User's Manual

æro 28 series

Antes de utilizar el equipo, lea la sección "Precauciones de seguridad" de este manual. Conserve este manual para futuras consultas.

Before operating the device, please read the "Safety precautions" section of this manual. Retain this manual for future reference.

æro 28

El signo de exclamación dentro de un triángulo indica la existencia de importantes instrucciones de operación y mantenimiento en la documentación que acompaña al producto.
Conserve y lea todas estas instrucciones.
Siga las advertencias.

The exclamation point inside an equilateral triangle is intend to alert the users to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the product.
Heed all warnings. Follow all instructions.
Keep these instructions.

El doble cuadrado indica equipo de Clase II.

The double square indicates Class II device.

Las especificaciones se encuentran en la etiqueta de la parte posterior del producto.

The specifications can be found on the rear label of the product.

No exponga este equipo a la lluvia o humedad. No use este aparato cerca del agua (piscinas y fuentes, por ejemplo). No exponga el equipo a salpicaduras ni coloque sobre él objetos que contengan líquidos, tales como vasos y botellas. Equipo IP-20.

Do not expose this device to rain or moisture. Do not use this apparatus near water (for example, swimming pools and fountains). Do not place any objects containing liquids, such as bottles or glasses, on the top of the unit. Do not splash liquids on the unit. IP-20 equipment.

Este símbolo indica que el presente producto no puede ser tratado como residuo doméstico normal, sino que debe entregarse en el correspondiente punto de recogida de equipos eléctricos y electrónicos.

This symbol on the product indicates that this product should not be treated as household waste. Instead it shall be handed over to the appicable collection point for the recycling of electrical and electronic equipment.

Equipo diseñado para funcionar entre 15ºC y 35ºC con una humedad relativa máxima del 75%.

Working temperature ranges from 15ºC to 35ºC with a relative humidity of 75%.

El cableado exterior conectado al equipo requiere de su instalación por una persona instruida o el uso de cables flexibles ya preparados.

The outer wiring connected to the device requires installation by an instructed person or the use of a flexible cable already prepared.

El equipo cuenta con dos conectores de entrada en paralelo para facilitar la conexión de varias cajas en paralelo.

Note that the two Speakon input connectors are wired in parallel to provide easy parallel connection of several enclosures.

No emplace altavoces en proximidad a equipos sensibles a campos magnéticos, tales como monitores de televisión o material magnético de almacenamiento de datos.

Do not place loudspeakers in proximity to devices sensitive to magnetic fields such as television monitors or data storage magnetic material.

El colgado del equipo sólo debe realizarse utilizando los herrajes de colgado recomendados y por personal cualificado. No cuelgue la caja de las asas.

The appliance should be flown only from the rigging points and by qualified personnel. Do not suspend the box from the handles.

No existen partes ajustables por el usuario en el interior de este equipo. Cualquier operación de mantenimiento o reparación debe ser realizada por personal cualificado. Es necesario el servicio técnico cuando el equipo se haya dañado de alguna forma, como que haya caído líquido o algún objeto en el interior del aparato, haya sido expuesto a lluvia o humedad, no funcione correctamente, haya recibido un golpe o su cable de red esté dañado.

No user serviceable parts inside. Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally or has been dropped.

Limpie con un paño seco. No use limpiadores con disolventes.

Clean only with a dry cloth. Do not use any solvent based

El signo de exclamación dentro de un triángulo indica la existencia de importantes instrucciones de operación y mantenimiento en la documentación que acompaña al producto.
Conserve y lea todas estas instrucciones.
Siga las advertencias.

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Heed all warnings. Follow all instructions.
Keep these instructions.

Equipo de Clase I.

Class I device.

El signo del rayo con la punta de flecha, alerta contra la presencia de voltajes peligrosos no aislados. Para reducir el riesgo de choque eléctrico, no retire la cubierta.

The lightning and arrowhead symbol warns about the presence of uninsulated dangerous voltage. To reduce the risk of electric shock, do not remove the cover.

No instale el aparato cerca de ninguna fuente de calor como radiadores, estufas u otros aparatos que produzcan calor. Debe instalarse siempre sin bloquear la libre circulación de aire por las aletas del radiador.

Do not install near any heat sources such as radiators, heat registers, stoves or other apparatus that produce heat.
The circulation of air through the heatsink must not be blocked.

No exponga este equipo a la lluvia o humedad sin el protector de lluvia recomendado. No use este aparato cerca del agua (piscinas y fuentes, por ejemplo). No exponga el equipo a salpicaduras sin el protector de lluvia recomendado, ni coloque sobre él objetos que contengan líquidos, tales como vasos y botellas.

Do not expose this device to rain or moisture without the rain protector supplied. Do not use this apparatus near water (for example, swimming pools and fountains). Do not place any objects containing liquids, such as bottles or glasses, on the top of the unit. Do not splash liquids on the unit without the rain protector supplied.

Este símbolo indica que el presente producto no puede ser tratado como residuo doméstico normal, sino que debe entregarse en el correspondiente punto de recogida de equipos eléctricos y electrónicos.

This symbol on the product indicates that this product should not be treated as household waste. Instead it shall be handed over to the appicable collection point for the recycling of electrical and electronic equipment.

Equipo diseñado para funcionar entre 15ºC y 35ºC con una humedad relativa máxima del 75%, con un rango de ±10% de la tensión nominal de alimentación indicada en la etiqueta trasera (según IEC 60065:2001). Si debe sustituir el fusible preste atención al tipo y rango.

Working temperature ranges from 15ºC to 35ºC with a relative humidity of 75%, with ±10% of the rated main voltage value indicated on the rear label (according to IEC 60065:2001). If the fuse needs to be replaced, please pay attention to correct type and ratings.

El cableado exterior conectado al equipo requiere de su instalación por una persona instruida o el uso de cables flexibles ya preparados.

The outer wiring connected to the device requires installation by an instructed person or the use of a flexible cable already prepared.

Si el aparato es conectado permanentemente, la instalación eléctrica del edificio debe incorporar un interruptor multipolar con separación de contacto de al menos 3mm en cada polo.

If the apparatus is connected permanently, the electrical system of the building must incorporate a multipolar switch with a separation of contact of at least 3mm in each pole.

Desconecte este aparato durante tormentas eléctricas, terremotos o cuando no se vaya a emplear durante largos periodos.

Unplug this apparatus during ligtning storms, earthquakes or when unused for long periods of time.

No emplace altavoces en proximidad a equipos sensibles a campos magnéticos, tales como monitores de televisión o material magnético de almacenamiento de datos.

Do not place loudspeakers in proximity to devices sensitive to magnetic fields such as television monitors or data storage magnetic material.

El colgado del equipo sólo debe realizarse utilizando los herrajes de colgado recomendados y por personal cualificado. No cuelgue la caja de las asas y respete los valores máximos de carga dados en el manual.

The appliance should be flown only from the rigging points and by qualified personnel. Do not suspend the box from the handles and respect the maximium load values given in the manual.

No existen partes ajustables por el usuario en el interior de este equipo. Cualquier operación de mantenimiento o reparación debe ser realizada por personal cualificado. Es necesario el servicio técnico cuando el equipo se haya dañado de alguna forma, como que haya caído líquido o algún objeto en el interior del aparato, haya sido expuesto a lluvia o humedad, no funcione correctamente, haya recibido un golpe o su cable de red esté dañado.

No user serviceable parts inside. Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally or has been dropped.

Limpie con un paño seco. No use limpiadores con disolventes.

Clean only with a dry cloth. Do not use any solvent based

DECLARACIÓN DE CONFORMIDAD
DECLARATION OF CONFORMITY

D.A.S. Audio, S.A.
C/ Islas Baleares, 24 - 46988 - Pol. Fuente del Jarro - Valencia. España (Spain).

Declara que la ***serie aero***:
Declares that ***aero series***:

Cumple con los objetivos esenciales de las Directivas:
Abide by essential objectives relating Directives:

- Directiva de Baja Tensión (Low Voltage Directive) 2006/95/CE
- Directiva de Compatibilidad Electromagnética (EMC) 2004/108/CE
- Directiva RoHS 2002/95/CE
- Directiva RAEE (WEEE) 2002/96/CE

Y es conforme a las siguientes Normas Armonizadas Europeas:
In accordance with Harmonized European Norms:

- EN 60065:2002 Audio, video and similar electronic apparatus. Safety requirements.
- EN 55103-1:1996 Electromagnetic compatibility. Product family standard for audio, video, audio-visual and entertainment lighting control apparatus for professional use. Part 1:Emission.
- EN 55103-2:1996 Electromagnetic compatibility. Product family standard for audio, video, audio-visual and entertainment lighting control apparatus for professional use. Part 2:Immunity.

GARANTÍA

Todos nuestros productos están garantizados por un periodo de 24 meses desde la fecha de compra.

Las garantías sólo serán válidas si son por un defecto de fabricación y en ningún caso por un uso incorrecto del producto.

Las reparaciones en garantía pueden ser realizadas, exclusivamente, por el fabricante o el servicio de asistencia técnica autorizado.

Otros cargos como portes y seguros, son a cargo del comprador en todos los casos.

Para solicitar reparación en garantía es imprescindible que el producto no haya sido previamente manipulado e incluir una fotocopia de la factura de compra.

WARRANTY

All D.A.S. products are warrantied against any manufacturing defect for a period of 2 years from date of purchase.

The warranty excludes damage from incorrect use of the product.

All warranty repairs must be exclusively undertaken by the factory or any of its authorised service centers.

To claim a warranty repair, do not open or intend to repair the product.

Return the damaged unit, at shippers risk and freight prepaid, to the nearest service center with a copy of the purchase invoice.

CB TEST CERTIFICATE

Ref. Certificate No.
BE-1363

IEC SYSTEM FOR MUTUAL RECOGNITION OF TEST CERTIFICATES FOR ELECTRICAL EQUIPMENT (IECEE) CB SCHEME

Issued by:	SGS Belgium NV - Division SGS CEBEC		
Product:	Self-powered loudspeaker cabinets		
Applicant:	D.A.S. Audio S.A.	Islas Baleares, 24 46988 Fuente Del Jarro, VALENCIA	Spain
Manufacturer:	D.A.S. Audio S.A.	Islas Baleares, 24 46988 Fuente Del Jarro, VALENCIA	Spain
Factory:	D.A.S. Audio S.A.	Islas Baleares, 24 46988 Fuente Del Jarro, VALENCIA	Spain
Rating and principal characteristics:	50/60 Hz, audio amplifier 350 W MF+100W HF Type CA-28A (120 V version) : 120 V AC, 2.5 A Type CA-28A (230 V version) : 230 V AC, 1 A		
Trade mark (if any):	D.A.S.		
Model/Type reference:	CA-28A (120 V version), CA-28A (230 V version)		
Additional information:	/		
Sample of product tested to be in conformity with IEC:	60065(ed.7)	National differences: EU Group Differences; EU Special National Conditions; AU; CA; NZ; US	
Test Report Ref. No:	580268.01		

This CB Test Certificate is issued by the National Certification Body:

SGS Belgium NV - Division SGS CEBEC
Avenue F. Van Kalken 9 A, B - 1070 Brussels, Belgium

Signed by: Ronan MAQUESTIAU

Date of issue: 2008-01-16

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SYSTEM DESCRIPTION

DAS Audio offers two line array systems; the *CA-28* (mid-high) and the *CA-215* (low). DAS Audio offers two line array systems; the *CA-28* (mid-high) and the *CA-215* (low) which make up the *aero 28*. They have been conceived as light, easy to use, modular systems that, when coupled to other units in a coherent manner allow for a resulting equivalent linear source with high efficiency, high directivity and extended bandwidth to 80Hz (-6dB), in the case of the *CA-28* mid/hi unit. This makes the *aero 28* ideal for small and medium sized venues (up to 60m), such as theatres, concert and conference venues, achieving great quality and intelligibility. *CA-28* is also ideal for fixed installations where the visual impact of the sound systems needs to be minimized as far as its size and finish. As a two-way full-range system it can be utilized for reinforcing conferences and seminars; but for applications requiring low frequency reinforcement it may be combined with the *CA-215* system, extending the range to 35Hz (-6dB). The use of the DAS Audio *DSP-26* controller is recommended.

The model *CA-28* includes the version *CA-28B* (passive) and the version *CA-28A* (active), and the model *CA-215* includes the version *CA-215* (passive) and the version *CA-215A* (active).

The boxes are manufactured from 15mm Finnish birch plywood. Enclosure shape is trapezoidal with 5º for the mid-high box. Finish is finely textured black polyurethane paint, which is resistant to ambient conditions. Both units incorporate rigging on their sides for safe, easy and quick flying or stacking; the units can be angled vertically for wider coverages, specifically the allowable angles are from 0º to 10º in 2.5º increments. These features allow the user to configure large numbers of units, depending on the application, quickly and easily, be it stacked on the ground on top of the subwoofers, or flown. The steel grille is covered with an acoustically transparent nylon fabric.

The loudspeakers used in the system feature advanced technologies; new TAF (total air flow) cooling systems, Neodymium magnetic circuits which allow for important weight reductions, titanium diaphragms for the high frequency sections, and low-mid frequency cones manufactured using crossed fibres and elastic suspension that provide exceptional stability in the vertical plane.

The model *CA-28* includes two *8MN16* 8” speakers arranged on a V shape, incorporating 2.5” voice coils, Neodymium magnet assemblies and TAF cooling system for mid frequency reproduction. For high frequencies, it incorporates a *M-10N* high frequency compression driver with 3” coil, Neodymium magnet and 1.5” exit coupled to the DAS Audio *SERPIS* plane wave guide, and to a narrow coverage *BP-906* horn.

The *SERPIS* plane wave adapter also serves as a heat sink for the compression driver.

The system must be used in multiples, otherwise line array benefits will not be accomplished. Thus, the minimum number of *CA-28* units would be 4 *CA-28* up to a maximum of 16 units* with a 5:1 safety factor. Vertical coverage offered by the different configurations will be given by the splay angles (max. 10º) and the number of boxes.

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Self powered systems

The *aero 28 series* include two powered systems: *CA-28A* and *CA-215A*.

CA-28A

Two way bi-amplified system.
Amplifier power 350W+100W.

Amplifier panel description, *CA-28A*:

A) LIMIT: Amplifier limiter indicator lights. When lit, the level of the signal source should be reduced.

B) SIGNAL: Signal presence indicator at the amplifiers' inputs.

C) ON: Indicator light for each amplifier channel.

D) FUSE

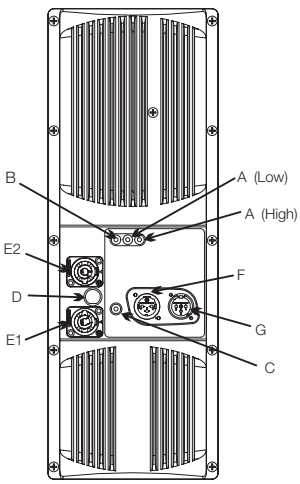
E) AC INPUT: With PowerCon NAC 3 FCA connector. Only when the connector is inserted and rotated (clicked) into place will the AC turn on. The connector can be used as a switch, rotating the connector to or from the locked position will turn the unit on or off, respectively. Mute the signal feeding the INPUT before turning the unit on or off.

F) AC OUTPUT: With (white) PowerCon NAC 3 DFCB connector. This is used as an AC loop thru so that up to four boxes can be power from a single AC line.

G) INPUT: Balanced signal XLR. Pin assignments as follows :

1 = GND (Ground)
2 = (+) Non-inverted input
3 = (-) Inverted input

H) LOOP THRU: Used for paralleling several units, which will share the same input. Could also be used to provide signal for an outboard power amplifier.



CA-215A

Low frequency mono-amplified system.
Amplifier power 1000W.

Amplifier panel description, *CA-215A*:

A) LIMIT: Amplifier limiter indicator lights. When lit, the level of the signal source should be reduced.

B) SIGNAL: Signal presence indicator at the amplifiers' inputs.

C) ON: Indicator light for each amplifier channel.

D) FUSE

E) AC INPUT: With PowerCon NAC 3 FCA connector. Only when the connector is inserted and rotated (clicked) into place will the AC turn on. The connector can be used as a switch, rotating the connector to or from the locked position will turn the unit on or off, respectively. Mute the signal feeding the INPUT before turning the unit on or off.

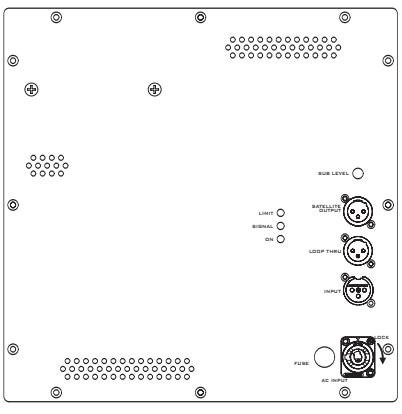
F) INPUT: Balanced signal XLR. Pin assignments as follows :

1 = GND (Ground)
2 = (+) Non-inverted input
3 = (-) Inverted input

G) LOOP THRU: Used for paralleling several units, which will share the same input. Could also be used to provide signal for an outboard power amplifier.

H) SATELLITE OUTPUT: This sends the high-passed signal to the system that will reproduce the mid-high frequencies.

I) SUB LEVEL: Used to control the subwoofer level. Does not affect the satellite output. To prevent accidental mis-setting, a flat-blade screwdriver is needed to rotate the control, which is recessed and detented. Depending on the sensitivity, placement and configuration of your mid-high system, you may need to adjust this control for balanced frequency response.



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Switch ON/OFF

A sound system should be switched on sequentially. Switch on the self-powered unit last in your sound system. Switch on the sound sources such as CD players or turntables, then the mixer, then the processors, and finally the self-powered unit. If you have several units, it is recommended that you switch them on sequentially one at a time.

Follow the inverse order when switching off, turning self-powered units off before any other element in the sound system.

Mute all signal sources before switching the unit on or off.

Overload (*limit)* indicators

It is recommended that the red LIMIT LED indicators are not lit continuously; at most it should blink only occasionally.

If you wish to have a visual indication at the mix position of whether the LIMIT LEDs are lighting, during equipment set-up, closely observe what mixer VUmeter level corresponds to the level that lights the enclosure's LIMIT LEDs. That level that should not be exceeded during the event.

Overheating

Due to their high efficiency, the *aero series* amplifiers generate very little residual heat and therefore do not need a fan for cooling. In normal use, the amplifier panel will be warm to the touch.

If the unit stops playing (or just the mid-high or the bass sections), the amplifier's overheating protection may be activated to protect the components from thermal damage.

Overheating may be due to insufficient cooling, or to very aggressive use in extremely hot conditions. Do not use the unit in proximity to high power lights.

Once the amplifier cools down, it switches back on automatically. If the unit should shut down again, try reducing the volume a notch to avoid overheating.

Equalisation

The units do not need extreme settings of equalisation to produce quality sound. Avoid high levels of gain on the equalisers. Gain values above +6 dB on a console's EQ are not recommended.

Low mains voltage

If mains voltage falls below the shutdown voltage for the unit, it will stop playing. When acceptable levels are regained, the unit will switch back on automatically.

Current consumption (A)

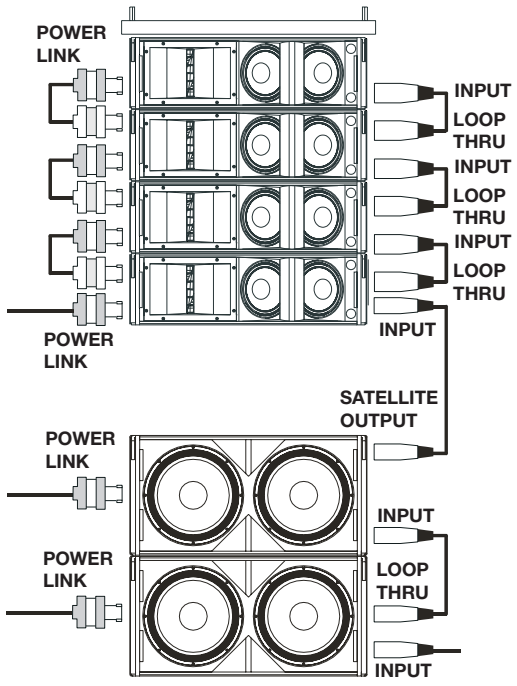
AC = 230V	*CA-28A*	*CA-215A*
Max. Power	1,7	3,5
1/3 Power	0,75	1,8
1/8 Power	0,4	0,9
Idle	0,2	0,1

Connections

The *CA-28A* can be used full-range or reinforced with *CA-215A*.

Full-range use is only recommended for applications where not a lot of SPL is required. To use it in this mode simply plug the mixer into the enclosure's input.

To use it in combination with the *CA-215A*, plug the mixer into the *CA-215A* input, and connect the SATELLITE output to the *CA-28A*s input. If you have more boxes, simply daisy chain *CA-28A*s and *CA-215A*s as shown.



System connection.

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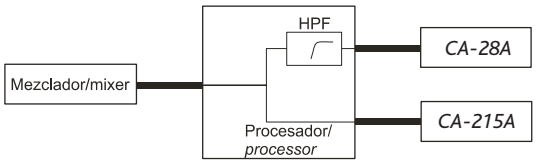
The LOOP THRU output is an output XLR in parallel with the input connector and is useful for daisy chaining the input signal to a number of boxes, connecting them in parallel.

The number of units that can be linked this way depends on the output impedance of the equipment driving the enclosure, such as the mixer or processor. Typically, to avoid signal degradation, the maximum number that can be daisy chained is given by the formula (1250/Z), where Z is the output impedance of the equipment driving the enclosure. For instance, a 100 ohm output impedance allows daisy chaining 12 boxes.

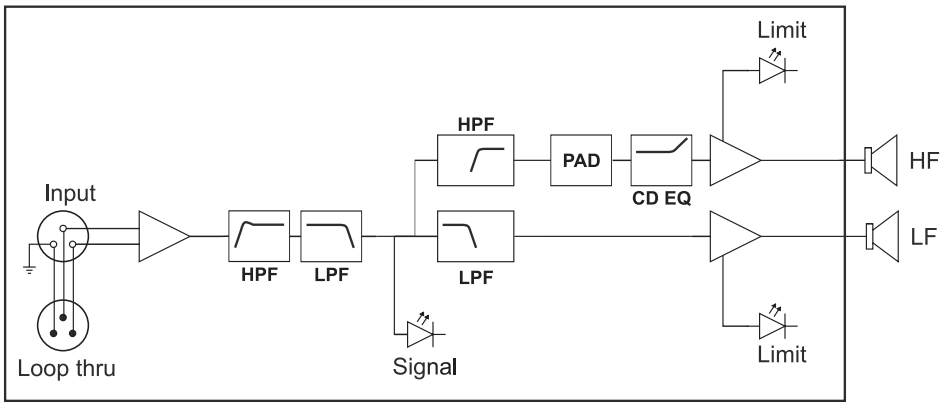
Subwoofer level is controlled via the SUB LEVEL potentiometer. If separate control and signal routing to the *CA-28A* and *CA-215A* is required (such as for applications where the subwoofer is run off a console's aux bus as an effect, or it needs to be delayed), drive each enclosure model separately from a processor, using a Linkwitz-Riley 24 dB/octave 100 Hz high-pass filter for the *CA-28A* (so that the missing high-pass from the *CA-215A* is replicated), feeding the *CA-215A* with full-range signal.



Independent subwoofer control.

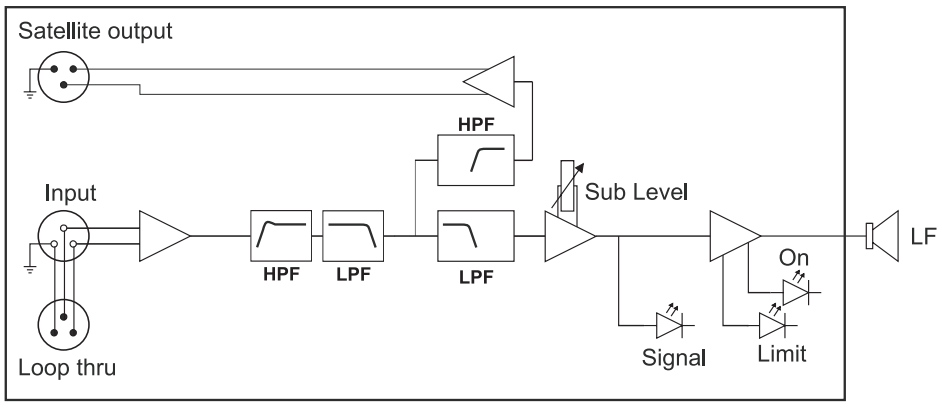
Block diagrams

CA-28A



AMPLIFIER MODULE

CA-215A



AMPLIFIER MODULE

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Troubleshooting

PROBLEM	CAUSE	SOLUTION
No sound from the unit. The SIGNAL presence LED indicator(s) do(es) not light up.	1 – The signal source is sending no signal. 2 – Defective cable.	1 – Check that the mixer or sound source is sending signal to the UNIT. 2 – Check that the cable from the sound source to the UNIT is connected correctly. Replace the cable if defective.
Full power cannot be obtained. The LIMIT LED indicator(s) never light(s) up.	1 – The signal source does not have a hot enough output.	1 – If using a mixer, use the balanced output if available. Use a professional mixer with a hotter output.
Sound is distorted. The LIMIT LED indicator(s) is/are not on, or only light up occasionally.	1 – The mixer or signal source is distorting.	1 – Turn mixer channel gains down. Check that none of your signal sources are distorting.
Sound is distorted and very loud. One or more LIMIT LED indicators light up.	1 – The system is overloaded and has reached maximum power.	1 – Turn down the mixer's output.
Hum or buzz when a mixer is connected to the unit.	1 – The console probably has un-balanced outputs. You may be using an incorrect un-balanced to balanced cable. 2 – The mixer and the powered speaker are not plugged into the same mains outlet. 3 – The audio signal cable is too long or too close to an AC cable.	1 – Read the appendix of this manual to make a correct un-balanced to balanced cable. 2 – Connect the mixer and the unit to the same mains outlet. 3 – Use a cable that is as short as possible and/or move the audio signal cable away from mains cables.
Hum or buzz when using lighting controls in the same building.	1 – The audio signal cable is too long or too close to the lighting cable. 2 – On a sound system with three-phase AC, the lighting equipment and the UNIT are connected to the same phase.	1 – Move the audio signal cable away from lighting cables. Try to find out at what point the noise is leaking into the system. 2 – Connect the sound system to a different phase than the lights. You may need the help of an electrician.
The power on LED indicator(s) do(es) not light up when the power connector is rotated and locked at the ON (LOCK) position.	1 – Bad or loose AC connection to the UNIT or the mains outlet. 2 – Faulty AC cable. 3 – Blown Fuse.	1 – Check you connections. 2 – Check the cables, connectors and AC power with a suitable mains tester. 3 – Replace fuse on fuse holder with one of the same type. If it blows again, take the unit to a service centre.

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RIGGING SYSTEM

Warning

This manual contains needed information for flying DAS Audio line array systems, description of the elements and safety precautions. To perform any operations related to flying the system, read the present document first, and act on the warnings and advice given. The goal is to the allow the user to become familiar with the mechanical elements required to fly the acoustic system, as well as the safety measures to be taken during set-up and tear-down.

Only experienced installers with adequate knowledge of the equipment and local safety regulations should fly speaker boxes. It is the user's responsibility to ensure that the systems to be flown (including flying accessories) comply with state and local regulations.

The working load limits in this manual are the results of tests by independent laboratories. It is the user's responsibility to stay within safe limits. It is the user's responsibility to follow and comply with safety factors, resistance values, periodical supervisions and warnings given in this manual.

To this date, there is no international standard regarding the flying of acoustic systems. However, it is common practice to apply 5:1 safety factors for enclosures and static elements. For slings and elements exposed to material fatigue due to friction and load variation the following ratios must be met; 5:1 for steel cable slings, 4:1 for steel chain slings and 7:1 polyester slings. Thus, an element with a breaking load limit of 1000 kg may be statically loaded with 200 kg (5:1 safety factor) and dynamically loaded with 250 Kg (4:1 safety factor).

When flying a system, the working load must be lower than the resistance of each individual flying point in the enclosure, as well as each box.

Hanging hardware should be regularly inspected and suspect units replaced if in doubt. This is important to avoid injury and absolutely no risks should be taken on this respect. It is highly recommended that you implement an inspection and maintenance programme on flying elements, including reports to be filled out by the personnel that will carry out the inspections. Local regulations may exist that, in case of accident, may require you to present evidence of inspection reports and corrective actions after defects were found.

Absolutely no risks should be taken with regards to public safety.

When flying enclosures from ceiling support structures, extreme care should be taken to assure the load bearing capabilities of the structures so that the installation is absolutely safe. Do not fly enclosures from unsafe structures. Consult a certified professional if needed.

All flying accessories that are not supplied by DAS Audio are the user's responsibility. Use at your own risk.

Description

DAS Audio line array systems (*CA-28, CA-215*) include 2 structures on each side of the box. These are manufactured from black painted zinc plated steel; they are affixed to an internal plate with special crop resistant screws. Two stainless steel guides assembled on each of the structures: G1A (front guide) y G2A (back guide), that allow for stacking or flying of boxes. Angles can be changed from 0º to 10º in 2.5º increments on the *CA-28*. On the *CA-215*, three possible angles are possible that allow for flying from it and stacking on it; 0º, 2.5º and 5º angles. To lock both guides, the quick release safety pin supplied (6) must be used.

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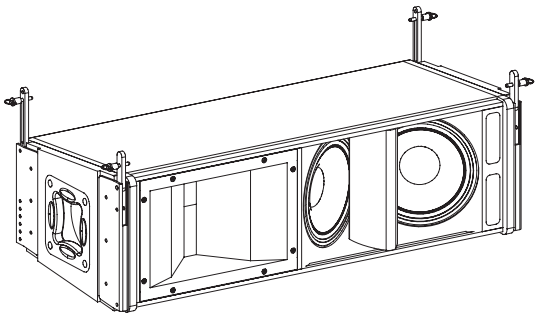
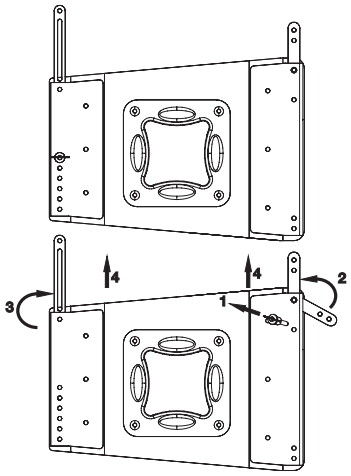
The G1A front guide provides a solid connection to the box and whatever is on top of it, while the G2A back guide determines the vertical splay angle (whether stacked or flown), as a function of the hole where the pin gets inserted.



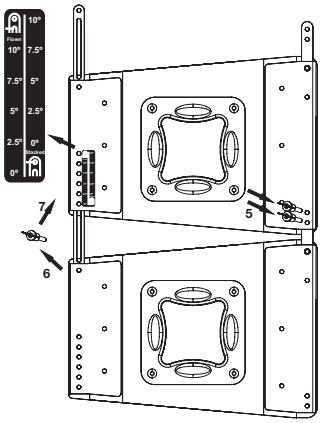
Rigging elements.

To ease the setting of the G2A guide in the corresponding hole in the top box, each hole is labelled with an associated angle, both for stacked and flown applications.



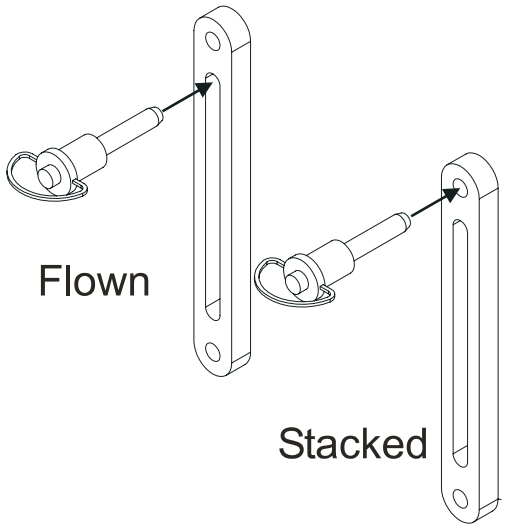
G1A and G2A guides; safety pins.

To fix the guides to the holes, highly resistant 6 mm quick release pins are used (AISI 4130 steel alloy) with ball safety lock:



CA-28 **splay angles.**

For flying boxes (flown) boxes and defining the splay angle, the pins must be inserted in the slot of guide 2, whereas for stacking (stacked), the pin goes through the top whole of the guide:



Pin location on G2A.

All units in a column will be flown from the *AX-CA* flying grid (bumper, frame), which allows for flying both the *CA-28* and *CA-215*, as well as providing several vertical aiming angles for the top box (*CA-28* only). The grid uses either one or two pickup points, to allow for quick and easy vertical aiming.

The pickup points will be used in conjunction with electric hoists (motors) for load lifting. One or two hoists shall be used, depending on array size. Small 4 to 6 unit columns may use a single hoist.

Hoists used will be 1/2 ton when using two per cluster, or 1 ton when using a single one. In either case the user needs to check that the weight of the complete array is lower than the load capacity of the hoist.

If two hoists are used, the load capacity will be given by the weight of the cluster divided by two:

Hoist load capacity> cluster weight/2

It must be noted that two hoists will be required for configurations that require a large number of units and/or need to tilt the cluster.

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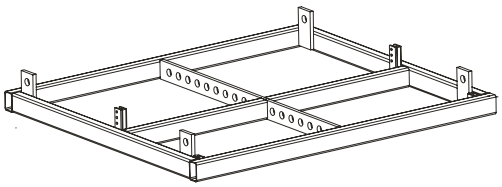
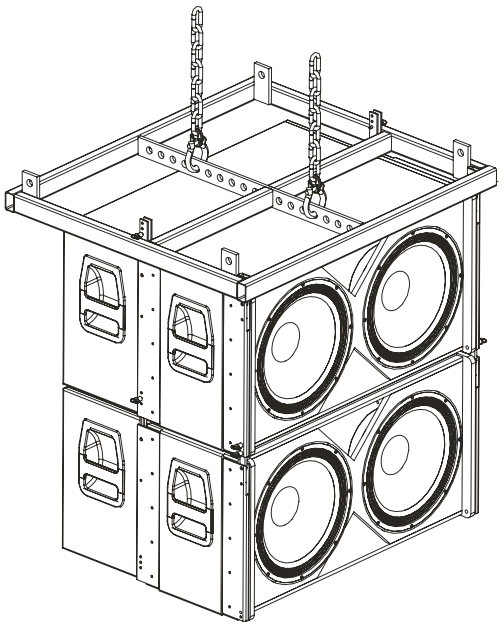
The *AX-CA* grid is made from 50x30x2mm steel tubing and is designed to handle great loads. It features a centre reinforcement bar that is also used for the lifting slings. The bar has a series of holes (17) with a 2cm diameter that provide a pickup point for the steel chain slings or the hoists. The pickup point chosen will determine the tilt angle of the whole array. 4 additional pickup points exist for securing the array and prevent it from rotating.



DIMENSIONS (WxHxD)	937mm x 816mm x 100mm
WEIGHT	14.7kg (32.4lbs)

AX-CA

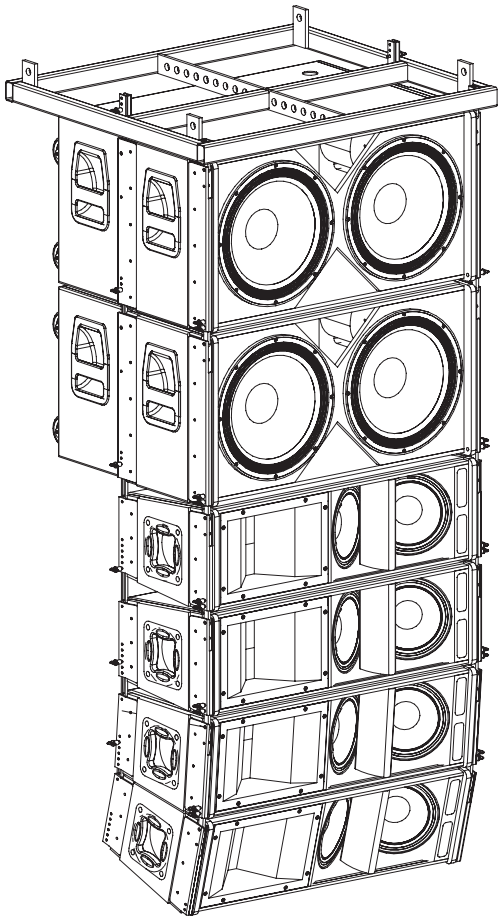
There may be occasions where a standalone cluster of *CA-215* subwoofers needs to be flown. The *AX-CA* has therefore been designed to fly both systems:



CA-215 **units flown from** *AX-CA*.

On the *AX-CA* grid, there are 4 additional pull points that should never be used to lift the array, but only to prevent it from shifting and rotating.

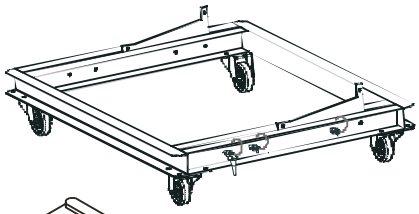
Both systems may be combined:

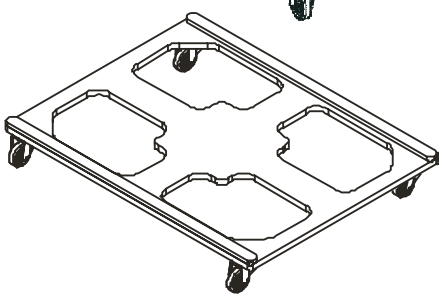


Four *CA-28* **and two** *CA-215*, **with** *AX-CA*.

Most accessories needed to lift or stack boxes are integrated into the boxes, such as G1A, G2A and safety pins. The only additional elements are the *AX-CA* grid, the slings for lifting and securing the array, the hoists and the dollies for transporting *CA-28* units: *PL4-28* and *PL-28S*.

PL-28S





PL4-28

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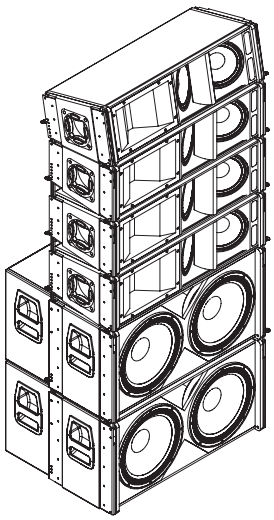
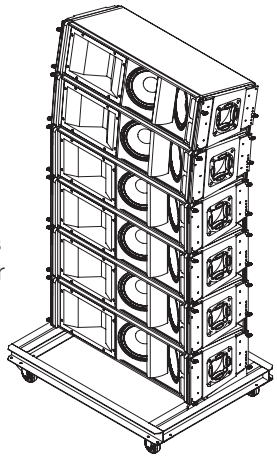
INSTALLATION QUICK GUIDE

STACKED



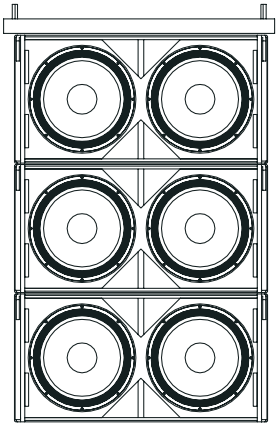
Up to 4 *CA-28* units can de stacked over *CA-215* units, using integrated rigging hardware.
Cabinets are stacked "one by one".

Up to 6 *CA-28* units can be stacked over *PL-28S*, using integrated rigging hardware.



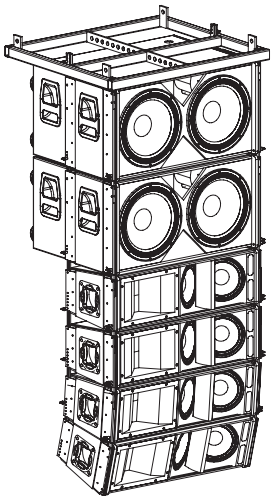
FLOWN

CA-215



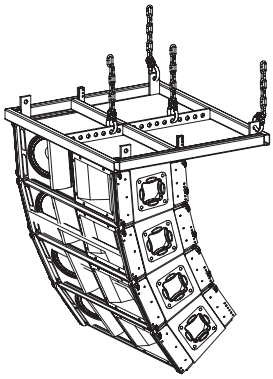
CA-215 cabinets are flown "one by one".

CA-215+CA-28

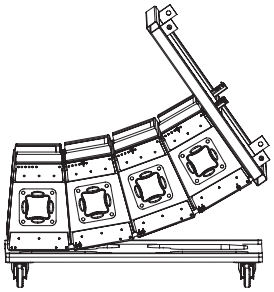


Cabinets are flown "one by one".

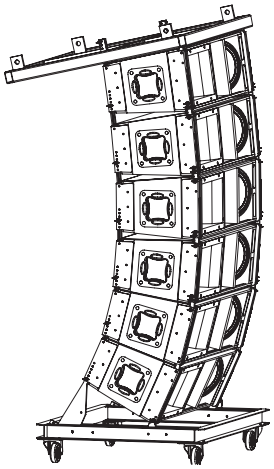
CA-28



CA-28 cabinets are flown "one by one".



CA-28 cabinets can be flown using *PL4-28*.



CA-28 cabinets can be flown using *PL-28S*.

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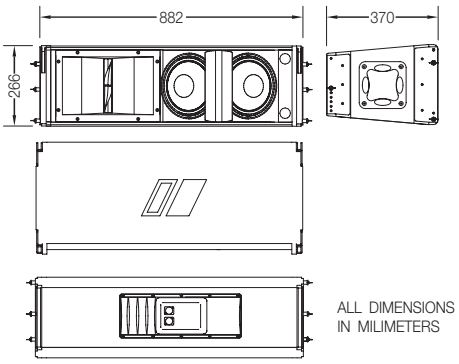
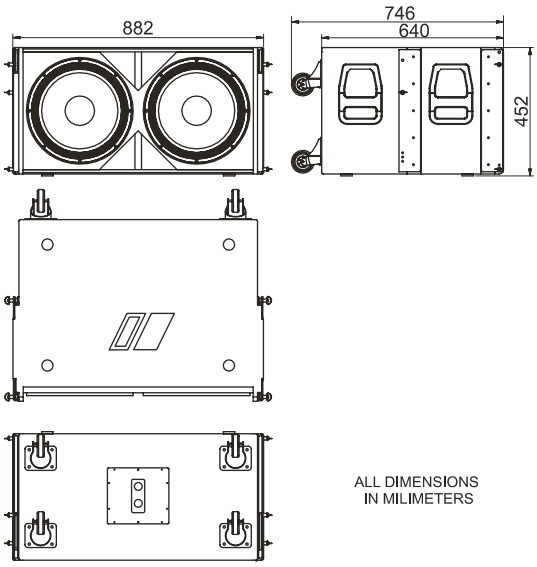
LINE DRAWINGS

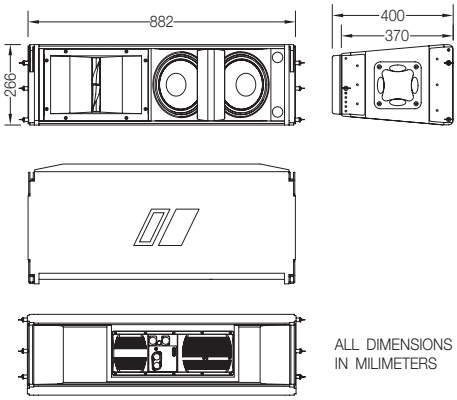
CA-28B



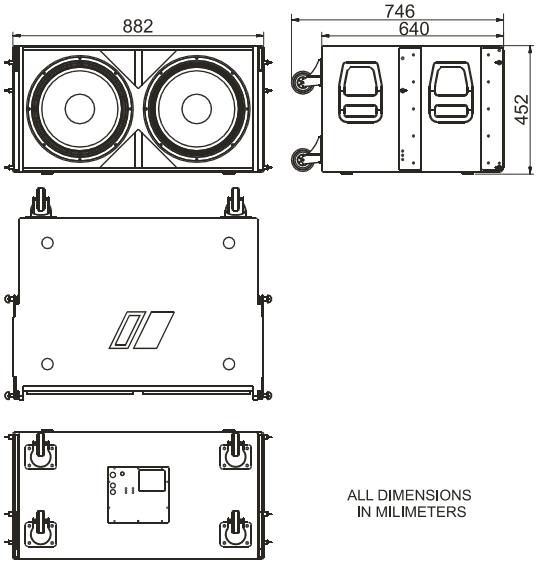
CA-215



CA-28A



CA-215A



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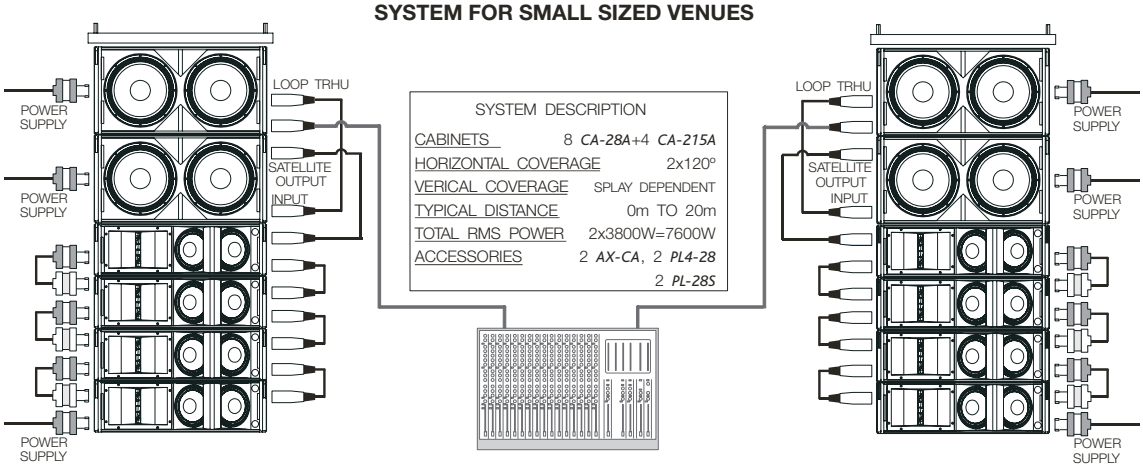
CONFIGURATIONS

CONFIGURATION 1

3 WAY TRI-AMP STEREO SELF POWERED SYSTEM FOR SMALL SIZED VENUES



SPECIFICATIONS	*CA-28A*	*CA-215A*
Frequency Range	80 Hz - 20 kHz (-6dB)	35 Hz - 150 Hz (-6dB)
Horizontal coverage	120º (-6dB, 500Hz-16kHz)	----------
Vertical coverage	Splay angle dependent	----------
Nominal amplifier power RMS	350W+ 100W	1000W
Input and output type	Balanced XLR	
Input impedance	20 Kohm	25 Kohm
Satellite output impedance	----------	280 ohm
Sensitivity	1.23V (+4dBu)	0.88V (+1.1 dBu)
AC power requirements	115V, 50Hz/60Hz 230V, 50Hz/60Hz	
Sensitivity-SPL(1W/1m)	100dB	99dB
Minimum system	4 units	2 units
Array	Continuous/Peak SPL	Continuous/Peak SPL
Flat Array — One enclosure	125 dB/131dB	129 dB/135 dB
Flat Array — Two enclosures	131 dB/137dB	135 dB/141 dB
Flat Array — Four enclosures	137 dB/143dB	141 dB/147 dB
Curved Array: Four enclosures 10º splay angle	133 dB/139dB (36º vertical coverage)	----------
Transducers Neodymium magnets		
LF section	2x8" model *8MN16* 2.5" voice coil	2x15" model *15LX* 4" voice coil
HF section	3" voice coil compression driver, model *M-10N*, 1.5" exit coupled to a horn through a plane wave generator *SERPIS*.	
Enclosure		
Dimensions (HxWxD)	26.5x88.2x40 cm (10.4x34.7x15.8 in)	45.2x88.2x74.6 cm (17.8x34.7x29.4 in)
Material	Wisa Birch Plywood	Wisa Birch Plywood
Finish	Black polyurethane paint	Black polyurethane paint
Rigging hardware	Integrated in cabinet	Integrated in cabinet
Weight	36.5 kg (80.5 lbs)	64.5 kg (142.2 lbs)

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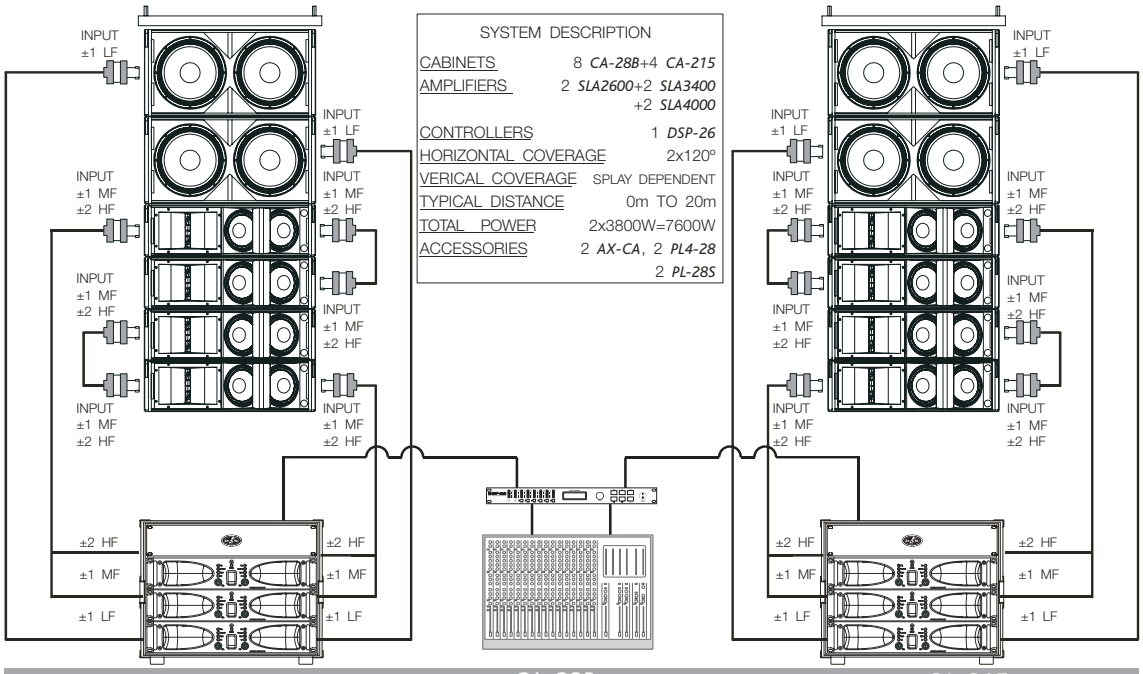
CONFIGURATION 2

3 WAY TRI-AMP STEREO SYSTEM, EXTERNAL AMPLIFICATION, FOR SMALL SIZED VENUES



SPECIFICATIONS	*CA-28B*	*CA-215*
Frequency Range	80 Hz - 20 kHz (-6dB)	35 Hz - 300 Hz (-6dB)
Horizontal coverage	120º (-6dB, 500Hz-16kHz)	----------
Vertical coverage	Splay angle dependent	----------
Xover	Active External processor needed	
Impedance	MF 8Ω HF 8 Ω	4Ω
RMS Power Handling	MF 350W HF 100W	LF 1200W
Sensitivity-SPL(1W/1m)	MF 100dB HF 110dB	99dB
Minimum system	4 units	2 units
Array	Continuous/Peak SPL	Continuous/Peak SPL
Flat Array: One enclosure	125 dB/131dB	129 dB/135 dB
Flat Array: Two enclosures	131 dB/137dB	135 dB/141 dB
Flat Array: Four enclosures	137 dB/143dB	141 dB/147 dB
Curved Array: Four enclosures 10º splay angle	133 dB/139dB (36º vertical coverage)	----------
Transducers Neodymium magnets LF section	2x8" model *8MN16* 2.5" voice coil	2x15" model *15LX* 4" voice coil
HF section	3" voice coil compression driver, 1.5" exit model M-10N coupled to a horn through a plane wave generator *SERPIS*.	
Processor settings (when using amplifiers with equal Gain)		Digital processor *DSP-26*
Recommended Amp Power	DAS amplifiers: LF *SLA-4000* , MF *SLA-3400* , HF *SLA-2600*	
	HF: 200-300W@4ohms per channel (2x*CA-28B* HF sections per channel)	
	MF: 600-700W@4ohms per channel (2x*CA-28B* MF sections per channel)	
	LF: 1000-1200W@4ohms per channel (1x*CA-215* per channel)	
Enclosure		
Dimensions (HxWxD)	26.5x88.2x37 cm (10.4x34.7x14.6 in)	45.2x88.2x74.6 cm (17.8x34.7x29.4 in)
Material	Wisa Birch Plywood	Wisa Birch Plywood
Finish	Black polyurethane paint	Black polyurethane paint
Rigging hardware	Integrated in cabinet	Integrated in cabinet
Weight	28.5 kg (62.8 lbs)	56.5 kg (124.6 lbs)

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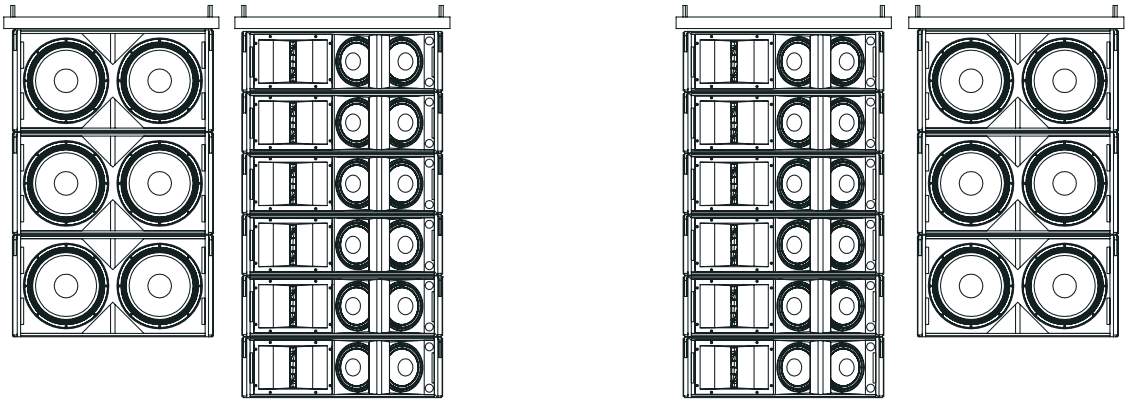
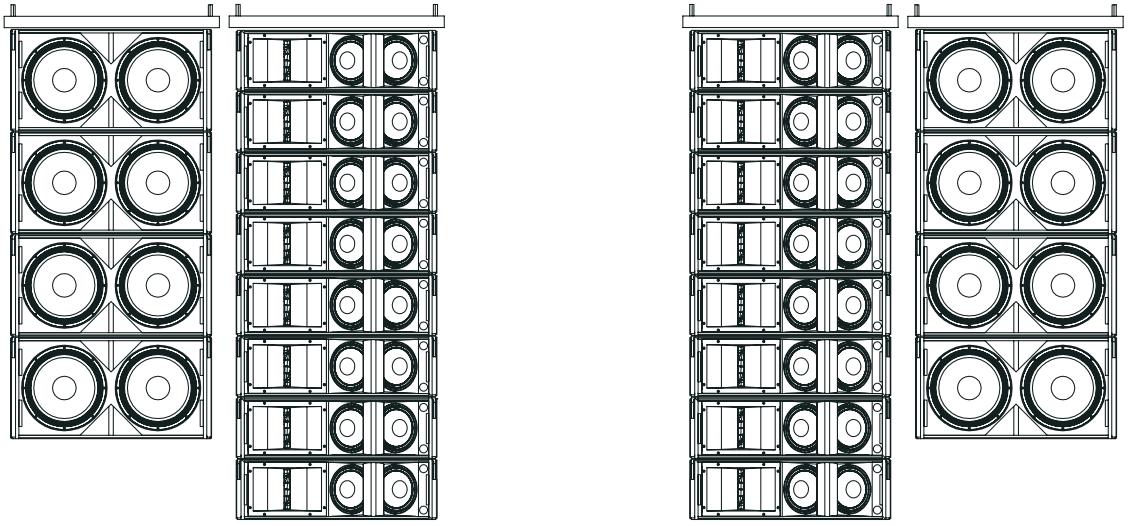
SMALL-MID SIZED VENUES: Typical distance 20m to 40m



MID SIZED VENUES: Typical distance 30m to 50m



MID-LARGE SIZED VENUES: Typical distance 40m to 60m

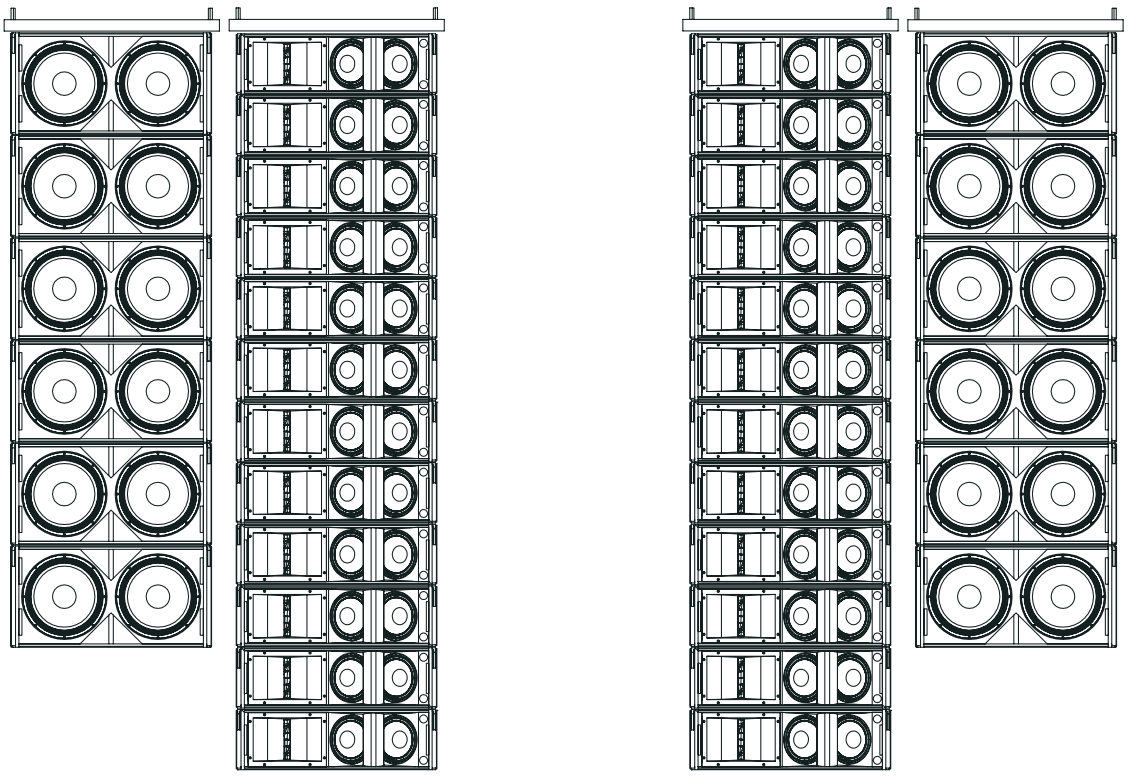


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TABLE OF PARAMETERS

TRI-AMP SYSTEM - DIGITAL PROCESSOR *AERO 28B (2xCA-28B/1xCA-215)*
AMPLIFIERS WITH EQUAL GAIN USED

OUT	LOW	OUT	MID	OUT	HIGH
GAIN	0.0 dB	GAIN	-2 dB	GAIN	-13 dB
DELAY	0.4 ms	DELAY	0.4 ms	DELAY	0.0 ms
POLARITY	NORMAL	POLARITY	NORMAL	POLARITY	INVERT
LO SHAPE	L-R 24	LO SHAPE	L-R 24	LO SHAPE	L-R 24
LO FREQUENCY	30 Hz	LO FREQUENCY	159 Hz	LO FREQUENCY	1.00 kHz
HI SHAPE	L-R 24	HI SHAPE	L-R 24	HI SHAPE	OUT
HI FREQUENCY	159 Hz	HI FREQUENCY	1.00 kHz	HI FREQUENCY	-------
EQ FREQUENCY	50 Hz	EQ FREQUENCY	353 Hz	EQ FREQUENCY	10.1 kHz
EQ +-	+7 dB	EQ +-	-6 dB	EQ +-	+15 dB
EQ WD	0.9 oct	EQ WD	0.9 oct	EQ WD	0.8 oct

BI-AMP SYSTEM - DIGITAL PROCESSOR *AERO 28 (2xCA-28/1xCA-215)*
AMPLIFIERS WITH EQUAL GAIN USED

OUT	LOW	OUT	MID/HIGH
GAIN	0.0 dB	GAIN	-2 dB
DELAY	0.0 ms	DELAY	0.0 ms
POLARITY	NORMAL	POLARITY	NORMAL
LO SHAPE	L-R 24	LO SHAPE	L-R 24
LO FREQUENCY	30.1 Hz	LO FREQUENCY	159 Hz
HI SHAPE	L-R 24	HI SHAPE	OUT
HI FREQUENCY	159 Hz	HI FREQUENCY	OUT
EQ FREQUENCY	50 Hz	EQ FREQUENCY	353 Hz
EQ +-	+7 dB	EQ +-	-6 dB
EQ WD	0.9 oct	EQ WD	0.9 oct
		EQ FREQUENCY	933 Hz
		EQ +-	+6 dB
		EQ WD	0.2 oct
		EQ FREQUENCY	2000 Hz
		EQ +-	+4 dB
		EQ WD	0.4 oct
		EQ FREQUENCY	11.3 kHz
		EQ +-	+12 dB
		EQ WD	0.7 oct

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CONTROLLER

The *DSP-26* processor is designed to optimise the audio signal for the Aero systems when used with external amplification. The program *aero 28B* is recommended for use with the *CA-28B* and the *CA-215*.

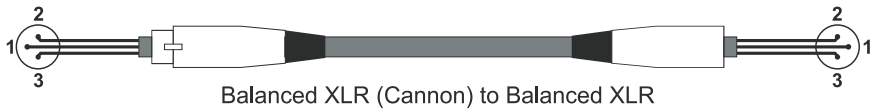
APPENDIX: Line connections: unbalanced and balanced

There are two basic ways to transport an audio signal with microphone or line level:

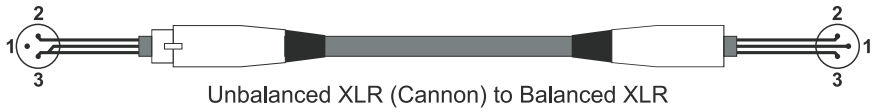
Unbalanced line: Utilising a two conductor cable, it transports the signal as the voltage between them. Electromagnetic interference can get added to the signal as undesired noise. Connectors that carry unbalanced signals have two pins, such as RCA (Phono) and ¼" (6.35mm, often referred to as jack) mono. 3 pin connector such as XLR (Cannon) may also carry unbalanced signals if one of the pins is unused.

Balanced line: Utilising a three conductor cable, one of them acts as a shield against electromagnetic noise and is the ground conductor. The other two have the same voltage with respect to the ground conductor but with opposite signs. The noise that cannot be rejected by the shield affects both signal conductors in the same way. At the device's input the two signals get summed with opposite sign, so that noise is cancelled out while the programme signal doubles in level. Most professional audio devices use balanced inputs and outputs. Connectors that can carry balanced signal have three pins, such as XLR (Cannon) and ¼" (6.35mm) stereo.

The graphs that follow show the recommended connection with different types of connectors to balanced processor or amplifier inputs. The connectors on the left-hand side come from a signal source, and the ones on the right hand side go to the inputs of the processor or amplifier. Note that on the unbalanced connectors on the left-hand side, two terminals are joined in side the connector. If hum occurs with balanced to balanced connections, try disconnecting the sleeve (ground) on the input connector. Note that the illustrations show what should be connected to what, but that pin locations on an actual XLR connector are different. Also, pin 2 hot is assumed on XLR connectors.



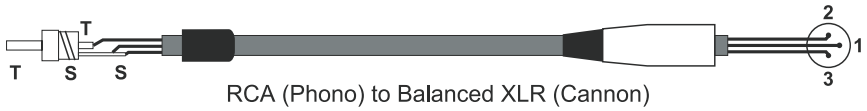
Balanced XLR (Cannon) to Balanced XLR



Unbalanced XLR (Cannon) to Balanced XLR

Balanced 1/4" (*Jack*) to Balanced XLR (Cannon)

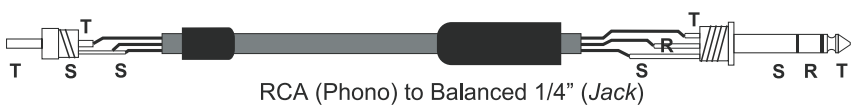
Unbalanced 1/4" Jack to Balanced XLR (Cannon)



RCA (Phono) to Balanced XLR (Cannon)

Balanced 1/4" (*Jack*) to Balanced 1/4" (*Jack*)

Unbalanced 1/4" (*Jack*) to Balanced 1/4" (*Jack*)



RCA (Phono) to Balanced 1/4" (*Jack*)

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