outlinearray

english version

butterfly Hi-Pack C.D.H. 483

Technical specifications

Number of Speakers	**5**
Low/mid	2x 8" NdFeB bandpass loaded woofers
Mid	2x 8" Partially horn-loaded mid woofers (high heat dissipation ferrite magnets)
High	1x 3" Diaphragm NdFeB, **DPRWG** (Double Parabolic Reflective Wave Guide) loaded compression driver
Operating configuration	Biamped, 3 sections (mid-bass section mechanically filtered)
Enclosure	High impact exterior grade shaped composite plywood
Finish	Textured scratchproof fire-retardant black paint
Connectors	2x Neutrik NL4
Rigging hardware	Integrated high-load flying hardware and handles
Maximum Degree Cabinet Coupling	7.5° with 0.25° standard minimum increment (0.1° on request)
Maximum Flyable Elements	**32** – Height 7.68 m (25.20 ft) – Weight 1120 kg. (2464 lb)

Single Unit DIMENSIONS	Millimetres/ kilogram	Inches/ pounds
Front Height	240	9.45
Rear Height	194	7.64
Width	700	27.56
Depth	600	23.62
Net Weight (Including flying hardware)	35	77

FREQUENCY RESPONSE	
Single element +/- 3dB	110 Hz ÷ 18 kHz
Coupled array four units +/- 3dB	80 Hz ÷ 18 kHz
NOMINAL COVERAGE ANGLE -6dB	
Horizontal	90°
Vertical	Depending on array height and curvature
BANDPASS NOMINAL IMPEDANCE	
Low/mid	4 ohms (min. 3.5 ohms)
High	8 ohms (min. 8.3 ohms)

INPUT POWER RATING (AES-Standard)	Continuous WRMS	Calculated W peak + 6dB	Continuous VRMS
High-pass filtered low/mid	800	3,200	56.57
High	120	480	30.98

CALCULATED MAX SPL - 1m	Continuous	Calculated +6dB Peak	Calculated +10dB Peak
Low/mid	130.03	136.03	140.03
High	130.79	136.79	140.79

Min. box array MAX SPL - 1m	Continuous	Calculated +6dB Peak	Calculated +10dB Peak
4-box flat array low/mid	136.03	142.03	146.03
4-box flat array high	136.79	142.79	146.79

8-box array - Max SPL - 1m	Continuous	Calculated +6dB Peak	Calculated +10dB Peak
8-box flat array low/mid	142.03	148.03	152.03
8-box flat array high	142.79	148.79	152.79

butterfly Low-Pack C.D.L. 1815

Technical specifications

Number of Speakers	**2**
Main Low	1x 18" vented high-pass loaded woofer
Reverse Low	1x 15" vented bandpass loaded NdFeB woofer
Operating configuration	Biamped and electronically controlled
Enclosure	High impact exterior grade shaped composite plywood
Finish	Textured scratchproof fire-retardant black paint
Connectors	2x Neutrik NL4
Rigging Hardware	Butterfly compatible; integrated flying hardware and handles
Maximum Degree Cabinet Coupling	7.5° with 0.25° minimum increments
Maximum Flyable Elements	**24 –** Height 11.59 m (38 ft) – Weight 1099 kg. (2418 lb.)

Single unit DIMENSIONS	Millimetres/ kilograms	Inches/ pounds
Front height	483	19.02
Rear height	437	17.20
Width	700	27.56
Depth	600	23.62
Net Weight (Including flying hardware)	45.80	100.76

TECHNICAL SPECIFICATIONS

FREQUENCY RESPONSE	
Single element +/- 3dB	40 Hz ÷ 120 Hz
40 Hz ÷ 120 Hz COVERAGE ANGLE –6 dB	
Horizontal	180°
Vertical	According to array height and position
BANDPASS NOMINAL IMPEDANCE	
Main 18" (front)	5 ohms (min. 4.9 ohms)
Reverse 15" (back)	8 ohms (min. 7.9 ohms)

INPUT POWER RATING (AES-Standard)	Continuous WRMS	Calculated W peak + 6dB	Continuous VRMS
High-pass filtered front 18"	1,000	4,000	70.71
High-pass filtered back 15"	350	1,400	52.92

CALCULATED MAX SPL - 1m (Single Unit – half space)	Continuous	Calculated +6dB Peak	Calculated +10dB Peak
	132	138	142

MULTIPLE BOX ARRAY CALC. MAX SPL 4 Units – 1m half space	Continuous	Calculated +6dB Peak	Calculated +10dB Peak
	138	144	148

MAX. BOX ARRAY FLYABLE BASS UNITS 24 Units - 1m full space	Continuous	Calculated +6dB Peak	Calculated +10dB Peak
	142.8	148.8	152.8

(*) Source: Butterfly System White Paper by Guido Noselli

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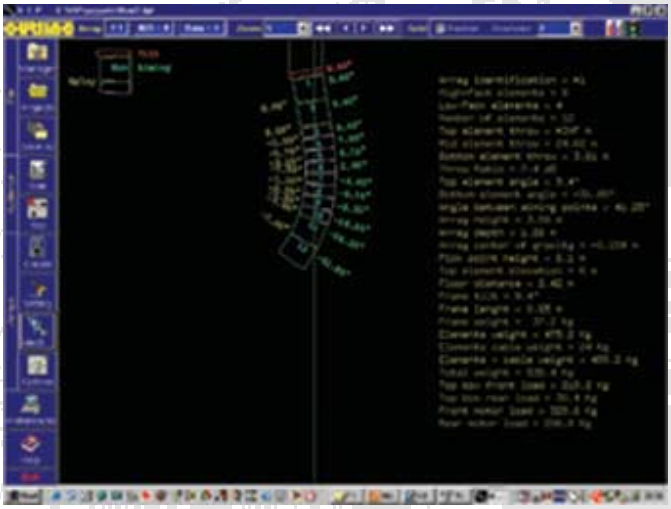
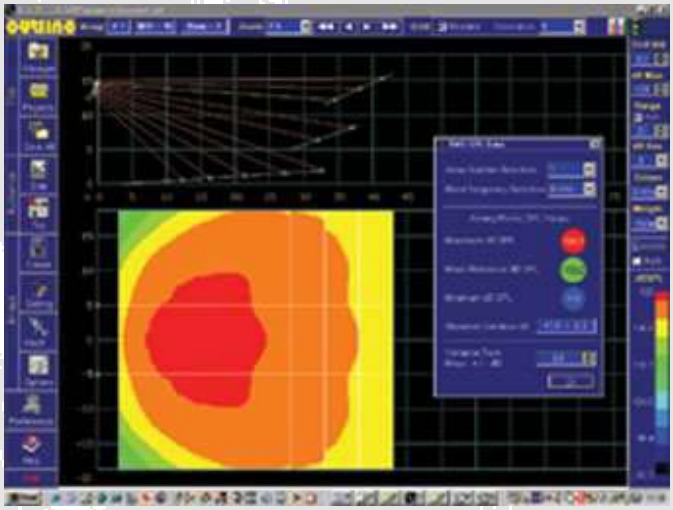
butterfly V.I.P. Software

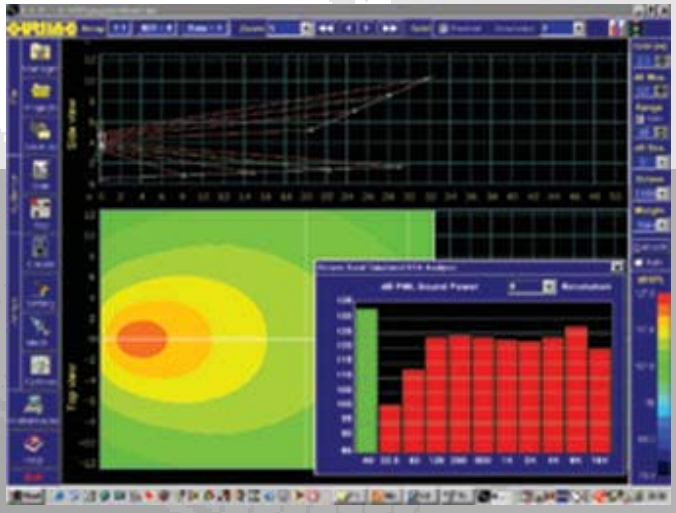
The Butterfly project includes the design of sophisticated acoustical and mechanical simulation software, which greatly facilitates installation, setting and aiming of Line Array elements. V.I.P. (the abbreviation of Vector Implementation Protocol) software was completely developed with a high-level programming language using powerful 'Open GL' graphic libraries. The result is a 'tool' able to guide PA system engineers through correct set-up procedure from an acoustic and mechanical point of view while fully respecting safety norms. The risk of poor results is thus drastically reduced. The following illustrations show the great possibilities offered by V.I.P.:



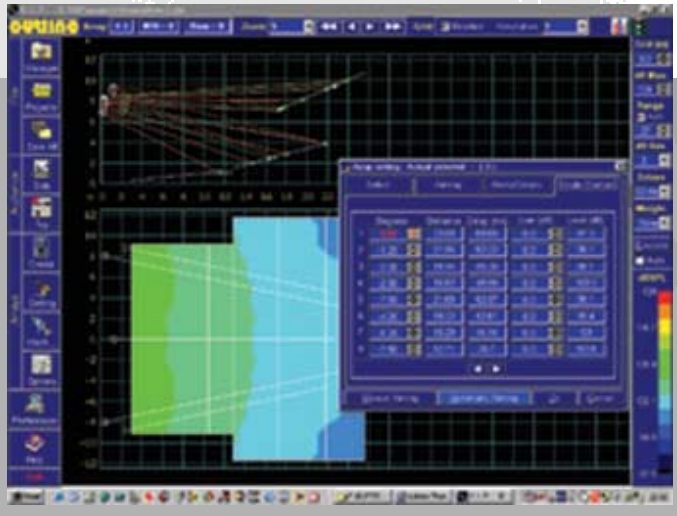
An accurate prediction of the angle between the elements, even if they're a mixture of Hi-Packs and Low-Packs, greatly facilitates "aiming" at the audience. Riggers are thus provided with all the geometric and mechanical data necessary for carrying out their work perfectly, without worrying about committing any serious mistakes. A diagram is created for each array, with all the parameters for flying according to the limits set by international safety norms for suspended loads.



A sophisticated acoustic and mechanical prediction program greatly facilitates the installation, setting and aiming of the elements that make up an OutlineArray. It enables the simultaneous creation, setting and manual and automatic aiming of eight OutlineArrays with two different types of enclosures (Hi-Pack or Low-Pack), or with a combination of the two.



The countless acoustic parameters shown in the various types reports include the interesting exclusive display (in every position) of the planes crossed by array elements' aiming axes and sound pressure level with octave bargraphs (in short, the spl status shown in octave bands) which takes into consideration the effect of all the elements of the array in that point.



The software, which has an extremely powerful graphic interface, enables to predict the effect on up to eight audience areas simultaneously and the behaviour of eight arrays, as well as offering a large number of functions which make it extremely versatile. Cross sections and plan views of audience areas can be viewed simultaneously, designed in a few seconds using the software's powerful graphic functions. The array system can be checked element by element at a glance: inclination, distance from the target audience area, sound pressure level and any simulated gain adjustment.

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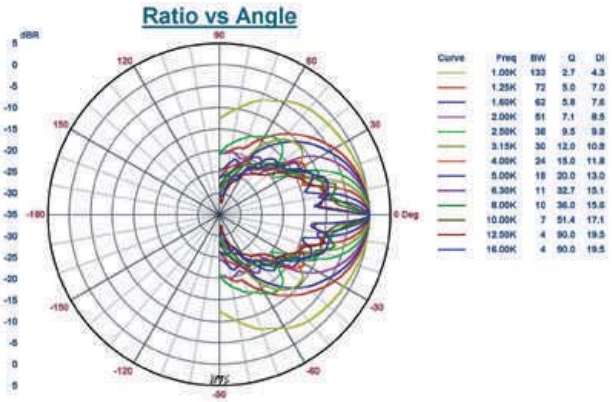
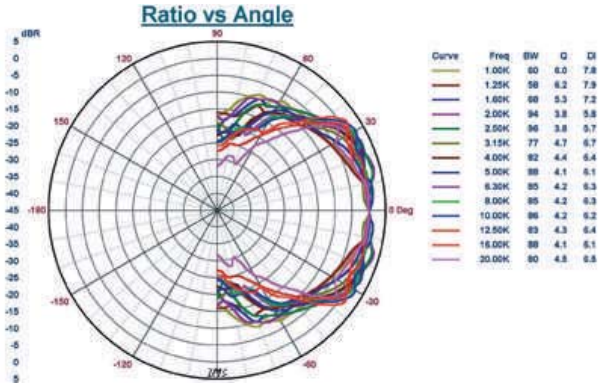
The butterfly system is yet another extremely important technical goal achieved by Outline thirty years from the company's foundation. Thanks to the system's features, three international patents have been applied for.

Designed and constructed without cutting any corners to save on costs, butterfly has optimized all the acoustic and operating parameters of a vertical line array, with the precise aim of achieving state of the art performance.

butterfly Hi-Packs C.D.H. 483

The C.D.H. 483 Hi-Pack is the Butterfly system's element for mid-low, mid and high frequency reproduction. Weighing just 35 kg. the cabinet has an unmistakable shape (the only one among current line array systems covered by an international patent) which brings to mind the butterfly from which it takes its name, thanks to the triangular opening in the upper and lower "sides". This original design solution favours the optimum coupling of array elements up to the highest frequencies, keeping the distance between the sources as short as possible and at the same time providing them with a continuous loading 'baffle'. Unlike other units, Butterfly's shape doesn't contrast with the cabinet's technical operation, so doesn't accentuate any diffraction or alteration of mid/high response.



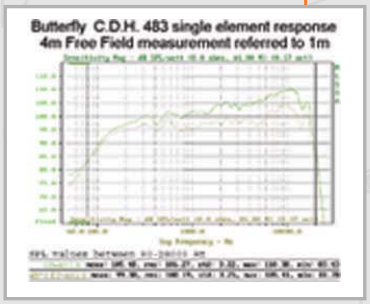


HF Section and D.P.R.W.G. Device

The high frequency section of the Butterfly system is equipped with a 3" (1.41" throat) compression driver coupled with a D.P.R.W.G. (Double Parabolic Reflective Wave Guide) device, another Outline invention for which an international patent has been applied for. The result of three years of research and tests, the D.P.R.W.G. is a really original device and is geometrically based entirely on precise mathematic calculations. It has the job of taking a circular planar (flat) wavefront emitted by the source at its input (e.g. that of a compression driver) and transforming it into a rectangular planar wavefront at its output, keeping signal paths identical from every emission point of the source. The rectangular planar wavefront thus obtained can be loaded by an appropriate horn or waveguide to ensure the necessary coverage. (*)

MID-BASS and MID Section

The C.D.H. 483 is a three-section element/enclosure designed for biamping. As well as a 3" compression driver, it's equipped with four high-efficiency 8" mid woofers: two band-pass loaded (110 ÷ 400Hz) and two reflex high-pass (110 ÷ 1250Hz) loaded by the sides of a waveguide with a 90° dispersion angle. These two sections are connected in parallel without any type of passive crossover, so can both be powered using one amplifier. By means of the appropriate upper mechanical filter of the first band-pass section, obtained with the precise restricting design of the resonance chambers and the respective tuning, emission phase has been shifted, enabling the energy in the portion of band reproduced by both sections together to be doubled. This peculiarity, at present an exclusive feature, enables to make up for the lack of power in the mid/low frequencies typical of other line array elements whose compact dimensions are comparable to those of Butterfly C.D.H. 483 High-Packs.



Original component positioning has resulted in extremely uniform on and off-axis horizontal response over a very wide range of frequencies. Measurements at 45° show how directivity is constant from approximately 700 Hz up to the highest frequencies. Looking at the diagrams, it's impossible to see where the crossover frequency is (approximately 1250 Hz), which goes to show that the components are perfectly in phase.

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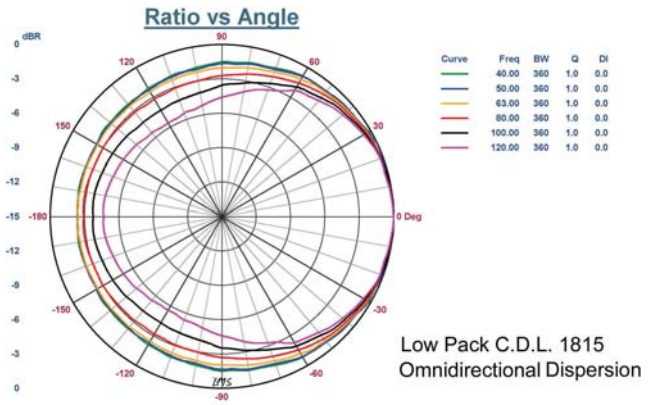
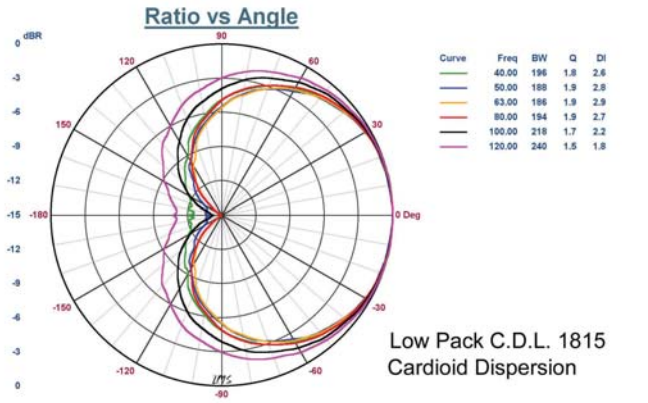
Low-Packs C.D.L. 1815

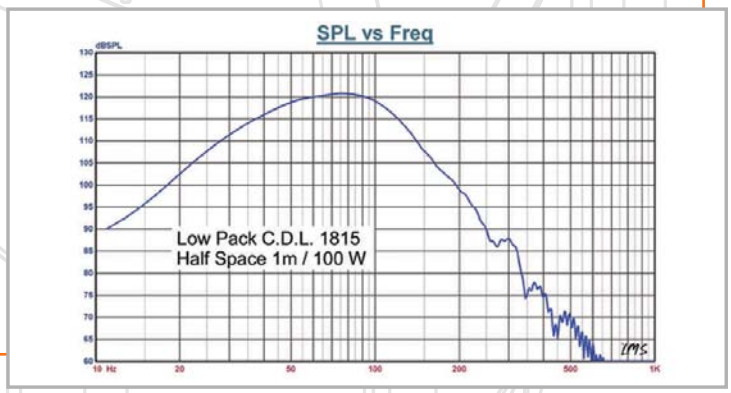
The C.D.L. 1815 Low-Pack is the Butterfly system's low frequency element. To all effects, it's an enclosure built with the criteria necessary for forming a real low frequency Vertical Line Array. It weighs just 45.8 kg. and its dimensions are the same as two C.D.H. 483 Hi-Packs one above the other. Being fitted with the same flying hardware, it's therefore completely compatible and able to be perfectly combined with the latter.





Cardioid or hypercardioid dispersion

The C.D.L. 1815 Low-Pack is equipped with a 18" woofer for front emission and a 15" woofer inside the box, used to recreate the system's Cardioid or Hypercardioid dispersion. The two loudspeakers are powered by separate amplifiers. The diagram, related to the most useful cardioid configuration, shows the uniform reduction of rear emission for all frequency bands involved and the remarkable "front-to-back" ratio which, from a minimum of 12dB at 120Hz (the suggested upper cut-off frequency) gives an attenuation of over 15dB on rear emission for all the other frequency bands (100, 80, 63, 50, 40 Hz). Applications have been made for Italian and international (PCT) patents for the C.D.L. 1815 Low-Pack too, supported by frequency response polar plots and a circuit diagram to make its original operating principle more easily understood. (*)



Flight-cases for transporting the elements

Dedicated cases fitted with sturdy smooth-running wheels have been designed and built to transport and protect the elements. A 2 or 3-unit case protects Hi-Packs and becomes a handy trolley, perfect for facilitating the raising in rapid succession of the elements of the "train" of enclosures in an array. Illustrations of assembly procedure can be seen alongside.

A 2-unit case protects the Low-Pack and transforms into a trolley designed to facilitate fast hassle-free lifting of each element (see alongside).

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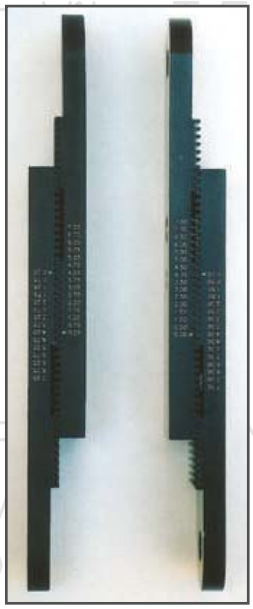
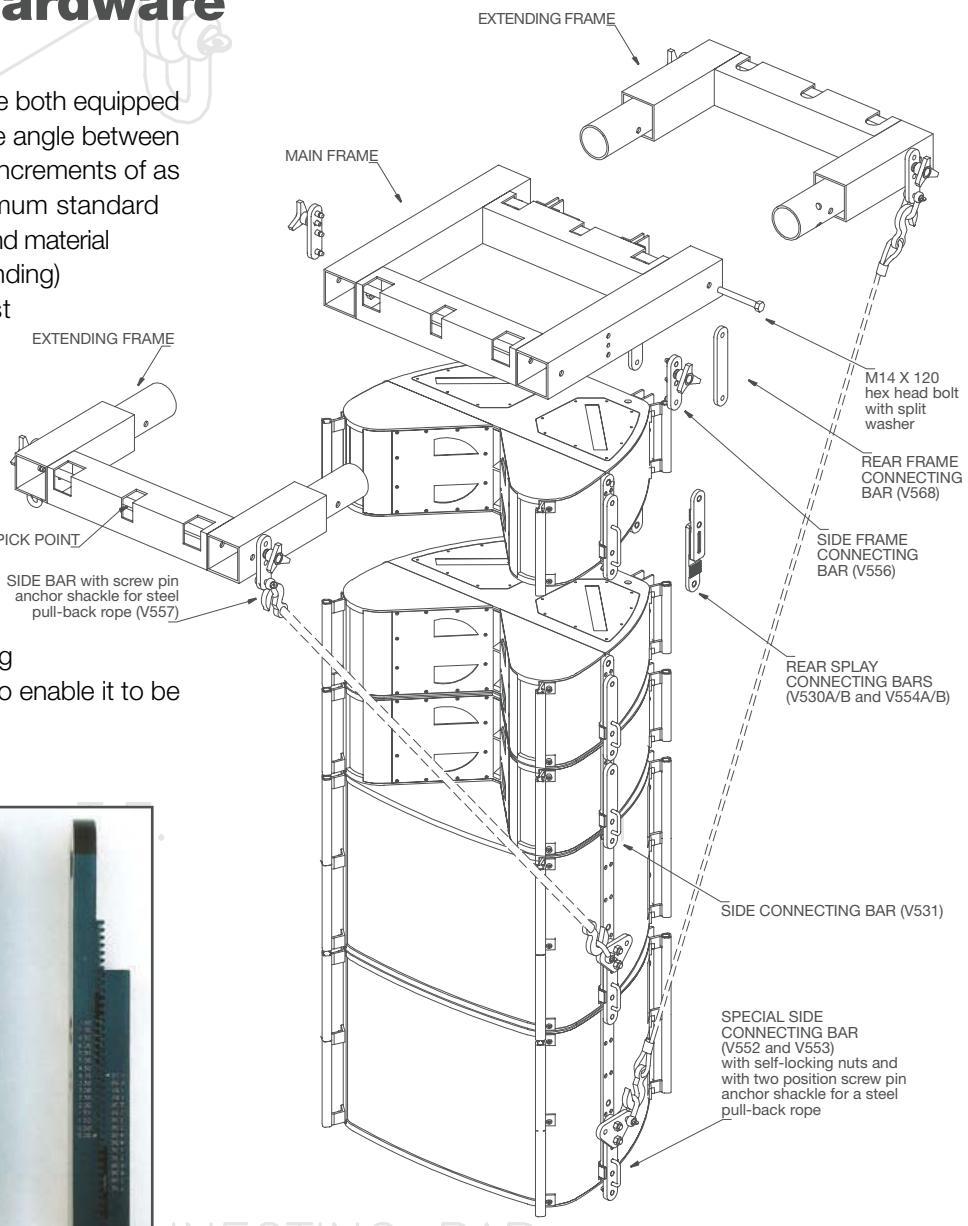
Built-in Hardware

Butterfly Hi-Pack and Low-Pack elements are both equipped with built-in flying hardware. This enables the angle between the elements to be adjusted with minimum increments of as little as 0.1 degrees, if necessary (the minimum standard increment is 0.25 degrees). The dimensions and material used have enabled this hardware (patent pending) to be certified according to the strictest international norms, for flying an array of up to 32 C.D.H. 483 Hi-Packs at a height of approximately 8 metres and up to 24 C.D.L. 1815 Low-Packs in another array at a height of approximately 11.5 metres. As far as the positioning of the single elements is concerned, compared with all line arrays currently on the market, this flying system also has a matchless adjustment precision, as well as having an excellent load-bearing capacity and such compact dimensions as to enable it to be an integral part of each single element.





Close-up of the graduated load-bearing bar: it's designed to enable a setting increment of 0.25 degrees in the angle between array elements (a version with 0.1 degree increments is available on request).

Some stages of the assembly of a Butterfly system made up of eight Hi-Packs and four Low-Packs. This procedure takes just 10 minutes.