LINEA RESEARCH

Advanced System Controller

Due to the flexibility of its processing, Linea's new digital **Advanced System Controller** (ASC) is equally suited for duty as a high performance loudspeaker crossover or for overall system control and management.

The ASC takes audio performance to the next level with new audio converters and advanced DSP algorithms that make full use of the processing power offered by the latest 4th generation SHARC DSPs.

Unique to the industry on the ASC are the revolutionary new LIR Linear Phase crossover filters, and for the ultimate in driver protection with maximum SPL, the new VX Limiters. These are not marketing gimmicks; they are carefully implemented, powerful tools that allow OEMs to extract the maximum performance from their systems, safely.

Couple all this with integrated 'plug-and-play' Ethernet connectivity that does not require an IT consultant to configure.

- Four input & Eight output channels
- AES3 inputs & outputs selected in pairs
- Dante networked audio option
- 96kHz 4th generation SHARC DSP algorithms
- Powerful *Drive Module* speaker-centric presets
- LIR Linear Phase crossovers
- Multi-stage peak & RMS limiters
- **V**irtual **X**over Limiter for passive systems
- PEQ & FIR equalisers on all inputs
- Flexible hiding of OEM settings
- Easy User grouping & EQ Overlays
- Easy PodWare PC control over Ethernet
- Contact closure 'Snapshot' recall
- Quality machined front panel

Introduction / Key Features

The Linea Research Advanced System Controller (LSC) is a high performance, easy to use signal processor for loudspeaker systems, providing processing for up to 4 inputs and 8 outputs. Taking advantage of the latest advances in analogue to digital conversion and digital signal processing technologies the units achieve performance levels higher than previous devices. The ASC provides generous amounts of signal processing capability and a wide variety of crossover shapes. The package is complemented by a highly flexible parameter hiding arrangement, and presets for both the OEM and the user.

The ASC includes Linea Research minimal signal path design, and a 96kHz sampling frequency provides for a nominally flat response beyond 40kHz. Three rotary encoders, illuminated buttons and graphical display provide a rapid, intuitive and user-friendly control interface.

Powerful *Drive Module* concept which allows for abstraction from device centric to speaker based control. High speed capable and flexible Ethernet communications that supports DHCP, static-IP and auto-IP and direct connection to a computer without the need for a router or a switch

Class-leading sonic performance achieved by the use of state of the art converters, a 4th Generation Analogue Devices Sharc DSP and highly advanced DSP algorithms.
Unique LIR linear phase crossover shapes giving FIR-like performance without the drawbacks. Also Linear phase HF system EQ profiling which provides perfect integration between enclosures

Innovative limiter suite which includes; VX limiter providing dynamic control for passive 2-way enclosures, an Xmax excursion limiter with sliding High Pass Filter which retains dynamic impact whilst effectively protecting drivers, Tmax transducer thermal modelling

provides regulation limiters, addressing long term overload and overshoot limiter governs the amplitude of transient signals, retaining average power whilst constraining peaks.

AES3 inputs and outputs switchable in pairs as standard, with the option of a Dante audio networking card with AVB upgrade path.

Sonic Purity

Independent listening tests have confirmed that the Linea Research ASC performs as well as the very top brands often costing many times more than the ASC. This is testament to our 'Minimum Signal Path' philosophy, our careful choice of converters, and our many years of expertise in DSP algorithm design for professional audio.
The ASC uses 96kHz sampling and a powerful 4th generation Sharc Digital signal Processor (DSP). All this adds up to deliver the ultimate in sonic transparency and a stunning open natural sound quality.

Crossover shapes

As well as the standard Butterworth, Bessel, Linkwitz-Riley and Hardman filters, Linear research offers a unique "Linea Impulse Response" (LIR) crossover filter which gives a Linear Phase crossover that has a constant delay regardless of frequency (unlike other types of crossover which delay different frequencies to a different extent, thus smearing the arrival time).

The LIR crossover can thus be described as having a flat Group Delay response, and thus entirely free of Group Delay Distortion, this is exactly the same as can be provided by common FIR filtering but without the complications and disadvantages inherent with the FIR technique. The shape of the LIR crossover filter is similar to a 4th order Linkwitz-Riley filter, and maintains zero phase difference between the adjacent bands across the crossover region to keep the polar response rock steady.

As we also employ phase matching on our Bessel filters; adjacent bands are in-phase throughout the crossover region.

High-Pass Filtering

To avoid unnecessary inter-band phase shifts common in many competing products, we provide high-pass filtering on the inputs rather than forcing you to apply 'system' high-pass filtering on the low crossover bands.
Our white-paper "High-Pass Filtering in Two-Way Systems" explains why this is important.

Presets

The ASC-48 uses Drive Module presets, which are defined as a number of outputs driven from one DSP input. This system allows for better flexibility and greater functionality when loading and storing presets. Drive Modules allow for a less processor-centric and more speaker-orientated system design. The ASC allows 50 drive module presets to be stored.

Presets are stored permanently inside the ASC and so will always be available even if the ASC is not being used with PodWare. The OEM can easily create a library of

locked 'factory' presets from which the user can create their own variants.

Branding

Subject to minimum batch quantities, you can choose to have the unit finished in your choice of paint colour, your silk-screen layout and colours and your logo.

Each device is branded for the OEM customer so that PodWare reports the model name of your choice, with your PodWare panel scheme etc.

PodWare Application

Thanks to the power of Obcom, PodWare becomes much more than just a remote control panel for an ASC. PodWare and any connected device(s) become intimately intertwined, faithfully duplicating any control adjustments whether they are made in PodWare or on the front panel of the device itself. Adjust a gain control on the device, and watch the gain value in PodWare smoothly slide in sympathy. They simply cannot get out of 'sync'. You can also update the firmware in the unit via PodWare – even via the network.

Each input and each output can be named in PodWare. These names not only appear for the User on the PodWare control panels, but also show when scrolling through the inputs and outputs on the device itself.

Security

As the OEM, you have complete freedom to edit any parameters you wish, then optionally lock any individual parameters away from the user so that they cannot be edited or even viewed in PodWare or on the Device. You can also apply a model name for the device.

Once a complete tuning has been prepared, you can save the settings into a Drive Module preset. PodWare allows you to lock any given presets so that they become permanent factory presets which the end user cannot erase or overwrite. When you save a file in PodWare as an OEM, a Factory file is created which contains all these parameters and can contain all the factory presets. This file can then be used to load settings in production.

Should you wish to change the factory presets in the field, modified Factory files can be distributed and loaded by the user without disturbing the user presets, and without the user being able to access the OEM settings in the factory presets.
The full ASC control panels in PodWare look like this:

Hiding
You can hide the parameters of each individual processing element from the user by selecting it to be hidden in the special hiding tab in PodWare.
The user cannot access any of the hidden parameters which are considered to be the responsibility of the OEM. Only with your OEM password (agreed with Linea Research) can PodWare be unlocked to gain access to the OEM parameters and to the hiding tab.

User settings
The user cannot access your hidden settings or overwrite your factory presets since these are only accessible in OEM mode, which is password protected. The user can however freely use any unhidden processing elements, even spare equalisation not utilised in an OEM factory preset, which will effectively overlay your OEM settings. The user can then save modified versions of your factory presets.
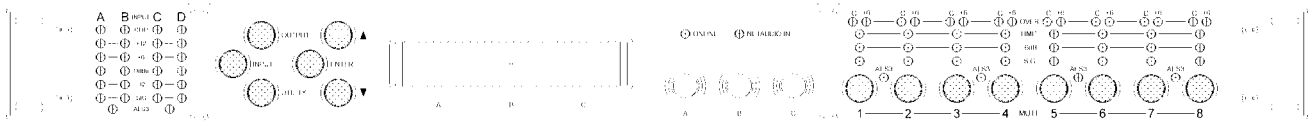
User Security
In addition to the OEM security features, the ASC also has a SECURE LOCK feature accessible from the front panel, which enables users to view but not change parameters thus making the unit tamper-proof.
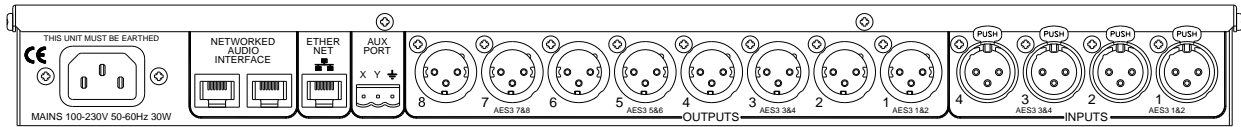
Panel Views

Front view

Rear view

Technical Specifications

Input impedance	>10k Ohm balanced
Output Imp	<100R imp. balanced
Max Input level	+20dBu
Max Output level	+18dBu into 600R
Sample rate	96kHz
Frequency Resp	10Hz - 40kHz
Inp Dyn range	>120dBa Typ.
Out Dyn range	>118dBa Typ.
THD (20Hz–20kHz)	<0.008% Typ.
Mains required	85-230VAC 50-60Hz
Mains power	30W

Connectors

Audio input	3 pin female XLR
Audio output	3 pin male XLR
Ethernet	Shielded RJ45
Aux Contact	3 pin Phoenix
Mains	3 pin IEC

Environmental

Temperature	0 to +45°C
Humidity	0 to 80% RH (non-condensing)

Dimensions

Height	1U (44mm)
Width	482mm
Depth	254mm
Weight	2.7kg net

Options

There is internal provision for digital audio network option cards to be fitted. It is possible to use this connection to control the ASC if desired *. Currently Linea plan to support :

- DANTE (available now)
- AVB *

Regulatory compliance

This product complies with the EMC Directive (89/336/EEC) as issued by the Commission of the European Community. Compliance with these directives implies conformity with the following European standards:

- EN55103-1 Electromagnetic Interference (Emission)
- EN55103-2 Electromagnetic Susceptibility (Immunity)
- EN60065 Electrical Safety

It also meets the requirements of UL6500 (Electrical Safety) and FCC part 15B (EMC).

This product is intended for operation in the E2 (commercial) & E3 (urban) Electromagnetic Environments.
*planned
E&OE
© 2012 linea-research.co.uk