HIFONICS

HW-10 ◆ HW-12 ◆ HW-15
Owners/Installation Manual

This manual has been prepared to help you make a decision on the woofer enclosure, and desired tuning for a particular application. As you can see on the following pages, there are many possible variations of woofers, and enclosure sizes that may be used to achieve a specific performance.
Considering all space, and power handling limitations, choose the woofer and enclosure size that will give you the desired performance for your application. All measurements used to calculate the volume are Internal Measurements. Always allow for the thickness of the wood.

Formula for Volume:

Volume for cu. Ft.=H (in) X W (in) X D (in) ÷1728
(Divide by 1,728 to convert to cubic feet)

Wiring:

Wiring (Series or Parallel). The wiring of two or more drivers can effect impedance for the entire system. Care must be taken to insure that the resulting impedance does not exceed the amplifiers requirements. When wiring in series, just add the impedance together. (Fig. A) When wiring in parallel, things get more complicated. The formula is:

1 divided by 1/R1 + 1/R2 + 1/R3 + 1R4 =Total Impedance, where R = impedance of each individual speaker. (Fig B)

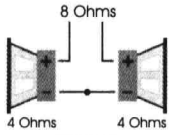

Figure A

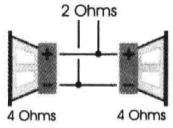

Figure B

Cabinet Material:

Generally 5/8" to 3/4" material should be used on all enclosures. The following is a list of commonly used construction materials.

- Medium Density FiberBoard: The best overall material for speaker cabinets, MDF is extremely rigid, and is able to withstand high-pressure levels.
- Birch, Oak, and most hard woods: these are also very rigid; however, they are usually very expensive.
- Standard grade plywood & underlayment particleboard: Both are commonly used; however, they are not well suited for the car audio environment.

Bracing:

Internal bracing is encouraged to prevent flexing, and to strengthen the cabinet. NOTE: Volume taken up by the bracing must be added to the total enclosure volume. There are three main types of bracing, they are:

- Corner Bracing: Corner bracing helps to strengthen the cabinet and prevents splitting of particleboard caused by screws going into the panel edge. 1" X 1" at all corner joints, glued and screwed.

- Diagonal Bracing: Diagonal bracing on all panels, prevents panel flexing under high sound pressure conditions. Remember that any flexing panels will produce unwanted sound vibrations, which can lead to a "muddy sound". 1" X 2", with 1" surfaced glued and screwed to the panel.

- Cross Bracing: Cross braces used between opposite panels will tie them together as one structure, again helping to prevent panel flexing . Diagonal braces will provide convenient anchoring points for cross braces 1" X 1" glued and screwed.

Damping:

All inside surfaces should be lined with 1/2" thick Dacron for fiber fill for sound damping. Be sure to attach the insulation firmly to prevent interference with woofer(s) and or port(s).

HIFONICS WARRIOR SERIES SUBWOOFER SPECIFICATIONS

	HW-10	HW-12	HW-15
Re	4.0 ohms	4.0 ohms	4.0 ohms
Le	1.38 mH	1.38 mH	1.52 mH
Qm	3.85	3.28	3.48
Qe	0.41	0.32	0.35
Qts	0.37	0.29	0.32
BL	12.2	15.8	15.8
Mms	113.6	166.1 g	229 g
Cms	0.24 mm	0.21 mm	0.24 mm
Rms	5.7 kg	8.7 kg	8.9 kg
Vas	41.1 litres	71.8 litres	237.9 litres
SPL	86.4	88.4 dB	90.2 dB
Fms	30.8 Hz	27.2 Hz	21.6 Hz
Res	83.0 ohms	88.9 ohms	89.1 ohms

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HW-10	BOX TYPE		
	Small Ported	large Ported	Sealed
Volume			
Litres	28.4	42.6	14.2
Cubic Feet	1	1.5	.5
Tuning Freq.	fb:37	fb:35	fc:60/Qtc:0.78
Port Diameter	2.5	3	n/a
Port Length	8	8	n/a
# of Ports	1	1	n/a

HW-12	BOX TYPE	
	Small Ported	Large Ported
Volume		
Litres	28.4	39.7
Cubic Feet	1	1.4
Tuning Freq.	fb:43	fb:38
Port Diameter	3	3
Port Length	8	7
# of Ports	1	1

HW-15	BOX TYPE		
	Small Ported	large Ported	Sealed
Volume			
Litres	63.8	92.2	50
Cubic Feet	2.25	3.25	1.75
Tuning Freq.	fb:37	fb:34	fc:51/Qtc:0.76
Port Diameter	4	4	n/a
Port Length	8	6	n/a
# of Ports	1	1	n/a

Glossary of Terms

Q	The system losses of relative damping (ratio of stored to dissipated energy or ratio of reative to resistive energy.
Fs	Free air resonance of drive in Hz.
Qms	Mechanical Q of system.
Vas	Volume of air equivalent to drive from rest position.
Cms	Mechanical compliance of a loudspeaker piston.
Mms	Moving mass of total assembly.
Xmas	The maximum linear excursion of a loudspeaker piston.
Sd	Surface area of cone.
Dia	The piston diameter of a loudspeaker.
Qes	Electrical Q of system.
Re	DC resistance.
Le	VC inductance.
Pe	Maximum input power.
Qts	Total Q of system.
Sens	Sensitivity.
Vc	Volume of a closed enclosure.
Vb	Volume of a vented enclosure.
Fc	The resonant frequency of a closed box system.
Fb	The resonant frequency of a vented box system.
F3	The half-power (3dB) frequency of a loudspeaker enclosure design.
Qtc	The Q of a loudspeaker at Fc in a closed box, considering both its electrical and mechanical resistance.
QL	The Q of a vented box, resulting from all box losses.
Fill	The acoustic absorption added inside a box to suppress unwanted resonance.
Ports	Number of ports.
DV	Diameter of vent.
LV	Length of vent.
H	Height
W	Width
D	Depth

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Troubleshooting:

Basic Problem	Possible Solution
No Sound from Speaker	Confirm power is on from all components.
Very Low Sound	Adjust fader control. Check connection cables equipment. Etc...
Unnatural Bass Emphasis	Adjust loudness contour. Crossover points, bass control, etc...
Whining Sound	Clean and tighten power/ground connections. Check all cables and contacts. Check all grounding points.
Distortion at Very High Listening Levels	Check gain control Check amplifier input or output controls.
No High Frequency Output	Check passive crossover/active crossover. Check all cables and connections.

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