

DR-304P/DR-305P/DR-306P

Design Reference Series

**Component
Midrange Speakers**

4260 Charter Street
Vernon, CA, 90058-2520, U.S.A.

TEL: 800-227-8879 or 213-582-2832
FAX: 213-582-4328

A Division of Concept Enterprises, Inc.
Copyright © 1996
By Concept Enterprises, Inc.
All Rights Reserved

Congratulations...

on your purchase of our Coustic Design Reference Series Mid-range speakers engineered specially for use in automotive environments. These speakers will give you countless hours of unparalleled listening pleasure while you are on the road.

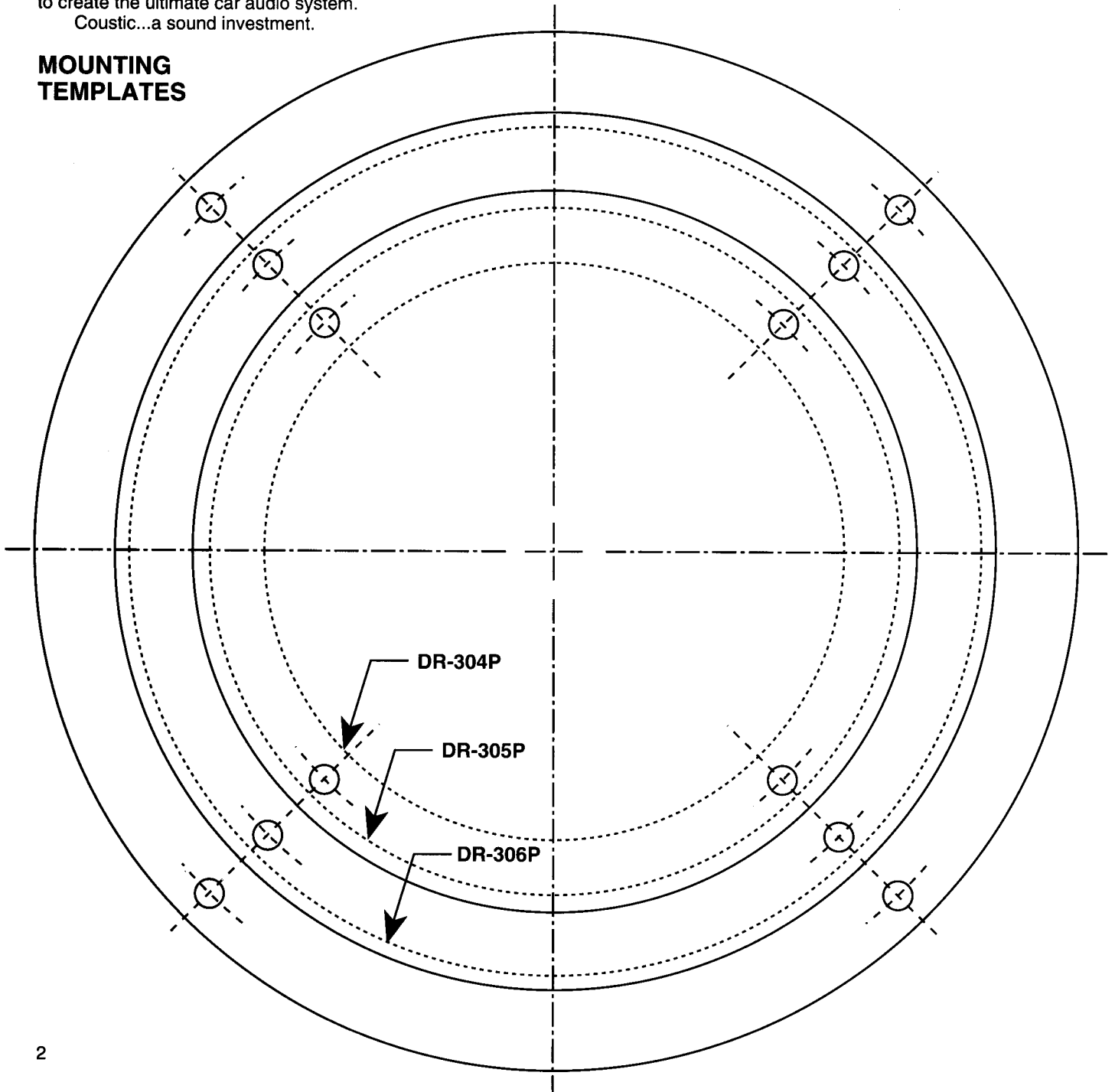
These speakers feature die cast aluminum baskets, butyl rubber surround and MICA impregnated injection molded polypropylene cones for maximum protection from environmental effects such as weathering and aging.

However, to ensure that your speakers will perform at their highest level of efficiency, read the manual thoroughly and follow the precautionary steps and instructions as listed. That done, you will then have superb sound reproduction from tweeters designed specifically by Coustic.

The Design Reference Series also includes a full line of 15-, 12-, 10- and 8-inch woofers as well as 0.75- and 1-inch Neodymium tweeters to cater for any installation needs. Coustic's Design Reference Series also includes space-saving BassPump™ woofer systems, versatile electronic crossovers, high power amplifiers and digital to analog converters. In other words, everything you need to create the ultimate car audio system.

Coustic...a sound investment.

MOUNTING TEMPLATES



FEATURES

- Die Cast Aluminum Speaker Basket
- High Energy Strontium Magnet Structure
- High Temperature Aluminum Voice Coil
- Butyl Rubber Surround
- MICA Impregnated Injection Molded Polypropylene Cone

INSTALLATION PREPARATIONS AND PRECAUTIONS

A. GENERAL PRECAUTIONS

1. Make sure car audio system is turned off before speaker installation begins.
2. Metal clips and filings should be kept away from speakers; **WORK AS CLEANLY AS POSSIBLE.**
3. Install each speaker as firmly as possible. To maximize output efficiency, make sure there is no obstruction between speaker and the listener.
4. Make sure speaker cone has sufficient breathing room.
5. Speakers must be wired **IN PHASE** to produce the best sound fidelity. Double check audio system for correct phasing (i.e., "+" to "+", "-" to "-").
6. Before doing any cutting or drilling, check all clearances and mounting locations again.
7. Run wires along door sills. Lift and replace carpeting if need to (you may have to remove rear seat to route wires from back to front).

B. DOOR MOUNTING PRECAUTIONS

1. Speaker cables should be dressed, if possible, through existing holes in the sheet metal. File edges of any new holes drilled for wires and install rubber grommets before passing wires through to protect them against abrasion.
2. Protect each speaker cone from exposure to moisture. Make sure there are debris-free drain holes in the bottom of each door. Watch for any signs of water leaking into the door.
3. If car door has plastic moisture barrier, cut it to form a flap to shield speaker from leaking water. You can also make such a flap from a piece of heavy-gauge sheet plastic and attach it to the inside of door above the speaker.

INSTALLATION

1. Trace the template onto the mounting panel. Mark pilot hole for large cutout, the edges of the large cutout and locations of the screws.
2. Drill small pilot hole at the center of the cutout first. Then drill four 1/8" holes for the four mounting screws around the driver. Next, make the large circular cutout with a saber or hole saw or a utility knife.
3. Slip the metal "C" clips over the material as shown. This is necessary to prevent the mounting screws from working loose, and must be done to hold the speaker securely.
4. Connect speaker wire to the terminals and mount the speaker using the screws supplied.
5. Install grille.

PLACEMENT SUGGESTIONS

Care in placement and installation of any speakers can make a big difference in the sound you get. Refer to the auto manufacturer's recommended size and location for proper speaker mounting - whether they are installed in the dash, door panels, kick panels, rear deck or rear window pillars.

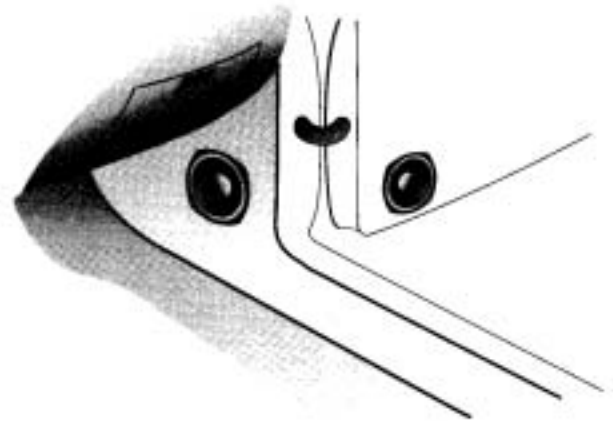


Figure 1. Kick Panel/Door Mount.

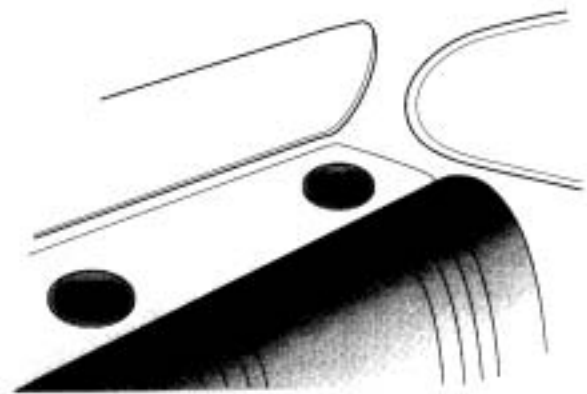


Figure 2. Rear Deck (Top Mount)

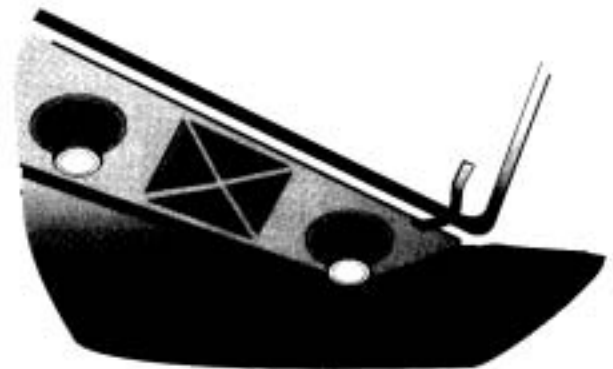


Figure 3. Rear Deck (Bottom Mount)

MECHANICAL INSTALLATION

A. DOOR/KICK PANEL MOUNTING

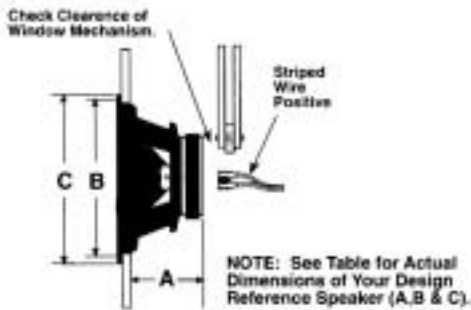


Figure 4. Installation Measurements.

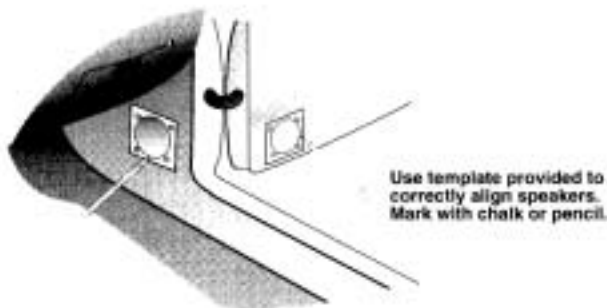


Figure 5. Marking Holes.

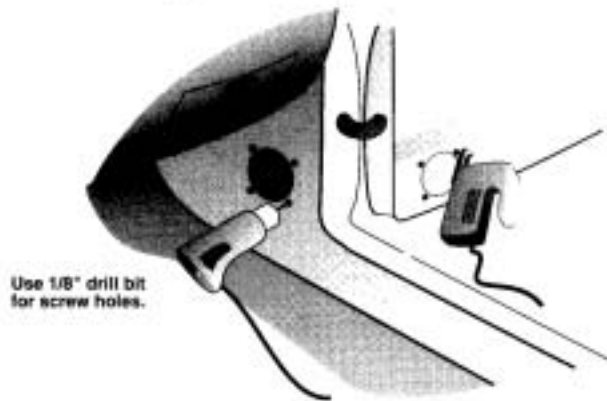


Figure 6. Cutting and Drilling Holes.

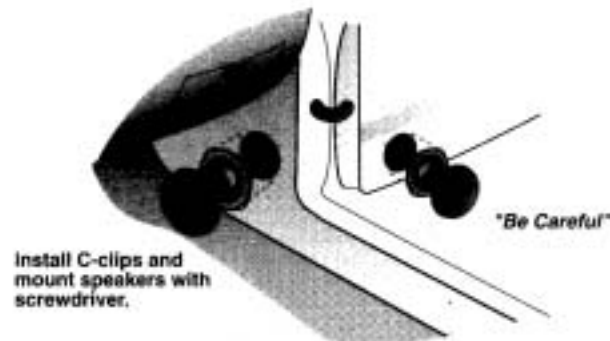


Figure 7. Installing Speaker and Grille.

B. REAR DECK MOUNTING

Use template provided to correctly align speaker. Mark with chalk or pencil.

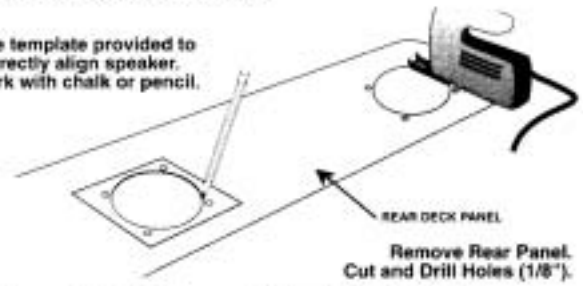


Figure 8. Marking and Cutting Rear Deck Panel.

Replace Rear Panel and use as template. Mark, Cut and Drill.

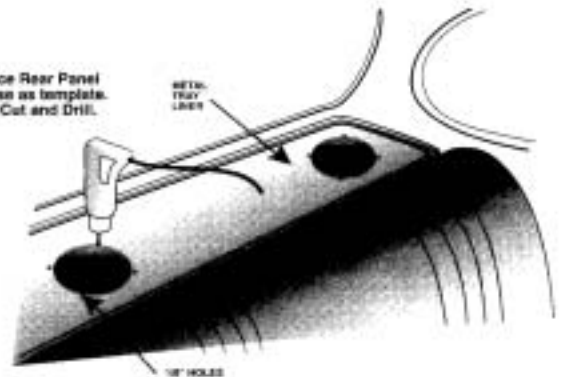


Figure 9. Cutting Metal Rear Deck.

Install C-Clips (if needed) and mount speakers with screwdriver.

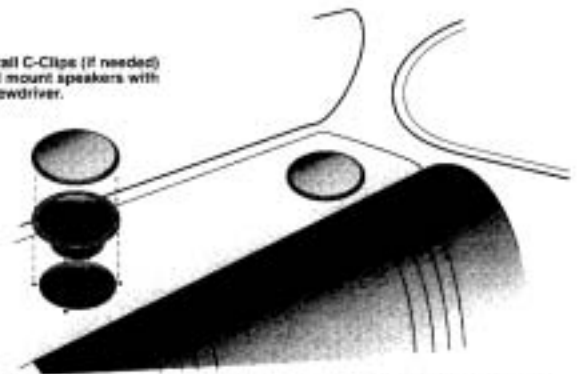


Figure 10. Installing Top Mount Speakers and Grilles.

Install metal studs into grille. Load speaker grille with studs thru drilled speaker hole.

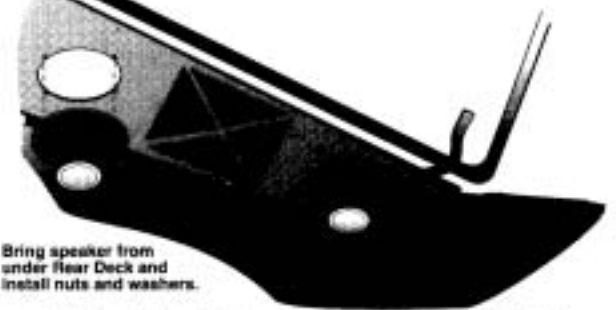


Figure 11. Installing Bottom Mount Speakers and Grilles.

HIGH PERFORMANCE CONSIDERATIONS

High performance systems are characterized by their ability to play at high volume, cleanly and with ease. The best route for getting this kind of performance is by optimizing the playback and power handling capabilities of the speakers. This optimization is achieved through the use of proper crossover elements in the system, to assure that the speakers are operating in their best response region. There are two types of crossover systems available, electronic and passive.

Passive Crossovers

The passive crossover system utilizes capacitors (C) and inductors (L) placed in the speaker leads to block out the amplifier power at unwanted frequencies. The following chart is tabulated to help you select the correct values and wiring of components when designing a passive crossover system. This chart contains complete information with respect to the various crossover slopes, frequencies and impedance values of the design. Please bear in mind that for the crossover frequency that you have selected to be accurate, you must use the actual impedance of the speaker at that frequency. The only way to determine this is by using a frequency generator and an ohmmeter to calculate the impedance curve of the driver, which does vary considerably with frequency. In other words, just because the speaker is rated for 4 ohms doesn't mean that it's 4 ohms at 150 Hz. At that frequency, the speaker impedance may actually be 8 ohms, which means that you would really be crossing over at 75 Hz.

WARNING: The higher slope orders (12/18 dB) will generally yield greater power handling, response shaping and speaker protection capabilities. **When using the higher slope rates, while running an amplifier in Tri-mode (mixed mono) configuration, the speaker leads MUST contain protection fuses to prevent damage to the amplifier in the event that a speaker should short out or go open. Failure to include proper fusing CAN DAMAGE THE AMPLIFIER!**

The formula for calculating the correct speaker fuse size, is as follows:

$$\sqrt{\frac{\text{Power in watts per channel}}{\text{Load Impedance}}} = \text{Fuse Amperage}$$

$$\sqrt{\frac{100 \text{ watts}}{4 \text{ ohms}}} = \sqrt{25} = 5 \text{ Amp Fuse}$$

Fuse type is 3AG fast-blow which should be installed in the positive speaker lead of each speaker. Separate calculations should be performed for each speaker and power rating when used in Tri-mode operation i.e. 2 x 30 watts plus 1 x 100 watts. Always round off the fuse amp rating to the next lowest available fuse size if you come up with an odd number.

Electronic Crossovers

Electronic crossovers, such as the Design Reference DX-36, DX-28 or DX-22, offer a number of advantages over passive designs.

- The ability to easily change settings for both frequency and level. This makes it much easier to adjust and "tweak" a system for best performance.
- Precise control of the actual crossover frequency, since the filter is not effected by the speaker impedance curve.
- Better power/performance ratio from the amplifiers, since amp power does not get wasted in the crossover network.
- No need to fuse the speaker leads, since the amp is not run in mixed mono configuration.

ELECTRICAL CONNECTION

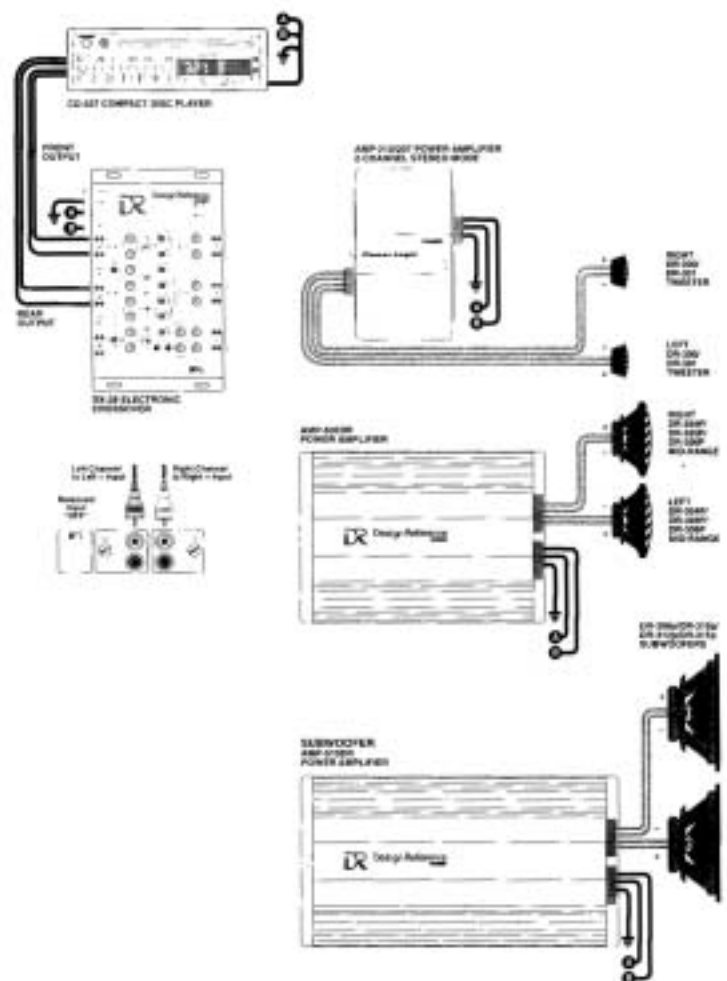


Figure 12. Electrical Wiring Diagram

HIGH PASS FILTERS

Slope dB/Octave	Specifications		Crossover Frequency in Hz										
	Imp	Value	80	85	90	95	100	125	150	170	200	225	250
6 dB (Figure 13A)	2 ohm	C1 (μf)	995	936	884	838	796	637	531	468	398	354	318
	4 ohm	C1 (μf)	497	468	442	419	398	318	265	234	199	177	159
	8 ohm	C1 (μf)	249	234	221	209	199	159	133	117	99	88	80
12 dB (Figure 13B)	2 ohm	C2 (μf)	703	662	625	592	563	450	375	331	281	250	225
		L2 (mH)	5.6	5.3	5.0	4.7	4.5	3.6	3.0	2.7	2.25	2.0	1.8
	4 ohm	C2 (μf)	352	331	313	296	281	225	188	165	141	125	113
		L2 (mH)	11.3	10.6	10.0	9.5	9.0	7.2	6.0	5.3	4.5	4.0	3.6
	8 ohm	C2 (μf)	176	165	156	148	141	113	94	83	70	63	56
		L2 (mH)	22.5	21.2	20.0	19.0	18.0	14.4	12.0	10.6	9.0	8.0	7.2
18 dB (Figure 13C)	2 ohm	C4 (μf)	664	625	590	559	531	425	354	312	265	236	212
		L5 (mH)	3.0	2.8	2.7	2.5	2.4	1.9	1.59	1.4	1.2	1.06	0.95
		C5 (μf)	1986	1870	1766	1673	1589	1271	1059	935	795	706	636
	4 ohm	C4 (μf)	331	312	295	279	265	212	177	156	133	118	106
		L5 (mH)	6.0	5.6	5.3	5.0	4.8	3.8	3.2	2.8	2.4	2.1	1.9
		C5 (μf)	993	935	883	836	795	636	530	467	398	353	318
	8 ohm	C4 (μf)	165	156	147	141	133	106	89	78	66	59	53
		L5 (mH)	11.9	11.2	10.6	10.0	9.6	7.5	6.4	5.6	4.8	4.2	3.8
		C5 (μf)	497	467	441	418	397	318	265	234	199	177	159

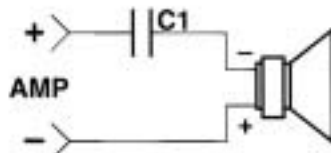


Figure 13A.
6 dB/Octave High Pass

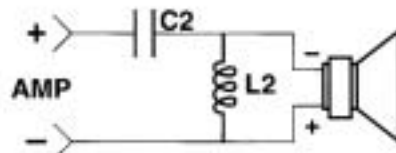


Figure 13B.
12 dB/Octave High Pass

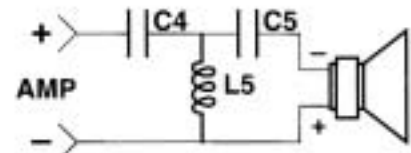


Figure 13C.
18 dB/Octave High Pass

TABLE OF INSTALLATION MEASUREMENTS

	DR-304P	DR-305P	DR-306P
Depth Behind Panel (A)	1.7" (44 mm)	2.0" (52 mm)	2.5" (64 mm)
Mounting Bolt Centers (B)	4.5" (112 mm)	5.6" (141 mm)	6.6" (168 mm)
Speaker Size (C)	4.0" (102 mm)	5.25" (133 mm)	6.5" (165 mm)
Actual Size	3.5" (87 mm)	4.5" (114 mm)	5.6" (142 mm)

SPECIFICATIONS

	DR-304P	DR-305P	DR-306P
Dynamic Power (IHF):	80 watts	120 watts	150 watts
Rated Power (DIN):	50 watts RMS	75 watts RMS	100 watts RMS
Frequency Response (±3 dB):	95-10,000 Hz	74-8,000 Hz	55-8,000 Hz
Sensitivity (1 Watt, 1 Meter):	86 dB SPL	89 dB SPL	90 dB SPL
F _s (Hz)	95	74	55
Q _{TS}	0.59	0.48	0.49
Vas (ft./Liters)	1.7/0.96	5.8/0.21	17.5/0.62
Inductance (mH)	0.20	0.45	0.48
Input Impedance:	4 ohms	4 ohms	4 ohms