BSS Audio

FDS-366T
OMNIDRIVE
COMPACT plus

FDS-366/366T Users

AAS • Acoustic Technologies • Adlib Audio • AED Rental
Apogee telecommunications • Arcan Sound Systems •
Arm Audio • Arpege son Et Lumiere • Audex conce
Audio Denver • Audio Light • Audiolite • Audiol
Britannia Row Productions • Café de Paris • Ce
Muse Hiroshima • Coda Audio Systems • CVA
Daiyoung Acoustic Research Laboratory • D
Media Rent AG • EML Rentals • Espiral So
Elemental • Elements/Circo • Exciting Li
Foxwoods Resort & Casino • Free-Po
Golden Voice • Haine Audio • Hal
Instalaciones DBD S.L. • J & K I
Sound en Light • Jeremiah
Les Ateliers Lumieres •
Audio • Mahrer Co
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Audio • Ph
Raven

BCS •
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Evangelical Church
Dr. WA Günther
Sound Systems
Showequipment BV
Production Concepts
SA • Ing. Albin Kerschbaum
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Hotel • Latvian Saiema • Le Voyageu •
skompaniet Ljudbolaget • Loudness • Mac
ternlight MLT GmbH • Night Club "Tonus"
of Sorrows • Panoramix • PFL Sound • Philing
Prago Sound • Radio Son S.A. • Rampa Huesca
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NTM

BSS FDS-366 T
58 ARENA6WY*

96kHz

OMNIDRIVE™ COMPACT plus

ENTER
STORE
RECALL

LOUDSPEAKER MANAGEMENT SYSTEM

Loudspeaker Management Systems
incorporating WHISEWORKS – NTM filters

Touring Sound • Studio Monitoring Systems

Club Sound Systems • Zone Control (EQ and delay)

OMNIDRIVE systems have been responsible for raising the standards in sound system control for ten years, and now reach new heights with the FDS-366T OMNIDRIVE COMPACT plus with WHISEWORKS – NTM filters.

FDS-366T OMNIDRIVE COMPACT plus

Determined to provide leading edge products, BSS have incorporated not only the latest technology advances in digital audio, but have provided genuinely useful facilities for the engineer to ensure better performances, time after time.

- 3 analogue Inputs and 6 Outputs for maximum flexibility in one rack space

- New version 2 firmware incorporating Australia's WHISEWORKS Neville Thiele Method™ filter technology for even better system performance

- Latest 24-bit input and output converters give a dynamic range in excess of 112dB,117dB when AES inputs used.

- 96kHz Sample rate

- New DSP algorithms for absolute phase matching

- Alignment Assistant takes care of your driver delay settings, automatically

- Stereo Digital Input (44.1/48/88.2/96kHz AES)

- Dynamic Equalisation on every input and output

- Freely assignable EQ filters – put EQ where you need it

- Contact closure program recall

- Output transformer options

- RS-232, RS-485 and MIDI control options

3 Inputs, 6 Outputs

Now offering the maximum flexibility in one rack space, the FDS-366T can be used in multiple applications:
Stereo 3-way; mono 4, 5 and 6-way (units can be slaved for large stereo systems), triple bi-amp or even dual tri-amp for stage monitors; zoning with EQ and delay to 6 zones; LCR studio monitoring, each channel giving a 2-way output; and more.

This means standard inventory and less redundancy as one model can be used for either FOH or monitor racks.

96kHz Sample Rate

Using a sample rate of 96kHz not only prepares the FDS-366T for use with digital sources, but means that we can give you a wider, more open sound thanks to an extended bandwidth. The use of a higher Nyquist frequency means we have been able to design more accurate filter sets and so enhance the performance.

High Specification Converters

With technology continually advancing in the digital domain, we use high specification A/D and D/A converters, giving the 366T a dynamic range of greater than 112dB, possibly the best performance for such a processor currently available.
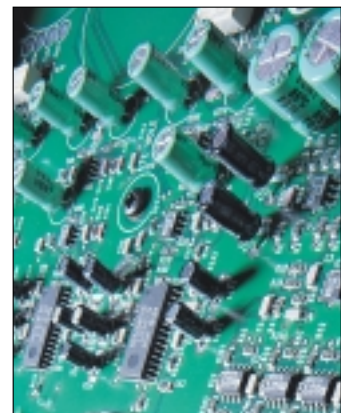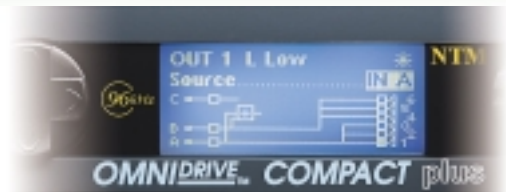
A New Filter Design for Outstanding Performance

"The biggest step forward in digital crossover technology since Linkwitz-Riley. Significantly lower distortion artifacts, increased clarity, greater projection coupled with a closer, tighter sound are among the benefits of using these new filters."

Jerry Wing, Britannia Row, UK

The new Version 2.0 firmware includes new filter designs in the shape of the WHISEWORKS – NTM* topology.

This new design, developed by Neville Thiele and patented by Australia's Precision Audio, provides the fastest roll-off slopes outside of the pass band in modern IIR filter designs, while maintaining zero phase difference between adjacent bands throughout the crossover region, preventing beam-tilting. Listening tests have shown a marked and noticeable enhancement in performance over traditional Linkwitz-Riley 48dB filters. The new filters are kinder on the ear, and like the L-R design also maintain a flat frequency response throughout the crossover region.

"In my opinion they are the cleanest and clearest filters I've heard to date."
Andy Dockerty, Adlib Audio, UK

Our WHISEWORKS – NTM filters are designed around 4th order and 8th order topologies. Since WHISEWORKS – NTM filters have a very fast roll-off this can often be used in place of an 8th order Linkwitz-Riley filter with a much improved group delay characteristic. These new filters use a notching characteristic to 'speed-up' the roll-off slope. This notching action causes the slope to change continuously, actually nearing infinity dB/Octave close to the notch, which is one octave away from the crossover frequency (in each direction).

NTM 4th order rolloff

L-R 4th order rolloff
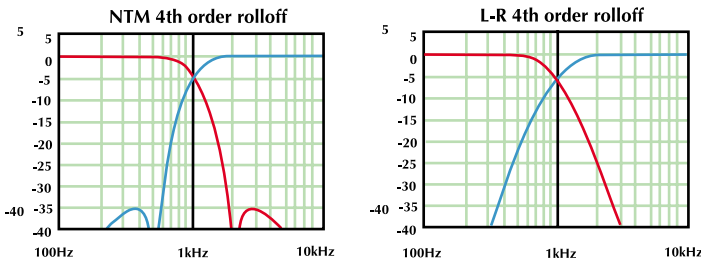
Existing users can upgrade their FDS-366 to include WHISEWORKS – NTM filters by registering their unit on the BSS Audio website at www.bss.co.uk/366/thiele.htm, where you can also find a white paper describing in detail the advantages of this new design.

"The new filters allow me to put more power to the devices without fear of overload or over-excursion. Once adjusted, sounds better than standard filters. The system seemed louder and clearer. We were setting off alarms in the car park!"
Ferrit, Enterprise Live, Las Vegas, Nevada, USA

New Algorithms for Enhanced Precision and Performance

Our DSP code just gets better and better. We've developed new algorithms which maximise the dynamic range of crossover and EQ filters and makes them more accurate, and algorithms that optimise the phase responses at crossover band edges. The benefits are reduced noise and distortion, better resolution and greater accuracy.

New Limiter Design

A new limiter design offers user-adjustable attack and release, with an adaptive attack algorithm that helps to preserve sonic transparency for light overshoots, but acts more aggressively if the signal strays too far. An adaptive release system prevents short-term overshoots reducing the average power output while keeping distortion low on sustained overshoots. Finally, an adjustable brickwall overshoot limiter contains signals which overshoot during the attack phase.

THE FDS-366T IN USE
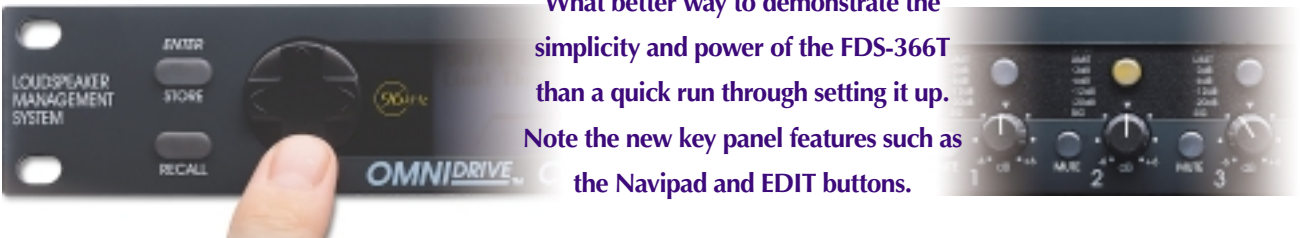
What better way to demonstrate the simplicity and power of the FDS-366T than a quick run through setting it up. Note the new key panel features such as the Navipad and EDIT buttons.

Setting the Crossover Points

Select the band to adjust using the EDIT button for that channel. Then use the Navipad to select the crossover screen. Using the rotary encoder, you have control over the crossover filter type (Linkwitz-Riley, Butterworth, Bessel or NTM™), slope (from 6 to 52dB per octave) and overlap (use the Xover Edge mode for this, otherwise Xover Both simply moves the crossover point). You are shown the filter positions graphically, and the crossover frequency numerically to achieve pinpoint accuracy.
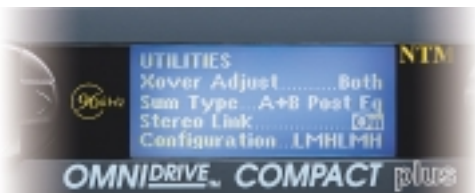
EQ

The FDS-366T has a 'pool' of EQ filters which you can assign to inputs or outputs as you need them - no fixed EQ configurations here.

To add an EQ filter, select the output with the EDIT key and move to the EQ screen. No filter is used until you adjust its gain from 0dB. Select the mode (EQ type (bell or shelf), slope, gain, width and frequency) and use the encoder to adjust. To add a second filter, use the Navipad to select another filter. You will see the number of free EQ filters is displayed in the corner of the screen.

The screen always shows the composite EQ curve for the selected channel. As you select a filter, all its parameters are displayed numerically for reference. When EQ is used on an input, it serves as FOH or wedge equalisation very effectively.
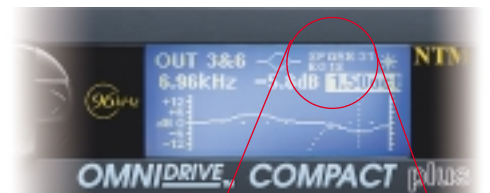
Context Sensitive Utilities
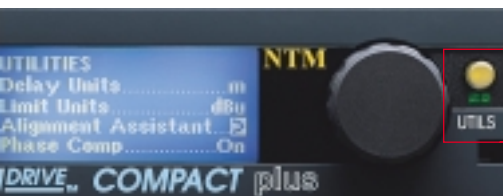
The FDS-366T speeds up navigation through the many features offered by taking you to the most appropriate utility when you press the UTILS button. If you are editing the limiter threshold parameter for example, pressing utils will take you to the limiter units utility. You are still free to navigate around all the other utilities in the usual way.

Delays
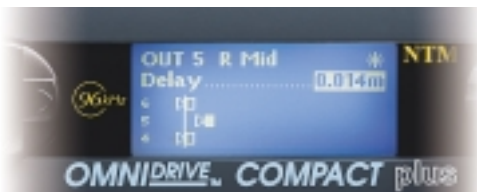
We've always provided highly-accurate delay setting in all our OMNIDRIVE models. The FDS-366T offers precision steps of 10 microseconds on each delay – all 3 inputs and 6 outputs. With a maximum delay setting of 2.6 seconds per channel (including inputs) the FDS-366T can easily compensate for delay towers as well as stereo image correction between stacks, and individual cabinet driver alignments.

Adjusting the delays is simply a matter of selecting the channel/band, selecting the delay adjust screen and entering the value with the rotary encoder. Delays can be linked and adjusted simultaneously to make correction between different cabinets easily achievable.

Limiters

The new limiter design in the FDS-366T is more protective and comprehensive than ever. The design incorporates Adaptive Attack, where the attack time is reduced the more over the threshold the signal strays. This helps to preserve transparency for light overshoots, but the limiter will act more aggressively if the signal strays too far. Adaptive Release, another new feature, prevents short-term overshoots from reducing the average power output, whilst keeping distortion low on sustained overshoots.
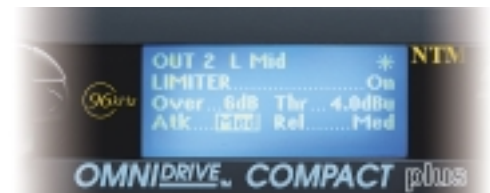
Adjustable Attack and Release speeds are provided (Fast/Medium or Slow) with the speeds ganged to the high-pass crossover frequency for optimal performance depending on the frequency range of the band.

Finally, a brick-wall overshoot limiter stage is applied, which contains signals which overshoot during the attack phase. The user has adjustable 'overshoot' from 1 to 12dB (and Off).

Phase Compensation

This feature, introduced on the FDS-355, maintains the inter-band phase relationship true to the filter type selected (Bessel, Butterworth, Linkwitz-Riley etc), regardless of any interference from far-end crossover filtering. In 2-way crossovers, this is not an issue since each band has only either a high-pass or a low-pass filter. Three or more bands however cause at least one band to have both low and high-pass filters which react with one another, and so disturb the correct phase relationship at the crossover point. This can result in poor combining of adjacent crossover bands, resulting in an irregular frequency response, and non-uniform polar characteristics.

The Phase Matching technique used in the FDS-366T eliminates this problem by compensating for these phase anomalies.
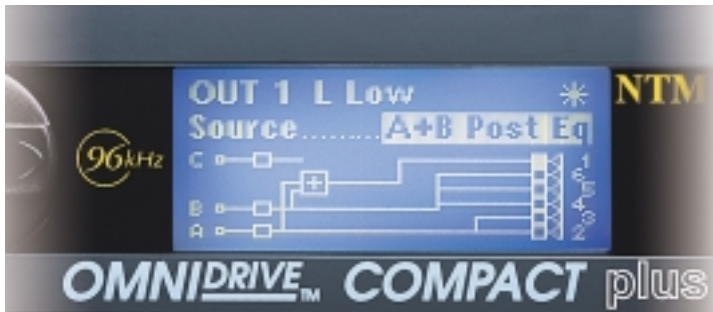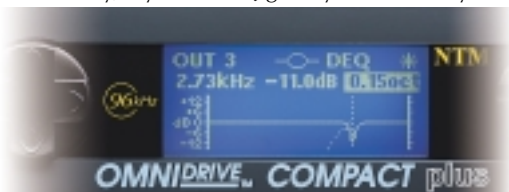
A+B, A+B+C

A Mono sum of the inputs is often used for sub-bass drive. In the FDS-366T, that sum can be of the inputs A&B, or for LCR systems particularly, a sum of the three inputs A, B, &C. The feed can be taken pre or post input EQ.

Dynamic Equalisation

Pioneered by BSS in the DPR-901 and respected by engineers worldwide, dynamic equalisation means you can tame room resonances, deal with non-linearities in drivers (such as 2" horns), and address instrument and vocal problems.
Essentially, Dynamic EQ gives you the ability to compress a given frequency only when the signal reaches a preset threshold. You can determine how much of the program is affected using the bandwidth setting. As an example, consider how some horn drivers can 'bleat' or distort at high levels - using dynamic eq you can cut the offending frequency as the level passes that threshold.
Dynamic EQ is provided on every input and output on the FDS-366T.

AES/EBU Stereo Input

Now go straight from digital desk to crossover, without losing a bit of performance. We include the digital stereo input as standard, and you still have an analogue input available in this mode. Many top studios are moving to the FDS-366T for digital monitoring management. Input sample rates may be 44.1kHz, 48kHz, 88.2kHz, and 96kHz. With AES inputs, the dynamic range is greater than 117dB.

Alignment Assistant

The effects of non-identical delays between loudspeaker drivers in cabinets, and between cabinets are well known, but correcting for driver position in a cabinet or stereo image can be a very hit and miss affair.

The FDS-366T's Alignment Assistant makes the calculation and implementation of the correction delays quick and automatic, by using the sound path itself to measure and correct for the acoustic delay introduced by the positioning of the drivers and cabinets.
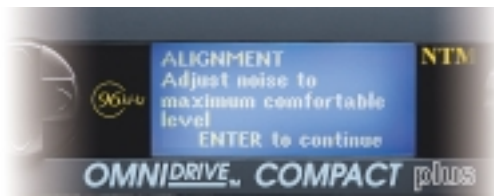

In Alignment Assistant mode, the bands/channels to be measured are chosen. A microphone is used on input C, and pink noise is then automatically output through every band in turn. The FDS-366T will then analyse the signal delays, and automatically adjust the delays to compensate. Field tests have shown this to be not only highly accurate, but the enhancement in image and sound quality is staggering.

Analyse and Equalise – using the FDS-366T with SMAART LIVE
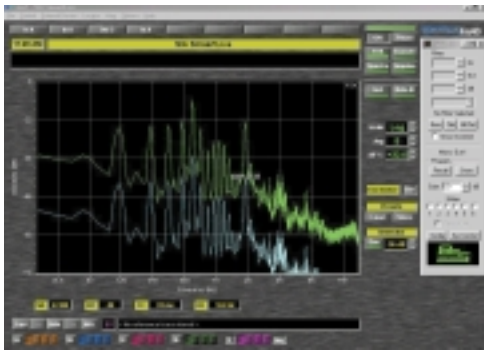
The FDS-366T is controllable from SMAART LIVE, SIA Software's advanced audio analysis software which uses an independent microphone to analyse room responses and measure delay times, and can then automatically correct these by itself programming the FDS-366T. BSS Audio is an SIA partner, and the evaluation copy can easily be upgraded to a full purchased version.
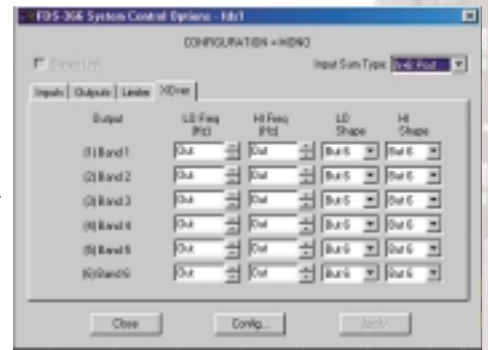
Four Different Lock Modes for Security from Adjustment

With Omnidrive Compact Plus, you can restrict access to certain memories, individual parameters such as crossover points or EQ settings, and be sure that nobody can 'tweak' the programs. Parameters can be hidden as well as made inaccessible so that they do not even feature on the display. Owners can also allow access only to parameters that may need adjustment on site such as limiters and main delays. It is also possible to lock out the whole unit.

Other facilities

- Input and output meters
- Real-time edit comparisons using BACKUP and SWAP facility
- EQ gain variable in 0.2dB steps
- Gain and limiter resolution in 0.1dB steps
- Variable input and output gain
- RS232/RS485 'in' and 'out'

- Contact Closure program select port
- EQ and crossover filter adjustment to 20kHz
- Delay correction for temperature change by manual adjustment
- Delay units can be Feet, Metres, Milliseconds, or fps (24, 25, 30)
- Store/Recall programs to PC card

- Control several FDS-366T units simultaneously by slaving through MIDI
- Update firmware via the RS-232 port (new releases always available on BSS Audio website)

TECHNICAL SPECIFICATIONS

INPUT SECTION

Input Impedance	10kOhm, electronically balanced
Maximum Input Level	+20dBu
CMRR	Better than 50dB (30Hz-20kHz)
Input gain:	+/-15dB variable in 0.1dB steps
Input Connector	XLR-3F or equivalent Pin 1 Floating (no connection) Pin 2 Signal +ve (Hot) Pin 3 Signal -ve (Cold)

AES/EBU INTERFACE

Input Sample Rate:	44.1kHz, 48kHz, 88.2kHz, 96kHz

OUTPUT SECTION

Output Impedance	<50 Ohms, electronically balanced and floating
Maximum Output Level	+20dBu into 600 Ohms or greater
Output Gain	+/-21dB, variable in 0.1dB steps
Output Connector	XLR-3M or equivalent Pin 1 Ground Pin 2 Signal +ve (Hot) Pin 3 Signal -ve (Cold) Transformer Balancing optional

CROSSOVER FILTERS

Slopes	6, 12, 18, 24, 36, 48 or 52dB per octave (Filter type dependant)
Type	WHISEworks–NTM, Bessel, Butterworth, or Linkwitz-Riley

DELAYS

	Available on Inputs A, B, and C, and Outputs 1, 2, 3, 4, 5, 6
Delay Step	11 microseconds minimum
Max Delay time	2.6 seconds

EQ

Max number of EQ filters	> 50 (depending on crossover slopes)
EQ Type	Parametric, Bell or shelving on any filter
EQ Gain	+/-15dB, variable in 0.2dB steps
Bandwidth	0.05 to 3 octaves, variable in 0.05 steps
EQ frequency	15Hz to 20kHz
Dynamic slope:	2:1 to 20:1 (dynamic EQs only)

GENERAL PERFORMANCE (FILTERS OUT)

Frequency response:	10Hz - 20kHz, +/-0.25dB 10Hz - 40kHz, +/-2dB
Dynamic range	>112dB, unweighted 22Hz to 22kHz >117dB when AES/EBU inputs used
Channel Separation	>80dB, 30Hz to 20kHz
Distortion (THD)	<0.005%, 20Hz - 20kHz @+10dBu output
Input headroom metering:	-20dB, -12dB, -6dB, -3dB, Clip Relative to clip point (+20dBu)
Output metering:	SIG (-40dB), -20dB, -12dB, -6dB, -3dB, 0dB, Over (+6dB) Relative to limiter threshold setting

GENERAL

Dimensions	19" x 1.75" x 11.5" (483mm x 45mm x 292mm)
Weight	8.4lbs (3.8kgs), unpacked
AC Power	90V-264V AC, 50/60Hz, 30VA

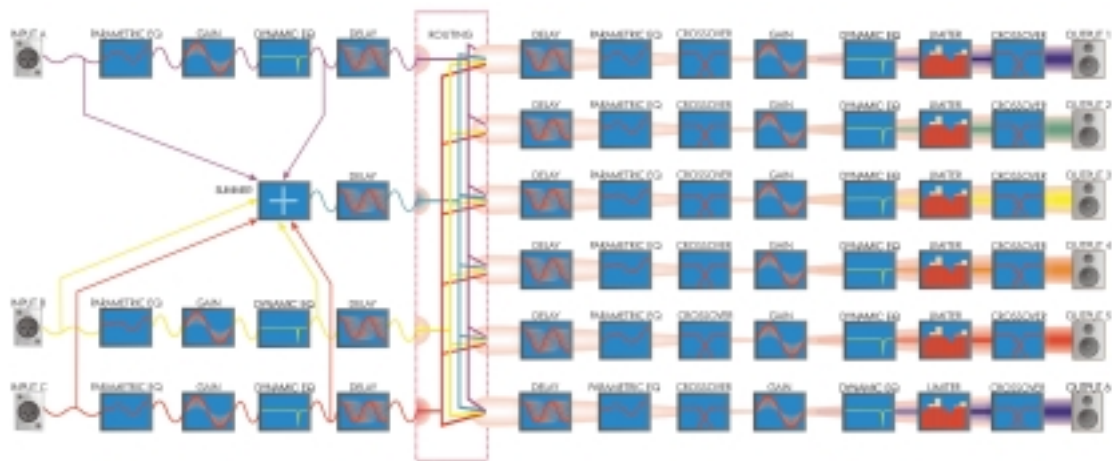### OPTIONS

Output Transformers

BSS Audio reserves the right to change specifications and features without notice.

FDS-366T SYSTEM BLOCK DIAGRAM

Part No.