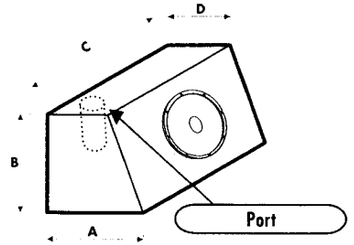
Building the enclosure

Enclosures aren't as simple as they seem, but don't be put off as a few simple guidelines and some common sense will normally yield a fine result. Use a minimum 3/4" thickness of MDF for the cabinet, preferably with at least one brace. Use damping pads on all internal surfaces as well as an absorbent material in the cavity. Your dealer should either stock or be able to recommend suitable materials for this. Bass reflex cabinets are easier to construct because it is not so important for them to be airtight and the internal pressures are lower, but they are more difficult to tune well. For an ideal cabinet, you should not be able to feel any vibration coming from the panels at full power. For safety reasons, it is essential that your bass cabinet is securely fixed in the trunk - bass is meant to motor, not fly!

Calculating the internal volume



Internal volume calculation: Vb = B x C x (D+(A-D)/2)

Internal volume		20L	30L	40L	50L	60L	70L	80L	100L
External sizes in mm with sides of 19mm thickness in medite	A	300	370	370	370	400	450	450	450
	B	300	370	370	370	400	450	450	450
	C	410	380	490	605	720	650	730	900
	D	190	237	237	237	170	170	190	190

Power recommended

The power handling of Focal Audiomobile subwoofers is very high. It is therefore important to choose an amplifier powerful enough to drive them properly. An amplifier that is too small will distort quickly, limiting the level and quality of the sound and eventually causing damage to the loudspeakers.

Warning!

The high output and power handling of Focal Audiomobile subwoofers means that high sound pressure levels can be reached. You are reminded that listening to music at levels beyond 110dB can permanently damage your hearing.

Guarantee

In the unlikely event of any problem, please contact your Focal Audiomobile retailer.

Guarantee conditions conform to those in force in the country of sale, or as defined by the local distributor.

CE

SESD28099901

Utopia 5 WS
Bass-reflex enclosure

ø: 10.5cm
Sd: 86.6cm²
Xmax: 8mm
Fs: 44.6Hz
Qes: 0.38
Qms: 5.51

Internal volume (litres)	-3dB cut-off frequency (Hz)	Port internal diameter (cm)	Port length (cm)
5	55	3	14
7	48.7	4	18
10	43	4	15

Qts: 0.36
Vas: 9.0l
Re: 5.2ohms
Mms: 14.8g
Bl: 7.5T.m
Le: 1.05mH

Closed enclosure (Using the driver for bass in a very small cabinet)

Internal volume (litres)	-3dB cut-off frequency (Hz)	Qtc
3	88	0.707

The 5 WS can be loaded by a very small volume of air; this makes it possible to mount the drivers in the front of the vehicle so that the coherence of the system is optimum. For higher levels where maximum acoustic impact is required, it is possible to use multiple 5 WS drivers. The impedance of 5ohms when connected in parallel is as follows:

- *2 x 5 WS in parallel = 2.5ohm*
- *3 x 5 WS in parallel = 1.7ohm*
- *4 x 5 WS in parallel = 1.25ohm*
- *5 x 5 WS in parallel = 1ohm*

The effective surface area of four 5 WS drivers used as a subwoofer is equivalent to a single 27cm subwoofer..

Utopia 27 WX
Bass-reflex enclosure

ø: 21cm
Sd: 346.4cm²
Xmax: 9mm
Fs: 37.4Hz
Qes: 0.6
Qms: 7.4

Internal volume (litres)	-3dB cut-off frequency (Hz)	Port internal diameter (cm)	Port length (cm)
30	39	9.6	40
40	36	9.6	30
50	32	9.6	30

Qts: 0.56
Vas: 38.6l
Re: 4.4 ohms
Mms: 79.1g
Bl: 11.7T.m
Le: 2.12mH

Closed enclosure

Internal volume (litres)	-3dB cut-off frequency (Hz)	Qtc
30	49	0.84
40	48	0.77
50	47.7	0.74

Utopia 33 WX
Bass-reflex enclosure

ø: 26.5cm
Sd: 551.5cm²
Xmax: 9mm
Fs: 32.5Hz
Qes: 0.36
Qms: 11.75

Internal volume (litres)	-3dB cut-off frequency (Hz)	Port internal diameter (cm)	Port length (cm)
30	46	9.6	35
40	40	9.6	35
50	37	9.6	23

Qts: 0.35
Vas: 73.1l
Re: 3.3ohms
Mms: 140.1g
Bl: 16.2T.m
Le: 2.85mH

Utopia 38 WX
Bass-reflex enclosure

ø: 33cm
Sd: 855.3cm²
Xmax: 9mm
Fs: 35.0Hz
Qes: 0.51
Qms: 6.19

Internal volume (litres)	-3dB cut-off frequency (Hz)	Port internal diameter (cm)	Port length (cm)
60	45	9.6	20
80	40	2x9.6	30
100	36	2x9.6	30

Qts: 0.47
Vas: 122.2l
Re: 3.6ohms
Mms: 174.0g
Bl: 16.4T.m
Le: 2.85mH

Recommended solutions

SUBWOOFERS OWNER'S MANUAL

Congratulations on choosing a Focal Audiomobile product.
Now that you have purchased one of Focal's many high technology precision audio components, make sure that you get the maximum performance from it by following these instructions - they are there to help YOU. Failure to observe the recommendations and advice contained in these comprehensive instructions may result in damage to your loudspeakers or other components and invalidate your warranty. At best, you may never realize the full potential of your Focal Audiomobile product.
Every Focal subwoofer has been designed to operate within a specific box volume. Recommended volumes and alignments are provided that ensure optimum results. You can purchase the Focal Works optimization program if you wish to experiment with other alignments.

Connections

It is essential that correct polarity be observed with subwoofers. Failure to do so will result in a large 'hole' in the sound where the upper bass cancels with the lower midrange. Positive is marked in red, negative in black. The total impedance is then 3ohms. You can connect several subwoofers to the same amplifier in this configuration, but use the calculations below to check the impedance is OK.

A note on wiring

The quality and gauge of wire used will have a strong effect on the quality of sound. Focal Audiomobile recommend a minimum specification of 2.5mm² oxygen free copper (OFC) wire for subwoofers, but ask your dealer for advice on your specific installation.

Parallel connection

Many high-end in-car amplifiers can drive very low impedance loads (some as low as 1ohm) enabling them to deliver more current. To calculate the total impedance presented to your amplifier, divide the impedance of one subwoofer coil by the total number of coils connected.

Example
2 subwoofers of 4ohm in parallel = 4/2 = 2ohm
4 subwoofers of 4ohm in parallel = 4/4 = 1ohm

Version Française au verso...

Series connection

Sometimes it is necessary to increase the impedance using a series connection. Connect the positive terminal of the first subwoofer to the positive terminal of the amplifier. Connect the negative terminal of the first subwoofer to the positive terminal of the second subwoofer, then return the negative terminal of the second subwoofer back to the negative of your amplifier. The total impedance is equal to the sum of the impedances of each sub-woofer coil.

Example:
2 subwoofers of 4ohm in series = 4+4 = 8ohm

Fitting instructions *(except for 5 WS)*

Focal subwoofers are supplied with a fixing kit: bolts + inserts. After you have made the cutout for the loud-speaker, position the driver and pre-drill the fixing holes. For 27cm and 33cm subwoofers drill fixing holes of 7mm diameter, for 38cm subwoofers, drill fixing holes of 8mm diameter. Push in the inserts securely from the rear and fit the seal provided. Finally, screw the driver firmly into place.

Mounting the subwoofer with the magnet system external *(hanging out)*

Mounting the subwoofer with the cone firing into the box, magnet system outside, gives a slight increase in effective box volume. This increase is small enough though not to effect the tuning by any appreciable margin. However if you do choose to mount the driver in this way, remember to reverse the polarity of the connections so that it stays in-phase with the rest of the system.

Adjusting the cut-off frequency

The ideal cut-off frequency is normally between 60 and 100 Hz. Optimum adjustment can only be achieved after listening and/or measuring.

Enclosures

Focal offer 4 ready-to-use optimized enclosures. If you decide to 'brew your own', it is safest to go for a single driver closed or bass-reflex type. These classic simple alignments usually give the best and most consistent results.

CLOSED BOXES

On the face of it the closed box appears quite simple, but construction must be first rate. It is of prime importance that the enclosure is fully sealed (this is how a closed box works after all) so air pressures and stresses inside the cabinet are high. Below the tuning frequency roll-off is slow at 12dB/octave, so bass is normally deep and tuneful. A good check for sealing is to push the driver gently down once it has been fitted - instead of springing quickly back into place, it should slowly return to its center position after a second or so.

BASS REFLEX BOXES

A bass reflex system is more efficient than the closed box since some of the energy from the rear of the cone is converted via the reflex port to add in phase with the main output. There is also a reduction of cone travel at the tuning frequency, so this system can also give higher power handling. However, at very low frequencies bass rolls off faster (24dB/octave). In simple terms, bass is louder, but not quite as deep. You can make a reflex port from a piece of plastic pipe, or there are many flared ports custom designed for loudspeakers that minimize turbulence (prevents what's commonly referred to as chuffing).

Utopia

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