GTO

DESCRIPTION

Outline's concept for GTO is to produce a large format line-source loudspeaker system that is flexible, adaptable, easy to use and which provides audio performance that meets the demands of the most discerning engineers, rental companies and production managers. GTO is an acronym for Grand Touring Outline, which describes our concept of a system engineered specifically for large-scale sound reinforcement applications.

In 2002 we launched the Butterfly system which contained a number of unique Outline engineering concepts, and which has brought us many new friends and customers around the world. GTO benefits from a process of natural evolution which retains the basic design principles, proven within the Butterfly project, and expands them into a new system which provides greater SPL, more control, improved resolution, faster transient response and unrivalled uniformity in long-distance projection.

One of the essential design elements retained from Butterfly is the V-shaped front baffle, for which Outline was awarded an international design patent in 2002, and to which we refer as the 'V-Power Concept'. This ground-breaking design allows individual sound sources to be positioned, when coupled in an array, much closer together than in conventional line-source systems. This facilitates superior acoustical coupling between high-frequency modules thus producing a smooth yet extended HF response.

It also creates the ideal 'unbroken baffle' shape through an array which minimises diffraction and deterioration of the mid-high frequencies, thus contributing to the far-field performance of the system.

A COMBINATION OF POWER, STRENGTH AND LIGHT WEIGHT

GTO cabinets contain no less than ten transducers in a compact cabinet with an internal volume of just 340 litres (74.79 gals). It features four 3-inch diaphragm compression drivers, each loaded with our patented D.P.R.W.G. (first used in Butterfly), and whose combined output is channelled through a single output slot. Four 8-inch drivers produce the midrange frequencies, which are output via the same horizontal dispersion waveguide as the HF. Two 15-inch cone transducers generate the low frequency range, providing tremendous depth, articulation and fast transient response.

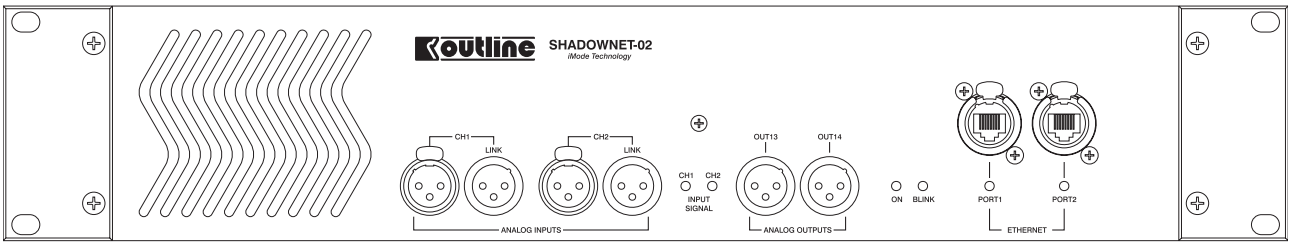
Despite the very high concentration of individual transducers within a GTO cabinet, we have managed to keep the weight down to just 96 kg (212 lb). The design contains a number of weight-saving components, but the greatest contribution to this success is the use of a space-age aluminium alloy from the aerospace industry, which we have used for the integrated flying hardware in preference to steel. This innovation reduces the per-cabinet weight of the hardware by 66%, yet is strong enough to fly up to 24 GTO cabinets with a total weight of 2.4 tons.

The splay angle between GTO cabinets is adjustable between 0° and 5° in 0.5° increments, with the addition of a 0.25° position intended for the uppermost cabinets in an array to provide additional control in far-field performance. Since the splay angle between cabinets affects the physical distance between drive units, the overall performance of a line-source system demands precise control over these parameters. A goniometer (a splay angle indicator), which is integral to the cabinet flying hardware, allows precise adjustment of the angle between individual cabinets which is then locked by insertion of a captive steel pin.

Both Mantas and Butterfly modules may be used for downfills by using the appropriate flying accessories, taking advantage of the intentional electro-acoustic compatibility and phase coherence between the different modules. It is also possible to mount Butterfly and Mantas cabinets above the main flying frame if required, providing a unique option for upward system coverage in venues where a very large vertical dispersion is required.

THE HUMAN INTERFACE

The GTO system benefits from a sophisticated DSP processor that can control and maximise the power of the electro-mechanical designs within the loudspeakers. We have developed our own proprietary digital control system, called the iMode Intelligent Audio Platform which includes a unique combination of Finite Impulse Response (FIR) and IIR (Infinite Impulse Response) filters which are applied to separate functions. The frequency-dividing filters utilise FIR filters which minimise phase shift around the system crossover points.



This advanced technology is also used to control the dual RMS / peak compressor / limiters included for component protection, and also to process a proprietary Outline convolution algorithm which provides essential compensation functions which significantly improve the linearity of the high-frequency components. 64-bit IIR processing is employed to optimise signal to noise performance and provide fine control over gain, polarity and delay settings.

OPENARRAY 3D ACOUSTIC SIMULATION SOFTWARE

Almost limitless configurability is a significant advantage provided by modern professional loudspeaker systems, giving sound designers and operators more flexibility and options than ever before. However, to realise the potential of this technology designers must be able to create 'virtual' systems using computer simulation software that will accurately predict the acoustic response of any configuration of loudspeakers in a given location.

OPENARRAY is Outline's acoustic simulation software, providing full three-dimensional emulation programs that will accurately predict the acoustic response from a wide range of Outline products, including all our line-source products and subwoofers, as well Outline's most popular point source systems. OPENARRAY is a vital tool for both fixed and mobile applications and facilitates optimisation of various Outline loudspeaker systems. It is also particularly useful for configuring, installing and aiming our Mantas, Butterfly and GTO line-source systems.
In OPENARRAY you can create visual representations of the tonal balance over the entire venue and use them to tailor the system design to your application by varying the number of 'virtual' GTO-LOW elements in the array. It is also possible to accurately predict the response of cardioid LF arrays by means of a sophisticated simulation of the frequency response over the whole area.

TECHNICAL SPECIFICATIONS:

FREQUENCY RESPONSE	(-10 dB)	35 Hz ÷ 18 kHz
	(±3 dB)	50 Hz ÷ 18 kHz
AVERAGE DISPERSION		
	Horizontal	90°
	Vertical	Depending on array configuration
IMPEDANCE (Ω)		
	Low	2 x 8 Ω (min 6.5 Ω)
	Mid	8 Ω (min 6.8 Ω)
	High	16 Ω (min 15.3 Ω)

POWER - WATT AES	Cont.	Peak
Low	1200 W	4800 W
Mid	800 W	3200 W
High	500 W	2000 W

MAX SPL @ 1 M (calculated) (Single Unit, full space)	Cont.	Peak (+ 6 dB)
Low	131 dB SPL	137 dB SPL
Mid	134 dB SPL	140 dB SPL
High	138 dB SPL	144 dB SPL

MAX SPL - 4 BOXES (calculated) (Simulated at 20 m – referred at 1 m)	Cont.	Peak (+ 6 dB)
Low	143 dB SPL	149 dB SPL
Mid	142 dB SPL	148 dB SPL
High	144 dB SPL	150 dB SPL

LOUDSPEAKERS AND LOADING	
Low	2 x 15" hybrid band-pass loaded woofers
Mid	4 x 8" NdFeB partially horn loaded mid-woofer
High	4 x 3" diaphragm NdFeB compression driver loaded by 2 double V-coupled D.P.R.W.G.

WEIGHT - SINGLE UNIT
96 kg (212 lb)

DIMENSION	Net	With Pins inserted
Height	1126 mm (44.3")	1181 mm (46.5")
Width	460 mm (18.1")	460 mm (18.1")
Depth	655 mm (25.8")	655 mm (25.8")