Jordan JX92S/Aurum Cantus G2si/G2i Mini-monitor Design

I spent much time during the last three years living with a pair of the Jordan JX92S full range drivers mounted in small 0.25 cubic foot ported enclosures. These Jordan drivers impart a coherency that is unique to a quality full range driver. But as much as I liked the Jordan drivers running full range, I recognized that they do have frequency response roughness in the 10-20 kHz range. Furthermore, the JX92S starts to beam (exhibit reduced off axis horizontal angular coverage) above 3000 Hz. You can see these issues associated with the JX92S from the frequency response plots shown on the E. J. Jordan website (see http://www.ejjordan.co.uk/jx92.html).

While many people will be content with the performance of the JX92S as is, my goal in this new design was to add a high quality ribbon tweeter to the JX92S. The goal was to correct the higher frequency issues associated with the Jordan driver. The Aurum Cantus G2si (or G2i) ribbon tweeter is an ideal choice to supplement the JX92S. This small ribbon works best above 2500 Hz and features flat frequency response over its operational range with wide horizontal axis dispersion beyond 20 kHz. The G2si is available for general usage while the G2i variant is an original equipment manufacturer version which is equivalent to the G2si but with slightly less sensitivity. My experience is that small ribbons like the G2si or G2i are superior to dome tweeters because they exhibit better off axis horizontal dispersion. They produce an airy, light sound which is missing from dome tweeters. This results in improved performance in typical in-room listening situations. While some ribbon tweeters have limited vertical axis dispersion, the shorter ribbons similar to the G2si/G2i have acceptable sound radiation in this axis. Listeners will find impressive in-room performance with this combination of the Jordan driver with the A-C ribbon.

The Jordan JX92S/Aurum Cantus G2si mini-monitor design was developed to synergistically blend these two drivers. The objectives were to retain the coherency that is so desirable with the JX92S but also achieve the wide dispersion of the G2si/G2i across the upper frequency range. The crossover network transitions between drivers at 3000 Hz. The JX92S is attenuated with a second order electrical filter above this frequency. The G2si/G2i needs a third order electrical filter below 3000 Hz to best match with the JX92S.

The measured horizontal axis frequency response of the Jordan JX92S/Aurum Cantus G2si/G2i mini-monitor is shown in Figure 1. Both on-axis and 30 degrees off axis plots are shown. Notice the flat response across the entire frequency

range. The small dip in the 15 kHz range is characteristic of the Aurum Cantus G2i and G2si series drivers. One final note on the frequency measurement is that the vertical axis on the graph represents relative sound pressure level (SPL) but it is not calibrated to a specific SPL.

While not shown, the vertical axis dispersion of the G2si/G2i drivers enables the listener to hear exceptional sound while either standing or sitting. Longer ribbon tweeters exhibit a more limited vertical dispersion so high frequencies might be missed if you stand at the listening position.

Figure 2 shows the low frequency extension of the Jordan JX92S in this configuration. The bass alignment permits this speaker to be used as either a sealed or ported (vented) enclosure. To simulate a sealed enclosure the port tube was stuffed with a small piece of foam for the near field measurement. For this sealed box measurement the half power (3 dB down) point is 70 Hz which is remarkable for any enclosure this small. The 10 dB down point is 47 Hz. Naturally, with the normal vented enclosure (the port tube stuffing removed) the low frequency extension will be slightly lower than for the sealed enclosure. The vented measurement shown in Figure 1 (dashed line) combines the driver and port tube output. The 3 dB down point is 51 Hz with a 10 dB down point reached at 38 Hz for the ported design. Many users will wish to use a subwoofer if their musical tastes demand bass content coverage into the 20 to 50 Hz range. I recommend that you use the sealed configuration (stuff the ports) for the mini-monitor to achieve the best integration with a subwoofer.

Other specifications for this speaker are shown in Table I.

Well enough of the technical stuff--you ask how do the mini-monitors sound? In my opinion very good, thank you. The sound is very smooth and natural with these drivers. You'll hear no brightness or shrill sounds from this design. The voicing of the speakers was intended to have a comfortable sonic nature versus an overly aggressive or 'forward' sound from some speakers. You can listen to these speakers for hours without tiring of their sound.

At the 2004 DIY Atlanta Southeast Region event the Jordan JX92S/Aurum Cantus G2si/G2i mini-monitors won best of show among the 17 entries (see http://maxhawk.bravepages.com/diyatl/). They received 15 of 17 votes for 'Best of Show'. Rob Cheng, event organizer, commented that the mini-monitors had:

"Wide soundstage and again awesome bass from such a small driver."

Another attendee, Bob Drake, stated:

"Like Rob I've never heard a soundstage thrown out like this before, in a speaker at any price! It felt like the speakers were the whole width of the room. There

must be fairy dust in those Jordan drivers. (At the price I suppose there should be.)”

Finally, at the Atlanta show we measured the on-axis frequency response performance of the mini-monitors. The results are shown in Figure 3. Notice the flat response extension beyond 30 kHz. As this plot was taken in-room at 1 meter distance, the response below 200 Hz is modulated by room modes which create the variations in the results in that frequency region.

Table I – Jordan JX92S/Aurum Cantus G2si/G2i Mini-monitor Specifications

- 2-way bass reflex design (can also be operated as a sealed enclosure)
- Aurum Cantus G2si or G2i ribbon tweeter with Jordan JX92S full range woofer
- Frequency response 51 to 30 kHz +/-2.5 dB
- Low Frequency Extension -3 dB at 51Hz
- Nominal Sensitivity 84 dB (1 Watt/1m)
- Recommended amplification 20 to 100 watts (no more than 150 Watts)
- Impedance 8 ohms nominal with 7 ohms minimal value
- Dimensions: 12" x 7.5" x 11.75" HWD

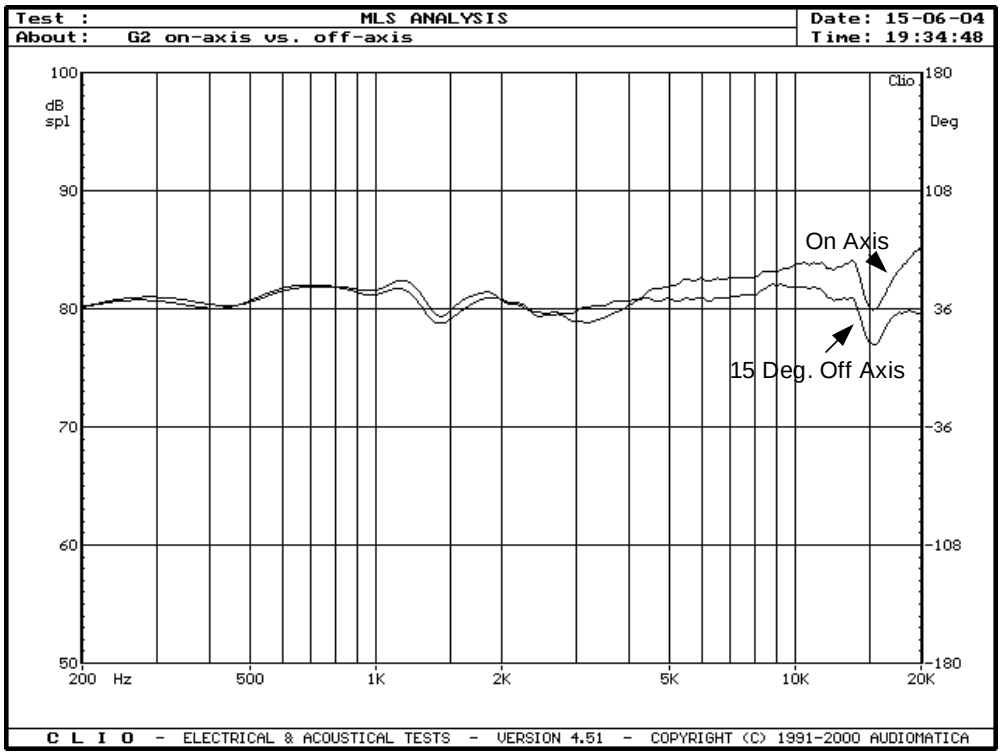


Figure 1. Jordan JX92S/Aurum Cantus G2si/G2i Mini-monitor Horizontal Axis Frequency Response

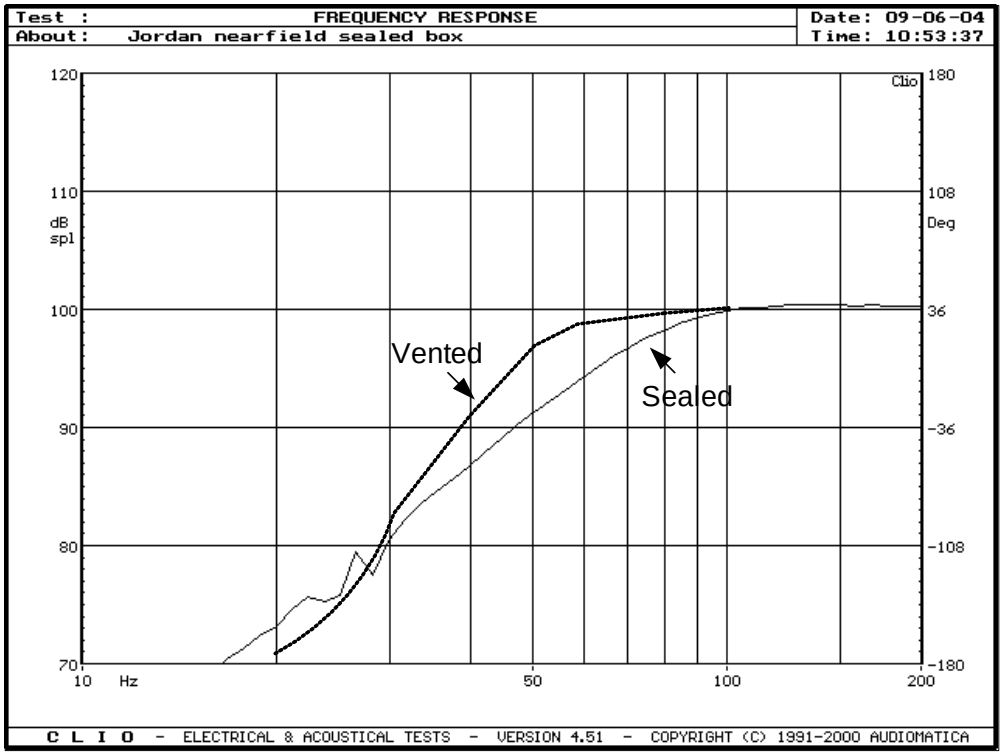


Figure 2. Jordan JX92S/Aurum Cantus G2si Mini-monitor Sealed and Vented Box Low Frequency Response

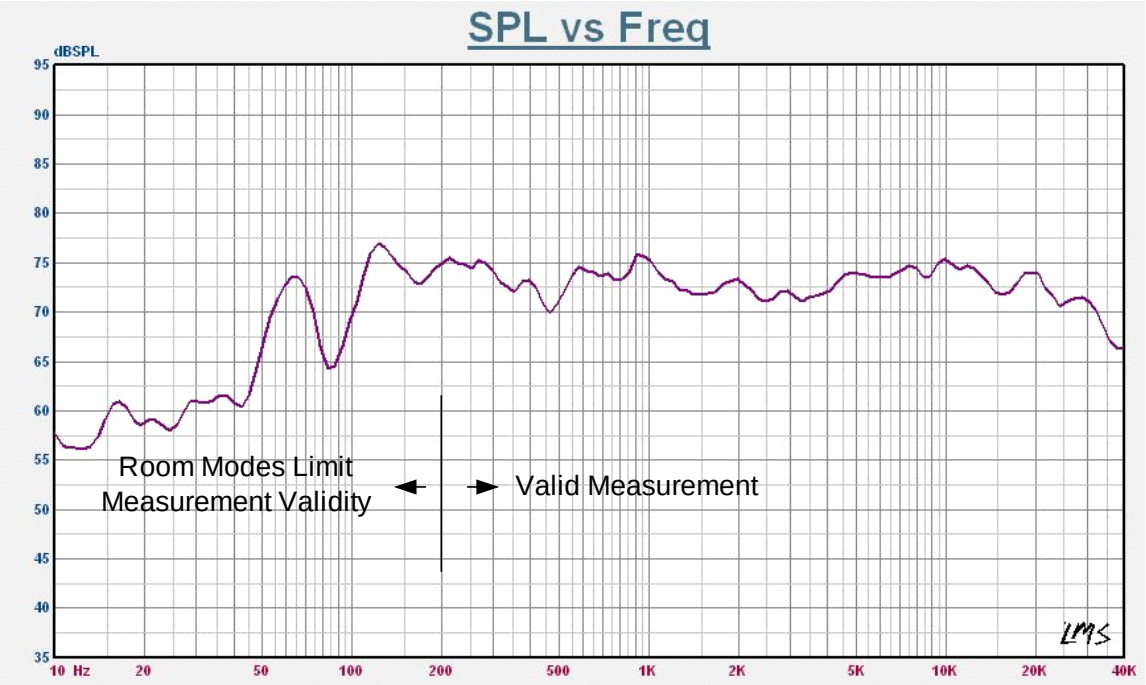
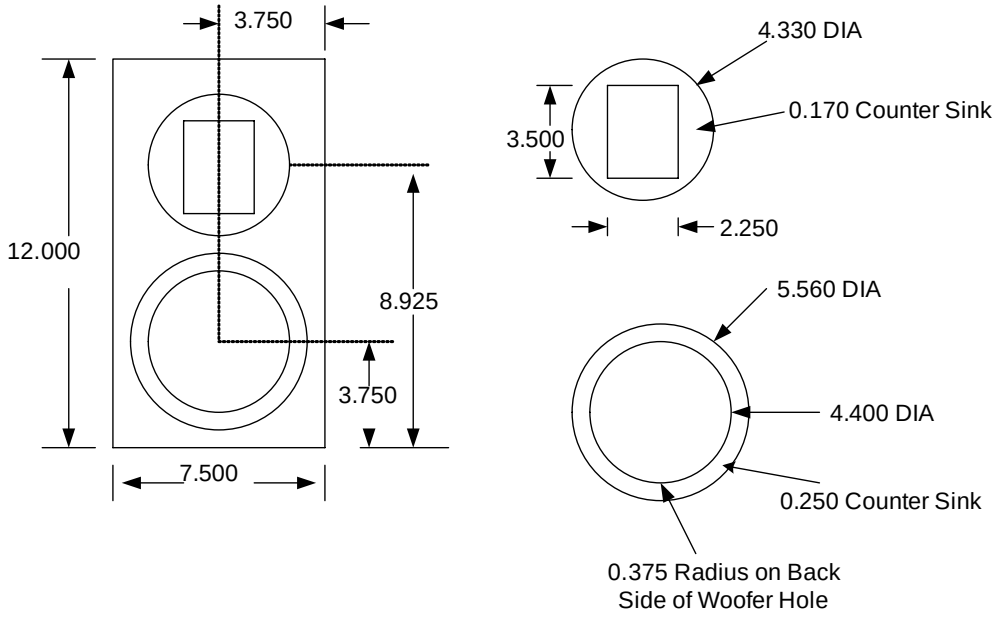


Figure 3. Jordan JX92S/Aurum Cantus G2si/G2i Mini-monitor On-axis Frequency Response Measurement

Jordan JX92S/AC G2si/G2i
Speaker

Front Panel

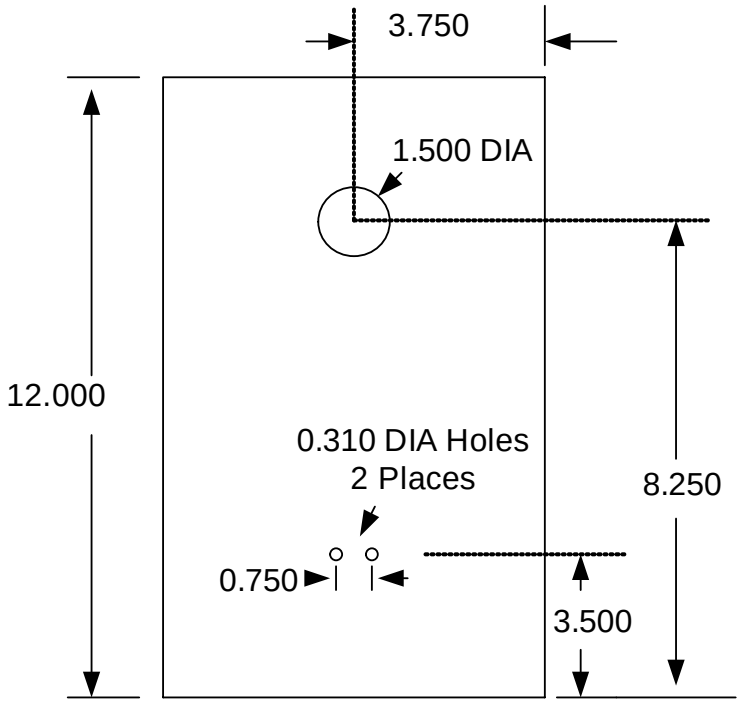


Notes

1. All Dimensions are nominal and in inches
2. Material is 1.000" Thick MDF

Jordan JX92S/AC G2si/G2i Speaker

Rear Panel



Notes

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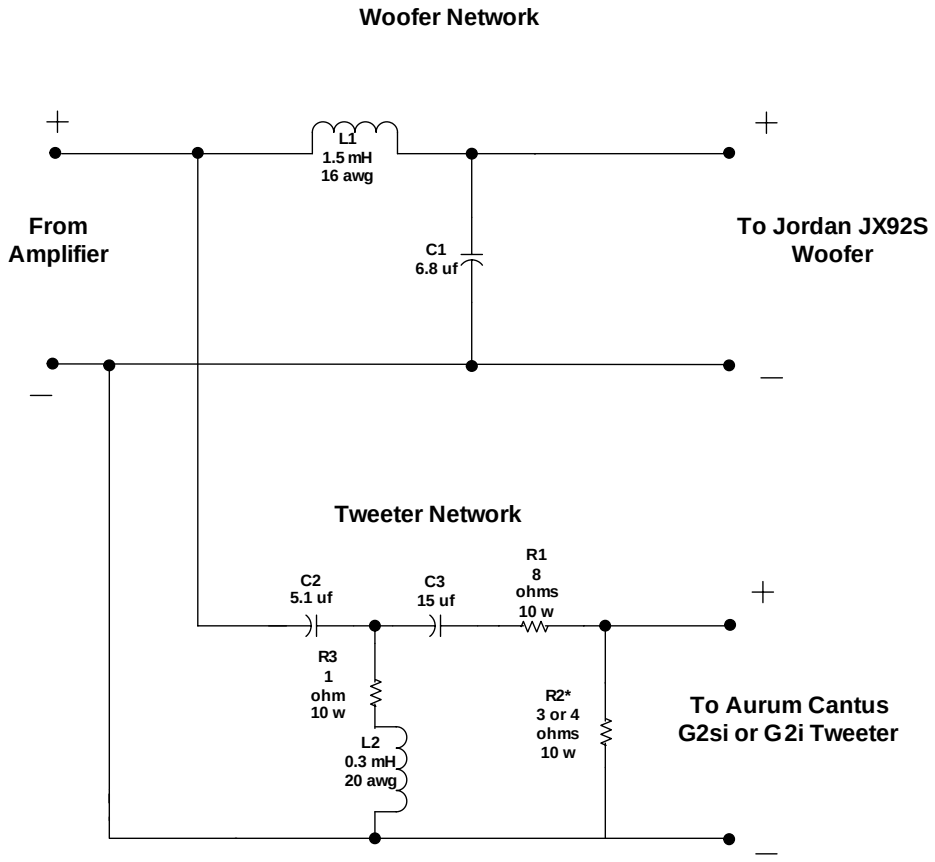
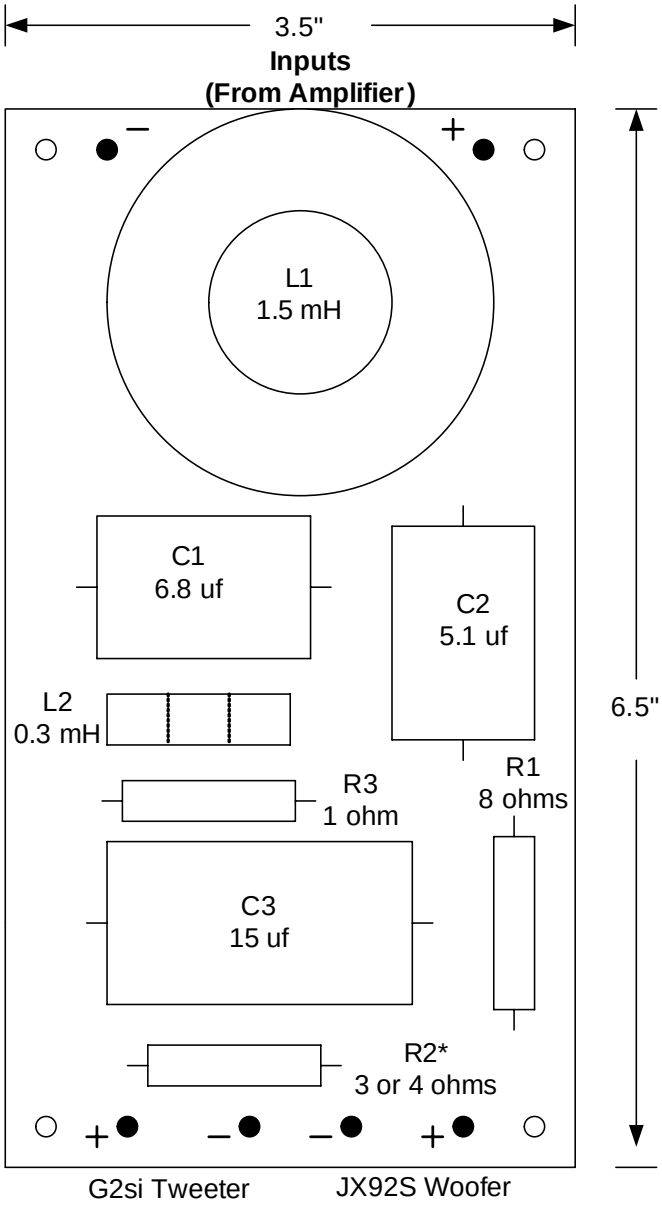
2. Material is 1.000" Thick MDF

Jordan JX92S/Aurum Cantus G2si/G2i Mini-monitor Crossover Network



* R2 value should be 3 ohms for G2si.
For G2i tweeter R2 should be 4 ohms

Jordan JX92S/G2si/G2i Mini-Monitor Crossover Board
Suggested Layout



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