

HE12.1 Instructions

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1. Introduction

Welcome to Adire Audio's HE12.1 loudspeaker system. The HE12.1 is a high-performance high efficiency coaxial driver system, designed for use where high efficiency is required, such as PA monitors and use with low-power amplifiers (specifically SET amplifiers). It features a 12" paper cone driver with a coaxially mounted compression driver loaded into a 90° conical constant directivity horn, which yields a system sensitivity of 96 dB SPL @ 2.83 Vrms.

2. Parts

Your kit should include the following parts (quantities given are for a pair):

Part	Qty	Use
22 uF 160VDC electrolytic capacitor	2	C1 in the impedance network
12 uF 250VDC polypropylene capacitor	2	C2 in the woofer crossover
2.4 uF 250VDC polypropylene capacitor	2	C3 in the tweeter crossover
4.7 uF 250VDC polypropylene capacitor	2	C4 in the tweeter crossover
0.30 mH 20 GA perfect lay air core coil	2	L1 in the impedance network
2.7 mH 16 GA perfect lay air core coil	2	L2 in the woofer crossover
0.36 mH 20 GA perfect lay air core coil	2	L3 in the tweeter crossover
0.56 mH 18 GA perfect lay air core coil	2	L4 in the tweeter crossover
0.18 mH 20 GA perfect lay air core coil	2	L5 in the tweeter crossover
13 ohm 10W sandcast resistor	2	R1 in the impedance network
20 ohm 10W sandcast resistor	2	R2 in the tweeter crossover
BETA 12CX 12" midrange/woofer	2	Woofers
ACD1 1" compression driver	2	Tweeters
DIC dual input cup	2	Dual pair input cup
14GA/2C 14GA twin conductor cable	10	Internal wiring
0.25" female FAST-ON connector	12	Terminal connectors
21cm long wire tie wrap	32	Crossover assembly
8-32 x 3/4" long black oxide screw	8	Input cup mounting
Large T-nut/socket cap screw set	16	Woofer mounting
4" ID by 4.4"L vent	2	Vent tuning

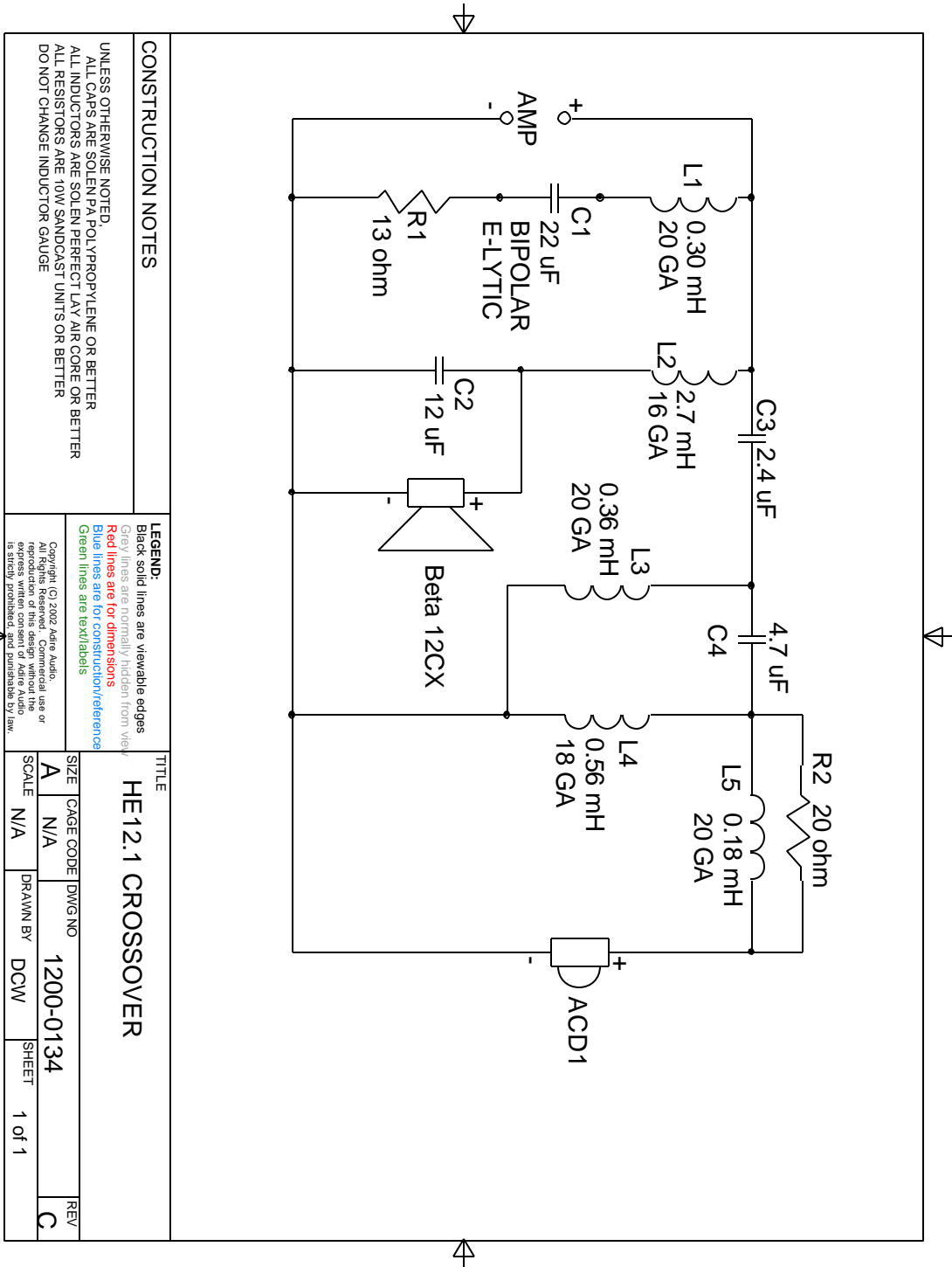
If any parts are missing, please contact the factory as soon as possible, and we'll correct the shortage.

3. Needed Tools

You'll need to supply the following parts and tools to assemble the HE12.1:

- Mounting board (hardboard, plywood, or any other material suitable for crossover mounting)
- Electrical tape
- Masking tape
- Pliers
- Razor blade or sandpaper
- Wire cutters
- Soldering iron
- Solder

4. Crossover Schematic



5. Crossover Assembly

5.1. *The Basics of Crossover Assembly*

Crossover assembly is one of the most critical aspects of loudspeaker construction. A poorly built crossover can seriously degrade the sonic performance of a kit. Additionally, poor construction can lead to early failure of components!

The key to good crossover assembly is to go slow. Take your time. Best to double-check every connection and step twice before proceeding. Remember, each part of a crossover interfaces with others. Mess up one connection, and that will ripple through the entire crossover.

We recommend that you start by reading over these instructions a few times prior to actual construction. This way, you'll know what comes when, and will have a somewhat "intuitive" feel for the process.

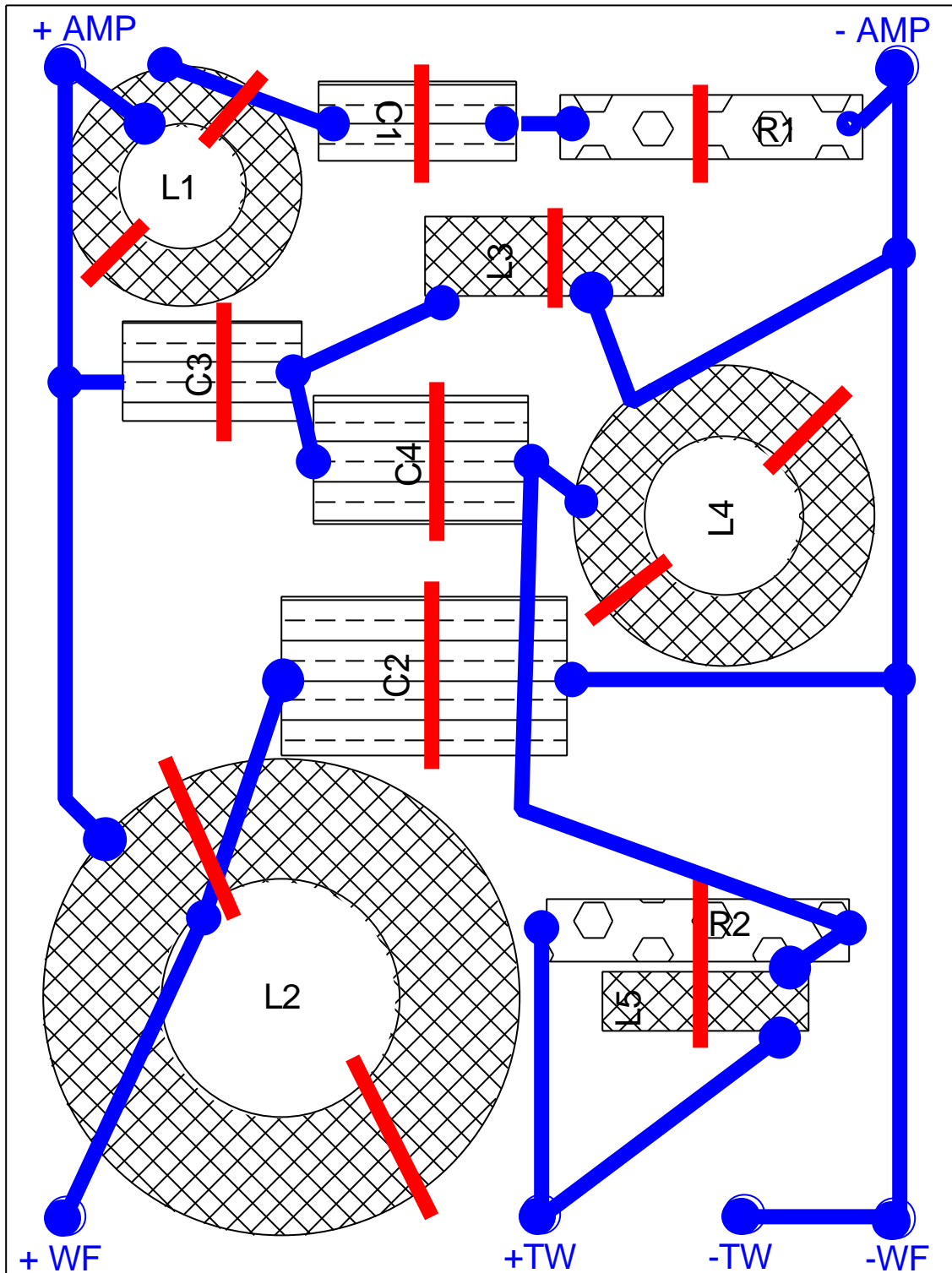
Also, familiarize yourself with the crossover schematic as best as possible! That way, when you're hooking parts up, you'll recognize bad connections before they become permanent. Get a feel for the flow of the crossover, and your assembly will go MUCH smoother.

That said, let's get into the basics of crossover assembly...

Crossover assembly is the process of building the electrical network that goes between the amplifier and the driver(s). As such, it's VERY similar to other electrical kit assembly. If you've soldered parts together before, and can read a schematic, you'll have no problems assembling this kit. On the other hand, if you've never soldered, or don't understand schematics, you should the time to learn some basics of soldering, and how to read a schematic, or find a friend with some electronics experience, and you'll be set. We recommend any of the "Intro to Electronics" books at Radio Shack, or other electronics/hobbyist stores.

Anyway, on to the assembly!

5.2. Suggested Layout



You can actually print out the layout, tape it to some ¼” thick hardboard or plywood, and use it as a drill/wiring/placement guide. If this document is printed out on US Letter or A-4 size paper (roughly 8.5” wide by 11” long), then the above layouts are in real 1:1 scale, matched for the actual component sizes. The crossover board will be 6” wide by 8” long, and should easily fit through the woofer cutouts.

As far as the crossover layout goes, we use the following marking conventions:

- Crosshatch is for inductors
- Rectangular inductors are vertical (standing on edge)
- Alternating line/dashes are for capacitors
- Hexagons are for resistors
- Blue lines indicate electrical connections
- Red lines indicate tie wrap locations
- Tie wraps go through the center of both horizontal and vertical inductors
- Gray lines are for board edges.

For the longer electrical connections, we recommend using either the extra inductor lead, or some of the supplied 14AWG wire. Alternatively, you can use some 16AWG or larger wire that you may have laying around.

You may want to make the electrical connections on the back of the board, rather than the front. This will provide some more mechanical reinforcement for the components, but does require additional drilling of the mounting board. Simply drill a hole at the location of each component lead, and push/pull the leads through (this does make a neater looking crossover, but be careful when screwing the crossover down, so that you don't short out a hidden electrical connection!).

Note that the driver and amplifier polarities are spelled out; follow them!

5.3. Strip Inductor Insulation

The first thing you'll need to do is strip all of the varnish insulation off the inductor leads. This is what the razor blade or sandpaper is for. If you're using the razor blade, you'll need to scrape the insulation. Hold the razor blade perpendicular to the inductor lead, and scrape. Rotate the lead a bit, and scrape. Repeat as necessary.

For the sandpaper, your best bet is to wrap a small piece of paper around the inductor lead and twist. This will allow you to sand off the insulation in no time!

5.4. Mount Inductors

Reading Inductor Values: All inductors are labeled with their value, such as 1.2 mH. All are 16 gauge units, so simply pay attention to the value on the inductor label.

Now mount the inductors. All the locations are shown in section 5.2. Note that inductors L3 and L5 are vertical. This means to stand the inductor up on edge (like a standing tire or inner tube).

Pull the leads through the mounting board. Give them a quick bend to hold the inductors down.

Now use the masking tape to temporarily hold the inductors in place. Go ahead and be liberal with it, and don't worry about a perfect mount; we'll replace the tape with the wire ties later.

5.5. Mount Capacitors

Reading Capacitor Values: All capacitors are marked with their nominal capacitance, such as "6.2 uF". All capacitors are 250VDC units, so, don't worry about matching up the voltage rating. Also, note that all the capacitors you received are non-polar. You don't have to worry about connecting the capacitor "backwards", like you do with polarized capacitors.

Lay out the capacitors on the board. As with the inductors, pull the leads through the mounting board then tape the capacitors down with the masking tape.

5.6. Mount Resistors

Reading Resistor Values: Resistors are labeled WWSQP10JXRY, where XRY is the resistor value. X represents the whole ohm value, and Y the fractional ohm value. For example, a 7.5 ohm resistor would be 7R5, while an 11 ohm resistor would be 11R. The "10J" represents the power handling; all resistors are rated for 10W, so as with the capacitors, don't worry about searching the kit for different power ratings on the resistors.

Lastly, put the resistors on the board. Pull the leads through, and tape down the resistors with the masking tape.

5.7. Connect Component Leads

Using the pliers, twist the component leads together as needed. You should be able to have all the leads contact each other as needed. No extra wire is necessary.

Once each connection is made, give it a quick wrap in electrical tape, to avoid shorting out during the testing phase.

5.8. Build Connection Wires

Now we'll build the connection wires. For this step, you'll need to use the wire cutters and the supplied internal cable and FAST-ON connectors.

For each speaker, you'll need two 12" long pieces and one 24" piece. Use the 12" pieces to connect the drivers to the crossovers, and the 24" long piece to connect the input cup to the crossovers. Note that the positive terminal is marked with a red dot.

Now strip ~0.5" of insulation off all ends of the cable. One end of each cable will ultimately be soldered to the crossover. The other ends we're going to attach to the

Twist the raw ends of the cable on to the crossover inputs and outputs. Cover in electrical tape (for protection while testing the crossover).

5.9. TEST, TEST, TEST

Connect the connection wires to the drivers. Now mount the crossovers in the cabinets; lay them down on any suitable brace, or strap them to the wall of the cabinet with masking or duct tape.

Mount the drivers into the cabinets. Now connect the crossover input wires to the terminal cup. Connect the terminal cup to your amp, and **TURN THE VOLUME ALL THE WAY DOWN.**

Start playing some music. Turn the volume up **VERY** slowly. Put your ear in front of the tweeter, to make sure no bass is coming from it. Likewise, listen to **EACH** woofer to make sure no really high frequencies are coming from them.

SLOWLY increase the volume a bit more. Listen to the soundstage, frequency response, and general timbre of the speaker. If all sounds OK, then continue on to the next step. Otherwise, see section 6 for details on tracking down a potential crossover problem.

5.10. Secure Components

Now comes the fun part: strapping down all the components! Start by removing the crossovers from the speaker. Then use the supplied wire ties to strap the crossover components tight to the mounting board.

Use one wire tie for each capacitor and resistor. Use two wire ties for the inductors, as they're pretty heavy. Go ahead and pull fairly tight; you don't want the components moving around. Don't pull so tight as to crush the capacitors, though – that can damage the components. Just pull the ties tight enough that it takes a good amount of effort to get the components to move.

5.11. Solder Joints

Unwrap the electrical-taped joints. Solder each joint, and inspect for cold solder joints. Then re-wrap each joint with electrical tape.

5.12. Secure Inside Cabinets

Mount the crossovers inside the cabinets. Typically a pair of drywall screws are used to hold the crossover to a brace or side panel. Make sure you do **NOT** put a screw through a wire, or through the center of an inductor!

5.13. Enjoy!

We trust this step is self-explanatory...☺

6. System Troubleshooting

So you encountered a few problems in testing the crossover. Here are some common tips to check over:

1. Double-check all component values. The resistors all look the same, and can only be differentiated by the markings! Likewise, check the capacitors and inductors.
2. Make sure the polarity of the drivers is observed. Reverse connections will create a deep suck-out in the midrange.
3. Triple-check all component values.
4. Make sure all joints are electrically isolated from each other.
5. Make sure the drivers are wired to the outputs of the crossover
6. Quadruple-check all component values.
7. Contact us! We try to answer all questions within one business day. You can reach us at techsupport@Adireaudio.com, phone at 206-789-2919 or FAX us at 630-839-6192.

7. Cabinet Plans

We offer two pre-designed cabinet plans for the HE12.1 – a large stand-mounted sealed box with bass extension to the mid 60s, or a floor-standing vented box with bass extension to the low 40s.

7.1. Sealed Cabinet Plans

The sealed cabinet HE12.1 is a net 60 liters, stuffed with 24 ounces of polyfill. It yields a system Qtc of 0.85, with an F3 of 65 Hz.

Maximum in-room SPL - driven with 10W - will be in excess of 103 dB SPL (at 1 meter) from 55 Hz and up; driven with 100W, the system is capable of more than 113 dB SPL in-room.

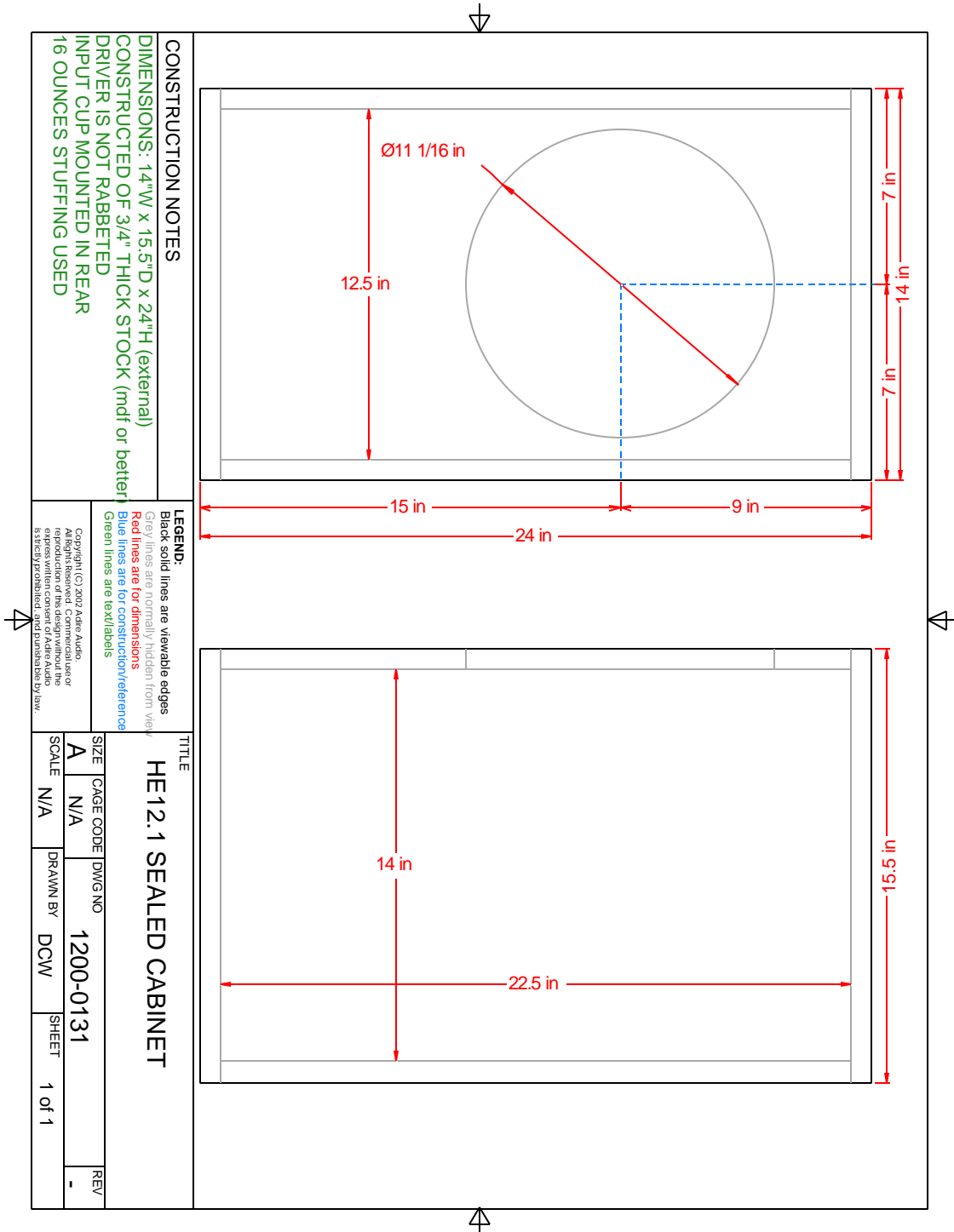
7.1.1. Panel cuts

QTY	SIZE	USE
4	14" x 22.5"	Sides, baffle and back
2	14" x 15.5"	Top and bottom

7.1.2. Hole/baffle cuts

QTY	SIZE	USE
1	11 1/16" diameter	Driver cutout; in baffle
1	3" x 3 3/4"	Dual Input Cup cutout; in back

7.1.3. Cabinet Drawing



7.2. Vented Cabinet Plans

The vented cabinet HE12.1 is a net 125 liters, and uses a single 4" flared vent kit. It is tuned to 30 Hz to yield a system F3 of 44 Hz.

Maximum in-room SPL - driven with 10W - will be in excess of 103 dB SPL (at 1 meter) from 35 Hz and up; driven with 100W, the system is capable of more than 115 dB SPL in-room.

7.2.1. Panel cuts

QTY	SIZE	USE
4	14" x 46.5"	Sides, baffle and back
2	14" x 15.5"	Top and bottom
2	14" x 12.5"	Internal braces

7.2.2. Hole/baffle cuts

QTY	SIZE	USE
1	1 1/16" diameter	Driver cutout; in baffle
1	3" x 3 3/4"	Dual Input Cup cutout; in back
1	4 1/16" diameter	Vent cutout
3	8" diameter	Brace vent holes (one centered on each brace)

7.2.3. Cabinet Drawing

