

## The Spirit of Sound :

This document reveals the exclusive technologies used in the new professional digital monitoring system SM11. It also presents our innovating manufacturing processes, which use the very latest materials and technologies, to bring our participation in the sound reproduction...



# SM11

## Professional Digital Monitoring System

### Technical details

#### • Exclusive Acoustical Technologies

##### - Beryllium tweeter \_\_\_\_\_ Page 2

The reversed dome tweeter is a hallmark of Focal. As a result of more than twenty years of development into a tweeter that could produce a high output, but without requiring high energy input and without increasing directivity. And now the company is ready to make a major leap forward with the introduction of the pure Beryllium version.

##### - Focus Ring \_\_\_\_\_ Page 3

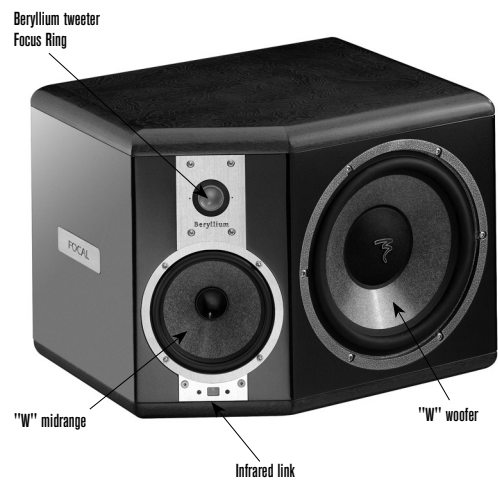
This innovative and patented magnetic structure provides extremely strong flux density (2T) with the highest thermal stability achievable.

##### - The "W" cone \_\_\_\_\_ Page 4

For more than 15 years the composite cone sandwich technology is a Focal exclusivity. The "W" process - first initiated in 1995 with the Grande Ultima - now provides a true optimisation of the frequency response by fine tuning of mass, rigidity and damping parameters.

##### - Passive Radiator \_\_\_\_\_ Page 3

In order to reproduce the lowest frequency range within a very small volume the SM11 is equipped with a no compromise, custom designed W passive radiator.



#### • Advanced Digital Technologies

##### - 24 Bits 96kHz converters \_\_\_\_\_ Page 5

In addition to a direct digital input, the SM11 uses the latest high quality chipsets performing 24 Bits 96kHz A/D and D/A conversion.

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The combination of powerful DSP devices and carefully designed algorithms allows multiple and very precise equalisation.

##### - "Sweet Spot" \_\_\_\_\_ Page 5

A dedicated processing algorithm enables to optimise and tailor the SM11 response according to the listener's position with regards to the loudspeakers.

##### - Wireless Remote Control PDA based \_\_\_\_\_ Page 7

The SM11 is the first loudspeaker system ever designed to be remotely controlled via a PDA (PALM-like). This allows a level of conviviality never reached before.

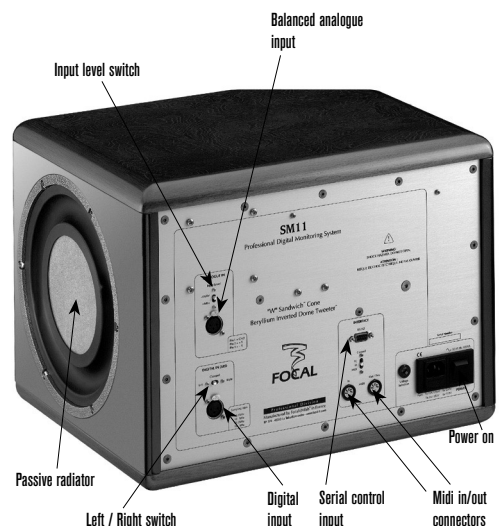


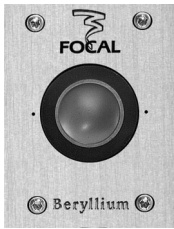
PDA based wireless remote control

#### • High Performance Amplification

##### - High efficiency, low distortion class "D" output stages \_\_\_\_\_ Page 7

Tri-amplified (250 Wrms/Bass, 150 Wrms/Midrange, 100 Wrms/Treble), the SM11 uses low distortion class "D" power stages for low and mid-frequency channels, dramatically reducing heat at high power, while wide bandwidth class AB stage is utilised for the tweeter channel.





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### Beryllium "Be" tweeter

*The reversed dome tweeter is a hallmark of Focal. As a result of more than twenty years of development into a tweeter that could produce a high output, but without requiring high energy input and without increasing directivity. And now the company is ready to make a major leap forward with the introduction of the pure Beryllium version.*

#### The main advantage of the inverted dome tweeter or the "full" range tweeter...

The experience acquired over the last twenty years has allowed Focal to push back the limits of reversed dome technology and the work on the suspension, driver shape, adhesives and materials have at each stage produced an improvement in linearity and bandwidth.

The research began by testing fibre domes, as a simple and less sensitive way to validate the advantages of the reversed dome with regards to energy response. Then the company introduced more rigid metal domes to extend the response in high frequencies, and with Titanium producing the most impressive results it has proved to be the most relevant choice. Today to exceed these limits and particularly *to extend the response to nearly 40kHz*, we need to move towards a material even lighter and more rigid. Already competitors have moved to introduce *super tweeters* to satisfy the extreme requirements of the new high-bandwidth sources. However, Focal does not believe the adoption of the super tweeter is to be a satisfactory solution.

First of all, the distance between the tweeters, for frequencies where the wavelength is of the order of cm, poses serious problems of coherence. A filtering is imposed which destroys, by the losses and distortion of phase, the benefits introduced by extending the frequency response. So it is advisable to point out that simply extending the high frequency response is not an end in itself, as the ear is most sensitive to transients. The improvement with regards to the impulse response is only perceptible at a tweeter output far beyond the 20Khz, limit and to far beyond the perception of human hearing. We should not forget that Focal's first objective was to design tweeters offering an optimum coupling, being able to integrate with the mid-range at sufficiently low frequencies and before the output of the mid-range begins to tighten or beam. Thus the only successful solution is, therefore, to produce a tweeter with an extended response that covers more than five octaves from 1 000Hz to 40 000Hz.

#### Beryllium - The ideal material for a dome.

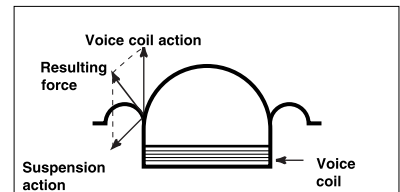
An ideal dome must combine lightness, rigidity and damping. Currently, only one material offers the possibility of a significant improvement. *Beryllium's density* is 2.5 times lower than Titanium and 1.5 times lower than Aluminium while its *rigidity* is 3 times higher than Titanium and 5 times superior to Aluminium. Which means that for a dome of identical mass, a Beryllium version is 7 times more rigid than one made of Titanium or Aluminium - which have similar rigidity for a given mass. Moreover, *the velocity of sound in a Beryllium dome is 3 times faster* than a Titanium version and 2.5 times faster than Aluminium. However, the manufacturing of Beryllium remains very difficult and its production has been limited to just three countries: the United States, France and Russia. To date, Great Britain, Germany and Japan do not manufacture pure Beryllium, rather using it in the form of an alloy. Beryllium is an excellent high-tech metal - the only metal able to scratch glass - it is only used in strategic applications in the aeronautical and military industries and consequently, its unique characteristics make it extraordinarily expensive, much more than gold and nearly 100 times that of Titanium.

#### The only solution for Focal - Control the manufacturing process.

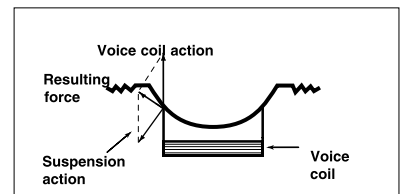
The analysis of the mechanical characteristics inevitably leads to Beryllium's choice as the ideal material for a tweeter dome. However, a major problem exists because no company has been able to manufacture such a dome. To arrive at a solution, required Focal to conceive a process *for forming a pure 25µm Beryllium dome\**. And after two years research and investment, the company now possesses a machine to carry out what was considered as utopia. Technological it is a world's first and certainly exceeds anything currently found in the audio field.

And the result is in line with the company's hopes and expectations of an outstandingly detailed loudspeaker which extends to nearly 40kHz while maintaining a perfect impulse response.

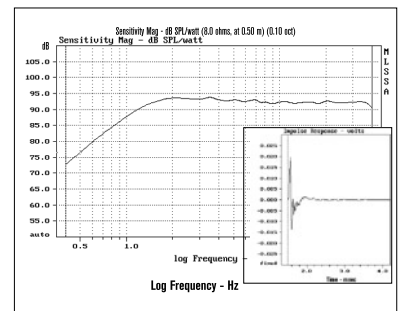
*\* In the past certain manufacturers have attempted to use Beryllium for the construction of a direct radiating tweeter dome. However, they have actually only used Beryllium as a surface coating on a dome structure leading to different characteristics to anything achieved with pure Beryllium.*



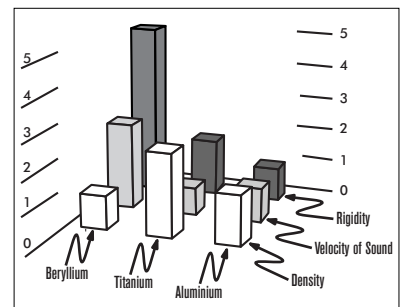
A standard dome tweeter has a poor mechanical coupling with the voice coil attached to the outer diameter of the dome. The result of the mechanical forces shows that considerable energy is lost into the suspension where it is dissipated as heat.



Focal-JMLab inverted dome tweeter: The mechanical interface between the voice coil and dome is optimal, the result of the forces tangential to the dome. All of the energy is transmitted into the dome and radiated as sound.



The Beryllium tweeter offers a very extended response up to five octave from 1 000Hz to 40 000Hz. The impulse response is ideal.



Comparison between Beryllium, Titanium and Aluminium. Beryllium is nearly seven times more rigid for identical mass.



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### Focus Ring™

*Being hidden away magnetic circuits are seldom considered. However the energy that they give is essential to the quality of reproduction. Focal is always associated with investing in powerful arrays. And with the new Ultima line, the company wanted to apply its latest innovations.*

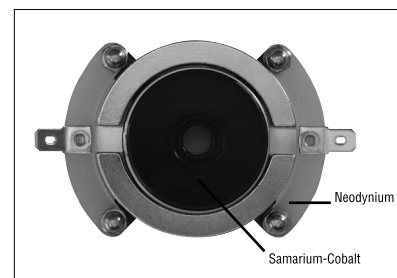
#### Focus Ring™ - a patent for the magnetic circuit of the tweeter.

An intense magnetic field is of the utmost importance for good tweeter performance and the TGU conceived for large Ultima into 95 was a key point in the development of the Ultima line. Selecting a magnet that combines high power with small dimensions narrows the choice of magnet material to Neodymium. However the small dimensions required - and the need for a light coil with a narrow air gap leads to intense heating of the magnet. A problem then occurs due to a characteristic of Neodymium: its low "Curie Point". The magnetisation saturation decreases as the temperature rises and will cancel at a certain temperature, called the "Curie Point" (Tc). For a ferrite, Tc is equal to 450 °C and, for a Neodymium Nd<sub>2</sub>Fe<sub>14</sub>B magnet Tc is equal to 319 °C. Which means, should the magnet reach its Tc, the magnetic structure will lose its magnetism bringing irreversible damage to its output and an audible loss of dynamics and definition. Since the design of the TGU in 95, the evolution of the home cinema arena has imposed new constraints with regards to power handling. In high fidelity musical performances very little energy is demanded at high frequencies. However, with the special sound effects of home cinema new rules in terms of power handling are created, with the subsequent effect on magnet temperatures.

Handling these new demands was a key rationale in the design process of the new tweeter Beryllium Ultima (TBe), which adopted a key new concept called "Focus Ring™" - Focal-JMLab patent pending. The material used in the magnet is *Samarium-Cobalt Sm<sub>2</sub>Co<sub>17</sub>*, which is more expensive and slightly less powerful than Neodymium. However it offers a major advantage in that it pushes the "Curie Point" (Tc) back to 825 °C, avoiding any chance of temperature related magnetic losses. However to obtain a magnetic field of 2 Tesla, as in the TGU, doping of the magnetic circuit is required by using a *Neodymium ring* to surround the Samarium magnet, thereby concentrating the magnetic flux and reaching the target field. In addition, with the ring being mounted away from the coil it is not affected by temperature increases and gives the tweeter exceptional stability

Magnet material	Curie Temp.
Neodymium Nd <sub>2</sub> Fe <sub>14</sub> B	319°
Ferrite	450°
AlNiCo	810°
Samarium Cobalt Sm <sub>2</sub> Co <sub>17</sub>	825°

"Curie Point" of different magnets. Only Samarium-Cobalt and Alnico offer a large safety area when temperature increases.



"Focus Ring™": Neodymium ring concentrates the magnetic flux to 2T. The central magnet uses Samarium-Cobalt to offer high stability with temperature.

### Passive radiator

*In order to reproduce the lowest frequencies within a very small volume the SM11 is equipped with a no compromise, custom designed passive radiator.*

Low frequency performance of loudspeaker systems has been the subject of extensive analysis and debate over several decades now. Some of the well-known results are the following :

- According to theory and neglecting non-linear effects vented systems offer the advantage (when compared to closed boxes) of a higher efficiency factor, translating into more output and / or extended frequency range for a given volume.
- On the other hand, they may suffer at higher levels from effects of turbulent air-flows, inducing power compression and distortion. Another drawback of vented systems is that they are prone to midrange coloration due to back-wave radiations, ill-absorbed inside the enclosure, and radiated through the port.

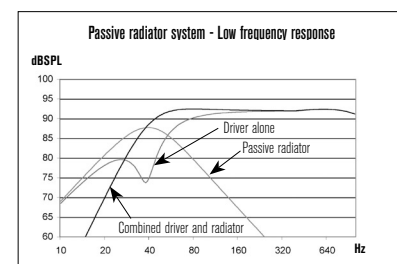
The passive radiator concept has been introduced a long time ago, in order to overcome the drawbacks of vented systems while retaining their benefits in terms of efficiency and therefore acoustic output. However, to achieve this result a number of conditions must be fulfilled, and this is where careful engineering is required:

- The passive radiator must have a high, well-dimensioned excursion capability, in line with the expected output power.
- It must have a suspension combining low mechanical losses, high compliance, but high radial stability.

The passive radiator especially designed for the SM11 uses a wide, single roll rubber surround, with dimensions and shape allowing maximum distortion-free excursion, and material selected among several varieties to provide the best possible compromise for linearity, stability, and long term reliability. This allows the use of a flat W-piston, saving as much as possible of the available volume.



In order to achieve high linear excursion and minimise the occupied volume, the passive radiator utilises a wide rubber surround and a flat "W" piston.



A graph of the low frequency response shows the respective contribution of the driver and the passive radiator.



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### The "W"® woofer and midrange cones

*For more than 15 years the composite cone sandwich technology is a Focal exclusivity. The "W" process, first initiated in 1995 with the Grande Ultima, provides now a true optimisation of the frequency response.*

#### Properties of a drive unit membrane

Three parameters are of prime importance: mass, internal damping and stiffness.

- Stiffness allows the cone to behave as a piston over a wide range of frequencies, especially important at bass frequencies for low distortion.
- Low mass delivers maximum acceleration on transients for the best reproduction of fine detail.
- Internal Damping damps out any ringing or vibrations in the cone structure that would otherwise color the sound.

#### Materials

- Paper a light material, though not very rigid, but with reasonable internal damping. Sound often suffers from a "cardboard" coloration.
- Polypropylene/Plastics a material relatively heavy, but with good internal damping properties. Not especially stiff and the sound tends to lack detail and precision.
- A simple woven aramid fibres cone (not a sandwich type construction) uses a resin to seal the cone and bring about the rigidity required, but this tends to lead to a dull plasticky coloration.

#### The sandwich structure Focal

During the mid 1980s, a new type of cone was developed and patented by Focal which combined low mass, stiffness and high internal damping; the "Poly-K sandwich".

Using woven aramid fibres tissue skins and a core of hollow microspheres of glass mixed with a resin, this structure exhibited extremely high rigidity and low mass.

The damping could be controlled by the properties of the core.

Since this original construction, the process has been refined and developed to produce a new generation of aramid fibres sandwich. The major advance in the construction of this cone is the use of a special structural foam in place of the resin + microballs. This foam is used primarily in the Aerospace industry; no other foam offers the same high ratio of stiffness/mass.

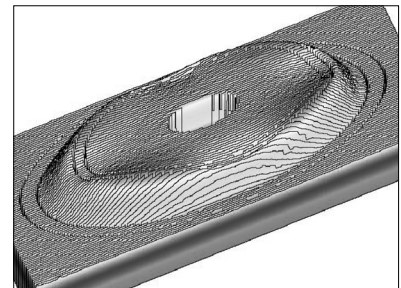
The name "W" is derived from Verre-Verre (Verre = Glass). The "W" cone uses two very fine tissues of woven glass that are lighter and thinner than aramid fibres.

In addition, the molecular bond between the foam and the glass tissue is far superior to that of the aramid fibres. This results in a cone structure which is mechanically more stable and with superior stiffness. This construction allows us to further optimize the transmission speed of the sound wave in the cone. This new construction process allows the amount of internal damping in the structure to be very accurately controlled by varying the thickness of the foam: the thicker the foam, the higher the damping factor.

The relationship between the thickness of the glass tissues and the foam core allows us to finely optimize the cone structure depending on the particular application and the frequency area to reproduce.

The "W" cone produces an extremely transparent and neutral sound free from coloration and distortions normally associated with loudspeakers.

Its only limitation, the price; more than ten times the price of a quality paper cone.



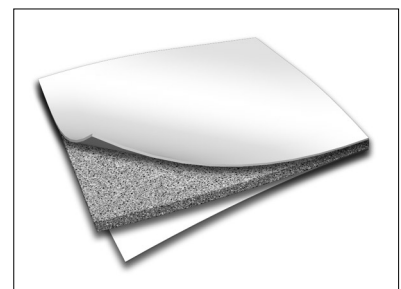
Analysis using laser interferometry allows the optimization of the "W" cones in terms of rigidity/damping/mass.

	Woofer cones of identical mass	Midrange cones of identical mass
Polypropylene	42	11
Aluminum	77	21
Paper	366	99
Aramid fibres	313	84
Sandwich W	<b>6854</b>	<b>685</b>
	Mass area 650g/m <sup>2</sup>	Mass area 420g/m <sup>2</sup>

Comparison of the index of rigidity in flexure (expressed in N.mm). The performance of the "W" cones significantly better than that of other materials for the same mass. In addition, internal damping is also superior.

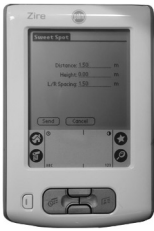


"W" cone fresh out of the press. Our industrial process is patented.



The "W" structure, a central core of foam covered by skins of glass tissue.





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### 24 Bits 96kHz converters

*In addition to a direct digital input, the SM11 utilizes the latest high quality chipsets performing 24 Bits 96kHz A/D and D/A conversion.*

One of the main feature of the SM11 lies in its capability to provide a purely digital audio path right up to the power stages, hence avoiding the need for redundant signal conversions and their potential degradation in terms of signal-to-noise ratio, clarity, transparency (you name it). With the SM11 you can truly export your sound material, from your digital console - or whatever digital source you may use - without any concern: what you'll hear is really what you are getting from the material.

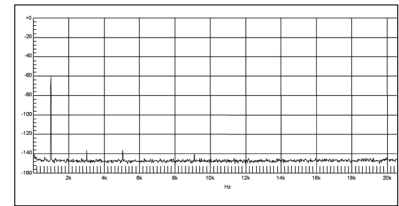
If you are driving from a digital source using the AES input, sampling rates of 44.1, 48, 88.2 and 96kHz will be automatically detected and handled by the system. If you can, use 88.2 or 96kHz sampled signals, as you will get the full benefit of the extended frequency range of the Beryllium tweeter of the SM11.

In order to get the best possible performance out of a digital connection, the Focal SM11 uses simply the best available D/A converters: 24 bits resolution, 120dB S/N ratio, outstanding sonic performance.

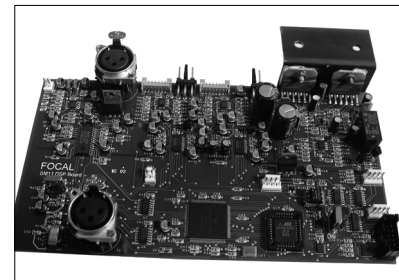
While knowing that providing a purely digital link was a must for high-end, "no compromise" monitoring system, Focal are aware of possible constraints that can still make an analogue connection very meaningful.

Hence the presence on the SM11 of the analogue balanced input. But again, no compromise has been made: the A/D converter has been carefully selected to offer the best available performance with 24 bits resolution and very high dynamic range. Moreover, both input channels of the converter - which is a stereo device - are in use, providing a further 3dB improvement of signal-to-noise ratio.

Either the digital or analogue input may be used with automatic switching between the two, priority being given to the digital input whenever it is fed.



The high level of performance achieved by the D/A converters used in the SM11 is illustrated by this graph showing the output FFT of a sine wave signal : very low noise floor and extremely low distortion (-104 dB re. Full scale).



Core of the SM11 electronics, the multi-layer DSP board uses 95% of SMD components allowing for a very high density design, reducing board size and helping to get the best performance out of the key elements such as the converters.

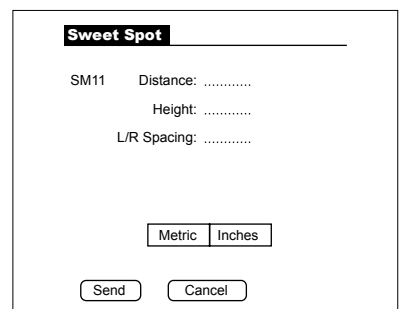
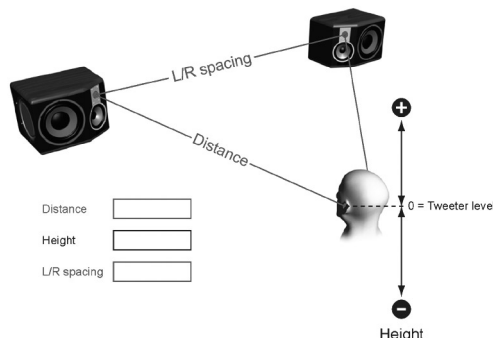


A digital (AES) input as well as a balanced analogue input can be used. Each one has its XLR connector, and switching between the two is done automatically with priority given to the digital input.

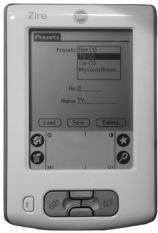
### "Sweet Spot"

*A dedicated processing algorithm enables to optimize and tailor the SM11 response according to the listener's position with regards to the loudspeakers.*

Another, and very significant benefit provided by the SM11 thanks to its digital core is its capability to fine tune what sound engineers refer to as the "sweet spot". To put it in simple words, get the most coherent sonic image at the listening position. Technically, what is it all about? Essentially it is about adjusting delays applied to each transducer so that, at the listening position, acoustic waves generated by each transducer can be perfectly coherent in phase, therefore combine together and be perceived as a virtual point source.



The "Sweet Spot" facility, provided by the dedicated control software implemented on the PDA, optimises the coherence of the 3 drive units at the listening position.



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### Multiple equalisation facilities

*The combination of powerful DSP devices with carefully designed algorithms allows multiple and very precise equalisation.*

Once through the initial stage, the digital signal enters the main core of the active filtering system: the DSP. The selected device is a very powerful, specialised micro-processor, achieving 120 MIPS, with a large accumulator allowing double precision algorithms. The choice of a DSP is not a trivial one as far as audio processing is concerned: a fixed point device has been preferred to a more versatile floating point one. The relevance of this choice has been confirmed by some recent paper showing that with careful programming and intelligent use of the double precision facility offered by fixed point DSP's, these not only offered more processing power but were sonically performing better than their floating point counterparts, especially at low frequencies.

Digital audio processing algorithms can broadly be classified into two categories: recursive or IIR (for Infinite Impulse Response) filters, and non-recursive or FIR (for Finite Impulse Response) filters.

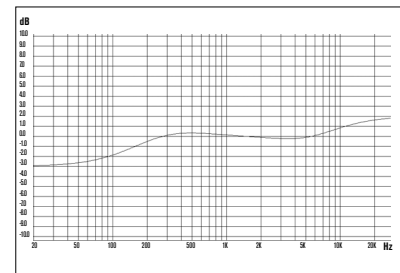
- Recursive filters are the most widely used in audio today. This is mostly because they simply mimic analogue filters, and as such their properties can be described by a few parameters, easily understandable and thus manageable by users: they are therefore well suited for general purpose processing units. They are also quite efficient – in terms of processing power – at low frequencies, but require careful and skilled programming to keep up with high sonic performance.
- FIR filters are a "different kind of animal" altogether, and on paper they have a lot to offer: capability to manipulate amplitude and phase in an independent way, rock solid stability, and unchallenged accuracy at high frequencies. However, they behave in a "global" way that cannot be pictured by a couple of parameters, and therefore allow very little flexibility. To put it another way, there are an extremely powerful tool for the system designer, but not for the sound engineer.

Inside the SM11 processing core, Focal have endeavoured to make the most of both worlds: a virtually unique combination of FIR filtering (for fine adjustments at high frequencies and phase manipulation capability), and IIR filtering (for efficiency at low frequencies and user friendly flexibility).

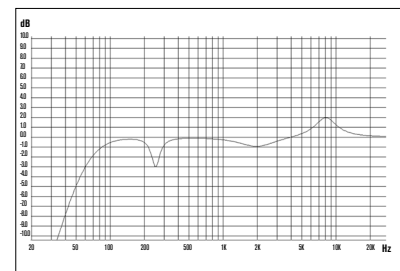
Beside anything else, one of the beauty of digital processing is that it allows for a great deal of flexibility, through software changes. This is obviously a useful feature for a studio monitoring system, and the SM11 provides the user with an extensive set of possible adjustments.

Firstly, tailored EQing is accessible with a combination of 3 fully programmable parametric EQs, low frequency and high frequency shelving, hi-pass and low-pass filters. The system response is therefore totally at hand to the engineer, allowing for any specific need required by the acoustic environment (location of the speakers with regard to nearby walls or reflecting surfaces, room resonances, etc...), or by subjective preferences dictated by whatever reason.

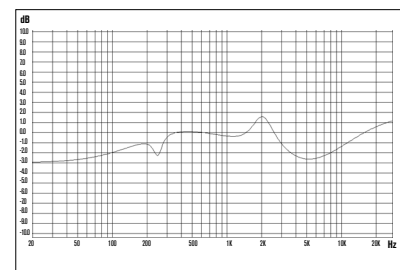
In this respect, a number of factory preset Eq settings are offered that will mimic the response of a typical cinema, or disco system, to name just a few. Those presets can be called, edited, and stored at leisure under other names.



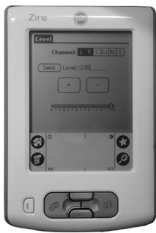
The Shelving EQ settings allow for low and high frequency contouring, especially useful to tailor the system response to the acoustic environment. Roll-off frequencies as well as amplitudes are user selectable.



More refined and selective equalisation is available through the General EQ adjustments. Full control of three parametric EQ's is provided, as well as Low and Hi Pass filters.



Presets are a very convenient way for defining a full set of EQ adjustments which encompass both Shelving and General EQ settings. The system comes with several factory presets, but the user is given the possibility for storing, recalling or editing new presets of his choice.



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## PDA based Wireless Remote Control

*The SM11 is the first loudspeaker system ever designed to be remotely controlled via a PDA (PALM-like). This allows a level of conviviality never reached before.*

Offering such a wide range of possible adjustments to the sound engineer would not make much sense without a truly easy-to-use, handy, and user friendly interface. Once again, Focal have turned their attention to the latest technology and have chosen to implement a remote control facility based on a hand-held computer (PDA).

All user accessible parameters can be set up from a hand-held, allowing wireless remote control of the system via the PDA InfraRed port within a range of about 3m(10").

A specially developed software programme, running on Windows or Mac OS computers, can be used to graphically monitor the changes to the response brought via the hand-held.

## Class D output stages

*Tri-amplified (250W Rms/Bass, 150W Rms/Medium, 100W Rms/Treble), the SM11 uses class "D" power stages for low and mid-frequencies channels to allow high power together with the purest sound quality.*

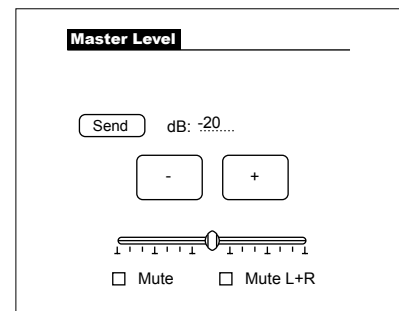
Though primarily intended for near field monitoring situations, the SM11 has an outstanding output capability and low frequency extension that could rival or exceed the performance of so called "mid field" or even "main" monitoring systems, despite its compact size. By this Focal have acknowledged the need for ever more demanding headroom dictated by the dynamics of modern recordings.

In order to reach this goal, the SM11 amplification stages have been dimensioned to produce 500W of overall electrical power (250W for the woofer, 150W for the midrange driver, and 100W for the Beryllium tweeter respectively). Achieving such an amazing power in such a compact system would not have been possible with conventional amplifier technology: the SM11 utilises two class-D power stages, one for the woofer amplification and one for the midrange.

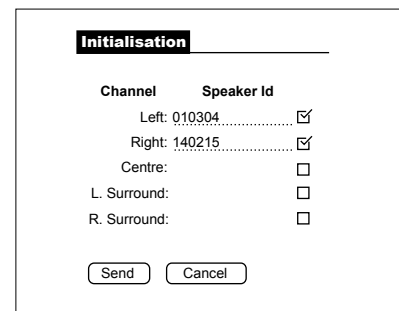
But only two years ago, this would not have been compatible with the performance level demanded by a high-end monitoring system such as the SM11.

Class-D amplifiers achieve very high efficiency (typically over 90%, compared to -at most- 65% for conventional amplification stages) by using a high frequency switching scheme of the output transistors, with those operating only in two extreme states: "full speed" or "zero speed".

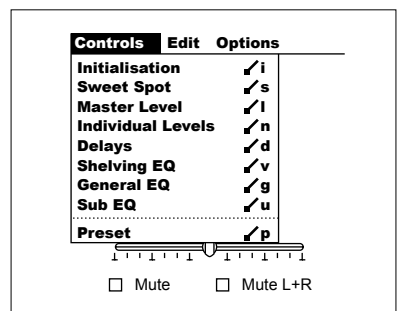
The benefit being that in either of these two states the losses in the transistors (generating heat) is minimal. Since the theory has been introduced, the penalty has for long been a high level of distortion, making it unsuitable for high quality audio. The breakthrough only occurred a couple of years ago, and the class-D modules used in the SM11 (under patent by a third party) can match or exceed the performance, both sonically and on objective tests, of the best conventional designs. Having said that, the best class-D stages still suffer from some bandwidth limitation inherent to the switching frequency: to put it simply they can cope well up to 20kHz, but no so well beyond. Hence the choice, on the SM11, of a conventional, high quality, class AB power stage for the high frequency channel, allowing extended bandwidth at the expense of lower efficiency: but this was a rational choice knowing that the effective r.m.s. power dissipated on this channel is relatively small when compared to those of the woofer and midrange.



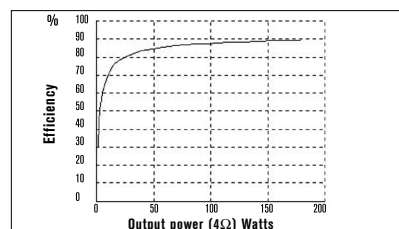
The dedicated control software (controlled via the provided hand-held) gives the user full access over the entire system parameters, through a user friendly interface.



The initialisation menu allows the user to define "which does what", by allocating each relevant channel to the speakers serial number: a full 5.1 system can then be managed



The most basic but most fundamental facility: adjusting listening level... Each channel can be individually adjusted, if required. And most of all, the level setting does not affect the performance in terms of dynamics, as it operates after the D/A final conversion



The nice thing about class D amplification, illustrated by this graph: outstanding efficiency, meaning cool and reliable operation even with little heat-sinking, saving more space for performance elsewhere.



## SM11

# Professional Digital Monitoring System

## Technical details

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### SYSTEM

Frequency response	34Hz – 40kHz +/- 2dB
Maximum SPL	118dB SPL (peak @ 1m)

### INPUT SECTION

Analogue input	Type / Impedance Connector Sensitivity A/D converter	Electronically balanced / 10kOhms XLR Adjustable, +4dBu or –10dBV 24 bits resolution, 96kHz sampling rate
Digital input	Format Connector Sampling rates	AES (110 Ohms with transformer) XLR 44.1, 48, 88.2 or 96kHz (automatic detection)
Internal section	Processing D/A converters	Internal DSP 24 bits resolution, 96kHz sampling rate
Dynamic range	> 110dB	

### AMPLIFIER SECTION

LF stage	Class D / 250Wrms
MF stage	Class D / 150Wrms
HF stage	Class AB / 100Wrms

### INTERFACE

System Control	Switchable between	Wireless Infra-Red (handheld) Serial RS-232 (PC / Mac) MIDI
Power supply	Mains voltage	230V (3.15A fuse rating) 115V (6.3A fuse rating) IEC inlet and detachable power cord

### USER CONTROLS AND INDICATORS

Hardware controls	Analogue input sensitivity switch Left / Right AES channel selection switch System control source (Interface) switch
Software controls	Output level, Sweet spot, Shelving EQ, General EQ, Presets
Indicators	Power on LED, Infra-Red reception LED

### TRANSDUCERS

Woofers	“W” cone, long excursion Focal 11W551B 11” drive unit
Passive radiator	“W” piston, extra wide surround Focal 11WPP51 11” radiator
Midrange	“W” cone Focal 6W0451 6” drive unit with push-pull Neodymium magnet
High frequency	Focal TBUSM11 Beryllium dome tweeter with Focus Ring magnet
Shielding	Integral through cancellation magnets / cans or by magnet design

### CABINET

Construction	19mm and 25mm MDF panels with internal braces
Finish	Slate grey metallic lacquer on side panels Dark red veneer on top / bottom, corners in stained solid wood
Dimensions (HxWxD)	338mm x 460mm x 350mm
Weight	25kg

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