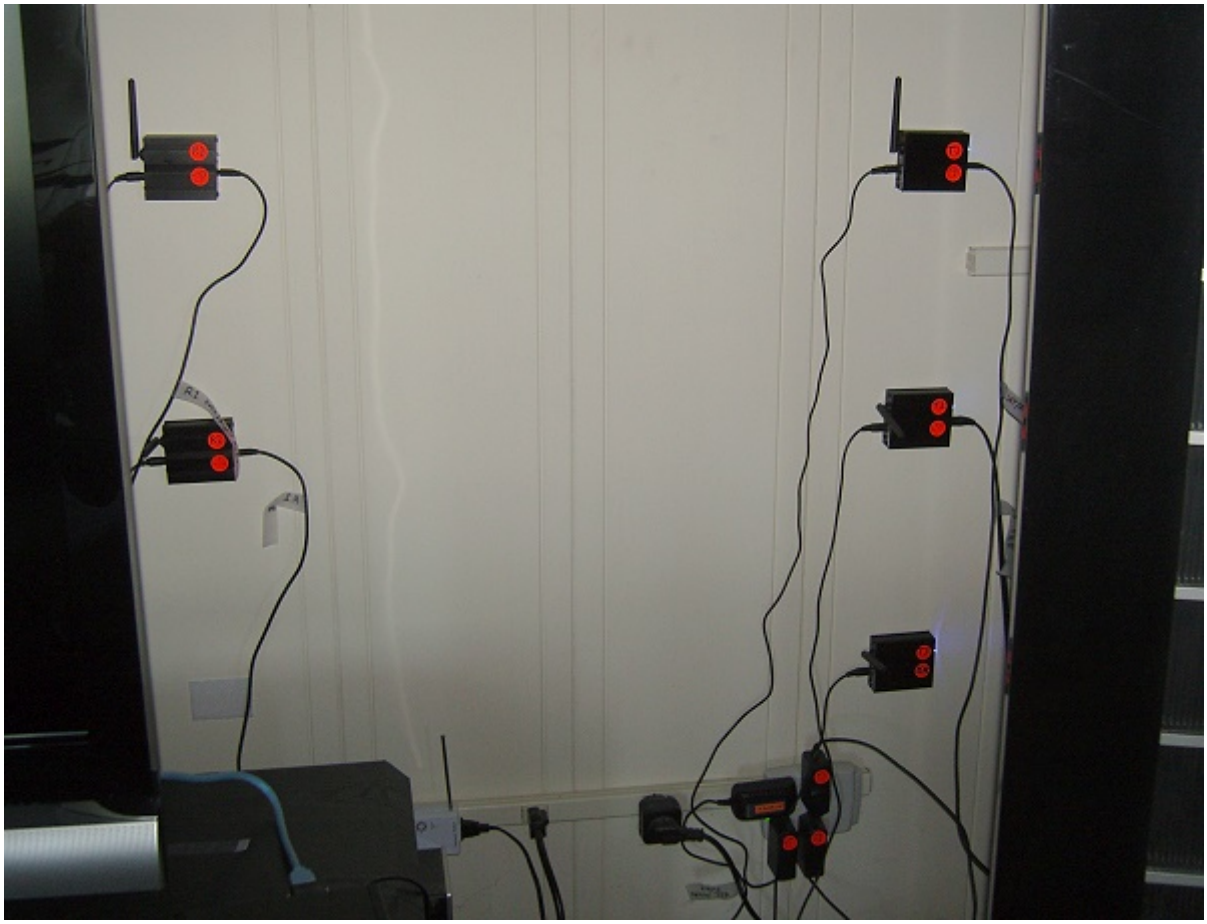
I used some Velcro® 2" wide strips (Cat # PN-90595) to attach the transmitters and receivers to the wall behind my equipment rack, but they can be placed on the floor if you want. I just like to keep the floor as clear as possible for cleaning purposes.

I did run into some issues with whistling noises, but this seems to be a problem that is addressed by arranging the input and output cables so that they don't act as antennae themselves.

In any case, I was delighted with the results. One bit of serendipity was that a ground loop hum in one of the subs that had been driving me crazy disappeared, because there was no longer a direct wire connection from the SSP to the subwoofer.

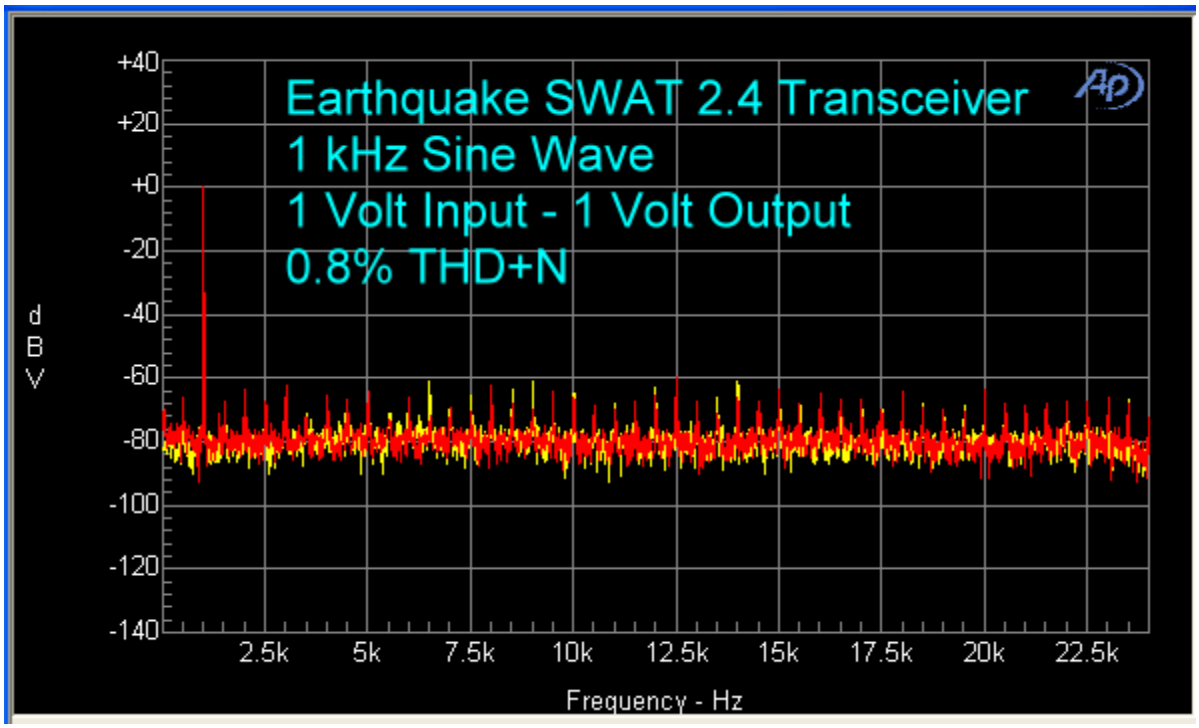
Here is a photo of three transmitters and two receivers mounted on the wall. The transmitters are on the right and the receivers are on the left. You don't have to mount them this close together, but I

plan to experiment with them, and I need them close so I can press the CH buttons on the transmitter and receiver without having to disconnect anything. Notice that the antennae are not all pointed in the same direction. You have to play around with the direction to find the best reception. If you look down near the bottom, on the power strip, there is another transmitter with its antenna sticking straight up. This is my wireless lighting controller. So, you can begin to see that it can complicate things to have several wireless components in your setup, all operating on the same frequency bands. Transmitter 3 on the right doesn't have its input cable connected as I was in the middle of some other tests. The cable that comes with the transceiver has unbalanced RCA plugs. My SSP has XLR balanced outputs, so I bought some 1/8" stereo plug-to-XLR Female adapter cords from AudioGear priced at $12.89 (the item at the bottom of the linked page). You may also need an extension cable for the audio connection. I used Radio Shack Cat # 42-2492.

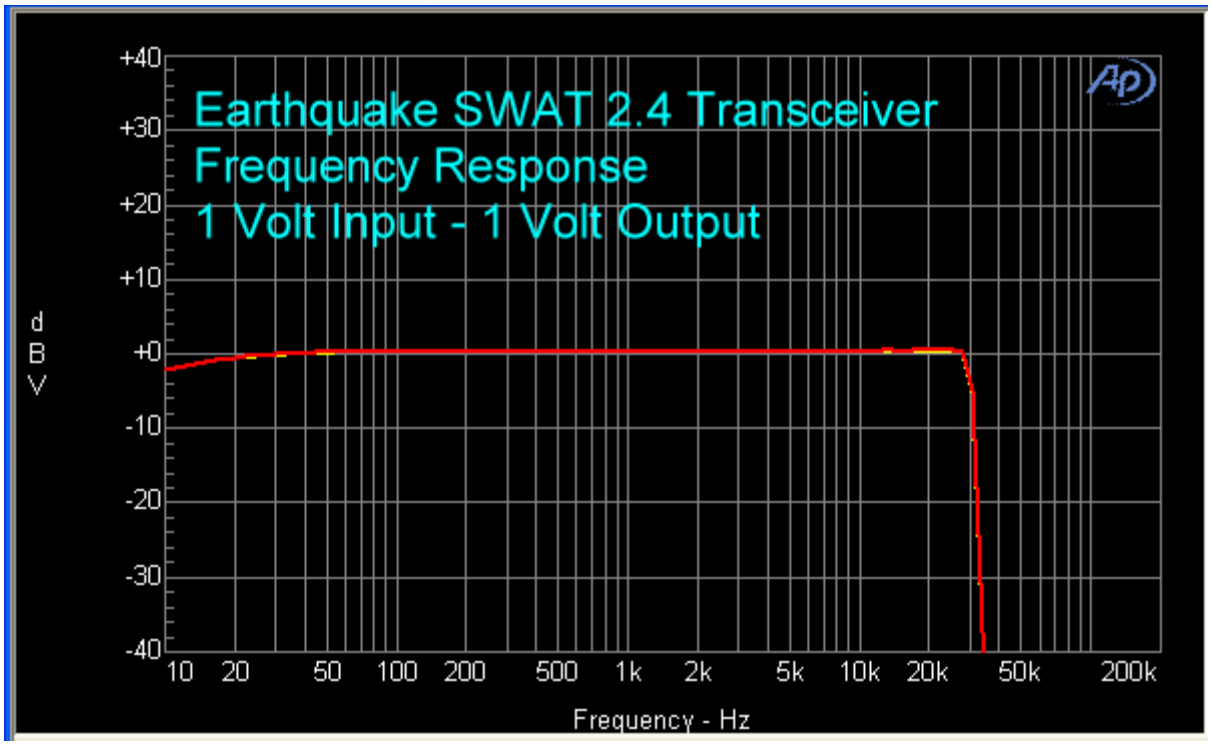


On the Bench

The SWAT 2.4 does have more noise than you would encounter with a direct wire connection, but that is to be expected. Here is a 1 kHz sine wave spectrum. The receiver output clipped at about 1.2 volts output, and the output varies with the input to the transmitter (which varies as you change the volume control on your receiver). I did not hear any noticeable clipping in use, so the output voltage of the receiver obviously stayed below 1 volt. I could hear a hiss only if I turned the volume up nearly to full output (with no music playing).



The frequency response of the SWAT 2.4 was flat from 20 Hz to 20 kHz. It was down 2 dB at 10 Hz, which might affect some subwoofers, but this is correctable with the Auto EQ functions that are present on most receivers these days.

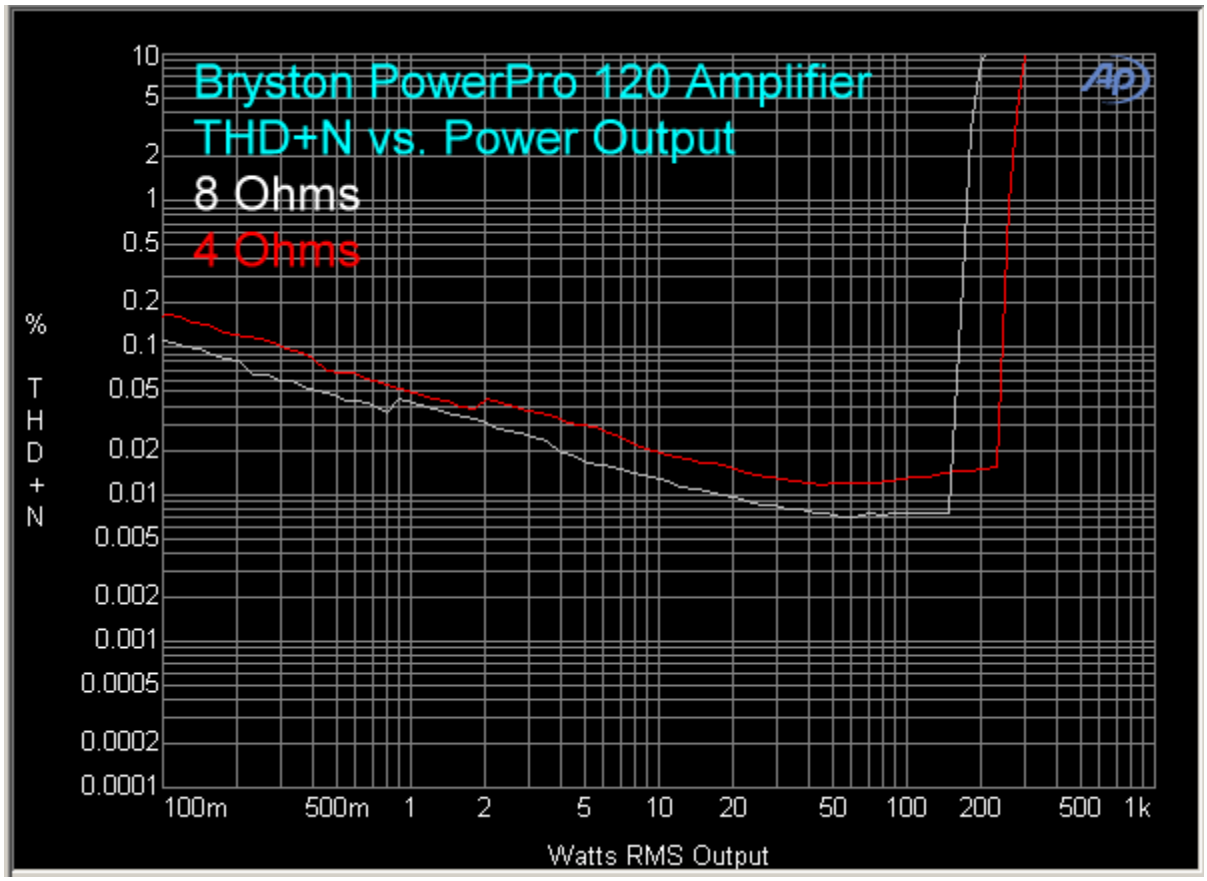


For transceiver 3, which had the receiver under the couch, I used two Bryston PowerPro 120 monoblocks, shown with the transceiver in the photo below. To test the limits of the system, I used an extra receiver paired to transmitter 3 and ran the left channel output of receiver 3a to one

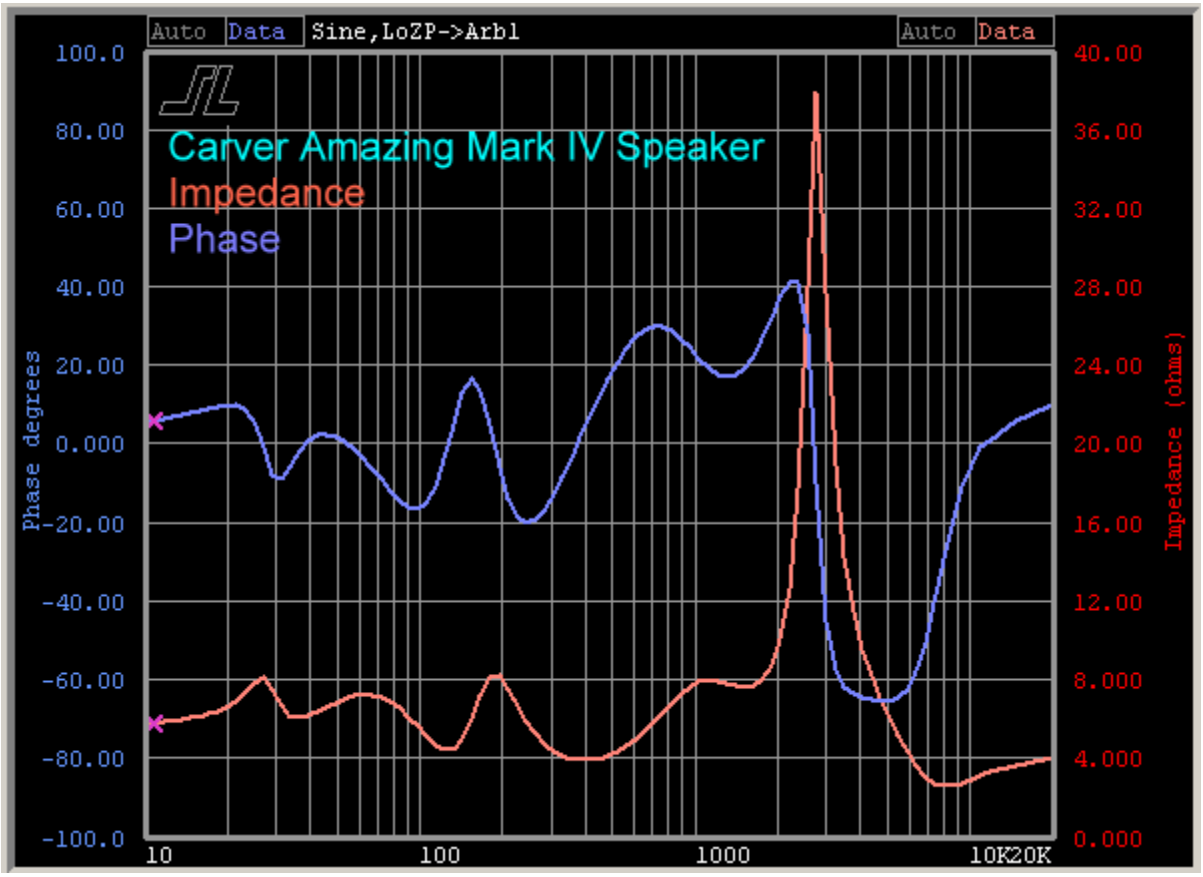
monoblock and the right channel output of receiver 3b to the other monoblock. It worked without any problem. Under normal conditions, you would only need the one receiver since it has stereo outputs.

I thought it appropriate to give some performance spectra for the Bryston PowerPro 120 monoblocks here.

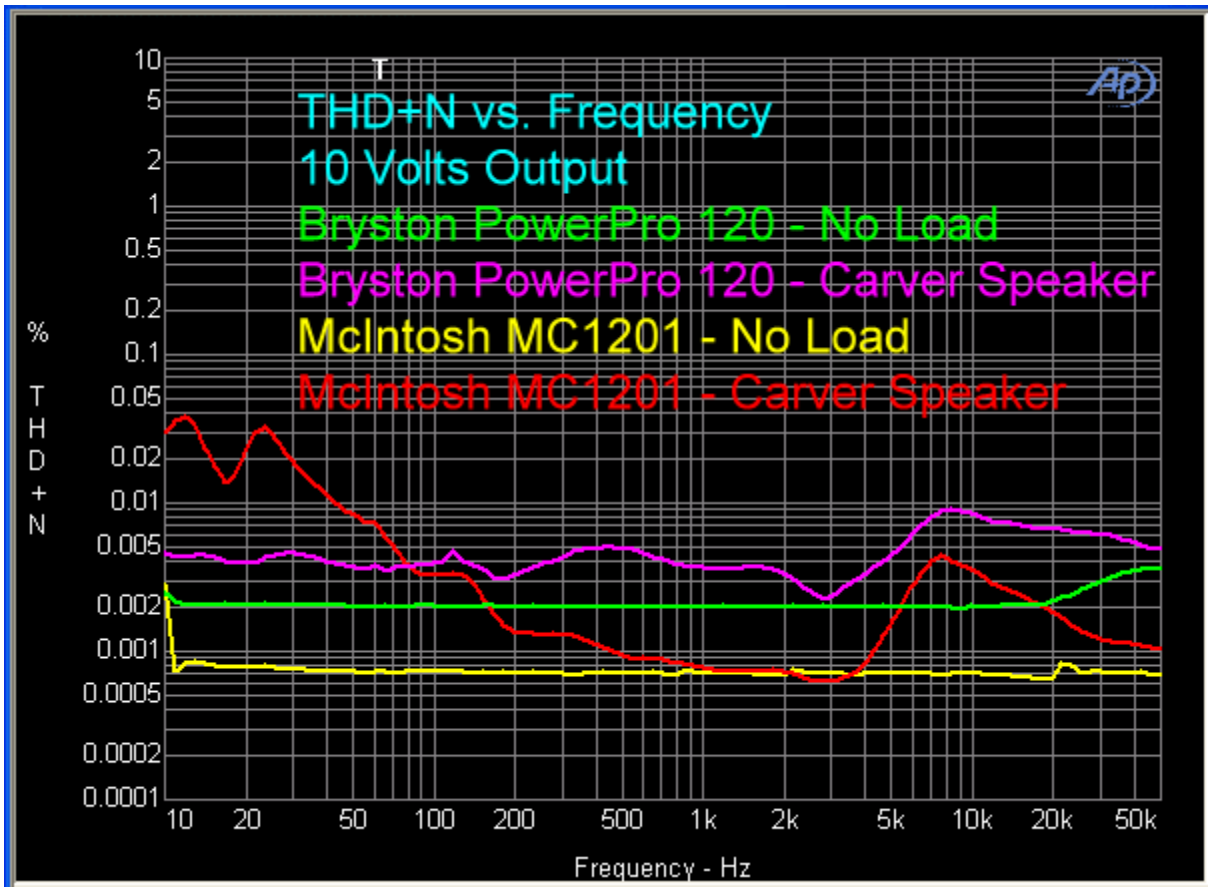
THD+N vs. Power Output is shown below. It delivered 160 watts rms into 8 ohms and 240 watts into 4 ohms before rising rapidly to clipping (1% THD+N).



I measured THD+N vs. Frequency in a different way this time. Instead of the usual power resistor as a load, I used one of my Carver Amazing Mark IV ribbon speakers, because impedance changes with frequency, and this affects amplifier performance. I use planar speakers for the rear channels, so I wanted to see how the Bryston would perform into an actual planar speaker load. First, here is the Impedance/Phase graph for the speaker.



Now, THD+N vs. Frequency for the Bryston PowerPro 120, with 10 volts output into the Carver speaker. For comparison, I also tested my reference McIntosh MC1201 monoblock at 10 volts into the Carver speaker. You can see that the Bryston, with no load, had a steady 0.002% THD+N from 10 Hz to 50 kHz, while the McIntosh was at 0.0007%. At 10 volts output, the Bryston maintained a distortion level in the 0.005% to 0.009% range. The McIntosh had about 0.02% distortion in the low frequencies, but then dropped to 0.001%. Both amplifiers had a distortion peak at 8 kHz, which in the speaker impedance/phase graph, corresponds to a low impedance and - 60^0 phase (difficult region to drive).



Conclusions

Just as hard copy media (music and movie discs) will disappear in favor of on-demand downloads from music and movie distributors, we are headed for a wireless home networking for many of our electronics, including our home theaters. The Earthquake Sound SWAT 2.4 transceiver is the first salvo, with more to come. Try one out and see for yourself.