



Power Logic
Component
Woofers/Subwoofers

HT-812/HT-810/HT-808/HT-807

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Congratulations...

on your purchase of our HT-Series Power Logic Component Woofers/Subwoofers engineered specially for use in automotive environments. Over the years, these speakers will give you countless hours of unparalleled listening pleasure while you are on the road.

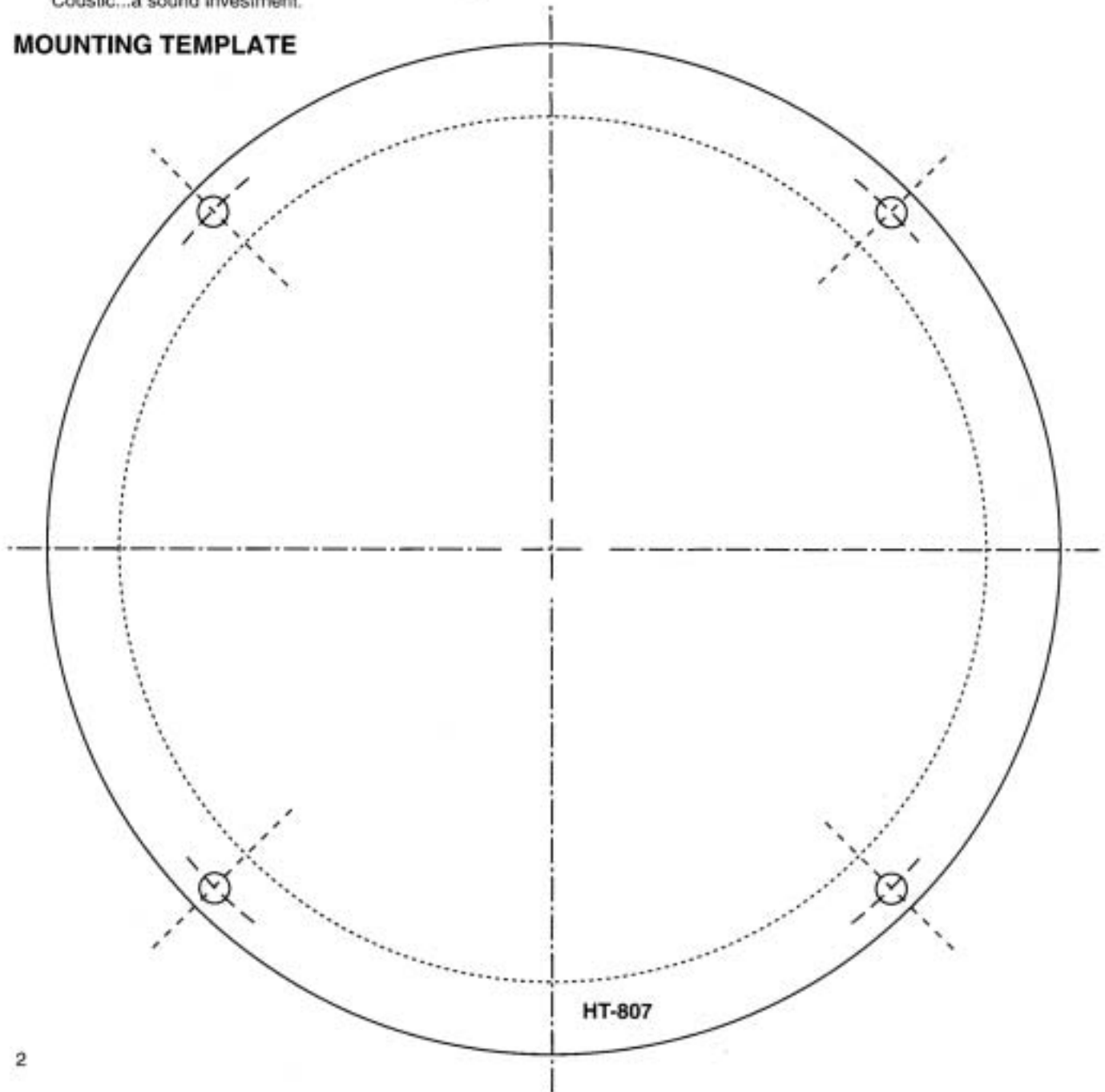
These speakers feature butyl rubber surround, vented pole structure and polypropylene injection cones for maximum protection from environmental effects such as weathering and aging.

However, to ensure that your Coustic Power Logic component 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.

Coustic's HT-Series also includes a full line of 4-, 5.25- and 6.5-inch midranges, 4"x6" 2-way plate system as well as 0.75- and 1-inch Neodymium tweeters to cater for any installation needs. Coustic also manufactures full-featured, high quality CD/cassette radios, award-winning electronic crossovers, high power amplifiers and direct replacement speaker systems. In other words, everything you need to create the ultimate car audio system.

Coustic...a sound investment.

MOUNTING TEMPLATE



FEATURES

- High Energy Strontium Magnet Structure
- High Temperature Aluminum Voice Coil
- Butyl Rubber Surround
- Polypropylene Injection 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 (HT-807)

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.

MECHANICAL INSTALLATION

A. DOOR/KICK PANEL MOUNTING (HT-807)

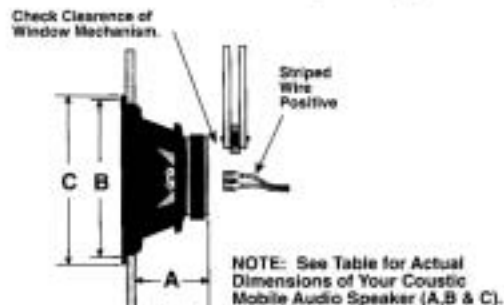


Figure 1. Installation Measurements.

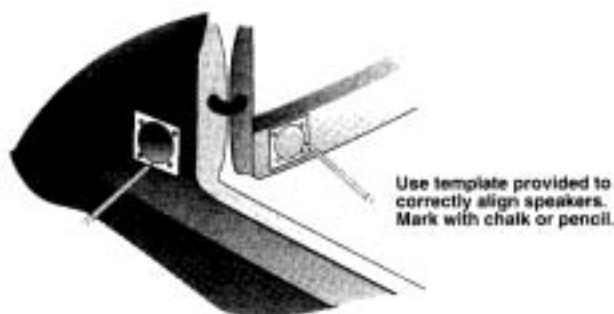


Figure 2. Marking Holes.

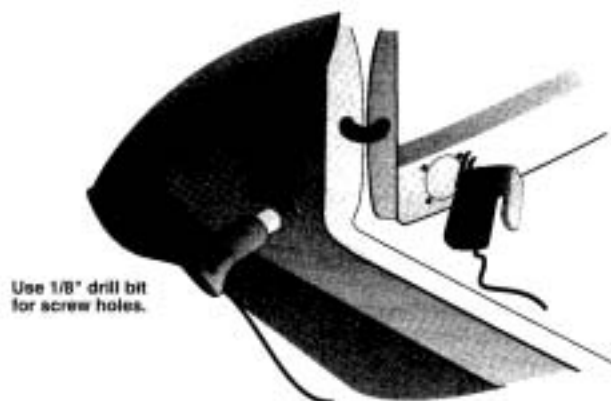


Figure 3. Cutting and Drilling Holes.

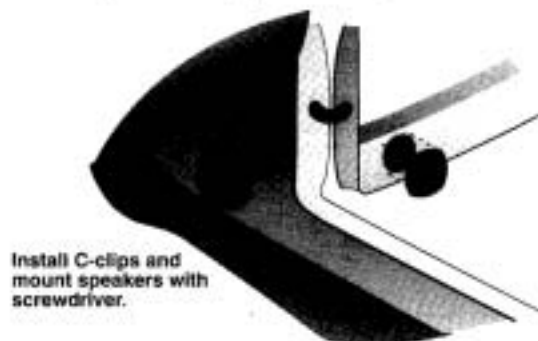


Figure 4. Installing Speaker.

MECHANICAL INSTALLATION

B. HT-807/HT-808/HT-810/HT-812 Custom Speaker Boxes

The Coustic HT-Series of subwoofers have been specifically designed to work best in small woofer enclosures. The following enclosure designs are chosen to provide the best performance from your new subwoofers. One of the key factors in getting the most from any subwoofer is to install it in the optimum enclosure for the type of bass response you want. Please take a few moments to study this material carefully and choose the design that meets your needs.

Sealed Enclosure

This design is the easiest to construct (figure 5). Well suited for Pop, Vocals and acoustical instruments because it provides tight, fast and extremely musical transient response characteristics. This enclosure will benefit from a high powered amplifier and an appropriate crossover to yield the maximum output. It is critical to ensure that there are no leaks in the enclosure.

Vented Enclosure

Fairly straight forward to construct (figure 6), this enclosure is very efficient and will play loud! Great for all around listening such as Rock, Rap, Pop and Orchestral music. By combining the direct output of the subwoofer and the added push of the port, this enclosure produces extra bass response with an F3 point of about 40 Hz. An appropriate crossover is necessary for optimum performance.

Band Pass Enclosure

This enclosure (figure 7) is a little more difficult to build but well worth the effort! It is extremely efficient and plays very loud, ideal for both Rap and Hard Rock listening. Comprised of a combination of a sealed chamber and a ported-chamber and with different frequencies produced in each chamber, the result is a passband design where most of the hard bass notes are concentrated. Similar to all band pass enclosure designs, it can be used without a crossover because of its inherent frequency response shaping characteristics. However, best results will be obtained when used with an electronic crossover such as the XM e-Series from Coustic.

Enclosure Dimensions

All dimensions given are internal dimensions for an optimum non-resonant enclosure. You may change the overall dimensions as long as you maintain the same total volume.

Construction Tips

Ideal material for construction is 5/8-inch or thicker high density particle board which produces the least amount of resonance and is easy to work with. However, they tend to absorb moisture rather easily. Be sure to paint the finished enclosure to avoid swelling.

All joints should be glued and screwed to provide maximum structural integrity. Always drill a small pilot hole first to prevent splitting of the particle board. Nails should be used if you have access to an air nail gun. Be sure to clamp the enclosure securely while the glue dries. Larger boxes should include corner braces at all seams to increase overall rigidity and remember to increase the overall box volume by their equivalent amounts. All internal seams should be sealed with silicone sealant to make them airtight.

Band pass designs should include a removable access panel for loading and servicing of the driver. This should be built into chamber 2, using the endplate of the box as the removable panel. Line the interior of the opening with 1" x 1" strips that are offset to the inside of the box a distance equal to your material thickness. Cover the contact side of these strips with high density foam tape to prevent air leaks.

Most of all, remember to "Measure twice, and cut once."

Glossary of Terms

V_b	Internal volume of the enclosure (cubic feet/liters)
F_3	Frequency in Hz where speaker response is down 3 dB
F_c	Tuning frequency of sealed enclosure
V_{net}	Total net volume of the enclosure (cubic feet/liters)
T_v	Total volume of the enclosure including the driver and port(s) (cubic feet/liters)
F_p	Tuning Frequency of the port in Hz
F_0	Center frequency of a band pass enclosure in Hz
L_p	Port length (inches/cm)
D_p	Port diameter (inches/cm)

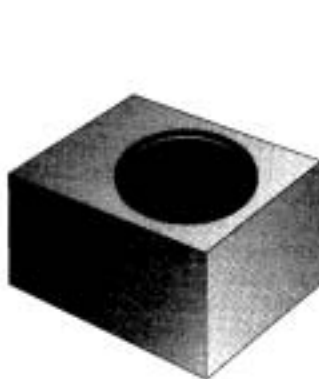


Figure 5. Sealed Enclosure

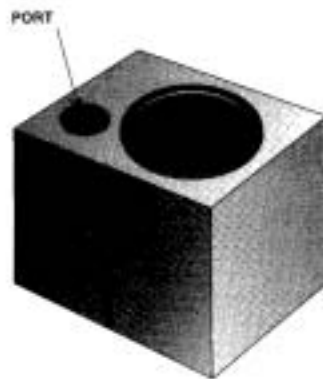


Figure 6. Vented Enclosure

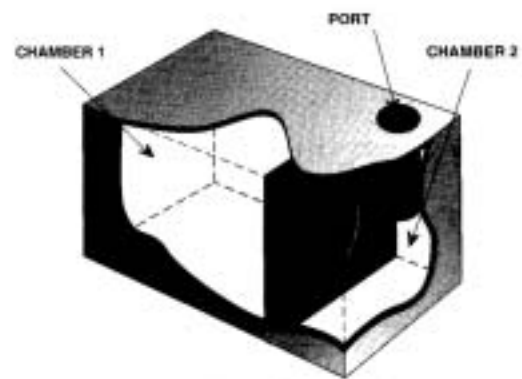


Figure 7. Band Pass Enclosure

Sealed Enclosure Design Parameters

Butterworth Alignment ($Q_{tc} = 0.707$) with heavy fill

Parameter	HT-812	HT-810	HT-808	HT-807*
V_B	0.6 (17)	0.24 (6.8)	0.18 (5.1)	0.23 (6.5)
F_c/F_c	72	90	96	90

Bessel Alignment ($Q_{tc} = 0.5$) with heavy fill

Parameter	HT-812	HT-810	HT-808	HT-807*
V_B	1.6 (45.3)	0.6 (17)	0.48 (13.6)	0.98 (27.7)
F_c	49	61	64	61
F_s	76	95	100	94

Ported Enclosure Design Parameters

Optimally Flat (Q_{ts} alignment) with heavy fill

Parameter	HT-812	HT-810	HT-808	HT-807*
V_B^{**}	1.27 (35.9)	0.50 (14.2)	0.39 (11.0)	0.66 (18.7)
F_B	33	40	43	42
F_c	44	56	58	44
D_v	4"	3.5"	3"	2"
L_v	17.9"	25.3"	20.9"	4.5"

Extended Bass with heavy fill

Parameter	HT-812	HT-810	HT-808	HT-807*
V_B	2.0 (56.5)	0.8 (22.6)	0.75 (21.2)	0.76 (21.5)
F_B	25	30	32	35
F_c	48	62	64	51
D_v	4"	3.5"	3"	2"
L_v	20.2"	28.6"	19"	6.2"

4th-Order Band-Pass Enclosure Design Parameters

Parameter	HT-812	HT-810	HT-808	HT-807*
V_B^{***}	1.7 (48.1)	0.75 (21.2)	0.7 (19.8)	0.6 (17.0)
V_{B1}	0.7 (19.8)	0.3 (8.5)	0.3 (8.5)	0.25 (7.1)
F_{c1}	67	79	78	88
F_{c2}	24	30	22	27
V_{B2}	1.0 (28.3)	0.45 (13.7)	0.4 (11.3)	0.35 (9.9)
F_{B2}	40	50	40	45
F_{c2}	89	103	100	113
D_{v2}	4"	3"	2.5"	2"
L_{v2}	15"	12.1"	16"	8.7"

* HT-807 woofer was designed specifically to augment the front stage bass response of systems using smaller (4" - 5 1/4") coaxial or component sets. The sealed enclosure volume shown here is roughly equal to the internal volume of the average front door panel. In most cases, simply mounting the driver into the door panel will provide the optimum operating environment and best overall performance.

** V_B does not include volume of driver and vent.

*** V_B total internal volume of sealed and ported chambers. Chamber #1 is sealed with heavy fill. Chamber #2 is ported with light liner filling.

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 chart at the back of this manual 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 Coustic XM-1e, XM-3e or XM-5e, 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.

LOW PASS FILTERS

Slope	Specifications		Crossover Frequency in Hz										
	dB/Octave	Imp	Value	50	60	70	80	85	90	95	100	125	150
6 dB (Figure 8A)	2 ohm	L1 (mH)	6.4	5.3	4.6	4.0	3.74	3.6	3.4	3.2	2.5	2.1	1.59
	4 ohm	L1 (mH)	12.8	10.6	9.0	8.0	7.5	7.2	6.7	6.4	5.3	4.2	3.2
	8 ohm	L1 (mH)	25.5	21.2	18.2	15.9	15.0	14.2	13.4	12.7	10.2	8.4	6.4
12 dB (Figure 8B)	2 ohm	L2 (mH)	9.0	7.5	6.4	5.6	5.3	5.0	4.7	4.5	3.6	3.0	2.25
		C2 (μ f)	1125	938	804	703	662	625	592	563	450	375	281
	4 ohm	L2 (mH)	18.0	15.0	12.8	11.3	10.6	10.0	9.5	9.0	7.2	6.0	4.5
		C2 (μ f)	563	468	402	352	331	313	296	281	225	188	141
	8 ohm	L2 (mH)	36.0	30.0	25.7	22.5	21.2	20.0	19.0	18.0	14.4	12.0	9.0
		C2 (μ f)	281	234	201	176	165	156	148	141	113	94	70
18 dB (Figure 8C)	2 ohm	L3 (mH)	9.6	8.0	6.8	6.0	5.6	5.3	5.0	4.8	3.8	3.2	2.4
		C3 (μ f)	2117	1764	1512	1323	1245	1176	1114	1058	847	706	529
		L4 (mH)	3.2	2.7	2.25	2.0	1.9	1.8	1.7	1.59	1.27	1.06	.80
	4 ohm	L3 (mH)	19.1	15.9	13.6	12.0	11.2	10.6	10.0	9.6	7.6	6.4	4.8
		C3 (μ f)	1058	882	756	662	623	588	557	529	423	353	265
		L4 (mH)	6.4	5.3	4.5	4.0	3.74	3.6	3.4	3.2	2.5	2.1	1.59
	8 ohm	L3 (mH)	38.2	31.8	27.3	23.9	22.5	21.2	20.1	19.1	15.3	12.7	9.6
		C3 (μ f)	529	441	378	331	311	294	279	265	212	176	133
		L4 (mH)	12.7	10.6	9.0	8.0	7.5	7.1	6.7	6.4	5.1	4.2	3.2

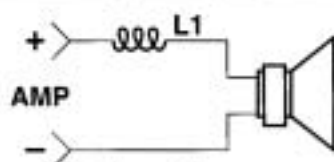


Figure 8A.
6 dB/Octave Low Pass

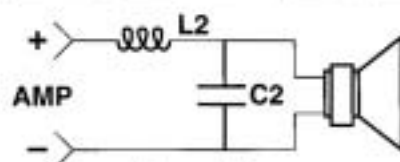


Figure 8B.
12 dB/Octave Low Pass

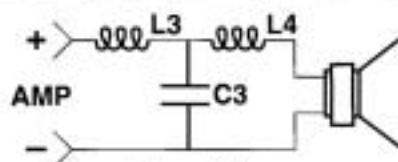


Figure 8C.
18 dB/Octave Low Pass

TABLE OF INSTALLATION MEASUREMENTS

	HT-807	HT-808	HT-810	HT-812
Depth Behind Panel* (A)	2.90" (74 mm)	3.84" (97.5 mm)	4.65" (118 mm)	5.20" (132 mm)
Mounting Bolt Centers (B)	6.22" (158 mm)	7.76" (197 mm)	9.76" (248 mm)	11.65" (296 mm)
Speaker Size (C)	6.5" (165 mm)	8.0" (208 mm)	10.0" (258 mm)	12.0" (306 mm)
Actual Size	5.63" (143 mm)	7.0" (175 mm)	9.0" (229 mm)	10.75" (273 mm)

SPECIFICATIONS

	HT-807	HT-808	HT-810	HT-812
Speaker Type	Woofer	Subwoofer	Subwoofer	Subwoofer
Dynamic Power (IHF):	140 watts	170 watts	200 watts	250 watts
Rated Power (DIN):	70 watts RMS	80 watts RMS	100 watts RMS	120 watts RMS
Frequency Response (± 3 dB):	50-3,500 Hz	35-2,500 Hz	30-2,000 Hz	25-2,000 Hz
Sensitivity (1 Watt, 1 Meter):	89 dB SPL	90 dB SPL	91 dB SPL	93 dB SPL
F_s (Hz)	46	36	30	26
Q_{rs}	0.44	0.29	0.27	0.30
Vas (ft./Liters)	0.8/22	1.4/40	2.5/70	4.6/130
Q_{cs}	0.49	0.30	0.28	0.32
Q_{ms}	7.17	6.98	6.73	6.30
R^{ms}	3.52	3.37	3.38	3.27
Magnet Size (oz.)	16	25	45	45
Voice Coil Size	1.25"	1.50"	2.0"	2.0"
Input Impedance:	4 ohms	4 ohms	4 ohms	4 ohms

* From back of flange.